FINAL

F-35A OPERATIONAL BEDDOWN - AIR FORCE RESERVE COMMAND ENVIRONMENTAL IMPACT STATEMENT

Prepared for:
United States Air Force
United States Department of the Navy

VOLUME I

August 2020

Privacy Advisory

Any personal information provided throughout this process has been used only to identify individuals' desire to make a statement during the public comment period or to fulfill requests for copies of the Final EIS or associated documents. Private addresses were compiled to develop a mailing list for those requesting copies of the Final EIS.

RECORD OF DECISION

ENVIRONMENTAL IMPACT STATEMENT
UNITED STATES AIR FORCE F-35A OPERATIONAL BEDDOWN
AIR FORCE RESERVE COMMAND

INTRODUCTION

The U.S. Air Force (USAF) and the Department of the Navy (Navy) are issuing this Record of Decision (ROD) for the Air Force Reserve Command (AFRC) F-35A Operational Beddown Environmental Impact Statement (EIS) (*Federal Register* [FR] Vol. 85, No. 163, EIS Number 20200169, page 51693, August 21, 2020). In making this decision, the USAF and Navy considered the information, analyses, and public comments contained in the AFRC F-35A Operational Beddown Final EIS (FEIS), along with other relevant matters.

This ROD is prepared in accordance with the Council on Environmental Quality (CEQ) regulations implementing the National Environmental Policy Act (NEPA) at Title 40 *Code of Federal Regulations (CFR)* Section 1505.2, *Record of decision in cases requiring environmental impact statements*.[1] The USAF is the Lead Agency, with the Navy, Pima County, Arizona, and the City of Tucson as Cooperating Agencies. By signing this ROD, the Navy concurs with the USAF decision and adopts the Final EIS to satisfy obligations under NEPA and associated laws and regulations.

Specifically, this ROD documents the following:

- The USAF and Navy decision;
- The alternatives considered in reaching the decision and the alternative considered to be environmentally preferable;
- Relevant factors that were considered in making the decision among the alternatives and how those factors entered into the decision;
- Whether all practicable means to avoid or minimize environmental harm from the selected alternative have been adopted and, if not, why they were not adopted; and
- Practicable mitigation measures.

DECISION SYNOPSIS

The USAF will, by this decision, beddown its 7th Operational squadron (Ops 7) of up to 24 F-35A Primary Aerospace Vehicles Authorized (PAA) with 2 Backup Aircraft Inventory (BAI) in one squadron under AFRC. For the FEIS, the USAF considered four alternative locations with fighter missions and three afterburner scenarios.

1 The Ops 7 EIS was ongoing prior to the 14 September 2020 effective date of the CEQ's final rule updating its regulations for implementing the procedural provisions of NEPA. Accordingly, the new regulations were not used for this action, pursuant to 40 C.F.R. 1506.13.

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The USAF analyzed four alternative locations with fighter missions:

- The 355th Fighter Wing (355 FW) at Davis-Monthan Air Force Base (AFB) in Arizona;
- The 482nd Fighter Wing (482 FW) at Homestead Air Reserve Base (ARB) in Florida;
- The 301st Fighter Wing (301 FW) at Naval Air Station (NAS) Joint Reserve Base (JRB) Fort Worth in Texas; and
- The 442nd Fighter Wing (442 FW) at Whiteman AFB in Missouri.

The USAF analyzed a range of potential after burner use for takeoffs:

- Scenario A is afterburner use on 5 percent of total takeoffs;
- Scenario B is afterburner use on 50 percent of total takeoffs; and
- Scenario C is afterburner use on 95 percent of total takeoffs.

The USAF has decided to base the AFRC F-35A Ops 7 mission with associated construction at NAS JRB Fort Worth, Texas. The USAF has also chosen Scenario C (95 percent of total takeoffs in afterburner mode as analyzed in the FEIS) to be implemented as part of this decision. Under Scenario C, unless dictated by flight, noise, or environmental restrictions, AFRC F-35A pilots will use afterburner on up to 95 percent of total takeoffs to attain altitude at the maximum rate. The increased altitude provides the pilot with more time to safely land the aircraft should an emergency occur.

Delivery of the F-35A aircraft is anticipated to occur in 2024, subsequent to completion of requisite construction. The proposed AFRC F-35A mission will require a variety of different full-time and part-time personnel. Changes in personnel at each base were derived by comparing the requirements of the incoming AFRC F-35A mission with the requirements of the existing mission at each base. At NAS JRB Fort Worth, the AFRC F-35A mission would result in a net decrease of 102 personnel. The USAF and Navy expect that changes in personnel authorizations necessary for the AFRC F-35A mission would occur coincident with the arrival of the F-35A aircraft.

BACKGROUND

The AFRC mission is to provide combat ready forces to fly, fight, and win. During peacetime, the combat-ready units support most USAF Major Commands to carry out missions compatible with training, mobilization readiness, and humanitarian and contingency operations. Beddown and operation of the AFRC F-35A mission at NAS JRB Fort Worth represents a major step toward meeting the purpose of the proposed action to efficiently and effectively maintain combat capability and mission readiness as the USAF faces deployments across a spectrum of conflicts while also providing for homeland defense.

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ALTERNATIVES CONSIDERED

As more fully described in the FEIS (*Vol. I, Pages 2-1 through 2-2, §2.2*), the Air Force Strategic Basing process was used to identify the subset of bases under consideration. To meet the overall purpose and need for the action, the USAF identified two broad selection standards that a base must meet for Ops 7: (1) the base must have a current AFRC unit-equipped fighter mission, and (2) the base must have a runway longer than 8,000 feet. Applying these two broad selection standards, the USAF identified four candidate bases for the first AFRC-led F-35A base. On April 12, 2016, the Secretary of the Air Force issued a basing memorandum identifying four candidate bases: Davis-Monthan AFB, Arizona; Homestead ARB, Florida; NAS JRB Fort Worth, Texas; and Whiteman AFB, Missouri.

Air Combat Command and AFRC then conducted detailed site surveys at each candidate base and assessed each location against additional specific selection standards (mission, capacity, environment, and cost factor). These specific selection standards represent criteria that each installation must have in order to qualify as a reasonable alternative.

The completed site survey results were briefed to the Secretary of the Air Force and Chief of Staff of the Air Force to identify preferred and reasonable alternatives for the AFRC F-35A beddown location. On January 6, 2017, the USAF announced NAS JRB Fort Worth as the preferred alternative and the remaining three bases as reasonable alternatives for the AFRC F-35A mission.

The No Action Alternative, in which case the AFRC F-35A beddown would not occur at any of the four alternative bases, was also evaluated (*FEIS Vol. I, Page 2-18, §2.4*).

ENVIRONMENTALLY PREFERRED ALTERNATIVE

Of the alternatives considered, the environmentally preferred alternative is the No Action Alternative. Under the No Action Alternative, no F-35A operational aircraft would be based at any of the four AFRC alternative bases, no F-35A personnel changes or construction would be implemented, and no F-35A operational activities would be conducted. Under the No Action Alternative, the AFRC would continue to conduct their current mission using existing, legacy aircraft with multiple aircraft configurations. Implementation of the No Action alternative is environmentally preferable because taking no action would result in no additional impacts to any environmental resources such as soil and water resources from ground disturbance or increased noise beyond what is currently occurring at the selected installation and below the airspace proposed for use.

BASIS OF DECISION

NAS JRB Fort Worth was selected for the AFRC F-35A Ops 7 mission based on operational analysis; results of site surveys; environmental, economic, and technical factors discussed in this ROD; environmental impacts as analyzed in the FEIS; input from the public and government agencies; and military judgment factors. NAS JRB Fort Worth was preferable because of its economically competitive costs and its highly successful existing active-duty fighter association, which will lead to the lowest active-duty manpower required to stand up the F-35A unit, as well as mission synergy and access to an experienced workforce.

Certain F-35A operational requirements, such as the use of afterburners, are mission- and situation-dependent and include factors such as runway length, temperature, and aircraft loads (Vol. 1, Page 2-6). The USAF chose Scenario C or afterburner use on up to 95 percent of total takeoffs to allow AFRC F-35A pilots to utilize all capabilities of the aircraft. Increased afterburner use expedites formation rejoins after departure; allows formations to meet departure restrictions, and allows pilots to complete tactical tasks sooner in preparation for mission training. As described in the FEIS (*Vol. I Page 3-8, §3.2.3.1*), afterburner use allows the aircraft to gain altitude faster; by being at a higher altitude as it departs the installation, the pilot has more time to safely land the aircraft should an emergency occur.

Additionally, faster acceleration and climb rates result in greater maneuverability in case of emergencies. This increased altitude and airspeed provides F-35A pilots more time to analyze and perform appropriate actions if they encounter aircraft malfunction during departure. Finally, increased use of afterburner would allow the F-35A to take off with more munitions and/or fuel, which provides better operational/training advantages for F-35A pilots taking off from NAS JRB Fort Worth.

PUBLIC INVOLVEMENT

Public involvement was integral to the development of the AFRC F-35A Ops 7 EIS. Public and agency comments received were fully considered at the Draft EIS (DEIS) public hearings, during the DEIS public comment period, and early in the process during public scoping.

Information regarding public involvement at NAS JRB Fort Worth for the AFRC F-35A mission is contained in the FEIS (*Vol. I, Pages 1-5 to 1-8, §FW2-9 to §FW2-13, §FW2.5, and Vol. II, Appendix A*), Vol II reflects public involvement documentation and summarizes substantive comments received during the DEIS public comment period and responses to those comments. Public notices and meetings included:

- *Notice of Intent (NOI):* Published March 22, 2018, in Federal Register (FR) Vol. 83, Number 56, page 12568. Notices were also published in local newspapers at all locations.
- *Revised NOI:* Published August 13, 2018, in FR Vol. 83, Number 56, page 39992. Notices were also published in local newspapers at all locations.
- *Scoping Period:* Initiated March 22, 2018, and ended May 11, 2018. During this time, scoping meetings were held near each of the four alternative bases in Florida, Texas, Arizona, and Missouri. The scoping period was extended for an additional 10 days starting on August 13, 2018, and ending on August 23, 2018.
- *DEIS Notice of Availability (NOA):* Published February 14, 2020, in FR Vol. 85, Number 31, page 8585. Notices were also published in local newspapers at all locations.
- *Public Comment Period:* A 45-day public comment period was initiated with the NOA publication in the FR on February 14, 2020, and ended on March 30, 2020;

  - Public Hearings:
    - March 3, 2020, Miami Dade College – Homestead Campus, Homestead, Florida
    - March 5, 2020, Brewer High School Auditorium, Fort Worth, Texas;
    - March 10, 2020, Tucson Convention Center, Tucson, Arizona;
    - March 12, 2020, Knob Noster High School, Knob Noster, Missouri.

- *FEIS Notice of Availability (NOA):* Published August 21, 2020, in FR Vol. 85, No. 163, page 51693, August 21, 2020. Notices were also published in local newspapers at all locations. The FEIS NOA publication initiated a 30-day waiting period prior to ROD signature.

AGENCY COORDINATION AND CONSULTATION

As described more completely in the FEIS (*Vol. II, Appendix A*), the USAF coordinated and consulted with federal and state agencies and federally recognized tribes (tribes). The federal and state agencies responsible for relevant resources were contacted early in the DEIS development process and received USAF notification in March 2018.

Regulatory consultations associated with the proposed action and alternatives included informal consultation with the U.S. Fish and Wildlife Service (USFWS) under Section 7 of the Endangered Species Act. Informal regulatory consultations were completed at NAS JRB Fort Worth. On May 9, 2018, the USAF sent a letter to the USFWS (Arlington, TX field office) regarding the proposed action along with a map of the airspace and ranges proposed for use. This letter concluded that implementation of the AFRC F-35A mission would result in *No Effects* to federally listed species. On June 27, 2018, the USFWS (Arlington, TX field office) responded with an email stating that they had reviewed the letter and acknowledged that the *No Effects* determination was sound and well supported. Therefore, no further Section 7 consultation was required.

Pursuant to Section 106 of the National Historic Preservation Act (NHPA), consultation was initiated with the Texas State Historic Preservation Officer (SHPO). On April 11, 2019, the Texas SHPO concurred with determination that no historic properties would be affected by this undertaking (*FEIS Vol. II, Appendix A, Page A.3-99*). Section 106 consultation for NAS JRB Fort Worth is complete.

In addition to the coordination and consultation with federal agencies, the USAF also completed government-to-government consultations with potentially affected tribes at all locations. No adverse effects to tribal resources or traditional cultural properties were identified at any of the installations (*FEIS Vol. II, Appendix A, Pages A.3-18 to A.3-26, §A.3.2.2, Pages A.3-38 to A.3-44 §A.3.3.2, Pages A.3-85 to A.3-86, §A.3.4.2 and Pages A.3-103 to A.3-105 §A.3.5.2*). Specifically, government-to-government consultation with potentially affected tribes for the AFRC F-35A mission at NAS JRB Fort Worth is complete.

Regarding air quality, Tarrant County, Texas, is in moderate nonattainment of the 2008 ozone (O3) standard and in marginal nonattainment of the 2015 O3 standard. Potential air quality impacts from the proposed construction and operational emissions at NAS JRB Fort Worth will be insignificant for all criteria pollutants (*FEIS Vol. I, page FW3-35, §FW3.3.2.3,* and Record of Air Analysis [ROAA], Vol. II, Appendix C, page C-4-3). Applicable air quality pollutants do not exceed *de minimis* thresholds for general conformity (*FEIS Vol. I, page FW3-36, §FW3.3.5*); therefore, a general conformity determination is not required for implementation of the AFRC F-35A beddown at NAS JRB Fort Worth.

Environmental Consequences

As described in the FEIS (Vol I, Pages 2-19 to 2-27, §2.4), implementation of the AFRC F-35A Ops 7 mission at NAS JRB Fort Worth would result in significant noise impacts and no anticipated significant impacts to any of the other resource areas evaluated in the EIS. Within the FEIS, potential impacts from the proposed action are differentiated between potential impacts at and around the installation and within or beneath the Special Use Airspace utilized by the aircraft. Further, potential impacts can generally be viewed as resulting from physical (i.e. tangible) disturbance caused by capital improvements (e.g., construction and demolition) or nonphysical impacts (e.g., noise and air quality). Resulting noise impacts are then reviewed against the resources areas (biological resources, land use, noise sensitive receptors) to determine what, if any, impact exists.

While not significant, potential impacts could occur to several resource areas. An example of this is the typical impacts associated with construction and demolition projects. However, these impacts would be limited as projects would occur in developed and previously disturbed areas, federal- and state-listed species are absent, and compliance with environmental regulations (e.g. permitting) has been or would be followed in all aspects, that is, construction and operation of the action. The total disturbed area resulting from the proposed action is approximately 7.7 acres, with new impervious area amounting to approximately 1.2 acres.

Aircraft would utilize previously established special use airspace and ranges. There would be a noticeable 4 decibel (dB) increase to 49 dB at Falcon Range on Fort Sill and the Wichita Mountains National Wildlife Refuge and Wilderness Area. However, this increase based on context and intensity was not identified as a significant impact.

Potential impacts to air quality were analyzed by conducting a General Conformity Applicability analysis. Net emissions were determined to be insignificant in that they were less than the thresholds for nonattainment criteria pollutant precursors. Tarrant County is in moderate nonattainment of the 2008 ozone (O_3) standard and in marginal nonattainment of the 2015 O_3 standard. A determination was made that the net direct and indirect emissions were below the *de minimus* thresholds for O_3 precursors and therefore, a conformity determination is not necessary. Further, volatile organic compounds emissions would decrease. Air quality emissions within the special use airspace would decrease.

The new F-35A mission would not create any unique or extraordinary safety issues. Likewise, typical construction and demolition techniques would be utilized and compliance with applicate Occupational Safety and Health Administration regulations would protect workers. There would be no changes to Accident Potential Zones or Clear Zones. These zones are identified based on aircraft mishap patterns and are established to delineate recommended surrounding land uses for the protection of people and property. The boundaries of these zones are provided to local governments for use in their planning. Safety within the airspace would continue to follow established flight safety procedures, plans and regulations, such as fire management and Bird Aircraft Strike Hazard Plan. The frequency of flare use would remain the same or decrease and primarily be used above 15,000 feet above Mean Sea Level, thereby reducing the potential risk of accidental fire. Similarly, munitions use would be less than or the same as the current F-16 mission.

The significant noise impacts that would result from the AFRC F-35A Ops 7 beddown are described below. As discussed in FEIS (Vol. I, Page 3-64, §3.8), most land use compatibility guidelines are focused on Day-Night Average Sound Level (DNL) greater than 65 dB. Pursuant to Department of Defense Noise Working Group guidance, the USAF used the DNL metric as the primary predictor of community reaction to noise. Supplemental metrics such as speech interference and L_{eq24} (aircraft noise levels decibel averaged over a 24-hour period) were also used to describe noise impacts.

The USAF identified baseline noise impacts at several representative locations in the communities surrounding NAS JRB Fort Worth. These impacts would increase to varying degrees after implementation of the AFRC F-35A Ops 7 mission.

The area surrounding NAS JRB Fort Worth is urbanized, and much of the area currently affected by baseline noise levels exceeding 65 dB DNL is zoned as residential. In total, 5,499 acres and an estimated 13,093 residents are currently exposed to DNL greater than 65 dB (FEIS Vol. I Page FW3-8 §FW3.2.1.1).

Implementation of the 95 percent afterburner scenario (Scenario C, as analyzed in the FEIS) results in 2,386 additional acres and an estimated 8,648 additional people newly exposed to DNL greater than 65 dB (FEIS Vol. I Pages FW3-20 to FW3-21 §FW3.2.2.1.3) from baseline conditions. However, with the exception of 1.5 acres, all of the 2,386 newly exposed acres are inside the 65 dB DNL noise contour identified in the North Central Texas Council of Governments, Joint Land Use Study (FEIS Vol. I Page FW3-64 §FW3.8.1). Joint Land Use studies are used by planning authorities to manage incompatible development.

The frequency of speech interference events resulting from aircraft overflights for people while indoors and outdoors will increase. The number of individuals exposed to noise levels that are associated with an increased risk of measureable noise induced hearing loss under certain circumstances would also increase under the proposed action.

During aircraft departures and approaches, areas immediately beyond the ends of runways [Clear Zones (CZs) and Accident Potential Zones (APZs)] are overflown at low altitudes. These areas are invariably exposed to high noise levels under baseline conditions and would continue to be exposed to high noise levels after implementation of the AFRC F-35A Ops 7 mission.

Noise levels exceeding 80 dB L_{eq24}, which are associated with an increased risk of measureable noise-induced hearing loss under certain circumstances, currently affect an estimated 49 people. The census-based population estimate may be higher or lower than the actual population. Seven residential land parcels are exposed to these noise levels. These parcels are located on Lake Worth opposite Runway 36. Some of these parcels are located in the CZ and all of these parcels are located in areas zoned by the City of Fort Worth as high noise areas (FEIS Vol. I Page FW3-11 §FW3.2.1.5).

Implementation of the 95 percent afterburner scenario (Scenario C, as analyzed in the FEIS) will expose an additional 44 estimated residents to noise levels greater than 80 dB Leq24. All of the parcels affected by noise levels greater than 80 dB L_{eq24} under baseline conditions and after the Ops 7 mission beddown are located in the runway CZ and APZ 1 and are zoned as high noise areas (FEIS Vol. I Page FW3-23 to FW3-24 §§FW3.2.2.5.1, FW3.2.2.5.2 and FW3.2.2.5.3).

Federal agencies are directed to address environmental and human health conditions in children and minority and low-income communities. Implementation of the proposed action and the selection of Scenario C would result in a disproportionate impact to minority and low-income populations. Implementation would expose an additional estimated 2,200 children and 1,129 elderly persons to a noise level of 65 dB or greater.

MITIGATION

Avoiding, minimizing, or reducing potential impacts has been a priority for the USAF and Navy in guiding development of the proposed AFRC F-35A Ops 7 mission and associated aircraft operations. Specific measures to avoid, reduce, or minimize noise impacts have been built or designed into the proposed action. As stated in the FEIS (Vol. I, Page FW3-13, §FW3.2.2), these include instructions to aircrews to avoid low-altitude flight over populated areas whenever possible and regular review of local flight procedures to create a balance between safety, mission effectiveness and minimizing noise. Other measures include NAS JRB Fort Worth staff maintaining open lines of communication with the City of Fort Worth and community leaders to develop and implement potential noise abatement procedures when possible. As stated in the FEIS (Vol. I, Pages 2-29 to 2-32, §2.5), the USAF and Navy considered and adopted practicable means to avoid or minimize environmental harm at NAS JRB Fort Worth. Mitigation measures to reduce potential noise impacts were considered (*Vol. 1, Table 2-13, Pages 2-30, 2-32, and Table 2-14, Pages 2-34-2-36*), but none would be operationally feasible.

Other management actions to facilitate implementation of the decision were identified in the FEIS (Vol. I, Pages 2-34 through 2-36, §2.5.1) and will be carried forward and implemented. These are different from mitigation measures because they are required by regulation, or USAF guidance or instructions. Compliance laws and regulations administered by the U.S. Environmental Protection Agency and other regulatory and/or state environmental quality agencies are mandated and some have mitigating effects. These laws and regulations are not considered discretionary with respect to USAF and Navy decision making and will be implemented.

To track management actions, within 90 days of the signature of this ROD, the USAF will develop a Mitigation Plan that identifies principal and subordinate organizations with responsibility for oversight and execution of these specific actions. In no case will an impact-inducing action be taken or implemented prior to the applicable mitigation measure (defined below) being funded and put in place.

The Mitigation Plan will include, but not be limited to, the following:

- Identification of the specific actions;
- Identification of the responsible organization for each action; and
- Timing for execution of the actions.

Airspace Management and Use

- To the extent practical, AFRC F-35A pilots will utilize advanced simulators for training purposes.
- AFRC F-35A pilots will operate in existing Special Use Airspace and maintain close contact with the Federal Aviation Administration to minimize conflicts with civil and commercial aviation.

Noise

- The USAF will continue to work to implement mitigation measures discussed in the FEIS and referred to above.
- Once the AFRC F-35A beddown is complete and the full operational tempo of the squadron is in place, the Navy may update Air Installations Compatible Use Zones (AICUZ) Study.
- The USAF and Navy will continue to work closely with local communities to minimize noise impacts.
- Briefing guides will be augmented to ensure pre-flight briefings and debriefings include tracking of afterburner use as a standard operating procedure.
- Afterburner use will be tracked and recorded.

Air Quality

- Construction personnel will minimize idling of all vehicles during construction.
- Truckloads of dirt, sand or gravel will be covered at all times.
- Disturbed areas will be revegetated as soon as possible after construction.
- All equipment will be maintained to manufacturer specifications.
- Fugitive dust control and soil retention practices will be employed, including:
    - Use of water spray trucks to keep all areas of vehicle movement damp enough to prevent dust from leaving the construction area.
    - Suspension of all soil disturbance activities when visible dust plumes emanate from the site.
    - Minimization of vehicle traffic on unpaved roads.
    - Designation of personnel to monitor the dust control program and to order increased watering, as necessary, to prevent the transport of dust off-site.

Safety

- All renovation and construction activities will be completed in compliance with applicable Air Force Occupational Safety and Health program and Occupational Safety and Health Administration requirements.

Soil and Water

- Stormwater Pollution Prevention Plans will be developed, as required by state and federal Clean Water Act requirements, to include the new AFRC F-35A building construction.
- Post-construction, all disturbed areas will be re-graded to pre-construction contours.
- Silt fence, interceptor trenches, hay bales, or other suitable erosion and sediment control measures will be used during construction, and revegetation of disturbed areas will occur as soon as practical (*FEIS, Vol. I, Page 2-34, §2.5.1*).

Biological Resources (FEIS Vol. I, Page 2-35, §2.5.1)

- To minimize impacts to migratory birds, adherence to Bird/Wildlife-Aircraft Strike Hazard program will continue as identified in the FEIS (*Vol. I, Page FW3-60, §FW3.6.4.3.2*).

Cultural Resources (FEIS Vol. I, Page 2-35, §2.5.1)

- In the case of unanticipated or inadvertent cultural resource discoveries during construction the USAF and Navy will comply with Section 106 of the NHPA and follow the standard operating procedures outlined in the Inadvertent Discovery Plan as Appendix E of the Integrated Cultural Resource Management Plan.

Land Use and Recreation

- Once the AFRC F-35A beddown is complete and the full operational tempo of the squadron is in place, the Navy may update AICUZ Study.

Infrastructure

- Leadership in Energy and Environmental Design and sustainable development concepts will be incorporated into construction projects to achieve optimum resource efficiency, sustainability, and energy conservation, except to the extent limited or prohibited by law (*FEIS Vol. I, Page 2-35, §2.5.1*).
- The USAF and Navy will continue and enhance recycling and reuse programs to accommodate waste generated by the AFRC F-35A beddown (*FEIS Vol. I, Page 2-35, §2.5.1*).

Hazardous Materials and Waste

- The Hazardous Waste Management Plan will be updated to account for any new and/or changed waste streams or new procedures, if any, for managing hazardous materials and wastes associated with F-35A aircraft (*FEIS Vol. I, Page 2-36, §2.5.1*).

- Construction plans for renovation and demolition will include provisions to handle and dispose of toxic substances such as lead-based paint and asbestos-containing material (*FEIS Vol. I, Page 2-36, §2.5.1*).
- If perfluorooctane sulfonate (PFOS)/perfluorooctanoic acid (PFOA) is encountered at the construction site during construction activities, the PFOS/PFOA will be managed in accordance with U.S. Department of Defense, Navy, and USAF guidance.

Although the USAF and Navy considered and adopted practicable means to avoid or minimize environmental harm at NAS JRB Fort Worth, potential impacts that could occur and cannot be mitigated include the following (*FEIS Vol. I, Page 2-37, §2.6*):

- The existing capacity of regional landfills will be reduced due to the solid waste generated;
- Temporary increase of stormwater runoff and erosion during construction; and
- There is potential for an increase in the number of bird/wildlife-aircraft strikes and aircraft mishaps resulting from the increased number of annual operations.

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AIR FORCE RESERVE COMMAND

DECISION

After considering the potential environmental consequences of the proposed action and alternatives, comments and concerns of the public and other key stakeholders, as well as other factors related to national defense, including current military operational needs and costs, the USAF and Navy have selected Alternative 3 with afterburner Scenario C from the FEIS. This alternative will result in the beddown of up to 24 F-35A aircraft (PAA with 2 BAI in one squadron) at NAS JRB Fort Worth and use afterburner on up to 95 percent of total takeoffs. By implementing the mitigation measures identified in the Final EIS and adhering to the mitigation plan described herein, the USAF and Navy have adopted all practicable means to avoid or minimize environmental harm.

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22-Dec-2020

ROBERT E. MORIARTY, P.E., SES
Deputy Assistant Secretary of the Air Force
(Installations)

(Date)

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TODD L. SCHAFER
Senior Executive Service
Principal Deputy Assistant Secretary of the Navy
(Energy, Installations & Environment)

29 OCT 2020
(Date)

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COVER SHEET

FINAL
AIR FORCE RESERVE COMMAND (AFRC) F-35A OPERATIONAL BEDDOWN
ENVIRONMENTAL IMPACT STATEMENT

a. Responsible and Cooperating Agencies: United States Air Force (USAF), AFRC, United States Department of the Navy (Navy), Pima County, and City of Tucson.

b. Report Designation: Final Environmental Impact Statement (EIS)

c. Comments and Inquiries: Mr. Hamid Kamalpour, AFCEC/CZN, HQAFRC.F-35.EIS@us.af.mil

U.S. Postal Service: AFCEC/CZN, ATTN: Mr. Hamid Kamalpour, 2261 Hughes Avenue, Suite 155, JBSA-Lackland Air Force Base, Texas 78236-9853

Courier (FedEx, UPS, etc.): AFCEC/CZN, ATTN: Mr. Hamid Kamalpour, 3515 S. General McMullen Drive, Suite 155, San Antonio, Texas 78226-1710

d. Proposed Action: Beddown and operation of 24 Primary Aerospace Vehicles Authorized (PAA) F-35A aircraft with 2 Backup Aircraft Inventory (BAI) in one squadron at one base in the continental United States (CONUS) where the AFRC leads a global precision attack mission. These F-35A aircraft would replace the existing AFRC F-16 fighter or A-10 ground-attack aircraft at the selected alternative.

e. Alternatives: The Strategic Basing Process resulted in the identification of the following four alternatives for the AFRC F-35A Operational Beddown:

- Naval Air Station (NAS) Joint Reserve Base (JRB) Fort Worth, Fort Worth, Texas (preferred alternative);
- Davis-Monthan Air Force Base (AFB), Tucson, Arizona (reasonable alternative);
- Homestead Air Reserve Base (ARB), Homestead, Florida (reasonable alternative); and
- Whiteman AFB, Knob Noster, Missouri (reasonable alternative).

Note: All four alternatives are evaluated equally along with the No Action Alternative.

f. Abstract: This EIS has been prepared in compliance with the National Environmental Policy Act (NEPA) (42 *United States Code [USC]* 4331 et seq.); the regulations of the President's Council on Environmental Quality (CEQ) that implement NEPA procedures (40 *Code of Federal Regulations [CFR]* 1500-1508); and the USAF Environmental Impact Analysis Process (EIAP) as promulgated at 32 *CFR* 989, *Environmental Impact Analysis Process*. The Navy implements NEPA through 32 *CFR* 775, *Procedures for Implementing the National Environmental Policy Act.* This EIS will serve the NEPA requirements of both the USAF and the Navy. The USAF has prepared this EIS to assess the potential environmental consequences that could result from the beddown and operation of the AFRC F-35A operational mission. The USAF identified alternatives using operational analysis, the results of site surveys, and military judgment factors. Resources addressed in the EIS include airspace management and use, noise, air quality, safety, soil and water resources, biological resources, cultural resources, land use and recreation, socioeconomics, environmental justice and the protection of children, infrastructure, hazardous materials and waste, and cumulative effects and irreversible and irretrievable commitment of resources.

How to Use This Document

Our goal is to provide a reader-friendly document that provides an in-depth, accurate analysis of the proposed action, the alternative basing locations, the No Action Alternative, and the potential environmental consequences for each base. The organization of this Environmental Impact Statement (EIS) is shown below.

EXECUTIVE SUMMARY

- Synopsis of Purpose and Need and Proposed Action and Alternatives
- Comparison of Impacts

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ACRONYMS AND ABBREVIATIONS

$\mu g/m^3$	micrograms per cubic meter
°F	degrees Fahrenheit
1-135 ARB	1-135th Attack Reconnaissance Battalion
20 RS	20th Reconnaissance Squadron
47 FS	47th Fighter Squadron
55 ECG	55th Electronic Combat Group
56 FW	56th Fighter Wing
72 TES	72nd Test and Evaluation Squadron
93 FS	93rd Fighter Squadron
125 FW	125th Fighter Wing
131 BW	131st Bomb Wing
136 AW	136th Airlift Wing
162 FW	162nd Fighter Wing
214 RG	214th Reconnaissance Group
301 FW	301st Fighter Wing
325 WPS	325th Weapons Squadron
355 FW	355th Fighter Wing
442 FW	442nd Fighter Wing
482 FW	482nd Fighter Wing
509 BW	509th Bomb Wing
563 RQG	563rd Rescue Group
924 FG	924th Fighter Group
943 RQG	943rd Rescue Group
2013 CGP	Construction General Permit
AATC	Air National Guard Air Force Reserve Command Test Center
ACAM	Air Conformity Applicability Model
ACC	Air Combat Command
ACM	asbestos-containing material
ACS	American Community Survey
ADC	approach-departure corridor
ADEQ	Arizona Department of Environmental Quality
AEZ	Airport Environs Zone
AFB	Air Force Base
AFFF	Aqueous Film Forming Foam
AFGM	Air Force Guidance Memorandum
AFH	Air Force Handbook
AFI	Air Force Instruction
AFMAN	Air Force Manual
AFOSH	Air Force Occupational Safety and Health
AFPAM	Air Force Pamphlet
AFPD	Air Force Policy Directive
AFRC	Air Force Reserve Command
AFSEC	Air Force Safety Center
AFTO	Air Force Technical Order
AGE	Aerospace Ground Equipment
AGL	above ground level

ACRONYMS AND ABBREVIATIONS (Continued)

AHAS	Avian Hazard Advisory System
AICUZ	Air Installations Compatible Use Zones
AIM	Air Intercept Missile
AIRFA	American Indian Religious Freedom Act
AMARG	Aerospace Maintenance and Regeneration Group
ANG	Air National Guard
ANGB	Air National Guard Base
ANSI	American National Standards Institute
APAFR	Avon Park Air Force Range
APE	Area of Potential Effects
APZ	Accident Potential Zone
ARAR	Applicable or Relevant and Appropriate Requirement
ARB	Air Reserve Base
ARTCC	Air Route Traffic Control Center
ASRAAM	Advanced Short Range Air-to-Air Missile
AST	aboveground storage tank
ATC	Air Traffic Control
ATCAA	Air Traffic Control Assigned Airspace
AZDA	Arizona Department of Agriculture
AZGFD	Arizona Game and Fish Department
AZPDES	Arizona Pollutant Discharge Elimination System
BAI	Backup Aircraft Inventory
BASH	Bird/Wildlife-Aircraft Strike Hazard
BG	Block Group
BGEPA	Bald and Golden Eagle Protection Act
BLM	Bureau of Land Management
BMGR	Barry M. Goldwater Range
BMP	Best Management Practice
BO	Biological Opinion
BOS	Base Operating Support
BRAC	Base Realignment and Closure
BSA	Basic Surface Attack
BWC	Bird Watch Conditions
BX	Base Exchange
C&D	construction and demolition
CAA	Clean Air Act
CAF	Combat Air Forces
CAS	Close Air Support
CBP	U.S. Customs and Border Protection
CDMP	Comprehensive Development Master Plan
CDNL	C-weighted day-night average sound level
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERP	Comprehensive Everglades Restoration Plan
CFR	*Code of Federal Regulations*
CH_4	methane

ACRONYMS AND ABBREVIATIONS (Continued)

CHRIMP	Consolidated Hazardous Material Reutilization and Inventory Management Program
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
COC	community of comparison
CONUS	continental United States
CSAF	Chief of Staff of the Air Force
CSR	*Code of State Regulations*
CT	Census Tract
CTOL	Conventional Takeoff and Landing
CWA	Clean Water Act
CZ	Clear Zone
dB	decibel(s)
dBA	A-weighted decibel(s)
DDESB	Department of Defense Explosives Safety Board
DERP	Defense Environmental Restoration Program
DM	Davis-Monthan Air Force Base
DNL	day-night average sound level
DNWG	DoD Noise Working Group
DoD	U.S. Department of Defense
DoDI	Department of Defense Instruction
EA	Environmental Assessment
ECP	Entry Control Point
EESOH-MIS	Enterprise Environmental, Safety, and Occupational Health Management Information System
EIAP	Environmental Impact Analysis Process
EIS	Environmental Impact Statement
EISA	Emergency Independence and Security Act
EO	Executive Order
EPCRA	Emergency Planning and Community Right-to-Know Act
ERP	Environmental Restoration Program
ESA	Endangered Species Act
ESQD	explosive safety quantity-distance
ESRI	Environmental Systems Research Institute
FAA	Federal Aviation Administration
FANG	Florida Air National Guard
FDEP	Florida Department of Environmental Protection
FEAD	Facilities Engineering and Acquisition Division
FEMA	Federal Emergency Management Agency
FICAN	Federal Interagency Committee on Aviation Noise
FICUN	Federal Interagency Committee on Urban Noise
FIRM	Flood Insurance Rate Map
FL	Flight Level
FLARNG	Florida Army National Guard
FONPA	Finding of No Practicable Alternative

ACRONYMS AND ABBREVIATIONS (Continued)

FPL	Florida Power and Light Company
FRP	Facility Response Plan
FW	Naval Air Station Joint Reserve Base Fort Worth
FWC	Florida Fish and Wildlife Commission
FWNC&R	Fort Worth Nature Center & Refuge
GCR	General Conformity Rule
GHG	greenhouse gas
GIS	geographic information system
GPD	gallons per day
GPS	global positioning system
GWP	global warming potential
HAP	hazardous air pollutant
HAZMART	Hazardous Materials Pharmacy
HDMS	Heritage Data Management System
HQ	Headquarters
HS	Homestead Air Reserve Base
HUD	U.S. Department of Housing and Urban Development
HWMP	Hazardous Waste Management Plan
HYENA	Hypertension and Exposure to Noise near Airports
Hz	hertz
I-	Interstate
ICP	Integrated Contingency Plan
ICRMP	Integrated Cultural Resources Management Plan
IDP	Installation Development Plan
IEMP	Installation Emergency Management Plan
IFR	instrument flight rules
ILS	Instrument Landing System
IMPLAN	Impact Analysis for Planning
INRMP	Integrated Natural Resources Management Plan
IPaC	Information for Planning and Consultation
IPMP	Integrated Pest Management Plan
IRP	Installation Restoration Program
ISR	Intelligence, Surveillance, and Reconnaissance
ISWMP	Integrated Solid Waste Management Plan
JASSM	Joint Air-to-Surface Standoff Missile
JDAM	Joint Direct Attack Munition
JLUS	Joint Land Use Study
JRB	Joint Reserve Base
kV	kilovolt(s)
kWh	kilowatt hour(s)
LBP	lead-based paint
L_{dnmr}	onset rate-adjusted day-night average sound level
LEED	Leadership in Energy and Environmental Design
L_{eq}	equivalent noise level
L_{eq16}	16-hour equivalent noise level
L_{eq24}	24-hour equivalent noise level

ACRONYMS AND ABBREVIATIONS (Continued)

$L_{eq(SD)}$	school day equivalent noise level
LID	Low Impact Development
L_{max}	maximum noise level
L_{night}	nighttime equivalent noise level
LOA	Letter of Agreement
MAD	Managed Areas Database
MAG-41	Marine Aircraft Group 41
MAJCOM	Major Command
MAP	Management Action Plan
MBTA	Migratory Bird Treaty Act
MCAS	Marine Corps Air Station
MCF	million cubic feet
MDC	Missouri Department of Conservation
M-DCPS	Miami-Dade Public School
MDFR	Miami-Dade Fire Rescue
MDNR	Missouri Department of Natural Resources
MDT	Miami-Dade Transit
mg/kg	milligrams per kilogram
MGD	million gallons per day
MIA	Miami International Airport
MILCON	Military Construction
MILSPEC	Military Specification
MJU	Mobile Jettison Unit
mm	millimeter
MMBTU	million British thermal units
mmHg	millimeters of mercury
MMPA	Marine Mammal Protection Act
MO ANG	Missouri Air National Guard
MOA	Military Operations Area
MS4	Municipal Separate Stormwater Sewer System
MSA	Munitions Storage Area
MSGP	Multi-Sector General Permit
MSGP-2010	2010 Multi-Sector General Permit
MSL	mean sea level
MTR	Military Training Route
MVA	megavolt ampere(s)
MW	megawatt(s)
MWh	megawatt hour(s)
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection and Repatriation Act
NAS	Naval Air Station
Navy	U.S. Department of the Navy
NCD	Noise Control District
NCTCOG	North Central Texas Council of Governments
NDI	Noise Depreciation Indices
NEI	National Emissions Inventory

ACRONYMS AND ABBREVIATIONS (Continued)

NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NGVD	National Geodetic Vertical Datum
NHO	Native Hawaiian Organization
NHPA	National Historic Preservation Act
NIA	Natural Infrastructure Assessment
NIOSH	National Institute for Occupational Safety and Health
NIPTS	Noise-Induced Permanent Threshold Shift
NM	nautical mile(s)
NO_2	nitrogen dioxide
NOA	Notice of Availability
NOI	Notice of Intent
NOT	Notice of Termination
NO_x	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRHP	National Register of Historic Places
NWR	National Wildlife Refuge
O&M	operations and maintenance
O_3	ozone
OPNAVINST	Chief of Naval Operations Instruction
OR	odds ratio
OSHA	Occupational Safety and Health Administration
OSI	Office of Special Investigations
OWS	oil/water separator
PAA	Primary Aerospace Vehicles Authorized
PBA	Programmatic Biological Assessment
PCB	polychlorinated biphenyl
PCL	Pilot Controlled Lighting
PDEQ	Pima County Department of Environmental Quality
PEP	Project Evaluation Program
PFAS	per- and polyfluoroalkyl substances
PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonate
PHL	Potential for Hearing Loss
$PM_{2.5}$	particulate matter less than or equal to 2.5 micrometers in diameter
PM_{10}	particulate matter less than or equal to 10 micrometers in diameter
ppm	parts per million
PR	personnel recovery
PSD	Prevention of Significant Deterioration
PTSD	post-traumatic stress disorder
RA	Restricted Area
RAICUZ	Range Air Installations Compatible Use Zones
RAP	Ready Aircrew Program
RAPCON	Radar Approach Control
RCRA	Resource Conservation and Recovery Act

ACRONYMS AND ABBREVIATIONS (Continued)

RCZ	Range Compatibility Zone
RNAV	Radio Navigation
ROD	Record of Decision
ROI	Region of Influence
RV	recreational vehicle
SARA	Superfund Amendments and Reauthorization Act
SAT	Surface Attack Tactics
SECAF	Secretary of the Air Force
SEL	sound exposure level
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SO_2	sulfur dioxide
SO_x	sulfur oxides
SPCC	Spill Prevention, Control, and Countermeasures
SRI	Statistical Research, Inc.
STAR	Standard Terminal Arrival Route
SUA	Special Use Airspace
SULMA	Special Use Land Management Area
SWPPP	Stormwater Pollution Prevention Plan
SWPPT	Stormwater Pollution Prevention Team
TAA	Tucson Airport Authority
TACAN	Tactical Air Navigation
TAF	Taiwan Air Force
TANG	Texas Air National Guard
TCE	trichloroethylene
TCEQ	Texas Commission on Environmental Quality
TDSHS	Texas Department of State Health Services
TIM	Time In Mode
TO	Technical Order
TOLD	takeoff and landing data
TPDES	Texas Pollutant Discharge Elimination System
TPWD	Texas Parks and Wildlife Department
TRACON	Terminal Radar Approach Control
TSCA	Toxic Substances Control Act
TUS	Tucson International Airport
UDB	Urban Development Boundary
UEA	Urban Expansion Area
UFC	Unified Facilities Criteria
USACE	U.S. Army Corps of Engineers
USAF	U.S. Air Force
USC	*United States Code*
USCG	U.S. Coast Guard
USDA	U.S. Department of Agriculture
USEIA	U.S. Energy Information Administration
USEPA	U.S. Environmental Protection Agency
USFS	U.S. Forest Service

ACRONYMS AND ABBREVIATIONS (Continued)

USFWS	U.S. Fish and Wildlife Service
USGCRP	U.S. Global Change Research Program
USMC	U.S. Marine Corps
UST	underground storage tank
UTA	Unit Training Assembly
UTBNI	up to but not including
VFR	visual flight rules
VOC	volatile organic compound
WADS	Western Air Defense Sector
WDZ	Weapons Danger Zone
WH	Whiteman Air Force Base
WHMP	Wildlife Hazard Management Plan
WHO	World Health Organization
WMWA	Wichita Mountains Wilderness Area
WMWR	Wichita Mountains Wildlife Refuge
WWTP	Wastewater Treatment Plant

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CHAPTER 1

PURPOSE AND NEED FOR THE AIR FORCE RESERVE COMMAND F-35A OPERATIONAL BEDDOWN

How to Use This Document

Our goal is to provide a reader-friendly document that provides an in-depth, accurate analysis of the proposed action, the alternative basing locations, the No Action Alternative, and the potential environmental consequences for each base. The organization of this Environmental Impact Statement (EIS) is shown below.

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1.0 PURPOSE AND NEED FOR THE AIR FORCE RESERVE COMMAND F-35A OPERATIONAL BEDDOWN

1.1 INTRODUCTION

The F-35A Lightning II is the next-generation, multi-role, fighter aircraft for the U.S. Air Force (USAF) and will replace the USAF's F-16 fighter and A-10 ground-attack aircraft. The F-16 and A-10 aircraft that would be replaced by this action would be retired or reassigned. Should the aircraft be reassigned as Primary Aerospace Vehicles Authorized (PAA), a separate basing process supported by a National Environmental Policy Act (NEPA) analysis would be completed as an independent action from this Environmental Impact Statement (EIS).

The proposed action evaluated in this EIS addresses the beddown and operation of 24 PAA[1] F-35A aircraft with 2 Backup Aircraft Inventory (BAI) in one squadron at one base in the continental United States (CONUS) where the Air Force Reserve Command (AFRC) leads a global precision attack mission. Air Combat Command (ACC) is the primary provider of combat airpower to the United States' warfighting commands. To support global implementation of national security strategy, ACC operates fighter, bomber, reconnaissance, battle-management, and electronic-combat aircraft. It also provides command, control, communications, and intelligence systems, and conducts global information operations. In this role, ACC organizes trains, equips, and maintains combat-ready forces for rapid deployment and employment while ensuring strategic air defense forces are ready to meet the challenges of peacetime air sovereignty and wartime air defense. AFRC supports ACC in fulfilling these roles, although on a lesser scale. The proposed action considers the beddown of F-35A aircraft and replacement of existing fighter or ground-attack aircraft at one of the following alternative bases: Davis-Monthan Air Force Base (AFB), Arizona; Homestead Air Reserve Base (ARB), Florida; Naval Air Station (NAS) Joint Reserve Base (JRB) Fort Worth, Texas; and Whiteman AFB, Missouri (Figure 1-1). NAS JRB Fort Worth has been identified as the preferred alternative, and the other three bases are reasonable alternatives.

This EIS has been prepared in compliance with the NEPA (42 *United States Code [USC]* 4331 et seq.); the regulations of the President's Council on Environmental Quality (CEQ) that implement NEPA procedures (40 *Code of Federal Regulations [CFR]* 1500-1508); and the USAF Environmental Impact Analysis Process (EIAP) as promulgated at 32 *CFR* 989, *Environmental Impact Analysis Process*. The U.S. Department of the Navy (Navy) and Pima County and the City of Tucson in Arizona are serving as Cooperating Agencies through this EIS process (see Section 1.6). The Navy implements NEPA through 32 *CFR* 775, *Procedures for Implementing the National Environmental Policy Act*. This EIS will serve the NEPA requirements of both the USAF and the Navy.

The National Guard Bureau prepared a separate EIS that supported an independent decision to beddown F-35A aircraft at two Air National Guard (ANG) installations, to be operated by the ANG. The ANG F-35A EIS considered Dannelly Field Air Guard Station (AGS), Montgomery, Alabama; Gowen Field AGS, Boise, Idaho; Jacksonville AGS, Jacksonville, Florida; Selfridge Air National Guard Base (ANGB), Detroit, Michigan; and Truax AGS, Madison, Wisconsin. The Secretary of the Air Force (SECAF) signed the Record of Decision (ROD) for the ANG F-35A EIS on 14 April 2020. The ROD stated that Truax AGS in Madison, Wisconsin, and Dannelly Field AGS in Montgomery, Alabama, would be the two locations for the ANG F-35A mission. This action was separate and independent from the AFRC F-35A decision that will result from this EIS.

[1] PAA is the number of aircraft authorized to a unit in order to perform its operational mission, while BAI is the aircraft that would be used only if one of the PAA aircraft is out of commission.

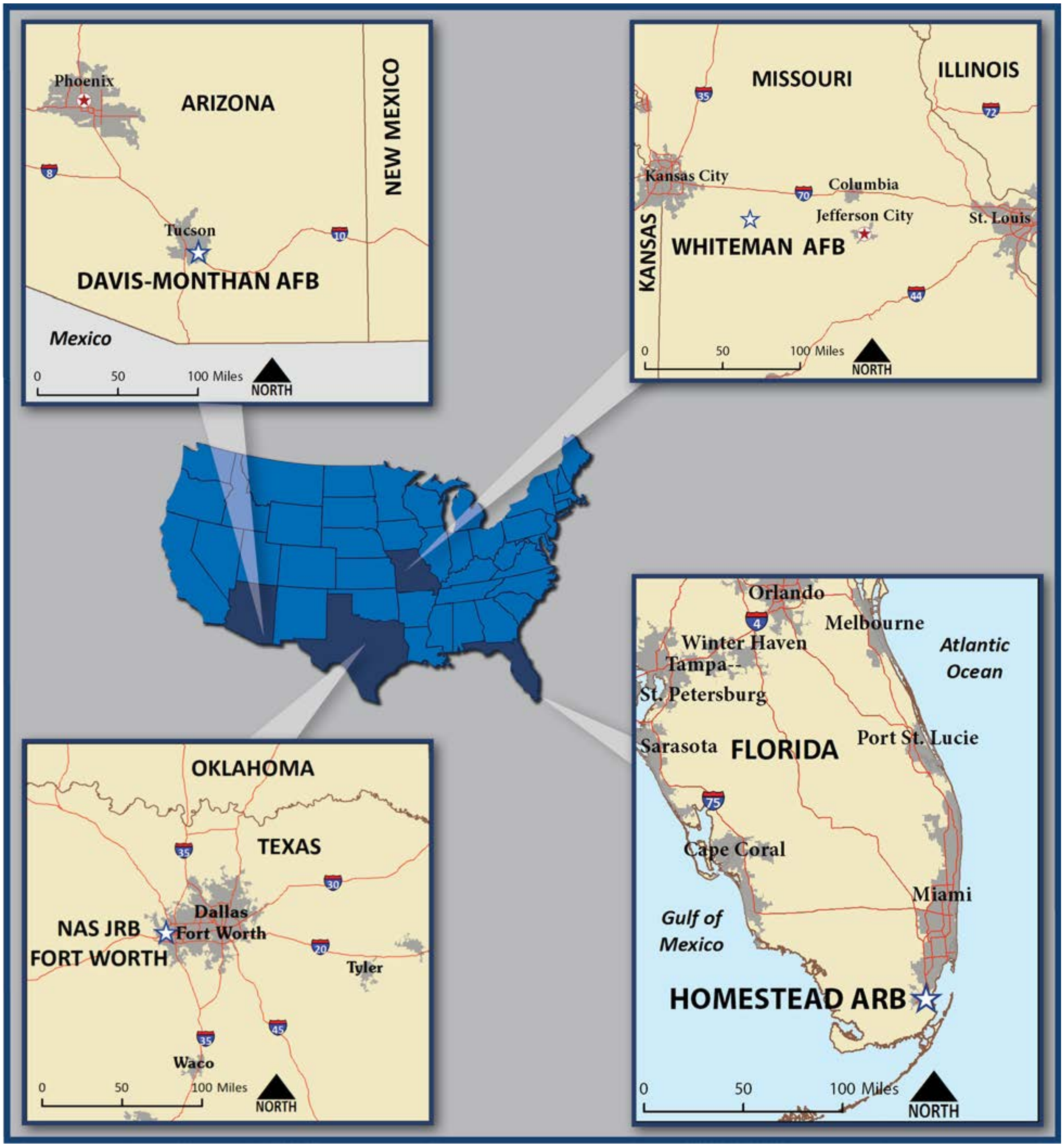

Figure 1-1. Location of Alternative Bases Proposed for the AFRC F-35A Operational Beddown

1.2 BACKGROUND

The USAF strategy to modernize the aging aircraft inventory with a near all-stealth fighter force by 2025 began with the F-22A Raptor in the early 1990s. In 1994, the U.S. Congress and U.S. Department of Defense (DoD) determined that the F-35 would be developed to replace USAF F-16 and A-10 aircraft (Congressional Research Service 2006).

Development and deployment of the F-35 Lightning II represents one of the priority defense programs for the United States. This multi-decade program was initiated in the early 1990s to provide the premier strike fighter aircraft to the USAF, U.S. Marine Corps (USMC), and Navy, as well as international partners, for the next several decades. The DoD established and is implementing the F-35 program for several branches of the Armed Services. The information in this section is for background purposes only. This EIS covers only the proposed AFRC F-35A beddown.

1.2.1 Aircraft Characteristics of the F-35A

The USAF has designated the F-35A to replace existing but aging fighter or ground-attack aircraft at one base in the CONUS where AFRC leads a global precision attack mission. These new aircraft would fulfill the wide range of roles and missions currently conducted by legacy fighter and ground-attack aircraft, including Attack Operations/Air Interdiction, Offensive Counter Air, Close Air Support (CAS), Strategic Attack, Suppression of Enemy Air Defenses, Destruction of Enemy Air Defenses, and Defensive Counter Air. Additional F-35A missions would include Armed Reconnaissance, Forward Air Controller (airborne), and Combat Search and Rescue. The USAF variant (i.e., Conventional Takeoff and Landing [CTOL]) of the F-35 therefore embodies critical combat capabilities to fulfill multiple mission roles and epitomizes the characteristics needed for these roles, offering a unique combination of capabilities (USAF 2013). The following are a unique combination of capabilities of the F-35A (CTOL version) aircraft.

The F-35A is optimized to be a multi-role fighter, with the ability to perform air-to-air; air-to-ground; and intelligence, surveillance and reconnaissance (ISR) missions.

- **Stealth –** Design features and radar-absorbent composite materials make the F-35A more difficult to detect than conventional aircraft of similar size.
- **Range and Supersonic Speed –** The F-35A offers an equivalent or greater combat radius than current legacy aircraft. The ability to fly at supersonic speeds makes the F-35A more effective in engaging the enemy and less vulnerable to enemy aircraft and ground-based threats.
- **Sensor Integration to Support Precision Munitions –** New F-35A computer systems, improved multi-spectral sensor technology, and networked sharing of information permit USAF pilots to detect enemy threats and deliver precision munitions at substantially greater distances than those supported by current aircraft.
- **Comprehensive Combat Information Systems –** Highly sophisticated avionics systems, including a helmet-mounted display, are integrated throughout the F-35A to provide the pilot information from many sources and produce a clear, easily understood picture of the combat situation.

- **Reduced Maintenance Costs** – Computerized self-tests of all systems, improved maintenance, and other autonomic logistics information system components reduce both maintenance time and costs.

The F-35A, a single-seat, all-weather fighter, receives its power from one F135 Pratt and Whitney jet engine capable of supplying approximately 40,000 pounds of thrust and speeds up to 1,151 miles per hour. The aircraft is capable of employing guided air-to-ground and air-to-air weapons from an internal weapons bay or external weapon stations. It has a four-barrel version of the Gatling-type 25-millimeter (mm) autocannon for close air support missions, effective against lightly-armored and "thin-skinned" vehicles. The aircraft also employs defensive countermeasures such as flares.

The F-35A measures approximately 51 feet long, 35 feet across the wings, and 15 feet tall. Internal fuel capacity is more than 18,000 pounds, providing an unrefueled range of 1,200 miles without external tanks. The aircraft has two internal weapon bays with four stations: two stations that can carry up to 2,000 pounds of air-to-ground bombs and two stations for smaller weapons (including but not limited to air-to-air missiles and/or bombs). The suite of ordnance the F-35A can employ includes, but is not limited to: Air Intercept Missile (AIM)-9X, AIM-120, and AIM-132 Advanced Short Range Air-to-Air Missile (ASRAAM) missiles; Air-to-Ground Missile (AGM)-158 Joint Air-to- Surface Standoff Missiles (JASSMs); Joint Direct Attack Munitions (JDAMs); Small Diameter Bombs; and other guided bombs. When low observability is not required, external pylons can be loaded with ordnance, yielding a weapons payload of more than 18,000 pounds (USAF Fact Sheet, http://www.af.mil/About-Us/Fact-Sheets/Display/Article/478441/f-35a-lightning-ii-conventional-takeoff-and-landing-variant/).

The F-35A contains an integrated core processor that combines information from all the aircraft's sensors into a single, coordinated view of the battlefield. Among these sensors is an active, electronically scanned array radar with a synthetic aperture radar mapping mode to provide pilots with far more precise search and targeting capabilities than those of F-15 and F-16 fighters. The aircraft is also equipped with an infrared search and tracking system for air-to-air combat, while advanced air-to-ground combat features include an electro-optical targeting system with a forward-looking infrared imager, a targeting laser, a laser spot tracker, and a closed circuit digital television camera. With software capable of analyzing the information, these sensors provide the F-35A with an automatic target recognition and classification system to identify specific targets. A speech recognition system that detects a pilot's spoken commands operates various systems without the need of pressing buttons or flipping switches.

1.3 PURPOSE OF THE AIR FORCE RESERVE COMMAND F-35A OPERATIONAL BEDDOWN

The purpose of the proposed action is to efficiently and effectively maintain combat capability and mission readiness as the USAF faces deployments across a spectrum of conflicts while also providing for homeland defense. Beddown and operation of the F-35A at one of the alternative bases would represent a major step toward this goal. This beddown action would continue to posture the USAF with the ready availability of the most advanced fighter aircraft in the world at an additional strategic location in the CONUS.

1.4 NEED FOR THE AIR FORCE RESERVE COMMAND F-35A OPERATIONAL BEDDOWN

Three factors establish the need for the AFRC beddown and operation of the F-35A. First, existing and anticipated enemy air defense systems have reached levels of effectiveness sufficient to pose a significant threat to current fighter and ground-attack aircraft. In addition, worldwide prevalence of sophisticated air-to-air and surface-to-air missiles continues to grow, increasing the number of threats to which existing USAF fighter and ground-attack aircraft are vulnerable. Implementation of the proposed beddown would provide AFRC with a location to operate the F-35A aircraft.

Second, AFRC needs to efficiently and effectively maintain combat capability and mission readiness. However, it faces increased difficulty in maintaining aging fighter and ground-attack aircraft inventories. These aircraft need to be replaced as a result of attrition, decreasing service life, and the lack of manufacturing of additional aircraft. Therefore, AFRC must replace the aging aircraft and supporting infrastructure to integrate operational F-35A squadrons into the existing USAF structure.

Third, the F-35A must support AFRC core competencies of air and space superiority, global precision attack and agile combat support. In order for AFRC to organize, train, equip and support F-35A pilots to meet a full range of military operations, the USAF needs to beddown the F-35A at existing locations offering compatible base infrastructure and providing ready access to existing airspace and ranges suitable for the F-35A. Beddown and operation of the F-35A at such locations forms a critical priority for the USAF.

1.5 PUBLIC AND AGENCY INVOLVEMENT

CEQ regulations for implementing the NEPA (40 *CFR* §§ 1500-1508), and the USAF's implementing regulations (32 *CFR* § 989), require the USAF to consider potential environmental consequences of its proposed action early and concurrent with the initial project planning stages. An EIS documents the detailed study of the potential environmental consequences of the proposed action, as well as cumulative impacts. When preparing an EIS, the USAF is required to invite review from other federal, state, and local agencies and from the public. In providing the opportunity for comment on the EIS, the USAF requests that comments be substantive in nature. Generally, substantive comments are regarded as those specific comments that challenge the analysis, methodologies, or information in the EIS as being factually inaccurate or analytically inadequate; that identify impacts not analyzed or developed and evaluate reasonable alternatives or feasible mitigations not considered by the USAF; or that offer specific information (e.g., differences in interpretations of significance, scientific, or technical conclusions) that may have a bearing on the decision or cause changes or revisions in the proposal. Non-substantive comments, which do not require a USAF response, are generally considered to be those comments that are non-specific; that express a conclusion, an opinion, agree or disagree with the proposals; vote for or against the proposal itself, or some aspect of it; that state a position for or against a particular alternative; or that otherwise state a personal preference or opinion.

Stages of the environmental review process are provided as follows:

- **Notice of Intent (NOI)** – A notice that announced the USAF's intent to prepare an EIS was published in the *Federal Register* on 22 March 2018. Notices were also published in local newspapers near each of the four alternative bases and under the airspace proposed for use. The NOI formally initiated the public scoping process. The NOI included descriptions of the alternatives and the scoping process, and the dates, times and locations of the scoping meetings. The NOI also invited affected federal, state, and local agencies; affected Indian tribe(s); and interested persons (e.g., public) to participate in the scoping process. After the scoping period closed, the USAF was made aware that the address provided for submittal of courier delivered public scoping comments (e.g., Federal Express or United Parcel Service) was incorrect. Consequently, the USAF provided the correct address, published an amended NOI, and added an additional 10-working days to resubmit scoping comments from the time resubmittal instructions were published in the *Federal Register* on 13 August 2018 and in the local newspapers.

- **Scoping –** The USAF held four public scoping meetings near Homestead ARB, NAS JRB Fort Worth, Davis-Monthan AFB, and Whiteman AFB. The purpose of the public scoping meetings was to gather community-specific concerns to help focus the EIS analysis. The meetings were arranged in a "come and go," open-house format with no formal presentation or opportunity for public testimony. Meeting attendees were asked to sign in and written comments were accepted. Poster display stations were set up and staffed approximately one-half hour prior to each meeting's scheduled start time to answer questions concerning the EIS process, the proposed action and alternatives, and base mission-specific questions. Resource specialists were on hand to provide information, answer questions, facilitate the identification of issues, and encourage public involvement. All four of the scoping meetings were well attended and during both comment periods, 711 comments were received regarding all of the resource areas evaluated in this Draft EIS.
- **Draft EIS –** The Draft EIS analyzed the environmental consequences of the proposed action. It included a description of the proposed action, the purpose and need for the proposed action, alternatives for implementing the proposed action, the existing environmental conditions where the proposed action would take place, and the potential environmental consequences of the proposed action. The Draft EIS was supported by detailed technical studies. The Draft EIS was distributed to agencies, regional libraries, and members of the public who requested copies, and was/is accessible for downloading on the project website.
- **Draft EIS Notice of Availability (NOA) and Public/Agency Review –** The U.S. Environmental Protection Agency (USEPA) published the NOA of the Draft EIS in the *Federal Register* on 14 February 2020. The NOA was also published in the following local newspapers near each of the four alternative bases and under the primary airspace proposed for use:
    - **Davis Monthan AFB –** Arizona Daily Star, La Estrella De Tucson, Douglas Dispatch, Yuma Sun, and the Sierra Vista Herald.
    - **Homestead ARB –** Miami Herald, Highland News, South Dade Leader, and the El Nuevo Herald.
    - **NAS JRB Fort Worth –** Fort Worth Star Telegram, Lawton Constitution, and the Snyder Daily News.
    - **Whiteman AFB –** Warrensburg Daily Star Journal and the Dixon Pilot.

  The NOA and newspaper advertisements announced the availability of the Draft EIS at public libraries and on the project website. The NOA also included the dates, times, and locations of the public hearings near each of the four alternative bases. Publication of the NOA initiated the 45-day public comment period, during which time the public hearings were held near each of the four alternative bases. The dates, locations, and number of attendees for each of the four public hearings are provided in Table 1-1.

Table 1-1. Public Hearing Dates, Locations and Attendance

Hearing/Date	Attendees	Location
Homestead ARB March 3, 2020	54	Miami Dade College – Homestead Campus, Building F, Room F222/F223, 500 College Terrace, Homestead, Florida 33030
NAS JRB Fort Worth March 5, 2020	67	Brewer High School Auditorium 1025 W. Loop 820 N., Fort Worth, Texas 76108
Davis-Monthan AFB March 10, 2020	130	Tucson Convention Center, 260 South Church Avenue, Tucson, Arizona 85701
Whiteman AFB March 12, 2020	7	Knob Noster High School, 504 South Washington, Knob Noster, Missouri 65336

Press releases were distributed to local media (e.g., radio, television, print) organizations prior to the public hearings. Spanish and English Fact Sheets were distributed to local areas, and notification letters were mailed to those on the mailing lists and everyone that signed up to be on the mailing list during scoping. Updates were posted on the project website, and each of the four bases used their media outlets and social media to notify the general public of the Draft EIS public comment period. Volume II, Appendix A, of the EIS provides a list of individuals on the mailing list, as well as federal, state, and local agencies that were provided notification letters and copies of the Draft EIS.

During the public hearings, AFRC presented details about the AFRC F-35A mission and the NEPA process, and provided attendees an opportunity to provide written and/or oral comments. The verbatim transcripts from the four public hearings are contained in Appendix A, Section A.6. In addition to receiving written and oral comments at the hearings, the USAF also accepted written comments from the public and agencies through U.S. mail, the website, and email. Consistent with 40 *CFR* § 1503.4, all substantive comments received during the public comment period were fully considered and addressed in the Final EIS, as appropriate.

- **Final EIS –** The Final EIS has been prepared following the Draft EIS public comment period. All public and agency comments have been reviewed, and, where applicable, the Final EIS has been revised to reflect public and agency comments and the proponent’s responses. The Final EIS will provide the SECAF (the decision-maker) with a comprehensive review of the potential environmental consequences of selecting any of the four alternative bases. A NOA will be published in the *Federal Register* to announce availability of the Final EIS, and a 30-day waiting period will be initiated.
- **Record of Decision (ROD) –** The USAF will prepare a concise public ROD that will address the USAF decision, identify alternatives considered, specify the environmentally preferred alternative, and state whether all practicable means to avoid or minimize environmental harm have been adopted (and if not, why they were not). The ROD NOA will then be announced in the *Federal Register* no sooner than the end of the Final EIS 30-day waiting period.

1.5.1 Agency Consultation

Agency consultation is integral to developing a comprehensive EIS. Specifically, the NEPA, CEQ regulations, and the EIAP require a process called "scoping" to involve the public early in the assessment process. The scoping process is designed to solicit input from the public and interested agencies on the nature and extent of issues and impacts to be addressed, and the methods by which potential impacts are evaluated.

As part of the EIAP process, the USAF notified the U.S. Fish and Wildlife Service (USFWS) regional offices and the respective State Historic Preservation Officers (SHPOs) of the intent to undertake the EIS and initiate informal consultation (Volume II, Appendix A). Prior to the scoping meetings, the USAF initiated direct contact with potentially interested and affected government agencies, government representatives, elected officials, and parties in the states potentially affected through distribution of Interagency and Intergovernmental Coordination letters (Volume II, Appendix A). The letters announced the beginning of the scoping process and included maps of the proposed beddown locations, a list of scoping meeting dates and locations, and the scoping flier. The USAF published advertisements in local newspapers a week prior to the scoping meetings. Each advertisement provided scoping meeting dates and locations applicable to that area. Summaries of the correspondence received from the USFWS and SHPOs are contained in the following sections: DM2.5.3.2, DM2.5.3.3, FW2.5.3.2, FW2.5.3.3, HS2.5.3.2, HS2.5.3.3, WH2.5.3.2 and WH2.5.3.3. Responses from other government agencies, government representatives, elected officials, and parties in the states are included in Volume II, Appendix A.

Chapter 4 of this EIS is divided into five subsections, one for each alternative base and one for the No Action Alternative. Each alternative subsection is labeled with a unique identifier in front of each of the section and page numbers. DM – Davis-Monthan AFB; HS – Homestead ARB; FW – NAS JRB Fort Worth; WH – Whiteman AFB: and NA – No Action Alternative.

1.5.2 Government-to-Government Consultation

In compliance with the National Historic Preservation Act (NHPA) of 1966, as amended, the USAF has endeavored to identify historic properties, sacred sites, and Traditional Cultural Properties that may be affected by the proposed action. The USAF has consulted Native American tribes with cultural affinity to the proposed beddown sites in keeping with the Presidential Memorandum on Government-to-Government Relations with Native American Tribal Governments; Executive Order (EO) 13175, *Consultation and Coordination with Indian Tribal Governments;* Air Force Instruction (AFI) 90-2002, *Air Force Interactions with Federally-Recognized Tribes* and Air Force Manual (AFMAN) 32-7003, *Environmental Conservation*; and DoD Policy on Native American and Native Alaskan Consultation. The USAF sent letters to federally recognized tribes with potential interest in the proposed action. The letters requested any concerns or additional information for incorporation into the EIS. Volume II, Appendix A, Section A.2, contains a record of these consultations. Summaries of the correspondence received from the Tribes are contained in the following sections: DM2.5.3.1, FW2.5.3.1, HS2.5.3.1, and WH2.5.3.1.

1.6 LEAD AND COOPERATING AGENCIES

The USAF is the proponent for the proposed AFRC F-35A beddown and is the lead agency for the preparation of the EIS. The Navy has agreed to be a Cooperating Agency due to the fact the Navy has been assigned lead Service for NAS JRB Fort Worth and is also the airspace and range controller for specific aspects of the proposed action and alternatives.

The City of Tucson Arizona and Pima County Arizona are also serving as Cooperating Agencies because they have special expertise with respect to zoning and land use planning codes relative to noise in the Tucson city limits and in Pima County Arizona.

As defined in 40 *CFR* § 1508.5, a Cooperating Agency:

> *"…means any Federal agency other than a lead agency which has jurisdiction by law or special expertise with respect to any environmental impact involved in a proposal (or a reasonable alternative) for legislation or other major Federal action significantly affecting the quality of the human environment. The selection and responsibilities of a cooperating agency are described in § 1501.6. A State or local agency of similar qualifications or, when the effects are on a reservation, an Indian Tribe, may by agreement with the lead agency become a cooperating agency."*

Volume II, Appendix A, presents the relevant correspondence exchanged between the USAF and the Cooperating Agencies.

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CHAPTER 2

DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

How to Use This Document

Our goal is to provide a reader-friendly document that provides an in-depth, accurate analysis of the proposed action, the alternative basing locations, the No Action Alternative, and the potential environmental consequences for each base. The organization of this Environmental Impact Statement (EIS) is shown below.

EXECUTIVE SUMMARY

- Synopsis of Purpose and Need and Proposed Action and Alternatives
- Comparison of Impacts

VOLUME I
OVERALL SUMMARY

CHAPTER 1

- Purpose and Need for the Air Force Reserve Command (AFRC) F-35A Operational Beddown

CHAPTER 2

- Description of the Proposed Action and Alternatives
- Alternative Identification Process
- Summary Comparison of the Proposed Action and Alternatives

CHAPTER 3

- Resource Definition and Methodology

VOLUME I
BASE-SPECIFIC INFORMATION

CHAPTER 4

- Base Alternatives and the No Action Alternative

Davis-Monthan AFB	Homestead ARB	NAS JRB Fort Worth	Whiteman AFB	No Action Alternative
Section DM1.0 Proposed Action Overview	**Section HS1.0** Proposed Action Overview	**Section FW1.0** Proposed Action Overview	**Section WH1.0** Proposed Action Overview	This section describes the effects of not implementing the AFRC F-35A mission at any of the four bases.
Section DM2.0 Base-Specific Project Details	**Section HS2.0** Base-Specific Project Details	**Section FW2.0** Base-Specific Project Details	**Section WH2.0** Base-Specific Project Details	
Section DM3.0 Affected Environment and Environmental Consequences	**Section HS3.0** Affected Environment and Environmental Consequences	**Section FW3.0** Affected Environment and Environmental Consequences	**Section WH3.0** Affected Environment and Environmental Consequences	
Section DM4.0 Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section HS4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section FW4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section WH4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	

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CHAPTER 5

- References

- List of Preparers
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- Index

APPENDICES: VOLUME II

- Appendix A – Correspondence
- Appendix B – Noise Modeling, Methodology, and Effects
- Appendix C – Air Quality

2.0 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

2.1 OVERVIEW

This chapter presents a description of the process the U.S. Air Force (USAF) used to identify and select alternatives for the Air Force Reserve Command (AFRC) F-35A mission. This chapter also describes the activities and implementing actions that would be associated with the proposed mission. The proposed AFRC F-35A mission involves the beddown and operation of 24 Primary Aerospace Vehicles Authorized (PAA) F-35A aircraft with 2 Backup Aircraft Inventory (BAI) in one squadron at one base in the continental United States (CONUS) where the AFRC leads a global precision attack mission. The AFRC F-35A mission requires facilities and infrastructure, personnel, airspace to conduct training activities, and airspace to support missions.

Table 2-1 provides an overview of key elements associated with the proposed AFRC F-35A beddown that have the potential to affect environmental resources at the selected base in or under the regional training airspace.

Table 2-1. Overview of the AFRC F-35A Beddown

The proposed AFRC F-35A beddown would involve implementing several related elements at the selected base. The following elements would occur at the selected base and in the associated training airspace.

Elements Affecting the Base

- ✓ The beddown of 24 PAA F-35A aircraft with 2 BAI and either the replacement of 24 existing F-16 or 24 existing A-10 aircraft at one installation in accordance with the aircraft delivery schedule;
- ✓ Renovate, construct, and manage facilities and infrastructure necessary to support the mission;
- ✓ Implement personnel changes (increases or decreases) at the base to conform to F-35A requirements; and
- ✓ Conduct airfield operations for missions and training.

Elements Affecting Airspace

- ✓ Conduct F-35A operations in existing Restricted Areas (RAs), Military Operations Areas (MOAs), Air Traffic Control Assigned Airspace (ATCAA), and offshore Warning Areas, emphasizing fighter and ground-attack aircraft requirements, to include supersonic flight;
- ✓ Employ defensive countermeasures, such as flares, in airspace authorized for their use; and
- ✓ Accomplish limited employment of ordnance at existing ranges approved for such use.

2.2 ALTERNATIVE IDENTIFICATION PROCESS

2.2.1 Alternative Identification Process Methodology

The established USAF strategic basing process (Air Force Instruction [AFI] 10-503, *Strategic Basing*) provides a deliberate, repeatable, standardized, and transparent framework for identifying operations and training locations. As part of the F-35A strategic basing process, the USAF developed basing criteria to assess the four AFRC fighter bases, based on their capability and capacity to support F-35A training and operations. The USAF has used this process for basing selections of operational locations.

Through a process involving collaborative staffing between Air Combat Command (ACC), AFRC, and Headquarters (HQ) functional offices, the need for an AFRC F-35A installation was validated. The seventh operational location, which is the focus of this Environmental Impact Statement (EIS), is a 24 PAA AFRC squadron with 2 BAI, with the first aircraft expected to arrive in 2024.

2.2.2 Identification of Preferred and Reasonable Alternatives

To meet the overall purpose and need, the USAF identified two broad selection standards that a base must meet: (1) the base must be a current AFRC installation with a fighter mission, and (2) the base must have a runway longer than 8,000 feet. Applying these two broad selection standards, the USAF identified four candidate bases for the first AFRC-led F-35A base. On 12 April 2016, the USAF released the names of these four candidate bases: Davis-Monthan AFB, Arizona; Homestead Air Reserve Base (ARB), Florida; Naval Air Station (NAS) Joint Reserve Base (JRB) Fort Worth, Texas; and Whiteman AFB, Missouri.

ACC and AFRC then conducted detailed, on-the-ground site surveys at each candidate base and assessed each location against four additional specific selection standards. These specific selection standards represent capabilities that each installation must have in order to qualify as a reasonable alternative. The four specific selection standards are as follows:

1. Mission standard: ability to conduct a global precision attack core mission with access to training and range airspace;
2. Capacity standard: operational and logistics facilities, and ramp and parking space;
3. Environmental standard: considerations on air quality, incompatible development, base encroachment, and land use controls; and
4. Cost factor standard: Given budgetary constraints, the USAF considered area construction factors based on Unified Facilities Criteria (UFC) 3-701-01, *DoD Facilities Pricing Guide*, dated March 2011, Change 11, September 2016, area Basic Allowance Housing rates, and area General Schedule locality pay.

The completed site survey results were briefed to the Secretary of the Air Force (SECAF) and Chief of Staff of the Air Force (CSAF) to select preferred and reasonable alternatives for the AFRC F-35A beddown location.

On 6 January 2017 the USAF announced NAS JRB Fort Worth as the preferred alternative and the remaining three bases as reasonable alternatives for the AFRC F-35A mission. Along with the No Action Alternative, all four bases are equally evaluated in this EIS.

2.3 ELEMENTS OF THE PROPOSED ACTION COMMON TO ALL BEDDOWN ALTERNATIVES

The AFRC F-35A mission would replace the existing AFRC mission at one of the four alternative bases. Implementation of the proposed action would occur in two stages: a beddown stage and an operational stage. The beddown stage would involve construction/retrofit of required facilities, infrastructure, and prepared surfaces, which includes renovation, alteration, new construction, and demolition. The beddown stage would also include preparing support facilities for new personnel to support the mission. The operational stage would involve conducting the day-to-day activities (operational missions, etc.) of the squadron at the base, including flight operations and training in the regional airspace.

Section 2.3.5 provides a general description of each of the alternative bases under consideration. The description of each alternative carried forward as a reasonable alternative in Chapter 4 contains specifics about how the beddown and mission would be implemented at each base and within the regional airspace. In accordance with the Council on Environmental Quality (CEQ) regulations (40 *Code of Federal Regulations [CFR]* 1502.14(d)), Section 2.3.6 describes the No Action Alternative, which consists of not bedding down an AFRC F-35A mission at any of the four alternative bases.

Four elements of the proposed action have the potential to affect the base and associated airspace: (1) facility and infrastructure projects necessary or required to support the F-35A beddown;

(2) personnel changes necessary to meet F-35A requirements; (3) airfield operations conducted by AFRC F-35A pilots; and (4) airspace and range use by AFRC F-35A pilots. Each element is explained below.

The USAF proposes to beddown 24 PAA F-35A aircraft with 2 BAI in one squadron at one of the four alternative bases. At Davis-Monthan AFB or Whiteman AFB, 24 A-10 aircraft would be replaced with 24 F-35A aircraft. At Homestead ARB or NAS JRB Fort Worth, 24 F-16 aircraft would be replaced with 24 F-35A aircraft. The aircraft replacement process would occur over approximately 2 years as the required F-35A aircraft are manufactured. Delivery of the first F-35A aircraft to the selected base would occur in 2024. At the end of the 2-year period the full complement of 24 PAA F-35A aircraft and 2 BAI would be located at the installation. The F-16 or A-10 aircraft that would be replaced by the F-35A aircraft would be reassigned or removed from the USAF inventory. Construction activities are planned to start in 2021 and be completed in approximately 2 years.

2.3.1 Facilities and Infrastructure

To accommodate the AFRC F-35A beddown, the selected base must provide the facilities and infrastructure necessary to support all aspects of the AFRC F-35A mission. Examples of some basic F-35A facility and infrastructure requirements necessary to support the beddown of F-35A aircraft include the following:

- Squadron operations/maintenance facilities;
- Hangars;
- Full mission simulator facility;
- Base communications infrastructure;
- Electrical system upgrades; and
- Other base support facilities (e.g., an engine repair shop, lightning-protected sunshades, and aircraft parking aprons), which vary from base to base.

While all four of the bases offer the basic necessary facilities for the operational beddown, none have all of the required infrastructure and facilities. Construction of new facilities and/or modification of existing facilities would be necessary at each of the alternative bases, although the nature and magnitude of these efforts would differ among the four bases. Table 2-2 presents the amount of total acres that would be disturbed at each installation as a result of implementing the AFRC F-35A mission. Details on construction and modification projects are presented in each alternative base-specific section contained in Chapter 4.

Table 2-2. Proposed Construction and Infrastructure Modifications for the AFRC F-35A Mission

Alternative[a]	Ground Disturbance[b] (Acres)
Davis-Monthan AFB	15.2
Homestead ARB	2.3
NAS JRB Fort Worth	7.7
Whiteman AFB	2.9

[a] Data in this table were obtained from AFRC in 2017 for each of the four bases (NAS JRB Fort Worth 2017, Davis-Monthan AFB 2017, Homestead ARB 2017, Whiteman AFB 2017).

[b] The total disturbed area includes the construction footprint plus an additional 50 feet around the footprint of buildings and an additional 20 feet for road widening.

As suggested by its designation, the construction footprint represents the area covered by the footprint of the proposed facilities and consists of the designed limits of the structure, facility, apron, road, access, and/or parking lot. To account for construction grading and clearing, equipment laydown space, landscaping, modifications to final designs, and associated disturbance, this analysis includes disturbance areas in addition to the construction footprints. These disturbance areas encompass 20 feet adjacent to each linear feature (e.g., roads, utility extensions, etc.) to 50 feet around the construction footprint for all other structures or facilities.

Proposed improvements on the alternative bases would disturb between 2.3 and 15.2 total acres. Overall, construction and modification of facilities and infrastructure would be limited at any one of the four bases. Construction and modifications would precede beddown of the F-35A aircraft and could extend through 2023.

2.3.2 Personnel

Beddown of the F-35A aircraft would also require sufficient and appropriate personnel to operate and maintain the aircraft and to provide necessary support services. Personnel discussed in this EIS include the following:

- All personnel authorizations in the AFRC units directly related to flying and maintaining the aircraft;
- Associated Base Operating Support (BOS) personnel authorizations (military, civilian, contractor) performing functions such as security or administration at the bases;
- Other AFRC unit personnel authorizations associated with the AFRC units; and
- Total base personnel to provide an overall context for changes resulting from the F-35A beddown.

Depending on the alternative base, the proposed AFRC F-35A mission would require a variety of different full-time and part-time personnel (Table 2-3). At Davis-Monthan AFB, Homestead ARB, and NAS JRB Fort Worth, the AFRC F-35A mission would result in net decreases of 30, 91, and 102 personnel, respectively. At Whiteman AFB, the AFRC F-35A mission would result in a net increase of 11 personnel. The USAF expects that changes in personnel authorizations necessary for the AFRC F-35A mission would occur coincident with the arrival of the F-35A aircraft during the procurement process.

Table 2-3. Summary of Personnel Changes by Alternative Base

Alternative Base	Baseline Personnel			Proposed F-35A Authorized Personnel			Percent Change to Total Personnel at Each Base
	Total Authorized Personnel at Each Base	AFRC Authorized Personnel at Each Base	Percent of Total Authorized Based Personnel	AFRC F-35A	Change to AFRC Unit Personnel Positions	Percent Change to AFRC Unit Personnel	
Davis-Monthan AFB	10,140	1,154	11.38%	1,124	-30	-2.60%	-0.3%
Homestead ARB	3,430	1,735	50.58%	1,644	-91	-5.24%	-2.7%
NAS JRB Fort Worth	9,600	1,751	18.24%	1,649	-102	-5.83%	-1.1%
Whiteman AFB	12,642	1,009	7.98%	1,020	11	1.09%	0.1%

2.3.3 Airfield Operations

To provide the training necessary to ensure combat readiness, F-35A pilots would conduct aircraft operations in two types of areas: (1) an airfield associated with a base and (2) airspace and ranges. The aircraft operations conducted at the training ranges and airspace would be geographically separate from the aircraft operations conducted at the airfields.

This EIS uses two terms to describe different components of aircraft flying activities: sortie and operation. Each term has a distinct meaning and commonly applies to a specific set of activities in a particular airspace environment or unit. These terms also provide a means to quantify activities for the purposes of analysis. A sortie consists of one single military aircraft from a take-off through a landing and includes a flying mission. For this EIS, the term sortie is commonly used when summarizing the amount of flight activity from a base. A sortie can include more than one operation. The term operation is applied in this EIS to airfield activities. An operation comprises one action (e.g., a landing or take-off). Pilots making multiple practice approaches (i.e., touch and go's) conduct a landing followed immediately by a take-off; this entire closed pattern circuit is counted as two airfield operations.

In order to meet the AFRC F-35A mission requirements, the USAF anticipates that each AFRC F-35A aircraft would be used to fly 193 sorties per year. Thus, a total of 24 F-35A aircraft would account for an estimated 4,632 sorties per year.

Sortie = a single military aircraft mission, from take-off through landing, that includes a flying mission. A sortie can include more than one *operation*.

Operation = one action (e.g., a landing or take-off). Pilots making multiple practice approaches (i.e., touch and go's) conduct a landing followed immediately by a take-off; this entire closed pattern circuit is counted as two airfield operations.

Each of the alternative bases currently supports a considerable number of airfield operations. Using information from previous Air Installations Compatible Use Zones (AICUZ) studies, airfield management logs, recent environmental documentation, and interviews with airfield managers and pilots, the baseline operations provide a benchmark (as of November 2017) against which proposed activities can be assessed. For each alternative base, these data include operations by other based (tenants) or transient military aircraft. Tenant aircraft operations would not change with implementation of the AFRC F-35A mission. The baseline aircraft operations and the proposed AFRC F-35A airfield operations are identified in Table 2-4. The EIS assumed that 100 percent of F-35A operations would be conducted at the selected installation (i.e., home station) to provide a conservative estimate for initial F-35A aircraft operations. After the full complement of F-35A aircraft are located at the selected installation, deployments will begin and off-station aircraft operations could be expected to be reduced to a level closer to historical home station operations, with a commensurate reduction in noise impacts.

Table 2-4. AFRC F-35A Baseline and Proposed Annual Airfield Operations

Total Baseline Operations[a]		Proposed AFRC F-35A Mission
Davis-Monthan AFB[b]		
Based A-10 (924 FG only)	11,088	0
Proposed F-35A	0	11,580[c]
Other Aircraft	62,168	62,168
Total Airfield Operations	73,256	73,748
	Percent Change	**0.7%**

Table 2-4. AFRC F-35A Baseline and Proposed Annual Airfield Operations (Continued)

Total Baseline Operations[a]		Proposed AFRC F-35A Mission
Homestead ARB		
Based F-16	10,428	0
Proposed F-35A	0	11,580[c]
Other Aircraft	28,090	28,090
Total Airfield Operations	38,518	39,670
	Percent Change	**3.0%**
NAS JRB Fort Worth		
Based F-16	8,524	0
Proposed F-35A	0	11,580[c]
Other Aircraft	16,768	16,768
Total Airfield Operations	25,292	28,348
	Percent Change	**12.1%**
Whiteman AFB		
Based A-10	5,810	0
Proposed F-35A	0	11,580[c]
Other Aircraft	27,370	27,370
Total Airfield Operations	33,180	38,950
	Percent Change	**17.4%**

[a] Total baseline operations is for the last year. Data in this table were collected from the operations staff at each of the four bases in 2017 (NAS JRB Fort Worth 2017, Davis-Monthan AFB 2017, Homestead ARB 2017, Whiteman AFB 2017).

[b] Multiple flying units operate A-10 aircraft at Davis-Monthan AFB. Should Davis-Monthan AFB be selected for the AFRC F-35A mission, the A-10 aircraft operated by the 924th Fighter Group (924 FG) would be replaced by F-35A aircraft. However, the 355th Fighter Wing (355 FW) and a detachment of the Air National Guard Air Force Reserve Command Test Center (AATC) would continue to operate A-10 aircraft at Davis-Monthan AFB.

[c] The EIS assumes all 11,580 operations would be conducted at home station to provide a conservative estimate of initial operations.

Beddown of the F-35A aircraft would increase total aircraft operations at each of the four alternative bases. Implementation of the AFRC F-35A mission would increase total aircraft operations the most at Whiteman AFB and the least at Davis-Monthan AFB.

Current F-16 and A-10 aircraft operations, which include departures, flying local patterns, and landings, are unique at each of the four bases and reflect the nature of base-specific training requirements, safety considerations, course rules, noise reduction practices, and other factors. AFRC F-35A pilots would adhere to the identified restrictions, avoidance procedures, and existing quiet-hour programs in place at the selected base.

The F-35A Ready Aircrew Program (RAP) Tasking Memorandum, Aviation Schedule 2018, establishes F-35A pilot proficiency requirements. The RAP Tasking Memorandum also establishes the proposed F-35A training activities and annual sortie requirements.

Certain F-35A operational requirements, such as the use of afterburner, are mission- and situation-dependent. Runway length, temperature, atmospheric pressure, wind conditions, and aircraft loads (e.g., avionics, fuel, weapons) are some of the factors that influence pilot decisions to use afterburner power for departures versus standard military power. AFI 11-2F-35A V3, *Flying Operations, F-35 – Aircrew Training,* guidelines state that F-35A pilots should not takeoff with military power if calculations, based on the relevant site conditions, indicate that the aircraft would require more than 50 percent of the available runway for takeoff when using military power. In short, the primary requirement for using afterburner is safety.

AFRC evaluated the requirement for afterburner use during departures, calculated takeoff requirements, and determined that afterburner use would be required on approximately 5 percent of the total departures from each alternative base. However, for this analysis, the USAF evaluated three different scenarios for afterburner use: Scenario A is afterburner use on 5 percent of total takeoffs, Scenario B is afterburner use on 50 percent of total takeoffs, and Scenario C is afterburner use on 95 percent of total takeoffs. Figure 3-1 in Chapter 3 illustrates the difference between a takeoff using afterburner and a takeoff using standard military power.

Combat missions can require flying after dark. Therefore, combat pilots are required to train and fly after dark. F-16 and A-10 pilots stationed at each of the four bases currently fly after dark. F-35A pilots would also need to train under such conditions. For the purposes of meeting this requirement, 1 hour after sunset is generally considered to be dark. Therefore, the hours of flight activity after dark vary from season to season and by base. As shown in Table 2-5, the aircraft proposed for replacement are only flown 1 to 4 percent of the time during "environmental night" (i.e., after 10:00 P.M. and before 7:00 A.M.).

Table 2-5. Comparison of Baseline and Proposed Night Operations

Alternative Base	Percent Operations After 10:00 P.M. and Prior to 7:00 A.M.		
	Aircraft Proposed for Replacement	Total Operations (all aircraft)	Proposed AFRC F-35A Operations
Davis-Monthan AFB	1%	6%	1%
Homestead ARB	3%	8%	2%
NAS JRB Fort Worth	<1%	2%	<1%
Whiteman AFB	4%	7%	4%

Note: Data in this table were obtained from each of the four bases and AFRC in 2017 (NAS JRB Fort Worth 2017, Davis-Monthan AFB 2017, Homestead ARB 2017, Whiteman AFB 2017).

Environmental night receives special consideration for analysis because it represents a period when noise effects are more noticeable. Because of the capabilities and expected tactics of the F-35A aircraft, AFRC F-35A pilots are predicted to generally follow the same night requirement as AFRC F-16 and A-10 pilots. AFRC F-35A pilots would fly very little during environmental night, although contingencies such as weather or special combat mission training could result in rare, unplanned operations during this time period. AFRC F-35A units could conduct nearly all required "after dark" operations prior to 10:00 P.M.

Day-Night Average Sound Level (DNL) is a noise metric combining the levels and duration of noise events, and the number of events over an extended time period. It is a cumulative average, computed over a given time period (e.g., a year) to represent total noise exposure. DNL also accounts for more intrusive nighttime noise, adding a 10-decibel (dB) penalty for noise occurring between 10:00 P.M. and 7:00 A.M.

2.3.4 Airspace and Range Use

2.3.4.1 Airspace Use

Although the exact nature and sequence of training activities for the F-35A remain under development, information available from the RAP indicates that F-35A pilots must conduct multiple role training for five major mission types to replace the missions of F-16 and A-10 aircraft (Table 2-6). Each of these five major missions requires the necessary airspace and range assets to permit realistic training. Due to advanced electronics, the ability to engage targets at higher altitudes, and the speed of the aircraft, F-35A pilots would primarily use Special Use Airspace (SUA), including Military Operations Areas (MOAs), Air Traffic Control Assigned Airspace (ATCAA), Restricted Areas (RAs), and offshore Warning Areas. AFRC F-35A pilots would infrequently use Military Training Routes (MTRs), either to access SUA or conduct training.

Table 2-6. Proposed F-35A Training Activities

Major Mission	Training Activities	Airspace Type
Basic Fighter Maneuvers	G-force awareness, maneuverability, break turns, high angle of attack maneuvering, acceleration maneuvering, gun tracking, offensive and defensive positioning, air refueling, stall recovery.	MOAs, ATCAA, and Warning Areas.
Surface Attack Tactics (SAT)	Single to multiple aircraft attacking a wide range of ground targets using different ingress and egress methods, delivery tactics, ordnance types, angles of attack, and combat scenarios.	MOAs and RAs (over weapons delivery ranges).
Air Combat Maneuvers	Multi-aircraft formations and tactics, systems check, G-force awareness, two-versus-four and four-versus-six aircraft intercepts, combat air patrol, defense of airspace sector from composite force attack, intercept and destroy bomber aircraft, avoid adversary fighters, supersonic engagement.	MOAs, ATCAA, Warning Areas, and RAs (over weapons delivery ranges).
Close Air Support (CAS)	Air support for ground-based offensive and defensive operations, work with Joint Terminal Attack Controllers, use SAT and Basic Surface Attack (BSA) components.	MOAs and RAs (over weapons delivery ranges).
Air Combat Tactics	Multi-aircraft and multi-adversary defense and combat air patrol, defense of airspace sector from composite force attack, intercept and destroy bomber aircraft, avoid adversary fighters, strike-force rendezvous and protection, supersonic engagement.	MOA, ATCAA, and Warning Areas.

Each of the four alternative bases has a fighter mission that is gained by ACC. ACC, as the lead Major Command (MAJCOM) for the Combat Air Forces (CAF), including the F-35A, develops and directs training requirements. The F-35A program recognizes that combat pilots will need to conduct the range of training activities in appropriate SUA, as shown in Table 2-6. Figure 2-1 depicts and describes the characteristics of these different types of SUA. While the USAF developed both estimated minimum dimensions and a recommended set of dimensions (USAF 2012), training for the F-35A would adapt to existing airspace structures near each of the alternative bases. Adaptation, where needed, could include the use of SUA in combination or sequencing events within a sortie to fit the airspace. Such adaptation would vary among the bases due to differences in the structure and configuration of the SUA to be used at each of the four alternative bases.

AFRC F-35A pilots would only use existing, Federal Aviation Administration (FAA)-approved and -charted SUA and ranges. By adapting training activities to the airspace associated with the selected base, no F-35A-specific changes to airspace size or structure, or to ranges would be required to accommodate the AFRC F-35A training. Should the USAF decide to make any F-35A-specific airspace or range modifications in the future, these actions would undergo the appropriate level of environmental analysis at that time. In general, AFRC F-35A pilots stationed at each alternative base would operate in MOAs, ATCAA, and RAs above ranges. AFRC F-35A pilots stationed at Homestead ARB would conduct some of their training in offshore Warning Areas.

Table 2-7 identifies SUA associated with each alternative base where AFRC F-35A pilots could operate. The airspace structure for each base represents conditions under the No Action Alternative, where sorties conducted by the based F-16 and A-10 pilots currently occur.

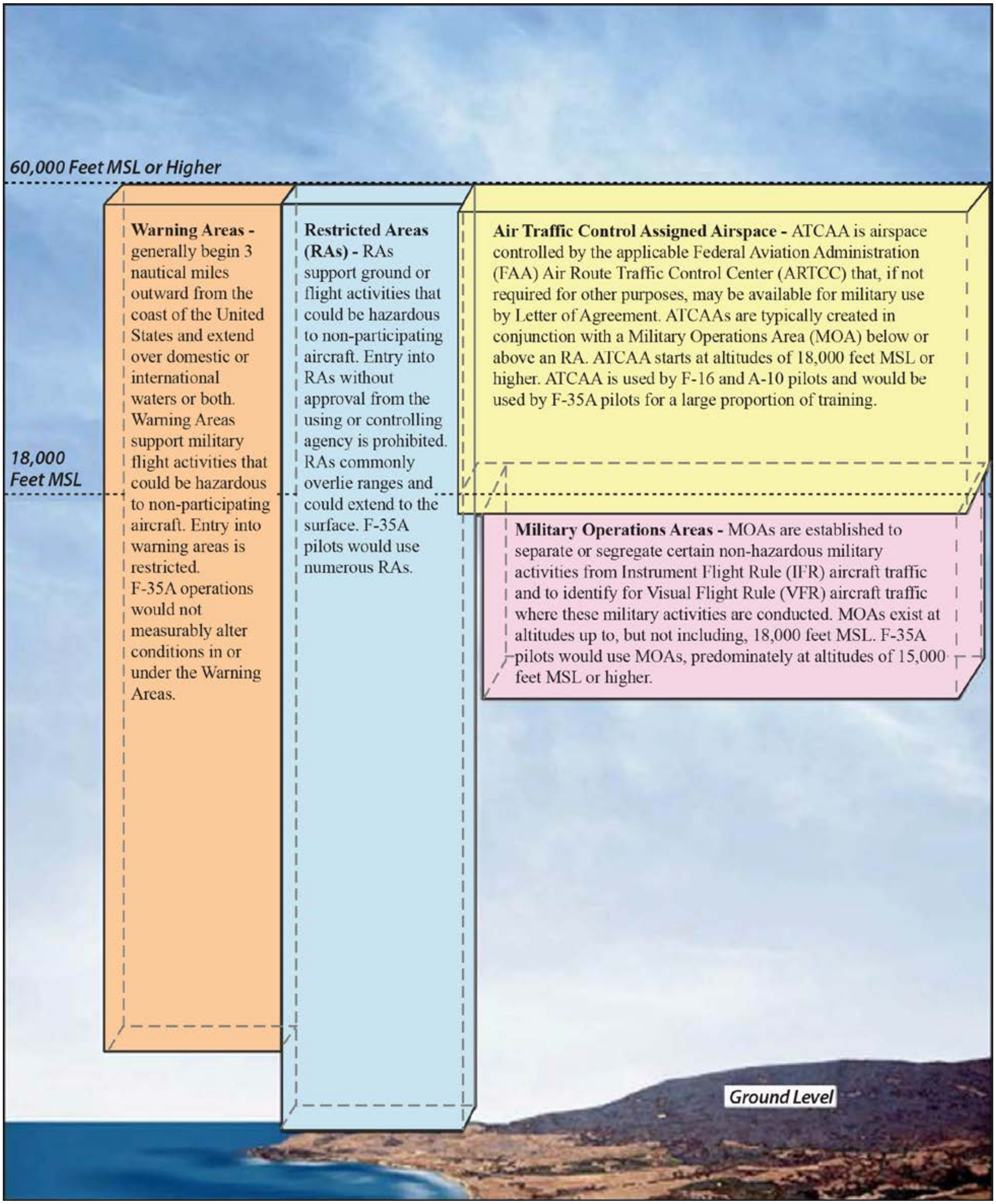

Figure 2-1. Types of Training Airspace

Table 2-7. Summary of Existing Airspace Proposed for Use by AFRC F-35A Pilots

Davis-Monthan AFB	Airspace[a]
Southern Arizona	Fuzzy MOA
	Jackal MOA
	Jackal Low MOA
	Outlaw MOA
	Ruby 1 MOA
	Sells 1 MOA
	Sells Low MOA
	Tombstone A, B, & C MOAs
	Barry M. Goldwater Range (BMGR) R-2301E
	BMGR R-2304
	BMGR R-2305
	Fort Huachuca Range R-2303A, B & C
Homestead ARB	**Airspace**
U.S. Navy Pinecastle Range Complex (to include Rodman and Lake George Ranges)	Palatka 1 & 2 MOAs
	R-2907 A, B, & C
	R-2910 A, B, C, D, & E
	R-2906
Avon Park Air Force Range (APAFR)	Avon East MOA
	Avon East High MOA
	Basinger MOA
	Lake Placid N, E & W MOAs
	Marian MOA
	R-2901 A, B, C, D, E, F, G, H, I, J, K, L, M, & N
Warning Areas	W-168
	W-174 A, B, C, E, F, & G
	W-465 A, B, & D
NAS JRB Fort Worth	**Airspace**
Southwest Texas	Brady Low and High MOAs
	Brady North MOA
	Brownwood 1 East & West MOAs
	Brownwood 2 East & West MOAs
	Brownwood 3 & 4 MOAs
	Hood MOA
	Hood High MOA
	Lancer MOA
	Gray MOA
	Sheppard 1 MOA
	Rivers MOA
	Washita MOA
	Falcon Range R-5601 A, B, C, D, E, F, G, H, & J; R-5602 A & B
	Fort Hood R-6302A, B, C & D
Central United States	Ada East & West MOAs
	Bison MOA
	Cannon A & B MOAs
	Eureka Low & High MOAs
	Lindbergh A, B, & C MOAs
	Lindbergh D and West ATCAAs[b]
	Riley MOA
	Salem MOA
	Shirley A, B, & C MOAs
	Smoky Low and High MOAs
	Truman A, B, & C MOAs

Table 2-7. Summary of Existing Airspace Proposed for Use by AFRC F-35A Pilots (Continued)

Whiteman AFB	Airspace
Central United States (Continued)	Cannon Range R-4501 Complex
	Fort Riley Range R-3602A & B
	Smoky Hill Range R-3601A

[a] Airspace used by F-35A pilots will include ATCAAs that overly the MOAs included in the table. The ATCAAs will accommodate training above 18,000 feet mean sea level (MSL).
[b] Lindbergh ATCAAs are called out in the table and figures for reference because no MOAs are located beneath these areas.

To simplify discussion of the numerous SUAs associated with the alternative bases, many are combined under a single unofficial designation. This approach is used because adjacent SUAs are typically scheduled at the same time due to their proximity to each other and due to the airspace manager that controls the airspace. For example, pilots from Davis-Monthan AFB operate in the Southern Arizona complex, which includes numerous MOAs, ATCAA, and RAs. This EIS therefore uses the combined unofficial designations both analytically and descriptively in lieu of presenting the constituent airspaces. Individual airspace is only identified in those instances in which greater specificity enhances the description or the analysis. Further details on airspace associated with each alternative base are presented in the base-specific sections contained in Chapter 4.

Table 2-8 summarizes the proposed F-35A sorties to training airspace that would be conducted at completion of the AFRC F-35A beddown. These proposed sorties are also compared to the baseline sorties conducted by existing F-16 or A-10 aircraft at each of the four alternative bases. Although differences in numbers of aircraft, training activities, and configuration of airspace preclude direct and precise comparison among alternative bases, these data reflect basic trends of usage. Detailed sortie data for each alternative base are provided in the individual base discussions contained in Chapter 4.

Table 2-8. Summary of Baseline and Proposed Airspace Training Sorties

Alternative Base	Total Baseline Sorties[a]	AFRC F-35A Sorties	Change in Total Sorties	Percent Change in Total Sorties
Davis-Monthan AFB	40,358	4,632	2,004	5.0%
Homestead ARB	45,151	4,632	-108	-0.2%
NAS JRB Fort Worth	77,445	4,632	917	1.2%
Whiteman AFB	15,739	4,632	-931	-5.9%

[a] Includes sorties flown in all aircraft types.

AFRC F-35A pilots would share training airspace with many other users. Representative types of other aircraft using the airspace could include other F-35A aircraft operated by Lockheed Martin, the U.S. Marine Corps (USMC), and the USAF; U.S. Department of the Navy (Navy) F-18; F-15C, F-15E, F-22A, A-10, F-16, E-3, and C-130 aircraft; and various types of helicopters. These other users would continue operations after beddown of the AFRC F-35A aircraft. Depending on the base, other aircraft would account for varying amounts of total activity in the airspace. At Davis-Monthan AFB and NAS JRB Fort Worth, the number of sorties flown in training airspace would increase. At Homestead ARB and Whiteman AFB, the number of sorties flown in training airspace would decrease.

AFRC F-35A pilots would use the same types of airspace used by F-16 and A-10 pilots. Although F-35A missions would be similar to those of the aircraft they are proposed to replace, F-35A aircraft have distinctive capabilities and would be flown differently. Some of the expected differences in the F-35A operational capabilities relative to the F-16 or A-10 aircraft include the following:

- More effective in air-to-air engagements;
- More effective in executing missions against fixed and mobile targets;
- More effective in non-traditional intelligence surveillance reconnaissance, suppression of enemy air defense, and destruction of enemy air defense missions;
- Self-sufficient or part of multisystem and multiservice combat operations;
- Able to rapidly transition between air-to-ground and air-to-air missions while still airborne; and
- Reduced detection with low-observable technologies and tactics.

Due to these capabilities and the breadth of the F-35A mission requirements, several changes in the operational use of existing airspace and ranges could occur at any one of the four alternative bases. These changes are detailed as follows.

2.3.4.1.1 Use of Higher Altitudes

In order to fulfill multi-role requirements, AFRC F-35A pilots would use the full, authorized capabilities of the airspace available for training, operating (where permitted) from 500 feet above ground level (AGL) up to 60,000 feet mean sea level (MSL)[1]. However, F-35A pilots would generally conduct training in the airspace at altitudes higher than those used by F-16 pilots, operating at 18,000 feet MSL or higher approximately 71 percent of the time (Table 2-9). Due to the capabilities and expected tactics of the F-35A aircraft, F-35A pilots would rarely (1 percent) fly below 5,000 feet AGL. Actual flight altitudes would depend upon the lower and upper limits of specific airspace. Some SUA might not offer sufficient vertical spans to permit all of the required training activities. Due to such limitations, F-35A pilots would need to use existing airspace in different proportions than those used by F-16 or A-10 pilots.

Table 2-9. Current and Proposed Aircraft Altitude Distribution in the Airspace

Altitude (feet)	Existing Percentage of Use				Proposed Percentage of Use
	Davis-Monthan AFB	Homestead ARB	NAS JRB Fort Worth	Whiteman AFB	All Bases
	A-10	F-16	F-16	A-10	F-35A
100 – 500 AGL	7%	0%	0%	7%	0%
500 – 2,000 AGL	30%	2%	2%	30%	1%
2,000 – 5,000 AGL	26%	4%	4%	26%	0%
5,000 AGL – 10,000 MSL	33%	10%	10%	33%	5%
10,000 – 18,000 MSL	4%	68%	70%	4%	23%
18,000 – 30,000 MSL	0%	11%	12%	0%	60%
+30,000 MSL	0%	5%	2%	0%	11%

[1] MSL is the elevation (on the ground) or altitude (in the air) of an object, relative to the average sea level. The elevation of a mountain, for example, is marked by its highest point and is typically illustrated as a small circle on a topographic map with the MSL height shown in either feet or meters, or both. Because aircraft fly across vast landscapes, where points above the ground can and do vary, MSL is often used is denote the “plane” on which the floors and ceilings of SUA are established and the altitude at which aircraft must operate within that SUA. AGL is the height as measured from ground level.

In comparison to the F-35A, the F-16 and A-10 aircraft are generally operated at lower altitudes a greater proportion of the time. Altitude distribution varies according to mission type. Overall, F-16 pilots focus operations below 18,000 feet MSL (84-86 percent). A-10 pilots spend approximately 56 percent of training flight time between 500 and 5,000 feet AGL and rarely operate above 18,000 feet MSL. While these data represent generalized altitude distributions for F-16 and A-10 aircraft (not specific to a single airspace), they clearly establish the differences in altitude use between the F-35A aircraft and currently based aircraft.

Regardless of the proposed altitude distribution and percent use indicated in Table 2-9, AFRC F-35A pilots would adhere to all FAA-charted floors and ceilings of SUA. For example, if a MOA has a charted floor of 7,000 feet AGL, then AFRC F-35A pilots would remain at or above that altitude. When flying, AFRC F-35A pilots would continue to comply with FAA avoidance regulations (14 *CFR* 91.119) and any base-specific avoidance procedures that current F-16 or A-10 pilots employ. For instance, aircraft must avoid congested areas of a city, town, or settlement or any open-air assembly of people by 1,000 feet above the highest obstacle within a horizontal radius of 2,000 feet of the aircraft.

2.3.4.1.2 Combined Use of Existing Airspace

Due to advanced capabilities, F-35A aircraft require larger expanses of airspace to operate. In order to conduct required training missions, F-35A pilots would use SUA in combination rather than individually. For example, an AFRC F-35A pilot might schedule and use two MOAs and their overlying ATCAA for one training activity. Although F-16 and A-10 pilots also use combined airspace, the F-35A aircraft would require more consistent combined use and incorporation of more existing SUA. Again, the need for sufficient size airspace would require changes in use patterns of existing airspace when compared to those of the F-16 or A-10 aircraft.

2.3.4.1.3 Night Operations

Combat can occur 24 hours per day and, as noted in Section 2.3.3, F-35A pilots would need to train after dark. In many circumstances, these after-dark operations are and would be completed before environmental night (i.e., 10:00 P.M. to 7:00 A.M.). The F-16 and A-10 aircraft proposed for replacement are currently flown between 1 and 4 percent of the time during environmental night (refer to Table 2-5). AFRC F-35A pilots are expected to fly approximately the same percent of operations during environmental night. Contingencies such as weather or special combat mission training could result in rare, unplanned operations during environmental night.

2.3.4.1.4 Supersonic Flight

Use of supersonic speeds enables F-35A pilots to “close on” (fly toward) and set up to fire a missile more rapidly than an adversary aircraft with less supersonic capability. F-35A pilots also use supersonic capability defensively to evade adversary air-to-air and ground-to-air weapons. To train with the full capabilities of the aircraft, AFRC F-35A pilots would employ supersonic flight where permitted. All supersonic flight would occur at altitudes and within airspace already authorized (i.e., approved and charted by the FAA) for such activities. Due to the F-35A mission and the aircraft’s capabilities, the USAF anticipates that AFRC F-35A supersonic flight training would be conducted above 15,000 feet MSL, with 90 percent occurring above 30,000 feet MSL (Table 2-10). AFRC F-35A pilots would fly at supersonic speeds below 15,000 MSL on only an occasional basis. F-16 pilots conduct supersonic training at lower altitudes more frequently, with approximately 8 percent of supersonic operations occurring between 10,000 and 15,000 feet MSL, 12 percent between 15,000 and 30,000 feet MSL, and the remaining 80 percent at altitudes above 30,000 feet MSL. As mentioned previously, F-35A tactics are still evolving. Currently, the estimated percentage of F-35A sorties involving supersonic flight is approximately the same as the percentage flown by 4th generation fighter aircraft such as the F-16. A-10 pilots do not conduct supersonic flights.

Table 2-10. Average Altitude Profiles for Supersonic Flight

Altitude (feet)	F-16 Aircraft	Proposed F-35A
5,000 AGL – 10,000 MSL	0%	0%
10,000 – 15,000 MSL	8%	0%
15,000 – 30,000 MSL	12%	10%
+30,000 MSL	80%	90%

2.3.4.1.5 Mission Duration

Like the F-16 and A-10 pilots, AFRC F-35A pilots would fly, on average, approximately 45 to 115 minute-long missions, including take-off, transit to and from the training airspace, training activities, and landing. Depending upon the distance and type of training activity, AFRC F-35A pilots (like F-16 and A-10 pilots) would fly approximately 20 to 60 minutes in the training airspace. Occasionally, F-35A pilots could fly up to 90-minute sessions in one or more SUA(s).

2.3.4.2 Range Use

The F-35A has the requirement and capability to perform air-to-ground missions. For the AFRC F-35A aircraft, air-to-ground training would represent about 60 percent of the training program, with the air superiority mission accounting for the remaining 40 percent. Most air-to-ground ordnance delivery training would be simulated (i.e., nothing is released from the aircraft and electronic scoring is used). The F-35A aircraft uses high-fidelity avionics and embedded training systems to simulate ordnance delivery on a target. This type of training could be conducted in any of the SUA meeting the airspace training event requirements for floor, ceiling, and size.

Air-to-ground training would also include occasional ordnance delivery. AFRC F-35A pilots would conduct air to ground ordnance delivery training only while operating in existing RA over the ranges previously approved for ordnance use. No changes to airspace structure or size are proposed to support the AFRC F-35A mission. Additionally, no changes to range target configurations or types are needed to accommodate F-35A training and operations. Should AFRC choose to make any F-35A-specific airspace or range modifications in the future, these actions would undergo an appropriate level of environmental analysis prior to implementation.

Proposed ranges at each of the alternative bases include: the Barry M. Goldwater Range (BMGR) (Davis-Monthan AFB); Pinecastle Range and Avon Park Air Force Range (APAFR) (Homestead ARB); Falcon and Fort Hood Ranges (NAS JRB Fort Worth); and Cannon, Fort Riley and Smoky Hill Ranges (Whiteman AFB). The U.S. Navy Pinecastle Range Complex, to include the Rodman and Lake George Ranges, located in Florida, does not currently include F-35A air-to-ground ordnance training. However, the U.S. Navy Pinecastle Range Complex does support both high-explosive and inert training conducted by AFRC F-16 pilots. AFRC F-35A training proposed to be conducted at the U.S. Navy Pinecastle Range Complex would be conducted at the same training tempo and type as training currently conducted by AFRC F-16 pilots. Prior to the use of F-35A ordnance profiles and training actions, the USAF would coordinate with the Navy to ensure that the proposed F-35A ordnance profiles have been approved for use at the U.S. Navy Pinecastle Range Complex. Should additional analysis or planning be required for range safety actions, they would be completed as applicable.

The F-35A is capable of carrying and employing several types of ordnance. As the USAF currently envisions, the following describes the types of ordnance that could be employed by the F-35A; however, ordnance types change over the years and how they are employed in training evolves as well. AFRC F-35A pilots would only use ordnance that is approved for use at each of the ranges identified in this EIS.

Currently, the F-35A is expected to use the GBU-31 variant of the Joint Direct Attack Munition (JDAM), which is a 2,000-pound, general-purpose Mark-84 bomb, for air-to-ground ordnance delivery. JDAMs are guided to the target by an attached global positioning system (GPS) receiver. These weapons, commonly released between 20,000 and 40,000 feet MSL, require no laser guidance. The USAF expects no changes in the numbers of JDAMs used by F-35A aircraft when compared to those of the F-16 or A-10 aircraft proposed for replacement, and JDAMs would continue to be used on ranges already approved for such use. Optional internal loads include a wide variety of air-to-ground ordnance: small diameter bombs, missiles, dispensers, and guided weapons. In addition, because the F-35A carries an internal, four-barrel cannon, occasional tactical training using the cannon would be conducted. Using the cannon involves firing at a prescribed target for a short burst of time. As is the case for air-to-air and air-to-ground ordnance training, use of the cannon would follow specific safety procedures and be employed only on ranges and targets approved for such use.

2.3.4.2.1 Defensive Countermeasures

Flares are one of the defensive mechanisms dispensed by military aircraft to avoid attack by enemy aircraft and air defense systems. Although the stealth features of the F-35A aircraft significantly reduce its detectability, pilots must train to use defensive countermeasures. Flares dispensed from aircraft provide high-temperature heat sources that mislead heat-sensitive or heat-seeking targeting systems. Flares provide an infrared countermeasure against homing, heat-seeking, surface-to-air and air-to-air missiles. Flares would only be used in airspace approved for flare use and at altitudes designated for the airspace. Flares burn out in approximately 500 feet, so altitude restrictions in SUA are established to ensure flares burn out before reaching the ground or water (ACC Supplement to AFI 11-214).

Flare deployment in authorized airspace associated with the four alternative bases is governed by a series of regulations based on safety and environmental considerations and limitations. These regulations establish procedures governing the use of flares over ranges, other government-owned and -controlled lands, and nongovernment-owned or -controlled areas. All areas used for flare deployment are required to be analyzed through appropriate National Environmental Policy Act (NEPA) documentation. ACC has set standard minimum-release altitudes (ACC Supplement to AFI 11-214, Change 1, 2016) for flares over government-owned and -controlled lands. These standards, which vary from 300 to 900 feet AGL according to aircraft type, are designed to allow the flares to burn out completely at least 100 feet AGL. For F-16 and A-10 aircraft, the minimum release altitude for flares is 700 feet AGL. Minimum release altitudes for the F-35A aircraft would be the same. Over nongovernment-controlled lands, flare release is restricted to a minimum of 2,000 feet AGL and above for all aircraft; this requirement would apply to F-35A aircraft. More restrictive altitude restrictions are followed for specific airspace in response to local considerations, including wildfire threat levels. Flares can also be dispensed in the offshore Warning Areas without altitude restrictions.

Defensive flares are made of magnesium that, when ignited, burns for a short period (less than 5 seconds) at approximately 2,000 degrees Fahrenheit (°F). The burn temperature is hotter than the F-35A exhaust, so the flare attracts and decoys heat-seeking weapons and sensors targeted on the aircraft. Pilots must regularly train with defensive flares under simulated threat conditions to ensure flare deployment in extremely high-stress combat conditions. F-35A pilots would use the Mobile Jettison Unit (MJU)-61A/B type of flare. If the USAF determines that F-35A pilots need to employ flares in training airspace not yet approved for such operations, then appropriate NEPA documentation would be completed prior to use of flares in that airspace (USAF 2013).

The MJU-61A/B flare measures approximately 1 inch by 1 inch by 8 inches in size. This flare has an igniter device that allows the hot gasses propelling the flare from the aluminum cartridge to ignite the flare magnesium pellet as the flare exits the cartridge. As shown in Table 2-11, residual materials are deposited on the ground following deployment of each MJU-61A/B flare (USAF 2013).

Table 2-11. Disposition of Residual Material Following Deployment of One Flare

Material	Disposition	MJU-61A/B
Flare Case	Aluminum, remains in aircraft	1-inch x 1-inch x 8-inch
Flare Insert	Burns when deployed	Magnesium, Teflon
End Cap/Pad	Deposited on the ground	1-inch x 1-inch x 1/8-inch plastic or nylon cap; one same-sized silicone foam pad
Piston	Deposited on the ground	1-inch x 1-inch x 1/2-inch nylon/plastic piston
Flare/Body Wrapping	Deposited on the ground	Up to 2-inch x 17-inch piece of graphite fabric (stiff, duct-tape type material)
Initiator	Deposited on the ground	1-inch x 1-inch x 1/2-inch plastic/spring device

Source: USAF 2012

Different residual flare materials have different rates of descent and different impacts when they reach the ground. All of the MJU-61A/B residual flare materials that fall have surface area-to-weight ratios that do not produce any substantial impact when the residual flare material reaches the ground. The largest item (by surface area-to-weight ratio) that would fall from the MJU-61A/B flare is the 0.975-inch by 0.975-inch by 0.5-inch plastic and spring igniter device, which weighs approximately 0.33 ounce. This igniter device strikes the ground with a momentum of 0.046 pound/second, or approximately the same force as a small hailstone. If an igniter device were to strike an unprotected individual, it would be expected to be noticed, but not cause a bruise (USAF 2012).

Use of these defensive countermeasures varies among the airspace for the four alternative bases, and records defining the amount of use are not complete or comparable. This is due to the fact that F-16 and A-10 pilots do not dispense flares on every sortie, and F-35A pilots can be expected to use fewer flares. Although AFRC F-35A missions and training would retain similarities with F-16 or A-10 missions and training, F-35A tactics and training events are evolving and continue to develop. Flare use by F-35A pilots would conform to existing altitude and seasonal restrictions to ensure fire safety. These restrictions would continue to minimize the potential for fires, so the impacts of flare use would not exceed the negligible impacts already occurring. Based on the emphasis on flight at higher altitudes for the F-35A, roughly 90 percent of F-35A flares released throughout the authorized airspace would occur above 15,000 feet MSL, further reducing the potential risk for accidental fires.

2.3.5 Proposed Action and Alternatives

Along with the No Action Alternative, four beddown alternatives that best fulfill AFRC's mission responsibilities as presented in the purpose and need are carried forward for further detailed analysis. To provide a context for the proposed action and beddown alternatives, the following sections present a brief description of each base and its missions.

2.3.5.1 Davis-Monthan AFB, Arizona

Davis-Monthan AFB is located on the southeastern edge of the City of Tucson in Pima County, Arizona. The majority of the base, with the exception of the southeastern portion, is located within the city limits of Tucson. The base encompasses approximately 10,700 acres, of which approximately 5,700 acres are developed or semi-improved, 4,700 acres are undeveloped, and 300 acres are under easement and maintained by Pima County. Davis-Monthan AFB is surrounded by heavy to light industrial development to the south and west and the City of Tucson to the north. The Aerospace Maintenance and Regeneration Group (AMARG), which serves as the storage facility for retired aircraft, dominates land use to the east, with some residential development to the northeast.

Davis-Monthan AFB is the home of the 355th Fighter Wing (355 FW), which is part of the ACC. The 924 Fighter Group (924 FG) is an "associate unit to the 355 FW and operates 24 A-10 aircraft at Davis-Monthan AFB; these aircraft would be replaced with 24 F-35A aircraft should the installation be selected to receive the AFRC F-35A mission.

2.3.5.2 Homestead ARB, Florida

Homestead ARB is located in southern Miami-Dade County, Florida, approximately 25 miles south of Miami. The base is located approximately 8 miles from the center of the City of Homestead and outside the city limits. The installation encompasses approximately 1,950 acres and is surrounded by agricultural lands and some residential and commercial development.

Homestead ARB is an AFRC installation and is led by the AFRC 482nd Fighter Wing (482 FW). As part of the 482 FW, the 93rd Fighter Squadron (93 FS) "Makos" fly and maintain 24 F-16 aircraft; these aircraft would be replaced with 24 F-35A aircraft should the installation be selected to receive the AFRC F-35A mission.

2.3.5.3 NAS JRB Fort Worth, Texas

NAS JRB Fort Worth is located in the western portion of Fort Worth, directly south of Lake Worth, in Tarrant County, Texas. The installation encompasses approximately 1,805 acres and is bordered to the east by residential development, to the west by the Lockheed Martin assembly plant and residential development, to the north by Lake Worth, and to the south by light industrial and commercial development.

NAS JRB Fort Worth is operated by the Navy. The 301st Fighter Wing (301 FW) is the only AFRC fighter unit in the State of Texas and operates 24 F-16 aircraft at NAS JRB Fort Worth; these aircraft would be replaced with 24 F-35A aircraft should the installation be selected to receive the AFRC F-35A mission.

2.3.5.4 Whiteman AFB, Missouri

Whiteman AFB is located in Johnson County, Missouri, approximately 2 miles south of the City of Knob Noster and 70 miles southeast of Kansas City, Missouri. The installation encompasses approximately 5,419 acres and is predominantly surrounded by agricultural land use with some minor residential development to the east.

The 509th Bomb Wing (509 BW) of the USAF Global Strike Command is the host unit at Whiteman AFB. The 442nd Fighter Wing (442 FW) operates 24 A-10 aircraft at Whiteman AFB; these aircraft would be replaced by 24 F-35A aircraft should the installation be selected to receive the AFRC F-35A mission.

2.3.6 No Action Alternative

Analysis of the No Action Alternative (40 *CFR* §1502.14(d)) provides a benchmark, allowing the decision-maker to compare the magnitude of the environmental effects from taking no action to the effects of implementation of the proposed action at any of the four alternative bases. The No Action Alternative for this EIS means that there would be no AFRC F-35A mission. Implementation of the No Action Alternative would mean that the AFRC F-35A aircraft beddown would not occur and there would be no F-35A related personnel or construction changes at any of the four bases. The current environmental situation, which includes on-going, currently planned activities and programs would continue, unchanged at each of the four bases.

2.4 COMPARISON OF ENVIRONMENTAL CONSEQUENCES AMONG ALTERNATIVES

Table 2-12 summarizes the potential environmental consequences from Chapter 4 where the AFRC F-35A mission requirements from Chapter 2 are overlaid on the baseline conditions for each of the four alternative bases. The consequences will be presented for each environmental resource area and will be described for each alternative base.

This summary comparison of environmental consequences provides an overview of the consequences associated with implementation of the AFRC F-35A mission at each base. The following NEPA activities will be completed to ensure that decision makers have a comprehensive understanding of the potential environmental consequences of their decision.

- Documentation of existing environmental conditions for each alternative base. The existing conditions for these resources relied heavily on recent environmental materials and federal and state databases prepared at and near each alternative base.
- Base-specific assessments of environmental consequences of the beddown of the AFRC F-35A mission. Each assessment overlaid the project details upon the existing conditions to estimate potential base-specific environmental consequences.

Table 2-12. Comparative Summary of Environmental Consequences

Resource Area	<u>Davis-Monthan AFB</u> 24 F-35A aircraft (+2 BAI) Replace 24 A-10 aircraft	<u>Homestead ARB</u> 24 F-35A aircraft (+2 BAI) Replace 24 F-16 aircraft	<u>NAS JRB Fort Worth</u> 24 F-35A aircraft (+2 BAI) Replace 24 F-16 aircraft	<u>Whiteman AFB</u> 24 F-35A aircraft (+2 BAI) Replace 24 A-10 aircraft	No Action
Airspace Management and Use	**<u>Installation:</u>** • No adverse impacts to airspace management and use in the local air traffic environment. • 0.7 percent increase in total annual airfield operations. This increase could be accommodated by the Davis-Monthan AFB airfield and surrounding airspace without adverse effect. **<u>Airspace:</u>** • No change to the current configuration of airspace. • Approximate 5 percent increase in total sorties. This increase could be accommodated by the region's airspace. • No adverse impacts on airspace management and use.	**<u>Installation:</u>** • No adverse impacts to airspace management and use in the local air traffic environment. • 3.0 percent increase in total annual airfield operations. This increase could be accommodated by the air traffic control (ATC) within the Homestead ARB airfield and surrounding airspace without adverse effect. **<u>Airspace:</u>** • No change to the current configuration of airspace. • Approximate 0.2 percent decrease in total sorties. • No adverse impacts on airspace management and use.	**<u>Installation:</u>** • No adverse impacts to airspace management and use in the local air traffic environment. • 12.1 percent increase in total annual airfield operations. This increase could be accommodated by the NAS JRB Fort Worth airspace environment without adverse effect. **<u>Airspace:</u>** • No change to the current configuration of airspace. • Approximate 1.2 percent increase in total sorties. • No adverse impacts on airspace management and use.	**<u>Installation:</u>** • No adverse impacts to airspace management and use in the local air traffic environment. • 17.4 percent increase in total annual airfield operations. This increase could be accommodated Whiteman AFB airfield and surrounding airspace environment without adverse effect. **<u>Airspace:</u>** • No change to the current configuration of airspace. • Approximate 5.9 percent decrease in total sorties. • No adverse impacts on airspace management and use.	Under the No Action Alternative at all four alternative bases, the USAF would continue to use and manage airspace as it is today until retirement of the current aircraft. Flying operations and airspace use would continue with no F-35A-related increase or decrease in air traffic.

Table 2-12. Comparative Summary of Environmental Consequences (Continued)

Resource Area	**Davis-Monthan AFB** **24 F-35A aircraft (+2 BAI)** **Replace 24 A-10 aircraft**	**Homestead ARB** **24 F-35A aircraft (+2 BAI)** **Replace 24 F-16 aircraft**	**NAS JRB Fort Worth** **24 F-35A aircraft (+2 BAI)** **Replace 24 F-16 aircraft**	**Whiteman AFB** **24 F-35A aircraft (+2 BAI)** **Replace 24 A-10 aircraft**	No Action
Noise	Implementation of the AFRC F-35A mission would result in significant noise impacts at Davis-Monthan AFB. The USAF considered a number of different measures to mitigate noise impacts, but none of these measures were determined to be operationally feasible (Section 2.5). **Installation:** **Affected by day-night average sound level (DNL) of 65 decibels (dB) or greater:** ***Scenario A*** Acres – 1,566 Estimated Population – 1,506 ***Scenario B*** Acres – 1,679 Estimated Population – 1,428 ***Scenario C*** Acres – 1,762 Estimated Population – 1,361 **Other items of note:** • The Griffin Foundation Schools would be the only schools exposed to DNL of 65 dB or greater (all scenarios). • Residential areas including parts of the Roberts and Julia Keen neighborhoods would be exposed to DNL of 65 dB (all scenarios). • Transient F-35A aircraft operate at Davis-Monthan AFB occasionally under baseline conditions. Operations would become much more frequent under the AFRC F-35A mission. • The highest sound exposure level (SEL) experienced at representative locations would remain the same under the AFRC F-35A mission as under baseline conditions except at Freedom Park, the Griffin Foundation Schools, and the University of Arizona where they would increase by 2, 1, and 5 dB, respectively, under Scenario A, B, or C. • All the proposed action noise contours (all scenarios) are within the Airport Environs Zone (AEZ). **Airspace:** • Onset-rate adjusted day-night average sound level (L_{dnmr}) would not increase by more than 1 dB in the training airspace. • Supersonic training would occur in the BMGR airspace (i.e., R-2301, R-2304, and R-2305) and Sells MOA, which are currently approved for supersonic training. The number of sonic booms in the BMGR would increase from 3.1 to 3.5 per day and the C-weighted day-night average sound level (CDNL) would increase from 56 to 57 dB. The average number of sonic booms per day beneath the Sells MOA would increase from 2.1 to 2.2 per day and CDNL would increase from 54 to 56 dB.	Implementation of the AFRC F-35A mission would result in adverse but not significant noise impacts at Homestead ARB. The USAF considered a number of different measures to mitigate noise impacts, but none of these measures were determined to be operationally feasible (Section 2.5). **Installation:** **Affected by DNL of 65 dB or greater:** ***Scenario A*** Acres – 2,926 Estimated Population – 62 ***Scenario B*** Acres – 3,088 Estimated Population – 79 ***Scenario C*** Acres – 3,263 Estimated Population – 104 **Other items of note:** • All of the estimated population affected by DNL greater than 65 dB are located at the South Dade Center (S02). • The highest SEL experienced at representative locations would remain the same or decrease under the AFRC F-35A mission except at the Biscayne Bay Visitor Center where it would increase by 4 dB from 88 to 92 dB. • The DNL at Biscayne Bay National Park offshore would increase by 10 dB, 9 dB, and 8 dB under Scenarios A, B, and C, respectively. • The DNL at Audubon Park would increase by 8 dB under all scenarios. • The DNLs at other representative locations studied would increase by 1 to 4 dB under Scenarios A and B and by as much as 5 dB under Scenario C. **Airspace:** • L_{dnmr} would increase by as much as 6 dB beneath training airspace. • The number of sonic booms would decrease and supersonic training would be conducted in areas currently authorized for supersonic activities. • L_{dnmr} in the Ocala National Forest would range from 48 to 56 dB.	Implementation of the AFRC F-35A mission would result in significant noise impacts at NAS JRB Fort Worth. The USAF considered a number of different measures to mitigate noise impacts, but none of these measures were determined to be operationally feasible (Section 2.5). **Installation:** **Affected by DNL of 65 dB or greater:** ***Scenario A*** Acres – 2,350 Estimated Population – 8,593 ***Scenario B*** Acres – 2,369 Estimated Population – 8,622 ***Scenario C*** Acres – 2,386 Estimated Population – 8,648 **Other items of note:** • Under Scenario A, DNL at all 11 representative locations studied would exceed 65 dB. At 5 of the locations DNL would exceed 70 dB, and at 1 location DNL would exceed 75 dB. • DNL under Scenarios B and C would be the same as under Scenario A except at White Settlement Library where it would increase under Scenarios B and C by 3 dB rather than 2 dB. • DNL at Malaga Park and Luelle Merritt Elementary School would increase by 5 dB, to 71 and 67 dB, respectively. • DNL at the other locations would increase 1 to 4 dB. • The estimated number of residents exposed to outdoor 24-hour equivalent noise levels (L_{eq24}) >80 dB would increase by 40 under Scenario A, 42 under Scenario B, and 44 under Scenario C. These individuals would be exposed to noise levels that are associated with an increased risk of measureable noise-induced hearing loss under certain circumstances. **Airspace:** • L_{dnmr} would remain at baseline levels or below 45 dB beneath the training airspace, with the exception of R-5601/R-5602 (Falcon Range). The L_{dnmr} at R-5601/R-5602 would increase from less than 45 dB to 49 dB. • Supersonic training would continue to occur above the Brownwood MOAs and the number of sonic booms would average less than one per day.	Implementation of the AFRC F-35A mission would result in significant noise impacts at Whiteman AFB. The USAF considered a number of different measures to mitigate noise impacts, but none of these measures were determined to be operationally feasible (Section 2.5). **Installation:** **Affected by DNL of 65 dB or greater:** ***Scenario A*** Acres – 2,421 Estimated Population – 2,226 ***Scenario B*** Acres – 2,517 Estimated Population – 2,507 ***Scenario C*** Acres – 2,620 Estimated Population – 2,804 **Other items of note:** • Under all scenarios, DNL at Knob Noster Elementary School would increase from 61 dB to 65 dB and DNL at Knob Noster High School would increase from 55 to 62 dB. • The DNL at residential area 3 would increase from 57 to 66 dB under Scenarios A and B, and from 57 to 67 dB under Scenario C. • At Residential Areas 1 and 2, DNL would increase to 69 dB and 73 dB, respectively under all scenarios. • The DNL at Knob Noster State Park would increase from 48 dB to 54 dB under Scenario A and to 55 dB under Scenarios B and C. **Airspace:** • L_{dnmr} would remain at baseline levels beneath the training airspace, with the exception of R-4501 and the Cannon and Salem MOAs. L_{dnmr} below these areas would increase by up to 2 dB. • Supersonic training is not authorized in the training airspace associated with this alternative and would not occur.	Under the No Action Alternative at Davis-Monthan AFB, Homestead ARB, NAS JRB Fort Worth and Whiteman AFB, existing aircraft operations would continue unchanged until retirement of the current aircraft. Construction associated with the AFRC F-35A beddown would not occur. Noise levels at each of the four installations would continue as described in this EIS under baseline conditions, and there would be no new F-35A-related noise impacts. At NAS JRB Fort Worth, Lockheed Martin would continue to build F-35 and other aircraft at the adjacent assembly facility and Lockheed Martin pilots would continue to conduct F-35 test flights for the new aircraft.

Table 2-12. Comparative Summary of Environmental Consequences (Continued)

<table>
<tr><th>Resource Area</th><th><u>Davis-Monthan AFB</u>
24 F-35A aircraft (+2 BAI)
Replace 24 A-10 aircraft</th><th><u>Homestead ARB</u>
24 F-35A aircraft (+2 BAI)
Replace 24 F-16 aircraft</th><th><u>NAS JRB Fort Worth</u>
24 F-35A aircraft (+2 BAI)
Replace 24 F-16 aircraft</th><th><u>Whiteman AFB</u>
24 F-35A aircraft (+2 BAI)
Replace 24 A-10 aircraft</th><th>No Action</th></tr>
<tr><td>Air Quality</td><td><u>Installation:</u>
• Net emissions were determined to be insignificant in that they were less than the General Conformity applicability threshold for the maintenance criteria pollutant and the Prevention of Significant Deterioration (PSD) threshold used as an indicator of significance for the area’s attainment criteria pollutants.
• Area is in attainment for all criteria pollutants but is a maintenance area for carbon monoxide (CO); the General Conformity applicability analysis determined the net direct and indirect emissions to be below the de minimis threshold for CO and the action may proceed without a conformity determination.
• Volatile organic compound (VOC), CO, nitrogen oxide (NO_x), particulate matter less than or equal to 10 micrometers in diameter (PM_{10}) and particulate matter less than or equal to 2.5 micrometers in diameter ($PM_{2.5}$) emissions would be reduced and sulfur oxide (SO_x) concentrations would increase slightly but not exceed the indicator threshold.
<u>Airspace:</u>
• Emissions in the training airspace would decrease.</td><td><u>Installation:</u>
• Net emissions were determined to be insignificant in that they were less than the PSD threshold used as an indicator of significance for the area’s attainment criteria pollutants.
• Area is in attainment for all criteria pollutants.
<u>Airspace:</u>
• Emissions in the training airspace would decrease.</td><td><u>Installation:</u>
• Net emissions were determined to be insignificant in that they were less than the General Conformity applicability thresholds for the nonattainment criteria pollutant precursors and the PSD threshold used as an indicator of significance for the area’s attainment criteria pollutants.
• Tarrant County is in moderate nonattainment of the 2008 ozone (O_3) standard and in marginal nonattainment of the 2015 O_3 standard; the General Conformity applicability analysis determined the net direct and indirect emissions to be below the de minimis thresholds for O_3 precursor pollutants and the action may proceed without a conformity determination.
• VOC emissions would reduce with the new mission and all other pollutant emissions would increase but not exceed their respective indicator thresholds.
<u>Airspace:</u>
• Emissions in the training airspace would decrease.</td><td><u>Installation:</u>
• Net emissions were determined to be insignificant in that they were less than the PSD threshold used as an indicator of significance for the area’s attainment criteria pollutants.
• Area is in attainment for all criteria pollutants.
<u>Airspace:</u>
• Emissions in the training airspace would decrease.</td><td>Under the No Action Alternative, baseline conditions at each installation would remain unchanged until retirement of the current aircraft. No F-35A-related construction emissions would occur, and operational emissions would be identical to the current baseline conditions. No additional F-35A-related impacts would occur.</td></tr>
<tr><td rowspan="2">Safety</td><td colspan="4"><u>Installation:</u>
• No specific aspect of the AFRC F-35A mission would create any unique or extraordinary safety issues.
• No unique construction practices or materials would be required as part of any of the demolition, renovation, or construction projects and would be completed in compliance with all applicable Occupational Safety and Health Administration (OSHA) regulations to protect workers.
• Emergency response and mishap plans, including fire and crash response plans (including aircraft containing composite material), would be updated and followed.
• Due to the current safety record of the F-35A, the increasing safety trend for single-engine fighter aircraft, and increases in safety as an airframe matures operationally, it is reasonable to expect nominal changes in flight-safety risk.
• No changes to existing Accident Potential Zones (APZs) or Clear Zones (CZs).
• Bird/Wildlife-Aircraft Strike Hazard (BASH) Plans and procedures would continue to be followed.
• No significant impacts to installation safety are anticipated.</td><td rowspan="2">Under the No Action Alternative, baseline conditions at each installation would continue as they are today until retirement of the current aircraft. The number and types of operations would remain the same as those described under baseline conditions.</td></tr>
<tr><td colspan="4"><u>Airspace:</u>
• Compliance with fire management plans and mutual response agreements would continue.
• The frequency of flare use would remain the same or decrease and primarily be used above 15,000 feet MSL reducing the potential risk of accidental fires.
• Compliance with all flight safety procedures and requirements would minimize the chances for aircraft mishaps.
• BASH Plan and procedures would continue to be followed.
• No significant impacts to airspace safety are anticipated.</td></tr>
<tr><td rowspan="2">Soil and Water Resources</td><td colspan="4">Implementation of the AFRC F-35A mission would not result in significant impacts to soil and water resources at any of the four bases.</td><td rowspan="2">Conditions at each installation would remain unchanged. None of the construction associated with the AFRC F-35A mission would occur and no F-35A-related impacts to soil and water resources would occur.</td></tr>
<tr><td><u>Installation:</u>
• Total disturbed area – approximately 15.2 acres, total new impervious area – 1.6 acres.
• Most of the construction would occur in areas that have been previously disturbed.
• No changes to the existing aircraft deicing operations would occur.
<u>Airspace:</u> Not applicable.</td><td><u>Installation:</u>
• Total disturbed area - approximately 2.3 acres, total new impervious area - approximately 2 acres.
• Most construction would occur in disturbed areas.
<u>Airspace:</u> Not applicable.</td><td><u>Installation:</u>
• Total disturbed area – approximately 7.7 acres, total new impervious area – approximately 1.2 acres.
• Most of the construction would occur in areas that have been previously disturbed.
• No changes to the existing aircraft deicing operations would occur.
<u>Airspace:</u> Not applicable.</td><td><u>Installation:</u>
• Total disturbed area – approximately 2.9 acres, total new impervious area – reduction of approximately 0.4 acres.
• Most of the construction would occur in areas that have been previously disturbed.
• No changes to the existing aircraft deicing operations would occur.
<u>Airspace:</u> Not applicable.</td></tr>
</table>

Table 2-12. Comparative Summary of Environmental Consequences (Continued)

Resource Area	Davis-Monthan AFB 24 F-35A aircraft (+2 BAI) Replace 24 A-10 aircraft	Homestead ARB 24 F-35A aircraft (+2 BAI) Replace 24 F-16 aircraft	NAS JRB Fort Worth 24 F-35A aircraft (+2 BAI) Replace 24 F-16 aircraft	Whiteman AFB 24 F-35A aircraft (+2 BAI) Replace 24 A-10 aircraft	No Action
Biological Resources	**Installation:** • No significant impacts to biological resources or wetlands are anticipated. • Construction and demolition (C&D) projects would occur in developed and previously disturbed areas resulting in no significant impacts to vegetation. • No federal-listed species are known to occur on Davis-Monthan AFB. The U.S. Fish and Wildlife Service (USFWS) indicated that no further Section 7 consultation is required (see Volume II, Appendix A, Section A.2.4.5). • State-listed species known to occur at Davis-Monthan AFB include Gila monster (*Heloderma suspectum*), cactus ferruginous pygmy-owl (*Glaucidium brasilianum*), western burrowing owl, cave myotis (*Myotis velifer*), and western yellow bat (*Lasiurus xanthinus*); one state-protected species, the Saguaro cactus (*Carnegiea giganteus*), is known to occur at Davis-Monthan AFB. No impacts to federal- or state-listed species are anticipated. • No significant impacts to wildlife are anticipated. Wildlife would adapt, acclimate, and habituate to the increase in noise from aircraft operations. • C&D projects would not occur in wetlands resulting in no impacts to wetlands. **Airspace:** • No significant impacts to biological resources or wetlands are anticipated. • Ground disturbance would be limited to flare and munitions use which would be less than or the same as used by the current A-10 mission. No significant impacts to vegetation are anticipated. • 90 percent of F-35A operations would occur at elevations greater than 15,000 feet and 99 percent of operations would occur at elevations higher than 5,000 feet. No significant impacts to wildlife or protected species are anticipated. • Supersonic operations would occur at the BMGR and above the Sells MOA at elevations typically greater than 30,000 feet MSL (~90 percent of time). The number of sonic booms would increase from 3.1 to 3.5 per day below the BMGR resulting in an increase of the CDNL from 56 to 57 dB. The number of sonic booms above the Sells MOA would increase from 2.1 to 2.2 per day but the CDNL would increase from 54 to 56 dB. No significant impacts to wildlife or protected species are anticipated.	**Installation:** • No significant impacts to biological resources or wetlands are anticipated. • C&D projects would occur in developed and previously disturbed areas resulting in no significant impacts to vegetation. • 10 federal-listed species are known to occur on Homestead ARB. USAF determined that the proposed action would have *No Effect* on the American alligator (*Alligator mississippiensis*), American crocodile (*Crocodylus acutus*), Eastern indigo snake (*Drymarchon corais couperi*), sand flax (*Polygala smallii*), Small's milkpea (*Galactia smallii*), and *May Effect* but is *Not Likely to Adversely Affect* the Everglade snail kite (*Rostrhamus sociabilis plumbeus*), rufa red knot (*Calidris canutus rufa*), Florida bonneted bat (*Eumops floridanus*), wood stork (*Mycteria americana*), and least tern *(Sterna antillarum)*. Consultations with the USFWS are complete. • No significant impacts to federal- or state-listed species are anticipated. • No significant impacts to wildlife are anticipated. Animals would adapt, acclimate, and habituate to the increase in noise from aircraft operations. • C&D projects would not occur in wetlands resulting in no impacts to wetlands. **Airspace:** • No significant impacts to biological resources or wetlands are anticipated. • 2 percent decrease in aircraft operations. • Ground disturbance would be limited to flare and munitions use which would be less than or the same as used by the current F-16 mission. No significant impacts to vegetation are anticipated. • 94 percent of F-35A operations would occur at elevations above 10,000 feet and 99 percent of operations would occur at elevations higher than 5,000 feet. • Supersonic operations would occur only in areas currently authorized for supersonic activities. No significant impacts to wildlife or threatened and endangered species are anticipated.	**Installation:** • No significant impacts to biological resources or wetlands are anticipated. • C&D projects would occur in developed and previously disturbed areas resulting in no significant impacts to vegetation. • No federal- or state-listed species are known to occur on NAS JRB Fort Worth. No impacts to federal- or state-listed species are anticipated. The USFWS indicated that no further Section 7 consultation is required (see Volume II, Appendix A, Section A.2.6.4). • No significant impacts to wildlife are anticipated. Wildlife would adapt, acclimate, and habituate to the increase in noise from aircraft operations. • C&D projects would not occur in wetlands resulting in no impacts to wetlands. **Airspace:** • No significant impacts to biological resources or wetlands are anticipated. • Ground disturbance would be limited to flare and munitions use which would be less than or the same as used by the current F-16 mission. No significant impacts to vegetation are anticipated. • 94 percent of F-35A operations would occur at elevations greater than 10,000 feet and 99 percent of operations would occur at elevations higher than 5,000 feet. No significant impacts to wildlife or threatened and endangered species are anticipated. • Supersonic operations would continue to occur above the Brownwood MOAs at altitudes of 30,000 feet MSL or higher. No significant impacts to wildlife or threatened and endangered species are anticipated.	**Installation:** • No significant impacts to biological resources or wetlands are anticipated. • C&D projects would occur in developed and previously disturbed areas resulting in no significant impacts to vegetation. • No federal- or state-listed species are known to occur on Whiteman AFB and no trees would be cleared. No impacts to federal- or state-listed species are anticipated. The USFWS indicated that no further Section 7 consultation is required (see Volume II, Appendix A, Section A.2.7.4). • No significant impacts to wildlife are anticipated. Wildlife would adapt, acclimate, and habituate to the increase in noise from aircraft operations. • C&D projects would not occur in wetlands resulting in no impacts to wetlands. **Airspace:** • No significant impacts to biological resources or wetlands are anticipated. • Ground disturbance would be limited to flare and munitions use which would be less than or the same as used by the current A-10 mission. No significant impacts to vegetation are anticipated. • 94 percent of F-35A operations would occur at elevations greater than 10,000 feet and 99 percent of operations would occur at elevations higher than 5,000 feet. No supersonic operations would occur. No significant impacts to wildlife or threatened and endangered species are anticipated.	Under the No Action Alternative, baseline conditions at each of the four bases and associated airspace would continue as they are today until retirement of the current aircraft. There would be no F-35A-related changes to vegetation or wildlife habitat resulting in no impacts to biological resources.

Table 2-12. Comparative Summary of Environmental Consequences (Continued)

Resource Area	<u>Davis-Monthan AFB</u> 24 F-35A aircraft (+2 BAI) Replace 24 A-10 aircraft	<u>Homestead ARB</u> 24 F-35A aircraft (+2 BAI) Replace 24 F-16 aircraft	<u>NAS JRB Fort Worth</u> 24 F-35A aircraft (+2 BAI) Replace 24 F-16 aircraft	<u>Whiteman AFB</u> 24 F-35A aircraft (+2 BAI) Replace 24 A-10 aircraft	No Action
Cultural Resources	**<u>Installation:</u>** No adverse impacts to cultural resources are anticipated. **<u>Airspace:</u>** No adverse impacts to cultural resources are anticipated. **<u>Consultations:</u>** **Native American** • No adverse Section 106 impacts to tribal resources or traditional cultural properties are anticipated. • Section 106 consultation with Native American tribes is complete. The USAF will continue to coordinate with interested tribes throughout the EIS process. **SHPO** • No National Register of Historic Places (NRHP)-eligible or listed resources affected. • The Arizona State Historic Preservation Office (SHPO) concurred with the Area of Potential Effects (APE) and the USAF determination of no adverse effect (See Volume II, Appendix A, Section A.2.4.3).	**<u>Installation:</u>** No adverse impacts to cultural resources are anticipated. **<u>Airspace:</u>** No adverse impacts to cultural resources are anticipated. **<u>Consultations:</u>** **Native American** • No adverse Section 106 impacts to tribal resources or traditional cultural properties are anticipated. • Section 106 consultation with Native American tribes is complete. The USAF will continue to coordinate with interested tribes throughout the EIS process. **SHPO** • No NRHP-eligible or listed resources affected. • The Florida SHPO concurred with the APE and the USAF determination of no adverse effect (see Volume II, Appendix A, Section A.2.5.3).	**<u>Installation:</u>** No adverse impacts to cultural resources are anticipated. **<u>Airspace:</u>** No adverse impacts to cultural resources are anticipated. **<u>Consultations:</u>** **Native American** • No adverse Section 106 impacts to tribal resources or traditional cultural properties are anticipated. • Section 106 consultation with Native American tribes is complete. The USAF will continue to coordinate with interested tribes throughout the EIS process. **SHPO** • No NRHP-eligible or listed resources affected. • The Texas SHPO concurred with the APE and the USAF determination of no adverse effect (see Volume II, Appendix A, Section A.2.6.3).	**<u>Installation:</u>** No adverse impacts to cultural resources are anticipated. **<u>Airspace:</u>** No adverse impacts to cultural resources are anticipated. **<u>Consultations:</u>** **Native American** • No adverse Section 106 impacts to tribal resources or traditional cultural properties are anticipated. • Section 106 consultation with Native American tribes is complete. The USAF will continue to coordinate with interested tribes throughout the EIS process. **SHPO** • No NRHP-eligible or listed resources affected. • The Missouri SHPO concurred with the APE and the USAF determination of no adverse effect (see Volume II, Appendix A, Section A.2.7.3).	Under the No Action Alternative, there would be no F-35A-related building renovation, demolition or construction at any of the four bases thus resulting in no changes to cultural resources. In addition, aircraft operations in the airspace would not change resulting in no changes to cultural resources under the airspace currently used by pilots from each of the four bases until retirement of the current aircraft. Implementation of the No Action Alternative would result in no effect to cultural resources and/or historic properties.
	Inadvertent discovery of archaeological resources is considered unlikely. An inadvertent discovery of previously unrecorded cultural resources would be managed in compliance with federal and state laws and USAF regulations.				

Table 2-12. Comparative Summary of Environmental Consequences (Continued)

Resource Area	<u>Davis-Monthan AFB</u> 24 F-35A aircraft (+2 BAI) Replace 24 A-10 aircraft	<u>Homestead ARB</u> 24 F-35A aircraft (+2 BAI) Replace 24 F-16 aircraft	<u>NAS JRB Fort Worth</u> 24 F-35A aircraft (+2 BAI) Replace 24 F-16 aircraft	<u>Whiteman AFB</u> 24 F-35A aircraft (+2 BAI) Replace 24 A-10 aircraft	No Action
Land Use and Recreation	<u>Installation:</u> No significant impacts to land use resources would result from the proposed on-base physical development.				Under the No Action Alternative, land use conditions at each installation would remain as they are today. No F-35A-related changes would occur to planning noise contours surrounding the installations and no F-35A-related land use changes would occur in the installation boundaries.
	Affected by day-night average sound level (DNL) of 65 decibels (dB) or greater: ***Scenario A*** Total Acres – 1,566 Residential Acres – 91 ***Scenario B*** Total Acres – 1,679 Residential Acres – 85 ***Scenario C*** Total Acres – 1,762 Residential Acres – 79 The AFRC F-35A mission would not expose any land or property outside of the AEZ to DNL of 65 dB or greater. None of the recreational facilities identified near the base would be exposed to a DNL of 65 dB or greater under any of the afterburner scenarios. However, as shown in Tables DM3-10, DM3-11, and DM3-13, the change in noise levels at some of the locations would be noticeable. Saguaro National Park would not be affected by DNL greater than 45 dBA. <u>**Airspace:**</u> Six Special Use Land Management Areas (SULMAs) would experience an indiscernible 1 dB L_{dnmr} increase above baseline. Sonic booms would occur in areas where they occur today and at an intensity comparable to what occurs today with an average of one more per day. The increase in the number of sorties in training airspace above some recreational areas would indiscernibly affect the noise level, but a slight increase (1 per day) in supersonic events could affect recreational users.	**Affected by day-night average sound level (DNL) of 65 decibels (dB) or greater:** ***Scenario A*** Total Acres – 2,926 Residential Acres – 6 ***Scenario B*** Total Acres – 3,088 Residential Acres – 8 ***Scenario C*** Total Acres – 3,263 Residential Acres – 10 All of the residential acres affected by DNL of 65 dB or greater are located at the South Dade Center (S02). <u>**Airspace:**</u> A small portion of Biscayne National Park located offshore and northeast of the base would be exposed to a DNL increase of 10 dB (from 57 to 67 dB) from Scenario A. Average noise levels would increase below all of the training airspace proposed for use except the Palatka 1 MOAs. The Ocala National Forest is located below the Palatka MOA. However, the subsonic L_{dnmr} would remain below 65 dB in all of these areas.	**Affected by day-night average sound level (DNL) of 65 decibels (dB) or greater:** ***Scenario A*** Total Acres – 2,350 Residential Acres – 640 ***Scenario B*** Total Acres – 2,369 Residential Acres – 643 ***Scenario C*** Total Acres – 2,386 Residential Acres – 643 Average noise levels at recreational facilities (local city/county parks) near the base would increase which could reduce the quality and enjoyment of outdoor activities. <u>**Airspace:**</u> Wichita Mountains National Wildlife Refuge and Wilderness Area would experience a noticeable 4-dB increase, from less than 45 to 49 dB. Subsonic L_{dnmr} at the Falcon Range on Fort Sill and areas below the R-5601/R-5062 would experience a noticeable 4-dB increase, from less than 45 to 49 dB.	**Affected by day-night average sound level (DNL) of 65 decibels (dB) or greater:** ***Scenario A*** Total Acres – 2,421 Residential Acres – 307 ***Scenario B*** Total Acres – 2,517 Residential Acres – 354 ***Scenario C*** Total Acres – 2,620 Residential Acres – 405 The Joint Land Use Study (JLUS) identifies these residential areas (expect for the mobile home parks) as compatible, or generally compatible, with DNL from 65 dB to 75 dB when measures to achieve overall noise level reductions are included in the facility design and construction. Two mobile home parks would be impacted by increased noise from the AFRC F-35A mission. One park represented by point R02 is currently exposed to 68 dB DNL under baseline conditions. Implementation of Scenario A, B, or C would result in a DNL increase of 5 dB. A second mobile home park, represented by point R03, would be exposed to a DNL increase of 9 dB (66 dB) under all three afterburner scenarios. <u>**Airspace:**</u> No recreational land would be exposed to DNL of 65 dB or greater. Average noise levels would increase by up to 2 dB below all of the training airspace proposed for use. However, the subsonic L_{dnmr} would remain below 65 dB and none of the proposed airspace is approved for supersonic operations.	

Table 2-12. Comparative Summary of Environmental Consequences (Continued)

Resource Area	Davis-Monthan AFB 24 F-35A aircraft (+2 BAI) Replace 24 A-10 aircraft	Homestead ARB 24 F-35A aircraft (+2 BAI) Replace 24 F-16 aircraft	NAS JRB Fort Worth 24 F-35A aircraft (+2 BAI) Replace 24 F-16 aircraft	Whiteman AFB 24 F-35A aircraft (+2 BAI) Replace 24 A-10 aircraft	No Action
Socioeconomics (all numbers are approximated)	Due to the increased noise, implementation of the AFRC F-35A mission would result in significant socioeconomic impacts. **Installation[a]:** ***Population*** Decrease of 30 full-time mission personnel. Less than 0.01 percent decrease in the population of Pima County. ***Economic Activity*** Construction activities would be temporary and provide limited economic benefit. Total construction costs of $87.3 million could generate $44.5 million in direct, indirect, and induced income for the duration of the construction activity. ***Housing*** The 30 outgoing full-time personnel would no longer require off-base housing. Properties which have not changed ownership since 2004 could experience a noise discount on property values. The exact percent of discount would depend upon a number of factors, including the noise indicators used, thresholds, types of properties evaluated, and other factors. The general impact on home pricing would be the same regardless of which afterburner scenario is selected. ***Education*** Approximately 30 military and non-military dependents of school age would no longer attend schools in Pima County. This decrease in students would not be noticed in the dynamic Pima County Schools System. Griffin Foundation Schools would be exposed to DNL of 65 dB or greater which could interfere with learning. The number of schools and students impacted by increased noise would constitute a significant impact. ***Public Services*** No measurable effect to public services would be anticipated. ***Base Services*** No measurable effect to base services would be anticipated. **Airspace:** Not applicable.	**Installation[a]:** ***Population*** Decrease of 91 full-time mission personnel. Less than 0.01 percent decrease in the population of Miami-Dade County. ***Economic Activity*** Construction activities would be temporary and provide limited economic benefit. Total construction costs of $18.6 million could generate $9.8 million in direct, indirect, and induced income for the duration of the construction activity. ***Housing*** Military housing is not available at Homestead ARB. The 91 outgoing full-time personnel would no longer require off-base housing. ***Education*** Approximately 89 military and non-military dependents of school age would no longer attend the Miami-Dade Public School (M-DCPS) district. The M-DCPS district schools would not be adversely impacted by the reduction in enrollment. No off-base schools would be exposed to a DNL of 65 dB or greater. ***Public Services*** No measurable effect to public services would be anticipated. ***Base Services*** No measurable effect to base services would be anticipated. **Airspace:** Not applicable.	**Installation[a]:** ***Population*** Decrease of 102 full-time mission personnel. Less than 0.1 percent decrease in the population of Tarrant County. ***Economic Activity*** Construction activities would be temporary and provide limited economic benefit. Total construction costs of $21.7 million could generate $11.4 million in direct, indirect, and induced income for the duration of the construction activity. ***Housing*** The 102 outgoing full-time personnel would no longer require off-base housing. ***Education*** Approximately 100 military and non-military dependents of school age would no longer attend schools in Tarrant County. Tarrant County schools would not be noticeably affected. Six off-base schools are currently exposed to DNL of 65 dB or greater and three additional schools would be exposed to a DNL of 65 dB or greater. One school currently exposed to a DNL of 65 dB or greater would be exposed to a DNL of 70 dB or greater. The number of schools and students exposed to increased noise would constitute an adverse impact. ***Public Services*** No measurable effect to public services would be anticipated. ***Base Services*** No measurable effect to base services would be anticipated. **Airspace:** Not applicable.	**Installation[a]:** ***Population*** 11 additional full-time mission personnel. Less than 0.1 percent increase in the population of Johnson County. ***Economic Activity*** Construction activities would be temporary and provide limited economic benefit. Total construction costs of $32.5 million could generate $8.0 million in direct, indirect, and induced income for the duration of the construction activity. ***Housing*** Assuming all 11 incoming full-time military personnel associated with the AFRC F-35A mission would require off-base housing, the housing market in the Region of Influence (ROI) would be anticipated to support the change in personnel. ***Education*** Approximately 11 military and non-military dependents of school age would enter public school districts in the ROI. Johnson County schools would not be noticeably affected. One off-base childcare facility and one off-base school would be newly exposed to DNL of 65 dB or greater. Educational services are identified in the JLUS as a generally compatible use with sound attenuation measures within the 65 to 70 dB DNL contour. ***Public Services*** No measurable effect to public services would be anticipated. ***Base Services*** No measurable effect to base services would be anticipated. **Airspace:** Not applicable.	Under the No Action Alternative, socioeconomic conditions would remain as they are today. No new F-35A-related personnel increases or decreases would occur at any of the installations and no F-35A-related construction would occur.

Table 2-12. Comparative Summary of Environmental Consequences (Continued)

<table>
<tr><th>Resource Area</th><th><u>Davis-Monthan AFB</u>
24 F-35A aircraft (+2 BAI)
Replace 24 A-10 aircraft</th><th><u>Homestead ARB</u>
24 F-35A aircraft (+2 BAI)
Replace 24 F-16 aircraft</th><th><u>NAS JRB Fort Worth</u>
24 F-35A aircraft (+2 BAI)
Replace 24 F-16 aircraft</th><th><u>Whiteman AFB</u>
24 F-35A aircraft (+2 BAI)
Replace 24 A-10 aircraft</th><th>No Action</th></tr>
<tr><td>Environmental Justice and Other Sensitive Receptors</td><td>Implementation of the AFRC F-35A mission would result in disproportionate impacts to minority and low-income populations.
<u>Installation:</u>
Scenario A
• Disproportionate impact to minority populations would occur in 6 of the 9 census blocks groups (BGs) (i.e., ROIs) affected by the increased noise (DNL of 65 dB or greater).
• Disproportionate impact to low-income populations would occur in 3 of the 9 ROIs affected by the increased noise (DNL of 65 dB or greater).
• Implementation of Scenario A would expose an additional estimated 281 children and 223 elderly persons to DNL of 65 dB or greater.
Scenario B
• Disproportionate impact to minority populations would occur in 6 of the 9 ROIs affected by the increased noise (DNL of 65 dB or greater).
• Disproportionate impact to low-income populations would occur in 3 of the 9 ROIs affected by the increased noise (DNL of 65 dB or greater).
• Implementation of Scenario B would expose an additional estimated 269 children and 206 elderly persons to DNL of 65 dB or greater.
Scenario C
• Disproportionate impact to minority populations would occur in 6 of the 9 ROIs affected by the increased noise (DNL of 65 dB or greater).
• Disproportionate impact to low-income populations would occur in 3 of the 9 ROIs affected by the increased noise (DNL of 65 dB or greater).
• Implementation of the Scenario C would expose an additional estimated 258 children and 194 elderly persons to DNL of 65 dB or greater.</td><td>Implementation of the AFRC F-35A mission would result in disproportionate impacts to minority and low-income populations.
<u>Installation:</u>
Scenario A
• Disproportionate impact to minority populations would occur in the 1 ROI affected by affected by the increased noise (DNL of 65 dB or greater).
• Disproportionate impact to low-income populations would impact 1 ROI affected by the increased noise (DNL of 65 dB or greater).
• Implementation of the Scenario A would expose an additional estimated 22 children and 3 elderly persons to DNL of 65 dB or greater.
Scenario B
• Disproportionate impact to minority populations would occur in the 1 ROI affected by affected by the increased noise (DNL of 65 dB or greater).
• Disproportionate impact to low-income populations would impact 1 ROI affected by the increased noise (DNL of 65 dB or greater).
• Implementation of the Scenario B would expose an additional estimated 28 children and 4 elderly persons to DNL of 65 dB or greater.
Scenario C
• Disproportionate impact to minority populations would occur in the 1 ROI affected by affected by the increased noise (DNL of 65 dB or greater).
• Disproportionate impact to low-income populations would impact 1 ROI affected by the increased noise (DNL of 65 dB or greater).
• Implementation of Scenario C would expose an additional estimated 37 children and 5 elderly persons to DNL of 65 dB or greater.</td><td>Existing disproportionate impacts to minority populations in 13 ROIs and to low income populations in 8 ROIs. Implementation of the AFRC F-35A mission would result in disproportionate impacts to minority populations and low-income populations.
<u>Installation:</u>
Scenario A
• Disproportionate impact to minority populations would occur in 17 ROIs that would be newly exposed to DNL of 65 dB or greater.
• Disproportionate impact to low-income populations would occur in 10 ROIs that would be newly exposed to DNL of 65 dB or greater.
• Implementation of Scenario A would expose an additional estimated 2,188 children and 1,126 elderly persons to DNL of 65 dB or greater.
Scenario B
• Disproportionate impact to minority populations would occur in 17 ROIs that would be newly exposed to DNL of 65 dB or greater.
• Disproportionate impact to low-income populations would occur in 10 ROIs that would be newly exposed to DNL of 65 dB or greater.
• Implementation of Scenario B would expose an additional estimated 2,192 children and 1,129 elderly persons to DNL of 65 dB or greater.
Scenario C
• Disproportionate impact to minority populations would occur in 17 ROIs that would be newly exposed to DNL of 65 dB or greater.
• Disproportionate impact to low-income populations would occur in 10 ROIs that would be newly exposed to DNL of 65 dB or greater.
• Implementation of Scenario C would expose an additional estimated 2,200 children and 1,129 elderly persons to DNL of 65 dB or greater.</td><td>The analysis of environmental justice populations at Whiteman AFB identified 3 ROIs with disproportionally high minority populations and 1 ROI with disproportionally high low-income populations. These populations are currently impacted by DNL of 65 dB or greater and would continue to be impacted by DNL of 65 dB or greater under the all three afterburner scenarios. Therefore, implementation of the AFRC F-35A mission would not result in disproportionate impacts to minority or low-income populations.
<u>Installation:</u>
Scenario A
Implementation of the new mission would expose an additional estimated 669 children and 196 elderly persons to DNL of 65 dB or greater.
Scenario B
Implementation of the new mission would expose an additional estimated 764 children and 194 elderly persons to DNL of 65 dB or greater.
Scenario C
Implementation of the new mission would expose an additional estimated 863 children and 207 elderly persons to DNL of 65 dB or greater.</td><td>Under the No Action Alternative, baseline conditions at Davis-Monthan AFB, Homestead ARB, NAS JRB Fort Worth and Whiteman AFB would remain as described in Sections DM3.10.1, HS3.10.1, FW3.10.1 and WM3.10.1.

Disproportionate impacts to minority and low-income populations would continue to occur under baseline conditions at NAS JRB Fort Worth and Whiteman AFB and children and elderly persons would continue to be exposed to DNL of 65 dB or greater at both of these installations.</td></tr>
</table>

Table 2-12. Comparative Summary of Environmental Consequences (Continued)

Resource Area	Davis-Monthan AFB 24 F-35A aircraft (+2 BAI) Replace 24 A-10 aircraft	Homestead ARB 24 F-35A aircraft (+2 BAI) Replace 24 F-16 aircraft	NAS JRB Fort Worth 24 F-35A aircraft (+2 BAI) Replace 24 F-16 aircraft	Whiteman AFB 24 F-35A aircraft (+2 BAI) Replace 24 A-10 aircraft	No Action
Infrastructure	**Installation:** Implementation of the proposed AFRC F-35A mission is not anticipated to result in significant impacts to infrastructure systems (e.g., potable water, wastewater, stormwater, electrical, natural gas, solid waste management, and transportation). **Airspace:** Not applicable.				Under the No Action Alternative, baseline conditions at each installation would continue as they are today until retirement of the current aircraft. No new F-35A-related construction would occur and no new F-35A-related personnel would arrive or decrease at any of the installations. No additional impacts to the infrastructure system at any of the installations would occur.
Hazardous Materials and Waste	**Installation:** Implementation of the proposed AFRC F-35A mission is not anticipated to result in significant impacts to hazardous materials and waste management. • Quantities and types of hazardous materials needed for maintenance would be less than those currently generated by maintaining A-10 and F-16 aircraft. • Operations and maintenance involving hydrazine, cadmium, and hexavalent chromium primer, and various heavy metals have been eliminated or greatly reduced for the F-35A. • The proposed demolition and renovation projects would be reviewed for asbestos-containing material (ACM) and lead-based paint (LBP) according to established procedures. If present or located, all remediation and disposal would be performed according to USAF policies and procedures and in compliance federal, state, and local regulations. • The proposed construction, demolition, and renovation projects and operations are not expected to affect known Environmental Restoration Program (ERP) or known or potential perfluorooctane sulfonate (PFOS)/perfluorooctanoic acid (PFOA) locations. Davis-Monthan AFB, Homestead ARB, and Whiteman AFB would comply with Air Force Guidance Memorandum (AFGM) 2019-32-01, *AFFF-Related Waste Management Guidance*, to manage waste streams containing PFOS/PFOA. NAS JRB Fort Worth would comply with Department of Defense Instruction (DoDI) 4715.18, *Emerging Chemicals (ECs) of Environmental Concern*. **Airspace:** Not applicable.				Under the No Action Alternative, conditions at each installation would remain as they are today until retirement of the current aircraft. Each installation would continue to use hazardous materials and dispose of hazardous waste as described for each installation's baseline conditions.

[a] For purposes of the EIS analysis a change in personnel assumes those personnel will leave the area. It is possible that these personnel could remain in the area and associated changes in population, housing, and education would not occur. Impacts for such a small change in personnel would be negligible.
Note: "Installation" includes the base and the area surrounding the base.

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2.5 MITIGATION

Mitigation measures avoid, minimize, remediate, or compensate for environmental impact. CEQ regulations (40 *CFR* 1508.20) define mitigation to include the following:

1. Avoiding the impact altogether by not taking a certain action or parts of an action.
2. Minimizing impacts by limiting the degree or magnitude of the action, and its implementation.
3. Rectifying the impact by repairing, rehabilitating, or restoring the affected environment.
4. Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.
5. Compensating for the impact by replacing or providing substitute resources or environments.

Avoiding, minimizing, or reducing potential impacts has been a priority for the USAF in guiding the development of the proposed AFRC F-35A mission and associated aircraft operations. Specific measures to avoid, reduce, or minimize impacts have been built or designed into the proposed action and alternatives; applied to construction, operation, and maintenance involved in the action; or implemented as compensatory measures. No mitigation measures were identified during the Environmental Impact Analysis Process (EIAP). The USAF does not have congressionally approved authority to expend appropriated funds on facilities that are not under the control of the USAF.

During the EIAP, if mitigation measures are determined to be operationally feasible and to not negatively affect training or safety, they are addressed in a mitigation plan. The mitigation plan would identify principal and subordinate organizations responsible for the execution and oversight of specific mitigation measures. The plan would be prepared in accordance with 32 *CFR* 989.22(d) and CEQ mitigation and monitoring guidance.

Table 2-13 presents potential measures to reduce noise that were considered but determined to be operationally infeasible. Specific measures (where applicable) to reduce impacts are presented in each of the base-specific sections contained in Chapter 4.

Table 2-13. Measures Considered to Reduce Potential Noise Impacts

Alternative Base	Measures Considered
All Bases	Potential operational modifications to mitigate significant noise impacts were considered in terms of their effects on safety of flight. Measures that were considered unsafe by members of the operational community were eliminated from further analysis and not considered as practicable. Other measures to reduce noise were found to result in substantial reductions in training effectiveness because they would provide negative training (i.e., reinforcement of non-standard flight procedures in pilots) or would reduce training efficiency (i.e., reducing the number of training goals met per flight hour). Reductions in training effectiveness could potentially affect unit combat readiness. Measures considered at all bases include the following: 1. **Reduce the number of practice approaches**. In order to accommodate training requirements, AFRC F-35A pilots fly approximately one practice second approach for every four sorties flown. Although AFRC considered a lesser number of practice second approaches to reduce noise, it was determined that flying a reduced number of second approaches would not allow pilots to meet training requirements. In addition to evaluating a reduction in the number of practice approaches, AFRC evaluated flying second approaches at other airfields. Because of the lack of availability and the inefficiency of using other airfields, aircraft noise was modeled under the assumption that all practice second approaches would be conducted at the primary installation. 2. **Adjust runway usage patterns so that loud overflights occur less frequently over areas of greater noise sensitivity**. Currently, runway selection for approaches and departures is made based on considerations including winds, noise sensitivities, and air traffic flows at nearby airfields. Flight safety is improved by flying into the wind during landing and takeoff. When runway use is not dictated by winds, runways can be selected according to noise sensitivities such that that the loudest operations (i.e., departures) overfly less-noise-sensitive areas. At installations near other airfields, maintaining a single direction of air traffic flow at all airfields is important to maintain safety of both civilian and military flight. Base-specific runway use considerations that were evaluated are discussed below by alternative base. 3. **Increase distance between aircraft and noise-sensitive locations by increasing altitudes or adjusting routing**. Aircraft flight procedures currently used at each alternative base have been refined over several years to provide the greatest safety and operational efficiency while also minimizing noise to the extent practicable. Wing leadership meets regularly with subordinate units to discuss issues including potential adjustments to flying procedures that could improve safety/effectiveness and/or reduce noise impacts. Current flight procedures at each alternative base reflect a balancing of several factors to achieve safe and efficient operations while also reducing noise. 4. **Place restrictions on late-night flying**. Late-night flying (i.e., between 10:00 P.M. and 7:00 A.M.) comprises a small fraction (4 percent or less) of total operations expected to be flown by AFRC F-35A pilots at each of the alternative bases. Further reductions in the number of late-night flights would limit operational flexibility, preventing pilots from accomplishing night training during portions of the year when the sun sets late in the day. Limiting runway usage, altitudes, or routing specifically during these times could decrease safety and/or reduce operational effectiveness, as described above.

Table 2-13. Measures Considered to Reduce Potential Noise Impacts (Continued)

Alternative Base	Measures Considered
Davis-Monthan AFB	In addition to the general types of mitigation measures described above, the following potential mitigation measures specific to Davis-Monthan AFB were considered. Potential noise mitigation measures considered for Davis-Monthan AFB were evaluated in context of extensive previous and ongoing collaboration between the base, Tucson International Airport (TUS), and the local community. 1. Due to lack of alternate airfield availability, the USAF cannot commit to conducting any particular number of practice approaches at airfields such as Libby Army Airfield. Therefore completing second approach training requirements at locations other than Davis-Monthan AFB is not a viable mitigation measure. Libby Army Airfield could be used by AFRC F-35A pilots on an occasional basis for practice second approaches, but there is currently a high tempo of aircraft operations at Libby Army Airfield and availability of the runway for practice approaches would be uncertain. 2. Increasing the percentage of departure operations conducted toward the less-densely populated areas of Tucson to the south is not a viable mitigation measure. Currently, approximately 67 percent of operations are conducted on Runway 12 (toward the south) and 33 percent of operations are conducted on Runway 30 (toward the north), which is similar to the traffic flow pattern at nearby TUS. If Davis-Monthan AFB were to conduct operations in the opposite direction of TUS operations, air traffic controllers at both airfields would be required to delay both civilian and military air traffic until opposing traffic separation minimums could be guaranteed. 3. Local flight procedures have been restricted to avoid direct overflights of several noise-sensitive locations in Tucson (e.g., neighborhoods, Reid Park Zoo, etc.). Further flight procedure restrictions to reduce noise impacts were not operationally feasible. The Tucson Military/Community Relations Committee and other avenues are available for communication of ideas relating to new noise abatement procedures. 4. Because approximately 1 percent of proposed AFRC F-35A operations would be conducted between 10:00 P.M. and 7:00 A.M., the reduction of operations during this time was found to result in only minor noise reductions; further reducing this number could prevent pilots from accomplishing night training during portions of the year when the sun sets late in the day. In conclusion, the USAF has considered several categories of potential noise mitigation for Davis-Monthan AFB, but none of the measures would be operationally feasible.

Table 2-13. Measures Considered to Reduce Potential Noise Impacts (Continued)

Alternative Base	Measures Considered
NAS JRB Fort Worth	In addition to the general types of mitigation measures described above, the following potential mitigation measures specific to NAS JRB Fort Worth were considered. 1. No alternative runways have been identified near NAS JRB Fort Worth that are appropriate to accommodate F-35A practice second approaches. 2. The areas immediately north and immediately south of NAS JRB Fort Worth are both densely populated, and shifting departure operations from one runway to the other would simply shift elevated noise levels from one set of noise-sensitive locations to another. Therefore, changing patterns of runway usage was not considered as a viable mitigation option. 3. Test pilots from the Lockheed Martin aircraft assembly plant located directly across the runway fly approximately 2,900 sorties per year; modifications to flight routing would impact both USAF pilots and Lockheed Martin pilots. Therefore, no modifications to flight routing or altitude profiles to reduce noise impacts have been proposed at this time. The USAF is not aware of changes to local flying procedures that would reduce noise impacts without adversely affecting safety and/or training effectiveness. 4. Because less than 1 percent of F-35A operations would be conducted between 10:00 P.M. and 7:00 A.M., the reduction of operations during this time was found to result in only minor noise reductions; further reducing this number could prevent pilots from accomplishing night training during portions of the year when the sun sets late in the day. In conclusion, the USAF has considered several categories of potential noise mitigation for NAS JRB Fort Worth, but none of the measures would be operationally feasible.
Whiteman AFB	In addition to the general types of mitigation measures described above, the following potential mitigation measures specific to Whiteman AFB were considered. 1. No alternative runways near Whiteman AFB were considered appropriate to accommodate the proposed AFRC F-35A practice second approaches. 2. Increasing the percentage of departure operations on Runway 19 (this southerly traffic flow currently comprises 65 percent of total) would not match runway usage patterns used by current missions at Whiteman AFB, which could potentially lead to delay of the launch of strategic B-2 aircraft. 3. No modifications to flight routing or altitude profiles were considered operationally feasible. The USAF is not aware of changes to local flying procedures that would reduce noise impacts without adversely affecting safety and/or training effectiveness. 4. Because approximately 4 percent of the proposed AFRC F-35A operations would be conducted between 10:00 P.M. and 7:00 A.M., reductions of operations during this time was found to result in only minor noise reductions; further reducing this number could prevent pilots from accomplishing night training during portions of the year when the sun sets late in the day. In conclusion, the USAF has considered several categories of potential noise mitigation for Whiteman AFB, but none of the measures would be operationally feasible.

2.5.1 Best Management Practices to Reduce the Potential for Environmental Impacts

A variety of different general mitigation and best management practices (BMPs) have been incorporated into design of the AFRC F-35A beddown in furtherance of 32 *CFR* 989.22 or to fulfill permit requirements, regardless of the location alternative. These measures include BMPs for construction practices and continuation of ongoing operational restrictions and avoidance measures. These BMPs are listed according to specific resources and are presented in Table 2-14.

Table 2-14. Best Management Practices to Reduce the Potential for Environmental Impacts

Resource Area/Alternative	Best Management Practices
Airspace Management and Use	
All Bases	1. To the extent practical, AFRC F-35A pilots would utilize advanced simulators for training purposes. 2. AFRC F-35A pilots would operate in existing SUA and maintain close contact with the FAA Air Route Traffic Control Centers (ARTCCs), ATC and other FAA entities to minimize conflicts with civil and commercial aviation.
Noise	
All Bases	1. As a follow-up to this EIS, once the AFRC F-35A beddown is complete and the full operational tempo of the squadron is in place, the USAF would validate the noise impacts identified in this EIS in a new AICUZ. In addition, the USAF would continue to work closely with local communities to minimize noise impacts. 2. Briefing guides will be augmented to ensure pre-flight briefings and debriefings include tracking afterburner use as a standard operating procedure. Afterburner use will be recorded reflecting computed need and afterburner use on mission data cards as part of the overall takeoff and landing data (TOLD) per AFI 11-2F-35A V3 (ref: §§2.9.1, 2.9.3., 3.6.2., and Atch 3, §A3.9.10.2.4.) and recorded in the Air Force Technical Order (AFTO) Form 781 "other things" column. This afterburner data will be provided in the debrief section of local aircrew debriefing guide via the operational utilization update screen in the Air Force Management Information System used to enter flying time information per AFI 21-101, *Aircraft and Equipment Maintenance Management*.
Air Quality	
All Bases	1. Construction personnel would minimize idling of all vehicles during construction. 2. Truckloads of dirt, sand or gravel will be covered at all times. 3. Disturbed areas will be revegetated as soon as possible post construction. 4. Maintain all equipment to manufacturer specifications. 5. Employ fugitive dust control and soil retention practices including: • Use water spray trucks to keep all areas of vehicle movement damp enough to prevent dust from leaving the construction area. • Suspend all soil disturbance activities when visible dust plumes emanate from the site. • Minimize vehicle traffic on non-paved roads. • Designate personnel to monitor the dust control program and to order increased watering, as necessary, to prevent the transport of dust off-site.
Safety	
All Bases	No base-specific management actions identified.
Soil and Water	
All Bases	1. Develop Stormwater Pollution Prevention Plans (SWPPPs), as required by state and federal Clean Water Act (CWA) requirements, to include the new AFRC F-35A building construction. 2. Post-construction, all disturbed areas would be re-graded to pre-construction contours. 3. Silt fence, interceptor trenches, hay bales, or other suitable erosion and sediment control measures would be used during construction, and revegetation of disturbed areas will occur as soon as practical.

Table 2-14. Best Management Practices to Reduce the Potential for Environmental Impacts (Continued)

Resource Area/Alternative	Best Management Practices
Biological Resources	
All Bases	Continue adherence to BASH program.
Homestead ARB	Surveys for bats would be conducted prior to any demolitions and/or facility modification or new construction that occurs in areas with potential roosting habitat. Extensive acoustic surveys using simultaneous multiple song meters, combined with roost surveys at sunset would be conducted on the base and adjacent areas northward toward Mystic Lake. Surveys would be conducted to locate roosts and any removal of occupied habitat would be coordinated with the USFWS and be mitigated. Should Florida bonneted bats be identified in a facility proposed for modification or demolition, the Homestead ARB natural resource manager would contact the USFWS to develop the appropriate plans prior to any construction. Homestead ARB would continue to employ measures outlined in the Florida Bonneted Bat Management Plan to avoid impacts to local populations near the installation. Prior to any construction, demolition, or renovation actions, Homestead ARB would coordinate with the USFWS to determine potential direct, adverse impacts to federally listed plant species. Should sand flax plants be identified as impacted by construction, the Biological Opinion (BO) specifies a replanting ratio of 5:1 (i.e., number of plants replaced: number of plants affected). Should Small's milkpea plants be identified as impacted by construction, the BO specifies a replanting ratio of 3:1 (i.e., number of plants replaced: number of plants affected) (USFWS 2019).
Cultural Resources	
All Bases	1. Consultation with the SHPOs and Native American tribes is complete. Coordination with interested tribes will continue throughout the EIS process. 2. Track results of government-to-government consultation with tribes. 3. In the case of unanticipated or inadvertent cultural resource discoveries, the USAF would comply with Section 106 of the NHPA and follow the standard operating procedures outlined in the Integrated Cultural Resource Management Plan (ICRMP).
Land Use and Recreation	
All Bases	Once the full complement of F-35A aircraft are operating at the selected base, prepare an update to the current AICUZ Study to validate operational data and identify projected noise levels based on the most recent noise data.
Socioeconomics	
All Bases	No base-specific management actions identified.
Environmental Justice and Protection of Children	
All Bases	No base-specific management actions identified.
Infrastructure	
All Bases	1. Incorporate Leadership in Energy and Environmental Design (LEED) and sustainable development concepts into construction projects to achieve optimum resource efficiency, sustainability, and energy conservation, except to the extent limited or prohibited by law. 2. Continue and enhance recycling and reuse programs to accommodate waste generated by the AFRC F-35A beddown.

Table 2-14. Best Management Practices to Reduce the Potential for Environmental Impacts (Continued)

Resource Area/Alternative	Best Management Practices
Hazardous Materials and Waste	
All Bases	1. Update Hazardous Waste Management Plans (HWMPs) to account for any new and/or changed waste streams or new procedures, if any, for managing hazardous materials and wastes associated with F-35A aircraft. 2. Review construction plans to identify any monitoring wells that would need to be removed and/or replaced. 3. Review construction plans to identify any buildings containing toxic substances such as LBP and ACM.

2.6 UNAVOIDABLE IMPACTS

Potential impacts that could occur and cannot be mitigated include the following:

- The existing capacity of regional landfills would be reduced due to the solid waste generated.
- Although anticipated to be similar in type to what is currently generated or what was recently generated at all four bases, hazardous and nonhazardous waste would be generated as a result of maintenance functions associated with the new aircraft.
- Individual species would be affected by land disturbance and air operations.
- Stormwater runoff and associated erosion would increase due to construction.
- There is potential for an increase in the number of bird/wildlife-aircraft strikes and aircraft mishaps resulting from the increased number of annual operations.

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CHAPTER 3

DEFINITION OF RESOURCE AND METHODOLOGY FOR ANALYSIS

How to Use This Document

Our goal is to provide a reader-friendly document that provides an in-depth, accurate analysis of the proposed action, the alternative basing locations, the No Action Alternative, and the potential environmental consequences for each base. The organization of this Environmental Impact Statement (EIS) is shown below.

EXECUTIVE SUMMARY

- Synopsis of Purpose and Need and Proposed Action and Alternatives
- Comparison of Impacts

VOLUME I OVERALL SUMMARY

CHAPTER 1

- Purpose and Need for the Air Force Reserve Command (AFRC) F-35A Operational Beddown

CHAPTER 2

- Description of the Proposed Action and Alternatives
- Alternative Identification Process
- Summary Comparison of the Proposed Action and Alternatives

CHAPTER 3

- Resource Definition and Methodology

VOLUME I BASE-SPECIFIC INFORMATION

CHAPTER 4

- Base Alternatives and the No Action Alternative

Davis-Monthan AFB	Homestead ARB	NAS JRB Fort Worth	Whiteman AFB	No Action Alternative
Section DM1.0 Proposed Action Overview	**Section HS1.0** Proposed Action Overview	**Section FW1.0** Proposed Action Overview	**Section WH1.0** Proposed Action Overview	This section describes the effects of not implementing the AFRC F-35A mission at any of the four bases.
Section DM2.0 Base-Specific Project Details	**Section HS2.0** Base-Specific Project Details	**Section FW2.0** Base-Specific Project Details	**Section WH2.0** Base-Specific Project Details	
Section DM3.0 Affected Environment and Environmental Consequences	**Section HS3.0** Affected Environment and Environmental Consequences	**Section FW3.0** Affected Environment and Environmental Consequences	**Section WH3.0** Affected Environment and Environmental Consequences	
Section DM4.0 Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section HS4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section FW4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section WH4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	

VOLUMES I AND II SUPPORTING INFORMATION

CHAPTER 5

- References
- List of Preparers
- List of Repositories
- Glossary
- Index

APPENDICES: VOLUME II

- Appendix A – Correspondence
- Appendix B – Noise Modeling, Methodology, and Effects
- Appendix C – Air Quality

3.0 DEFINITION OF RESOURCE AND METHODOLOGY FOR ANALYSIS

This chapter directly corresponds to the baseline conditions and the analysis of consequences for the environmental resource areas described in Volume I, Chapter 4, for each of the four alternative bases under consideration. For each environmental resource area, this chapter provides a definition of the resource, the regulatory setting, if applicable, and a description of the methodology used to evaluate the environmental resource area.

Because the same resource areas were analyzed for each of the four bases, the definition, regulatory setting, and methodology for each resource area are the same for all four bases. The analysis methodology addresses both the context of the environmental resource and the intensity of potential consequences to the resource resulting from implementation of the Air Force Reserve Command (AFRC) F-35A mission.

3.1 AIRSPACE MANAGEMENT AND USE

3.1.1 Definition of the Resource

Airspace management generally refers to the manner in which the Federal Aviation Administration (FAA), U.S. Department of Defense (DoD), and other responsible agencies coordinate and integrate use of the nation’s navigable airspace so as to ensure all aviation activities are conducted safely and efficiently. The following sections describe how the National Airspace System is classified and regulated to meet both military and civil aviation needs.

For the purposes of this airspace analysis, the Region of Influence (ROI) for the proposed action and No Action Alternative includes the airspace proposed for use near each of the alternative bases and the airspace and ranges proposed for use by AFRC F-35A pilots.

3.1.2 Regulatory Setting

Federal Aviation Regulations define navigable airspace as airspace at and above the minimum flight altitudes prescribed by *United States Code (USC)* Title 49, Subtitle VII, Part A, and includes airspace needed to ensure safety in the takeoff and landing of aircraft (49 *USC* 40102). This navigable airspace is a limited resource that Congress has charged the FAA to administer in the public interest as necessary to ensure the safety of aircraft and its efficient use (FAA Order 7400.2L 2017).

Management of the National Airspace System considers how this limited resource is designated, used, and administered to best accommodate the individual and common needs of military, commercial, and general aviation pilots. The FAA considers multiple and competing demands for aviation airspace and other special needs to determine how the National Airspace System can best be structured and regulated to address all user requirements. Management of the navigable airspace also considers, as appropriate, those conditions where flight restrictions or other measures could be needed for avoidance of obstacles and other sensitive land use areas.

The FAA has categorized U.S. airspace as Controlled, Special Use, Other, or Uncontrolled airspace. Controlled airspace has defined dimensions within which air traffic control (ATC) service is provided to pilots operating by Instrument Flight Rules (IFR) or Visual Flight Rules (VFR) in accordance with the airspace classification. Controlled airspace is categorized into Classes A through E; uncontrolled airspace is designated as Class G. The following extracts from the FAA Aeronautical Information Manual and the Pilot/Controller Glossary (FAA 2018) define the specific classifications most relevant to the affected airspace environment at each alternative base and associated training areas described in Chapter 2.

Class A airspace generally extends from 18,000 feet mean sea level (MSL) up to and including 60,000 feet MSL or Flight Level (FL) 600 and includes established Jet Routes. Class A airspace also includes Air Traffic Control Assigned Airspace (ATCAA), which is normally established over a Military Operations Area (MOA) for high-altitude training.

Class B airspace generally extends from the surface to 10,000 feet MSL surrounding the nation's busiest airports. The configuration of each Class B airspace area is individually tailored, consists of a surface area and two or more layers (some Class B airspace areas resemble upside-down wedding cakes), and is designed to contain all published instrument procedures once an aircraft enters the airspace. ATC clearance is required for all pilots to operate in the areas, and all pilots that are cleared to operate receive separation services within the airspace.

Class C airspace generally extends from the surface to 4,000 feet above the airport elevation (charted in MSL) surrounding airports that have an operational ATC tower, are serviced by a radar approach control facility, and have a certain number of IFR operations or passenger enplanements. Although the actual configuration of Class C airspace is individually tailored, it usually consists of a surface area within a 5-nautical mile (NM) radius from the surface to 1,000 feet above the airport elevation and an outer circle within a 10-NM radius from 1,200 feet to 4,000 feet above the airport elevation. The primary purpose of Class C airspace is to improve aviation safety by reducing the risk of midair collisions in the terminal area and enhancing the management of air traffic operations therein.

Class D airspace generally extends from the surface to 2,500 feet above the airport elevation (charted in MSL) surrounding those airports that have an operational ATC tower. The configuration of each Class D airspace area is individually tailored and, when instrument procedures are published, the airspace will normally be designed to contain those procedures. Arrival extensions for instrument approach procedures may be designated as Class D or Class E airspace.

Class E airspace is controlled airspace that is not Class A, B, C, or D. Class E airspace has several purposes, but those that relate to the alternative bases include controlled airspace around the airfields to protect the instrument approach procedures for those airfields and the airspace in which the Federal Airways used by en-route pilots are established.

Class G airspace is uncontrolled airspace that has not been designated as Class A, B, C, D, or E airspace. ATC does not have authority over operations within Class G airspace, where the primary users are general aviation pilots operating by VFR.

Most Restricted Areas (RAs) are designated joint use (i.e., IFR/VFR operations can be authorized by the controlling ATC facility when the airspace is not being utilized by the using agency). MOAs are also considered joint use airspace (i.e., nonparticipating pilots operating by VFR are permitted to enter a MOA, even when the MOA is active for military use). Pilots operating by IFR must remain clear of an active MOA unless approved by the responsible ATC agency. Flight by both participating and nonparticipating pilots operating by VFR is conducted under the "see-and-avoid" concept, which stipulates that when weather conditions permit, pilots operating by VFR are required to observe and maneuver to avoid other aircraft.

ATCAAs are contained in Class A airspace and are assigned by ATC for the purpose of providing air traffic segregation between military training activities and other IFR traffic. The U.S. Air Force (USAF) manages airspace in accordance with processes and procedures detailed in Air Force Instruction (AFI) 13-201, *Airspace Management*. AFI 13-201 implements Air Force Policy Directive (AFPD) 13-2, *Air Traffic, Airspace, Airfield, and Range Management,* and DoD

Directive 5030.19, *DoD Responsibilities on Federal Aviation*. AFI 13-201 addresses the development and processing of Special Use Airspace (SUA) and covers aeronautical matters governing the efficient planning, acquisition, use, and management of airspace required to support USAF flight operations. USAF management of training ranges involves the development and implementation of the processes and procedures required by AFI 13-212, *Range Planning and Operations*, to ensure that USAF ranges are planned, operated, and managed in a safe manner; that all required equipment and facilities are available to support range use; and that proper security for range assets is present. The overall purpose of range management is to balance the military's need to accomplish realistic testing and training with the need to minimize potential impacts of such activities on the environment and surrounding communities.

3.1.3 Methodology

Potential impacts to airspace use in the airfield environment at each alternative base and the SUA areas were assessed by comparing the projected AFRC F-35A and total sorties/flight operations, as appropriate, with baseline conditions. Because no modifications or additions are proposed for the current airspace structure at any of the alternative bases, this analysis focused primarily on what effects, if any, the proposed AFRC F-35A operations could have on other airspace uses.

3.2 NOISE

3.2.1 Definition of the Resource

Noise, which is defined simply as unwanted sound, has the potential to affect several environmental resource areas. In this Environmental Impact Statement (EIS), the noise analysis for each alternative base describes potential impacts of noise (e.g., human annoyance and health as well as physical effects on structures). Noise impacts to biological resources (e.g., wildlife), cultural resources, land use and recreation, socioeconomics (e.g., property values), and environmental justice/protection of children are discussed in sections dedicated to those resources. The primary sources of noise considered in this EIS are aircraft operations at the alternative bases and in the training airspace. Other components of the proposed AFRC F-35A mission (e.g., construction, operation of Aerospace Ground Equipment [AGE] for maintenance purposes, and vehicle traffic) would produce transitory noise that would negligibly contribute to the overall noise environment. For the purposes of this noise analysis, the ROI for the proposed action and No Action Alternative includes areas that experience aircraft noise at each alternative base, training airspace, and areas overflown by pilots traveling to and from the training airspace.

Noise and sound are expressed in logarithmic units of decibels (dB). A sound level of 0 dB is approximately the threshold of human hearing and is barely audible under extremely quiet listening conditions. Normal speech has a sound level of approximately 60 dB; sound levels above 120 dB begin to be felt inside the human ear as discomfort. Sound levels between 130 to 140 dB are felt as pain (Berglund and Lindvall 1995). The minimum change in the sound level of individual events that an average human ear can detect is about 3 dB. The human ear perceives a doubling (or halving) of a sound's loudness when the sound level changes by 10 dB and a quadrupling (or quartering) of loudness when the sound level changes by 20 dB.

All sounds have a spectral content, which means their magnitude or level changes with frequency, where frequency is measured in cycles per second or hertz (Hz). To mimic the human ear's non-linear sensitivity and perception of different frequencies of sound, the spectral content is weighted. For example, environmental noise measurements usually employ an "A-weighted" scale that filters out very low and very high frequencies in order to replicate human sensitivity. It is common to add the "A" to the measurement unit in order to identify that the measurement has been made with this filtering process (i.e., A-weighted decibels [dBA]). In this EIS, the dB unit refers to A-weighted sound levels. "C-weighting" is typically applied to impulsive sounds such as sonic booms, and are specially denoted in this EIS.

Because noise is a subjective experience, noise analysis requires assessing a combination of physical measurement of sound, physical and physiological effects, plus psycho- and socio-acoustic effects. Individual response to noise depends on several non-acoustic factors, including, but not limited, to the person's perceived importance of the noise, its appropriateness in the setting, the time of day, and the activity the person is involved in when the noise occurs. Further information on noise effects, metrics, modeling, and related information is contained in Appendix B.

3.2.1.1 Noise Metrics

In accordance with DoD guidelines and standard practice for environmental impact analysis documents, the noise analysis in this EIS uses multiple descriptors (known as metrics) to provide a thorough description of noise levels and impacts.

Maximum Noise Level (L_{max}). The L_{max} is the highest sound level measured during a single event in which the sound level changes with time (e.g., an aircraft overflight). During an aircraft overflight, the sound level starts at the ambient level (i.e., background sound level without aircraft noise), rises to the maximum level as the aircraft is nearest to the observer, and returns to the background level as the aircraft recedes into the distance. L_{max} defines the maximum noise level occurring for a fraction of a second as measured by a sound level meter on 'fast' setting (generally 1/8th of a second). Maximum noise levels generated by several aircraft types in flight configurations used near airfields are listed in Table 3-1. Maximum noise levels generated by several aircraft types in typical training airspace flight configurations are listed in Table 3-2. In this EIS, L_{max} is used to predict speech interference and for comparison between aircraft noise levels.

Table 3-1. Maximum Noise Levels (L_{max}) in Takeoff and Landing Configurations

Aircraft (engine type)	Power Setting	Power Unit	L_{max} Values (in dB) at Varying Distances (in feet)[a]				
			500	1,000	2,000	5,000	10,000
Takeoff/Departure Operations (at 300 knots airspeed)							
F-35A[b]	100%	ETR	119	111	103	90	79
F-35A (afterburner)	150%	ETR	124	117	108	97	87
A-10A	6,200	NF	100	92	82	67	56
B-1[c]	97.5%	RPM	113	105	97	83	71
F-15 (P220)	90%	NC	112	104	96	84	73
F-16 (P229)	93%	NC	114	106	98	85	74
F-22	100%	ETR	120	113	104	92	81
Landing/Arrival Operations (at 160 knots airspeed)							
F-35A[b]	40%	ETR	100	93	85	72	60
A-10A	5,225	NF	97	89	79	59	45
B-1	90%	RPM	105	97	89	75	63
F-15 (P220)	75%	NC	91	84	76	65	54
F-16 (P229)	83.5%	NC	93	86	78	65	54
F-22	43%	ETR	111	104	96	83	71

[a] Engine power settings are not constant during flight. Power settings shown are typical.
[b] Based on field noise level measurements conducted at Edwards Air Force Base (AFB) in 2013.
[c] B-1 departure modeled with afterburner because afterburner is almost always used with this aircraft.
Key: Engine Unit of Power: RPM=revolutions per minute; ETR=engine thrust request; NC=engine core RPM; and NF=engine fan RPM.
Source: SELCALC3 using standard weather conditions of 59 degrees Fahrenheit (°F) and 70 percent relative humidity.

Table 3-2. Maximum Noise Levels (L_{max}) in Training Airspace and Cruise Configurations

Aircraft (engine type)	Power Setting/Unit	Speed (knots)	L_{max} Values (in dBA) at Varying Distances (in feet)[a]				
			500	1,000	2,000	5,000	10,000
Representative Training Airspace Flight Configuration							
F-35A[b]	90% ETR	425	117	110	101	89	77
A-10A	5,333 NF	300	98	90	80	61	47
F-15E (PW220)	81% NC	500	100	94	86	76	67
F-16 (GE100)	95.4% NC	500	102	94	86	74	62
F/A-18E/F	90.5% NC	500	114	107	99	85	73
Cruise							
F-35A[b]	35% ETR	350	96	89	81	69	57
A-10A	87% NC	250	98	90	80	61	47
F-15E (PW220)	82% NC	500	102	95	88	78	69
F-16 (GE100)	90% NC	350	94	86	78	66	54
F/A-18E/F	84% NC	300	108	100	92	78	65

[a] Engine power settings are not constant during flight. Power settings shown are typical during level, steady, high-speed flight.
[b] Based on field noise level measurements conducted at Edwards AFB in 2013.
Key: Engine Unit of Power: RPM=revolutions per minute; ETR=engine thrust request; NC=engine core RPM; and NF=engine fan RPM.
Source: SELCALC3 using standard weather conditions of 59 °F and 70 percent relative humidity.

Sound Exposure Level (SEL). The SEL represents both the sound level of a single event and its duration. It captures the total sound energy from the beginning of the acoustic event to the point when the sound is no longer heard. The SEL metric represents all of the noise energy of an event as if it occurred within a single second. The noise generated by an aircraft overflight typically lasts for multiple seconds; therefore, the SEL (representing the energy in all of those seconds) for an event is typically higher than the L_{max} (which is momentary). SELs generated by several aircraft types in flight configurations used near airfields are listed in Table 3-3. SELs generated by several aircraft types in typical training airspace flight configurations are listed in Table 3-4. In this EIS, SEL is used to predict the probability of awakening.

Table 3-3. Sound Exposure Levels in Takeoff and Landing Configurations

Aircraft (engine type)	Power Setting	Power Unit	SEL Values (in dB) at Varying Distances (in feet)[a]				
			500	1,000	2,000	5,000	10,000
Takeoff/Departure Operations (at 160 knots airspeed)							
F-35A[b]	100%	ETR	125	119	113	103	95
A-10A	6,200	NF	105	99	91	80	71
B-1[c]	97.5%	RPM	119	113	106	96	86
F-15 (P220)	90%	NC	120	115	109	100	91
F-16 (P229)	93%	NC	119	114	107	98	89
F-22	100%	ETR	127	121	115	106	98
Landing/Arrival Operations (at 160 knots airspeed)							
F-35A[b]	40%	ETR	107	102	95	86	76
A-10A	5,225	NF	98	92	83	67	55
B-1	90%	RPM	111	105	98	88	79
F-15 (P220)	75%	NC	99	94	88	79	71
F-16 (P229)	83.5%	NC	97	92	86	77	68
F-22	43%	ETR	115	109	103	94	85

[a] Engine power settings are not constant during flight. Power settings shown are typical.
[b] Based on field noise level measurements conducted at Edwards AFB in 2013.
[c] B-1 departure modeled with afterburner because afterburner is almost always used with this aircraft. All other aircraft-type departure noise levels are modeled without afterburner.
Key: Engine Unit of Power: RPM=revolutions per minute; ETR=engine thrust request; NC=engine core RPM; and NF=engine fan RPM.
Source: SELCALC3 using standard weather conditions of 59 °F and 70 percent relative humidity.

Table 3-4. Sound Exposure Levels in Training Airspace and Cruise Configurations

Aircraft (engine type)	Power Setting	Power Unit	Speed (knots)	SEL Values (in dB) at Varying Distances (in feet)[a]				
				500	1,000	2,000	5,000	10,000
Representative Training Airspace Flight Configuration								
F-35A[b]	90%	ETR	425	120	114	107	97	87
A-10A	5,333	NF	300	97	91	83	66	53
F-15 (P220)	81%	NC	500	101	97	93	86	79
F-16 (GE-100)	95.4%	NC	500	105	99	93	83	73
F/A-18E/F	90.5%	NC	500	115	109	103	92	81
Cruise								
F-35A[b]	35%	ETR	350	99	94	88	78	68
A-10A	87%	NC	250	98	92	83	66	54
F-15 (P220)	82%	NC	500	103	99	95	88	81
F-16 (GE-100)	90%	NC	350	97	91	85	75	65
F/A-18E/F	84%	NC	300	112	106	99	88	77

[a] Engine power settings are not constant during flight. Power settings shown are typical.
[b] Based on field noise level measurements conducted at Edwards AFB in 2013.
Key: Engine Unit of Power: RPM=revolutions per minute; ETR=engine thrust request; NC=engine core RPM; and NF=engine fan RPM.
Source: SELCALC3 using standard weather conditions of 59 °F and 70 percent relative humidity.

Equivalent Noise Level (L_{eq}). The L_{eq} represents aircraft noise levels decibel-averaged over a specified time period. The L_{eq} is useful for considering noise effects during a specific time period such as a school day (denoted $L_{eq(SD)}$) or a 24-hour period (denoted L_{eq24}).

Day-Night Average Sound Level (DNL). The DNL noise metric is the decibel-averaged sound level measured over a 24-hour period, with a 10 dB penalty assigned to noise events occurring between 10:00 P.M. and 7:00 A.M. to account for added intrusiveness of late night noise. DNL is the preferred noise metric of the U.S. Department of Housing and Urban Development (HUD), FAA, U.S. Environmental Protection Agency (USEPA), and DoD. Studies of community annoyance in response to numerous types of environmental noise show that there is a positive correlation between DNL and the percent of the population that can be expected to be highly annoyed by the noise (refer to Appendix B for details). The DNLs referenced in this EIS are A-weighted unless otherwise noted. The DNL metric is used to predict the likelihood of annoyance in response to noise and is the basis for land use compatibility recommendations. Similar to the "Time-Weighted Average" noise metric referenced in workplace noise regulations, DNL averages noise levels over an extended period of time (see Section 3.2.3). However, DNL is specifically designed to account for additional annoyance associated with late-night noise events.

Onset Rate-Adjusted Day-Night Average Sound Level (L_{dnmr}) is a version of DNL that has been modified to account for the nature of flying operations in training airspace. While aircraft operations at airfields tend to be continuous or patterned, operations in airspace are sporadic and dispersed. L_{dnmr} also accounts for the specific effects of low-altitude and high-speed operations that can occur in airspace such as MOAs or RAs. Because military jet aircraft can exhibit a rate of increase in sound level (onset rate) of up to 150 dB per second, the L_{dnmr} metric is adjusted to account for the startle effect with addition of up to 11 dB to the normal SEL. Unlike the use of DNL around airfields, the land use compatibility guidelines do not readily apply to land use under military airspace. The implications of increased L_{dnmr} depend upon the underlying land uses and the degree of change in noise levels.

C-weighted Day-Night Average Sound Level (CDNL) is a variation of DNL used to describe the frequency and intensity of impulsive noises such as sonic booms. Peak overpressure, measured in pounds per square foot, is used to characterize the strength of a single impulsive noise such as a sonic boom.

3.2.2 Regulatory Setting

Because legal limits on allowable noise levels could, in some cases, reduce the combat effectiveness of military equipment, military equipment is exempt from regulations that impose noise limitations. However, several policies and regulations are in place to limit the effects of military noise.

The USAF recognizes that noise-sensitive land uses are not compatible with elevated aircraft noise levels and has implemented the Air Installations Compatible Use Zones (AICUZ) program, as described in AFI 32-1015, *Integrated Installation Planning*, and Department of Defense Instruction (DoDI) 4165.57, *Air Installations Compatible Use Zones (AICUZ)*, to minimize incompatible land use. In 1980, the Federal Interagency Committee on Urban Noise (FICUN) created a set of guidelines detailing which land uses are recommended as compatible at which noise levels; these guidelines have been adopted as part of the AICUZ program. These guidelines are provided to state and local communities as recommendations only, and a recommendation that a certain land use is incompatible with residential use does not mean that the land is uninhabitable.

Areas with DNL of 65 to 74 dB are considered "generally incompatible" with noise-sensitive land uses (e.g., residences, schools, hospitals, and public services). Although discouraged, residential development is compatible within the 65 to 69 and 70 to 74 dB DNL contours, provided noise reduction levels of 25 dB and 30 dB, respectively, are achieved. Commercial/retail businesses are compatible without restrictions up to 69 dB, and up to 79 dB DNL, provided that minimum noise reduction levels are achieved for public areas. Industrial/manufacturing, transportation, and utility land uses are less noise-sensitive, and, therefore, are considered compatible within the higher noise exposure zones.

Workers in known high-noise exposure locations could be required to wear hearing protection devices, including, but not limited to, earplugs and earmuffs. The hearing conservation programs at each alternative base are conducted in accordance with AFI 48-127, *Occupational Noise and Hearing Conservation Program*, DoDI 6055.12, *DoD Hearing Conservation Program*, and Title 29 of the *Code of Federal Regulations (CFR)* Section 1910.95, *Occupational Noise Exposure*. The Bioenvironmental Engineering Office administers the Hearing Conservation Program at each of the alternative bases. Representatives from the Bioenvironmental Engineering Office visit facilities in which workers could potentially be exposed to noise levels exceeding noise exposure thresholds. A health risk assessment involving dosimeter testing of a representative sample of employees is conducted. An audiometric monitoring program is initiated if noise exposure exceeds established thresholds.

Per DoD policy, the 80 dB DNL noise contour is used to identify populations most at risk of potential hearing loss (USD 2009). In cases in which people are exposed to DNL greater than 80 dB on a regular basis, the policy directs that methodology defined in USEPA report number 550/9-82-105 be used to quantify the risk (Section 3.2.3).

3.2.3 Methodology

3.2.3.1 Base Vicinity

Noise levels near the bases were modeled using NOISEMAP, version 7.3. NOISEMAP references a database of field-measured sound levels generated by each aircraft type in various flight configurations. NOISEMAP runs were conducted using the topographic effects module, which accounts for the effects of local terrain and ground surface type on the propagation of sound. In accordance with DoDI 4165.57 and Air Force Handbook (AFH) 32-7084, *AICUZ Program Manager's Guide*, noise levels were calculated for an Annual Average Day, which is defined as a day with 1/365th of total annual operations. Median atmospheric conditions for sound propagation were selected from local climate data for use in noise modeling. NOISEMAP runs used F-35A engine power, airspeed, and altitude profiles provided by F-35A pilots at other installations where the aircraft is currently based. As described in Section 2.3.3, as the F-35A program has matured over the last several years, information from other USAF installations indicates that F-35A pilots are using afterburner on a higher number of takeoffs. As shown on Figure 3-1, use of afterburner allows the aircraft to accelerate faster and reach takeoff airspeeds earlier than standard military power departures. During afterburner takeoffs, the aircraft typically leaves the ground sooner and is at slightly higher altitudes throughout the climbout compared to standard military power takeoffs.

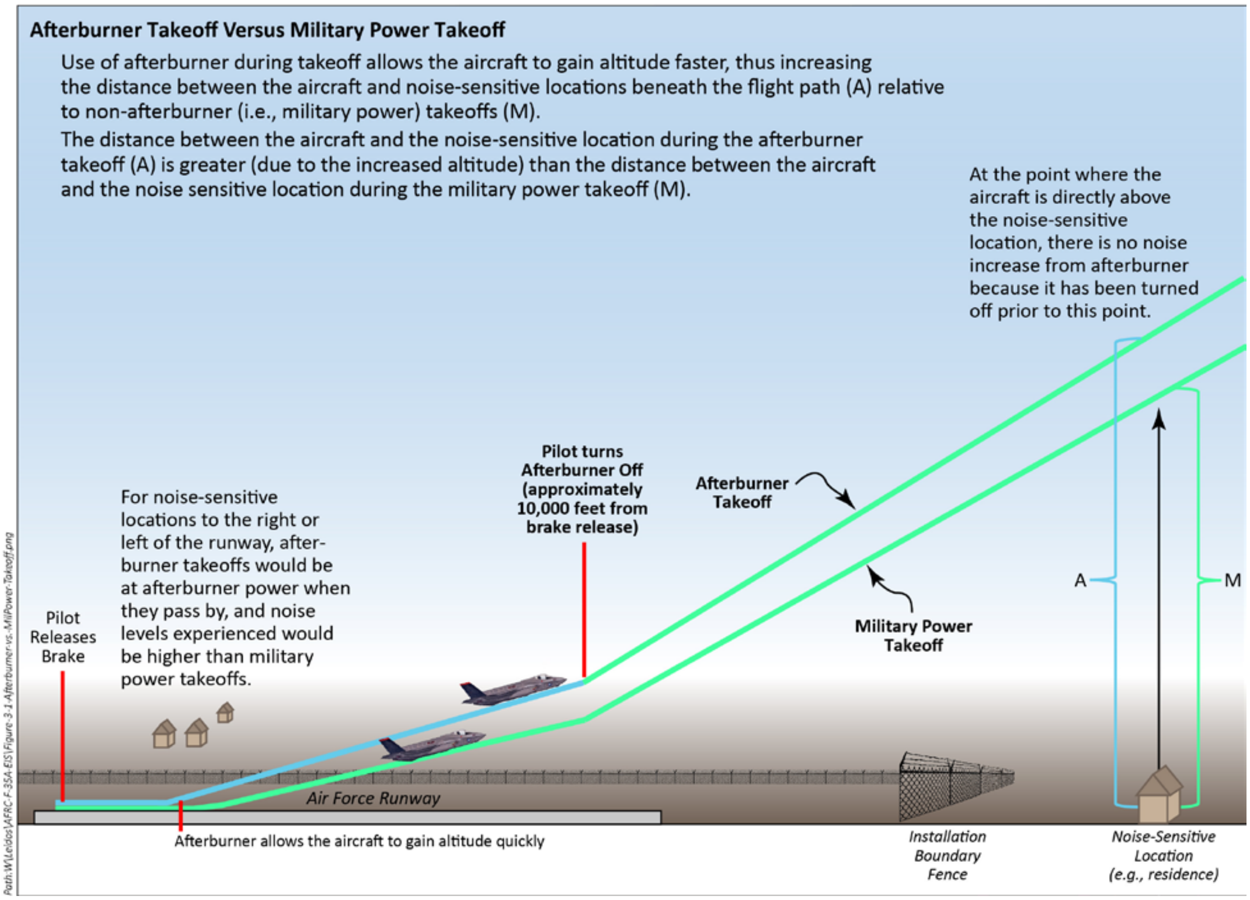

Figure 3-1. Afterburner Takeoff versus Military Power Takeoff

During afterburner takeoffs, F-35A pilots typically turn the afterburner off at approximately 10,000 feet from brake release to conserve fuel and avoid accelerating beyond airspeeds allowable near an installation. After turning the afterburner off, the aircraft continues its climb at standard military power (i.e., the same power setting used by pilots conducting standard military power takeoffs). At locations perpendicular to the runway, the increased noise generated by the afterburner results in maximum noise levels being slightly louder, as measured in A-weighted sound levels, than standard military power takeoffs. However, locations further down the aircraft flight path are overflown at slightly higher altitudes and the same engine power setting during afterburner takeoffs than during standard military power takeoffs. As a result, afterburner takeoff overflight noise levels are often slightly less loud than standard military power takeoff noise levels at locations beyond the end of the runway due to the difference in the distance between the aircraft and the noise-sensitive location.

For this EIS, the USAF evaluated three different scenarios for afterburner use: Scenario A is afterburner use on 5 percent of total takeoffs, Scenario B is afterburner use on 50 percent of total takeoffs, and Scenario C is afterburner use on 95 percent of total takeoffs.

Flight paths, pattern altitudes, and other operational parameters specific to each alternative base were used following current base procedures. Noise modeling of the proposed AFRC F-35A mission reflects the noise that would be generated by AFRC F-35A aircraft operations combined with noise generated by ongoing based and transient aircraft operations that would continue under all alternatives. The analysis does not include aircraft operations at other airfields. When airfields are located near each other, airspace near each airfield is apportioned to provide separation between aircraft operating under guidance from the ATC tower at each airfield. Although noise generated by aircraft operating at nearby airfields could be audible within the ROI, pilots typically operate in separate volumes of airspace during departure, pattern maneuvers, and final approach to land (i.e., the loudest phases of flight).

Areas exposed to elevated DNL are shown using contours at 5-dB increments from 65 to 85 dB. Elevated DNL implies that overflight noise is particularly frequent and intense. In general, noise levels are highest on and near airfields and decrease with distance from the airfield. Frequently used flight paths are often reflected by elevated time-averaged noise levels.

The number of off-base residents within each 5-dB DNL increment was estimated using U.S. Census 2017 American Community Survey (ACS) data at the block group level. First, the fraction of each census block that occurs within each noise level increment was calculated. Then the census block's population was apportioned to inside or outside of the noise level increment based on the fraction of the census block affected. The accuracy of the population estimates was improved by excluding areas not classified as being used for residential purposes. This method assumes an even distribution of population within the residential portions of census blocks. The U.S. Census counts permanent residents; non-permanent residents are not counted using this method.

3.2.3.1.1 Annoyance

Annoyance is the most common impact associated with aircraft noise. Social surveys have found that, in areas exposed to higher DNL, individuals are more likely to become highly annoyed by the noise (see Appendix B for additional details). Individuals have variable sensitivity to noise depending on a number of factors. Extreme examples of noise-sensitivity can be found in people on the autism spectrum or those afflicted with post-traumatic stress disorder.

3.2.3.1.2 Speech Interference

Interference with conversation and other communication-related activities is one of the most common complaints received about noise. Communication could be interrupted when background noise levels (e.g., the noise generated by aircraft overflights) exceed 50 dB L_{max}. The number of speech interference events is quantified by the average number of daytime (7:00 A.M. to 10:00 P.M.) events per hour exceeding 50 dB L_{max}. Indoor events account for 15 or 25 dB of noise attenuation (i.e., windows open or closed, respectively).

3.2.3.1.3 Classroom Interference

Noise can interfere with learning by interfering with communication and by disrupting concentration. American National Standards Institute (ANSI) guidelines recommend limiting background transportation noise levels to 35 to 40 dB L_{eq} (depending on classroom size) and limiting single events to less than 50 dB L_{max} (ANSI 2009). In accordance with DoD Noise Working Group (DNWG) recommendations, estimated interior school day equivalent noise levels ($L_{eq(SD)}$) exceeding

40 dB were taken as an indication that ANSI criteria are being exceeded (DNWG 2013). Noise generated by sources other than aircraft (e.g., ground vehicle traffic, air conditioning systems, etc.) are outside the scope of this analysis and are assumed to be minimal. This EIS provides the indoor L_{eq} and average number of events per hour exceeding 50 dB L_{max} during the school day (7:00 A.M. to 4:00 P.M.) with windows closed and with windows open. This EIS also includes the number of daytime (7:00 A.M. to 10:00 P.M.) events per hour exceeding 50 dB L_{max} outside the school. The outdoor noise level is not part of ANSI criteria, but would be relevant to assessing potential noise impacts to sports, recess, and other school-related activities that occur outside the school building.

3.2.3.1.4 Sleep Disturbance

Lack of quality sleep has the potential to affect health and concentration. This EIS includes the probability of being awakened at least once per night by overflights occurring between 10:00 P.M. and 7:00 A.M. (when most people sleep). Following a procedure published by the ANSI, the probability of being awakened by each overflight type was first calculated based on the overflight SEL (ANSI 2008). Next, the probabilities of being awakened by each type of event were summed to determine overall probability of being awakened at least once per night. Results are presented for people sleeping indoors with windows open and for people sleeping indoors with windows closed. The calculations account for 15 dB of structural noise level reduction with windows open and 25 dB of structural noise-level reduction with windows closed.

3.2.3.1.5 Potential for Hearing Loss

Risk of noise-related hearing loss has been extensively studied, with most studies conducted in workplace environments. Populations exposed to DNL greater than 80 dB are at the greatest risk of potential hearing loss, and DoD policy calls for estimation of long-term Noise-Induced Permanent Threshold Shift (NIPTS) risk in such areas using a process defined in the USEPA's *Guideline for Noise Impact Analysis* (Undersecretary of Defense for Acquisition Technology and Logistics 2009). A permanent threshold shift is a change in the lowest sound level audible that does not disappear over time. Some hearing loss is normal as people age, and the NIPTS is specifically defined as the difference in threshold shifts between people exposed to noise and those who are not exposed. Numerically, the NIPTS is the change in threshold averaged over several frequencies that can be expected from exposure lasting 8 hours per day, 5 days per week starting at age 20 and continuing for 40 years. Because individual sensitivity to noise varies, NIPTS is estimated for a person with average sensitivity and for a person in the most sensitive 10 percent of the population. Many people spend at least part of their day indoors, where aircraft noise levels are lower. A 2-year USEPA-sponsored telephone survey of more than 9,000 persons found that the average American spends approximately 87 percent of their time indoors (Klepeis et al. 2001). This percentage was found to be fairly constant across the 48 contiguous United States. Table 3-5 shows the "average NIPTS" and the "10th percentile" NIPTS as a function of L_{eq24} if the person is fully exposed to the noise level at his or her residence (i.e., outdoors 100 percent of the time) or if he or she is outdoors for the national average 13 percent of the day. It was assumed for the purposes of this study that residents would remain at their residences 24 hours per day, 365 days per year.

Table 3-5. Estimated Average Noise-Induced Permanent Threshold Shift and 10th Percentile Noise-Induced Permanent Threshold Shift as a Function of L_{eq24}

L_{eq24} (dB)[a]	100 Percent of Time Outdoors		National Average Percentage of Time Outdoors	
	Average NIPTS (dB)[b]	10th Percentile NIPTS (dB)[b]	Average NIPTS (dB)[b]	10th Percentile NIPTS (dB)[b]
80–81	3	7	NA[c]	NA[c]
81–82	3.5	8	NA[c]	NA[c]
82–83	4	9	1	3.5
83–84	4.5	10	1	4
84–85	5.5	11	1.5	4.5
85–86	6	12	2	5.5
86–87	7	13.5	2.5	6.5
87–88	7.5	15	3	7
88–89	8.5	16.5	3.5	8
89–90	9.5	18	4	9

[a] Relationships between DNL and NIPTS were derived from *Environmental Impact Statements with Respect to Noise* (CHABA 1977).
[b] NIPTS values rounded to the nearest 0.5 dB.
[c] Equivalent exposure noise level is less than 75 dB DNL, below the threshold at which NIPTS has been demonstrated to occur.
Key: NA = not applicable

To put these changes in time-averaged noise level (DNL) in perspective, a 3-dB change in instantaneous noise level is typically barely perceptible to a person with normal hearing in a non-laboratory setting. Furthermore, no known evidence suggests that a NIPTS of 5 dB is perceptible or has any practical significance for the individual. Lastly, the variability in audiometric testing is generally assumed to be ±5 dB (USEPA 1974).

The preponderance of available information on risk of hearing loss for the adult working population is from the workplace with continuous exposure throughout the day for many years. According to *Long Term Effects of Military Jet Aircraft Noise Exposure During Childhood on Hearing Threshold Levels*, military personnel who as children had lived in or near stations where jet operations were based had no significant differences in audiometric test results compared to a similar group who had no such exposure as children (Ludlow and Sixsmith 1999). For the purposes of hearing loss analysis, it could be assumed that the limited data on hearing loss are applicable to the general population, including children, and provide a conservative estimate of hearing loss.

3.2.3.1.6 Workplace Noise

In 1972, the National Institute for Occupational Safety and Health (NIOSH) published a criteria document with a recommended exposure limit of 85 dB as an 8-hour, time-weighted average. This exposure limit was reevaluated in 1998 when NIOSH made recommendations that went beyond conserving hearing by focusing on the prevention of occupational hearing loss (NIOSH 1998). Following the reevaluation using a new risk assessment technique, NIOSH published another criteria document in 1998 which reaffirmed the 85 dB recommended exposure limit (NIOSH 1998). Active-duty and reserve components of the USAF, as well as civilian employees and contractor personnel working on USAF bases and Air Guard stations, must comply with Occupational Safety and Health Administration (OSHA) regulations (29 *CFR* § 1910.95), DoDI 6055.12, AFI 48-127 (February 2016), and the Occupational Noise and Hearing Conservation Program (including material derived from the International Standards Organization 1999.2, *Acoustics-Determination of Occupational Noise Exposure and Estimation of Noise Induced Impairment*). Per AFI 48-127, the Hearing Conservation Program is designed to protect workers from the harmful effects of hazardous noise by identifying all areas where workers are exposed to hazardous noise.

3.2.3.1.7 Non-Auditory Health

During scoping, the question of the potential for non-auditory health effects from noise was raised. Studies have been performed to see whether noise can cause health effects other than hearing loss. The premise is that annoyance causes stress. Prolonged stress is known to be a contributor to a number of health disorders. Cantrell (1974) confirmed that noise can provoke stress, but noted that results on cardiovascular health have been contradictory. Some studies have found a connection between aircraft noise and blood pressure (e.g., Michalak et al. 1990; Rosenlund et al. 2001), while others have not (e.g., Pulles et al. 1990).

Kryter and Poza (1980) noted, "It is more likely that noise related general ill-health effects are due to the psychological annoyance from the noise interfering with normal everyday behavior, than it is from the noise eliciting, because of its intensity, reflexive response in the autonomic or other physiological systems of the body."

The connection from annoyance to stress to health issues requires careful experimental design. Some highly publicized reports on health effects have, in fact, been rooted in poorly done science. Meecham and Shaw (1979) apparently found a relation between noise levels and mortality rates in neighborhoods under the approach path to Los Angeles International Airport. When the same data were analyzed by others (Frerichs et al. 1980), no relationship was found. Jones and Tauscher (1978) found a high rate of birth defects for the same neighborhood. But when the Centers For Disease Control performed a more thorough study near Hartsfield-Jackson Atlanta International Airport, no relationships were found for levels greater than 65 dB (Edmonds et al. 1979).

A carefully designed study, Hypertension and Exposure to Noise near Airports (HYENA), was conducted around six European airports from 2002 through 2006 (Jarup et al. 2005, 2008). There were 4,861 subjects, aged between 45 and 70. Blood pressure was measured, and questionnaires administered for health, socioeconomic, and lifestyle factors, including diet and physical exercise. Hypertension was defined by World Health Organization (WHO) blood pressure thresholds (WHO 2003). Noise from aircraft and highways was predicted from models.

The HYENA results were presented as an odds ratio (OR). An OR of 1 indicates there is no added risk, while an OR of 2 indicates risk is doubled. An OR of 1.14 was found for nighttime aircraft noise, measured by the equivalent noise level during nighttime hours (L_{night}). For daytime aircraft noise, measured by 16-hour equivalent noise level (L_{eq16}), the OR was 0.93. For road traffic noise, measured by L_{eq24}, the OR was 1.1.

Note that OR is a statistical measure of change, not the actual risk. Risk itself and the measured effects were small, and not necessarily distinct from other events. Haralabidis et al. (2008) reported an increase in systolic blood pressure of 6.2 millimeters of mercury (mmHg) for aircraft noise, and an increase of 7.4 mmHg for other indoor noises such as snoring.

It is interesting that aircraft noise was a factor only at night, while traffic noise is a factor for the full day. Aircraft noise results varied among the six countries, so that result is pooled across all data. Traffic noise results were consistent across the six countries.

One interesting conclusion from a 2013 study of the HYENA data (Babisch et al. 2013) states there is some indication that noise level is a stronger predictor of hypertension than annoyance. That is not consistent with the idea that annoyance is a link in the connection between noise and stress. Babisch et al. (2012) present interesting insights on the relationship of the results to various modifiers.

Two studies examined the correlation of aircraft noise with hospital admissions for cardiovascular disease. Hansell et al. (2013) examined neighborhoods around London's Heathrow Airport. Correia et al. (2013) examined neighborhoods around 89 airports in the United States. Both studies included areas of various noise levels. They found associations that were consistent with the HYENA results. The authors of these studies noted that further research is needed to refine the associations and the causal interpretation with noise or possible alternative explanations. Rhee et al. (2008) found a significant association between military helicopter noise and the prevalence of hypertension, but no significant effect due to exposure to fighter jet (fixed-wing) noise. This study also noted that more research is needed to better understand the observed effects (Rhee et al. 2008).

Associations between aircraft noise and negative mental health outcomes has been the subject of several studies in recent years. Analysis of cross-sectional data of 15,010 Germans by Beutel et al. (2016) found significant associations between noise and increased prevalence of anxiety and depression. The authors acknowledge that annoyance due to aircraft noise could not be related directly to the negative outcomes, but establish that it was a major source of annoyance in the sample.

In a 2018 review of selected aviation noise research, the Federal Interagency Committee on Aviation Noise (FICAN) stated that, based on a large number of studies on the subject, they conclude chronic road traffic noise has non-acoustic (cardiovascular) health effects, but that there is a need for more and better designed studies before a similar conclusion can be reached for aircraft noise. Several studies have associated high road traffic noise levels with an increased risk of hypertension (Dzhambov et al. 2017; Hahad et al. 2019) and stroke for people over the age of 64 (Sørensen et al. 2011). Recent studies provide novel insights into mechanisms of vascular damage that is attributed to noise (Münzel et al. 2018a; Münzel et al. 2018b). The accumulated evidence to support an association between aircraft noise and non-auditory health impacts (Münzel et al. 2014; Willich et al. 2006) is considered by FICAN to be less strong.

In 2018, van Kempen et al. conducted a systematic review of literature on cardiovascular and metabolic effects of noise at the behest of the WHO (van Kempen et al. 2018). The quality of evidence available supporting associations between noise and a variety of potential noise impacts in hundreds of published studies was rated based on risk of bias, inconsistency, indirectness, imprecision, publication bias, strength of association, exposure-response gradient, and possible confounding in multiple categories of studies. For example, the reviewers judged the overall quality of evidence for an association between aircraft noise and prevalence of hypertension to be "low" due primarily to a "serious" risk of bias and inconsistency of data and a "small" strength of association in the cross-sectional and cohort studies considered. The quality of evidence to support an association between aircraft noise and prevalence of ischemic heart disease as well as mortality due to ischemic heart disease was judged to be "very low" or "low" for the cross-sectional and cohort studies considered. The association between aircraft noise and the prevalence of stroke was found to be "very low" while the evidence supporting association with mortality due to stroke were judged to be "moderate." The quality of evidence supporting associations between aircraft noise and the prevalence of diabetes was judged to be "very low," while the association with the incidence of diabetes was judged to be "low." Evidence of an association between aircraft noise and the risk of obesity, as quantified using body mass index, was found to be "low," while the quality of evidence supporting an association with increased waist circumference was found to be "moderate."

A literature review by the International Civil Aviation Organization published in 2017 and titled *Aviation Noise: State of the Science* concluded that, "There is a good biological plausibility by which noise may affect health in terms of impacts on the autonomic system, annoyance and sleep disturbance. Studies are suggestive of impacts on cardiovascular health especially hypertension, but limited and inconclusive with respect to quantification of these, with a relatively small number of studies conducted to date. More studies are needed to better define exposure-response relationships, the relative importance of night versus daytime noise and the best noise metrics for health studies (e.g., number of aircraft noise events versus average noise level)” (Basner et al. 2017).

3.2.3.1.8 Animals in the Care of Humans

The reactions of animals in the care of humans (e.g., pets, other domesticated animals, and animals kept in zoos) to noise depends on several factors including temperament, training, and past experiences associated with the noise. Aircraft approaching and departing the airfield typically operate at airspeeds and altitudes such that there is some time between when the aircraft is first heard and the maximum noise of the overflight. The relatively slow rise-time of sounds during overflights near the base tends to be less frightening to animals than sudden onset noise. Even so, some animals could react strongly to noise generated by aircraft overflights. Horses can be particularly prone to strong reactions, and can pose a risk to riders if they are not accustomed to the noise. Animals tend to become accustomed to noise over time if the noise is not accompanied by any unpleasant experiences.

3.2.3.2 Airspace

3.2.3.2.1 Subsonic

Subsonic flight activity for the airspace and ranges considers the following factors in the noise analysis: flight operations, flight durations, flight areas and/or tracks, flight profiles, and climatological data. Modeled flight operations are summarized in each alternative’s section. The MR_NMAP computer program model was used to calculate L_{dnmr} values for average daily aircraft subsonic flight operations during the busiest month for each modeled airspace unit. For the defined airspace units, single L_{dnmr} noise levels were calculated from the MR_NMAP program. Airspace units used and scheduled together consistently were assessed as one area.

For airspace environments where noise levels are calculated to be less than 45 dB, the noise levels are stated as “<45.” This annotation is used because in calculating time-averaged sound levels, the reliability of the results varies at lower noise levels. This arises from the increasing variability of individual aircraft sound levels at the longer distances (greater than 1 mile versus less than 1 mile) due to atmospheric effects on sound propagation and the presence of other ambient sources of noise.

Time-averaged outdoor sound levels less than 45 dB are substantially less than any currently accepted guidelines for aircraft noise compatibility. As discussed under land use, most of the guidelines for the acceptability of aircraft noise are on the order of 65 dB and greater.

3.2.3.2.2 Supersonic

Aircraft exceeding the speed of sound create a sonic boom, but the sonic boom does not always reach the ground. A sonic boom is characterized by a rapid increase in pressure, followed by a decrease before a second rapid return to normal atmospheric levels. This change occurs very quickly, usually within a few tenths of a second. It is usually perceived as a “bang-bang” sound. The amplitude of a sonic boom is measured by its peak overpressure, in pounds per square foot. The amplitude depends on the aircraft’s size, weight, geometry, Mach number, and flight altitude. Altitude is usually the biggest single factor. Maneuvers (turns, dives, etc.) also affect the amplitude of particular booms. As altitude increases, air temperature and sound speed decrease. These layers of sound speed change, causing sonic booms to be turned upward as they travel toward the ground. Depending on the altitude of the aircraft and the Mach number, many sonic booms can be bent upward such that they never reach the ground. This phenomenon, referred to as “cutoff,” also acts to limit the amount of area affected by sonic booms that do reach the ground.

The overpressures of booms that reach the ground are well below those that would begin to cause physical injury to humans or animals (see Appendix B). They can, however, be annoying, and can cause startle reaction in humans and animals. On occasion, sonic booms can cause physical damage (e.g., to a window) if the overpressure is of sufficient magnitude. The condition of the structure is a major factor when damage occurs, the probability of which, tends to be low. For example, the probability of a 1 pound per square foot boom (approximate average overpressure in airspace) breaking a window is between one in one billion (Sutherland 1990) to one in one million (Hershey and Higgins 1976). Damage to plaster occurs at similar ranges to glass damage. Plaster has a compounding issue in that it will often crack due to shrinkage while curing or from stresses as a structure settles, even in the absence of outside loads. Sonic boom damage to plaster often occurs when internal stresses are high as a result of these factors. In general, for well-maintained structures, the threshold for damage from sonic booms is 2 pounds per square foot (Haber and Nakaki 1989), below which damage is unlikely.

Training for air combat usually begins with opposing aircrews setting up at opposite edges of the training airspace and then proceeding toward each other. Aircraft can become supersonic at various times during an engagement exercise. Supersonic flight segments can occur as the aircraft accelerate toward each other, during dives in the engagement itself, and during disengagement. Most supersonic flight occurs within a generally elliptical region aligned between the setup points. The long-term, average pattern of sonic booms experienced on the ground, as quantified by CDNL and numbers of booms, reflects this pattern of flight.

Modeling of supersonic flight activity considers the following factors: airspace geometry, flight operations, flight durations, flight areas, flight profiles (altitude distribution, maneuver characteristics), and atmospheric effects. The BOOMAP computer model was used to calculate CDNL for average daily aircraft supersonic flight operations for each area in which supersonic flight would be conducted. This EIS shows single tabulated CDNL levels in applicable airspace and defines the number of booms per day.

3.3 AIR QUALITY

3.3.1 Resource Definition

Air quality in a given location is defined by the size and topography of an air basin, the air emissions that occur within and outside of the air basin, local and regional meteorological influences, and the resulting types and concentrations of pollutants in the atmosphere. The significance of a pollutant concentration is often determined by comparing its concentration to an appropriate national or state ambient air quality standard. These standards represent the allowable atmospheric concentrations at which the public health and welfare are protected and include a reasonable margin of safety to protect the more sensitive individuals in the population. The USEPA established the National Ambient Air Quality Standards (NAAQS) to regulate the following criteria pollutants: ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter less than or equal to 10 micrometers in diameter (PM_{10}), particulate matter less than or equal to 2.5 micrometers in diameter ($PM_{2.5}$), and lead. Units of concentration for the NAAQS are generally expressed in parts per million (ppm) or micrograms per cubic meter ($\mu g/m^3$). Table 3-6 presents the NAAQS. The following paragraph contains the specific attainment definitions for each criteria pollutant.

Table 3-6. National Ambient Air Quality Standards

Pollutant	Averaging Time	National Standards[a]	
		Primary[b]	Secondary[c]
O_3	8-hour	0.070 ppm (137 μg/m^3)	Same as primary
CO	8-hour	9 ppm (10 mg/m^3)	NA
	1-hour	35 ppm (40 mg/m^3)	NA
NO_2	Annual	0.053 ppm (100 μg/m^3)	Same as primary
	1-hour	0.10 ppm (188 μg/m^3)	NA
SO_2	3-hour	NA	0.5 ppm (1,300 μg/m^3)
	1-hour	0.075 ppm (196 μg/m^3)	NA
PM_{10}	24-hour	150 μg/m^3	Same as primary
$PM_{2.5}$	Annual	12 μg/m^3	15 μg/m^3
	24-hour	35 μg/m^3	Same as primary
Lead	Rolling 3-month period	0.15 μg/m^3	Same as primary

[a] Concentrations are expressed first in units in which they were promulgated. Equivalent units are included in parentheses.
[b] Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.
[c] Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.
Key: NA = not applicable

The NAAQS 8-hour O_3 standard is attained when the 3-year average of the fourth-highest daily maximum 8-hour concentration measured each year is less than or equal to 0.070 ppm. For CO and PM_{10}, the NAAQS are not to be exceeded more than once per year. The NAAQS annual NO_2 standard is attained when the annual arithmetic mean concentration in a calendar year is less than or equal to 0.053 ppm. The 1-hour NO_2 standard is attained when the 3-year average of the 98th percentile of the daily maximum 1-hour average concentration does not exceed 0.10 ppm. For SO_2, the primary NAAQS is attained when the 99th percentile of 1-hour daily maximum concentrations, averaged over 3 years, is less than or equal to 0.075 μg/m^3. The NAAQS $PM_{2.5}$ standards are attained when the annual arithmetic mean concentration is less than or equal to 12 μg/m3 and when the 98th percentile of the 24-hour concentration is less than or equal to 35 μg/m3, both averaged over 3 years.

O_3 concentrations are typically highest during the warmer months of the year and coincide with periods of high insolation. However, there are circumstances that can contribute to higher levels of ozone under cooler temperatures. Maximum O_3 concentrations tend to be homogeneously spread throughout a region, as it often takes several hours to convert precursor emissions to O_3 (mainly nitrogen oxides [NO_x] and photochemically reactive volatile organic compounds [VOCs]) in the atmosphere. Inert pollutants, such as CO, tend to have the highest concentrations during the colder months of the year, when light winds and nighttime/early morning surface-based temperature inversions inhibit atmospheric dispersion. Maximum inert pollutant concentrations are usually found near an emission source.

3.3.1.1 Greenhouse Gases

Greenhouse gases (GHGs) are gases that trap heat in the atmosphere. GHG emissions are generated by both natural processes and human activities. The accumulation of GHGs in the atmosphere regulates the earth’s temperature. Human activities are contributing to climate change, primarily by releasing GHGs into the atmosphere. Climate change refers to any significant change in the measures of climate lasting for an extended period of time (USEPA 2016). The U.S. Global Change Research Program (USGCRP) report, *Climate Science Special Report: Fourth National Climate Assessment* (USCGRP 2017), states the following:

- Global annually averaged surface air temperature has increased by about 1.8°F (1.0°C) over the last 115 years (1901–2016). This period is now the warmest in the history of modern civilization.
- It is extremely likely that human activities, especially emissions of GHGs, are the dominant cause of the observed warming since the mid-20th century.
- Over the next few decades (2021–2050), annual average temperatures are expected to rise by about 2.5°F for the United States, relative to the recent past (average from 1976–2005), under all plausible future climate scenarios.
- Many other aspects of global climate are changing, including rising oceanic temperatures; melting glaciers; diminishing snow cover; shrinking sea ice; rising sea levels; ocean acidification; and increasing atmospheric water vapor.
- Global average sea level has risen by about 7 to 8 inches since 1900, a rate that is greater than during any preceding century in at least 2,800 years. Global sea level rise has already affected the United States; the incidence of daily tidal flooding is accelerating in more than 25 Atlantic and Gulf Coast cities. Global average sea levels are expected to continue to rise by at least several inches in the next 15 years and by 1 to 4 feet by 2100. A rise of as much as 8 feet by 2100 cannot be ruled out. Sea level rise will be higher than the global average on the East and Gulf Coasts of the United States.
- Annual trends toward earlier spring melt and reduced snowpack are already affecting water resources in the western United States and these trends are expected to continue. Under higher emission scenarios and assuming no change to current water resources management, chronic, long-duration hydrological drought is increasingly possible before the end of this century.
- The magnitude of climate change beyond the next few decades will depend primarily on the amount of GHGs (especially carbon dioxide [CO_2]) emitted globally. Without major reductions in emissions, the increase in annual average global temperature relative to preindustrial times could reach 9°F (5°C) or more by the end of this century. With significant reductions in emissions, the increase in annual average global temperature could be limited to 3.6°F (2°C) or less.

GHGs include water vapor, CO_2, methane (CH_4), nitrous oxide, O_3, and several hydrocarbons and chlorofluorocarbons. Each GHG has an estimated global warming potential (GWP), which is a function of its lifetime and ability to trap heat in the atmosphere. The GWP rating system is standardized to CO_2, which has a value of one. For example, CH_4 has a GWP of 28, which means that it has a global warming effect 28 times greater than CO_2 on an equal-mass basis (USGCRP 2017). To simplify GHG analyses, total GHG emissions from a source are often expressed as a carbon dioxide equivalent (CO_2e). The CO_2e is calculated by multiplying the emissions of each GHG by its GWP and adding the results together to produce a single, combined emission rate representing all GHGs. While CH_4 and nitrous oxide have much higher GWPs than CO_2, CO_2 is emitted in such greater quantities that it is the overwhelming contributor to global CO_2e emissions from both natural processes and human activities.

The potential effects of GHG emissions generated by the proposed AFRC F-35A mission are by nature global. Given the global nature of climate change and the current state of the science, it is not useful at this time to attempt to link the emissions quantified for local actions to any specific climatological change or resulting environmental impact. Nonetheless, GHG emissions from the proposed AFRC F-35A mission have been quantified in this EIS for use as indicators of their potential contributions to climate change effects.

3.3.2 Regulatory Setting

The Clean Air Act (CAA) and its subsequent amendments establish air quality regulations and the NAAQS, and delegate the enforcement of these standards to the states. The CAA establishes air quality planning processes and requires states to develop a State Implementation Plan (SIP) that details how they will maintain the NAAQS or attain a standard in nonattainment within mandated timeframes. The requirements and compliance dates for attainment are based on the severity of the nonattainment classification of the area. The following summarizes the air quality rules and regulations that apply to the proposed AFRC F-35A mission.

3.3.2.1 Federal Regulations

CAA Section 176(c) and USEPA’s General Conformity Rule (GCR) generally prohibit federal agencies from engaging in, supporting, permitting, or approving any activity that does not conform to the most recent USEPA-approved SIP. This means that federal projects in such areas or other activities using federal funds or requiring federal approval (1) will not cause or contribute to any new violation of an NAAQS; (2) will not increase the frequency or severity of any existing violation; or (3) will not delay the timely attainment of any standard, interim emission reduction, or other milestone. The USEPA’s GCR regulations implementing the prohibitions of CAA Section 176(c) are promulgated at 40 *CFR* Part 93, Subpart B.

The GCR applies to federal actions affecting areas that are in nonattainment of an NAAQS, and to designated maintenance areas (attainment areas that have been reclassified from a previous nonattainment status and are required to prepare an air quality maintenance plan). Conformity requirements only apply to nonattainment and maintenance pollutants and their precursor emissions. Conformity determinations are required when the annual direct and indirect emissions that would result from a proposed federal action equal or exceed an applicable *de minimis* threshold. These thresholds vary by pollutant and the severity of nonattainment conditions in the region that would be affected by the proposed action. If the GCR applicability analysis shows that the net annual direct and indirect emissions generated by the proposed AFRC F-35A actions in these areas will be below the applicable *de minimis* threshold of 100 tons per year of CO and VOCs/NO_x, respectively, then the action will be exempt from any further requirements under the GCR (40 *CFR* § 93.153(c)(1)).

As part of the Prevention of Significant Deterioration (PSD) Regulation, the CAA provides special protection for air quality and air quality-related values (including visibility and pollutant deposition) in selected areas of the United States (national parks greater than 6,000 acres or national wilderness areas greater than 5,000 acres). These Class I areas are areas in which any appreciable deterioration of air quality is considered significant. In 1999, the USEPA promulgated a regional haze regulation that requires states to establish goals and emission reduction strategies to make initial improvements in visibility within their respective Class I areas. Visibility impairment is defined as a reduction in the visual range and atmospheric discoloration. Criteria to determine the significance of air quality impacts in Class I areas usually pertain to stationary emission sources, because mobile sources are generally exempt from permit review by regulatory agencies. However, Section 169A of the CAA states the national goal of prevention of any future impairment of visibility within Class I areas from manmade sources of air pollution. Therefore, due to the proximity of these pristine areas to some areas proposed for aircraft operations, this EIS provides qualitative analyses of the potential for emissions generated by the AFRC F-35A mission to affect visibility within these areas. The PSD program also includes permitting requirements and standards for new major stationary sources and major modifications to existing major stationary sources designed to prevent the air quality in attainment areas from deteriorating into nonattainment. Unless otherwise noted, none of the stationary source modifications under the proposed action or alternatives would trigger those PSD permitting requirements under either 40 *CFR* § 51.166 (state plan requirements) or 40 *CFR* § 52.21 (federal requirements for areas without an approved state plan). While these PSD regulatory permitting requirements only apply to stationary sources, the PSD permitting threshold of 250 tons per year for new stationary sources under either 40 *CFR* § 51.166(b)(1)(i)(b) or § 52.21(b)(1)(i)(b) was used as an initial indicator of significance or non-significance for any net annual construction and operational emission increases that would occur from an alternative located in areas that attain a NAAQS.

Hazardous air pollutants (HAPs) are air pollutants known or suspected to cause serious health effects or adverse environmental effects. HAPs are compounds that generally have no established ambient standards. The CAA identifies 187 substances as HAPs (e.g., benzene, formaldehyde, mercury, and toluene). HAPs are emitted from a range of industrial facilities and vehicles. The USEPA sets federal regulations to reduce HAP emissions from stationary sources. A "major" source of HAPs is defined as any stationary facility or source that directly emits or has the potential to emit 10 tons per year or more of any HAP or 25 tons per year or more of combined HAPs. The USEPA also sets ambient levels of concern for HAPs.

Under the CAA, state and local agencies can establish ambient air quality standards and regulations of their own, provided these are at least as stringent as the federal requirements. These state and local standards and regulations are described in the affected environment sections for each alternative base (see EIS Sections DM3.3, HS3.3, FW3.3, and WM3.3).

3.3.2.2 Greenhouse Gases

The USEPA has promulgated several final regulations involving GHGs, either under the authority of the CAA, or as directed by Congress, but none of them apply directly to the proposed AFRC F-35A mission. At this time, climate change presents a global problem caused by increasing global atmospheric concentrations of GHG emissions. The current state of the science surrounding climate change does not support determining the global significance of local or regional emissions of GHGs from a particular action. Therefore, the quantitative analysis of CO_2e emissions contained in this EIS is intended only to disclose the local net effects of the proposed action and alternatives, and to potentially aid in making reasoned choices among alternatives.

3.3.3 Methodology

The air quality analysis estimated the magnitude of emissions that would be generated by proposed AFRC F-35A mission construction and operational activities at each alternative base. The estimation of operational impacts is based on the net change in emissions that would result from the replacement of existing aircraft operations with AFRC F-35A aircraft operations.

Potential impacts to air quality are evaluated with respect to the extent, context, and intensity of the impact in relation to relevant regulations, guidelines, and scientific documentation. The Council on Environmental Quality (CEQ) defines significance in terms of context and intensity in

40 *CFR* 1508.27. This requires that the significance of an action be analyzed in respect to the setting of the action and based relative to the severity of the impact. For attainment area criteria pollutants, the project air quality analysis uses the USEPA's prevention of significant deterioration permitting threshold of 250 tons per year as an initial indicator of the local significance of potential impacts to air quality. It is important to note that these indicators only provide a clue to the potential impacts to air quality. In the context of criteria pollutants for which the proposed project region is in attainment of a NAAQS, the analysis compares the annual net increase in emissions estimated for each project alternative to the 250 tons per year prevention of significant deterioration permitting threshold. The prevention of significant deterioration permitting threshold represents the level of potential new emissions below which a new or existing minor, non-listed, stationary source may acceptably emit without triggering the requirement to obtain a permit. Thus, if the intensity of any net emissions increase for a project alternative is below 250 tons per year in the context of an attainment criteria pollutant, the indication is the air quality impacts would be insignificant for that pollutant. To be conservative, the analysis also uses the conformity *de minimis* threshold for a maintenance area of 100 tons per year as an initial indicator of the significance of potential impacts to attainment area criteria pollutant levels. In the case of criteria pollutants for which the proposed project region does not attain a NAAQS, the analysis compares the net increase in annual direct and indirect emissions to the applicable pollutant *de minimis* threshold(s). If the net direct and indirect emissions from the project alternative equal or exceed an applicable *de minimis* threshold, then a positive general conformity determination would be required before any emissions from the action(s) are generated.

If emissions exceed an indicator threshold, further analysis was conducted to determine whether impacts were significant. In such cases, if emissions (1) do not contribute to an exceedance of an ambient air quality standard or (2) conform to the approved SIP, then impacts would not be significant.

3.3.3.1 Construction

The proposed AFRC F-35A mission at each alternative base would require construction and/or renovation of airfield facilities (e.g., training facilities, hangars, taxiways, and maintenance and fueling facilities). Air quality impacts associated with proposed construction and demolition activities would result from (1) combustive emissions generated by fossil fuel-powered equipment and (2) fugitive dust emissions (PM_{10}/$PM_{2.5}$) from demolition and the operation of equipment on exposed soil.

The USAF Air Conformity Applicability Model (ACAM) version 5.0.12a was used to estimate air emissions that would be generated by construction activities associated with the proposed AFRC F-35A mission (Solutio Environmental, Inc. 2018). Construction activity data developed for each alternative base were used as inputs for ACAM. Appendix C includes ACAM output reports that detail the calculations that estimate criteria pollutant emissions and GHGs that would be generated by proposed construction activities at each alternative base.

Inclusion of standard construction practices and Leadership in Energy and Environmental Design (LEED) Silver certification into proposed construction activities would potentially reduce fugitive dust emissions from the operation of construction equipment on exposed soil by 50 percent from uncontrolled levels (Countess Environmental 2006). The standard construction practices for fugitive dust control include the following:

- Use water trucks to keep areas of vehicle movement damp enough to minimize the generation of fugitive dust.
- Minimize the amount of disturbed ground area at a given time.

- Suspend all soil disturbance activities when winds exceed 25 miles per hour or when visible dust plumes emanate from the site, and stabilize all disturbed areas with water application.
- Designate personnel to monitor the dust control program and to increase watering, as necessary, to minimize the generation of dust.

The air quality analysis assumed that all construction activities for the proposed AFRC F-35A mission would begin in 2021 and be completed in 2023.

3.3.3.2 Operations

Implementation of the AFRC F-35A mission at each alternative base would primarily affect emissions from existing and proposed (1) aircraft operations at alternative base locations and in associated airspace, (2) aircraft engine maintenance and testing, and (3) AGE. The relatively minor net changes in personnel that would result from implementation of the AFRC F-35A mission at each alternative base would result in inconsequential changes in emissions from other sources (e.g., onsite government motor vehicles or privately-owned vehicles). The net changes in emissions that would result from the replacement of existing aircraft operations with proposed AFRC F-35A aircraft operations from the three different afterburner scenarios were compared to pollutant indicators to determine significance.

The analysis of proposed aircraft operations is limited to operations that would occur in the lowest part of the atmosphere, because this is the typical depth of the atmospheric mixing layer where the release of aircraft emissions would affect ground-level pollutant concentrations. In general, aircraft emissions released above the mixing layer would not appreciably affect ground-level air quality. In accordance with the GCR (40 *CFR* 93 Subpart B), when the applicable SIP or Transportation Implementation Plan does not specify a mixing height, the federal agency can use 3,000 feet (914 meters) above ground level (AGL) as a default mixing height. Only Davis Monthan Air Force Base (AFB) and Naval Air Station (NAS) Joint Reserve Base (JRB) Fort Worth have SIPs for their areas; however, these SIPs do not specify a mixing height. Therefore, the analysis used 3,000 feet AGL as a default mixing height at all project locations.

Flight operations (including arrivals, departures, and pattern operations) are derived by utilizing the same site-specific operational data as the noise impact analysis. Both analyses (noise and air quality) factor in the number and type of operations, location-specific landing and take-off patterns, aircraft power settings, and other relevant details of the affected environment, the proposed action(s), and alternatives necessary to produce a consistent determination of environmental consequences. The air quality impact analysis at each location was evaluated based on the USEPA's Time In Mode (TIM) Model and site-specific representative TIM cycles. Representative TIM cycles factored in weighted frequency and times in each mode of flight operations (i.e., TIMs) that occur at or below 3,000 feet AGL, based on the site-specific flight profiles developed and the projected frequency of use of each flight profile. Calculations showing the time-weighted average assigned to each pattern based on the TIM and its percentage of use, consistent with the operational data used throughout this analysis, are contained in Appendix C. Methodologies and calculations showing how representative TIM cycles were derived from weighted-averaging based on the flight profiles are also contained in Appendix C.

The ACAM was used to estimate emissions from existing A-10 and F-16 and proposed AFRC F-35A aircraft flight operations and AGE usages. Site-specific representative TIM cycles developed for each alternative base were used as inputs to ACAM (see Chapter 2, Table 2-4, of this EIS). The air quality analysis uses year 2024 conditions to define existing and proposed emissions for the F-35A mission (baseline year). Appendix C includes the ACAM output reports that detail the calculations used to estimate criteria pollutant emissions and GHGs from proposed operations at each alternative base.

3.4 SAFETY

3.4.1 Resource Definition

For the purposes of this analysis, safety addresses the explosive, construction and demolition (C&D), airfield, and flight safety, as well as bird/wildlife-aircraft strike hazard (BASH), associated with the proposed AFRC F-35A mission. The F-35A will have undergone approximately 10 years of flight testing before regularly operating from any of the bases under consideration for basing aircraft in this EIS. C&D safety considers issues associated with facility construction/renovation, operations and maintenance (O&M) activities that support base operations, including fire response and anti-terrorism/force protection measures at each location.

F-35A flight risks and safety issues associated with aircraft operations at each alternative base and in associated airspace are addressed. Any F-35A accident at an airfield would have direct impacts on the ground in the immediate vicinity of the mishap as a result of explosion/fire and debris spread. Class A mishaps and bird–aircraft strike hazards are specifically addressed.

3.4.2 Regulatory Setting

Numerous federal, civil, and military laws and regulations govern operations at each alternative base and in the surrounding airspace(s). These laws and regulations individually and collectively prescribe measures, processes, and procedures required to ensure safe operations and to protect the public, military, and property.

3.4.3 Methodology

The elements of the F-35A beddown that could potentially affect safety are evaluated relative to the degree to which the action increases or decreases safety risks to the public or private property. Explosive, C&D, airfield, and flight safety, as well as BASH, are assessed for the potential to increase risk and the capability to manage that risk by responding to emergencies.

3.4.3.1 Explosive Safety

Department of Defense Explosives Safety Board Standard 6055.09, *DoD Ammunition and Explosives Safety Standards*, and Air Force Manual (AFMAN) 91-201, *Explosives Safety Standards*, represent DoD and USAF guidelines for complying with explosives safety. Explosives include ammunition, propellants (solid and liquid), pyrotechnics, warheads, explosive devices, and chemical agent substances and associated components that present real or potential hazards to life, property, or the environment.

Siting requirements for munitions and ammunition storage and handling facilities are based on safety and security criteria. Defined distances are maintained between munitions storage areas and a variety of other types of facilities. These distances, called explosive safety quantity-distance (ESQD) arcs, are determined by the type and quantity of explosive material to be stored. Each explosive material storage or handling facility has ESQD arcs extending outward from its sides and corners for a prescribed distance. Within these ESQD arcs, development is either restricted or prohibited altogether to ensure personnel safety and to minimize potential for damage to other facilities in the event of an accident. In addition, explosives storage and handling facilities must be located in areas where security of the munitions can be maintained at all times. Identifying the ESQD arcs ensures that construction does not occur within these areas.

3.4.3.2 Construction and Demolition Safety

Short-term safety risks are associated with any C&D activity, including C&D activities proposed as part of the AFRC F-35A mission. However, adherence to standard safety practices (OSHA Standard 29 *CFR*) would minimize any potential risks.

3.4.3.3 Airfield Safety

Determining accident potential relies on identifying where most accidents have occurred in the past at military airfields. This approach does not produce accident probability statistics because the question of probability involves too many variables for an accurate prediction model to be developed. The analysis of the history of military aircraft accidents focuses on determining where (within the airfield environments) an accident would likely occur and estimates the size of the impact area that would likely result from any single accident. Per DoDI 4165.57, all structures on the ground have the potential to create hazards to flight. The FAA provides detailed instructions for the marking (i.e., paint schemes and lighting) of obstructions to warn pilots of their presence. Any temporary or permanent structure, including all appurtenances, that exceeds an overall height of 200 feet AGL or exceeds any obstruction standard contained in 14 *CFR* 77 should normally be marked and/or lighted. The FAA can also recommend marking and/or lighting a structure that does not exceed 200 feet AGL or 14 *CFR* 77 standards because of its particular location. The obstruction standards in 14 *CFR* 77 are primarily focused on structures in the immediate vicinity of airports and approach and departure corridors from airports (14 *CFR* 77).

3.4.3.4 Flight Safety

The primary public concern with regard to flight safety is the potential for aircraft accidents (mishaps). Such mishaps could occur as a result of mid-air collisions, collisions with man-made structures or terrain, weather-related accidents, mechanical failure, pilot error, or bird-aircraft collisions. Collisions with structures around the airfield are controlled through airfield setbacks and safety zones that restrict construction around the airfield so that both the ground surface is clear for ground maneuvering and the airspace is clear of obstructions such as groves of trees, poles and power lines, and tall structures. An AICUZ study defines the accident potential zones (APZs) around the airfield and prescribes restrictions on any construction in the clear zone (CZ). Land use restrictions are recommended for APZs I and II, based mostly on the intensity of use. That is, activities where people congregate are not recommended, and uses where people spend a high percentage of time (such as residential) are also not recommended.

The USAF defines five major categories of aircraft mishaps: Classes A, B, C, D, and E, which includes high-accident potential. Class A mishaps result in a loss of life, permanent total disability, a total cost in excess of $2 million, and/or destruction of an aircraft. Class B mishaps result in permanent partial disability or inpatient hospitalization of three or more personnel and/or a total cost of between $500,000 and up to $2 million. Class C mishaps involve an injury resulting in any loss of time from work beyond the day or shift on which it occurred, an occupational illness that causes loss of time from work at any time, or an occupational injury or illness resulting in permanent change of job and/or reportable damage of between $50,000 and up to $500,000. High-accident-potential events include any hazardous occurrence that has a high potential for becoming a mishap. Class C mishaps and high-accident potential, the most common types of accidents, represent relatively unimportant incidents because they generally involve minor damage and injuries, and rarely affect property or the public.

Class D mishaps result in total cost of property damage of $20,000 or more, but less than $50,000; or a recordable injury or illness not otherwise classified as a Class A, B, or C mishap. Note that in

2010, the threshold for determining the class of mishaps was raised from $1 million to $2 million for Class A mishaps, and the ceiling was raised for Class B from $1 million to $2 million.

Accident rates for commercial aircraft are determined using accidents per million departures (or flight cycles), because there is a stronger statistical correlation between accidents and departures than there is between accidents and flight hours, between accidents and the number of airplanes in service, or between accidents and passenger miles or freight miles.

This EIS focuses on USAF Class A mishaps because of their potentially catastrophic results. Based on historical data on mishaps at the four alternative bases, and under all conditions of flight, the military services calculate Class A mishap rates per 100,000 flying hours for each type of aircraft in the inventory. Mishap rates do not consider combat losses due to enemy action. In evaluating this information, it should be emphasized that data presented are only statistically predictive. The actual causes of mishaps are due to many factors, not simply the amount of flying time of the aircraft. Mishap rates are statistically assessed as an occurrence rate per 100,000 flying hours.

The analysis of flight safety risk examines the historic and current Class A mishap rates of aircraft currently operated at the alternative bases compared to the F-35 Class A mishap rate. At the time of this writing, the F-35A has not amassed the 100,000 flight hours necessary for a statistically robust comparison to legacy aircraft; therefore, while not ideal, this EIS makes use of the flight safety record using USAF data available to-date for the F-35A and using data from other F-35 variants. Through November 2019, the F-35A has more than 96,000 flying hours with three Class A mishaps, resulting in a Class A mishap rate of 3.11 (USAF 2019) (these statistics are updated annually). These mishaps included an engine failure during takeoff preparation (the aircraft was safely brought to a halt), an aborted takeoff with damage confined to the engine, and a hydraulic failure resulting in collapsed nose landing gear that occurred after landing and parking. No injuries occurred during these events.

An aircraft crash is what is known in the probability analysis world as a low-probability/high-consequence risk. Aircraft are designed to ensure that aircraft accidents are rare events. To minimize these accidents, factors that cause or contribute to accidents must be understood and prevented. Accident data have been studied to determine these factors. However, the low rate of accidents makes it difficult to discover repeating patterns of these factors.

3.4.3.5 Bird/Wildlife-Aircraft Strike Hazard (BASH)

Bird/wildlife-aircraft strikes constitute a safety concern for the USAF because they can result in damage to aircraft or injury to aircrews or local human populations if an aircraft crashes. Aircraft can encounter birds at altitudes up to 30,000 feet MSL or higher. However, most birds fly close to the ground. According to the Air Force Safety Center BASH statistics, from 1995 to 2016, where altitude at time of strike was known, more than 50 percent of the strikes occurred below 400 feet AGL, and 90 percent occurred below 2,000 feet AGL (USAF 2017).

To address the issue of bird-aircraft strikes, the USAF has developed the Avian Hazard Advisory System (AHAS) to monitor bird activity and forecast bird strike risks. Using Next Generation Radar (NEXRAD) weather radars and models developed to predict bird movement, the AHAS is an online, near real-time, geographic information system (GIS) used for bird strike risk flight planning across the continental United States. Additionally, as part of an overall strategy to reduce BASH risks, the USAF has developed a Bird Avoidance Model using GIS technology. The Bird Avoidance Model is a key tool for analysis and correlation of bird habitat, migration, and breeding characteristics and is combined with key environmental and man-made geospatial data. The model was created to provide USAF pilots and flight schedulers/planners with a tool for making informed decisions when selecting flight routes. The model was created in an effort to protect human lives, wildlife, and equipment during aircraft operations. This information is integrated into required pilot briefings that occur prior to any sortie.

3.5 SOIL AND WATER RESOURCES

3.5.1 Resource Definition

The term “soils” refers to unconsolidated materials formed from the underlying bedrock or other parent material. Soils play a critical role in both the natural and human environment.

Water resources include surface water, groundwater, and floodplains. Surface water resources include lakes, rivers, and streams and are important for a variety of reasons, including economic, ecological, recreational, and human health factors. Groundwater includes the subsurface hydrologic resources of the physical environment; its properties are often described in terms of depth to aquifer or water table, water quality, and surrounding geologic composition. Floodplains are lowland areas adjacent to surface waterbodies where flooding events periodically cover areas with water. Wetlands are discussed in Section 3.6.

For the purposes of this analysis of soil and water resources, the ROI for the proposed action and No Action Alternative includes the areas proposed for infrastructure upgrades and construction, along with areas immediately downstream of base outfalls that could be impacted during construction.

3.5.2 Regulatory Setting

The Clean Water Act (CWA) of 1977 (33 *USC* 1251 et seq.) and the USEPA Stormwater General Permit regulate pollutant discharges. Pollutants regulated under the CWA include “priority” pollutants, including various toxic pollutants, such as biochemical oxygen demand, total suspended solids, fecal coliform, oil and grease, and pH.

Section 438 of the Energy Independence and Security Act (EISA) (42 *USC* §17094) establishes into law stormwater design requirements for federal construction projects that disturb a footprint of greater than 5,000 square feet of land. EISA Section 438 requirements are independent of stormwater requirements under the CWA. A project footprint consists of all horizontal hard surface and disturbed areas associated with project development. Under these requirements, pre-development site hydrology must be maintained or restored to the maximum extent technically feasible with respect to temperature, rate, volume, and duration of flow. Pre-development hydrology is calculated using recognized tools and must include site-specific factors such as soil type, ground cover, and ground slope. Site design shall incorporate stormwater retention and reuse technologies such as bioretention areas, permeable pavements, cisterns/recycling, and green roofs to the maximum extent technically feasible.

Post-construction analyses shall be conducted to evaluate the effectiveness of the as-built stormwater reduction features. These regulations were incorporated into applicable DoD Unified Facilities Criteria (UFC) in April 2010, which stated that low-impact development (LID) features need to be incorporated into new construction activities to comply with the restrictions on stormwater management promulgated by EISA Section 438. LID is a stormwater management strategy designed to maintain site hydrology and mitigate the adverse impacts of stormwater runoff and non-point source pollution. LIDs can manage the increase in runoff between pre- and post-development conditions on the project site through interception, infiltration, storage, and evapotranspiration processes before the runoff is conveyed to receiving waters. Examples of the methods that could reduce the potential impacts of a proposed action include bioretention, permeable pavements, cisterns/recycling, and green roofs. Additional guidance is provided in USEPA’s *Technical*

Guidance on Implementing the Storm Water Runoff Requirements for Federal Projects under Section 438 of the Energy Independence and Security Act (USEPA 2009).

Section 404 of the CWA and EO 11990, *Protection of Wetlands,* regulate development activities in or near streams and wetlands. Actions that affect streams and/or wetlands require a permit from the U.S. Army Corps of Engineers (USACE) for dredging and filling in wetlands. EO 11988, *Floodplain Management,* requires federal agencies to take action to reduce the risk of flood damage; minimize the impacts of floods on human safety, health, and welfare; and restore and preserve the natural and beneficial values served by floodplains. Federal agencies are directed to consider the proximity of their actions to or location within floodplains. Wetlands are discussed in Section 3.6.

The Farmland Protection Policy Act was created to minimize federally aided conversion of farmland and includes provisions to protect important soils that comprise farmlands. These soils include prime, unique, and state and locally important farmlands. These farmlands are not discussed in the EIS because the proposed construction is for national defense purposes and the surrounding land is already in urban development.

With respect to soil erosion, Section 402(p) of the CWA regulates non-point source discharges of pollutants, under the National Pollutant Discharge Elimination System (NPDES) program, or state equivalent program. This section of the CWA was amended to require the USEPA to establish regulations for discharges from active construction sites. NPDES General Construction Permits require preparation of a Stormwater Pollution Prevention Plan (SWPPP) for projects that would disturb more than 1 acre of land.

3.5.3 Methodology

Impacts to soils and surface water can result from earth disturbance that exposes soil to wind or water erosion. Analysis of impacts to soils and surface water examines the potential for such erosion at each alternative base and describes typical measures taken to minimize erosion. In addition, soil limitations and associated typical engineering remedial measures are evaluated with respect to proposed construction.

Criteria for evaluating impacts related to soil resources associated with implementation of the proposed AFRC F-35A mission are impacts on unique soil resources, minimization of soil erosion, and the siting of facilities relative to potential soil limitations. Should development proposed as part of the AFRC F-35A mission substantially affect any of these features, impacts would be considered significant. Soil disturbance that would result from implementation of the AFRC F-35A mission at each alternative base was calculated by summing the square footages of the proposed construction.

Criteria for evaluating impacts related to water resources associated with implementation of the proposed AFRC F-35A mission are water availability, water quality, adherence to applicable regulations, and existence of floodplains. Impacts are measured by the potential to reduce water availability to existing users; to endanger public health or safety by creating or worsening health hazards or safety conditions; or to violate laws or regulations adopted to protect or manage water resources.

Flooding impacts are evaluated by determining if proposed construction is located in a designated floodplain. Groundwater impacts are evaluated by determining if groundwater resources beneath the project site would be used for implementing the proposed AFRC F-35A mission, and if so, by determining the potential to adversely affect those groundwater resources. Impacts to soil and water resources are not evaluated for the areas below where the proposed AFRC F-35A aircraft operations would be conducted because no ground-disturbing activities or use of water resources would occur at these locations.

3.6 BIOLOGICAL RESOURCES

3.6.1 Resource Definition

Biological resources include the native and introduced terrestrial and aquatic plants and animals found in the ROI. For the purposes of this biological resources analysis, the ROI for the proposed action and No Action Alternative is defined as the land area (habitats) that could potentially be affected by infrastructure and construction projects on the base and the airspace where AFRC F-35A pilots would train. The ROI generally includes the developed cantonment and airfield areas of the respective bases, but could also include areas near but outside the base boundary. Examples of off-base areas include managed wildlife areas and surface waters that could be indirectly affected by noise or changes in water quality, respectively. Habitat types are based on floral, faunal, and geophysical characteristics.

Sensitive habitats include areas that the federal government, state governments, or the DoD have designated as worthy of special protection due to certain characteristics such as high species diversity, special habitat conditions for rare species, or other unique features.

For the purposes of this analysis, biological resources were organized into four categories: vegetation, wildlife, special-status species, and wetlands. Vegetation includes existing terrestrial plant communities, but does not include special-status plants, which are described below and in Section 3.6.2. Plant species composition within an area generally defines ecological communities and indicates the type of wildlife that could be present. Marine vegetation (plants that inhabit the seas and oceans) would not be impacted by implementation of the AFRC F-35A mission at any of the alternative bases and therefore are not further described in this EIS.

Wildlife includes all vertebrate animal species, with the exception of special-status species, which are described below and in Section 3.6.2. Typical wildlife includes animal groups such as large and small mammals, songbirds, waterfowl, reptiles, amphibians, and seabirds. The attributes and quality of available habitats influences the composition, diversity, and abundance of terrestrial and marine wildlife communities.

Special-status species are defined as those plant and animal species protected by various regulations established by federal and state agencies. These regulations and the species addressed by them are described in Section 3.6.2.

Wetlands are areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

3.6.2 Regulatory Setting

The Sikes Act was approved 15 September 1960 (as amended in 2003) and is implemented to promote effectual planning, development, maintenance, and coordination of wildlife, fish, and game conservation and rehabilitation on military reservations. The Sikes Act applies to federal land under DoD control and requires military services to establish Integrated Natural Resources Management Plans (INRMPs) to conserve natural resources for their military installations. AFI 32-7064, *Integrated Natural Resources Management,* explains how to manage natural resources on USAF property in compliance with federal, state, and local standards. The chief tool for managing base ecosystems is the INRMP. Based on an interdisciplinary approach to ecosystem management, the INRMP ensures the successful accomplishment of the military mission by integrating all aspects of natural resources management with each other and the rest of the base’s mission.

Special-status plant and wildlife species are subject to regulations under the authority of federal (U.S. Fish and Wildlife Service) and state (Arizona Game and Fish Department [AZGFD], Texas Parks and Wildlife Department [TPWD], Florida Fish and Wildlife Commission [FWC], and the Missouri Department of Conservation [MDC]) agencies. Special-status species include species designated as threatened, endangered, or candidate species by state or federal agencies. Under the Endangered Species Act (ESA) (16 *USC* 1536), an endangered species is defined as any species in danger of extinction throughout all or a significant portion of its range. A threatened species is defined as any species likely to become an endangered species in the foreseeable future. Candidate species are those species for which the USFWS has sufficient information on their biological status and threats to propose them as endangered or threatened under the ESA, but for which development of a proposed listing regulation is precluded by other higher-priority listing activities. Although candidate species receive no statutory protection under the ESA, the USFWS believes it is important to advise government agencies, industry, and the public that these species are at risk and could warrant protection under the ESA.

The Migratory Bird Treaty Act (MBTA) of 1918 (16 *USC* 703-712) is the domestic law that affirms, or implements, the United States' commitment to four international conventions (with Canada, Japan, Mexico, and Russia) for the protection of a shared migratory bird resource. Each of the conventions protect selected species of birds that are common to both countries (i.e., species occur in both countries at some point during their annual life cycle). The act protects all migratory birds and their parts (including eggs, nests, and feathers).

The Bald and Golden Eagle Protection Act (BGEPA) (16 *USC* 668-668d) is legislation in the United States that protects two species of eagles. The BGEPA prohibits anyone without a permit issued by the Secretary of the Interior from "taking" bald eagles. Taking involves molesting or disturbing birds, their parts, nests, or eggs. The BGEPA prescribes criminal penalties for persons who "take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or any manner, any bald or golden eagles... [or any golden eagle], alive or dead, or any part, nest, or egg thereof."

The Marine Mammal Protection Act (MMPA) is a statute enacted in 1972 by the United States to protect marine mammals and their habitat. The MMPA prohibits the "taking" of marine mammals, and enacts a moratorium on the import, export, and sale of any marine mammal, along with any marine mammal part or product within the United States. The Act defines "take" as "the act of hunting, killing, capture, and/or harassment of any marine mammal; or, the attempt at such." The MMPA defines harassment as "any act of pursuit, torment or annoyance which has the potential to either: a. injure a marine mammal in the wild, or b. disturb a marine mammal by causing disruption of behavioral patterns, which includes, but is not limited to, migration, breathing, nursing, breeding, feeding, or sheltering."

Section 404 of the CWA established a program to regulate the discharge of dredged and fill material into waters of the United States, including wetlands. Activities in waters of the United States that are regulated under this program include fills for development, water resource projects (e.g., dams and levees), infrastructure development (e.g., highways and airports), and conversion of wetlands to uplands for farming and forestry. The USACE is the lead agency in protecting wetland resources. The USACE maintains jurisdiction over federal wetlands (33 *CFR* 328.3) under Section 404 of the CWA (33 *CFR* 323.3) and Section 10 of the Rivers and Harbors Act (30 *CFR* 329). The USEPA assists the USACE (in an administrative capacity) in the protection of wetlands (40 *CFR* 225.1 to 233.71). In addition, the USFWS and the National Marine Fisheries Service provide support with important advisory roles.

Furthermore, EO 11990, *Protection of Wetlands*, requires federal agencies, including the USAF, to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands. EO 11990 requires federal agencies to avoid, to the extent possible, the long- and short-term, adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative; if construction in wetlands cannot be avoided, the USAF would issue a Finding of No Practicable Alternative (FONPA).

Under CWA Section 401, applicants for a federal license or permit to conduct activities that could result in the discharge of a pollutant into waters of the United States must obtain certification from the state in which the discharge would originate or, if appropriate, from the interstate water pollution control agency with jurisdiction over affected waters at the point where the discharge would originate. Therefore, all projects that have a federal component and could affect state water quality (including projects that require federal agency approval, such as issuance of a Section 404 permit) must also comply with CWA Section 401.

3.6.3 Methodology

The first step in the analysis of potential impacts to biological resources was to determine the locations of sensitive habitats and species at each alternative base in relation to the proposed AFRC F-35A mission. Maps were examined to locate sensitive habitats and species. Next, areas of overlap for the proposed development and sensitive habitats and species were identified. Scientific literature was reviewed for studies that examined similar types of noise-related impacts to biological resources. The literature review included a review of basic characteristics and habitat requirements of each sensitive species. Where available, information was also gathered relative to management considerations, incompatible resource management activities, and threats to each sensitive species. Impact analyses were then conducted based on the information gathered from the literature reviews and discussions with natural resource managers at each alternative base. The analyses included an assessment of the impacts to biological resources that would result from both construction activities (ground disturbance) and daily aircraft operations (changes in takeoffs, landings, engine runups) at the alternative bases and in the associated airspace and ranges. Impacts that could result from implementation of the AFRC F-35A mission at any of the alternative bases include temporary and permanent impacts associated with the construction and use of facilities, disturbance to wildlife from noise and effects associated with aircraft overflight, and ground impacts associated with the use of defensive countermeasures.

Measures to avoid and/or minimize adverse impacts to biological resources are also presented. The following criteria were evaluated when determining the significance of an effect on biological resources that could result from implementation of the AFRC F-35A mission:

- The direct impact or taking of a protected special-status species, including habitat alteration.
- The importance (legal, commercial, ecological, or scientific) of the resource.
- The relative sensitivity of biological resources that could be affected by implementation of the mission.
- The quantity or percentage of biological resources affected by implementation of the mission relative to overall abundance in the ROI.
- The expected duration of potential impacts that would result from implementation of the mission.

The focus of the analysis is on the federally and state listed or candidate threatened and endangered species. Other species of conservation concern are addressed, but are not analyzed to the same level of detail as the species listed by the USFWS as threatened or endangered. Impacts to threatened, endangered, and special status species/communities that would result from implementation of the AFRC F-35A mission at any of the alternative bases include potential habitat loss, temporary and permanent impacts associated with the construction and use of facilities, and ground impacts associated with the use of defensive countermeasures.

Plant species below the airspace and range areas proposed for use were excluded from extensive review and analysis because the proposed AFRC F-35A aircraft operations would not result in new ground disturbance. Ordnance delivery and flare use would not exceed baseline levels and would occur in locations already used and authorized for those purposes. Invertebrates and fish in areas below the airspace and ranges proposed for use were also excluded from review and analysis because they would not likely be impacted by implementation of the AFRC F-35A mission.

Determination of the significance of wetland impacts is based on (1) loss of wetland acreage, (2) the function and value of the wetland, (3) the proportion of the wetland that would be affected relative to the occurrence of similar wetlands in the region, (4) the sensitivity of the wetland to proposed activities, and (5) the duration of ecological ramifications. Impacts to wetland resources are considered significant if high-value wetlands would be adversely affected or if wetland acreage is lost. High-value wetlands are those wetlands that provide a significant function or value (i.e., flood control, unique wildlife habitat, etc.).

3.7 CULTURAL RESOURCES

3.7.1 Resource Definition

Cultural resources are districts, sites, buildings, structures, or objects considered important to a culture, subculture, or community for scientific, traditional, religious, or other purposes. They include archaeological resources, historic architectural/engineering resources, and traditional resources. Only significant cultural resources are considered for potential adverse impacts from an action. Significant cultural resources are historic properties as defined by the National Register of Historic Places (NRHP) (36 *CFR* 60.4) or resources identified as important to tribes or other traditional groups, as outlined in the American Indian Religious Freedom Act (AIRFA); the Native American Graves Protection and Repatriation Act (NAGPRA); and EO 13007, *Indian Sacred Sites*. Historic properties are any prehistoric, historic, or traditional resource included in or eligible for inclusion on the NRHP (36 *CFR* 800.16(l)).

For a cultural resource to be considered eligible for the NRHP, it must possess integrity of location, design, setting, materials, workmanship, feeling, or association, and it must meet one or more of the following criteria (36 *CFR* 60.4):

- Association with events that have made a significant contribution to the broad patterns of our history (Criterion A).
- Association with the lives of persons significant in our past (Criterion B).
- Embodiment of distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction (Criterion C).
- Have yielded, or may be likely to yield, information important in prehistory or history (Criterion D).

In general, these resources must be more than 50 years old; however, younger resources may be eligible if they are exceptionally significant or date to a defined period of historic significance (e.g., the Cold War).

Section 101(d)(6)(A) of the National Historic Preservation Act (NHPA) states that properties of traditional religious and cultural importance to a tribe or Native Hawaiian organization can be determined eligible for inclusion on the NRHP. National Register Bulletin 38, *Guideline for Evaluating and Documenting Traditional Cultural Properties* (NPS 1998) defines a traditional cultural property as a resource that is eligible for inclusion on the NRHP. Eligibility could be based on association with cultural practices or beliefs of a living community that are rooted in that community’s history and are important in maintaining the continuing cultural identity of the community. Traditional cultural properties can include archaeological resources, buildings, neighborhoods, prominent topographic features, habitats, plants, animals, landscapes, and minerals that tribes and other groups consider essential for the continuance of traditional cultures.

Properties of traditional religious and cultural importance need not be determined eligible for the NRHP to be a significant cultural resource considered for potential adverse impacts from an action. On 21 November 1999, the DoD promulgated its American Indian and Alaska Native Policy, which emphasizes the importance of respecting and consulting with tribal governments on a government-to-government basis. The policy requires an assessment, through consultation, of the effect of proposed DoD actions that could have the potential to significantly affect protected tribal resources, tribal rights, and tribal and Alaska Native lands, before decisions are made by the services. DoDI 4710.02, *DoD Interactions with Federally-Recognized Tribes,* implements DoD policy, assigns responsibilities, and provides procedures for DoD interactions with federally recognized tribes in accordance with its American Indian and Alaska Native Policy and other DoD directives and policies. The USAF implements DoDI 4710.02 through AFI 90-2002, *Air Force Interactions with Federally-Recognized Tribes.*

EO 13007 defines sacred sites as any specific, discrete, narrowly delineated location on federal land that is identified by a tribe or individual as sacred by virtue of its established religious significance to or ceremonial use by a tribal religion and identified as such to the land managing agency. EO 13007 also requires agencies to accommodate access to, and ceremonial use of, sacred sites by tribal religious practitioners and to avoid adversely affecting their physical integrity.

3.7.2 Regulatory Setting

DoDI 4715.16, *Cultural Resources Management* (DoD 2008), and AFMAN 32-7003, *Environmental Conservation* (USAF 2020), outline and specify proper procedures for cultural resource management on USAF bases.

Laws pertinent to the proposed action include the NHPA of 1966, as amended; the Antiquities Act of 1906; the Historic Sites Act of 1935; NEPA; the Archeological and Historic Preservation Act of 1974; the Archaeological Resources Protection Act of 1979; the NAGPRA of 1990; and the AIRFA of 1978.

Under Section 106 of the NHPA, the USAF is required to consider the effects of its undertakings at each location on historic properties listed, or eligible for listing, on the NRHP and to consult with the State Historic Preservation Officer (SHPO), Tribal Historic Preservation Office, and others regarding potential effects as per 36 *CFR* 800. Under AFMAN 32-7003, recorded cultural resources not evaluated for NRHP eligibility must be managed as eligible. Under Section 110 of the NHPA, each location is mandated to maintain an active historic preservation program and provide stewardship of cultural resources "consistent with the preservation of such properties and the mission of the agency (Section 470 h-2(a))."

Federal regulations governing cultural resource activities include the following: 36 *CFR* 60, *National Register of Historic Places;* 36 *CFR* 63, *Determinations of Eligibility for Inclusion in the National Register;* 36 *CFR* 79, *Curation of Federally Owned and Administered Archaeological Collections;* 36 *CFR* 800, *Protection of Historic Properties* (incorporating amendments effective 5 August 2004); and 43 *CFR* 7, *Protection of Archaeological Resources*. Cultural resource-related EOs that may affect the locations include: EO 11593, *Protection and Enhancement of the Cultural Environment*; EO 13007, *Indian Sacred Sites*; EO 13175, *Consultation and Coordination with Indian Tribal Governments*; and EO 13287, *Preserve America*.

3.7.3 Methodology

Impact analysis for cultural resources focuses on assessing whether the proposed AFRC F-35A mission would have the potential to affect cultural resources that are eligible for listing on the NRHP or have traditional significance for tribes. For this EIS, impact analysis for cultural resources focuses on, but is not limited to, guidelines and standards set forth in the implementing regulations of NHPA Section 106 (36 *CFR* 800). Under Section 106 of the NHPA, the proponent of an action is responsible for determining whether any historic properties are located in the area, assessing whether the proposed undertaking would adversely affect the resources, and notifying the SHPO of any adverse effects. An adverse effect is any action that may directly or indirectly change the characteristics that make a historic property eligible for listing on the NRHP. If an adverse effect is identified, the federal agency consults with the SHPO and federally recognized tribes to develop measures to avoid, minimize, or mitigate the adverse effects of the undertaking.

Analysis of potential impacts to cultural resources considers both direct and indirect impacts. Impacts could occur through the following:

- Physically altering, damaging, or destroying all or part of a resource.
- Altering characteristics of the surrounding environment that contribute to a resource's significance.
- Introducing visual or audible elements that are out of character with a property or alter its setting.
- Neglecting a resource to the extent that it deteriorates or is destroyed.

Direct impacts are assessed by (1) identifying the nature and location of all elements of the proposed action and alternatives; (2) comparing those locations with identified historic properties, sensitive areas, and surveyed locations; (3) determining the known or potential significance of historic properties that could be affected; and (4) assessing the extent and intensity of the effects. Indirect impacts occur later in time or farther from the location(s) of the proposed action. Indirect impacts to cultural resources generally result from the effects of project-induced population increases (e.g., the need to develop new housing areas, utility services, and other support functions to accommodate population growth, or increased visitation of a remote area due to improved vehicle access). These activities and the subsequent use of the facilities can impact cultural resources.

A key component of this analysis is defining the Area of Potential Effects (APE), defined as "the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist" (36 *CFR* 800.16(d)). For the proposed AFRC F-35A mission, the APE is defined as the viewshed for historic facilities and the areas of ground disturbance associated with construction, demolition, and renovation at each alternative base. The APE also includes the primary airspace and ranges.

Archaeological and historic architectural resources at the alternative bases were characterized using existing survey and analysis information from Integrated Cultural Resources Management Plans (ICRMPs), archaeological survey reports, historic buildings survey reports, local histories, and the records of the NRHP and National Historic Landmarks. These documents provided information on known locations of significant resources. In compliance with Section 106 of the NHPA, the USAF consulted with the relevant SHPOs regarding the APE and potential cultural resource concerns for the proposed action. NRHP-eligible or -listed properties at each alternative base are identified in the base-specific sections contained in Chapter 4.

The potential for traditional resources at the alternative bases was identified using ICRMPs and information provided by base cultural resource management staff. Potentially interested tribes were contacted to request information on potential concerns about the proposed action.

In this analysis, demolition, construction, and other alternative base-specific actions needed to support the AFRC F-35A mission are part of the alternatives. The assessment of adverse effects takes into account both the potential for physical damage or destruction of historic properties at the alternative bases and the potential adverse effects of visual intrusions, noise, and vibration on historic properties at the alternative bases. Impacts on properties of traditional religious and cultural importance can result from noise and visual effects of aircraft overflights on rituals and ceremonies and on wildlife resources.

3.8 LAND USE AND RECREATION

3.8.1 Resource Definition

3.8.1.1 Land Use

Land use describes the way the natural landscape has been modified or managed to provide for human needs. The attributes of land use addressed in this analysis include ownership and status, land management plans and general land use patterns. For each alternative base and surrounding areas, land management plans and zoning regulations determine the type and extent of land use in specific areas to limit conflicting uses and protect certain designated or environmentally sensitive areas. In some cases, the DoD has partnered with local municipal governments to develop Joint Land Use Studies (JLUSs). JLUSs include zoning overlays in which local municipal governments have implemented zoning restrictions to protect lands located in APZs or lands subjected to high noise levels.

The attributes of land use addressed in this analysis include the land use regulatory setting, general land use patterns, and Special Use Land Management Areas (SULMAs). SULMA is a term used to categorize types of land uses for analysis purposes and is not an official term used by federal or state agencies. SULMAs generally include recreation, conservation, or natural areas under the airspace owned by state and federal agencies. SULMAs also include Native American Reservation lands. On-base land uses are described at a general level considering that facilities are sited on the installation per their functional use (i.e., proposed hangars would be adjacent to the runway).

3.8.1.2 Recreation

Recreational resources provide outdoor recreational opportunities apart from where people live. These resources include public facilities in urban and suburban areas (i.e., parks, zoos, playing fields, amphitheaters, and outdoor sports facilities), and natural areas (i.e., state and federal lands) and associated developed picnic areas, campgrounds, historical and educational sites, and trails that are designated or available for public outdoor recreational use.

3.8.2 Regulatory Setting

3.8.2.1 Land Use

The regulatory setting for land use includes the key federal, state, and local statutes, regulations, plans, policies, and programs applicable to land use on and near each alternative base. The land use analysis assumed the federal noise compatibility requirements as identified below, but also addresses state-specific compatibility requirements (e.g., for Arizona). The specific state and local land use regulations applicable to each alternative base are summarized in the base-specific sections contained in Chapter 4 (Sections DM3.8, HS3.8, FW3.8, and WH3.8).

DoD UFC 3-260-01, *Airfield and Heliport Planning and Design.* To maintain safety, the USAF adheres to guidelines set forth in UFC 3-260-01. Several siting criteria have been established specific to land development and use at commercial and military airfields. These criteria include CZs, APZs, and other obstruction zones relative to airfield environments. These and other criteria related to safety, security, and other land use issues are used to assist planners and decision makers with appropriate siting of facilities affecting design and physical layout of USAF bases.

FICUN Land Use Guidelines (1980). In 1980, FICUN was formed to develop federal policy and guidance on noise. The committee included the USEPA, FAA, Federal Highway Administration, DoD, HUD, and the U.S. Department of Veterans Affairs. The designations contained in the FICUN compatibility table for land use do not constitute a federal determination that any use of land covered by the program is acceptable or unacceptable under federal, state, or local law. The responsibility for determining the acceptable and permissible land uses and the relationship between specific properties and specific noise contours rests with the local authorities.

The FICUN guidelines consider areas exposed to DNL of 75 dB or greater as unacceptable living environments. Areas exposed to DNL of 65 to 74 dB are considered “generally unacceptable” for noise-sensitive land uses such as residences, schools, hospitals, and public services. Houses located in areas exposed to DNL of 65 to 74 dB may not qualify for federal mortgage insurance without additional costs associated with installing noise attenuation. In the outdoor noise environment, DNL greater than 65 dB can be annoying to some people during communications. Generally, residential development is not recommended in areas exposed to DNL of 65 dB or greater. Although discouraged, residential development is compatible in areas exposed to DNL of 65 to 69 dB and 70 to 74 dB, provided noise reduction levels of 25 dB and 30 dB, respectively, are achieved. Commercial/retail businesses are compatible without restrictions up to DNL of 69 dB and 79 dB, provided that noise reduction levels of 25 dB and 30 dB, respectively, are achieved for public areas. Industrial/manufacturing, transportation, and utility companies have a high noise level compatibility, and therefore, can be located within the higher noise zones.

AFI 32-1015, *Integrated Installation Planning.* AFI 32-1015 establishes the AICUZ program, which is similar to the FAA’s Federal Aviation Regulations Part 150 program for civil airports. The AICUZ program is a DoD discretionary program designed to promote compatible land use around military airfields. The military services maintain an AICUZ program to protect the operational integrity of their flying mission.

Despite well-maintained aircraft and highly trained aircrews, areas around airfields are exposed to the potential of aircraft accidents. The DoD developed the AICUZ program to aid in the development of planning mechanisms that protect the safety and health of personnel on and near military airfields and to preserve operational capabilities. The AICUZ program consists of the following distinct parts: CZs, APZs, hazards to air navigation (height and obstruction criteria established by the FAA), and noise zones.

Bases use the AICUZ program to provide land use compatibility guidelines for areas exposed to increased safety risks and noise near the airfield. The noise compatibility guidelines recommended in the AICUZ program are similar to those used by the HUD, FAA, and the U.S. Department of Veterans Affairs to provide information to surrounding jurisdictions to guide planning and regulation of land use. When DNL exceeds 65 dB, residential land uses are normally considered incompatible. However, incompatibility does not constitute a federal determination that any land use is acceptable or unacceptable under federal, state, or local law, and incompatibility is not used to determine if a structure is habitable or uninhabitable.

AFI 32-1015 also establishes the Comprehensive Planning Program for USAF installations. The Comprehensive Planning Program is a USAF discretionary program designed to establish a framework for decision making with regard to the development of USAF installations. It incorporates USAF programs such as operational, environmental, urban planning, and others to identify and assess development alternatives and ensure compliance with applicable federal, state, and local laws, regulations, and policies. The Installation Development Plan (IDP) is the only plan document required by all major installations under AFI 32-1015. The IDP guides land use decisions on an installation.

Governance of Tribal Lands. A federal Indian Reservation is an area of land reserved for a tribe or tribes under treaty or other agreement with the United States (e.g., EO, or federal statute or administrative action) as permanent tribal homelands, and where the federal government holds title to the land in trust on behalf of the tribe. Approximately 55.7 million acres of land are held in trust by the United States for various Indian tribes and individuals. Approximately 326 Indian land areas in the United States are administered as federal Indian Reservations (i.e., reservations, pueblos, rancherias, missions, villages, communities, etc.). Tribes possess the right to license and regulate activities within their jurisdiction, to zone, and to exclude persons from tribal lands. Other types of Indian lands include allotted lands, restricted status lands, and state Indian Reservations. American Indian and Alaska Native tribes, businesses, and individuals can also own land as private property; such privately owned land is subject to state and local laws, regulations, codes, and taxation.

Section 3.7 identifies regulations that address required government-to-government consultation between the DoD and federally recognized tribes regarding military activities that could affect tribal resources, including lands. Section 3.7 also identified regulations that address how the federal government assesses the potential for activities to affect cultural resources that are eligible for listing on the NRHP or have traditional significance for Native American tribes.

3.8.2.2 Recreation

Guidance and recommendations for noise compatibility with some recreational activities is provided in the same guidelines, regulations, and programs described in Section 3.8.2.1. No specific regulations govern the availability of recreational resources. Under the Federal Land Policy and Management Act, federal land managers are responsible for preserving and managing public lands for the benefit of the public at large, including access to and enjoyment of public lands for recreational purposes. This requires balancing uses to meet multiple needs of individuals and national interests.

3.8.3 Methodology

3.8.3.1 Land Use

For the purposes of this land use analysis, the ROI for the proposed action and No Action Alternative includes the area around each of the four alternative bases that encompasses the full extent of airfield APZs, areas exposed to noise levels of concern, and lands underneath the airspace and ranges proposed for use.

Potential impacts to land use can result from actions that (1) change the suitability of a location for its current or planned use (e.g., noise exposure in residential areas); (2) cause conditions that are unsafe for public welfare; (3) conflict with the current and planned use of the area based on current zoning, amendments, agreements, regulatory restrictions, management, and land use plans; or (4) displace a current use with a use that does not meet the goals, objectives, and desired use for an area based on public plans or resolutions. The degree of land use effects (negligible, minor, moderate, or significant) is based on the level of land use sensitivity in areas affected by a proposed action, the magnitude of change, and the compatibility of a proposed action with existing or planned land uses. The assessment considers multiple contextual factors that are both quantitative and qualitative.

3.8.3.1.1 Military Installation

The methodology for evaluating land use impacts on and near each of the four alternative bases includes the following steps:

1. Characterize and describe existing land use and conditions.
   a. Describe general context for the base (whether urbanized, rural, or natural) and describe jurisdictional boundaries.
   b. Generally describe the land use setting surrounding the base.
   c. Describe current compatibility planning efforts for the base and status of compatibility around the airfield (based on AICUZ studies, JLUSs, zoning districts, airfield noise complaint logs).
   d. Identify current noise exposure for land uses surrounding the airfield (using GIS maps with baseline noise contours superimposed on aerial photography), describe noise levels affecting current uses and compatibility of the current exposure levels, and identify specific sensitive receptors affected by incompatible noise levels (e.g., schools and child development centers) based on the DoD noise compatibility guidelines.
2. Evaluate the effects of new C&D on land use.
3. Evaluate effects of new O&M activities on land use. Qualitatively consider if changes in O&M activities can have indirect effects on the suitability of areas outside the base for their current or planned uses. These effects could include dust, noise, traffic, or visual modifications.
4. Assess whether any induced changes (e.g., new housing demands in the local area) pose any particular concerns for land use.
5. Quantify and locate changes in noise exposure from aircraft operations including engine run-ups, takeoffs, and landings.

a. Estimate change in acreage of off-base land exposed to noise levels of 65 dB L_{Adn} and greater at 5-dB intervals. Consider the relative degree of change in exposure in the area surrounding each alternative base.

b. For each alternative base, overlay the baseline and the three afterburner scenario noise contours on aerial photographs to locate where changes in noise exposure would occur. In some cases, alternative bases and surrounding communities have adopted noise contours from a previous JLUS. For the purposes of the land use analysis, the JLUS contours are also shown. The extent to which off-base land uses near each alternative base would be affected was analyzed by determining the acres of land use types and the approximate number of people affected. The methodology for estimating the affected populations near each alternative base is described in Chapter 3, Section 3.2. Additional data were provided to address the State of Arizona compatibility requirements that apply within the state-regulated vicinity of military airports in Arizona. http://www.re.state.az.us/airportmaps/militaryairports.aspx#MILITARY%20AIRPORT%20MAPS

c. Where changes in exposure would interact with incompatible land uses near each of the four alternative bases, a more careful evaluation of the zoning and potential future development of the affected area is included. This considers potential for future changes in land use or infill that could heighten an existing incompatible condition. Where residential land would be impacted, review of aerial photography and zoning ordinances is used to determine the relative density of homes and potential for future infill. The analysis also identifies whether current noise compatibility planning is adequate to protect airfield and community interests.

The impact assessment considers the degree or intensity of projected accident risk at the airfield in combination with current or possible future incompatible uses in the APZs (context). The analysis rates the degree of existing land use compatibility in the CZs and APZs based on the DoD's land use compatibility guidelines using levels of incompatible land uses and occupied structures within the APZs and CZs. Because accident risk is low, the current condition of land use compatibility in the APZs and CZs is the primary criteria in assessing impacts to land use.

For land uses near each of the four alternative bases, the analysis used GIS data from local jurisdictions. To support comparison of the four alternative bases, land use was classified according to a standardized set of land use classifications that are based on the generalized land use categories described in AFH 32-7084. Because local land use classifications differ from categories in AFH 32-7084, some aggregation of local land use classifications was required. For example, land use data available at each of the four alternative bases do not support differentiating low-density residential (i.e., less than one dwelling unit per acre), as described in AFH 32-7084, from other residential land uses. Therefore, all residential land uses were aggregated as simply residential for this analysis. As another example, transportation is not specifically listed in the AFH 32-7084 generalized land use categories, but was a predominant feature in land use datasets provided by localities. In instances such as this, where the description of generalized land use types in AFH 32-7084 did not specifically state a land use type included in local land use data, the most appropriate land use was selected. Transportation is similar to open and agricultural in terms of having relatively low noise sensitivity and similar noise compatibility criteria in the standard USAF land use compatibility matrix and was aggregated with open and agricultural in this analysis. Descriptions of the land use categories used in this analysis include:

- Residential: Includes all types of residential activity (e.g., single and multi-family residences and mobile homes) at a density greater than one dwelling unit per acre.
- Commercial: Offices, retail, restaurants, and other types of commercial establishments. For this analysis, airfields other than the alternative base airfields were classified as commercial.
- Industrial: Includes manufacturing, warehousing, and other similar uses.
- Public/Quasi-Public: Publicly owned lands and/or land to which the public has access, including military reservations and training grounds, prisons, public buildings, schools, churches, cemeteries, and hospitals.
- Recreational: Land areas designated for recreational activity, including parks, golf courses, wilderness areas and reservations, conservation areas, and areas designated for trails, hiking, camping, etc.
- Open/Agricultural/Mining/Low-Density: Incudes undeveloped land areas, agricultural areas, and grazing lands. This land could include single-family residences located on an agricultural parcel and areas with residential densities less than or equal to one dwelling unit per acre.

3.8.3.1.2 Airspace

For land under the proposed airspace, the land use analysis focused on the degree of change that would result from noise. The methodology used baseline aircraft operations in various SUAs to determine baseline noise levels. Proposed AFRC F-35A aircraft operations were then used to determine the noise levels that would result from implementation of the proposed mission. In addition, SULMAs were identified using the Environmental Systems Research Institute (ESRI) federal lands dataset and the Managed Areas Database (MAD). The ESRI federal lands dataset identified lands administered by various federal agencies such as the U.S. Forest Service (USFS), USFWS, and National Park Service (NPS), as well as National Monuments, Wilderness Areas and Federal Indian Reservation lands held in trust by the Bureau of Indian Affairs. The MAD dataset was filtered to show items at a state or local level because federal lands were already covered in the ESRI dataset. Lands included in the MAD dataset are state and local parks and state wildlife refuges. Wilderness Study Areas in New Mexico were left out of the ESRI federal lands dataset but included in the MAD dataset.

Where L_{dnmr} was projected to increase by 1 dB or greater over baseline, the area of each SULMA was calculated using GIS to determine the acreage below the affected airspace units. If a SULMA consisted of more than one part (i.e., polygon), the areas were totaled so that calculations used the entire area. If a small SULMA such as a natural area was contained inside a larger SULMA, only the larger SULMA was identified and the smaller areas within were given equal consideration and evaluation. Airspace units were "intersected" with the land use SULMA layers to identify the overlap with the SULMAs and the percentage of overlap was calculated. Airspace units were calculated individually because some MOAs, ranges, and RAs overlap each other. The affected SULMAs were exported in a tabular format and organized by airspace unit. The impacts to SULMAs were evaluated by reviewing changes in noise compared to baseline noise levels. Only SULMAs under airspace that would be exposed to L_{dnmr} increases of 1 dB or greater above baseline are included for evaluation.

3.8.3.2 Recreation

For the purposes of this recreation analysis, the ROI for the proposed action and No Action Alternative includes the area around each of the four alternative bases that encompasses the full extent of airfield APZs and lands under the airspace proposed for use. The recreation ROI does not include lands under routes where AFRC F-35A pilots would travel between each installation and the airspace proposed for use. There are no proposed established routes between each installation and the proposed airspace. Aircraft travel between each alternative base and the airspace proposed for use is highly variable depending on meteorological conditions, air traffic and other factors such as mission type.

Evaluation of recreational resources determines if implementation of the proposed action would preclude, displace, or alter the suitability of an area or facility for ongoing or planned recreational uses. This could be triggered by changes in noise, access, availability of recreational resources or change in desired qualities of an area that contributes to recreational opportunities. This is a qualitative assessment based on popularity/visitation of the area, management goals, and availability of similar recreational opportunities. If an impact is identified by this analysis, the assessment considers the level of significance using a subjective scale based on the value of the resources and degree of change and degree of interference with current activities and management standards.

3.8.3.2.1 Military Installation

For the areas surrounding the four alternative bases, the following are considered and evaluated relative to recreation.

Effects of changes in noise levels and aircraft operations activity. The analysis uses the FAA's recommended land use compatibility average sound levels (see Table 3-7) for various recreational facilities, activities, and events as the basis for evaluating impacts. Also considered are the degree of change in noise exposure, change in frequency of operations, and the time of day. A person with normal hearing in a non-laboratory setting can typically barely perceive a 3-dB change in instantaneous noise level, and a 5-dB change in instantaneous noise level is easily detectable in the same circumstances.

Effects from noise and dust or changes in visual context from construction on outdoor recreation activities or facilities. The analysis considers the distance of potential construction areas from recreational sites, and the relationship between new facilities and surrounding recreational areas and uses.

Effects of increased personnel and family members on local recreational resources. The analysis considers the relative change in population resulting from the action in the given community and the degree to which this could affect the capacity of local recreational resources to serve area residents.

Table 3-7. Recreational Land Use Compatibility with Yearly Day-Night Average Sound Levels

Recreational Land Use	Annual DNL (dB)					
	< 65	65–69	70–74	75–79	80–85	> 85
Outdoor sports arenas and spectator sports	Y	Y[a]	Y[a]	N	N	N
Outdoor music halls and amphitheaters	Y	N	N	N	N	N
Nature exhibits and zoos	Y	Y	N	N	N	N
Amusement parks, resorts, and camps	Y	Y	Y	N	N	N
Golf courses, riding stables, and water recreation	Y	Y	25	30	N	N

[a] Land use compatible, provided special sound reinforcement systems are installed.

Key: Y = Land use and related structures are compatible without restrictions; N = Land use and related structures are not compatible and should be prohibited; 25 / 30 = Land use and related structures are generally compatible; recommend noise level reduction (outdoor to indoor) of specified dB through incorporation of noise attenuation in structures.

3.8.3.2.2 Airspace

The analysis of potential effects of noise generated by military aircraft in airspace on regional recreational resources considers the noise sensitivity of affected recreational sites or settings, degree of change in noise exposure, frequency of operations, altitudes of overflights, and time of day. Also considered is the relative popularity and value of recreational activities and opportunities for residents and visitors/tourists within the context of the region. The analysis emphasizes the potential change in noise exposure on areas that are relatively pristine or quiet. The analysis addresses increases in sound levels of specific events and sonic booms, which can be startling to persons in outdoor settings.

Typical effects from aircraft noise on recreational uses are provided below, and could result from the proposed AFRC F-35A mission evaluated in this EIS. Most impacts result from specific events affecting persons engaged in a recreational activity at a particular time. The varying levels of operations could increase the potential for effects from single events. The following paragraphs provide a review of the multiple considerations and the relativity of a noise-driven impact assessment on recreation.

Noise generated by aircraft operations can change the context in which recreation is undertaken. Recreational opportunity is partially classified by the Bureau of Land Management (BLM) by the type of challenge afforded to participants. One of the opportunity factors is degree of isolation and remoteness. Quiet and naturalness is an intrinsic part of remote recreational experiences. Changes to quiet settings could affect the spectrum of recreational opportunities and the quality of the experience in an area or region, but is not expected to change recreational use opportunities of the area. People's reactions to noise in recreational settings vary. A study by the USFS found that wilderness area visitors did not generally notice high altitude aircraft noise intrusions, although startle effects from low-flying, high-speed aircraft were noticed and reported as annoying by some visitors (NPS 1992). According to NPS publication Report on Effects of Aircraft Overflights on the National Park System, Report to Congress (NPS 1994), natural quiet is an important part of visitor experiences and a reason for visiting national parks and monuments for about 91 percent of persons surveyed. Increased airspace use over NPS units has the potential to impact visitor experience and the setting and feeling of the areas.

Visitors have varying perspectives on whether aircraft overflights are a positive or detrimental factor to their outdoor experience. For example, some outdoor sporting participants generate localized noise through the use of vehicles and mechanical equipment (e.g., portable generators). Others seek a more natural experience on foot away from vehicles. Reactions vary depending upon individual expectations and the context where aircraft noise occurs. These incidences are not likely to be persistent and would have only temporary impacts on any given experience. These events are not expected to change visitor habits or recreational land uses overall, but intermittent overflight during individual recreational events could annoy some affected participants.

A common concern is the potential for noise to interfere with hunting activities. A sudden, low-level overflight could startle an animal and a hunter preparing to shoot. Some animals or birds (e.g., pheasants and sage grouse) could be susceptible to noise and scatter when a sudden, loud noise occurs. This interference could be annoying and degrade the quality of the outdoor experience for some hunters. While these isolated events can happen, behavior of game animals and their reproduction and populations are not significantly affected by noise. Higher noise levels are not expected to noticeably reduce populations of popular game species or negatively impact hunting. Hunting is a viable local land use under much of the airspace proposed for use. Hunting can and does coexist with infrequent and random, low-level military overflights, but this does not reduce the perceived significance of the impact to residents or visitors to this area.

Startle effects could also result in safety risks for rock climbing or other physically challenging tasks requiring a high degree of concentration. Locations where training would be performed on weekends would have higher potential to affect recreation, as this is the time when most recreation activity takes place. The F-35A is normally flown at higher altitudes than other fighter aircraft to perform its air-to-ground mission. Considering this, intrusion from high-altitude operations of the F-35A is less likely to cause startle effects on users of quiet recreational settings.

The noise effect of sonic booms could similarly disrupt or startle persons in outdoor settings. Even very infrequent sonic booms could cause annoyance for recreational activities where quiet is desirable (e.g., remote hiking, camping, and hunting). Because of their infrequency, sonic booms could be startling, but would have a minimal effect on the overall quality of recreational opportunities or experiences. Sonic booms can startle animals and could cause a horse or pack animal to react. This could result in infrequent accidents. There is no way to specifically avoid a location from experiencing a sonic boom if aircraft are performing supersonic maneuvers in approved airspace.

The interface between military aircraft and recreational use of airspace for flying, parasailing, gliding, and ballooning is an air safety concern. Because the proposed AFRC F-35A mission would use existing military training airspace, recreational aviation activities would already be known or identified with appropriate avoidance procedures in place. An increase in military use could affect the availability of airspace for recreational uses in some locations.

3.9 SOCIOECONOMICS

3.9.1 Resource Definition

Socioeconomics refers to features or characteristics of the social and economic environment. Socioeconomics evaluates the change in personnel and expenditures associated with the proposed AFRC F-35A mission that could potentially impact population, employment, earnings, housing, education, and public services. Socioeconomics also addresses potential noise effects to housing, schools, and other noise-sensitive social or economic activities. For the purposes of this socioeconomics analysis, the ROI for the proposed action and No Action Alternative generally includes the county area or areas where each alternative base is located.

3.9.2 Regulatory Setting

There is no applicable regulatory setting for socioeconomics.

3.9.3 Methodology

The socioeconomic analysis focuses on the effects that would result from personnel changes, construction, and/or O&M at each alternative base. As a basis for estimating population changes in the ROI, the total number of non-contractor, full-time personnel, and dependents and family members were added together and assumed to be either migrating in to the area or migrating out of the area. It was assumed that for all four alternative bases, the change in personnel represented 20 percent active duty military personnel and 80 percent full-time reservists; thus the full change in personnel was considered.

The economic impact analysis used to determine the effect of construction and O&M costs (if any) was conducted using the Impact Analysis for Planning (IMPLAN) economic forecasting model.

The IMPLAN model uses data from the U.S. Bureau of Labor Statistics and the U.S. Bureau of Economic Analysis to construct a mathematical representation of a local economy using region-specific spending patterns, economic multipliers, and industries. In this analysis, the IMPLAN model provided representations of the county-wide economy at each alternative base. Economic impacts are analyzed by introducing a change to a specific industry in the form of increased or decreased employment or spending; the IMPLAN model mathematically calculates the resulting changes in the local economy. In this analysis, the IMPLAN model was used to estimate the economic effects of the incoming and outgoing personnel on spending and employment in the established ROI. The economic impact analysis separates effects into three components: direct, indirect, and induced. Direct effects are the change in employment and income generated directly by the expenditures of the incoming or outgoing personnel. To produce the goods and services demanded by the incoming personnel, businesses, in turn, might need to purchase additional goods and services from other businesses. The employment and incomes generated by these secondary purchases would be indirect effects. Induced effects are the increased household spending generated by direct and indirect effects. The overall effect from the economic impact analysis is the total number of jobs created throughout the ROI by the direct, indirect, and induced effects. The construction and O&M costs used in the economic activity section were provided by the USAF during site surveys.

To determine whether the local housing market could support the personnel associated with the proposed AFRC F-35A mission it was assumed that the total number of homes required off base was equal to the total number of incoming or outgoing full-time military personnel. This number was compared against the number of vacant housing units as defined by the ACS 5-year estimate for years 2017-2022. If the number of incoming, full-time military personnel would not exceed the number of vacant housing units as defined by the ACS estimates, the housing market in the ROI would be able to support the incoming population.

During scoping people submitted comments concerning the potential impact the noise generated by AFRC F-35A aircraft operations would have on surrounding property values. The metric known as the Noise Depreciation Indices (NDIs) is used to determine the percent increase in the loss of property values due to a unit increase in noise exposure. Several studies have analyzed property values as they relate to military and civilian aircraft noise. One study conducted a regression analysis of property values as they relate to aircraft noise at two military installations (Fidell et al., 1996). This study found that while aircraft noise at these installations could have resulted in minor impacts to property values, it was difficult to quantify those impacts because other factors (e.g., the quality of the housing near the installations and the local real estate market) had a larger impact on property values. Therefore, the regression analysis was not able to predict the impact of aircraft noise on the property values of two comparable properties.

In a study performed by Nelson (2004), the author analyzed 20 different property value studies that attempted to quantify the impact of noise on property values (Nelson 2004). Nelson (2004) also analyzed the values of similar properties, using one property located near a noise source, specifically an airport, and one property not located near a noise source. The result of the study is that, considering all other factors (e.g., neighborhood characteristics and desirability, local real estate market conditions, school districts) as equal, an adverse impact on property values as a result of aircraft noise is possible. The Nelson study estimates that the value of a specific property could be discounted between 0.51 and 0.67 percent per decibel when compared with a similar property that is not impacted by aircraft noise. Additional indications are that the discount for property values as a result of noise would be higher for noise levels above 75 dB DNL (Nelson 2004). In comparison, a report by Trojanek (Trojanek et al., 2017) concluded that the majority of the NDI estimates fell between 0.26 percent and 1.00 percent based on 79 studies from 1970 to 2016 from Wadud (2013) and their own research (Trojanek et al., 2017). The 0.26 percent to 1.00 percent reduction in value for every decibel increase in noise represents the average relative value when comparing equivalent units that are located inside or outside the 65 dB DNL contour. On average, housing subject to additional noise could have lower relative values of approximately 0.26 to 1 percent for those units in the 66 dB DNL contour and up to approximately 1.5 to 6 percent for those units within the 70 dB DNL contour. The discounted values could still be lower or higher, because the values are dependent upon a number factors, one of which is noise levels.

To determine the total dependents for each alternative base associated with the proposed AFRC F-35A mission, 65 percent of all non-contractor, full-time military personnel, as identified in the personnel tables in Chapter 2, Table 2-3, were assumed to be accompanied. Each accompanied military member was assumed to be accompanied by 2.5 dependents, or 1 spouse and approximately 1.5 children. All children were assumed to be attending child care or be of school age. Therefore, to determine the total number of school-aged children, a multiplier of 1.5 was applied to 65 percent of the non-contractor, full-time military personnel.

Public services were analyzed by considering the overall percentage change to the respective county population. Base services were analyzed by considering the capacity, staffing, and infrastructure available to support the incoming personnel.

The magnitude of potential impacts could vary depending on the alternative base. If potential socioeconomic changes were to result in substantial shifts in population trends or a decrease in regional spending or earning patterns, those effects would be considered adverse. The proposed AFRC F-35A mission could impact socioeconomic conditions in the surrounding ROI if the following were to occur:

- Change in the local business volume, employment, or population that exceeds the ROI's historical annual change.
- Adverse change in social services or social conditions, including property values, school enrollment, county or municipal expenditures, or crime rates.

3.10 ENVIRONMENTAL JUSTICE AND PROTECTION OF CHILDREN

3.10.1 Resource Definition

The resource considered for environmental justice is potentially affected populations that meet certain characteristics based on race, income, and age. The resource is relatively defined in order to understand if impacts from an action occur in areas that are disproportionately composed of minorities and low-income persons. While not specifically part of environmental justice analysis, this section also considers similar impacts to youth and elderly populations. This concern arises because large impact projects have historically used sites where real estate values are lower and/or more industrialized. Locations with low property values tend to attract development of affordable and marginal housing. This dynamic tends to perpetuate and often pre-dates the enactment of community land use ordinances. The intent of environmental justice is to reduce the burden of impacts on socially and economically vulnerable populations.

3.10.2 Regulatory Setting

EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, directs federal agencies to address environmental and human health conditions in minority and low-income communities. In addition to environmental justice issues are concerns pursuant to EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, which directs federal agencies to identify and assess environmental health and safety risks that may disproportionately affect children.

USAF guidance for implementation of EO 13045 is contained in the *Guide for Environmental Justice Analysis under the Environmental Impact Analysis Process (EIAP)*, dated November 2014 (USAF 2014). That guidance also explains the need to address impacts which may adversely impact elderly populations.

The terms minority, low-income, youth, and elderly are defined as follows for purposes of this analysis.

- <u>Minority</u>: The term "minority" for purposes of environmental justice analysis includes those individuals who have identified themselves as having one of the following origins: "Hispanic," "Asian-American," "Native Hawaiian and other Pacific Islander," "Black or African-American," "American Indian or Alaskan Native," or "Some Other Race" (which does not include "White," "Black or African-American," "American Indian or Alaska Native," "Asian," or "Native Hawaiian or Other Pacific Islander" race categories) (USAF 2014).
- <u>Low-Income</u>: The U.S. Census Bureau defines the term "poverty" (also referred to as "low-income") as "a set of money income threshold that vary by family size and composition to determine who is in poverty" (USCB 2018). A family and each individual in the family is considered in poverty if the total family income is less than the family's threshold or the dollar amount calculated by the U.S. Census to determine poverty status. For poverty calculations, poverty status is determined for all people except institutionalized people, people in military group quarters, people in college dormitories, and unrelated individuals under 15 years of age.
- <u>Youth</u>: Children are vulnerable to environmental exposure and potential health and safety effects to children are considered in this EIS under the guidelines established by EO 13045 and the USAF EIAP guidance. For purposes of this analysis, the term "youth" refers to any person under the age of 18.
- <u>Elderly</u>: The USEPA and the USAF EIAP guidance identify the importance of considering an elderly person as a sensitive receptor to potential environmental impacts. The term "elderly" refers to any person age 65 or older.

3.10.3 Methodology

Environmental justice analysis overlays the 65 dB or greater DNL contour resulting from each of the three afterburner scenarios on the census data polygons. The smallest census data which has the information necessary for analysis of potential impacts to environmental justice populations is used to determine potential impacts. The smallest group of census data which contain the needed information for this analysis is the Census Block Group (BG). Each BG that is partially or wholly encompassed by the 65 dB or greater DNL contour is defined as an ROI. There could be few or many ROIs for a specific environmental justice analysis, depending on the extent of the noise contour and the size of the BGs. The next higher level of census data is the Census Tract (CT). Each CT contains a number of BGs (ROIs). Example census units (CT and BG) are shown on Figure 3-2.

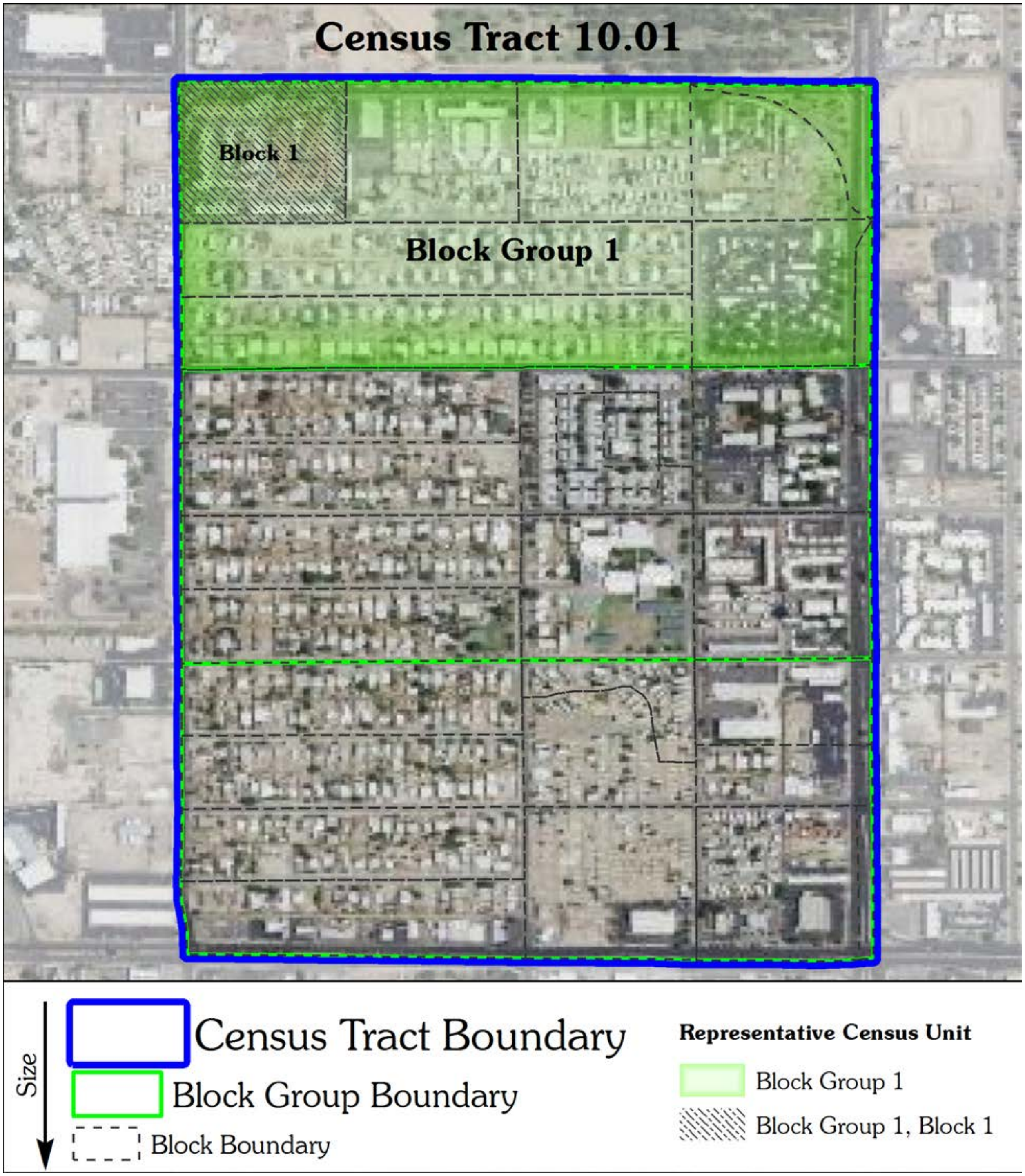

Figure 3-2. Census Units

In order to identify disproportionate impacts from baseline or proposed action noise levels, a Community of Comparison (COC) is needed. The COC is defined by summing the population in all the CTs which contain any part of an ROI affected by the 65 dB or greater DNL contour. The percentages of minority and low-income persons are calculated for each ROI (i.e., BG). The ROI and COC percentages are then compared. If the percentage of minorities or low-income persons in an ROI is equal to or greater than the percentage of minorities or low-income persons in the COC, there is a disproportionate impact to the environmental justice population in that ROI (USAF 2014).

3.11 INFRASTRUCTURE

3.11.1 Resource Definition

Infrastructure consists of the systems and physical structures that enable the population of a USAF base to function. Infrastructure is primarily human-made, with a high correlation between the type and extent of infrastructure and the degree to which an area is characterized as urban, or developed built environment. The availability of infrastructure and its capacity for expansion are essential to the ability of a base to carry out a specific mission and provide for the needs of employees and residents.

Utilities analyzed for each of the four bases in this EIS include water supply and distribution, sanitary sewer and wastewater systems, stormwater drainage, electrical system, natural gas, solid waste, and transportation. Solid waste management primarily relates to the availability of systems and landfills to support a population's residential, commercial, and industrial needs. AFI 32-7042, *Waste Management,* incorporates the requirements of Subtitle D, 40 *CFR* 240 through 244, 257, and 258; applicable federal regulations; AFIs; and DoD directives. It also establishes the requirement for bases to have a solid waste management plan; procedures for handling, storage, collection, and disposal of solid waste; record keeping and reporting; and pollution prevention. The infrastructure information contained in this section provides a brief overview of each infrastructure component and describes its capacities, effectiveness, deficiencies, and existing general condition.

Ground traffic and transportation infrastructure includes the public roadway network, public transportation systems, airports, railroads, pedestrian/bicycle facilities, and waterborne transportation required for the movement of people, materials, and goods. Implementation of the AFRC F-35A mission has the potential to impact the public roadways that provide access to the alternative bases, base access control points or gates, and the internal roadway systems of the bases. Roadways are typically assigned a functional classification by state departments of transportation. Functional classification is the process by which streets and highways are grouped into classes, or systems, according to the character of service they are intended to provide. The three main functional classifications for roadways include the following:

- Arterial – These roadways provide mobility so traffic can move from one place to another quickly and safely.
- Local – These roadways provide access to homes, businesses, and other property.
- Collector – These roadways link arterial and local roads and perform some of the duties of each.

For the purposes of this infrastructure analysis, the ROI for the proposed action and No Action Alternative includes the areas proposed for infrastructure upgrades on each alternative base and areas surrounding each alternative base where traffic could be affected by implementation of the AFRC F-35A mission.

3.11.2 Regulatory Setting

There is no applicable regulatory setting for infrastructure resources.

3.11.3 Methodology

Effects on infrastructure were evaluated for the proposed action based on the potential for disruption or improvement of existing levels of service and additional needs for water, energy and natural gas consumption, wastewater and stormwater drainage systems, and solid waste system availability. Changes in population and proposed development were used to determine impacts to infrastructure. At each alternative base, the maximum demand or impact to capacity was calculated for the potable water, wastewater, electric and natural gas systems based on the change in population. For the transportation analysis, any change in population was assumed to reside offbase.

The impact analysis consisted of (1) a quantitative assessment, based on available information for average and peak use and demand data for each on-base utility and the ability of a utility provider to absorb a given level of demand increase for its service area, and (2) a qualitative assessment of the physical condition of each on-base system. Impacts could arise from physical changes to utility supply and distribution systems over their design life cycle and energy needs created by either direct or indirect workforce and population changes related to base activities. An effect would be considered adverse if the proposed action requirements caused any of the following:

- A violation of a permit condition or contract with a utility provider.
- A capacity exceedance of a utility or solid waste facility.
- A system that could not sustain a mission increase due to poor condition, inefficient function, or operation.
- A mission increase that would require costly upgrades.
- A long-term interruption of a utility.

To assess the potential environmental consequences associated with ground traffic and transportation resources, increased utilization of the existing roadway system and base access gates due to the change in personnel is analyzed, as well as potential effects of construction activities. Impacts could arise from physical changes to circulation, construction-related traffic delays, and changes in traffic volumes. Adverse impacts on roadway capacities would be significant if roads with no history of capacity exceedance had to operate at or above their full design capacity as a result of implementation of the proposed action.

3.12 HAZARDOUS MATERIALS AND WASTE

3.12.1 Resource Definition

The terms “hazardous materials” and “hazardous waste” refer to substances that, because of their quantity, concentration, or physical, chemical, or infectious characteristic, could present substantial danger to public health or the environment when released into the environment.

Products containing hazardous materials that could result in the generation of hazardous waste include aviation fuel, adhesives, sealants, conversion coatings, corrosion-prevention compounds, hydraulic fluids, lubricants, oils, paints, polishes, thinners, and cleaners.

For the purposes of this hazardous materials and waste analysis, the ROI for the proposed action and No Action Alternative encompasses areas that could be impacted by AFRC F-35A mission-related changes to hazardous materials usage and management, hazardous waste generation and management, and hazardous waste disposal at each alternative base. Therefore, the ROI is defined as the boundary of each alternative base.

For environmental restoration sites, the ROI is the footprint of the proposed construction projects described in Chapter 2 of this EIS.

3.12.2 Regulatory Setting

The key federal regulatory requirements related to hazardous materials and waste include the following:

- Resource Conservation and Recovery Act (RCRA) of 1976 (42 *USC* 6901 et seq.)
- Emergency Planning and Community Right-to-Know (EPCRA) Act of 1986 (42 *USC* 11001-11050)
- Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986 (42 *USC* 9601-9675)
- Community Environmental Response Facilitation Act of 1992 (42 *USC* 9620)
- Asbestos Hazard Emergency Response Act (15 *USC* 2651)
- Spill Prevention, Control and Countermeasure (SPCC) Rule (40 *CFR* 112)
- USEPA Regulation on Identification and Listing of Hazardous Waste (40 *CFR* 261)
- USEPA Regulation on Standards for the Management of Used Oil (40 *CFR* 279)
- USEPA Regulation on Designation, Reportable Quantities, and Notification (40 *CFR* 302)
- EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance*
- Toxic Substances Control Act (TSCA) of 1976 (40 *CFR* 700–766)
- CAA of 1970, including the 1990 CAA Amendments (40 *CFR* 61)

Several USAF regulations address the management and safe handling of hazardous materials and wastes in accordance with applicable federal and state regulations. These include the following:

- AFI 32-7086, *Hazardous Material Management*
- AFI 32-7042, *Solid and Hazardous Waste Compliance*
- AFI 32-1052, *Facility Asbestos Management*
- Air Force Guidance Memorandum (AFGM) 2019-32-01, *AFFF-Related Waste Management Guidance*

3.12.3 Methodology

The exact amounts of hazardous waste that would be generated as a result of implementation of the AFRC F-35A mission at each alternative base are unknown at this time. The qualitative and quantitative assessment of impacts from hazardous materials and waste management focuses on how (context) and to what degree (intensity) each location could affect hazardous materials usage and management, hazardous waste generation and management, and hazardous waste disposal. Potential impacts associated with hazardous materials and wastes were analyzed for the following five effects:

1. Generation of hazardous material/waste types or quantities could not be accommodated by the current management system.
2. Increased likelihood of an uncontrolled release of hazardous materials that could contaminate the soil, surface water, groundwater, or air.
3. Non-compliance with applicable federal and state regulations as a result of the proposed action.
4. Disturbance or creation of contaminated sites, resulting in adverse effects on human health and/or the environment.
5. Established management policies, procedures, and handling capacities that could not accommodate the proposed action.

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CHAPTER 4

BASE ALTERNATIVES AND THE NO ACTION ALTERNATIVE

How to Use This Document

Our goal is to provide a reader-friendly document that provides an in-depth, accurate analysis of the proposed action, the alternative basing locations, the No Action Alternative, and the potential environmental consequences for each base. The organization of this Environmental Impact Statement (EIS) is shown below.

EXECUTIVE SUMMARY
- Synopsis of Purpose and Need and Proposed Action and Alternatives
- Comparison of Impacts

VOLUME I — OVERALL SUMMARY

CHAPTER 1
- Purpose and Need for the Air Force Reserve Command (AFRC) F-35A Operational Beddown

CHAPTER 2
- Description of the Proposed Action and Alternatives
- Alternative Identification Process
- Summary Comparison of the Proposed Action and Alternatives

CHAPTER 3
- Resource Definition and Methodology

VOLUME I — BASE-SPECIFIC INFORMATION

CHAPTER 4
- Base Alternatives and the No Action Alternative

Davis-Monthan AFB	Homestead ARB	NAS JRB Fort Worth	Whiteman AFB	No Action Alternative
Section DM1.0 Proposed Action Overview	**Section HS1.0** Proposed Action Overview	**Section FW1.0** Proposed Action Overview	**Section WH1.0** Proposed Action Overview	This section describes the effects of not implementing the AFRC F-35A mission at any of the four bases.
Section DM2.0 Base-Specific Project Details	**Section HS2.0** Base-Specific Project Details	**Section FW2.0** Base-Specific Project Details	**Section WH2.0** Base-Specific Project Details	
Section DM3.0 Affected Environment and Environmental Consequences	**Section HS3.0** Affected Environment and Environmental Consequences	**Section FW3.0** Affected Environment and Environmental Consequences	**Section WH3.0** Affected Environment and Environmental Consequences	
Section DM4.0 Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section HS4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section FW4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section WH4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	

VOLUMES I AND II — SUPPORTING INFORMATION

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- List of Repositories

- Glossary

- Index

APPENDICES: VOLUME II
- Appendix A – Correspondence
- Appendix B – Noise Modeling, Methodology, and Effects
- Appendix C – Air Quality

4.0 INTRODUCTION TO ALTERNATIVE BASE-SPECIFIC SECTIONS AND THE NO ACTION ALTERNATIVE

This Environmental Impact Statement (EIS) has been prepared as concisely as possible while still addressing the installation-specific concerns of individuals and agencies. This EIS meets the requirements for a comparative analysis to provide the U.S. Air Force (USAF) decision-maker with maximum flexibility to determine where the proposed Air Force Reserve Command (AFRC) F-35A mission should be located. The USAF evaluated and compared operational, economic, and environmental factors to determine whether to make a basing decision at this time and, if such a decision is made, where the AFRC F-35A mission would be located. During the public scoping period, the public and agencies submitted comments regarding base-specific concerns. The comments received covered a variety of different topics. Some comments applied to the AFRC F-35A mission at each of the four alternative bases, while other comments were specific to one alternative base. Therefore, this EIS analyzes the impacts that would result from implementation of the AFRC F-35A mission at each of the four alternative bases along with the No Action Alternative.

Chapter 3, Resource Definition and Methodology, applies to all four of the alternative bases. Chapter 4 is divided into five subsections, four of which apply to a specific alternative base and one of which applies to the No Action Alternative. Each subsection in Chapter 4 is labeled with a unique identifier in front of each of the section and page numbers. The alphabetical order and unique identifier **(bold)** used to present these subsections is as follows:

- Davis Monthan Air Force Base (AFB), Arizona **(DM)**
- Homestead Air Reserve Base (ARB), Florida **(HS)**
- Naval Air Station (NAS) Joint Reserve Base (JRB) Fort Worth, Texas **(FW)**
- Whiteman AFB, Missouri **(WH)**
- No Action Alternative **(NA)**

Each of the base-specific sections contains four subsections. Subsections 1 and 2 describe the base and the details of the proposed action at that base should the AFRC F-35A mission be located at that base. Subsection 3 describes the affected environment (i.e., baseline conditions for 12 resource areas) and the consequences that would result from implementation of the proposed mission. Subsection 4 describes the cumulative effects and irreversible and irretrievable commitment of resources for each base.

The resource areas described in Subsection 3 are presented in the same order for each alternative base to allow for ready comparison of the alternatives. For example, the noise subsection for Davis-Monthan AFB is labeled as subsection DM3.2 and the noise subsection for Homestead ARB is labeled as HS3.2.

Implementation of the AFRC F-35A mission would involve four action elements that would affect the selected alternative base (if an alternative base is selected) and three action elements that would affect the airspace proposed for use by AFRC F-35A pilots that would be stationed at that base. Per the National Environmental Policy Act (NEPA) and Council on Environmental Quality (CEQ) regulations, this EIS focuses on the resource areas that would be affected by implementation of the AFRC F-35A mission and excludes discussion of resource areas not affected. For example, the affected environment and environmental consequences for some of the resource areas (e.g., infrastructure) were not evaluated under the airspace proposed for use because implementation of the proposed mission would not result in any changes or impacts to infrastructure under the airspace proposed for use. Table 4-1 identifies the resource areas analyzed in this EIS and the range of analysis presented for each resource area (i.e., alternative base and airspace proposed for use).

Table 4-1. Resource Areas Analyzed in this EIS

Resource Area	Analysis of Affected Environment and Environmental Consequences at Alternative Base	Analysis of Affected Environment and Environmental Consequences Under Airspace Proposed For Use
Airspace Management and Use	Yes	Yes
Noise	Yes	Yes
Air Quality	Yes	Yes
Safety	Yes	Yes
Soil and Water Resources	Yes	No
Biological Resources	Yes	Yes
Cultural Resources	Yes	Yes
Land Use and Recreation	Yes	Yes
Socioeconomics	Yes	No
Environmental Justice/Protection of Children	Yes	No
Infrastructure	Yes	No
Hazardous Materials and Waste	Yes	No

As described in Chapter 2, Section 2.3.3, the USAF evaluated three different scenarios for afterburner use. Scenario A is afterburner use on 5 percent of takeoffs. Scenario B is afterburner use on 50 percent of takeoffs. Scenario C is afterburner use on 95 percent of takeoffs. Impacts to the airspace, safety, soil and water, biological, cultural, infrastructure, and hazardous materials and hazardous waste resource areas would not be affected by the afterburner scenario selected. Therefore, the different afterburner scenarios are not described for these resource areas.

The No Action Alternative for this EIS means that no AFRC F-35A mission would be implemented. Implementation of the No Action Alternative would mean that the AFRC F-35A aircraft beddown would not occur and no F-35A-related personnel or construction changes would occur at any of the four alternative bases. The current environmental situation, which includes on-going, currently planned activities and programs, would continue unchanged at each of the four alternative bases until retirement of the current aircraft.

CHAPTER 4

BASE ALTERNATIVE: DAVIS-MONTHAN AIR FORCE BASE

DM1.0 DAVIS-MONTHAN AIR FORCE BASE OVERVIEW

Davis-Monthan Air Force Base (AFB) is located on the southeastern edge of the City of Tucson in Pima County, Arizona (Figure DM1-1). The majority of the base, with the exception of the southeastern portion, is located within the city limits of Tucson. The base encompasses approximately 10,700 acres, of which approximately 5,700 acres are developed or semi-improved, 4,700 acres are undeveloped, and 300 acres are under easement and maintained by Pima County. Davis-Monthan AFB is surrounded by heavy to light industrial development to the south and west and the City of Tucson to the north. The Aerospace Maintenance and Regeneration Group (AMARG) dominates land use to the east, with some residential development to the northeast. (Figure DM1-1). The primary runway at Davis-Monthan AFB, Runway 12/30, is 13,645-feet long and 200-feet wide with 1,000-foot overruns at each end (Figure DM1-2).

The Air Combat Command (ACC) 355th Fighter Wing (355 FW) is the host unit at Davis-Monthan AFB. The primary mission of the 355 FW is to deploy, employ, support, and sustain attack airpower for military commanders worldwide. The 355 FW provides medical, logistical, mission, and operational support to all assigned units.

The Air Force Reserve Command (AFRC) 924th Fighter Group (924 FG) is an “associate” unit to the 355 FW. As an associate unit, the 924 FG works with the 355 FW to train and produce qualified A-10 pilots for theater commanders worldwide. The 47th Fighter Squadron (47 FS), as a unit of the 924 FG, operates 24 A-10C aircraft at Davis-Monthan AFB; these aircraft would be replaced with 24 F-35A aircraft should the installation be selected to receive the AFRC F-35A mission. The 924 FG currently occupies facilities along the northeast edge of the flightline in support of their mission.

The major tenants at Davis-Monthan AFB include Headquarters (HQ) 12th Air Force, the 162nd Fighter Wing (162 FW), the 563rd Rescue Group (563 RQG), the 943rd Rescue Group (943 RQG), the AMARG, the 55th Electronic Combat Group (55 ECG), the 214th Reconnaissance Group (214 RG), the Western Air Defense Sector (WADS) Alert Detachment, and U.S. Customs and Border Protection (CBP). The tenants and the AMARG operate a wide variety of both fixed and rotary wing aircraft at Davis-Monthan AFB, including but not limited to C-130, Cessna 210, F-16, P-3, HH-60, UH-60, and AS-350. The Air National Guard Air Force Reserve Command Test Center (AATC) also operates a detachment of test mission A-10C aircraft at Davis-Monthan AFB. The AMARG provides a single location to process and maintain aircraft and components stored by all branches of the Armed Services.

Refer to Chapter 1 for the purpose and need for the AFRC F-35A mission, a description of the F-35A aircraft characteristics, and information about public involvement and agency coordination. Refer to Chapter 2 for the description of the proposed action and alternatives, and a description of the strategic basing and alternative identification processes. In the base-specific sections that follow, Section DM2 presents the description of the proposed action at Davis-Monthan AFB. Section DM3 addresses baseline conditions and environmental consequences that could result from implementation of the proposed action at Davis-Monthan AFB. Section DM4 identifies other, unrelated past, present, and reasonably foreseeable future actions in the affected environment and evaluates whether these actions would cause cumulative effects when considered along with the AFRC F-35A beddown. This section also presents the irreversible and irretrievable resources that would be committed should the proposed action be implemented at Davis-Monthan AFB.

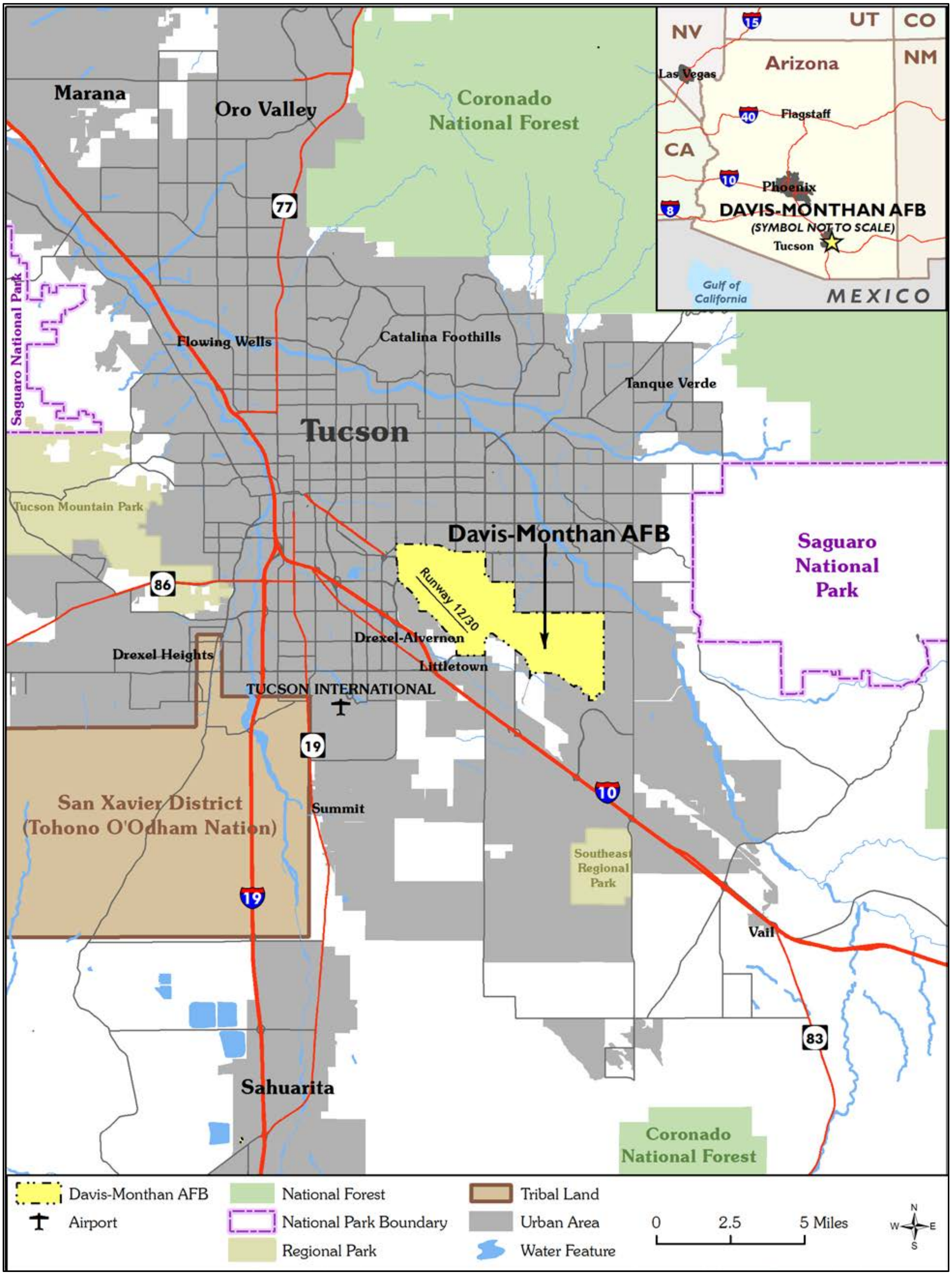

Figure DM1-1. Regional Location of Davis-Monthan AFB

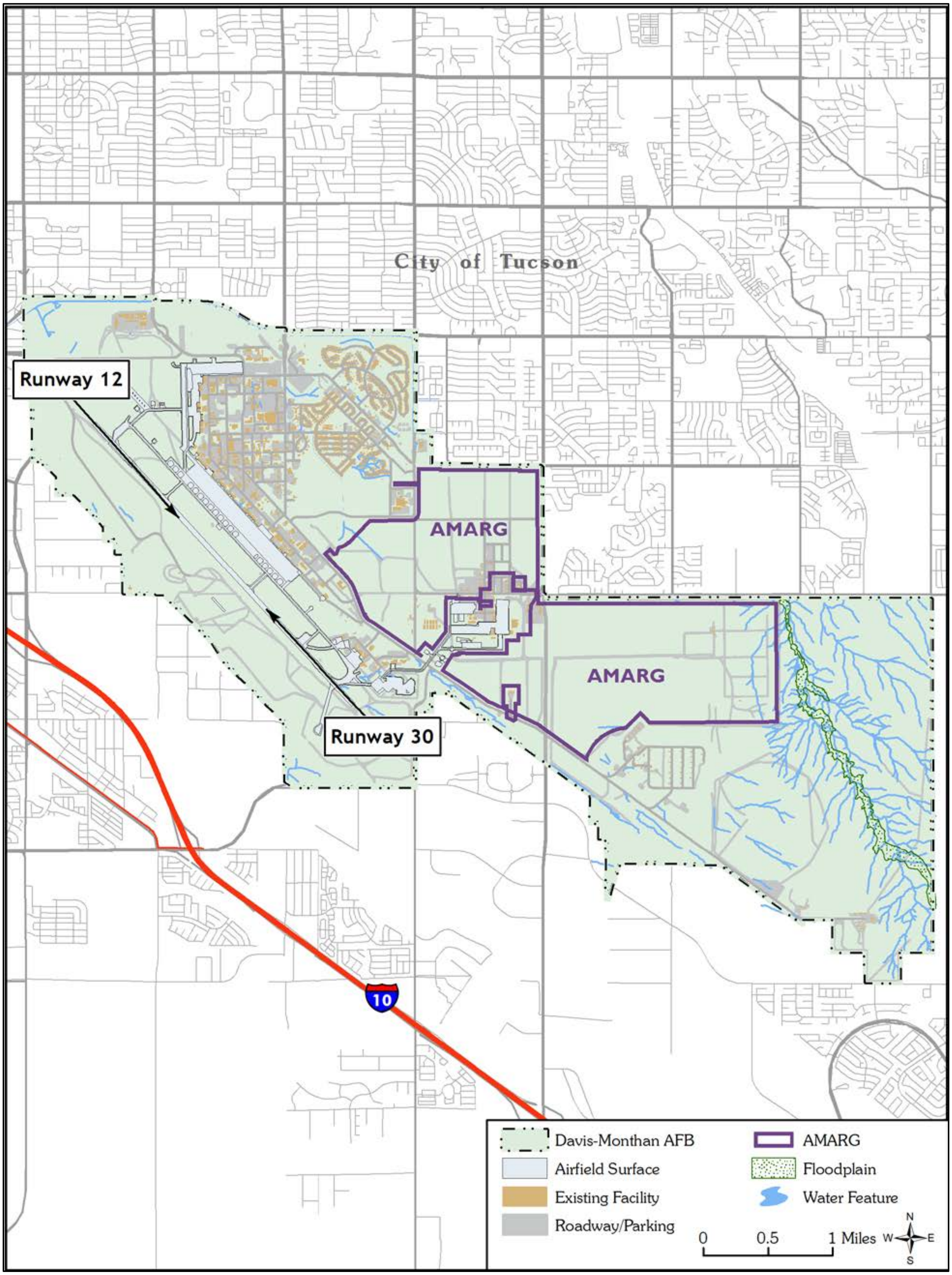

Figure DM1-2. Primary Runways at Davis-Monthan AFB

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DM2.0 DAVIS-MONTHAN AIR FORCE BASE ALTERNATIVE

This section presents the specifics of the proposed action at Davis-Monthan AFB. Four elements of the proposed action have the potential to affect the base and associated airspace: (1) facility and infrastructure projects to support the F-35A beddown; (2) personnel changes necessary to meet F-35A requirements; (3) airfield operations conducted by AFRC F-35A pilots; and (4) airspace and range use by AFRC F-35A pilots. Each element is explained in the following subsections. In addition, this section also presents state and federal consultation efforts and associated permits that would be required should Davis-Monthan AFB be selected to receive the AFRC F-35A mission.

Under the proposed action, 24 Primary Aerospace Vehicles Authorized (PAA) F-35A aircraft would start to arrive at Davis-Monthan AFB in early 2024. Delivery of the full complement of 24 PAA F-35A aircraft and 2 Backup Aircraft Inventory (BAI) is anticipated to take 2 years. At that time, the F-35A aircraft would completely replace the existing 24 A-10 aircraft assigned to the 924 FG. The A-10 aircraft that would be replaced by the F-35A aircraft would be reassigned or removed from the U.S. Air Force (USAF) inventory.

DM2.1 FACILITIES AND INFRASTRUCTURE

To support the AFRC F-35A mission, additional infrastructure and facility modifications would be required at Davis-Monthan AFB (Table DM2-1). A total of 17 different improvement projects and 2 demolition projects would be implemented in 2021 at Davis-Monthan AFB (Figure DM2-1). The USAF estimates that $87.3 million in Military Construction (MILCON) expenditures would be required to implement the proposed AFRC F-35A mission at Davis-Monthan AFB.

Table DM2-1. Facilities and Infrastructure Projects for the AFRC F-35A Mission at Davis-Monthan AFB

Project[a]	Size (ft^2)[b]
Demolition	
Demolish Building 5247	18,418
Demolish Building 5251	47,432
Demolition Total	**65,850**
Renovation	
Building 5111 addition for hazardous materials storage	9,301
Building 5111 renovation for collateral storage	500[c]
Building 404 medical building addition	2,178
Building 1358 renovation for the security forces facility modifications	500[c]
Widen street north of Building 5111	11,920
Runway 30 approach end concrete modifications (not shown)	52,788
Ramp repairs (not shown)	398,445
Refurbish 23 sunshades to hardened tops (change tops of existing structures)	0
Renovation Total	**475,632**
New Construction	
Construct a 6-bay hangar	18,418
Construct an F-35A flight simulator building	13,650
Construct a squadron operations building	37,523
Construct a maintenance support building	32,636
Construct a munitions maintenance building (not shown)	5,000
Construct a munitions operations building (not shown)	4,800

Table DM2-1. Facilities and Infrastructure Projects for the AFRC F-35A Mission at Davis-Monthan AFB (Continued)

Project[a]	Size (ft^2)[b]
New Construction	
Construct a flare storage building (not shown)	4,800
Construct a storage igloo facility (not shown)	9,840
Construct 1 sunshade	6,400
New Construction Total	**133,067**

[a] Data in this table were obtained from site interviews at Davis-Monthan AFB (Davis-Monthan AFB 2017a).
[b] Size is the area covered by the footprint of the proposed facilities and consists of the designed limits of the structure, facility, apron, road, access, and/or parking lot.
[c] Interior renovation only.

New construction and facility additions would require construction grading, clearing, and equipment laydown space. To account for this disturbance, this analysis also includes disturbance areas in addition to the facility size. These disturbance areas encompass 20 feet adjacent to linear features (e.g., roads, utility extensions, etc.) and 50 feet around the facility footprint for all other facilities. Repairs of existing aircraft aprons or ramps are not included in these calculations because these repairs would occur on paved or concrete surfaces. Interior renovations are also not included in these calculations because these renovations would not create ground disturbance or a change in impervious surfaces.

New construction and facility additions would also result in changes to existing impervious surfaces. It is assumed that any demolition would include demolition of the building slab and result in a reduction in impervious surfaces. In some cases, demolished facilities would be replaced by new construction or pavements. This increase in impervious surfaces is accounted for in the new construction. Table DM2-2 provides a summary of the ground disturbance and changes in impervious surfaces.

Table DM2-2.Summary of Facility and Infrastructure Projects for Davis-Monthan AFB

Project Type	Ground Disturbance (Acres)	Change in Impervious Surfaces (Acres)
Demolition	4.5	-1.5
Renovation[a]	2.0	+0.5
New Construction[b]	8.7	+2.6
Total	**15.2**	**+1.6**

[a] Totals do not include interior renovation, runway, or ramp renovation projects.
[b] Totals do not include construction of the sunshade.

Facility siting on military installations is predominantly functional-use based (i.e., locating facilities with like functional uses adjacent to one another). However, safety and compliance with policies and regulations are also used as planning factors. During the planning phase for a new aircraft mission beddown, military planners consider a variety of alternatives necessary to meet the requirements of the new mission, including the use of existing facilities that can be partially or entirely used to meet mission requirements. Depending on available infrastructure, facilities, and, to some degree, personnel available to support the AFRC F-35A mission, proposed construction, demolition, and renovation projects vary between alternatives. The facility siting analysis for each alternative base considered the functional requirements of the AFRC F-35A mission and compared them with the existing infrastructure and environmental constraints at each alternative base.

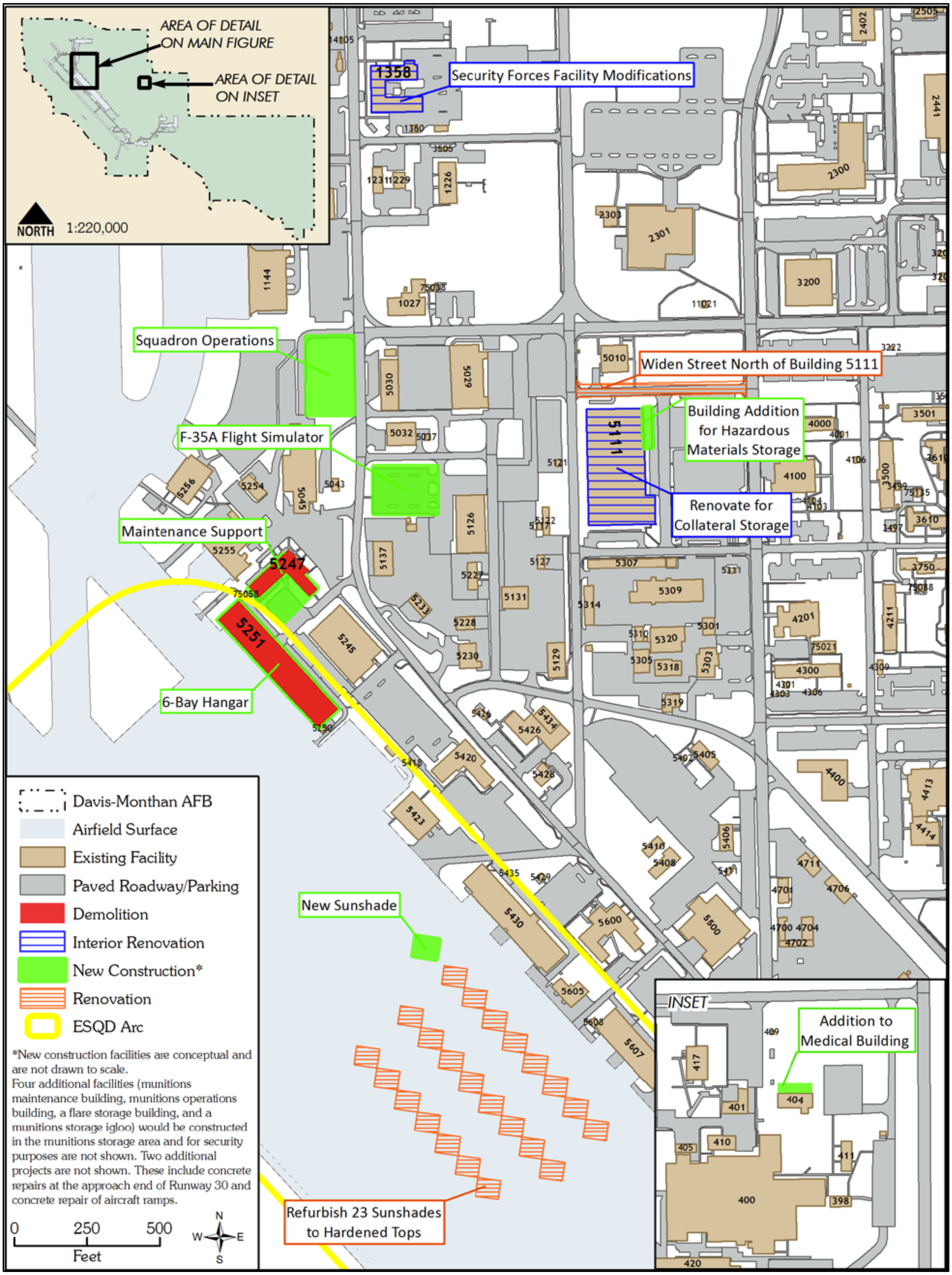

Figure DM2-1. Facilities and Infrastructure Projects for the AFRC F-35A Mission at Davis-Monthan AFB

New construction siting is a stepwise process that includes identifying suitable sites relative to existing facilities and base infrastructure to provide operational efficiencies and suitable cost-benefit values. Utility siting, including the re-routing of existing utilities or the installation of new utility infrastructure (e.g., power, water, sewer, and communication lines), could also be required to accommodate the new mission. The siting process for utilities focused on using existing conduits and previously disturbed areas or areas that would also be disturbed for facility modifications. Temporary construction laydown areas could also be required to support construction. Construction laydown areas would be located in developed or semi-developed areas, or previously disturbed or paved areas. Construction laydown areas not proposed for permanent disturbance would be returned to their pre-construction state upon completion of construction. All construction contracts would be managed under Unified Facilities Criteria (UFC) 3-101-01, *Best Management Practices*, and attainment of a Leadership in Energy and Environmental Design (LEED) Silver certification.

Construction and renovation projects within the 65-decibel (dB) noise contour would include acoustical design considerations for façade elements and interior design requirements per UFC 3-101-01. Land use would be consistent with Department of Defense Instruction (DoDI) 4165.57, *Air Installations Compatible Use Zones*, and Air Force Handbook (AFH) 32-7084, *AICUZ Program Manager's Guide*.

DM2.2 PERSONNEL

Implementation of the AFRC F-35A mission at Davis-Monthan AFB would require sufficient and appropriately skilled military and civilian personnel to operate and maintain the F-35A aircraft and to provide other necessary support services. Implementation of the AFRC F-35A mission at Davis-Monthan AFB would result in a decrease of 30 positions. This would constitute a 0.3 percent decrease in base staffing (Table DM2-3).

Table DM2-3. Personnel Changes for the AFRC F-35A Mission at Davis-Monthan AFB

Baseline Personnel			Proposed F-35A Authorized Personnel			Percent Change to Total Personnel
Total Authorized Personnel	AFRC Authorized Personnel	Percent of Total Authorized Based Personnel	AFRC F-35A	Change to AFRC Unit Personnel Positions	Percent Change to AFRC Unit Personnel	
10,140	1,154	11.38%	1,124	-30	-2.60%	-0.3%

DM2.3 AIRFIELD OPERATIONS

The 924 FG is an integral part of the Combat Air Forces (CAF). The CAF defends the homeland of the United States and deploys forces worldwide to meet threats and ensure the security of the nation. To fulfill this role, the 924 FG must train as it would fight.

The USAF anticipates that once the full complement of aircraft is received, the 24 F-35A aircraft would be used to fly 11,580 operations per year from the airfield. Based on the proposed requirements and deployment patterns, AFRC F-35A pilots would fly additional operations during deployments, or at other locations for exercises or in preparation for deployments. In addition, AFRC F-35A pilots stationed at Davis-Monthan AFB could participate in remote training exercises. Some of these missions could involve ordnance delivery training or missile firing exercises (within the scope of existing National Environmental Policy Act [NEPA] documentation) at ranges approved for such ordnance use (e.g. Barry M. Goldwater Range [BMGR] in western Arizona).

Conducting 11,580 operations per year would represent an increase of 492 annual airfield operations compared to current A-10 aircraft operations (Table DM2-4). Of the 73,256 total airfield operations currently conducted at Davis-Monthan AFB, 15 percent are conducted by the 924 FG. Implementation of the AFRC F-35A mission at Davis-Monthan AFB would result in a 0.7 percent increase in annual total airfield operations.

Table DM2-4. Davis-Monthan AFB Baseline A-10 and Proposed F-35A Annual Airfield Operations

Total Baseline Operations[a]		Proposed AFRC F-35A Mission
Based A-10 (924 FG only)	11,088	0
Proposed F-35A	0	11,580
Other Aircraft	62,168	62,168
Total Airfield Operations	73,256	73,748
	Percent Change	**0.7%**

[a] Total baseline operations is for the last year. Data in this table were collected from the operations staff at Davis-Monthan AFB in 2017 (Davis-Monthan AFB 2017a).

AFRC F-35A pilots would perform departure and landing procedures similar to those currently conducted by the A-10 pilots at the installation. Due to differences in aircraft characteristics and performance, the flight profiles and tracks used by AFRC F-35A pilots would slightly vary from those currently used by A-10 pilots. A-10 pilots from the 924 FG average 245 flying days per year. For the purposes of this analysis and to compare the alternatives on an equal basis, the total number of possible flying days for AFRC F-35A pilots is also assumed to be 245, including both Saturday and Sunday (on Unit Training Assembly [UTA] weekends).

Although the AFRC A-10 aircraft do not have afterburners, other military aircraft operating at Davis-Monthan AFB use afterburners on occasion when additional power is needed. As described in Chapter 2, Section 2.3.3, the USAF evaluated three different scenarios for afterburner use. Scenario A is afterburner use on 5 percent of takeoffs. Scenario B is afterburner use on 50 percent of takeoffs. Scenario C is afterburner use on 95 percent of takeoffs.

AFRC F-35A pilots would operate similar to the A-10 pilots. Currently, A-10 operations primarily begin at 7:00 A.M. and conclude by 10:00 P.M. on weekdays and on UTA weekends (except when weather contingencies or special exercises cause operations to occur after 10:00 P.M.). After-dark training is normally scheduled to be completed before 10:00 P.M. After-dark training for AFRC F-35A pilots would also be scheduled to be completed before 10:00 P.M. Because of the capabilities and expected tactics of the F-35A aircraft, AFRC F-35A pilots are predicted to generally follow the same night requirement as AFRC A-10 pilots depending on weather or special exercises.

DM2.4 AIRSPACE AND RANGE USE

Table DM2-5 identifies the Federal Aviation Administration (FAA)-designated airspace currently used by Davis-Monthan AFB A-10 pilots that is also proposed for use by AFRC F-35A pilots. Implementation of the AFRC F-35A mission would not require any new airspace or changes to existing airspace boundaries, and the type and number of ordnance used at any of the ranges approved for such use could decrease.

Table DM2-5. Davis-Monthan AFB Training Airspace

FAA-Designated Airspace[a]	Floor[b] (feet MSL unless otherwise noted)	Ceiling (feet MSL unless otherwise noted)
Fuzzy MOA	100 AGL	UTBNI 10,000
Jackal MOA	11,000 or 3,000 AGL whichever is higher	UTBNI 18,000
Jackal Low MOA	100 AGL	UTBNI 11,000 MSL or 3,000 AGL whichever is higher
Outlaw MOA	8,000 or 3,000 AGL whichever is higher	UTBNI 18,000
Ruby 1 MOA	10,000	UTBNI 18,000
Sells 1 MOA	10,000	UTBNI 18,000
Sells Low MOA	3,000 AGL	UTBNI 10,000
Tombstone A & B MOAs	500 AGL	UTBNI 14,500
Tombstone C MOA	14,500	UTBNI 18,000
Barry M. Goldwater Range (BMGR) R-2301E	Surface	UTBNI 80,000
BMGR R-2304	Surface	UTBNI 24,000
BMGR R-2305	Surface	UTBNI 24,000
Fort Huachuca Range R-2303A	Surface	UTBNI 15,000
Fort Huachuca Range R-2303B	8,000	UTBNI 30,000
Fort Huachuca Range R-2303C	15,000	UTBNI 30,000

[a] Airspace used by F-35A pilots would include Air Traffic Control Assigned Airspaces (ATCAAs) that occur over the Military Operations Areas (MOAs) included in the table. The ATCAAs will accommodate training above 18,000 feet mean sea level (MSL).
[b] Floor altitudes could exclude certain areas. See FAA Sectional Charts for exclusions.
Note: MSL is the elevation (on the ground) or altitude (in the air) of an object, relative to the average sea level. The elevation of a mountain, for example, is marked by its highest point and is typically illustrated as a small circle on a topographic map with the MSL height shown in either feet or meters or both. Because aircraft fly across vast landscapes, where points above the ground can and do vary, MSL is used to denote the “plane” on which the floors and ceilings of Special Use Airspace (SUA) are established and the altitude at which aircraft must operate within that SUA.
Key: AGL = above ground level; UTBNI = Up To But Not Including
Source: FAA Phoenix (2018) and San Antonio (2018) Sectional Charts

DM2.4.1 Airspace Use

AFRC F-35A pilots would conduct missions and training activities necessary to fulfill the multi-role responsibility of this aircraft. All F-35A flight activities would occur in existing airspace. AFRC F-35A pilots would operate in the same airspace used by A-10 pilots from 924 FG, but at higher altitudes. A-10 pilots from the 924 FG use Military Operations Areas (MOAs), Restricted Areas (RAs), and Air Traffic Control Assigned Airspace (ATCAA) (Figure DM2-2 and Table DM2-5). To support realistic training, A-10 pilots schedule and use multiple adjacent airspaces together.

The FAA-designated airspace identified in Table DM2-5 is also used by other USAF pilots operating A-10, F-16, and F-35A aircraft and Navy pilots operating F-18 aircraft. A-10 pilots from the 924 FG conduct approximately 7 percent of the total sorties flown in the airspace identified in Table DM2-5. Although AFRC F-35A pilots would conduct missions similar to those of A-10 pilots, the capabilities of the F-35A aircraft allow for supersonic and higher altitude flight. Regardless of the altitude structure and percent use indicated in Table DM2-6, AFRC F-35A pilots (as do existing military aircraft pilots) would adhere to all established floors and ceilings of existing FAA-designated airspace. For example, the floor of the Sells Low MOA is 3,000 feet above ground level (AGL). While in this MOA, AFRC F-35A pilots would not fly below that altitude. Rather, AFRC F-35A pilots would adapt training to this and other airspace with lower floors.

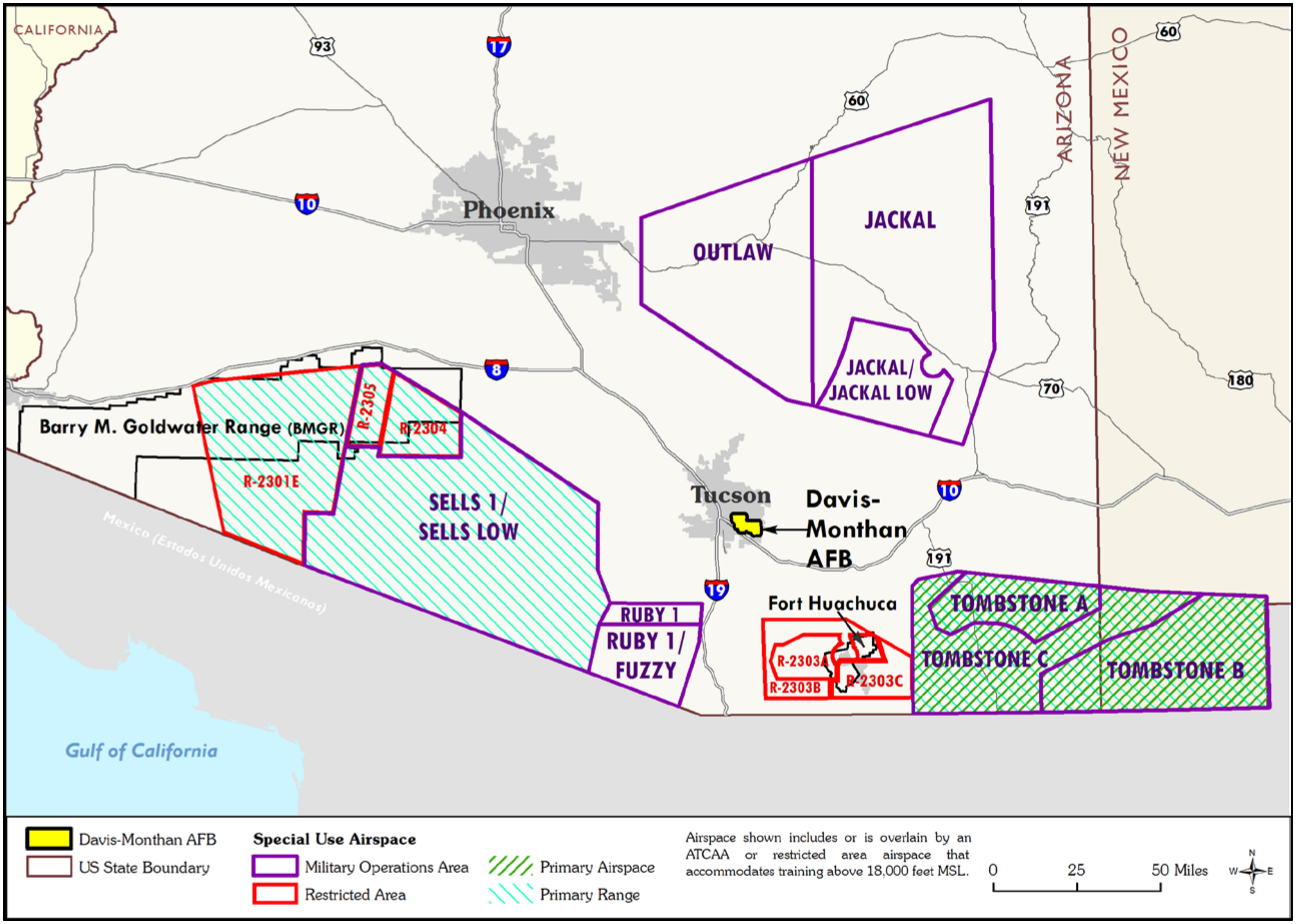

Figure DM2-2. Airspace Associated with Davis-Monthan AFB

Table DM2-6. Current and Proposed Aircraft Altitude Distribution in the Airspace

Altitude (feet)	Percentage of Use	
	A-10	AFRC F-35A
100 – 500 AGL	7%	0%
500 AGL – 2,000 AGL	30%	1%
2,000 – 5,000 AGL	26%	0%
5,000 AGL – 10,000 MSL	33%	5%
10,000 – 18,000 MSL	4%	23%
18,000 – 30,000 MSL	0%	60%
+30,000 MSL	0%	11%

A-10 pilots from the 924 FG generally operate 100 percent of the time at or below 18,000 feet mean sea level (MSL). In contrast, AFRC F-35A pilots would operate 71 percent of the time at or above 18,000 feet MSL, with 11 percent of the flight time above 30,000 feet MSL.

By 2030, total annual sorties would increase by 5 percent from baseline levels (Table DM2-7). In the most heavily used airspace, like the Tombstone MOA, AFRC F-35A sorties would account for 85 percent of total airspace sorties.

Table DM2-7. AFRC F-35A Airspace Sorties Flown from Davis-Monthan AFB

Airspace[a]	Total Baseline	A-10 Baseline	AFRC F-35A Sorties	Net Change (Total)	Percent Change (Total)
Southern Arizona	40,358	**2,628**	4,632	2,004	5.0%
Total	**40,358**	**2,628**	**4,632**	**2,004**	**5.0%**

[a] Includes all airspace identified in Table DM2-5.

To train with the full capabilities of the aircraft, AFRC F-35A pilots would conduct supersonic flight at altitudes and within airspace already authorized for such activities. Due to the capability of the F-35A aircraft, the USAF anticipates that approximately 10 percent of the time spent in air combat training would involve supersonic flight. A-10 aircraft operating from Davis-Monthan AFB are not capable of supersonic flight.

AFRC F-35A missions would last approximately 45 to 115 minutes, including takeoff, transit to and from the training airspace, training activities, and landing. Depending upon the distance and type of training activity, AFRC F-35A pilots would fly approximately 20 to 60 minutes in the training airspace. Occasionally, AFRC F-35A pilots could fly up to 90-minute sessions. AFRC F-35A pilots would not fly in Special Use Airspace (SUA) during environmental night (10:00 P.M. to 7:00 A.M.), except for rare contingencies and special mission training.

DM2.4.2 Range Use

AFRC F-35A pilots would only use existing ranges. At Davis-Monthan AFB, AFRC F-35A pilots would use the BMGR.

Most air-to-ground training would be simulated (i.e., nothing is released from the aircraft and electronic scoring is used). However, as described in Chapter 2, Section 2.3.4.2, the F-35A (like the A-10) is capable of carrying and using several types of air-to-air and air-to-ground ordnance, and pilots would require training in their use. The type and number of ordnance used by AFRC F-35A pilots could decrease from that currently used by A-10 pilots. If in the future the USAF identifies weapon systems that are either new or could exceed currently approved levels, appropriate NEPA documentation would be completed prior to their use.

Similar to A-10 pilots, AFRC F-35A pilots would use flares as defensive countermeasures in training. Flares are one of the defensive mechanisms dispensed by military aircraft to avoid attack by enemy aircraft and air defense systems. For the purposes of this analysis, it is estimated that flare use by AFRC F-35A pilots would be less than or equal to that of A-10 pilots. Chapter 2, Section 2.3.4.2.1, provides details on the composition and characteristics of flares. Flares would only be used in areas currently approved for such use. Current restrictions on the altitude of flare use would also apply. Approximately 70 percent of F-35A flare releases would occur above 15,000 feet MSL. At this altitude, most flares would be released more than 21 times higher than the minimum altitude required (700 feet) to ensure complete combustion of each flare.

DM2.5 PUBLIC, AGENCY, AND TRIBAL INVOLVEMENT

DM2.5.1 Scoping Process

The public scoping period for the AFRC F-35A Environmental Impact Statement (EIS) began on 22 March 2018 with publication of the Notice of Intent (NOI) in the *Federal Register*. During the following weeks, notification letters were mailed to federal, state, and local agencies; elected officials; federally recognized tribes (tribes)[1]; nongovernmental organizations; and interested individuals as a part of an interagency/intergovernmental coordination process. Through this process, concerned federal, state, and local agencies are notified and allowed sufficient time to evaluate potential environmental impacts of a proposed action.

Volume II, Appendix A, provides sample notification letters, the notification mailing lists, and the agency comments and concerns received by the USAF during the public scoping period. For the Davis-Monthan AFB alternative, newspaper advertisements announcing the intent to prepare an EIS and hold a public scoping meeting were published in five different local newspapers, including one Spanish language newspaper. These advertisements were published in the weeks preceding the scheduled public scoping meeting.

For the Davis-Monthan AFB alternative, one public scoping meeting was held on 24 April 2018 at the Tucson Convention Center (260 South Church Avenue, Tucson, Arizona 85701). This meeting was held in an open-house format where attendees could sign in, if desired, review display boards about the proposed AFRC F-35A mission, and provide written comments on the project. During this meeting, USAF personnel presented information on the project through the use of display boards and fact sheets. The Davis-Monthan AFB public scoping meeting was attended by 230 people, including residents, elected officials, local business leaders, military affairs committee members, congressional staffers, base employees, local media, and others.

Throughout the public scoping period, the USAF offered multiple ways in which comments could be submitted. Comments were submitted at the public scoping meeting and through the project website, via email, and via regular mail or courier. The public scoping period closed on 11 May 2018, and 510 comments were received regarding the Davis-Monthan AFB alternative. Some comments were received after the public scoping period closed but were still considered during development of the Draft EIS.

[1] Per DoDI 4710.02, *DoD Interactions with Federally-Recognized Tribes*, "tribe" refers to a federally recognized Indian or Alaska Native tribe, band, nation, pueblo, village, or community that the Secretary of the Interior acknowledges (DoDI 4710.02, Section 3.5). Although not included as federally recognized tribes in the list, the USAF similarly must consult with Native Hawaiian organizations in accordance with DoDI 4710.03, *Consultation with Native Hawaiian Organizations (NHOs).*

After the public scoping period closed, the USAF was made aware that the address provided for submittal of courier-delivered (e.g., Federal Express or United Parcel Service) public scoping comments was incorrect. Consequently, the USAF provided the correct address and an additional 10 working days to resubmit scoping comments from the time resubmittal instructions were published in the *Federal Register* on 13 August 2018 and in five local newspapers. During this second public scoping period, an additional 161 comments were received regarding the Davis-Monthan AFB alternative. These comments were also considered during development of the Draft EIS.

The majority of comments received for the Davis-Monthan AFB alternative were related to potential noise increases. Although some commenters expressed support for the proposed mission, other commenters expressed concerns about safety, airspace, biological resources, air quality, land use, and socioeconomics. To a lesser extent, some people submitted comments concerning hazardous materials and hazardous waste, environmental justice, cultural resources, infrastructure, traffic and transportation, and soil and water resources.

DM2.5.1.1 NEPA Process and Development of EIS

Several comments were made on the sufficiency of time allowed for scoping comments. One commenter expressed concern about how the USAF addresses comments by grouping them into categories and then summarizing the group with one sentence. One commenter wrote a letter on honesty and transparency, stating that the EIS must be honest and transparent and criticizing several previous USAF EISs that the commenter felt did not meet those qualifications.

DM2.5.1.2 Airspace Management and Use

Comments related to airspace included those that requested the EIS analyze any changes in airspace use, creation of new airspace, or alterations in flight paths. Concerns were raised about congested airspace near Tucson International Airport (TUS). Several comments suggested moving existing flight paths away from populated areas or other sensitive locations.

DM2.5.1.3 Noise

Comments received during scoping indicated a broad range of concerns and requested a comprehensive presentation of noise impacts. Many commentators noted the difference in noise level between the A-10 aircraft currently based at Davis-Monthan AFB and the F-35A aircraft.

The most commonly expressed concerns dealt with the potential for an increase in noise pollution and the effects of any noise increases on human health, quality of life issues, natural resources, animals (domesticated animals, zoo animals, and wildlife), wilderness and other natural areas, outdoor recreation, educational facilities, and vibrational effects to structures.

Several people submitted comments regarding the noise analysis in the EIS and requested the USAF use supplemental metrics other than day-night average sound level (DNL). Comments were received on the modeling parameters the USAF has used in past EISs and recommended parameters for inclusion in this EIS.

Several people submitted comments regarding overflight noise that could occur while the aircraft are transiting from the airfield to and from the airspace proposed for use. Other people submitted comments regarding noise impacts inside the current noise contours surrounding Davis-Monthan AFB. A number of facilities, neighborhoods and parks were listed, including, but not limited to, University of Arizona, Reid Park Zoo, elementary schools, medical facilities, and senior or assisted living facilities.

Some comments requested that the EIS include noise mitigation or recommended basing the F-35A aircraft in a more rural setting.

DM2.5.1.4 Air Quality

During scoping, people submitted comments regarding the pollutant impacts that could result from implementation of the proposed AFRC F-35A mission. Jet fuel and jet fumes were often mentioned, as were particulates, carbon dioxide, nitrous oxide, and ozone (O_3). Some commenters noted that the USAF does not appear to change flight conditions due to extreme temperatures or air quality warnings.

Some of the commenters expressed concern about future air pollution increases in the region and how pollution from the AFRC F-35A mission would add to that. Concern was also expressed about climate change-related impacts and weather inversions in the region's valleys.

DM2.5.1.5 Safety

Several people submitted comments regarding flight safety. Many of these commenters expressed concern about the safety of a single-engine aircraft in a major metropolitan area. Commenters also expressed concern about the number of deficiencies that have been reported for the F-35 aircraft and the general readiness of the aircraft.

Concern was also expressed over the safety of the composite materials used in the construction of the F-35 and a desire to see the full safety record of the F-35, including all Class A through Class C mishaps.

DM2.5.1.6 Soil and Water Resources

Several commenters expressed concern that the proposed mission would deplete groundwater supplies and contribute to water pollution through spills of cleaners and chemicals. It was mentioned that Tucson is in a drought and that the proposed mission would make it worse. Contamination of the groundwater from historical use of firefighting agents was also mentioned.

DM2.5.1.7 Biological Resources

A large number of commenters expressed concern about noise impacts to animals (domesticated, pets, wildlife, zoo animals, and threatened and endangered species) and to natural areas in the region. Areas mentioned included, but were not limited to, Tucson Mountains, Santa Ritas, Tortolitas, Rincons, Saguaro National Park, and Reid Park Zoo. One commenter requested that the EIS should include sound exposure level (SEL) values at parks, wilderness areas, forests, refuges, and monuments and another noted that noise impacts to animals varies between different species.

In a letter dated 3 May 2018, the Arizona Game and Fish Department (AZGFD) identified Cienega Creek and other riparian corridors as bird migration areas that should be avoided. Eagle nesting and bighorn sheep (*Ovis canadensis*) lambing areas were also identified as areas that should be avoided.

DM2.5.1.8 Cultural Resources

During scoping, several people commented about the potential for noise to damage historical structures such as homes and buildings within the Barrio Santa Rosa Historic District. The noise level at the Arizona Inn was also mentioned as a potential concern. A private citizen expressed concern for impact to the Tohono O'odham and Pascua Yaqui tribal reservations as well.

DM2.5.1.9 Land Use

As part of the scoping process, representatives from various neighborhoods surrounding the installation expressed concerns about noise. These neighborhoods included the following: Broadmoor Broadway Village La Estancia, Barrio Kroeger Lane, Julia Keen, Sam Hughes, Keeling, Starr Pass and Arroyo Chico, among others. Comments were received expressing concern that increased noise would affect property values or impact recreational areas in the Tucson area. Comments were received about potential mitigation to homes affected by noise such as buy outs, reimbursement for repairs and upgrades to reduce interior noise levels. Comments were also received indicating that land use should be evaluated outside of the immediate base area.

Commenters also expressed concern about encroachment issues, the compatibility of a base in a densely populated area, concern that new noise contours would exceed previously studied Joint Land Use Study (JLUS) contours, and a concern that housing would be deemed uninhabitable or incompatible. One commentator mentioned the potential for restricted property rights when DNL exceeds 65 dB.

During scoping, the National Park Service (NPS) submitted a letter indicating their desire to work with the USAF on the analysis of potential impacts to park resources and values associated with Davis-Monthan AFB. The letter indicated that increased noise levels resulting from the new mission could impact the park and could adversely affect wilderness qualities, wildlife, and park visitor experiences. The NPS indicated that supplemental noise metrics might be appropriate for the assessment of impacts to solitude in the Saguaro Wilderness Area.

DM2.5.1.10 Socioeconomics

Several comments received during scoping expressed concern about how increased noise would affect property values. Other concerns were related to potential impacts to tourism, hospitability, hotel usage, retirement, decreasing tax base, and enrollment and funding for educational institutions. Concerns were expressed about the sustainability of the base if it does not receive additional missions and the economic impacts associated with a base closure. Commenters also expressed concern about the potential impact that noise from the F-35A aircraft would have on the quality of life and health of residents. One commentator asked about the financial cost to repair walls and windows in the flight path. One commentator noted that an analysis showed how home sales within a 1-mile radius of Davis-Monthan AFB from 2010 through November 2016 increased almost 31 percent while home prices in the greater Tucson area increased only 14 percent during the same time period.

Pima County provided a letter that indicated the base provides substantial monetary benefits, no reduction of property values, and is an economic driver for the area. Several commenters expressed concern about what would happen to the economy without the presence of the base and several commenters wanted the EIS to state how many jobs the F-35A mission would add to the base and the expected economic benefit of the new mission.

DM2.5.1.11 Environmental Justice

During scoping, several people submitted comments regarding the potential noise impacts on children and education facilities. Some of the commenters expressed concern about how the project could impact minority, low-income populations, or special needs populations. Other commenters expressed concern that public outreach was not sufficient to reach minority and low-income groups.

DM2.5.1.12 Infrastructure

During scoping, people submitted comments about the potential for the AFRC F-35A mission to increase water use. Many commenters expressed concern about the impact of increased noise levels on older adobe homes, walls, windows, and foundations.

DM2.5.1.13 Hazardous Materials and Waste

Several commenters expressed concern that the new mission would cause more pollution because of cleaners and chemicals used on aircraft or from the increased use of jet fuel. Many commenters also requested that the USAF establish plans to prevent and clean up spills. Some comments indicated that sampling from homes in the area has found fuel residue and others expressed concerns of high cancer rates in the community. Some commenters mentioned the groundwater contamination that has recently been in the news.

Concerns were raised about dangers from the chemical stealth coating and composite materials used in the F-35A aircraft. Comments were received about hazardous materials used in the operation and maintenance of the F-35A aircraft.

DM2.5.1.14 Cumulative Impacts

One commenter wrote a letter regarding cumulative impacts. This individual indicated that the cumulative impacts must include all entities in the Region of Influence (ROI). For airspace, the EIS must evaluate the air traffic at TUS, vehicles, construction, etc., in combination with the proposed action. The letter stated that the impacts must be quantified and not summarized. Another commenter stated that the USAF should establish the proper geographic scope for cumulative impacts and include areas in New Mexico, etc.

DM2.5.2 Draft EIS Public and Agency Review

A Draft EIS public hearing was held on 10 March 2020 at the Convention Center in Tucson, Arizona. A total of 130 people signed in at the public hearing, but some attendees did not sign in. The verbatim transcript from the Davis-Monthan AFB public hearing is contained in Appendix A, Section A.6.1. A total of 388 comments were received from the public and agencies regarding the proposed AFRC F-35A mission at Davis-Monthan AFB prior to close of the comment period. See Chapter 1, Section 1.5, of the EIS for more details on the public involvement process. A synopsis of the comments received specific to Davis-Monthan AFB on the Draft EIS are listed as follows. See Appendix A, Section A.2, for responses to the substantive Draft EIS comments.

1) General support for or opposition to the proposed beddown.
2) General concerns about noise.
3) Concerns about how noise is modeled (e.g., DNL versus maximum noise level [L_{max}] or SEL), inadequacy of analysis, use of NOISEMAP, Karnes profiles, focus on aircraft noise, and use of old references, etc.
4) Concerns about increased noise impacts to education and schools.
5) Concerns about increased noise causing health concerns and sleep disturbance.
6) Concerns about noise impacts to people with medical conditions or special needs (mental health, post-traumatic stress disorder [PTSD], autism, migraines, hyperacusis, etc.).
7) Concerns about noise resulting in a decrease in property values and tax base along with the related analysis.

8) Concerns about noise causing property damage.

9) General concerns about increased noise impacting outdoor recreation activities and quality of life (e.g., parks, zoo, etc.).

10) Commenters questioned whether the use of the afterburner for 5 percent of departures is reasonable.

11) General concerns about noise impacts on land use and encroachment.

12) Concern that "incompatible" meant "uninhabitable" with respect to anticipated noise increases in residential areas.

13) General concerns about environmental justice communities and the associated analysis (e.g., development of the Community of Comparison [COC]).

14) General concerns about air quality and associated analysis.

15) Concerns about transient F-35A aircraft numbers.

16) Suggestions to identify less urban areas or alternative(s) for the F-35A aircraft basing.

17) Requests for more elaboration on noise mitigation.

18) Concerns about safety, the scope and extent of the safety analysis, mishap response (e.g., composite material and stealth coatings), and the use of and training with live ordnance (e.g., Joint Direct Attack Munitions [JDAMs]).

19) Concerns about hazardous materials and waste (e.g., perfluorooctane sulfonate [PFOS]/perfluorooctanoic acid [PFOA] issues).

20) General comments on public hearing(s) notification, advertisement, and outreach, along with requests to extend the comment period.

21) General comments regarding the extent of the cumulative impacts analysis and what is included in that analysis.

DM2.5.3 Consultation

DM2.5.3.1 Government-to-Government Consultation

In January 2012 the U.S. Department of Defense (DoD) updated its Annotated American Indian and Alaska Native Policy, which emphasizes the importance of respecting and consulting with tribal governments on a government-to-government basis. This policy requires an assessment, through consultation, of the effect of proposed DoD actions that may have the potential to significantly affect protected tribal resources, tribal rights, and Indian lands before decisions are made by the respective DoD services. In an ongoing effort to identify significant cultural resources, tribal resources, or other issues of interest to tribes, and as part of the NEPA scoping process, combined notification and Section 106 consultation letters were submitted to the federally-recognized American Indian tribes associated with Davis-Monthan AFB.

Following standard USAF practice for government-to-government correspondence, tribal consultation was initiated by base Commanders who represent key leadership points of contact. Davis-Monthan AFB has identified 15 tribes potentially affiliated with the installation. These tribes, along with a record of consultations, are listed in Volume II, Appendix A, Section A.3. Nine (9) tribes have responded to a request for consultation. Additional direct communication efforts (phone calls and emails) were made for tribes that did not respond to USAF mailings. Section 106 consultation is considered complete for all tribes and Davis-Monthan AFB will continue to coordinate with interested tribes throughout the EIS process.

All communications with tribes will be completed in accordance with 54 *United States Code (USC)* 300101 *et seq.*, *National Historic Preservation of Act of 1966* (NHPA), as amended; 36 *Code of Federal Regulations (CFR)* § 800, *Protection of Historic Properties;* Executive Order (EO) 13175, *Consultation and Coordination with Indian Tribal Governments;* and DoDI 4710.02, *DoD Interactions with Federally-Recognized Tribes.*

DM2.5.3.2 State Historic Preservation Officer Consultation

Davis-Monthan AFB has determined that no historic properties would be affected by implementing the AFRC F-35A mission at the installation. All buildings within the Area of Potential Effects (APE) have been evaluated for National Register of Historic Places (NRHP) eligibility and determined non-eligible. The Arizona State Historic Preservation Officer (SHPO) concurred with the APE and the non-eligibility determination in a letter dated 14 May 2018 (Volume II, Appendix A, Section A.2.4.2).

DM2.5.3.3 U.S. Fish and Wildlife Service Consultation

Because no federally listed threatened, endangered, or candidate species and/or designated critical habitat occur near Davis-Monthan AFB, no impacts to federally listed species would result from implementation of the proposed AFRC F-35A mission. Although a variety of federally listed species have the potential to occur under the primary airspace and ranges proposed for use, the potential impacts would not be significant. In an email dated 26 June 2018, the U.S. Fish and Wildlife Service (USFWS) agreed that Endangered Species Act (ESA) Section 7 requirements had been applied and that no further Section 7 consultation is required (Volume II, Appendix A).

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DM3.0 DAVIS-MONTHAN AIR FORCE BASE AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

DM3.1 AIRSPACE MANAGEMENT AND USE

DM3.1.1 Base Affected Environment

DM3.1.1.1 Airfield Operations

Baseline annual airfield operations at Davis-Monthan AFB are described in Section DM2.3 and shown in Table DM2-4. The primary runway at Davis-Monthan AFB, Runway 12/30, is described in Section DM1.0 and shown on Figure DM1-2. Runway 12 (takeoffs/landings to the southeast) is more frequently used for daily operations as noise abatement, wind directions, air traffic flows, and other such factors dictate the real-time “active” runway. The Davis-Monthan AFB air traffic control (ATC) tower is responsible for controlling and managing all airfield arriving and departing aircraft within a Class D airspace area designated as being northeast of Interstate (I)-10 within 5 nautical miles (NM) of the airport from the surface (field elevation 2,704 feet MSL) up to 5,500 feet MSL.

The FAA Albuquerque Air Route Traffic Control Center (ARTCC) has overall responsibility for managing airspace throughout this region and has delegated responsibility to the FAA Tucson Terminal Radar Approach Control (TRACON) facility for providing radar ATC services within approximately 40 NM of Davis-Monthan AFB below 17,000 feet MSL. This facility controls and separates all instrument flight rules (IFR) air traffic operating within this assigned airspace to include the different airport arrivals/departures and enroute traffic transiting through this airspace. Radar advisory services are also provided to visual flight rules (VFR) pilots, upon request, to enhance the flight safety of all military, commercial and general aviation operating within this airspace environment.

The Class C airspace established for this terminal area encompasses both Davis-Monthan AFB and TUS due to the close proximity (5 NM) of these two airfields and the joint control of both by the Tucson TRACON. As depicted on the FAA Phoenix Sectional Aeronautical Chart, this Class C inner area extends from the surface up to and including 6,600 feet MSL within a 5-mile radius of Davis-Monthan AFB airfield to the points where the 5-mile arc joins a 5-mile arc from the TUS Class C airspace area. The more highly controlled Class C airspace enhances aviation safety within an airport environment by requiring all aircraft, including VFR pilots transiting through this charted airspace, to establish two-way communications with the Tucson TRACON prior to entering this Class C boundary. The Tucson TRACON had approximately 191,000 air traffic operations in 2017 which includes all military and civilian IFR/VFR aircraft (FAA Air Traffic Activity System).

The navigational aids serving the Davis-Monthan AFB airfield include an Instrument Landing System (ILS) and a Tactical Air Navigation (TACAN) which provide instrument direction for military aircraft to navigate to/from the active runway during marginal weather conditions or as needed for training and managing/sequencing air traffic. Navigation aids transmit signals that provide directional bearing and distance information that guide the course and descent directions described on an instrument approach or departure procedure. Eight instrument approach and three departure procedures are published for Davis-Monthan AFB aircraft and the projected AFRC F-35As.

DM3.1.2 Base Environmental Consequences

DM3.1.2.1 Airfield Operations

The Davis-Monthan AFB alternative for the AFRC F-35A beddown would generate the operational changes noted in Table DM2-4. Loss of the 11,088 A-10 airfield operations and gaining the projected F-35A 11,580 operations while other aircraft operations remain unchanged would result in an overall 0.7 percent increase. The percentage of operations flown during environmental night by AFRC F-35A pilots would remain the same as the percentage currently conducted by A-10 pilots. The AFRC F-35A beddown could be accommodated within the Davis-Monthan AFB airfield and Class C environment without adversely affecting the overall use of this airspace. No modifications would be required for this airspace structure or the manner in which ATC and local operating procedures manage Davis-Monthan AFB aircraft operations.

DM3.1.3 Airspace Affected Environment

DM3.1.3.1 Airspace and Range Use

The MOAs, ATCAAs, RAs, and ranges currently used by Davis-Monthan AFB aircraft and projected for use by AFRC F-35A pilots for flight and air-to-ground training are shown in Table DM2-5. The published floor and ceiling altitudes pilots must adhere to while operating within each airspace area are also shown in this table. While the Tucson TRACON controls departing and arriving mission aircraft in their delegated airspace, Albuquerque ARTCC is the controlling agency for all aircraft operations within the training airspace. Pilots must follow local operating procedures/practices for flights to/from the different training areas which helps standardize the manner in which ATC separates military aircraft from other IFR nonmilitary air traffic.

Table DM3-1 notes the baseline and projected F-35A sortie operations for each training complex as well as the responsible military agency for each airspace/range area. These agencies coordinate the scheduled use of each area with all concerned to ensure the individual training requirements of the different user groups are met to the extent possible.

Table DM3-1. Baseline and AFRC F-35A Annual Sorties

Training Airspace/Ranges[a]	Using/Scheduling Agency	Baseline Total	924 FG A-10	AFRC F-35A	Proposed Total	Percent Change
Jackal MOA	Air National Guard (ANG), Tucson	3,207	-198	100	3,109	-3.1
Outlaw MOA	ANG, Tucson	2,980	-184	56	2,852	-4.3
Ruby/Fuzzy MOAs	ANG, Tucson	2,858	-177	157	2,838	-0.7
Sells MOA	56th Fighter Wing (56 FW), Luke AFB	11,330	-870	194	10,654	-6.0
Tombstone A B and C MOAs[b]	355 FW, Davis-Monthan AFB	2,128	-132	2,585	3,041	42.9
Barry M. Goldwater Range[b]	56 FW, Luke AFB	15,868	-981	1,540	16,427	3.5
Fort Huachuca Range	US Army, Ft. Huachuca/ 56 FW, Luke AFB	1,987	-86	0	1,901	-4.3
Total		**40,358**	**-2,628**	**4,632**	**42,362**	**5.0**

[a] AFRC F-35A training airspace and ranges also includes the high-altitude ATCAA above the MOAs. Airspace areas in this table have been grouped due to similarity of training use and for noise modeling purposes.
[b] Primary Use Airspace and Ranges

DM3.1.4 Airspace Environmental Consequences

As noted in Table DM3-1, replacing the A-10 training with the projected F-35A sorties in the different MOAs, RAs, and ranges would result in a 5 percent increase in overall training airspace sorties. While the number of annual sorties conducted would decrease in most of the airspace and range areas proposed for use, the number of annual sorties conducted would increase in the Tombstone MOAs and in the BMGR/Sells MOA. An additional 2,453 annual sorties would be conducted in the Tombstone MOAs. Combined operations in the BMGR/Sells MOA would increase by 559 annual sorties.

The Tombstone MOAs are primarily used by the 355 FW at Davis-Monthan AFB and also used by the 56th Fighter Wing (56 FW) at Luke AFB and the 162 FW at TUS. A cooperative scheduling agreement between the 56 FW at Luke AFB, 355 FW at Davis-Monthan AFB, and 162 FW at TUS assures all three units sufficient access to the region's airspace to accomplish their training goals.

As noted in Table DM2-6, the majority of A-10 activities in the SUA are conducted below 10,000 feet MSL, while 71 percent of the proposed AFRC F-35A operations would be above 18,000 feet MSL. Because VFR aircraft cannot operate above 18,000 feet MSL but are permitted to fly through an active MOA at lower altitudes, there would be less interactions between the F-35As and VFR aircraft than currently experienced with the A-10s. Albuquerque ARTCC separates all nonmilitary IFR traffic either from the active SUA or from aircraft in this airspace as necessary. Overall, the AFRC F-35A sorties could be accommodated in the training airspace, ranges, and while en route to/from these areas without adversely affecting other airspace uses throughout the affected region. Implementation of the AFRC F-35A mission would not result in the creation of new SUA or change the boundaries of existing SUA.

DM3.1.5 Summary of Impacts to Airspace Management and Use

Implementation of the AFRC F-35A mission would involve a one-for-one exchange of A-10 aircraft with F-35A aircraft, and would not require any changes to airspace or to how the airfield is managed. Eventual replacement of A-10 aircraft at Davis-Monthan AFB with F-35A aircraft would result in a 0.7 percent increase in airfield operations. This minor operational increase would not affect how local air traffic is managed. In addition, the AFRC F-35A sorties proposed for the airspace could be accommodated in the training airspace, ranges, and while en route to/from these areas without adversely affecting other airspace uses throughout the affected region. Therefore, impacts to airspace around Davis-Monthan AFB and the airspace proposed for use would not be significant.

DM3.2 NOISE

Although noise can affect several resource areas, this section describes potential noise impacts on human annoyance and health, physical effects on structures, and potential impacts to animals in the care of humans. Noise impacts on biological resources (e.g., wildlife), cultural resources, land use and recreation, socioeconomics (e.g., property values), and environmental justice/protection of children are discussed in sections dedicated to those resources. Chapter 3, Section 3.2, defines terms used to describe the noise environment as well as methods used to calculate noise levels and assess potential noise impacts. These terms and analytical methods are uniformly applied to all four bases. A summary of noise metrics used in this EIS is also provided in Table DM3-2.

For consistency, the dB unit is used throughout this EIS. However, all subsonic aircraft noise levels described in this EIS are measured in A-weighted decibels (dBA). In compliance with current DoD Noise Working Group (DNWG) guidance, the overall noise environment is described in this EIS using the DNL metric. During scoping, people submitted comments expressing concern about use of the DNL metric. The DNL metric is used because it is the preferred noise metric of the U.S. Department of Housing and Urban Development (HUD), FAA, U.S. Environmental Protection Agency (USEPA), and DoD. Studies of community annoyance in response to numerous types of environmental noise show that there is a correlation between DNL and the percent of the population that can be expected to be highly annoyed by the noise. In addition to the DNL metric, supplemental noise metrics are used to provide a more complete picture of noise and particular types of noise impacts (Table DM3-2). Operations occurring during environmental nighttime hours are assessed a 10-dB penalty applied in calculation of DNL (refer to Chapter 3, Section 3.2.3, for more detailed resource definition and methodology used to evaluate impacts).

Table DM3-2. Summary of Noise Metrics Used in this EIS

Different noise measurements (or metrics) quantify noise. These noise metrics are as follows:

- The A-weighted decibel (dBA) is used to reflect a weighting process applied to noise measurements to filter out very low and very high frequencies of sound in order to replicate human sensitivity to different frequencies of sound and reflect those frequencies at which human hearing is most sensitive. Environmental noise is typically measured in dBA.
- Day-Night Average Sound Level (DNL) combines the levels and durations of noise events, the number of events over a 24-hour period, and more intrusive nighttime noise to calculate an average noise exposure.
- Onset Rate-Adjusted Day-Night Average Sound Level (L_{dnmr}) adds to the DNL metric the startle effects of an aircraft flying low and fast where the sound can rise to its maximum very quickly. Because the tempo of operations is so variable in airspace areas, L_{dnmr} is calculated based on the average number of operations per day in the busiest month of the year.
- C-Weighted Day-Night Average Sound Level (CDNL) is a day-night average sound level computed for impulsive noise such as sonic booms. Peak overpressure, measured in pounds per square foot (psf), characterizes the strength of impulsive noise.
- Sound Exposure Level (SEL) accounts for the maximum sound level and the length of time a sound lasts by compressing the total sound exposure for an entire event into a single second.
- Maximum Noise Level (L_{max}) is the highest sound level measured during a single event in which the sound level changes value with time (e.g., an aircraft overflight).
- Equivalent Noise Level (L_{eq}) represents aircraft noise levels decibel-averaged over a specified time period and is useful for considering noise effects during a specific time period such as a school day (denoted $L_{eq(SD)}$ and measured from 8:00 A.M. to 4:00 P.M.).

In this EIS, multiple noise metrics are used to describe the noise environment at each alternative base. This approach, which is in accordance with DoD policy (DoD 2009), provides a more complete picture of the current and expected noise experience than can be provided by any one noise metric alone.

Comments received during scoping indicated a broad range of concerns and requested a comprehensive presentation of noise impacts. Therefore, this analysis covers a wide variety of potential noise impact categories. Additional details are provided in Volume II, Appendix B.

DM3.2.1 Base Affected Environment

This section discusses noise impacts near the installation. Noise generated in the training airspace and during training to and from the training airspace is discussed in Section DM3.2.2.1. Under baseline conditions, 73,256 airfield operations are annually conducted at Davis-Monthan AFB. This includes 11,088 operations by the AFRC's 924 FG A-10 aircraft, and 22,974 operations by other based A-10 aircraft. Fixed-wing (C-130) and rotary-wing (H-60) aircraft associated with a combat search and rescue mission conduct 17,446 operations annually. CBP operates several types of small, fixed-wing and rotary-wing aircraft conducting 16,532 operations annually. The AMARG carries out occasional test-flights of older aircraft being stored at Davis-Monthan AFB conducting 450 operations annually. Red Flag combat search and rescue training exercises involve approximately 672 operations annually, and F-16 pilots assigned to the Air National Guard (ANG) alert mission conduct 288 operations per year. A wide variety of transient aircraft types, which includes F-35A aircraft, conduct a total of 3,806 operations annually. Transient aircraft pilots use the airfield for a variety of purposes (e.g., stop-over during cross country flights, unfamiliar airfield for practice approaches, divert landing location during severe weather), and transient aircraft could potentially include any aircraft type. Approximately 6 percent of total airfield operations are conducted between 10:00 P.M. and 7:00 A.M. These late-night operations are primarily conducted as part of combat search and rescue or CBP missions. Approximately 1 percent of 924 FG A-10 airfield operations are conducted between 10:00 P.M. and 7:00 A.M.

The land area around Davis-Monthan AFB is currently exposed to noise from both civilian and military aircraft operations and land is zoned accordingly. Recognizing that the comparatively quiet A-10 flying mission would likely eventually be replaced by a less-quiet flying mission, Davis-Monthan AFB, Pima County, and the City of Tucson initiated a study in 2002 to determine notional future mission noise levels. The "notional" future mission noise contours, which reflect five squadrons of F-16 aircraft operating at Davis-Monthan AFB, were combined with accident zones to establish the Airport Environs Zone (AEZ) in the 2004 JLUS (Arizona Department of Commerce 2004). As part of the JLUS process, Pima County and the City of Tucson adopted the AEZ. Any use within the AEZ that legally existed prior to adoption of the most recent AEZ code amendment, which would have otherwise not been permitted or would not have conformed to the AEZ development standards, was grandfathered (Pima County 2020). The notional future mission noise contours are henceforth referred to as the JLUS contour or the outer boundary of Noise Control District (NCD) A.

Aircraft operations at both Davis-Monthan AFB and TUS are audible from many portions of Tucson. The two airfields are separated by a distance of approximately 4 miles and utilize parallel traffic flows. Noise generated during landings and takeoffs at each airfield substantially attenuates by the time it reaches the vicinity of the other airfield. Aircraft approaching or departing the two airfields may overfly many of the same areas while several miles from the runway, but do so while at relatively high altitudes with correspondingly lower noise impacts. Because the lowest-altitude and loudest parts of landings and takeoffs occur several miles apart, noise generated at the two airfields do not combine to exceed noise impact thresholds.

DM3.2.1.1 Noise Exposure

Because F-35A aircraft visit Davis-Monthan AFB as transient aircraft[2], many people in the local area have experienced noise generated by F-35A aircraft. As was noted in multiple scoping comments, F-35A aircraft are substantially louder than A-10 aircraft. Table DM3-3 compares A-10 and F-35A individual overflight noise levels at a representative noise-sensitive location north of Davis-Monthan AFB (Country Club Annex Park).

Table DM3-3. Comparison of A-10 and F-35A Noise Levels at the Country Club Annex Park near Davis-Monthan AFB

Aircraft	Operation Type	Engine Power	Airspeed (knots)	Altitude (feet AGL)	Slant Distance (feet)	SEL (dB)	L_{max} (dB)
F-35A (Military Power)	Departure	100% ETR	300	2,161	2,835	104	97
F-35A (Afterburner Power)[a]		100% ETR	300	2,342	2,994	103	96
A-10		97% NC	200	1,613	2,385	88	80
F-35A (Overhead Break)	Arrival	35% ETR	300	1,500	2,289	97	87
A-10 (Hung Ordnance)		86% NC	130	498	865	89	86
F-35A (VFR Low Approach)	Closed Pattern	60% ETR	190	587	2,675	96	87
A-10 (Re-entry)		87% NC	250	2,059	2,788	75	70

[a] For a detailed explanation of why F-35A afterburner departures might have lower SEL and L_{max} values than military power departures, see Chapter 3, Section 3.2.3.1. Essentially, during afterburner takeoffs, the aircraft reaches the required takeoff speed and leaves the ground sooner, and is at a slightly higher altitude throughout the flight profile. As a result, the aircraft altitude and slant distance at the location studied are both typically higher for the afterburner departure. Typically, the afterburner is turned off at approximately 10,000 feet from brake release, which occurs before the aircraft is over the location studied. The engine power (i.e., ETR) setting of the aircraft when it is above the location studied is the same for both the military power and the afterburner departure.

Notes: Noise levels presented were calculated at Country Club Annex Park for the departure, arrival, and closed pattern flight that has the highest SEL at this location. Actual individual overflight noise levels vary from the noise levels listed because of variations in aircraft configuration, flight track, altitude, and atmospheric conditions. Representative noise levels were calculated using NOISEMAP Version 7.3 and the same operational data (e.g., flight tracks and flight profiles) used to calculate the DNL contours.

Key: ETR = Engine Thrust Request; NC = core engine speed

[2] 480 transient F-35A operations were modeled as part of the baseline noise analysis. This number may vary from year to year.

The noise levels listed in Table DM3-3 reflect flight procedures at Davis-Monthan AFB (e.g., pattern altitudes) and are not directly applicable to other installations. The specific types of flight departure, arrival, or closed pattern procedures listed in the table were selected because they generate the highest dB SEL of any departure, arrival, or closed pattern procedure flown by that aircraft at the location studied. The same set of Davis-Monthan AFB specific flight procedures used to calculate DNL contours was also used to calculate noise levels in Table DM3-3.

At the representative noise-sensitive location (Country Club Annex Park), the L_{max} generated by departing F-35A aircraft is approximately 16 dB louder than A-10 aircraft departure L_{max}. During afterburner departures, F-35A pilots turn off the afterburner (see Chapter 3, Figure 3-1) soon after lifting off from the runway and then continue their climb-out in “military” power setting (i.e., 100 percent engine thrust without afterburner). Use of the afterburner during takeoff allows the aircraft to accelerate and climb slightly faster than departures that rely on military power setting alone. At the time the aircraft pass directly over Country Club Annex Park, afterburner power departures are approximately 200 feet higher than military power departures and both departure types are using the same power setting. Because of the altitude difference, afterburner power F-35A departure generates a slightly lower L_{max} and SEL at the Country Club Annex Park than F-35A departures using military power, primarily due to the altitude of the aircraft as it flies over the Country Club Annex Park.

The F-35A arrival procedure with the highest SEL (i.e., overhead break) generates an L_{max} that is (1 dB) higher than that generated by the A-10 profile with the highest SEL (i.e., hung ordnance approach), but the SEL is substantially higher (8 dB). The SEL noise metric reflects the duration of a noise event as well as its intensity (Chapter 3, Section 3.2.1.1). The F-35A overhead break flight procedure follows a circling path to the runway remaining in proximity to Country Club Annex Park for longer than the A-10 hung ordnance procedure which makes a straight-line approach to the runway. The longer duration of the overhead break noise event generates an SEL 10 dB higher than the L_{max} whereas the straight-line A-10 approach SEL is only 3 dB higher than the L_{max}.

The F-35A and A-10 closed pattern flight procedures compared in Table DM3-3 differ in L_{max} by 17 dB. The F-35A profile passes Country Club Annex Park during descent to the runway at 190 knots whereas the A-10 profile is passing during climb-out at 250 knots. The slower speed of the F-35A descent results in a longer noise event duration, resulting in an SEL that is 21 dB higher than the A-10 SEL.

Several comments received during scoping requested the USAF provide individual overflight noise levels quantified using the SEL noise metric. The information on SELs shown in Table DM3-4 was calculated based on local flying procedures and conditions using methods described in Chapter 3, Section 3.2.3.1. Specifically, Table DM3-4 lists only the highest SEL generated by any flight procedure (e.g., departure, arrival or closed pattern) by any based or transient aircraft type. The table also identifies the number of times per year that the flight procedure occurs during “acoustic day” (i.e., 7:00 A.M. to 10:00 P.M.) and “acoustic night” (i.e., 10:00 P.M. to 7:00 A.M.). It is worth noting that the noise environment at a particular location is complex and the highest SEL is only one descriptor of this complex situation. In addition, actual flight paths vary, due to weather, winds, aircrew technique, and other factors, from the most-frequently followed (representative) flight paths used in noise modeling. Therefore, individual overflights could be closer to, or be farther away from, the representative noise-sensitive location, resulting in noise levels being slightly higher or lower than indicated in Table DM3-4.

Several factors, including, but not limited to, weather conditions, the precise flight path followed, and whether the aircraft is flying in formation, affect the sound level of individual overflights

(Chapter 3, Section 3.2.3). Formation flights involve multiple aircraft, usually of the same type, flying together. The maximum noise level experienced during a formation overflight depends on the spacing and arrangement of the formation's member aircraft. If the aircraft are spaced close together, then doubling the number of aircraft would add as much as 3 dB to the L_{max} of the event. Since the SEL metric is an exposure-based metric, doubling the number of aircraft of a single aircraft type adds 3 dB to the event sound level. For example, a two-aircraft formation would generate an SEL that is 3 dB higher than single aircraft SEL listed in Table DM3-3.

Table DM3-4. Highest SEL at Representative Noise-Sensitive Locations near Davis-Monthan AFB Under Baseline Conditions

Representative Noise-Sensitive Location			Flight Procedure with the Highest SEL					
Type	ID	Description	Aircraft	Aircraft Group	Operation Type	Annual Operations[a] at this SEL: 7:00 A.M. to 10:00 P.M.	Annual Operations[a] at this SEL: 10:00 P.M. to 7:00 A.M.	SEL (dB)[b]
Park	P01	Parkview Park	F-35A	T	Departure	77	2	102
Park	P02	Swan Park	F-16C	T	Departure	455	26	96
Park	P03	Freedom Park	F-35A	T	Departure	20	1	95
Park	P04	Escalante Park	C-130	B	Closed Pattern	120	0	100
Park	P05	The Groves Park	F-35A	T	Departure	39	1	86
Park	P06	Country Club Annex Park	F-35A	T	Departure	77	2	104
Park	P07	Reid Park Zoo	F-35A	T	Departure	77	2	101
Park	P08	Jacobs Park and Ochoa Soccer Complex	F-35A	T	Arrival	109	3	95
Park	P09	Saguaro National Park (Tucson Mountain District)	C-130	B	Arrival	9	0	62
Park	P10	Arthur Pack Regional Park	C-130	B	Departure	240	5	72
School[c]	S01	Griffin Foundation Schools[d]	F-35A	T	Arrival	47	1	103
School[c]	S02	Roberts Elementary School	F-35A	T	Departure	77	2	96
School[c]	S03	Smith Elementary School (on-base)	F-35A	T	Departure	59	2	97
School[c]	S04	Borman Elementary School (on-base)	AH-64	T	Arrival	4	0	91
School[c]	S05	Irene Erickson Elementary School	C-130	B	Closed Pattern	120	0	100
School[c]	S06	Billy Lane Laufer Middle School	F-35A	T	Departure	118	3	95
School[c]	S07	University of Arizona	F-35A	T	Arrival	109	3	95
School[c]	S08	Robison Elementary	F-35A	T	Departure	77	2	101

[a] The SEL dB numbers in this table do not account for the combined noise of all operations at each POI. As described in Table DM3-2, DNL is the noise metric that accounts for the overall exposure to noise (i.e., from total annual operations) at each representative noise-sensitive location; those numbers are shown in Table DM3-5.

[b] SEL accounts for the maximum sound level and the length of time a sound lasts by compressing the total sound exposure for an entire event into a single second.

[c] For the purposes of this noise analysis, noise levels at schools are described throughout this EIS using representative schools; discussion of noise at schools may not include all schools in the area.

[d] Representative noise-sensitive location S01 is located at Children Reaching for the Sky (CRS) Elementary. CRS Elementary is part of The Griffin Foundation School District, which also includes Kids with a Smile Preschool and Future Investment Middle School. Because all three schools are located on the same property and would be exposed to the same noise levels, they are referred to as the Griffin Foundation Schools throughout this EIS.

Key: T = Transient aircraft or non-Davis-Monthan AFB-based aircraft involved in training exercise; B = Based aircraft

Figure DM3-1 shows baseline DNL contours in 5-dB increments. Areas with the highest DNL are located along the runway and extended runway centerline or in areas where aircraft static engine runs are conducted. Although 100 acres of off-installation land area is exposed to DNL of 65 dB or greater, the affected area is industrial, commercial, and open space, and no residents are exposed.

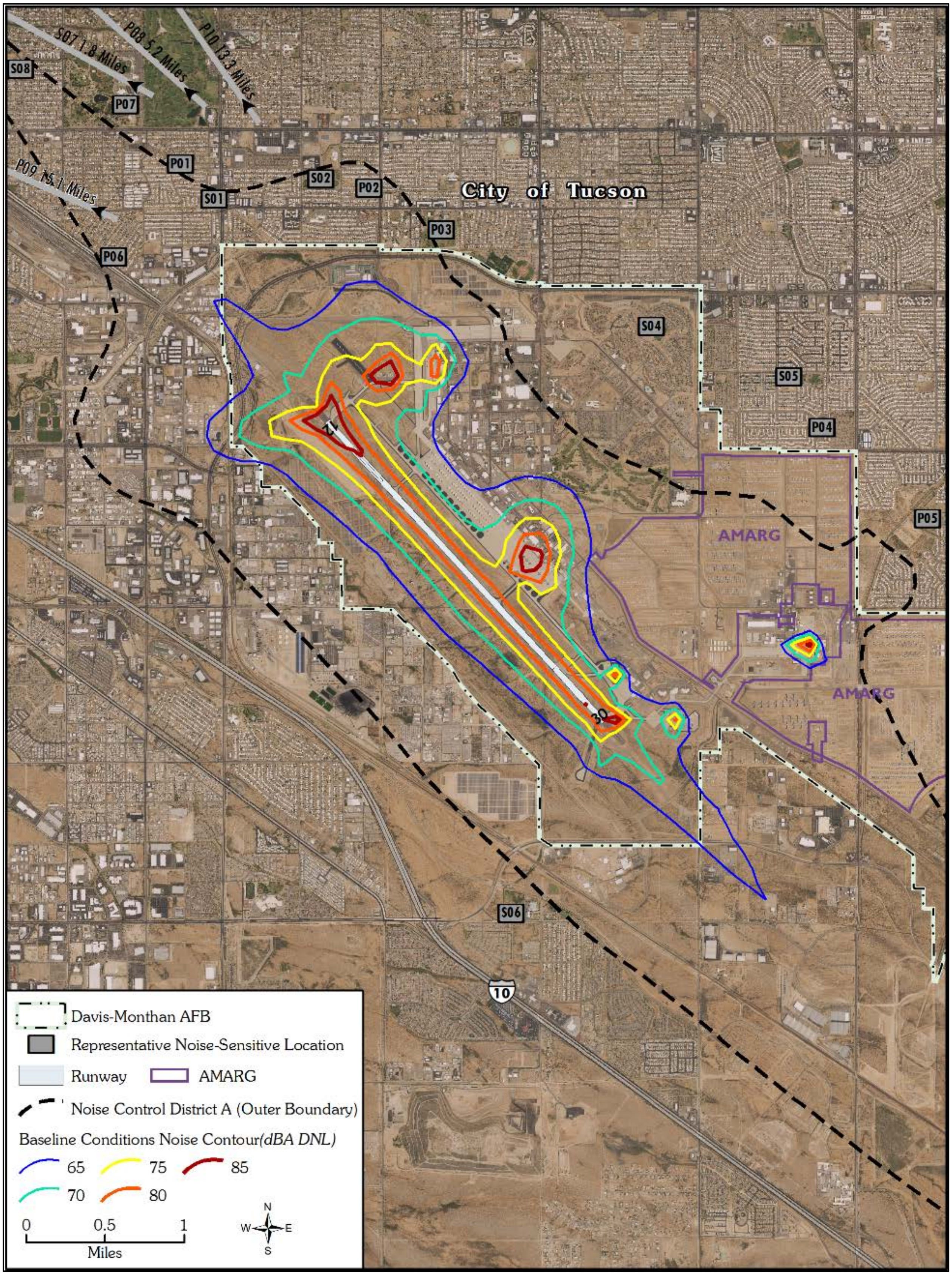

Figure DM3-1. Baseline DNL Contours at Davis-Monthan AFB

For reference, Figure DM3-1 also shows the boundary of the 2004 JLUS 65 dB DNL contour, which has been adopted by the City of Tucson and Pima County as the outer boundary of NCD A. The city and county use the NCD to plan land use decisions.

Table DM3-5 lists baseline DNL at several representative noise-sensitive locations around the base. These include parks, schools and a sports complex. Parks and schools are often located in residential areas, and the baseline DNL at the locations listed in Table DM3-5 is similar to the DNL in surrounding areas. None of the locations selected are currently exposed to DNL of 65 dB or greater. Several of the locations are exposed to aircraft DNL below 45 dB, which is a typical ambient noise level (i.e., noise level without aircraft noise) in lightly populated areas.

Table DM3-5. DNL at Representative Noise-Sensitive Locations near Davis-Monthan AFB Under Baseline Conditions

Type	ID	Description	DNL (dB)
Park	P01	Parkview Park	55
	P02	Swan Park	54
	P03	Freedom Park	55
	P04	Escalante Park	47
	P05	The Groves Park	<45
	P06	Country Club Annex Park	56
	P07	Reid Park Zoo	54
	P08	Jacobs Park and Ochoa Soccer Complex	46
	P09	Saguaro National Park (Tucson Mountain District)	<45[a]
	P10	Arthur Pack Regional Park	<45
School	S01	Griffin Foundation Schools	56
	S02	Roberts Elementary School	53
	S03	Smith Elementary School (on-base)	53
	S04	Borman Elementary School (on-base)	51
	S05	Irene Erickson Elementary School	47
	S06	Billy Lane Laufer Middle School	48
	S07	University of Arizona	51
	S08	Robison Elementary School	56

[a] Median existing ambient noise levels (i.e., the level exceeded 50 percent of the time) measured at four locations within Saguaro National Park ranged from 23 to 28 dB (NPS 2016). Although NOISEMAP calculates the DNL at a representative noise-sensitive location in the park to be 18 dB, NOISEMAP estimates of DNL are less reliable at extremely low noise levels due to uncertainties in actual noise propagation variations. However, the calculated DNL and number of events per hour with potential to interfere with speech (Table DM3-6) supports a conclusion that aircraft flights over Saguaro National Park resulting in DNL less than 45 dB are infrequent.

Areas outside the 65 dB DNL contour line could also experience noise that can be disturbing at times. A low time-averaged noise level (e.g., DNL) does not imply that loud individual aircraft overflights never occur. Although noise events are less frequent and/or less intense at locations exposed to DNL less than 65 dB than at locations exposed to DNL of 65 dB or greater, loud and potentially disturbing noise events do occur. Some people are more noise-sensitive than others as a result of physical, psychological, and emotional factors. People with autism and people afflicted with PTSD can be particularly sensitive to sudden loud noises such as those that occur near an airport. The DNL metric is useful for describing the noise environment at a location with a single number, but it does not provide a complete description of the noise environment. In accordance with current DoD policy (DoD 2009), this EIS makes use of several supplemental noise metrics (e.g., SEL, L_{max}, number of events exceeding dB threshold) to provide a more complete description of the noise experience.

DM3.2.1.2 Speech Interference

Speech interference is possible when noise levels exceed 50 dB. For the purposes of this analysis, any change to normal speech patterns is counted as an interference event. Table DM3-6 lists the current number of events exceeding L_{max} of 50 dB in buildings with windows open, in buildings with windows closed, and outdoors. Many of the parks listed in Table DM3-6 are near residential areas, and noise levels are similar in the residential areas. Flight paths are variable and speech interference events sometimes occur far from standard Davis-Monthan AFB flight patterns.

Table DM3-6. Potential Speech Interference Under Baseline Conditions at Davis-Monthan AFB

Representative Noise-Sensitive Location			Annual Average Daily Daytime (7:00 A.M. to 10:00 P.M.) Events per Hour		
Type	**ID**	**Description**	**Windows Open[a]**	**Windows Closed[a]**	**Outdoor**
Park	P01	Parkview Park	3	1	6
	P02	Swan Park	2	<<1	8
	P03	Freedom Park	1	<<1	8
	P04	Escalante Park	1	<<1	5
	P05	The Groves Park	<<1	<<1	4
	P06	Country Club Annex Park	3	1	6
	P07	Reid Park Zoo	2	1	4
	P08	Jacobs Park and Ochoa Soccer Complex	1	<<1	2
	P09	Saguaro National Park (Tucson Mountain District)	<<1	<<1	<<1
	P10	Arthur Pack Regional Park	<<1	<<1	<<1

[a] Number of events per average hour with an indoor L_{max} of at least 50 dB; assumes standard values of 15 dB and 25 dB noise level reductions for windows open and closed, respectively.

Key: <<1 indicates that the number of potential speech interference events (>50 dB) per hour resulting from Davis-Monthan based aircraft overflights is low (rounding to zero)

DM3.2.1.3 Interference with Classroom Learning

Noise interference with learning in schools is of particular concern because noise can interrupt communication or interfere with concentration. When considering intermittent noise caused by aircraft overflights, guidelines for classroom interference indicate that an appropriate criterion is a limit of 35 to 40 dB (depending on classroom size) on indoor background equivalent noise levels during the school day ($L_{eq(SD)}$) and a 50 dB L_{max} limit on single events. In accordance with DNWG recommendations, estimated interior $L_{eq(SD)}$ exceeding 40 dB was taken as an indication that American National Standards Institute (ANSI) criteria are being exceeded (DNWG 2013). Table DM3-7 lists $L_{eq(SD)}$ and the average number of events per hour exceeding L_{max} of 50 dB at schools near Davis-Monthan AFB when windows are open and when windows are closed. $L_{eq(SD)}$ currently exceeds 40 dB at the Griffin Foundation Schools and Robison Elementary when windows are open, but not when they are closed. $L_{eq(SD)}$ at all other schools studied are below the equivalent noise level criterion. L_{max} temporarily exceeds 50 dB at a rate ranging from less than one event per hour to three events per hour. The number of outdoor events per hour with potential to interfere with speech is also listed for the hours between 7:00 A.M. and 10:00 P.M. because communication is important during recess and other activities that could occur outside the school building.

Table DM3-7. Indoor Classroom Learning Disruption Under Baseline Conditions at Davis-Monthan AFB

Type	ID	Description	Windows Open[a]		Windows Closed[a]		Outdoor
			$L_{eq(SD)}$ (dB)	Events per Hour[b]	$L_{eq(SD)}$ (dB)	Events per Hour[b]	Events per Hour[c]
School	S01	Griffin Foundation Schools	42	3	<35	1	7
	S02	Roberts Elementary School	39	3	<35	<<1	8
	S03	Smith Elementary School (on-base)	37	1	<35	<<1	8
	S04	Borman Elementary School (on-base)	36	1	<35	1	6
	S05	Irene Erickson Elementary School	<35	1	<35	<<1	5
	S06	Billy Lane Laufer Middle School	<35	1	<35	<<1	5
School	S07	University of Arizona	<35	2	<35	<<1	2
	S08	Robison Elementary	41	2	<35	2	3

[a] Assumes standard values of 15 dB noise level reductions for windows open and 25 dB noise level reductions for windows closed, respectively.
[b] Average number of events per hour at or above an indoor L_{max} of 50 dB during an average 8-hour school day (8:00 A.M. to 4:00 P.M.).
[c] Average number of events per hour at or above an outdoor L_{max} of 50 dB during daytime (7:00 A.M. to 10:00 P.M.).
Key*:* $L_{eq(SD)}$ is the equivalent noise level during a school day (defined as 8:00 A.M. to 4:00 P.M.); <<1 indicates that the number of potential speech interference (>50 dB) events per hour resulting from Davis-Monthan AFB based aircraft overflights is low (rounding to zero).

DM3.2.1.4 Sleep Disturbance

Nighttime flying, which is required as part of training for certain missions, has an increased likelihood of causing sleep disturbance. The lack of quality sleep has the potential to affect health and concentration. The probability of being awakened at least once per night was calculated using a method described by the ANSI (ANSI 2008). The method first predicts the probability of awakening associated with each type of flying event (higher SELs yield higher probability of awakening) and then sums the probabilities associated with all event types. The overall probability of awakening at least once per night reflects all flying events that occur between 10:00 P.M. and 7:00 A.M., when most people sleep (Table DM3-8). Sleep disturbance probabilities listed for parks and schools are not intended to imply that people regularly sleep in parks or schools, but instead are indicative of impacts in nearby residential areas. Results apply only to people who sleep during the night. People who sleep during the day experience additional noise events, resulting in higher probabilities of awakening.

Table DM3-8. Average Probability of Awakening Under Baseline Conditions at Davis-Monthan AFB

Type	ID	Name / Description	Annual Average Nightly (10:00 P.M. to 7:00 A.M.) Probability of Awakening (%)	
			Windows Open[a]	Windows Closed[a]
Park	P01	Parkview Park	6	2
	P02	Swan Park	5	1
	P03	Freedom Park	6	1
	P04	Escalante Park	2	<<1
	P05	The Groves Park	2	<<1
	P06	Country Club Annex Park	8	4
	P07	Reid Park Zoo	5	2
	P08	Jacobs Park and Ochoa Soccer Complex	2	1
	P09	Saguaro National Park (Tucson Mountain District)	<<1	<<1
	P10	Arthur Pack Regional Park	<<1	<<1

Table DM3-8. Average Probability of Awakening Under Baseline Conditions at Davis-Monthan AFB (Continued)

Type	ID	Name / Description	Annual Average Nightly (10:00 P.M. to 7:00 A.M.) Probability of Awakening (%)	
			Windows Open[a]	Windows Closed[a]
School	S01	Griffin Foundation Schools	7	3
	S02	Roberts Elementary School	5	1
	S03	Smith Elementary School (on-base)	3	1
	S04	Borman Elementary School (on-base)	3	1
	S05	Irene Erickson Elementary School	2	1
	S06	Billy Lane Laufer Middle School	2	<<1
	S07	University of Arizona	4	2
	S08	Robison Elementary	5	3

[a] Assumes standard values of 15 dB noise level reductions for windows open and 25 dB noise level reductions for windows closed, respectively.
Key: Locations where the percentage probability of awakening rounds to zero are listed using the symbol <<1%.

DM3.2.1.5 Potential for Hearing Loss

Potential for Hearing Loss (PHL) applies to people living in high noise environments where they can experience long-term (40 years) hearing effects resulting from DNL greater than 80 dB (USD 2009). PHL is not an issue of concern because DNL greater than 80 dB only exist on Davis-Monthan AFB near the runways and aircraft parking aprons.

DM3.2.1.6 Occupational Noise

In on-base areas with high noise levels, existing USAF occupational noise exposure prevention procedures, such as hearing protection and monitoring, are undertaken in compliance with all applicable Occupational Safety and Health Administration (OSHA) and USAF occupational noise exposure regulations.

DM3.2.1.7 Non-Auditory Health Impact

During scoping, the question of the potential for non-auditory health effects from noise was raised. Studies have been performed to see whether noise can cause health effects other than hearing loss. The premise is that annoyance causes stress. Prolonged stress is known to be a contributor to a number of health disorders. Cantrell (1974) confirmed that noise can provoke stress, but noted that results on cardiovascular health have been contradictory. Some studies have found a connection between aircraft noise and blood pressure (e.g., Michalak et al. 1990; Rosenlund et al. 2001), while others have not (e.g., Pulles et al. 1990).

Kryter and Poza (1980) noted, "It is more likely that noise related general ill-health effects are due to the psychological annoyance from the noise interfering with normal everyday behavior, than it is from the noise eliciting, because of its intensity, reflexive response in the autonomic or other physiological systems of the body."

The connection from annoyance to stress to health issues requires careful experimental design, and the resulting data are subject to different interpretations. Some of the highly publicized research reports on the impacts of noise on human health effects are unsubstantiated or not based on sound science. Meecham and Shaw (1979) apparently found a relation between noise levels and mortality rates in neighborhoods under the approach path to Los Angeles International Airport. When the same data were analyzed by others (Frerichs et al. 1980), no relationship was found. Jones and Tauscher (1978) found a high rate of birth defects for the same neighborhood. But when the Centers For

Disease Control performed a more thorough study near Hartsfield-Jackson Atlanta International Airport, no relationships were found for levels greater than 65 dB (Edmonds et al. 1979).

A carefully designed study, Hypertension and Exposure to Noise near Airports (HYENA), was conducted around six European airports from 2002 through 2006 (Jarup et al. 2005, 2008). There were 4,861 subjects, aged between 45 and 70. Blood pressure was measured, and questionnaires were administered for health, socioeconomic, and lifestyle factors, including diet and physical exercise. Hypertension was defined by World Health Organization (WHO) blood pressure thresholds (WHO 2003). Noise from aircraft and highways was predicted from models.

The HYENA results were presented as an odds ratio (OR). An OR of 1 indicates there is no added risk, while an OR of 2 indicates risk is doubled. An OR of 1.14 was found for nighttime aircraft noise, measured by the equivalent noise level during nighttime hours (L_{night}). For daytime aircraft noise, measured by 16-hour equivalent noise level (L_{eq16}), the OR was 0.93. For road traffic noise, measured by 24-hour equivalent noise level (L_{eq24}), the OR was 1.1.

Note that OR is a statistical measure of change, not the actual risk. Risk itself and the measured effects were small, and not necessarily distinct from other events. Haralabidis et al. (2008) reported an increase in systolic blood pressure of 6.2 millimeters of mercury (mmHg) for aircraft noise, and an increase of 7.4 mmHg for other indoor noises such as snoring.

For these studies, aircraft noise was a factor only at night, while traffic noise is a factor for the full day. Aircraft noise results varied among the six countries. The result is therefore pooled across all data. Traffic noise results were consistent across the six countries.

One interesting conclusion from a 2013 study of the HYENA data (Babisch et al. 2013) states there is some indication that noise level is a stronger predictor of hypertension than annoyance. That is not consistent with the idea that annoyance is a link in the connection between noise and stress. Babisch et al. (2012) present interesting insights on the relationship of the results to various modifiers.

Two studies examined the correlation of aircraft noise with hospital admissions for cardiovascular disease. Hansell et al. (2013) examined neighborhoods around London's Heathrow Airport. Correia et al. (2013) examined neighborhoods around 89 airports in the United States. Both studies included areas of various noise levels. They found associations that were consistent with the HYENA results. During the Draft EIS public comment period, several commenters provided citations of research papers and requested additional information from these research papers be included in the Final EIS. Please refer to Chapter 3, Section 3.2.3.1.7, for additional information that has been added to the Final EIS.

The current state of scientific knowledge cannot yet support inference of a causal or consistent relationship between aircraft noise exposure and non-auditory health consequences for exposed residents. The large-scale HYENA study (Jarup et al. 2005, 2008) and the recent studies by Hansell et al. (2013) and Correia et al. (2013) offer indications, but it is not yet possible to establish a quantitative cause and effect based on the currently available scientific evidence.

DM3.2.1.8 Structural Damage

During scoping, several people expressed concern about increased noise resulting in structural damage to homes or other personal property. Noise that does not exceed 130 dB in any 1/3-octave frequency band or last for more than 1 second does not typically have the potential to damage structures in good repair (CHABA 1977). The term "frequency bands" refers to noise energy in a certain range of frequencies and is similar in concept to frequency bands employed on home stereo equalizers to control relative levels of bass and treble. Noise energy in certain frequency bands has increased potential to vibrate and/or damage structures. Noise exceeding 130 dB in any 1/3-octave frequency band and lasting for more than 1 second of that intensity and duration does not occur except on the flightline immediately adjacent to jet aircraft.

Noise-induced structural vibration and secondary vibrations (i.e., "rattle") of objects within structures can occur during loud overflights, as was noted in scoping comments. Rattling of objects such as dishes, hanging pictures, and loose window panes can cause residents to fear damage. Rattling objects have the potential to contribute to annoyance along with other potential noise effects (e.g., speech interference, sleep disturbance).

DM3.2.1.9 Animals in the Care of Humans

Potential noise impacts on wildlife are discussed in Section DM3.6. However, pets, other domesticated animals, and animals kept in zoos live in different circumstances than wild animals and often react differently to human-generated noises. During scoping, people submitted comments regarding the impact of noise on the animals at the Reid Park Zoo and instances of pets fearfully reacting to aircraft noise under baseline conditions.

DM3.2.2 Base Environmental Consequences

Implementation of the AFRC F-35A mission would replace the 24 A-10 aircraft currently assigned to the 924 FG with 24 F-35A aircraft. The number of airfield operations annually flown by the 924 FG would change from 11,088 to 11,580, increasing the grand total number of airfield operations flown by all aircraft at Davis-Monthan AFB by less than 1 percent. AFRC F-35A aircrews would fly 4,632 sorties annually, whereas 924 FG A-10 aircrews fly 5,040 sorties annually. However, AFRC F-35A aircrews would fly an average of 1 practice second approach to the runway per 4 sorties, whereas A-10 aircrews fly a practice approach as part of only 1 out of 10 sorties on average. The smaller number of sorties and larger number of second approaches per sortie flown by AFRC F-35A aircrews would result in a less than 1 percent net overall change in the number of airfield operations flown.

AFRC F-35A pilots would fly approximately 1 percent of their departures and initial approaches to the runway during the late-night time period between 10:00 P.M. and 7:00 A.M. This is roughly the same percentage of total flights that are conducted by 924 FG A-10 pilots late at night. As is currently the case with A-10 pilots, AFRC F-35A pilots would not conduct practice approaches or overhead break patterns between 10:00 P.M. and 7:00 A.M.

Based on context and intensity, noise impacts resulting from implementation of the proposed AFRC F-35A mission at Davis-Monthan AFB would be considered significant for the area surrounding Davis-Monthan AFB. As described in Section 2.5, the USAF considered several potential noise mitigation measures. None of the measures considered were determined to be operationally feasible. Local flight procedures at Davis-Monthan AFB are internally reviewed on a regular basis for changes that create the best balance between safety (paramount concern), mission and training effectiveness, and minimizing noise impacts. Furthermore, the base maintains open lines of communication with the City of Tucson and local community leaders to develop and implement potential noise abatement procedures when possible. Currently, no additional noise abatement procedures have been identified that would reduce noise impacts without also adversely affecting safety of flight and/or mission effectiveness.

Operating procedures at Davis-Monthan AFB already include procedures to minimize noise impacts. These procedures, which have been developed over several years as part of a regularly-occurring procedural review process, have been selected to minimize mission impacts while maintaining operational efficiency and flexibility; these procedures would be applied to any new aircraft at the installation, including the F-35A. Noise modeling conducted as part of this EIS analysis reflects the following procedures:

- During designated quiet hours (10:30 P.M. and 6:30 A.M.), flying and maintenance engine run-up operations are severely restricted.
- During daytime (i.e., dawn to dusk) and in wind conditions up to a 10-knot tailwind, preference is given to conducting arrivals and departures to Runway 12 (i.e., approaches and departures toward the south). During night (i.e., dusk to dawn), weekends, and holidays, preference is given to departing aircraft from Runway 12 and conducting arrivals to Runway 30. These runway selection noise abatement procedures do not apply to alert missions or other missions in which operational requirements (e.g., live loads) dictate that another runway be used.
- Multiple practice approaches are typically only allowed for based flying units.
- Aircraft airspeeds are limited within 30 NM of Davis-Monthan AFB and beneath 10,000 feet MSL.
- Overhead approaches (i.e., high-speed approach to above the runway threshold followed by a circling maneuver descending to land) are not permitted before 9:00 A.M. on weekends and holidays, and are never permitted at night for transient aircraft.
- Aircrews are instructed to not directly overfly the University of Arizona, Reid Park Zoo, downtown Tucson, the Griffin Foundation Schools, or the Rita Ranch subdivision to the extent practicable while maintaining safety of flight at all times and meeting aircrew training requirements.

Construction and demolition (C&D) projects in support of the proposed AFRC F-35 mission would generate short-term, localized increases in noise. However, the installation is currently exposed to elevated aircraft noise levels as well as noise generated by the day-to-day operation and maintenance (O&M) of vehicles and equipment. Construction would occur during normal working hours (i.e., 7:00 A.M. to 5:00 P.M.), and construction equipment would be equipped with mufflers. Workers would wear hearing protection in accordance with applicable regulations. Transportation of materials and equipment to and from the construction sites would generate noise similar to heavy trucks currently operating on base and along local roadways. In the context of ongoing frequent and intense aircraft noise events on an active military installation, construction noise generated by the AFRC F-35A mission would not result in significant impacts.

DM3.2.2.1 Noise Exposure

DM3.2.2.1.1 Scenario A

The F-35A aircraft is substantially louder than the A-10 aircraft, although the precise difference in noise level depends on the specific flight configurations being used by each aircraft and the aircraft's location relative to the listener (both of which are heavily dependent on the aircraft's performance characteristics). Pilots flying F-35A aircraft from other bases occasionally visit Davis-Monthan AFB. Scoping comments indicate that many people living near the base have taken note of the difference in noise level between the A-10 aircraft currently based at Davis-Monthan AFB and F-35A aircraft. Single overflight event noise levels (dB L_{max} and dB SEL) for F-35A and A-10 aircraft at a location near Davis-Monthan AFB are listed in Table DM3-3. The noise levels in the table were calculated in NOISEMAP based on field measurements (obtained under past controlled test conditions at other locations) of noise levels generated by both aircraft types and information on local conditions and flying procedures. Listening to A-10 and occasional transient F-35A aircraft overflights provides an alternative, non-numeric way to understand the differences between noise levels generated by the two aircraft. However, the experience of hearing individual transient F-35A aircraft overflights does not provide all of the information about the noise that would be generated by the AFRC F-35A mission. The number of flights, timing of flights, and other details also affect the intensity of noise impacts. The most accurate method available to estimate potential future noise impacts of an F-35A squadron operating at Davis-Monthan AFB involves computer noise modeling.

As noted in Chapter 3, Section 3.2.3, computer noise modeling was conducted in compliance with current USAF and DoD-approved methods. The modeling accounted for the effects of terrain relief (e.g., hills and valleys) near Davis-Monthan AFB as well as surface type on the propagation of sound. In accordance with standard modeling procedures, noise modeling at Davis-Monthan AFB used median atmospheric conditions for sound propagation based on local climate records. The modeling does not reflect possible future climates in Tucson, Arizona, in part because the degree to which the climate will change and the timeframe in which change would occur are not known at this time. Noise levels were calculated for an average annual day, which is a day with 1/365th of annual total operations. The computer noise model NOISEMAP references a database of field-measured sound levels for aircraft in various flight configurations. The model also uses data on flight procedures for current and proposed aircraft operations (e.g., where, how often, what time of day, and what configurations are used) based on recent inputs provided by Davis-Monthan AFB pilots and ATC. Application of noise results generated for another airfield (e.g., Luke AFB) would be inappropriate because flight procedures, terrain, and several other factors are different at other airfields. F-35A flight parameters (e.g., altitude, airspeed, and engine power setting) that are expected to be used at Davis-Monthan AFB were developed based on information provided by F-35A pilots at bases where the aircraft is operating currently, such as Luke, Hill, and Eglin AFBs. These flight parameters were used to generate results specific to Davis-Monthan AFB.

Several comments received during scoping requested that the USAF provide individual predicted overflight noise levels using the SEL noise metric. Information is provided on the flight procedure with the highest SEL at several representative noise-sensitive locations in Table DM3-9. A flight procedure is a specific type of operation (e.g., afterburner departure) on a specific flight path, by a specific aircraft type. Actual flight paths vary as a result of weather, winds, aircrew technique, and other factors, and individual flights would deviate in position and noise level from those listed in Table DM3-9. In addition, the flight procedure with the highest SEL is one aspect of a complex sound environment which includes many other flight procedures (e.g., flaps or gear position) as well as other noise sources. At all of the locations except for Freedom Park, the Griffin Foundation Schools, and the University of Arizona, the highest SEL would remain the same under the proposed action as under baseline conditions. At several locations, transient F-35A aircraft generate the highest SEL under baseline conditions, and following beddown of an F-35A flying unit at Davis-Monthan AFB, based F-35A aircraft would conduct the same flight procedures. However, following the proposed beddown, the frequency of F-35A operations would substantially increase. At Freedom Park, the Griffin Foundation Schools, and the University of Arizona, the highest SEL would increase by 2, 1, and 5 dB, respectively.

Table DM3-9. Highest SEL at Representative Noise-Sensitive Locations near Davis-Monthan AFB Under Baseline and AFRC F-35A Mission Conditions

Scenario	Representative Noise-Sensitive Location			Flight Procedure with the Highest SEL					SEL (dB)[b,c]
	Type	ID	Description	Aircraft	Aircraft Group	Operation Type	Annual Operations at this SEL[a]		
							7:00 A.M. to 10:00 P.M.	10:00 P.M. to 7:00 A.M.	
Baseline	Park	P01	Parkview Park	F-35A	T	Departure	77	2	102
		P02	Swan Park	F-16C	T	Departure	455	26	96
		P03	Freedom Park	F-35A	T	Departure	20	1	95
		P04	Escalante Park	C-130	B	Closed Pattern	120	0	100
		P05	The Groves Park	F-35A	T	Departure	39	1	86
		P06	Country Club Annex Park	F-35A	T	Departure	77	2	104
		P07	Reid Park Zoo	F-35A	T	Departure	77	2	101
		P08	Jacobs Park and Ochoa Soccer Complex	F-35A	T	Arrival	109	3	95
		P09	Saguaro National Park (Tucson Mountain District)	C-130	B	Arrival	9	0	62
		P10	Arthur Pack Regional Park	C-130	B	Departure	240	5	72
	School	S01	Griffin Foundation Schools	F-35A	T	Arrival	47	1	103
		S02	Roberts Elementary School	F-35A	T	Departure	77	2	96
		S03	Smith Elementary School (on-base)	F-35A	T	Departure	59	2	97
		S04	Borman Elementary School (on-base)	AH-64	T	Arrival	4	0	91
		S05	Irene Erickson Elementary School	C-130	B	Closed Pattern	120	0	100
		S06	Billy Lane Laufer Middle School	F-35A	T	Departure	118	3	95
		S07	University of Arizona	F-35A	T	Arrival	109	3	95
		S08	Robison Elementary	F-35A	T	Departure	77	2	101

Table DM3-9. Highest SEL at Representative Noise-Sensitive Locations near Davis-Monthan AFB Under Baseline and AFRC F-35A Mission (Continued)

Scenario	Representative Noise-Sensitive Location			Flight Procedure with the Highest SEL					SEL (dB)[b,c]
	Type	ID	Description	Aircraft	Aircraft Group	Operation Type	Annual Operations at this SEL[a] 7:00 A.M. to 10:00 P.M.	Annual Operations at this SEL[a] 10:00 P.M. to 7:00 A.M.	
AFRC F-35A Mission	Park	P01	Parkview Park	F-35A	B/T	Departure	1,590	17	102
		P02	Swan Park	F-16C	T	Departure	455	26	96
		P03	Freedom Park	F-35A	B	Closed Pattern	666	0	97
		P04	Escalante Park	C-130	B	Closed Pattern	120	0	100
		P05	The Groves Park	F-35A	B/T	Departure	193	2	86
		P06	Country Club Annex Park	F-35A	B/T	Departure	1,590	17	104
		P07	Reid Park Zoo	F-35A	B/T	Departure	1,590	17	101
		P08	Jacobs Park and Ochoa Soccer Complex	F-35A	B/T	Arrival	416	21	95
		P09	Saguaro National Park (Tucson Mountain District)	C-130	B	Arrival	9	0	62
		P10	Arthur Pack Regional Park	C-130	B	Departure	240	5	72
	School	S01	Griffin Foundation Schools	F-35A	B	Closed Pattern	1,350	0	104
		S02	Roberts Elementary School	F-35A	B/T	Departure	1,590	17	96
		S03	Smith Elementary School (on-base)	F-35A	B/T	Departure	289	4	97
		S04	Borman Elementary School (on-base)	AH-64	T	Arrival	4	0	91
		S05	Irene Erickson Elementary School	C-130	B	Closed Pattern	120	0	100
		S06	Billy Lane Laufer Middle School	F-35A	B/T	Departure	3,230	35	95
		S07	University of Arizona	F-35A	B	Arrival	15	0	100
		S08	Robison Elementary	F-35A	B/T	Departure	1,590	17	101

[a] The SEL dB numbers in this table do not account for the combined noise of all operations at each POI. As described in Table DM3-2, DNL is the noise metric that accounts for the overall exposure to noise (i.e., from total annual operations) at each representative noise-sensitive location; those numbers are shown in Table DM3-11.
[b] SELs were calculated using NOISEMAP Version 7.3 and the same operational data (e.g., flight tracks and flight profiles) used to calculate the DNL contours.
[c] SEL accounts for the maximum sound level and the length of time a sound lasts by compressing the total sound exposure for an entire event into a single second.
Key: T = Transient or non-Davis-Monthan AFB aircraft involved in training exercise; B = Based aircraft; B/T = both based and transient

Figure DM3-2 shows DNL contours in 5-dB increments that would result from Scenario A overlain on baseline contours for comparison. At Davis-Monthan AFB, the net change in number of airfield operations under the proposed action would be minimal and local flight procedures would remain approximately the same. The most important factor in the increase in DNL under Scenario A would be the higher noise levels generated by F-35A aircraft relative to A-10 aircraft.

The majority of the land newly exposed to DNL of 65 dB or greater under Scenario A is designated as industrial and open land. Residential areas including parts of the Roberts and Julia Keen neighborhoods are also included. The number of acres exposed to DNL of 65 dB or greater would increase by 1,566 acres. The estimated number of residents exposed to DNL of 65 dB or greater would increase from zero to 1,506. Although this land and the estimated residents would be newly exposed to this level of noise, all of these areas are located in the JLUS contour and the AEZ and

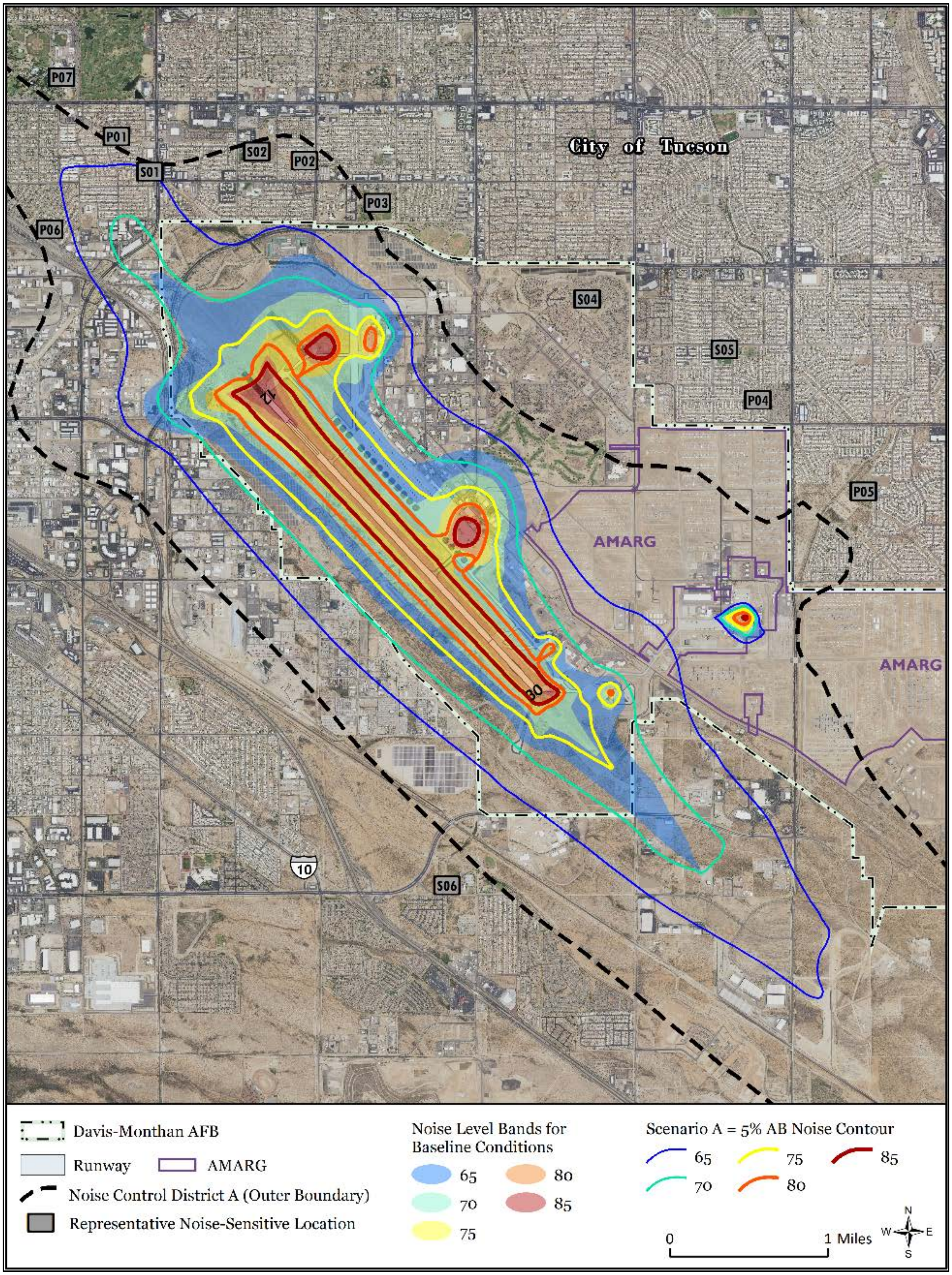

Figure DM3-2. AFRC F-35A Scenario A DNL Contours at Davis-Monthan AFB

are zoned accordingly (Table DM3-10). As described in Chapter 3, Section 3.2.3, the affected population was estimated based on U.S. Census data at the Block Group (BG) level with adjustments to remove non-residential areas from calculations (USCB 2016).

Table DM3-10. Off-Base Acres and Estimated Population Exposed to DNL of 65 dB or Greater from Scenario A at Davis-Monthan AFB

DNL (dB)	Acres				Estimated Population			
	JLUS Contour	Baseline	Scenario A	Change[a]	JLUS Contour	Baseline	Scenario A	Change[a]
65 – 69	6,521	100	1,433	1,333	14,234	0	1,497	1,497
70 – 74	2,369	0	233	233	1,111	0	9	9
75 – 79	689	0	0	0	179	0	0	0
80 – 84	117	0	0	0	0	0	0	0
≥85	0	0	0	0	0	0	0	0
Total	**9,696**	**100**	**1,666**	**1,566**	**15,524**	**0**	**1,506**	**1,506**

[a] Change equals the difference between baseline acreage and acres exposed to noise resulting from the AFRC F-35A mission.

As noted in Chapter 3, Section 3.2.3, the probability that an individual will become annoyed by noise is impossible to predict with confidence because of differing physical and emotional variables between individuals (Newman and Beattie 1985). These variables include, but are not limited to, the person’s feeling about the necessity or preventability of the noise, the person’s attitude about the environment, and any feelings of fear the person might have about the noise source. It can be said with confidence that people in communities exposed to increased DNL would be more likely to become highly annoyed by the noise (Schultz 1978, Finegold et al. 1994, Meidema and Vos 1998). Studies conducted by Schultz in 1978 and Finegold et al. in 1994 indicated that approximately 12 percent of people exposed to DNL of 65 dB and 36 percent of people exposed to DNL of 75 dB could be expected to be highly annoyed by the noise (Schultz 1978, Finegold et al. 1994). More recent studies suggest that the percentage of people highly annoyed by noise–and aircraft noise in particular–might be higher than previously thought. A study conducted by Meidema and Vos in 1998 indicated that 28 percent of people could be expected to be annoyed by DNL of 65 dB, and 48 percent of people could be expected to be highly annoyed by DNL of 75 dB (Meidema and Vos 1998). Additional details on the prevalence of annoyance in communities exposed to high noise levels are contained in Volume II, Appendix B.

USAF land use compatibility guidelines classify residential land uses as incompatible with DNL greater than 65 dB unless the residences meet minimum structural noise reduction goals. Residential land uses are considered to be compatible if measures are incorporated which achieve outdoor-to-indoor noise level reduction of at least 25 dB in areas exposed to DNL of 65 to 69 dB and 30 dB in areas exposed to DNL of 70 to 74 dB. Structural elements with better-than-average temperature insulation properties (e.g., double-paned windows) tend to also provide better-than-average noise level reduction. A more detailed discussion of land use compatibility is contained in Section DM3-8.

As previously described, Pima County and the City of Tucson regulate land use in the AEZ. The AEZ is larger than the proposed action noise contours. The AEZ has been a basis for prohibiting noise-sensitive new development in designated noise control districts and/or requiring that minimum structural noise attenuation standards be met in new development and for certain renovation projects. Certain existing residences within the AEZ were retrofitted, at no expense to the homeowner(s), with structural elements selected to improve sound attenuation. Structures with improved sound attenuation reduce noise impacts while people are indoors. A more detailed discussion of land use compatibility and the effects of the AEZ on land use patterns is contained in Section DM3.8.

Representative DNL changes that would result from implementation of Scenario A are shown in Table DM3-11. Noise levels resulting from the new mission at the locations listed are similar to noise levels in nearby residential areas. Of the noise-sensitive receptors analyzed, Griffin Schools would be exposed to the highest noise levels (65 dB). According to the 2004 JLUS this level is considered generally compatible. Although there would be substantial increases in DNL at other locations, noise levels would be considered compatible in accordance with USAF guidelines.

Table DM3-11. DNL at Representative Noise-Sensitive Locations near Davis-Monthan AFB Under Baseline and Scenario A Conditions

Representative Noise-Sensitive Location			DNL (dB)		
Type	**ID**	**Name / Description**	**Baseline**	**Scenario A**	**Change**
Park	P01	Parkview Park	55	62	7
	P02	Swan Park	54	58	4
	P03	Freedom Park	55	58	3
	P04	Escalante Park	47	50	3
	P05	The Groves Park	<45	48	3
	P06	Country Club Annex Park	56	63	7
	P07	Reid Park Zoo	54	60	6
	P08	Jacobs Park and Ochoa Soccer Complex	46	50	4
	P09	Saguaro National Park (Tucson Mountain District)	<45[a]	<45	0
	P10	Arthur Pack Regional Park	<45	<45	0
School	S01	Griffin Foundation Schools	56	65	9
	S02	Roberts Elementary School	53	59	6
	S03	Smith Elementary School (on-base)	53	58	5
	S04	Borman Elementary School (on-base)	51	54	3
	S05	Irene Erickson Elementary School	47	50	3
	S06	Billy Lane Laufer Middle School	48	56	8
	S07	University of Arizona	51	55	4
	S08	Robison Elementary	56	60	4

[a] Median existing ambient noise levels (i.e., the level exceeded 50 percent of the time) measured at four locations within Saguaro National Park ranged from 23 to 28 dB (NPS 2016). Although NOISEMAP calculates the DNL at a representative noise-sensitive location in the park would be 18.5 dB under the AFRC F-35A mission, NOISEMAP estimates of DNL are less reliable at extremely low noise levels due to uncertainties in actual noise propagation variations. However, the calculated DNL and number of events per hour with potential to interfere with speech supports a conclusion that loud aircraft overflights are infrequent.

DM3.2.2.1.2 Scenario B

Scenario B differs from Scenario A only in that 50 percent rather than 5 percent of F-35A departures would use afterburner. Flight procedures under Scenario B would be the same as Scenario A, and the highest SELs experienced under Scenario B would be the same as listed for Scenario A in Table DM3-9. At all of the representative noise-sensitive locations except The Groves Park and Smith Elementary School (on-base), the SEL generated by the loudest military and afterburner power departures were within 1 dB of each other. At these locations, the number of annual operations at the highest SEL listed in Table DM3-9 includes both military power and afterburner power departure operations and these numbers would be constant under Scenarios A, B, and C. At The Groves Park, the loudest afterburner power departure SELs are slightly more than 1 dB louder than military power departure SELs. At Smith Elementary School, the afterburner departure would be 3 dB louder than the military power departure. Under Scenario B, 50 percent rather than 5 percent of F-35A departures would use afterburner and generate SELs that are 1 dB and 3 dB louder than military power departures at The Groves Park and Smith Elementary School, respectively.

As discussed in Section DM3.2.2.1.1, people exposed to increases in DNL are more likely to become highly annoyed by the noise, and some land uses are not considered compatible at DNL greater than 65 dB. The Scenario B 65 dB DNL contour is slightly larger than Scenario A noise contours in areas right and left of the runway but slightly smaller in areas farther out along departure flight paths (Figure DM3-3). The DNL contours are shown in 5-dB intervals ranging from 65 to 85 dB on Figure B-20 in Appendix B, Section B.4. These differences in time-averaged noise levels (DNL metric) reflect the noise level differences between individual afterburner and military power departure noise levels that were discussed above. As noted previously, there are no operational differences between Scenarios A and B other than the increased percentage of departures using afterburner power.

DNL greater than 65 dB would affect portions of the off-base industrial area west of the installation that are exposed to DNL less than 65 dB under baseline conditions or Scenario A. Residential areas, including parts of the Roberts and Julia Keen neighborhoods, would experience noise levels that are the same as or slightly lower under Scenario B than under Scenario A. These slight reductions in noise level are reflected by a minor contraction of noise contours in these areas. The total land area and estimated population exposed to DNL of 65 dB or greater are listed in Table DM3-12. The total number of acres exposed to DNL of 65 dB or greater would increase by 1,679 acres under Scenario B, whereas it would increase by 1,566 acres under Alternative A. The estimated number of residents exposed to DNL of 65 dB or greater would increase from zero to 1,428 under Scenario B, but would increase to 1,506 under Scenario A. The net decrease in estimated population exposed to DNL of 65 dB or greater under Scenario B relative to Scenario A would occur because a smaller fraction of the affected area would be residential. All of the areas exposed to DNL of 65 dB or greater are located in the JLUS contour and the AEZ and are zoned accordingly.

Table DM3-12. Off-Base Acres and Estimated Population Exposed to DNL of 65 dB or Greater from Scenario B at Davis-Monthan AFB

DNL (dB)	Acres				Estimated Population			
	JLUS Contour	Baseline	Scenario B	Change[a]	JLUS Contour	Baseline	Scenario B	Change[a]
65 – 69	6,521	100	1,500	1,400	14,234	0	1,419	1,419
70 – 74	2,369	0	279	279	1,111	0	9	9
75 – 79	689	0	0	0	179	0	0	0
80 – 84	117	0	0	0	0	0	0	0
≥85	0	0	0	0	0	0	0	0
Total	**9,696**	**100**	**1,779**	**1,679**	**15,524**	**0**	**1,428**	**1,428**

[a] Change equals the difference between baseline acreage and acres exposed to noise resulting from the AFRC F-35A mission.

Changes in DNL at representative noise-sensitive locations under Scenario B are shown in Table DM3-13. As was the case under Scenario A, Griffin Foundation Schools would be exposed to 65 dB DNL – a noise level considered conditionally compatible according to USAF guidelines. DNL at all other locations would be less than 65 dB, and would be considered compatible accordance to USAF guidelines. DNL would increase by 2 dB or less compared to Scenario A.

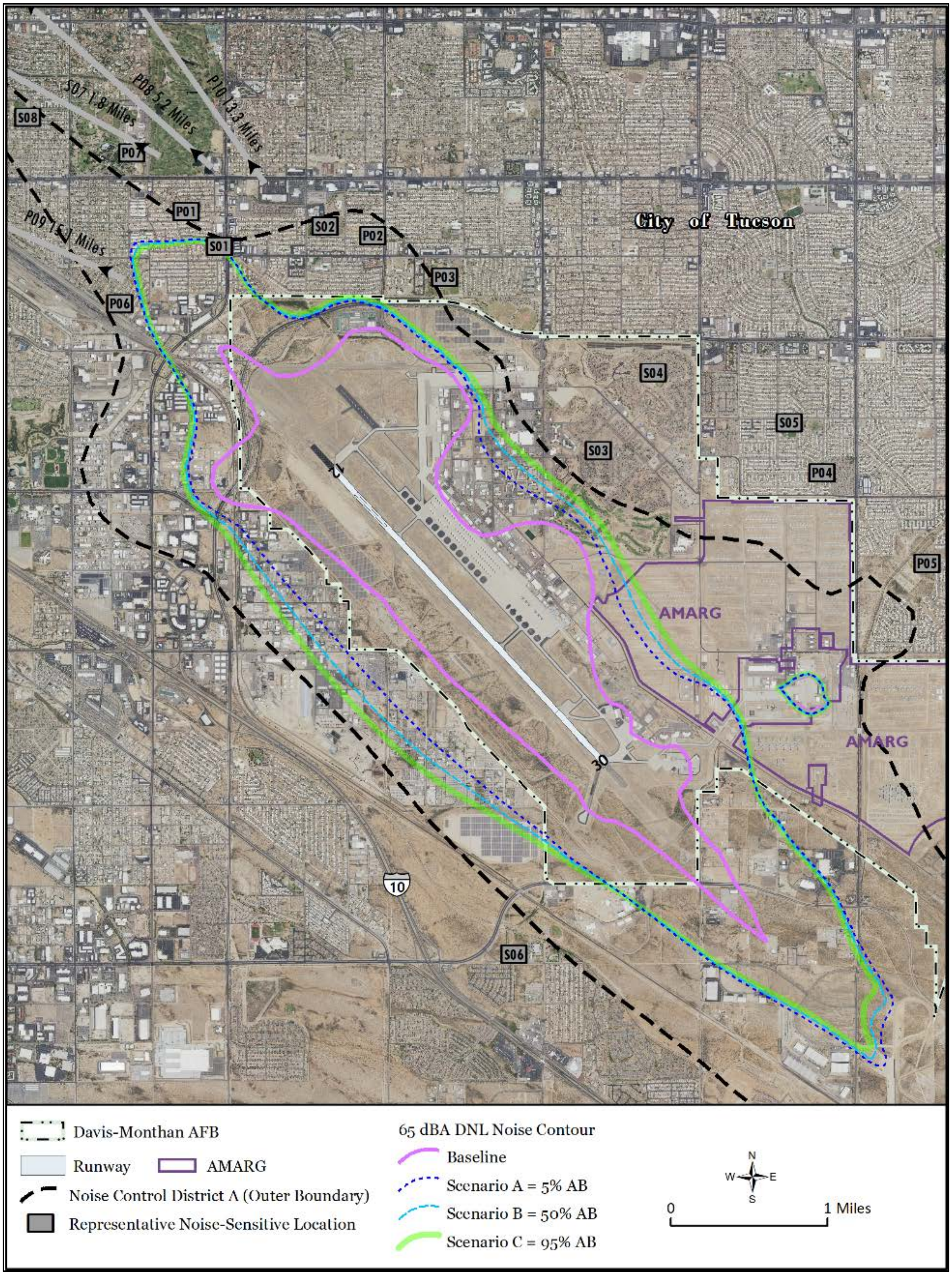

Figure DM3-3. AFRC F-35A Mission 65 dB DNL Contours (Scenarios A, B, and C) at Davis-Monthan AFB

Table DM3-13. DNL at Representative Noise-Sensitive Locations near Davis-Monthan AFB Under Baseline and Scenario B Conditions

Representative Noise-Sensitive Location			DNL (dB)		
Type	ID	Name / Description	Baseline	Scenario B	Change
Park	P01	Parkview Park	55	62	7
	P02	Swan Park	54	59	5
	P03	Freedom Park	55	58	3
	P04	Escalante Park	47	51	4
	P05	The Groves Park	<45	48	3
	P06	Country Club Annex Park	56	63	7
	P07	Reid Park Zoo	54	60	6
	P08	Jacobs Park and Ochoa Soccer Complex	46	50	4
	P09	Saguaro National Park (Tucson Mountain District)	<45[a]	<45	0
	P10	Arthur Pack Regional Park	<45	<45	0
School	S01	Griffin Foundation Schools	56	65	9
	S02	Roberts Elementary School	53	59	6
	S03	Smith Elementary School (on-base)	53	60	7
	S04	Borman Elementary School (on-base)	51	55	4
	S05	Irene Erickson Elementary School	47	51	4
	S06	Billy Lane Laufer Middle School	48	56	8
	S07	University of Arizona	51	55	4
	S08	Robison Elementary	56	60	4

[a] Median existing ambient noise levels (i.e., the level exceeded 50 percent of the time) measured at four locations within Saguaro National Park ranged from 23 to 28 dB (NPS 2016). Although NOISEMAP calculates the DNL at a representative noise-sensitive location in the park would be 18.5 dB under the AFRC F-35A mission, NOISEMAP estimates of DNL are less reliable at extremely low noise levels due to uncertainties in actual noise propagation variations. However, the calculated DNL and number of events per hour with potential to interfere with speech supports a conclusion that loud aircraft overflights are infrequent.

DM3.2.2.1.3 Scenario C

Ninety-five (95) percent of F-35A departures would be flown using afterburner under Scenario C (as opposed to 5 percent under Scenario A and 50 percent under Scenario B), but all other aspects of the mission would be identical to Scenarios A and B. The differences between afterburner and military power noise levels are described in Section DM 3.2.2.1.2.

The highest SEL experienced at representative noise-sensitive locations would be the same as shown in Table DM3-9. As was described in Section DM3.2.2.1.2, afterburner power SELs would differ from military power SELs by less than 1 dB at all locations studied except The Groves Park and Smith Elementary School (on-base), where they would be slightly greater than 1 dB and 3 dB louder than military power departures, respectively. The higher SEL associated with afterburner takeoffs would comprise a larger percent (95 percent rather than 5 percent) of departure noise events, and there would be correspondingly fewer military power noise events.

Noise contours under Scenario C exhibit the same relative differences in extent that exist between Scenarios A and B, but to a greater degree (see Figure DM3-3). The DNL contours are shown in 5-dB intervals ranging from 65 to 85 dB on Figure B-21 in Appendix B, Section B.4. Noise contours to the right and left of the runway are larger than contours under Scenarios A or B, and noise contours farther out along departure paths are slightly smaller than under Scenarios A or B. The reasons for these patterns of noise level differences are described in Section DM3.2.2.1.2. As discussed in Section DM3.2.2.1.1, people exposed to increases in DNL are more likely to become highly annoyed by the noise, and some land uses are not considered compatible at DNL greater than 65 dB.

The total land area and estimated population exposed to DNL of 65 dB or greater from Scenario C are listed in Table DM3-14. DNL of 65 dB or greater would newly affect portions of the off-base industrial area west of the installation under Scenario C that are exposed to DNL of 65 dB under baseline conditions and Scenario B. The number of acres exposed to DNL greater than 65 dB would increase by 1,762 under Scenario C. In residential areas north of the installation, DNL would remain the same or decrease slightly compared to Scenario A. The estimated number of people exposed to DNL of 65 dB or greater would increase by 1,361 under Scenario C, whereas it would increase by 1,506 under Scenario A and by 1,428 under Scenario B.

Table DM3-14. Off-Base Acres and Estimated Population Exposed to DNL of 65 dB or Greater from Scenario C at Davis-Monthan AFB

DNL (dB)	Acres				Estimated Population			
	JLUS Contour	Baseline	Scenario C	Change[a]	JLUS Contour	Baseline	Scenario C	Change[a]
65 – 69	6,521	100	1,524	1,424	14,234	0	1,336	1,336
70 – 74	2,369	0	338	338	1,111	0	25	25
75 – 79	689	0	0	0	179	0	0	0
80 – 84	117	0	0	0	0	0	0	0
≥85	0	0	0	0	0	0	0	0
Total	**9,696**	**100**	**1,862**	**1,762**	**15,524**	**0**	**1,361**	**1,361**

[a] Change equals the difference between baseline acreage and acres exposed to noise resulting from the AFRC F-35A mission.

Noise level changes under Scenario C, as measured in DNL, are listed in Table DM3-15. Griffin Foundations Schools would be exposed to DNL of 65 dB, as would also be the case under Scenarios A and B. All other locations studied would be exposed to DNL less than 65 dB. DNL would increase by an additional 1 dB or less relative to Scenario B.

Table DM3-15. DNL at Representative Noise-Sensitive Locations near Davis-Monthan AFB Under Baseline and Scenario C Conditions

Representative Noise-Sensitive Location			DNL (dB)		
Type	**ID**	**Name / Description**	**Baseline**	**Scenario C**	**Change**
Park	P01	Parkview Park	55	62	7
	P02	Swan Park	54	59	5
	P03	Freedom Park	55	59	4
	P04	Escalante Park	47	51	4
	P05	The Groves Park	<45	49	4
	P06	Country Club Annex Park	56	63	7
	P07	Reid Park Zoo	54	60	6
	P08	Jacobs Park and Ochoa Soccer Complex	46	50	4
	P09	Saguaro National Park (Tucson Mountain District)	<45[a]	<45	0
	P10	Arthur Pack Regional Park	<45	<45	0
School	S01	Griffin Foundation Schools	56	65	9
	S02	Roberts Elementary School	53	59	6
	S03	Smith Elementary School (on-base)	53	61	8
	S04	Borman Elementary School (on-base)	51	55	4
	S05	Irene Erickson Elementary School	47	51	4
	S06	Billy Lane Laufer Middle School	48	57	9
	S07	University of Arizona	51	55	4
	S08	Robison Elementary	56	60	4

[a] Median existing ambient noise levels (i.e., the level exceeded 50 percent of the time) measured at four locations within Saguaro National Park ranged from 23 to 28 dB (NPS 2016). Although NOISEMAP calculates the DNL at a representative noise-sensitive location in the park would be 18.5 dB under the AFRC F-35A mission, NOISEMAP estimates of DNL are less reliable at extremely low noise levels due to uncertainties in actual noise propagation variations. However, the calculated DNL and number of events per hour with potential to interfere with speech supports a conclusion that loud aircraft overflights are infrequent.

DM3.2.2.2 Speech Interference

DM3.2.2.2.1 Scenario A

The number of daytime (7:00 A.M. to 10:00 P.M.) events per hour that could potentially interfere with speech under Scenario A are listed in Table DM3-16. Any aircraft noise event exceeding L_{max} of 50 dB was assumed to have some potential to interfere with speech. The interference would be for a few seconds for each overflight. Noise levels at the locations listed are similar to noise levels in nearby residential areas. The largest noise increase with windows open would occur at The Groves Park, where the average number of events per hour indoors would increase from infrequent (i.e., a number rounding to zero) to two events. At Swan and Freedom Parks, the average number of events per hour with windows closed would increase from infrequent to two events. The number of events per hour exceeding L_{max} of 50 dB would be one or less at other locations with windows open, windows closed, or outdoors. Any increases in the frequency of disruptions in communication have a high likelihood of being annoying.

Table DM3-16. Potential Speech Interference Resulting from Scenario A at Davis-Monthan AFB

Type	ID	Description	Annual Average Daily Daytime (7:00 A.M. to 10:00 P.M.) Events per Hour					
			Scenario A			Change		
			Windows Open[a]	Windows Closed[a]	Outdoor	Windows Open[a]	Windows Closed[a]	Outdoor
Park	P01	Parkview Park	4	2	7	1	1	1
	P02	Swan Park	3	2	8	1	2	0
	P03	Freedom Park	2	2	9	1	2	1
	P04	Escalante Park	2	<<1	6	1	0	1
	P05	The Groves Park	2	<<1	5	2	0	1
	P06	Country Club Annex Park	4	2	7	1	1	1
	P07	Reid Park Zoo	3	1	5	1	0	1
	P08	Jacobs Park and Ochoa Soccer Complex	1	<<1	2	0	0	0
	P09	Saguaro National Park (Tucson Mountain District)	<<1	<<1	<<1	0	0	0
	P10	Arthur Pack Regional Park	<<1	<<1	<<1	0	0	0

[a] Number of events per average hour with an indoor L_{max} of at least 50 dB; assumes standard values of 15 dB and 25 dB noise level reductions for windows open and closed, respectively.

Key: <<1 indicates that the number of potential speech interference events (>50 dB) per hour resulting from Davis-Monthan based aircraft overflights is low (rounding to zero).

DM3.2.2.2.2 Scenario B

The numbers of daytime events per hour under Scenario B that could potentially interfere with speech would be the same as under Scenario A (see Table DM3-16) except at Escalante Park. Escalante Park would experience one potential speech interference event per hour under Scenario B with windows closed, whereas under Scenario A the number of events per hour with windows closed would round to zero. The number of speech interference events at Escalante Park with windows open and outdoor as well as the number of events at all other locations would be the same as under Scenario A.

DM3.2.2.2.3 Scenario C

Under Scenario C, the number of daytime (7:00 A.M. to 10:00 P.M.) events per hour that could potentially interfere with speech would be the same as under Scenario B.

DM3.2.2.3 Interference with Classroom Learning

DM3.2.2.3.1 Scenario A

Table DM3-17 presents changes in classroom noise levels with windows open and closed under Scenario A. As described in Section DM3.2.1.3, two of the eight schools with windows open are currently exposed to $L_{eq(SD)}$ greater than 40 dB under baseline conditions. In accordance with DNWG recommendations, estimated interior $L_{eq(SD)}$ exceeding 40 dB was taken as an indication that ANSI criteria are being exceeded (DNWG 2013). Implementation of the AFRC F-35A mission would increase $L_{eq(SD)}$ at the Griffin Foundation Schools from less than 35 dB to 42 dB while windows are closed, exceeding the recommended background noise level. If windows are open, four additional schools would be exposed to $L_{eq(SD)}$ greater than 40 dB. The number of indoor events per hour with potential to interrupt speech would increase by as much as two with windows either closed or open.

Table DM3-17. Indoor Classroom Learning Disruption Resulting from Scenario A at Davis-Monthan AFB

Type	ID	Description	Scenario A					Change				
			Windows Open[a]		Windows Closed[a]		Outdoor	Windows Open[a]		Windows Closed[a]		Outdoor
			$L_{eq(SD)}$ (dB)	Events per Hour[b]	$L_{eq(SD)}$ (dB)	Events per Hour[b]	Events per Hour[c]	$L_{eq(SD)}$ (dB)	Events per Hour[b]	$L_{eq(SD)}$ (dB)	Events per Hour[b]	Events per Hour[c]
School	S01	Griffin Foundation Schools	52	4	42	2	8	10	1	7	1	1
	S02	Roberts Elementary School	46	4	36	2	8	6	1	1	2	0
	S03	Smith Elementary School (on-base)	44	2	<35	1	8	7	1	0	1	0
	S04	Borman Elementary School (on-base)	40	3	<35	2	6	3	2	0	1	0
	S05	Irene Erickson Elementary School	36	2	<35	0	6	3	1	0	0	1
	S06	Billy Lane Laufer Middle School	43	2	<35	1	6	9	1	0	1	1
	S07	University of Arizona	41	2	<35	1	3	5	0	0	1	1
	S08	Robison Elementary	47	3	37	2	4	6	1	2	0	1

[a] Assumes standard values of 15 dB and 25 dB noise level reductions for windows open and closed, respectively.
[b] Average number of events per hour during 8-hour school day (8:00 A.M. to 4:00 P.M.) at or above an indoor L_{max} of 50 dB.
[c] Average number of outdoor events per hour at or above L_{max} of 50 dB during daytime (7:00 A.M. to 10:00 P.M.).

DM3.2.2.3.2 Scenario B

Classroom noise levels with windows open and closed under Scenario B are presented in Table DM3-18. As described in Section DM3.2.1.3, two of the eight schools are currently exposed to interior $L_{eq(SD)}$ greater than 40 dB under baseline conditions with windows open. Implementation of Scenario B would increase $L_{eq(SD)}$ at the Griffin Foundation Schools from less than 35 dB to 42 dB while windows are closed, exceeding the recommended background noise level. If windows are open, four additional schools would be exposed to $L_{eq(SD)}$ greater than 40 dB. The number of indoor events per hour with potential to interrupt speech would increase by as much as two with windows closed and with windows open.

Table DM3-18. Indoor Classroom Learning Disruption Resulting from Scenario B at Davis-Monthan AFB

Type	ID	Description	Scenario B					Change				
			Windows Open[a]		Windows Closed[a]		Outdoor	Windows Open[a]		Windows Closed[a]		Outdoor
			$L_{eq(SD)}$ (dB)	Events per Hour[b]	$L_{eq(SD)}$ (dB)	Events per Hour[b]	Events per Hour[c]	$L_{eq(SD)}$ (dB)	Events per Hour[b]	$L_{eq(SD)}$ (dB)	Events per Hour[b]	Events per Hour[c]
School	S01	Griffin Foundation Schools	52	4	42	2	8	10	1	10	1	1
	S02	Roberts Elementary School	46	4	36	2	8	7	1	7	2	0
	S03	Smith Elementary School (on-base)	46	2	36	1	8	9	1	9	1	0
	S04	Borman Elementary School (on-base)	41	3	<35	2	6	4	2	4	1	0
	S05	Irene Erickson Elementary School	37	2	<35	1	6	2	1	4	1	1
	S06	Billy Lane Laufer Middle School	43	2	<35	1	6	8	1	9	1	1
	S07	University of Arizona	40	2	<35	1	3	5	0	5	1	1
	S08	Robison Elementary	46	3	36	2	4	6	1	6	0	1

[a] Assumes standard values of 15 dB and 25 dB noise level reductions for windows open and closed, respectively.
[b] Average number of events per hour during 8-hour school day (8:00 A.M. to 4:00 P.M.) at or above an indoor L_{max} of 50 dB.
[c] Average number of outdoor events per hour at or above L_{max} of 50 dB during daytime (7:00 A.M. to 10:00 P.M.).

DM3.2.2.3.3 Scenario C

Table DM3-19 lists classroom noise levels with windows open and closed under Scenario C. An additional four schools would be exposed to $L_{eq\ (SD)}$ greater than 40 dB with windows open, and the $L_{eq(SD)}$ at the Griffin Foundation Schools would increase from less than 35 to 42 dB with windows closed. The number of indoor events per hour with potential to interrupt speech would increase by as much as two with windows closed and with windows open.

Table DM3-19. Indoor Classroom Learning Disruption Resulting from Scenario C at Davis-Monthan AFB

Type	ID	Description	Scenario C					Change				
			Windows Open[a]		Windows Closed[a]		Outdoor	Windows Open[a]		Windows Closed[a]		Outdoor
			$L_{eq(SD)}$ (dB)	Events per Hour[b]	$L_{eq(SD)}$ (dB)	Events per Hour[b]	Events per Hour[c]	$L_{eq(SD)}$ (dB)	Events per Hour[b]	$L_{eq(SD)}$ (dB)	Events per Hour[b]	Events per Hour[c]
School	S01	Griffin Foundation Schools	52	4	42	3	8	10	1	7	2	1
	S02	Roberts Elementary School	46	4	36	2	8	7	1	1	2	0
	S03	Smith Elementary School (on-base)	47	2	37	1	8	9	1	2	1	0
	S04	Borman Elementary School (on-base)	41	3	<35	2	6	4	2	0	1	0
	S05	Irene Erickson Elementary School	38	2	<35	1	6	3	1	0	1	1
	S06	Billy Lane Laufer Middle School	43	2	<35	1	6	8	1	0	1	1
	S07	University of Arizona	40	2	<35	1	3	5	0	0	1	1
	S08	Robison Elementary	46	3	36	2	4	6	1	1	0	1

[a] Assumes standard values of 15 dB and 25 dB noise level reductions for windows open and closed, respectively.
[b] Average number of events per hour during 8-hour school day (8:00 A.M. to 4:00 P.M.) at or above an indoor L_{max} of 50 dB.
[c] Average number of outdoor events per hour at or above L_{max} of 50 dB during daytime (7:00 A.M. to 10:00 P.M.).

DM3.2.2.4 Sleep Disturbance

As noted in Chapter 3, Section 3.2.3, the probability of sleep being disturbed at least once per night is estimated based on the number of overflight events and the SEL of each event. Most of the night flying conducted from Davis-Monthan AFB is part of the combat search and rescue mission and would not change under the proposed action. The number of late-night flights by AFRC F-35A pilots would be similar to the number currently conducted by A-10 pilots. However, when AFRC F-35A night operations do occur, they would have higher SELs than A-10 operations. Increases in probability of being awakened would range from no increase to a 1 percent increase (Table DM3-20). Impacts to sleep disturbance resulting from implementation of the AFRC F-35A mission would be the same regardless of which afterburner scenario is selected. Results apply only to people who sleep during the night. People who sleep during the day would experience additional noise events, resulting in higher probabilities of awakening.

Table DM3-20. Average Probability of Awakening Resulting from the AFRC F-35A Mission at Davis-Monthan AFB

Type	ID	Name / Description	Annual Average Nightly (10:00 P.M. to 7:00 A.M.) Probability of Awakening (%)			
			AFRC F-35A Mission		Change	
			Windows Open[a]	Windows Closed[a]	Windows Open[a]	Windows Closed[a]
Park	P01	Parkview Park	6	3	0	1
	P02	Swan Park	6	1	1	0
	P03	Freedom Park	6	1	0	0
	P04	Escalante Park	2	1	0	1
	P05	The Groves Park	2	1	0	1
	P06	Country Club Annex Park	9	4	1	0
	P07	Reid Park Zoo	6	2	1	0
	P08	Jacobs Park and Ochoa Soccer Complex	2	1	0	0
	P09	Saguaro National Park (Tucson Mountain District)	<<1	<<1	0	0
	P10	Arthur Pack Regional Park	<<1	<<1	0	0
School	S01	Griffin Foundation Schools	7	3	0	0
	S02	Roberts Elementary School	6	1	1	0
	S03	Smith Elementary School (on-base)	3	1	0	0
	S04	Borman Elementary School (on-base)	3	2	0	1
	S05	Irene Erickson Elementary School	3	1	1	0
	S06	Billy Lane Laufer Middle School	2	1	0	1
	S07	University of Arizona	4	2	0	0
	S08	Robison Elementary	5	3	0	0

[a] Assumes standard values of 15 dB and 25 dB noise level reductions for windows open and closed, respectively.

Key: <<1% indicates that the probability of awakening resulting from Davis-Monthan AFB based aircraft overflights is low (rounding to zero percent).

DM3.2.2.5 Potential for Hearing Loss

Implementation of the AFRC-F-35A mission (with any of the three afterburner scenarios selected) would not expose any on-base or off-base residences to DNL greater than 80 dB. Therefore, PHL would not result from implementation of the AFRC F-35A mission.

DM3.2.2.6 Occupational Noise

USAF occupational noise exposure prevention procedures (e.g., hearing protection and monitoring) would be implemented under the AFRC F-35A mission, regardless of which afterburner scenario is selected. These procedures would comply with all applicable OSHA and USAF occupational noise exposure regulations.

DM3.2.2.7 Non-Auditory Health Impacts

As noted in Section DM3.2.1.7, the current state of scientific knowledge does not yet support a consistent causal relationship between exposure to aircraft noise and non-auditory health impacts (i.e., impacts other than hearing loss). Several types of potential health impacts have been investigated in multiple studies with contradictory results (Meecham and Shaw 1979; Frerichs et al. 1980; Jones and Tauscher 1978; Edmonds et al. 1979). The premise of the studies is that annoyance causes stress, and prolonged stress is known to be a contributor to a number of health disorders. The connection from annoyance to stress to health issues requires careful experimental design, and the resulting data are subject to different interpretations. A recent, large-scale study indicated that nighttime aircraft noise could be linked to increases in the likelihood of hypertension (Jarup et al. 2005, 2008). However, extensive reviews of recent literature conducted by several groups support the conclusion that it is not yet possible to establish a quantitative cause and effect based on the currently available scientific evidence (Basner et al. 2017; FICAN 2018; van Kempen et al. 2018).

DM3.2.2.8 Structural Damage

Damage to structures is not anticipated to result from AFRC F-35A subsonic noise because noise resulting from implementation of the AFRC F-35A mission would not exceed 130 dB in any 1/3-octave frequency band at distances of greater than 250 feet (CHABA 1977).

Furthermore, studies conducted on vibrations induced by subsonic aircraft overflights generating noise levels similar to those that would result from operation of the F-35A in ancient Anasazi ruins indicate that vibrations would not occur at or near potentially damaging levels (Battis 1983). Additional discussion of the effects of noise on cultural resources can be found in Section DM3.7. Noise-induced structural vibration and secondary vibrations (i.e., "rattle") of objects in structures would continue to occur. Induced vibrations do not normally result in structural damage, but the rattling of objects does have the potential to contribute to annoyance. Although the risk posed to structures by noise would be minimal, a process exists for dealing with any such damage. Any claims from USAF-related damage would begin by contacting the Davis-Monthan AFB Public Affairs Office with details of the claim. The USAF would then investigate the claim to establish the exact nature and extent of the damage.

DM3.2.2.9 Animals in the Care of Humans

During scoping, several people submitted comments concerning the reactions of animals in the care of humans (e.g., pets, other domesticated animals, and animals kept in zoos) to an increased number of loud overflight events. An animal's reaction to noise depends on several factors including the animal's temperament, training, and past experiences associated with the noise. Certain domesticated animal species (e.g., horses) are more likely to have strong reactions to noise than others. As mentioned previously, noise impacts on wildlife are discussed in Section DM3.6.

In the airfield environment, aircraft typically operate at slower speeds than are used in training airspace. Although these slower speeds mean that elevated sound levels last longer, they also result in a time lag between the aircraft first being heard and the overflight noise maximum. Sounds with slow rise-times are less likely to induce panic than sudden onset noise (USAF 1994). Because F-35 and A-10 aircraft operate at similar speeds in the airfield environment, the rise times of noise generated by the two aircraft are similar.

One of the most important factors affecting an animal's reaction to noise is the level of familiarity with the noise source. Under baseline conditions, the ROI is overflown by several types of jet aircraft (F-16, A-10, C-550) including occasional visits by transient F-35A aircraft. As described in Section DM2.0, the replacement of 924 FG A-10 aircraft with F-35A aircraft would occur over approximately 2 years, and the tempo of AFRC F-35A operations around the base would increase slowly as the new airframe gets established at the base. AFRC F-35A pilots would use flight paths and altitudes similar to those currently used by A-10 pilots. For the purposes of this analysis, all noise impacts show the full impact of 24 aircraft. AFRC F-35A pilots would use the flight paths identified in the 2004 JLUS (Arizona Department of Commerce 2004). Because the reactions of domestic animals depends on several factors (e.g., species, situation, predisposition), there is no single noise level below which behavioral reactions would never occur. However, if it is assumed that noise events with the potential to interfere with human conversation could also be bothersome to animals, then the number of noise events per hour with potential to interfere with speech (Table DM3-16) could be an indicator of how frequently animals could be bothered by noise. It is recognized that this metric of noise events per hour with potential to interfere with speech is an arbitrary metric for determining how frequently animals would be bothered by noise. The metric is used purely as a measure of relative change between the No Action Alternative and proposed action.

DM3.2.3 Airspace Affected Environment

This section presents noise levels in training airspace and ranges that would be used by AFRC F-35A pilots. As described in Section DM2.4.1, Davis-Monthan AFB-based F-35A pilots would operate in existing MOAs, RAs, and ATCAAs performing combat training missions similar to those currently conducted by Davis-Monthan AFB-based A-10 pilots. The noise analysis accounts for subsonic flight noise and supersonic flight noise generated in locations where supersonic flight is authorized. As noted in Chapter 3, Section 3.2.1.1, subsonic noise in training airspace is quantified using the onset-rate adjusted day-night average sound level (L_{dnmr}) and supersonic noise levels are quantified using C-weighted day-night average sound level (CDNL) as well as the number of booms per month that would be heard on the ground. The location, types, and number of munitions used during F-35A training would be similar to that used during A-10 training. Therefore, munitions noise levels would remain approximately the same as under baseline conditions.

DM3.2.3.1 Subsonic Noise

Figure DM3-4 shows baseline subsonic noise levels beneath airspace proposed for use by AFRC F-35A pilots from Davis-Monthan AFB. L_{dnmr} beneath the Outlaw, Jackal, and Tombstone MOAs and R-2303 are below 45 dB. Areas beneath the Ruby and Fuzzy MOAs are exposed to L_{dnmr} of 46 dB, areas beneath the Sells 1 MOAs are exposed to L_{dnmr} of approximately 64 dB, and areas beneath R-2031E / R-2304 / R-2305 are exposed to L_{dnmr} of 65 dB.

DM3.2.3.2 Supersonic Noise

Supersonic flight is permitted in R-2031E / R-2304 / R-2305 at or above 5,000 feet MSL and in Sells MOA at or above 10,000 feet MSL. A-10 aircraft, such as the ones based at Davis-Monthan AFB, are not capable of supersonic speeds. However, the airspace also supports training by aircraft types that are supersonic-capable, and sonic booms are generated on a regular basis. As shown on Figure DM3-4, the area beneath R-2301E, R-2304, and R-2305 experiences an average of three sonic booms per day, resulting in CDNL of 56 dB. Areas beneath the Sells MOA currently experience an average of two booms per day, resulting in CDNL of 54 dB.

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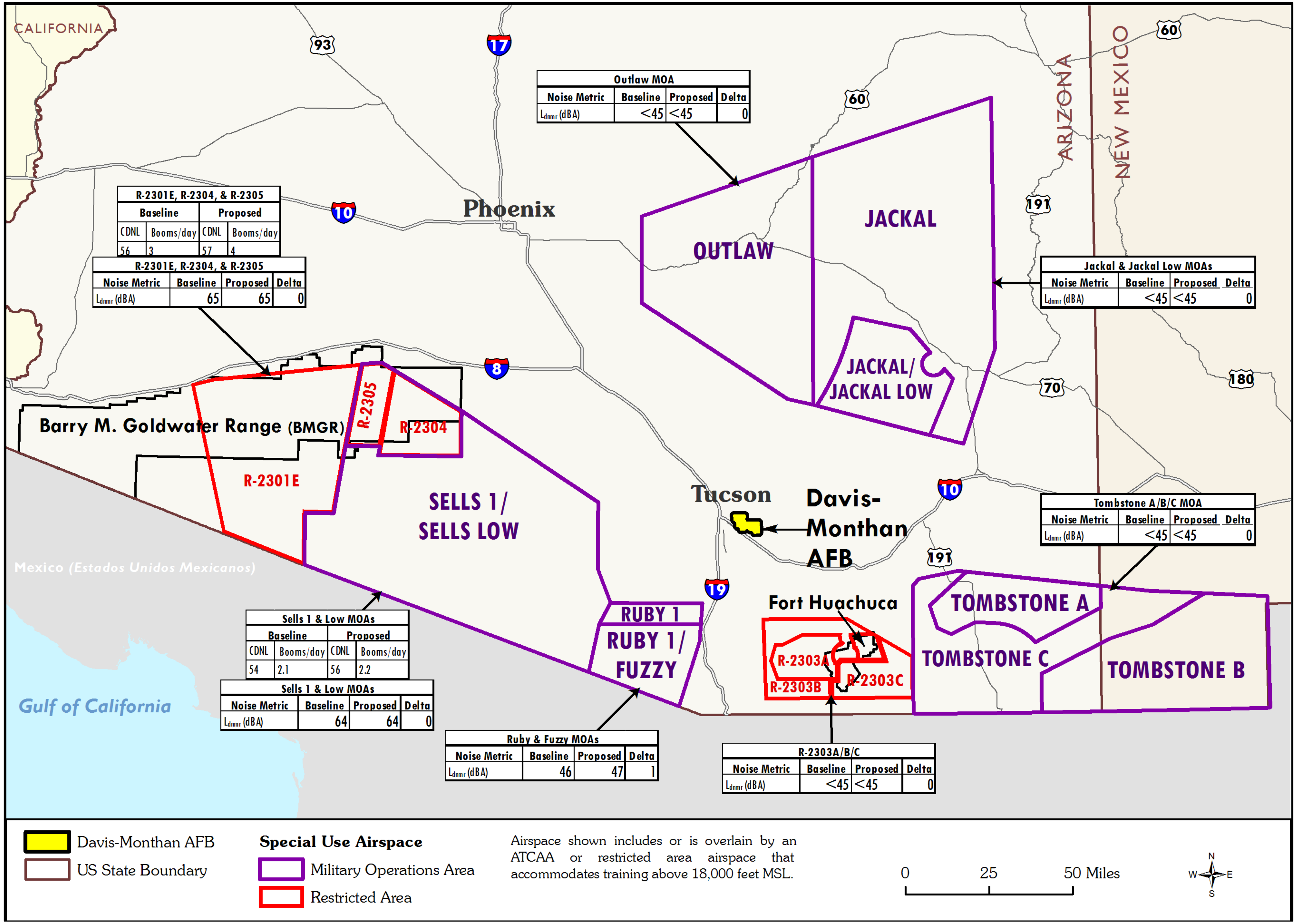

Figure DM3-4. Noise Levels in Training Airspace used by Davis-Monthan AFB Pilots

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DM3.2.4 Airspace Environmental Consequences

DM3.2.4.1 Subsonic Noise

Changes in sortie operations tempo under the proposed action are discussed in Chapter 2, Section 2.3.4.1, and Section DM.2.4.1. Late-night training (10:00 P.M. to 7:00 A.M.) by AFRC F-35A pilots would only be conducted in rare contingencies and special mission training. As shown on Figure DM3-4, L_{dnmr} would not increase by more than 1 dB below all of the airspace proposed for use except for the Ruby/Fuzzy MOAs. Implementation of the AFRC F-35A mission would result in an L_{dnmr} increase of 1 dB to areas beneath the Ruby/Fuzzy MOAs.

The overall number of sorties flown by the 924 FG would increase by about 5 percent (Table DM2-7). Although F-35A aircraft are louder than the 924 FG A-10 aircraft that they would replace when flying at the same altitude, AFRC F-35A pilots would predominantly train at high altitudes. Approximately 96 percent of A-10 training is conducted at altitudes below 10,000 feet MSL, but only about 6 percent of F-35A training would be conducted below 10,000 feet MSL (Table DM2-6). Several of the airspace areas proposed for use by AFRC F-35A pilots (i.e., R-2301, R-2304, R-2305, and Sells MOA, Ruby MOA, and Fuzzy MOA) are currently used by multiple F-35A squadrons based at Luke AFB and/or 162 FW F-16 pilots based at TUS. Training by these aircraft and other baseline users generates a noise environment in which training by an additional F-35A squadron would not increase the L_{dnmr} by more than 1 dB. The R-2303/Tombstone MOA airspace complex, Jackal MOA, and Outlaw MOA are large training airspace areas. Overflight of any particular location within these airspace areas would remain infrequent under the proposed action, such that L_{dnmr} would remain below 45 dB. Although L_{dnmr} would not increase in areas below all of the airspace proposed for use, except the Ruby and Fuzzy MOAs, the replacement of 924 FG A-10 aircraft with AFRC F-35A aircraft would increase the number of training sorties conducted with aircraft that are louder than the A-10. This increase in sorties could be considered annoying to people on the ground under these areas.

Overflight noise events have the potential to interfere with activities. An increase in the number of loud events would be expected to increase the percentage of the population that is highly annoyed by noise. The proposed AFRC F-35A training sorties would occur in several large training airspace areas. As shown in Table DM2-6, approximately 94 percent of F-35A training time is spent at altitudes above 10,000 feet MSL. Because training would occur across very large areas, and because most of the training would be at high altitudes, the loudest of the overflights (i.e., overhead at low altitudes) would be rare.

During scoping, several people submitted comments regarding overflight noise while the aircraft are transiting from the airfield to and from the airspace proposed for use. Aircrews transiting from the installation to training airspace and back again typically use a set of existing prescribed routes. As identified in the 2004 JLUS, actual ground tracks of transiting aircraft vary based on several factors, and non-standard routing can be used, as needed, in response to air traffic, weather, or other time-varying conditions. AFRC F-35A pilots would typically transit at high altitudes and in cruise configuration using lowered engine power settings to reduce noise impacts and improve fuel efficiency. In addition, flight at these altitudes allows the aircraft to arrive at the training airspace at an appropriate altitude to begin training. Single overflight event noise levels generated by F-35A aircraft in cruise configuration are listed in Chapter 3, Table 3-4.

Although AFRC F-35A pilots would implement measures to reduce noise, the noise generated by transiting aircraft can be disturbing, particularly when overflight noise affects national parks and other noise-sensitive places where ambient noise levels are low. Detailed discussion of recreation impacts is contained in Section DM3.8.

DM3.2.4.2 Supersonic Noise

AFRC F-35A pilots would conduct supersonic training in the BMGR airspace (i.e., R-2301, R-2304, and R-2305) and Sells MOA, which are currently approved for supersonic training. Although supersonic flight is permitted at lower altitudes, combat tactics developed to make the best use of the F-35A aircraft's capabilities concentrate supersonic flight at high altitudes. Approximately 90 percent of F-35A supersonic flight would occur above 30,000 feet MSL and the remaining 10 percent would occur at altitudes between 15,000 and 30,000 feet MSL (Chapter 2, Table 2-10). F-16 pilots conduct approximately 8 percent of supersonic flight between 10,000 feet and 15,000 feet MSL, 12 percent between 15,000 and 30,000 feet MSL, and the remaining 80 percent above 30,000 feet MSL. F-35A pilots from Luke AFB (as well as several other fighter aircraft type pilots) currently conduct supersonic operations in BMGR airspace, and sonic booms generated by 924 FG pilots operating F-35A aircraft would be the same as F-35A sonic booms experienced currently. The average number of booms per day on the ground beneath the BMGR airspace would increase from 3.1 to 3.5 and CDNL would increase from 56 to 57 dB. ANG F-16 pilots based at TUS conduct supersonic operations in Sells MOA on a regular basis. The overpressure generated by an F-16 in straight and level flight at the lowest permitted altitude (10,000 feet MSL) at Mach 1.2 is 4.9 pounds per square foot. An F-35A aircraft in straight and level flight at the same speed at 15,000 feet MSL generates an overpressure of approximately 4 pounds per square foot. The average number of sonic booms per day beneath the Sells MOA would increase from 2.1 to 2.2 and CDNL would increase from 54 to 56 dB. Sonic booms would be more common (increasing by as much as one additional sonic boom every other day), and the increase in frequency could be considered annoying.

DM3.2.5 Summary of Noise Impacts

Implementation of the AFRC F-35A Scenario A would expose an additional 1,566 acres of off-installation land and an estimated 1,506 people to DNL of 65 dB or greater. All of this land is located in the AEZ. Implementation of Scenario B would expose an additional 1,679 acres and an estimated 1,428 people to DNL of 65 dB or greater. Implementation of Scenario C would expose an additional 1,762 acres and an estimated1,361 people to DNL of 65 dB or greater.

DNL would increase from 3 to 9 dB at 16 of the 18 representative noise-sensitive locations around Davis-Monthan AFB under Scenarios A, B, and C. With the exception of DNL at the Griffin Foundation Schools, DNL at all of the representative noise-sensitive locations would remain below 65 dB. All of the representative schools identified for evaluation in the EIS would experience an increase in the number of events causing speech interference (windows open and closed) with levels reaching up to 4 events per hour at the Griffin Foundation Schools with the windows open.

Regarding noise under the airspace proposed for use, L_{dnmr} would remain below 47 dB beneath the airspace proposed for use. L_{dnmr} beneath all of the airspace proposed for use would remain the same as baseline except beneath the Ruby and Fuzzy MOAs where the new mission would result in a 1 dB L_{dnmr} increase. Supersonic flight would only occur in the BMGR and Sells MOA. Increases in the CDNL resulting from the addition of supersonic activity would be between zero and 2 dB and sonic booms would increase by one additional sonic boom every other day. Noise impacts to the airspace proposed for use are not anticipated to be significant. Based on context and intensity, noise impacts to the area surrounding Davis-Monthan AFB resulting from implementation of the proposed AFRC F-35A mission would be considered significant.

DM3.3 AIR QUALITY

The proposed AFRC F-35A mission at Davis-Monthan AFB would result in net changes in air emissions due to the replacement of existing aircraft operations with operations from the proposed mission in the base region and associated airspace. The following section describes the air quality affected environment and estimations of impacts due to proposed construction and operational activities within these project regions.

DM3.3.1 Base Affected Environment

Air emissions resulting from implementation of the proposed AFRC F-35A mission at Davis-Monthan AFB would primarily affect air quality in the Tucson region and eastern Pima County. Pima County Department of Environmental Quality (PDEQ) has adopted standards that are the same as the National Ambient Air Quality Standards (NAAQS) for purposes of regulating criteria air pollutant levels in Arizona. Table 3-6 in Chapter 3, Section 3.3 of this EIS presents the NAAQS.

DM3.3.1.1 Region of Influence and Existing Air Quality

Identifying the ROI for air quality requires knowledge of the pollutant type, source emission rates, the proximity of project emission sources to other emission sources, and local and regional meteorology. For inert pollutants (such as carbon monoxide [CO] and particulates in the form of dust), the ROI is generally limited to a few miles downwind from a source. The ROI for reactive pollutants such as O_3 can extend much farther downwind than for inert pollutants. The pollutant O_3 is formed in the atmosphere by photochemical reactions of previously emitted pollutants called precursors. Ozone precursors are mainly nitrogen oxides (NO_x) and photochemically reactive volatile organic compounds (VOCs). In the presence of solar radiation, the maximum effect of precursor emissions on O_3 levels usually occurs several hours after they are emitted and many miles from their source.

The USEPA designates all areas of the United States in terms of having air quality better (attainment) or worse (nonattainment) than the NAAQS. An area is in attainment of a NAAQS if its pollutant concentration remains below the standard value, as defined by the annual to tri-annual metrics described in Chapter 3, Section 3.3.1. Former nonattainment areas that have attained a NAAQS are designated as maintenance areas. Currently, eastern Pima County is designated by the USEPA as in attainment of the NAAQS for all pollutants (USEPA 2018a). However, the Tucson region that encompasses Davis-Monthan AFB is a maintenance area for the CO NAAQS.

In the 1970s and early 1980s, the Tucson Air Planning Area that encompasses Davis-Monthan AFB did not attain the CO NAAQS and a revision to the State Implementation Plan was required to comply with the Clean Air Act (CAA). Due to a reduction in emissions caused by federal emission standards for new vehicles, state clean fuels, and vehicle emissions testing programs, no violations of the CO NAAQS have been recorded in the region since 1984. The USEPA re-designated the region as in attainment for the CO standards on 25 April 2000. In the same year, the USEPA approved the first CO Limited Maintenance Plan for the region. This plan was updated and approved by the USEPA in 2009, with an effective date of January 2010 (Pima Association of Governments 2008). The plan maintains existing controls and contingency provisions and replaces the 2000 plan. This revision ensures maintenance of the CO standard through 2020.

The USEPA designated Pima County as in attainment of the 2015 O_3 NAAQS in April 2018. In August 2018, air monitoring data indicated that O_3 emissions measured at the Rincon Mountain District of Saguaro National Park exceeded the 2015 O_3 standard (Pima County 2018a). This is the first time any air monitoring station in Pima County had recorded O_3 emissions in excess of this recently promulgated standard. A violation of the NAAQS for O_3 occurs when the 3-year average of the fourth highest daily maximum 8-hour O_3 concentration within a region exceeds 0.070 parts per million. The period that comprises this violation includes years 2016 through 2018. The PDEQ is in the process of validating these O_3 data and they will then send documentation of these data to the USEPA for review. The current O_3 attainment designation will remain in effect until further action is taken by the USEPA.

DM3.3.1.2 Regional Air Emissions

Table DM3-21 summarizes estimates of annual emissions generated by activities within Pima County for year 2014. Emissions for Pima County were obtained from the National Emissions Inventory (NEI) process (USEPA 2018b). The majority of emissions within these regions occur from (1) on-road and nonroad mobile sources (VOCs, CO, NO_x, and carbon dioxide equivalent [CO_2e]), (2) industrial processes and fuel combustion by electrical utilities (NO_x and sulfur oxides [SO_x]), (3) solvent/surface coating usages (VOCs), and (4) fugitive dust (particulate matter less than or equal to 10 micrometers in diameter [PM_{10}]/particulate matter less than or equal to 2.5 micrometers in diameter [$PM_{2.5}$]).

Table DM3-21. Annual Emissions for Pima County, Arizona, 2014

Source Type	Air Pollutant Emissions (tons per year)						
	VOCs	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$	CO_2e (mt)
Stationary Sources	13,592	25,142	5,896	1,361	38,427	6,770	NA
Mobile Sources	11,044	106,943	19,329	122	1,347	852	4,361,094
Total Emissions[a]	**24,636**	**132,084**	**25,225**	**1,484**	**39,773**	**7,622**	**4,361,094**

[a] Calculated values and totals have been rounded; therefore, sum totals may not match the totals row.
Key: CO_2e (mt) = carbon dioxide equivalent in metric tons; NA = not available
Source: USEPA 2018b

DM3.3.1.3 Davis-Monthan AFB Emissions

The AFRC F-35A mission at Davis-Monthan AFB would replace activities associated with the 924 FG. This unit operates 24 A-10 aircraft at Davis-Monthan AFB. The proposed F-35A aircraft replacement action at Davis-Monthan AFB mainly would affect existing emissions from (1) A-10 operations, (2) A-10 engine maintenance and testing, and (3) Aerospace Ground Equipment (AGE). While the decrease of 30 personnel that would result from implementation of the proposed AFRC F-35A mission at Davis-Monthan AFB would result in virtually inconsequential changes in emissions from other base sources associated with the 924 FG (e.g., onsite government motor vehicles or privately owned vehicles), those reductions have been calculated as part of the build-out emission calculations for the action. Nonetheless, the main focus of the project air quality analysis remains emissions from existing and proposed aircraft-specific source categories to determine the net changes in emissions from the AFRC F-35A mission.

To estimate emissions from A-10 aircraft operations and AGE usages associated with the 924 FG mission at Davis-Monthan AFB, the analysis employed the USAF Air Conformity Applicability Model (ACAM) version 5.0.13a (Solutio Environmental, Inc. 2019). Table DM3-22 summarizes the annual emissions estimated for the existing A-10 operations of the 924 FG. Volume II, Appendix C, presents details of the emission calculations presented in Table DM3-22. The net emissions change from the decrease of 30 personnel (e.g., emissions from government and privately owned vehicle miles traveled by those 30 personnel) were calculated as a net reduction in the build-out emission calculations for the action.

Table DM3-22. Annual Emissions of Existing A-10 Operations from the 924 FG at Davis-Monthan AFB

Activity Type	Air Pollutant Emissions (tons per year)						
	VOCs	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$	CO_2e (mt)
Flight Operations and Engine Trim Tests – A-10s	41.59	118.12	7.35	1.83	11.87	5.28	5,074
Aircraft Engine Test Cells – A-10C	0.14	0.52	0.20	0.03	0.13	0.06	78
Aerospace Ground Equipment	65.56	91.30	139.20	6.81	17.74	17.19	4,475
Total Emissions[a]	**107.29**	**209.94**	**146.76**	**8.67**	**29.74**	**22.53**	**9,627**

[a] Calculated values and totals have been rounded; therefore, sum totals may not match the totals row.
Key: CO_2e (mt) = carbon dioxide equivalent in metric tons

DM3.3.1.4 Regional Climate

Meteorological data collected at the TUS are used to describe the climate of the Davis-Monthan AFB project region (WRCC 2018).

Temperature. Pima County is known for extreme heat in the summer months and mild conditions during the winter. The average high and low temperatures during the summer months at Davis-Monthan AFB range from about 100 to 68 degrees Fahrenheit (°F). The average high and low temperatures during the winter months range from 74 to 39°F.

Precipitation. Average annual precipitation for Davis-Monthan AFB is 11.4 inches. Annual precipitation in the region peaks in the summer months (July through September) due to monsoonal flow from the tropics. The peak monthly average rainfall of 2.4 inches occurs in July. Spring is the driest season, as the lowest monthly average of 0.2 inches occurs in May. Snowfalls in the region are rare and average 1.0 inch per year.

Prevailing Winds. Wind data collected in the Tucson area are used to describe the wind climate of the Davis-Monthan AFB project region (National Climatic Data Center 1998). The annual average wind speed at Davis-Monthan AFB is 8.3 miles per hour (National Climatic Data Center 1998). April through June experience the strongest winds, with a monthly average speed of 9 miles per hour during this period. The winds prevail from the southeast year round, except in June and July, when they prevail from the south-southeast.

DM3.3.1.5 Applicable Regulations and Standards

The Arizona Department of Environmental Quality (ADEQ) is responsible for enforcing air pollution regulations in Arizona. However, the PDEQ has the authority to regulate air quality in Pima County. The PDEQ enforces the NAAQS by monitoring air quality, developing rules to regulate and to permit stationary sources of air emissions, and contributing to the air quality attainment planning processes in Pima County. The PDEQ air quality regulations are found in Title 17 of the Pima County Code, "Air Quality Control" (Pima County 2018b).

DM3.3.2 Base Environmental Consequences

The air quality analysis estimated the magnitude of emissions that would result from construction and operation of the proposed AFRC F-35A mission at Davis-Monthan AFB. The estimation of operational impacts is based on the net change in emissions due to the replacement of existing A-10 aircraft operations with those of the proposed AFRC F-35A mission. Volume II, Appendix C, of this EIS presents the calculations used to estimate air pollutant emissions from proposed construction and operational sources at Davis-Monthan AFB.

The air quality analysis for the AFRC mission at Davis-Monthan AFB evaluates F-35A takeoff operations based on the three afterburner scenarios. Activity levels and resulting emissions for all other proposed operational activities would remain the same under each afterburner scenario.

The immediate area surrounding Davis-Monthan AFB within eastern Pima County is currently in attainment of all of the NAAQS. However, the Tucson region that encompasses Davis-Monthan AFB is a maintenance area for the CO NAAQS. Therefore, the analysis used the USEPA General Conformity Rule (GCR) *de minimis* threshold of 100 tons per year for CO and the prevention of significant deterioration permitting threshold of 250 tons per year for all other criteria pollutants as indicators of the significance of projected air quality impacts within the Davis-Monthan AFB project region.

DM3.3.2.1 Construction

The AFRC F-35A mission at Davis-Monthan AFB would require C&D and/or renovation of airfield facilities such as training facilities, hangars, runways, and maintenance and storage facilities. Air quality impacts resulting from the proposed construction activities would occur from (1) combustive emissions due to the use of fossil fuel-powered equipment and (2) fugitive dust emissions (PM_{10}/$PM_{2.5}$) from demolition and/or renovation activities or the operation of equipment on exposed soil. Prior to project initiation, the AFRC would determine if asbestos-containing materials (ACM) exist in any facilities proposed for demolition and/or renovation, and AFRC would comply with the requirements of the PDEQ Asbestos [National Emissions Standards for Hazardous Air Pollutants] NESHAP Notification & Activity Permit Application process (PDEQ 2018).

Construction activity data were developed to estimate construction equipment usages and areas of disturbed ground due to the proposed AFRC F-35A mission. These data were used as inputs to ACAM, which was used to estimate air emissions from proposed construction activities at Davis-Monthan AFB. The air quality analysis assumed that all construction activities for the proposed mission would begin in 2021 and be completed in 2023.

Inclusion of standard construction practices and LEED Silver certification into proposed construction activities would potentially reduce fugitive dust emissions generated from the use of construction equipment on exposed soil by 50 percent from uncontrolled levels. Chapter 3, Section 3.3.3.1, of this EIS describes the standard construction practices that would control fugitive dust.

Table DM3-23 presents estimates of emissions from the infrastructure improvements for the AFRC F-35A mission at Davis-Monthan AFB. These data show that even if total construction emissions occurred in one year, the construction emissions would be well below the annual indicator thresholds. Therefore, temporary construction emissions associated with the proposed AFRC F-35A mission would not result in significant air quality impacts. Regulations and procedures associated with the demolition of buildings containing asbestos are discussed in Section DM3.11.2.6.

Table DM3-23. Total Construction Emissions from the AFRC F-35A Mission at Davis-Monthan AFB

Construction Activity	Air Pollutant Emissions (tons)						
	VOCs	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$	CO_2e (mt)
Demolish Buildings	0.06	0.48	0.43	0.00	0.43	0.02	101
Renovate/Construct Buildings	0.86	3.49	3.16	0.01	0.34	0.14	722
Street/Ramp/Runway Repairs	0.16	0.93	0.92	0.00	0.65	0.05	175
Total Emissions[a]	**1.09**	**4.90**	**4.51**	**0.01**	**1.42**	**0.21**	**995**
Annual Indicator Threshold	**250**	**NA**	**250**	**250**	**250**	**250**	**NA**
General Conformity *De Minimis* Threshold	**NA**	**100**	**NA**	**NA**	**NA**	**NA**	**NA**

[a] Calculated values and totals have been rounded; therefore, sum total may not match the totals row.
Key: CO_2e (mt) = carbon dioxide equivalent in metric tons; NA = not applicable

DM3.3.2.2 Operations

The proposed AFRC F-35A mission at Davis-Monthan AFB would primarily generate air emissions from (1) F-35A aircraft operations, (2) F-35A engine maintenance and testing, and (3) AGE. The analysis also includes emissions that would occur from the net change in commuting activities between the proposed F-35A and existing A-10 missions at Davis-Monthan AFB. Because the mission would result in a net reduction of 30 personnel, this would produce a net reduction in emissions from commuting activities. To estimate emissions from the F-35A mission at Davis-Monthan AFB, the analysis employed the ACAM. The air quality analysis assumed that the proposed mission would reach full operations and resulting emissions in 2024 after the completion of all required infrastructure improvements.

The analysis of proposed aircraft operations is limited to operations that would occur within the lowest 3,000 feet of the atmosphere, as this is the typical depth of the atmospheric mixing layer, where the release of aircraft emissions would affect ground-level pollutant concentrations. In general, aircraft emissions released above the mixing layer would not appreciably affect ground-level air quality.

During scoping, people submitted comments regarding the pollutant impacts that could result from implementation of the proposed AFRC F-35A mission. Table DM3-24 summarizes the annual operational emissions that would result from implementation of the proposed mission at Davis-Monthan AFB. The data in Table DM3-24 show that the replacement of existing A-10 aircraft operations with the proposed AFRC F-35A operations would result in reductions of all criteria pollutant emissions for the three afterburner scenarios. The emission reductions would primarily result from differences in the emission rates and durations of operation between the (1) F-35A and A-10 aircraft and (2) AGE inventories for each aircraft. The data in Table DM3-18 also show that scenario emissions would increase with increasing afterburner use rates. Implementation of Scenario C (95 percent afterburner rate) would result in the most emissions, but the emissions would increase by less than 6 percent for any criteria pollutant compared to Scenario A (5 percent afterburner rate).

Table DM3-24. Projected Annual Emissions from the AFRC F-35A Mission Operations at Davis-Monthan AFB, 2024 – All Afterburner Scenarios

Afterburner Scenario/Activity Type	Air Pollutant Emissions (tons per year)[a]						
	VOCs	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$	CO_2e (mt)
Scenario A							
Flight Operations and Engine Trim Tests – F-35A	0.14	60.38	54.35	5.98	9.52	8.55	16,553
Aircraft Engine Test Cells – F-35A	0.00	0.41	1.95	0.13	0.17	0.15	374
Aerospace Ground Equipment	8.20	14.39	23.60	1.65	2.43	2.36	1,130
Net Commuting Activities (F-35A - A-10 staff)	(0.05)	(0.53)	(0.04)	(0.00)	(0.00)	(0.00)	(50)
Total F-35A Mission Emissions	**8.29**	**74.65**	**79.86**	**7.76**	**12.12**	**11.06**	**18,007**
Existing 924 FG Emissions	**107.29**	**209.94**	**146.76**	**8.67**	**29.74**	**22.54**	**9,627**
F-35A Mission Minus 924 FG Emissions	**(98.99)**	**(135.29)**	**(66.89)**	**(0.91)**	**(17.62)**	**(11.47)**	**8,381**
Scenario B							
Total F-35A Mission Emissions	**8.30**	**76.77**	**80.16**	**7.86**	**12.21**	**11.14**	**17,946**
F-35A Mission Minus 924 FG Emissions	**(98.99)**	**(133.17)**	**(66.59)**	**(0.81)**	**(17.53)**	**(11.39)**	**8,320**
Scenario C							
Total F-35A Mission Emissions	**8.30**	**78.88**	**80.31**	**7.95**	**12.29**	**11.21**	**17,862**
F-35A Mission Minus 924 FG Emissions	**(98.99)**	**(131.06)**	**(66.44)**	**(0.72)**	**(17.45)**	**(11.32)**	**8,236**
Indicator Threshold	**250**	**NA**	**250**	**250**	**250**	**250**	**NA**
General Conformity *De Minimis* Threshold	**NA**	**100**	**NA**	**NA**	**NA**	**NA**	**NA**

[a] Calculated values and totals have been rounded; therefore, sum totals may not match the totals row.
Key: CO_2e (mt) = carbon dioxide equivalent in metric tons; NA = not applicable; ( ) = negative values and net reductions in emissions

The net change in emissions that would result from implementation of the proposed AFRC F-35A mission at Davis-Monthan AFB would not exceed any indicator threshold. Therefore, operational emissions associated with the proposed AFRC F-35A mission at Davis-Monthan AFB would not result in significant air quality impacts.

The VOC, CO, NO_x, SO_x PM_{10}, and $PM_{2.5}$ emission reductions estimated to result from implementation of the proposed AFRC F-35A mission at Davis-Monthan AFB would result in the following positive effects within the Tucson region:

- VOC and NO_x emission reductions would result in a net benefit to ambient O_3 levels.
- CO, PM_{10}, and $PM_{2.5}$ emission reductions would result in net benefits to these ambient pollutant levels.
- Proposed operations would generate hazardous air pollutants (HAPs), primarily in the form of VOCs and particulates from the combustion of aviation fuel in F-35A aircraft and AGE. The reductions in VOC, PM_{10}, and $PM_{2.5}$ emissions would result in similar net reductions of HAPs. These emission reductions would result in a net benefit to ambient HAP levels.

DM3.3.2.3 General Conformity Statement

The above analyses show that the net change in annual CO emissions that would result from implementation of the AFRC F-35A mission at Davis-Monthan AFB would remain below the applicable conformity *de minimis* threshold of 100 tons per year. As a result, the proposed AFRC F-35A mission at Davis-Monthan AFB would not require a conformity determination under the GCR.

DM3.3.3 Airspace Affected Environment

Projected AFRC F-35A aircraft operations in the airspace proposed for use and along the flight routes between these locations and Davis-Monthan AFB would affect air quality within these portions of southern Arizona and southwestern New Mexico. Most of the regions below and adjacent to these areas currently attain all of the NAAQS. Areas that do not attain an NAAQS or are maintenance areas for these standards include (1) the Ajo sulfur dioxide (SO_2) maintenance area and Ajo PM_{10} moderate nonattainment area within Pima County, (2) the Douglas SO_2 maintenance area and Douglas-Paul Spur PM_{10} moderate nonattainment area within Cochise County, (3) the San Manuel SO_2 maintenance area in Pinal County, (4) the Hayden SO_2 maintenance area and Hayden Planning Area PM_{10} moderate nonattainment area within Gila and Pinal Counties, and (5) the Miami SO_2 maintenance area and Miami Planning Area PM_{10} moderate nonattainment area within Gila and Pinal Counties.

Several of the airspace areas proposed for use by AFRC F-35A pilots also are in close proximity to or overlie pristine Class I areas, including (1) the Galiuro Wilderness Area, (2) the Chiricahua Wilderness Area, (3) the Chiricahua National Monument Wilderness Area, (4) the Superstition Wilderness Area, (5) the Sierra Ancha Wilderness Area, and (6) the Mount Baldy Wilderness Area. Therefore, due to the proximity of these pristine areas to projected aircraft operations, this EIS provides a qualitative analysis of the potential for projected emissions to affect air quality within these areas.

DM3.3.4 Airspace Environmental Consequences

AFRC F-35A pilots operating from Davis-Monthan AFB would operate in the same airspace and training areas as existing 924 FG pilots, but at higher altitudes. The proposed AFRC F-35A operations in these areas would occur above 3,000 feet AGL about 99 percent of the time (Table DM2-6) and therefore these operations would not appreciably affect ground-level air quality. A-10 pilots from the 924 FG currently conduct 46 percent of operations below 3,000 feet AGL.

To quantify the air quality effects of the F-35A mission within the Davis-Monthan AFB airspaces and training areas, the analysis employed the ACAM to estimate the net change in emissions between the replacement of existing A-10 aircraft operations with proposed F-35A aircraft operations within these areas. The analysis used aircraft flight profiles developed by the project noise analyses as inputs to the ACAM. The analysis focused on operations within the lowest 3,000 feet of the atmosphere.

Table DM3-25 presents the annual operational emissions that would result from implementation of the F-35A mission within the Davis-Monthan AFB airspaces and training areas. These data show that the proposed changes in aircraft operations within these areas would result in net reductions in all air pollutant emissions within 3,000 feet AGL.Therefore, the proposed AFRC F-35A mission would result in a net improvement to ground-level air quality within proposed airspaces and training areas. This would also be the case for projected impacts within any pristine Class I area. Therefore, implementing the proposed AFRC F-35A mission in existing airspace and training areas would not result in significant air quality impacts.

Table DM3-25. Projected Annual Emissions from the AFRC F-35A Mission Operations within Davis-Monthan AFB Airspaces and Training Areas - 2024

Activity Type	Air Pollutant Emissions (tons per year)[a]						
	VOCs	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$	CO_2e (mt)
Existing 924 FG Flight Operations – A-10	(0.21)	(3.94)	(19.14)	(1.91)	(4.76)	(3.01)	(5,785)
AFRC Mission Flight Operations – F-35A	0.00	0.22	11.89	0.58	0.63	0.57	1,748
F-35A Mission Minus 924 FG Emissions	**(0.21)**	**(3.72)**	**(7.25)**	**(1.34)**	**(4.13)**	**(2.44)**	**(4,038)**
Indicator Threshold	**250**	**250**	**250**	**NA**	**NA**	**250**	**NA**
General Conformity *De Minimis* Threshold	**NA**	**NA**	**NA**	**100**	**100**	**NA**	**NA**

[a] Calculated values and totals have been rounded; therefore, sum totals may not match the totals row.
Key: CO_2e (mt) = carbon dioxide equivalent in metric tons; NA = not applicable; ( ) = negative values and net reductions in emissions

DM3.3.5 Summary of Impacts to Air Quality

Pima County is in attainment for all criteria pollutants but is designated as a maintenance area for CO. However, the Tucson region that encompasses Davis-Monthan AFB is a maintenance area for the CO NAAQS. As shown in Table DM3-26, calendar year annual emissions from construction activities and the net change in aircraft operations around the base would not exceed threshold levels. Emissions would decrease in training airspace. Impacts to air quality resulting from implementation of the AFRC F-35A mission would not be significant.

Table DM3-26. Summary of Calendar Year Annual Emissions from the AFRC F-35A Mission at Davis-Monthan AFB

Activity/Year	Air Pollutant Emissions (tons)						
	VOCs	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$	CO_2e (mt)
Construction – Year 2021	0.37	2.51	2.34	0.01	1.31	0.10	537
Construction – Year 2022	0.37	2.38	2.17	0.01	0.11	0.11	458
Construction – Year 2023	0.36	0.00	0.00	0.00	0.00	0.00	0
Net Change in Operations – Most Emissive Afterburner Scenario C – Year 2024+	(98.99)	(131.06)	(66.44)	(0.72)	(17.45)	(11.32)	8,236
Annual Indicator Threshold	**250**	**NA**	**250**	**250**	**250**	**250**	**NA**
General Conformity *De Minimis* Threshold	**NA**	**100**	**NA**	**NA**	**NA**	**NA**	**NA**

Key: CO_2e (mt) = carbon dioxide equivalent in metric tons; NA = not applicable; ( ) = negative values and net reductions in emissions.

DM3.4 SAFETY

Air Force Instruction (AFI) 90-801, *Environment, Safety, and Occupational Health Councils*, implements the risk management guidance within Air Force Policy Directive (AFPD) 90-8, *Environment, Safety, and Occupational Health Management and Risk Management*. All USAF missions and daily routines involve risk. Requirements outlined in this document provide for a process to maintain readiness in peacetime and achieve success in combat while safeguarding people and resources. The safety analysis contained in the following sections addresses issues related to the health and well-being of both military personnel and civilians living on or near Davis-Monthan AFB and under the training airspace.

Specifically, this section provides information on explosive safety; fire risk and management; hazards associated with aviation safety (Accident Potential Zones [APZs]); aircraft mishaps; and Bird/Wildlife Aircraft Strike Hazard [BASH]).

The FAA is responsible for ensuring safe and efficient use of U.S. airspace by military and civilian aircraft and for supporting national defense requirements. To fulfill these requirements, the FAA has established safety regulations, airspace management guidelines, a civil-military common system, and cooperative activities with the DoD. The primary safety concern with regard to military training flights is the potential for aircraft mishaps (i.e., crashes) to occur, which could be caused by mid-air collisions with other aircraft or objects, weather difficulties, mechanical failures, pilot error, or bird-aircraft strikes.

DM3.4.1 Base Affected Environment

DM3.4.1.1 Explosive Safety

Facilities/activities with explosive safety quantity-distance (ESQD) arcs at Davis-Monthan AFB include the Munitions Storage Area (MSA), the Explosive Ordnance Demolition area, the alert hangar and apron, combat aircraft parking areas, hot cargo pad, aircraft explosives cargo area, the arm/de-arm aprons on the airfield, the AMARG’s Explosive Ordnance Disposal area, and ammunition shipping/inspection/storage facilities. The ESQD arcs at Davis-Monthan AFB are shown on Figure DM3-5.

DM3.4.1.2 Fire Risk and Management

Day-to-day O&M activities conducted at the base are performed in accordance with applicable USAF safety regulations, published USAF Technical Orders (TOs), and standards prescribed by Air Force Occupational Safety and Health (AFOSH) requirements including AFI 91-202, *The US Air Force Mishap Prevention Program*. Aircraft Rescue Firefighting services are available on a 24-hour basis. Upon notification of an in-flight or ground emergency, the crash and rescue services personnel would coordinate emergency services.

Davis-Monthan AFB Fire Emergency Services responds to many different types of emergencies within their area of responsibility. These include, but are not limited to, aircraft and rescue firefighting emergencies, structural response, emergency medical services, hazardous material and technical rescue response such as confined space emergencies. The base is equipped with two command vehicles, two engines, one ladder, three aircraft rescue and firefighting trucks, one 5,000-gallon tanker, a hazardous material response vehicle, a technical rescue vehicle, a 1,000-gallon foam trailer and various support units/vehicles. The Fire Emergency Services Flight also has local mutual-aid agreements with the City of Tucson Fire Department and the 162 FW.

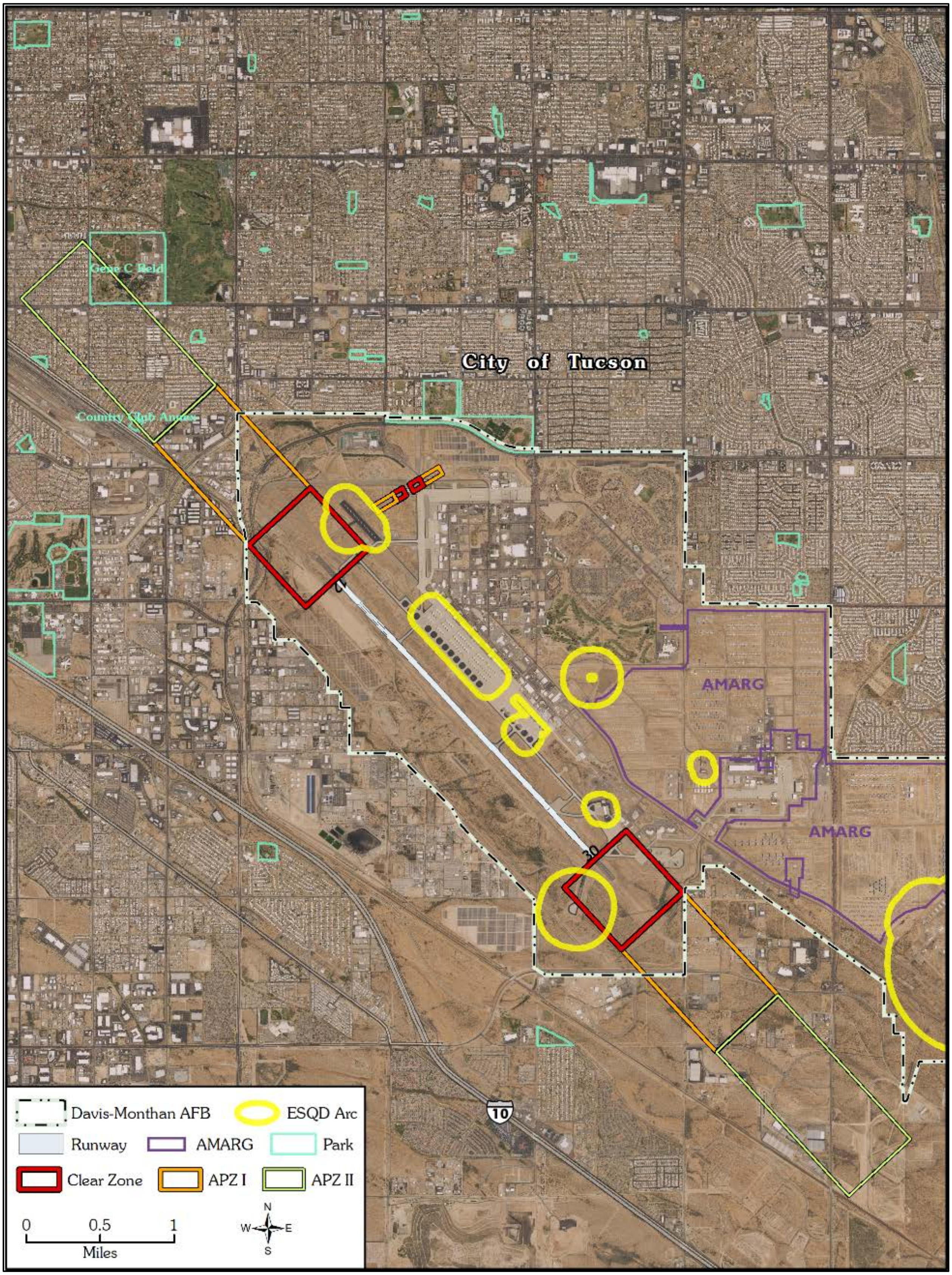

Figure DM3-5. CZs and APZs at Davis-Monthan AFB

Davis-Monthan AFB adheres to specific emergency-response procedures contained in TO 00-105E-9, *Aerospace Emergency Rescue and Mishap Response Information,* for aircraft mishaps involving composite materials. TO 00-105E-9 contains a section (Chapter 3) on Mishap Composite Awareness.

DM3.4.1.3 Accident Potential Zones

In accordance with DoDI 4165.57, APZs are established at military airfields to delineate recommended compatible land uses for the protection of people and property on the ground. APZs define the areas of a military airfield that would have the highest potential to be affected if an aircraft mishap were to occur. Air Installations Compatible Use Zones (AICUZ) guidelines identify three types of APZs for airfields based on aircraft mishap patterns: the Clear Zone (CZ), APZ I, and APZ II. The standard USAF CZ for Class B runways such as Runway 12/30 at Davis-Monthan AFB is a rectangle area that extends 3,000 feet from the end of a runway, is 3,000 feet wide, and identifies the area with the highest probability for mishaps. APZ I, which typically extends 5,000 feet from the end of the CZ, has a lower mishap probability, and APZ II, which typically extends 7,000 feet from the end of APZ I, has the lowest mishap probability of the three zones. If needed, to reflect different departure and arrival patterns, both the shape and size of APZs can be modified.

The CZs are located entirely within base boundaries. The northern APZ I is approximately 40 percent on-base and 60 percent off-base. The southern APZ I is approximately 20 percent on-base and 80 percent off-base. Both the northern and southern APZs II are almost entirely off-base. The northern APZ I has 24 acres of residential land use, which is incompatible. No other incompatible land use is found in the northern or southern CZs or APZs. Conditionally compatible land uses exist in both the northern and southern APZs. These include residential, commercial, industrial, and public/semi-public land uses (Arizona Department of Commerce 2004). Figure DM3-5 depicts the CZs and APZs at Davis-Monthan AFB.

DM3.4.1.4 Aircraft Mishaps

Mishaps are defined as any damage that occurs on the ground or in flight. As shown in Table DM3-27, mishaps are classified into four categories, based on the severity of the mishap relative to property damage or personnel injury. Class A mishaps are the most severe with total property damage of $2 million or more or a fatality and/or permanent total disability. Comparison of Class A mishap rates for various engine types, as calculated per 100,000 flying hours provide the basis for evaluating risks among different aircraft and levels of operations. This safety section analyzes existing and projected Class A mishap potentials based on flying hours and aircraft types. While USAF mishaps affecting the general public are extremely rare, two mishaps involving Davis-Monthan AFB aircraft in the Tucson area have resulted in civilian casualties. These events happened 40 and 51 years ago and involved a single-engine A-7 and a twin-engine F-4, respectively. Since then, significant improvements have been made in aircraft safety and procedures.

Table DM3-27. Aircraft Class Mishaps

Mishap Class	Total Property Damage	Fatality/Injury
A	$2,000,000 or more and/or aircraft destroyed	Fatality or permanent total disability
B	$500,000 or more but less than $2,000,000	Permanent partial disability or three or more persons hospitalized as inpatients
C	$50,000 or more but less than $500,000	Nonfatal injury resulting in loss of one or more days from work beyond day/shift when injury occurred
D	$20,000 or more but less than $50,000	Recordable injury or illness not otherwise classified as A, B, or C

Aircraft flight operations at Davis-Monthan AFB are governed by standard flight rules. Aircrews ensure flight safety when operating at the airfield by complying with all safety and aircraft operating requirements. No Class A mishaps have occurred during the past 3 years at Davis-Monthan AFB. Four Class B mishaps occurred in the same time period, two (A-10C and C-27J) were related to foreign object debris engine damage and the other two were engine related (A-10C and EC-130H). These Class B mishaps did not result in injury. The lifetime Class A mishap rate for the A-10 is 1.88 for every 100,000 hours of flight time (USAF 2019).

DM3.4.1.5 Bird/Wildlife-Aircraft Strike Hazard

Bird and wildlife-aircraft strikes and the hazards they present form another safety concern for aircraft operations. Bird/wildlife-aircraft strikes constitute a safety concern because of the potential for damage to aircraft or injury to aircrews or local populations if an aircraft crash should occur in a populated area.

According to the Air Force Safety Center (AFSEC) BASH statistics, from 1995 to 2016, where altitude at time of strike was known, more than 50 percent of the strikes occurred below 400 feet AGL, and 90 percent occurred below 2,000 feet AGL (USAF 2017). Waterfowl generally present the greatest BASH potential due to their flocking flight patterns and because, when migrating, they can be encountered at altitudes up to 21,000 feet AGL. Raptors also present a substantial hazard due to their size and soaring flight patterns. In general, the threat of bird-aircraft strikes increases during March and April and from August through November due to migratory activities. The USAF BASH Team maintains a database that documents all reported bird/wildlife-aircraft strikes. Historic information across the USAF for the past 20 years indicates that 11 USAF aircraft have been destroyed and five fatalities have occurred from bird/wildlife-aircraft strikes, with the last Class A mishap occurring in 2016 (USAF 2017).

The USAF BASH program was established to minimize the risk for collisions of birds and aircraft and the subsequent loss of life and property. AFI 91-202 requires each flying unit in the USAF to develop a BASH plan to reduce hazardous bird/animal activity relative to airport flight operations. The intent of each plan is to reduce BASH issues at the airfield by creating an integrated hazard abatement program through awareness, avoidance, monitoring, and actively controlling bird and animal population movements. Some of the procedures outlined in the plan include monitoring the airfield for bird activity, issuing bird hazard warnings, initiating bird avoidance procedures when potentially hazardous bird activities are reported, and submitting BASH reports for all incidents. The 355 FW BASH Plan, which also provides BASH guidelines to 924 FG pilots, provides specific guidance and assigns responsibilities in developing an effective bird strike hazard reduction program for Davis-Monthan AFB (355 FW 2018).

From 2016 to present, the 355 FW recorded 83 bird strikes at Davis-Monthan AFB, with 55 of these occurring in 2016 (Foltz 2018). The concentration of birds at and around Davis-Monthan AFB poses a risk to flying operations. The terrain, bodies of water, and climate are ideal living conditions for birds year-round, as well as migratory species. Davis-Monthan AFB is located in the extreme eastern edge of the Pacific Migratory Flyway. Davis-Monthan AFB-specific wildlife hazards to air operations historically include mourning doves, ravens and raptors (hawks and falcons). Davis-Monthan AFB is also home to other desert wildlife including road runners, quail, burrowing owls, javelinas, and coyotes. Coyote strikes are less common than bird strikes, but have much higher potential to cause damage (355 FW 2018).

The Davis-Monthan AFB BASH Plan is implemented in two phases. The first phase is implemented outside of migration season (February to October). During this phase aircraft are operated corresponding to current Bird Watch Conditions (BWC) which are categorized as Low, Moderate, or Severe. BWC Severe or Moderate requires action from the installation's wildlife dispersal team to reduce the BWC to Low as soon as possible. Phase II of the plan is used in conjunction with BWC procedures during the migratory season (September through January). Phase II elements include procedures for operations that occur one hour before to one hour after sunrise/sunset and or any other designated BASH window including weighing the benefits of the mission versus the increased bird strike risk when scheduling missions as well as visually surveying the airfield for significant bird activity prior to first takeoff (355 FW 2018).

The BASH Plan also establishes implementation procedures and actions to minimize the potential of bird-aircraft strikes. Such measures include eliminating broad-leaf weeds, maintaining grass heights between 7 and 14 inches, and periodic inspection requirements for ponding and proper drainage on the airfield whenever possible to reduce insect breeding (insects are a major food source for birds during much of the year). BASH reduction techniques currently employed by the base include abating nuisance avian species, pyrotechnics, and depredation when necessary (355 FW 2018).

DM3.4.2 Base Environmental Consequences

O&M activities conducted on Davis-Monthan AFB would continue to be performed in accordance with all applicable safety directives. No specific aspects of F-35A O&M would create any unique or extraordinary safety issues. Refer to Chapter 2, Section 2.3.4.2, for a discussion of the types of defensive countermeasures and ordnance that would be used by AFRC F-35A pilots. Only approved weapons systems would be used by AFRC F-35A pilots on the impact training ranges and pilots would adhere to all flare and live-fire use restrictions.

No unique construction practices or materials would be required as part of any of the demolition, renovation, or construction projects associated with the proposed AFRC F-35A mission. All renovation and construction activities would be completed in compliance with all applicable OSHA regulations to protect workers. In addition, the newly constructed buildings would be built in compliance with antiterrorism/force protection requirements and explosives safety requirements. The USAF does not anticipate any significant safety impacts to result from construction, demolition, or renovation if all applicable AFOSH and OSHA requirements are implemented. In addition, O&M of the new munitions buildings would not result in significant safety impacts.

Although emergency and mishap response plans would be updated, the proposed AFRC F-35A mission at Davis-Monthan AFB is not expected to create new or unique ground safety issues. Emergency and mishap response plans would be updated to include procedures and response actions necessary to address a mishap involving AFRC F-35A aircraft and associated equipment. With this update, airfield safety conditions would remain similar to baseline conditions. As indicated in Section DM3.4.2.2, base Fire and Emergency Services would continue to be party to mutual-aid support agreements with nearby communities.

DM3.4.2.1 Explosive Safety

The construction and operation of the new munitions maintenance building, munitions operations building, flare storage building, and munitions igloo would comply with Department of Defense Explosives Safety Board (DDESB) Standard 6055.09, *DoD Ammunition and Explosives Safety Standards* (DoD 2008), Air Force Manual (AFMAN) 91-201, *Explosives Safety Standards* (USAF 2017) and AFMAN 32-1084, *Facility Requirements* (USAF 2016). The new buildings' ESQD arcs would be calculated and sited to remain within current ESQD arcs and to be compatible with existing facilities. No changes to explosive safety would result from the construction and operation of the proposed facilities at Davis-Monthan AFB.

DM3.4.2.2 Fire Risk and Management

Fire and crash response would continue to be provided by Davis-Monthan AFB Fire and Emergency Services. TO 00-105E-9 provides guidance on fire response to aircraft containing composite materials, including the F-35A. Firefighters would continue to be fully trained and appropriately equipped for crash and rescue response and the proposed AFRC F-35A beddown would not change these abilities. Aircraft pre-incident plans would be developed for the F-35A. Aircraft pre-incident plans are required to be reviewed, validated and/or updated annually or anytime there is a change to TO 00-105E-9 for the applicable aircraft. Equipment and training specific to addressing F-35A mishaps would be obtained and conducted prior to beddown. Additionally, Davis-Monthan AFB would keep local firefighting departments informed about any new information or firefighting techniques associated with composite materials should an accident occur.

DM3.4.2.3 Accident Potential Zones

No changes to existing APZs or CZs would be required to accommodate AFRC F-35A operations. As documented in Section DM3.4.1.3, there is incompatible residential development in the northern APZ I. For the reasons described in Section DM3.4.2, implementation of the AFRC F-35A mission would not increase the safety risk to these or other off-base areas. Davis-Monthan AFB would continue to work with communities and developers to apply the AICUZ guidelines.

DM3.4.2.4 Aircraft Mishaps

Implementation of the proposed AFRC F-35A mission at Davis-Monthan AFB would replace the existing AFRC A-10 mission operated by the 924 FG. During public scoping, several commenters were concerned with the flight safety of the single-engine F-35A, as well as the increased use of composite aerospace materials in the construction of the F-35A. Although the A-10 does have some composite material in wing leading edges, composites were not extensively used in A-10 construction. Approximately 42 percent of the F-35A, by weight, is comprised of composite materials (Air Force Research Laboratory 2015).

DM3.4.2.4.1 Flight Safety

In general, twin-engine aircraft have a lower mishap rate than single-engine aircraft. However, it is also true that aircraft with newer engines and designs have a lower mishap rate than aircraft with older engines and designs (Table DM3-28) and that the safety and reliability of single-engine USAF fighter aircraft has increased substantially over time. Table DM3-28 demonstrates the decreases in engine-related and lifetime mishap rates for 11 historic and current single-engine aircraft. The Pratt & Whitney F135 engine used in the F-35A was derived from the F119 engine, which is used in the F-22 Raptor. The F-22 features a 0.92 lifetime engine-related Class A flight mishap rate (USAF 2020).

Historical trends of USAF aircraft show that mishaps of all types decrease the longer an aircraft is operational. For example, when the last single-engine fighter fielded by the USAF (F-16) surpassed 100,000 hours in 1982, its Class A rate was 15.83 with four fatal mishaps (USAF 2018).

Since then, the mishap rate for the F-16 has decreased substantially. In 2019, the F-16 had a lifetime Class A mishap rate of 3.35, and its rate for the last 10 years is 1.84 (USAF 2019). Similarly, in 1979, when the A-10 surpassed 100,000 hours, its Class A rate was 9.24 with four fatalities recorded (USAF 2019). The A-10 has a lifetime Class A mishap rate of 1.88, and its rate for the last 10 years is 0.45 (USAF 2019).

Table DM3-28. Class A Flight Mishap Rates

Decade Introduced	Aircraft/Engine	Engine-Related Cumulative Class A Mishap Rate	Engine-Related Class A Mishap Rate Last 6 Quarters	Lifetime Class A Mishap Rate
1950s	F-100/ J57	5.61	No longer in service	21.22
	F-102/ J57	3.41	No longer in service	NA
	F-104/ J79	9.48	No longer in service	NA
	F-105/ J75	4.56	No longer in service	12.15
	F-106/ J75	2.04	No longer in service	NA
1960s	A-7/TF41	1.73	No longer in service	5.71
1970s	F-16/ F100-200	1.84	No longer in service	3.43
1980s	F-16/ F110-100	1.06	0.76	
	F-16/ F100-220	0.96	0	
1990s	F-16/ F110-129	0.85	0	
	F-16/ F100-229	0	0	

Key: NA = not available

As of November 2019, the F-35A has amassed more than 96,000 hours of flight time with three Class A mishaps, resulting in a mishap rate of 3.11 (Table DM3-29). These mishaps included an engine failure during takeoff preparation (the aircraft was safely brought to a halt), an aborted takeoff with damage confined to the engine, and a hydraulic failure resulting in collapsed nose landing gear that occurred after landing and parking. No injuries occurred during these events.

Table DM3-29. F-35A Class A Flight Mishap History

Fiscal Year	Class A		Destroyed		Fatal		Hours Flown Per Year	Cumulative Flight Hours
	Number of Mishaps	Rate	Aircraft	Rate	Pilot	All		
2010	0	0.00	0	0.00	0	0	0	0
2011	0	0.00	0	0.00	0	0	0	0
2012	0	0.00	0	0.00	0	0	215	215
2013	0	0.00	0	0.00	0	0	1,283	1,498
2014	1	37.54	0	0.00	0	0	2,664	4,162
2015	0	0.00	0	0.00	0	0	7,467	11,629
2016	0	0.00	0	0.00	0	0	11,343	22,972
2017	0	0.00	0	0.00	0	0	22,714	45,686
2018	2	11.90	0	0.00	0	0	30,514	76,200
2019	0	0	0	0.00	0	0	20,113	96,313
Lifetime	**3**	**3.11**	**0**	**0.00**	**0**	**0**	**-**	**96,313**

Note: Flight "rates" are number of mishaps per 100,000 flight hours. Only Aviation "Flight" mishaps are reported here. An aviation "Flight" mishap is any mishap in which there is intent for flight and reportable damage to a DoD aircraft.
Source: USAF 2019

Because the F-35A has not yet reached 100,000 hours, this mishap rate is not directly comparable to other aircraft (Chapter 3, Section 3.4.3) with more flying hours. However, this rate does provide some indication of the overall safety of the F-35A aircraft. For example, this rate is lower than the 8.86 rate of the F-16 after a comparable amount of hours. It is also lower than the 9.24 rate of the A-10 after the A-10 reached 152,977 hours. The mishap rate for the F-35A is expected to decline as the aircraft becomes operationally mature.

During scoping, some comments were received regarding safety deficiencies of the F-35A aircraft. In a review of the production program for all models of the F-35 (A, B, and C), the Government Accountability Office has noted various deficiencies as this advanced aircraft is developed and brought into production (GAO 2018). These deficiencies are being addressed as full-rate production is approached. The USAF recognizes that certain components have yet to reach full capability. The USAF would not operate any aircraft should safety-of-flight concerns be present. During scoping a request was made to include Class A, B, and C mishap data in the EIS. Class A mishap data is discussed above. Data available online show no Class B mishaps for the F-35A. F-35A Class C mishaps deal with a wide range of mishaps that vary from maintenance personnel slipping to accidental damage to aircraft. These rates and causes are available online at https://www.militarytimes.com/news/your-military/2018/04/06/military-times-aviation-database/.

DM3.4.2.4.2 Composite Aerospace Materials

Advanced composites have been used in aircraft construction since the late 1960s, when a boron-epoxy rudder was installed on the F-4 jet. As composite technology has advanced, the percentage of composite material used in modern aircraft has increased. Types of composites include carbon fiber (e.g., graphite used in sporting equipment), metal-matrix composites (e.g., materials used on spacecraft and racing bicycles), and ceramic-matrix composites (e.g., medical implants). As noted by members of the public during the public scoping period, one disadvantage of certain composites is that these materials can degrade under extreme temperatures, resulting in the production of toxic fumes and airborne fibers. Because of these characteristics, composite aerospace materials present unique hazards to mishap responders. A burning aircraft could release toxic products, exposing personnel and the environment. Individuals exposed to a crash site could experience dermatological and respiratory problems. Exposure to these hazards would not necessarily end when a fire is extinguished; exposure to recovery crews, site security, the surrounding population, and others could continue (Navy 2016). Sampling at mishap sites of aircraft containing composite materials indicated the presence of respirable fibers/dusts in the air. In addition, laboratory studies have identified respirable fiber products and toxic gases (including high levels of CO, NO_x, and hydrogen cyanide) from burning composite materials (Navy 2016).

Due to the rarity of mishaps involving composite aerospace materials, no epidemiological data are available on personnel exposure to burning composites. Similarly, no studies have assessed the toxicology of carbon fibers generated in a fire scenario with extended post-exposure duration. Synergistic interactions between the solid, vapor, and gaseous combustion products have also not been determined. However, research and experience during several crash responses do indicate that composite fiber release is relatively low (Air Force Research Laboratory 2015).

In the event of a crash of an aircraft containing composite materials, the USAF would follow the guidance contained in the *Mishap Response Checklist for Advanced Aerospace Materials/Composites* (USAF Advanced Composites Program Office 1993).

- Areas in the immediate vicinity of the mishap site affected by direct and dense fallout from the fire/explosion-generated smoke plume would be evacuated, along with easily mobile critical equipment. Aircraft and flight operations exposed to the immediate fallout area would be altered or moved. All unprotected personnel would be restricted from assembling downwind of the crash site.
- The fire would be extinguished and composites cooled to below 300°F. Only firefighters equipped with a self-contained breathing apparatus would be authorized in the immediate vicinity of a burning/smoking mishap site until the fire chief declares the area safe. If possible, high-pressure water break-up and dispersal of composite structures would be avoided.
- The mishap site would be roped or cordoned off and a single entry/exit point would be established upwind of the wreckage. Only sufficiently protected individuals would be authorized in the immediate mishap site and peripheral areas.
- Should personnel other than those at the accident site be directly and substantially exposed to adverse material hazards, the medical staff would be consulted for evaluation and

tracking. Time permitting, the otherwise unthreatened populace in affected or fallout areas would be advised to do the following:

  - Remain indoors;
  - Shut external doors and windows;
  - Turn off forced air intakes; and
  - Await further notification.

- Specific aircraft hazards would be identified by inspection and consultation with the crew chief or aircraft specialists. Composite and other hazardous materials would be identified to mishap response personnel. The On-Scene Commander would be advised of all findings and recommendations.
- When exiting the crash site, personnel would use a high-efficiency particulate air-filtered vacuum, if available, to remove ACM from their outer clothing, work gloves, boots, headgear, and equipment. If unavailable, efforts would be made to wipe or brush off as much contamination as possible. Clean sites (i.e., tent or trailer) would be set up for donning/removal of personal protective equipment if practical.
- Non-disposable clothing involved with crash/fire-damaged composite parts would be removed and laundered as determined by the base environmental engineer. Personnel should shower (in cool water) prior to going off-duty to preclude injury from loose fibers. Portable showers would be provided, if necessary.
- Burned/mobile composite fragments and loose ash/particulate residue would be secured with firefighting foam or a fine water mist until a hold-down fixant material is applied to immobilize the fibers. Initial actions should concentrate on debris containment. Investigators, specific aircraft authority, and the base environmental engineer would be consulted before applying any fixant.

DM3.4.2.4.3 Aircraft Mishap Summary

Aviation in all forms has inherent risk and it is not possible to guarantee the future flight-safety risk of any aircraft. However, due to the current F-35A record, the increasing safety trend for single-engine fighter aircraft, and increases in safety as an airframe matures operationally, it is reasonable to expect nominal changes in flight-safety risk to result from implementation of the AFRC F-35 mission at Davis-Monthan AFB.

DM3.4.2.5 Bird/Wildlife-Aircraft Strike Hazards

The 0.7 percent increase in airfield operations that would result from implementation of the AFRC F-35A mission could negligibly increase the risk of bird/wildlife-aircraft strikes at Davis-Monthan AFB. The BASH plan would remain in place to reduce these risks.

DM3.4.3 Airspace Affected Environment

The airspace proposed for use by AFRC F-35A pilots from Davis-Monthan AFB includes Restricted Areas, MOAs, and ATCAAs (Table DM2-5 and Figure DM2-2). Aircraft flight operations are governed by standard flight rules. The volume of airspace encompassed by the combination of airspace elements constitutes the ROI for airspace safety. These training areas allow military flight operations to occur without exposing civil aviation users, military aircrews, or the general public to hazards associated with military training and operations. This section describes the existing safety procedures in the airspace proposed for use and the following section evaluates changes that would occur with the introduction of the F-35A.

DM3.4.3.1 Fire Risk and Management

Fires attributable to flares are rare for three reasons. First, the altitude and other restrictions on flare use minimize the possibility for burning material to contact the ground. Second, to start a fire, burning flare material must contact vegetation that is susceptible to burning at the time. The probability of a flare igniting vegetation is expected to be equally minimal. Third, the amount and density of vegetation, as well as climate conditions, must be capable of supporting the continuation and spread of fire.

DM3.4.3.2 Aircraft Mishaps

Aircraft flight operations are governed by standard flight rules. Specific safety requirements are contained in standard operating procedures that must be followed by all aircrews operating from the airfield (354 FW Instruction 11-250, *Flying Operations and Local Flying Procedures*, February 2012) to ensure flight safety.

DM3.4.3.3 Bird/Wildlife-Aircraft Strike Hazard

The primary threat to military aircraft operating in the airspace is migratory birds. The exact number of birds struck in the airspace areas is difficult to assess because small birds are not detected until post-flight maintenance checks and the location of such strikes cannot be determined. The BMGR lies within the Pacific Flyway, which is a minor flyway for waterfowl and a major flyway for raptors and small songbirds (CSU 2018). Refer to Section DM3.4.1.5 for more information regarding BASH and the actions that are implemented to minimize bird strikes.

DM3.4.4 Airspace Environmental Consequences

The addition of F-35A aircraft to the airspace would not require changes to the management or structure of existing airspace. AFRC F-35A pilots would fly mission profiles similar to those flown by A-10 pilots currently operating from Davis-Monthan AFB, only at higher average altitudes, including air-to-ground ordnance delivery, air combat training operations. Although mission profiles would be similar, unlike the A-10, AFRC F-35A pilots could fly supersonic in approved airspace. Implementation of the AFRC F-35A mission would result in a 5 percent increase in overall airspace sorties in the existing airspace proposed for use. As described in Section DM3.1.3.2, total operations would remain within the capability and capacity of the airspace and ranges proposed for use.

DM3.4.4.1 Fire Risk and Management

Flare and ordnance deployment in authorized ranges and airspace is governed by a series of regulations based on safety and environmental considerations and limitations. These regulations establish procedures governing the use of flares over ranges, other government-owned and -controlled lands, and nongovernment-owned or -controlled areas. Chapter 2, Section 2.3.4.2, details the flares and ordnance proposed for use by AFRC F-35A pilots.

The frequency of flare use would remain the same or decrease compared to baseline conditions. AFRC F-35A pilots would only use flares in compliance with existing airspace altitude and seasonal restrictions to ensure fire safety. Based on the emphasis of flight at higher altitudes, roughly 90 percent of F-35A flares released throughout the authorized airspace would occur above 15,000 feet MSL, further reducing the potential risk for accidental fires. Lands surrounding the air-to-ground training impact areas underlying airspace ensure public protection by restricting access to areas associated with laser use, emitters, and ordnance delivery. All guidance, regulations, and instructions for ordnance delivery at the ranges would be adhered to by AFRC F-35A pilots. Mutual fire response and suppression agreements would continue.

DM3.4.4.2 Aircraft Mishaps

Continued maintenance of situational awareness and use of available communications for tracking the scheduled and near real-time status of the SUAs would help maintain a safe flying environment for all concerned. Any changes to those capabilities and the current or future areas in which this service is provided would be appropriately addressed and communicated through those same venues. The majority of flight operations would be conducted over remote areas; however, in the unlikely event that an aircraft accident occurs, existing response, investigation, and follow-on procedures would be enforced to ensure the health and safety of underlying populations and lands. Implementation of flight safety procedures and compliance with all flight safety requirements would minimize the chances for aircraft mishaps.

DM3.4.4.3 Bird/Wildlife-Aircraft Strike Hazards

AFRC F-35A pilots would operate the aircraft in the same airspace environment as other pilots from Davis-Monthan AFB, but at a higher altitude than current aircraft. Therefore, the overall potential for bird-aircraft strikes would be reduced following the beddown of the F-35A. When BASH risk increases due to time of year, limits are and would continue to be placed on low-altitude flights. Briefings are provided to pilots when the potential exists for greater bird-strike risks within the airspace; AFRC F-35A pilots would also be subject to these procedures. Implementation of the AFRC F-35A mission would not result in significant BASH risks in the airspace proposed for use.

DM3.4.5 Summary of Impacts to Safety

No unique construction practices or materials would be required as part of any of the demolition, renovation, or construction projects associated with the proposed AFRC F-35A mission. All new construction would incorporate antiterrorism/force protection requirements. All construction would be conducted in compliance with DDESB Standard 6055.09, AFMAN 91-201, and AFMAN 32-1084, and the ESQD arcs would not change. As of November 2019, the F-35A has amassed more than 96,000 hours of flight time with a Class A mishap rate of 3.11. Since the F-35A has not yet reached 100,000 hours, this rate is not directly comparable to other aircraft. As the F-35A becomes operationally mature, the F-35 mishap rate would be expected to continue to decline, as supported by the documented decline in mishap rates for the F-16 and A-10. Davis-Monthan AFB has an active BASH program and the 0.7 and 5 percent increases in aircraft operations/sorties at Davis-Monthan AFB and in the airspace proposed for use, respectively could increase BASH incidents. However, this increase is not anticipated to be significant. With regard to airspace, AFRC F-35A pilots would use the same airspace used by 924 FG pilots. Impacts to safety resulting from implementation of the new mission are not anticipated to be significant.

DM3.5 SOIL AND WATER RESOURCES

DM3.5.1 Base Affected Environment

DM3.5.1.1 Soil Resources

Davis-Monthan AFB is located in the Tucson Basin between the Tucson Mountains and the Rincon, Santa Catalina and Santa Rita mountains in the Sonoran Desert (Davis-Monthan AFB 2012). This area is characterized by deep alluvial deposits transported from the adjacent mountains. Mohave soils and urban land is the most common soil classification at Davis-Monthan AFB. Other soils include Tubac gravelly loam and Cave soils and urban land. These soils are all deep, well-drained soils with a slight susceptibility to wind and water erosion. More detailed descriptions of the soils types on the base are provided by the Web Soil Service (Soil Survey Staff 2018).

DM3.5.1.2 Water Resources

DM3.5.1.2.1 Surface Water

The base is located along the border of the Upper Santa Cruz and Rillito Watersheds. A ridge extending roughly from the north to the south divides the installation with the west side of the installation draining to the Julian Wash. Julian Wash eventually flows into the Santa Cruz River. The east side of the installation drains to the Atterbury and Kinnison Washes and eventually flows into the Rillito River. None of the drainages on the base are perennial and only experience flows of water during and immediately after storms. The Atterbury Wash flows off the base and into Lakeside Park Lake, which is a man-made lake fed by stormwater runoff and groundwater. This lake is considered impaired by the ADEQ and eventually drains into the Pantano Wash. The stormwater drainage system on the base is directed by surface channels and underground pipes. The base has three large underground collector pipes that eventually drain into the retention pond located on the edge of the AMARG area.

The base is subject to the requirements of both the 2016 Small Municipal Separate Stormwater Sewer System (MS4) permit and the 2010 Multi-Sector General Permit (MSGP-2010) for industrial activities. Both permits are issued by the ADEQ under the Arizona Pollutant Discharge Elimination System (AZPDES) program. The MS4 permit is still in draft form and yet to become effective. ADEQ is also in the process of replacing the MSGP-2010 permit. However, the base continues to remain in compliance with the MSGP-2010 permit until the new permit becomes effective. The permit requires the base to enforce a program to address stormwater runoff from new development and redevelopment projects maintained by the installation.

As part of the MSGP, the base is required to prepare, implement and maintain a Stormwater Pollution Prevention Plan (SWPPP) (Davis-Monthan 2016a). The most recent version of the SWPPP was prepared in 2016 to address the requirements of the ADEQ 2016 Small MS4 permit. The plan is reviewed annually and revised as necessary.

The plan identifies 11 different drainage areas on the installation and includes the amount of impervious surface for each of the drainage areas. Each drainage area has one or more outfalls for a total of 16 outfalls. Six (6) of the 16 outfalls (001, 002A, 002B/C, 004, 007 and 010) are permitted by ADEQ for industrial stormwater discharges. With the exception of outfalls 002B/C, 007, and 010 (because they are substantially similar to outfall 004), stormwater discharge monitoring is conducted at the outfalls that are permitted for industrial discharge. Visual monitoring is conducted at 001, 002A, 004 and analytical monitoring is conducted at outfall 001 and 002 two times during each rain season. Because no deicing is performed at the installation, there are no monitoring requirements for the use of deicing fluids.

DM3.5.1.2.2 Groundwater

The primary water source for the base is groundwater from the Tinaja Beds of the Tucson Basin Aquifer. Groundwater is extracted through a series of wells on the base and is distributed through two separate distribution systems. The base does not have any interconnection with the City of Tucson or other water supply sources. Historically, the base has not experienced water shortages during peak demand. The wells combined with approximately 2.5 million gallons of water storage are considered more than adequate to meet the current needs of the base, with capacity for growth in demand.

DM3.5.1.2.3 Floodplains

According to the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRMs), the base is located in an area categorized as Zone D, "Areas in which Flood Hazards are Undetermined." FEMA FIRMs 04019C2265K and 04019C2262K indicate, via extrapolation, that the 100-year floodplains for three washes (the Julian Wash, Kinnison Wash, and Atterbury Wash) are located on Davis-Monthan AFB property. The extent of study of all three of the floodplains terminates just prior to entering the base. Therefore, it is assumed that the 100-year floodplains would be present on the base along these washes (Davis-Monthan AFB 2016a).

DM3.5.2 Base Environmental Consequences

DM3.5.2.1 Soil Resources

Implementation of the projects identified in Table DM2-1 would disturb approximately 15.2 acres of land, most of which has been previously disturbed. Impacts to soil resources near each of the project sites would result from ground disturbance (e.g., compaction; vegetation removal; and excavation for foundations, footings, or utilities). The soil types in the areas proposed for construction are generally acceptable for construction or urban development. Onsite soils (predominantly Mohave and Urban land) have moderate potential for wind and water erosion but only slight limitations for shallow excavations (Soil Survey Staff 2018). Implementation of management practices would minimize impacts to soil resources. These actions could include, but would not be limited to, installation of silt fencing and sediment traps, application of water sprays to keep soil from becoming airborne, and revegetation of disturbed areas as soon as possible, as appropriate. Therefore, potential impacts to soil resources would be minimal, and no significant impacts to soil resources would result from implementation of the AFRC F-35A mission.

DM3.5.2.2 Water Resources

DM3.5.2.2.1 Surface Water

Impacts to surface water can result from land clearing, grading, and moving soil resulting in localized increases in stormwater runoff volume and intensity. New impervious surfaces would be created and pollutants have the potential to be introduced into construction areas. However, in accordance with UFC 3-210-10, *Low Impact Development* (LID) (as amended, 2016) and the Emergency Independence and Security Act (EISA) Section 438 (42 *USC* §17094), any increase in surface water runoff as a result of the proposed construction would be attenuated through the use of temporary and/or permanent drainage management features (i.e., use of porous materials, directing runoff to permeable areas, and use of detention basins to release runoff over time). The integration of LID concepts incorporates site design and stormwater management principles to maintain the site's pre-development runoff rates and volumes to further minimize potential adverse impacts associated with increases in impervious surface area.

Although the majority of the projects are located near the north end of the runway, two projects would be constructed in the MSA. Prior to construction, the contractor would be required to obtain coverage under an AZPDES Construction General Permit (2013 CGP) by filing a NOI with the ADEQ and prepare a site-specific SWPPP to manage stormwater discharges during and after construction until the area is revegetated. Upon revegetation, the contractor would file the Notice of Termination with the ADEQ to terminate permit coverage. The USAF would specify compliance with the stormwater discharge permit in all of the contractor construction requirements. The contractor would be required to prepare the SWPPP in accordance with the ADEQ SWPPP template and the plan would include site-specific management practices to eliminate or reduce sediment and non-stormwater discharges. Other management practices could include the use of water sprays during construction to keep soil from becoming airborne, use of silt fences, covering soil stockpiles, using secondary containment for hazardous materials and revegetating the site in a timely manner.

The Atterbury Wash is located approximately one mile from the nearest construction site in the MSA. Strict adherence to the SWPPP and the management actions identified for each construction site would reduce potential impacts to the Atterbury Wash and other water resources.

The areas planned for development as part of the proposed mission are located in drainage area 001, which has an existing impervious surface of approximately 384 acres (Davis-Monthan AFB 2016a). Less than 1.6 acres of impervious surface would be added to the existing impervious surface of this subbasin resulting in less than a 1 percent increase in impervious surface in this drainage area and a less than one percent increase of impervious surface over the entire installation.

The existing Davis-Monthan AFB SWPPP also identifies control practices to be followed for spill prevention and response, routine inspection of discharges at sites, and proper training of employees. As part of the SWPPP, the base has identified individuals to be part of the Stormwater Pollution Prevention Team (SWPPT). The SWPPT meets annually, is responsible for all aspects of the SWPPP and provides recommendations to the Environment, Safety, and Occupational Health Leadership Committee regarding the SWPPP status, any deficiencies, and outfall monitoring data.

DM3.5.2.2.2 Groundwater

During scoping, people expressed concern about the new mission increasing demands for groundwater. Implementation of the AFRC F-35A mission would result in a decrease (-30) in personnel. Due to the decrease in personnel and the capacity for growth described in Section DM3.5.1.2.2, implementation of the AFRC F-35A mission is not anticipated to result in significant impacts to groundwater resources. See Section DM3.11.2.1 for a description of potable water use.

DM3.5.2.2.3 Floodplains

No floodplains are located near any of the areas proposed for infrastructure development on Davis-Monthan AFB. Therefore, impacts to floodplains would not result from implementation of the proposed AFRC F-35A mission.

DM3.5.3 Summary of Impacts to Soil and Water Resources

Implementation of the proposed action would disturb approximately 15.2 acres of land. Less than 1.6 acres of new impervious surface would be added resulting in less than a 1 percent increase in impervious surface in this drainage area. No floodplains would be impacted and a SWPPP would be prepared for the proposed construction. Implementation of management practices would minimize impacts to soil resources and projects would be designed and implemented in accordance with LID and EISA to minimize impacts to soil and water resources. Therefore, potential impacts to soil resources would be minimal, and no significant impacts to soil resources would result from implementation of the proposed action.

DM3.6 BIOLOGICAL RESOURCES

The ROI for biological resources is defined as the land area (habitats) that could potentially be affected by infrastructure and construction projects on the base, and the airspace where AFRC F-35A pilots would train. For the purposes of this biological resources analysis, the ROI for the proposed action and No Action Alternative includes Pima County, Arizona.

DM3.6.1 Base Affected Environment

DM3.6.1.1 Vegetation

Davis-Monthan AFB is located in the Tucson Basin at the east central edge of the Arizona Upland Subdivision of the Sonoran Desert ecoregion. Native vegetation transitions between two biotic communities, Paloverde-Cacti-Mixed Scrub Series and the Creosote-White Bursage Series. Historical livestock grazing and extensive development of the area have altered the overall vegetative structure. Most native vegetative cover has been disturbed by development, agriculture, landscaping, and the introduction of non-native and invasive plant species.

Davis-Monthan AFB includes mostly improved and semi-improved grounds that are urbanized, with mowed grassland or landscaped desert vegetation within the developed portions of the base. Mowed grasses are maintained at a height of approximately one to three inches and are composed primarily of Lehmann's lovegrass (*Eragrostis lehmanniana*) and Bermuda grass (*Cynodon* spp.). Common landscaped plant species include agaves (*Agave* sp.) and various cacti such as barrel (*Ferocactus* spp.), hedgehog (*Echinocereus* spp.), organ pipe (*Stenocereus thurberi*), prickly pear (*Opuntia* sp.), saguaro (*Carnegiea giganteus*), and senita (*Pachycereus schottii*). Common trees and shrubs include Mexican Washington fan palms (*Washingtonia gracilis*), blue and foothills palo verde (*Parkinsonia* spp.), mesquite (*Prosopis juliflora*, *P. chilensis*), junipers (*Juniperus* sp.), oleander (*Nerium* sp.), pines (*Pinus* spp.), desert broom (*Baccharis sarothroides*), and globemallow (*Sphaeralcea* spp.).

Unimproved grounds make up approximately 40 percent of the installation and consist of relatively undisturbed vegetation of three Sonoran desert scrub communities: the Paloverde-Cacti- Mixed Scrub Series of the Arizona Upland Subdivision, the Creosote-White Bursage Series of the Lower Colorado River Valley Subdivision and Sonoran xeri-riparian series. Vegetation management at Davis-Monthan AFB is guided by the Integrated Natural Resources Management Plan (INRMP) (Davis-Monthan AFB 2012), Invasive Plant Mapping and Management surveys (Davis-Monthan AFB 2015a), and BASH Plan (355 FW 2015).

DM3.6.1.2 Wildlife

Information on wildlife occurring on Davis-Monthan AFB is provided in the INRMP (Davis-Monthan AFB 2012). Common wildlife documented on the base includes a wide variety of birds, mammals, reptiles, and invertebrate species adapted for survival in the hot, dry environment of the Sonoran Desert. There are no fish resources at Davis-Monthan AFB and there is no hunting on base. Desert wildlife species documented at the installation within areas of human disturbance include road runners (*Geococcyx californianus*), quail (*Callipepla gambelii*), burrowing owls (*Athene cunicularia hypogea*), javelinas (*Tayassu tajacu*), and coyotes (*Canis latrans*).

DM3.6.1.3 Threatened, Endangered, and Special Status Species

DM3.6.1.3.1 Federally Listed Species

The USFWS's Information for Planning and Consultation (IPaC) online system was accessed on 8 February 2018 to identify current USFWS trust resources (e.g., migratory birds, species proposed or listed under the ESA (6 *USC* § 1531 et seq.), inter-jurisdiction fishes, specific marine mammals, wetlands, and USFWS National Wildlife Refuge System lands) with potential to occur within the ROI for biological resources at Davis-Monthan AFB.

On 8 February 2018, the USFWS provided an automated *Official Species List* via Section 7 letter that identified 22 threatened and endangered species protected under the ESA (16 *USC* § 1531 et seq.) and 9 designated and proposed critical habitats that could occur in Pima County, Arizona. Table DM3-30 presents these species.

Table DM3-30. Federally Listed Species with Potential to Occur in Pima County, Arizona

Common Name	Scientific Name	Federal Listing Status	Habitat	Historically Observed at Davis-Monthan AFB?
Mammals				
Jaguar	*Panthera onca*	FE	The jaguar is very rare in the United States. In Arizona, the species could occur in desert scrub to pine-oak woodland.	No
Ocelot	*Felis pardalis*	FE	The ocelot is a habitat specialist; the species lives in areas of dense cover or vegetation and high prey populations. The ocelot avoids open country.	No
Sonoran Pronghorn	*Antilocapra americana sonoriensis*	FE	Sonoran pronghorn habitat is characterized by broad alluvial valleys separated by block-faulted mountains. Food includes forbs, cholla (summer and fall), shrubs, ocotillo and cacti (year-round).	No
Lesser Long-nosed Bat	*Leptonycteris curasoae yerbabuenae*	Delisted	Lesser long-nosed bats occur in desert grassland and shrubland up to the oak transition. These bats roost in caves, mine tunnels, and occasionally in old buildings. The species forages in areas of saguaro, ocotillo, paloverde, prickly pear and organ pipe cactus and later in the summer among agaves. This species was listed as Federally Endangered during the initial data collection for this EIS. It was delisted in 2018.	No
Birds				
California Least Tern	*Sterna antillarum browni*	FE	California least terns nest on barren to sparsely vegetated sandbars along rivers, sand and gravel pits, lake and reservoir shorelines, and occasionally on gravel rooftops.	No
Masked Bobwhite	*Colinus virginianus ridgwayi*	FE	Masked bobwhites use habitat patches with higher canopy coverage of woody plants. They select 10 to 45 percent brush cover in Sonora and 20 to 100 percent brush cover in Arizona.	No
Mexican Spotted Owl	*Strix occidentalis lucida*	FT	In Arizona, Mexican spotted owls occur primarily in mixed-conifer, pine-oak, and evergreen oak forests; the species also occurs in ponderosa pine forest and rocky Canyonlands.	No
Southwestern Willow Flycatcher	*Empidonax traillii extimus*	FE	The southwestern willow flycatcher is a riparian obligate. The species prefers dense canopy cover, a large volume of foliage, and surface water during midsummer. The species appears to avoid riparian areas found in steep, closed canyons.	No
Yellow-billed Cuckoo	*Coccyzus americanus*	FT	In Arizona, yellow-billed cuckoos prefer streamside cottonwood, willow groves, and larger mesquite bosques for migrating and breeding. The species is rarely observed as transient in xeric desert or urban settings.	No

Table DM3-30. Federally Listed Species with Potential to Occur in Pima County, Arizona (Continued)

Common Name	Scientific Name	Federal Listing Status	Habitat	Historically Observed at Davis-Monthan AFB?
Reptiles				
Northern Mexican Gartersnake	*Thamnophis eques megalops*	FT	In Arizona, three general habitat types are used: (1) source area ponds and cienegas; (2) lowland river riparian forests and woodlands; and (3) upland stream gallery forests. Northern Mexican gartersnakes avoid steep mountain canyon stream habitats. The species is most abundant in densely vegetative cienegas, cienega streams, and stock tanks in the southern part of its distribution.	No
Sonoyta Mud Turtle	*Kinosternon sonoriense longifemorale*	FE	The Sonoyta mud turtle is found only in Quitobaquito Pond in Arizona and a few isolated sites in Sonora, Mexico.	No
Amphibians				
Chiricahua Leopard Frog	*Rana chiricahuensis*	FT	Chiricahua leopard frogs have historically inhabited cienegas, pools, livestock tanks, lakes, reservoirs, streams, and rivers at elevations between 3,281 and 8,890 feet MSL in central, east-central, and southeastern Arizona. Currently, the species is often restricted to springs, livestock tanks, and streams in the upper portions of watersheds where non-native predators either have yet to invade or habitats are marginal.	No
Fish				
Desert Pupfish	*Cyprinodon macularius*	FE	No natural populations of desert pupfish remain in Arizona. Historic range includes the lower Gila River basin in Arizona and Sonora, Mexico, including the Gila, Santa Cruz, San Pedro, and Salt Rivers as well as the lower Colorado River in Arizona, California, and adjacent Mexican states from the vicinity of Needles downstream to the Gulf of California.	No
Gila Chub	*Gila intermedia*	FE	The Gila chub occupies cool-to-warm water in mid-to-headwater stretches of mid-sized streams of the Gila River basin. The species is typically found in deep, near-shore pools adjacent to swift riffles and runs, and near obstructions. Cover consists of root wads, boulders, undercut banks, submerged organic debris, or deep water.	No
Gila Topminnow	*Poeciliopsis occidentalis*	FE	The Gila topminnow occupies headwater springs, and vegetated margins and backwater areas of intermittent and perennial streams and rivers. The species prefers shallow warm water in a moderate current with dense aquatic vegetation and algae mats. Gila topminnows can withstand water temperatures from near freezing to 90 to 100°F and can live in a range of water chemistries, with a pH ranging from 6.6 to 8.9; dissolved oxygen readings from 2.2 to 11 milligrams per liter; and salinities from tap water to sea water.	No
Sonora Chub	*Gila ditaenia*	FT	The Sonora chub is endemic to streams of the Rio de la Concepcion drainage of Sonora, Mexico, and Arizona. In Arizona, the species occurs in Sycamore Creek (Bear Canyon), a tributary of the Rio Altar, 15.5 miles west of Nogales in Santa Cruz County.	No

Table DM3-30. Federally Listed Species with Potential to Occur in Pima County, Arizona (Continued)

Common Name	Scientific Name	Federal Listing Status	Habitat	Historically Observed at Davis-Monthan AFB?
Flowering Plants				
Acuna Cactus	*Echinomastus erectocentrus var. acunensis*	FE	Acuna cactus occurs in valleys and on small knolls and gravel ridges of up to 30 percent slope in the Palo Verde-Saguaro Association of the Arizona Upland subdivision of the Sonoran Desert scrub at elevations between 1,198 and 3,773 feet MSL.	No
Canelo Hills Ladies-tresses	*Spiranthes delitescens*	FE	Canelo Hills ladies-tresses occurs in marshy wetlands or cienegas intermixed with tall grasses and sedges. The species grows on slopes near water, where the soil is drained although saturated. The species grows in very dense vegetation. As slope increases, growth increases. Based on records in the Heritage Data Management System (HDMS), this species occurs at elevations between 585 and 4,970 feet MSL.	No
Huachuca Water-umbel	*Lilaeopsis schaffneriana var. recurva*	FE	Huachuca water-umbel habitat consists of cienegas or marshy wetlands at elevations between 2,000 and 6,000 feet MSL, within Sonoran desert scrub, grassland or oak woodland, and conifer forest. The species can be found in unshaded or shaded sites in shallow water, saturated soil near seeps, springs, and streams. The species requires perennial water, gentle stream gradients, small- to medium-sized drainage areas, and mild winters.	No
Kearney's Blue-star	*Amsonia kearneyana*	FE	Kearney's blue-star habitat consists of dry, open, slopes at elevations between 4,000 and 6,000 feet MSL in Madrean evergreen woodlands/interior chaparral transition zones and on stable, partially shaded, coarse alluvium along dry washes at elevations between 3,600 and 3,800 feet MSL under deciduous riparian trees and shrubs in Sonoran desert scrub or desert scrub-grassland ecotone.	No
Nichol's Turk's Head Cactus	*Echinocactus horizonthalonius var. nicholii*	FE	Nichol's Turk's head cactus habitat is characterized by open vegetation, few trees, and scattered low shrubs. The species is found in bedrock habitat at higher elevations and in gravelly bajadas with limestone clasts at lower elevations.	No
Pima Pineapple Cactus	*Coryphantha scheeri var. robustispina*	FE	Pima pineapple cactus habitat consists of ridges in semidesert grassland and alluvial fans in Sonoran desert scrub.	No

Key: FE = federally endangered; FT = federally threatened

Source: AZGFD 2000, 2001a-c, 2002a-c, 2003a, b, 2004, 2005, 2008, 2010a, b, 2011, 2012, 2013, 2015, 2018a, b; Davis-Monthan AFB 2012; USFWS 2014a, b, 2018; Wakefield 2018

Of the 22 species identified in Table DM3-30, no federally threatened or endangered species are currently known to occur on Davis-Monthan AFB. This assessment is based on historical surveys completed by the Arizona Game and Fish Department (AZGFD) and subsequent annual survey work conducted in part of the INRMP (Davis-Monthan AFB 2012, 2016; Wakefield 2018). Additionally, no critical habitat occurs on Davis-Monthan AFB (USFWS 2018).

DM3.6.1.3.2 Migratory Birds

Migratory bird species protected under the Migratory Bird Treaty Act (MBTA) (16 *USC* §§ 703–712) could occur as residents or migrants near Davis-Monthan AFB. According to the installation INRMP, more than 120 species of birds are present or are known to utilize Sonoran desert scrub communities on or near the base. Under the INRMP and through various consulting local agencies (such as the AZGFD and University of Arizona), Davis-Monthan AFB manages and monitors populations of burrowing owls (*Athene cunicularia*), Swainson's hawks (*Buteo swainsoni*), Cooper's hawks (*Accipiter cooperii*), and great horned owls (*Bubo virginianus*) (Davis-Monthan AFB 2012, 2016). The AZGFD routinely monitors the western burrowing owl populations on the infield and runway ends and has recently begun active translocations to protect the species from BASH conflicts (Correll 2018). Under AFI 91-202 and AFI 91-212, *Bird/Wildlife Aircraft Strike Hazard (BASH) Management Program,* Davis-Monthan AFB employs a BASH Plan that establishes an overall bird/wildlife control program to minimize aircraft exposure to potentially hazardous wildlife strikes. The BASH Plan delineates responsibilities for minimizing potential hazards in the areas where tasked units assigned to Davis-Monthan AFB conduct flying operations. A U.S. Department of Agriculture (USDA) Wildlife Biologist employed at Davis-Monthan AFB manages potential wildlife hazards by removal, dispersal, and wildlife control methods to avoid any BASH incidents. Commonly controlled avian species include turkey vultures (*Cathartes aura*), ravens (*Corvus corax*), western burrowing owls, red-tailed hawks (*Buteo jamaicensis*), Swainson's hawks, and American kestrels (*Falco sparverius*) (Correll 2018; Wakefield 2018). Davis-Monthan AFB is currently in the process of preparing a Wildlife Hazard Management Plan tailored specifically to wildlife at risk unique to Davis-Monthan AFB (Correll 2018).

DM3.6.1.3.3 Bald and Golden Eagles

Bald (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*) protected under the Bald and Golden Eagle Protection Act (BGEPA) (16 *USC* 668-668c) are not known to occur on Davis-Monthan AFB. Golden eagles could be observed soaring within the Tucson area. Bald eagles are less common to the area and generally occur only as winter migrants.

DM3.6.1.3.4 State-Listed Species

The AZGFD Heritage Data Management System (HDMS) and Project Evaluation Program (PEP) online review tool was accessed on 9 February 2018 to identify special status species (e.g., Arizona Species of Conservation Concern, Species of Greatest Conservation Need, and Species of Economic and Recreation Importance) with potential to occur within the ROI for biological resources at Davis-Monthan AFB (Project ID: HGIS-06771). State-listed species known to occur at Davis-Monthan AFB include Gila monster (*Heloderma suspectum*), cactus ferruginous pygmy-owl (*Glaucidium brasilianum*), western burrowing owl, cave myotis (*Myotis velifer*), and western yellow bat (*Lasiurus xanthinus*). These species are monitored through the INRMP and Rare Species Assessments coordinated through the installation natural resource manager, AZGFD, USFWS, and the University of Arizona (Davis-Monthan AFB 2015b).

The Arizona Department of Agriculture (AZDA) maintains a list of native plant species that warrant protection under the Arizona Native Plant Law. Only one species of protected plant, the saguaro cactus, is known to occur at Davis-Monthan AFB. The saguaro cactus is present within the Sonoran habitat on base and is designated as Highly Safeguarded (i.e., a plant that is threatened for survival or in danger of extinction) (Davis-Monthan AFB 2012; AZDA 2018).

DM3.6.1.4 Wetlands

According to the installation INRMP, an analysis of potential Waters of the United States was conducted in 1996 at Davis-Monthan AFB. The survey identified 141,349 linear feet and 9.49 acres of Clean Water Act (CWA)-protected Waters of the United States (Davis-Monthan AFB 2012). The CWA-protected habitats at the installation are all ephemeral drainages; there are no perennial drainages on Davis-Monthan AFB. Several channelized ephemeral drainages carry runoff from the developed portions of the installation and exit the base through underground or open drainage systems. Atterbury Wash is the primary ephemeral drainage on the undeveloped portion of the base.

DM3.6.2 Base Environmental Consequences

DM3.6.2.1 Vegetation

Activities associated with construction, demolition, and renovation projects would occur in developed or disturbed areas within the commercial land use area of Davis-Monthan AFB. Revegetation of temporarily disturbed areas would be conducted as directed by the base natural resource manager to minimize the potential for erosion and dust generation. No significant impacts to vegetation would result from implementation of the AFRC F-35A mission at Davis-Monthan AFB.

DM3.6.2.2 Wildlife

Potential impacts to wildlife could include ground disturbance and construction noise from the associated facility and infrastructure projects. In addition, airfield operations can result in bird/wildlife-aircraft strikes and noise impacts.

The areas planned for development for the proposed AFRC F-35A mission at Davis-Monthan AFB are highly disturbed and provide little habitat for wildlife species. The existing turfgrass and landscaped areas provide some urban adapted wildlife species with limited habitat. This habitat would be lost with construction of the proposed facilities and infrastructure projects.

Noise resulting from the proposed construction, demolition, and renovation activities would be localized, short-term, and only occur during daylight hours. Areas proposed for construction are in a military/industrial land use with frequent elevated noise levels. Impacts to wildlife from construction noise would be minimal.

Implementation of the AFRC F-35A mission at Davis-Monthan AFB would result in an approximately 0.7 percent increase in total airfield operations (see section DM2.3). Any increase in operations could increase the potential for bird/wildlife-aircraft strikes. Davis-Monthan AFB would continue to adhere to the installation's BASH Plan to minimize the risk of strikes.

Impacts to wildlife and domestic animals that could result from aircraft noise are summarized below and discussed in more detail in Volume II, Appendix B. As described in Section DM3.2.2.1, the number of acres exposed to DNL greater than 65 dB would increase. This increase in noise levels surrounding Davis-Monthan AFB would result in an increase in the numbers of animals exposed to higher noise levels. Animals hear noise at different levels, in different frequency ranges, and tolerate noise differently than humans. These differences make comparing the noise metrics created for evaluating human impacts to animal impacts difficult. However, the number of noise events per hour with potential to interfere with speech (Table DM3-16) can be used as an indicator of changing frequency noise events that could affect animals. For example, under baseline conditions animals that are outside at the Reid Park Zoo currently experience five events per hour that are at a sufficient level to interfere with human speech. Implementation of the AFRC F-35A mission would increase this number by one event per hour.

Volume II, Appendix B, summarizes a number of scientific studies that have been conducted on the effects of aircraft noise on animals. These studies have shown that animal species have a wide range of responses to aircraft noise. One conclusion of these studies is that a general response to noise by domestic animals and wildlife is a startle response. These responses vary from flight, trampling, stampeding, jumping, or running to the movement of the head in the directions of the noise. These studies report that the intensity and duration of the startle response decreases with time, suggesting no long-term, adverse effects. The majority of the studies suggest that domestic animal species and wildlife show behaviors characteristic of adaptation, acclimation, and habituation to repeated aircraft noise (Volume II, Appendix B). Therefore, significant impacts to wildlife in the ROI surrounding Davis-Monthan AFB would not result from the proposed action.

DM3.6.2.3 Threatened, Endangered, and Special Status Species

DM3.6.2.3.1 Federally Listed Species

Because no federally listed threatened, endangered, or candidate species and/or designated critical habitat occur in the ROI near Davis-Monthan AFB, no impacts to the areas surrounding Davis-Monthan AFB would result from implementation of the proposed AFRC F-35A mission. In an email dated 26 June 2018, the USFWS agreed that ESA Section 7 requirements had been applied and that no further Section 7 consultation is required (Volume II, Appendix A, Section A.2.4.4)

DM3.6.2.3.2 Migratory Birds

Implementation of the AFRC F-35A mission at Davis-Monthan AFB would result in an increase (0.7 percent) in annual airfield operations. Any increase in operations could result in an increased opportunity for bird-aircraft strikes to occur. Adherence to the existing BASH program would minimize the risk of bird-aircraft strikes, including those for migratory birds, to negligible levels (Section DM3.4.1.5). Noise-related impacts to migratory birds nesting near Davis-Monthan AFB would be the same as those described for other wildlife. Minimal impacts to migratory birds would result from implementation of the proposed AFRC F-35A mission in the ROI near Davis-Monthan AFB.

DM3.6.2.3.3 Bald and Golden Eagles

No bald or golden eagle nesting is known to occur at Davis-Monthan AFB or in the immediate vicinity of the base and therefore impacts to sensitive nesting habitat would not occur. Both bald and golden eagles are known to occur in the general vicinity of the installation. Eagles are known to forage near the installation and noise-related impacts to these birds would be similar to those described for other wildlife. No significant impacts to eagles are anticipated to result from implementation of the proposed AFRC F-35 mission in the ROI near Davis-Monthan AFB.

DM3.6.2.3.4 State-Listed Species

Under the INRMP program and Rare Species Assessments (as coordinated through the installation natural resource manager, AZGFD, USFWS, and the University of Arizona), Davis-Monthan AFB would continue to closely manage and monitor populations of state-listed species. Should plants protected under the Arizona Native Plant Law be disturbed, the AZDA would be notified by the Davis-Monthan AFB natural resource manager before removal in accordance with the Native Plant Removal Procedures (AZDA 2018).

In a letter dated 3 May 2018, the AZGFD identified Cienega Creek and other riparian corridors as bird migration areas that should be avoided. Eagle nesting and bighorn sheep lambing areas were also identified as areas that should be avoided. See Volume II, Appendix A, Section A.2.4.1, for a copy of the scoping letter. AFRC F-35A pilots would continue to use the existing flight paths and runway approaches currently used by existing pilots at Davis-Monthan AFB. No impacts to state-listed species would result from implementation of the proposed AFRC F-35A mission at Davis-Monthan AFB.

DM3.6.2.4 Wetlands

Proposed facility and infrastructure projects at Davis-Monthan AFB would be confined to the installation's existing footprint. Construction, demolition, and renovation projects associated with the proposed action would not occur within or near any wetland areas. Therefore, there would be no impacts to wetlands in the ROI near Davis-Monthan AFB.

DM3.6.3 Airspace Affected Environment

The ROI for biological resources included in the analysis of primary airspace and primary ranges associated with the proposed action at Davis-Monthan AFB includes eight counties within Arizona and New Mexico. Counties under the primary airspace and primary ranges in Arizona include Maricopa, Pinal, Yuma, Pima, Cochise, and Santa Cruz. Counties under the primary airspace and primary ranges in New Mexico include Hidalgo and Luna Counties.

DM3.6.3.1 Vegetation

The airspace proposed for use by AFRC F-35A pilots from Davis-Monthan AFB covers approximately 19,996 square miles of land over southern Arizona and southwest New Mexico. The primary range area proposed for use covers approximately 7,858 acres over Arizona and the primary airspace area covers approximately 4,012 acres over southern Arizona and southwest New Mexico (DM2-2). Native vegetation varies greatly by elevation and ecological diversity is extremely high. The Madrean Archipelago and the Sonoran Basin and Range comprise the two primary ecoregions under the airspace proposed for use. Vegetation within the Madrean Archipelago ecoregion is mostly grama-tobosa shrub-steppe in the basins and oak-juniper woodlands on the ranges, except at higher elevations where ponderosa pine is predominant (USEPA 2013). The Sonoran Basin and Range contains scattered low mountains and large areas of paloverde-cactus shrub and giant saguaro cactus. Other typical Sonoran plants include white bursage (*Ambrosia dumosa*), ocotillo (*Fouquieria splendens*), creosote bush (*Larrea tridentata*), cholla (*Cylindropuntia* spp.), desert saltbush (*Atriplex parryi*), ironwood (*Ostrya virginiana*), mesquite (*Prosopis glandulosa*), and various cacti (USEPA 2013).

DM3.6.3.2 Wildlife

The Madrean Archipelago and the Sonoran Basin and Range ecoregions support a wide range of wildlife species. Some common bird and mammal species known to the region include Gambel's quail (*Lophortyx gambelii*), Gila woodpecker (*Melanerpes uropygialis*) roadrunner (*Geococcyx californianus*), curve-billed thrasher (*Taxostoma curvirostre*), mourning dove (*Zenaida macroura*), cactus wren (*Campylorhynchus brunneicapillus*), black-throated sparrow (*Amphispiza bilineata*), White-tailed deer (*Odocoileus virginianus*), black bear (*Ursus americanus*), bighorn sheep, mountain lion (*Puma concolor*), coyote (*Canis latrans*), bobcat (*Felis rufus*), black-tailed jackrabbit (*Lepus californicus*), desert cottontail (*Sylvilagus auduboni*), Merriam's kangaroo rat (*Dipodomys merriami*), white-throated woodrat (*Neotoma albigula*), desert pocket mouse (*Perognathus penicillatus*) and round tailed ground squirrel (*Spermophilous tereticaudus*). Common reptiles and amphibians of the region include an expansive variety of snakes, lizards, whiptails, geckos, toads, frogs, and salamanders. Some of the most common include collard lizards (*Crotaphytuscollaris*), desert spiny lizard (*Sceloporus magister*), common chuckwalla (*Sauromalus obesus*), desert horned lizard

(*Phrynosoma platyrhinos*), ground snake (*Sonora semiannulata*), gopher snake (*Pituophis catenifer*), Sonoran desert toad (*Bufo alvarius*), and American bull frog (*Lithobates catesbeianus*). Wildlife under the existing SUA and near existing ranges are exposed to overflight noise, sonic booms, use of munitions and flares, and bird-aircraft collisions.

DM3.6.3.3 Threatened, Endangered, and Special Status Species

DM3.6.3.3.1 Federally Listed Species

Federally listed threatened, endangered, and/or candidate mammal and bird species that could occur in the eight counties included in the analysis of primary airspace and range areas proposed for use are presented in Table DM3-31. Due to the limited nature of ground disturbance activity under the primary airspace, plant, invertebrate, and fish species were excluded from further analysis.

Table DM3-31. Federally Listed Species with Potential to Occur Under Primary Airspace and Primary Ranges Associated with the Proposed Action at Davis-Monthan AFB

Common Name	Scientific Name	Federal Listing Status	Habitat
Mammals			
Jaguar	*Panthera onca*	FE	The jaguar is very rare in the United States. In Arizona, the species could occur in desert scrub to pine-oak woodland.
Ocelot	*Felis pardalis*	FE	The ocelot is a habitat specialist; lives in areas of dense cover or vegetation and high prey populations. Avoids open country.
Sonoran Pronghorn	*Antilocapra americana sonoriensis*	FE	Sonoran pronghorn habitat is characterized by broad alluvial valleys separated by block-faulted mountains. Food includes forbs, cholla (summer and fall), shrubs, ocotillo and cacti (year-round).
Lesser Long-nosed Bat	*Leptonycteris curasoae yerbabuenae*	Delisted	Lesser long-nosed bats occur in desert grassland and shrubland up to the oak transition. These bats roost in caves, mine tunnels, and occasionally in old buildings. The species forages in areas of saguaro, ocotillo, paloverde, prickly pear and organ pipe cactus and later in the summer among agaves. This species was listed as Federally Endangered during the initial data collection for this EIS. It was delisted in 2018.
Birds			
California Least Tern	*Sterna antillarum browni*	FE	California least terns nest on barren to sparsely vegetated sandbars along rivers, sand and gravel pits, lake and reservoir shorelines, and occasionally on gravel rooftops.
Masked Bobwhite	*Colinus virginianus ridgwayi*	FE	Masked bobwhites use habitat patches with higher canopy coverage of woody plants. The species selects 10-45 percent brush cover in Sonora and 20-100 percent brush cover in Arizona.
Mexican Spotted Owl	*Strix occidentalis lucida*	FT	In Arizona, Mexican spotted owls occur primarily in mixed-conifer, pine-oak, and evergreen oak forests; the species also occurs in ponderosa pine forest and rocky Canyonlands.
Southwestern Willow Flycatcher	*Empidonax traillii extimus*	FE	The southwestern willow flycatcher is a riparian obligate. The species prefers dense canopy cover, a large volume of foliage, and surface water during midsummer. The species appears to avoid riparian areas found in steep, closed canyons.
Yellow-billed Cuckoo	*Coccyzus americanus*	FT	In Arizona, yellow-billed cuckoos prefer streamside cottonwood, willow groves, and larger mesquite bosques for migrating and breeding. The species is rarely observed as transient in xeric desert or urban settings.
Yuma Clapper Rail	*Rallus longirostris yumanensis*	FE	The Yuma clapper rail inhabits brackish water marshes and side waters. The species prefers the tallest, densest cattail and bulrush marshes. The Yuma clapper rail is the only species of clapper rail to breed in freshwater marshes.

Table DM3-31. Federally Listed Species with Potential to Occur Under Primary Airspace and Primary Ranges Associated with the Proposed Action at Davis-Monthan AFB (Continued)

Common Name	Scientific Name	Federal Listing Status	Habitat
Reptiles			
Narrow-headed Gartersnake	*Thamnophis rufipunctatus*	FT	The narrow-headed gartersnake is highly aquatic. Disjunct populations occur in fast-flowing, higher-elevation (typically between 3,937 and 6,233 feet MSL) headwater streams near and below the Mogollon Rim in Arizona and New Mexico.
Northern Mexican Gartersnake	*Thamnophis eques megalops*	FT	In Arizona, three general habitat types are used: (1) source area ponds and cienegas; (2) lowland river riparian forests and woodlands; and (3) upland stream gallery forests. Northern Mexican gartersnakes avoid steep mountain canyon stream habitats. The species is most abundant in densely vegetative cienegas, cienega streams, and stock tanks in the southern part of its distribution.
Sonoyta Mud Turtle	*Kinosternon sonoriense longifemorale*	FE	The Sonoyta mud turtle is found only in Quitobaquito Pond in Arizona and a few isolated sites in Sonora, Mexico.
New Mexican Ridge-nosed Rattlesnake	*Crotalus willardi*	FT	The New Mexican ridge-nosed rattlesnake is found primarily in the mountains in southeastern Arizona. The species occurs at elevations between 4,800 and 9,000 feet MSL, but is most often found at elevations between 5,400 and 7,500 feet MSL.
Amphibians			
Chiricahua Leopard Frog	*Rana chiricahuensis*	FT	The Chiricuhua leopard frog has historically inhabited cienegas, pools, livestock tanks, lakes, reservoirs, streams, and rivers at elevations between 3,281 and 8,890 feet MSL in central, east-central, and southeastern Arizona. Currently, the species is often restricted to springs, livestock tanks, and streams in the upper portions of watersheds where non-native predators either have yet to invade or habitats are marginal.
Sonora Tiger Salamander	*Ambystoma tigrinum stebbinsi*	FE	Sonora tiger salamanders live only in the grasslands and woodlands of the San Rafael Valley in Santa Cruz and Cochise Counties in southeastern Arizona and in the most northern parts of Sonora, Mexico. The species needs year-round availability of standing water for breeding, growth, and development.

Key: FE = federally endangered; FT = federally threatened

Source: AZGFD 1986, 1998, 2000, 2001a-h, 2002a-d, 2003a, b, 2004, 2005, 2008, 2009, 2010a, b, 2011, 2012, 2013a-c, 2015, 2018a, b; Davis-Monthan AFB 2012; NAU 2018; TPWD n.d.; USFWS 2014a, b, 2018; Wakefield 2018

Critical habitats for the Chiricahua leopard frog, Southwestern willow flycatcher, yellow-billed cuckoo, jaguar, Mount Graham red squirrel (*Tamiasciurus hudsonicus grahamensis*), Mexican spotted owl, and the New Mexican ridge-nosed rattlesnake, as designated by the USFWS, are present under the primary airspace and range areas proposed for use(USFWS 2018a).

DM3.6.3.3.2 Migratory Birds

The primary airspace and range areas proposed for use occur in the USFWS designated Bird Conservation Region 33 Sonoran and Mojave Deserts and Bird Conservation Region 34 Sierra Madre Occidental between the Pacific and Central Migratory Flyways (USFWS 2008).

Bird-aircraft strikes are currently rare in the airspace, and would not be expected to increase under the proposed action. AFRC F-35A pilots would predominantly fly above 5,000 feet AGL, which is above where 95 percent of strikes occur. In addition, current procedures for avoiding flight operations during periods of high concentrations of migratory bird (both in time and space) would continue. Adherence to the existing, effective BASH program would minimize the risk of bird-aircraft strikes, including those for migratory birds, to negligible levels (Section DM3.4.2.5).

In accordance with AFI 91-202 and AFI 91-212, Davis-Monthan AFB employs a BASH Program that establishes an overall bird/wildlife control program to minimize aircraft exposure to potentially hazardous wildlife strikes.

DM3.6.3.3.3 Bald and Golden Eagles

In the fall, bald eagles migrate to Arizona from the north and are found in a variety of habitats throughout the state. Habitat and historic range for the golden eagle includes the primary airspace and range areas proposed for use. Golden eagle nesting habitat in southern Arizona generally includes cliffs in remote mountains and canyons, although they are sometimes found nesting in trees among rolling hills near open foraging grounds. Outside the nesting season, golden eagles are found foraging in kind open or semi-open desert landscapes (AZGFD 2016).

DM3.6.4 Airspace Environmental Consequences

Impacts to biological resources occurring under the airspace proposed for use by AFRC F-35A pilots could result from overflights and associated noise, sonic booms, the use of munitions and flares, and bird-aircraft collisions. A review of current literature evaluating potential noise effects on wildlife is presented in Volume II, Appendix B.

DM3.6.4.1 Vegetation

Ground disturbance beneath the airspace proposed for use would be limited to the use of flares and munitions, which would be less than or the same as what is currently being used by A-10 mission pilots from Davis-Monthan AFB and would only occur in areas that are currently approved for such use. No significant impacts to vegetation would result from implementation of the AFRC F-35 mission in the airspace proposed for use by AFRC F-35A pilots stationed at Davis-Monthan AFB.

DM3.6.4.2 Wildlife

All airspace proposed for use by AFRC F-35A pilots is currently used as active military airspace by military jet aircraft; therefore, no new types of impacts would be introduced into these areas as a result of introducing the F-35A aircraft. Potential impacts for overflights and associated noise, sonic booms, munitions and flares, and bird-aircraft collisions are described as follows.

L_{dnmr} would remain the same in all of the airspace areas proposed for use, except under the Ruby and Fuzzy MOAs, where L_{dnmr} would increase by 1 dB (Figure DM3-4). Wildlife under the proposed airspace would not be exposed to a significant change in the noise environment and therefore no significant impacts to wildlife would occur from sub-sonic noise.

AFRC F-35A pilots would conduct supersonic flight at altitudes and within airspace already authorized for such activities (BMGR and Sells MOA). Approximately 90 percent of supersonic flight would occur at altitudes above 30,000 feet. The average number of booms per day beneath BMGR airspace would increase from three to four and CDNL would increase from 56 to 57 dB. The average number of sonic booms per day beneath the Sells MOA would remain the same and CDNL would increase from 54 to 56 dB.

Some physiological/behavioral responses (from both subsonic and supersonic noise) such as increased hormonal production, increased heart rate, and reduction in milk production have been described in a small percentage of studies. A majority of the studies focusing on these types of effects have reported short-term or no effects (Volume II, Appendix B).

The relationships between physiological effects and how species interact with their environments have not been thoroughly studied. Therefore, the larger ecological context issues regarding physiological effects of jet aircraft noise (if any) and resulting behavioral pattern changes are not well understood (Volume II, Appendix B).

Animal species exhibit a wide variety of responses to noise. It is therefore difficult to generalize animal responses to noise disturbances or to draw inferences across species, as reactions to jet aircraft noise appear to be species-specific. Consequently, some animal species could be more sensitive than other species and/or may exhibit different forms or intensities of behavioral responses. For instance, the results of one study indicate that wood ducks appear to be more sensitive to noise and more resistant to acclimation to jet aircraft noise than Canada geese (Edwards et al. 1979). Similarly, wild ungulates (e.g., deer) seem to be more easily disturbed than domestic animals.

The literature does suggest that common responses include the “startle” (or “fright”) response and, ultimately, habituation. It has been reported that the intensities and durations of the startle response decrease with the numbers and frequencies of exposures, suggesting no long-term adverse effects. The majority of the literature suggests that domestic animal species (cows, horses, chickens) and wildlife species exhibit adaptation, acclimation, and habituation after repeated exposure to jet aircraft noise and sonic booms.

Animal responses to aircraft noise appear to be somewhat dependent on, or influenced by, the size, shape, speed, proximity (vertical and horizontal), engine noise, color, and flight profile of planes. Helicopters also appear to induce greater intensities and durations of disturbance behavior as compared to fixed-wing aircraft. Some studies showed animals that had been previously exposed to jet aircraft noise exhibited greater degrees of alarm and disturbance to other objects creating noise, such as boats, people, and objects blowing across the landscape. Other factors influencing response to jet aircraft noise could include wind direction, speed, and local air turbulence; landscape structures (i.e., amount and type of vegetative cover); and, in the case of bird species, whether the animals are in the incubation/nesting phase.

In summary adverse behavioral responses ranging from mild to severe could occur in individual animals as a result of sonic booms. Mild responses include head raising, body shifting, or turning to orient toward the aircraft. Moderate disturbance could be nervous behaviors, such as trotting a short distance. Escape is the typical severe response (Volume II, Appendix B).

Wildlife under the BMGR and Sells MOA have been previously exposed to sonic booms and could be habituated to the sound. The increase in sonic booms is not anticipated to have long-term population level effects on species under the BMGR or Sells MOA.

Flares would be used as a defensive countermeasure by AFRC F-35A pilots during training operations. Flares would only be used in airspace areas currently approved for such use. Flare use by AFRC F-35A pilots would conform to existing altitude and seasonal restrictions to ensure fire safety. Based on the emphasis on flight at higher altitudes for the F-35A, roughly 90 percent of flares released throughout the authorized airspace would occur above 15,000 feet MSL, further reducing the potential risk for accidental fires or adverse impacts to underlying land areas and habitats. Ordnance delivery would only occur in ranges authorized for use. AFRC F-35A pilots would use less than or the same amount of flares and ordnance as currently used by the A-10 pilots; therefore, the new mission would not result in an increased potential for adverse impacts to wildlife under the training airspace.

AFRC F-35A pilots would fly at higher altitudes than A-10 pilots, with the majority (99 percent) of operations occur above 5,000 feet AGL (operations below 5,000 feet AGL would occur less frequently than baseline operations). Most birds fly below 500 feet, except during migration (Section DM3.6.4.3.2). No F-35A low-level flight training is expected to occur below 500 feet AGL and the potential for bird-aircraft collisions would be minor.

DM3.6.4.3 Threatened, Endangered, and Special Status Species

DM3.6.4.3.1 Federally Listed Species

Potential impacts to federally listed species and critical habitats that could occur under the airspace proposed for use would be the same as those described for wildlife. Therefore, it is anticipated that significant adverse impacts to federally listed species would not result from implementation of the AFRC F-35A mission.

DM3.6.4.3.2 Migratory Birds

Implementation of the AFRC F-35A mission at Davis-Monthan AFB would result in an increase (5 percent) in aircraft sorties in the training airspace. Increased operations could result in an increased opportunity for bird-aircraft strikes. The chances of such bird-aircraft strikes are considered unlikely for the following reasons. AFRC F-35A pilots would fly predominantly above 5,000 feet AGL. Most bird strikes (95 percent) occur below 5,000 feet AGL. Except during migration most birds spend the majority of their time below 500 feet. Migrations typically occur in ranges from 500 to 2,000 feet. The highest known flight of a North American migratory bird species is that of the mallard duck (*Anas platyrhynchos*), which has been observed to fly as high as 21,000 feet (World Atlas 2016). Vultures *(Aegypius monachus)* sometimes rise to elevations higher than 10,000 feet in order to scan larger areas for food and to watch the behavior of distant vultures for clues to the location of food sources (Stanford University 1988). Due to the predominant use of higher altitudes, implementation of the proposed AFRC F-35A mission would result in minimal impacts to migratory birds protected under the MBTA.

Current procedures for avoiding flight operations during periods of high concentrations of migratory birds (both in space and time) would continue. Adherence to the existing BASH program would minimize the risk of bird-aircraft strikes, including those for migratory birds, to negligible levels (Section DM3.4.2.5). Therefore, minimal impacts to migratory birds protected under the MBTA would result from implementation of the proposed AFRC F-35 mission at Davis-Monthan AFB.

DM3.6.4.3.3 Bald and Golden Eagles

Potential impacts to bald and golden eagles and habitats that occur in areas under the primary airspace and range areas would be similar to those described in Section DM3.6.4.3.2. AFRC F-35A pilots would fly at higher altitudes than A-10 pilots, reducing the potential for BASH. As described in Section DM3.2.3, subsonic noise would increase in one SUA unit. Therefore, no impacts to eagles would result from implementation of the proposed AFRC F-35A mission at Davis-Monthan AFB.

DM3.6.5 Summary of Impacts to Biological Resources

Construction activities on the base would occur in previously disturbed areas. Impacts to wetlands and protected species would not result from implementation of the AFRC F-35A mission. Impacts to wildlife from construction noise would be minimal. Aircraft operations near Davis-Monthan AFB and sorties in the airspace proposed for use would expose some wildlife species to increased levels of noise, and the 0.7 percent increase in aircraft operations near the base and 5 percent increase in sorties in the airspace proposed for use, respectively, could result in increased bird-aircraft strikes. However, because these percentages are low and species are currently exposed to military and commercial aircraft noise, impacts to biological resources are not anticipated to be significant.

DM3.7 CULTURAL RESOURCES

Cultural resources are historic districts, sites, buildings, structures, or objects considered important to a culture, subculture, or community for scientific, traditional, religious, or other purposes. They include archaeological resources, architectural/engineering resources, and traditional resources. Cultural resources that are eligible for listing on the NRHP are known as historic properties.

DM3.7.1 Base Affected Environment

DM3.7.1.1 Architectural Resources

Historical building inventories at Davis-Monthan AFB and on off-base lands controlled by the installation (TRC Mariah and Associates 1995, Davis-Monthan AFB 2005, Geo-Marine, Inc. 2009) have identified 39 buildings that are eligible for listing in the NRHP. Eleven (11) buildings are associated with the MSA (located in the eastern portion of the base) and 27 structures are part of the Titan Missile Complex (located off-base in Green Valley, Arizona). Hangar 8030, constructed in 1932 as part of the municipal airport, is an isolated hangar at the northwest end of the runway. Davis-Monthan has concluded that no other NRHP-eligible buildings are present on the installation.

DM3.7.1.2 Archaeological Resources

Numerous archaeological surveys have been conducted on Davis-Monthan AFB (Davis-Monthan AFB 2015c, SRI 2017) and approximately 74 percent of the base has been evaluated for archaeological resources. Some portions of the installation, such as the land under existing parking lots or other existing facilities have not been surveyed. Past surveys have identified 84 archaeological sites on or within 1 mile of Davis-Monthan AFB (SRI 2017). Ninety-nine (99) archaeological sites were evaluated as part of the recent survey conducted by Statistical Research, Inc. (SRI), and 20 of these contained a component that was recommended eligible for listing on the NRHP (SRI 2017).

DM3.7.1.3 Traditional Resources

Davis-Monthan AFB has identified 15 tribes potentially affiliated with the installation. These tribes, listed in Table A-1 in Volume II, Appendix A, Section A.2.4.2, were asked to provide information on any properties to which they attach religious and cultural significance. No known tribal sacred sites or properties of traditional religious and cultural importance are located on Davis-Monthan AFB.

DM3.7.2 Base Environmental Consequences

Implementation of the proposed AFRC F-35A mission at Davis-Monthan AFB would include the construction of nine new facilities, demolition of two buildings, and eight renovation projects (Table DM2-1 and Figure DM2-1). All buildings within the APE have been evaluated for NRHP eligibility and determined non-eligible. The Arizona SHPO concurred with the APE and the non-eligibility determination in a letter dated 14 May 2018 (Volume II, Appendix A, Section A.2.2.3.1).

No impacts to known archaeological resources would result from implementation of the proposed AFRC F-35A mission at Davis-Monthan AFB. All areas of the base proposed for construction are either in areas that have already been disturbed by previous construction or have been inventoried for archaeological resources. No NRHP-eligible archaeological resources have been identified in the APE. Because ground-disturbing activities would occur in previously disturbed and inventoried areas, it is extremely unlikely that any previously undocumented archaeological resources would be encountered during facility demolition, renovation, addition, or construction. In the case of unanticipated or inadvertent discoveries, the USAF would comply with NHPA and Native American Graves Protection and Repatriation Act (NAGPRA) regulations.

NRHP-eligible facilities located on the installation (MSA and Building 8030) are located outside the APE and there would be no direct impact to historic properties. Indirect impacts on cultural resources from population changes, noise or visual intrusions would be extremely unlikely. The total authorized personnel for Davis-Monthan AFB would decrease (0.3 percent) with the proposed action. This small population change would not directly or indirectly impact cultural resources at the installation. The MSA is located outside of the proposed 65 dB DNL contour and Building 8030 is located between the 70 and 75 dB DNL contour lines. As described in Section DM3.2.2, the noise levels in these zones would not be at high enough levels to cause structural impacts to buildings. Visual intrusion from the proposed action would not be a significant issue. Building 8030 and the buildings in the MSA derive their historical significance from association with military activities and their setting within a military installation. New construction would occur in the context of an active USAF base, where changes in the infrastructure are common. The viewshed of remaining historic properties would not be affected by the proposed construction.

During scoping, several people commented about the potential for noise to damage historical structures such as homes and buildings within the Barrio Santa Rosa Historic District. The noise level at the Arizona Inn was also mentioned as a potential concern. As described in Section DM3.2.1.8, noise levels of 130 dB could cause structural damage to certain facilities. Single event noise levels were modeled for the Country Club Annex Park which is approximately 3 miles closer to Davis-Monthan AFB than the Barrio Santa Rosa Historic District. The highest SEL at that location was 104 dB. SEL levels at the Barrio Santa Rosa Historic District are anticipated to be lower than 104 dB and the potential to impact structures is considered unlikely. The Arizona Inn is located approximately 3.5 miles northeast of the Country Club Annex Park and noise levels would be anticipated to be less than those at the Country Club Annex Park. For additional information on noise levels at Country Club Annex Park, including the number of events per day that are anticipated to interfere with speech, see Section DM4.2.2.

No Section 106 impacts to tribal resources or traditional cultural properties are anticipated to result from implementation of the AFRC F-35A mission. As required by Sections 101(d)(6)(B) and 106 of the NHPA; implementing regulations prescribed in 36 *CFR* Section 800.2(c)(2); EO 13175, *Consultation and Coordination with Indian Tribal Governments;* DoDI 4710.02; and AFI 90-2002, *Air Force Interactions with Federally-Recognized Tribes*, Davis-Monthan AFB initiated Section 106 government-to-government consultation with 15 tribes to identify traditional cultural properties. Volume II, Appendix A, Section A.2.4.1, contains a record of these consultations. The consultation correspondence included an invitation to participate in the NEPA process, and an invitation to consult directly with the Davis-Monthan AFB Commander regarding any comments, concerns, and suggestions (see letter dated 11 May 2018, Volume II, Appendix A, SectionA.2.2.3.1). Ten (10) of the tribes have responded to the invitation to participate in the NEPA/Section 106 process. Nine (9) of the 10 tribes (Ak-Chin Indian Community, Gila River Indian Community, Hopi Tribe of Arizona, Jicarillo Apache Nation, San Carlos Apache Tribe, Salt River Pima-Maricopa Indian Community of Salt River Reservation, Tohono O'odham Nation, White Mountain Apache Tribe of the Fort Apache Reservation, Pueblo of Zuni) indicated that they had no traditional resources in the APE. One (1) tribe, the Yavapai Nation of the Camp Verde Indian Reservation, has no comments at this time. Section 106 consultation is considered complete. Davis-Monthan AFB will continue to coordinate with interested tribes throughout the EIS process.

DM3.7.3 Airspace Affected Environment

Table DM3-32 presents the NRHP-listed sites and Native American Reservation lands under training airspace proposed for use by AFRC F-35A pilots operating at Davis-Monthan AFB. Although the primary airspace and range areas occur over 8 Arizona counties, all of the training airspace overlies at least part of 10 Arizona counties (Apache, Cochise, Gila, Graham, Maricopa, Navajo, Pima, Pinal, Santa Cruz, and Yuma), and 2 New Mexico counties (Hidalgo and Luna). One-hundred eighteen (118) NRHP-listed properties have been identified under Davis-Monthan AFB airspace. Forty-two (42) of these are located under the primary airspace and range areas. Three Native American tribes (Fort Sill Apache Tribe of Oklahoma, San Carlos Apache, and the Tohono O'odham Nation) are known to own land under the airspace proposed for use including I'itoi Mo'o and 'Oks Daha. No other known traditional cultural resources have been identified under the airspace proposed for use. It is possible that such resources could exist in the area as the exact location of some traditional cultural resources is confidential.

Table DM3-32. NRHP-Listed Sites and Native American Reservation Lands Under Davis-Monthan AFB Training Airspace

Airspace Designations	Number of NRHP Properties Under Airspace[a]	Native American Reservation Lands Under Airspace[a]
Jackal & Jackal Low MOAs	31	Fort Sill Apache Tribe of Oklahoma and San Carlos Apache
Outlaw MOA	39	San Carlos Apache
R-2301E	1	None
R-2303A/B/C	8	None
Ruby & Fuzzy MOAs	2	Tohono O'odham Nation
Sells 1 & Low MOAs; R-2304 & R-2305	10	Tohono O'odham Nation
Tombstone A/B/C MOA	27	None

[a] Due to the sensitivity of the locations, archaeological sites are not included in this table or shown on any figures.

DM3.7.4 Airspace Environmental Consequences

Implementation of the proposed action would result in a 5 percent increase in the annual sorties conducted in the airspace proposed for use. As described in Section DM3.2, subsonic L_{dnmr} under the training airspace would remain the same or increase (1 dB) and would not exceed 65 dB. Supersonic flights would occur in the Sells 1 MOA/ATCAA at altitudes above 10,000 feet MSL and at R-2301E over the BMGR at altitudes above 5,000 feet MSL.

No impacts to historic properties under the airspace proposed for use are expected. Scientific studies of the effects of noise and vibration on historic properties have considered potential impacts on historic buildings, prehistoric structures, water tanks, archaeological cave/shelter sites, and rock art. These studies have concluded that overpressures generated by supersonic overflight were well below established damage thresholds and that subsonic operations would be even less likely to cause damage (Volume II, Appendix B, Section B.2.10).

Use of ordnance and flares would continue in areas already used for these activities. No additional ground disturbance would occur. Flare and ordnance use is not expected to impact historic properties under the airspace. Existing use of flares and ordnance is not known to have impacted these resources; therefore, the continued use of flares and ordnance from F-35A aircraft is not expected to result in any new impacts.

DM3.7.4.1 Native American Concerns

During scoping, the USAF contacted 15 federally affiliated Native American tribes to invite them to attend the public meetings and express their concerns about the potential AFRC F-35A beddown at Davis-Monthan AFB. During the scoping process, including the public meetings, one member of the public expressed concern that the proposed project would impact lands of the Tohono O'odham Nation or the Pascua Yaqui Tribe. No comments regarding potential impacts on traditional cultural resources or traditional cultural properties were received and no comments were received from the fifteen tribes.

In accordance with Section 106 of the NHPA and EO 13175, USAF also has contacted these 15 tribes to consult on a government-to-government basis regarding their concerns about potential impacts on traditional cultural resources and traditional cultural properties under the airspace associated with Davis-Monthan AFB. Section 106 consultation is considered complete and Davis-Monthan AFB will continue to coordinate with interested tribes throughout the EIS process.

DM3.7.5 Summary of Impacts to Cultural Resources

No archaeological sites are located in any of the proposed construction footprints at Davis-Monthan AFB. In the case of unanticipated or inadvertent discoveries, the USAF would comply with Section 106 of the NHPA. All buildings within the APE have been evaluated for NRHP eligibility and determined non-eligible and the Arizona SHPO has concurred with this finding. Davis-Monthan AFB is currently conducting government-to-government consultation with 15 associated tribes regarding their concerns with the proposed action at Davis-Monthan AFB and the airspace proposed for use. Section 106 consultation is considered complete and Davis-Monthan AFB will continue to coordinate with interested tribes throughout the EIS process. No impacts to historic properties under the airspace proposed for use are expected. Implementation of the AFRC F-35A mission is not anticipated to result in significant impacts to cultural resources.

DM3.8 LAND USE AND RECREATION

DM3.8.1 Base Affected Environment

DM3.8.1.1 Land Use

On-base construction would be consistent with established base land uses. Because potential land use consequences would primarily be noise-related, the discussion in this section focuses on noise-related land use regulations and compatibility constraints. The following paragraphs address federal, state, and local statutes, regulations, codes, programs, and plans that are relevant to the analysis of land use for Davis-Monthan AFB and surrounding areas.

Installation Development Plan (IDP). The Davis-Monthan IDP guides future development and land use decisions at Davis-Monthan AFB (Davis-Monthan AFB 2016c).

Davis-Monthan Air Force Base/Tucson/Pima County JLUS. The JLUS for Davis-Monthan AFB and Tucson and Pima County was published in 2004 as part of the Arizona Military Regional Compatibility Project. The JLUS was developed to facilitate implementation of compatible land uses around the base through a cooperative program between the USAF, the City of Tucson and Pima County, and with other interested and affected parties, including private and public institutions, corporations, and private citizens. As part of the JLUS process, two public information meetings were held to provide residents and stakeholders an opportunity to receive information on issues and to provide input and comments in a comfortable environment. The study area boundary used in the 2004 JLUS report extended from the Catalina Foothills to the Pima County Fairgrounds and encompassed approximately 90,500 acres of land. This area focused on the CZ, APZs, approach-departure corridors (ADCs) and noise zones for both Davis-Monthan AFB and TUS. The JLUS compatible land use plan defines recommended compatible uses and performance standards to be used by the City of Tucson and Pima County to guide development in order to protect Davis-Monthan AFB's mission and its economic benefits, while increasing the economic diversity and viability of the community by facilitating the development of other key sectors in ways that are compatible with the base's mission. As part of the JLUS process, Pima County and the City of Tucson combined NCD A with accident zones and adopted this combined area as the AEZ (Figure DM3-6). Both Pima County and the City of Tucson regulate land use in the AEZ.

In 2004, the Military Airport comprehensive plan designation was adopted to manage development to ensure compatible zoning within the high noise zones (NCDs) and APZs of Davis-Monthan AFB in line with the JLUS Implementation Program Strategies. The strategies include provisions addressing land use and building height within the JLUS boundaries. In 2008, the Pima County Zoning Code was amended to implement the JLUS Compatible Land Use Plan recommendations and adopt amendments for internal noise mitigation under the International Building Code.

Pima Prospers Comprehensive Plan. The Pima County comprehensive plan describes planning goals for Pima County, including areas near Davis-Monthan AFB (Pima County 2015).

Plan Tucson. The City of Tucson's General and Sustainability Plan states that the planning goal for the area surrounding TUS is to conserve neighborhood centers and promote development of Airport-related commercial/industrial activities north and south of the Airport (City of Tucson 2013).

Arizona Revised Statutes. For the purposes of preserving health and safety, Title 28, Article 7, *Airport Zoning & Regulation* (ARS 28-8480, 28-8481, and 28-8482), requires political subdivisions in "a territory in the vicinity of a military airport" to adopt land use plans and enforce zoning regulations that ensure development is compatible with the high noise zones and APZs generated by military airport operations. Within this territory, the law requires disclosure to property owners that they are within the territory of a military airport. In addition, no new residential development in the NCDs and APZs is allowed unless the subject property had a building permit, had a residence constructed or was approved for development in a "development plan" prior to 31 December 2000.

Local Regulations and Ordinances. The City of Tucson and Pima County have regulations and ordinances that specifically address land use and zoning issues surrounding Davis-Monthan AFB. Both the City of Tucson and Pima County have adopted the AEZ, as shown on Figure DM3-6. Pima County Code Chapter 18.57, *Airport Environs and Facilities,* established height and land use overlay zones for the environs of TUS, Ryan Field, Davis-Monthan AFB, and Pinal Airpark.

The City of Tucson Unified Development Code (UDC) was adopted in 2012 by the Mayor and the City Council. The Airport Environs Overlay Zone (originally adopted 16 April 1990), as established in the City's UDC Exhibit LT-5B, shows the official State of Arizona Map that illustrates the noise contours, APZs, and ADCs for Davis-Monthan AFB, collectively referred to as the AEZ. Pima County and the City of Tucson have adopted the following corridors and districts surrounding Davis-Monthan AFB.

- ADC-1 – Northwest end of the Davis-Monthan AFB runway.
- ADC-2 – Southeast end of the Davis-Monthan AFB runway up to 30,000 feet from end of runway.

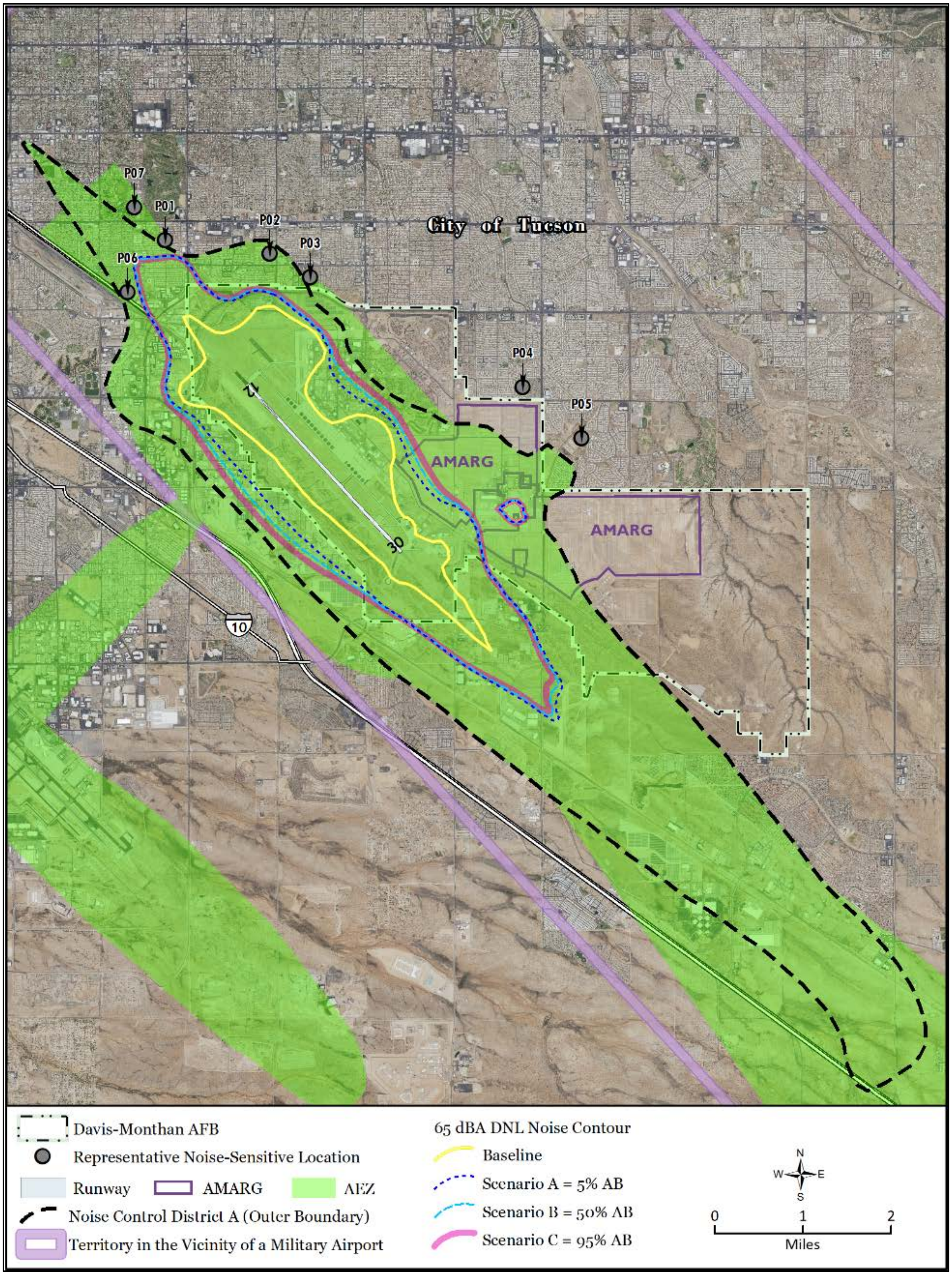

Figure DM3-6. City of Tucson and Pima County Airport Environs Zone

- ADC-3 – Southeast end of the Davis-Monthan AFB runway 30,000 to 50,200 feet from end of runway.
- NCD A – High Noise District with exposures of 65-70 L_{dn} designated at Davis-Monthan AFB.
- NCD B – High Noise District with exposures of 70+ L_{dn} designated at Davis-Monthan AFB.
- Airport Hazard Districts – A specifically designated area of land where uses which constitute hazards to aircraft operations are prohibited and heights are limited.

The UDC outlines land use regulations that apply in each of the areas described above. Acoustical treatment of buildings in the AEZ is required to reduce exposure to high levels of airport noise. In addition, the UDC directs that the L_{dn} values are to be calculated based on the DoD NOISEMAP model that averages noise over the total flying days of the year (City of Tucson 2013).

On-Base Land Use. Davis-Monthan AFB occupies approximately 10,700 acres; 5,700 acres are developed or semi-improved, 4,530 acres are undeveloped, and 300 acres are under easement to and maintained by Pima County. Land use on the base is generally divided into seven Planning Districts. These Planning Districts include flightline operations, North Planning, Housing Planning; Main Base Planning, AMARG Planning, main base south and the munitions and ranges. The flightline operations district is the largest Planning District and encompasses the runway, taxiways, aprons and aircraft parking and hangar areas.

Surrounding Land Use. Davis-Monthan AFB borders the southeastern edge of the City of Tucson, within the city limits. Residential development is the predominant land use to the east and north of the installation with industrial and open land uses to the west and south of the installation. As part of the scoping process, representatives from various neighborhoods surrounding the installation expressed concerns about noise. These neighborhoods included the following: Broadmoor Broadway Village, La Estancia, Barrio Kroeger Lane, Julia Keen, Sam Hughes, Keeling, Starr Pass, and Arroyo Chico. All of these neighborhoods, except Starr Pass, are located in the AEZ.

Since the 1980s, many of these neighborhoods have incorporated provisions into their neighborhood plans or Planned Area Development plans that account for noise resulting from Davis-Monthan AFB aircraft operations. For example, the Arroyo Chico Area Plan (1986) includes maps of the NCD A and B areas and policies to encourage new residential development and other noise-sensitive uses to incorporate acoustical treatment to reduce interior noise levels to a maximum of 45 dB. Some of the plans include noise and overflight hazard districts into the subdivision plan. Some of the neighborhood plans also include noise attenuation requirements. These plans are publicly available at the following website: https://www.tucsonaz.gov/pdsd/area-neighborhood-plans.

In 2001, the Arizona legislature mandated that the Arizona real estate commissioner record, in the office of the Pima county recorder, a document that applies to all property in "territory in the vicinity of a military airport." The document contains the following disclosure: "This property is located within territory in the vicinity of a military airport and may be subject to increased noise and accident potential."

Table DM3-33 identifies acres of land exposed to DNL of 65 dB or greater by land use category including all land in the JLUS contour. The JLUS contour represents acreage that current zoning requirements already treat as if the land was in a high-noise environment (i.e., DNL of 65 dB or greater). Baseline conditions represent the noise levels as modeled using the current conditions and operations at Davis-Monthan AFB. Noise from baseline conditions primarily affects industrial, commercial, undesignated, open/agriculture/low density, and public/quasi-public land. All of this land is entirely within the AEZ.

Table DM3-33. Off-Base Acres Currently Exposed to DNL of 65 dB or Greater at Davis-Monthan AFB

Land Use Category[a]	DNL (dB)											
	65–69		70–74		75–79		80–84		≥85		Totals	
	JLUS Contour	Baseline	JLUS Contour	Baseline	JLUS Contour	Baseline	JLUS Contour	Baseline	JLUS Contour	Baseline	JLUS Contour	Baseline
Commercial	569	37	311	0	79	0	24	0	0	0	983	37
Industrial	1,039	36	548	0	135	0	60	0	0	0	1,782	36
Open	2,636	6	1,119	0	365	0	10	0	0	0	4,130	6
Public/Quasi-Public	574	5	22	0	19	0	2	0	0	0	617	5
Recreational	21	0	0	0	0	0	0	0	0	0	21	0
Residential	874	0	91	0	16	0	0	0	0	0	981	0
Undesignated[b]	808	16	278	0	75	0	21	0	0	0	1,182	16
Total	6,521	100	2,369	0	689	0	117	0	0	0	9,696	100

[a] All numbers are in units of acres

[b] Undesignated land includes roads, retention basins, and other municipal features that might not be shown on Figure DM3-7.

Note: Numbers may not sum due to rounding. To best represent the level of accuracy achieved, acreage numbers are displayed as whole numbers in the text and tables, whereas calculations are based on the raw acreage numbers containing multiple decimal points. The resulting summations and change calculations are then rounded to whole numbers.

Source: Pima County 2018d

DM3.8.1.2 Recreation

The City of Tucson has a wide variety of recreational facilities including parks, playgrounds, barbeque areas, walking paths, off-leash dog areas, sports fields, golf courses, play courts and recreation and senior centers (Table DM3-34). Schools also provide outdoor playing fields and playgrounds for recreation. The Reid Park Zoo encompasses 24 acres and features more than 500 animals. In addition to the city facilities, Saguaro National Park consists of the Tucson Mountain District to the west and the Rincon Mountain District to the east. The Rincon Mountain District is 14 miles from Davis-Monthan AFB and the Tucson Mountain District is located 21 miles west-northwest of the base (Davis-Monthan 2008). Table DM3-34 shows that none of the nearby recreational facilities are currently exposed to DNL of 65 dB and all of them are compatible with the baseline noise levels. Land use compatibility with noise is based on DoDI 4165.57 and *Guidelines for Considering Noise in Land Use Planning and Control*. Recreational uses are considered compatible up to DNL of 74 dB, with structures in the 70 dB-to-74 dB range needing an additional 25 dB of noise attenuation beyond that of typical construction.

Table DM3-34. Recreation Facilities near Davis-Monthan AFB

ID	Recreational Facility	Activities	DNL (dB)	Compatibility (Y/N)	Within the AEZ
P01	Parkview Park	Playground	55	Y	Y
P02	Swan Park	Playground, picnic area	54	Y	Y
P03	Freedom Park	Ball fields, pool, playground, basketball courts	55	Y	N
P04	Escalante Park	Ball fields, pool	47	Y	N
P05	The Groves Park	Playground, disc golf	<45	Y	N
P06	County Club Annex Park	Playground, picnic area, soccer fields	56	Y	Y
P07	Reid Park Zoo	Animal viewing, walking trails	54	Y	Y

Table DM3-34. Recreation Facilities near Davis-Monthan AFB (Continued)

ID	Recreational Facility	Activities	DNL (dB)	Compatibility (Y/N)	Within the AEZ
P08	Jacobs Park and Ochoa Soccer Complex	Soccer and softball fields, playground, picnic area	46	Y	N
P09	Saguaro National Park (Tucson Mountain District)[a]	Hiking, Biking, animal viewing	<45	Y	N
P10	Arthur Pack Regional Park	Ball fields, golf course, basketball court, soccer fields, picnic area.	<45	Y	N

[a] DNL at the Saguaro National Park (Rincon Mountain District) would also be less than 45 dB.
Source: https://www.tucsonaz.gov/parks/parks

Davis-Monthan AFB offers a variety of both indoor and outdoor recreational facilities. The Arthur J. Benko Fitness and Sports Center is a premier sports and fitness complex that includes state-of-the-art exercise equipment, an indoor track, a parent exercise room, and a lap pool. The Haeffner Fitness and Sports Center is a well-equipped modern facility with aerobics and weight training areas. Other indoor recreational facilities include a 20-lane bowling center, and an arts and craft center. Outdoor facilities include athletic fields; racquetball and tennis courts; a pool; a golf course and driving range; an archery, skeet, and trap range and a shooting park; and opportunities for hiking, biking, and jogging. In addition, the 280-space Agave Gulch family camp offers opportunities for recreational vehicle (RV) camping. These facilities are available to active duty and retired military and government-employed civilians.

DM3.8.2 Base Environmental Consequences

DM3.8.2.1 Land Use

DM3.8.2.1.1 Physical Development

The physical development associated with the proposed AFRC F-35A mission at Davis-Monthan AFB would primarily occur in previously disturbed areas near the flightline where airfield and aircraft O&M support activities occur on a daily basis. None of the physical development associated with implementation of the proposed mission at Davis-Monthan AFB would impact land use because these activities would occur in land uses designated for the proposed use. Subsequent O&M activities for the proposed mission would conform to current and future land uses on the base and traffic, noise, dust and similar effects from construction equipment would be reduced through construction plans and practices agreed to by contractors. The physical changes and daily activities on the ground would be confined to the base. The proposed on-base development would have no impact to off-base areas.

DM3.8.2.1.2 Aircraft Operations

This analysis includes an evaluation of the potential noise impacts to on- and off-base land uses resulting from the proposed AFRC F-35A airfield operations at Davis-Monthan AFB. Volume II, Appendix B, Section B.2.2, presents the noise compatibility guidelines for noise exposure to various land uses.

During scoping, people submitted comments expressing concern that increased noise would affect property values. As discussed in more detail in Chapter 3, Section 3.9.3, studies have shown a relation between noise and property values. Properties in the AEZ which have changed ownership since 2004, and in some locations earlier, have included notification that the property is located in the AEZ and near a military airport. Notification to the prospective buyer that the property is in the AEZ is assumed to be reflected in negotiated housing prices. The extent to which the AEZ would affect housing prices depends on a number of factors, including the noise indicators used, thresholds, types of properties evaluated, and other factors. Although noise levels in residential areas would increase from current levels, as explained above, implementation of the AFRC F-35A mission would not expose any land or property outside of the AEZ to DNL of 65 dB or greater.

Scenario A

Implementation of the AFRC F-35A mission would increase the area surrounding Davis-Monthan AFB exposed to DNL of 65 dB or greater by approximately 1,566 acres. The largest increase in acreage exposed to additional noise would be industrial (30 percent), followed by open areas (27 percent), and commercial (19 percent). Six (6) percent (91 acres) of the 1,566 acres exposed to additional noise is classified as residential land. This residential land is currently within the AEZ. Areas within the AEZ are treated by State and local regulations as if they were already exposed to DNL of 65 dB or greater (Table DM3-35 and Figure DM3-7).

Approximately 1,506 off-installation residents who reside in the AEZ are not currently exposed to DNL of 65 dB. These residents would be affected by DNL of 65 dB or greater from Scenario A. All of the 1,566 acres and the off-installation residents are currently located in the AEZ. Per the Pima County and Tucson ordinances, buildings in the AEZ are treated as if they were already exposed to DNL of 65 dB or greater. This includes requirements for acoustical treatment to reduce exposure to high levels of airport noise. However, as noted in the JLUS, unlike similarly situated areas around TUS, there is no federal program currently available to retrofit residences in the areas near Davis-Monthan AFB for noise attenuation.

Scenario B

Implementation of Scenario B would increase the area surrounding Davis-Monthan AFB exposed to DNL of 65 dB or greater by approximately 1,679 acres. The largest increase in acreage exposed to additional noise would be industrial (31 percent), followed by open areas (25 percent) and commercial (21 percent). Five (5) percent (85 acres) of the 1,679 acres exposed to additional noise is classified as residential land and is currently located in the AEZ. Compared to Scenario A, implementation of Scenario B would result in approximately 113 more acres of all land use types exposed to DNL of 65 dB or greater. Implementation of Scenario B would result in 85 acres of land exposed to DNL of 65 dB or greater.

As previously described for Scenario A, this residential land is currently in the AEZ (Table DM3-36 and Figure DM3-7). Approximately 1,428 off-installation residents who reside in the AEZ are not currently exposed to DNL of 65 dB. These residents would be affected by DNL of 65 dB or greater from the proposed mission. All of the 1,679 acres and the off-installation residents are currently located in the AEZ. Per the Pima County and Tucson ordinances, acoustical treatment of buildings in the AEZ is already required to reduce exposure to high levels of airport noise. However, as noted in the JLUS, unlike similarly situated areas around TUS, there is no program available to retrofit residences in these areas for noise attenuation.

Table DM3-35. Off-Base Acres Exposed to DNL of 65 dB or Greater at Davis-Monthan AFB under Scenario A

Land Use Category[a]	DNL (dB) 65–69 JLUS Contour	65–69 Baseline	65–69 AFRC F-35A Mission	65–69 Change[b]	70–74 JLUS Contour	70–74 Baseline	70–74 AFRC F-35A Mission	70–74 Change[b]	75–79 JLUS Contour	75–79 Baseline	75–79 AFRC F-35A Mission	75–79 Change[b]	80–84 JLUS Contour	80–84 Baseline	80–84 AFRC F-35A Mission	80–84 Change[b]	≥85 JLUS Contour	≥85 Baseline	≥85 AFRC F-35A Mission	≥85 Change[b]	Totals JLUS Contour	Totals Baseline	Totals AFRC F-35A Mission	Totals Change[b]
Commercial	569	37	302	265	311	0	32	32	79	0	0	0	24	0	0	0	0	0	0	0	983	37	334	297
Industrial	1,039	36	401	365	548	0	108	108	135	0	0	0	60	0	0	0	0	0	0	0	1,782	36	509	473
Open	2,636	6	409	403	1,119	0	22	22	365	0	0	0	10	0	0	0	0	0	0	0	4,130	6	431	425
Public/Quasi-Public	574	5	23	18	22	0	21	21	19	0	0	0	2	0	0	0	0	0	0	0	617	5	44	39
Recreational	21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21	0	0	0
Residential	874	0	90	90	91	0	1	1	16	0	0	0	0	0	0	0	0	0	0	0	981	0	91	91
Undesignated[c]	808	16	208	192	278	0	49	49	75	0	0	0	21	0	0	0	0	0	0	0	1,182	16	257	241
Total	6,521	100	1,433	1,333	2,369	0	233	233	689	0	0	0	117	0	0	0	0	0	0	0	9,696	100	1,666	1,566

[a] All numbers are in units of acres.
[b] Change equals the difference between baseline acreage and acres exposed to noise resulting from the AFRC F-35A mission.
[c] Undesignated land includes roads, retention basins, and other municipal features that might not be shown on Figure DM3-7.
Note: Numbers may not sum due to rounding. To best represent the level of accuracy achieved, acreage numbers are displayed as whole numbers in the text and tables, whereas calculations are based on the raw acreage numbers containing multiple decimal points. The resulting summations and change calculations are then rounded to whole numbers.
Source: Pima County 2018d

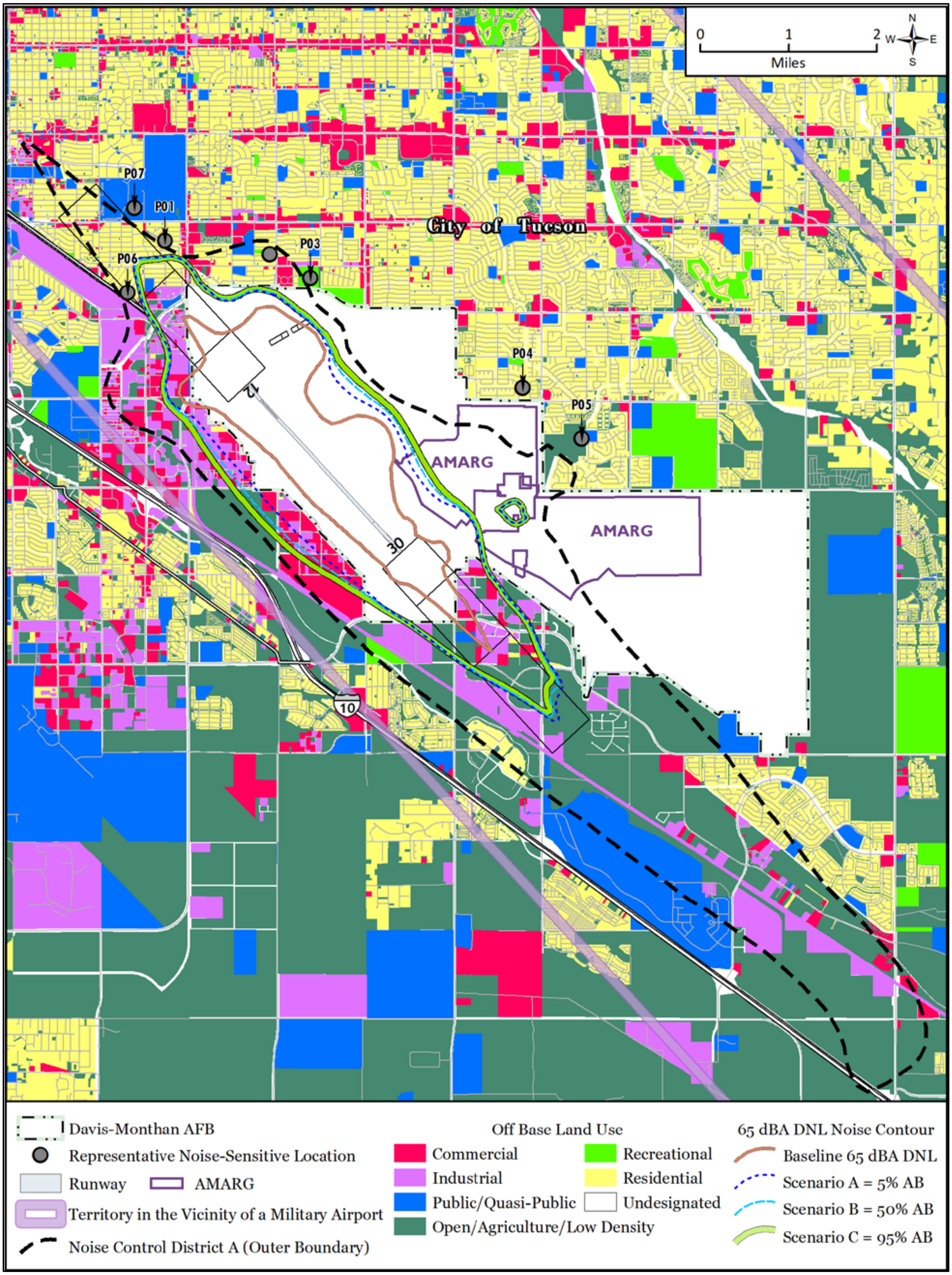

Figure DM3-7. Baseline, JLUS, and AFRC F-35A Mission DNL Contours Relative to Land Use at Davis-Monthan AFB

Table DM3-36. Off-Base Acres Exposed to DNL of 65 dB or Greater at Davis-Monthan AFB under Scenario B

Land Use Category[a]	DNL (dB)																							
	65–69				70–74				75–79				80–84				≥85				Totals			
	JLUS Contour	Baseline	AFRC F-35A Mission	Change[b]	JLUS Contour	Baseline	AFRC F-35A Mission	Change[b]	JLUS Contour	Baseline	AFRC F-35A Mission	Change[b]	JLUS Contour	Baseline	AFRC F-35A Mission	Change[b]	JLUS Contour	Baseline	AFRC F-35A Mission	Change[b]	JLUS Contour	Baseline	AFRC F-35A Mission	Change[b]
Commercial	569	37	327	290	311	0	64	64	79	0	0	0	24	0	0	0	0	0	0	0	983	37	391	354
Industrial	1,039	36	441	405	548	0	118	118	135	0	0	0	60	0	0	0	0	0	0	0	1,782	36	559	523
Open	2,636	6	404	398	1,119	0	21	21	365	0	0	0	10	0	0	0	0	0	0	0	4,130	6	425	419
Public/Quasi-Public	574	5	23	18	22	0	21	21	19	0	0	0	2	0	0	0	0	0	0	0	617	5	44	39
Recreational	21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21	0	0	0
Residential	874	0	84	84	91	0	1	1	16	0	0	0	0	0	0	0	0	0	0	0	981	0	85	85
Undesignated[c]	808	16	221	205	278	0	54	54	75	0	0	0	21	0	0	0	0	0	0	0	1,182	16	275	259
Total	6,521	100	1,500	1,400	2,369	0	279	279	689	0	0	0	117	0	0	0	0	0	0	0	9,696	100	1,779	1,679

[a] All numbers are in units of acres.
[b] Change equals the difference between baseline acreage and acres exposed to noise resulting from the AFRC F-35A mission.
[c] Undesignated land includes roads, retention basins, and other municipal features that might not be shown on Figure DM3-7.
Note: Numbers may not sum due to rounding. To best represent the level of accuracy achieved, acreage numbers are displayed as whole numbers in the text and tables, whereas calculations are based on the raw acreage numbers containing multiple decimal points. The resulting summations and change calculations are then rounded to whole numbers.
Source: Pima County 2018d

Scenario C

Implementation of Scenario C would increase the area surrounding Davis-Monthan AFB exposed to DNL of 65 dB or greater by approximately 1,762 acres. The largest increase in acreage exposed to additional noise would be industrial (31 percent), followed by open areas (24 percent) and commercial (23 percent). Four (4) percent (79 acres) of the 1,762 acres exposed to additional noise is classified as residential land and is currently located in the AEZ. Compared to Scenario A or B, implementation of Scenario C would result in more acres of all land use types exposed to DNL of 65 dB or greater. Implementation of Scenario C would result in less acres of residential land exposed to DNL of 65 dB or greater than Scenarios A or B.

As previously described for Scenario A, this residential land is currently in the AEZ (Table DM3-37 and Figure DM3-7). Approximately 1,361 off-installation residents who reside in the AEZ are not currently exposed to DNL of 65 dB. These residents would be affected by DNL of 65 dB or greater from the proposed mission. All of the 1,762 acres and the off-installation residents are currently located in the AEZ. Per the Pima County and Tucson ordinances, acoustical treatment of buildings in the AEZ is already required to reduce exposure to high levels of airport noise. However, as noted in the JLUS, unlike similarly situated areas around TUS, there is no program available to retrofit residences in these areas for noise attenuation.

Table DM3-37. Off-Base Acres Exposed to DNL of 65 dB or Greater at Davis-Monthan AFB under Scenario C

Land Use Category[a]	DNL (dB)																							
	65–69				70–74				75–79				80–84				≥85				Totals			
	JLUS Contour	Baseline	AFRC F-35A Mission	Change[b]	JLUS Contour	Baseline	AFRC F-35A Mission	Change[b]	JLUS Contour	Baseline	AFRC F-35A Mission	Change[b]	JLUS Contour	Baseline	AFRC F-35A Mission	Change[b]	JLUS Contour	Baseline	AFRC F-35A Mission	Change[b]	JLUS Contour	Baseline	AFRC F-35A Mission	Change[b]
Commercial	569	37	332	295	311	0	106	106	79	0	0	0	24	0	0	0	0	0	0	0	983	37	438	401
Industrial	1,039	36	464	428	548	0	127	127	135	0	0	0	60	0	0	0	0	0	0	0	1,782	36	591	555
Open	2,636	6	406	400	1,119	0	21	21	365	0	0	0	10	0	0	0	0	0	0	0	4,130	6	427	421
Public/Quasi-Public	574	5	22	17	22	0	21	21	19	0	0	0	2	0	0	0	0	0	0	0	617	5	43	38
Recreational	21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21	0	0	0
Residential	874	0	78	78	91	0	1	1	16	0	0	0	0	0	0	0	0	0	0	0	981	0	79	79
Undesignated[c]	808	16	222	206	278	0	62	62	75	0	0	0	21	0	0	0	0	0	0	0	1,182	16	284	268
Total	6,521	100	1,524	1,424	2,369	0	338	338	689	0	0	0	117	0	0	0	0	0	0	0	9,696	100	1,862	1,762

[a] All numbers are in units of acres.
[b] Change equals the difference between baseline acreage and acres exposed to noise resulting from the AFRC F-35A mission.
[c] Undesignated land includes roads, retention basins, and other municipal features that might not be shown on Figure DM3-7.
Note: Numbers may not sum due to rounding. To best represent the level of accuracy achieved, acreage numbers are displayed as whole numbers in the text and tables, whereas calculations are based on the raw acreage numbers containing multiple decimal points. The resulting summations and change calculations are then rounded to whole numbers.
Source: Pima County 2018d

DM3.8.2.2 Recreation

Construction in support of the AFRC F-35A mission would occur in the existing developed portions of the base. Off-base parks, schools, and recreational facilities are too far from the installation to be affected by construction noise. Increased truck traffic to the installation during the 2-year construction period could cause temporary effects on traffic flow on local roads, but this is not anticipated to interfere with access to recreational areas around Tucson. New facilities would not alter any sensitive views that have important recreational value. No land designated as recreational land would be exposed to DNL of 65 dB or greater.

Implementation of the AFRC F-35A mission at Davis-Monthan AFB would result in a net loss of 30 personnel with dependents as a result of the drawdown of the AFRC A-10 mission as the F-35A aircraft arrive. This change in the number of people would have no discernable effect on recreational resources. Noise impacts to recreational resources from construction and personnel changes would be the same regardless of which afterburner scenario is selected.

Noise-related changes resulting from implementation of the AFRC F-35A mission would be similar under all three afterburner scenarios. The following discussion highlights the areas in which impacts would be different. Implementation of the AFRC F-35A mission (Scenario A, B, or C) would result in an increase of average noise (DNL) at 8 of the 10 recreational facilities evaluated as representative noise-sensitive locations in this EIS. Implementing Scenario B would increase the average noise level (DNL) by 1 dB at Swan and Escalante Parks. Under Scenario C, DNL would increase by 1 dB at Freedom and The Groves Parks. Noise modeling results summarized in Table DM3-38 indicate that implementation of the AFRC F-35A mission (Scenarios A, B, or C) at Davis Monthan AFB would not result in DNL exceeding 65 dB at any of the recreational facilities near Davis-Monthan AFB identified for evaluation in this EIS. However, a DNL increase of 3 dB above baseline conditions would be noticeable.

Table DM3-38. Noise Effects on Recreation Facilities near Davis-Monthan AFB

ID	Recreational Facility	Within the AEZ	DNL (dB)			
			Baseline Conditions	Scenario A	Scenario B	Scenario C
P01	Parkview Park	Y	55	62	62	62
P02	Swan Park	Y	54	58	59	59
P03	Freedom Park	N	55	58	58	59
P04	Escalante Park	N	47	50	51	51
P05	The Groves Park	N	<45	48	48	49
P06	County Club Annex Park	Y	56	63	63	63
P07	Reid Park Zoo	Y	54	60	60	60
P08	Jacobs Park and Ochoa Soccer Complex	N	46	50	50	50
P09	Saguaro National Park (Tucson Mountain District)	N	<45	<45	<45	<45
P10	Arthur Pack Regional Park	N	<45	<45	<45	<45

Source: https://www.tucsonaz.gov/parks/parks

The use of outdoor sports fields and ball courts is compatible with DNL below 65 dB, although noise increases could reduce the quality and enjoyment of outdoor activities for some persons. One measure of annoyance is the potential for speech interference. As described in Section DM3.2.2.2, L_{max} of 50 dB is the metric used to determine potential speech interference. As shown in Table DM3-16, under Scenario A P01, P03, P04, P05, P06 and P07 would experience one additional outdoor noise event per hour at L_{max} exceeding 50 dB.

Another noise metric that can be used to evaluate potential impacts to recreational uses is SEL. As shown in Table DM3-9, SEL would not increase at any of the recreational facilities analyzed. Although the SEL noise from a single overflight would not change, certain recreational areas could experience an increase in the number of overflights at existing SEL values and experience an increased average noise level as measured by the DNL.

Saguaro National Park, located in two districts, on the west (Tucson Mountain District) and east (Rincon Mountain District) sides of the City of Tucson, would not be affected by DNL greater than 45 dB. As shown in Table DM3-9, the aircraft and operation type that results in the highest SEL (based C-130 arrival) at the Tucson Mountain District of Saguaro National Park would continue to be the aircraft and operation type resulting in the highest SEL after implementation of the AFRC F-35A mission. Saguaro National Park could be overflown by AFRC F-35A pilots transiting to and from Davis-Monthan AFB, but overflights would be infrequent. AFRC F-35A pilots operating at Davis-Monthan AFB would use established flight tracks, so areas that have not been directly overflown in the past would not be overflown frequently by AFRC F-35A pilots. The noise analysis indicated that no events exceeding L_{max} of 50 dB would occur at P09 or P10.

During scoping, the NPS submitted a comment letter on 10 May 2018 expressing desire to work with the USAF on the analysis of potential impacts to Saguaro National Park resources and values associated with Davis-Monthan AFB. The letter expressed concern over the potential increase in noise produced by the F-35A aircraft relative to the existing A-10 aircraft operations at Davis-Monthan AFB, as the new mission could adversely affect wilderness qualities, wildlife, and park visitor experiences. The NPS indicated that supplemental noise metrics might be appropriate for the assessment of noise impacts to solitude in the Saguaro Wilderness Area.

On 1 October 2018, the USAF hosted a teleconference with the NPS to discuss these concerns and seek any additional information the NPS might want to include in the EIS. During the teleconference, the USAF and NPS discussed the specific noise metrics that would be used to measure the overall noise environment around Saguaro National Park. The NPS and USAF agreed that inclusion of SEL, and L_{max} noise metrics would be the appropriate to use in addition to DNL when assessing the overall sound environment for the AFRC F-35A EIS analysis. Subsequent to the teleconference, the NPS provided the USAF with geographic information system (GIS) files of trails and other areas in Saguaro National Park that are considered sensitive noise areas.

DM3.8.3 Airspace Affected Environment

DM3.8.3.1 Land Use

This section summarizes land ownership and affected Special Use Land Management Areas (SULMAs) under the airspace currently used by pilots based at Davis-Monthan AFB. SULMAs include selected areas managed by federal and state agencies that provide recreational and scenic opportunities (e.g., parks, monuments, and scenic river corridors), solitude or wilderness experiences (e.g., forests and wilderness areas), conservation of natural or cultural resources (e.g., wildlife refuge areas and national monuments), and other special management functions (e.g., Native American reservation lands). SULMAs often provide a combination of these attributes. Some SULMAs could include recreation-oriented sites such as campgrounds, trails, and visitor centers; recreation is addressed in Section DM3.8.3.2. Pilots operating from Davis-Monthan AFB use airspace located in Arizona and New Mexico, with most areas in Arizona (see Figure DM3-8). The majority of federal land under this airspace is administered by the U.S. Bureau of Indian Affairs, followed by the U.S. Forest Service (USFS), Bureau of Land Management (BLM), DoD, USFWS, and the NPS. The SULMAs under the airspace currently used by pilots from Davis-Monthan AFB include wilderness

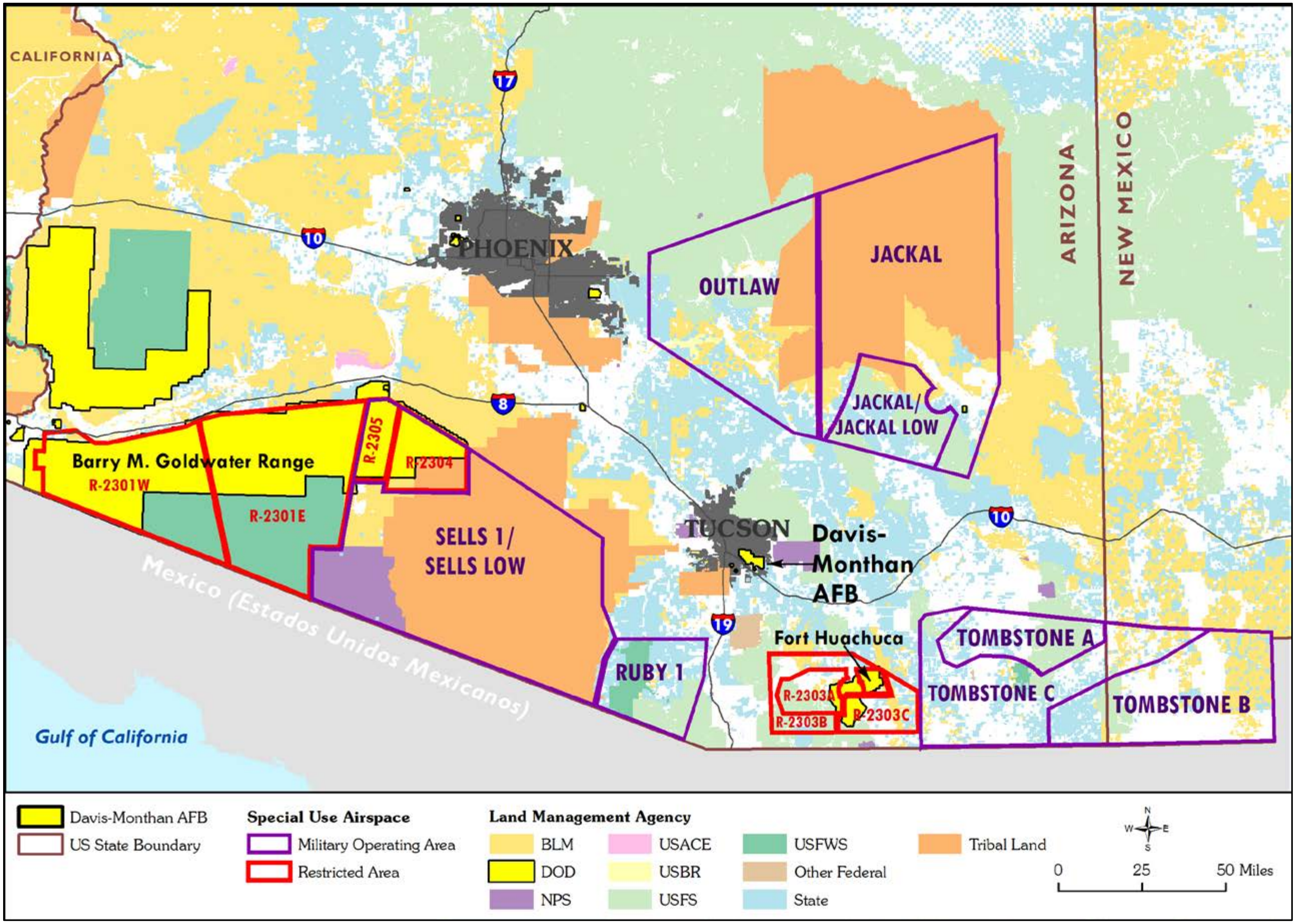

Figure DM3-8. SULMAs Beneath Davis-Monthan AFB Airspace

and wilderness study areas, primitive areas, national forests, national wildlife refuges, national conservation areas, national monuments, Native American reservation lands, and state parks. Figure DM3-8 identifies the airspace currently used along with the SULMAs aggregated by ownership (i.e., USFS, USFWS, state land, etc.).

DM3.8.3.2 Recreation

Recreational opportunities under the airspace used by pilots from Davis-Monthan AFB are similar to those described in Section DM3.8.2.2. The underlying land reflects the same mosaic of federal, state, and private ownership, with a similar range of outdoor recreational activities. The public lands support a spectrum of recreational opportunities and activities, with some areas having particular qualities or recreational purposes.

Southeastern Arizona and southwestern New Mexico hosts habitats that support a wide variety of birds, particularly along waterways and in mountainous areas. These areas are popular for recreational bird watching. Public access is permitted to limited portions of the BMGR for recreation. The Sikes Act stipulates that access for wildlife-oriented recreation shall be provided to the extent possible with military use, while maintaining the priority of the military purpose and safety of public users. Recreational activities in the BMGR include camping, driving, hunting, off-highway vehicle uses, and viewing of cultural and natural resources of interest. AZGFD is responsible for conserving recreational opportunities on the BMGR over the long-term and for providing ongoing opportunities to the extent compatible with the military mission. This includes active sports, such as hunting and off-road uses.

DM3.8.4 Airspace Environmental Consequences

DM3.8.4.1 Land Use

Table DM3-39 identifies the SULMAs that occur under the airspace proposed for use by AFRC F-35A pilots operating from Davis-Monthan AFB that would be exposed to noise that would increase by 1-dB L_{dnmr} above baseline. Although SULMAs below some of the airspace proposed for use would not be exposed to 1-dB L_{dnmr} increases above baseline (i.e., Jackal, Outlaw, and Tombstone MOAs), the proposed AFRC F-35A operations would result in changes in subsonic airspace noise of an indiscernible 1 dB L_{dnmr} beneath the Ruby 1 and Fuzzy MOAs. Use of the Ruby 1 and Fuzzy MOAs by AFRC F-35A pilots would result in an indiscernible 1 dB L_{dnmr} increase above baseline at 6 different SULMAs (Table DM3-39).

Table DM3-39. Special Use Areas Land Management Areas Exposed to Subsonic Noise Increases of 1 dB or Greater from the AFRC F-35A Mission at Davis-Monthan AFB

SULMA Name	SULMA Acreage	Percentage of SULMA Under Airspace	Baseline Conditions	AFRC F-35A Mission	
			L_{dnmr}	L_{dnmr}	Change
Ruby 1 & Fuzzy MOAs					
Arivaca Land and Lake	208	100	46	47	1
Buenos Aires National Wildlife Refuge	117,457	99	46	47	1
Coronado National Forest	1,718,945	7	46	47	1
Pajarita Wilderness	7,499	72	46	47	1
Tohono O'odham Reservation	2,773,453	<1	46	47	1
Tumacacori Roadless Area	44,594	52	46	47	1

Supersonic aircraft operations would occur in BMGR airspace (i.e., R-2301, R-2304, and R-2305) and Sells MOA, which are currently approved for supersonic training. F-35A pilots from Luke AFB (as well as other fighter types) currently conduct supersonic operations in BMGR airspace. Sonic booms generated by AFRC F-35A pilots would be comparable to sonic booms that occur today. The average number of booms per day below the BMGR airspace would increase from 3.1 to 3.5 and CDNL would increase from 56 to 57 dB. The average number of sonic booms per day below the Sells MOA would increase from 2.1 to 2.2 and CDNL would increase from 54 to 56 dB (Table DM3-40). In summary, sonic booms would occur in areas and at intensities that are comparable to what occurs today. Sonic booms would become more common (increasing by as much as one additional sonic boom every other day), and the increase in frequency could be considered annoying to individuals who recognize the increase.

Table DM3-40. Supersonic Noise Levels (CDNL) by Airspace and Associated SULMAS for Davis-Monthan Airspace

SULMA Name	SULMA Acreage	Percentage of SULMA Under Airspace	Baseline Conditions	AFRC F-35A Mission	
			CDNL	CDNL	Change
Barry M. Goldwater Range R-2301E					
Cabeza Prieta National Wildlife Refuge	855,602	68	56	57	1
Cabeza Prieta Wilderness	791,839	66	56	57	1
Organ Pipe Cactus National Monument	329,138	<1	56	57	1
Organ Pipe Cactus Wilderness	310,661	1	56	57	1
Sells MOA/ATCAA & R-2304 and R-2305					
Baboquivari Peak Area of Critical Environmental Concern	2,060	100	54	56	2
Baboquivari Peak Wilderness	2,060	100	54	56	2
Buenos Aires National Wildlife Refuge	117,457	<1	54	56	2
Cabeza Prieta Wilderness	791,839	<1	54	56	2
Coffeepot Botanical Area of Critical Environmental Concern	8,893	100	54	56	2
Organ Pipe Cactus National Monument	329,138	95	54	56	2
Organ Pipe Cactus Wilderness	310,661	99	54	56	2
Sonoran Desert National Monument	496,513	<1	54	56	2
Tohono O'odham Reservation	2,773,453	81	54	56	2

DM3.8.4.2 Recreation

A synopsis of issues and the methodology for addressing potential impacts resulting from military training on recreational resources under the airspace proposed for use are provided in Chapter 3, Section 3.8. Chapter 3, Section 3.8.2, describes typical recreational impacts that could result from implementation of the AFRC F-35 mission at Davis-Monthan AFB. In general, a diverse range of active and passive recreational activities occurring throughout the region already coexists within a context of exposure to military overflight and supersonic events. Increased numbers of sorties in some airspace would indiscernibly affect the noise levels and an increase in supersonic events could result in recreational participants experiencing startle effects from these events. This could continue to result in some degradation in enjoyment for those affected and result in loss of opportunity for quiet recreational environments in the region. Increased noise could diminish opportunities for visitors to experience natural soundscapes in national park units, and could affect the qualities of natural quiet that are intrinsic to recreational opportunities in wilderness areas, wilderness study areas, and other remote locations.

During scoping, a comment was received regarding the impact of noise on recreational areas in addition to those identified in Tables DM3-38, DM3-39, and DM3-40, potentially affected by AFRC F-35A aircraft operations. These areas are Picacho Peak State Park, Ironwood Forest National Monument, and Table Top Wilderness Area. Average noise levels under the airspace proposed for use would generally remain the same, except for areas under the Ruby 1 and Fuzzy MOAs. These areas would experience an indiscernible 1 dB L_{dnmr} increase. As shown in Table DM3-1, aircraft sorties in the Tombstone MOAs would increase by approximately 43 percent. The increase in sorties would not detectably change average subsonic noise levels, although the increase in single event overflights could annoy some individuals using the recreational areas below the Tombstone MOAs. Supersonic operations conducted by AFRC F-35A pilots would result in sonic booms, similar to other aircraft using this airspace. The potential for isolated events to be experienced by persons engaging in recreational activities throughout the affected area would continue. Areas supporting recreational uses sensitive to loud, intrusive noise, such as wilderness areas and wildlife refuges could experience one additional sonic boom every other day.

Federal agencies are generally mandated to manage wilderness areas for their wilderness qualities. This includes maintaining the natural setting and allowing minimal human disturbance and development. Although CDNL would not change more than 2 dB, wilderness management goals could be negatively affected by increased noise and disturbance associated with military overflights. Increased noise in wilderness areas, recreation areas, and other specially managed lands could also be perceived by some recreational users as affecting their recreation experience.

DM3.8.5 Summary of Impacts to Land Use and Recreation

Land use and recreational resources would not be impacted by any of the construction because all of the construction would be conducted on the base in land use zones compatible with the proposed development. Implementation of Scenarios A, B, or C would expose an additional 91, 85, or 79 acres, respectively, of residential land in the AEZ to DNL of 65 to 69 dB. Per the JLUS, the impacted residential land would remain incompatible with these noise levels. Per the Pima County and Tucson ordinances, acoustical treatment of buildings in the AEZ is required to reduce exposure to high levels of airport noise. However, as noted in the JLUS, unlike areas around TUS, there is no program available to retrofit residences in these areas for noise attenuation. None of the recreational areas identified for study around the base would be exposed to DNL greater than 65 dB under any of the afterburner scenarios. However, DNL would increase at these locations from 3 dB to 7 dB and this increase would be noticeable. Regarding impacts to land use and recreation under the airspace proposed for use, DNL would remain below 47 dB below all of the airspace proposed for use but the increase in aircraft operations would be noticeable. In addition, sonic booms below the BMGR and Sells MOA would increase. Impacts to land use and recreational resources would not be considered significant under any of the afterburner scenarios.

DM3.9 SOCIOECONOMICS

Socioeconomics refers to features or characteristics of the social and economic environment. The factors affecting socioeconomic resources are the change in personnel, construction of new facilities, renovations and modifications to existing facilities, and noise from F-35A aircraft at Davis-Monthan AFB. These factors are evaluated relative to the existing population, employment, earnings, housing, education, and public and base services. Davis-Monthan AFB is located in Tucson, Arizona, in Pima County. Impacts to socioeconomic resources would extend beyond the base boundaries. Therefore, for the purposes of this socioeconomic analysis, the ROI for the proposed action and No Action Alternative is Pima County, with an emphasis on Davis-Monthan AFB.

DM3.9.1 Base Affected Environment

DM3.9.1.1 Population

Population estimates for Pima County totaled over 1.02 million persons in 2017 (USCB 2018). Between 2010 and 2017, the county population increased at an average annual rate of 0.7 percent, with a total increase of approximately 42,506 persons over the 7-year period (USCB 2018). The state of Arizona has an estimated population of 7.02 million (USCB 2018). Average annual population growth in the county has been less than the state (Table DM3-41).

Table DM3-41. Population in the ROI for Davis-Monthan AFB

Location	2010 Census	2017 Estimates	Annual Percent Change (2010–2017)
Pima County	980,263	1,022,769	0.6
Arizona	6,392,017	7,016,270	1.3

Source: USCB 2018

As shown in Table DM2-3, the total current authorized personnel at the base is 10,140 persons. Of the total authorized base personnel, 11.38 percent (1,154) are associated with AFRC.

DM3.9.1.2 Economic Activity (Employment and Earnings)

In 2016, employment in Pima County totaled 507,179 jobs (BEA 2017a). The largest employment sector in Pima County was government and government enterprises (17.2 percent), followed by health care and social assistance (13.4 percent), and retail trade (10.3 percent) (BEA 2017a). Construction accounted for 4.4 percent of total employment. Over the last several years, the average annual unemployment rate in the county has steadily declined from 6.8 percent in 2013 to 4.5 percent in 2017 (BLS 2018a). During this same time, the state average annual unemployment rate also declined but remained higher than the county (BLS 2018b). Per capita personal income in Pima County is estimated at $39,541, which is less than the estimated $40,415 per capita personal income in the state (BEA 2017b).

Davis-Monthan AFB is an important economic contributor to Southern Arizona and Pima County through employment of military and civilian personnel, and expenditures for goods and services. The total economic impact of the base on the surrounding communities in 2016 was $1,018 million (without retirees), an increase of $27 million since 2015 (Davis-Monthan AFB 2016b). Of the total $253.7 million in expenses during 2016, approximately 21 percent ($52.2 million) was spent on military construction, non-appropriated funds, and O&M. The total payroll for military, civilians, and other base personnel exceeded $579 million in 2016 (Davis-Monthan AFB 2016b). Based on the Impact Analysis for Planning (IMPLAN) economic model, the on-base authorized employment of 10,140 personnel supports an estimated additional 4,732 secondary jobs in the community.

DM3.9.1.3 Housing

Military family housing at Davis-Monthan AFB is privatized and owned by Actus Lend Lease/Soaring Heights Communities. Dormitories for permanent party unaccompanied personnel are available on base. The base includes eight buildings with 775 rooms and one building for “pipeline students” (Davis-Monthan AFB 2018).

Table DM3-42 presents census-derived housing data for Pima County. The county has an estimated 450,828 total housing units (houses), of which 12.3 percent (55,438 units) were vacant in 2016 (USCB 2016a). More than half (61.3 percent) of the occupied houses in the county are owner-occupied and the remaining 38.7 percent are renter-occupied. The median value of owner occupied houses in Pima County is estimated at $160,800. The median gross rent was $831 in 2016 (USCB 2016a). As shown in Table DM3-33, although approximately 981 acres of residential land is in the JLUS contour, none of this land is currently exposed to DNL of 65 dB or greater from aircraft operations at Davis-Monthan AFB.

Table DM3-42. Housing Data in the ROI for Davis-Monthan AFB

Location	Houses	Occupied	Vacant
Pima County	450,828	395,390	55,438

Source: USCB 2016a

Table DM3-43 presents the average and median housing sale prices for 2010 through 2016 within the Tucson market area and the results of a study performed by the Tucson Association of Realtors which presented average housing sale prices within a 1-mile radius of Davis-Monthan AFB. Average sale prices are affected by sales of high-end properties and are above the median sale prices which represent the value of one-half of the properties sold. Table DM3-43 demonstrates that housing sale prices recovered to the 2010 sale prices by 2013 and have continued to grow since 2013. The average housing sale prices within a 1-mile radius of Davis Monthan AFB reflect the relatively fewer high-end properties in that area, and the increase in sale prices in the 1-mile radius reflects the high demand for housing in Tucson since the recession bottom experienced in November of 2011. Table DM3-43 demonstrates that average housing sale prices within the 1-mile radius of Davis-Monthan AFB increased by approximately 30 percent during the study period and, within the Tucson market area, average housing sale prices increased by approximately 15 percent in the same time period (MLS 2016). The median home prices in the Tucson market area increased by a total of approximately 6 percent over the same period. In November 2017, the median home price in the Tucson market area was $174,000, an increase of 8 percent over the 2016 median price of $161,000 (Zillow 2018).

Table DM3-43. Comparison of Housing Data for Tucson Market Area and Within One-Mile Radius of Davis-Monthan AFB

Year	Market Area within 1-mile Radius of Davis-Monthan AFB Average Sale Price (in Thousands of Dollars)		Tucson Market Area Average Sale Price (in Thousands of Dollars)		Tucson Market Area Median Sale Price (in Thousands of Dollars)	
	Average Sold Price	Year-Over-Year Growth	Average Sold Price	Year-Over-Year Growth	Median Sale Price	Year-Over-Year Growth
2010	$92	NA	$189	NA	152	NA
2011	$71	-23%	$164	-13%	119	-27%
2012	$80	13%	$174	6%	127	7%
2013	$94	18%	$191	10%	140	10%
2014	$103	10%	$203	6%	146	4%
2015	$106	3%	$210	3%	149	2%
2016	$120	13%	$217	3%	161	8%
Total Change (%)	**30%**	NA	**15%**	NA	**6%**	NA

Key: NA=Not applicable, does not apply
Source: MLS 2016; Zillow 2018

DM3.9.1.4 Education

Pima County has 17 school districts and 241 non-charter schools. During the 2013 to 2014 school year, approximately 160,000 students were enrolled in Pima County district schools. Fourteen (14) of the school districts are unified and serve kindergarten through 12th-grade students. The remaining three (3) districts include two transportation districts (districts that do not have schools) and one Joint

Technical Education District (Pima County Schools 2018). As described in Section DM3.2, no off-base schools are currently exposed to DNL of 65 dB.

Two schools, the Tucson Unified School District for children attending elementary school and a charter school for children attending middle school, are located on Davis-Monthan AFB. Class size or the teacher-student ratio for regular education is the responsibility of the board and is flexible to accommodate a variety of variables including budget, student needs, and curriculum requirements (Arizona School Board Association 2018). Two child development centers are also located on base and accommodate a combined 512 children, ages infancy to 5 years old (MyBaseGuide 2018). As described in Section DM3.2, no schools on base are known to be currently exposed to DNL of 65 dB.

DM3.9.1.5 Public Services

Nineteen (19) fire districts/fire departments located throughout Pima County provide emergency services, permits and inspections, and fire protection to the county (Tucson Fire Foundation 2009). Law enforcement services in the county include the Pima County Sheriff's Department, the Tucson Police Department, and nine other law enforcement jurisdictions throughout the county (Pima County 2018c). Healthcare in Pima County includes 23 Primary Care Facilities, 7 general hospitals, and 2,702 primary care providers with an average of 369:1 population to provider ratio (Pima County 2015).

DM3.9.1.6 Base Services

Base services at Davis-Monthan AFB include shopping and dining facilities, airman and family services, community activity center, exchange shop, family support building, education and training facilities, and outdoor and indoor recreational facilities (MyBaseGuide 2018).

DM3.9.2 Base Environmental Consequences

DM3.9.2.1 Population

The current personnel at Davis-Monthan AFB and the projected change anticipated to support the AFRC F-35A mission are provided in Table DM2-3. Implementation of the AFRC F-35A mission would result in a net decrease of 30 full-time mission personnel. This would result in a 0.3 percent decline in the existing base population and a less than 0.01 percent decline in the existing county population. Calculation of this potential decrease in the county population is based on the assumption that all 30 personnel would be full-time and be reassigned to other bases, and that the personnel and any dependents would migrate out of the area. The regional economy is expected to be capable of absorbing the estimated decrease of 14 secondary jobs associated with a decrease in 30 on-base positions.

DM3.9.2.2 Economic Activity (Employment and Earnings)

Implementation of the AFRC F-35A mission at Davis-Monthan AFB would decrease the full-time work force assigned to the base by 30 total personnel (Table DM2-3). Using the IMPLAN model, the direct effect of a net decrease of 30 full-time personnel at Davis-Monthan AFB would have an estimated indirect and induced effect of a loss of up to 14 jobs throughout Pima County. This reduction in employment would not be noticed in the dynamic county environment (IMPLAN 2018).

Construction activities provide economic benefits to surrounding areas through the employment of construction workers and the purchase of materials and equipment. Construction activities would be temporary and provide a limited economic benefit. Noise associated with construction activities would be limited to within the base boundaries and would not impact economic activity. The USAF estimates that a total of $87.3 million in MILCON expenditures during 2021-2023 would be associated with implementation of the AFRC F-35A mission at Davis-Monthan AFB. The total expenditures could generate approximately 502 jobs during the construction period, primarily in the construction industry or related industries, and to a lesser extent in real estate, architectural, engineering and related services; retail stores; hospitals; full-service and limited-service restaurants; and employment services. With a labor force of 475,622 people and an unemployment rate of 4.5 percent, it is expected that the local labor force in the ROI and in the surrounding areas would be sufficient to fill these new jobs without a migration of workers into the area. Implementation of the AFRC F-35A mission and projected total MILCON expenditures of $87.3 million at Davis-Monthan AFB would generate an estimated $44.5 million in direct, indirect and induced labor income in the ROI. The jobs and related income generated would be temporary (i.e., during the construction activity).

DM3.9.2.3 Housing

Military housing is available at Davis-Monthan AFB. Assuming that all 30 full-time personnel reside off-base and would no longer require off-base housing, the reassignment of 30 full-time positions to another location would make approximately 30 rental and/or owner-occupied units available. Real-estate trends in the Tucson area suggest that the economy would be able to absorb an addition to the supply of residential units.

During scoping, people expressed concern about the potential impact of noise on surrounding property values. All of the properties exposed to DNL of 65 dB or greater are within the AEZ. Since 2004, property transactions require owners to notify buyers that their property is within the AEZ and exposed to aircraft noise. As discussed in more detail in Chapter 3, Section 3.9.3, studies have shown a relation between noise and property values. A study conducted by Trojanek et al. (2017) summarized the results from 79 studies; the majority of those studies found that housing values decreased in a range from 0.26 to 1 percent for every decibel increase in DNL above 65 dB. Some of the studies had values that decreased less than this range and others decreased more. The requirement to notify buyers that the subject property is within the AEZ would be expected to result in all properties which have changed ownership since 2004 to have values adjusted for noise. Properties which have not changed ownership since 2004 could experience a noise discount on property values. The exact percent of discount would depend upon a number of factors, including the noise indicators used, thresholds, types of properties evaluated, and other factors. The 0.26 percent to 1 percent reduction in value for every decibel increase in noise represents the average relative value when comparing equivalent units that are located inside or outside the 65 dB DNL contour. On average, housing subject to additional noise could have lower relative values of approximately 0.26 to 1 percent for those units in the 66 dB DNL contour and up to approximately 1.5 to 6 percent for those units within the 70 dB DNL contour. The general impact on home pricing would be the same regardless of which afterburner scenario is selected.

Table DM3-44 shows the total estimated number houses that would be newly exposed to DNL of 65 dB or greater from the AFRC F-35A mission, although many of these homes are located in areas zoned for high noise levels. The estimated number of residents exposed to this level of noise is identified in Tables DM3-10, DM3-12, and DM3-14. The JLUS identifies residential land use in areas subject to DNL in excess of 65 dB as incompatible use. This would include all the estimated houses in Table DM3-44. The JLUS notes that attenuation could mitigate the effects of the DNL exposure on residential use, although higher dB SEL noise would not be fully mitigated.

Table DM3-44. Estimated Houses Exposed to DNL of 65 dB or Greater from Baseline and AFRC F-35A Mission Conditions at Davis-Monthan AFB

DNL (dB)	Estimated Houses							
	AEZ	Baseline	Scenario A	Change	Scenario B	Change	Scenario C	Change
65 – 69	6,384	0	806	806	751	751	705	705
70 – 74	422	0	4	4	3	3	6	6
75 – 79	55	0	0	0	0	0	0	0
80 – 84	0	0	0	0	0	0	0	0
≥85	0	0	0	0	0	0	0	0
Total	6,861	**0**	810	**810**	754	**754**	711	**711**

DM3.9.2.4 Education

As described in Chapter 3, Section 3.9.3, the total number of dependents, including spouse and children, was estimated at 2.5 times 65 percent of full-time active duty and full-time active reserve. The total number of children was estimated at 1.5 times 65 percent of full-time personnel, because it was assumed each military member would be accompanied by a spouse. Thus, it is estimated that up to 30 dependents would be of school age and would no longer attend schools in Pima County. The projected number of students leaving would represent less than a 0.01 percent decrease of the current total enrollment throughout the 17 districts located in Pima County. Based on the number and size of the school districts in the ROI, as well as class size for the state, it is anticipated that the school capacity in the county would not be adversely impacted. This decrease in students would not be noticed in the dynamic Pima County School System.

During scoping, several people submitted comments regarding the potential noise impacts on children and education facilities. Results of recent reviews on how chronic aircraft noise exposure at school or at homes has been associated with children having poorer reading and memory skills (Basner et al. 2018). Studies also suggest that "children exposed to chronic aircraft noise at school have poorer performance on standardized achievement tests compared to children who are not exposed to aircraft noise" (Basner et al., 2018). Implementation of the AFRC F-35A mission would not expose any schools on base to DNL of 65 dB or greater. However, the off-base Griffin Foundation Schools would be exposed to DNL of 65 dB or greater from all afterburner scenarios. Increased noise impacts to students have been identified as interfering with learning (Section DM3.2.1.3). The number of schools and students impacted by increased noise from Scenario A, B, or C would constitute a significant impact.

DM3.9.2.5 Public Services

Pima County represents a large community with police, fire, and other services. The estimated reduction of 30 full-time USAF related personnel and dependents would represent decrease of less than 0.01 percent of the existing Pima County population. This decrease would have no discernible effect on public services.

A concern raised during scoping is the potential impact that noise from the F-35A aircraft would have on the quality of life and health of residents. Aircraft noise has a variety of effects such as annoyance, speech interference, sleep interference, hearing loss, and non-auditory health effects. Different individuals perceive and experience noise differently and this could affect their perceived quality of life. The increase in noise from baseline conditions, even though all affected properties are within the AEZ, could interfere with speech and sleep (Sections DM3.2.2.2 and DM3.2.2.4).

Potential non-auditory health impacts due to aircraft noise are discussed in more detail in Section DM3.2.1.7 and Volume II, Appendix B. The USAF continually works with local governments and communities to assess and manage aircraft noise in the environment and attempts to reduce, where possible, the potential impacts of noise to people.

DM3.9.2.6 Base Services

A reduction in the number of personnel would have no discernible effect on revenue generating services on base. Populations on military bases are constantly in flux as deployments and mission personnel changes are assigned.

DM3.9.3 Summary of Socioeconomic Impacts

The personnel decreases and community service requirements of the AFRC F-35A mission (Scenario A, B, or C) at Davis-Monthan AFB would not result in significant impacts to population, economic activity, housing availability, or public services. However, as described in Section DM3.2.2, DNL of 65 dB or greater from Scenarios A, B, or C would result in adverse impacts to housing and significant impacts to schools.

DM3.10 ENVIRONMENTAL JUSTICE AND PROTECTION OF CHILDREN

The environmental justice analysis considers affected populations that meet certain characteristics based on income and age. Analysis of environmental justice and other sensitive receptors is conducted pursuant to EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, and EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*. Environmental justice addresses impacts to minority and low-income populations. This analysis focuses on increased noise resulting from the proposed action as the primary impact to these populations. The USAF guidelines for environmental justice analysis use census data (i.e., percentages of populations identifying themselves as minority, low-income, etc.) to determine potential impacts to these populations. The guidelines also address children (under 18) and elderly (65 and older) as additional sensitive populations. (Minority, low-income, children, and elderly populations are henceforth referred to as environmental justice populations.) Tables DM3-10, DM3-12, and DM3-14 list the number of people exposed to DNL of 65 dB or greater from baseline and the three afterburner scenario conditions at Davis Monthan AFB.

This analysis is completed to determine if there are existing disproportionate noise impacts to environmental justice populations (i.e., baseline DNL of 65 dB or greater) and if implementation of the proposed action would result in disproportionate noise impacts to environmental justice populations (i.e., AFRC F-35A mission DNL of 65 dB or greater).

Environmental justice analysis overlays the 65 dB DNL contour on the census data polygons. The smallest census data which has the information necessary for analysis of potential impacts to environmental justice populations is used to determine potential impacts. The smallest group of census data which contain the needed information for this analysis is the Census BG. Each BG that is partially or wholly encompassed by the 65 dB DNL contour is defined as an ROI. There could be few or many ROIs for a specific environmental justice analysis, depending on the extent of the noise contour and the size of the BGs. The next higher level of census data is the Census Tract (CT). Each CT contains a number of BGs (ROIs).

> Census blocks are the smallest unit for which the USCB collects census information. **Block Groups (BGs)** are comprised of a combination of census blocks and are a subdivision of **census tracts (CTs)**. Census tracts are a small, relatively permanent statistical subdivision of a county delineated by a local committee of census data users for the purpose of presenting census data. This EIS uses **BGs** and **CTs** in the environmental justice analysis. The **BGs** also comprise the **Region of Influence (ROI)** analyzed in the EIS.

In order to identify disproportionate impacts from baseline or proposed action noise levels, a COC is needed. The COC is defined by summing the population in all the CTs which contain any part of an ROI affected by the 65 dB DNL contour. The percentages of minority and low-income persons are calculated for each ROI (i.e., BG). The ROI and COC percentages are then compared. If the percentage of minorities or low-income persons in an ROI is equal to or greater than the percentage of minorities or low-income persons in the COC, there is a disproportionate impact to the environmental justice population in that ROI (USAF 2014). Chapter 3, Section 3.10.3, provides a description of the method applied to calculate the proportion of the population in the ROIs.

For Davis Monthan AFB, there are six CTs containing nine ROIs (BGs) which are partially or wholly exposed to DNL of 65 dB or greater from the AFRC F-35A mission. Figure DM3-9 presents an overlay of the baseline and AFRC F-35A mission 65 dB DNL contour on the ROIs and the COC.

DM3.10.1 Base Affected Environment

Table DM3-45 provides baseline demographic conditions in Pima County, where Davis-Monthan AFB is located. Also shown in Table DM3-45 is the existing proportion of environmental justice populations in the six CTs located in the proposed action affected area at Davis-Monthan AFB. The six CTs are the COC for the environmental justice analysis. As shown in Table DM3-45, the COC has a higher proportion of minority, low-income, and children populations than Pima County, the State of Arizona, or the nation.

Under baseline conditions, no off-base residential areas or other areas in the AEZ are currently exposed to DNL of 65 dB or greater. No on-base or off-base schools or child care facilities are exposed to DNL of 65 dB or greater under baseline conditions at Davis-Monthan AFB. Additionally, no hospitals, parks, or libraries are exposed to DNL of 65 dB or greater under baseline conditions.

Figure DM3-10 maps the census data minority and low-income populations and Figure DM3-11 maps the children and elderly populations exposed to DNL of 65 dB or greater resulting from the AFRC F-35A mission at Davis-Monthan AFB. Both figures also show the Census BGs and the CTs used for the environmental justice analysis. Under baseline conditions, no minority or low-income populations are exposed to DNL of 65 dB or greater and there is no existing disproportionate effect to minority or low-income persons (see Table DM3-46).

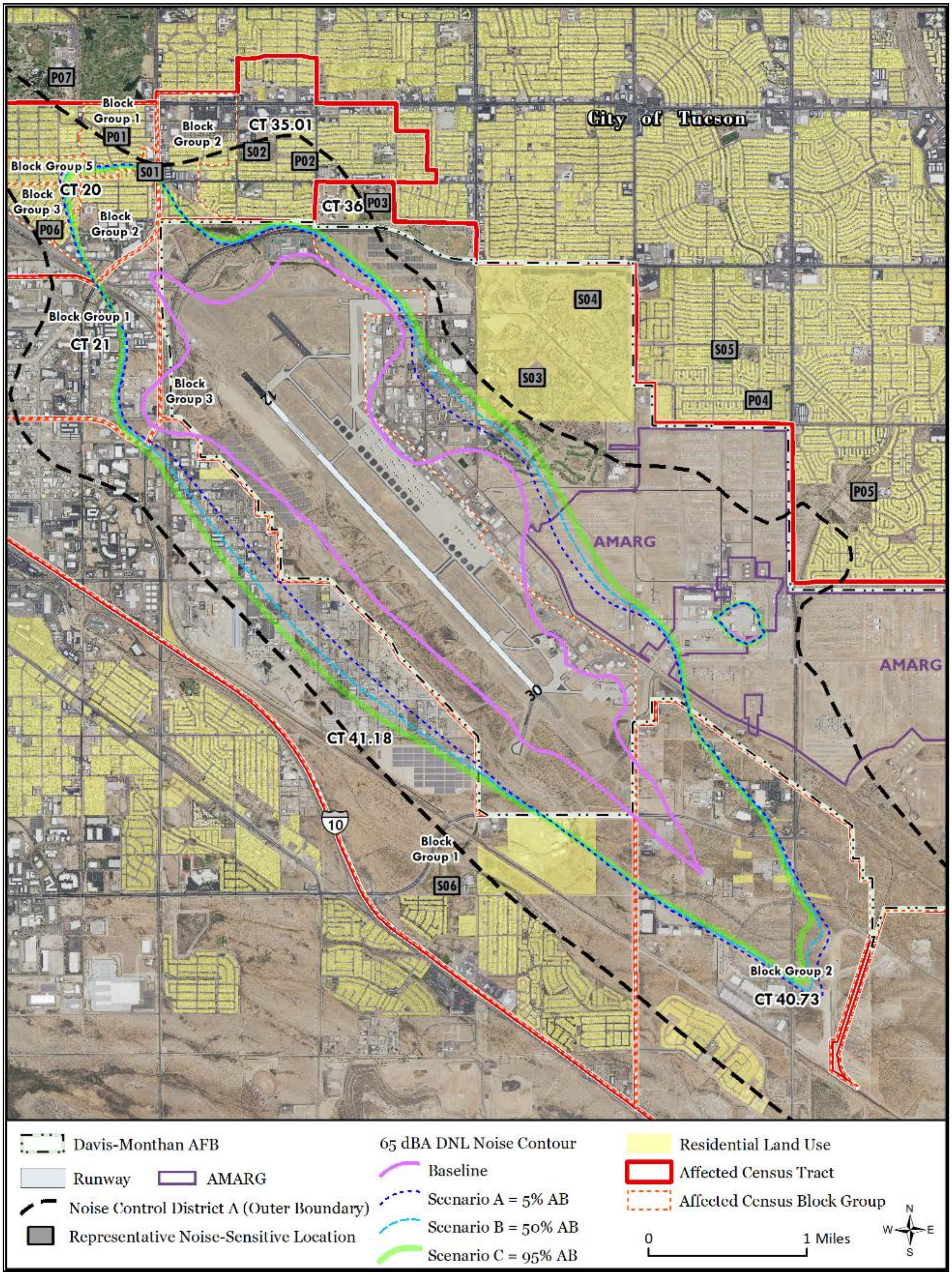

Figure DM3-9. Davis-Monthan AFB Census Tracts and Block Groups Exposed to DNL of 65 dB or Greater Under Baseline and AFRC F-35A Mission Conditions

Table DM3-45. Environmental Justice Populations and Demographics for Davis-Monthan AFB

Geographic Unit	Total Population	Population for Whom Poverty is Determined[a]	Minority		Low-Income		Children		Elderly	
			Number	Percent	Number	Percent	Number	Percent	Number	Percent
CT 20.00	6,101	6,101	4,387	71.9	600	9.8	1,139	18.7	1,143	18.7
CT 21.00	5,621	5,551	5,120	91.1	1,867	33.6	1,793	31.9	542	9.6
CT 35.01	7,750	7,750	5,477	70.7	2,992	38.6	2,079	26.8	663	8.6
CT 36.00	5,549	4,914	2,571	46.3	756	15.4	2,109	38.0	44	0.1
CT 40.73	4,815	4,767	1,776	36.9	380	8.0	1,318	27.3	402	8.3
CT 41.18	5,032	4,635	3,285	65.3	478	10.3	1,576	31.3	553	11.0
COC	**34,868**	**33,718**	**22,616**	**64.9**	**7,073**	**21.0**	**10,014**	**28.7**	**3,347**	**9.6**
Pima County	1,007,257	979,062	477,283	47.4	179,569	18.3	218,316	21.7	182,720	18.1
State of Arizona	6,809,946	6,654,096	3,023,528	44.4	1,128,046	17.0	1,622,426	23.8	1,106,362	16.2
United States	321,004,407	313,048,563	123,726,618	38.5	45,650,345	14.6	73,601,279	22.9	47,732,389	14.9

[a] Poverty status was determined for all people except institutionalized people, people in military group quarters, people in college dormitories, and unrelated individuals under 15 years of age.

Note: Numbers may not sum due to rounding. To best represent the level of accuracy achieved, population group numbers are displayed as whole numbers in the text and tables, whereas calculations are based on the raw population group numbers containing multiple decimal points. The resulting summations and change calculations are then rounded to whole numbers.

Source: USCB 2017a-e

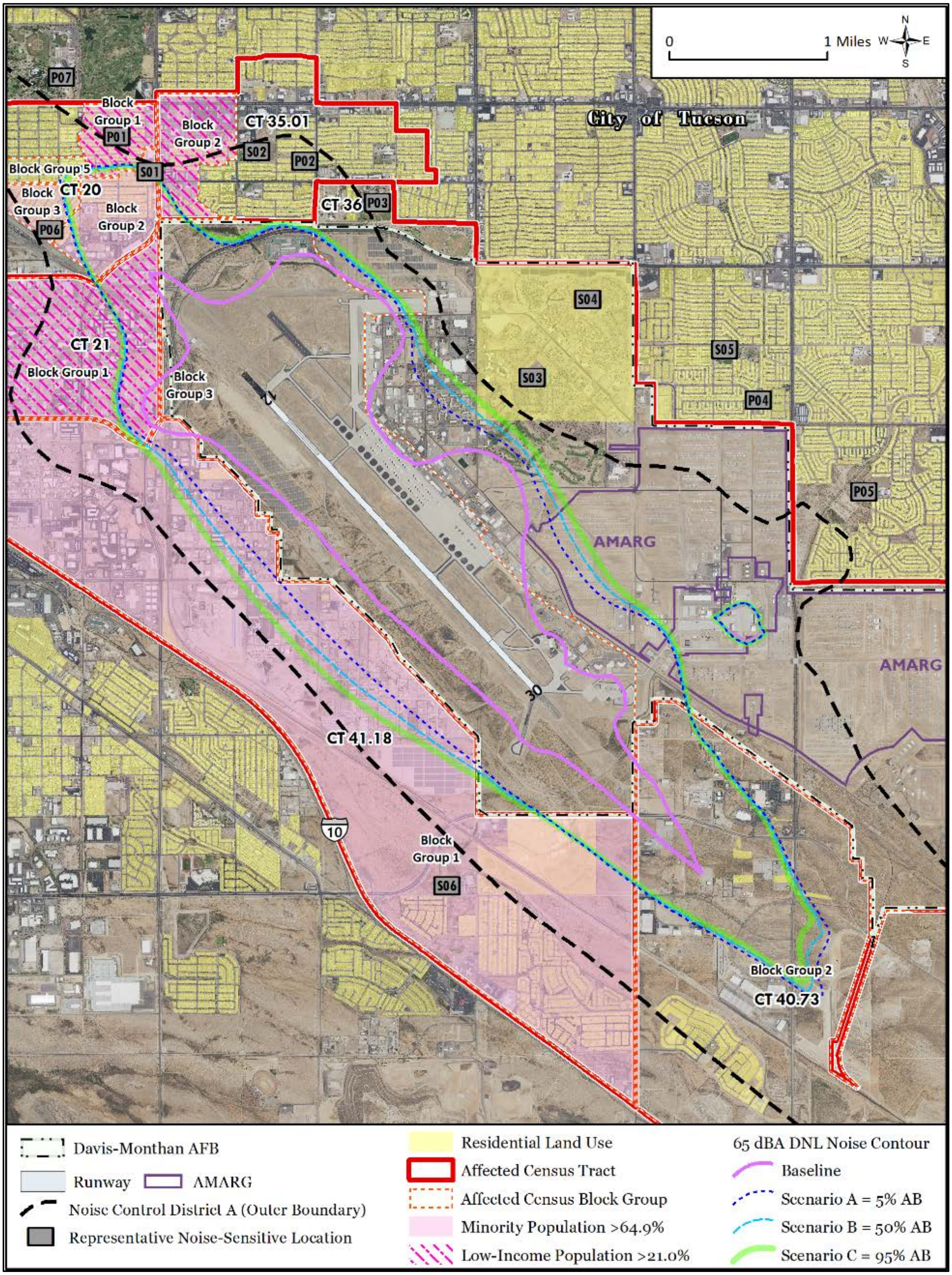

Figure DM3-10. Minority and Low-Income Populations Exposed to DNL of 65 dB or Greater Under Baseline and AFRC F-35A Mission Conditions at Davis-Monthan AFB

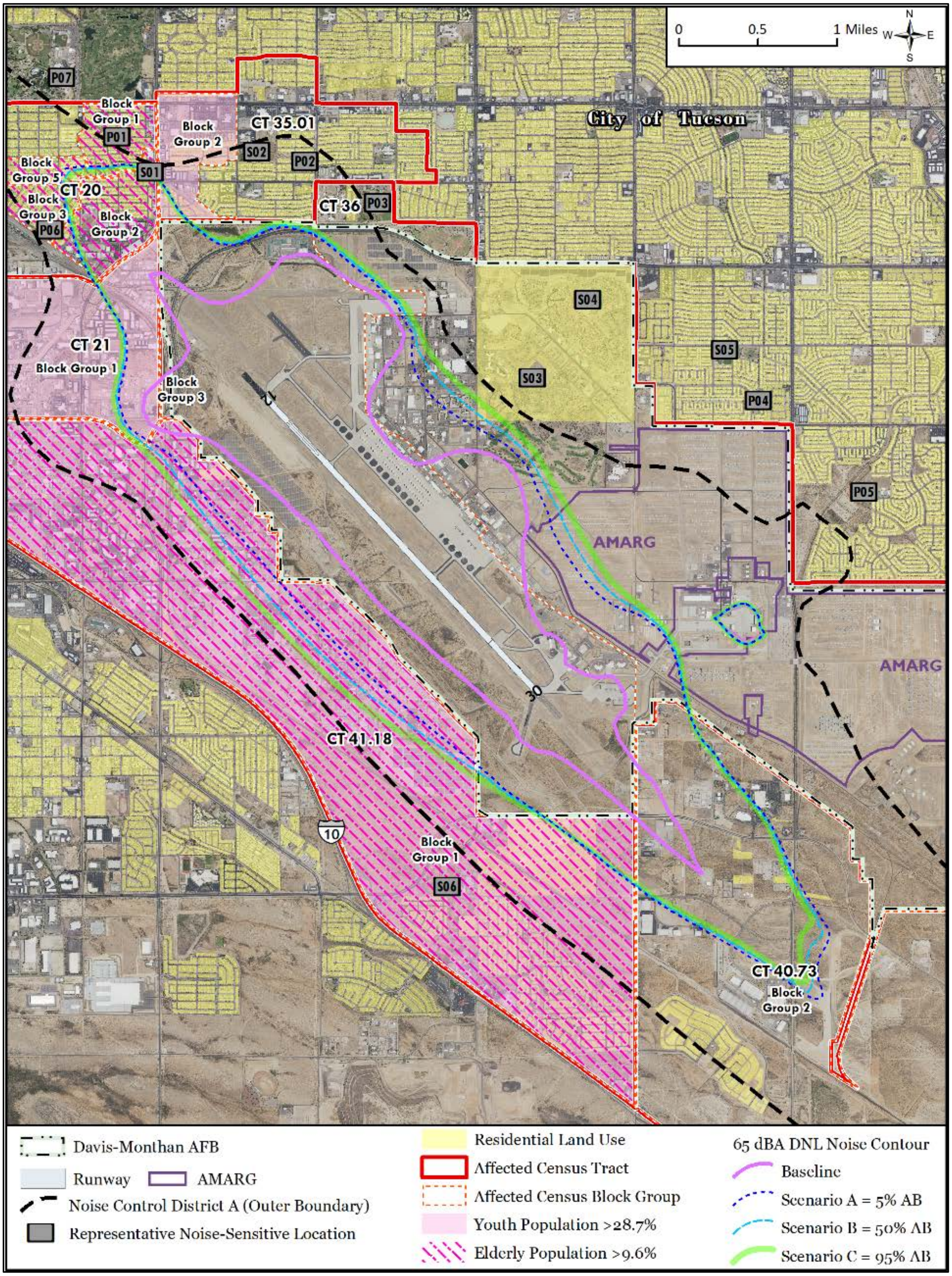

Figure DM3-11. Youth and Elderly Populations and Noise-Sensitive Receptors Exposed to DNL of 65 dB or Greater Under Baseline and AFRC F-35A Mission Conditions at Davis-Monthan AFB

DM3.10.2 Base Environmental Consequences

DM3.10.2.1 Scenario A

Based on the analysis results shown in Table DM3-46, implementation of Scenario A would result in disproportionate noise impacts to minority and low-income populations. The proportion of the population that is considered below poverty (low-income) in three of the nine ROIs is greater than the COC (see Table DM3-46). The proportion of the population that identifies themselves as minority in six of the ROIs exceeds the COC. The areas where these populations are located are shown on Figure DM3-10. “If percentages of minority and low-income populations in an ROI are greater than or equal to the corresponding percentages in the COC, then it is presumed that there would be disproportionate impacts to the EJ population” (USAF 2014). “When it is determined that disproportionate impacts on EJ populations will occur,” the EIS is to suggest “potential mitigation for the decision maker.” Mitigations for sound attenuations would have been designed for properties located in the AEZ and constructed or remodeled since 2004. The USAF considered a number of different measures to mitigate noise impacts, but none of these measures were determined to be operationally feasible (Chapter 2, Section 2.5).

The other sensitive populations evaluated in this analysis are children and elderly. Table DM3-47 shows that three of the nine ROIs (BGs) have higher percentages of children than the COC. Five of the ROIs (BGs) have a greater percentage of elderly persons than the COC. Implementation of Scenario A would expose an estimated 281 children and 223 elderly persons to DNL of 65 dB or greater. These children and elderly persons reside in the AEZ and are not currently exposed to DNL of 65 dB or greater. The areas where these populations are located are shown on Figure DM3-11.

Implementation of Scenario A would expose the Griffin Foundation Schools to DNL of 65 dB or greater (Figure DM3-2). During scoping, several people submitted comments regarding the potential noise impacts on children and education facilities. Chronic aircraft noise exposure at school or homes has been associated with children having poorer reading and memory skills (Basner et al., 2018). Studies also suggest that “children exposed to chronic aircraft noise at school have poorer performance on standardized achievement tests compared to children who are not exposed to aircraft noise” (Basner et al. 2018). Section DM3.2.2.3 explains that noise impacts to students have been identified as interfering with learning. Sections DM3.2.2.2 and DM3.2.2.3 describe speech interference and classroom learning disruption associated with increased overflight and noise levels which would adversely impact children and elderly populations. Noise-sensitive locations which would be exposed to DNL of 65 dB or greater are discussed in Section DM3.2.2.1 and Section DM3.8.2.1.1.

Table DM3-46. Minority and Low-Income Populations Exposed to DNL of 65 dB or Greater Under Baseline and AFRC F-35A Mission Conditions at Davis-Monthan AFB (Scenario A)

Geographic Units		Baseline					Proposed Action (Newly Exposed)				
Census BG (ROI)/COC	Population in the Census Area	Population in the Area Encompassed by DNL of 65 dB or Greater	Minority (%)	Disproportionate	Low-Income (%)	Disproportionate	Population in the Area Encompassed by DNL of 65 dB or Greater	Minority (%)	Disproportionate	Low-Income (%)	Disproportionate
CT 20.00											
1	887	0	69.7	No[a]	21.8	No[a]	101	69.7	Yes	21.8	Yes
2	972	0	84.2	No[a]	20.1	No[a]	877	84.2	Yes	20.1	No
3	493	0	81.3	No[a]	0.0	No[a]	79	81.3	Yes	0.0	No
5	531	0	40.1	No[a]	6.2	No[a]	82	40.1	No	6.2	No
CT 21.00											
1	1,543	0	95.0	No[a]	25.7	No[a]	7	95.0	Yes	25.7	Yes
CT 35.01											
2	1,731	0	85.3	No[a]	38.0	No[a]	198	85.3	Yes	38.0	Yes
CT 36.00											
3	0	0	0.0	No[a]	0.0	No[a]	0	0.0	No	0.0	No
CT 40.73											
2	2,160	0	45.5	No[a]	8.5	No[a]	138	45.5	No	8.5	No
CT 41.18											
1	5,032	0	65.3	No[a]	10.3	No[a]	24	65.3	Yes	10.3	No
ROI Totals	**13,349**	**0**	**NA**	**NA**	**NA**	**NA**	**1,506**	**NA**	**NA**	**NA**	**NA**
COC	34,868	NA	64.9	NA	21.0	NA	NA	64.9	NA	21.0	NA

[a] No disproportionate impacts because this BG (ROI) is not encompassed by the baseline 65 dB or greater DNL contour.

Notes: Shading indicates that implementation of the AFRC F-35A mission would result in disproportionate noise impacts to the BG (ROI). Numbers may not sum due to rounding. To best represent the level of accuracy achieved, population group numbers are displayed as whole numbers in the text and tables, whereas calculations are based on the raw population group numbers containing multiple decimal points. The resulting summations and change calculations are then rounded to whole numbers.

Key: NA = Not applicable, does not apply

Source: USCB 2017a-e

Table DM3-47. Children and Elderly Populations Exposed to DNL of 65 dB or Greater Under Baseline and AFRC F-35A Mission Conditions at Davis-Monthan AFB (Scenario A)

Geographic Units	Population in the Census Area	Baseline					Proposed Action (Newly Exposed)				
		Population in the Area Encompassed by DNL of 65 dB or Greater	Children (<18 years)		Elderly (65 years or >)		Population in the Area Encompassed by DNL of 65 dB or Greater	Children (< 18 years)		Elderly (65 years or >)	
Census BG (ROI)/COC			Percent	Number	Percent	Number		Percent	Number	Percent	Number
CT 20.00											
1[a]	887	0	26.9	0	19.4	0	101	26.9	27	19.4	20
2[a]	972	0	15.1	0	15.9	0	877	15.1	132	15.9	139
3[a]	493	0	18.9	0	15.0	0	79	18.9	15	15.0	12
5[a]	531	0	5.6	0	30.1	0	82	5.6	5	30.1	25
CT 21.00											
1[a]	1,543	0	35.4	0	7.6	0	7	35.4	2	7.6	1
CT 35.01											
2[a]	1,731	0	29.8	0	4.8	0	198	29.8	59	4.8	10
CT 36.00											
3[a]	0	0	0.0	0	0.0	0	0	0.0	0	0.0	0
CT 40.73											
2	2,160	0	24.1	0	9.5	0	138	24.1	33	9.5	13
CT 41.18											
1[a]	5,032	0	31.3	0	11.0	0	24	31.3	8	11.0	3
ROI Totals	**13,349**	**0**	**NA**	**0**	**NA**	**0**	**1,506**	**NA**	**281**	**NA**	**223**
COC	34,868	NA	28.7	10,014	9.6	3,347	NA	28.7	10,014	9.6	3,347

[a] This BG (ROI) is not encompassed by the baseline 65 dB or greater DNL contour.

Notes: Numbers may not sum due to rounding. To best represent the level of accuracy achieved, population group numbers are displayed as whole numbers in the text and tables, whereas calculations are based on the raw population group numbers containing multiple decimal points. The resulting summations and change calculations are then rounded to whole numbers.

Key: NA = Not applicable, does not apply

Source: USCB 2017a-e

DM3.10.2.2 Scenario B

Implementation of Scenario B would result in disproportionate noise impacts to minority populations in six ROIs (BGs) and low-income populations in the three ROIs (BGs) evaluated for this analysis (Table DM3-48 and Figure DM3-10). This scenario would also expose an additional estimated 269 children and 206 elderly persons to DNL of 65 dB or greater (Table DM3-49 and Figure DM3-11). Noise impacts to schools resulting from Scenario B are described in Section DM3.2.2.3.2. The USAF considered a number of different measures to mitigate noise impacts, but none of these measures were determined to be operationally feasible (Chapter 2, Section 2.5).

Table DM3-48. Minority and Low-Income Populations Exposed to DNL of 65 dB or Greater Under Baseline and AFRC F-35A Mission Conditions at Davis-Monthan AFB (Scenario B)

Geographic Units		Baseline					Proposed Action (Newly Exposed)				
Census BG (ROI)/COC	Population in the Census Area	Population in the Area Encompassed by DNL of 65 dB or Greater	Minority (%)	Disproportionate	Low-Income (%)	Disproportionate	Population in the Area Encompassed by DNL of 65 dB or Greater	Minority (%)	Disproportionate	Low-Income (%)	Disproportionate
CT 20.00											
1	887	0	69.7	No[a]	21.8	No[a]	86	69.7	Yes	21.8	Yes
2	972	0	84.2	No[a]	20.1	No[a]	868	84.2	Yes	20.1	No
3	493	0	81.3	No[a]	0.0	No[a]	68	81.3	Yes	0.0	No
5	531	0	40.1	No[a]	6.2	No[a]	49	40.1	No	6.2	No
CT 21.00											
1	1,543	0	95.0	No[a]	25.7	No[a]	7	95.0	Yes	25.7	Yes
CT 35.01											
2	1,731	0	85.3	No[a]	38.0	No[a]	188	85.3	Yes	38.0	Yes
CT 36.00											
3	0	0	0.0	No[a]	0.0	No[a]	0	0.0	No	0.0	No
CT 40.73											
2	2,160	0	45.5	No[a]	8.5	No[a]	138	45.5	No	8.5	No
CT 41.18											
1	5,032	0	65.3	No[a]	10.3	No[a]	24	65.3	Yes	10.3	No
ROI Totals	**13,349**	**0**	**NA**	**NA**	**NA**	**NA**	**1,428**	**NA**	**NA**	**NA**	**NA**
COC	34,868	NA	64.9	NA	21.0	NA	NA	64.9	NA	21.0	NA

[a] No disproportionate impacts because this BG (ROI) is not encompassed by the baseline 65 dB or greater DNL contour.

Notes: Shading indicates that implementation of the AFRC F-35A mission would result in disproportionate noise impacts to the BG (ROI). Numbers may not sum due to rounding. To best represent the level of accuracy achieved, population group numbers are displayed as whole numbers in the text and tables, whereas calculations are based on the raw population group numbers containing multiple decimal points. The resulting summations and change calculations are then rounded to whole numbers.

Key: NA = Not applicable, does not apply

Source: USCB 2017a-e

Table DM3-49. Children and Elderly Populations Exposed to DNL of 65 dB or Greater Under Baseline and AFRC F-35A Mission Conditions at Davis-Monthan AFB (Scenario B)

Geographic Units	Population in the Census Area	Baseline					Proposed Action (Newly Exposed)				
		Population in the Area Encompassed by DNL of 65 dB or Greater	Children (<18 years)		Elderly (65 years or >)		Population in the Area Encompassed by DNL of 65 dB or Greater	Children (< 18 years)		Elderly (65 years or >)	
Census BG (ROI)/COC			Percent	Number	Percent	Number		Percent	Number	Percent	Number
CT 20.00											
1[a]	887	0	26.9	0	19.4	0	86	26.9	23	19.4	17
2[a]	972	0	15.1	0	15.9	0	868	15.1	131	15.9	138
3[a]	493	0	18.9	0	15.0	0	68	18.9	13	15.0	10
5[a]	531	0	5.6	0	30.1	0	49	5.6	3	30.1	15
CT 21.00											
1[a]	1,543	0	35.4	0	7.6	0	7	35.4	2	7.6	1
CT 35.01											
2[a]	1,731	0	29.8	0	4.8	0	188	29.8	56	4.8	9
CT 36.00											
3[a]	0	0	0.0	0	0.0	0	0	0.0	0	0.0	0
CT 40.73											
2	2,160	0	24.1	0	9.5	0	138	24.1	33	9.5	13
CT 41.18											
1[a]	5,032	0	31.3	0	11.0	0	24	31.3	8	11.0	3
ROI Totals	**13,349**	**0**	**NA**	**0**	**NA**	**0**	**1,428**	**NA**	**269**	**NA**	**206**
COC	34,868	NA	28.7	10,014	9.6	3,347	NA	28.7	10,014	9.6	3,347

[a] This BG (ROI) is not encompassed by the baseline 65 dB or greater DNL contour.

Notes: Numbers may not sum due to rounding. To best represent the level of accuracy achieved, population group numbers are displayed as whole numbers in the text and tables, whereas calculations are based on the raw population group numbers containing multiple decimal points. The resulting summations and change calculations are then rounded to whole numbers.

Key: NA = Not applicable, does not apply

Source: USCB 2017a-e

DM3.10.2.3 Scenario C

Implementation of Scenario C would result in disproportionate noise impacts to minority populations in six ROIs (BGs) and low-income populations in the three ROIs (BGs) evaluated for this analysis (Table DM3-50 and Figure DM3-10). This scenario would also expose an additional estimated 258 children and 194 elderly persons to DNL of 65 dB or greater (Table DM3-51 and Figure DM3-11). Noise impacts to schools resulting from Scenario C are described in Section DM3.2.2.3.3. The USAF considered a number of different measures to mitigate noise impacts, but none of these measures were determined to be operationally feasible (Chapter 2, Section 2.5).

Table DM3-50. Minority and Low-Income Populations Exposed to DNL of 65 dB or Greater Under Baseline and AFRC F-35A Mission Conditions at Davis-Monthan AFB (Scenario C)

Geographic Units		Baseline					Proposed Action (Newly Exposed)				
Census BG (ROI)/COC	Population in the Census Area	Population in the Area Encompassed by DNL of 65 dB or Greater	Minority (%)	Disproportionate	Low-Income (%)	Disproportionate	Population in the Area Encompassed by DNL of 65 dB or Greater	Minority (%)	Disproportionate	Low-Income (%)	Disproportionate
CT 20.00											
1	887	0	69.7	No[a]	21.8	No[a]	71	69.7	Yes	21.8	Yes
2	972	0	84.2	No[a]	20.1	No[a]	860	84.2	Yes	20.1	No
3	493	0	81.3	No[a]	0.0	No[a]	57	81.3	Yes	0.0	No
5	531	0	40.1	No[a]	6.2	No[a]	28	40.1	No	6.2	No
CT 21.00											
1	1,543	0	95.0	No[a]	25.7	No[a]	7	95.0	Yes	25.7	Yes
CT 35.01											
2	1,731	0	85.3	No[a]	38.0	No[a]	178	85.3	Yes	38.0	Yes
CT 36.00											
3	0	0	0.0	No[a]	0.0	No[a]	0	0.0	No	0.0	No
CT 40.73											
2	2,160	0	45.5	No[a]	8.5	No[a]	136	45.5	No	8.5	No
CT 41.18											
1	5,032	0	65.3	No[a]	10.3	No[a]	24	65.3	Yes	10.3	No
ROI Totals	**13,349**	**0**	**NA**	**NA**	**NA**	**NA**	**1,361**	**NA**	**NA**	**NA**	**NA**
COC	34,868	NA	64.9	NA	21.0	NA	NA	64.9	NA	21.0	NA

[a] No disproportionate impacts because this BG (ROI) is not encompassed by the baseline 65 dB or greater DNL contour.

Notes: Shading indicates that implementation of the AFRC F-35A mission would result in disproportionate noise impacts to the BG (ROI). Numbers may not sum due to rounding. To best represent the level of accuracy achieved, population group numbers are displayed as whole numbers in the text and tables, whereas calculations are based on the raw population group numbers containing multiple decimal points. The resulting summations and change calculations are then rounded to whole numbers.

Key: NA = Not applicable, does not apply

Source: USCB 2017a-e

Table DM3-51. Children and Elderly Populations Exposed to DNL of 65 dB or Greater Under Baseline and AFRC F-35A Mission Conditions at Davis-Monthan AFB (Scenario C)

Geographic Units	Population in the Census Area	Baseline					Proposed Action (Newly Exposed)				
		Population in the Area Encompassed by DNL of 65 dB or Greater	Children (<18 years)		Elderly (65 years or >)		Population in the Area Encompassed by DNL of 65 dB or Greater	Children (< 18 years)		Elderly (65 years or >)	
Census BG (ROI)/COC			Percent	Number	Percent	Number		Percent	Number	Percent	Number
CT 20.00											
1[a]	887	0	26.9	0	19.4	0	71	26.9	19	19.4	14
2[a]	972	0	15.1	0	15.9	0	860	15.1	130	15.9	137
3[a]	493	0	18.9	0	15.0	0	57	18.9	11	15.0	9
5[a]	531	0	5.6	0	30.1	0	28	5.6	2	30.1	8
CT 21.00											
1[a]	1,543	0	35.4	0	7.6	0	7	35.4	2	7.6	1
CT 35.01											
2[a]	1,731	0	29.8	0	4.8	0	178	29.8	53	4.8	9
CT 36.00											
3[a]	0	0	0.0	0	0.0	0	0	0.0	0	0.0	0
CT 40.73											
2	2,160	0	24.1	0	9.5	0	136	24.1	33	9.5	13
CT 41.18											
1[a]	5,032	0	31.3	0	11.0	0	24	31.3	8	11.0	3
ROI Totals	**13,349**	**0**	**NA**	**0**	**NA**	**0**	**1,361**	**NA**	**258**	**NA**	**194**
COC	34,868	NA	28.7	10,014	9.6	3,347	NA	28.7	10,014	9.6	3,347

[a] This BG (ROI) is not encompassed by the baseline 65 dB or greater DNL contour.

Notes: Numbers may not sum due to rounding. To best represent the level of accuracy achieved, population group numbers are displayed as whole numbers in the text and tables, whereas calculations are based on the raw population group numbers containing multiple decimal points. The resulting summations and change calculations are then rounded to whole numbers.

Key: NA = Not applicable, does not apply

Source: USCB 2017a-e

DM3.10.3 Summary of Impacts to Environmental Justice and Protection of Children

Based on the analysis described in Section DM3.10.2 and shown in Table DM3-52, implementation of any of the three afterburner scenarios would result in disproportionate impacts to minority and low-income populations. The percentage of the population identifying themselves as minority residing in six ROIs (BGs) that would be exposed to DNL of 65 dB or greater exceeds the percentage of minority populations in the COC. The percentage of the exposed population that is considered below poverty (low-income) residing in three ROIs (BGs) is greater than the percentage of low-income populations in the COC. The estimated number of children and elderly people exposed to DNL of 65 dB or greater from each afterburner scenario are listed in Table DM3-52.

Table DM3-52. Summary of the Minority, Low-Income, Children, and Elderly Populations Exposed to DNL of 65 dB or Greater Under Baseline and the Three Afterburner Scenarios for the AFRC F-35A Mission at Davis-Monthan AFB

Scenario and Baseline/No Action	Disproportionate Impact		Newly Exposed Individuals	
	Minority Populations - Census BGs (ROIs)	Low-Income Populations - Census BGs (ROIs)	Children	Elderly Persons
Baseline/No Action[a]	0 of 9[a]	0 of 9[a]	0[a]	0[a]
Scenario A	6 of 9	3 of 9	281	223
Scenario B	6 of 9	3 of 9	269	206
Scenario C	6 of 9	3 of 9	258	194

[a] Baseline/No Action is the existing conditions and does not include the values for any of the other scenarios.

DM3.11 INFRASTRUCTURE

DM3.11.1 Base Affected Environment

DM3.11.1.1 Potable Water System

Davis-Monthan AFB's potable water demand is met by eight active on-base wells (from a total of 17), which pump water from the Tinaja Beds and the Fort Lowell Formation of the Tucson Basin aquifer. The installation produces, treats, and distributes its own water for consumption and fire protection. Well depths vary between 800 and 1,300 feet deep and operate for 2 to 3 hours a day to meet demand via a 10-inch-diameter line from the wells to the base (Davis-Monthan AFB 2016c).

Davis-Monthan AFB can supply a maximum of approximately 4.03 million gallons per day (MGD) from the aquifer to meet peak demands. The estimated peak demand is approximately 1.6 MGD and the average demand is approximately 1.18 MGD. The water demand has decreased by greater than 25 percent since 2007 because of substantial investment in landscape xeriscaping and water metering. Reclaimed water use on the base (e.g., golf course) ranges from a summer peak of 9 million gallons per month to winter use of nearly 5 million gallons per month, which equates to approximately 16.7 percent of the total amount of water annually consumed on the base (Davis-Monthan AFB 2016c).

Water storage capacity at Davis-Monthan AFB is handled by a mix of elevated and underground tanks with a capacity of 2.53 million gallons. The potable water distribution system is generally considered adequate to meet existing needs (Davis-Monthan AFB 2016c).

Davis-Monthan AFB's original water distribution system was constructed in the 1950s. Despite the age of the piping, the distribution system and water pressure are in adequate condition, with few leaks or buildup issues. The active wells currently are in good condition, but some could require deeper bore holes to continue operating to full capacity. If water in the Tucson Basin aquifer continues to be consumed without recharge, the base could need to drill additional wells of greater depth to maintain an adequate water supply (Davis-Monthan AFB 2016c).

DM3.11.1.2 Wastewater

The Davis-Monthan AFB sanitary sewer system was installed in the 1960s. This system extends east-west through two 15-inch-diameter pipes and exits in the extreme northwest corner of the installation to the Pima County sanitary sewer system. Most of the sanitary sewer system functions by gravity flow, but the installation does have five lift stations. Pima County treats an average of 0.48 MGD of wastewater discharged from the installation. The peak wastewater demand at Davis-Monthan AFB is 0.72 MGD with the maximum capacity of the Pima County discharge connection of 3 MGD. The wastewater system is in adequate condition with enough capacity for current and future needs (Davis-Monthan AFB 2016c).

DM3.11.1.3 Stormwater System

Stormwater runoff on Davis-Monthan AFB is managed through a stormwater system consisting of a combination of surface channels and underground infrastructure which currently have adequate capacity to handle most flows. However, during the rainy season from July through September, storms can lead to flooding in portions of the base (Davis-Monthan AFB 2016c). Additional information regarding the stormwater system and associated permits is contained in Section DM3.5.1.2

DM3.11.1.4 Electrical System

Tucson Electric Power provides electricity to the installation via two separate overhead 46-kilovolt (kV) feeder lines that enter on the northeast side of the installation and extend along Wilmot Road to the substation. A single, three-phase, 25 megavolt ampere (MVA) transformer steps the voltage down to 13.8 kV for distribution throughout the base via eight primary circuits. Seven (7) of the 10 transformer switchgears are currently in use and 70 percent of the electrical distribution lines on base are overhead. Davis-Monthan AFB also has 16.4-megawatt (MW) and 6.5-MW solar arrays. The majority of the electrical system is fairly new and in good condition (Davis-Monthan AFB 2016c).

Privatization of the housing electrical system reduced the load on the main transformer and opened a substantial amount of capacity at the substation. The current electrical demand at Davis-Monthan AFB is approximately 16 MVA with the system having a capacity of approximately 25 MVA. The electrical system capacity is considered adequate (Davis-Monthan AFB 2016c).

DM3.11.1.5 Natural Gas System

The natural gas system at Davis-Monthan AFB is supplied by Southwest Gas Corporation through two high-pressure transmission lines connecting to the base at the northwest corner along Valencia Road and the southeast corner along Wilmot Road. Natural gas supplied to installation flows through the utility’s regulator and metering station via two 6-inch-diameter, buried, and coated supply lines. All of the main lines are polyethylene plastic, less than 20 years old, and in excellent condition. The natural gas pipeline distribution capacity is 3.4 million cubic feet (MCF) per day with a current demand of approximately 0.36 MCF per day (Davis-Monthan AFB 2016c).

DM3.11.1.6 Solid Waste Management

Municipal solid waste management and compliance at USAF installations is established in AFI 32-7042, *Waste Management.* In general, AFI 32-7042 establishes the requirements for installations to have a solid waste management program to incorporate a solid waste management plan; procedures for handling, storage, collection and disposal of solid waste; record-keeping and reporting; and pollution prevention. Davis-Monthan AFB’s Integrated Solid Waste Management Plan (ISWMP) describes the solid waste management and recycling program. The purpose of this program is to maximize the diversion of solid waste from landfills through reuse, donation, and recycling; and to describe Qualified Recycling Program business practices (Davis-Monthan AFB 2015d).

The USAF goal for solid waste reduction is to divert 65 percent of non-hazardous solid waste by 2020 and 60 percent of C&D debris by 2018 (DoD 2012). Davis-Monthan AFB’s solid waste and C&D debris diversion rates in 2014 were 41.38 and 39.30 percent, respectively (Davis-Monthan AFB 2015d).

Municipal solid waste generated at Davis-Monthan AFB that is not recycled is collected by a contractor. The contractor removes and disposes of the refuse in the City of Tucson Los Reales Landfill. No active municipal landfills are located on the installation. Collection of C&D debris generated during contracted facility demolition, renovations, or new construction activity is the responsibility of the contractor performing the work (Davis-Monthan AFB 2015d).

DM3.11.1.7 Transportation

I-10 is located just west of the installation and I-19 is southwest of the installation. I-10 provides east-west access to Phoenix and El Paso, Texas, while I-19 connects Tucson with the Mexican border. Access to the base includes the main gate access on Craycroft Road, additional gate access off Swan, Wilmot, and Irvington Roads.

The City of Tucson does not provide mass transit on Davis-Monthan AFB, although there are nearby bus stops, and there is no direct rail connection to the base. There are officially designated bike paths on base as well as two major pedestrian routes on Kachina and Sixth streets that serve the dormitory area. Additional pedestrian paths are planned for the Airman living areas.

TUS provides air passenger service to several cities where airline hubs provide access worldwide. The airport is located approximately 10 miles from the main gate at Davis-Monthan AFB and can be reached in approximately 15 minutes by car or by airport shuttle bus. Military passenger and military cargo are served by the Military Air Passenger Terminal Building (Building 4819) and the Air Cargo Terminal (Building 4822).

Generally, parking is adequate on Davis-Monthan AFB. However, as is the case with many installations, parking at high use customer-oriented locations can be problematic. The base commissary parking lot experiences parking problems during peak use, especially from 10:30 A.M. to 3:00 P.M. daily. On military paydays and holidays the parking situation is more problematic. An additional 465 spaces are required to address this situation and the expansion of commissary retail space. The base is exploring alternatives to address the parking situation (Davis-Monthan AFB 2008).

DM3.11.1.7.1 Gate Access

Vehicle access to the base is provided through four gates: the main gate access on Craycroft Road, and additional gates off Swan, Wilmot, and Irvington Roads. Current gates meet minimum mission demands. However, throughput for commercial traffic, currently at Swan Gate, needs improvement (Davis-Monthan AFB 2016c).

DM3.11.1.7.2 On-Base Traffic Circulation

Four major, primary roads serve Davis Monthan AFB. Craycroft Road extends generally north/south through the main base, and provides the main entry point to the base. Wilmot Road provides access to the AMARG and the base hospital.

The intersection of Sunglow Road, 5th Street and Yuma Street, begins at the Swan Gate and extends north/south through the base. The Yuma Street extension of these combined arteries intersects with Craycroft Road and Picacho Street. Picacho Street extends east/west and connects with the Yuma Street extension and Wilmot Road.

The major secondary roads on the main base area include: Quijota Road, Arizola Street, Comanche Street, Granite Street Ironwood Street, First Street and Third Street. The AMARG area of Davis-Monthan AFB is served by Irvington Road, the Wilmot Road extension, Coolidge Street and Wickenberg Streets (Davis-Monthan AFB 2008).

The Davis-Monthan AFB on-base transportation network is sufficient to handle the existing traffic volume. The road system has a good base and requires only minor maintenance repair on its top surface (Davis-Monthan AFB 2016c).

DM3.11.2 Base Environmental Consequences

The projected change in population that would result from implementation of the proposed AFRC F-35A mission at Davis-Monthan AFB is a reduction of 30 base personnel or approximately 0.3 percent of the base population. This projected change in population and development was used to determine the impact on infrastructure. Since the proposed AFRC F-35A mission results in the loss of base personnel, it is assumed that the current demand for the potable water, wastewater, electric, and natural gas systems is sufficient to support the projected change in population. The impact of the proposed AFRC F-35A mission on the transportation infrastructure, would be negligible based on the potential minor reduction of on-base traffic.

DM3.11.2.1 Potable Water System

During scoping, people submitted comments about the potential for the AFRC F-35A mission to increase water use. Implementation of the AFRC F-35A mission would result in a decrease (30 employees) in personnel. Based on the average usage rate of 175 GPD per person, it is anticipated that the decrease in population associated with the proposed mission would lower the water use demand at Davis Monthan AFB by approximately 5,250 GPD (175 GPD x 30). This decrease would have no effect on the ability to supply water, and the overall impacts would not be significant. In addition to water use by on-base personnel, O&M of the F-35A aircraft is not anticipated to have any additional water requirements above and beyond what is currently required for A-10 aircraft. Therefore, significant impacts to potable water would not result from implementation of the AFRC F-35A mission.

DM3.11.2.2 Wastewater

The USEPA estimates that the average person generates approximately 120 GPD of wastewater between showering, toilet use, and general water use (USEPA 2014). Based on this rate, the proposed decrease in population (i.e., 120 people) would lower the wastewater discharge from Davis-Monthan AFB by 3,600 GPD. This decrease would have no effect on the ability to handle and treat wastewater, and the overall impacts would not be significant.

DM3.11.2.3 Stormwater System

The proposed AFRC F-35A mission would require demolition of facilities and construction of new facilities. All of the infrastructure development would occur in the existing developed base flightline and other developed portions of the base. The total disturbed area associated with these projects would be approximately 15.2 acres and impacts would not be significant.

During the short-term construction period, all contractors would be required to comply with applicable statutes, standards, regulations, and procedures regarding stormwater management. During the design phase, a variety of stormwater controls could be incorporated into construction plans. These could include planting vegetation in disturbed areas as soon as possible after construction; constructing retention facilities; and implementing structural controls (e.g., interceptor dikes, swales [excavated depressions], silt fences, straw bales, and other storm drain inlet protection), as necessary, to prevent sediment from entering inlet structures.

DM3.11.2.4 Electrical System

The U.S. Energy Information Administration (USEIA) estimates that the average household in Arizona uses 9.826 megawatt hours (MWh) per year (USEIA 2016). The proposed decrease in population would lower the electrical use at Davis Monthan AFB by 2,951 MWh per year. This decrease would have no effect on the power supply limit from Tucson Electric Power and the overall impacts would not be significant.

DM3.11.2.5 Natural Gas System

The natural gas system at Davis Monthan AFB is supplied by Southwest Gas Corporation and has a delivery capacity of 3.4 MCF per day. The current demand is approximately 0.36 MCF per day. A decrease in population of 30 personnel would have no effect on the natural gas supply limit and the overall impacts would not be significant.

DM3.11.2.6 Solid Waste Management

Solid waste would continue to be managed in accordance with AFI 32-7042 and the ISWMP with the implementation of the proposed AFRC F-35A mission at Davis-Monthan AFB. Using methodology developed by the USEPA (USEPA 2009b), it is estimated that implementation of the proposed AFRC F-35A mission would generate approximately 5,559 tons of C&D debris for recycling or removal to landfills. Application of the 60 percent DoD target diversion rate (DoD 2012) for C&D debris would result in approximately 3,335 tons being reused or recycled, and approximately 2,224 tons being placed in a permitted construction debris landfill in the region. C&D debris is the responsibility of the contractor performing the work, and contract documents require disposal in a permitted construction debris landfill. C&D debris is usually disposed of at the Speedway Landfill (a C&D landfill operated by the Fairfax Management Company), although other landfills in the area are permitted to accept C&D debris (Davis-Monthan AFB 2015d). Additionally, solid waste generated from the proposed renovation and repair of the airfield pavement, apron, and ramp projects (see Table DM2-1), would be recycled and reused as aggregate for the concrete and asphalt used in those projects.

Implementation of the AFRC F-35A mission at Davis-Monthan AFB would result in a reduction of 30 personnel and their associated dependents resulting in a minor decrease in municipal solid waste generation having little effect on the municipal solid program (collection, disposal, etc.). The City of Tucson Los Reales Landfill has an estimated life span of 47 years and would continue to accommodate the municipal solid waste from Davis-Monthan AFB (Davis-Monthan AFB 2015d). The overall impacts would not be significant.

Contractors would be required to comply with federal, state, and local regulations for the collection and disposal of municipal solid waste from the base. C&D debris, including debris contaminated with hazardous waste, ACM, lead-based paint (LBP), or other hazardous components, would be managed in accordance with AFI 32-7042 and the installation's ISWMP.

DM3.11.2.7 Transportation

Implementation of the proposed AFRC F-35A mission would not alter traffic circulation on the base. Haul routes related to C&D have not been established, but would be routed to avoid base housing areas, and other noise-sensitive areas as much as practicable. Truck traffic could lead to the degradation of road surfaces over an extended period of use. Construction truck traffic and construction workers commuting to the project sites would generate minor increases in vehicle trips per day on base roadways and increase congestion at the gates.

At project sites, temporary lane closures could be necessary during C&D activities. Appropriate signage and detour to maintain access would be provided. These impacts would be short-term and temporary, occurring only for the duration of the construction period.

Implementation of the AFRC F-35A mission at Davis-Monthan AFB would result in a reduction of 30 personnel and their associated dependents, which would result in little to no effect to gate access or on- and off-installation traffic and transportation systems.

DM3.11.3 Summary of Impacts to Infrastructure

Implementation of the AFRC F-35A mission would not result in changes to any of the utility infrastructure (potable water, wastewater, stormwater, electricity, natural gas and solid waste) on Davis-Monthan AFB. In addition, the new mission would also not require any changes to transportation resources including any of the base gates. Therefore, implementation of the new mission would result in negligible impacts to infrastructure.

DM3.12 HAZARDOUS MATERIALS AND WASTE

DM3.12.1 Base Affected Environment

DM3.12.1.1 Hazardous Materials

Hazardous materials used by USAF and contractor personnel at Davis-Monthan AFB are managed in accordance with the Hazardous Materials Management Plan (Davis-Monthan AFB 2015e). This plan is written in accordance with and to aid in the implementation of AFI 32-7086, *Hazardous Materials Management*. Hazardous materials are controlled through the base Hazardous Materials Storage Facility and Enterprise Environmental, Safety, and Occupational Health Management Information System (EESOH-MIS). The purpose of this system is to track the procurement, storage, distribution, use, reuse, recycling, and disposal of hazardous materials at Davis-Monthan AFB.

DM3.12.1.1.1 Aboveground and Underground Storage Tanks

The Davis-Monthan AFB Spill Prevention, Control, and Countermeasures (SPCC) Plan outlines the procedures to prevent, control, and/or mitigate releases of oil and other petroleum substances. Davis-Monthan AFB made a determination under 40 *CFR* 112.20(e), as recorded in the "Certification of Applicability of Substantial Harm Criteria," that the facility does not pose a risk of substantial harm. Therefore, a Facility Response Plan (FRP) is not required for Davis-Monthan AFB (Davis-Monthan AFB 2018). The SPCC Plan and Installation Emergency Management Plan (IEMP) 10-2 address roles, responsibilities, and response actions for all major spills (Davis-Monthan 2017b).

Davis-Monthan AFB has 11 aboveground storage tanks (ASTs) with capacities greater than 10,000 gallons. These ASTs are located throughout the installation and are used to store Jet-A, diesel, oil and used oil. Davis-Monthan AFB also manages 39 underground storage tanks (USTs). The total Jet-A storage capacity at Davis-Monthan AFB is approximately 8,800,000 gallons (Davis-Monthan AFB 2018). Davis-Monthan AFB used an average of approximately 20,525,000 gallons of Jet-A per year over the last three years. Davis-Monthan AFB receives fuel through a 6-inch commercial pipeline or by commercial tank trucks if the pipeline is inoperative. Jet-A is delivered to the flightline via Type III hydrant system with nine (9) outlets/pits for refueling aircraft and two loading racks used for issuing fuel to refueling trucks. The 924 FG A-10 aircraft are issued fuel via 11 refueling trucks (R-11) (Davis-Monthan AFB 2018).

DM3.12.1.1.2 Toxic Substances

The Facility Asbestos Plan establishes the responsibilities and procedures for properly managing facilities with ACM at Davis-Monthan AFB (Davis-Monthan AFB 2010). An additional plan, the Asbestos Management Plan for Davis-Monthan AFB, supplements the Facility Asbestos Plan. The Asbestos Management Plan provides documentation for all asbestos management efforts and the procedures for carrying out the asbestos management program. The plan also presents organizational responsibilities and procedures for ensuring base compliance with applicable USEPA and OSHA requirements (Davis-Monthan AFB 2009). The Civil Engineering Squadron maintains a permanent file documenting the amount, status, and condition of ACM in base facilities. Based on these plans, all proposed facility demolition and renovation projects must be reviewed by a USEPA-certified accredited asbestos building inspector to identify the presence of ACM prior to work beginning. PDEQ requires a permit for any demolition of buildings which are 100 square feet or greater as well as a permit for the removal of ACM. Work on all ACM abatement for renovation or demolition projects would only be performed by contractor personnel who will follow all local, state, and federal laws concerning asbestos removal and abatement. ACM wastes are removed by the contractor performing the work and handled and disposed of in accordance with federal, state, and local regulations at a waste disposal site authorized to accept such waste (Davis-Monthan AFB 2009, 2010).

The Davis-Monthan AFB Lead-Based Paint Management and Operations Plan (Davis-Monthan AFB 2007) provides guidance and establishes procedures for the management of LBP and the implementation of the LBP program. This plan also defines management and organizational responsibilities and procedures for ensuring that personnel at Davis-Monthan AFB are not exposed to lead poisoning. The Civil Engineering Squadron maintains an LBP Survey database to document the location of LBP. This database is updated after each abatement project. The design of building alteration projects and requests for self-help projects are reviewed to determine if lead-containing materials are present in the proposed work area. For every project on Davis-Monthan AFB, LBP wastes are removed by the contractor and disposed of in accordance with state and federal regulations at a permitted off-base landfill.

The electrical systems (transformers, light ballasts, etc.) at Davis-Monthan AFB are polychlorinated biphenyl (PCB)-free (Shore 2018). However, transistors from old aircraft at AMARG are routinely found and disposed of in accordance with the Hazardous Waste Management Plan (HWMP) (Davis-Monthan AFB 2017c) and federal and state laws and regulations.

DM3.12.1.2 Hazardous Waste Management

Davis-Monthan AFB is classified as a Large-Quantity Generator. Hazardous waste generated, stored, transported, or disposed of by Davis-Monthan AFB is regulated by the State of Arizona under authority granted to the state by the USEPA. Typical hazardous wastes generated during O&M activities include flammable solvents, contaminated fuels and lubricants, paint/coating, stripping chemicals, waste oils, blast media, waste paint-related materials, and other miscellaneous wastes.

Hazardous wastes at Davis-Monthan AFB are managed in accordance with the HWMP (Davis-Monthan AFB 2017c). This plan covers the management of hazardous wastes from the point the material becomes a hazardous waste to the point of ultimate disposal, as required by federal and state laws and regulations. In 2016, the base generated approximately 98,851 pounds of hazardous waste, which was disposed of at off-base permitted disposal facilities.

DM3.12.1.3 Environmental Restoration Program

There are 55 Installation Restoration Program (IRP) sites at Davis-Monthan AFB. Of the 55 sites, 43 sites are closed, 8 are no further response action planned, and 4 are active sites. Environmental response actions at Davis-Monthan AFB are planned and executed under the IRP/Environmental Restoration Program (ERP) in a manner consistent with Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Resource Conservation and Recovery Act (RCRA), and other applicable laws. Davis-Monthan AFB is not listed on the USEPA's National Priorities List (Davis-Monthan AFB 2017d).

PFOS/PFOA are members of a family of emerging contaminants known as per- and polyfluoroalkyl substances (PFAS) that are directly related to the former use of Aqueous Film Forming Foam (AFFF), a fire suppressing agent that was used by the DoD. The USEPA has not issued regulatory limits on PFAS. However, the USEPA has issued a 70 parts per trillion Lifetime Health Advisory level for PFOS/PFOA in drinking water. In February 2019, consistent with CERCLA, Davis-Monthan AFB completed the on-base portion of a site inspection of AFFF release areas (Davis-Monthan AFB 2019). The preliminary assessment identified 37 potential AFFF release areas, 6 of which were identified for site inspection. Four (4) of these areas were combined into 1 site, resulting in 3 AFFF release areas for site inspection. If the CERCLA risk assessment process ultimately determines there is a need for cleanup action, federal and state cleanup standards will be evaluated under the CERCLA process to see if they are Applicable or Relevant and Appropriate Requirements (ARARs) at any of the three on-base sites. The off-base portion of the AFFF site inspection has not been completed.

Davis-Monthan AFB has transitioned to firefighting foam that meets the Military Specification (MILSPEC) standard for PFAS concentrations. The new foam meets both the MILSPEC requirements for firefighting and the goals of the USEPA 2010/2015 PFOA Stewardship Program.

DM3.12.2 Base Environmental Consequences

DM3.12.2.1 Hazardous Materials Management

Implementation of the proposed AFRC F-35A mission at Davis-Monthan AFB would not add any new hazardous materials that would exceed the base's current hazardous waste processes. Existing procedures for the centralized management of the storage, distribution, use, reuse, recycling, and disposal of hazardous materials through the base Hazardous Materials Storage Facility and EESOH-MIS are adequate to accommodate the changes anticipated with the replacement of the A-10 mission with the AFRC F-35A mission.

The F-35A was designed to reduce the quantities and types of hazardous materials needed for maintenance of the aircraft. Unlike the A-10 aircraft, the F-35A aircraft does not use cadmium fasteners, chrome plating, copper-beryllium bushings, or primers containing cadmium and hexavalent chromium. No adverse impacts are anticipated to result from implementation of the AFRC F-35A mission at Davis-Monthan AFB. Long-term environmental benefits from the reduced use of hazardous materials are anticipated.

The F-35A aircraft is composed of composite materials (e.g., carbon fiber) and stealth coatings (e.g., low observable material), which could pose a health risk under specific circumstances (e.g., during maintenance or when burned as a result of an aircraft crash). The only maintenance of the stealth coating that would occur at the base would be done using a brush or roller to apply coatings, bonding materials, or applying tape. Depot-level maintenance of the low observable material (including spray capability) would be conducted off-site; therefore, the composite material for major repairs to the low observable material would not be stored on base. Section DM3.4.2.4.2 discusses composite materials and emergency crash response.

DM3.12.2.1.1 Aboveground and Underground Storage Tanks

New and remodeled facilities would require the addition of new ASTs to support generators, as well as new hazardous material and waste containers. The new and remodeled facilities would be constructed with berms and drains leading to oil-water separators (OWSs), if required, to contain potential uncontrolled releases of petroleum products. No ASTs, USTs, or OWSs would be removed with the proposed construction, demolition, or renovation projects. The Davis-Monthan AFB SPCC Plan and IEMP 10-2 would subsequently need to be revised to incorporate any changes in facility design, construction operation, or maintenance that materially affects the potential for an uncontrolled release of petroleum products (Davis-Monthan AFB 2018, 2017b).

DM3.12.2.1.2 Toxic Substances

Several demolition and renovation projects are planned as part of the proposed AFRC F-35A mission. Any construction, demolition, or renovation project proposed at Davis-Monthan AFB would be reviewed to determine if ACM is present. As shown in Table DM3-53, Buildings 1358, 5111, 5247, and 5251 are proposed for modification and could potentially contain ACM. All handling and disposal of ACM wastes would be performed in accordance with the Davis-Monthan AFB Facility Asbestos Plan, Asbestos Management Plan (Davis-Monthan AFB 2009, 2010), and in compliance with federal, state, and local regulations. Before initiating any demolition or ACM work, required notifications to the PDEQ would be completed. This notification must be submitted 10 working days before the planned work start date with an Asbestos NESHAP Activity Permit Application and Notification of Demolition and Renovation (if applicable). A PDEQ Activity Permit must be received before work begins. Work on ACM projects would only be conducted by contractor personnel who follow all local, state, and federal laws concerning asbestos removal and abatement. All ACM wastes would be disposed of at an approved landfill.

Table DM3-53. Toxic Substances Associated with Projects for the AFRC F-35A Mission at Davis-Monthan AFB

Project	Year Constructed	ACM	LBP	PCBs
Demolition				
Building 5247	1953	[a]	[b]	[c]
Building 5251	1971	[a]	[b]	[c]
Renovation				
Building 5111 addition for hazardous materials storage, renovation for collateral storage	1954	[a]	[b]	[c]
Building 404 medical building addition	2008	[d]	[d]	[c]
Building 1358 renovation for the security forces facility modifications	1980	[a]	[b]	[c]
Refurbish 23 sunshades to hardened tops (change tops of existing structures)	Various	[a]	[b]	[c]

[a] Buildings constructed before 1980 are assumed to potentially contain ACM (AFI 32-1052, *Facilities Asbestos Management*).
[b] Building assumed to potentially contain LBP. Paints produced prior to 27 February 1978 were lead-based (Davis-Monthan AFB 2007).
[c] Base facilities are PCB-free (Shore 2018).
[d] Buildings constructed after 1980 are presumed to not contain ACM or LBP.

All construction, demolition, and renovation projects proposed at Davis-Monthan AFB would be reviewed to determine if LBP or lead containing materials are present, and whether such materials would be disturbed. To the extent possible, the presence of lead within the work area would be identified prior to work beginning. Table DM3-53 contains a list of buildings (Buildings 1358, 5111, 5247, and 5251) proposed for modification that have the potential to contain LBP or lead-containing material. If the presence of lead containing material in the project work area is unknown, the shop and real property records would be reviewed to determine the presence of lead. If the presence of lead containing material in the work area is still unknown, sampling and analysis for lead would be conducted. The handling and disposal of lead wastes would be conducted in accordance with the Davis-Monthan AFB Lead-Based Paint Management and Operations Plan and HWMP (Davis-Monthan AFB 2007, 2017c), and in compliance with federal, state, and local requirements and regulations.

Although minor increases in the management requirements for ACM and LBP removal are anticipated, no adverse impacts are anticipated to result from implementation of the AFRC F-35A mission at Davis-Monthan AFB. Long-term environmental benefits from removal of toxic substances are anticipated.

DM3.12.2.2 Hazardous Waste Management

Davis-Monthan AFB would continue to operate as a Large-Quantity Generator and would generate hazardous wastes during various O&M activities associated with the proposed AFRC F-35A mission. Waste-associated maintenance materials include adhesives, sealants, conversion coatings, corrosion prevention compounds, hydraulic fluids, lubricants, oils, paints, polishes, thinners, cleaners, strippers, tapes, and wipes. No new hazardous materials would be added that exceed the base’s current hazardous waste processes. The Davis-Monthan AFB HWMP (Davis-Monthan AFB 2017c) would be updated to reflect any changes in disposal procedures or hazardous waste generators and waste accumulation points.

During scoping, several people submitted comments concerning hazardous materials used for O&M of the F-35A aircraft. Implementation of the AFRC F-35A mission at Davis-Monthan AFB would potentially have a beneficial impact on hazardous waste management. Transition from the A-10 to the F-35A would decrease the volume and types of hazardous waste and waste streams because O&M involving cadmium and hexavalent chromium primer and various heavy metals have been eliminated or greatly reduced. All hazardous wastes would be handled and managed in accordance with federal, state, and local regulations.

DM3.12.2.3 Environmental Restoration Program

There are 55 IRP sites at Davis-Monthan AFB. Environmental response actions at these sites are planned and executed under the ERP in a manner consistent with CERCLA, RCRA, and other applicable laws. None of the proposed construction, demolition, or renovation projects associated with the proposed AFRC F-35A mission at Davis-Monthan AFB are on or directly adjacent to active IRP sites. During scoping, people submitted comments regarding contamination and hazardous waste sites. The USAF addresses these matters with both state and federal regulatory agencies. None of the AFRC F-35A construction would affect any of these contaminated sites. However, there is the possibility that undocumented contaminated soils and/or groundwater from historical fuel spills may be present. If encountered during C&D-related excavations, storage/transport/disposal of contaminated groundwater/soils would be conducted in accordance with applicable federal, state, and local regulations; AFIs; and base policies. Should soil or groundwater contaminants be encountered during C&D activities, health and safety precautions, including worker awareness training, would be required.

Davis-Monthan AFB identified three AFFF (PFAS) release areas for site inspection on base. These sites are currently being evaluated in accordance with the CERCLA process. Davis-Monthan AFB will comply with Air Force Guidance Memorandum (AFGM) 2019-32-01, *AFFF-Related Waste Management Guidance*, to manage waste streams containing PFAS. The AFGM will be updated as needed to address changes in regulatory requirements, DoD determinations of risk, or development of new technologies. If PFOS/PFOA attributable to DoD actions is found in drinking water at levels that exceed USEPA's Lifetime Health Advisory, the DoD takes immediate action to stop human exposure by providing alternate drinking water sources.

In addition to groundwater contamination as it relates to drinking water, other PFAS contamination considerations relative to the proposed AFRC F-35A mission include worker safety during implementation of the projects and proper management of any PFAS-impacted environmental media that is identified in the project footprint. As part of implementation of the new mission, excavations for new buildings and building additions would occur. Based on review of known historical releases of AFFF at Davis-Monthan AFB, none of the proposed new buildings or building additions associated with the F-35A beddown are located in those areas. However, the Runway 30 approach end concrete modifications project is located near a plane crash from the early to mid-1990s. Less than 50 gallons of AFFF was used to extinguish the aircraft fire and was left to dissipate where it was applied. During the AFFF site inspection, PFOS in surface soil was detected (0.0007 milligrams per kilogram [mg/kg]) at levels below the screening level (0.126 mg/kg) at this airfield crash site (Davis-Monthan AFB 2019). The next step in the CERCLA process is the remedial investigation. During the remedial investigation, the USAF will collect detailed information to characterize site conditions, determine the nature and extent of the contamination, and evaluate risks to human health and the environment posed by the site conditions by conducting a baseline ecological and human health risk assessment. The CERCLA process will continue regardless of any construction activities. Construction activities, to include the handling, mitigation, and disposal or other disposition of contamination discovered before or during the construction activity, will proceed in accordance with all applicable legal requirements. The ERP manager would be consulted during the CERCLA process and prior to implementation of this project to ensure worker safety.

DM3.12.3 Summary of Impacts to Hazardous Materials and Waste

Implementation of the new mission would not add any new hazardous materials that would exceed the base's current processes. No ASTs, USTs or OWSs would be removed. Four of the buildings proposed for demolition could contain ACM and LBP. Prior to demolition, Davis-Monthan AFB would complete the appropriate notifications and complete the abatement work in accordance with applicable plans and per all local, state and federal requirements. None of the construction would affect ERP sites. Should contaminated media be encountered during construction, storage/transport/disposal of contaminated media would be conducted in accordance with base plans and applicable regulations. Implementation of the new mission would not result in significant impacts to hazardous materials and wastes.

DM4.0 CUMULATIVE EFFECTS AND IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Council on Environmental Quality (CEQ) regulations stipulate that the cumulative effects analysis should consider the potential environmental impacts resulting from "the incremental impacts of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person (federal or non-federal) undertakes such other actions" (40 *CFR* 1508.7). In this section, an effort has been made to identify past and present actions in the Davis-Monthan AFB region and those reasonably foreseeable actions that are in the planning phase or unfolding at this time. Actions that have a potential to interact with the AFRC F-35A mission at Davis-Monthan AFB are included in this cumulative analysis. This approach enables decision makers to have the most current information available so that they can evaluate the environmental consequences of the AFRC F-35A mission at Davis-Monthan AFB and in associated airspace.

Davis-Monthan AFB is an active military installation that undergoes changes in mission and training requirements in response to defense policies, current threats, and tactical and technological advances. As a result, the installation requires new construction, facility improvements, infrastructure upgrades, and other maintenance/repairs on a nearly continual basis. Although known construction and upgrades are a part of the analysis contained in this document, some future requirements cannot be predicted. As those requirements surface, future NEPA analyses will be conducted, as necessary.

DM4.1 PAST, PRESENT, AND REASONABLY FORESEEABLE ACTIONS

In 1976, after 30 years of flying B-29s, B-47s, F-86s, and F-4s under the Strategic Air Command, Davis-Monthan AFB was transferred to the Tactical Air Command. During that same year, the 355 FW received its first group of A-10A Thunderbolts. Since 1979, Davis-Monthan AFB has been the only training location for A-10 pilots in the United States. From 1975 to 2017, the ANG had responsibility for conducting the Operation Snowbird program. In 2002, ACC completed the West Coast Combat Search and Rescue beddown at Davis-Monthan. This beddown involved HH-60 helicopters and HC-130 aircraft and brought 1,095 new personnel to the installation.

Table DM4-1 summarizes past, present, and reasonably foreseeable actions within the region that could interact with the beddown of F-35A at Davis-Monthan AFB. The table briefly describes each identified action, presents the proponent or jurisdiction of the action and the timeframe (e.g., past, present/ongoing, future), and indicates which resources potentially interact with the AFRC F-35A mission at Davis-Monthan AFB. Recent past and ongoing military actions in the region were considered as part of the baseline or existing conditions in the region surrounding Davis-Monthan AFB and training airspace.

Table DM4-1. Past, Present, and Reasonably Foreseeable Actions at Davis-Monthan AFB and Associated Region

Action	Proponent/Location	Timeframe	Description	Resource Interaction
Military Actions				
Davis-Monthan AFB IDP	355 FW Davis-Monthan AFB	Future	The proposed action includes the implementation of 16 representative projects, which include MILCON, additions and renovations, and demolition projects. Implementation of these projects would provide for the continuously evolving mission of the 355 FW and their tenants. Proposed projects meet applicable DoD installation master planning criteria.	Noise, Air Quality, Safety, Soil and Water Resources, Transportation
Angel Thunder	USAF Davis-Monthan AFB	Present and Future	As part of this project, the USAF would conduct biannual personnel recovery (PR) training operations using DoD and non-DoD landing zones, drop zones, ground training sites, and aircraft sorties.	Airspace, Noise, Air Quality, Land Use and Recreation
BMGR Land Withdrawal and Projects	USAF and Navy/ Arizona and New Mexico	Future	The BMGR land withdrawal will terminate in October 2024. The USAF and Navy will file an application to extend the land withdrawal to serve the continuing military need for this range. In separate actions, Range 3 has been converted to a helicopter gunnery range. A new taxiway at the Gila Bend Auxiliary Airfield has been approved but not constructed, and the construction of a moving vehicle target range in the North Tactical Range has also been approved but not completed.	Airspace, Noise, Air Quality, Safety, Biological Resources, Land Use and Recreation
SUA Reconfigurations	USAF	Future	Various concepts for a Tombstone MOA redesign are under consideration. These concepts include the possibility of new RA and an expansion of the MOA to the north. In addition, a Regional Airspace Optimization Study is being considered along with a study for the Playas MOA.	Airspace, Noise, Safety, Land Use and Recreation
RA R-2301E	USAF	Future	Lowering the operational floor of R-2301E to 500 feet over the Cabeza Prieta National Wildlife Refuge has been proposed but will not be implemented until an agreement between the Department of Interior and the DoD has been negotiated. Lowering the floor would allow fixed-wing pilots to perform realistic low-level attacks on targets in the South Tactical Range.	Airspace, Noise, Safety, Biological Resources, Land Use and Recreation
EC-130 Rehost	355 FW Davis-Monthan AFB	Future	The current 14 EC-130H aircraft at Davis-Monthan AFB would be replaced with 10 EC-37B aircraft. Pilots would be trained commercially and the aircraft would be maintained by contractors. - Manpower Reduction of 516 (49 Operations, 467 Maintenance: 5 Officers, 467 Enlisted) - 755th Aircraft Maintenance Squadron Flag Stand down - Contract Maintenance Support end state to be determined, expected to be between 125 and 130 contract personal	Airspace, Noise, Safety, Air Quality, Land Use and Recreation, Transportation, Socioeconomics

Table DM4-1. Past, Present, and Reasonably Foreseeable Actions at Davis-Monthan AFB and Associated Region (Continued)

Action	Proponent/Location	Timeframe	Description	Resource Interaction
Military Actions (Continued)				
2009 Solar Power System Environmental Assessment (EA)	355 FW Davis-Monthan AFB	Past, Present, Future	The USAF proposes to allow the construction of a solar power system at Davis-Monthan AFB. The USAF would lease 3 noncontiguous parcels (Chevron Parcel [54 acres], West Airfield Parcel [155 acres], and the Valencia Road Parcel [38 acres]) of land to a private contractor, who would construct and maintain the facility. The solar power system would generate a minimum of 1 MW of electricity for use by Davis-Monthan AFB. This would reduce electricity expenses paid by the base, and also comply with the Energy Policy Act of 2005.	Noise, Air Quality, Safety, Soil and Water Resources, Biological Resources, Cultural Resources, Land Use and Recreation, Transportation
Personnel Recovery (PR) Training	USAF	Present/ Future	The proposed action is to provide PR training for regular USAF, Army, Navy, and U.S. Marine Corps (USMC) units; special forces; and other federal and state agencies. The training program would involve ground, water, and flight/airspace activities. The PR Program centered out of Davis-Monthan AFB would utilize unique training environments across four states: Arizona, California, Nevada, and New Mexico. The proposed PR training sites could be located on federal, tribal, state, municipal, or private lands; on sites that have been previously disturbed or are currently disturbed; or on sites previously used for similar activities. An EA is currently being prepared that will include detailed information on this action.	Airspace, Noise, Air Quality, Safety, Soil and Water Resources, Biological Resources, Cultural Resources, Land Use and Recreation
HH-60 Beddown	ACC	Future	This action would beddown 14 HH-60 Aircraft and 400 personnel from Nellis AFB at Davis-Monthan AFB.	Airspace, Noise, Air Quality, Safety, Land Use and Recreation, Traffic, Socioeconomics
RC-26 Beddown	162 ANG 355 FW Davis-Monthan AFB	Future	This action would relocate one RC-26 aircraft and associated manpower to Davis-Monthan AFB in existing facilities. This project would also consolidate 214th Attack Group assets and operations in a common location. The manpower footprint of the RC-26 program includes 9 aircrew (5-6 full time), 1 full-time administrative support staff, and 3 full-time contract logistics support/maintenance personnel. Operational activities average one 4-5 hour sortie per day (time of day dependent upon customer requirements), 27 sorties per month, and 324 sorties per year.	Airspace, Noise, Air Quality, Safety, Land Use and Recreation, Socioeconomics

Table DM4-1. Past, Present, and Reasonably Foreseeable Actions at Davis-Monthan AFB and Associated Region (Continued)

Action	Proponent/Location	Timeframe	Description	Resource Interaction
Military Actions (Continued)				
Future F-35A Beddowns	ACC/ANG/AFRC	Future	During the AFRC F-35A scoping period, a member of the public requested future beddowns of F-35A aircraft be considered in cumulative impacts since the USAF had announced that the F-35A would replace the existing USAF fighter inventory, which includes the A-10. At this time it is unknown how long existing A-10 aircraft would remain at Davis-Monthan AFB and if those A-10 aircraft would be replaced by F-35A aircraft or a different aircraft mission. It is also unknown when or if Davis-Monthan AFB or TUS would be considered in those basing actions. All future beddowns would comply with NEPA and would be evaluated for environmental impacts.	Airspace, Noise, Air Quality, Safety, Soil and Water Resources, Biological Resources, Cultural Resources, Land Use and Recreation, Socioeconomics, Environmental Justice and Protection of Children, Infrastructure, Hazardous Materials and Waste
Taiwan Air Force (TAF) to TUS Beddown	162 ANG (TUS)	Future	This project involves relocation of 14 TAF F-16 aircraft and associated personnel from their current location to Tucson ANGB. Infrastructure improvements at Tucson ANGB would include the reconfiguration of aircraft sunshades, interior renovations and minor additions to Buildings 1 and 40, construction of a new entry control facility, and in-kind replacement of Aerovation Hangar on Tucson Airport Authority (TAA) property. This relocation would result in an approximate 16 percent increase in F-16 operations from TUS.	Airspace, Noise, Air Quality, Safety, Biological Resources, Land Use and Recreation
Army General Instructional Building	USAF	Present, Future	This project involves the construction of a General Instruction Building across from the North Ramp and the CBP HQ building. The proposed action would add approximately 159 permanent staff and approximately 126 transient students to the base population.	Noise, Air Quality, Safety, Soil and Water Resources, Transportation, Socioeconomics
BMGR Future aircraft and weapons (F-22A, F-18 E/F, MV-22/CV-22, Joint Strike Fighter, Joint Direct Attack Munitions, other stand-off weapons)	USAF	Future	New aircraft and weapons for the USAF, USMC, and Navy are being developed or entering production. These aircraft and weapons will replace those currently in use throughout the armed forces. BMGR is a likely candidate for continued military training using these new aircraft weapon systems. Navy environmental studies evaluating potential home bases for the MV-22 and Joint Strike Fighter are underway and are expected to include training operations within the BMGR (date unknown). The USAF is also evaluating potential home bases for the F-35 adversary air training, to include training operations with the BMGR.	Airspace, Noise, Air Quality, Safety, Biological Resources, Cultural Resources, Land Use and Recreation
Marine Corps Air Station (MCAS) Yuma	USMC	Past	The Navy approved development of the Auxiliary Landing Field complex to support USMC F-35B training in 2010 for West Coast basing of the F-35B. Construction was completed in 2015.	Airspace, Noise, Air Quality, Safety,

Table DM4-1. Past, Present, and Reasonably Foreseeable Actions at Davis-Monthan AFB and Associated Region (Continued)

Action	Proponent/Location	Timeframe	Description	Resource Interaction
Military Actions (Continued)				
Libby Army Airfield	U. S. Army - Fort Huachuca	Future	Two projects are proposed for improvements at the Libby Army Airfield. The Airfield North project is an Enhanced Use Lease of 203 acres and uses could include aircraft activity. The Airfield South, Mission Expansion Plan includes 146 acres south of Libby Army Airfield managed to support potential missions requiring proximity to Libby Army Airfield within the base's secure area (USCBP 2015).	Airspace, Noise, Air Quality, Safety,
Non-Military (Federal) Actions				
Border Wall	Department of Homeland Security/ South of Tucson	Future	Increased government spending on border protection could increase aircraft, vehicle and other operations at and near Davis-Monthan AFB.	Noise, Airspace Air Quality, Land Use and Recreation, Transportation
State and Local				
TUS Proposed Safety Enhancement Project	FAA	Present and Future	The FAA is currently preparing an EIS for safety improvements at TUS. These improvements include relocation of Runway 11R/29L, demolition of existing Runway 11R/39L, construction of new center parallel and connecting taxiway system, land acquisition, relocation of navigational aids and development and/or modification of associated arrival departure procedures for the relocated runway, and demolition and replacement of 12 earth-covered magazines.	Airspace, Noise, Air Quality, Safety, Soil and Water Resources, Transportation, Land Use and Recreation, Socioeconomics
TUS Part 150 Program Update	TAA	Present	In 2012, the TAA initiated a Part 150 Noise Program Update. On 9 September 2013, the FAA approved the Noise Compatibility Program for TUS.	Noise, Land Use and Recreation, Environmental Justice
Miracle Point Apartment Complex	Arizona Department of Housing/central Tucson area	Present	Construction of 34 one-bedroom and 6 two-bedroom, single-story units in an attached town house configuration.	Noise, Air Quality, Land Use and Recreation
Tucson Downtown Links Project	Pinal Regional Transportation Authority	Present and Future	The third and final phase of this project will take drivers from Barraza-Aviation Parkway to I-10 on a new four-lane road that bypasses the frequently congested downtown area.	Noise, Air Quality, Transportation
Private Actions				
20-story Office Tower	Private Developer/Central Tucson	Future	Construction of a 300-foot tall, 250,000 square foot office tower with an associated parking area.	Noise, Air Quality, Land Use and Recreation, Soil and Water Resources, Socioeconomics, Infrastructure
Subdivision Development near Davis-Monthan AFB	Private	Past, Present, Future	Numerous developments are in progress near the installation. These include Rocking K (undeveloped to date), Ranch del Lago (nearly completed), Santa Rita Ranch (approximately 25 percent completed), and Santa Rita Mountain Ranch (approximately 30 percent completed).	Airspace, Noise, Air Quality, Safety, Soil and Water Resources, Biological Resources, Socioeconomics, Infrastructure

Table DM4-1. Past, Present, and Reasonably Foreseeable Actions at Davis-Monthan AFB and Associated Region (Continued)

Action	Proponent/Location	Timeframe	Description	Resource Interaction
Private Actions (Continued)				
Port of Tucson	Private	Past, Present, Future	420 acres zoned in 1988 and 2009 for industrial uses. Approximately 15 percent complete.	Airspace, Noise, Air Quality, Safety, Soil and Water Resources, Biological Resources, Socioeconomics, Infrastructure
Verano (Swan Southlands)	Private	Past, Present, Future	This site was originally zoned primarily for residential use but zoning was subsequently amended to include a greater mix of non-residential uses. Although there has been no residential development, a large solar farm is proposed for this site.	Airspace, Noise, Air Quality, Safety, Soil and Water Resources, Biological Resources
Southline Transmission Project	Southline Transmission, LLC	Present	New electric transmission line to be built in 2 sections. The new build Section is construction of approximately 240 miles of new 345-kV, double-circuit lines in New Mexico and Arizona. The Upgrade Section would convert approximately 120 miles of existing single-circuit, 115- kV transmission lines, currently owned by the Western Area Power Administration, to double-circuit 230-kV lines between the existing Apache Substation and the existing Saguaro Substation northwest of Tucson, Arizona. http://www.southlinetransmissionproject.com/location.html	Air Quality, Land Use and Recreation, Infrastructure
Bisbee-Douglass International Airport	Cochise County under the Tombstone MOA	Future	Cochise County is evaluating various expansion options for the Bisbee-Douglass International Airport, including hangar and terminal renovation and water system upgrades.	Airspace, Noise, Air Quality, Safety

DM4.2 CUMULATIVE IMPACTS

The following analysis considers how the impacts of the actions in Table DM4-1 might affect or be affected by the AFRC F-35A mission at Davis-Monthan AFB. The analysis considers whether such a relationship would result in potentially significant impacts not identified when the AFRC F-35A mission at Davis-Monthan AFB is considered alone. Table DM4-2 provides a summary of the cumulative effects. As shown in Table DM4-2, safety, cultural resources, infrastructure, and hazardous materials and waste are not anticipated to contribute to cumulative effects. Cumulative effects are described for airspace, noise, air quality, soil and water resources, biological resources, land use and recreation, socioeconomics, and environmental justice and protection of children. Climate change is also described in this section because changes in climate have the potential to cumulatively impact other resource areas.

Table DM4-2. Summary of Cumulative Effects for Davis-Monthan AFB

Resource Area	AFRC F-35A Mission	Past, Present, and Reasonably Foreseeable Actions[a]	Cumulative Effects
Airspace	◘	◘	◘
Noise	●	◘	◘
Air Quality	○	◘	○
Safety	○	○	○
Soil and Water Resources	◘	◘	◘
Biological Resources	◘	◘	◘
Cultural Resources	○	○	○
Land Use and Recreation	◘	◘	◘
Socioeconomics	●[b]	◘	◘
Environmental Justice and Protection of Children	◘	◘	◘
Infrastructure	○	○	○
Hazardous Materials and Waste	○	○	○

[a] When determining the potential for significance, past and ongoing actions in the region were considered as part of the baseline or existing conditions in the region surrounding Davis-Monthan AFB and the airspace (e.g., the cumulative noise impact of past and present missions at Davis-Monthan AFB were modeled under baseline conditions).

[b] Significant impacts to socioeconomic resources would result from noise impacts to schools.

Key: ○ = not affected or beneficial impacts
◘ = affected but not significant, short to medium term, impacts that range from low to high intensity
● = significant impacts, that are high in intensity or are long-term

DM4.2.1 Airspace

DM4.2.1.1 Airfield Operations

The Davis-Monthan AFB alternative for the AFRC F-35A beddown would generate the operational changes noted in Table DM2-4. Loss of the 11,088 A-10 airfield operations and gaining the projected AFRC F-35A 11,580 operations, while other aircraft operations remain unchanged, would result in an overall 0.7 percent increase in aircraft operations. Therefore, the AFRC F-35A beddown could be accommodated within this Davis-Monthan AFB airfield and Class C airspace environment without adversely affecting the overall use of this airspace. Several projects described in Table DM4-1 would add operations to the surrounding airfield environment. These projects include Angel Thunder, EC-130 Rehost, HH-60 Beddown, RC-26 Beddown, and the Taiwan Air Force (TAF) F-16 Beddown at TUS. In addition to these projects the TUS forecasts positive growth in airfield operations over a 5-year period. The exact operational numbers for several of the proposed military projects is not known at this time but the largest increase would likely result from the relocation of the TAF F-16 mission from Luke AFB to TUS. Should the TAF F-16 mission be relocated to TUS, it is estimated that they would fly 6,459 operations per year bringing total annual ANG operations to approximately 31,000. TUS has forecasted that annual operations will increase by approximately 6,160 from 2023 to 2028 (FAA 2018) which includes the approximately 31,000 current F-16 operations. The operations anticipated from these projects, in addition to the increase in operations at Davis-Monthan AFB as a result of the AFRC F-35A mission would not present a significant impact to airspace use in an environment that experienced 191,000 air traffic operations in 2017.

Military actions with major changes in aircraft types or operations would undergo additional environmental analysis to determine the exact number of operations and the potential for additional impacts within the airspace.

No present and/or known reasonable foreseeable future actions, when combined with the minor increase in airfield operations from the AFRC F-35A mission, would result in any cumulative impacts to airfield operations or the management and configuration of the Class C airspace surrounding this airfield environment.

DM4.2.1.2 Training Airspace

The primary airspace proposed for use by AFRC F-35A pilots operating from Davis-Monthan AFB is the Tombstone MOA and the associated ATCAA. The primary range proposed for use by AFRC F-35A pilots operating from Davis-Monthan AFB is the BMGR. The airspace and range proposed for use are identified on Figure DM2-2, and the operations proposed in that airspace are described in Table DM2-7.

A number of projects listed in Table DM4-1 would occur under the airspace proposed for use by AFRC F-35A pilots. These include BMGR Land Withdrawal and Projects; SUA Reconfigurations; RA R-2301E, EC-130 Rehost; Personnel Recovery (PR) Training Environmental Assessment (EA); HH-60 Beddown; RC-26 Beddown; TAF to TUS Beddown; Marine Corps Air Station (MCAS) Yuma, Libby Army Airfield, and Bisbee-Douglass International Airport projects.

The operations anticipated from these projects in addition to the increase in sorties at Davis-Monthan AFB as a result of the AFRC F-35A mission would not present a significant impact to airspace use. Any potential conflicts in the use of airspace would be deconflicted by the scheduling agency. Any changes to SUA or charting of new SUA would require separate environmental analysis.

No present and/or known reasonable foreseeable future actions, when combined with the minor increase in airspace sorties that would result from implementation of the AFRC F-35A mission at Davis-Monthan AFB, would result in cumulative impacts to airspace management in the SUAs proposed for use.

DM4.2.2 Noise

Cumulative noise impacts were evaluated for construction related noise and for the impact of aircraft noise resulting from operations in the airfield and airspace environments near Davis-Monthan AFB. C&D projects associated with the proposed AFRC F-35A beddown would occur near other ongoing and future C&D projects (e.g., IDP projects) occurring during the same time periods. C&D projects are a regular occurrence on and near active USAF installations such as Davis-Monthan AFB. C&D noise would be localized and temporary. Construction work is generally limited to normal working hours (i.e., 7:00 A.M. to 5:00 P.M.). Furthermore, the C&D projects are or would be located in an acoustic environment that includes elevated aircraft operations noise levels. In the instance that multiple C&D projects affect a single area at the same time, construction noise could be a slightly more noticeable component of the acoustic environment.

The noise analysis in this EIS is a cumulative analysis which includes those defined projects listed in Table DM4-1. Actions occurring within the present timeframe (e.g., Angel Thunder PR training exercises) are accounted for in calculated baseline aircraft noise levels to the extent that aircraft operations are defined. The PR Training EA is currently under way, and specific noise impacts associated with the project will be included in that EA. The EC-130 Re-host, HH-60 Beddown, and RC-26 Beddown, identified in Table DM4-1, do not have defined details at this time although the aircraft proposed for replacement beddown are substantially less loud than F-35A aircraft, and would not be expected to cumulatively add to the overall time-averaged noise levels presented in this EIS.

Implementation of one or more of the past, present, and reasonably foreseeable future actions in combination with the proposed action would not be expected to result in cumulative noise impacts beyond the noise impacts identified for the AFRC F-35A mission. As described in Section DM4.2, the proposed AFRC F-35A mission at Davis-Monthan AFB would result in increased noise from the proposed aircraft operations. It was determined that the increase in noise would result in significant impacts to the environment surrounding Davis-Monthan AFB.

Potential future independent projects, for which definition is not available at this time, would be separately environmentally assessed when the details for the projects become available. If there were to be a future proposal to beddown F-35A aircraft (in addition to the currently-proposed F-35A beddown) then that beddown action could have substantial effects on noise levels. At this time, there are no specific plans to beddown additional F-35 units. Environmental impacts of any future beddown action would be assessed in compliance with NEPA. Actions proposed at TUS (i.e., Safety Enhancement Projects, TAF F-16 Beddown) would be expected to have minimal effect on noise levels near Davis-Monthan AFB. Noise impacts associated with these projects would depend on the details of the actions as implemented. Significant impacts associated with any undefined future projects would have their own mitigation measures to reduce or minimize impacts.

Several actions which would occur in the airspace proposed for use (e.g., BMGR Land Withdrawal and Projects, SUA Reconfigurations, Modification of R-2301E, Projects at Libby Army Airfield, and Projects at MCAS Yuma, BMGR Future Aircraft and Weapons) could affect noise levels. Specific noise effects of these actions would depend on the details of the actions as implemented.

Private and state/municipal government-sponsored land development actions could potentially affect noise impacts by increasing the number of noise-sensitive locations in areas exposed to elevated noise levels near Davis-Monthan AFB. The JLUS contains guidance to have land development be compatible with expected noise conditions. Military planners assess such projects for mission compatibility on a case by case basis, and contribute the results of their assessment as part of the civilian development planning process. Noise generated on-site during the construction and operation of privately owned properties is localized and qualitatively consistent with surrounding existing noise environments in adjacent developed areas.

DM4.2.3 Air Quality

C&D projects associated with the proposed AFRC F-35A mission would occur near other ongoing and future C&D projects (e.g., IDP projects) during the same time periods. C&D projects have been and will continue to be a regular occurrence on and near installations such as Davis-Monthan AFB. These projects would generate the same types of construction related impacts as described for the proposed AFRC F-35A construction (e.g. fugitive dust emissions, increases in construction related criteria pollutant emissions). Cumulative impacts resulting from implementation of the proposed AFRC F-35A mission in conjunction with past, present, and reasonably foreseeable future actions on air quality at Davis-Monthan AFB would not be expected to result in exceedance of adopted NAAQS or result in significant cumulative impacts to the air quality.

Implementation of the proposed AFRC F-35A mission at Davis-Monthan AFB would result in a decrease in all air pollutants emissions except CO_{2e}. Because the proposed mission would have a net overall positive impact to the amount of pollutants in the region of Davis-Monthan AFB, no cumulative adverse impacts from the other projects described in Table DM4-1 would occur.

DM4.2.4 Soil and Water Resources

C&D projects associated with the proposed AFRC F-35A mission would occur near other ongoing and future C&D projects (e.g., IDP projects) during the same time periods. C&D projects have been and will continue to be a regular occurrence on and near installations such as Davis-Monthan AFB. These construction projects would increase the amount of soil disturbed and have the potential to increase erosion and sedimentation into surface water features. Management practices described in Section DM3.5 would avoid and minimize impacts to soil and water resources. Cumulative impacts resulting from implementation of the proposed AFRC F-35A mission in conjunction with past, present, and reasonably foreseeable future actions on the soil and water resources at Davis-Monthan AFB would not be significant.

DM4.2.5 Biological Resources

C&D projects associated with the proposed AFRC F-35A mission would occur near other ongoing and future C&D projects (e.g., IDP projects, construction from private and state and local development) during the same time periods. Potential cumulative effects to biological resources would be associated with ground disturbance. C&D projects have been and will continue to be a regular occurrence on and near installations such as Davis-Monthan AFB. These construction projects would increase the amount of soil disturbed and have the potential to increase erosion and sedimentation into surface water features. Indirect cumulative impacts can occur from the increased potential for invasive species and wildland fires associated with commercial, residential, and recreational development, as well as military activities. Wildland fires could pose a substantial threat to native vegetation and wildlife species. Increased recreational development in the areas surrounding Davis-Monthan AFB could also impact biological resources. Cumulative impacts resulting from implementation of the proposed AFRC F-35A mission in conjunction with past, present, and reasonably foreseeable future actions on biological resources at Davis-Monthan AFB would not be significant.

Implementation of the AFRC F-35A mission at Davis-Monthan AFB were found to have no significant impacts to wildlife, including threatened and endangered species and migratory birds. Projects such as the proposed TAF beddown or the beddown of new missions with aircraft operations would have similar impacts to wildlife as those described in this EIS. Implementation of the proposed AFRC F-35A mission in conjunction with past, present, and reasonably foreseeable future actions at Davis-Monthan AFB would not have cumulative significant impacts to sensitive biological species or habitats.

No present and/or known reasonable foreseeable future actions, when combined with aircraft operations in the training airspace, would result in environmental consequences to biological resources under the training airspace beyond those associated with implementation of the AFRC F-35A mission at Davis-Monthan AFB.

DM4.2.6 Land Use and Recreation

C&D projects associated with the proposed AFRC F-35A mission would occur near other ongoing and future C&D projects (e.g., IDP projects, construction from private and state and local development) during the same time periods. C&D projects have been and will continue to be a regular occurrence on and near installations such as Davis-Monthan AFB. Construction projects that occur within the AEZ of Davis-Monthan AFB or TUS will still be required to comply with zoning requirements. These zoning requirements have been implemented to minimize adverse impacts to land use from incompatible development. Cumulative impacts resulting from implementation of the proposed AFRC F-35A mission in conjunction with past, present, and reasonably foreseeable future actions on land use and recreation at Davis-Monthan AFB would not be significant.

C&D projects and aircraft operations associated with the proposed AFRC F-35A mission at Davis-Monthan AFB would be consistent with established JLUS land use recommendations and would result in no significant impacts to land use and recreation. The noise increase resulting from the AFRC F-35A mission would remain completely within the AEZ and this action combined with other actions would also not be anticipated to result in significant impacts to land use and recreation. However, increased noise would impact some recreational facilities near Tucson and could reduce the enjoyment of those facilities for some persons.

Increases in aircraft operations resulting from the proposed AFRC F-35A mission combined with the TAF F-16 mission could increase noise levels in some recreational areas in Arizona. These increases would occur in areas that are currently exposed to military aircraft noise. Although some users of these recreational areas could be annoyed by these noise increases, use of these recreational areas would not be expected to substantially change and no significant impacts are projected to result from training in the airspace.

DM4.2.7 Socioeconomics

The C&D projects associated with the AFRC F-35A mission would provide short-term economic benefits to surrounding areas through employment of construction workers and through the purchase of materials and equipment. The short-term impact of implementing the proposed mission combined with any or all of the projects listed in Table DM4-1 would result in negligible cumulative impacts to socioeconomics in the area. In addition, the decrease in personnel associated with the proposed mission, combined with implementation of any or all of the projects listed in Table DM4-1, is also not anticipated to result in cumulative impacts to socioeconomic resources.

DM4.2.8 Environmental Justice and Protection of Children

Noise resulting from the operation of F-35A aircraft would affect people living near the installation. As discussed in Section DM3.10.2, implementation of the AFRC F-35A mission at Davis-Monthan AFB would result in disproportionate impacts to minority and low-income populations. Section DM3.10.2 quantifies the number of children and elderly exposed to DNL of 65 dB or greater. Implementation of the AFRC F-35A mission, when combined with other past, present, or reasonably foreseeable projects, would not be expected to result in an increase to the cumulative impacts to environmental justice and other sensitive populations beyond those described in this EIS for the proposed action. Implementation of the C&D projects on Davis-Monthan AFB would not result in any impacts to environmental justice populations.

DM4.2.9 Climate Change

Arizona and the surrounding region could experience a continuing of recent upward trends in average temperatures and extreme heat, an increase in the frequency of wildfire occurrence and severity, and a decrease in spring precipitation (USGCRP 2017).

Increases in temperature, increases in wildfires, and a decrease in spring precipitation could interact with resource areas such as air quality, water resources, and socioeconomics. Increasing temperatures and wildfires have been shown to increase ground level ozone and particulates (Orru et al. 2017). Decreases in spring precipitation could impact water availability. Potential socioeconomic impacts could include increased costs associated with poor air quality and water availability.

While Davis-Monthan AFB has adapted operations to manage the recent temperature changes, exacerbation of climate conditions in the future could increase the cost of proposed operations and could impede operations during extreme events. Additional measures could be needed to mitigate such impacts over the operational life expectancy of the F-35A.

DM4.3 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Irreversible and irretrievable resource commitments are related to the use of nonrenewable resources and the effects that the uses of these resources have on future generations. Irreversible effects primarily result from the use or destruction of a specific resource (e.g., energy and minerals) that cannot be replaced within a reasonable timeframe. Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored as a result of the action.

For the AFRC F-35A mission at Davis-Monthan AFB, most resource commitments are neither irreversible nor irretrievable. Most impacts would be short-term (e.g., air emissions from construction). Those limited resources that could involve a possible irreversible or irretrievable commitment are discussed as follows.

Should the AFRC F-35A mission be located at Davis-Monthan AFB, some land in the developed portions of the base would be disturbed. Much of this land has been previously disturbed and is heavily influenced by airfield development. Construction and renovation of base facilities would require the consumption of limited amounts of material typically associated with interior renovations (e.g., wiring, insulation, windows, and drywall) and exterior construction (e.g., concrete, steel, sand, and brick). Although an undetermined amount of energy to conduct renovation, construction, and operation of these facilities would be expended and irreversibly lost, new construction would result in energy savings from energy efficient buildings and appurtenances.

Training operations would continue and involve consumption of nonrenewable resources, such as gasoline used in vehicles and jet fuel used in aircraft. None of these activities are expected to significantly decrease the availability of minerals or petroleum resources. Privately owned vehicle use by the personnel continuing to support the existing missions would consume fuel, oil, and lubricants. The amount of these materials used would increase; however, this additional use is not expected to significantly affect the availability of the resources.

CHAPTER 4

BASE ALTERNATIVE: HOMESTEAD AIR RESERVE BASE

HS1.0 HOMESTEAD AIR RESERVE BASE OVERVIEW

Homestead Air Reserve Base (ARB) is located in southern Miami-Dade County, Florida, approximately 25 miles south of Miami. The base is located adjacent to the City of Homestead. The installation encompasses approximately 1,950 acres and is surrounded by agricultural lands and some residential and commercial development (Figure HS1-1). The primary runway at Homestead ARB, Runway 06/24, is 11,202 feet long and 300 feet wide (Figure HS1-2).

Homestead ARB is an Air Force Reserve Command (AFRC) installation and is led by the AFRC 482nd Fighter Wing (482 FW). The primary mission of the 482 FW is to (1) provide ready, trained, and equipped combat air power and agile combat support forces to the joint warfighter; (2) provide ready, on-call, humanitarian support; and (3) provide quality programs, services, and recognition to our Citizen Airmen. As the host wing, the 482 FW supports civil engineering, communications, medical, logistics, aircraft maintenance, mission support, and aerial transportation specialists, and provides a security forces squadron. As part of the 482 FW, the 93rd Fighter Squadron (93 FS) "Makos" fly and maintain 24 F-16C aircraft.

Tenants at Homestead ARB include the 125th Fighter Wing (125 FW) of the Florida Air National Guard (FANG), the Defense Energy Support Center Americas East, the Florida Army National Guard (FLARNG), the U.S. Coast Guard (USCG) Maritime Safety and Security Team Miami, and the U.S. Army Corps of Engineers (USACE). Although the Special Operations Command South and the U.S. Customs and Border Protection (CBP) use support facilities on Homestead ARB, their buildings are not located on U.S. Air Force (USAF)-owned land. The FANG operates F-15C aircraft at Homestead ARB; Special Operations Command South operates C-130 and C-146 aircraft; and the CBP operates DHC-8, UH-60, and AS-350 aircraft.

Refer to Chapter 1 for the purpose and need for the AFRC F-35A mission, a description of the F-35A aircraft characteristics, and information about public involvement and agency coordination. Refer to Chapter 2 for the description of the proposed action and alternatives, and a description of the strategic basing and alternative identification processes. In the base-specific sections that follow, Section HS2 presents the description of the proposed action at Homestead ARB. Section HS3 addresses baseline conditions and environmental consequences that could result from implementation of the proposed action at Homestead ARB. Section HS4 identifies other, unrelated past, present, and reasonably foreseeable future actions in the affected environment and evaluates whether these actions would cause cumulative effects when considered along with the AFRC F-35A beddown. This section also presents the irreversible and irretrievable resources that would be committed should the proposed action be implemented at Homestead ARB.

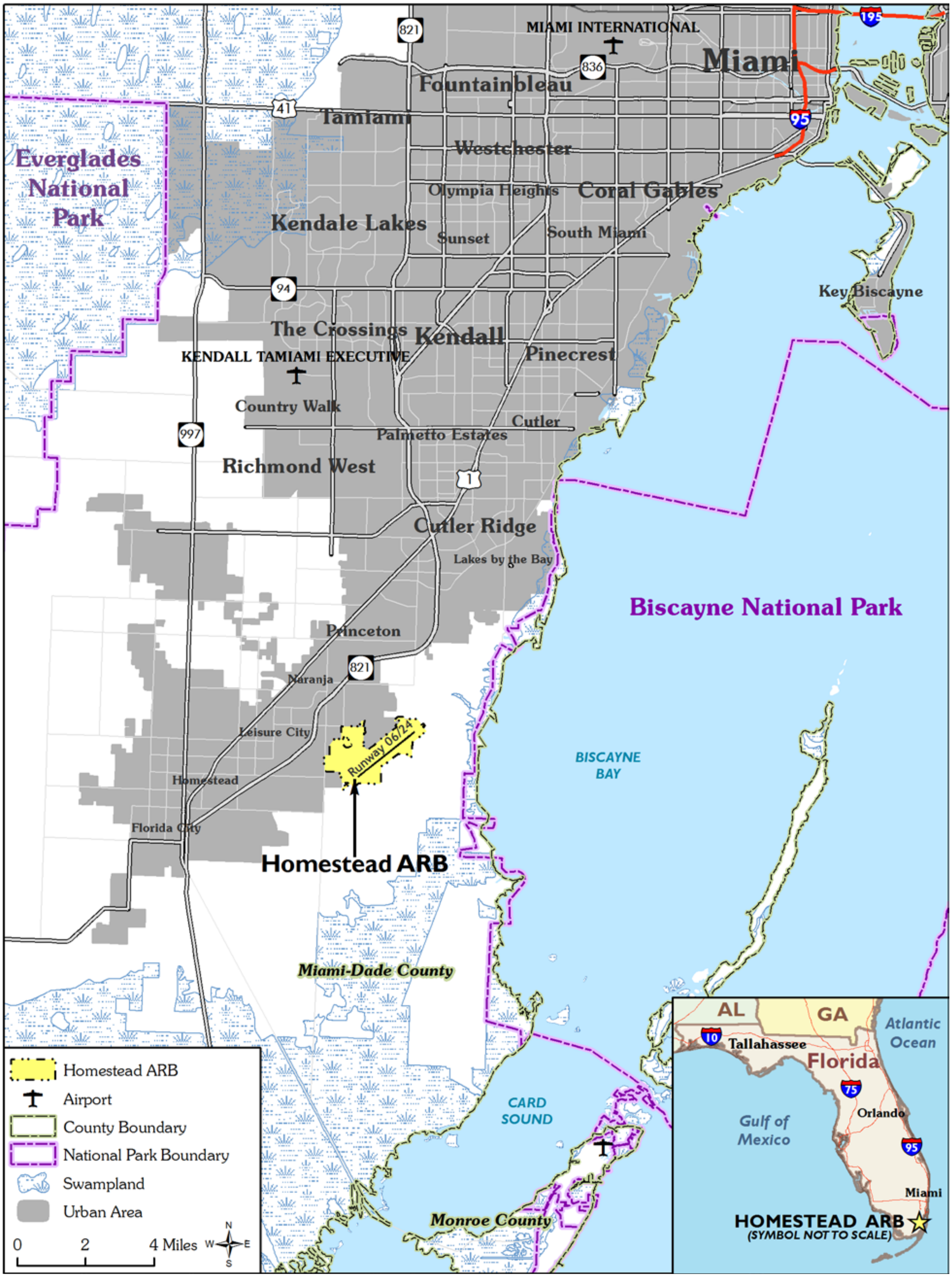

Figure HS1-1. Regional Location of Homestead ARB

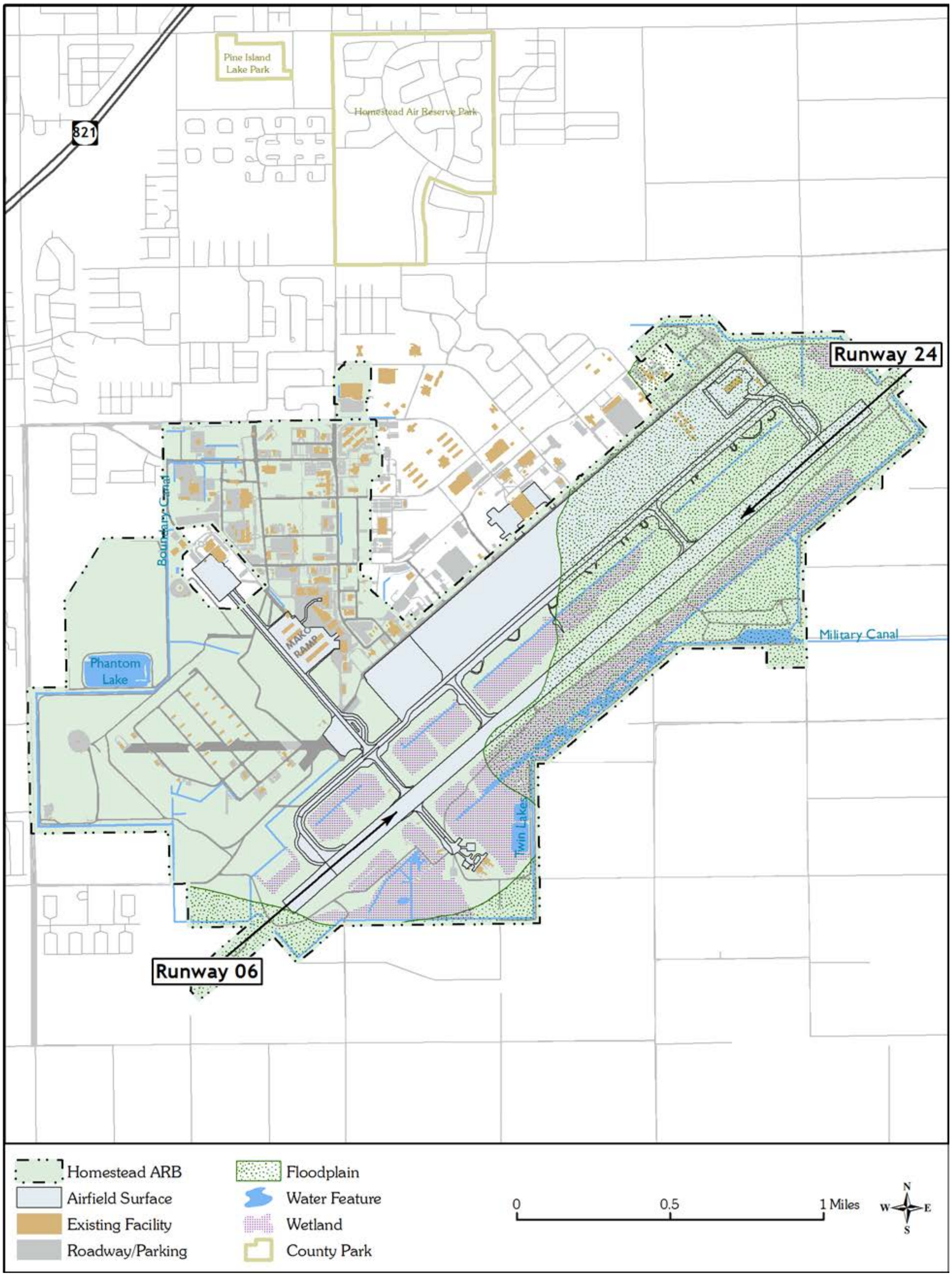

Figure HS1-2. Primary Runways at Homestead ARB

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HS2.0 HOMESTEAD AIR RESERVE BASE ALTERNATIVE

This section presents the specifics of the proposed action at Homestead ARB. Four elements of the proposed action have the potential to affect the base and associated airspace: (1) facility and infrastructure projects to support the F-35A beddown; (2) personnel changes necessary to meet F-35A requirements; (3) airfield operations conducted by AFRC F-35A pilots; and (4) airspace and range use by AFRC F-35A pilots. Each element is explained in the following subsections. In addition, this section also presents state and federal consultation efforts and associated permits that would be required should Homestead ARB be selected to receive the AFRC F-35A mission.

Under the proposed action, 24 Primary Aerospace Vehicles Authorized (PAA) F-35A aircraft would start to arrive at Homestead ARB in early 2024. Delivery of the full complement of 24 F-35A aircraft and 2 Backup Aircraft Inventory (BAI) is anticipated to take 2 years. At that time, the F-35A aircraft would completely replace the existing 24 F-16 aircraft assigned to the 482 FW. The F-16 aircraft that would be replaced by the F-35A aircraft would be reassigned or removed from the USAF inventory.

HS2.1 FACILITIES AND INFRASTRUCTURE

To support the AFRC F-35A mission, additional infrastructure and facility modifications would be required at Homestead ARB (Table HS2-1). A total of 10 different improvement projects and 1 demolition project would be implemented in 2021 (Figure HS2-1). The USAF estimates that $18.6 million in Military Construction (MILCON) expenditures would be required to implement the proposed AFRC F-35A mission at Homestead ARB.

Table HS2-1. Facilities and Infrastructure Projects for the AFRC F-35A Mission at Homestead ARB

Project[a]	Size Area (ft^2)[b]
Demolition	
Building 208 (storage of Aerospace Ground Equipment [AGE])	8,786
Demolition Total	**8,786**
Renovation	
Building 180 repair egress shop, battery storage	500[c]
Building 185 repair propulsion shop	500[c]
Building 191 renovation for flight equipment	3,867[c]
Building 192 repair vault and replace hoists	763[c]
Building 193 electrical upgrades	NA[d]
Building 194 electrical upgrades	NA[d]
Building 200 electrical upgrades and new addition for shop and administrative space	5,050
Building 213 construct storage cage	500[c]
Renovation Total	**11,180**
New Construction	
Construct an AGE building	9,821
Construct an F-35A flight simulator building	13,650
New Construction Total	**23,471**

[a] Data in this table were obtained from site surveys (Homestead ARB 2017a).
[b] Size is the area covered by the footprint of the proposed facilities and consists of the designed limits of the structure, facility, apron, road, access, and/or parking lot.
[c] Interior renovation only.
[d] Includes minor interior upgrade projects that do not have a square footage.

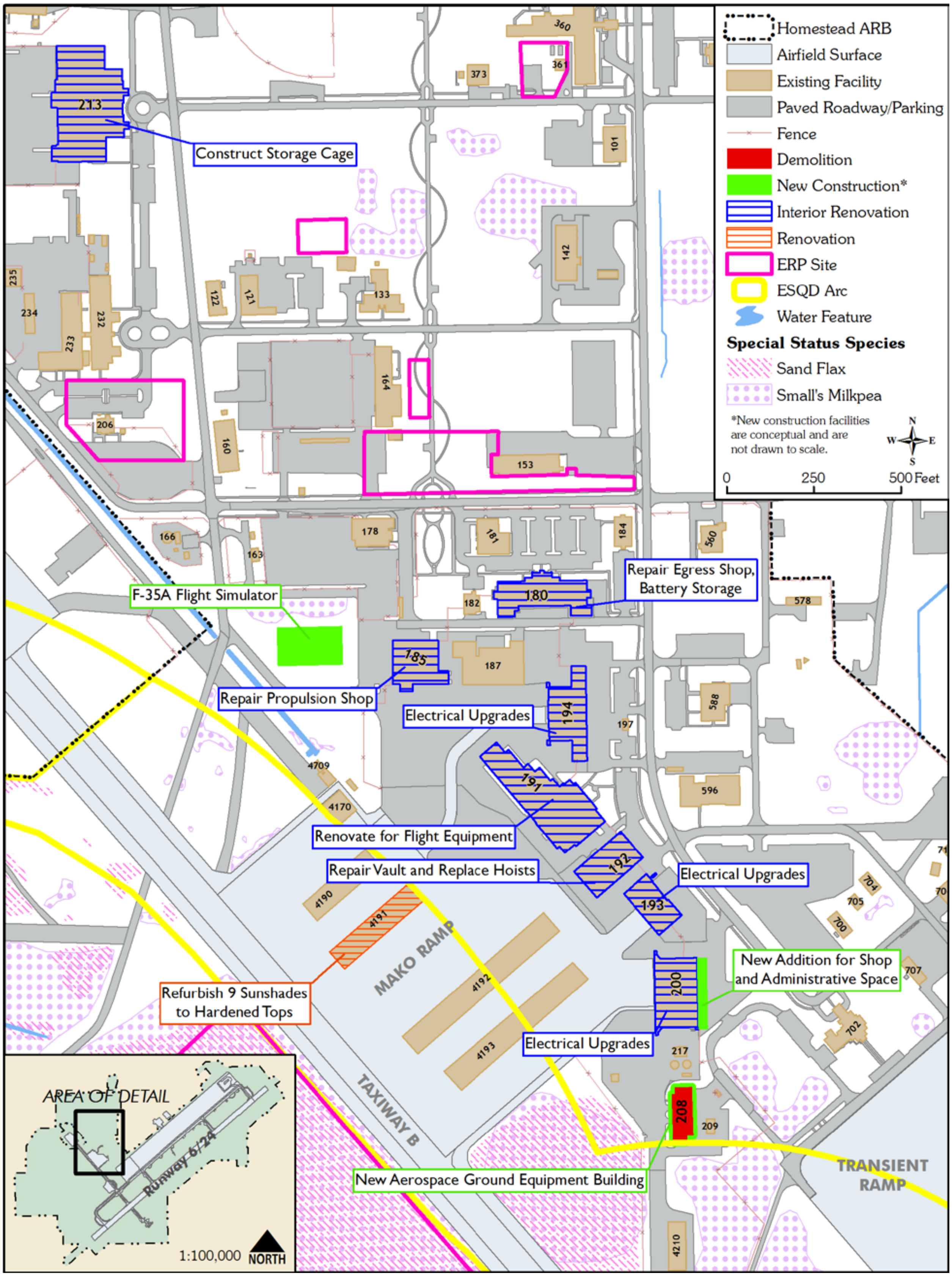

Figure HS2-1. Facilities and Infrastructure Projects for the AFRC F-35A Mission at Homestead ARB

New construction and facility additions would require construction grading, clearing, and equipment laydown space. To account for this disturbance, this analysis also includes disturbance areas in addition to the facility size. These disturbance areas encompass 20 feet adjacent to linear features (e.g., roads, utility extensions, etc.) and 50 feet around the facility footprint for all other facilities. Repairs of existing aircraft aprons or ramps are not included in these calculations because these repairs would occur on paved or concrete surfaces. Interior renovations are also not included in these calculations because these renovations would not create ground disturbance or a change in impervious surfaces.

New construction and facility additions would also result in changes to existing impervious surfaces. It is assumed that any demolition would include demolition of the building slab and result in a reduction in impervious surfaces. In some cases, demolished facilities would be replaced by new construction or pavements. This increase in impervious surfaces is accounted for in the new construction. Table HS2-2 provides a summary of the ground disturbance and changes in impervious surfaces.

Table HS2-2. Summary of Facility and Infrastructure Projects for Homestead ARB

Project Type	Ground Disturbance (Acres)	Change in Impervious Surfaces (Acres)
Demolition	1.0	-0.2
Renovation[a]	0.8	+0.1
New Construction	0.5	+2.1
Total	**2.3**	**+2.0**

[a] Totals do not include interior renovation projects.

Facility siting on military installations is predominantly functional-use based (i.e., locating facilities with like functional uses adjacent to one another). However, safety and compliance with policies and regulations are also used as planning factors. During the planning phase for a new aircraft mission beddown, military planners consider a variety of alternatives necessary to meet the requirements of the new mission, including the use of existing facilities that can be partially or entirely used to meet mission requirements. Depending on available infrastructure, facilities, and, to some degree, personnel available to support the AFRC F-35A mission, proposed construction, demolition, and renovation projects vary between alternatives. The facility siting analysis for each alternative base considered the functional requirements of the AFRC F-35A mission and compared them with the existing infrastructure and environmental constraints at each alternative base.

New construction siting is a stepwise process that includes identifying suitable sites relative to existing facilities and base infrastructure to provide operational efficiencies and suitable cost-benefit values. Utility siting, including the re-routing of existing utilities or the installation of new utility infrastructure (e.g., power, water, sewer, and communication lines), could also be required to accommodate the new mission. The siting process for utilities focused on using existing conduits and previously disturbed areas or areas that would also be disturbed for facility modifications. Temporary construction laydown areas could also be required to support construction. Construction laydown areas would be located in developed or semi-developed areas, or previously disturbed or paved areas. Construction laydown areas not proposed for permanent disturbance would be returned to their pre-construction state upon completion of construction. All construction contracts would be managed under Unified Facilities Criteria (UFC) 3-101-01, *Best Management Practices*, and attainment of a Leadership in Energy and Environmental Design (LEED) Silver certification.

Construction and renovation projects within the 65-decibel (dB) noise contour would include acoustical design considerations for façade elements and interior design requirements per UFC 3-101-01. Land use would be consistent with Department of Defense Instruction (DoDI) 4165.57, *Air Installations Compatible Use Zones*, and Air Force Handbook (AFH) 32-7084, *AICUZ Program Manager's Guide.*

HS2.2 PERSONNEL

Implementation of the AFRC F-35A mission at Homestead ARB would require sufficient and appropriately skilled military and civilian personnel to operate and maintain the F-35A aircraft and to provide other necessary support services. Implementation of the AFRC F-35A mission at Homestead ARB would result in a decrease of 91 positions. This would constitute a 2.7 percent decrease in base staffing (Table HS2-3).

Table HS2-3. Personnel Changes for the AFRC F-35A Mission at Homestead ARB

Baseline Personnel			Proposed F-35A Authorized Personnel			Percent Change to Total Personnel
Total Authorized Personnel	AFRC Authorized Personnel	Percent of Total Authorized Based Personnel	AFRC F-35A	Change to AFRC Unit Personnel Positions	Percent Change to AFRC Unit Personnel	
3,430	1,735	50.58%	1,644	-91	-5.24%	-2.7%

HS2.3 AIRFIELD OPERATIONS

The 482 FW is an integral part of the Combat Air Forces (CAF). The CAF defends the homeland of the United States and deploys forces worldwide to meet threats and ensure the security of the nation. To fulfill this role, the 482 FW must train as it would fight.

The USAF anticipates that once the full complement of aircraft is received, the total of 24 F-35A aircraft would be used to fly 11,580 operations per year from the airfield. Based on the proposed requirements and deployment patterns, AFRC F-35A pilots would fly additional operations during deployments, or at other locations for exercises or in preparation for deployments. In addition, AFRC F-35A pilots stationed at Homestead ARB could participate in remote training exercises. Some of these missions could involve ordnance delivery training or missile firing exercises (within the scope of existing National Environmental Policy Act [NEPA] documentation) at ranges approved for such ordnance use (e.g. Eglin Air Force Base's [AFB's] offshore ranges in the Gulf of Mexico).

Conducting 11,580 operations per year would represent an increase of 1,152 annual airfield operations compared to current F-16 aircraft operations (Table HS2-4). Of the 38,518 total airfield operations currently conducted at Homestead ARB, 27 percent are conducted by the 482 FW. Implementation of the AFRC F-35A mission at Homestead ARB would result in a 3.0 percent increase in annual total airfield operations.

Table HS2-4. Homestead ARB Baseline F-16 and Proposed F-35A Annual Airfield Operations

Total Baseline Operations[a]		Proposed AFRC F-35A Mission
Based F-16	10,428	0
Proposed F-35A	0	11,580
Other Aircraft	28,090	28,090
Total Airfield Operations	38,518	39,670
	Percent Change	**3.0%**

[a] Total baseline operations is for the last year. Data in this table were collected from the operations staff at Homestead ARB in 2017 (Homestead ARB 2017a).

AFRC F-35A pilots would perform departure and landing procedures similar to those currently conducted by the F-16 pilots at the installation. Due to differences in aircraft characteristics and performance, the flight profiles and tracks used by the AFRC F-35A pilots would slightly vary from those currently used by F-16 pilots. F-16 pilots from the 482 FW average 260 flying days per year. For the purposes of this analysis and to compare the alternatives on an equal basis, the total number of possible flying days for AFRC F-35A pilots is also assumed to be 260, including both Saturday and Sunday (on Unit Training Assembly [UTA] weekends).

Afterburners are used on occasion by F-16 pilots at Homestead ARB when additional power is needed. As described in Chapter 2, Section 2.3.3, the USAF evaluated three different scenarios for afterburner use. Scenario A is afterburner use on 5 percent of takeoffs. Scenario B is afterburner use on 50 percent of takeoffs. Scenario C is afterburner use on 95 percent of takeoffs.

AFRC F-35A pilots would operate similar to the F-16 pilots. Currently, F-16 operations primarily begin at 7:00 A.M. and conclude by 10:00 P.M. on weekdays and on UTA weekends (except when weather contingencies or special exercises cause operations to occur after 10:00 P.M). After-dark training is normally scheduled to be completed before 10:00 P.M. After-dark training for AFRC F-35A pilots would also be scheduled to be completed before 10:00 P.M. Because of the capabilities and expected tactics of the F-35A aircraft, AFRC F-35A pilots are predicted to generally follow the same night requirement as AFRC F-16 pilots depending on weather or special exercises.

HS2.4 AIRSPACE AND RANGE USE

Table HS2-5 identifies the Federal Aviation Administration (FAA)-designated airspace currently used by Homestead ARB F-16 pilots that is also proposed for use by AFRC F-35A pilots. Implementation of the AFRC F-35A mission would not require any new airspace or changes to existing airspace boundaries, and the type and number of ordnance used at the any of the ranges approved for such use could decrease.

Table HS2-5. Homestead ARB Training Airspace

Airspace	FAA-Designated Airspace[a]	Floor[b] (feet MSL unless otherwise noted)	Ceiling (feet MSL unless otherwise noted)
U.S. Navy Pinecastle Range Complex (to include Rodman and Lake George Ranges)	Palatka 1 & 2 MOAs	3,000	UTBNI 18,000
	R-2907A	Surface	23,000
	R-2907B	2,000	23,000
	R-2907C	500	UTBNI 2,000
	R-2910A	Surface	23,000
	R-2910B & C	Surface	6,000
	R-2910D	2,000	23,000
	R-2910E	500	UTBNI 2,000
	R-2906	Surface	14,000
Avon Park Air Force Range (APAFR)	Avon East MOA	500 AGL	UTBNI 14,000
	Avon East High MOA	14,000	UTBNI 18,000
	Basinger MOA	500 AGL	5,000
	Lake Placid N, E & W MOAs	7,000	UTBNI 18,000
	Marian MOA	500 AGL	5,000
	R-2901A	Surface	UTBNI 4, 000
	R-2901B	14,000	UTBNI 18,000
	R-2901C	Surface	UTBNI 14,000
	R-2901D[c]	500	UTBNI 4,000
	R-2901D[d]	1,000 AGL	UTBNI 4,000
	R-2901E	1,000 AGL	UTBNI 4,000
	R-2901F	4,000	UTBNI 5,000

Table HS2-5. Homestead ARB Training Airspace (Continued)

Airspace	FAA-Designated Airspace[a]	Floor[b] (feet MSL unless otherwise noted)	Ceiling (feet MSL unless otherwise noted)
Avon Park Air Force Range (APAFR) (Continued)	R-2901G	Surface	UTBNI 5,000
	R-2901H	1,000	UTBNI 4,000
	R-2901I	1,500	UTBNI 4,000
	R-2901J	18,000	UTBNI 23,000
	R-2901K	23,000	UTBNI 31,000
	R-2901L	31,000	40,000
	R-2901M	4,000	UTBNI 14,000
	R-2901N[e]	5,000	UTBNI 14,000
	R-2901N[f]	4,000	UTBNI 14,000
Warning Areas	W-168	Surface	Unlimited
	W-174 A, B, C, F, & G	Surface	70,000
	W-174 E	Surface	70,000
	W-465A, B, & D	Surface	70,000

[a] Airspace used by F-35A pilots would include Air Traffic Control Assigned Airspaces (ATCAAs) that occur over the Military Operations Areas (MOAs) included in the table. The ATCAAs will accommodate training above 18,000 feet mean sea level (MSL).
[b] Floor altitudes could exclude certain areas. See FAA Sectional Charts or exclusions.
[c] This portion of R-2901D is located east of line 81°21’00”W.
[d] This portion of R-2901D is located west of line 81°21’00”W.
[e] This portion of R-2901N is located north of line 27°24’46”N, 81°10’59”W to 27°29’31”N, 81°05’27”W.
[f] This portion of R-2901N is located south of line 27°24’46”N, 81°10’59”W to 27°29’31”N, 81°05’27”W.
Note: MSL is the elevation (on the ground) or altitude (in the air) of an object, relative to the average sea level. The elevation of a mountain, for example, is marked by its highest point and is typically illustrated as a small circle on a topographic map with the MSL height shown in either feet or meters or both. Because aircraft fly across vast landscapes, where points above the ground can and do vary, MSL is used is denote the “plane” on which the floors and ceilings of Special Use Airspace (SUA) are established and the altitude at which aircraft must operate within that SUA.
Key: AGL = above ground level; UTBNI = Up To But Not Including
Source: FAA Jacksonville 2018 and Miami 2018 Sectional Charts

HS2.4.1 Airspace Use

AFRC F-35A pilots would conduct missions and training activities necessary to fulfill the multi-role responsibility of this aircraft. All F-35A flight activities would occur in existing airspace. AFRC F-35A pilots would operate in the same airspace used by F-16 pilots from the 482 FW, but at higher altitudes. F-16 pilots from the 482 FW use Military Operations Areas (MOAs), Restricted Areas (RAs), and Air Traffic Control Assigned Airspace (ATCAAs), as well as offshore Warning Areas (Table HS2-5 and Figure HS2-2). To support realistic training, F-16 pilots schedule and use multiple adjacent airspaces together.

The FAA-designated airspace identified in Table HS2-5 is also used by Navy pilots operating F-18 aircraft and other USAF pilots operating A-10, F-15, and F-16 aircraft. F-16 pilots from the 482 FW conduct approximately 10 percent of the total sorties flown in the airspace identified in Table HS2-5. Although AFRC F-35A pilots would conduct missions similar to those of F-16 pilots, the capabilities of the F-35A aircraft allow for supersonic and higher altitude flight. Regardless of the altitude structure and percent use indicated in Table HS2-6, AFRC F-35A pilots (as do existing military aircraft pilots) would adhere to all established floors and ceilings of existing FAA-designated airspace. For example, the floor of the Lake Placid North MOA is 7,000 feet mean sea level (MSL). While in this MOA, AFRC F-35A pilots would not fly below that altitude. Rather, AFRC F-35A pilots would adapt training to this and other airspace with lower floors.

MSL is the elevation (on the ground) or altitude (in the air) of an object relative to the average sea level. AGL is the height as measured from ground level. In this EIS, the term MSL is assumed to mean feet above MSL

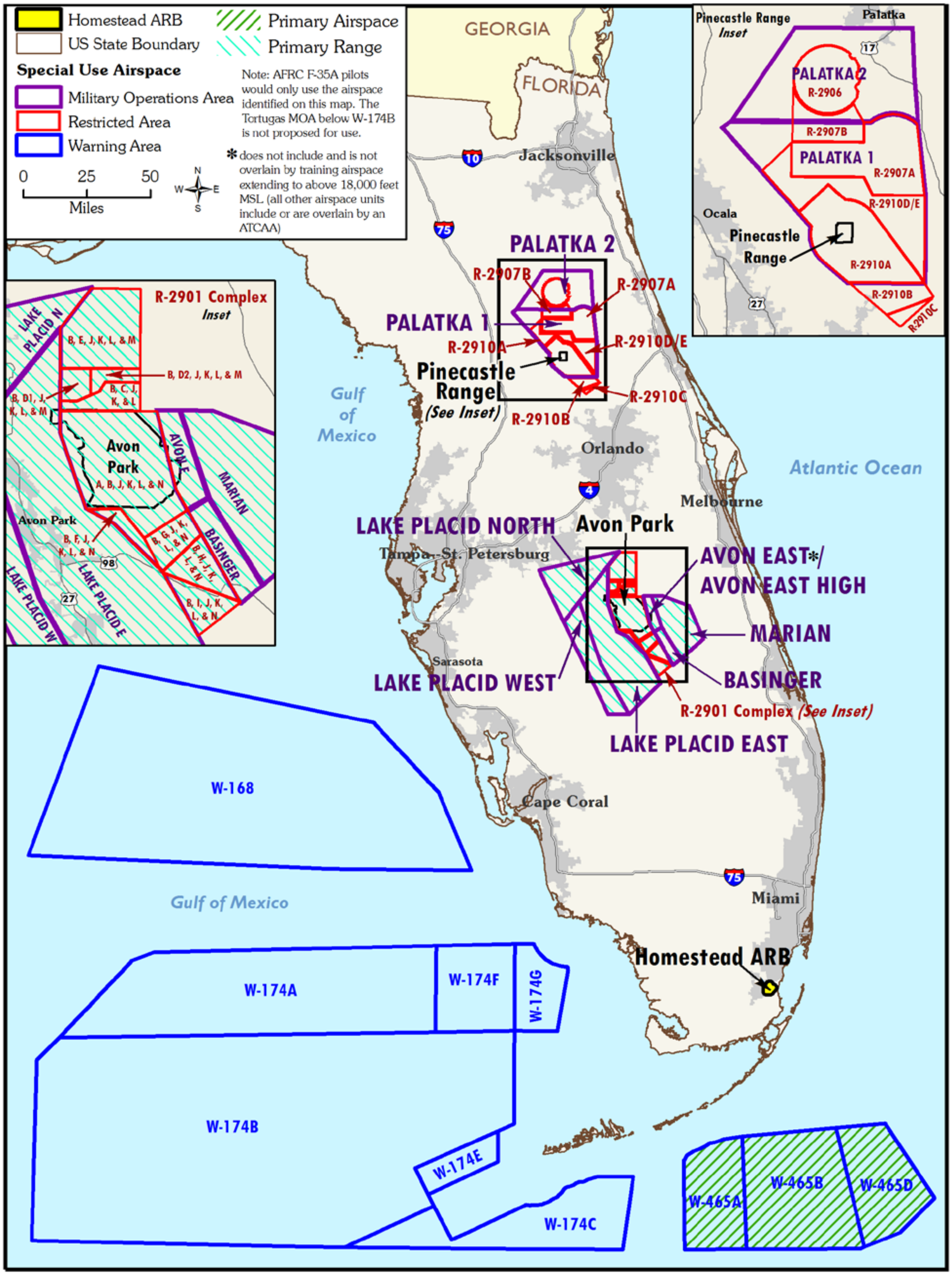

Figure HS2-2. Airspace Associated with Homestead ARB

Table HS2-6. Current and Proposed Aircraft Altitude Distribution in the Airspace

Altitude (feet)	Percentage of Use	
	F-16	AFRC F-35A
100 – 500 AGL	0%	0%
500 AGL – 2,000 AGL	2%	1%
2,000 – 5,000 AGL	4%	0%
5,000 AGL – 10,000 MSL	10%	5%
10,000 – 18,000 MSL	68%	23%
18,000 – 30,000 MSL	11%	60%
+30,000 MSL	5%	11%

F-16 pilots from the 482 FW generally operate 84 percent of the time at or below 18,000 feet MSL, depending on mission type. In contrast, AFRC F-35A pilots would operate 71 percent of the time at or above 18,000 feet MSL, with 11 percent of the flight time above 30,000 feet MSL.

By 2030, total annual sorties would decrease 0.2 percent from baseline levels (Table HS2-7). In the most heavily used airspace, like the Avon Park Air Force Range (APAFR) Complex, AFRC F-35A sorties would account for 31 percent of total airspace sorties. Similar proportions would apply to the other airspace. The total percent of use by AFRC F-35A pilots would not significantly vary from baseline.

Table HS2-7. AFRC F-35A Airspace Sorties Flown from Homestead ARB

Airspace[a]	Total Baseline	F-16 Baseline	AFRC F-35A Sorties	Net Change (Total)	Percent Change Total
U.S. Navy Pinecastle Range Complex[b]	2,314	237	923	686	29.6%
APAFR Complex	6,285	1,422	2,156	734	11.7%
Warning Areas	36,552	3,081	1,553	-1,528	-4.2%
Total	**45,151**	**4,740**	**4,632**	**-108**	**-0.2%**

[a] Includes all airspace identified in Table HS2-5.
[b] Includes Rodman and Lake George Ranges

To train with the full capabilities of the aircraft, AFRC F-35A pilots would conduct supersonic flight at altitudes and within airspace already authorized for such activities. Due to the capability of the F-35A aircraft, the USAF anticipates that approximately 10 percent of the time spent in air combat training would involve supersonic flight.

AFRC F-35A missions would last approximately 45 to 115 minutes, including takeoff, transit to and from the training airspace, training activities, and landing. Depending upon the distance and type of training activity, AFRC F-35A pilots would fly approximately 20 to 60 minutes in the training airspace. Occasionally, AFRC F-35A pilots could fly up to 90-minute long missions. AFRC F-35A pilots would not fly in Special Use Airspace (SUA) during environmental night (10:00 P.M. to 7:00 A.M.), except for rare contingencies and special mission training.

HS2.4.2 Range Use

AFRC F-35A pilots would only use existing ranges. AFRC F-35A pilots stationed at Homestead ARB, would use the APAFR and U.S. Navy Pinecastle Range Complex (to include the Rodman and Lake George Ranges) in Florida.

Most air-to-ground training would be simulated (i.e., nothing is released from the aircraft and electronic scoring is used). However, as described in Chapter 2, Section 2.3.4.2, the F-35A (like the F-16) is capable of carrying and using several types of air-to-air and air-to-ground ordnance, and pilots would require training in their use. The type and number of ordnance used by AFRC F-35A pilots could decrease from that currently used by F-16 pilots. The U.S. Navy Pinecastle Range Complex, to include the Rodman and Lake George Ranges, located in Florida, does not currently include F-35A air-to-ground ordnance training. However, the U.S. Navy Pinecastle Range Complex does support both high-explosive and inert training conducted by AFRC F-16 pilots. AFRC F-35A training proposed to be conducted at the U.S. Navy Pinecastle Range Complex would be conducted at the same training tempo and type as training currently conducted by AFRC F-16 pilots. Prior to the use of F-35A ordnance profiles and training actions, the USAF would coordinate with the Navy to ensure that the proposed F-35A ordnance profiles have been approved for use at the U.S. Navy Pinecastle Range Complex. Should additional analysis or planning be required for range safety actions, they would be completed as applicable. In addition, for ordnance use at Navy ranges, Weapons Danger Zones (WDZs) would be developed and approved in accordance with Commander United States Fleet Forces Command Instruction 3550.1, *Weapon Danger Zone Approval for Air-to-Ground Training Ranges*. If in the future the USAF identifies weapon systems that are either new or could exceed currently approved levels, appropriate NEPA documentation would be completed prior to their use.

Similar to F-16 pilots, AFRC F-35A pilots would use flares as defensive countermeasures in training. Flares are one of the defensive mechanisms dispensed by military aircraft to avoid attack by enemy aircraft and air defense systems. For the purposes of this analysis, it is estimated that flare use by AFRC F-35A pilots would be less than or equal to that of F-16 pilots. Chapter 2, Section 2.3.4.2.1, provides details on the composition and characteristics of flares. Flares would only be used in areas currently approved for such use. Current restrictions on the altitude of flare use would also apply. Approximately 70 percent of F-35A flare releases would occur above 15,000 feet MSL. At this altitude, most flares would be released more than 21 times higher than the minimum altitude required (700 feet) to ensure complete combustion of each flare.

HS2.5 PUBLIC, AGENCY, AND TRIBAL INVOLVEMENT

HS2.5.1 Scoping Process

The public scoping period for the AFRC F-35A Environmental Impact Statement (EIS) began on 22 March 2018 with publication of the Notice of Intent (NOI) in the *Federal Register*. During the following weeks, notification letters were mailed to federal, state, and local agencies; elected officials; federally recognized tribes (tribes)[1]; nongovernmental organizations; and interested individuals as a part of an interagency/intergovernmental coordination process. Through this process, concerned federal, state, and local agencies are notified and allowed sufficient time to evaluate potential environmental impacts of a proposed action.

Volume II, Appendix A, provides sample notification letters, the notification mailing lists, and the agency comments and concerns received by the USAF during the public scoping period. For the Homestead ARB alternative, newspaper advertisements announcing the intent to prepare an EIS and hold a public scoping meeting were published in four different local newspapers, including one Spanish language newspaper. These advertisements were published in the weeks preceding the scheduled public scoping meeting.

[1] Per DoDI 4710.02, *DoD Interactions with Federally-Recognized Tribes*, "tribe" refers to a federally recognized Indian or Alaska Native tribe, band, nation, pueblo, village, or community that the Secretary of the Interior acknowledges (DoDI 4710.02, Section 3.5). Although not included as federally recognized tribes in the list, the USAF similarly must consult with Native Hawaiian organizations in accordance with DoDI 4710.03, *Consultation with Native Hawaiian Organizations (NHOs).*

For the Homestead ARB alternative, one public scoping meeting was held on 17 April 2018 at the William F. Dickenson Community Center (1601 North Krome Avenue, Homestead, Florida 33030). This meeting was held in an open-house format where attendees could sign in, if desired, review display boards about the proposed AFRC F-35A mission, and provide written comments on the project. During this meeting, USAF personnel presented information on the project through the use of display boards and fact sheets. The Homestead ARB scoping meeting was attended by 27 people, including residents, elected officials, local business leaders, military affairs committee members, congressional staffers, base employees, local media, and others.

Throughout the public scoping period, the USAF offered multiple ways in which comments could be submitted. Comments were submitted at the public scoping meeting and through the project website, via email, and via regular mail or courier. The public scoping period closed on 11 May 2018, and six comments were received regarding the Homestead ARB alternative. Some comments were received after the scoping period closed but were still considered during development of the Draft EIS.

After the public scoping period closed, the USAF was made aware that the address provided for submittal of courier-delivered (e.g., Federal Express or United Parcel Service) public scoping comments was incorrect. Consequently, the USAF provided the correct address and an additional 10 working days to resubmit scoping comments from the time resubmittal instructions were published in the *Federal Register* on 13 August 2018 and in four different local newspapers. During this second public scoping period, no additional comments were received regarding the Homestead ARB alternative.

The majority of comments received for the Homestead ARB alternative were generally supportive of the proposed mission. Some people expressed concerns about airspace and noise.

HS2.5.1.1 Airspace Management and Use

Comments related to airspace included those that requested the EIS analyze any changes in airspace use, creation of new airspace, or alterations in flight paths. One comment requested analysis of impacts on flights paths to existing airports and with existing and future aircraft operations to public service airports. It was recommended that the USAF develop Area Navigation arrival and departure procedures to and from Homestead ARB.

HS2.5.1.2 Noise

The Miami International Airport (MIA) submitted a comment letter recommending an analysis and comparison of the existing conditions 2017 noise contours with the proposed action (2020) contours along with a comparison to the No Action Alternative. The letter went on to recommend analysis and comparison of the 2017 contours with the future proposed action contours in 2025 and 2030 and to recommend that the EIS should list any significant increase of day-night average sound level (DNL) of 1.5 dB or greater over noise-sensitive land uses within the 65 dB DNL and higher and list the proposed mitigation for these areas. The letter also recommended adding a section on the noise footprint of the F-35A compared to the F-16.

HS2.5.1.3 Biological Resources

The U.S. Fish and Wildlife Service (USFWS) provided comments on species that should be evaluated in the EIS.

HS2.5.1.4 Socioeconomics

One commenter noted that the economic benefits of the new mission would be beneficial to the community.

HS2.5.2 Draft EIS Public and Agency Review

A Draft EIS public hearing was held on 3 March 2020 at the Miami-Dade College, Homestead Campus, in Homestead, Florida. A total of 54 people signed in at the public hearing, but some attendees did not sign in. The verbatim transcript of the Homestead ARB public hearing is contained in Appendix A, Section A.6.2. A total of 11 comments were received from the public and agencies regarding the proposed AFRC F-35A mission at Homestead ARB prior to close of the comment period. See Chapter 1, Section 1.5, of the EIS for more details on the public involvement process. A synopsis of the comments received specific to Homestead ARB on the Draft EIS are listed as follows. See Appendix A, Section A.2, for responses to the substantive Draft EIS comments.

1) General support of the proposed beddown.
2) Complaint about noise and the noise analysis (e.g., noise contour lines versus what one hears).
3) Comment requesting the extension of the comment period.

HS2.5.3 Consultation

HS2.5.3.1 Government-to-Government Consultation

In January 2012 the U.S. Department of Defense (DoD) updated its Annotated American Indian and Alaska Native Policy, which emphasizes the importance of respecting and consulting with tribal governments on a government-to-government basis. This policy requires an assessment, through consultation, of the effect of proposed DoD actions that may have the potential to significantly affect protected tribal resources, tribal rights, and Indian lands before decisions are made by the respective DoD services. In an ongoing effort to identify significant cultural resources, tribal resources, or other issues of interest to tribes, and as part of the NEPA scoping process, combined notification and Section 106 consultation letters were submitted to the federally-recognized American Indian tribes associated with Homestead ARB.

Following standard USAF practice for government-to-government correspondence, tribal consultation was initiated by base Commanders who represent key leadership points of contact. Homestead ARB initiated Section 106 government-to-government consultation with five tribes to identify traditional cultural properties. All five tribes have provided responses to the USAF. These tribes along with a record of consultations are listed in Volume II, Appendix A, Section A.3. All communications with tribes will be completed in accordance with 54 *United States Code (USC)* 300101 *et seq.*, *National Historic Preservation of Act of 1966, as amended* (NHPA); 36 *Code of Federal Regulations (CFR)* § 800, *Protection of Historic Properties;* Executive Order (EO) 13175, *Consultation and Coordination with Indian Tribal Governments;* and DoDI 4710.02, *DoD Interactions with Federally-Recognized Tribes.*

HS2.5.3.2 State Historic Preservation Officer Consultation

Homestead ARB has determined that no historic properties would be affected by implementing the AFRC F-35A mission at the installation. The Florida State Historic Preservation Officer (SHPO) concurred with these findings in a letter dated 27 November 2018 (Volume II, Appendix A, Section A.2.5.3).

HS2.5.3.3 U.S. Fish and Wildlife Service Consultation

On 2 July 2018, the USFWS responded to the USAF's request for coordination and recognized the potential for adverse effects to the Florida bonneted bat (*Eumops floridanus*) from proposed renovation and demolition activities. The USFWS referred to minimization measures that could be implemented to assist in determining impacts to the Florida bonneted bat. Those minimization efforts would be incorporated should Homestead ARB be selected for the AFRC F-35A mission.

The USFWS also requested additional evaluation for federally listed plant species depending upon the location of proposed construction and renovation projects (Volume II, Appendix A, Section A.2.5.4).

HS3.0 HOMESTEAD ARB AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

HS3.1 AIRSPACE MANAGEMENT AND USE

HS3.1.1 Base Affected Environment

HS3.1.1.1 Airfield Operations

Baseline annual airfield operations at Homestead ARB are described in Section HS2.3 and shown in Table HS2-4. The primary runway at Homestead ARB, Runway 06/24, is described in Section HS1.0 and shown on Figure HS1-2. Runway 06 is used for takeoffs/landings to the northeast and is the primary runway for numerous reasons (e.g., noise abatement, wind conditions, air traffic flows, and other factors). The Homestead ARB air traffic control (ATC) tower is responsible for all airfield operations within a Class D airspace area surrounding the base out to 5.5 nautical miles (NM) from the ground surface (field elevation 5.6 feet MSL) to 2,500 feet MSL.

The FAA Miami Air Route Traffic Control Center (ARTCC) has overall responsibility for managing the airspace throughout the greater Florida region and has delegated responsibility to the FAA Miami Terminal Radar Approach Control (TRACON) facility for providing radar ATC services within 30 NM of MIA from the surface to 7,000 feet MSL. This is a high-density air traffic environment with several public and private airports supporting military, commercial, and general aviation needs. The FAA Miami TRACON facility oversaw approximately 413,000 total operations in 2017. For that reason, the FAA established the more highly regulated Class B airspace around MIA, as depicted on the FAA Miami Sectional Aeronautical Chart. The Class B airspace is segmented into eight areas (A-H), two of which (D and G) overlie the northern portion of the Homestead ARB Class D airspace. Both areas are within a 15-NM radius of MIA, with the D and G altitudes extending, respectively, from 3,000 and 5,000 feet MSL up to and including 7,000 feet MSL above the Homestead ARB Class D airspace. The Homestead ARB Class D airspace has a 2,500 feet MSL ceiling. The Homestead ARB Radar Approach Control (RAPCON) provides basic radar services to aircraft transiting within this area at 3,000 feet MSL and below.

The Tactical Air Navigation (TACAN) and Instrument Landing System (ILS) navigational aids on this airfield, as well as global positioning system (GPS), provide seven instrument approaches and ten Standard Terminal Arrival Route (STAR) procedures to the runway environment. These procedures, along with ATC direction, provide pilots with standard means for safely navigating to the Homestead ARB airfield/runway while being separated from other instrument flight rules (IFR) aircraft around this high-density area.

HS3.1.2 Base Environmental Consequences

HS3.1.2.1 Airfield Operations

The Homestead ARB alternative for the AFRC F-35A mission would replace 10,428 F-16 operations with a projected 11,580 F-35A operations. This would result in a 3.0 percent increase in the overall operations conducted at Homestead ARB (Table HS2-4). Other based and transient aircraft operations would remain constant. The percentage of operations flown during environmental night by AFRC F-35A pilots would be less than the percentage currently conducted by F-16 pilots. The AFRC F-35A mission at Homestead ARB could be effectively accommodated by ATC within the Homestead ARB Class D and Miami Class B airspace in the same manner current operations are managed without adversely affecting other airspace uses. This increase of 1,152 operations is a small percentage of the 413,000 operations conducted via the FAA Miami TRACON in 2017. No modifications would be required for this airspace structure or those local operating procedures that dictate how military operations are conducted while flying to and from this airfield.

HS3.1.3 Airspace Affected Environment

HS3.1.3.1 Airspace and Range Use

The MOAs, ATCAAs, RAs, and ranges currently used by pilots from Homestead ARB and projected for AFRC F-35A pilots for training activities are identified in Table HS2-5. The published floor and ceiling altitudes within which these activities are conducted are also shown in Table HS2-5. Depending upon the location of the different training airspace areas, either the FAA Miami or Jacksonville ARTCC has control over the respective MOA, RA, and Warning Area within their area of jurisdiction.

Table HS3-1 identifies the baseline and projected AFRC F-35A sorties for each airspace complex as well as the military agency responsible for coordinating and scheduling the use airspace with the different users. The number of annual sorties would increase in both the U.S. Navy Pinecastle Range Complex (to include Rodman and Lake George Ranges) and APAFR Complexes. The Warning Areas are located off the southern Florida coast within about 50 NM of Homestead ARB.

Table HS3-1. Baseline and AFRC F-35A Annual Sorties

Training Airspace/Ranges[a]	Using/Scheduling Agency	Baseline Total	AFRC F-16	AFRC F-35A	Proposed Total	Percent Change
U.S. Navy Pinecastle Range Complex[b]	FACSFAC[c] Jacksonville	2,314	-237	923	3,000	29.6
APAFR Complex	23rd WG, MacDill AFB	6,285	-1,422	2,156	7,019	11.7
W-168	96th TW, Eglin AFB	2,858	-1,185	614	2,287	-20.0
W-174 A, B, C, E, F, & G	Naval Air Station (NAS) Key West	4,614	-1,185	233	3,662	-20.6
W-465 A, B, & D		29,080	-711	706	29,075	0.0
Total		**45,151**	**-4,740**	**4,632**	**45,043**	**-0.2**

[a] AFRC F-35A training airspace and ranges also includes the high-altitude ATCAA above the MOAs. Airspace areas in this table have been grouped due to similarity of training use and for noise modeling purposes.
[b] Includes Rodman and Lake George Ranges.
[c] U.S. Navy, Fleet Area Control and Surveillance Facility, Jacksonville.

HS3.1.4 Airspace Environmental Consequences

HS3.1.4.1 Airspace and Range Use

As shown in Table HS3-1, replacement of the F-16 sorties with the projected AFRC F-35A sorties would result in a decrease (0.2 percent) in overall sorties. While most of the training airspace and ranges would experience decreases or no change in sorties, sorties would increase in the U.S. Navy Pinecastle Range Complex (to include Rodman and Lake George Ranges) and APAFR Complexes. The U.S. Navy Pinecastle Range Complex would experience an increase of 686 annual sorties and the APAFR Complex would experience an increase of 734 sorties. The U.S. Navy Pinecastle Range Complex has been previously analyzed for 10,216 annual operations (Brock 2018) and the increase in F-35A sorties would have no impact on the usage of that airspace.

AFRC F-35A sorties would require deconfliction with existing Navy sorties at the U.S. Navy Pinecastle Range Complex and USAF sorties within the APAFR Complex. Priority scheduling at the U.S. Navy Pinecastle Range Complex is given to Navy exercises. Scheduling coordination between the Navy and USAF and within the USAF would avoid conflicts within the airspace.

Implementation of the AFRC F-35A mission would not result in the creation of new SUA or change the boundaries of existing SUA. Therefore, no major changes to civilian operations are anticipated. The FAA would control the airspace when the MOA/ATCAA is activated, ensuring that there are no conflicts with the use of the jet routes and airways. Minor rerouting of flights along these routes and/or scheduling of specific portions of the MOA/ATCAA could alleviate potential conflicts.

HS3.1.5 Summary of Impacts to Airspace Management and Use

Implementation of the AFRC F-35A mission would involve a one-for-one exchange of F-16 aircraft with F-35A aircraft, and would not require any changes to airspace or to how the airfield is managed. Eventual replacement of F-16 aircraft at Homestead ARB with F-35A aircraft would result in a 3.0 percent increase in airfield operations. This minor operational increase would not affect how local air traffic is managed. In addition, the AFRC F-35A sorties proposed for the airspace could be accommodated in the training airspace, ranges, and while en route to/from these areas without adversely affecting other airspace uses throughout the affected region. Therefore, impacts to airspace around Homestead ARB and the airspace proposed for use would not be significant.

HS3.2 NOISE

Although noise can affect several resource areas, this section describes potential noise impacts on human annoyance and health, physical effects on structures, and potential impacts to animals in the care of humans. Noise impacts on biological resources (e.g., wildlife), cultural resources, land use and recreation, socioeconomics (e.g., property values), and environmental justice/protection of children are discussed in sections dedicated to those resources. Chapter 3, Section 3.2, defines terms used to describe the noise environment as well as methods used to calculate noise levels and assess potential noise impacts. These terms and analytical methods are uniformly applied to all four bases. A summary of noise metrics used in this EIS is also provided in Table HS3-2.

For consistency, the dB unit is used throughout this EIS. However, all subsonic aircraft noise levels described in this EIS are measured in A-weighted decibels (dBA). In compliance with current DoD Noise Working Group (DNWG) guidance, the overall noise environment is described in this EIS using the DNL metric. During scoping, people submitted comments expressing concern about use of the DNL metric. The DNL metric is used because it is the preferred noise metric of the U.S. Department of Housing and Urban Development (HUD), FAA, U.S. Environmental Protection Agency (USEPA), and DoD. Studies of community annoyance in response to numerous types of environmental noise show that there is a correlation between DNL and the percent of the population that can be expected to be highly annoyed by the noise. In addition to the DNL metric, supplemental noise metrics are used to provide a more complete picture of noise and particular types of noise impacts (Table HS3-2). Operations occurring during environmental nighttime hours are assessed a 10-dB penalty applied in calculation of DNL (refer to Chapter 3, Section 3.2.3, for more detailed resource definition and methodology used to evaluate impacts).

Comments received during the scoping indicated a broad range of concerns and requested a comprehensive presentation of noise impacts. Therefore, this analysis covers a wide variety of potential noise impact categories. Additional details are provided in Volume II, Appendix B.

Table HS3-2. Summary of Noise Metrics Used in this EIS

Different noise measurements (or metrics) quantify noise. These noise metrics are as follows:

- The A-weighted decibel (dBA) is used to reflect a weighting process applied to noise measurements to filter out very low and very high frequencies of sound in order to replicate human sensitivity to different frequencies of sound and reflect those frequencies at which human hearing is most sensitive. Environmental noise is typically measured in dBA.
- Day-Night Average Sound Level (DNL) combines the levels and durations of noise events, the number of events over a 24-hour period, and more intrusive nighttime noise to calculate an average noise exposure.
- Onset Rate-Adjusted Day-Night Average Sound Level (L_{dnmr}) adds to the DNL metric the startle effects of an aircraft flying low and fast where the sound can rise to its maximum very quickly. Because the tempo of operations is so variable in airspace areas, L_{dnmr} is calculated based on the average number of operations per day in the busiest month of the year.
- C-Weighted Day-Night Average Sound Level (CDNL) is a day-night average sound level computed for impulsive noise such as sonic booms. Peak overpressure, measured in pounds per square foot (psf), characterizes the strength of impulsive noise.
- Sound Exposure Level (SEL) accounts for the maximum sound level and the length of time a sound lasts by compressing the total sound exposure for an entire event into a single second.
- Maximum Noise Level (L_{max}) is the highest sound level measured during a single event in which the sound level changes value with time (e.g., an aircraft overflight).
- Equivalent Noise Level (L_{eq}) represents aircraft noise levels decibel-averaged over a specified time period and is useful for considering noise effects during a specific time period such as a school day (denoted $L_{eq(SD)}$ and measured from 8:00 A.M. to 4:00 P.M.).

In this EIS, multiple noise metrics are used to describe the noise environment at each alternative base. This approach, which is in accordance with DoD policy (DoD 2009), provides a more complete picture of the current and expected noise experience than can be provided by any one noise metric alone.

HS3.2.1 Base Affected Environment

This section discusses noise impacts near the installation. Noise generated in the training airspace and during transit to and from the training airspace is discussed in Section HS3.2.3.

Under baseline conditions, 38,518 airfield operations are conducted annually at Homestead ARB (operational information was collected from Homestead ARB personnel) (Homestead ARB 2017a). This includes 10,428 operations by AFRC F-16 pilots. CBP pilots fly 7,622 operations per year in DHC-8, AS-350, and UH-60 aircraft. Special Operations Command South pilots fly 788 operations annually in propeller-driven aircraft. Pilots from the Golden Knights fly 4,608 operations annually in F-27 and DHC-6 aircraft. Transient aircraft pilots use the airfield for a variety of purposes (e.g., stop-over during cross country flights, unfamiliar airfield for practice approaches, divert landing location during severe weather), and transient aircraft could potentially include any aircraft type. Approximately 8 percent of total airfield operations are conducted between 10:00 P.M. and 7:00 A.M. Approximately 3 percent of 482 FW F-16 airfield operations are conducted between 10:00 P.M. and 7:00 A.M.

HS3.2.1.1 Noise Exposure

Several comments received during scoping requested the USAF provide individual overflight noise levels quantified using the sound exposure level (SEL) noise metric. The information on SELs shown in Table HS3-3 was calculated based on local flying procedures and conditions using methods described in Chapter 3, Section 3.2.3.1. Specifically, Table HS3-3 lists only the highest SEL generated by any flight procedure (e.g., arrival, departure, or closed pattern) by any based or transient aircraft type. The table also states the number of times per year that the flight procedure occurs during "acoustic day" (i.e., 7:00 A.M. to 10:00 P.M.) and "acoustic night" (10:00 P.M. to 7:00 A.M). It is worth noting that the noise environment at a particular location is complex and the highest SEL is only one descriptor of this complex situation. In addition, actual flight paths vary, due to weather, winds, aircrew technique, and other factors, from the most-frequently followed (representative) flight paths used in noise modeling. Therefore, individual flight events could be closer to, or be farther away from, the representative noise-sensitive location, resulting in noise levels being slightly higher or lower than indicated in Table HS3-3.

Table HS3-3. Highest SEL at Representative Noise-Sensitive Locations near Homestead ARB Under Baseline Conditions

Representative Noise-Sensitive Location			Flight Procedure with the Highest SEL					SEL (dB)[a,b]
Type	ID	Description	Aircraft Group	Aircraft	Operation Type	Annual Ops at this SEL: 7:00 A.M. to 10:00 P.M.	Annual Ops at this SEL: 10:00 P.M. to 7:00 A.M.	
Park	P01	Biscayne National Park Offshore	B	F-16C	Departure	4,414	0	95
Park	P02	Everglades National Park Ernest F. Coe Visitor Center	B	F-15E	Arrival	62	7	93
Park	P03	Biscayne Bay Visitor Center	B	F-15E	Departure	2	0	88
Park	P04	Audubon Park	B	F-15E	Arrival	32	4	93
Park	P05	Cutler Ridge Park	B	F-15E	Arrival	1	0	88
Residential	R01	Verde Gardens	B	F-15E	Departure	61	6	101
School[c]	S01	Mandarin Lakes K-8 Academy	B	F-15E	Departure	61	6	100
School[c]	S02	De La Salle Education Center	T	F/A-18A/C	Departure	3	0	106
School[c]	S03	Keys Gate Charter School	T	F/A-18A/C	Arrival	52	3	110
School[c]	S04	The Charter School at Waterstone	B	F-16C	Arrival	19	0	100
School[c]	S05	Miami Arts Charter School	T	F/A-18A/C	Arrival	52	3	98

[a] SELs were calculated using NOISEMAP Version 7.3 and the same operational data (e.g., flight tracks and flight profiles) used to calculate the DNL contours.
[b] SEL accounts for the maximum sound level and the length of time a sound lasts by compressing the total sound exposure for an entire event into a single second.
[c] For the purposes of this noise analysis, noise levels at schools are described throughout this EIS using representative schools; discussion of noise at schools may not include all schools in the area.
Key: T = Transient aircraft or non-Homestead ARB-based aircraft involved in training exercise; B = Based aircraft

Several factors, including, but not limited to, weather conditions, the precise flight path followed, and whether the aircraft is flying in formation, affect the noise level of individual overflights (Chapter 3, Section 3.2.3). Formation flights involve multiple aircraft, usually of the same type, flying together. The maximum noise level experienced during a formation overflight depends on the spacing and arrangement of the formation's member aircraft. If the aircraft are spaced close together, then doubling the number of aircraft would add as much as 3 dB to the maximum noise level (L_{max}) of the event. Since the SEL metric is an exposure-based metric, doubling the number of aircraft of a single aircraft type adds 3 dB to the event noise level.

Figure HS3-1 shows baseline DNL contours in 5-dB increments. Areas with the highest DNL are located along the runway, beneath the most heavily-used flight paths and in areas near the airfield

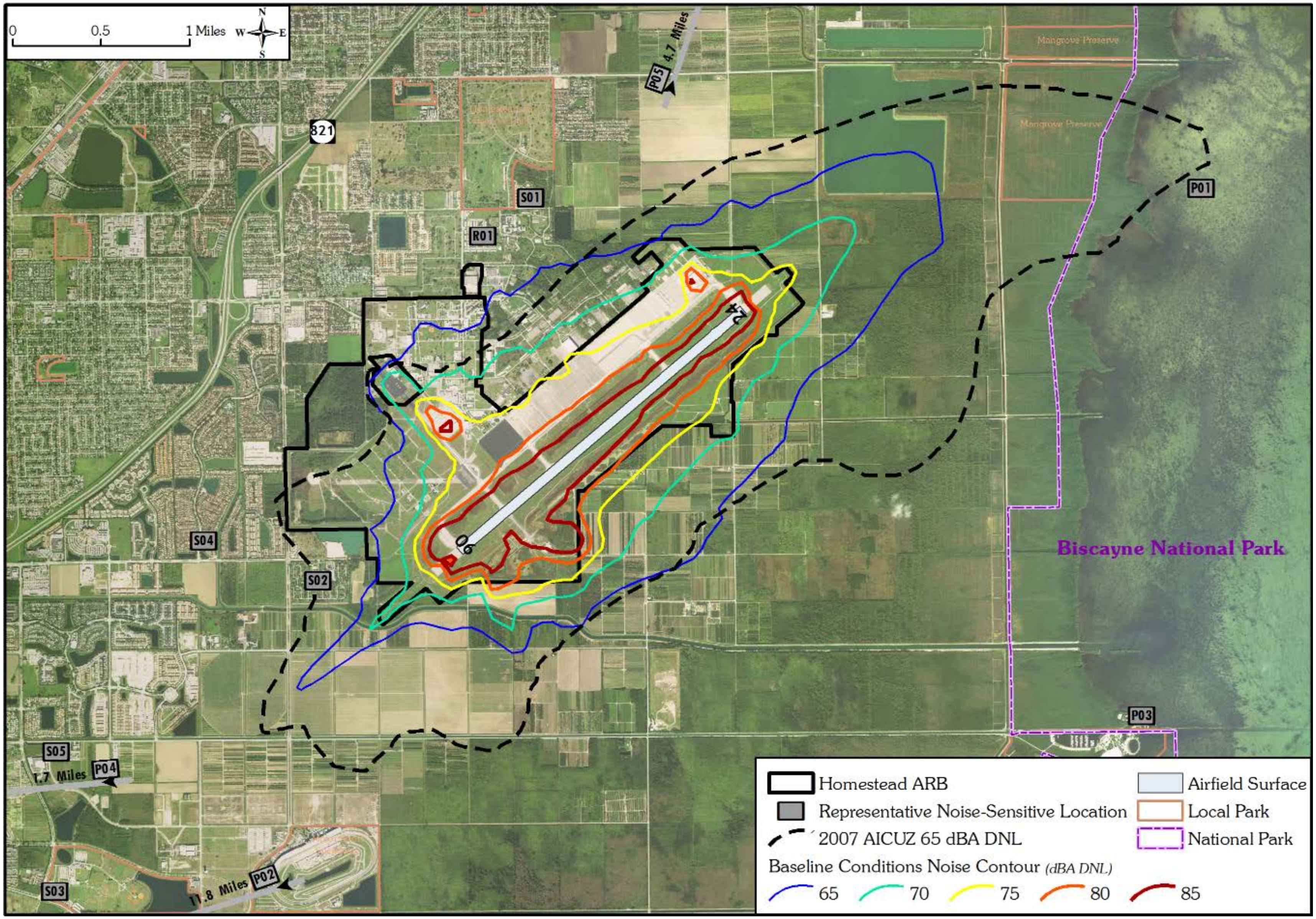

Figure HS3-1. Baseline DNL Contours at Homestead ARB

where aircraft static engine runs are conducted. Noise contours generated for baseline conditions represent the most current estimate of operations derived from interviews with Homestead ARB personnel. The fact that baseline noise contours are smaller than those included in the 2007 AICUZ reflects a decrease in the tempo of operations relative to the number modeled in the 2007 AICUZ.

The off-base land areas exposed to DNL of 65 dB or greater are agricultural. Although a total of 1,692 acres are currently exposed to DNL greater than 65 dB, the estimated population of the affected area is zero (Table HS3-4). Agricultural land is considered to be generally compatible at all noise levels according to USAF land use guidelines. People living outside of the 65 dB DNL contour also sometimes experience potentially disturbing aircraft overflights and can become annoyed by the noise. As noted in Chapter 3, Section 3.2.3, and Volume II, Appendix B, a person's reaction to noise is dependent on several non-acoustic factors, including the person's perception of the importance of the activity generating the noise and the activity the person is involved in at the time the noise occurs. Additional details on annoyance are contained in Chapter 3, Section 3.2.3, and Volume II, Appendix B.

Table HS3-4. Off-Base Acres and Population Exposed to DNL of 65 dB or Greater Under Baseline Conditions at Homestead ARB

DNL (dB)	Acres	Estimated Population
65 – 69	1,156	0
70 – 74	437	0
75 – 79	86	0
80 – 84	12	0
≥85	1	0
Total	**1,692**	**0**

Table HS3-5 lists baseline DNL at several representative noise-sensitive locations around the base. These include a point off the coast in Biscayne National Park, a residential area, and several schools. Baseline DNLs at the representative noise-sensitive locations are similar to and indicative of DNL in any nearby residential areas. DNLs at the locations studied range from less than 45 to 62 dB.

Table HS3-5. DNL at Representative Noise-Sensitive Locations near Homestead ARB Under Baseline Conditions

Type	ID	Description	DNL (dB)
Park	P01	Biscayne National Park Offshore	57
	P02	Everglades National Park Ernest F. Coe Visitor Center	<45
	P03	Biscayne Bay Visitor Center	50
	P04	Audubon Park	<45
	P05	Cutler Ridge Park	<45
Residential	R01	Verde Gardens	62
School	S01	Mandarin Lakes K-8 Academy	60
	S02	De La Salle Education Center	60
	S03	Keys Gate Charter School	58
	S04	The Charter School at Waterstone	54
	S05	Miami Arts Charter School	51

Areas outside the 65 dB DNL contour line could also experience noise that can be disturbing at times. Although noise events are less frequent and/or less intense in locations exposed to DNL less than 65 dB than in locations exposed to DNL greater than 65 dB, loud and potentially disturbing noise events do occur. Some people are more noise-sensitive than others as a result of physical, psychological, and emotional factors. People with autism and people afflicted with post-traumatic stress disorder (PTSD) may be particularly sensitive to sudden loud noises such as those that occur near an airbase. The DNL metric is useful for describing the noise environment at a location with a single number, but it does not provide a complete description of the noise environment. In accordance with current DoD policy (DoD 2009), this EIS uses several supplemental noise metrics (e.g., SEL, L_{max}, number of events exceeding dB threshold) to provide a more complete description of the noise experience.

HS3.2.1.2 Speech Interference

Speech interference is possible when noise levels exceed 50 dB. For the purposes of this analysis, any change to normal speech patterns is counted as an interference event. Table HS3-6 lists the number of events exceeding L_{max} of 50 dB in buildings with windows open, in buildings with windows closed, and outdoors. Predictions of indoor speech interference events account for standard values of 15 dB or 25 dB of noise attenuation provided by buildings with windows open or closed, respectively. Many of the parks listed in Table HS3-6 are near residential areas, and noise levels are similar. Flight paths are variable and speech interference events sometimes occur far from standard Homestead ARB flight patterns.

Table HS3-6. Potential Speech Interference Under Baseline Conditions at Homestead ARB

Representative Noise-Sensitive Location			Annual Average Daily Daytime Events per Hour (7:00 A.M. to 10:00 P.M.)		
Type	**ID**	**Description**	**Windows Open[a]**	**Windows Closed[a]**	**Outdoor**
Park	P01	Biscayne National Park Offshore	1	1	3
	P02	Everglades National Park Ernest F. Coe Visitor Center	<<1	<<1	<<1
	P03	Biscayne Bay Visitor Center	1	<<1	2
	P04	Audubon Park	1	<<1	3
	P05	Cutler Ridge Park	<<1	<<1	1
Residential	R01	Verde Gardens	1	1	3

[a] Number of events per average hour with an indoor L_{max} of at least 50 dB; assumes standard values of 15 dB and 25 dB of noise level reductions for windows open and closed, respectively.

Key: Locations where the hourly disruption events round to zero are listed using the symbol <<1.

HS3.2.1.3 Interference with Classroom Learning

Noise interference with learning in schools is of particular concern because noise can interrupt communication or interfere with concentration. When considering intermittent noise caused by aircraft overflights, guidelines for classroom interference indicate that an appropriate criterion is a limit of 35 to 40 dB (depending on classroom size) on indoor background equivalent noise levels during the school day ($L_{eq(SD)}$) and a 50 dB L_{max} limit on single events. In accordance with DNWG recommendations, estimated interior $L_{eq(SD)}$ exceeding 40 dB was taken as an indication that American National Standards Institute (ANSI) criteria are being exceeded (DNWG 2013). Table HS3-7 lists $L_{eq(SD)}$ and the average number of events per hour that exceed 50 dB L_{max} at several schools near Homestead ARB when windows are open and when windows are closed. Indoor $L_{eq(SD)}$ exceed 40 dB at four of the five schools studied when windows are open, but $L_{eq(SD)}$ do not exceed 40 dB with windows closed at any of these schools. Between one and two events per hour during the school day exceed L_{max} of 50 dB if windows are closed and one or less event per hour exceeds L_{max} of 50 dB when windows are closed. The number of outdoor events per hour with potential to interfere with speech between 7:00 A.M. and 10:00 P.M. is not directly related to classroom noise level but is relevant during recess and to other activities that could occur outside the school building.

Table HS3-7. Indoor Classroom Learning Disruption Under Baseline Conditions at Homestead ARB

ID	Description	Windows Open		Windows Closed		Outdoor
		$L_{eq(SD)}$ (dB)	Events per Hour[a]	$L_{eq(SD)}$ (dB)	Events per Hour[a]	Events per Hour[b]
S01	Mandarin Lakes K-8 Academy	47	1	37	1	3
S02	De La Salle Education Center[c]	47	2	37	1	4
S03	Keys Gate Charter School	43	2	<35	1	3
S04	The Charter School at Waterstone	40	1	<35	1	3
S05	Miami Arts Charter School	36	1	<35	<<1	3

[a] Average number of events per hour at or above an indoor L_{max} of 50 dB during an average 8-hour school day (8:00 A.M. to 4:00 P.M.).
[b] Average number of events per hour at or above an outdoor L_{max} of 50 dB during daytime (7:00 A.M. to 10:00 P.M.).
[c] The De La Salle Education Center is used for afterschool tutoring and nighttime adult education.
Key: $L_{eq(SD)}$ is the equivalent noise level during a school day (defined as 8:00 A.M. to 4:00 P.M.). Locations where the hourly disruption events round to zero are listed using the symbol <<1.

HS3.2.1.4 Sleep Disturbance

Nighttime flying, which is required as part of training for certain missions, has an increased likelihood of causing sleep disturbance. The lack of quality sleep has the potential to affect health and concentration. The probability of being awakened at least once per night was calculated using a method described by the ANSI (ANSI 2008). The method first predicts the probability of awakening associated with each type of flying event (higher SELs yield higher probability of awakening) and then sums the probabilities associated with all event types. The overall probability of awakening at least once per night reflects all flying events that occur between 10:00 P.M. and 7:00 A.M., when most people sleep (Table HS3-8). The analysis also accounts for standard building attenuation of 15 dB and 25 dB with windows open and closed, respectively. Sleep disturbance probabilities listed for parks and schools are not intended to imply that people regularly sleep in parks or schools, but instead are indicative of impacts in nearby residential areas. Results apply only to people who sleep during the night. People who sleep during the day experience additional noise events, resulting in higher probabilities of awakening.

Table HS3-8. Average Probability of Awakening Under Baseline Conditions at Homestead ARB

Type	ID	Description	Annual Average Nightly (10:00 P.M. to 7:00 A.M.) Probability of Awakening (%)	
			Windows Open[a]	Windows Closed[a]
Park[b]	P01	Biscayne National Park Offshore	3	1
	P02	Everglades National Park Ernest F. Coe Visitor Center	0	0
	P03	Biscayne Bay Visitor Center	2	1
	P04	Audubon Park	1	0
	P05	Cutler Ridge Park	0	0
Residential	R01	Verde Gardens	4	1
School[b]	S01	Mandarin Lakes K-8 Academy	3	1
	S02	De La Salle Education Center	6	3
	S03	Keys Gate Charter School	4	1
	S04	The Charter School at Waterstone	2	1
	S05	Miami Arts Charter School	3	1

[a] Assumes standard values of 15 dB and 25 dB noise level reductions for windows open and closed, respectively.
[b] Parks and schools listed in this table serve as representative geographic areas by which surrounding neighborhoods can estimate their potential noise exposure. None of the above-listed parks or schools are open from 10:00 P.M. to 7:00 A.M.

HS3.2.1.5 Potential for Hearing Loss

Potential for Hearing Loss (PHL) applies to people living in high noise environments where they can experience long-term (40 years) hearing effects resulting from DNL greater than 80 dB (USD 2009). PHL is not an issue of concern because there are no residences exposed to DNL greater than 80 dB.

HS3.2.1.6 Occupational Noise

In on-base areas with high noise levels, existing USAF occupational noise exposure prevention procedures, such as hearing protection and monitoring, are implemented to comply with all applicable Occupational Safety and Health Administration (OSHA) and USAF occupational noise exposure regulations.

HS3.2.1.7 Non-auditory Health Impact

During scoping, the question of the potential for non-auditory health effects from noise was raised. Studies have been performed to see whether noise can cause health effects other than hearing loss. The premise is that annoyance causes stress. Prolonged stress is known to be a contributor to a number of health disorders. Cantrell (1974) confirmed that noise can provoke stress, but noted that results on cardiovascular health have been contradictory. Some studies have found a connection between aircraft noise and blood pressure (e.g., Michalak et al. 1990; Rosenlund et al. 2001), while others have not (e.g., Pulles et al. 1990).

Kryter and Poza (1980) noted, “It is more likely that noise related general ill-health effects are due to the psychological annoyance from the noise interfering with normal everyday behavior, than it is from the noise eliciting, because of its intensity, reflexive response in the autonomic or other physiological systems of the body.”

The connection from annoyance to stress to health issues requires careful experimental design, and the resulting data are subject to different interpretations. Some of the highly publicized research reports on the impacts of noise on human health effects are unsubstantiated or not based on sound science. Meecham and Shaw (1979) apparently found a relation between noise levels and mortality rates in neighborhoods under the approach path to Los Angeles International Airport. When the same data were analyzed by others (Frerichs et al. 1980), no relationship was found. Jones and Tauscher (1978) found a high rate of birth defects for the same neighborhood. But when the Centers For Disease Control performed a more thorough study near Hartsfield-Jackson Atlanta International Airport, no relationships were found for levels greater than 65 dB (Edmonds et al. 1979).

A carefully designed study, Hypertension and Exposure to Noise near Airports (HYENA), was conducted around six European airports from 2002 through 2006 (Jarup et al. 2005, 2008). There were 4,861 subjects, aged between 45 and 70. Blood pressure was measured, and questionnaires were administered for health, socioeconomic, and lifestyle factors, including diet and physical exercise. Hypertension was defined by World Health Organization (WHO) blood pressure thresholds (WHO 2003). Noise from aircraft and highways was predicted from models.

The HYENA results were presented as an odds ratio (OR). An OR of 1 indicates there is no added risk, while an OR of 2 indicates risk is doubled. An OR of 1.14 was found for nighttime aircraft noise, measured by the equivalent noise level during nighttime hours (L_{night}). For daytime aircraft noise, measured by 16-hour equivalent noise level (L_{eq16}), the OR was 0.93. For road traffic noise, measured by 24-hour equivalent noise level (L_{eq24}), the OR was 1.1.

Note that OR is a statistical measure of change, not the actual risk. Risk itself and the measured effects were small, and not necessarily distinct from other events. Haralabidis et al. (2008) reported an increase in systolic blood pressure of 6.2 millimeters of mercury (mmHg) for aircraft noise, and an increase of 7.4 mmHg for other indoor noises such as snoring.

For these studies, aircraft noise was a factor only at night, while traffic noise is a factor for the full day. Aircraft noise results varied among the six countries. The result is therefore pooled across all data. Traffic noise results were consistent across the six countries.

One interesting conclusion from a 2013 study of the HYENA data (Babisch et al. 2013) states there is some indication that noise level is a stronger predictor of hypertension than annoyance. That is not consistent with the idea that annoyance is a link in the connection between noise and stress. Babisch et al. (2012) present interesting insights on the relationship of the results to various modifiers.

Two studies examined the correlation of aircraft noise with hospital admissions for cardiovascular disease. Hansell et al. (2013) examined neighborhoods around London's Heathrow Airport. Correia et al. (2013) examined neighborhoods around 89 airports in the United States. Both studies included areas of various noise levels. They found associations that were consistent with the HYENA results. During the Draft EIS public comment period, several commenters provided citations of research papers and requested additional information from these research papers be included in the Final EIS. Please refer to Chapter 3, Section 3.2.3.1.7 for additional information that has been added to the Final EIS.

The current state of scientific knowledge cannot yet support inference of a causal or consistent relationship between aircraft noise exposure and non-auditory health consequences for exposed residents. The large-scale HYENA study (Jarup et al. 2005, 2008) and the recent studies by Hansell et al. (2013) and Correia et al. (2013) offer indications, but it is not yet possible to establish a quantitative cause and effect based on the currently available scientific evidence.

HS3.2.1.8 Structural Damage

Noise that does not exceed 130 dB in any 1/3-octave frequency band or last for more than 1 second does not typically have the potential to damage structures in good repair (CHABA 1977). The term "frequency bands" refers to noise energy in a certain range of frequencies and is similar in concept to frequency bands employed on home stereo equalizers to control relative levels of bass and treble. Noise energy in certain frequency bands has increased potential to vibrate and/or damage structures. Noise exceeding 130 dB in any 1/3-octave frequency band and lasting for more than 1 second of that intensity and duration does not occur except on the flightline immediately adjacent to jet aircraft. The installation has not received any claims for noise-induced property damage.

Noise-induced structural vibration and secondary vibrations (i.e., "rattle") of objects within structures can occur during loud overflights. Rattling of objects such as dishes, hanging pictures, and loose window panes can cause residents to fear damage. Rattling objects have the potential to contribute to annoyance along with other potential noise effects (e.g., speech interference, sleep disturbance).

HS3.2.1.9 Animals in the Care of Humans

Potential noise impacts on wildlife are discussed in Section HS3.6. However, pets, other domesticated animals, and animals kept in zoos live in different circumstances than wild animals and often react differently to human-generated noises, particularly when enclosed in small spaces. Negative reactions to loud overflights are possible under baseline conditions.

HS3.2.2 Base Environmental Consequences

Implementation of the AFRC F-35A mission would replace the 24 F-16 aircraft currently assigned to the 482 FW with 24 F-35A aircraft. The number of airfield operations flown annually by the 482 FW would change from 10,428 to 11,580, increasing the total number of airfield operations flown by all aircraft at Homestead ARB by 3 percent.

AFRC F-35A pilots would fly approximately 2 percent of initial approaches to the runway during the late-night time period between 10:00 P.M. and 7:00 A.M. This is the same percentage of initial approaches that are conducted by 482 FW F-16 pilots late at night. As is currently the case with F-16 pilots, AFRC F-35A pilots would not typically conduct departures or closed patterns (i.e., multiple practice approaches) between 10:00 P.M. and 7:00 A.M.

Based on context and intensity, noise impacts resulting from implementation of the proposed AFRC F-35A mission at Homestead ARB would be considered adverse but not significant. The intensity of noise impacts in several impact categories (e.g., speech interference, sleep disturbance, etc.) are described in Sections HS3.2.2.1 through HS3.2.2.9.

Construction and demolition (C&D) projects in support of the proposed AFRC F-35A mission would generate short-term, localized increases in noise. However, the installation is currently exposed to elevated aircraft noise levels as well as noise generated by the day-to-day operation and maintenance (O&M) of vehicles and equipment. Construction would occur during normal working hours (i.e., 7:00 A.M. to 5:00 P.M.), and construction equipment would be equipped with mufflers. Workers would wear hearing protection in accordance with applicable regulations. Transportation of materials and equipment to and from the construction sites would generate noise similar to heavy trucks currently operating on base and along local roadways. In the context of ongoing frequent and intense aircraft noise events on an active military installation, construction noise generated by the AFRC F-35A mission would not result in significant impacts.

HS3.2.2.1 Noise Exposure

HS3.2.2.1.1 Scenario A

Table HS3-9 compares F-16 and F-35A individual overflight noise levels at a representative noise-sensitive location southwest of the runway (i.e., De La Salle Education Center [S02]). The noise levels listed in Table HS3-9 reflect flight procedures at Homestead ARB (e.g., pattern altitudes) and are not directly applicable to other installations. The specific types of flight departure, arrival, or closed pattern procedures listed in the table were selected because they generate the highest dB SEL of any departure, arrival, or closed pattern procedure flown by that aircraft at the location studied. The same set of Homestead ARB-specific flight procedures used to calculate DNL contours was also used to calculate noise levels in Table HS3-9.

Table HS3-9. Comparison of F-16 and F-35A Noise Levels at the De La Salle Education Center (S02) near Homestead ARB

Aircraft	Operation Type	Engine Power	Airspeed (knots)	Altitude (feet AGL)	Slant Distance (feet)	SEL (dB)[a]	L_{max} (dB)[a]
F-35A (Military Power)	Departure	100% ETR	300	685	3,625	103	95
F-35A (Afterburner Power)[a]		100% ETR	300	766	3,641	104	95
F-16C (Military Power)		104% NC	300	1,156	3,744	96	87
F-16C (Afterburner Power)		104% NC	300	1,519	3,873	98	90
F-35A (Overhead Break)	Arrival	40% ETR	170	211	2,092	98	87
F-16C (Straight-in)		85% NC	180	230	2,094	78	69

Table HS3-9. Comparison of F-16 and F-35A Noise Levels at the De La Salle Education Center (S02) near Homestead ARB (Continued)

Aircraft	Operation Type	Engine Power	Airspeed (knots)	Altitude (feet AGL)	Slant Distance (feet)	SEL (dB)[a]	L_{max} (dB)[a]
F-35A (PFO Pattern)	Closed	100% ETR	300	1,253	3,300	104	96
F-16C (VFR Low Approach)	Pattern	104% NC	350	555	2,098	105	96

[a] For a detailed explanation of why F-35A afterburner departures might have lower SEL and L_{max} values than military power departures, see Chapter 3, Section 3.2.3.1. Essentially, during afterburner takeoffs, the aircraft reaches the required takeoff speed and leaves the ground sooner, and is at a slightly higher altitude throughout the flight profile. As a result, the aircraft altitude and slant distance at the location studied are both typically higher for the afterburner departure. Typically, the afterburner is turned off at approximately 10,000 feet from brake release, which occurs before the aircraft is over the location studied. The engine power (i.e., ETR) setting of the aircraft when it is above the location studied is the same for both the military power and the afterburner departure.

Notes: Noise levels presented were calculated at Homestead Housing Authority (De La Salle Education Center) for the departure, arrival, and closed pattern flight that has the highest SEL at this location. Actual individual overflight noise levels vary from the noise levels listed because of variations in aircraft configuration, flight track, altitude, and atmospheric conditions. Representative noise levels were calculated using NOISEMAP Version 7.3 and the same operational data (e.g., flight tracks and flight profiles) used to calculate the DNL contours.

Key: ETR = Engine Thrust Request; NC = core engine speed

AFRC F-35A pilots conducting afterburner departures would only use the afterburner for a short period of time (see Chapter 3, Figure 3-1), and then continue their climb in military power (i.e., the same power setting used throughout the departure during non-afterburner departures). During afterburner departures, the afterburner would be de-selected long before the aircraft overfly the De La Salle Education Center (S02). Because afterburner and non-afterburner power departures are at the same power setting as they pass near the school, overflight noise levels generated by the two types of departures are similar at the school.

As noted in Chapter 3, Section 3.2.3, computer noise modeling was conducted in compliance with current USAF and DoD-approved methods. The modeling accounted for the effects of terrain relief (e.g. hills and valleys, coastal plains, etc.) as well as surface type (land or water) on the propagation of noise. In accordance with standard modeling procedures, noise modeling at Homestead ARB used median atmospheric conditions for sound propagation based on local climate records. The modeling does not reflect possible future climates in part because the degree to which the climate will change and the timeframe in which change will occur are not known at this time. Noise levels were calculated for an average annual day, which is a day with 1/365th of annual total operations. The computer noise model NOISEMAP references a database of field-measured sound levels for aircraft in various flight configurations. The model also uses data on flight procedures for current and proposed aircraft operations (e.g., where, how often, what time of day, and what configurations are used) based on recent inputs provided by Homestead ARB pilots and Air Traffic Control. Application of noise results generated for another airfield would be inappropriate because flight procedures, terrain, and several other factors are different at other airfields. F-35A flight parameters (e.g., altitude, airspeed, and engine power setting) that are expected to be used at Homestead ARB were developed based on information provided by F-35A pilots at bases where the aircraft is operating currently, such as Luke, Hill, and Eglin AFBs. These flight parameters were used to generate results specific to Homestead ARB.

Several comments received during scoping requested that the USAF provide individual overflight noise levels using the SEL noise metric. Information is provided on the flight procedure with the highest SEL at several representative noise-sensitive locations in Table HS3-10. A flight procedure is a specific type of operation (e.g., afterburner departure) on a specific flight path, by a specific aircraft type. Actual flight paths vary as a result of weather, winds, aircrew technique, and other factors, and individual flights would deviate in position and noise level from those listed in Table HS3-10. In addition, the flight procedure with the highest SEL is one aspect of a complex sound environment which includes many other flight procedures (e.g., flaps or gear position) as well as other noise sources. At all of the representative noise-sensitive locations except the Biscayne Bay Visitor Center, the highest SEL would remain the same or decrease by 1 dB under the AFRC F-35A mission relative to baseline conditions. At the Biscayne Bay Visitor Center, the highest SEL would increase by 4 dB, from 88 to 92 dB. In many locations where the highest SEL would not change, transient F/A-18A/C aircraft or based F-15 aircraft generate the highest SEL under baseline conditions, and would continue to do so under the proposed action. At the Charter School at Waterstone, a based F-16 arrival procedure that had generated the highest SEL would stop occurring, and a based F-15 departure procedure which generates a lower SEL would replace it as the generator of the highest SEL.

Table HS3-10. Highest SEL at Representative Noise-Sensitive Locations near Homestead ARB Under Baseline and AFRC F-35A Mission Conditions

Scenario	Point of Interest			Operation with the Highest SEL					SEL (dB)[a,b]
	Type	ID	Description	Aircraft Group	Aircraft	Operation Type	Annual Operations at this SEL: 7:00 A.M. to 10:00 P.M.	Annual Operations at this SEL: 10:00 P.M. to 7:00 A.M.	
Baseline	Park[c]	P01	Biscayne National Park Offshore	B	F-16C	Departure	4,414	0	95
		P02	Everglades National Park Ernest F. Coe Visitor Center	B	F-15E	Arrival	62	7	93
		P03	Biscayne Bay Visitor Center	B	F-15E	Departure	2	0	88
		P04	Audubon Park	B	F-15E	Arrival	32	4	93
		P05	Cutler Ridge Park	B	F-15E	Arrival	1	0	88
	Residential	R01	Verde Gardens	B	F-15E	Departure	61	6	101
	School[c]	S01	Mandarin Lakes K-8 Academy	B	F-15E	Departure	61	6	100
		S02	De La Salle Education Center	T	F/A-18A/C	Departure	3	0	106
		S03	Keys Gate Charter School	T	F/A-18A/C	Arrival	52	3	110
		S04	The Charter School at Waterstone	B	F-16C	Arrival	19	0	100
		S05	Miami Arts Charter School	T	F/A-18A/C	Arrival	52	3	98

Table HS3-10. Highest SEL at Representative Noise-Sensitive Locations near Homestead ARB Under Baseline and AFRC F-35A Mission Conditions (Continued)

Scenario	Point of Interest			Operation with the Highest SEL					SEL (dB)[a,b]
	Type	ID	Description	Aircraft Group	Aircraft	Operation Type	Annual Operations at this SEL: 7:00 A.M. to 10:00 P.M.	Annual Operations at this SEL: 10:00 P.M. to 7:00 A.M.	
AFRC F-35A Mission[d]	Park[c]	P01	Biscayne National Park Offshore	B	F-35A	Departure	4,400	0	95
		P02	Everglades National Park Ernest F. Coe Visitor Center	B	F-15E	Arrival	62	7	93
		P03	Biscayne Bay Visitor Center	B	F-35A	Departure	4400	0	92
		P04	Audubon Park	B	F-15E	Arrival	32	4	93
		P05	Cutler Ridge Park	B	F-15E	Arrival	1	0	88
	Residential	R01	Verde Gardens	B	F-15E	Departure	61	6	101
	School[c]	S01	Mandarin Lakes K-8 Academy	B	F-15E	Departure	61	6	100
		S02	De La Salle Education Center	T	F/A-18A/C	Departure	3	0	106
		S03	Keys Gate Charter School	T	F/A-18A/C	Arrival	52	3	110
		S04	The Charter School at Waterstone	B	F-15E	Departure	30	3	99
		S05	Miami Arts Charter School	T	F/A-18A/C	Arrival	52	3	98

[a] SELs were calculated using NOISEMAP Version 7.3 and the same operational data (e.g., flight tracks and flight profiles) used to calculate the DNL contours.
[b] SEL accounts for the maximum sound level and the length of time a sound lasts by compressing the total sound exposure for an entire event into a single second.
[c] Parks and schools listed in this table serve as representative geographic areas by which surrounding neighborhoods can estimate their potential noise exposure. None of the above-listed parks or schools are open from 10:00 P.M. to 7:00 A.M.
[d] Military power and afterburner power departure SELs at the noise-sensitive locations are within 1 dB of each other and the numbers of annual operations include all three afterburner scenarios.
Key: B = Based aircraft; T = Transient or non-Homestead ARB aircraft involved in training exercise

Figure HS3-2 shows the DNL contours in 5-dB increments that would result from Scenario A overlain on the baseline noise contours for comparison. Much of the 2,926 acres that would be newly exposed to DNL of 65 dB or greater consists of agricultural land or open space, and the estimated number of off-base residents exposed to DNL of 65 dB or greater would increase from zero to 62 (Table HS3-11). No residents would be exposed to DNL greater than 69 dB. As described in Chapter 3, Section 3.2.3, the affected population was estimated based on U.S. Census data at the Block Group (BG) level with adjustments to remove non-residential areas from calculations.

Table HS3-11. Off-Base Acres and Estimated Population Exposed to DNL of 65 dB or Greater from Scenario A at Homestead ARB

DNL (dB)	Acres			Estimated Population[a]		
	Baseline	Scenario A	Change[b]	Baseline	Scenario A	Change[b]
65 – 69	1,156	2,865	1,709	0	62	62
70 – 74	437	1,298	861	0	0	0
75 – 79	86	414	328	0	0	0
80 – 84	12	40	28	0	0	0
≥85	1	1	0	0	0	0
Total	**1,692**	**4,618**	**2,926**	**0**	**62**	**62**

[a] All of the estimated population affected by DNL greater than 65 dB are located at the South Dade Center (S02).
[b] Change equals the difference between baseline acreage and acres exposed to noise resulting from implementation of the AFRC F-35A mission.

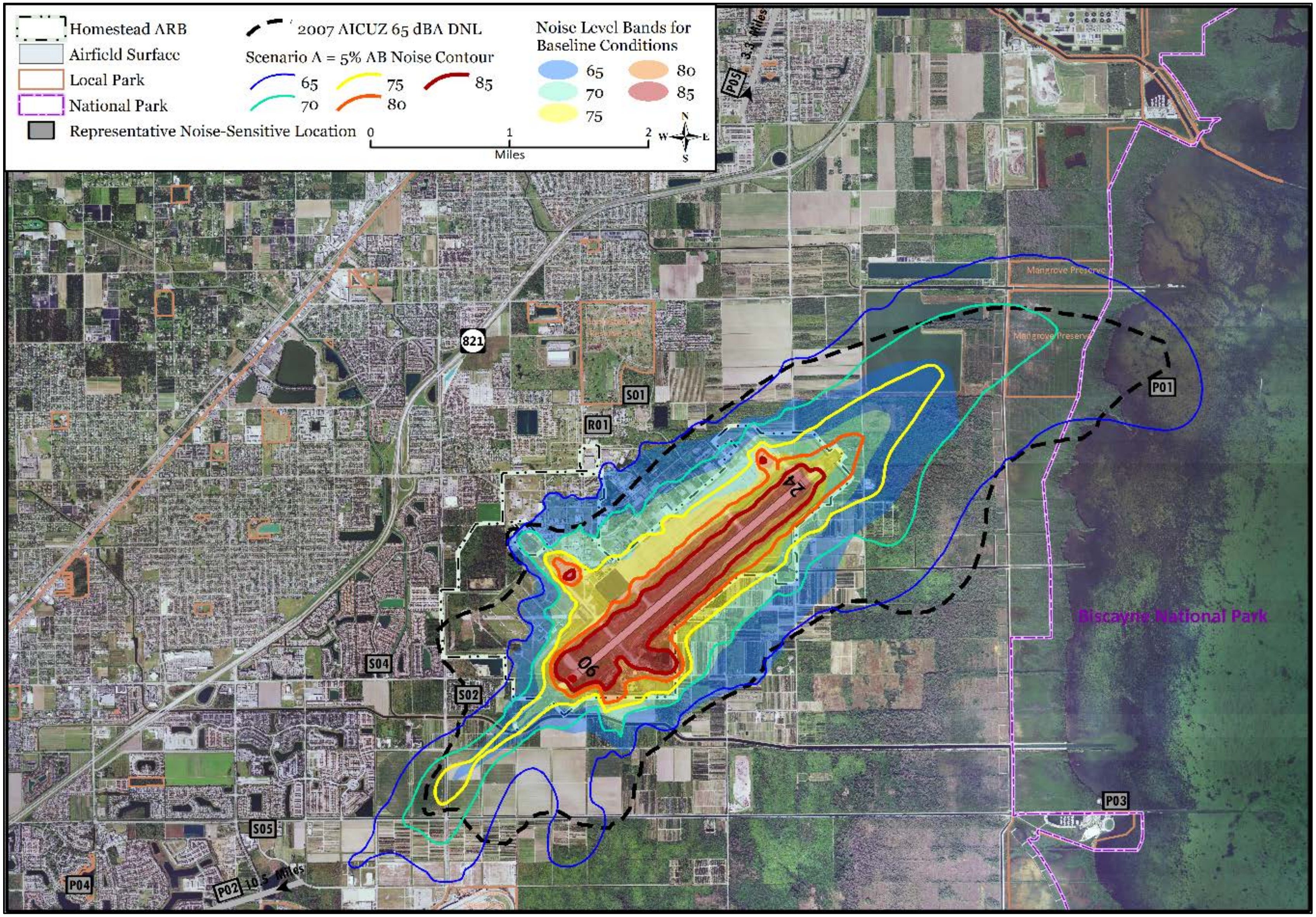

Figure HS3-2. AFRC F-35A Scenario A DNL Contours at Homestead ARB

As noted in Chapter 3, Section 3.2.3, the probability that an individual will become annoyed by noise is impossible to predict with confidence because of differing physical and emotional variables between individuals (Newman and Beattie 1985). These variables include, but are not limited to, the person's feeling about the necessity or preventability of the noise, the person's attitude about the environment, and any feelings of fear the person might have about the noise source. It can be said with confidence that people in communities exposed to increased DNL would be more likely to become highly annoyed by the noise (Schultz 1978, Finegold et al. 1994, Meidema and Vos 1998). Studies conducted by Schultz in 1978 and Finegold et al. in 1994 indicated that approximately 12 percent of people exposed to DNL of 65 dB and 36 percent of people exposed to DNL of 75 dB could be expected to be highly annoyed by the noise (Schultz 1978, Finegold et al. 1994). More recent studies suggest that the percentage of people highly annoyed by noise–and aircraft noise in particular–might be higher than previously thought. A study conducted by Meidema and Vos in 1998 indicated that 28 percent of people could be expected to be annoyed by DNL of 65 dB, and 48 percent of people could be expected to be highly annoyed by DNL of 75 dB (Meidema and Vos 1998). Additional details on the prevalence of annoyance in high noise communities are contained in Volume II, Appendix B.

USAF land use compatibility guidelines classify residential land uses as incompatible with DNL greater than 65 dB unless the residences meet minimum structural noise reduction goals. Residential land uses are considered to be compatible if measures are incorporated which achieve outdoor-to-indoor noise level reduction of at least 25 dB in areas exposed to DNL of 65 to 69 dB. Structural elements with better-than-average temperature insulation properties (e.g., double-paned windows) tend to also provide better-than-average noise level reduction. A more detailed discussion of land use compatibility is contained in Section HS3.8.

The DNL changes that would result from the implementation of Scenario A are shown in Table HS3-12. Noise levels at non-residential locations listed are similar to noise levels in any nearby residential areas. The DNL at Biscayne National Park Offshore would increase by 10 dB to 67 dB. The DNL at Audubon Park would increase by 8 dB. The DNL at the Biscayne Bay Visitor Center and Keys Gate Charter School would increase by 4 dB. DNL at the De La Salle Education Center and Miami Arts Charter School would increase by 3 dB. The DNL at the Verde Gardens residential area and Charter School at Waterstone would increase by 1 dB. The whole number DNL at the Everglades National Park Visitor Center, Cutler Ridge Park, and Mandarin Lakes K-8 Academy would not increase.

Table HS3-12. DNL at Representative Noise-Sensitive Locations near Homestead ARB under Baseline and Scenario A Conditions

Type	ID	Description	DNL (dB)		
			Baseline	Scenario A	Change
Park	P01	Biscayne National Park Offshore	57	67	10
	P02	Everglades National Park Ernest F. Coe Visitor Center	<45	<45	0
	P03	Biscayne Bay Visitor Center	50	54	4
	P04	Audubon Park	<45	51	8
	P05	Cutler Ridge Park	<45	<45	0
Residential	R01	Verde Gardens	62	63	1
School	S01	Mandarin Lakes K-8 Academy	60	60	0
	S02	De La Salle Education Center	60	63	3
	S03	Keys Gate Charter School	58	62	4
	S04	The Charter School at Waterstone	54	55	1
	S05	Miami Arts Charter School	51	54	3

HS3.2.2.1.2 Scenario B

The only difference between Scenario B and Scenario A is that 50 percent rather than 5 percent of departures would be conducted using afterburner power.

The flight procedures used by F-35A aircraft would be the same under Scenario B as Scenario A, and there would be no difference in the highest SEL experienced at representative noise-sensitive locations (see Table HS3-10). The noise levels generated by afterburner and military power departures would differ by less than 1 dB, and the numbers of annual operations in Table HS3-10 include all three afterburner scenarios.

As discussed in Section HS3.2.2.1.1, people exposed to increases in DNL are more likely to become highly annoyed by the noise, and some land uses are not considered compatible at DNL greater than 65 dB. The Scenario B 65 dB DNL contour is slightly larger than the Scenario A contour in areas to the right and left of the runway but slightly smaller in areas farther out along departure flight paths (Figure HS3-3). The DNL contours are shown in 5-dB intervals ranging from 65 to 85 dB on Figure B-23 in Appendix B, Section B.4. Differences in DNL under Scenarios A and B reflect the separate areas in which afterburner power departures are louder than or less loud than military power departures. Much of the land area exposed to DNL greater than 65 dB under Scenario B but not under Scenario A is open or agricultural. Implementation of Scenario B would expose and additional 3,088 acres to DNL of 65 dB or greater (162 more acres than Scenario A), and an estimated 17 additional people would be exposed to these noise levels (see Table HS3-13). As was the case under Scenario A, no people would be exposed to DNL greater than 69 dB.

Table HS3-13. Off-Base Acres and Estimated Population Exposed to DNL of 65 dB or Greater from Scenario B at Homestead ARB

DNL (dB)	Acres			Estimated Population[a]		
	Baseline	Scenario B	Change[b]	Baseline	Scenario B	Change[b]
65 – 69	1,156	2,901	1,745	0	79	79
70 – 74	437	1,364	927	0	0	0
75 – 79	86	459	373	0	0	0
80 – 84	12	55	43	0	0	0
≥85	1	1	0	0	0	0
Total	**1,692**	**4,780**	**3,088**	**0**	**79**	**79**

[a] All of the estimated population affected by DNL greater than 65 dB are located at the South Dade Center (S02).
[b] Change equals the difference between baseline acreage and acres exposed to noise resulting from the AFRC F-35A mission.

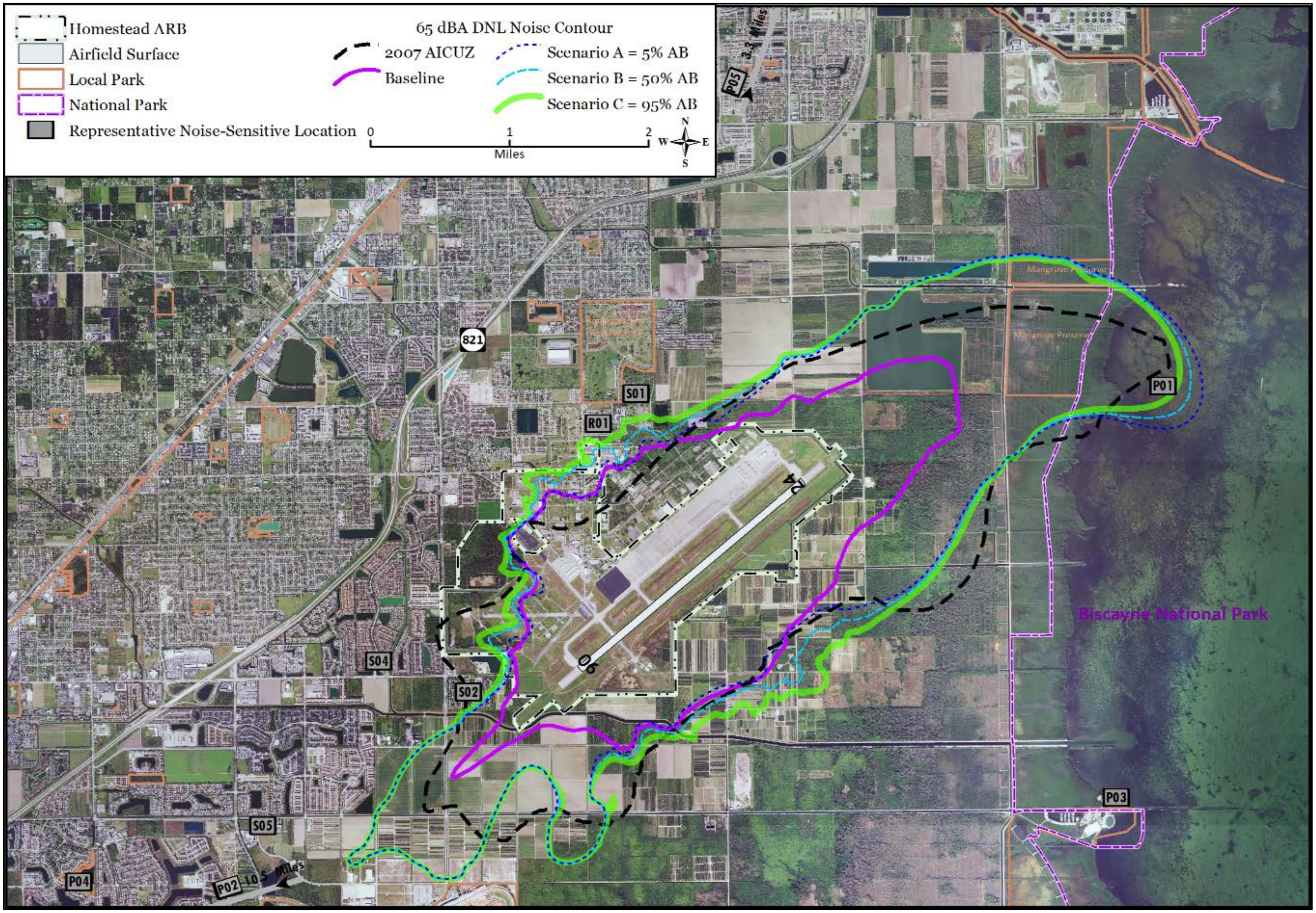

Figure HS3-3. AFRC F-35A Mission 65 dB DNL Contours (Scenarios A, B, and C) at Homestead ARB

Table HS3-14 lists changes in DNL under Scenario B. The DNL at Biscayne National Park Offshore would decrease by 1 dB relative to Scenario A while the DNL at Verde Gardens residential area and the Mandarin Lakes K-8 Academy would be 1 dB higher than under Scenario A.

Table HS3-14. DNL at Representative Noise-Sensitive Locations near Homestead ARB under Baseline and Scenario B Conditions

Type	ID	Description	DNL (dB)		
			Baseline	Scenario B	Change
Park	P01	Biscayne National Park Offshore	57	66	9
	P02	Everglades National Park Ernest F. Coe Visitor Center	<45	<45	0
	P03	Biscayne Bay Visitor Center	50	54	4
	P04	Audubon Park	<45	51	8
	P05	Cutler Ridge Park	<45	<45	0
Residential	R01	Verde Gardens	62	64	2
School	S01	Mandarin Lakes K-8 Academy	60	61	1
	S02	De La Salle Education Center	60	63	3
	S03	Keys Gate Charter School	58	62	4
	S04	The Charter School at Waterstone	54	55	1
	S05	Miami Arts Charter School	51	54	3

HS3.2.2.1.3 Scenario C

Under Scenario C, 95 percent of F-35A departures would be conducted using afterburner power, but all other aspects of the proposed AFRC F-35A mission would be identical to Scenarios A and B. There would be no difference between Scenarios A, B, and C in the highest SEL experienced at representative noise-sensitive locations (see Table HS3-10).

As discussed in Section HS3.2.2.1.1, people exposed to increases in DNL are more likely to become highly annoyed by the noise, and some land uses are not considered compatible at DNL greater than 65 dB. Noise levels, as measured in DNL, would be slightly higher to the right and left of the runway under Scenario C than Scenarios A or B, but would not be as high off the ends of the runway along the departure flight paths. These relative differences in noise levels are reflected in the locations of the 65 dB DNL contours shown on Figure HS3-3. The DNL contours are shown in 5-dB intervals ranging from 65 to 85 dB on Figure B-24 in Appendix B, Section B.4. Implementation of Scenario C would expose an additional 3,263 acres and an estimated 104 people to DNL of 65 dB or greater (Table HS3-15). Because a large fraction of the land encompassed by the Scenario C 65 dB DNL contour would be open or agricultural, the estimated population exposed to this level of noise would increase by 42 while the affected land area would increase by 337 acres relative to Scenario A.

Table HS3-15. Off-Base Acres and Estimated Population Exposed to DNL of 65 dB or Greater from Scenario C at Homestead ARB

DNL (dB)	Acres			Estimated Population[a]		
	Baseline	Scenario C	Change[b]	Baseline	Scenario C	Change[b]
65 – 69	1,156	2,968	1,812	0	104	104
70 – 74	437	1,413	976	0	0	0
75 – 79	86	503	417	0	0	0
80 – 84	12	70	58	0	0	0
≥85	1	1	0	0	0	0
Total	**1,692**	**4,955**	**3,263**	**0**	**104**	**104**

[a] All of the estimated population affected by DNL greater than 65 dB are located at the South Dade Center (S02).
[b] Change equals the difference between baseline acreage and acres exposed to noise resulting from the AFRC F-35A mission.

Table HS3-16 presents changes in DNL under Scenario C. The DNL at Biscayne National Park Offshore would be 1 dB lower than under Scenario B, while the DNL at the Verde gardens residential area, Mandarin Lakes K-8 Academy, and De La Salle Education center would be 1 dB higher than under Scenario B. Noise level increases at the other locations would be the same as under Scenario B.

Table HS3-16. DNL at Representative Noise-Sensitive Locations near Homestead ARB under Baseline and Scenario C Conditions

Type	ID	Description	DNL (dB)		
			Baseline	Scenario C	Change
Park	P01	Biscayne National Park Offshore	57	65	8
	P02	Everglades National Park Ernest F. Coe Visitor Center	<45	<45	0
	P03	Biscayne Bay Visitor Center	50	54	4
	P04	Audubon Park	<45	51	8
	P05	Cutler Ridge Park	<45	<45	0
Residential	R01	Verde Gardens	62	65	3
School	S01	Mandarin Lakes K-8 Academy	60	62	2
	S02	De La Salle Education Center	60	64	4
	S03	Keys Gate Charter School	58	62	4
	S04	The Charter School at Waterstone	54	55	1
	S05	Miami Arts Charter School	51	54	3

HS3.2.2.2 Speech Interference

HS3.2.2.2.1 Scenario A

The number of daytime (7:00 A.M. to 10:00 A.M.) events per hour that could potentially interfere with speech are listed in Table HS3-17. Calculations with windows closed and with windows open assume standard values of 25 dB and 15 dB of noise attenuation provided by buildings, respectively. Noise levels at non-residential locations listed are similar to noise levels in nearby residential areas. The number of indoor events per hour with windows open, indoor events with windows closed, and outdoor events would increase by one event or less. Any increases in the frequency of disruptions in communication have a high likelihood of being annoying.

Table HS3-17. Potential Speech Interference Resulting from Scenario A at Homestead ARB

Type	ID	Description	Annual Average Daily Indoor Daytime Events per Hour (7:00 A.M. to 10:00 P.M.)					
			Scenario A			Change		
			Windows Open[a]	Windows Closed[a]	Outdoor	Windows Open[a]	Windows Closed[a]	Outdoor
Park	P01	Biscayne National Park Offshore	1	1	3	0	0	0
	P02	Everglades National Park Ernest F. Coe Visitor Center	0	0	0	0	0	0
	P03	Biscayne Bay Visitor Center	1	1	3	0	1	1
	P04	Audubon Park	1	0	3	0	0	0
	P05	Cutler Ridge Park	0	0	2	0	0	1
Residential	R01	Verde Gardens	2	1	4	1	0	1

[a] Number of events per average hour with an indoor L_{max} of 50 dB; assumes standard values of 15 dB and 25 dB noise level reductions for windows open and closed, respectively.

The average number of potential speech interference events per hour would be the same under Scenario B as under Scenario A. Under Scenario C, the average number of potential speech interference events per hour would be the same as under Scenarios A and B except at Audubon Park, where it would be two rather than one.

HS3.2.2.3 Interference with Classroom Learning

HS3.2.2.3.1 Scenario A

Table HS3-18 presents changes in classroom noise levels with windows open and closed. As described in Section HS3.2.1.3, indoor $L_{eq(SD)}$ currently exceed 40 dB at four of the five schools evaluated when windows are open. In accordance with DNWG recommendations, estimated interior $L_{eq(SD)}$ exceeding 40 dB was taken as an indication that ANSI criteria are being exceeded (DNWG 2013). No additional schools would be exposed to $L_{eq(SD)}$ greater than 40 dB when windows are open. With windows closed, indoor background $L_{eq(SD)}$ would not exceed recommended levels at any of the schools. The number of events per hour with potential to interrupt speech indoors with windows closed, indoors with windows open, and outdoors would increase by one event or less.

Table HS3-18. Indoor Classroom Learning Disruption Resulting from Scenario A at Homestead ARB

ID	Description	Scenario A					Change				
		Windows Open[a]		Windows Closed[a]		Outdoor	Windows Open[a]		Windows Closed[a]		Outdoor
		$L_{eq(SD)}$ (dB)	Events per Hour[b]	$L_{eq(SD)}$ (dB)	Events per Hour[b]	Events per Hour[c]	$L_{eq(SD)}$ (dB)	Events per Hour[b]	$L_{eq(SD)}$ (dB)	Events per Hour[b]	Events per Hour[c]
S01	Mandarin Lakes K-8 Academy	47	1	37	1	4	0	0	0	0	1
S02	De La Salle Education Center[d]	49	3	39	2	4	2	1	2	1	0
S03	Keys Gate Charter School	47	2	37	1	4	4	0	2	0	1
S04	The Charter School at Waterstone	40	2	<35	1	3	0	1	0	0	0
S05	Miami Arts Charter School	39	1	<35	1	3	3	0	0	1	0

[a] Assumes standard values of 15 dB and 25 dB noise level reductions for windows open and closed, respectively.
[b] Average number of events per hour at or above an indoor L_{max} of 50 dB during an average 8-hour school day (8:00 A.M. to 4:00 P.M.).
[c] Average number of outdoor events per hour at or above L_{max} of 50 dB during daytime (7:00 A.M. to 10:00 P.M.).
[d] The De La Salle Education Center is used for afterschool tutoring and nighttime adult education.

HS3.2.2.3.2 Scenario B

Changes in classroom noise levels with windows open and closed are listed in Table HS3-19. Schools that are not already exposed to $L_{eq(SD)}$ greater than 40 dB when windows are open under baseline conditions would not exceed this threshold under Scenario B. With windows closed, indoor background $L_{eq(SD)}$ would not exceed 40 dB at any of the schools. The number of events per hour with potential to interrupt speech indoors with windows closed, indoors with windows open, and outdoors would increase by one event or less.

Table HS3-19. Indoor Classroom Learning Disruption Resulting from Scenario B at Homestead ARB

ID	Description	Scenario B					Change				
		Windows Open[a]		Windows Closed[a]		Outdoor	Windows Open[a]		Windows Closed[a]		Outdoor
		$L_{eq(SD)}$ (dB)	Events per Hour[b]	$L_{eq(SD)}$ (dB)	Events per Hour[b]	Events per Hour[c]	$L_{eq(SD)}$ (dB)	Events per Hour[b]	$L_{eq(SD)}$ (dB)	Events per Hour[b]	Events per Hour[c]
S01	Mandarin Lakes K-8 Academy	48	1	38	1	4	1	0	1	0	1
S02	De La Salle Education Center[d]	49	3	39	2	4	3	1	3	1	0
S03	Keys Gate Charter School	47	2	37	1	4	4	0	2	0	1
S04	The Charter School at Waterstone	40	2	<35	1	3	1	1	0	0	0
S05	Miami Arts Charter School	39	2	<35	1	3	3	1	0	1	0

[a] Assumes standard values of 15 dB and 25 dB noise level reductions for windows open and closed, respectively.
[b] Average number of events per hour at or above an indoor L_{max} of 50 dB during an average 8-hour school day (8:00 A.M. to 4:00 P.M.).
[c] Average number of outdoor events per hour at or above L_{max} of 50 dB during daytime (7:00 A.M. to 10:00 P.M.).
[d] The De La Salle Education Center is used for afterschool tutoring and nighttime adult education.

HS3.2.2.3.3 Scenario C

Table HS3-20 shows changes in classroom noise levels under Scenario C. The $L_{eq(SD)}$ with windows open would increase by up to 4 dB, but would not exceed 40 dB at any school not already exposed to greater than 40 dB $L_{eq(SD)}$ under baseline conditions. With windows closed, the $L_{eq(SD)}$ at all five schools would remain below 40 dB. The number of events per hour with potential to interfere with speech would increase by one or less at all of the schools studied with windows open or closed.

Table HS3-20. Indoor Classroom Learning Disruption Resulting from Scenario C at Homestead ARB

ID	Description	Scenario C					Change				
		Windows Open[a]		Windows Closed[a]		Outdoor	Windows Open[a]		Windows Closed[a]		Outdoor
		$L_{eq(SD)}$ (dB)	Events per Hour[b]	$L_{eq(SD)}$ (dB)	Events per Hour[b]	Events per Hour[c]	$L_{eq(SD)}$ (dB)	Events per Hour[b]	$L_{eq(SD)}$ (dB)	Events per Hour[b]	Events per Hour[c]
S01	Mandarin Lakes K-8 Academy	49	1	39	1	4	2	0	2	0	1
S02	De La Salle Education Center[d]	49	3	39	2	4	3	1	3	1	0
S03	Keys Gate Charter School	47	2	37	1	4	4	0	2	0	1
S04	The Charter School at Waterstone	41	2	<35	1	3	1	1	0	0	0
S05	Miami Arts Charter School	39	2	<35	1	3	3	1	0	1	0

[a] Assumes standard values of 15 dB and 25 dB noise level reductions for windows open and closed, respectively.
[b] Average number of events per hour at or above an indoor L_{max} of 50 dB during an average 8-hour school day (8:00 A.M. to 4:00 P.M.).
[c] Average number of outdoor events per hour at or above L_{max} of 50 dB during daytime (7:00 A.M. to 10:00 P.M.).
[d] The De La Salle Education Center is used for afterschool tutoring and nighttime adult education.

HS3.2.2.4 Sleep Disturbance

As noted in Chapter 3, Section 3.2.3, the probability of sleep being disturbed at least once per night is estimated based on the number of overflight events and the SEL of each event. Although AFRC F-35A pilots would continue to conduct only initial approaches between 10:00 P.M. and 7:00 A.M., the noise level generated by the approaches would be higher and the number of sorties would increase. The probability of awakening would increase by 1 percent or less at the locations studied and in any residential areas near the locations studied (Table HS3-21). Impacts to sleep disturbance resulting from implementation of the AFRC F-35A mission would be the same regardless of which afterburner scenario is selected. Results apply only to people who sleep during the night. People who sleep during the day would experience additional noise events, resulting in higher probabilities of awakening.

Table HS3-21. Average Probability of Awakening Resulting from the AFRC F-35A Mission at Homestead ARB

Type	ID	Description	Annual Average Nightly (10:00 P.M. to 7:00 A.M.) Probability of Awakening (%)			
			AFRC F-35A Mission		Change	
			Windows Open[a]	Windows Closed[a]	Windows Open[a]	Windows Closed[a]
Park[b]	P01	Biscayne National Park Offshore	3	1	0	0
	P02	Everglades National Park Ernest F. Coe Visitor Center	0	0	0	0
	P03	Biscayne Bay Visitor Center	3	1	1	0
	P04	Audubon Park	2	1	1	1
	P05	Cutler Ridge Park	1	0	1	0
Residential	R01	Verde Gardens	5	1	1	0
School[b]	S01	Mandarin Lakes K-8 Academy	4	1	1	0
	S02	De La Salle Education Center	7	3	1	0
	S03	Keys Gate Charter School	5	2	1	1
	S04	The Charter School at Waterstone	4	2	2	1
	S05	Miami Arts Charter School	4	2	1	1

[a] Assumes standard values of 15 dB and 25 dB noise level reductions for windows open and closed, respectively.
[b] Parks and schools listed in this table serve as representative geographic areas by which surrounding neighborhoods can estimate their potential noise exposure. None of the above-listed parks or schools are open from 10:00 P.M. to 7:00 A.M.

HS3.2.2.5 Potential for Hearing Loss

Implementation of the AFRC-F-35A mission (with any of the three afterburner scenarios selected) would not expose any on-base or off-base residences to DNL greater than 80 dB. Therefore, PHL would not result from implementation of the AFRC F-35A mission.

HS3.2.2.6 Occupational Noise

USAF occupational noise exposure prevention procedures (e.g., hearing protection and monitoring) would be implemented under the AFRC F-35A mission, regardless of which afterburner scenario is selected. These procedures would comply with all applicable OSHA and USAF occupational noise exposure regulations.

HS3.2.2.7 Non-auditory Health Impacts

As noted in Section HS3.2.1.7, the current state of scientific knowledge does not yet support a consistent causal relationship between exposure to aircraft noise and non-auditory health impacts (i.e., impacts other than hearing loss). Several types of potential health impacts have been investigated in multiple studies with contradictory results (Meecham and Shaw 1979; Frerichs et al. 1980; Jones and Tauscher 1978; Edmonds et al. 1979). The premise of the studies is that annoyance causes stress, and prolonged stress is known to be a contributor to a number of health disorders. The connection from annoyance to stress to health issues requires careful experimental design, and the resulting data are subject to different interpretations. A recent, large-scale study indicated that nighttime aircraft noise could be linked to increases in the likelihood of hypertension (Jarup et al. 2005, 2008). However, extensive reviews of recent literature conducted by several groups support the conclusion that it is not yet possible to establish a quantitative cause and effect based on the currently available scientific evidence (Basner et al. 2017; FICAN 2018; van Kempen et al. 2018).

HS3.2.2.8 Structural Damage

Damage to structures is not anticipated to result from AFRC F-35A subsonic noise because noise resulting from implementation of the AFRC F-35A mission would not exceed 130 dB in any 1/3-octave frequency band at distances of greater than 250 feet (CHABA 1977).

Furthermore, studies conducted on vibrations induced by subsonic aircraft overflights generating noise levels similar to those that result from operation of the F-35A in ancient Anasazi ruins indicate that vibrations would not occur at or near potentially damaging levels (Battis 1983). Additional discussion of the effects of noise on cultural resources is contained in Section HS3.7. Noise-induced structural vibration and secondary vibrations (i.e., “rattle”) of objects in structures would continue to occur. Induced vibrations do not normally result in structural damage, but the rattling of objects does have the potential to contribute to annoyance. Although the risk posed to structures by noise would be minimal, a process exists for dealing with any such damage. Any claims from USAF-related damage would begin by contacting the Homestead ARB Public Affairs Office with details of the claim. The USAF would then investigate the claim to establish the exact nature and extent of the damage.

HS3.2.2.9 Animals in the Care of Humans

The reactions of animals in the care of humans (e.g., pets, other domesticated animals, and animals kept in zoos) to an increased number of loud overflight events was a concern raised in several scoping comments. An animal’s reaction to noise depends on several factors including the animal’s temperament, training, and past experiences associated with the noise. Certain domesticated animal species (e.g., horses) are more likely to have strong reactions to noise than others. Potential noise impacts on wildlife are described in Section HS3.6.

In the airfield environment, aircraft typically operate at slower speeds than are used in training airspace. Although these slower speeds mean that elevated overflight sound levels last longer, they also mean that there is a time lag between when the aircraft is first heard and maximum overflight noise level. Sounds with slow rise-times are less likely to induce panic than sudden onset noise (USAF 1994). Because F-35 and F-16 aircraft operate at similar speeds in the airfield environment, the rise times of noise generated by the two aircraft are similar.

One of the most important factors affecting an animal’s reaction to noise is the level of familiarity with the noise source. As described in Section HS2.0, the replacement of F-16 aircraft with F-35A aircraft would occur over approximately 2 years, and the tempo of F-35A operations would increase slowly as the new airframe gets established at the base. Around the base, AFRC F-35A pilots would use similar flight paths and altitudes to those currently used by F-16 pilots. For the purposes of this analysis, all noise impacts show the full impact of 24 aircraft. Because the reactions of domestic animals depends on several factors (e.g., species, situation, predisposition), there is no single noise level below which animals will never react negatively to noise. However, if it is assumed that noise events with the potential to interfere with human conversation could also be bothersome to animals, then the number of noise events per hour with potential to interfere with speech (Table HS3-17) could be an indicator of how frequently animals could be bothered by noise. It is recognized that this metric of noise events per hour with potential to interfere with speech is an arbitrary metric for determining how frequently animals would be bothered by noise. The metric is used purely as a measure of relative change between the No Action Alternative and proposed action.

HS3.2.3 Airspace Affected Environment

This section presents noise levels in training airspace and ranges that would be used by AFRC F-35A pilots. As described in Section HS2.4.1, Homestead ARB-based AFRC F-35A pilots would operate in existing MOAs, RAs, Warning Areas and ATCAAs performing combat training missions similar to those currently conducted by Homestead ARB-based F-16 pilots. The noise analysis accounts for subsonic and supersonic flight noise generated in locations where supersonic flight is authorized. As noted in Chapter 3, Section 3.2.1.1, subsonic noise in training airspace is quantified using the onset-rate adjusted day-night average sound level (L_{dnmr}). Supersonic noise levels were not quantified for AFRC F-35A pilots operating from Homestead ARB because supersonic operations would only occur offshore and over water. The location, types and number of munitions used during AFRC F-35A training would be similar to that used during F-16 training. Therefore, munitions noise levels would remain approximately the same as under baseline conditions.

HS3.2.3.1 Subsonic Noise

Figure HS3-4 shows baseline subsonic noise levels beneath airspace proposed for use by AFRC F-35A pilots from Homestead ARB. L_{dnmr} beneath the MOAs and RAs within the Region of Influence (ROI) ranges from less than 45 to 55 dB. Noise generated by training in offshore Warning Areas affects primarily transient receptors (i.e., people on boats). Therefore, long-term, time-averaged noise levels were not calculated for Warning Areas.

HS3.2.3.2 Supersonic Noise

Supersonic flight would only be conducted in areas authorized for supersonic activities. Designated supersonic areas are W-174A through G and W-465A/B. Sonic booms could affect fishermen and other people on the water beneath the training airspace while supersonic training is underway. However, impacts to transient receptors such as these would be isolated and momentary. Long-term supersonic noise levels were not calculated for Warning Areas.

Restrictions on supersonic flight in W-174B that are recorded in the air operations manual for Naval Air Station (NAS) Key West ensure that sonic booms generated do not pose any risk to Fort Jefferson. The restrictions disallow supersonic flight within 12 NM of the Fort unless the aircraft is flying straight and level at greater than 20,000 feet MSL. A study conducted in 2009 found that there was no risk of structural damage associated with sonic booms generated at these distances and flight conditions (Blue Ridge Research and Consulting 2009).

HS3.2.4 Airspace Environmental Consequences

HS3.2.4.1 Subsonic Noise

Changes in sortie tempo under the proposed action are discussed in Chapter 2, Section 2.3.4.1, and Section HS2.4.1. Late-night training (10:00 P.M. to 7:00 A.M.) by AFRC F-35A pilots would only be conducted in rare contingencies and special mission training. Individual overflight noise levels (SEL) generated by F-16 and F-35A aircraft are listed in Chapter 3, Table 3-4. As shown on Figure HS3-4, L_{dnmr} would increase by as much as 6 dB beneath training airspace.

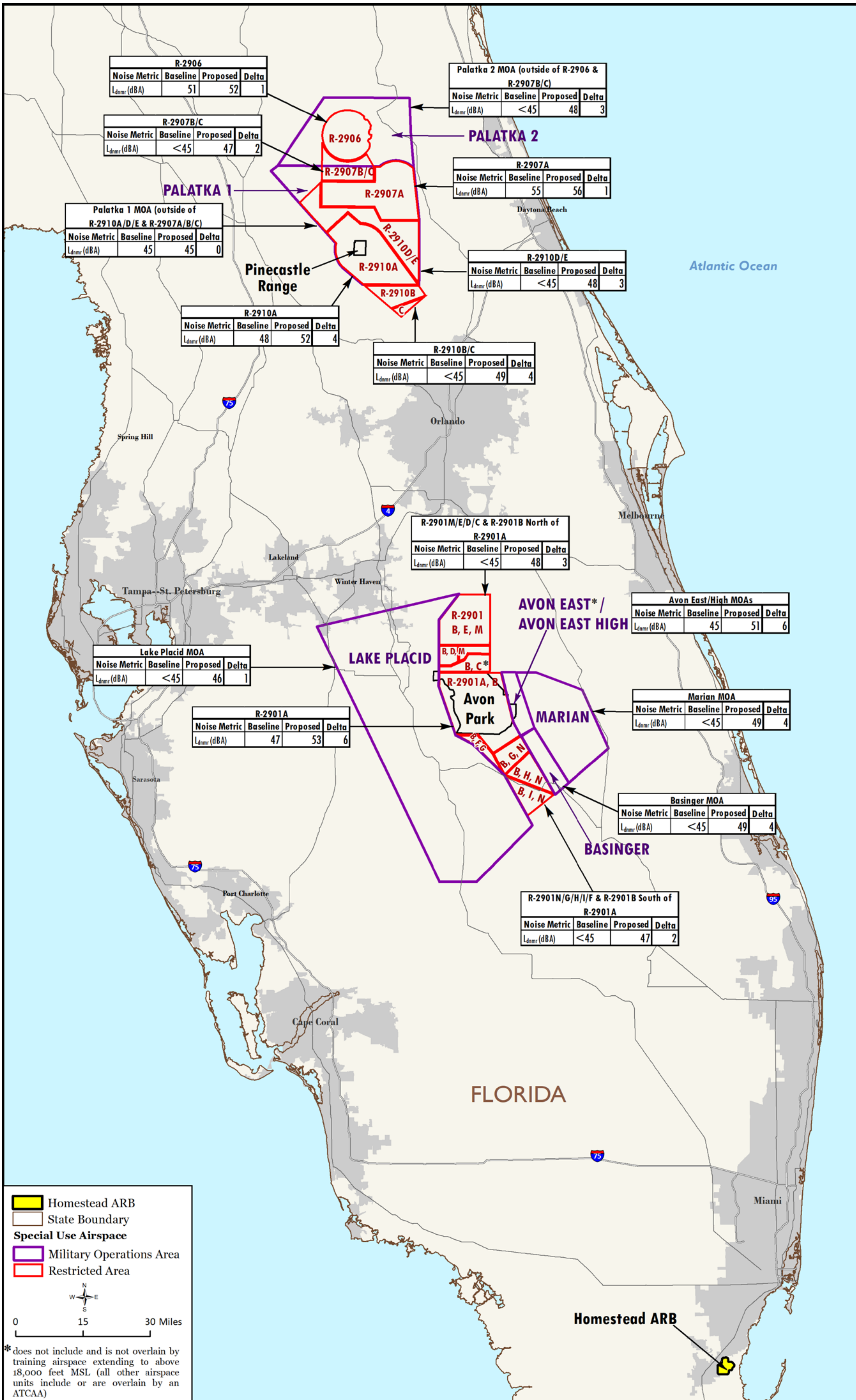

Figure HS3-4. Noise Levels in Training Airspace used by Homestead ARB Pilots

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Overflight noise events have the potential to interfere with activities. An increase in the number of loud events, as reflected in increased L_{dnmr}, would be expected to increase the percentage of the population that is highly annoyed by noise. The proposed AFRC F-35A training sorties would occur in several large training airspace areas. Because training operations would be spread over a very large area, overflights of any particular location would be infrequent. As shown in Table HS2-6, approximately 94 percent of F-35A training time is spent at altitudes above 10,000 feet MSL. Because training would occur across a very large area, and because most of the training would be at high altitudes, the loudest of the overflights (i.e., overhead at low altitudes) would be rare.

During scoping, several commenters expressed concerns about overflight noise while the aircraft are transiting from the airfield to and from the airspace proposed for use. Aircrews transiting from the installation to training airspace and back again typically use a set of existing prescribed routes. Actual ground tracks of transiting aircraft vary based on several factors, and non-standard routing can be used, as needed, in response to air traffic, weather, or other time-varying conditions. F-35A pilots would typically transit at high altitudes and in cruise configuration using lowered engine power settings to reduce noise impacts and improve fuel efficiency. In addition, flight at these altitudes allows the aircraft to arrive at the training airspace at an appropriate altitude to begin training. Single overflight event noise levels generated by F-35A aircraft in cruise configuration are listed in Chapter 3, Tables 3-3 and 3-4.

Although AFRC F-35A pilots would implement measures to reduce noise, the noise generated by transiting aircraft can be disturbing, particularly when overflight noise affects national parks and other noise-sensitive places where ambient noise levels are low. Detailed discussion of recreation impacts is contained in Section HS3.8.

HS3.2.4.2 Supersonic Noise

AFRC F-35A pilots would conduct supersonic training in offshore Warning Areas where supersonic flight is authorized. Sonic booms would primarily affect transient receptors (e.g., people in boats). Because a smaller percent of total training sorties would be conducted over water, the number of sonic booms would slightly decrease. Existing restrictions on flights near Fort Jefferson would continue to minimize the risk of damage to the Fort from sonic booms.

HS3.2.5 Summary of Noise Impacts

Implementation of the AFRC F-35A mission would expose an additional 2,962 acres, 3,088 acres, and 3,263 acres of off-installation land to DNL of 65 dB or greater, respectively, under Scenarios A, B and C. The estimated number of people exposed to DNL of 65 dB or greater would be 62 under Scenario A, 79 under Scenario B, and 104 under Scenario C, all of which would be located at the South Dade Center (S02). The Biscayne Bay Visitor Center would experience the highest SEL increase (from 88 to 92 dB) and a DNL increase from 50 to 54 dB under all three scenarios. The DNLs at Biscayne Bay National Park (Offshore) and at the Audubon Park would increase by 10 dB and 8 dB, respectively, under Scenario A. The increase in DNL at Biscayne Bay National Park (Offshore) would be 9 dB under Scenario B and 8 dB under Scenario C. The DNLs at four schools would increase by 1 to 4 dB but remain below 65 dB under Scenario A. Under Scenario B, all five schools studied would experience DNL increases of 1 to 4 dB, while still remaining below 65 dB. No residents would be exposed to DNL greater than 69 dB under any scenario.

Regarding noise under the airspace proposed for use, L_{dnmr} would not exceed 56 dB beneath all of the airspace proposed for use. Supersonic flight would only occur in offshore Warning Areas where supersonic flight is permitted. The number of sonic booms would decrease slightly.

Based on context and intensity, noise impacts to the area surrounding Homestead ARB and areas below the airspace and ranges proposed for use would be considered adverse but not significant.

HS3.3 AIR QUALITY

The proposed AFRC F-35A mission at Homestead ARB would result in net changes in air emissions due to the replacement of existing aircraft operations with operations from the proposed mission in the base region and associated airspace. The following section describes the air quality affected environment and estimates of impacts due to proposed construction and operational activities within these project regions.

HS3.3.1 Base Affected Environment

Air emissions resulting from implementation of the proposed AFRC F-35A mission at Homestead ARB would affect air quality within Miami-Dade County. The Florida Department of Environmental Protection (FDEP) Division of Air Resource Management has adopted the National Ambient Air Quality Standards (NAAQS) and promulgated state standards for the purposes of regulating criteria air pollutant levels within Florida. Table 3-6 in Chapter 3, Section 3.3, presents the NAAQS.

HS3.3.1.1 Region of Influence and Existing Air Quality

Identifying the ROI for air quality requires knowledge of the pollutant type, source emission rates, the proximity of project emission sources to other emission sources, and local and regional meteorology. For inert pollutants (such as carbon monoxide [CO] and particulates in the form of dust), the ROI is generally limited to a few miles downwind from a source. The ROI for reactive pollutants such as ozone (O_3) can extend much farther downwind than for inert pollutants. Ozone is formed in the atmosphere by photochemical reactions of previously emitted pollutants called precursors. Ozone precursors are mainly nitrogen oxides (NO_x) and photochemically reactive volatile organic compounds (VOCs). In the presence of solar radiation, the maximum effect of precursor emissions on O_3 levels usually occurs several hours after they are emitted and many miles from their source.

The USEPA designates all areas of the United States in terms of having air quality better (attainment) or worse (nonattainment) than the NAAQS. An area is in attainment of a NAAQS if its pollutant concentration remains below the standard value, as defined by the annual to tri-annual metrics described in Chapter 3, Section 3.3.1. Former nonattainment areas that have attained a NAAQS are designated as maintenance areas. Currently, Miami-Dade County is in attainment of the NAAQS for all pollutants (USEPA 2018a).

Homestead ARB is within 10 miles of the Everglades National Park pristine Class I area. Therefore, this EIS provides a qualitative analysis of the potential for projected emissions from aircraft operations to affect air quality within this area.

HS3.3.1.2 Regional Air Emissions

Table HS3-22 summarizes estimates of annual emissions generated by activities in Miami-Dade County for 2014. Emissions for Miami-Dade County were obtained from the National Emissions Inventory (NEI) process (USEPA 2018b). The majority of emissions within these regions occur from (1) on-road and nonroad mobile sources (VOCs, CO, NO_x, sulfur oxides [SO_x], and carbon dioxide equivalent [CO_2e]), (2) fuel combustion by industrial sources (SO_x), (3) solvent/surface coating usages (VOCs), and (4) combustion of biomass and dust from mining and paved/unpaved roads (particulate matter less than or equal to 10 micrometers in diameter [PM_{10}]/particulate matter less than or equal to 2.5 micrometers in diameter [$PM_{2.5}$]).

Table HS3-22. Annual Emissions for Miami-Dade County, Florida, 2014

Source Type	Air Pollutant Emissions (tons per year)						
	VOCs	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$	CO_2e (mt)
Stationary Sources	29,009	29,443	7,156	1,185	29,419	8,477	NA
Mobile Sources	23,053	296,522	42,094	2,457	3,572	2,015	12,444,531
Total Emissions[a]	**52,062**	**325,965**	**49,250**	**3,642**	**32,991**	**10,492**	**12,444,531**

[a] Calculated values and totals have been rounded; therefore, sum totals may not match the totals row.
Key: CO_2e (mt) = carbon dioxide equivalent in metric tons; NA = not available
Source: USEPA 2018b

HS3.3.1.3 Homestead ARB Emissions

The AFRC F-35A mission at Homestead ARB would replace activities associated with the 482 FW. This unit operates 24 F-16 aircraft at Homestead ARB. The proposed F-35A aircraft replacement action at Homestead ARB would primarily affect existing emissions from (1) F-16 operations, (2) F-16 engine maintenance and testing, and (3) Aerospace Ground Equipment (AGE). While the decrease of 91 personnel that would result from implementation of the AFRC F-35A mission at Homestead ARB would result in virtually inconsequential changes in emissions from other base sources associated with the 482 FW (e.g., onsite government motor vehicles or privately owned vehicles), those reductions have been calculated as part of the build-out emission calculations for the action. Nonetheless, the main focus of the air quality analysis remains emissions from existing and proposed aircraft-specific source categories to determine the net changes in emissions from the AFRC F-35A mission.

To estimate emissions from F-16 aircraft operations and AGE use associated with the 482 FW mission at Homestead ARB, the analysis employed the USAF Air Conformity Applicability Model (ACAM) version 5.0.13a (Solutio Environmental, Inc. 2019). Table HS3-23 summarizes the annual emissions estimated for the existing F-16 operations of the 482 FW. Volume II, Appendix C, presents details of the emission calculations presented in Table HS3-23. The net emissions change from the decrease of 91 personnel (e.g., emissions from government and privately owned vehicle miles traveled by those 91 personnel) were calculated as a net reduction in the build-out emission calculations for the action.

Table HS3-23. Annual Emissions of Existing 482 FW F-16 Operations at Homestead ARB

Activity Type	Air Pollutant Emissions (tons per year)						
	VOCs	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$	CO_2e (mt)
Flight Operations and Engine Trim Tests – F-16Cs	17.55	57.31	39.65	3.77	6.46	5.62	10,522
Aircraft Engine Test Cells – F-16C	0.23	0.46	1.22	0.08	0.13	0.12	224
Aerospace Ground Equipment	8.39	14.73	24.15	1.69	2.49	2.42	1,156
Total Emissions[a]	**26.17**	**72.50**	**65.03**	**5.54**	**9.08**	**8.15**	**11,902**

[a] Calculated values and totals have been rounded; therefore, sum totals may not match the totals row.
Key: CO_2e (mt) = carbon dioxide equivalent in metric tons

HS3.3.1.4 Regional Climate

Meteorological data collected at Homestead ARB are used to describe the climate of the Homestead ARB project region (Homestead ARB 2016a).

Temperature. Miami-Dade County is known for hot and humid summer months, and warm conditions during the winter. The average high and low temperatures during the summer months at Homestead ARB range from about 89 to 75 degrees Fahrenheit (°F). The average high and low temperatures during the winter months range from 78 to 60 °F.

Precipitation. Average annual precipitation for Homestead ARB is 58.4 inches. Annual precipitation in the region peaks in the summer months (June through September) due to persistent humid flow from the Atlantic and occasional tropical storms. The peak monthly average rainfall of 9.3 inches occurs in June. The region experiences thunderstorms on an average of 90 days per year. Winter is the driest season, as the lowest monthly average of 1.8 inches occurs in January. Snowfalls in the region are extremely rare.

Prevailing Winds. The annual average wind speed at Homestead ARB is 6.4 miles per hour. March through May is the windiest time of year, with monthly average speeds of approximately 9 miles per hour. However, the strongest instantaneous winds occur during the hurricane season (the core months of August through October) in association with tropical storms. From 1900 to 2010, 25 hurricanes have hit Miami-Dade County (National Hurricane Center 2018). The winds prevail from the east during each month of the year.

HS3.3.1.5 Applicable Regulations and Standards

The Division of Air Resource Management is responsible for enforcing air pollution regulations in Florida. The Division of Air Resource Management enforces the NAAQS by monitoring air quality and developing rules to regulate and to permit stationary sources of air emissions. The FDEP air quality regulations are found in Title 62 of the Florida Administrative Code.

HS3.3.2 Base Environmental Consequences

The air quality analysis estimated the magnitude of emissions that would result from construction and operation of the proposed AFRC F-35A mission at Homestead ARB. The estimation of operational impacts is based on the net change in emissions due to the replacement of existing F-16 aircraft operations with those of the proposed AFRC F-35A mission. Volume II, Appendix C, of this EIS presents the calculations used to estimate air pollutant emissions from proposed construction and operational sources at Homestead ARB.

The air quality analysis for the AFRC mission at Homestead ARB evaluates F-35A takeoff operations based on the three afterburner scenarios. Activity levels and resulting emissions for all other proposed operational activities would remain the same under each afterburner scenario. The area surrounding Homestead ARB within Miami-Dade County currently attains all of the NAAQS. Therefore, the analysis compares the annual net change in emissions to the 250 tons per year prevention of significant deterioration permitting threshold. The prevention of significant deterioration permitting threshold represents the level of potential new emissions below which a new or existing minor, non-listed, stationary source may acceptably emit without triggering the requirement to obtain a permit. Thus, if the intensity of any net emissions increase for a project alternative is below 250 tons per year in the context of an attainment criteria pollutant, the indication is the air quality impacts would be insignificant for that pollutant.

HS3.3.2.1 Construction

The AFRC F-35A mission at Homestead ARB would require C&D and/or renovation of airfield facilities such as training facilities and maintenance and storage facilities. Air quality impacts resulting from the proposed construction activities would occur from (1) combustive emissions due to the use of fossil fuel-powered equipment and (2) fugitive dust emissions (PM_{10}/$PM_{2.5}$) from the operation of equipment on exposed soil.

Construction activity data were developed to estimate construction equipment use and areas of disturbed ground due to the proposed mission. These data were used as inputs to ACAM, which was used to estimate air emissions from proposed construction activities at Homestead ARB. The air quality analysis assumed that all construction activities for the proposed AFRC F-35A mission would begin in 2021 and be completed in 2023.

Inclusion of standard construction practices and LEED Silver certification into proposed construction activities would potentially reduce fugitive dust emissions generated from the use of construction equipment on exposed soil by 50 percent from uncontrolled levels. Chapter 3, Section 3.3.3.1, of this EIS describes the standard construction practices that would control fugitive dust.

Table HS3-24 presents estimates of emissions from the infrastructure improvements for the AFRC F-35A mission at Homestead ARB. These data show that even if total construction emissions occurred in one year, the construction emissions would be well below the annual indicator thresholds. Therefore, temporary construction emissions associated with the proposed AFRC F-35A mission would not result in significant air quality impacts.

Table HS3-24. Total Construction Emissions from the AFRC F-35A Mission at Homestead ARB

Construction Activity	Air Pollutant Emissions (tons)						
	VOCs	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$	CO_2e (mt)
Demolish Buildings	0.01	0.10	0.08	0.00	0.04	0.00	18
Renovate/Construct Buildings	0.65	3.65	3.18	0.01	0.34	0.15	690
Total Emissions[a]	**0.66**	**3.75**	**3.26**	**0.01**	**0.38**	**0.15**	**708**
Annual Indicator Threshold	**250**	**250**	**250**	**250**	**250**	**250**	**NA**

[a] Calculated values and totals have been rounded; therefore, sum totals may not match the totals row.
Key: CO_2e (mt) = carbon dioxide equivalent in metric tons; NA = not applicable

HS3.3.2.2 Operations

The proposed AFRC F-35A mission at Homestead ARB would primarily generate air emissions from (1) F-35A aircraft operations, (2) F-35A engine maintenance and testing, and (3) AGE. The analysis also includes emissions that would occur from the net change in commuting activities between the proposed F-35A and existing F-16 missions at Homestead ARB. Because the mission would result in a net reduction of 91 personnel, this would produce a net reduction in emissions from commuting activities. To estimate emissions from the AFRC F-35A mission at Homestead ARB, the analysis employed the ACAM. The air quality analysis assumed that the proposed mission would reach full operations and resulting emissions in 2024 after the completion of all required infrastructure improvements.

The analysis of proposed aircraft operations is limited to operations that would occur within the lowest 3,000 feet of the atmosphere, as this is the typical depth of the atmospheric mixing layer, where the release of aircraft emissions would affect ground level pollutant concentrations. In general, aircraft emissions released above the mixing layer would not appreciably affect ground level air quality. During scoping, people submitted comments regarding the pollutant impacts that could result from implementation of the proposed AFRC F-35A mission. Table HS3-25 summarizes the annual operational emissions that would result from implementation of the proposed AFRC F-35A mission at Homestead ARB. The data in Table HS3-25 show that the replacement of existing F-16 aircraft operations with the proposed F-35A operations would result in increases in all pollutant emissions except VOCs for the three afterburner scenarios. The data in Table HS3-25 also show that scenario emissions would increase with increasing afterburner use rates. Implementation of Scenario C would result in the most emissions, but the emissions would increase by less than 6 percent for any criteria pollutant compared to Scenario A. These emission increases would not exceed any indicator threshold. Therefore, operational emissions associated with the proposed AFRC F-35A mission at Homestead ARB would not result in significant air quality impacts.

Table HS3-25. Projected Annual Emissions from AFRC F-35A Mission Operations at Homestead ARB, 2024 – All Afterburner Scenarios

Afterburner Scenario/Activity Type	Air Pollutant Emissions (tons per year)[a]						
	VOCs	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$	CO_2e (mt)
Scenario A							
Flight Operations and Engine Trim Tests – F-35A	0.14	60.41	53.16	5.87	9.37	8.42	16,252
Aircraft Engine Test Cells – F-35A	0.00	0.41	1.95	0.13	0.17	0.15	375
Aerospace Ground Equipment	8.20	14.39	23.60	1.65	2.43	2.36	1,130
Net Commuting Activities (F-35A - F-16 staff)	(0.16)	(1.87)	(0.13)	0.00	0.00	0.00	(153)
Total AFRC F-35A Mission Emissions	**8.18**	**73.34**	**78.58**	**7.65**	**11.98**	**10.93**	**17,603**
Existing 482 FW Emissions	**26.17**	**72.50**	**65.03**	**5.54**	**9.08**	**8.15**	**11,902**
AFRC F-35A Mission Minus 482 FW Emissions	**(17.99)**	**0.84**	**13.56**	**2.11**	**2.90**	**2.77**	**5,701**
Scenario B							
Total F-35A Mission Emissions	**8.18**	**75.47**	**79.00**	**7.76**	**12.07**	**11.03**	**17,560**
F-35A Mission Minus 482 FW Emissions	**(17.99)**	**2.97**	**13.98**	**2.22**	**2.99**	**2.87**	**5,658**
Scenario C							
Total F-35A Mission Emissions	**8.19**	**77.58**	**79.15**	**7.85**	**12.16**	**11.10**	**17,477**
F-35A Mission Minus 482 FW Emissions	**(17.98)**	**5.08**	**14.13**	**2.31**	**3.08**	**2.94**	**5,575**
Indicator Threshold	**250**	**250**	**250**	**250**	**250**	**250**	**NA**

[a] Calculated values and totals have been rounded; therefore, sum totals may not match the totals row.
Key: CO_2e (mt) = carbon dioxide equivalent in metric tons; NA = not applicable; ( ) = negative values and net reductions in emissions

The increases in CO, NO_x, SO_x, PM_{10}, $PM_{2.5}$, and CO_{2e} emissions that would result from implementation of the AFRC F-35A mission at Homestead ARB would have the potential to impact the Everglades National Park pristine Class I area. Emission increases generated by this mission would occur intermittently, primarily from mobile sources that would operate across the larger Homestead ARB flightline and runway and from ground level to a height of 3,000 feet in the atmosphere. These operational characteristics would substantially reduce the ambient concentrations of proposed emissions downwind of Homestead ARB. Homestead ARB is also at least 10 miles away from the nearest border of Everglades National Park. This travel distance from Homestead ARB would further dilute emissions generated by the AFRC F-35A mission to the point that they would not result in any appreciable increases in pollutant concentrations within this pristine Class I area. Therefore, the proposed AFRC F-35A mission at Homestead ARB would not result in significant air quality impacts to the Everglades National Park pristine Class I area.

HS3.3.3 Airspace Affected Environment

Projected AFRC F-35A aircraft operations in the airspace proposed for use and the flight routes between these locations and Homestead ARB would affect air quality in these portions of southern and central Florida and the nearby offshore waters. All of the regions below and adjacent to these areas currently attain all of the NAAQS.

HS3.3.4 Airspace Environmental Consequences

AFRC F-35A pilots operating from Homestead ARB would operate in the same airspace and training areas as existing 482 FW pilots, but at higher altitudes. The proposed AFRC F-35A operations in these areas would occur above 3,000 feet above ground level (AGL) approximately

99 percent of the time (Table HS2-6) and therefore these operations would not appreciably affect ground level air quality. Compared to existing 482 FW operations, F-16 operations occur below 3,000 feet AGL from 6 to 42 percent of the time, depending on the airspace. AFRC F-35A pilots would fly about 0.2 percent fewer sorties compared to existing 482 FW F-16 aircraft.

To quantify the air quality effects of the F-35A mission within the Homestead ARB airspaces and training areas, the analysis employed the ACAM to estimate the net change in emissions between the replacement of existing F-16 aircraft operations with proposed F-35A aircraft operations within these areas. The analysis used aircraft flight profiles developed by the project noise analyses as inputs to the ACAM. The analysis focused on operations within the lowest 3,000 feet of the atmosphere.

Table HS3-26 presents the annual operational emissions that would result from implementation of the F-35A mission within the Homestead ARB airspaces and training areas. These data show that the proposed changes in aircraft operations within these areas would result in net reductions in all air pollutant emissions within 3,000 feet AGL. Therefore, the proposed AFRC F-35A mission would result in a net improvement to ground level air quality in the airspace and training areas. This also would be the case for projected impacts within the Everglades National Park pristine Class I area. Therefore, implementing the proposed AFRC F-35A mission in existing airspaces and training areas would not result in significant air quality impacts.

Table HS3-26. Projected Annual Emissions from the AFRC F-35A Mission Operations within Homestead ARB Airspaces and Training Areas - 2024

Activity Type	Air Pollutant Emissions (tons per year)[a]						
	VOCs	**CO**	**NO_X**	**SO_X**	**PM_{10}**	**$PM_{2.5}$**	**CO_2e (mt)**
Existing 482 FW Flight Operations – F-16	(1.48)	(0.71)	(24.17)	(0.88)	(1.10)	(0.99)	(2,667)
AFRC Mission Flight Operations – F-35A	0.00	0.22	11.89	0.58	0.63	0.57	1,748
F-35A Mission Minus 482 FW Emissions	**(1.48)**	**(0.50)**	**(12.28)**	**(0.30)**	**(0.46)**	**(0.42)**	**(919)**
Indicator Threshold	**250**	**250**	**250**	**250**	**250**	**250**	**NA**

[a] Calculated values and totals have been rounded; therefore, sum totals may not match the totals row.
Key: CO_2e (mt) = carbon dioxide equivalent in metric tons; NA = not applicable; ( ) = negative values and net reductions in emissions

HS3.3.5 Summary of Impacts to Air Quality

Miami-Dade County is in attainment for all criteria pollutants. As shown in Table HS3-27, calendar year annual emissions from construction activities and the net change in aircraft operations around the base would not exceed indicator threshold levels. Emissions would decrease in training airspace. Impacts to air quality resulting from the AFRC F-35A mission would not be significant.

Table HS3-27. Summary of Calendar Year Annual Emissions from the AFRC F-35A Mission at Homestead ARB

Activity/Year	Air Pollutant Emissions (tons)						
	VOCs	**CO**	**NO_X**	**SO_X**	**PM_{10}**	**$PM_{2.5}$**	**CO_2e (mt)**
Construction – Year 2021	0.22	1.48	1.32	0.00	0.24	0.06	344
Construction – Year 2022	0.44	2.27	1.94	0.01	0.14	0.09	424
Construction – Year 2023	0.00	0.00	0.00	0.00	0.00	0.00	0
Net Change in Operations – Most Emissive Afterburner Scenario C – Year 2024+	**(17.98)**	**5.08**	**14.13**	**2.31**	**3.08**	**2.94**	**5,575**
Annual Indicator Threshold	**250**	**250**	**250**	**250**	**250**	**250**	**NA**

Key: CO_2e (mt) = carbon dioxide equivalent in metric tons; NA = not applicable; ( ) = negative values and net reductions in emissions.

HS3.4 SAFETY

Air Force Instruction (AFI) 90-801, *Environment, Safety, and Occupational Health Councils,* implements the risk management guidance within Air Force Policy Directive (AFPD) 90-8, *Environment, Safety, and Occupational Health Management and Risk Management*. All USAF missions and daily routines involve risk. Requirements outlined in this document provide for a process to maintain readiness in peacetime and achieve success in combat while safeguarding people and resources. The safety analysis contained in the following sections addresses issues related to the health and well-being of both military personnel and civilians living on or near Homestead ARB and under the training airspace.

Specifically, this section provides information on explosive safety; fire risk and management; hazards associated with aviation safety (Accident Potential Zones [APZs]); aircraft mishaps; and Bird/Wildlife Aircraft Strike Hazard [BASH]).

The FAA is responsible for ensuring safe and efficient use of U.S. airspace by military and civilian aircraft and for supporting national defense requirements. To fulfill these requirements, the FAA has established safety regulations, airspace management guidelines, a civil-military common system, and cooperative activities with the DoD. The primary safety concern with regard to military training flights is the potential for aircraft mishaps (i.e., crashes) to occur, which could be caused by mid-air collisions with other aircraft or objects, weather difficulties, mechanical failures, pilot error, or bird-aircraft strikes.

HS3.4.1 Base Affected Environment

HS3.4.1.1 Explosive Safety

Facilities/activities with explosive safety quantity-distance (ESQD) arcs at Homestead ARB include the munitions storage area, hot cargo pad, and the FANG mission. The ESQD arc near the proposed action area is shown on Figure HS2-1.

HS3.4.1.2 Fire Risk and Management

Day-to-day O&M activities conducted at the base are performed in accordance with applicable USAF safety regulations, published USAF Technical Orders (TOs), and standards prescribed by Air Force Occupational Safety and Health (AFOSH) requirements including AFI 91-202, *The US Air Force Mishap Prevention Program*. Aircraft Rescue Firefighting services are available on a 24-hour basis. Upon notification of an in-flight or ground emergency, the crash and rescue services personnel would coordinate emergency services.

The Homestead Fire Emergency Services Flight provides 24-hour crash, structural, and emergency medical first response; technical rescue; hazardous material and weapons-of-mass-destruction incident response; and fire prevention, safety, and training/education services to Homestead ARB. The base is equipped with two engine companies, three aircraft rescue and firefighting units, one 5,000-gallon water tanker, a portable mobile air unit, one rescue company, a confined space rescue trailer, and a hazardous materials response trailer. The Fire Emergency Services Flight also has a local mutual-aid and training agreement with the Miami-Dade County Fire Rescue Department.

Homestead ARB adheres to specific emergency-response procedures contained in TO 00-105E-9, *Aerospace Emergency Rescue and Mishap Response Information,* for aircraft mishaps involving composite materials (USAF 2018). TO 00-105E-9 contains a section (Chapter 3) on Mishap Composite Awareness.

HS3.4.1.3 Accident Potential Zones

In accordance with DoDI 4165.57, APZs are established at military airfields to delineate recommended compatible land uses for the protection of people and property on the ground. APZs define the areas of a military airfield that would have the highest potential to be affected if an aircraft mishap were to occur. Air Installations Compatible Use Zones (AICUZ) guidelines identify three types of APZs for airfields based on aircraft mishap patterns: the Clear Zone (CZ), APZ I, and APZ II. The standard USAF CZ for Class B runways such as Runway 06/24 at Homestead ARB is a rectangle area that extends 3,000 feet from the end of a runway, is 3,000 feet wide, and identifies the area with the highest probability for mishaps. APZ I, which typically extends 5,000 feet from the end of the CZ, has a lower mishap probability, and APZ II, which typically extends 7,000 feet from the end of APZ I, has the lowest mishap probability of the three zones. If needed, to reflect different departure and arrival patterns, both the shape and size of APZs can be modified.

Most of the land use in the CZs and APZs consists of agricultural and infrastructure uses and is considered compatible with the APZs. Incompatible land uses on the south end of the runway consist of residential development (South Dade Center) in APZ I (9 acres). A potentially incompatible land use on the north end of the runway consists of an inactive industrial-mining area (72 acres) in APZ I. Homestead ARB Flight Safety Officer Todd Possemato and USDA Wildlife Biologist Josh Friers agree that, "although the inactive industrial-mining area is a visually attractive body of water, it is not an attractant for bird life. The steep sides offer no loafing or feeding area for wading birds. Additionally, alligators and crocodiles are present in adjacent areas which is a deterrent for birds, such as gulls and terns, to roast or loaf on the water body at night. Furthermore, approximately 7 to 10 miles to the north is a waste-water treatment facility, Black Point Marina and Miami-Dade County Landfill. All of these areas provide much more attractive habitat for feeding, loafing, and daily use from birds. Due to the abundance of suitable habitat in the area, the inactive industrial-mining area will rarely be used by [birds]" (Hayenga 2019).

No incompatible development currently exists in APZ II at the south end of the runway. Figure HS3-5 depicts the CZs and APZs at Homestead ARB.

HS3.4.1.4 Aircraft Mishaps

Mishaps are defined as any damage that occurs on the ground or in flight. As shown in Table HS3-28, mishaps are classified into four categories, based on the severity of the mishap relative to property damage or personnel injury. Class A mishaps are the most severe with total property damage of $2 million or more or a fatality and/or permanent total disability. Comparison of Class A mishap rates for various engine types, as calculated per 100,000 flying hours provide the basis for evaluating risks among different aircraft and levels of operations. This safety section analyzes existing and projected Class A mishap potentials based on flying hours and aircraft types.

Table HS3-28. Aircraft Class Mishaps

Mishap Class	Total Property Damage	Fatality/Injury
A	$2,000,000 or more and/or aircraft destroyed	Fatality or permanent total disability
B	$500,000 or more but less than $2,000,000	Permanent partial disability or three or more persons hospitalized as inpatients
C	$50,000 or more but less than $500,000	Nonfatal injury resulting in loss of one or more days from work beyond day/shift when injury occurred
D	$20,000 or more but less than $50,000	Recordable injury or illness not otherwise classified as A, B, or C

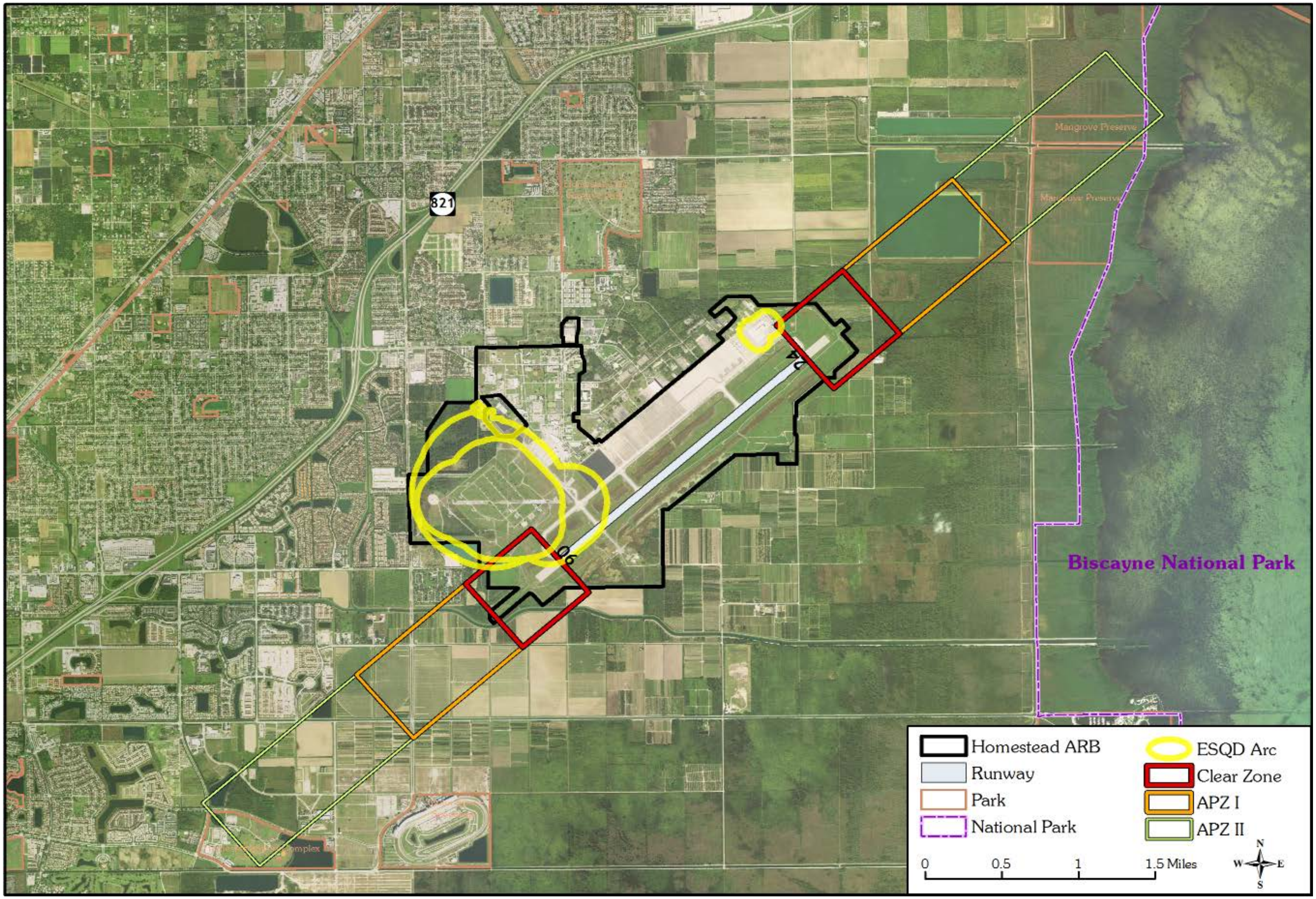

Figure HS3-5. CZs and APZs at Homestead ARB

Aircraft flight operations at Homestead ARB are governed by standard flight rules. Aircrews ensure flight safety when operating at the airfield by complying with all safety and aircraft operating requirements. One Class A and no Class B mishaps have occurred during the past 3 years at Homestead ARB. The Class A mishap resulted when a 482 FW F-16 aborted takeoff and departed the runway surface. The mishap did not result in injuries and was contained on the installation. The F-16 has a lifetime Class A mishap rate of 3.35 (11,278,471 cumulative hours through 2019) (USAF 2019).

HS3.4.1.5 Bird/Wildlife-Aircraft Strike Hazard

Bird and wildlife-aircraft strikes and the hazards they present form another safety concern for aircraft operations. Bird/wildlife-aircraft strikes constitute a safety concern because of the potential for damage to aircraft or injury to aircrews or local populations if an aircraft crash should occur in a populated area.

According to the Air Force Safety Center (AFSEC) BASH statistics, from 1995 to 2016, where altitude at time of strike was known, more than 50 percent of the strikes occurred below 400 feet AGL, and 90 percent occurred below 2,000 feet AGL (USAF 2017). Waterfowl generally present the greatest BASH potential due to their flocking flight patterns and because, when migrating, they can be encountered at altitudes up to 20,000 feet AGL. Raptors also present a substantial hazard due to their size and soaring flight patterns. In general, the threat of bird-aircraft strikes increases during March and April and from August through November due to migratory activities. The USAF BASH Team maintains a database that documents all reported bird/wildlife-aircraft strikes. Historic information across the USAF for the past 20 years indicates that 11 USAF aircraft have been destroyed and five fatalities have occurred from bird/wildlife-aircraft strikes, with the last Class A mishap occurring in 2016 (USAF 2017).

The USAF BASH program was established to minimize the risk for collisions of birds and aircraft and the subsequent loss of life and property. AFI 91-202 requires each flying unit in the USAF to develop a BASH plan to reduce hazardous bird/animal activity relative to airport flight operations. The intent of each plan is to reduce BASH issues at the airfield by creating an integrated hazard abatement program through awareness, avoidance, monitoring, and actively controlling bird and animal population movements. Some of the procedures outlined in the plan include monitoring the airfield for bird activity, issuing bird hazard warnings, initiating bird avoidance procedures when potentially hazardous bird activities are reported, and submitting BASH reports for all incidents. The 482 FW BASH Plan, which also provides BASH guidelines to 93 FS aircrews, provides specific guidance and assigns responsibilities in developing an effective BASH reduction program for Homestead ARB (Homestead ARB 2011).

From 2013 to 2017, Homestead ARB personnel recorded 72 bird strikes in the airfield and airspace. The concentration of birds at and around Homestead ARB poses a risk to flying operations. The terrain, bodies of water, and climate are ideal living conditions for birds year-round, as well as migratory species. Several features of the surrounding area are conducive to bird habitation. The base is bordered by large tracts of farmland. There is a large Miami-Dade County landfill located approximately 5 miles north of the base. Birds are attracted to landfills just as they are to any source of food. Homestead ARB is drained by several man-made canals and drainage ditches. These canals and drainage ditches provide habitat for water birds.

The BASH Plan establishes implementation procedures and actions to minimize the potential of bird-aircraft strikes. Such measures include operating aircraft according to current Bird Watch Conditions (Low, Moderate, Severe), maintaining grass heights between 7 and 14 inches, controlling broad-leaf weeds, and steepening and removal of vegetation in ditches and ponds to reduce accessibility to food sources for wading birds. BASH reduction techniques currently employed by the base include taped distress calls (bioacoustics), pyrotechnics, propane cannons, depredation when necessary, and novel methods (e.g., radio-controlled model aircraft, falconry, hawk kites, etc.) (Homestead ARB 2011).

HS3.4.2 Base Environmental Consequences

O&M activities conducted on Homestead ARB would continue to be performed in accordance with all applicable safety directives. No specific aspects of F-35A O&M would create any unique or extraordinary safety issues. Refer to Chapter 2, Section 2.3.4.2, for a discussion of the types of defensive countermeasures and ordnance that would be used by AFRC F-35A pilots. Only approved weapons systems would be used by AFRC F-35A pilots on the impact training ranges and pilots would adhere to all flare and live-fire use restrictions.

No unique construction practices or materials would be required as part of any of the demolition, renovation, or construction projects associated with the proposed AFRC F-35A mission. All renovation and construction activities would be completed in compliance with all applicable OSHA regulations to protect workers. In addition, the newly constructed buildings would be built in compliance with antiterrorism/force protection requirements and explosives safety requirements. The USAF does not anticipate any significant safety impacts to result from construction, demolition, or renovation if all applicable AFOSH and OSHA requirements are implemented. In addition, O&M of the new munitions buildings would not result in significant safety impacts.

Although emergency and mishap response plans would be updated, the proposed AFRC F-35A mission at Homestead ARB is not expected to create new or unique ground safety issues. Emergency and mishap response plans would be updated to include procedures and response actions necessary to address a mishap involving AFRC F-35A aircraft and associated equipment. With this update, airfield safety conditions would remain similar to baseline conditions. As indicated in Section HS3.4.2.2, base Fire and Emergency Services would continue to participate in mutual-aid support agreements with nearby communities.

HS3.4.2.1 Explosive Safety

The construction and operation of the proposed facilities would comply with Department of Defense Explosives Safety Board (DDESB) Standard 6055.09, *DoD Ammunition and Explosives Safety Standards* (DoD 2008), Air Force Manual (AFMAN) 91-201, *Explosives Safety Standards* and AFMAN 32-1084, *Facility Requirements*. No new requirements for ESQD arcs are anticipated. No changes to explosive safety would result from the construction and operation of the proposed facilities at Homestead ARB.

HS3.4.2.2 Fire Risk and Management

Fire and crash response would continue to be provided by Homestead ARB Fire and Emergency Services. TO 00-105E-9 provides guidance on fire response to aircraft containing composite materials, including the F-35A. Firefighters would continue to be fully trained and appropriately equipped for crash and rescue response and the proposed AFRC F-35A beddown would not change these abilities. Aircraft pre-incident plans would be developed for the F-35A. Aircraft pre-incident plans are required to be reviewed, validated and/or updated annually or anytime there is a change to TO 00-105E-9 for the applicable aircraft. Equipment and training specific to addressing F-35A mishaps would be obtained and conducted prior to beddown. Additionally, Homestead ARB would keep local firefighting departments informed about any new information or firefighting techniques associated with composite materials should an accident occur.

HS3.4.2.3 Accident Potential Zones

No changes to existing APZs or CZs would be required to accommodate AFRC F-35A operations. As documented in Section HS3.4.1.3, there is incompatible development within the northern and southern APZ I. For the reasons described in Section HS3.4.2, implementation of the AFRC F-35A mission would not increase the safety risk to these or other off-base areas. Homestead ARB would continue to work with communities and developers to apply the AICUZ guidelines.

HS3.4.2.4 Aircraft Mishaps

Implementation of the proposed AFRC F-35A mission at Homestead ARB would replace the existing F-16 mission operated by the 482 FW. During public scoping, several commenters were concerned with the flight safety of the single-engine F-35A, as well as the increased use of composite aerospace materials in the construction of the F-35A. Approximately 13 percent of the F-16, by weight, is comprised of composite materials, while approximately 42 percent of the F-35A, by weight, is comprised of composite materials (Air Force Research Laboratory 2015).

HS3.4.2.4.1 Flight Safety

As of November 2019, the F-35A has amassed more than 96,000 hours of flight time with three Class A mishaps, resulting in a mishap rate of 3.11 (Table HS3-29). These mishaps included an engine failure during takeoff preparation (the aircraft was safely brought to a halt), an aborted takeoff with damage confined to the engine, and a hydraulic failure resulting in collapsed nose landing gear that occurred after landing and parking. No injuries occurred during these events. Because the F-35A has not yet reached 100,000 hours, this mishap rate is not directly comparable to other aircraft (Chapter 3, Section 3.4.3) with more flying hours. However, this rate does provide some indication of the overall safety of the F-35A aircraft. For example, this rate is lower than the 8.86 rate of the F-16 after a comparable amount of hours. It is also lower than the 9.24 rate of the A-10 after the A-10 reached 152,977 hours.

Table HS3-29. F-35A Class A Flight Mishap History

Fiscal Year	Class A		Destroyed		Fatal		Hours Flown Per Year	Cumulative Flight Hours
	Number of Mishaps	Rate	Aircraft	Rate	Pilot	All		
2010	0	0.00	0	0.00	0	0	0	0
2011	0	0.00	0	0.00	0	0	0	0
2012	0	0.00	0	0.00	0	0	215	215
2013	0	0.00	0	0.00	0	0	1,283	1,498
2014	1	37.54	0	0.00	0	0	2,664	4,162
2015	0	0.00	0	0.00	0	0	7,467	11,629
2016	0	0.00	0	0.00	0	0	11,343	22,972
2017	0	0.00	0	0.00	0	0	22,714	45,686
2018	2	11.90	0	0.00	0	0	30,514	76,200
2019	0	0	0	0.00	0	0	20,113	96,313
Lifetime	**3**	**3.11**	**0**	**0.00**	**0**	**0**	**-**	**96,313**

Note: Flight "rates" are number of mishaps per 100,000 flight hours. Only Aviation "Flight" mishaps are reported here. An aviation "Flight" mishap is any mishap in which there is intent for flight and reportable damage to a DoD aircraft.
Source: USAF 2019

Historical trends of USAF aircraft show that mishaps of all types decrease the longer an aircraft is operational. For example, when the last single-engine fighter fielded by the USAF (F-16) surpassed 100,000 hours in 1982, its Class A rate was 15.83 with four fatal mishaps (USAF 2018). Since then, the mishap rate for the F-16 has decreased substantially. In 2019, the F-16 had a lifetime Class A mishap rate of 3.35, and its rate for the last 10 years is 1.84 (USAF 2019). Similarly, in 1979, when the A-10 surpassed 100,000 hours, its Class A rate was 9.24 with four fatalities recorded (USAF 2019). The A-10 has a lifetime Class A mishap rate of 1.88, and its rate for the last 10 years is 0.45 (USAF 2019). The mishap rate for the F-35A is expected to decline as the aircraft becomes operationally mature. The Pratt & Whitney F135 engine used in the F-35A was derived from the F119 engine, which is used in the F-22 Raptor. The F-22 features a 0.92 lifetime engine-related Class A flight mishap rate (USAF 2020).

In addition, aircraft with newer engines and designs generally have fewer mishaps than aircraft with older engines and designs. Table HS3-30 shows the decreases in engine-related and lifetime mishap rates for 11 historic and active single-engine aircraft.

Table HS3-30. Class A Flight Mishap Rates

<table>
<tr><th>Decade Introduced</th><th>Aircraft/Engine</th><th>Engine-Related Cumulative Class A Mishap Rate</th><th>Engine-Related Class A Mishap Rate Last 6 Quarters</th><th>Lifetime Class A Mishap Rate</th></tr>
<tr><td rowspan="5">1950s</td><td>F-100/ J57</td><td>5.61</td><td>No longer in service</td><td>21.22</td></tr>
<tr><td>F-102/ J57</td><td>3.41</td><td>No longer in service</td><td>NA</td></tr>
<tr><td>F-104/ J79</td><td>9.48</td><td>No longer in service</td><td>NA</td></tr>
<tr><td>F-105/ J75</td><td>4.56</td><td>No longer in service</td><td>12.15</td></tr>
<tr><td>F-106/ J75</td><td>2.04</td><td>No longer in service</td><td>NA</td></tr>
<tr><td>1960s</td><td>A-7/TF41</td><td>1.73</td><td>No longer in service</td><td>5.71</td></tr>
<tr><td>1970s</td><td>F-16/ F100-200</td><td>1.84</td><td>No longer in service</td><td rowspan="5">3.43</td></tr>
<tr><td rowspan="2">1980s</td><td>F-16/ F110-100</td><td>1.06</td><td>0.76</td></tr>
<tr><td>F-16/ F100-220</td><td>0.96</td><td>0</td></tr>
<tr><td rowspan="2">1990s</td><td>F-16/ F110-129</td><td>0.85</td><td>0</td></tr>
<tr><td>F-16/ F100-229</td><td>0</td><td>0</td></tr>
</table>

Key: NA = not available

During scoping, some comments were received regarding safety deficiencies of the F-35A aircraft. In a review of the production program for all models of the F-35 (A, B, and C), the Government Accountability Office, has noted various deficiencies as this advanced aircraft is developed and brought into production (GAO 2018). These deficiencies are being addressed as full-rate production is approached. The USAF recognizes that certain components have yet to reach full capability. The USAF would not operate any aircraft should safety-of-flight concerns be present.

HS3.4.2.4.2 Composite Aerospace Materials

Advanced composites have been used in aircraft construction since the late 1960s, when a boron-epoxy rudder was installed on the F-4 jet. As composite technology has advanced, the percentage of composite material used in modern aircraft has increased. Types of composites include carbon fiber (e.g., graphite used in sporting equipment), metal-matrix composites (e.g., materials used on spacecraft and racing bicycles), and ceramic-matrix composites (e.g., medical implants). As noted by members of the public during scoping, one disadvantage of certain composites is that these materials can degrade under extreme temperatures, resulting in the production of toxic fumes and airborne fibers. Because of these characteristics, composite aerospace materials present unique hazards to mishap responders. A burning aircraft could release toxic products, exposing personnel and the environment. Individuals exposed to a crash site could experience dermatological and respiratory problems. Exposure to these hazards would not necessarily end when a fire is extinguished; exposure to recovery crews, site security, the surrounding population, and others could continue (Navy 2016). Sampling at mishap sites of aircraft containing composite materials indicated the presence of respirable fibers/dusts in the air. In addition, laboratory studies have identified respirable fiber products and toxic gases (including high levels of CO, NO_x, and hydrogen cyanide) from burning composite materials (Navy 2016).

Due to the rarity of mishaps involving composite aerospace materials, no epidemiological data are available on personnel exposure to burning composites. Similarly, no studies have assessed the toxicology of carbon fibers generated in a fire scenario with extended post-exposure duration. Synergistic interactions between the solid, vapor, and gaseous combustion products have also not been determined. However, research and experience during several crash responses do indicate that composite fiber release is relatively low (Air Force Research Laboratory 2015).

In the event of a crash of an aircraft containing composite materials, the USAF would follow the guidance contained in the *Mishap Response Checklist for Advanced Aerospace Materials/Composites* (USAF Advanced Composites Program Office 1993).

- Areas in the immediate vicinity of the mishap site affected by direct and dense fallout from the fire/explosion-generated smoke plume would be evacuated, along with easily mobile critical equipment. Aircraft and flight operations exposed to the immediate fallout area would be altered or moved. All unprotected personnel would be restricted from assembling downwind of the crash site.
- The fire would be extinguished and composites cooled to below 300°F. Only firefighters equipped with a self-contained breathing apparatus would be authorized in the immediate vicinity of a burning/smoking mishap site until the fire chief declares the area safe. If possible, high-pressure water break-up and dispersal of composite structures would be avoided.
- The mishap site would be roped or cordoned off and a single entry/exit point would be established upwind of the wreckage. Only sufficiently protected individuals would be authorized in the immediate mishap site and peripheral areas.
- Should personnel other than those at the accident site be directly and substantially exposed to adverse material hazards, the medical staff would be consulted for evaluation and tracking. Time permitting, the otherwise un-threatened populace in affected or fallout areas would be advised to do the following:
    - Remain indoors;
    - Shut external doors and windows;
    - Turn off forced air intakes; and
    - Await further notification.
- Specific aircraft hazards would be identified by inspection and consultation with the crew chief or aircraft specialists. Composite and other hazardous materials would be identified to mishap response personnel. The On-Scene Commander would be advised of all findings and recommendations.
- When exiting the crash site, personnel would use a high-efficiency particulate air-filtered vacuum, if available, to remove asbestos-containing materials (ACM) from their outer clothing, work gloves, boots, headgear, and equipment. If unavailable, efforts would be made

to wipe or brush off as much contamination as possible. Clean sites (i.e., tent or trailer) would be set up for donning/removal of personal protective equipment if practical.

- Non-disposable clothing involved with crash/fire-damaged composite parts would be removed and laundered as determined by the base environmental engineer. Personnel should shower (in cool water) prior to going off-duty to preclude injury from loose fibers. Portable showers would be provided, if necessary.
- Burned/mobile composite fragments and loose ash/particulate residue would be secured with firefighting foam or a fine water mist until a hold-down fixant material is applied to immobilize the fibers. Initial actions should concentrate on debris containment. Investigators, specific aircraft authority, and the base environmental engineer would be consulted before applying any fixant.

HS3.4.2.4.3 Aircraft Mishap Summary

Aviation in all forms has inherent risk and it is not possible to guarantee the future flight-safety risk of any aircraft. However, due to the current F-35A record, the increasing safety trend for single-engine fighter aircraft, and increases in safety as an airframe matures operationally, it is reasonable to expect nominal changes in flight-safety risk to result from implementation of the AFRC F-35 mission at Homestead ARB.

HS3.4.2.5 Bird/Wildlife-Aircraft Strike Hazards

The 3 percent increase in airfield operations resulting from the AFRC F-35A mission could negligibly increase the risk of bird/wildlife-aircraft strikes at Homestead ARB. The BASH plan would remain in place to reduce these risks.

HS3.4.3 Airspace Affected Environment

The airspace proposed for use by AFRC F-35A pilots from Homestead ARB RAs, MOAs, and ATCAAs (Table HS2-5 and Figure HS2-2). Aircraft flight operations are governed by standard flight rules. The volume of airspace encompassed by the combination of airspace elements constitutes the ROI for airspace safety. These training areas allow military flight operations to occur without exposing civil aviation users, military aircrews, or the general public to hazards associated with military training and operations. This section describes the existing safety procedures in the airspace proposed for use and the following section evaluates changes that would occur with the introduction of the F-35A.

HS3.4.3.1 Fire Risk and Management

Fires attributable to flares are rare for three reasons. First, the altitude and other restrictions on flare use minimize the possibility for burning material to contact the ground. Second, to start a fire, burning flare material must contact vegetation that is susceptible to burning at the time. The probability of a flare igniting vegetation is expected to be equally minimal. Third, the amount and density of vegetation, as well as climate conditions, must be capable of supporting the continuation and spread of fire.

Aircraft based at Homestead ARB utilize two live fire ranges, the U.S. Navy Pinecastle Range Complex (to include Rodman and Lake George Ranges) and APAFR. The U.S. Forest Service (USFS) monitors fire conditions at the Ocala National Forest, where the U.S. Navy Pinecastle Range Complex is located. Occasionally, the USFS denies a Burn/Drought Index Waiver Notification, if the conditions exceed the established limits; however, the USFS works with the range users to ensure that planned training is not adversely impacted. The USFS conducts controlled burns at the U.S. Navy Pinecastle Range Complex in accordance with the USFS Land Resource Management Plan. The controlled burns are coordinated with U.S. Navy Pinecastle Range Complex personnel (Navy 2017).

APAFR manages fires in accordance with a Wildland Fire Management Plan. The primary goal of the plan is to protect the mission. APAFR conducts at least 33,000 acres of prescribed fire per year to reduce risks to the military mission, including the prevention of munitions related fires (APAFR 2014).

HS3.4.3.2 Aircraft Mishaps

Aircraft flight operations are governed by standard flight rules. Specific safety requirements are contained in standard operating procedures that must be followed by all aircrews operating from the airfield (482 FW Instruction 11-2, *F-16 Flying Operations*, February 2012) to ensure flight safety.

HS3.4.3.3 Bird/Wildlife-Aircraft Strike Hazard

The primary threat to military aircraft operating in the airspace is migratory birds. The exact number of birds struck in the airspace areas is difficult to assess because small birds are not detected until post-flight maintenance checks and the location of such strikes cannot be determined. Refer to Section HS3.4.1.5 for more information regarding BASH and the actions that are implemented to minimize bird strikes.

HS3.4.4 Airspace Environmental Consequences

The addition of F-35A aircraft to the airspace would not require changes to the management or structure of the airspace. AFRC F-35A pilots would fly mission profiles similar to those flown by F-16 pilots currently operating from Homestead ARB, only at higher average altitudes, including air-to-ground ordnance delivery and air combat training operations. Implementation of the AFRC F-35A mission would result in a 0.2 percent decrease in overall airspace sorties in the existing airspace proposed for use. As described in Section HS3.1.4.1, total sorties would remain within the capability and capacity of the airspace and ranges proposed for use.

HS3.4.4.1 Fire Risk and Management

Flare and ordnance deployment in authorized ranges and airspace is governed by a series of regulations based on safety and environmental considerations and limitations. These regulations establish procedures governing the use of flares over ranges, other government-owned and -controlled lands, and nongovernment-owned or -controlled areas. Chapter 2, Section 2.3.4.2, details the flares and ordnance proposed for use by AFRC F-35A pilots.

The frequency of flare use would remain the same or slightly decrease from baseline conditions. AFRC F-35A pilots would only use flares in compliance with existing airspace altitude and seasonal restrictions to ensure fire safety. Based on the emphasis of flight at higher altitudes, roughly 90 percent of F-35A flares released throughout the authorized airspace would occur above 15,000 feet MSL, further reducing the potential risk for accidental fires. Lands surrounding the air-to-ground training impact areas underlying airspace ensure public protection by restricting access to areas associated with laser use, emitters, and ordnance delivery. All guidance, regulations, and instructions for ordnance delivery at the ranges would be adhered to by AFRC F-35A pilots. Mutual fire response and suppression agreements would continue.

HS3.4.4.2 Aircraft Mishaps

Continued maintenance of situational awareness and use of available communications for tracking the scheduled and near real-time status of the SUAs would help maintain a safe flying environment for all concerned. Any changes to those capabilities and the current or future areas in which this service is provided would be appropriately addressed and communicated through those same venues. The majority of flight operations would be conducted over remote areas; however, in the unlikely event that an aircraft accident occurs, existing response, investigation, and follow-on procedures would be enforced to ensure the health and safety of underlying populations and lands. Implementation of flight safety procedures and compliance with all flight safety requirements would minimize the chances for aircraft mishaps.

HS3.4.4.3 Bird/Wildlife-Aircraft Strike Hazards

AFRC F-35A pilots would operate the aircraft in the same airspace environment as other pilots from Homestead ARB, albeit at a higher altitude than current aircraft. Therefore, the overall potential for bird-aircraft strikes would be reduced following the beddown of the F-35A. When BASH risk increases due to time of year, limits are and would continue to be placed on low-altitude flights. Briefings are provided to pilots when the potential exists for greater bird-strike risks within the airspace; AFRC F-35A pilots would also be subject to these procedures. Implementation of the AFRC F-35A mission would not result in significant BASH risks in the airspace proposed for use.

HS3.4.5 Summary of Impacts to Safety

No unique construction practices or materials would be required as part of any of the demolition, renovation, or construction projects associated with the proposed AFRC F-35A mission. All new construction would incorporate antiterrorism/force protection requirements. All construction would be conducted in compliance with DDESB Standard 6055.09, AFMAN 91-201, and AFMAN 32-1084, and the ESQD arcs would not change. As of November 2019, the F-35A has amassed more than 96,000 hours of flight time with a Class A mishap rate of 3.11. Since the F-35A has not yet reached 100,000 hours, this rate is not directly comparable to other aircraft. As the F-35A becomes operationally mature, the F-35 mishap rate would be expected to continue to decline, as supported by the documented decline in mishap rates for the F-16 and A-10. Homestead ARB has an active BASH program, but the 3.0 percent increase in aircraft operations at Homestead ARB and the 0.2 percent decrease in sorties in the airspace proposed for use could increase the overall BASH incidents. However, this increase is not anticipated to be significant. With regard to airspace, AFRC F-35A pilots would use the same airspace used by 482 FW pilots. Impacts to safety resulting from implementation of the new mission are not anticipated to be significant.

HS3.5 SOIL AND WATER RESOURCES

HS3.5.1 Base Affected Environment

HS3.5.1.1 Soil Resources

Homestead ARB is located in the Coastal Plains physiographic province, Floridian section. This section is characterized by extremely flat topography with soils that are composed of sedimentary rock and unlithified sediments (Stone et al. 1992). Urban land is the most common soil classification at Homestead ARB. Other common soils include Udorthents, limestone substratum-Urban land complex, and Biscayne marl (both drained and undrained). The Udorthents, limestone substratum-Urban land complex is a moderately deep soil that is somewhat poorly drained. Biscayne marl is a shallow soil that is naturally poorly drained (Soil Survey Staff 2018). All these soils have a slight susceptibility to wind and water erosion. More detailed descriptions of the soils types on the base are available from the Web Soil Survey (Soil Survey Staff 2018).

HS3.5.1.2 Water Resources

HS3.5.1.2.1 Surface Water

The base is located in the South Atlantic-Gulf Region and the Southern Florida Subregion. Natural drainage on the installation is poor due to the flat terrain and a high water table. Stormwater runoff is collected in a drainage system of canals, swales, ditches, and pipes, most of which eventually discharge into the Boundary Canal. A stormwater reservoir is located on the east side of the base and receives flow from the Boundary Canal system. During periods of heavy rainfall, water from the reservoir can be discharged to Biscayne Bay through the Military Canal (Homestead ARB 2017b). Three manmade lakes are located on Homestead ARB (Phantom Lake and the Twin Lakes).

Homestead ARB has a general stormwater National Pollutant Discharge Elimination System (NPDES) permit issued to the installation under FLR05A352-004 – NPDES Stormwater by the State of Florida. This permit is the Multi-Sector Generic Stormwater Discharge Associated with Industrial Activity and was issued under the provisions of Sections 403.0885, Florida Statues, and the applicable rules of the Florida Administrate Code. To satisfy the requirements of the NPDES permit the USAF has prepared and currently implements a Stormwater Pollution Prevention Plan (SWPPP) (Homestead ARB 2017b). The plan is annually reviewed and revised as necessary. The Homestead ARB SWPPP references the need for a land disturbance permit that applies, in part, to construction or other projects that will have a land disturbance greater than one acre. The SWPPP also recognizes that the Metropolitan Miami-Dade County Department of Environmental Resources Management requires a permit for the construction of surface water management systems that overflow into the Boundary Canal.

HS3.5.1.2.2 Groundwater

Homestead ARB is located above the Biscayne aquifer. In the Homestead ARB area, this aquifer extends from land surface to depths of approximately 80 to 100 feet below the ground surface. The Biscayne aquifer is designated by the USEPA as a sole-source aquifer for Broward, Miami-Dade, Monroe, and Palm Beach Counties (Homestead ARB 2017b). Two other aquifers, the Intermediate Confining Unit and the Floridan Aquifer system, are located below Homestead ARB but are not used as a primary source for potable water (Homestead ARB 2017b).

HS3.5.1.2.3 Floodplains

Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRMs) indicate that the northeastern portion of the base and a portion of the base located along the southern base boundary are within the 100-year floodzone (Figure HS1-2). Flooding within the base is typically caused by periods of heavy rainfall and not from coastal flooding or storm surges (Homestead ARB 2017b).

HS3.5.2 Base Environmental Consequences

HS3.5.2.1 Soil Resources

Implementation of the projects identified in Table HS2-1 would disturb approximately 2.3 acres of land, most of which has been previously disturbed. Impacts to soil resources near each of the project sites would result from ground disturbance (e.g., compaction; vegetation removal; and excavation for foundations, footings or utilities). Onsite soils (predominantly Urban land) have a slight potential for wind and water erosion (Soil Survey Staff 2018). Implementation of management practices would minimize impacts to soil resources. These actions could include, but would not be limited to, installation of silt fencing and sediment traps, application of water sprays to keep soil from becoming airborne, and revegetation of disturbed areas as soon as possible, as appropriate. Therefore, potential impacts to soil resources would be minimal, and no significant impacts to soil resources would result from implementation of the AFRC F-35A mission.

HS3.5.2.2 Water Resources

HS3.5.2.2.1 Surface Water

Impacts to surface water can result from land clearing, grading, and moving soil resulting in localized increases in stormwater runoff volume and intensity. Approximately 2 acres of new impervious surfaces would be created and pollutants have the potential to be introduced into construction areas. However, in accordance with UFC 3-210-10, *Low Impact Development* (LID) (as amended, 2016) and the Emergency Independence and Security Act (EISA) Section 438 (42 *USC* §17094), any increase in surface water runoff as a result of the proposed construction would be attenuated through the use of temporary and/or permanent drainage management features (i.e., use of porous materials, directing runoff to permeable areas, and use of detention basins to release runoff over time). The integration of LID design concepts incorporates site design and stormwater management principles to maintain the site's pre-development runoff rates and volumes to further minimize potential adverse impacts associated with increases in impervious surface area.

Prior to construction, the contractor would be required to obtain coverage under NPDES Generic Permit for Stormwater Discharge from Large and Small Construction Activities by filing an NOI with the FDEP and preparing a site-specific SWPPP to manage stormwater discharges during and after construction until the area is revegetated. Upon revegetation, the contractor would file the Notice of Termination with the FDEP to terminate permit coverage. The USAF would specify compliance with the stormwater discharge permit in all of the contractor construction requirements. Other management practices to include in the plan could include the use of water sprays during construction to keep soil from becoming airborne, use of silt fences, covering soil stockpiles, using secondary containment for hazardous materials and revegetating the site in a timely manner.

The existing Homestead ARB SWPPP also identifies control practices to be followed for spill prevention and response, routine inspection of discharges at sites, and proper training of employees. As part of the SWPPP, the base has identified individuals to be part of the Stormwater Pollution Prevention Team (SWPPT). The SWPPT meets annually, is responsible for all aspects of the SWPPP and provides recommendations to the Environment, Safety, and Occupational Health Leadership Committee regarding the SWPPP status, any deficiencies, deicing usage data and outfall monitoring data.

HS3.5.2.2.2 Groundwater

Implementation of the AFRC F-35A mission would result in an overall decrease of 91 people (i.e., a 2.7 percent decrease in base staffing). This slight decrease in personnel would result in no additional demand for groundwater. Implementation of the AFRC F-35A mission would not require any additional groundwater to be supplied by Miami-Dade County. The USAF has an active spill management program in place to minimize the potential for spills and allow the USAF to quickly respond to any spills that occur to minimize the potential for contamination of groundwater. Significant impacts to groundwater would not result from implementation of the AFRC F-35A mission.

HS3.5.2.2.3 Floodplains

No floodplains are located near any of the areas proposed for infrastructure development on Homestead ARB. Therefore, no impacts to floodplains would result from implementation of the proposed AFRC F-35A mission.

HS3.5.3 Summary of Impacts to Soil and Water Resources

Implementation of the proposed action would disturb approximately 2.3 acres of land. Less than 2 acres of new impervious surface would be added resulting in less than a 1 percent increase in impervious surface in this drainage area. No floodplains would be impacted and a SWPPP would be prepared for the proposed construction. Implementation of management practices would minimize impacts to soil resources and projects would be designed and implemented in accordance with LID and EISA to minimize impacts to soil and water resources. Therefore, potential impacts to soil resources would be minimal, and no significant impacts to soil resources would result from implementation of the proposed action.

HS3.6 BIOLOGICAL RESOURCES

HS3.6.1 Base Affected Environment

The ROI for biological resources is defined as the land and aquatic (habitats) that could be affected by the infrastructure and construction projects on the base, and the primary airspace where AFRC F-35A pilots would predominantly fly. For the purposes of this biological resources analysis, the ROI for the proposed action and No Action Alternative includes Miami-Dade County, Florida.

HS3.6.1.1 Vegetation

Homestead ARB is located in the Southern Florida Coastal Plain ecoregion. Historic land cover associated with the region consisted of flat plains with wet soils, marshland and swamp land cover (USGS 2009). Little remains of these original vegetation communities within Homestead ARB, and the areas that do remain have been altered by development and changed in hydrology.

Land cover at Homestead ARB consists of either improved or semi-improved grounds. These include primarily turf and landscaped areas or unimproved grounds consisting of remnant pine rockland, open grasslands, wetland marsh and fringe areas, and small monotypic stands of exotic plant species. Vegetation management at Homestead ARB is guided by the Integrated Natural Resources Management Plan (INRMP), the wildland fire management program, and the BASH Plan (Homestead ARB 2018a, 2011, 2018b). Homestead ARB is currently in the process of preparing a Landscape Management Plan that will include specific parameters to maintain unique vegetation communities and rare plant species on Homestead ARB (Andrejko 2018).

HS3.6.1.2 Wildlife

Information on wildlife occurring on Homestead ARB is provided in the INRMP and U.S. Department of Agriculture (USDA) Wildlife Management Program Reports (Homestead ARB 2018, USDA 2016). Homestead ARB supports a diversity of wildlife species. Common mammal species observed include coyotes (*Canis latrans*), gray fox (*Urocyon cinereoargenteus*), opossum (*Didelphis virginiana*), marsh rabbit (*Sylvilagus palustris*), cotton rat (*Sigmodon hispidus*), cotton mouse (*Peromyscus gossypinus*), raccoon (*Procyon lotor*) and bobcat (*Lynx rufus*). Avian species known to occur on base include waterfowl such as egrets (*Egretta rufenscens, Ardea alba, Bubulcus ibis*), herons (*A. herodias, E. tricolor*), white ibis (*Eudocimus* *albus*), American white pelican (*Pelecanus erythrorhynchos*), mottled duck (*Anas fulvigula*), black-bellied whistling-duck (*Dendrocygna autumnalis*), and blue-winged teal (*Anas discors*). Other birds include double-crested cormorant (*Phalacrocorax auritus*), red-shouldered hawk (*Buteo lineatus*), and pine warbler (*Dendroica pinus*). Reptile and amphibian species include rough grass snake (*Opheodrys aestivus*), corn snake (*Elaphe guttata*), checkered garter snake (*Thamnophis marcianus*), Florida slider (*Trachemys scripta*), Florida soft shell turtle (*Apalone ferox*), snapping turtle (*Chelydra serpentina*), Florida chorus frog (*Pseudacris nigrita verrucosa*), tree frogs (*Hyla* sp.), and two-toed amphiuma (*Amphiuma mean*s), southeastern five-lined skink (*Eumeces inexpectatus*), ringneck snake (*Diadophis punctatus*), and pygmy rattlesnake (*Sistrurus miliarius*). Wetlands and lakes provide habitat for fish species including largemouth bass (*Micropterus salmoides*), warmouth (*Lepomis gulosus*), bluegill (*Lepomis macrochirus*), striped mullet (*Mugil cephalus*), and Florida gar (*Lepisosteus platyrhincus*).

HS3.6.1.3 Threatened, Endangered, and Special Status Species

HS3.6.1.3.1 Federally Listed Species

The USFWS's Information for Planning and Consultation (IPaC) online system was accessed on 9 February 2018 to identify current USFWS trust resources (e.g., migratory birds, species proposed or listed under the Endangered Species Act (ESA), inter-jurisdiction fishes, specific marine mammals, wetlands, and USFWS National Wildlife Refuge System lands) with potential to occur in the ROI for biological resources at Homestead ARB.

On 9 February 2018, the USFWS provided an automated *Official Species List* via a letter that identified 48 threatened or endangered species protected under the ESA (16 *USC* § 1531 et seq.) and 9 critical habitats that could occur in Miami-Dade County, Florida. Although 48 species were identified under the IPaC Trust Resource Report, only 21 species are known to occur or have potential to occur near Homestead ARB (Homestead ARB 2018c). Table HS3-31 presents these species.

The USAF recently completed the formal Section 7 consultation process with the USFWS for current base operations at Homestead ARB. On 7 May 2018 the USAF submitted a Programmatic Biological Assessment (PBA) for potential impacts to federally listed species resulting from ongoing and future military and non-military operations at Homestead ARB. On 24 September 2019, the USFWS issued a Biological Opinion (BO) to identify the effects of military and non-military operations and activities, including aircraft operations, on federally listed species known to occur or with potential to occur at Homestead ARB (USFWS 2019).

Table HS3-31. Federally Listed Species with Potential to Occur in Miami-Dade County, Florida

Common Name	Scientific Name	Federal Listing Status	Habitat	Historically Observed at Homestead ARB?
Mammals				
Florida Bonneted Bat	*Eumops floridanus*	FE	The Florida bonneted bat roosts in rock crevices, old trees with suitable cavities, buildings, and Spanish tile roofs. The species feeds in very open areas and at high altitudes.	Yes
West Indian Manatee	*Trichechus manatus*	FT	West Indian manatees require access to aquatic vegetation, freshwater sources, and at least 2 meters of water depth. The species feeds along grass bed margins with access to deep water channels, where they flee when threatened.	No[a]
Birds				
Wood Stork	*Mycteria americana*	FT	Wood storks occur in shallow wetland areas where fish are plentiful. The species has been observed in the wetland areas on Homestead ARB near Twin Lakes.	Yes
Least Tern	*Sterna antillarum*	FE	Least terns occur along waterways, including reservoirs, refuges, and rivers. During migration the species is found on open flat beach areas. Least terns nest on the ground in open areas and near appropriate feeding habitat.	Yes
Everglade Snail Kite	*Rostrhamus sociabilis plumbeus*	FE	Habitat includes freshwater marshes and shallow vegetated edges of natural or man-made lakes where apple snails can be found. Because of its specific dietary and hydrological requirements, the Everglade snail kite is restricted to the watersheds of the Everglades, Lake Okeechobee, Lake Kissimmee, and the upper St. Johns River.	Yes
Rufa Red Knot	*Calidris canutus rufa*	FT	Rufa red knots winter in Florida from December to February, but could be present in some wintering areas as early as September or as late as May. Habitat includes intertidal, marine habitats, especially near coastal inlets, estuaries, and bays during the non-breeding season.	Yes
Piping Plover	*Charadrius melodus*	FT	Piping plovers winter in Florida and use coastal beaches, sandflats, and mudflats.	No
Roseate Tern	*Sterna dougallii*	FT	The roseate tern is a migratory, marine bird that could occur at Biscayne Bay. Preferred nesting habitat is open, sandy beach isolated from human activity and predators, although rooftops are also used.	No
Reptiles				
American Alligator	*Alligator mississippiensis*	FT	American alligators and crocodiles inhabit fresh and brackish marshes, ponds, lakes, rivers, swamps bayous, canals and large spring runs. Basking occurs on partially submerged logs or on land next to the water. Alligators dig dens in river or lake margins or in marshes.	Yes
American Crocodile	*Crocodylus acutus*	FT		Yes
Eastern Indigo Snake	*Drymarchon corais couperi*	FT	Eastern indigo snakes frequent a variety of habitat types including pine flatwoods, scrubby flatwoods, high pine, dry prairie, tropical hardwood hammocks, edges of freshwater marshes, agricultural fields, coastal dunes, and human-altered habitats.	No

Table HS3-31. Federally Listed Species with Potential to Occur in Miami-Dade County, Florida (Continued)

Common Name	Scientific Name	Federal Listing Status	Habitat	Historically Observed at Homestead ARB?
Insects				
Bartram's Scrub Hairstreak Butterfly	*Strymon acis bartrami*	FE	Both butterflies are endemic to the pine rockland habitat of south Florida and are closely tied to their larval host plant, pineland croton (*Croton cascarilla*). Pineland croton populations are restricted to pine rockland forests.	No
Florida Leafwing Butterfly	*Anaea troglodyta floridalis*	FE		No
Flowering Plants				
Florida Brickell-bush	*Brickellia mosieri*	FE	Florida Brickell-bush occurs in low moist limestone areas near margins, along the edges and gaps of pine rocklands, rockland hammocks, and coastal berms.	No
Blodgett's Silverbush	*Argythamnia blodgettii*	FT	Blodgett's silverbush occurs in low moist limestone areas near margins, along the edges and gaps of pine rocklands, rockland hammocks, and coastal berms.	No
Everglades Bully	*Sideroxylon reclinatum ssp. austrofloridense*	FT	Everglades bully occurs in fragmented pine rocklands with a tropical understory on limestone rock.	No
Carter's Small-flowered Flax	*Linum carteri*	FE	Carter's small-flowered flax occurs in disturbed edges of pine rockland habitat.	No
Florida Prairie-clover	*Dalea carthagenensis floridana*	FE	Florida prairie-clover occurs in pine rocklands, edges of rockland hammocks, coastal uplands, and marl prairie.	No
Tiny Polygala	*Polygala smallii*	FE	Tiny polygala occurs in four distinct habitats with similar characteristics: pine rockland, scrub, high pine, and open coastal spoil. All of these habitats are pyrogenic (i.e., extremely dry and prone to periodic natural fire).	No
Sand Flax	*Polygala smallii*	FE	Sand flax habitat includes pine rockland, marl prairie, and adjacent disturbed areas. The species grows on oolitic limestone formations in pine rockland, marl prairie, and disturbed areas. Preferred habitat is characterized by slash pine canopy with a shrub understory of saw palmetto, wax myrtle, poisonwood, and willow bustic shrub layer.	Yes
Small's Milkpea	*Galactia smallii*	FE	Habitat includes pine rockland characterized by a slash pine canopy with a saw palmetto, wax myrtle, poisonwood, and willow bustic shrub layer. Small's milkpea can also be found with crimson bluestem, wire bluestem, scaleleaf aster, and copperleaf. The species is more abundant in Cardsound rock outcrop complex soils with little quartz sand and prefers open sun with little shade.	Yes

[a] Manatees have been observed in and near Black Creek (approximately 3 miles north of Homestead ARB's Military and Mowry Canals) and Convoy Point (approximately 2 miles south of Military Canal). Between 1984 and 1989, there were three manatee sightings near Military Canal (Homestead ARB 2018a). Manatees have been observed in Military Canal and travel as far as the Homestead ARB stormwater pump structure during the winter. However, the stormwater pump structure prevents manatees from accessing the base (Homestead ARB 2018a).

Key: FE = federally endangered; FT = federally threatened

Source: Andrejko 2018; FNAI 2000a-c; Homestead ARB 2015, 2017, 2018a, 2018c, NatureServe 2018a, b; USFWS 1999, 2001, 2010a, b, 2013, 2014, 2017a, b, 2018

Of the 21 species identified, only 10 have been observed at Homestead ARB. These species include the following: American alligator (*Alligator mississippiensis*), rufa red knot (*Calidris canutus rufa*), American crocodile (*Crocodylus acutus*), Eastern indigo snake (*Drymarchon corais couperi*), Florida bonneted bat, Small's milkpea (*Galactia smallii*), wood stork (*Mycteria americana*), sand flax (*Polygala smallii*), Everglade snail kite (*Rostrhamus sociabilis plumbeus*), and least tern (*Sterna antillarum*). Recorded species documentation is based on targeted surveys and subsequent historical survey work conducted in part of the INRMP (Homestead ARB 2018a). Additionally, no critical habitat occurs on Homestead ARB (USFWS 2018c). Although pine rockland habitat located within a few miles of Homestead ARB is designated as critical habitat, none of the pine rockland habitat on the base has been designated as critical habitat because Homestead ARB manages that habitat through an active INRMP.

HS3.6.1.3.2 Migratory Birds

Migratory bird species protected under the Migratory Bird Treaty Act (MBTA) (16 *USC* §§ 703–712) could occur as residents or migrants near Homestead ARB. Migratory birds, including waterfowl, raptors, and neo-tropical migrants, have been observed on base (Homestead ARB 2018a). Under AFI 91-202 and AFI 91-212, *Bird/Wildlife Aircraft Strike Hazard (BASH) Management Program*, Homestead ARB maintains a BASH Plan that establishes an overall bird/wildlife control program to minimize aircraft exposure to potentially hazardous wildlife strikes. The BASH Plan delineates responsibilities for minimizing potential hazards in the areas where tasked units assigned to Homestead ARB conduct flying operations. A USDA wildlife biologist employed at Homestead ARB manages potential wildlife hazards by removal, dispersal, and wildlife control methods to avoid any BASH incidents. Commonly controlled avian species include turkey vultures (*Cathartes aura),* laughing gulls (*Leucophaeus atricilla*), and cattle egrets (*Bubulcus ibis*) (USDA 2016).

HS3.6.1.3.3 Bald and Golden Eagles

Bald eagles protected under the Bald and Golden Eagle Protection Act (BGEPA) (16 *USC* 668-668c) have been observed as occasional migrants at Homestead ARB, stopping over to feed during the winter months. However, there are no known nesting sites (as documented by the Eagle Nest Locater) on or near the installation (FWC 2016a). Bald eagles are also known to frequent Everglades National Park, located to the west of the installation (Andrejko 2018). Golden eagles have not been observed at Homestead ARB.

HS3.6.1.3.4 State-Listed Species

The Florida Fish and Wildlife Conservation Commission (FWC) works in partnership with USFWS to help conserve imperiled species. State-listed imperiled species documented at Homestead ARB include Florida burrowing owl (*Athene cunicularia floridana*) and the gopher tortoise (*Gopherus polyphemus*) (Homestead ARB 2018a, FWC 2016b).

HS3.6.1.4 Wetlands

Federal and state jurisdictional wetland surveys were conducted on Homestead ARB in 2001 and 2012 (Homestead ARB 2018a). Approximately 233.5 acres of wetlands occur on Homestead ARB (Homestead ARB 2018a). Wetlands occurring on the base include wet marsh and wet prairie. The wetland areas are primarily located within the runway infield and southeast of the runway extending in a southwest to northeast direction (Homestead ARB 2018a).

HS3.6.2 Base Environmental Consequences

HS3.6.2.1 Vegetation

Activities associated with construction, demolition, and renovation projects would occur in developed or disturbed areas of Homestead ARB. Revegetation of temporarily disturbed areas would be conducted as directed by the base natural resource manager to minimize the potential for erosion and dust generation. Potential impacts to protected vegetation species are described in Section HS3.6.2.3.1. No significant impacts to vegetation are anticipated to result from implementation of the AFRC F-35A mission at Homestead ARB.

HS3.6.2.2 Wildlife

Potential impacts to wildlife could include ground disturbance and construction noise from the associated facility and infrastructure projects. In addition, airfield operations can result in bird/wildlife-aircraft strikes and noise impacts.

The areas planned for development for the proposed AFRC F-35A mission at Homestead ARB are highly disturbed and provide limited habitat for some urban adapted wildlife species. This habitat would be lost with construction of the proposed facilities and infrastructure projects.

Noise resulting from the proposed construction, demolition, and renovation activities would be localized, short-term, and only occur during daylight hours. Areas proposed for construction are in a military industrial land use with frequent elevated noise levels. Impacts to wildlife from construction noise would be minimal.

Annual airfield operations are anticipated to increase by approximately 3 percent (Section HS2.3). Any increase in operations could increase the potential for bird/wildlife-aircraft strikes. Homestead ARB would continue to adhere to the installation's BASH Plan and implement wildlife controls as necessary to minimize the risk of strikes.

Impacts to wildlife and domestic animals that could result from aircraft noise are summarized below and discussed in more detail in Volume II, Appendix B. As described in Section HS3.2.2, the number of acres exposed to DNL greater than 65 dB would increase. Because additional land would be exposed to DNL greater than 65 dB, additional animals would also be exposed to this noise. Animals hear noise at different levels, in different frequency ranges, and tolerate noise differently than humans. These differences make comparing the noise metrics created for evaluating human impacts to animal impacts difficult. However, the number of noise events per hour with potential to interfere with speech (Table HS3-17) can be used as an indicator of changing frequency noise events that could affect animals. For example, under baseline conditions animals off the coast of Biscayne National Park would experience three events per hour that are at a sufficient level to interfere with human speech. Although implementation of the new mission would not increase the number of events per hour at this location, animals in the residential area of Verde Gardens would be exposed to one additional event per hour.

Volume II, Appendix B, summarizes a number of scientific studies that have been conducted on the effects of aircraft noise on animals. These studies have shown that animal species have a wide range of responses to aircraft noise. One conclusion of these studies is that a general response to noise by domestic animals and wildlife is a startle response. These responses vary from flight, trampling, stampeding, jumping, or running to the movement of the head in the directions of the noise. These studies report that the intensity and duration of the startle response decreases with time, suggesting no long-term, adverse effects. The majority of the studies suggest that domestic animal species and wildlife show behaviors characteristic of adaptation, acclimation, and habituation to repeated aircraft noise (Volume II, Appendix B). Therefore, significant impacts to wildlife in the ROI would not result from implementation of the AFRC F-35A mission at Homestead ARB.

HS3.6.2.3 Threatened, Endangered, and Special Status Species

HS3.6.2.3.1 Federally Listed Species

Minimal impacts to federally listed species are anticipated to result from implementation of the proposed AFRC F-35A mission at Homestead ARB. Under the proposed action, federally listed species would continue to be managed and monitored under the installation INRMP and annual coordination with the USFWS would continue. Potential impacts to federally listed species from the proposed action would be similar to those described in Section HS3.6.2.2. The effects determinations for the 10 federally listed species known to occur at Homestead ARB are analyzed further below.

Florida Bonneted Bat *(Eumops floridanus)*. Potential impacts to the Florida bonneted bat from the proposed action at Homestead ARB could include aircraft strikes, or take, in the form of mortality resulting from aircraft operations conducted during morning, evening, and night when bats are active onsite. On 7 May 2018 the USAF submitted a PBA for potential impacts to federally listed species resulting from current base operations at Homestead ARB (Homestead ARB 2018c). On 24 September 2019, the USFWS issued a BO to identify the effects of military and non-military operations and activities, including aircraft operations, on federally listed species known to occur or with potential to occur at Homestead ARB (Volume II, Appendix A, Section A.2.5.4). The BO determined that current and ongoing base operations *May Affect*, and are *Likely to Adversely Affect* the Florida bonneted bat. The BO included an incidental take statement for the Florida bonneted bat. The incidental take statement allows for no more than two Florida bonneted bats to be incidentally taken per year as a result of base operations.

The BO identified buildings 208, 700 and 702 as having metal roofs that could potentially provide roosting habitat for this species. As part of the proposed action, building 208 is proposed for demolition. Per the BO, the USAF, in accordance with Conservation Measure 1, shall visually inspect the potential roost cavities associated with the metal roof prior to initiation of demolition. If roosting bats are identified, Homestead ARB will coordinate with the USFWS on how to proceed with demolition.

Implementation of the AFRC F-35A mission at Homestead ARB would increase annual total airfield operations by approximately 3 percent, potentially increasing the number of BASH incidents. Any increase in operations could result in an increased opportunity for aircraft strikes to occur. The greatest risk to the Florida bonneted bat is within an hour after sunset, at the northeast corner of the runway (near the triple hangars), Phantom Lake, former Homestead AFB property and the Air Base K-8 Center for International Education (Homestead ARB 2018c). The majority (75 percent) of aircraft operations at Homestead ARB occur during the day. AFRC F-35A pilots are predicted to generally follow the same night requirement as AFRC F-16 pilots depending on weather or special exercises. There would be no increase in the percentage of night flight activity (Section HS2.3). Additionally, adherence to the existing installation BASH program would minimize the risk of potential bat strikes. Bat strikes by aircraft at Homestead ARB are not common. If Florida bonneted bat strikes were to occur in the future, they would be comparably rare and are not anticipated to result in population-level, direct, adverse impacts. Implementation of studies and monitoring surveys for Florida bonneted bat are currently proposed and also identified under the INRMP's management goals (Homestead ARB 2018a). These studies and surveys will document areas of highest use on the installation in order for the AFRC to minimize and avoid adverse impacts to this species.

If foraging habitat or roosts are disturbed, direct, adverse impacts (e.g. mortality, loss of habitat) to the Florida bonneted bat could result from construction, demolition, or renovation activities associated with the proposed action at Homestead ARB. Surveys for bats would be conducted prior to any demolitions and/or facility modification or new construction that occurs in areas with potential roosting habitat. Extensive acoustic surveys using simultaneous multiple song meters, combined with roost surveys at sunset would be conducted on the base and adjacent areas northward toward Mystic Lake. Surveys would be conducted to locate roosts and any removal of occupied habitat would be coordinated with the USFWS and be mitigated. Should Florida bonneted bats be identified in a facility proposed for modification or demolition, the Homestead ARB natural resource manager would contact the USFWS to develop the appropriate plans prior to any construction. Homestead ARB would continue to employ measures outlined in the Florida Bonneted Bat Management Plan to avoid impacts to local populations near the installation. As a result, the USAF has determined that the proposed action *May Affect but is Not Likely to Adversely Affect* the Florida bonneted bat. Consultation with the USFWS regarding the proposed action is complete (USFWS 2019).

Wood Stork *(Mycteria americana).* At Homestead ARB, wood storks (up to 10) have been regularly observed foraging near Twin Lakes in the winter. Additionally, flyover groups (of about 10 to 20) of wood storks have been observed annually passing through to nearby off-base shallow canals (Homestead ARB 2018a). Although the base is located in the USFWS-designated consultation area for this species, no nesting has been reported on the base.

All shallow wetland areas would be avoided during construction, demolition, and renovation activities associated with facility and infrastructure projects. Impacts could occur from aircraft strikes. However, proactive management of BASH issues would continue and the installation BASH Plan would be followed to minimize and avoid direct, adverse impacts. No strikes of the wood stork have been recorded at Homestead ARB (Andrejko 2018). As a result, the USAF has determined that the proposed action *May Affect but is Not Likely to Adversely Affect* the wood stork.

Everglade Snail Kite *(Rostrhamus sociabilis plumbeus).* Historical observations of the Everglade snail kite at Homestead ARB are rare. Homestead ARB is not located in the USFWS-designated Everglade snail kite consultation area. Additionally, no suitable habitat for this federally listed bird species is present within the proposed action area. Direct adverse impacts (mortality) to the Everglade snail kite could result from aircraft strikes. Proactive management of BASH issues would continue on Homestead ARB and the BASH Plan would be followed to minimize and avoid direct adverse impacts to Everglade snail kite. No strikes of the Everglade snail kite have been recorded and there have been infrequent occurrences at Homestead ARB (Andrejko 2018). As a result, USAF determined that the proposed action *May Affect but is Not Likely to Adversely Affect* the Everglades snail kite.

Least Tern *(Sterna antillarum).* The least tern is known to occasionally stopover at Homestead ARB near some of the standing water areas along Perimeter Road. Nesting was historically reported, although no details are available at this time. The AFRC F-35A mission would avoid all wetland areas. Impacts could occur from aircraft strikes. However, proactive management of BASH issues would continue and the installation BASH Plan would be followed to minimize and avoid direct, adverse impacts. No strikes of the least tern have been recorded at Homestead ARB (Andrejko 2018). As a result, the USAF has determined that implementation of the AFRC F-35A mission *May Affect but is Not Likely to Adversely Affect* the least tern.

Rufa Red Knot *(Calidris canutus rufa).* Historical observations of the rufa red knot at Homestead ARB are extremely rare. No suitable habitat for this federally listed bird species is present in the proposed action area. Impacts could occur from aircraft strikes. However, proactive management of BASH issues would continue and the installation BASH Plan would be followed to minimize and avoid direct, adverse impacts. No strikes of the rufa red knot have been recorded at Homestead ARB (Andrejko 2018). As a result, the USAF has determined that implementation of the AFRC F-35A mission *May Affect but is Not Likely to Adversely Affect* the rufa red knot.

American Alligator *(Alligator mississippiensis).* The American alligator has been observed in the lakes and canals on Homestead ARB. Reduced water quality from facility and infrastructure project activities that could affect the waterways could result in indirect impacts to this species. However, implementation of the SWPPP and Best Management Practices (BMPs), implementation of the Integrated Pest Management Plan (IPMP), and minimizing disturbance to alligator habitat would reduce the overall potential for direct, adverse impacts. Should this species be observed during construction, demolition, or renovation activities associated with the proposed action, activities would be stopped and AFRC biologists would safely capture the animal and relocate it outside of the project footprint as authorized by the FWC (Homestead ARB 2018b). Therefore, the USAF has determined that implementation of the AFRC F-35A mission would have *No Effect* on the American alligator.

American Crocodile *(Crocodylus acutus).* The canals and lakes on Homestead ARB provide habitat for the American crocodile and they can access the installation over land areas to gain access to waterbodies on Homestead ARB. Reduced water quality from facility and infrastructure project activities that could affect the waterways could result in indirect impacts to this species. However, implementation of the SWPPP and BMPs, implementation of the IPMP, and minimizing disturbance to crocodile habitat would reduce the overall potential for direct, adverse impacts. Should this species be observed during construction, demolition, or renovation activities associated with the proposed action, activities would be stopped and AFRC biologists would safely capture the animal and relocate it outside of the project footprint as authorized by the USFWS (Homestead ARB 2018c). Therefore, the USAF has determined that implementation of the AFRC F-35A mission would have *No Effect* on the American crocodile.

Eastern Indigo Snake *(Drymarchon corais couperi).* Over most of its range, the eastern indigo snake frequents a variety of habitat types, including pine flatwoods, scrubby flatwoods, high pine, dry prairie, tropical hardwood hammocks, edges of freshwater marshes, agricultural fields, coastal dunes, and human-altered habitats (Homestead ARB 2018c). No preferred suitable habitat for the eastern indigo snake is present in the proposed action area at Homestead ARB. Eastern indigo snakes would likely avoid areas of high human activity. Should an eastern indigo snake be observed in the proposed action area, the Homestead ARB natural resource manager would be contacted to assess the potential for direct, adverse impacts. Coordination with the USFWS would continue through the installation INRMP program. As a result, the USAF has determined that implementation of the AFRC F-35A mission would have *No Effect* on the eastern indigo snake.

Sand Flax *(Polygala smallii).* Various populations of sand flax have been identified throughout Homestead ARB (Homestead ARB 2018a). Populations are concentrated in the west-central portion of the base, primarily in the munitions area, which is less disturbed and has a higher quality of habitat than most other areas on the base. Populations are also known to occur in the Northeast Grasslands and along the edge of remnant pineland tract on the base (Andrejko 2018, Homestead ARB 2018a). Suitable habitats and known populations of sand flax occur near the proposed action area (Figure HS2-1). All construction, demolition, and renovation activities associated with facility and infrastructure projects would avoid these areas to prevent any direct "take" of the species. Homestead ARB would continue to adhere to the Protected Plant Management Plan (PPMP) that employs management actions to promote the preservation and maintenance of suitable habitats for rare plants at the base (Homestead ARB 2018a). Prior to any construction, demolition, or renovation actions, Homestead ARB would coordinate with the USFWS to determine potential direct, adverse impacts to federally listed plant species. If sand flax plants are identified to be impacted by construction, the BO specifies a replanting ratio of 5:1 (number of plants replaced: number of plants affected). Additionally, coordination with the USFWS would continue through the installation INRMP program. As a result, the USAF has determined that implementation of the AFRC F-35A mission would have *No Effect* on suitable habitats and known populations of sand flax at Homestead ARB.

Small's Milkpea *(Galactia smallii)*. Various populations of Small's milkpea have been identified throughout Homestead ARB (Homestead ARB 2018a). Suitable habitats and known populations of Small's milkpea occur near the proposed action area (Figure HS2-1). All construction, demolition, and renovation activities associated with facility and infrastructure projects would avoid these areas to prevent any direct "take" of the species. Homestead ARB would continue to adhere to the PPMP that employs management actions to promote the preservation and maintenance of suitable habitats for rare plants at the installation (Homestead ARB 2018a). Prior to any construction, demolition, or renovation actions, Homestead ARB would coordinate with the USFWS to determine potential direct, adverse impacts to federally listed plant species. If Small's milkpea plants are identified to be impacted by construction, the BO specifies a replanting ratio of 3:1 (number of plants replaced: number of plants affected). Additionally, coordination with the USFWS would continue through the installation INRMP program. As a result, the USAF has determined that implementation of the AFRC F-35A mission would have *No Effect* on suitable habitats and known populations of Small's milkpea at Homestead ARB.

HS3.6.2.3.2 USFWS Correspondence

On 2 July 2018, the USFWS responded to the USAF's request for coordination and recognized the potential for adverse effects to the Florida bonneted bat from proposed renovation and demolition activities. The USFWS referred to minimization measures that could be implemented to assist in determining impacts to the Florida bonneted bat. Those minimization efforts are previously described under **Florida Bonneted Bat** and would be incorporated into construction plans should Homestead ARB be selected for the AFRC F-35A mission. The USFWS also requested additional preconstruction evaluation for federally listed plant species depending upon the location of proposed construction and renovation projects. As described above, the BO includes guidelines on replanting ratios for impacted plants and monitoring and reporting requirements. Consultation with the USFWS regarding the proposed action is complete (USFWS 2019).

HS3.6.2.3.3 Migratory Birds

Implementation of the AFRC F-35A mission at Homestead ARB would result in a 3 percent increase in annual total airfield operations. The slight increase in operations could result in an increased opportunity for bird-aircraft strikes to occur. Adherence to the existing BASH program would minimize the risk of bird-aircraft strikes including those for migratory birds to negligible levels (Section HS3.4.1.5). Noise-related impacts to migratory birds nesting near Homestead ARB would be the same as those described for other wildlife. Minimal impacts to migratory birds protected under the MBTA would result from implementation of the proposed AFRC F-35A mission at Homestead ARB.

HS3.6.2.3.4 Bald and Golden Eagles

No bald or golden eagle nesting is known to occur at Homestead ARB, or in the immediate vicinity of the installation; therefore, impacts to sensitive nesting habitat would not occur. Bald eagles are known to forage near the installation and noise-related impacts to these bald eagles would be similar to that described for other wildlife. No significant impacts to eagles are anticipated to result from implementation of the proposed AFRC F-35A mission in the ROI near Homestead ARB.

HS3.6.2.3.5 State-Listed Species

Under the INRMP program and USDA Wildlife Management Program, Homestead ARB would continue to manage and monitor populations of state-listed species (Homestead ARB 2018, Andrejko 2018). Habitats for Florida burrowing owl, gopher tortoise, and the rim rock crowned snake would not be impacted by facility and infrastructure projects associated with the proposed action because no suitable habitats for these species are present within the proposed project areas. No impacts to state-listed species would result from implementation of the proposed AFRC F-35A mission at Homestead ARB.

HS3.6.2.4 Wetlands

Construction, demolition, and renovation projects associated with the proposed action would not occur within or near any wetland areas. Therefore, there would be no impacts to wetlands at Homestead ARB.

HS3.6.3 Airspace Affected Environment

The ROI for biological resources under airspace is defined as the primary airspace and ranges where AFRC F-35A pilots would predominantly fly.

HS3.6.3.1 Vegetation

The airspace proposed for use by AFRC F-35A pilots from Homestead ARB covers approximately 3,317 square miles of land over Florida and 35,760 square miles of water over the Gulf of Mexico and Atlantic Ocean. The primary range area proposed for use covers approximately 2,278 square miles of land over Florida and the primary airspace proposed for use covers approximately 4,050 square miles over the Gulf of Mexico and Atlantic Ocean (Figure HS2-2). No vegetation communities are located under the primary airspace proposed for use because it occurs entirely over open water. Vegetation communities under the primary range area include those of the Southern Florida Coastal Plain ecoregion's four distinct subregion; Everglades, Big Cypress, Miami Ridge and Atlantic Coastal Strip, and the Southern Coast and Islands. Each subregion has distinctive physical and biological characteristics that influence the type and spatial distribution of vegetation and land cover (USGS 2009).

HS3.6.3.2 Wildlife

The Southern Florida Coastal Plain ecoregion supports a wide diversity of terrestrial and aquatic plant and animal habitats (USGS 2009). Native animals include alligators, crocodiles, manatees, and an expansive variety of birds, fish, and turtles.

Because operations associated with the proposed action at Homestead ARB would occur in existing airspace over the Gulf of Mexico and Atlantic Ocean, species protected under the U.S. Marine Mammal Protection Act (MMPA) were considered. Twenty-eight (28) different species of marine mammals are known to occur in the Gulf of Mexico and 24 are known to occur in the Atlantic Ocean. All of these species are protected under the MMPA and 11 are also listed as threatened, endangered, or previously endangered under the ESA (NOAA 2012, 2018a,b).

HS3.6.3.3 Threatened, Endangered, and Special Status Species

HS3.6.3.3.1 Federally Listed Species

Federally listed threatened, endangered, and/or candidate species that could occur within the six counties included in the analysis of primary airspace and range areas proposed for use are presented in Table HS3-32. Due to the limited nature of ground disturbance in the areas under the primary airspace, plant, invertebrate, and fish species were excluded from further analysis. Critical habitat for the West Indian manatee (*Trichechus manatus*) is present under the primary airspace proposed for use (USFWS 2018c).

Table HS3-32. Federally Listed Species with Potential to Occur Under the Primary Airspace and the Primary Range Associated with the Proposed Action at Homestead ARB

Common Name	Scientific Name	Federal Listing Status	Habitat
Mammals			
Florida Bonneted Bat	*Eumops floridanus*	FE	The Florida bonneted bat roosts in rock crevices, old trees with suitable cavities, buildings, and Spanish tile roofs. The species feeds in very open areas and at high altitudes.
West Indian Manatee	*Trichechus manatus*	FT	West Indian manatees require access to aquatic vegetation, freshwater sources, and at least 2 meters of water depth. The species feeds along grass bed margins with access to deep water channels, where they flee when threatened.
Florida Panther	*Puma (=Felis) concolor coryi*	FE	The Florida panther occurs in forested areas, marsh shrub swamps, and prairie grasslands, with agricultural lands and other habitat types used in proportion to their availability. Large contiguous areas of suitable habitat are needed to meet the social, reproductive, and energetic needs of the species.
Puma	*Puma concolor (*all subsp. except *coryi)*	FT	Pumas have an extensive range and can be found from Canada to Argentina.
Southeastern Beach Mouse	*Peromyscus polionotus niveiventris*	FT	Habitat includes the sea oats (*Uniola paniculata*) zone of primary coastal dunes. This subspecies has also been reported from sandy areas of adjoining coastal strand vegetation which refers to a transition zone between the foredune and the inland plant community.
Birds			
Wood Stork	*Mycteria americana*	FT	Wood storks occur in shallow wetland areas where fish are plentiful. The species has been observed in the wetland areas on Homestead ARB near Twin Lakes.
Least Tern	*Sterna antillarum*	FE	Least terns occur along waterways, including reservoirs, refuges, and rivers. During migration the species is found on open flat beach areas. Least terns nest on the ground in open areas and near appropriate feeding habitat.
Everglade Snail Kite	*Rostrhamus sociabilis plumbeus*	FE	Habitat includes freshwater marshes and shallow vegetated edges of natural or man-made lakes where apple snails can be found. Because of its specific dietary and hydrological requirements, the Everglade snail kite is restricted to the watersheds of the Everglades, Lake Okeechobee, Lake Kissimmee, and the upper St. Johns River.

Table HS3-32. Federally Listed Species with Potential to Occur Under Primary Airspace and Primary Ranges Associated with the Proposed Action at Homestead ARB (Continued)

Common Name	Scientific Name	Federal Listing Status	Habitat
Birds (Continued)			
Rufa Red Knot	*Calidris canutus rufa*	FT	Rufa red knots winter in Florida from December to February, but could be present in some wintering areas as early as September or as late as May. Habitat includes intertidal, marine habitats, especially near coastal inlets, estuaries, and bays during the non-breeding season.
Piping Plover	*Charadrius melodus*	FT	Piping plovers winter in Florida and use coastal beaches, sandflats, and mudflats.
Roseate Tern	*Sterna dougallii*	FT	The roseate tern is a migratory, marine bird that could occur at Biscayne Bay. Preferred nesting habitat is open, sandy beach isolated from human activity and predators, although rooftops are also used.
Audubon's Crested Caracara	*Polyborus plancus audubonii*	FT	Open country, including dry prairie and pasture lands with cabbage palm, cabbage palm/live oak hammocks, and shallow ponds and sloughs. Preferred nest trees are cabbage palms, followed by live oaks.
Florida Grasshopper Sparrow	*Ammodramus savannarum floridanus*	FE	The Florida grasshopper sparrow is non-migratory and limited to the prairie region of south-central Florida. Habitat consists of large (greater than 50 hectares), treeless areas of frequently burned dry prairie habitat, with patchy open areas sufficient for foraging.
Florida Scrub-jay	*Aphelocoma coerulescens*	FT	The Florida scrub-jay inhabits scrub and scrubby flatwoods along the coastlines, high central ridges, and ancient shorelines of the Florida Peninsula. The species also occurs inland on scattered alluvial deposits bordering several major rivers. Habitat is dominated by several evergreen oaks (*Quercus ilex*).
Ivory-billed Woodpecker	*Campephilus principalis*	FE	The ivory-billed woodpecker was historically described as a resident of large, contiguous forests with numerous large trees. In Florida, bald cypress was noted as an important component of the forest used by this species, especially in conjunction with an adjacent pine forest.
Red-cockaded Woodpecker	*Picoides borealis*	FE	The red-cockaded woodpecker inhabits open, mature pine woodlands that have a diversity of grass, forb, and shrub species. The species generally occupies longleaf pine flatwoods in north and central Florida, mixed longleaf pine and slash pine in south-central Florida, and slash pine in south Florida outside the range of longleaf pine. Red-cockaded woodpeckers forage in several forested habitat types that include pines of various ages, but the species prefers more mature pines.
Reptiles			
American Alligator	*Alligator mississippiensis*	FT	American alligators and crocodiles inhabit fresh and brackish marshes, ponds, lakes, rivers, swamps, bayous, canals, and large spring runs. Basking occurs on partially submerged logs or on land next to the water. Alligators dig dens in river or lake margins or in marshes.
American Crocodile	*Crocodylus acutus*	FT	
Eastern Indigo Snake	*Drymarchon corais couperi*	FT	Eastern indigo snakes frequent a variety of habitat types including pine flatwoods, scrubby flatwoods, high pine, dry prairie, tropical hardwood hammocks, edges of freshwater marshes, agricultural fields, coastal dunes, and human-altered habitats.

Table HS3-32. Federally Listed Species with Potential to Occur Under Primary Airspace and Primary Ranges Associated with the Proposed Action at Homestead ARB (Continued)

Common Name	Scientific Name	Federal Listing Status	Habitat
Reptiles (Continued)			
Bluetail Mole Skink	*Eumeces egregius lividus*	FT	Bluetail mole skinks require loose sand for burrowing. Inhabit sandhill and xeric hammocks, oak and sand pine scrubs, and turkey oak barrens in Florida.
Sand Skink	*Neoseps reynoldsi*	FT	Sand skins occur in woodlands or mixed woodlands and have been documented on Central Florida's sand ridges.

Key: FE = federally endangered; FT = federally threatened
Source: Andrejko 2018; FNAI 2001a-d; 2018a-c; Homestead ARB 2011, 2017, 2018a.b, NatureServe 2018a, b; USDA 2018; USFWS 1999, 2008a, 2009, 2010a, b, 2013, 2014, 2016, 2017a, b, 2018

HS3.6.3.3.2 Migratory Birds

The primary airspace and range areas proposed for use are located in the USFWS-designated Bird Conservation Region 31 Peninsular Florida under the Atlantic Flyway (USFWS 2008b). Under AFI 91-202 and AFI 91-212, Homestead ARB employs a BASH Plan that establishes an overall bird/wildlife control program to minimize aircraft exposure to potentially hazardous wildlife strikes.

HS3.6.3.3.3 Bald and Golden Eagles

Florida has one of the highest concentrations of nesting bald eagles in the lower 48 states. An estimated 1,499 nesting pairs were recorded in Florida in 2014, compared to 88 active nests in 1973. Nesting territories are concentrated around inland lake and river systems in peninsular Florida, such as the Kissimmee Chain of Lakes, and along the Gulf coast. Bald eagles use forested habitats for nesting and roosting, and expanses of shallow fresh or salt water for foraging. According to the FWC Eagle Nest Locator, three bald eagle nests are located under the primary airspace and range areas proposed for use. All three nests are located within the Everglades and Francis S. Taylor Wildlife Management Area. Of the three nests, only two have been documented active within the last 5 years (FWC 2016a).

HS3.6.4 Airspace Environmental Consequences

Impacts to biological resources occurring under the airspace proposed for use by AFRC F-35A pilots could result from overflights and associated noise, the use of munitions and flares, and bird-aircraft collisions. However, aircraft sorties in the airspace proposed for use would decrease by approximately 0.2 percent from baseline sorties. A review of current literature evaluating potential noise effects on wildlife is presented in Volume II, Appendix B.

HS3.6.4.1 Vegetation

Ground disturbance beneath the airspace proposed for use would be limited to the use of flares and munitions, which would be less than or the same as what is currently being used by F-16 pilots from Homestead ARB and would only occur in areas that are currently approved for such use. No significant impacts to vegetation would result from implementation of the AFRC F-35A mission in the areas under the airspace proposed for use by AFRC F-35A pilots stationed at Homestead ARB.

HS3.6.4.2 Wildlife

All airspace proposed for use by AFRC F-35A pilots is currently used as active military airspace by military jet aircraft; therefore, no new types of impact would be introduced into these areas as a result of introducing the F-35A aircraft. Potential impacts for overflights and associated noise, munitions and flares, and bird-aircraft collisions are described as follows. A comprehensive review of current literature evaluating potential effects on wildlife and habitat from overflight, noise, and sonic booms is presented in Volume II, Appendix B.

As shown on Figure HS3-4, L_{dnmr} would increase by as much as 6 dB beneath the training airspace. Wildlife that are under the path of training overflights would be exposed to short, but intense noise events from overflights.

Some physiological/behavioral responses (from both subsonic and supersonic noise) such as increased hormonal production, increased heart rate, and reduction in milk production have been described in a small percentage of studies. A majority of the studies focusing on these types of effects have reported short-term or no effects.

The relationships between physiological effects and how species interact with their environments have not been thoroughly studied. Therefore, the larger ecological context issues regarding physiological effects of jet aircraft noise (if any) and resulting behavioral pattern changes are not well understood.

Animal species exhibit a wide variety of responses to noise. It is therefore difficult to generalize animal responses to noise disturbances or to draw inferences across species, as reactions to jet aircraft noise appear to be species-specific. Consequently, some animal species could be more sensitive than other species and/or could exhibit different forms or intensities of behavioral responses. For instance, the results of one study indicate that wood ducks appear to be more sensitive to noise and more resistant to acclimation to jet aircraft noise than Canada geese (Edwards et al. 1979). Similarly, wild ungulates (e.g., deer) seem to be more easily disturbed than domestic animals.

Animal responses to aircraft noise appear to be somewhat dependent on, or influenced by, the size, shape, speed, proximity (vertical and horizontal), engine noise, color, and flight profile of planes. Other factors influencing response to jet aircraft noise could include wind direction, speed, and local air turbulence; landscape structures (i.e., amount and type of vegetative cover); and, in the case of bird species, whether the animals are in the incubation/nesting phase. Proposed AFRC F-35A training would primarily occur at high altitudes, with 94 percent of total training time being spent at altitudes above 10,000 feet MSL. The higher flight profile could reduce the response of wildlife to aircraft noise.

The literature does suggest that common responses include the “startle” (or “fright”) response and, ultimately, habituation. It has been reported that the intensities and durations of the startle response decrease with the numbers and frequencies of exposures, suggesting no long-term adverse effects. The majority of the literature suggests that domestic animal species (cows, horses, chickens) and wildlife species exhibit adaptation, acclimation, and habituation after repeated exposure to jet aircraft noise.

In summary, adverse behavioral responses ranging from mild to severe could occur in individual animals as a result of loud overflights. Mild responses include head raising, body shifting, or turning to orient toward the aircraft. Moderate responses could include nervous behaviors, such as trotting a short distance. Escape is the typical severe response (Volume II, Appendix B).

AFRC F-35A pilots would conduct supersonic flight at altitudes and within airspace already authorized for such activities. Because no airspace over land is approved for supersonic flight, AFRC F-35A pilots would not conduct supersonic training in any airspace located over land. Supersonic flights are currently authorized over water in W-168, W-174, and W-465. Supersonic flights are not authorized within 12 NM of Fort Jefferson in Dry Tortugas National Park unless flight paths are straight, level, and higher than 20,000 feet MSL. Supersonic flights would only be conducted over open ocean and more than 15 NM from any land area. Only about 10 percent of the time spent in air combat training would involve supersonic flight. Additionally, 90 percent of supersonic flight would occur at altitudes above 10,000 feet. Overall sorties in the airspace are anticipated to decrease slightly under the proposed action, and the number of sonic booms would decrease proportionally. Therefore, no additional impacts related to supersonic noise are anticipated.

Flares would be used as a defensive countermeasure by AFRC F-35A pilots during training operations. Flares would only be used in airspace areas currently approved for such use. Flare use by AFRC F-35A pilots would conform to existing altitude and seasonal restrictions to ensure fire safety. Based on the emphasis on flight at higher altitudes for the F-35A, roughly 90 percent of flares released throughout the authorized airspace would occur above 15,000 feet MSL, further reducing the potential risk for accidental fires or adverse impacts to underlying land areas and habitats. Ordnance delivery would only occur in ranges authorized for use. AFRC F-35A pilots would use less than or the same amount of flares and ordnance as the current F-16 mission, resulting in no change to the potential for adverse impacts to wildlife under the training airspace.

AFRC F-35A pilots would fly at higher altitudes than F-16 pilots, with the majority (99 percent) of sorties occurring above 5,000 feet AGL (sorties under 5,000 feet AGL would occur less frequently than baseline sorties). Most birds fly below 500 feet, except during migration. No F-35A low-level flight training is expected to occur below 500 feet AGL and the potential for bird-aircraft collisions is anticipated to be minor.

The proposed AFRC F-35A operations would occur in existing airspace and ranges over the Gulf of Mexico and Atlantic Ocean where various protected species of marine wildlife occur. The number of sorties would remain the same (under airspace areas W-465 A, B, D) or substantially decrease (under W-168 and W-174 A, B, C, E, F, G) (Table HS3-1). The USAF has determined that the implementation of the AFRC F-35A mission would not result in reasonably foreseeable takes of a marine wildlife species (including marine mammals, sea turtles, fish, and birds) by harassment, injury, or mortality, as defined under the MMPA.

HS3.6.4.3 Threatened, Endangered, and Special Status Species

HS3.6.4.3.1 Federally Listed Species

No adverse impacts to federally listed species are anticipated to result from implementation of the proposed AFRC F-35A mission at Homestead ARB.

HS3.6.4.3.2 Migratory Birds

Implementation of the AFRC F-35A mission at Homestead ARB would result in a slight decrease (0.2 percent) in aircraft sorties. A slight decrease in sorties could result in a decreased opportunity for bird-aircraft strikes. Current procedures for avoiding flight operations during periods of high concentrations of migratory birds (both in space and time) would continue. Adherence to the existing BASH program would minimize the risk of bird-aircraft strikes, including those for migratory birds, to negligible levels (Section HS3.4). Due to the predominant use of higher altitudes, implementation of the proposed AFRC F-35A mission would result in minimal impacts to migratory birds protected under the MBTA.

HS3.6.4.3.3 Bald and Golden Eagles

Potential impacts to eagles and habitats that occur in areas under the primary airspace and range areas would be similar to those described in Section HS3.6.4.2. AFRC F-35A pilots would fly at higher altitudes than A-10, F-15, F-16, and F-18 pilots, reducing the potential for BASH. As such, no impacts to eagles would result from implementation of the proposed AFRC F-35A mission at Homestead ARB.

HS3.6.5 Summary of Impacts to Biological Resources

Construction activities on the base would occur in previously disturbed areas. Impacts to wetlands and protected species would not result from implementation of the proposed action. Noise resulting from construction activities would have minimal impacts to wildlife. Aircraft operations near Homestead ARB and in the airspace proposed for use would expose some animal species to increased levels of noise. The 3.0 percent increase in aircraft operations at Homestead ARB and the 0.2 percent decrease in sorties in the airspace proposed for use could result in slight increases in bird-aircraft strikes. Impacts to biological resources are not anticipated to be significant.

HS3.7 CULTURAL RESOURCES

Cultural resources are historic districts, sites, buildings, structures, or objects considered important to a culture, subculture, or community for scientific, traditional, religious, or other purposes. They include archaeological resources, architectural/engineering resources, and traditional resources. Cultural resources that are eligible for listing on the National Register of Historic Places (NRHP) are known as historic properties.

HS3.7.1 Base Affected Environment

HS3.7.1.1 Architectural Resources

Historical building inventories at Homestead ARB (Mariah Associates, Inc. 1994, NPS 1995, URS 2013, Homestead ARB 2018d) have identified one resource that is eligible for listing in the NRHP. A K-9 cemetery is located near the southwest end of the runway. The cemetery was started sometime in the 1950s and used throughout the Vietnam War-era for security dogs that patrolled the base. No other NRHP-eligible resources are present on the installation.

HS3.7.1.2 Archaeological Resources

The National Park Service (NPS) conducted an archaeological survey at Homestead AFB (NPS 1995). This survey concluded that no archaeological sites are located in the developed portions of the base and almost no potential exists for the discovery of sites in the future. The Florida SHPO concurred with the findings of this report in a letter dated 9 January 1998. While the NPS survey did not locate any archaeological sites, the 2017 Integrated Cultural Resources Management Plan (ICRMP) indicates that the undeveloped pine rockland habitat along the western boundary of the base could possibly contain archaeological resources (Homestead ARB 2018d).

HS3.7.1.3 Traditional Resources

Homestead ARB has identified five tribes potentially affiliated with the installation. These tribes, listed in Table A-1 in Volume II, Appendix A, Section A.2.5.2, were asked to provide information on any properties to which they attach religious or cultural significance. No known tribal sacred sites or properties of traditional religious and cultural importance are located on Homestead ARB.

HS3.7.2 Base Environmental Consequences

Implementation of the proposed AFRC F-35A mission at Homestead ARB would include the construction of two new facilities, demolition of one building, and eight renovation projects (Table HS2-1 and Figure HS2-1). All buildings within the Area of Potential Effects (APE) have been evaluated for NRHP eligibility and determined non-eligible. The Florida SHPO concurred with these findings in a letter dated 27 November 2018 (Volume II, Appendix A, Section A.2.5.3).

No impacts to known archaeological resources would result from implementation of the proposed AFRC F-35A mission at Homestead ARB. All areas of the base proposed for construction are either in areas that have already been disturbed by previous construction or have been inventoried for archaeological resources. No NRHP-eligible archaeological resources have been identified in the APE. Because ground-disturbing activities would occur in previously disturbed and inventoried areas, it is extremely unlikely that any previously undocumented archaeological resources would be encountered during facility demolition, renovation, addition, or construction. In the case of unanticipated or inadvertent discoveries, the USAF would comply with NHPA and Native American Graves Protection and Repatriation Act (NAGPRA) regulations.

The single NRHP-eligible facility located on the installation (K-9 Cemetery) is located outside the APE and there would be no direct impact to historic properties. Indirect impacts on this facility from population changes, noise, or visual intrusions would be extremely unlikely. The total authorized personnel for Homestead ARB would decrease (2.7 percent) with the proposed action. This small population change would not have an indirect impact on cultural resources at the installation. Noise levels at the K-9 Cemetery are not anticipated to change and there would be no noise-related impacts to this resource as a result of implementing the proposed action. Visual intrusion from the proposed action would not be a significant issue. New construction would occur in the context of an active USAF base, where changes in the infrastructure are common. The viewshed of remaining historic properties would not be affected by the proposed construction.

No Section 106 impacts to tribal resources or traditional cultural properties are anticipated to result from implementation of the AFRC F-35A mission. As required by Sections 101(d)(6)(B) and 106 of the NHPA; implementing regulations prescribed in 36 *CFR* Section 800.2(c)(2); EO 13175, *Consultation and Coordination with Indian Tribal Governments;* DoDI 4710.02; and AFI 90-2002, *Air Force Interactions with Federally-Recognized Tribes,* Homestead ARB initiated Section 106 government-to-government consultation with five tribes to identify traditional cultural properties. Volume II, Appendix A, Section A.2.5.2, contains a record of these consultations. The consultation correspondence included an invitation to participate in the NEPA process, and an invitation to consult directly with the Homestead ARB Commander regarding any comments, concerns, and suggestions. All five tribes responded to the request for consultation. Two tribes, the Muscogee (Creek) Nation and the Poarch Band of Creek Indians, indicated that the APE is outside of their historic area or that no known resources are located in the APE. The Miccosukee Tribe of Indians of Florida did not indentify any known resources in the APE and asked to receive future project information. The Seminole Tribe of Florida had no objections to the project. The Seminole Nation of Oklahoma requested additional information from Homestead ARB. Homestead ARB has responded to that request for information and consultation with all tribes is complete. Homestead ARB will continue to coordinate with interested tribes throughout the EIS process.

HS3.7.3 Airspace Affected Environment

Table HS3-33 presents the NRHP-listed sites and Native American Reservation lands under the training airspace proposed for use by AFRC F-35A pilots operating at Homestead ARB. The Homestead ARB training airspace overlies at least part of 11 Florida counties (Desoto, Glades, Hardee, Highlands, Lake, Marion, Okeechobee, Osceola, Polk, Putnam, and Volusia) as well as several overwater areas in the Gulf of Mexico and Atlantic Ocean.

Fifty (50) NRHP-listed properties have been identified under Homestead ARB airspace. Forty-two (42) of these are located under the primary airspace and range proposed for use. One Native

American tribe is known to own land under the proposed airspace (Miccosukee Tribe of Indians of Florida). No known traditional cultural resources have been identified under the airspace. It is possible that such resources could exist in the area as the exact location of some traditional cultural resources is confidential.

Table HS3-33. NRHP-Listed Sites and Native American Reservation Lands Under Homestead ARB Training Airspace

Airspace Designations	Number of NRHP Properties Under Airspace[a]	Native American Reservation Lands Under Airspace[a]
Lake Placid MOA	44	Miccosukee Tribe of Indians of Florida
R-2901A	1	None
R-2907B/C	2	None
W-174B/F	3	None

[a] Due to the sensitivity of the locations, archaeological sites are not included in this table or shown on any figures.

HS3.7.4 Airspace Environmental Consequences

Implementation of the proposed action would result in a minor decrease (0.2 percent) in the annual sorties conducted in the airspace proposed for use. As described in Section HS3.2, L_{dnmr} under the training airspace would remain the same or increase by up to 6 dB. The highest increase in noise levels would occur around the APAFR Complex (R-2901B, Avon East MOA). L_{dnmr} under the training airspace would not exceed 56 dB. Supersonic flights would not occur in airspace over mainland Florida, but could occur offshore in W-174A through G and W-465A/B. Supersonic flights are not authorized within 12 NM of Fort Jefferson in Dry Tortugas National Park unless flight paths are straight, level, and higher than 20,000 feet MSL. Should the AFRC F-35A mission be located at Homestead ARB, the F-35A pilots would follow the existing restrictions for supersonic flight.

No impacts on historic properties under the Homestead ARB training airspace are expected. Scientific studies of the effects of noise and vibration on historic properties have considered potential impacts on historic buildings, prehistoric structures, water tanks, archaeological cave/shelter sites, and rock art. These studies have concluded that overpressures generated by supersonic overflight were well below established damage thresholds and that subsonic operations would be even less likely to cause damage (see Volume II, Appendix B, Section B.2.10).

Use of ordnance and flares would continue in areas already used for these activities. No additional ground disturbance would occur. Flare and ordnance use is not expected to impact historic properties under the airspace. Existing use of flares and ordnance is not known to have impacted these resources; therefore, the continued use of flares and ordnance from F-35A aircraft is not expected to result in any new impacts.

HS3.7.4.1 Native American Concerns

During scoping, the USAF contacted five federally affiliated Native American tribes to invite them to attend the public meetings and express their concerns about the potential F-35A beddown at Homestead ARB. During the scoping process, including the public meetings, no comments regarding potential impacts on traditional cultural resources or traditional cultural properties were received.

In accordance with Section 106 of the NHPA and EO 13175, USAF also has contacted the five tribes to consult on a government-to-government basis regarding their concerns about potential impacts on traditional cultural resources and traditional cultural properties under the airspace associated with Homestead ARB. All five tribes have responded and USAF consultation with interested tribes is complete.

HS3.7.5 Summary of Impacts to Cultural Resources

No archaeological sites are located in any of the proposed construction footprints at Homestead ARB. In the case of unanticipated or inadvertent discoveries, the USAF would comply with Section 106 of the NHPA. All buildings within the APE at Homestead ARB have been evaluated for NRHP eligibility and determined non-eligible. The Florida SHPO concurred with this determination and the determination of no adverse effects in a letter dated 27 November 2018 (see Volume II, Appendix A, Section A.2.5.3). Homestead ARB has completed Section 106 consultation with five tribes. Coordination with interested tribes will continue throughout the EIS process. No impacts to historic properties under the airspace proposed for use are expected. Implementation of the AFRC F-35A mission is not anticipated to result in significant impacts to cultural resources.

HS3.8 LAND USE AND RECREATION

HS3.8.1 Base Affected Environment

HS3.8.1.1 Land Use

On-base construction would be consistent with established base land uses. Because potential land use consequences would primarily be noise-related, the discussion in this section focuses on noise-related land use regulations and compatibility constraints. The following paragraphs address federal, state, and local statutes, regulations, programs, and plans that are relevant to the analysis of land use for Homestead ARB and the surrounding areas.

Florida Statutes. Chapter 163 of the Florida Statutes guides compatible land-use planning by requiring each local government to adopt a comprehensive plan and establishing minimum criteria which identify required elements of a comprehensive plan. Additionally, Chapter 163 requires local governments near Homestead ARB to address compatibility of land development and to transmit to Homestead ARB any information relating to proposed changes to comprehensive plans, plan amendments, and proposed changes to land development regulations which, if approved, would affect the intensity, density, or use of the land near Homestead ARB. Furthermore, local governments are required to take into consideration any comments and accompanying data provided by Homestead ARB as they relate to the strategic mission of the base, public safety, and the economic vitality associated with the base’s operations. Chapter 163 of the Florida Statutes also allows for a representative of Homestead ARB to serve ex officio as a nonvoting member of the county’s or affected local government’s land planning or zoning board. Homestead ARB has ex officio representation on both the Miami-Dade County Planning Advisory Board and the City of Homestead Planning and Zoning Board.

Miami-Dade County Comprehensive Development Master Plan (CDMP). The Miami-Dade County CDMP expresses the County’s general objectives and policies, addressing where and how it intends development and the conservation of land and natural resources to occur during the next 10 to 20 years (Miami-Dade County 2017). The purpose of Miami-Dade County Code of Ordinances Chapter 33, Article XXXV, *Homestead Air Reserve Base Zoning*, is to enhance and promote the compatibility of adjacent land uses and development with Homestead ARB, and to protect Homestead ARB operations and activities. Additionally, Article XXXV identifies all land within the installation’s FAA Part 77 imaginary surfaces as the “airport hazard area” and establishes limitations on heights, land uses, and permitting. Height limitations apply to any structure or tree that would penetrate the imaginary surface. Furthermore, Article XXXV defines the “Airport Land Use Restriction Area” as consisting of the APZs and the Noise Contour Zones. Within the Airport Land Use Restriction Area, land cannot be used in a manner that would create electrical interference or visual impairments that could interfere with aircraft operations. Additionally, landfills are prohibited within 10,000 feet of the nearest point of the runway; all outdoor lighting designs must incorporate shielding to prevent light from projecting upward; and schools, hospitals, barracks, apartment buildings, religious facilities, and other buildings of public assembly are prohibited in the APZs and within the 75 dB DNL and greater Noise Contour Zones. Residential uses in excess of one dwelling unit per 5 acres are also prohibited in the 75 dB DNL and greater Noise Contour Zones and all new uses within the 65 dB DNL and greater Noise Contour Zones shall incorporate at least a 25-dB outdoor-to-indoor noise level reduction into the design and construction of the structure.

City of Homestead Comprehensive Plan. The comprehensive plan for the City of Homestead describes planning goals and objectives for this area of Miami-Dade County, including areas near Homestead ARB (City of Homestead 2011). The plan addresses compatibility with Homestead ARB in several areas, with a primary objective of maintaining land uses that are compatible with current and future Homestead ARB missions.

City of Homestead Ordinances and Regulations. The City of Homestead has regulations and ordinances that ensure land use and zoning that is compatible with Homestead ARB operations. Specifically, Section 30-6 of the City of Homestead Code of Ordinances (City of Homestead 2019), also known as the Homestead Airport Zoning Ordinance, establishes standards for airport obstructions, noise impacts, and land use compatibility to promote the public health, safety, and welfare of residents, as well as protect the utility and capacity of Homestead ARB. Additionally, the Homestead Airport Zoning Ordinance creates specific zones of differing height restrictions and noise level reductions; establishes certain land use limitations by zone; and establishes procedures for their orderly administration and enforcement. The Homestead Airport Zoning Ordinance also establishes a “Height and Hazard Zone”, which includes all of the land and air within the approach/departure, primary, transitional, inner and outer horizontal, CZ, and conical surfaces as they apply to Homestead ARB and the land beneath these surfaces (City of Homestead 2019). Land use restrictions within the Height and Hazard Zone closely emulate those listed in AFH 32-7084, to the extent that a detailed Land Use Compatibility Standards Chart is provided to delineate compatibility between land use type and the Accident, Hazard, and Noise zones. In addition, any land sold or developed around Homestead ARB must include a disclosure to the buyer that the land is located in the Homestead ARB military zone.

Surrounding Land Use. Land use around Homestead ARB is a mixture of commercial, residential and agricultural. To the east and south, land use is primarily agricultural. Most of the urban development near the base is to the north and west and within the Miami-Dade County Urban Development Boundary (UDB). The UDB, as defined in the CDMP, includes portions of the county where urban development is acceptable. The Urban Expansion Area (UEA), as defined in the CDMP, is where development is planned over the next 10 to 20 years. Two UEAs, UEA Number 3 and UEA Number 4, are located near Homestead ARB. UEA Number 3 is comprised of 3,124 acres located northeast of Homestead ARB; UEA Number 4 is comprised of 460 acres located southwest of Homestead ARB and contains portions of APZ I and APZ II. In May 2017, Miami-Dade County Mayor Carlos Gimenez created the Miami-Dade County UEA Task Force with the purpose of providing recommendations on the following topics:

- Changes to the current boundaries of the UEAs;
- Creation of new UEAs; and
- Changes to the criteria that should be considered for applications requesting expansion of the UDB.

The Task Force members represented a variety of interests, including environmental, agricultural, development, property owners, rock mining, and Homestead ARB. Eighty-five (85) percent of the Task Force recommended that Homestead ARB APZs remain classified as areas that "shall not be considered" for UDB expansion. Additionally, in the cases of both UEA Number 3 and UEA Number 4, 75 percent of respondents recommended either eliminating the UEAs entirely or contracting them to exclude restrained areas (including APZs). Furthermore, the Task Force included the need to "ensure compatibility with HARB [Homestead ARB]" as a priority. The 2015 and 2025 land use plan for Miami-Dade County identifies all areas directly north, south, and east of the base as agricultural or open land use types. Areas adjacent to the western boundary of the base, away from the flightline, are zoned primarily as residential. In 2017, Miami-Dade County modified the Miami-Dade County Code to establish the Homestead ARB zoning regulations to enhance and promote the compatibility of adjacent land uses and development with the base and protection of base operations and activities (Article XXXV Miami-Dade County, Florida Code). As identified in Table HS3-34, under baseline conditions, land uses exposed to DNL of 65 dB or greater primarily consist of open areas, followed by recreational areas and water.

Table HS3-34. Off-Base Acres Currently Exposed to DNL of 65 dB or Greater at Homestead ARB

Land Use Category[a]	DNL (dB)					
	65–69	70–74	75–79	80–84	≥ 85	Total
Commercial	0	6	14	2	0	22
Industrial	67	18	4	0	0	89
Open	701	293	67	10	1	1,072
Public/Quasi-Public	148	114	1	0	0	263
Recreational	128	0	0	0	0	128
Residential	0	0	0	0	0	0
Water	113	5	0	0	0	118
Total	**1,157**	**436**	**86**	**12**	**1**	**1,692**

[a] All numbers are in units of acres.

Note: Numbers may not sum due to rounding. To best represent the level of accuracy achieved, acreage numbers are displayed as whole numbers in the text and tables, whereas calculations are based on the raw acreage numbers containing multiple decimal points. The resulting summations and change calculations are then rounded to whole numbers.

Source: Miami-Dade County e-Maps 2018

Homestead Air Reserve Base/City of Homestead Joint Land Use Study (JLUS). The JLUS for Homestead ARB, the City of Homestead, and Miami-Dade County was published in 2007 as part of a cooperative land use planning process used by the USAF and surrounding communities. The JLUS was developed to facilitate implementation of compatible land uses around the base through a cooperative program between the USAF, the City of Homestead, and Miami-Dade County. The JLUS focused on Homestead ARB and the surrounding communities in Miami-Dade County, the City of Homestead, and the City of Florida City. This area focused on the CZ, APZs, and Noise Zones. The JLUS compatible land use plan defines recommended compatible uses and performance standards to be used by the City of Homestead and Miami-Dade County to guide development in order to protect the mission of Homestead ARB and its economic benefits, while increasing the economic diversity and viability of the community. The JLUS assists USAF and municipal planners by facilitating the development of other key sectors in ways that are compatible with the base's mission.

Installation Development Plan (IDP). The Homestead ARB IDP guides future development and land use decisions at Homestead ARB (Homestead ARB 2016b).

On-Base Land Use. Homestead ARB occupies approximately 1,950 total acres of land. Approximately 1,559 acres are developed and the remaining land is open and undeveloped. Land uses on the base are consolidated and not heavily mixed, and are divided into five planning districts. These districts include flightline, airfield, munitions, mission support, and industrial. The flightline and airfield districts are the largest and encompass the runway, taxiways, aprons, and aircraft parking and hangar areas.

HS3.8.1.2 Recreation

Recreation on Homestead ARB is limited because of the amount of land dedicated to missions and lands restricted due to safety and security, including ESQD arcs, the airfield, and other lands restricted for training. Hunting and fishing are not allowed on base and no recreational areas are available for all-terrain vehicle use. Homestead ARB does have tennis courts and baseball, softball, and multipurpose fields available for use. The Sam Johnson Fitness Center on the base offers racquetball and basketball courts, workout rooms, and a variety of fitness equipment. The area surrounding Homestead ARB offers substantial recreational opportunities, including several national parks (Table HS3-35).

Table HS3-35. Recreation Facilities near Homestead ARB

ID	Recreational Facility	Activities	Current DNL (dB)	Compatibility (Y/N)
P01	Biscayne National Park Offshore	Snorkeling, scuba diving, fishing, boating	67	Y
P02	Everglades National Park Ernest F. Coe Visitor Center	Hiking, camping, wildlife viewing, boating, fishing.	40	Y
P03	Biscayne National Park Visitor Center	Hiking, camping, wildlife viewing, boating, fishing.	54	Y
P04	Audubon Park	Playground, picnic areas	51	Y
P05	Cutler Ridge Park	Soccer fields, swimming pool, playground, picnic area	39	Y

Biscayne National Park is a shallow estuary established to protect historical and natural features that support the subtropical marine ecosystem. This park is home to many different fish and wildlife species and offers boating, diving, fishing, and other water activities (e.g., snorkeling).

The Everglades National Park is located approximately 10 miles west of Homestead ARB. The Everglades National Park was established in 1947 to protect 1.5 million acres of southern Florida. The park has elevated boardwalks, miles of surfaced trails, and visitor centers, and offers camping, fishing, wildlife viewing, and other recreational opportunities.

Big Cypress National Preserve is approximately 80 miles northwest of the base. The preserve was established to protect water quality and the integrity of the Big Cypress Swamp. The preserve offers wildlife viewing and hiking.

The City of Homestead has a wide variety of different parks and fields that include playgrounds, ball fields, barbeque areas, walking paths, play courts, and recreation and community centers. The Homestead-Miami Speedway is located south of the installation and offers opportunities for visitors to attend a variety of car races, including NASCAR and various championship series races.

HS3.8.2 Base Environmental Consequences

HS3.8.2.1 Land Use

HS3.8.2.1.1 Physical Development

The physical development associated with the proposed AFRC F-35A mission at Homestead ARB would primarily occur in previously disturbed areas near the flightline where airfield and aircraft

O&M support activities occur on a daily basis. None of the physical development associated with implementation of the proposed mission at Homestead ARB would impact land use because the proposed construction and renovation would occur in land uses designated for the proposed use. Subsequent O&M activities for the proposed mission would conform to current and future land uses on the base and traffic, noise, dust, and similar effects from construction equipment would be reduced through construction plans and practices agreed to by contractors. The physical changes and daily activities on the ground would be confined to the base. The proposed on-base development would have no impact to off-base areas. Impacts associated with physical development would be the same regardless of which afterburner scenario is selected.

HS3.8.2.1.2 Aircraft Operations

This analysis includes an evaluation of the potential noise impacts to on- and off-base land uses resulting from the proposed AFRC F-35A mission at Homestead ARB. Volume II, Appendix B, Section B.2.2, presents the noise compatibility guidelines for noise exposure to various land uses.

Scenario A

Implementation of Scenario A would increase the area surrounding Homestead ARB exposed to DNL of 65 dB or greater by approximately 2,926 acres (Table HS3-36 and Figure HS3-6). This would result in an increase of an estimated 62 off-installation residents exposed to DNL of 65 dB or greater. All of the estimated residents exposed to this level of noise would be located at the South Dade Center (S02).

Table HS3-36. Off-Base Acres Exposed to DNL of 65 dB or Greater at Homestead ARB under Scenario A

Land Use Category[a]	DNL (dB)																	
	65–69			70–74			75–79			80–84			≥ 85			Total		
	Baseline	AFRC F-35A Mission	Change[b]	Baseline	AFRC F-35A Mission	Change[b]	Baseline	AFRC F-35A Mission	Change[b]	Baseline	AFRC F-35A Mission	Change[b]	Baseline	AFRC F-35A Mission	Change[b]	Baseline	AFRC F-35A Mission	Change[b]
Commercial	0	0	0	6	7	1	14	13	-1	2	1	-1	0	0	0	22	21	-1
Industrial	67	195	128	18	100	82	4	38	34	0	3	3	0	0	0	89	336	247
Open	701	1,306	605	293	634	341	67	300	233	10	36	26	1	1	0	1,072	2,277	1,205
Public/Quasi-Public	148	121	-27	114	143	29	1	6	5	0	0	0	0	0	0	263	270	7
Recreational	128	731	603	0	231	231	0	18	18	0	0	0	0	0	0	128	980	852
Residential	0	6	6	0	0	0	0	0	0	0	0	0	0	0	0	0	6	6
Water	113	506	393	5	183	178	0	39	39	0	0	0	0	0	0	118	728	610
Total	**1,157**	**2,865**	**1,708**	**436**	**1,298**	**862**	**86**	**414**	**328**	**12**	**40**	**28**	**1**	**1**	**0**	**1,692**	**4,618**	**2,926**

[a] All numbers are in units of acres.
[b] Change equals the difference between baseline acreage and acres exposed to noise resulting from the AFRC F-35A mission.
Note: Numbers may not sum due to rounding. To best represent the level of accuracy achieved, acreage numbers are displayed as whole numbers in the text and tables, whereas calculations are based on the raw acreage numbers containing multiple decimal points. The resulting summations and change calculations are then rounded to whole numbers.
Source: Miami-Dade County e-Maps 2018

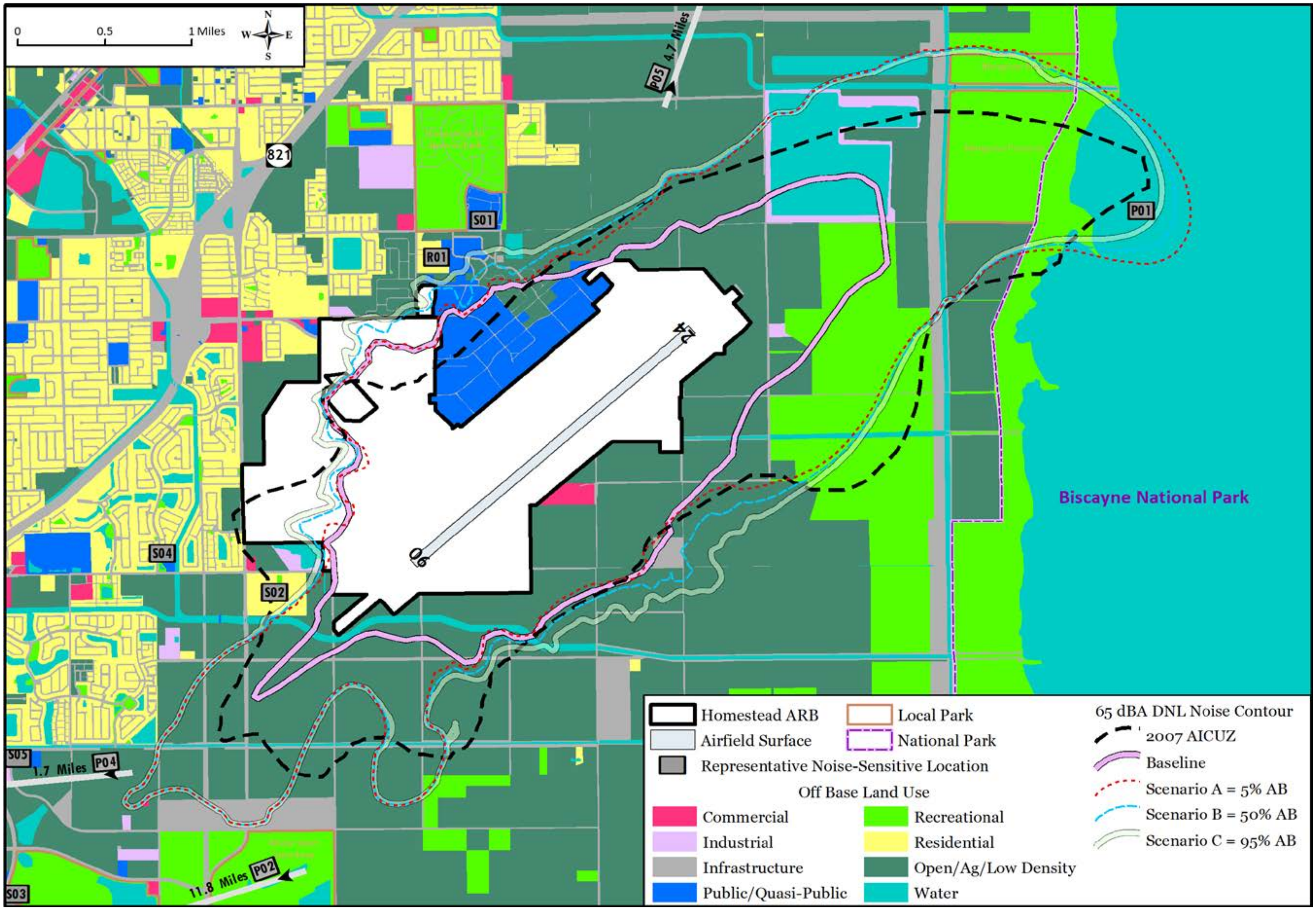

Figure HS3-6. Baseline, JLUS, and AFRC F-35A Mission DNL Contours Relative to Land Use at Homestead ARB

Acreage of industrial, open, public/quasi-public, recreational, and residential land uses exposed to DNL of 65 dB or greater would increase. The largest increase in acreage exposed to DNL of 65 dB or greater would be open areas, followed by recreational land uses. Six (6) additional acres of residential land would be newly exposed to DNL of 65 dB or greater. These 6 acres of residential land are located inside the 65 dB DNL contour as identified in the 2007 JLUS. This residential land is occupied by the South Dade Center (S02), which is a migrant housing and after school and adult education center funded by the state and federal governments. Zoning regulations adopted on 24 January 2017 require new residential construction in the 65 dB or greater DNL area to incorporate noise attenuation into each construction project. Section 33-295 of Miami-Dade Article XXXV prohibits certain buildings in the APZs and areas in the 75 dB or greater DNL contour zone. In addition, all new uses in the 65 dB or greater DNL contour zones shall incorporate at least a 25-dB outdoor-to-indoor noise level reduction into the design and construction of the structure. The increased water area exposed to DNL of 65 dB or greater would extend into Biscayne National Park.

Scenario B

Implementation of Scenario B would increase the area surrounding Homestead ARB exposed to DNL of 65 dB or greater by approximately 3,088 acres, 8 of which would be residential (Table HS3-37 and Figure HS3-6). This would result in an increase of an estimated 79 off-installation residents exposed to DNL of 65 dB or greater. All of the estimated residents exposed to this level of noise would be located at the South Dade Center (S02).

Table HS3-37. Off-Base Acres Exposed to DNL of 65 dB or Greater at Homestead ARB under Scenario B

Land Use Category[a]	DNL (dB)																	
	65–69			70–74			75–79			80–84			≥ 85			Total		
	Baseline	AFRC F-35A Mission	Change[b]	Baseline	AFRC F-35A Mission	Change[b]	Baseline	AFRC F-35A Mission	Change[b]	Baseline	AFRC F-35A Mission	Change[b]	Baseline	AFRC F-35A Mission	Change[b]	Baseline	AFRC F-35A Mission	Change[b]
Commercial	0	0	0	6	1	-5	14	15	1	2	5	3	0	0	0	22	21	-1
Industrial	67	217	150	18	100	82	4	38	34	0	3	3	0	0	0	89	358	269
Open	701	1,369	668	293	701	408	67	335	268	10	48	38	1	1	0	1,072	2,454	1,382
Public/Quasi-Public	148	107	-41	114	156	42	1	28	27	0	0	0	0	0	0	263	291	28
Recreational	128	750	622	0	217	217	0	16	16	0	0	0	0	0	0	128	983	855
Residential	0	8	8	0	0	0	0	0	0	0	0	0	0	0	0	0	8	8
Water	113	449	336	5	189	184	0	27	27	0	0	0	0	0	0	118	665	547
Total	**1,157**	**2,900**	**1,743**	**436**	**1,364**	**928**	**86**	**459**	**373**	**12**	**56**	**44**	**1**	**1**	**0**	**1,692**	**4,780**	**3,088**

[a] All numbers are in units of acres.
[b] Change equals the difference between baseline acreage and acres exposed to noise resulting from the AFRC F-35A mission.
Note: Numbers may not sum due to rounding. To best represent the level of accuracy achieved, acreage numbers are displayed as whole numbers in the text and tables, whereas calculations are based on the raw acreage numbers containing multiple decimal points. The resulting summations and change calculations are then rounded to whole numbers.
Source: Miami-Dade County e-Maps 2018

Scenario C

Implementation of Scenario C would increase the area surrounding Homestead ARB exposed to DNL of 65 dB or greater by approximately 3,263 acres, 10 of which would be residential (Table HS3-38 and Figure HS3-6). This would result in an increase of an estimated 104 off-installation residents exposed to DNL of 65 dB or greater. All of the estimated residents exposed to this level of noise would be located at the South Dade Center (S02).

Table HS3-38. Off-Base Acres Exposed to DNL of 65 dB or Greater at Homestead ARB under Scenario C

Land Use Category[a]	DNL (dB)																	
	65–69			70–74			75–79			80–84			≥ 85			Total		
	Baseline	AFRC F-35A Mission	Change[b]	Baseline	AFRC F-35A Mission	Change[b]	Baseline	AFRC F-35A Mission	Change[b]	Baseline	AFRC F-35A Mission	Change[b]	Baseline	AFRC F-35A Mission	Change[b]	Baseline	AFRC F-35A Mission	Change[b]
Commercial	0	0	0	6	0	-6	14	13	-1	2	8	6	0	0	0	22	21	-1
Industrial	67	227	160	18	101	83	4	38	34	0	3	3	0	0	0	89	369	280
Open	701	1,475	774	293	757	464	67	366	299	10	59	49	1	1	0	1,072	2,658	1,586
Public/Quasi-Public	148	95	-53	114	155	41	1	56	55	0	0	0	0	0	0	263	306	43
Recreational	128	760	632	0	205	205	0	13	13	0	0	0	0	0	0	128	978	850
Residential	0	10	10	0	0	0	0	0	0	0	0	0	0	0	0	0	10	10
Water	113	401	288	5	195	190	0	17	17	0	0	0	0	0	0	118	613	495
Total	**1,157**	**2,968**	**1,811**	**436**	**1,413**	**977**	**86**	**503**	**417**	**12**	**70**	**58**	**1**	**1**	**0**	**1,692**	**4,955**	**3,263**

[a] All numbers are in units of acres.
[b] Change equals the difference between baseline acreage and acres exposed to noise resulting from the AFRC F-35A mission.
Note: Numbers may not sum due to rounding. To best represent the level of accuracy achieved, acreage numbers are displayed as whole numbers in the text and tables, whereas calculations are based on the raw acreage numbers containing multiple decimal points. The resulting summations and change calculations are then rounded to whole numbers.
Source: Miami-Dade County e-Maps 2018

HS3.8.2.2 Recreation

Construction in support of the AFRC F-35A mission would occur in the existing cantonment area. Surrounding parks, schools, and recreational facilities are too far from the installation to be affected by construction noise. Increased truck traffic to the installation during the 2-year construction period could cause temporary effects to traffic flow on local roads, but this is not anticipated to interfere with access to recreational areas near Homestead ARB. New facilities would not alter any sensitive views that have important recreational value.

Implementation of the AFRC F-35A mission at Homestead ARB would result in a net loss of 91 personnel with dependents as a result of the drawdown of the AFRC F-16 mission as the F-35A aircraft arrive. This change in the number of people would have no discernable effect on recreational resources.

Depending on the location of the recreational facility, average noise levels would remain the same or increase at recreational facilities in the areas surrounding Homestead ARB.

Scenarios A, B, or C would expose approximately 18, 16, or 13 acres, respectively, of recreational land to DNL of 75 dB or greater. The JLUS identifies neighborhood parks with outdoor recreation activities as incompatible at DNL in excess of 75 dB. This area is currently overflown by F-16 pilots transiting to and from Homestead ARB and would continue to be overflown by AFRC F-35A pilots. Noise modeling results summarized in Table HS3-39 show the baseline DNL at various recreational facilities near Homestead ARB and the DNL that would result from implementation of the three afterburner scenarios at Homestead ARB.

Table HS3-39. Noise Effects on Recreation Facilities near Homestead ARB

ID	Recreational Facility	DNL (dB)			
		Baseline Conditions	Scenario A	Scenario B	Scenario C
P01	Biscayne National Park Offshore	57	67	66	65
P02	Everglades National Park Ernest F. Coe Visitor Center	<45	<45	<45	<45
P03	Biscayne National Park Visitor Center	50	54	54	54
P04	Audubon Park	<45	51	51	51
P05	Cutler Ridge Park	<45	<45	<45	<45

The Biscayne National Park is located directly east of the installation. The Biscayne National Park Visitor Center would be exposed to increased DNL from the AFRC F-35A mission at Homestead ARB and a small portion of the park located offshore and northeast of the base would be exposed to a DNL increase of 10 dB (from 57 to 67 dB) from Scenario A. AFRC F-35A pilots stationed at Homestead ARB would continue to use the existing and established flight tracks.

Everglades National Park is located directly west of Homestead ARB and would not be exposed to increased DNL as a result of the proposed mission. Although AFRC F-35A pilots stationed at Homestead ARB could occasionally fly over Everglades National Park, the park would not be exposed to increased DNL above the current ambient noise levels.

One measure of annoyance is the potential for speech interference. As described in Section HS3.2.2.2, 50 dB L_{max} is the metric used to determine potential speech interference. As shown in Table HS3-17, P03 and P05 would experience one additional outdoor noise event per hour at L_{max} greater than 50 dB regardless of which afterburner scenario is selected.

Another noise metric that can be used to evaluate potential impacts to recreational uses is SEL. As shown in Table HS3-10, the SEL of the loudest overflight event experienced regularly at the Biscayne National Park Visitor Center would increase by 3 dB.

Although the SEL from a single overflight would not change at the other four recreational facilities, certain recreational areas could experience an increase in the number of overflights at existing SEL values and experience an increased average noise level as measured by the DNL.

HS3.8.3 Airspace Affected Environment

HS3.8.3.1 Land Use

This section summarizes land ownership and Special Use Land Management Areas (SULMAs) under the airspace currently used by pilots from Homestead ARB. A description of the primary airspace used by pilots from Homestead ARB can be found in Section HS2.2.1. SULMAs include selected areas managed by federal and state agencies that provide recreational and scenic opportunities (e.g., parks, monuments, and scenic river corridors), solitude or wilderness experiences (e.g., forests and wilderness areas), conservation of natural or cultural resources (e.g., wildlife refuge areas and national monuments), and other special management functions (e.g., Native American reservation lands). SULMAs often provide a combination of these attributes. Some SULMAs could include recreation-oriented sites such as campgrounds, trails, and visitor centers; recreation is addressed separately in Section HS3.8.3.2. Pilots from Homestead ARB use airspace located in Florida and offshore in the Gulf of Mexico. Figure HS3-7 identifies the airspace currently used along with the SULMAs aggregated by ownership (i.e., NPS, USFS, USFWS, state land, etc.).

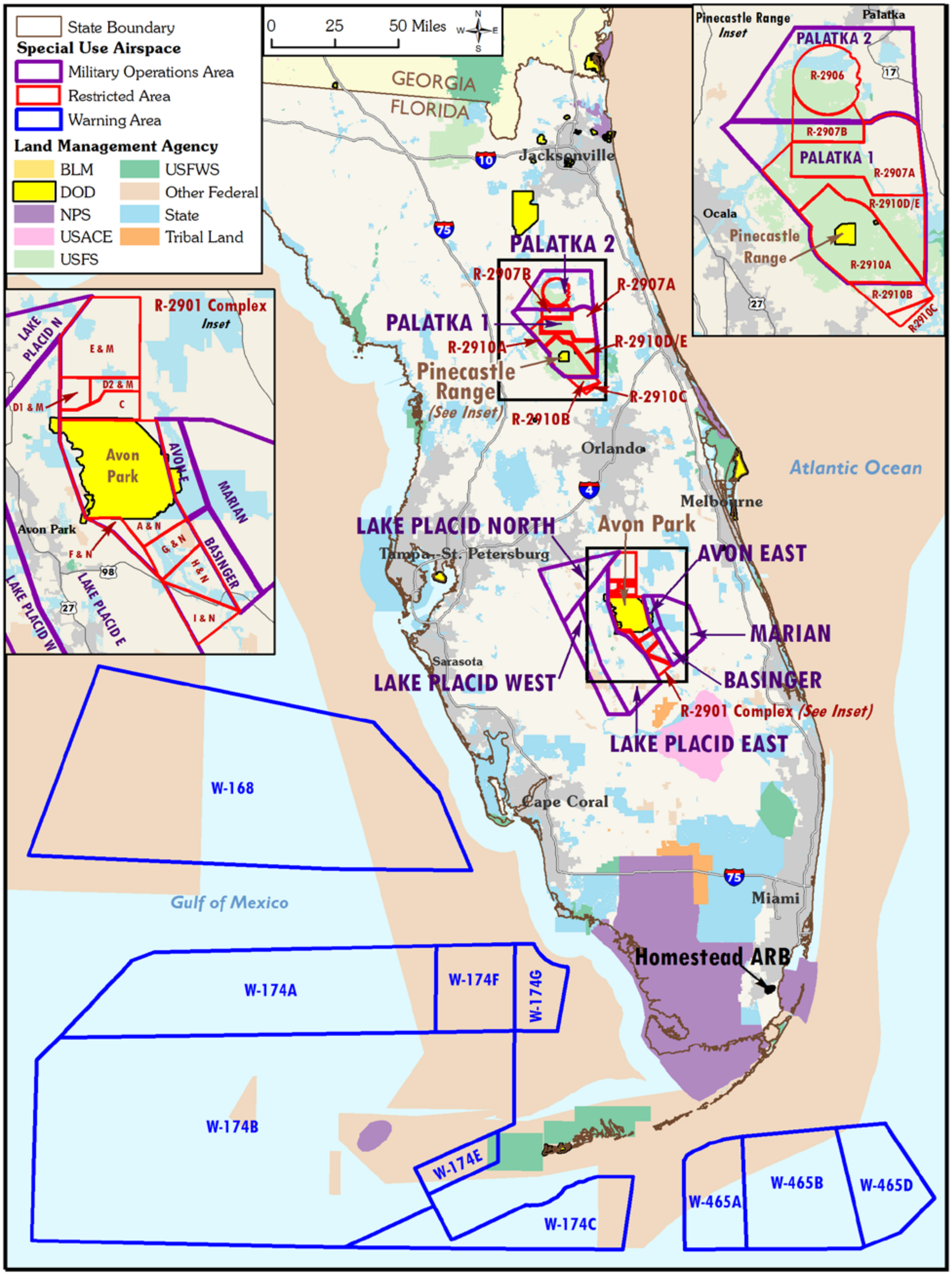

Figure HS3-7. SULMAs Beneath Homestead ARB Airspace

HS3.8.3.2 Recreation

Recreational opportunities under the airspace currently used by F-16 pilots from Homestead ARB are similar to those described in Section HS3.8.1.2. The underlying land reflects the same mosaic of federal, state, and private ownership, with a similar range of outdoor recreational activities. The public lands support a spectrum of recreational opportunities and activities, with some areas having particular qualities or recreational purposes.

Southern Florida hosts habitats that support a wide variety of birds, particularly in the Everglades along inland waterways and the coastline. These areas are popular for recreational bird watching. Public access is permitted to limited portions of the APAFR and U.S. Navy Pinecastle Range Complex (to include Rodman and Lake George Ranges). The Sikes Act stipulates that access for wildlife-oriented recreation shall be provided to the extent possible with military use, while maintaining the priority of the military purpose and safety of public users. Recreational activities within these areas include camping, driving, fishing, hunting, and many other activities.

HS3.8.4 Airspace Environmental Consequences

HS3.8.4.1 Land Use

The APAFR complex would be the primary range used by AFRC F-35A pilots operating from Homestead ARB. The APAFR complex is owned and managed by the USAF with a mission to provide a training infrastructure that allows U.S. air and ground forces to practice the latest combat training. The land area under the APAFR airspace is owned by a variety of different entities, including DoD, state, local, and private owners.

The U.S. Navy Pinecastle Range Complex (to include Rodman and Lake George Ranges) would also be used but not as the primary range complex. The majority of federal land under the U.S. Navy Pinecastle Range Complex airspace is owned by the USFS. The Ocala National Forest is the oldest national forest east of the Mississippi River and is known for large areas of sand pine and scrub forest. The U.S. Navy Pinecastle Range Complex is located in the Ocala National Forest and primarily managed for Atlantic Fleet Carrier Strike Groups. The Ocala National Forest has high annual visitation rates and offers hiking, hunting, camping, and utilization of the Florida National Scenic Trail. The U.S. Navy Pinecastle Range Complex is managed under the Range Air Installations Compatible Use Zone (RAICUZ) Program. The RAICUZ Program classifies range and adjacent lands into Range Compatibility Zones (RCZs) and provides various land use recommendations for these areas. The final September 2017 RAICUZ Study for the Pinecastle Range Complex identified approximately 21,740 acres of off-range, forested land that would be in the new RCZ-I boundary and subject to the land use recommendations as identified in Chief of Naval Operations Instruction (OPNAVINST) 3550.1A, *Range Air Installations Compatible Use Zones (RAICUZ) Program* (Navy 2017).

The offshore Warning Areas would be the primary airspace for AFRC F-35A pilots stationed at Homestead ARB. Although the majority of these areas are located over water, W-174B is located over Dry Tortugas National Park. Aircraft operations in W-174B are restricted around Dry Tortugas National Park.

Table HS3-40 identifies SULMAs that occur under the airspace proposed for use by AFRC F-35A pilots operating from Homestead ARB. These SULMAs would be exposed to subsonic noise that would increase L_{dnmr} 1 to 6 dB above baseline. Examples of these include one National Forest (Ocala); four wilderness areas; and numerous state parks, forests, and conservation areas. Table HS3-40 also presents the SULMA total acres along with the percentage of each SULMA covered by the respective airspace. Average noise levels would increase below all of the airspace proposed for use except the Palatka 1 MOA. Subsonic L_{dnmr} below all of the airspace proposed for use would remain below 65 dB.

Table HS3-40. Special Use Areas Land Management Areas Exposed to Subsonic Noise Increases of 1 dB or Greater from the AFRC F-35A Mission at Homestead ARB

SULMA Name	SULMA Acreage	Percentage of SULMA Under Airspace	Baseline Conditions	AFRC F-35A Mission	
			L_{dnmr}	L_{dnmr}	Change
Avon East MOA					
Kissimmee Prairie Preserve State Park	53,739	26	45	50	6
Basinger MOA					
Kissimmee Prairie Preserve State Park	53,739	5	<45	49	4
Lake Placid MOA					
Allen David Broussard Catfish Creek Preserve State Park	8,329	56.9	<45	46	1
Everglades Headwaters National Wildlife Refuge And Conservation Area	407	97.5	<45	46	1
Highlands Hammock State Park	9,238	100.0	<45	46	1
Lake June-in-Winter Scrub State Park	846	100.0	<45	46	1
Lake Kissimmee State Park	5,893	14.3	<45	46	1
Lake Wales Ridge National Wildlife Refuge	1,894	90.0	<45	46	1
Lake Wales Ridge State Forest	2,6840	71.3	<45	46	1
Marian MOA					
Kissimmee Prairie Preserve State Park	53,739	61	<45	49	4
Palatka 2 MOA (Outside of R-2906 & R-2907 B and C)					
Caravelle Ranch Conservation Area	6,596	<1	<45	48	3
Caravelle Ranch Wildlife Management Area	5,652	<1	<45	48	3
Carl Duval Moore State Forest and Park	335	26	<45	48	3
Dunns Creek Conservation Area	3,158	100	<45	48	3
Dunns Creek State Park	6,319	100	<45	48	3
Horseshoe Point Conservation Area	2,749	29	<45	48	3
Lake George Conservation Area	1,1750	14	<45	48	3
Little Lake George Wilderness	2,827	<1	<45	48	3
Marjorie Harris Carr Cross Florida Greenway State Recreation and Conservation Area	71,269	24.5	<45	48	3
Palatka 2 MOA (Outside of R-2906 & R-2907 B and C)					
Murphy Creek Conservation Area	1,718	100	<45	48	3
Seven Sisters Conservation Area	270	100	<45	48	3
Welaka State Forest	2,253	100	<45	48	3
R-2901 A and B					
Kissimmee Prairie Preserve State Park	53,739	9	47	53	6
Lake Wales Ridge State Forest	26,840	11	47	53	6
R-2901 C, D, E and M (and R-2901B North of R-2901A)					
Lake Kissimmee State Park	5,893	86	<45	48	3
Lake Wales Ridge State Forest	26,840	18	<45	48	3
R-2901 F, G, H and I (and R-2901B South of R-2901A)					
Kissimmee Prairie Preserve State Park	53,739	6	<45	47	2

Table HS3-40. Special Use Areas Land Management Areas Exposed to Subsonic Noise Increases of 1 dB or Greater from the AFRC F-35A Mission at Homestead ARB (Continued)

SULMA Name	SULMA Acreage	Percentage of SULMA Under Airspace	Baseline Conditions	AFRC F-35A Mission	
			L_{dnmr}	L_{dnmr}	Change
R-2906					
Caravelle Ranch Conservation Area	6,596	100	51	52	1
Caravelle Ranch Wildlife Management Area	5,652	100	51	52	1
Little Lake George Wilderness	2,827	100	51	52	1
Marjorie Harris Carr Cross Florida Greenway State Recreation and Conservation Area	71,269	100	51	52	1
Ocala National Forest	1,197,826	100	51	52	1
R-2907A					
Juniper Prairie Wilderness	14,298	6	55	56	1
Lake George Conservation Area	11,750	86	55	56	1
Lake George State Forest	21,262	8	55	56	1
Ocala National Game Refuge	68,284	15	55	56	1
Ocala National Forest	1,197,826	4	55	56	1
R-2907 B and C					
Ocala National Forest	1,197,826	3	<45	47	2
R-2910A					
Alexander Springs Creek	2,954	32	48	52	4
Billies Bay Wilderness	3,064	77	48	52	4
Farles Prairie	1,901	100	48	52	4
Juniper Prairie Wilderness	14,298	20	48	52	4
Ocala National Forest	1,197,826	9	48	52	4
Ocala National Game Refuge	68,284	60	48	52	4
Seminole State Forest	29,027	2	48	52	4
R-2910 B and C					
Lake Norris Conservation Area	2,357	94	<45	49	4
Ocala National Forest	1,197,826	<1	<45	49	4
Seminole State Forest	29,027	14	<45	49	4
R-2910 D and E					
Alexander Springs Creek	2,954	68	<45	48	3
Alexander Springs Wilderness	7,888	25	<45	48	3
Billies Bay Wilderness	3,064	23	<45	48	3
Juniper Prairie Wilderness	14,298	74	<45	48	3
Lake George State Forest	21,262	20	<45	48	3
Lake Woodruff National Wildlife Refuge	19,274	<1	<45	48	3
Lake Woodruff Wilderness Area	970	<1	<45	48	3
Marjorie Harris Carr Cross Florida Greenway State Recreation and Conservation Area	71,269	1	<45	48	3
R-2910 D and E					
Ocala National Forest	1,197,826	6.4	<45	48	3
Ocala National Game Refuge	68,284	25	<45	48	3

Supersonic operations are not authorized in any of the airspace located over land. Restrictions on supersonic flight in W-174B are recorded in the air operations manual for NAS Key West. Supersonic flights are not authorized within 12 NM of Fort Jefferson in Dry Tortugas National Park unless flight paths are straight, level, and higher than 20,000 feet MSL.

HS3.8.4.2 Recreation

A synopsis of issues and methodology for addressing potential impacts from military training on recreational resources under the airspace proposed for use are provided in Chapter 3, Section 3.8. Chapter 3, Section 3.8.2, describes typical recreational impacts. In general, a diverse range of active and passive recreational activities occurring throughout the region already coexists within a context of some exposure to military overflight. Increased numbers of sorties in some airspace would discernibly affect the noise levels and could result in recreational participants experiencing startle effects from these events. This could continue to result in some degradation in enjoyment for those affected and loss of opportunity for quiet recreational environments under the airspace. Increased noise could diminish opportunities for visitors to experience natural soundscapes in national park units, and could affect the qualities of natural quiet that are intrinsic to recreational opportunities in wilderness areas, wilderness study areas, and other remote locations.

Table HS3-40 lists SULMAs with high recreational value or opportunity underlying military training airspace where subsonic noise would increase L_{dnmr} by 1 to 6 dB above baseline. DNL increases would be noticeable under the airspace proposed for use and could affect recreational experiences. DNL increases are not expected to result in changes in recreational choices.

Federal agencies are generally mandated to manage wilderness areas for their wilderness qualities. This includes maintaining the natural setting and allowing minimal human disturbance and development. Wilderness management goals could be negatively affected by increased noise and disturbance associated with military overflights. Increased noise in wilderness areas, recreation areas, and other specially managed lands could also be perceived by some recreational users as affecting their recreation experience.

HS3.8.5 Summary of Impacts to Land Use and Recreation

Land use and recreational resources would not be impacted by any of the construction because all of the construction would be conducted on the base in land use zones compatible with proposed development. Implementation of Scenarios A, B, or C would expose an additional 2,926, 3,088, or 3,263 acres, respectively, of off-installation land to DNL of 65 to 69 dB. All of the newly exposed residential land is in the JLUS contour and is occupied by the South Dade Center. Zoning regulations adopted on 24 January 2017 require new residential construction in the 65 dB or greater DNL area to incorporate noise attenuation into each construction project. Biscayne National Park and Audubon Park would be exposed to increased noise. Implementation of Scenarios A, B, or C would expose an additional 18, 16, or 13 acres, respectively, of recreational land to DNL of 75 dB or greater. The JLUS identifies neighborhood parks with outdoor recreation activities as incompatible at DNL in excess of 75 dB. Subsonic noise levels in the training areas would remain below 65 dB and supersonic operations would only occur in areas authorized for these activities (i.e., W-174A through G and W-465A/B). Supersonic flights are not authorized within 12 NM of Fort Jefferson in Dry Tortugas National Park unless flight paths are straight, level, and higher than 20,000 feet MSL. Impacts to land use and recreation would not be considered significant under any of the afterburner scenarios.

HS3.9 SOCIOECONOMICS

Socioeconomics refers to features or characteristics of the social and economic environment. The factors affecting socioeconomic resources are the change in personnel, construction of new facilities, renovations and modifications to existing facilities, and noise from F-35A aircraft at Homestead ARB. These factors are evaluated relative to the existing population, employment, earnings, housing, education, and public and base services. Homestead ARB is located adjacent to the City of Homestead, Florida, and approximately 25 miles south of Miami in Miami-Dade County. Impacts to socioeconomic resources would extend beyond the base boundaries. Therefore, for the purposes of this socioeconomics analysis, the ROI for the proposed action and No Action Alternative is Miami-Dade County, with an emphasis on Homestead ARB.

HS3.9.1 Base Affected Environment

HS3.9.1.1 Population

Population estimates for Miami-Dade County totaled more than 2.75 million persons in 2017 (USCB 2018). Between 2010 and 2017, the county population increased at an average annual rate of 1.4 percent, with a total increase of approximately 255,361 persons over the 7-year period (USCB 2018). The State of Florida has an estimated population of 20.98 million (USCB 2018). Average annual population growth in the county has been less than the state (Table HS3-41).

Table HS3-41. Population in the ROI for Homestead ARB

Location	2010 Census	2017 Estimates	Annual Percent Change (2010–2017)
Miami-Dade County	2,496,435	2,751,796	1.4
Florida	18,801,310	20,984,400	1.6

Source: USCB 2018

As shown in Table HS2-3, the total current authorized personnel at the base is 3,430 persons. Of the total authorized base personnel, 50.58 percent (1,735 persons) are associated with AFRC.

HS3.9.1.2 Economic Activity (Employment and Earnings)

In 2016, employment in Miami-Dade County totaled 1,753,507 jobs (BEA 2017a). The largest employment sector in Miami-Dade County was healthcare and social assistance (10.5 percent), followed by retail trade (9.9 percent), and other services that do not include government (8.5 percent) (BEA 2017a). Construction accounted for 4.4 percent of total employment. Over the last several years, the average annual unemployment rate in the county has steadily declined from 7.4 percent in 2013 to 4.8 percent in 2017 (BLS 2018a). During this same time, the state average annual unemployment rate also declined but remained lower than the county (BLS 2018b). Per capita personal income in Miami-Dade County is estimated at $45,440, which is less than the estimated $45,953 per capita personal income in the state (BEA 2017b).

Homestead ARB is an important economic contributor to southern Miami-Dade County through employment of military and civilian personnel, and expenditures for goods and services. The total economic impact of the base on the surrounding communities in 2017 was $313 million, an increase of $21 million since 2016 (Homestead AFRC 2018). The majority of this work was awarded to local businesses (Homestead ARFC 2018). Construction, services, and materials contracts accounted for approximately 53 percent of the economic impact generated by Homestead ARB. The total payroll for military, civilians, and other base personnel exceeded $98 million in 2017 (Homestead AFRC 2018). Based on the Impact Analysis for Planning (IMPLAN) economic model, the on-base authorized employment of 3,430 personnel supports an estimated additional 980 secondary jobs in the community.

HS3.9.1.3 Housing

No military housing is available at Homestead ARB. Table HS3-42 presents census-derived housing data for Miami-Dade County. The county has an estimated 1,004,835 total housing units (houses), of which 15 percent (151,211 units) were vacant in 2016 (USCB 2016). Nearly half (47.4 percent) of the occupied houses in the county are renter-occupied and the remaining 52.6 percent are owner-occupied. The median value of owner-occupied houses in Miami-Dade County is estimated at $221,100. The median gross rent was $1,143 in 2016 (USCB 2016). As described in Section HS3.2.1.1, no residents or houses in Miami-Dade County are currently exposed to DNL of 65 dB or greater from aircraft operations at Homestead ARB.

Table HS3-42. Housing Data in the ROI for Homestead ARB

Location	Houses	Occupied	Vacant
Miami-Dade County	1,004,835	853,624	151,211

Source: USCB 2016

Housing in the Miami-Dade County area is experiencing strong growth and a surge in property values, leading to signs of sustainable growth. Property values in the county increased from 2015 to 2016 by an average of 9.1 percent, with a high of 16.5 percent in North Miami Beach City and a low of 4.3 percent in Bal Harbour. In 2016, property values in the City of Homestead increased by 8.3 percent from the previous year (Miami Herald 2016). Over the 5 years between the depressed market in 2013 and 2018, the average sale price of housing in Homestead increased from $130,000 to $240,000 (in current dollars). Most recent reports still indicate a strong real estate market in the county, with increased sales in residential properties and a lower number of days on the market (47 days in 2018 compared to 61 days in 2017). As a result of increased sales, the area is also experiencing a shortage of properties for sale (Miami Herald 2018). One reason cited for the strong growth is the migration of residents and retirees from northern states moving to Florida for the weather and to reduce their costs of living since Florida has no state income tax (Miami Herald 2018).

HS3.9.1.4 Education

The Miami-Dade Public School (M-DCPS) District serves the county. The M-DCPS District encompasses more than 2,000 square miles and includes 392 schools with 345,000 students and more than 40,000 employees. The district is ranked as the fourth largest school district in the United States (M-DCPS 2018). No schools or child development centers are located on Homestead ARB. As described in Section HS3.2, no off-base schools are known to be currently exposed to DNL of 65 dB or greater from aircraft operations at Homestead ARB.

HS3.9.1.5 Public Services

The Miami-Dade Fire Rescue (MDFR) provides emergency services, permits and inspections, and fire protection to the unincorporated parts of Miami-Dade County. MDFR maintains 69 fire rescue stations and is staffed by 2,429 employees with an operating budget of $361 million and a $54 million, 5-year capital plan (Miami-Dade County Government 2018). A number of municipalities within Miami-Dade County do not have their own fire rescue services and rely on the county for support. Law enforcement services are provided by the Miami-Dade Police Department, which is charged with the safety of more than 2.5 million residents. The department has approximately 2,900 sworn officers and 1,700 personnel (Miami-Dade County Government 2017). All incorporated areas (i.e., towns, cities, etc.) in the county have their own police departments. Thirty (30) hospitals are located in the Miami-Dade County region (Miami-Dade Government 2018) and approximately 31.0 to 55.2 physicians per 10,000 population in the county (FDH 2014).

HS3.9.1.6 Base Services

Base services at Homestead ARB include a lodging office (Homestead Inn), community activity center, exchange shop, family support building, visitor control center, outdoor recreation services, base chapel, retiree activities office, and a sports and fitness building (Homestead AFRC 2016).

HS3.9.2 Base Environmental Consequences

HS3.9.2.1 Population

The current personnel at Homestead ARB and the projected change anticipated to support the AFRC F-35A mission are provided in Table HS2-3. Implementation of the AFRC F-35A mission would result in a net decrease of 91 full-time mission personnel. This would result in a 2.7 percent decline in the existing base assigned personnel and a less than 0.01 percent decline in the existing county population. The reduction in base personnel would not be noticed in the large and dynamic county. Calculation of this potential decrease in the county population is based on the assumption that all 91 personnel would be full-time and be reassigned to other bases, and that the personnel and any dependents would migrate out of the area. Employment opportunities in the greater Homestead ARB area would be expected to absorb any reduction in secondary jobs.

HS3.9.2.2 Economic Activity (Employment and Earnings)

As shown in Table HS2-3, implementation of the AFRC F-35A mission at Homestead ARB would decrease the full-time work force assigned to the base by 91 total personnel. Using the IMPLAN model, the direct effect of a net decrease of 91 full-time personnel at Homestead ARB would have a negative estimated indirect and induced effect of a loss of up to 26 jobs throughout Miami-Dade County (IMPLAN 2018). This number would not affect regional economic activity.

Construction activities provide economic benefits to the surrounding areas through the employment of construction workers and the purchase of materials and equipment. Construction activities would be temporary and provide a limited amount of economic benefit. Noise associated with construction activities would be limited to within the base boundaries and would not impact economic activity. The USAF estimates that a total of $18.6 million in MILCON expenditures during 2021-2023 would be associated with implementation of the AFRC F-35A mission at Homestead ARB. The total expenditures could generate up to 102 jobs during facility construction, primarily within the construction industry or related industries, and to a lesser extent in wholesale trade, real estate, architectural, engineering and related services, retail stores, hospitals, truck transportation, and full-service restaurants. With a labor force of more than 1.3 million people and an unemployment rate of 4.8 percent, it is expected that the local labor force in the ROI and in the surrounding areas would be sufficient to fill these new jobs without a migration of workers into the area. Implementation of the AFRC F-35A mission and projected total MILCON expenditures of $18.6 million at Homestead ARB would generate an estimated $9.8 million in direct, indirect, and induced labor income in the ROI. The jobs and related income generated would be temporary (i.e., during the construction activity).

HS3.9.2.3 Housing

Military housing is not available at Homestead ARB and any reassigned full-time personnel would no longer require off-base housing. Assuming that the 91 personnel represented individual houses, the reduction in personnel would make 91 rental and/or owner-occupied units available in the market. Recent real-estate trends in Miami-Dade County and Homestead suggest that an additional supply of residential units would be absorbed in the area, which is seeing a shortage of residential properties. These impacts would be the same regardless of which afterburner scenario is selected.

During scoping, people raised concerns about the potential impact of noise on surrounding property values. As discussed in more detail in Chapter 3, Section 3.9.3, studies have shown a relationship between noise and property values. A study conducted by Trojanek et al (2017) summarized the results from 79 studies; the majority of those studies found that housing values decreased from 0.26 to 1 percent for every decibel increase in DNL above 65 dB. Some of the studies had values that decreased less than this range and others decreased more. The exact percent decrease is dependent upon a number of factors, including the noise indicators used, thresholds, types of properties evaluated, and other factors. The Homestead JLUS, adopted by Miami-Dade County on 24 January 2017, includes the recommendation that housing exposed to DNL of 65 dB or greater be constructed with sound attenuation features.

Prices for homes in the Miami-Dade County region have been increasing over the last several years due to economic and population growth in the region. These recent upward price trends in the local real estate market are expected to continue into the near future. Noise increases could cause some decrease in housing prices for the affected areas. The general impact on home pricing would be the same regardless of which afterburner scenario is selected.

Table HS3-43 shows the total estimated number houses that would be newly exposed to DNL of 65 dB or greater compared to the existing conditions. The estimated numbers of residents exposed to this level of noise from the three afterburner scenarios are listed in Tables HS3-11, HS3-13, and HS3-15. The JLUS and local zoning require that all new residential units within the 65 dB DNL and greater noise contours incorporate at least a 25-dB noise level reduction in the unit’s design and construction.

Table HS3-43. Estimated Houses Exposed to DNL of 65 dB or Greater from Baseline and AFRC F-35A Mission Conditions at Homestead ARB

DNL (dB)	Estimated Houses[a]						
	Baseline	**Scenario A**	**Change**	**Scenario B**	**Change**	**Scenario C**	**Change**
65 – 69	0	22	22	28	28	37	37
70 – 74	0	0	0	0	0	0	0
75 – 79	0	0	0	0	0	0	0
80 – 84	0	0	0	0	0	0	0
≥85	0	0	0	0	0	0	0
Total	**0**	22	**22**	28	**28**	37	**37**

[a] All of the estimated houses that would be impacted by DNL of 65 dB or greater are located at the South Dade Center (S02).

HS3.9.2.4 Education

As described in Chapter 3, Section 3.9.3, the total number of dependents, including spouse and children, was estimated at 2.5 times 65 percent of full-time active duty and full-time active reserve. The total number of children was estimated at 1.5 times 65 percent of full-time personnel, because it was assumed each military member would be accompanied by a spouse. Thus, it is estimated that 89 dependents would be of school age and would no longer attend schools in the M-DCPS District. The projected number of students leaving would represent less than a 0.01 percent decrease of the current total enrollment in the district. Based on the size of the school district in the ROI, as well as class size for the state, it is anticipated that school capacity in the county would not be adversely impacted. A reduction in school enrollment could have a small, local impact on revenue and expenses per pupil but would not be anticipated to significantly affect funding for schools in the M-DCPS District.

During scoping, several people expressed concern about the impacts of noise on children and educational facilities. The Homestead JLUS prohibits schools within the 75 dB DNL or greater noise contour. No schools would be exposed to DNL of 65 dB or greater. Implementation of Scenarios A, B, or C would expose students at De La Salle Education Center (Red West) and Miami Arts Charter School to an increase in overflight events per hour (see Section HS2.2.3), which would disrupt classroom learning.

HS3.9.2.5 Public Services

Miami-Dade County represents a large community with police, fire, and other services. The estimated reduction of 91 full-time, USAF-related personnel and dependents would represent a decrease of less than 0.01 percent of the existing Miami-Dade County population. The decrease in population would have no discernible effect on public services.

During scoping, people submitted comments regarding the potential impact that noise from the F-35A aircraft would have on the quality of life and health of residents. Aircraft noise has the potential to cause a variety of effects such as annoyance, speech interference, sleep interference, hearing loss, and non-auditory health effects (Section HS3.2.2). Potential non-auditory health impacts due to aircraft noise are discussed in more detail in Section HS3.2.2.7 and Volume II, Appendix B. The USAF continually works with local governments and communities to assess and manage aircraft noise in the environment and attempts to reduce, where possible, the potential impacts of noise to people. When possible, the AFRC F-35A pilots would intentionally avoid overflying identified noise-sensitive locations.

HS3.9.2.6 Base Services

A reduction in the number of personnel would not be expected to have a noticeable effect on base services. Populations on military bases are constantly in flux as deployments and mission personnel changes are assigned.

HS3.9.3 Summary of Impacts to Socioeconomics

The personnel decreases and community service requirements of the AFRC F-35A mission (Scenario A, B, or C) at Homestead ARB would not result in significant impacts to population, economic activity, housing availability, education, or public services. However, DNL greater than 65 dB resulting from AFRC F-35A aircraft operations would affect an estimated 22 houses under Scenario A, an estimated 28 houses under Scenario B, or an estimated 37 houses under Scenario C. All of the estimated houses that would be impacted by DNL of 65 dB or greater are located at the South Dade Center (S02). The JLUS and local zoning require that all new residential units within the 65 dB DNL and greater noise contours incorporate at least a 25-dB noise level reduction in the unit's design and construction.

HS3.10 ENVIRONMENTAL JUSTICE AND PROTECTION OF CHILDREN

The environmental justice analysis considers affected populations that meet certain characteristics based on income and age. Analysis of environmental justice and other sensitive receptors is conducted pursuant to EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations,* and EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*. Environmental justice addresses impacts to minority and low-income populations. This analysis focuses on increased noise resulting from the proposed action as the primary impact to these populations. The USAF guidelines for environmental justice analysis use census data (i.e., percentages of populations identifying themselves as minority, low-income, etc.) to determine potential impacts to these populations. The guidelines also address children (under 18) and elderly (65 and older) as additional sensitive populations. (Minority, low-income, children, and elderly populations are henceforth referred to as environmental justice populations.) Tables HS3-11, HS3-13, and HS3-15 list the number of people exposed to DNL of 65 dB or greater from baseline and the three afterburner scenario conditions at Homestead ARB.

This analysis is completed to determine if there are existing disproportionate noise impacts to environmental justice populations (i.e., baseline DNL of 65 dB or greater) and if implementation of the proposed action would result in disproportionate noise impacts to environmental justice populations (i.e., AFRC F-35A mission DNL of 65 dB or greater).

Environmental justice analysis overlays the 65 dB DNL contour on the census data polygons. The smallest census data which has the information necessary for analysis of potential impacts to environmental justice populations is used to determine potential impacts. The smallest group of census data which contain the needed information for this analysis is the Census BG. Each BG that is partially or wholly encompassed by the 65 dB DNL contour is defined as an ROI. There could be few or many ROIs for a specific environmental justice analysis, depending on the extent of the noise contour and the size of the BGs. The next higher level of census data is the Census Tract (CT). Each CT contains a number of BGs (ROIs).

> Census blocks are the smallest unit for which the USCB collects census information. **Block Groups (BGs)** are comprised of a combination of census blocks and are a subdivision of **census tracts (CTs)**. Census tracts are a small, relatively permanent statistical subdivision of a county delineated by a local committee of census data users for the purpose of presenting census data. This EIS uses **BGs** and **CTs** in the environmental justice analysis. The **BGs** also comprise the **Region of Influence (ROI)** analyzed in the EIS.

In order to identify disproportionate impacts from baseline or proposed action noise levels, a Community of Comparison (COC) is needed. The COC is defined by summing the population in all the CTs which contain any part of an ROI affected by the 65 dB DNL contour. The percentages of minority and low-income persons are calculated for each ROI (i.e., BG). The ROI and COC percentages are then compared. If the percentage of minorities or low-income persons in an ROI is equal to or greater than the percentage of minorities or low-income persons in the COC, there is a disproportionate impact to the environmental justice population in that ROI (USAF 2014). Chapter 3, Section 3.10.3, provides a description of the method applied to calculate the proportion of the population in the ROIs.

For Homestead ARB, there is one CT containing one ROI (BG) which is partially or wholly exposed to DNL of 65 dB or greater resulting from the AFRC F-35A mission. Figure HS3-8 presents an overlay of the baseline and AFRC F-35A mission 65 dB DNL contour on the ROIs and the COC.

HS3.10.1 Base Affected Environment

Table HS3-44 provides baseline demographic conditions (USBC 2017a-e) in Miami-Dade County, where Homestead ARB is located. Also shown in Table HS3-44 is the existing proportion of environmental justice populations in the one CT (CT 107.04) located in the proposed action affected area near Homestead ARB. The CT 107.04 is the COC for the environmental justice analysis. As shown in Table HS3-44, the COC has a higher proportion of minority, low-income, and child populations than Miami-Dade County, the State of Florida, or the nation. As shown on Figure HS3-8, this estimated population is limited to the residential area (South Dade Center) in the southwest portion of CT 107.04.

Under baseline conditions, no off-base residential areas are currently exposed to DNL of 65 dB or greater. No schools or child care facilities are exposed to DNL of 65 dB or greater under baseline conditions at Homestead ARB. Additionally, no hospitals, parks, or libraries are exposed to DNL of 65 dB or greater under baseline conditions.

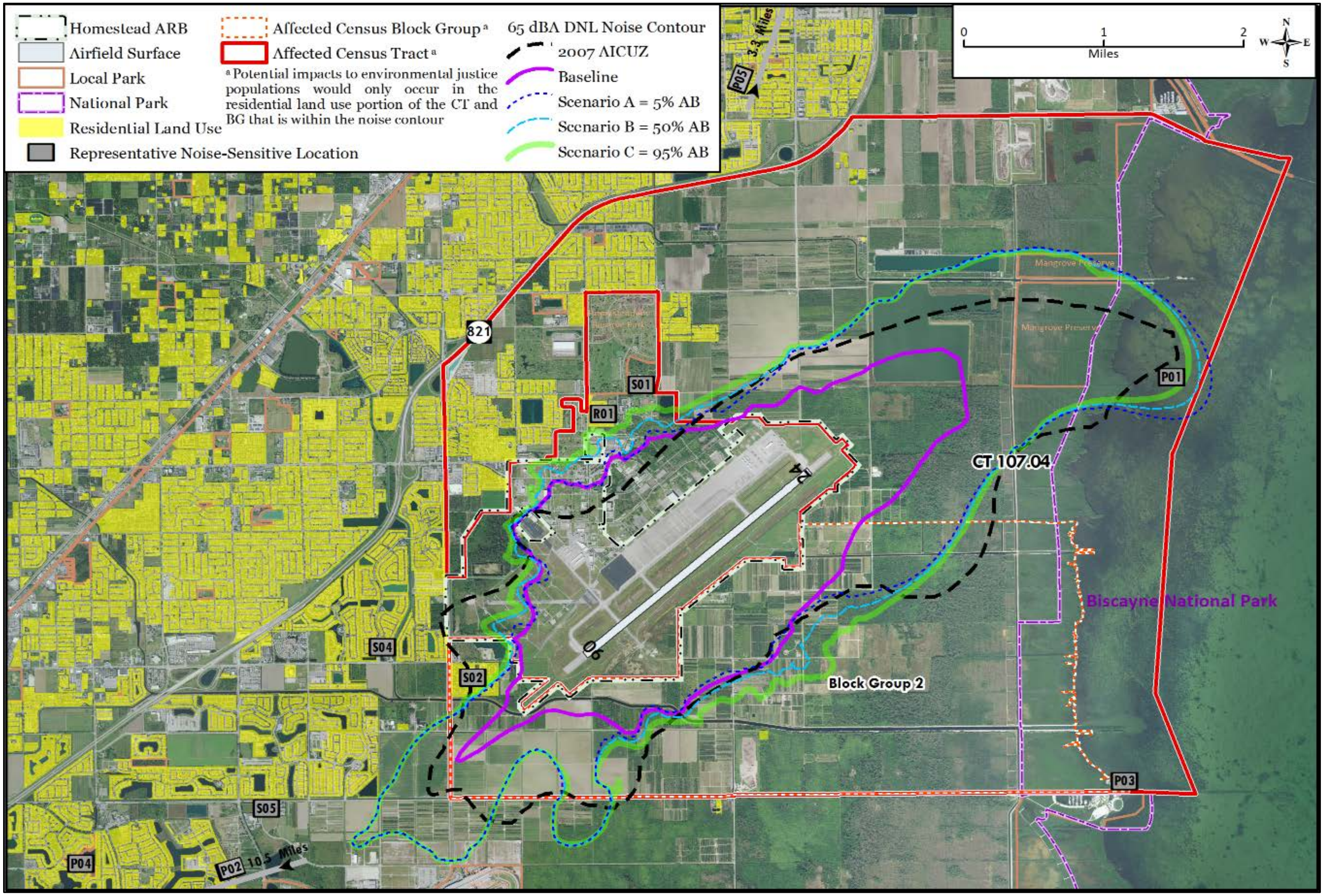

Figure HS3-8. Homestead ARB Census Tract and Block Group Exposed to DNL of 65 dB or Greater Under Baseline and AFRC F-35A Mission Conditions

Table HS3-44. Environmental Justice Populations and Demographics for Homestead ARB

Geographic Unit	Total Population	Population for Whom Poverty is Determined[a]	Minority		Low-Income		Children		Elderly	
			Number	Percent	Number	Percent	Number	Percent	Number	Percent
CT 107.04[b]	11,659	11,659	10,928	93.7	3,066	26.3	3,385	29.0	963	8.3
COC	**11,659**	**11,659**	**10,928**	**93.7**	**3,066**	**26.3**	**3,385**	**29.0**	**963**	**8.3**
Miami-Dade County	2,702,602	2,661,803	2,331,369	86.3	505,182	19.0	553,299	20.5	414,322	15.3
State of Florida	20,278,447	19,858,469	9,153,496	45.1	3,070,972	15.5	4,111,582	20.3	3,926,889	19.4
United States	321,004,407	313,048,563	123,726,618	38.5	45,650,345	14.6	73,601,279	22.9	47,732,389	14.9

[a] Poverty status was determined for all people except institutionalized people, people in military group quarters, people in college dormitories, and unrelated individuals under 15 years of age.

[b] The 65 dB DNL contour only impacts one census tract with a residential population under the noise contour.

Note: Numbers may not sum due to rounding. To best represent the level of accuracy achieved, population group numbers are displayed as whole numbers in the text and tables, whereas calculations are based on the raw population group numbers containing multiple decimal points. The resulting summations and change calculations are then rounded to whole numbers.

Source: USCB 2017a-e

HS3.10.2 Base Environmental Consequences

The following environmental justice analysis considers the three different afterburner scenarios when appropriate. For example, because noise impacts (i.e., DNL of 65 dB or greater) to environmental justice populations (minority, low-income, children, and elderly) would vary by afterburner scenario, an analysis of each afterburner scenario is included.

HS3.10.2.1 Scenario A

Based on the analysis results shown in Table HS3-45, disproportionate noise impacts to minority and low-income populations would result from the implementation of Scenario A. In the one ROI (BG) evaluated for this analysis, the proportion of the population identifying themselves as minority and the proportion of the population considered below poverty (low-income) both exceed the COC. The areas where these populations are located are shown on Figure HS3-9. “If percentages of minority and low-income populations in an ROI are greater than or equal to the corresponding percentages in the COC, then it is presumed that there would be disproportionate impacts to the EJ population” (USAF 2014). “When it is determined that disproportionate impacts on EJ populations will occur,” the EIS is to suggest “potential mitigation for the decision maker.” Mitigations for noise level reductions would have been designed for properties located near Homestead ARB and constructed since 2004. Because implementation of Scenario A would result in disproportionate impacts, potential mitigation measures were evaluated. The USAF considered a number of different measures to mitigate noise impacts, but none of these measures were determined to be operationally feasible (Chapter 2, Section 2.5).

The other sensitive populations evaluated in this analysis are children and elderly. Table HS3-46 shows that there is a higher percentage of children and a lower percentage of elderly persons in the ROI (BG) than the COC. Implementation of the AFRC F-35A mission would expose an additional estimated 22 children and 3 elderly persons to DNL of 65 dB or greater. The areas where these populations are located are shown on Figure HS3-10. Under baseline conditions, these populations have not been exposed to DNL of 65 dB or greater. Sections HS3.2.2.2 and HS3.2.2.3 identify speech interference and classroom learning disruption associated with increased overflight and noise levels which would adversely impact children and elderly populations.

Table HS3-45. Minority and Low-Income Populations Exposed to DNL of 65 dB or Greater Under Baseline and AFRC F-35A Mission Conditions at Homestead ARB (Scenario A)

Geographic Units	Population in the Census Area	Baseline					AFRC F-35A Mission (Newly Exposed)				
Census BG (ROI)/COC		Population in the Area Encompassed by 65 dB DNL or Greater	Minority (%)	Disproportionate	Low-Income (%)	Disproportionate	Population in the Area Encompassed by 65 dB DNL or Greater	Minority (%)	Disproportionate	Low-Income (%)	Disproportionate
CT 107.04											
2	579	0	96.5	No[a]	37.5	No[a]	62	96.5	Yes	37.5	Yes
COC	11,659	NA	93.7	NA	26.3	NA	NA	93.7	NA	26.3	NA

[a] No disproportionate impacts because there are no residential areas or people encompassed by the baseline 65 dB or greater DNL contour.

Notes: Shading indicates that implementation of the AFRC F-35A mission would result in disproportionate noise impacts to the BG (ROI). Numbers may not sum due to rounding. To best represent the level of accuracy achieved, population group numbers are displayed as whole numbers in the text and tables, whereas calculations are based on the raw population group numbers containing multiple decimal points. The resulting summations and change calculations are then rounded to whole numbers.

Key: NA = Not applicable, does not apply

Source: USCB 2017a-e

Table HS3-46. Children and Elderly Populations Exposed to DNL of 65 dB or Greater Under Baseline and AFRC F-35A Mission Conditions at Homestead ARB (Scenario A)

Geographic Units	Population in the Census Area	Baseline					AFRC F-35A Mission (Newly Exposed)				
Census BG (ROI)/COC		Population in the Area Encompassed by 65 dB DNL or Greater	Children (<18 years)		Elderly (65 years or >)		Population in the Area Encompassed by 65 dB DNL or Greater	Children (< 18 years)		Elderly (65 years or >)	
			Percent	Number	Percent	Number		Percent	Number	Percent	Number
CT 107.04											
2[a]	579	0	35.6	0	4.5	0	62	35.6	22	4.5	3
COC	11,659	NA	29.0	3,385	8.3	963	NA	29.0	3,385	8.3	963

[a] No residential areas or people are encompassed by the baseline 65 dB or greater DNL contour.

Notes: Numbers may not sum due to rounding. To best represent the level of accuracy achieved, population group numbers are displayed as whole numbers in the text and tables, whereas calculations are based on the raw population group numbers containing multiple decimal points. The resulting summations and change calculations are then rounded to whole numbers.

Key: NA = Not applicable, does not apply

Source: USCB 2017a-e

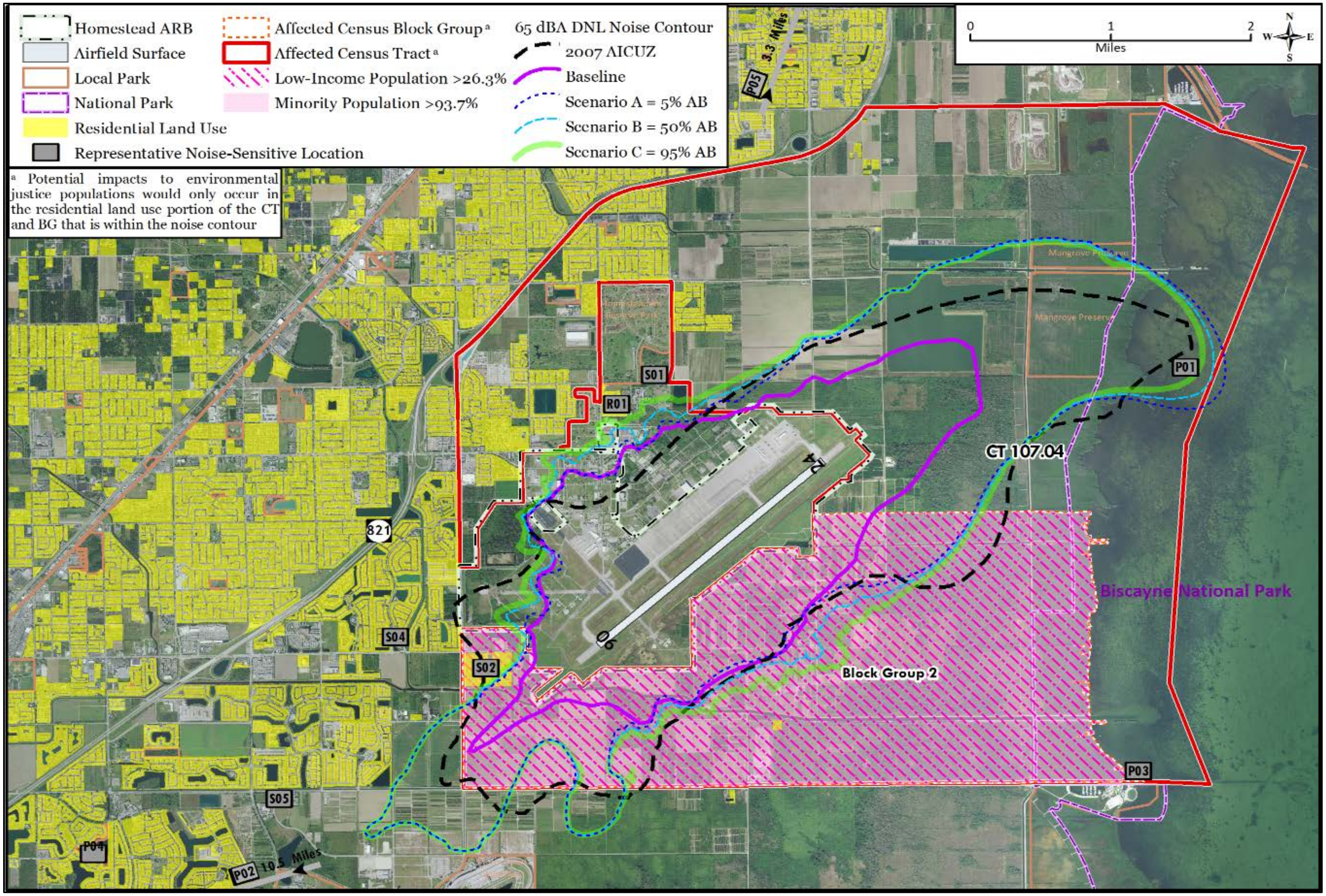

Figure HS3-9. Minority and Low-Income Populations Exposed to DNL of 65 dB or Greater Under Baseline and AFRC F-35A Mission Conditions at Homestead ARB

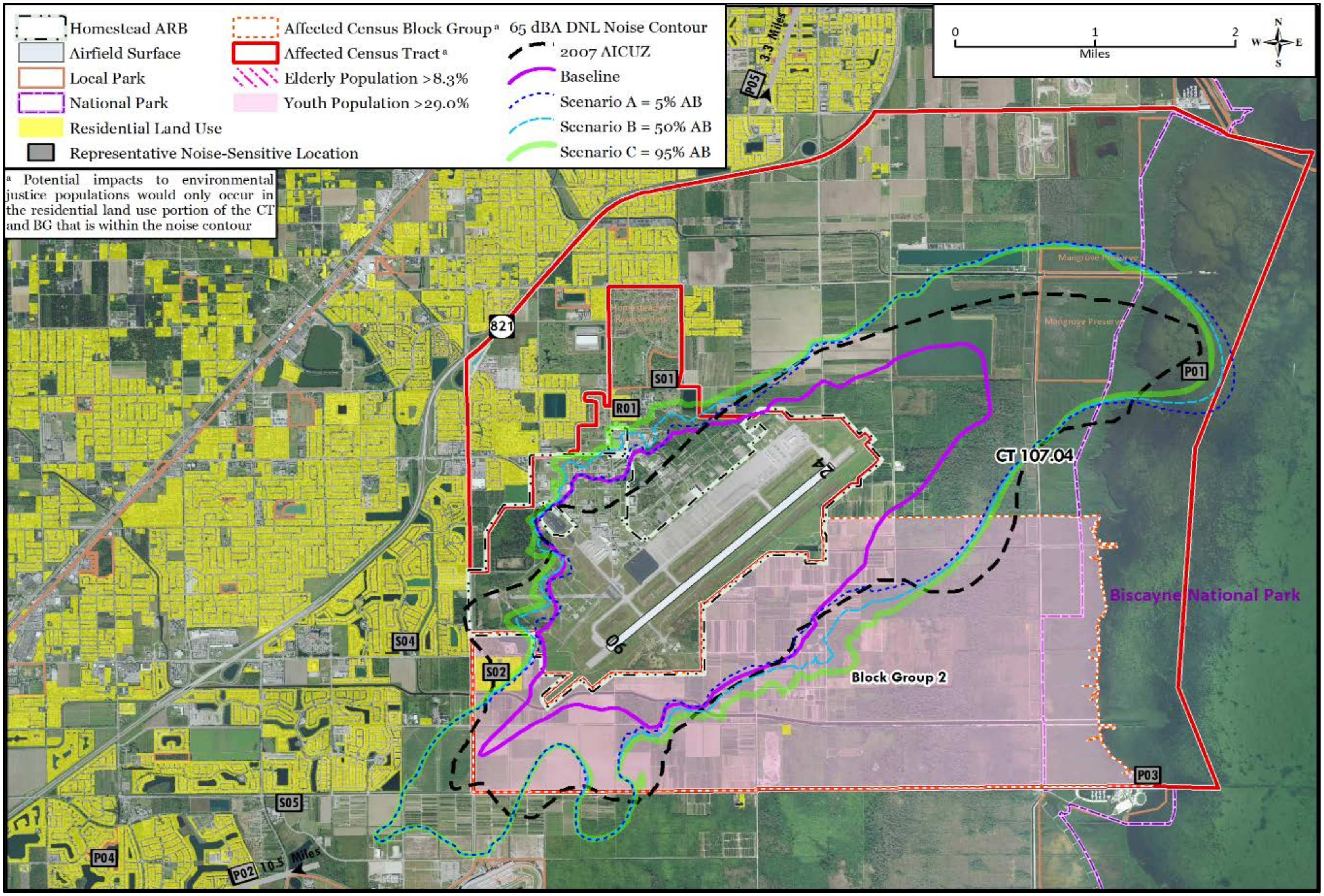

Figure HS3-10. Youth and Elderly Populations and Representative Noise-Sensitive Locations Exposed to DNL of 65 dB or Greater Under Baseline and AFRC F-35A Mission Conditions at Homestead ARB

No schools or childcare facilities would be exposed to DNL of 65 dB or greater from the AFRC F-35A mission at Homestead ARB. No hospitals or libraries would be exposed to DNL of 65 dB or greater.

HS3.10.2.2 Scenario B

Implementation of Scenario B would result in disproportionate noise impacts to minority and low-income populations in the one ROI (BG) evaluated for this analysis (Table HS3-47 and Figure HS3-9). This scenario would also expose an additional estimated 28 children and 4 elderly persons to DNL of 65 dB or greater (Table HS3-48 and Figure HS3-10). Because implementation of Scenario B would result in disproportionate impacts, potential mitigation measures were evaluated. The USAF considered a number of different measures to mitigate noise impacts, but none of these measures were determined to be operationally feasible (Chapter 2, Section 2.5).

No schools or childcare facilities would be exposed to DNL of 65 dB or greater from Scenario B at Homestead ARB. No hospitals or libraries would be exposed to DNL of 65 dB or greater.

Table HS3-47. Minority and Low-Income Populations Exposed to DNL of 65 dB or Greater Under Baseline and AFRC F-35A Mission Conditions at Homestead ARB (Scenario B)

Geographic Units	Population in the Census Area	Baseline					AFRC F-35A Mission (Newly Exposed)				
Census BG (ROI)/COC		Population in the Area Encompassed by 65 dB DNL or Greater	Minority (%)	Disproportionate	Low-Income (%)	Disproportionate	Population in the Area Encompassed by 65 dB DNL or Greater	Minority (%)	Disproportionate	Low-Income (%)	Disproportionate
CT 107.04											
2	579	0	96.5	No[a]	37.5	No[a]	79	96.5	Yes	37.5	Yes
COC	11,659	NA	93.7	NA	26.3	NA	NA	93.7	NA	26.3	NA

[a] No disproportionate impacts because there are no residential areas or people encompassed by the baseline 65 dB or greater DNL contour.

Notes: Shading indicates that implementation of the AFRC F-35A mission would result in disproportionate noise impacts to the BG (ROI). Numbers may not sum due to rounding. To best represent the level of accuracy achieved, population group numbers are displayed as whole numbers in the text and tables, whereas calculations are based on the raw population group numbers containing multiple decimal points. The resulting summations and change calculations are then rounded to whole numbers.

Key: NA = Not applicable, does not apply

Source: USCB 2017a-e

Table HS3-48. Children and Elderly Populations Exposed to DNL of 65 dB or Greater Under Baseline and AFRC F-35A Mission Conditions at Homestead ARB (Scenario B)

Geographic Units	Population in the Census Area	Baseline					AFRC F-35A Mission (Newly Exposed)				
Census BG (ROI)/COC		Population in the Area Encompassed by 65 dB DNL or Greater	Children (<18 years)		Elderly (65 years or >)		Population in the Area Encompassed by 65 dB DNL or Greater	Children (< 18 years)		Elderly (65 years or >)	
			Percent	Number	Percent	Number		Percent	Number	Percent	Number
CT 107.04											
2[a]	579	0	35.6	0	4.5	0	79	35.6	28	4.5	4
COC	11,659	NA	29.0	3,385	8.3	963	NA	29.0	3,385	8.3	963

[a] No residential areas or people are encompassed by the baseline 65 dB or greater DNL contour.

Notes: Numbers may not sum due to rounding. To best represent the level of accuracy achieved, population group numbers are displayed as whole numbers in the text and tables, whereas calculations are based on the raw population group numbers containing multiple decimal points. The resulting summations and change calculations are then rounded to whole numbers.

Key: NA = Not applicable, does not apply

Source: USCB 2017a-e

HS3.10.2.3 Scenario C

Implementation of Scenario C would result in disproportionate noise impacts to minority and low-income populations in the one ROI (BG) evaluated for this analysis (Table HS3-49 and Figure HS3-9). This scenario would expose an additional estimated 37 children and 5 elderly persons to DNL of 65 dB or greater (Table HS3-50 and Figure HS3-10). Because implementation of Scenario C would result in disproportionate impacts, potential mitigation measures were evaluated. The USAF considered a number of different measures to mitigate noise impacts, but none of these measures were determined to be operationally feasible (Chapter 2, Section 2.5).

No schools or childcare facilities would be exposed to DNL of 65 dB or greater from Scenario C at Homestead ARB. No hospitals or libraries would be exposed to DNL of 65 dB or greater.

Table HS3-49. Minority and Low-Income Populations Exposed to DNL of 65 dB or Greater Under Baseline and AFRC F-35A Mission Conditions at Homestead ARB (Scenario C)

Geographic Units		Baseline					AFRC F-35A Mission (Newly Exposed)				
Census BG (ROI)/COC	Population in the Census Area	Population in the Area Encompassed by 65 dB DNL or Greater	Minority (%)	Disproportionate	Low-Income (%)	Disproportionate	Population in the Area Encompassed by 65 dB DNL or Greater	Minority (%)	Disproportionate	Low-Income (%)	Disproportionate
CT 107.04											
2	579	0	96.5	No[a]	37.5	No[a]	104	96.5	Yes	37.5	Yes
COC	11,659	NA	93.7	NA	26.3	NA	NA	93.7	NA	26.3	NA

[a] No disproportionate impacts because no residential areas or people are encompassed by the baseline 65 dB or greater DNL contour.

Notes: Shading indicates that implementation of the AFRC F-35A mission would result in disproportionate noise impacts to the BG (ROI). Numbers may not sum due to rounding. To best represent the level of accuracy achieved, population group numbers are displayed as whole numbers in the text and tables, whereas calculations are based on the raw population group numbers containing multiple decimal points. The resulting summations and change calculations are then rounded to whole numbers.

Key: NA = Not applicable, does not apply

Source: USCB 2017a-e

Table HS3-50. Children and Elderly Populations Exposed to DNL of 65 dB or Greater Under Baseline and AFRC F-35A Mission Conditions at Homestead ARB (Scenario C)

Geographic Units		Baseline					AFRC F-35A Mission (Newly Exposed)				
Census BG (ROI)/COC	Population in the Census Area	Population in the Area Encompassed by 65 dB DNL or Greater	Children (<18 years)		Elderly (65 years or >)		Population in the Area Encompassed by 65 dB DNL or Greater	Children (< 18 years)		Elderly (65 years or >)	
			Percent	Number	Percent	Number		Percent	Number	Percent	Number
CT 107.04											
2[a]	579	0	35.6	0	4.5	0	104	35.6	37	4.5	5
COC	11,659	NA	29.0	3,385	8.3	963	NA	29.0	3,385	8.3	963

[a] No residential areas or people are encompassed by the baseline 65 dB or greater DNL contour.

Notes: Numbers may not sum due to rounding. To best represent the level of accuracy achieved, population group numbers are displayed as whole numbers in the text and tables, whereas calculations are based on the raw population group numbers containing multiple decimal points. The resulting summations and change calculations are then rounded to whole numbers.

Key: NA = Not applicable, does not apply

Source: USCB 2017a-e

HS3.10.3 Summary of Impacts to Environmental Justice and Protection of Children

Based on the analysis described in Section HS3.10.2 and shown in Table HS3-51, implementation of any of the three afterburner scenarios would result in disproportionate impacts to minority and low-income populations. The percentage of the population identifying themselves as minority residing in the ROI (BG) that would be exposed to DNL of 65 dB or greater exceeds the percentage of minority populations in the COC. The percentage of the exposed population that is considered below poverty residing in the ROI (BG) is greater than the percentage of low-income populations in the COC. The estimated number of children and elderly people exposed to DNL of 65 dB or greater from each afterburner scenario are listed in Table HS3-51.

Table HS3-51. Summary of the Minority, Low-Income, Children, and Elderly Populations Exposed to DNL of 65 dB or Greater Under Baseline and the Three Afterburner Scenarios for the AFRC F-35A Mission at Homestead ARB

Scenarios and Baseline/No Action	Disproportionate Impact		Newly Exposed Individuals	
	Minority Populations - Census BGs (ROIs)	Low-Income Populations - Census BGs (ROIs)	Children	Elderly Persons
Baseline/No Action[a]	0 of 1[a]	0 of 1[a]	0[a]	0[a]
Scenario A	1 of 1	1 of 1	22	3
Scenario B	1 of 1	1 of 1	28	4
Scenario C	1 of 1	1 of 1	37	5

[a] Baseline/No Action is the existing conditions and does not include the values for any of the other scenarios.

HS3.11 INFRASTRUCTURE

HS3.11.1 Base Affected Environment

HS3.11.1.1 Potable Water System

Potable drinking water and wastewater treatment and disposal are provided to the base and surrounding areas by Miami-Dade Water and Sewer Department. The three hydrologic units present in the Homestead area include, in descending order, the Biscayne aquifer, the Intermediate Confining Unit, and the Floridian aquifer system. The Biscayne aquifer extends from ground surface to approximately 80 to 100 feet below ground surface near Homestead ARB. The Biscayne aquifer is designated by the USEPA as a “sole-source” potable water supply for Broward, Miami-Dade, Monroe, and Palm Beach Counties. This designation under the Safe Drinking Water Act affords stringent protection for the aquifer (Homestead ARB 2016b).

Miami-Dade County Water and Sewer Department’s Alexander Orr Wellfield, with a permitted pumping capacity of approximately 308 million gallons per day (MGD), provides potable water to Homestead ARB. Raw water is chlorinated and fluoridated at a treatment facility next to the wellfield (Homestead ARB 2016b).

The Lower Floridian aquifer near Homestead ARB has mineralization and high salinity values that exceed primary drinking water standards and make the aquifer unsuitable as a potable water supply (Homestead ARB 2016b).

HS3.11.1.2 Wastewater

Homestead ARB has six industrial wastewater operating permits prepared in accordance with Chapter 24, Miami-Dade County Code. Permits cover all waste generating activities on Homestead ARB (Homestead ARB 2016b).

Primary waste-generating activities include hazardous materials storage; vehicle maintenance; aircraft washing and maintenance; and petroleum, oil, and lubricant storage activities. Homestead ARB facilities covered under these permits include: the Military Aircraft Jet Engine Testing Facility, Tank Farm, Buildings 185, 192, 193, 194, 200, 706, and 4709 (Homestead ARB 2016b).

In the event of a reportable spill (more than 25 gallons on pervious surfaces or more than 100 gallons on other surfaces), Homestead ARB would report the spill to Miami-Dade Regulatory and Economic Resources and the National Response Center (Homestead ARB 2016b, Cedeno 2018). The domestic wastewater treatment plant on Homestead ARB (former Homestead AFB) was closed and decommissioned in 1984. Miami-Dade Water and Sewer Department provides wastewater treatment and disposal for the base under contract to the AFRC. Homestead ARB has no industrial wastewater or stormwater disposal wells. Some wastewater treatment units at industrial areas are closed-loop-recycle systems that constantly treat and reuse the same wash water (Homestead ARB 2016b).

HS3.11.1.3 Stormwater System

Natural drainage on Homestead ARB is generally poor due to the relatively flat surface and the location of the water table, which is either at or near the land surface of Homestead ARB. Stormwater runoff is collected in an internal drainage system of canals, swales, ditches, and pipes, most of which eventually discharge into the Boundary Canal (Homestead ARB 2016b).

The stormwater reservoir is on the eastern side of the base and receives flow from the Boundary Canal system which collects runoff throughout the installation. The reservoir is approximately 300 feet wide and 900 feet long. Typical depths are estimated to range between 10 and 20 feet. Assuming an average depth of 12 feet, the reservoir volume is estimated to be 46.3-acre feet. A control structure at the eastern edge of the reservoir is used to discharge water when required (Homestead ARB 2016b).

This control structure is only opened when extra water must be discharged. During periods of heavy rainfall, three 100,000-gallon manual pumps with a total combined maximum rate of 300,000 gallons per minute pump water to the Military Canal. These pumps were designed to begin pumping at an elevation of 3.0 feet National Geodetic Vertical Datum (NGVD) and shut down at an elevation of 2.5 feet NGVD (Homestead ARB 2016b).

As a result, water elevations in the Flightline Canal are at acceptable operational levels and the pumps continue to operate until the water level in the canal is lowered to 2.5 feet NGVD. Manatee exclusion grates were installed at the control structure at the eastern edge of the reservoir (Homestead ARB 2016b).

HS3.11.1.4 Electrical System

The Florida Power and Light Company (FPL) provides electrical power to Homestead ARB. The main substation owned by FPL is on the former Homestead AFB near Mystic Lake. The electrical distribution system on Homestead ARB is owned by FPL, and most buildings are group-metered. Homestead ARB controls the airfield power grid (Homestead ARB 2016b).

FPL has the capacity to meet unusual power demands based on its ability to shift power from areas that are currently experiencing reduced electrical demands to areas that require additional power. The system’s capacity is 22,412 megawatts (MW). The distribution system varies between 13 kilovolts (kV) and 23 kV capacity lines. The current demand is 8,530 MWh, allowing ample supply for future expansion (Homestead ARB 2016b).

Most of the electric lines on base are underground. However, areas along the west perimeter fence, an area south of the airfield, and scattered segments throughout the base still have overhead lines. Overhead street lighting is mounted on concrete poles and served by FPL-owned underground lines (Homestead ARB 2016b).

The parking lot lighting is owned by Homestead ARB. The airfield lighting system includes in-ground taxiway lights, runway edge lights, lighted directional signs, and a vault building with power regulators, controls, and a generator (Homestead ARB 2016b).

HS3.11.1.5 Natural Gas System

Although natural gas is supplied to the local area by the City Gas Company of Florida, no natural gas supply is located at Homestead ARB. City Gas Company of Florida services approximately 101,000 customers in Miami-Dade and Brevard Counties (Homestead ARB 2016b).

HS3.11.1.6 Solid Waste Management

Municipal solid waste management and compliance at USAF installations is established in AFI 32-7042, *Waste Management.* In general, AFI 32-7042 establishes the requirements for installations to have a solid waste management program to incorporate a solid waste management plan; procedures for handling, storage, collection and disposal of solid waste; record-keeping and reporting; and pollution prevention. Homestead ARB's Integrated Solid Waste Management Plan (ISWMP) provides guidance for the management of municipal solid waste, compostable materials, C&D debris, and industrial solid waste at Homestead ARB in accordance with AFI 32-7042 and other applicable federal, state, and local requirements (Homestead ARB 2013).

The USAF goal for solid waste reduction is to divert 65 percent of non-hazardous solid waste by 2020 and 60 percent of C&D debris by 2018 (DoD 2012). Homestead ARB has an extensive solid waste recycling program. The storage and processing (e.g., segregation, bailing, and glass crushing) of recyclables is conducted at an on-site Recycle Center in Building 164. The installation maintains a diversion rate greater than 50 percent (Homestead ARB 2013).

Municipal solid waste generated at Homestead ARB that is not recycled is collected by a contractor. The contractor removes and transports refuse to the South Dade Landfill located 4 miles north of the base for evaluation, segregation, and additional recycling. No active municipal landfills are located on the installation. Collection of C&D debris generated during contracted facility demolition, renovations, or new construction activity is the responsibility of the contractor performing the work (Homestead ARB 2013).

HS3.11.1.7 Transportation

Homestead ARB is located in southeast Florida, about 30 miles south of Miami. The following are approximate distances to major cities from Homestead ARB: Fort Lauderdale, Florida, 64 miles northeast; Key West, Florida, 130 miles southwest; Orlando, Florida, 270 miles northwest; and Tampa, Florida, 300 miles northwest.

Homestead ARB is in northeast Homestead, Florida, approximately 7 miles from the central business district of Homestead (population: 64,079) and 30 miles south of Miami (population: 417,650). The base is situated along Biscayne Boulevard (SW 288th Street). The area around the base is a mix of commercial, residential, and agricultural.

The Miami-Dade metro area is the major transportation hub of South Florida. It lies at the intersection of two major national highways, Interstate (I)-95 and I-75. To the south, I-95 (which turns into US-1) connects Miami to the Florida Keys. Traveling east to west, I-75 connects the east coast of South Florida to the west coast of South Florida. Beyond its roadway and air connections, the region has alternative options for travel, such as public transit, bicycle, and pedestrian facilities. The two major pedestrian options are the Metrorail and the M-Path. The Metrorail system is a 25-mile dual track, elevated rapid transit system that provides service to MIA and extends from Kendall through south Miami, Coral Gables, and downtown Miami; to the Civic Center/Jackson Memorial Hospital area; and to Brownsville, Liberty City, Hialeah, and Medley in northwest Miami-Dade, with connections to Broward and Palm Beach counties at the Tri-Rail/Metrorail transfer station. The system currently uses 136 train cars. The M-Path is a paved multi-use trail in urban Miami-Dade County, which opened in 1983 and is part of the Miami-Dade Transit (MDT) system. The trail follows a MDT right-of-way under the elevated Metrorail guideways.

HS3.11.1.7.1 Gate Access

The Entry Control Point (ECP) on Westover Street is the primary gate providing ingress/egress to the installation. Originally, this gate served as the commercial gate with the ECP at Coral Sea Boulevard serving as the primary gateway onto the installation. However, due to security concerns, the ECP at Coral Sea Boulevard was closed and is now only open during UTA weekends. A new Entry Control Complex is currently under construction north of Bougainville Boulevard across from the former Base Exchange (BX), Building 920. The new Entry Control Complex will provide more efficient and secure processing for vehicles and personnel associated with the host wing and tenant organizations (Homestead ARB 2016b).

HS3.11.1.7.2 On-Base Traffic Circulation

The installation road network is laid out in a grid pattern with the primary routes extending north-south and the secondary routes extending east-west. Westover Street and Coral Sea Boulevard, being the signature routes, are the two primary roadways. Elmendorf Street, St. Lo Boulevard, Biggs Street, and Tuskegee Boulevard are the secondary routes and can be considered collector roads. Coral Sea Boulevard extends from the northern edge of the installation at Bougainville Boulevard southward to the flightline road. Westover Street extends from the main gate at Bougainville Boulevard southward to the Mako ramp area. The secondary, east-west roads bisect Coral Sea Boulevard and Westover Street at regular intervals (Homestead ARB 2016b).

Vehicle parking areas on the installation are scattered and fragmented. A few consolidated parking and service areas support multiple facilities. One consolidated lot is at the corner of Coral Sea Boulevard and Ploesti Road. A unique north-south pathway links the administrative functions at the north end of the installation with the O&M functions at the south end. This pathway is wide enough to simultaneously accommodate pedestrians, bicyclists, and electric golf carts. The pathway is wide and straight and is crisscrossed by a serpentine, pedestrian path. The pathway is landscaped with trees to provide shade and is lighted at night by electricity from solar collectors (Homestead ARB 2016b).

HS3.11.2 Base Environmental Consequences

The projected change in population that would result from implementation of the proposed AFRC F-35A mission at Homestead ARB is a reduction of 91 base personnel or approximately 2 percent of the base population. This projected change in population and development was used to determine the impact on infrastructure. Since the proposed AFRC F-35A mission results in the loss of base personnel, it is assumed that the current demand for the potable water, wastewater, electric, and natural gas systems is sufficient to support the projected change in population. The impact of the proposed AFRC F-35A mission on the transportation infrastructure, would be negligible based on the potential minor reduction of on-base traffic.

HS3.11.2.1 Potable Water System

Based on the average usage rate of 125 gallons per day (GPD) (UFC 3-230-03) per person, it is anticipated that the decrease in population (i.e., 91 people) associated with the proposed AFRC F-35A mission at Homestead ARB would reduce the water use demand by 11,375 GPD. This decrease would not result in significant impacts to the potable water system.

HS3.11.2.2 Wastewater

The USEPA estimates that the average person generates approximately 120 GPD of wastewater between showering, toilet use, and general water use (USEPA 2014). Based on this rate, the proposed decrease in population at Homestead ARB (i.e., 91 people) would decrease wastewater discharge by approximately 10,920 GPD. The decrease in wastewater discharge would not result in significant impacts to the wastewater system.

HS3.11.2.3 Stormwater System

The proposed AFRC F-35A mission would require demolition of facilities and construction of new facilities. These projects would disturb approximately 2.3 acres of land.

During the short-term construction period for the proposed AFRC F-35A mission, all contractors would be required to comply with applicable statutes, standards, regulations, and procedures regarding stormwater management. During the design phase, a variety of stormwater controls could be incorporated into construction plans. These could include planting vegetation in disturbed areas as soon as possible after construction; constructing retention facilities; and implementing structural controls (e.g., interceptor dikes, swales [excavated depressions], silt fences, straw bales, and other storm drain inlet protection), as necessary, to prevent sediment from entering inlet structures. Implementation of the AFRC F-35A mission would not result in significant impacts to the stormwater system.

HS3.11.2.4 Electrical System

The U.S. Energy Information Administration (USEIA) estimates that the average household in Florida uses 1.1 MWh per month (USEIA 2014). The proposed decrease in population would reduce the anticipated electrical use at Homestead ARB by approximately 100 MWh per month. This decrease would not affect the power supplied by FPL. Implementation of the AFRC F-35A mission would not result in significant impacts to the electrical system.

HS3.11.2.5 Natural Gas System

The proposed decrease in population would have no effect on the natural gas usage at Homestead ARB. Implementation of the AFRC F-35A mission would not result in significant impacts to the natural gas system.

HS3.11.2.6 Solid Waste Management

Solid waste would continue to be managed in accordance with AFI 32-7042 and the ISWMP with the implementation of the proposed AFRC F-35A mission at Homestead ARB. Using methodology developed by the USEPA (USEPA 2009b), it is estimated that implementation of the proposed AFRC F-35A mission would generate approximately 806 tons of C&D debris for recycling or removal to landfills. Application of the 60 percent DoD target diversion rate (DoD 2012) for C&D debris would result in approximately 483 tons being reused or recycled, and approximately 323 tons being placed in a permitted construction debris landfill in the region. C&D debris is the responsibility of the contractor performing the work, and contract documents require disposal in a permitted construction debris landfill (Homestead ARB 2013).

Implementation of the AFRC F-35A mission at Homestead ARB would result in a reduction of 91 personnel and their associated dependents. Although this reduction in personnel would result in a minor decrease in municipal solid waste generation, this would have little effect on the municipal solid waste program (collection, disposal, etc.). The South Dade Landfill has an estimated life span through 2029 and would continue to accommodate the municipal solid waste from Homestead ARB (Miami-Dade County 2018). Implementation of the AFRC F-35A mission would not result in significant impacts to solid waste management.

Contractors would be required to comply with federal, state, and local regulations for the collection and disposal of municipal solid waste from the base. C&D debris, including debris contaminated with hazardous waste, ACM, lead-based paint (LBP), or other hazardous components, would be managed in accordance with AFI 32-7042 and the installation's ISWMP.

HS3.11.2.7 Transportation

Implementation of the facilities and infrastructure projects associated with the proposed AFRC F-35A mission at Homestead ARB would require the delivery of materials to, and removal of construction-related debris from, construction, demolition, and renovation, sites. Construction-related traffic would comprise a small portion of the total existing traffic volume in the area and on the base. Increased traffic associated with these activities could contribute to increased congestion at the entry gates, delays in the processing of access passes, and degradation of the affected road surfaces. Traffic delays would be temporary in nature, ending once construction activities have ceased. As a result, no long-term impacts to on- or off-base transportation systems are anticipated.

Implementation of the proposed AFRC F-35A mission at Homestead ARB would result in a minor decrease of 91 on-base mission personnel, which would result in a slight reduction in daily commuting traffic to and from the base. No significant impacts to infrastructure would result from implementation of the proposed AFRC F-35A mission at Homestead ARB.

HS3.11.3 Summary of Impacts to Infrastructure

Implementation of the AFRC F-35A mission would not result in changes to any of the utility infrastructure (potable water, wastewater, stormwater, electricity, natural gas and solid waste) on Homestead ARB. In addition, the new mission would also not require any changes to transportation resources including any of the base gates. Therefore, implementation of the proposed mission would result in no significant impacts to infrastructure.

HS3.12 HAZARDOUS MATERIALS AND WASTE

HS3.12.1 Base Affected Environment

HS3.12.1.1 Hazardous Materials

Hazardous materials used by USAF and contractor personnel at Homestead ARB are managed in accordance with AFI 32-7086, *Hazardous Materials Management*, and are controlled through the base Hazardous Materials Storage Facility. This process provides centralized management of the procurement, handling, storage, and issuance of hazardous materials and turn-in, recovery, reuse, or recycling of hazardous materials.

HS3.12.1.1.1 Aboveground and Underground Storage Tanks

The Homestead ARB Hazardous Material Emergency Planning and Response and Oil Spill Facility Response Plan (Homestead ARB Hazardous Material Plan) represents both the Spill, Prevention, Control, and Countermeasure (SPCC) Plan and Facility Response Plan (FRP) in the Integrated Contingency Plan (ICP) format. This plan covers all operations that handle, transport, store, and utilize hazardous materials, including petroleum products and wastes. The Homestead ARB Hazardous Material Plan describes the measures implemented to prevent petroleum product discharges from occurring and prepares the base to respond in a safe, effective, and timely manner to mitigate the impacts of an uncontrolled discharge. This plan and Installation Emergency Management Plan (IEMP) 10-2 address roles, responsibilities, and response actions for all major spills (Homestead ARB 2014, 2017c).

Homestead ARB has eight aboveground storage tanks (ASTs) with capacities greater than or equal to 10,000 gallons. These ASTs are located at the bulk fuel storage area (2), hydrant pump house (2), base service station (2), fire training area (1), and heated wash rack (1). These ASTs are used to store Jet-A, gasoline, diesel, and propane. Homestead ARB also manages two underground storage tanks (USTs) associated with the Army Air Force Exchange Store BX Shopette The total Jet-A storage capacity at Homestead ARB is approximately 2,880,000 gallons (Homestead ARB 2018e). Homestead ARB used approximately 8,008,000 gallons of Jet-A in 2017. Homestead ARB receives fuel from commercial tank trucks. Jet-A is delivered to two fuel pits on the flightline apron via the fuel hydrant system which consists of two ASTs and associated pipelines and pump house. Jet-A is also delivered to aircraft via refueling trucks (Homestead ARB 2018e).

HS3.12.1.1.2 Toxic Substances

The Asbestos Management Plan implements AFI 32-1052, *Facility Asbestos Management*, policies and establishes management responsibilities and procedures to accomplish ACM-related activities at Homestead ARB. The plan also describes how the base will carry out ACM-related work (Homestead ARB 2012a). The Civil Engineering Environmental Flight office maintains the Asbestos Database, a permanent file, documenting asbestos-related activities and information on the status of ACM in buildings at Homestead ARB. Based on the plan, all proposed facility demolition, renovation, or removal projects must be reviewed, to the extent possible, to identify the presence of ACM prior to work beginning. Work on ACM projects would only be performed by individuals with a current license from the State of Florida and training in accordance with OSHA and USEPA standards. For any project on base, ACM wastes are removed by the contractor performing the work and handled and disposed of in accordance with federal, state, and local regulations at a waste disposal site authorized to accept such waste.

With regard to LBP, Homestead ARB currently has no residential housing, target housing, or child-occupied facilities as defined by the HUD. Therefore, all base buildings are designated as non-priority buildings and HUD standards do not apply. The LBP Management Plan (Homestead ARB 2012c) provides guidance and sets forth policies for managing LBP in accordance with state and federal regulations. The plan also addresses organizational roles and responsibilities, management practices, the management program, and work procedures and practices. As with ACM, the Civil Engineering Environmental Flight office maintains a LBP database to document the location of LBP on Homestead ARB. All demolition, renovation, and maintenance projects are reviewed to determine if lead-containing materials are present in the proposed work area. LBP wastes from Homestead ARB are removed and disposed of in accordance with state and federal regulations at a permitted off-base landfill.

Electrical transformers and light ballasts are potential sources of polychlorinated biphenyls (PCBs). No PCBs have been found recently at Homestead ARB but could be present in old transformers and light ballasts (Vespe 2017). PCB wastes are managed in accordance with the Hazardous Waste Management Plan and in compliance with state and federal regulations (Homestead ARB 2012c).

HS3.12.1.2 Hazardous Waste Management

Homestead ARB is classified as a Small-Quantity Generator. Hazardous waste generated, stored, transported, or disposed of by Homestead ARB is regulated by the State of Florida under authority granted to the state by the USEPA. Typical hazardous wastes generated during O&M activities include absorbents, contaminated rags, paint/coating, stripping chemicals, blast media, waste paint-related materials, adhesives, aerosol cans, spent photo development chemicals, and other miscellaneous wastes.

Hazardous wastes at Homestead ARB are managed in accordance with the Hazardous Waste Management Plan (Homestead ARB 2012c). This plan describes the responsibilities, policies, and procedures for managing hazardous waste generated during operations at Homestead ARB. This plan also covers the control and management of hazardous wastes from the point the material becomes a hazardous waste to the point of ultimate disposal, as required by federal and state laws and regulations. In 2017, the base generated approximately 13,400 pounds of hazardous waste, which was disposed of at off-base permitted disposal facilities.

HS3.12.1.3 Environmental Restoration Program

Thirty-two (32) Environmental Restoration Program (ERP) sites at Homestead ARB are administered in accordance with the Management Action Plan (MAP). The MAP describes the integrated, coordinated approach of conducting the ERP activities required at the installation (Homestead ARB 2017d). Environmental response actions are planned and executed under the ERP in a manner consistent with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and other applicable laws. Homestead ARB (formerly Homestead AFB) was listed on the USEPA's National Priorities List in August of 1990.

Perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA) are members of a family of emerging contaminants known as per- and polyfluoroalkyl substances (PFAS) that are directly related to the former use of Aqueous Film Forming Foam (AFFF), a fire suppressing agent that was used by the DoD. The USEPA has not issued regulatory limits on PFAS. However, the USEPA has issued a 70 parts per trillion Lifetime Health Advisory level for PFOS/PFOA in drinking water. In March of 2019, consistent with CERCLA, Homestead ARB completed the on-base portion of the site inspection of AFFF release areas (Homestead ARB 2019). The site inspection identified nine AFFF release areas. If the CERCLA risk assessment process ultimately determines there is a need for cleanup action, federal and state cleanup standards will be evaluated under the CERCLA process to see if they are Applicable or Relevant and Appropriate Requirements (ARARs) at any of the nine on-base sites. The off-base portion of the AFFF site inspection has not been completed.

Homestead ARB has transitioned to firefighting foam that meets the Military Specification (MILSPEC) standard for PFAS concentrations. The new foam meets both the MILSPEC requirements for firefighting and the goals of the USEPA 2010/2015 PFOA Stewardship Program (Homestead ARB 2019).

HS3.12.2 Base Environmental Consequences

HS3.12.2.1 Hazardous Materials Management

Implementation of the proposed AFRC F-35A mission at Homestead ARB would not add any new hazardous materials that would exceed the base's current hazardous waste processes. Existing procedures for the centralized management of the procurement, handling, storage, and issuance of hazardous materials and turn-in, recovery, reuse, and recycling of hazardous materials through the base Hazardous Materials Storage Facility are adequate to accommodate the changes anticipated with the replacement of the F-16 mission with the AFRC F-35A mission.

The F-35A was designed to reduce the quantities and types of hazardous materials needed for maintenance of the aircraft. Unlike the F-16 aircraft, the F-35A aircraft does not use hydrazine, cadmium fasteners, chrome plating, copper-beryllium bushings, or primers containing cadmium and hexavalent chromium. No adverse impacts are anticipated to result from implementation of the AFRC F-35A mission at Homestead ARB. Long-term environmental benefits from the reduced use of hazardous materials are anticipated.

The F-35A aircraft is composed of composite materials (e.g., carbon fiber) and stealth coatings (e.g., low observable material), which could pose a health risk under specific circumstances (e.g., during maintenance or when burned as a result of an aircraft crash). The only maintenance of the stealth coating that would occur at the base would be done using a brush or roller to apply coatings, bonding materials, or applying tape. Depot-level maintenance of the low observable material (including spray capability) would be conducted off-site; therefore, the composite material for major repairs to the low observable material would not be stored on base. Section HS3.4.2.4.2 discusses composite materials and emergency crash response.

HS3.12.2.1.1 Aboveground and Underground Storage Tanks

New and remodeled facilities would require the addition of new ASTs to support generators, as well as new hazardous material and waste containers. The new and remodeled facilities would be constructed with berms and drains leading to oil-water separators (OWSs), if required, to contain potential uncontrolled releases of petroleum products. ASTs 208-1 and 208-2 would be removed with the demolition and replacement of Building 208. The Homestead ARB Hazardous Material Plan and IEMP would subsequently need to be revised to incorporate any changes in facility design, construction operation, or maintenance that materially affects the potential for an uncontrolled release of petroleum products (Homestead ARB 2014, 2017c).

HS3.12.2.1.2 Toxic Substances

Several demolition and renovation projects are planned as part of the proposed AFRC F-35A mission. Any construction, demolition, or renovation project proposed at Homestead ARB would be reviewed to determine if ACM is present. As shown in Table HS3-52, Building 194 is proposed for modification and contains ACM. Table HS3-52 also includes two additional buildings proposed for modification that have the potential to contain ACM. All handling and disposal of ACM wastes would be performed in accordance with the Homestead ARB *Asbestos Management Plan* (Homestead ARB 2012a) and in compliance with federal, state, and local regulations. Before initiating any demolition or renovation project requiring review for ACM, the required notifications to the Miami-Dade County, Department of Regulatory and Economic Resources, Division of

Environmental Resources Management, would be completed. The Notice of Demolition or Asbestos Renovation form must be submitted at least 10 days before the project start date. Work on ACM projects would only be conducted by persons licensed by the State of Florida and with current certificates of training in accordance with standards established by OSHA and the USEPA. All ACM wastes would be disposed of at an approved landfill.

All renovation and C&D projects proposed at Homestead ARB would be reviewed to determine if LBP or lead containing materials are present, and whether such materials would be disturbed. To the extent possible, the presence of lead within the work area would be identified prior to work beginning. Building 200 is proposed for modification and is known to contain LBP or lead-containing material. Table HS3-52 contains a list of two additional buildings (194 and 208) proposed for modification that have the potential to contain lead. If the presence of lead containing material in the project work area is unknown, the shop and real property records would be reviewed to determine the presence of lead. If the presence of lead containing material in the work area is still unknown, sampling and analysis for lead would be conducted. The handling and disposal of lead wastes would be conducted in accordance with the Homestead ARB *Lead Based Paint Management Plan* (Homestead ARB 2012b) and *Final Hazardous Waste Management Plan* (Homestead ARB 2012c), and in compliance with federal, state, and local requirements and regulations.

Table HS3-52. Toxic Substances Associated with Projects for the AFRC F-35A Mission at Homestead ARB

Project	Year Constructed	ACM	LBP	PCBs
Demolition				
Building 208 (storage of AGE)	1969	[a]	[b]	[c]
Renovation				
Building 180 repair egress shop, battery storage	1997	[d]	[d]	[c]
Building 185 repair propulsion shop	1989	[d]	[d]	[c]
Building 191 renovation for flight equipment	1997	[d]	[d]	[c]
Building 192 repair vault and replace hoists	1981	[d]	[d]	[c]
Building 193 electrical upgrades	1993	[d]	[d]	[c]
Building 194 electrical upgrades	1972	X	X	[c]
Building 200 electrical upgrades and new addition for shop and administrative space	1963	[a]	[b]	[c]
Building 213 construct storage cage	1997	[d]	[d]	[c]

[a] Inspections and surveys must be conducted in all buildings prior to undergoing demolition and renovation. Facilities built after 1980 usually do not require inspection (Homestead ARB 2012a).
[b] Buildings constructed before 1980 are presumed to contain LBP (Homestead ARB 2012b).
[c] PCBs could be present in old transformers and light ballasts (Vespe 2017).
[d] Buildings constructed after 1980 are presumed to not contain ACM or LBP.
Key: X = Toxic substance known to occur in the building

Because some of the buildings proposed for renovation or demolition were constructed prior to 1980, it is assumed that those buildings could contain PCB-containing materials (light ballasts and transformers). The buildings that would be affected by demolition and renovation, their years of construction, and the potential for PCB-containing materials to be present are summarized in Table HS3-52. If PCB-containing materials are present, these materials would be removed, handled, and disposed of in accordance with federal and state regulations and the Homestead ARB *Final Hazardous Waste Management Plan* (Homestead ARB 2012c).

Although minor increases in the management requirements for ACM, LBP, or PCB removal are anticipated, no adverse impacts are anticipated to result from implementation of the AFRC F-35A mission at Homestead ARB. Long-term environmental benefits from removal of toxic substances are anticipated.

HS3.12.2.2 Hazardous Waste Management

Homestead ARB would continue to operate as a Small-Quantity Generator and would generate hazardous wastes during various O&M activities associated with the proposed AFRC F-35A mission. Waste-associated maintenance materials include adhesives, sealants, conversion coatings, corrosion prevention compounds, hydraulic fluids, lubricants, oils, paints, polishes, thinners, cleaners, strippers, tapes, and wipes. No new hazardous materials would be added that exceed the base's current hazardous waste processes. The Homestead ARB Hazardous Waste Management Plan (Homestead ARB 2012c) would be updated to reflect any change in disposal procedures or hazardous waste generators and waste accumulation points. Implementation of the AFRC F-35A operational beddown and mission at Homestead ARB would have a beneficial impact on hazardous waste management. Transition from the F-16 to the F-35A would decrease the volume and types of hazardous waste and waste streams because O&M involving hydrazine, cadmium and hexavalent chromium primer, and various heavy metals have been eliminated or greatly reduced. All hazardous wastes would be handled and managed in accordance with federal, state, and local regulations.

HS3.12.2.3 Environmental Restoration Program

There are 32 ERP sites at Homestead ARB that are administered in accordance with the MAP. None of the proposed construction, demolition, or renovation projects associated with the proposed AFRC F-35A mission at Homestead ARB are on or directly adjacent to active ERP sites. However, there is the possibility that undocumented contaminated soils and/or groundwater from historical fuel spills could be present. If encountered during C&D-related excavations, storage/transport/disposal of contaminated groundwater/soils would be conducted in accordance with applicable federal, state, and local regulations; AFIs; and base policies. Should soil or groundwater contaminants be encountered during C&D activities, health and safety precautions, including worker awareness training, would be required.

Homestead ARB identified nine AFFF (PFAS) release areas for site investigation on base. These sites are currently being evaluated in accordance with the CERCLA process. Homestead ARB will comply with Air Force Guidance Memorandum (AFGM) 2019-32-01, *AFFF-Related Waste Management Guidance*, to manage waste streams containing PFAS. The AFGM will be updated as needed to address changes in regulatory requirements, DoD determinations of risk, or development of new technologies. If PFOS/PFOA attributable to DoD actions is found in drinking water at levels that exceed USEPA's Lifetime Health Advisory, the DoD takes immediate action to stop human exposure by providing alternate drinking water sources.

In addition to groundwater contamination as it relates to drinking water, other PFOS/PFOA contamination considerations relative to the proposed AFRC F-35A mission include worker safety during implementation of the projects and proper management of any PFAS-impacted environmental media that is identified in the project footprint. As part of implementation of the new mission, excavations for new buildings and building additions would occur. Based on review of known historical releases of AFFF at Homestead ARB, only one building addition (Hangar 200) associated with the F-35A beddown is located in a likely AFFF release area (AFFF Area 3). Hangar 200, along with Hangars 193 and 194, are located in AFFF Area 3, and AFFF releases likely occurred at these hangars during Hurricane Andrew in 1992. The renovation projects at Hangar 193 and 194 are internal electrical upgrades only and would not impact this AFFF area or worker safety. During the AFFF site inspection, PFOA and PFOS were detected in the surface soil and subsurface soil samples at concentrations below the Regional Screening Levels. Concentrations of PFOA, PFOS, and combined PFOA and PFOS detected in the groundwater samples were above the USEPA health advisory (Homestead ARB 2019). The next step in the CERCLA process is the remedial investigation. During the remedial investigation, the USAF will collect detailed information to characterize site conditions, determine the nature and extent of the contamination, and evaluate risks to human health and the environment posed by the site conditions by conducting a baseline ecological and human health risk assessment. The CERCLA process will continue regardless of any construction activities. Construction activities, to include the handling, mitigation, and disposal or other disposition of contamination discovered before or during the construction activity, will proceed in accordance with all applicable legal requirements. The ERP manager would be consulted during the CERCLA process and prior to implementation of this project to ensure worker safety.

HS3.12.3 Summary of Impacts to Hazardous Materials and Hazardous Waste

Implementation of the new mission would not add any new hazardous materials that would exceed the base's current processes. ASTs 208-1 and 208-2 would be removed with the demolition and replacement of Building 208. The Homestead ARB Hazardous Material Plan and IEMP would subsequently need to be revised to incorporate any changes in facility design, construction operation, or maintenance that materially affects the potential for an uncontrolled release of petroleum products. Three of the buildings proposed for demolition or renovation could contain ACM and LBP. Prior to demolition or renovation, Homestead ARB would complete the appropriate notifications and complete the abatement work in accordance with applicable plans and per all local, state and federal requirements. None of the construction would affect ERP sites. Should contaminated media be encountered during construction, storage/transport/disposal of contaminated media would be conducted in accordance with base plans and applicable regulations. Implementation of the new mission would not result in significant impacts to hazardous materials and wastes.

HS4.0 CUMULATIVE EFFECTS AND IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Council on Environmental Quality (CEQ) regulations stipulate that the cumulative effects analysis should consider the potential environmental impacts resulting from "the incremental impacts of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person (federal or non-federal) undertakes such other actions" (40 *CFR* 1508.7). In this section, an effort has been made to identify past and present actions in the Homestead ARB region and those reasonably foreseeable actions that are in the planning phase or unfolding at this time. Actions that have a potential to interact with the AFRC F-35A mission at Homestead ARB are included in this cumulative analysis. This approach enables decision makers to have the most current information available so that they can evaluate the environmental consequences of the AFRC F-35A mission at Homestead ARB and in associated airspace.

Homestead ARB is an active military installation that undergoes changes in mission and training requirements in response to defense policies, current threats, and tactical and technological advances. As a result, the installation requires new construction, facility improvements, infrastructure upgrades, and other maintenance/repairs on a nearly continual basis. Although known construction and upgrades are a part of the analysis contained in this document, some future requirements cannot be predicted. As those requirements surface, future NEPA analyses will be conducted, as necessary.

HS4.1 PAST, PRESENT, AND REASONABLY FORESEEABLE ACTIONS

On 24 August 1992, Hurricane Andrew nearly destroyed Homestead AFB, and 2 years later the Base Realignment and Closure (BRAC) Commission recommended closure due to the damage. In January 1994, the USAF completed an EIS on the disposal of Homestead AFB and the base was officially closed in April 1994. In 1994, a portion of the former Homestead AFB was realigned to Homestead Air Reserve Station (ARS) under BRAC. In 2003, Homestead ARS became Homestead ARB. As part of this, the USAF retained approximately 1,943 acres for Homestead ARB and the remaining acres were divided into parcels and transferred to other entities.

Table HS4-1 summarizes past, present, and reasonably foreseeable actions within the region that could interact with the AFRC F-35A mission at Homestead ARB. Table HS4-1 briefly describes each identified action, presents the proponent or jurisdiction of the action and the timeframe (e.g., past, present/ongoing, future), and indicates which resources potentially interact with the AFRC F-35A mission at Homestead ARB. Recent past and ongoing military actions in the region were considered as part of the baseline or existing conditions in the region surrounding Homestead ARB and training airspace.

Table HS4-1. Past, Present, and Reasonably Foreseeable Actions at Homestead ARB and Associated Region

Action	Proponent/Location	Timeframe	Description	Resource Interaction
Military Actions				
Homestead ARB IDP	482 FW	Future	The IDP includes 17 short-range projects, 4 medium-range projects and 4 long-range projects. The short-range projects range in size from as large as the construction of a new corrosion control hangar to parking lot repairs. Four projects have been identified for medium-range development, the largest of which is the construction of a new fitness facility. The long-range development plan includes four projects. These include construction of a consolidated operations facility, road and parking improvements across the base and construction of a new simulator facility.	Noise, Air Quality, Safety, Soil and Water Resources, Transportation
Construction of Special Operations Command South Facility	Special Operations Command South/Homestead ARB	Past	Construction of a new 125,000 square foot multi-story facility for Special Operations Command South on 28 acres.	Noise, Air Quality, Soil and Water Resources, Transportation
Entry Control Complex	482 FW/Homestead ARB	Present	Construct a new entry control complex on Homestead ARB.	Noise, Air Quality, Soil and Water Resources, Transportation
Fleet Storage and Maintenance Facility	USAF	Future	Construct a new storage and maintenance facility on Homestead ARB.	Noise, Air Quality, Infrastructure, Traffic, Land Use and Recreation
Conservation Easement Purchases		Past, Present, Future	Polk County and APAFR were awarded a $1.5 million dollar grant in 2015 to purchase conservation easements around the range.	Biological Resources
APAFR JLUS	USAF	Past, Present, Future	In 2010 the USAF worked with the Central Florida Regional Planning Council to develop the APAFR JLUS (CFPRC 2010). The JLUS includes numerous community outreach measures, various environmental protection policies and recommendations to implement Military Influence Planning Areas.	Airspace, Safety
APAFR Range Improvements	USAF	Past, Present, Future	Various facility projects are planned for APAFR. These include an addition to Building 77, runway repairs, installation of smart infrastructure, construction of a deployed unit complex, linking of airspace over water to land to improve training and range/airspace upgrades to support advances in aircraft and weapons technology.	Airspace, Safety
Atlantic Fleet Testing and Training Phase III	Navy	Past, Present, Future	The Navy completed an EIS in September 2018 for the Atlantic Fleet Testing and Training. This training includes training in the Gulf of Mexico.	Airspace, Safety, Noise

Table HS4-1. Past, Present, and Reasonably Foreseeable Actions at Homestead ARB and Associated Region (Continued)

Action	Proponent/Location	Timeframe	Description	Resource Interaction
Non-Military (Federal) Actions				
Comprehensive Everglades Restoration Plan (CERP)	USFWS/Everglades National Park	Current-Future	Several CERP projects are intended to improve flows in and around Everglades National Park, including the de-compartmentalization of Water Conservation Area 3, Everglades National Park seepage management, the C-111 spreader canal project, the CERP Master Recreation Plan, the Central Everglades Planning Project, and the Water Control Plan.	Land Use, Biological Resources
Non-Military (Private Actions)				
Multi-model Complex and Parking Garage	Private Developer/City of Homestead	Future	This multilevel structure will contain a six and one-half story parking garage screened by aluminum canopies. It will contain an open plaza plus retail shops, ten movie theaters, 14 lanes of bowling, a bar, at least one restaurant, and public meeting rooms. A transit facility will be built to the south of the development.	Noise, Air Quality, Socioeconomics
Palm Drive Development	Private Developer/City of Homestead	Future	This project is a 10-acre development off of Palm Drive includes plans for 92 twin homes along a private street.	Noise, Air Quality, Socioeconomics
Kingman Commons Subdivision	Private Developer/City of Homestead	Future	This project includes the construction of 247 single family homes on 77 acres.	Noise, Air Quality, Socioeconomics
Turkey Point Power Plant Expansion	Florida Power and Light/Turkey Point	Current-Future	Development of two new nuclear units at the existing Turkey point site on Biscayne Bay. This expansion also includes various transmission line corridors that extend from Turkey Point to Miami either via a western corridor or an eastern corridor.	Noise, Air Quality, Infrastructure, Biological Resources, Land Use and Recreation
American Dream Miami indoor theme park	Disney/North Miami-Dade County	Future	This development would include a resort, a mall and a proposed housing-office park.	Noise, Air Quality, Infrastructure, Traffic, Land Use and Recreation
Walmart	Private	Past	The Walmart was constructed in early 2014 approximately 0.7 mile west of the North Gate.	Noise, Air Quality, Infrastructure, Traffic, Land Use and Recreation
FedEx Distribution Center	Private	Past	In April 2017, a private developer completed construction of a 150,000 square foot warehouse building to be leased to FedEx as a distribution center. The site is located directly north of Homestead ARB and encompasses approximately 50 acres.	Noise, Air Quality, Infrastructure, Traffic, Land Use and Recreation
State and Local				
Homestead Downtown Development	City of Homestead and Private Developers/Homestead	Current and Future	Multiple projects including a new City Hall, a new police station, a new fire station, the Seminole Theater Cultural Center, implementation of the National Park Trolley system. Additional development included the Palace Garden retirement facility, an extended stay facility, a Publix Supermarket, the Fresenius Dialysis Center and multiple residential developments.	Noise, Air Quality, Socioeconomics

HS4.2 CUMULATIVE IMPACTS

The following analysis considers how the impacts of the actions in Table HS4-1 might affect or be affected by the AFRC F-35A mission at Homestead ARB. The analysis considers whether such a relationship would result in potentially significant impacts not identified when the AFRC F-35A mission at Homestead ARB is considered alone. Table HS4-2 provides a summary of the cumulative effects. As shown in Table HS4-2, safety, cultural resources, infrastructure, and hazardous materials and waste are not anticipated to contribute to cumulative effects. Cumulative effects are described for airspace, noise, air quality, soil and water resources, biological resources, land use and recreation, socioeconomics, and environmental justice and protection of children. Climate change is also described in this section because changes in climate have the potential to cumulatively impact other resource areas.

Table HS4-2. Summary of Cumulative Effects for Homestead ARB

Resource Area	AFRC F-35A Mission	Past, Present, and Reasonably Foreseeable Actions[a]	Cumulative Effects
Airspace	◘	◘	◘
Noise	◘	◘	◘
Air Quality	○	◘	○
Safety	○	○	○
Soil and Water Resources	◘	◘	◘
Biological Resources	◘	◘	◘
Cultural Resources	○	○	○
Land Use and Recreation	◘	◘	◘
Socioeconomics	◘	○	◘
Environmental Justice and Protection of Children	◘	◘	◘
Infrastructure	○	○	○
Hazardous Materials and Waste	○	○	○

[a] When determining the potential for significance, past and ongoing actions in the region were considered as part of the baseline or existing conditions in the region surrounding Homestead ARB and the airspace (e.g., the cumulative noise impact of past and present missions at Homestead ARB were modeled under baseline conditions).

Key: ○ = not affected or beneficial impacts
◘ = affected but not significant, short to medium term, impacts that range from low to high intensity
● = significant impacts, that are high in intensity or are long-term

HS4.2.1 Airspace

HS4.2.1.1 Airfield Operations

No present and/or known reasonable foreseeable future actions have the potential to interact with the minor increase in airfield operations that would result from implementation of the AFRC F-35A mission at Homestead ARB. Therefore, there is no potential for cumulative impacts to airfield operations or the management and configuration of the Class D and Miami Class B airspace surrounding this airfield environment.

HS4.2.1.2 Training Airspace and Ranges

The primary airspace proposed for use by AFRC F-35A pilots operating from Homestead ARB is offshore Warning Areas W-465A, W-465B and W-465D. The primary range proposed for use by AFRC F-35A pilots operating from Homestead ARB is the APAFR. The offshore Warning Areas and APAFR are identified on Figure HS2-2.

Regarding the primary airspace and range proposed for use, no past, present or reasonably foreseeable actions proposed for W-465A, W-465B, W-465D or APAFR would combine with the AFRC F-35A aircraft operations to result in significant impacts to any of the resource areas described in this EIS.

HS4.2.2 Noise

Cumulative noise impacts were evaluated for construction related noise and for the impact of aircraft noise resulting from operations in the airfield and airspace environments near Homestead ARB. Aircraft noise would affect off-base land uses with noise conditions consistent with the JLUS identified noise conditions. Community planning efforts to prevent incompatible land development near Homestead ARB would be expected to continue to reduce noise impacts in the long-term by avoiding incompatible development of new noise-sensitive land uses. The JLUS and purchase of APAFR conservation easements are examples of actions taken to prevent incompatible development.

Private and state/municipal government-sponsored land development actions could potentially affect noise impacts in the long-term by increasing the number of noise-sensitive locations in areas exposed to elevated noise levels. Military planners assess such projects for mission compatibility on a case by case basis, and contribute the results of their assessment as part of the civilian development planning process. Noise generated on-site during the construction and operation of privately-owned properties is localized and qualitatively consistent with surrounding existing noise environments in adjacent developed areas. There would be no cumulative additional off-base aircraft noise impacts associated with past, present, or reasonably foreseeable future actions.

C&D projects associated with the proposed AFRC F-35A mission would occur near other ongoing and future C&D projects (e.g., IDP projects) occurring during the same time periods. C&D projects are a regular occurrence on and near active USAF installations such as Homestead ARB. C&D noise would be localized and temporary. Construction work is generally limited to normal working hours (i.e., 7:00 A.M. to 5:00 P.M.). Furthermore, the projects are or would be located in an acoustic environment that includes elevated aircraft operations noise levels. In the instance that multiple C&D projects affect a single area at the same time, construction noise would be a slightly more noticeable component of the acoustic environment.

Several actions listed in Table HS4-1 would occur in the AFRC F-35A training airspace ROI and could generate noise that would be additive with noise generated by AFRC F-35A training. The Atlantic Fleet Testing and Training Phase III EIS, which was completed in September 2018, includes Navy training in the Gulf of Mexico. Although Navy training in Warning Areas would overlap spatially with proposed training by the AFRC F-35A mission, both activities would occur over very large areas, and noise events in any given locations would remain infrequent. The APAFR Range Improvements Environmental Assessment (EA) is currently being prepared, and noise impacts associated with the action are not known at this time.

HS4.2.3 Air Quality

C&D projects associated with the proposed AFRC F-35A mission would occur near other ongoing and future C&D projects (e.g., IDP projects) during the same time periods. C&D projects have been and will continue to be a regular occurrence on and near installations such as Homestead ARB. These projects would generate the same types of construction-related impacts as described for the proposed AFRC F-35A mission (e.g., fugitive dust emissions, increases in construction-related criteria pollutant emissions). Although implementation of the AFRC F-35A mission would result in minor air emission increases of all pollutants except VOCs, these increases, combined with air emission increases from past, present, and reasonably foreseeable future actions, would not prevent this area from maintaining the NAAQS or would result in significant cumulative impacts to the air quality.

The implementation of the proposed AFRC F-35A mission at Homestead ARB would not result in significant impacts to air quality. No known projects, when added to the emissions that would be generated by the AFRC F-35A mission, would result in significant impacts to air quality.

HS4.2.4 Soil and Water Resources

C&D projects associated with the proposed AFRC F-35A mission would occur near other ongoing and future C&D projects (e.g., IDP projects) during the same time periods. C&D projects have been and will continue to be a regular occurrence on and near installations such as Homestead ARB. These construction projects would increase the amount of soil disturbed and have the potential to increase erosion and sedimentation into surface water features. Cumulative impacts resulting from implementation of the proposed AFRC F-35A mission in conjunction with past, present, and reasonably foreseeable future actions on the soil and water resources at Homestead ARB would not be significant.

HS4.2.5 Biological Resources

The additional C&D projects described in Table HS4-1 would be anticipated to have similar types of impacts to vegetation, wildlife, and special status species as those impacts described for the construction impacts for the proposed AFRC F-35A mission. Cumulative impacts resulting from implementation of the proposed AFRC F-35A mission in conjunction with past, present, and reasonably foreseeable future actions on biological resources at Homestead ARB would not be significant. The USAF has completed the formal Section 7 consultation process with the USFWS for current base operations at Homestead ARB.

The aircraft operations associated with implementation of the AFRC F-35A mission at Homestead ARB would not result in significant impacts to wildlife, including threatened and endangered species and migratory birds. Projects such as the APAFR Range Improvement may result in similar impacts to wildlife as those described in this EIS. Other projects such as the purchase of conservation easements around existing ranges would provide a positive impact to biological resources. Cumulative impacts resulting from implementation of the proposed AFRC F-35A mission in conjunction with past, present, and reasonably foreseeable future actions on the biological resources at Homestead ARB would not be significant.

HS4.2.6 Land Use and Recreation

C&D projects associated with the proposed AFRC F-35A mission would occur near other ongoing and future C&D projects (e.g., IDP projects, construction from private and state and local development) during the same time periods. C&D projects have been and will continue to be a regular occurrence on and near installations such as Homestead ARB. Construction projects would continue to comply with existing zoning ordinance. Cumulative impacts resulting from implementation of the proposed AFRC F-35A mission in conjunction with past, present, and reasonably foreseeable future actions on land use and recreation at Homestead ARB would not be significant.

Aircraft operations associated with implementation of the AFRC F-35A mission at Homestead ARB would not result in significant impacts to land use and recreation. Increased noise would impact some recreational facilities and could reduce the enjoyment of those facilities for some persons. None of the projects listed in Table HS4-1 would contribute to aircraft noise at Homestead ARB.

HS4.2.7 Socioeconomics

The C&D projects associated with the AFRC F-35A mission would provide short-term, economic benefits to surrounding areas through employment of construction workers and through the purchase of materials and equipment. The short-term impact of implementing the proposed mission combined with any or all of the projects listed in Table HS4-1 would result in negligible cumulative impacts to socioeconomics in the area. In addition, the decrease in personnel associated with the proposed mission is also not anticipated to result in cumulative impacts to housing, schools, or other socioeconomic resources.

HS4.2.8 Environmental Justice and the Protection of Children

The proposed C&D projects on and near Homestead ARB would not result in any cumulative impacts to environmental justice populations. Noise resulting from the operation of F-35A aircraft would affect people living near the installation. As discussed in Section HS3.10.2, implementation of the AFRC F-35A mission at Homestead ARB would result in disproportionate impacts to minority and low-income populations. Implementation of the proposed action in combination with one or more of the past, present, and reasonably foreseeable future actions would not result in additional cumulative impacts to environmental justice populations beyond the impacts identified for the AFRC F-35A mission.

HS4.2.9 Climate Change

Florida and the surrounding region could experience a continuing of recent upward trends in average temperatures, an increase in the intensity of naturally occurring droughts, an increase in projected hurricane rates, and a projected 1- to 4-foot rise in sea level by 2100 (USGCRP 2017).

Increases in temperature, drought intensity, hurricane rates, and sea level rise could interact with resource areas such as air quality, water resources, and socioeconomics. Increasing temperatures have been shown to increase ground level ozone and particulates (Orru et al. 2017). Increases in drought intensity could impact water availability. Potential socioeconomic impacts could include increased costs associated with poor air quality, water availability, and damage from hurricanes.

While Homestead ARB has operations to manage the recent temperature changes, exacerbation of climate conditions in the future could increase the cost of proposed operations and could impede operations during extreme events. Additional measures could be needed to mitigate such impacts over the operational life expectancy of the F-35A.

HS4.3 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Irreversible and irretrievable resource commitments are related to the use of nonrenewable resources and the effects that the uses of these resources have on future generations. Irreversible effects primarily result from the use or destruction of a specific resource (e.g., energy and minerals) that cannot be replaced within a reasonable timeframe. Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored as a result of the action.

For the beddown of F-35A aircraft at Homestead ARB, most resource commitments are neither irreversible nor irretrievable. Most impacts are short-term (e.g., air emissions from construction) or longer lasting but negligible (e.g., public service increases). Those limited resources that could involve a possible irreversible or irretrievable commitment are discussed below.

Should the AFRC F-35A mission be located at Homestead ARB, some land in the cantonment area would be disturbed. Much of this land has been previously disturbed and is heavily influenced by airfield development. Construction and renovation of base facilities would require the consumption of limited amounts of material typically associated with interior renovations (e.g., wiring, insulation, windows, and drywall) and exterior construction (e.g., concrete, steel, sand, and brick). An undetermined amount of energy to conduct renovation, construction, and operation of these facilities would be expended and irreversibly lost.

Training operations would continue and involve consumption of nonrenewable resources, such as gasoline used in vehicles and jet fuel used in aircraft. None of these activities are expected to significantly decrease the availability of minerals or petroleum resources. Privately owned vehicles use by the personnel continuing to support the existing missions would consume fuel, oil, and lubricants. The amount of these materials used would increase; however, this additional use is not expected to significantly affect the availability of the resources.

CHAPTER 4

BASE ALTERNATIVE: NAVAL AIR STATION JOINT RESERVE BASE FORT WORTH

FW1.0 NAVAL AIR STATION JOINT RESERVE BASE FORT WORTH OVERVIEW

Naval Air Station (NAS) Joint Reserve Base (JRB) Fort Worth is located in the western portion of Fort Worth, directly south of Lake Worth, in Tarrant County, Texas (Figure FW1-1). The installation encompasses approximately 1,805 acres and is bordered to the east by residential development, to the west by the Lockheed Martin assembly plant and residential development, to the north by Lake Worth, and to the south by light industrial and commercial development. The primary runway at NAS JRB Fort Worth, Runway 18/36, is 12,000-feet long and 200-feet wide (Figure FW1-2).

NAS JRB Fort Worth is operated by the U.S. Department of Navy (Navy) and is home to a variety of units including U.S. Navy, U.S. Marine Corps (USMC), U.S. Air Force (USAF), Army, and Texas Air National Guard (TANG) units. The NAS JRB Fort Worth mission is to provide support and training for Air Force Reserve Command (AFRC) and Air National Guard (ANG) fighter and airlift units in all branches of the Armed Services. Headquarters (HQ) AFRC Tenth Air Force, the AFRC 301st Fighter Wing (301 FW), and the TANG 136th Airlift Wing (136 AW) are based at the installation.

The 301 FW is the largest tenant unit on NAS JRB Fort Worth and is the only AFRC fighter unit in the State of Texas. Their mission is to provide combat ready warriors to operate the USAF expeditionary fight, win America’s wars, and protect America’s worldwide interests. The 301 FW operates 24 F-16 aircraft at NAS JRB Fort Worth.

The 136 AW operates C-130H2 aircraft at NAS JRB Fort Worth, and Marine Aircraft Group 41 (MAG-41) operates the FA-18A Hornet and the KC-130T Hercules at the base. The Army Reserve operates C-12 aircraft from the base. Test pilots from the Lockheed Martin assembly plant adjacent to west side of Runway 18/36 fly a variety of different aircraft, including the F-35A, B, and C models.

Refer to Chapter 1 for the purpose and need for the AFRC F-35A mission, a description of the F-35A aircraft characteristics, and information about public involvement and agency coordination. Refer to Chapter 2 for the description of the proposed action and alternatives, and a description of the strategic basing and alternative identification processes. In the base-specific sections that follow, Section FW2 presents the description of the proposed action at NAS JRB Fort Worth. Section FW3 addresses baseline conditions and environmental consequences that could result from implementation of the proposed action at NAS JRB Fort Worth. Section FW4 identifies other, unrelated past, present, and reasonably foreseeable future actions in the affected environment and evaluates whether these actions would cause cumulative effects when considered along with the AFRC F-35A beddown action. This section also presents the irreversible and irretrievable resources that would be committed should the proposed action be implemented at NAS JRB Fort Worth.

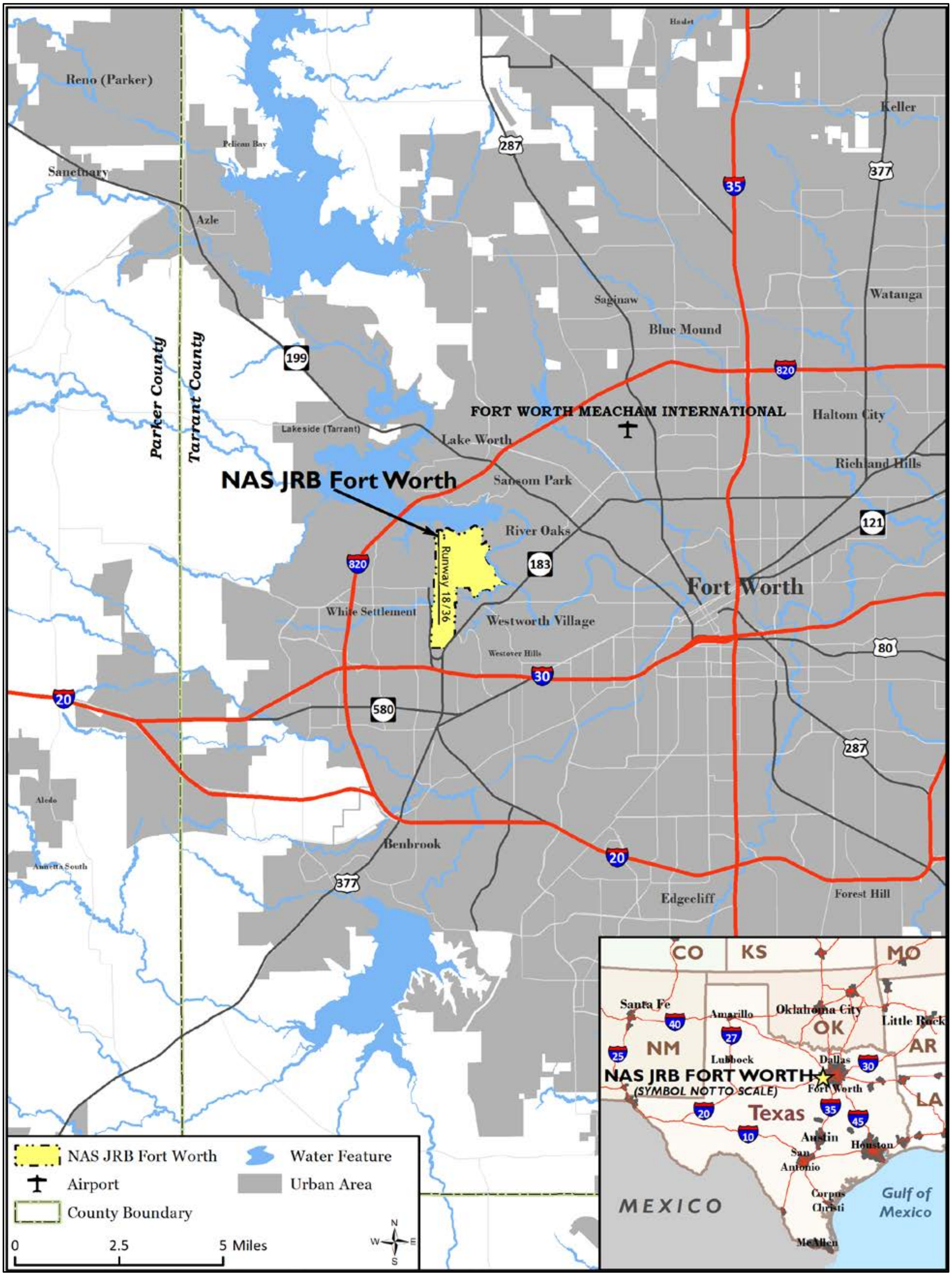

Figure FW1-1. Regional Location of NAS JRB Fort Worth

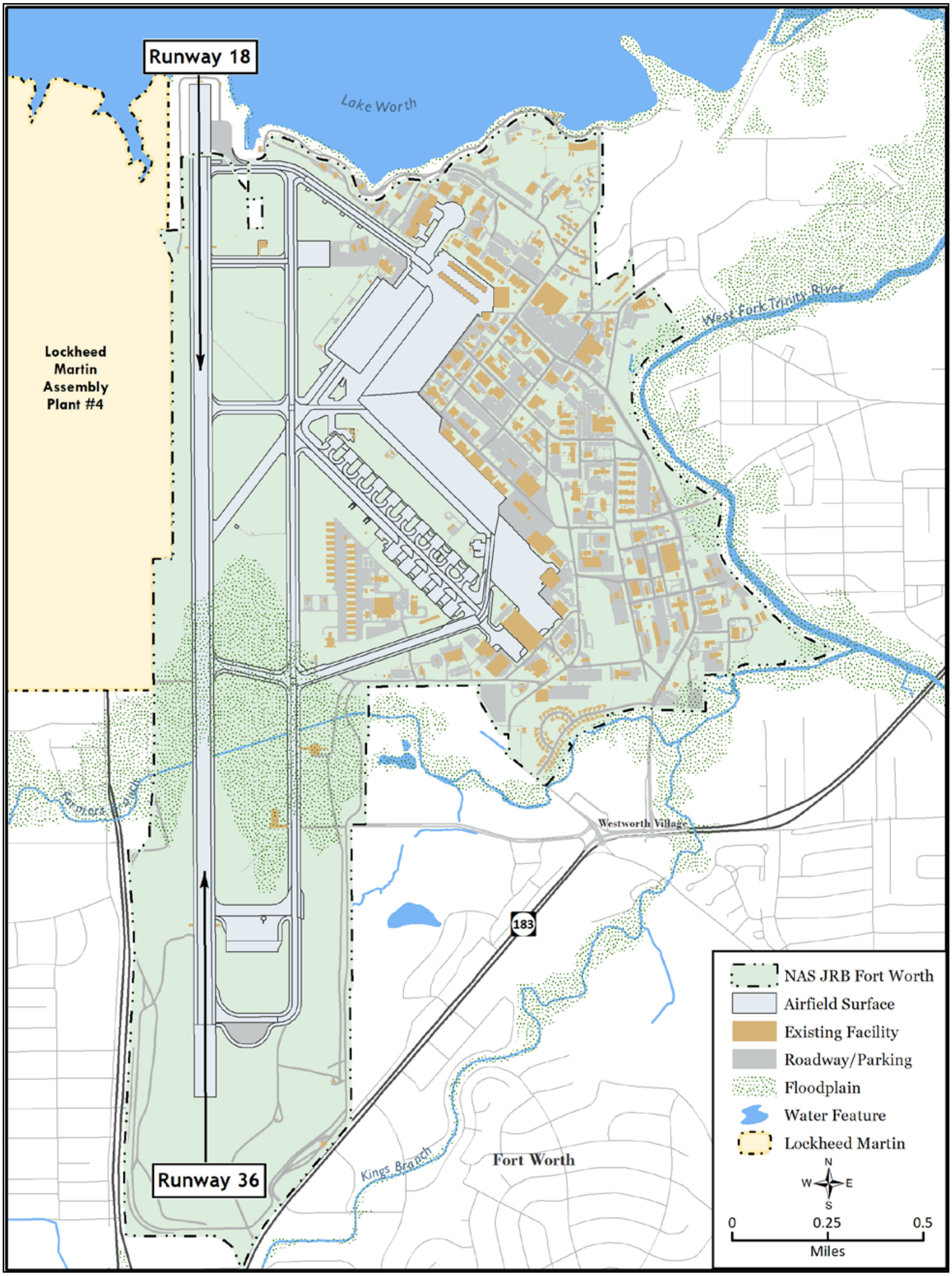

Figure FW1-2. Primary Runways at NAS JRB Fort Worth

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FW2.0 NAVAL AIR STATION JOINT RESERVE BASE FORT WORTH ALTERNATIVE

This section presents the specifics of the proposed action at NAS JRB Fort Worth. Four elements of the proposed action have the potential to affect the base and associated airspace: (1) facility and infrastructure projects to support the F-35A beddown; (2) personnel changes necessary to meet F-35A requirements; (3) airfield operations conducted by AFRC F-35A pilots; and (4) airspace and range use by AFRC F-35A pilots. Each element is explained in the following subsections. In addition, this section also presents state and federal consultation efforts and associated permits that would be required should NAS JRB Fort Worth be selected to receive the AFRC F-35A mission.

Under the proposed action, 24 Primary Aerospace Vehicles Authorized (PAA) F-35A aircraft would start to arrive at NAS JRB Fort Worth in early 2024. Delivery of the full complement of 24 F-35A aircraft and 2 Backup Aircraft Inventory (BAI) is anticipated to take 2 years. At that time, the F-35A aircraft would completely replace the existing 24 F-16 aircraft assigned to the 301 FW. The F-16 aircraft that would be replaced by the F-35A aircraft would be reassigned or removed from the USAF inventory.

FW2.1 FACILITIES AND INFRASTRUCTURE

To support the AFRC F-35A mission, additional infrastructure and facility modifications would be required at NAS JRB Fort Worth (Table FW2-1). A total of 17 different improvement projects and 5 demolition projects would be implemented in 2021 (Figure FW2-1). The USAF estimates that $21.7 million in Military Construction (MILCON) expenditures would be required to implement the proposed AFRC F-35A mission at NAS JRB Fort Worth.

Table FW2-1. Facilities and Infrastructure Projects for the AFRC F-35A Mission at NAS JRB Fort Worth

Project[a]	Size (ft^2)[b]
Demolition	
Building 1604	2,544
Building 1606	780
Building 1608	5,520
Building 1632	992
Building 1641	1,722
Demolition Total	**11,558**
Renovation	
Building 1602 electrical upgrade	NA[c]
Building 1628 electrical and ventilation upgrades	NA[c]
Building 1637 renovate for logistics readiness	NA[c]
Building 1637 addition for battery storage	2,970
Building 1643 electrical upgrade, classified storage, renovate egress shop	648[d]
Building 1648 renovate for gun maintenance and expand vault door	NA[c]
Building 1650 renovate for Logistics Readiness Squadron parts storage	10,194[d]
Building 1655 replace hoist and expand door	NA[c]
Building 1656 electrical upgrade	NA[c]
Building 1790 electrical and ventilation upgrades	NA[c]
Building 1792 renovate for logistics system	NA[c]
Building 3355 expand trailer maintenance area	572
Renovation Total	**13,736**

Table FW2-1. Facilities and Infrastructure Projects for the AFRC F-35A Mission at NAS JRB Fort Worth (Continued)

Project[a]	Size (ft^2)[b]
New Construction	
Construct Office of Special Investigations building	3,253
Construct a maintenance support section building	5,500
Construct a hazardous material storage building	1,584
Construct two sunshades	12,800
Construct a combined squadron operations and F-35A flight simulator building	49,000
New Construction Total	**59,337**

[a] Data in this table were obtained from AFRC in 2017 and in 2019 (NAS JRB Fort Worth 2017a, NAS JRB Fort Worth 2019).
[b] Size is the area covered by the footprint of the proposed facilities and consists of the designed limits of the structure, facility, apron, road, access, and/or parking lot.
[c] Includes minor interior upgrade projects that do not have a square footage.
[d] Interior renovation only.

New construction and facility additions would require construction grading, clearing, and equipment laydown space. To account for this disturbance, this analysis also includes disturbance areas in addition to the facility size. These disturbance areas encompass 20 feet adjacent to linear features (e.g., roads, utility extensions, etc.) and 50 feet around the facility footprint for all other facilities. Repairs of existing aircraft aprons or ramps are not included in these calculations because these repairs would occur on paved or concrete surfaces. Interior renovations are also not included in these calculations because these renovations would not create ground disturbance or a change in impervious surfaces.

New construction and facility additions would also result in changes to existing impervious surfaces. It is assumed that any demolition would include demolition of the building slab and result in a reduction in impervious surfaces. Table FW2-2 provides a summary of the ground disturbance and changes in impervious surfaces.

Table FW2-2. Summary of Facility and Infrastructure Projects for NAS JRB Fort Worth

Project Type	Ground Disturbance (Acres)	Change in Impervious Surfaces (Acres)
Demolition	2.5	-0.3
Renovation[a]	0.9	+0.0
New Construction	4.3	+1.5
Total	**7.7**	**+1.2**

[a] Totals do not include interior renovation projects.

Facility siting on military installations is predominantly functional-use based (i.e., locating facilities with like functional uses adjacent to one another). However, safety and compliance with policies and regulations are also used as planning factors. During the planning phase for a new aircraft mission beddown, military planners consider a variety of alternatives necessary to meet the requirements of the new mission, including the use of existing facilities that can be partially or entirely used to meet mission requirements. Depending on available infrastructure, facilities, and, to some degree, personnel available to support the AFRC F-35A mission, proposed construction, demolition, and renovation projects vary between alternatives. The facility siting analysis for each alternative base considered the functional requirements of the AFRC F-35A mission and compared them with the existing infrastructure and environmental constraints at each alternative base.

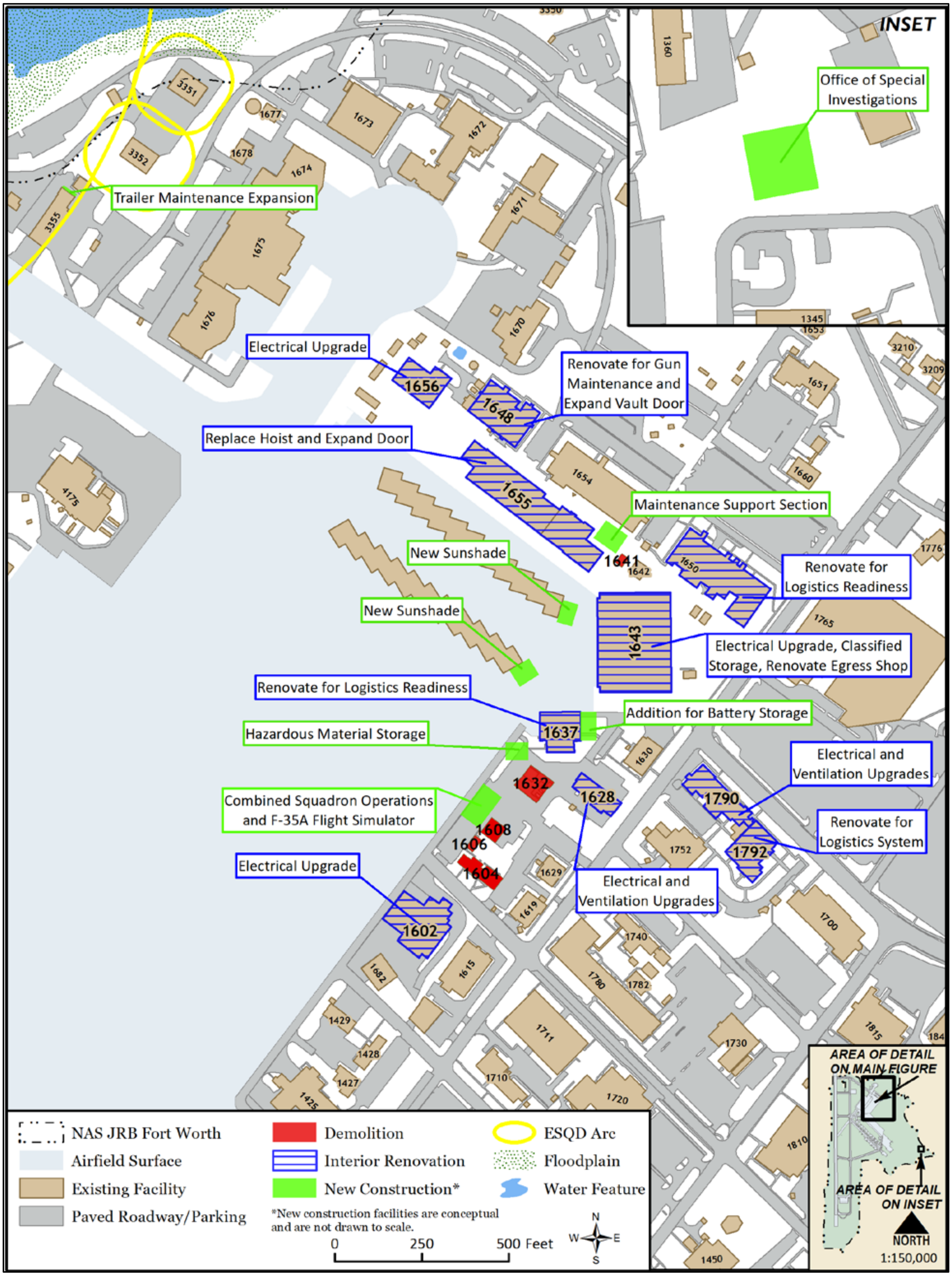

Figure FW2-1. Facilities and Infrastructure Projects for the AFRC F-35A Mission at NAS JRB Fort Worth

New construction siting is a stepwise process that includes identifying suitable sites relative to existing facilities and base infrastructure to provide operational efficiencies and suitable cost-benefit values. Utility siting, including the re-routing of existing utilities or the installation of new utility infrastructure (e.g., power, water, sewer, and communication lines), could also be required to accommodate the new mission. The siting process for utilities focused on using existing conduits and previously disturbed areas or areas that would also be disturbed for facility modifications. Temporary construction laydown areas could also be required to support construction. Construction laydown areas would be located in developed or semi-developed areas, or previously disturbed or paved areas. Construction laydown areas not proposed for permanent disturbance would be returned to their pre-construction state upon completion of construction. All construction contracts would be managed under Unified Facilities Criteria (UFC) 3-101-01, *Best Management Practices*, and attainment of a Leadership in Energy and Environmental Design (LEED) Silver certification.

Construction and renovation projects within the 65-decibel (dB) noise contour would include acoustical design considerations for façade elements and interior design requirements per UFC 3-101-01. Land use would be consistent with Department of Defense Instruction (DoDI) 4165.57, *Air Installations Compatible Use Zones;* Chief of Naval Operations Instruction (OPNAVINST) 11010.36C, *AICUZ Program*; and Air Force Handbook (AFH) 32-7084, *AICUZ Program Manager's Guide.*

FW2.2 PERSONNEL

Implementation of the AFRC F-35A mission at NAS JRB Fort Worth would require sufficient and appropriately skilled military and civilian personnel to operate and maintain the F-35A aircraft and to provide other necessary support services. Implementation of the AFRC F-35A mission at NAS JRB Fort Worth would result in a decrease of 102 positions. This would constitute a 1.1 percent decrease in base staffing (Table FW2-3).

Table FW2-3. Personnel Changes for the AFRC F-35A Mission at NAS JRB Fort Worth

Baseline Personnel			Proposed F-35A Authorized Personnel			Percent Change to Total Personnel
Total Authorized Personnel	AFRC Authorized Personnel	Percent of Total Authorized Based Personnel	AFRC F-35A	Change to AFRC Unit Personnel Positions	Percent Change to AFRC Unit Personnel	
9,600	1,751	18.24%	1,649	-102	-5.83%	-1.1%

FW2.3 AIRFIELD OPERATIONS

The 301 FW is an integral part of the Combat Air Forces (CAF). The CAF defends the homeland of the United States and deploys forces worldwide to meet threats and ensure the security of the nation. To fulfill this role, the 301 FW must train as it would fight.

The USAF anticipates that once the full complement of aircraft is received, the 24 F-35A aircraft would be used to fly 11,580 operations per year from the airfield. Based on the proposed requirements and deployment patterns, AFRC F-35A pilots would fly additional operations during deployments, or at other locations for exercises or in preparation for deployments. In addition, AFRC F-35A pilots stationed at NAS JRB Fort Worth could participate in remote training exercises. Some of these missions could involve ordnance delivery training or missile firing exercises (within the scope of existing National Environmental Policy Act [NEPA] documentation) at ranges approved for such use (e.g. Falcon Range on Fort Sill, Oklahoma).

Conducting 11,580 operations per year would represent an increase of 3,056 annual airfield operations compared to current F-16 aircraft operations (Table FW2-4). Of the 25,292 total airfield operations currently conducted at NAS JRB Fort Worth, 34 percent are conducted by the 301 FW. Implementation of the AFRC F-35A mission at NAS JRB Fort Worth would result in a 12.1 percent increase in annual total airfield operations.

Table FW2-4. NAS JRB Fort Worth Baseline F-16 and Proposed F-35A Annual Airfield Operations

Total Baseline Operations[a]		Proposed AFRC F-35A Mission
Based F-16	8,524	0
Proposed F-35A	0	11,580
Other Aircraft	16,768	16,768
Total Airfield Operations	25,292	28,348
	Percent Change	**12.1%**

[a] Total baseline operations is for the last year. Data in this table were collected from the operations staff at NAS JRB Fort Worth in 2017 (NAS JRB Fort Worth 2017a).

AFRC F-35A pilots would perform departure and landing procedures similar to those currently conducted by the F-16 pilots at the installation. Due to differences in aircraft characteristics and performance, the flight profiles and tracks used by AFRC F-35A pilots would slightly vary from those currently used by F-16 pilots. F-16 pilots from the 301 FW average 260 flying days per year. For the purposes of this analysis and to compare the alternatives on an equal basis, the total number of possible flying days for AFRC F-35A pilots is also assumed to be 260, including both Saturday and Sunday (on Unit Training Assembly [UTA] weekends).

Afterburners are used on occasion by F-16 pilots at NAS JRB Fort Worth when additional power is needed. As described in Chapter 2, Section 2.3.3, the USAF evaluated three different scenarios for afterburner use. Scenario A is afterburner use on 5 percent of takeoffs. Scenario B is afterburner use on 50 percent of takeoffs. Scenario C is afterburner use on 95 percent of takeoffs.

AFRC F-35A pilots would operate similar to F-16 pilots. Currently, F-16 operations primarily begin at 7:00 A.M. and conclude by 10:00 P.M. on weekdays and on UTA weekends (except when weather contingencies or special exercises cause operations to occur after 10:00 P.M.). After-dark training is normally scheduled to be completed before 10:00 P.M. After-dark training for AFRC F-35A pilots would also be scheduled to be completed before 10:00 P.M. Because of the capabilities and expected tactics of the F-35A aircraft, AFRC F-35A pilots are predicted to generally follow the same night requirement as AFRC F-16 pilots depending on weather or special exercises.

FW2.4 AIRSPACE AND RANGE USE

Table FW2-5 identifies the Federal Aviation Administration (FAA)-designated airspace currently used by NAS JRB Fort Worth F-16 pilots that is also proposed for use by AFRC F-35A pilots. Implementation of the AFRC F-35A mission would not require any new airspace or changes to existing airspace boundaries, and the type and number of ordnance used at any of the ranges approved for such use could decrease.

Table FW2-5. NAS JRB Fort Worth Training Airspace

FAA-Designated Airspace[a]	Floor[b] (feet MSL unless otherwise noted)	Ceiling (feet MSL unless otherwise noted)
Brady High MOA	6,000	UTBNI 18,000
Brady Low MOA	500 AGL	UTBNI 6,000
Brady North MOA	500 AGL[c]	UTBNI 18,000
Brownwood 1 East & West MOAs	7,000	UTBNI 18,000
Brownwood 2 East & West MOAs	7,000	UTBNI 18,000
Brownwood 3 & 4 MOAs	13,000[c]	UTBNI 18,000
Hood MOA	2,000	UTBNI 10,000
Hood High MOA	10,000	UTBNI 18,000
Lancer MOA	6,200 (operationally 6,500)	UTBNI 18,000
Gray MOA	2,000	10,000
Sheppard 1 MOA	8,000	UTBNI 18,000
Rivers MOA	8,000	UTBNI 18,000
Washita MOA	8,000	UTBNI 18,000
Falcon Range R-5601A, B, C, & H	Surface	40,000
Falcon Range R-5601D, F, & J	500 AGL	40,000
Falcon Range R-5601E	500 AGL	6,000
Falcon Range R-5601G	500 AGL	8,000
Falcon Range R-5602A & B	40,000	60,000
Fort Hood R-6302A, C, & D	Surface	UTBNI 30,000
Fort Hood R-6302B	Surface	UTBNI 11,000

[a] Airspace used by F-35A pilots would include Air Traffic Control Assigned Airspaces (ATCAAs) that occur over the Military Operations Areas (MOAs) included in the table. The ATCAAs will accommodate training above 18,000 feet mean sea level (MSL).
[b] Floor altitudes could exclude certain areas. See FAA Sectional Charts for exclusions.
[c] Altitudes established by Letters of Agreement (LOAs) between the FAA and the 301 FW.
Note: MSL is the elevation (on the ground) or altitude (in the air) of an object, relative to the average sea level. The elevation of a mountain, for example, is marked by its highest point and is typically illustrated as a small circle on a topographic map with the MSL height shown in either feet or meters or both. Because aircraft fly across vast landscapes, where points above the ground can and do vary, MSL is used is denote the "plane" on which the floors and ceilings of Special Use Airspace (SUA) are established and the altitude at which aircraft must operate within that SUA.
Key: AGL = above ground level; UTBNI = Up To But Not Including
Source: Brownsville 2018, Dallas Fort Worth 2018, and San Antonio 2018 FAA Sectional Charts

FW2.4.1 Airspace Use

AFRC F-35A pilots would conduct missions and training activities necessary to fulfill the multi-role responsibility of this aircraft. All F-35A flight activities would occur in existing airspace. AFRC F-35A pilots would operate in the same airspace used by F-16 pilots from the 301 FW, but at higher altitudes. F-16 pilots from the 301 FW use Military Operations Areas (MOAs), Restricted Areas (RAs), and Air Traffic Control Assigned Airspace (ATCAA) (Figure FW2-2 and Table FW2-5). To support realistic training, F-16 pilots schedule and use multiple adjacent airspaces together.

The FAA-designated airspace identified in Table FW2-5 is also used by Lockheed Martin test pilots operating F-35A, B, and C aircraft; Navy pilots operating F-18 aircraft; and other USAF pilots operating F-35A and F-16 aircraft. F-16 pilots from the 301 FW conduct approximately 6 percent of the total sorties flown in the airspace identified in Table FW2-5. Although AFRC F-35A pilots would conduct missions similar to those of F-16 pilots, the capabilities of the F-35A aircraft allow for supersonic and higher altitude flight. Regardless of the altitude structure and percent use indicated in Table FW2-6, AFRC F-35A pilots (as do existing military aircraft pilots) would adhere to all established floors and ceilings of existing FAA-designated airspace. For example, the floor of the Lancer MOA is 6,200 feet mean sea level (MSL). While in this MOA, AFRC F-35A pilots would not fly below that altitude. Rather, AFRC F-35A pilots would adapt training to this and other airspace with lower floors.

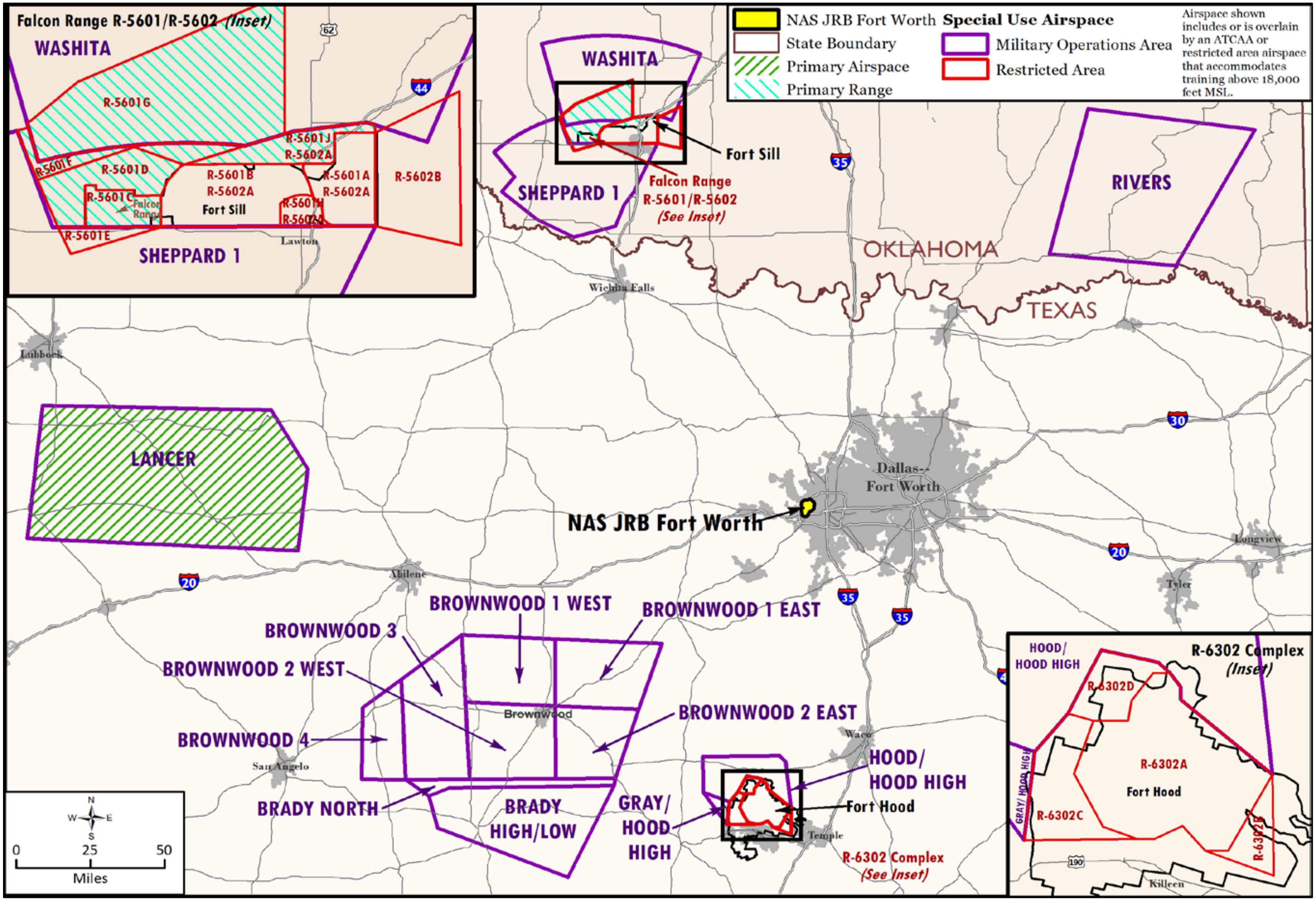

Figure FW2-2. Airspace Associated with NAS JRB Fort Worth

Table FW2-6. Current and Proposed Aircraft Altitude Distribution in the Airspace

Altitude (feet)	Percentage of Use	
	F-16	AFRC F-35A
100 – 500 AGL	0%	0%
500 AGL – 2,000 AGL	2%	1%
2,000 – 5,000 AGL	4%	0%
5,000 AGL – 10,000 MSL	10%	5%
10,000 – 18,000 MSL	70%	23%
18,000 – 30,000 MSL	12%	60%
+30,000 MSL	2%	11%

F-16 pilots from the 301 FW generally operate 86 percent of the time at or below 18,000 feet MSL, depending on mission type. In contrast, AFRC F-35A pilots would operate 71 percent of the time at or above 18,000 feet MSL, with 11 percent of the flight time above 30,000 feet MSL.

By 2030, total annual sorties would increase 1.2 percent from baseline levels (Table FW2-7). In the most heavily used airspace, like the Lancer MOA, AFRC F-35A sorties would account for 63 percent of total airspace sorties. Similar proportions would apply to the other airspace. The total percent of use by AFRC F-35A pilots would not significantly vary from baseline.

Table FW2-7. Airspace Sorties Flown from NAS JRB Fort Worth

Airspace[a]	Total Baseline	F-16 Baseline	AFRC F-35A Sorties	Net Change (Total)[a]	Percent Change (Total)
Southern Texas	77,445	3,715	4,632	917	1.2%
Total	**77,445**	**3,715**	**4,632**	**917**	**1.2%**

[a] Includes all airspace identified in Table FW2-5.

To train with the full capabilities of the aircraft, AFRC F-35A pilots would conduct supersonic flight at altitudes and within airspace already authorized for such activities. Due to the capability of the F-35A aircraft, the USAF anticipates that approximately 10 percent of the time spent in air combat training would involve supersonic flight.

AFRC F-35A missions would last approximately 45 to 115 minutes, including takeoff, transit to and from the training airspace, training activities, and landing. Depending upon the distance and type of training activity, AFRC F-35A pilots would fly approximately 20 to 60 minutes in the training airspace. Occasionally, AFRC F-35A pilots could fly up to 90-minute missions. AFRC F-35A pilots would not fly in Special Use Airspace (SUA) during environmental night (10:00 P.M. to 7:00 A.M.), except for rare contingencies and special mission training.

FW2.4.2 Range Use

AFRC F-35A pilots would only use existing ranges. AFRC F-35A pilots stationed at NAS JRB Fort Worth would use the Falcon Range at Fort Sill in Oklahoma and the Fort Hood Range in Texas.

Most air-to-ground training would be simulated (i.e., nothing is released from the aircraft and electronic scoring is used). However, as described in Chapter 2, Section 2.3.4.2, the F-35A (like the F-16) is capable of carrying and using several types of air-to-air and air-to-ground ordnance, and pilots would require training in their use. The type and number of ordnance used by AFRC F-35A pilots could decrease from that currently used by F-16 pilots. If in the future the USAF identifies weapon systems that are either new or could exceed currently approved levels, appropriate NEPA documentation would be completed prior to their use.

Similar to F-16 pilots, AFRC F-35A pilots would use flares as defensive countermeasures in training. Flares are one of the defensive mechanisms dispensed by military aircraft to avoid attack by enemy aircraft and air defense systems. For the purposes of this analysis, it is estimated that flare use by AFRC F-35A pilots would be less than or equal to that of F-16 pilots. Chapter 2, Section 2.3.4.2.1, provides details on the composition and characteristics of flares. Flares would only be used in areas currently approved for such use. Current restrictions on the altitude of flare use would also apply. Approximately 70 percent of F-35A flare releases would occur above 15,000 feet MSL. At this altitude, most flares would be released more than 21 times higher than the minimum altitude required (700 feet) to ensure complete combustion of each flare.

FW2.5 PUBLIC, AGENCY, AND TRIBAL INVOLVEMENT

FW2.5.1 Scoping Process

The public scoping period for the AFRC F-35A Environmental Impact Statement (EIS) began on 22 March 2018 with publication of the Notice of Intent (NOI) in the *Federal Register*. During the following weeks, notification letters were mailed to federal, state, and local agencies; elected officials; federally recognized tribes (tribes)[1]; nongovernmental organizations; and interested individuals as a part of an interagency/intergovernmental coordination process. Through this process, concerned federal, state, and local agencies are notified and allowed sufficient time to evaluate potential environmental impacts of a proposed action.

Volume II, Appendix A, provides sample notification letters, the notification mailing lists, and the agency comments and concerns received by the USAF during the public scoping period. For the NAS JRB Fort Worth alternative, newspaper advertisements announcing the intent to prepare an EIS and hold a public scoping meeting were published in three different local newspapers. These advertisements were published in the weeks preceding the scheduled public scoping meeting.

For the NAS JRB Fort Worth alternative, one public scoping meeting was held on 19 April 2018 at the Cendera Center (3600 Benbrook Highway, Fort Worth, Texas 76116). This meeting was held in an open-house format where attendees could sign in, if desired, review display boards about the proposed AFRC F-35A mission, and provide written comments on the project. During this meeting, USAF personnel presented information on the project through the use of display boards and fact sheets. The NAS JRB Fort Worth public scoping meeting was attended by 76 people, including residents, elected officials, local business leaders, military affairs committee members, congressional staffers, base employees, local media, and others.

Throughout the public scoping period, the USAF offered multiple ways in which comments could be submitted. Comments were submitted at the public scoping meeting and through the project website, via email, and via regular mail or courier. The public scoping period closed on 11 May 2018, and approximately 27 comments were received regarding the NAS JRB Fort Worth alternative. Some comments were received after the public scoping period closed but were still considered during development of the Draft EIS.

After the public scoping period closed, the USAF was made aware that the address provided for submittal of courier-delivered (e.g., Federal Express or United Parcel Service) public scoping

[1] Per DoDI 4710.02, *DoD Interactions with Federally-Recognized Tribes*, "tribe" refers to a federally recognized Indian or Alaska Native tribe, band, nation, pueblo, village, or community that the Secretary of the Interior acknowledges (DoDI 4710.02, Section 3.5). Although not included as federally recognized tribes in the list, the USAF similarly must consult with Native Hawaiian organizations in accordance with DoDI 4710.03, *Consultation with Native Hawaiian Organizations (NHOs).*

comments was incorrect. Consequently, the USAF provided the correct address and an additional 10 working days to resubmit scoping comments from the time resubmittal instructions were published in the *Federal Register* on 13 August 2018 and in three different local newspapers. During this second public scoping period, no additional comments were received regarding the NAS JRB Fort Worth alternative.

The majority of comments received for the NAS JRB Fort Worth alternative were generally supportive of the proposed mission. However, some people expressed concerns about noise, air quality, socioeconomics, airspace, biological resources, and safety. To a lesser extent, some people submitted comments concerning soil and water resources, cultural resources, hazardous materials and hazardous waste, infrastructure, and traffic and transportation.

FW2.5.1.1 Airspace Management and Use

Comments related to airspace included those that requested the EIS analyze any changes in airspace use, creation of new airspace, or alterations in flight paths. Other comments included concerns about 24-hour flight training and the increasing amount of air traffic using the airspace, both during the day and at night.

FW2.5.1.2 Noise

Several commenters expressed concern about aircraft noise. One of most commonly expressed concerns dealt with the potential for an increase in noise pollution and the effects of any noise increases on people, children, insects, birds, wildlife, and fish and aquatic invertebrates. Some commented on how the F-35 sounds different than existing aircraft while others requested information on how the aircraft compares to existing aircraft such as the F-16. Several comments were received noting that the F-35 is already flying at Fort Worth and that additional aircraft should not impact any resources.

FW2.5.1.3 Air Quality

The North Central Texas Council of Governments (NCTCOG) indicated that the USAF should use the Aviation Environmental Design Tool to evaluate impacts to air quality and if there is a net increase in emissions, the NCTCOG stands ready to offset any increase. The Texas Commission on Environmental Quality (TCEQ) indicated that a general conformity analysis would not be required. Residents of Lake Worth expressed concerns about air particulates and the impacts air pollution could have on trees. Other commenters requested the EIS compare the F-35A emissions with the F-16 emissions.

FW2.5.1.4 Safety

Comments received during scoping expressed concern about flight safety. One commenter asked about higher crash rates between the F-35 and the F-16, and about the safety of single engine aircraft. A commenter also expressed concern about the safety of operating the aircraft in a major metropolitan area and liability should an aircraft crash and cause property damage.

FW2.5.1.5 Soil and Water Resources

TCEQ indicated that the office of water does not anticipate significant, long-term impacts from the project as long as the construction and waste disposal are completed in accordance with all regulations. TCEQ recommended the proponent take steps to ensure that Best Management Practices (BMPs) are used to control runoff to protect surface and ground water. Residents of the

Lake Worth area expressed concerns about water quality. The Texas Parks and Wildlife Department (TPWD) recommended the use of erosion and seed/mulch stabilization measures that avoid hazards to snakes and other wildlife. No netting materials should be used and plastic mesh matting should be avoided.

FW2.5.1.6 Biological

Some commenters expressed concern about how noise and pollutants could affect migratory birds and other wildlife. Other commenters expressed concern about noise pollution and vibration effects on insects, wildlife, and fish and aquatic invertebrates.

TPWD encouraged the minimization of impacts to fish and wildlife including federal and state endangered species and migratory birds. TPWD stated that if vegetation is required for removal during nesting season, the area should be surveyed for nests with eggs or young. TPWD expressed concerns about night time lighting on migratory birds and recommended identifying impacts to threatened and endangered species. TPWD recommended considering the timing and location of migrating whooping cranes.

Several commenters indicated that the F-35 is already flying at Fort Worth and having a squadron would have no impact on the lake or any resources.

FW2.5.1.7 Land Use

One comment was received on the expansion of avigation easements and another commenter asked if the USAF would purchase homes. Concern was expressed about the impacts of the project on the Fort Worth Nature Center & Refuge (FWNC&R).

FW2.5.1.8 Socioeconomics

One commenter asked if realtors are required to disclose that children exposed to noise have an increased potential for cognitive problems. Several commenters expressed concern about the potential impact of noise on property use and values.

FW2.5.2 Draft EIS Public and Agency Review

A Draft EIS public hearing was held on 5 March 2020 at Brewer High School in Fort Worth, Texas. A total of 67 people signed in at the public hearing, but some attendees did not sign in. The verbatim transcript of the NAS JRB Fort Worth public hearing is contained in Appendix A, Section A.6.3. A total of 81 comments were received from the public and agencies regarding the proposed AFRC F-35A mission at NAS JRB Fort Worth prior to close of the comment period. See Chapter 1, Section 1.5, of the EIS for more details on the public involvement process. A synopsis of the comments received specific to NAS JRB Fort Worth on the Draft EIS are listed as follows. See Appendix A, Section A.2, for responses to the substantive Draft EIS comments.

1) General support or opposition to the proposed beddown.
2) General complaints about noise.
3) Concern about increased noise causing health concerns (e.g., hearing loss).
4) Concerns about increased noise impacts to education and schools.
5) General concerns about increased noise impacting outdoor recreation activities and quality of life.
6) Concerns about decreasing air quality.

7) Complaints about current and future flight patterns and flight level/elevation.

8) Concerns about increased operations causing negative impacts to biological resources (e.g., migratory birds) and flight safety (e.g., bird strikes).

9) Concerns about impacts to water resources (e.g., Lake Worth as a source of drinking water).

10) General concerns about environmental justice communities.

11) Suggestions to identify less urban areas or one of the other alternatives for the F-35A aircraft basing.

FW2.5.3 Consultation

FW2.5.3.1 Government-to-Government Consultation

In January 2012 the Department of Defense (DoD) updated its Annotated American Indian and Alaska Native Policy, which emphasizes the importance of respecting and consulting with tribal governments on a government-to-government basis. This policy requires an assessment, through consultation, of the effect of proposed DoD actions that may have the potential to significantly affect protected tribal resources, tribal rights, and Indian lands before decisions are made by the respective DoD services. In an ongoing effort to identify significant cultural resources, tribal resources, or other issues of interest to tribes, and as part of the NEPA scoping process, combined notification and Section 106 consultation letters were submitted to the federally-recognized American Indian tribes associated with NAS JRB Fort Worth.

Following standard USAF practice for government-to-government correspondence, tribal consultation was initiated by the Commanding Officer. NAS JRB Fort Worth has identified 16 tribes potentially affiliated with the installation. These tribes along with a record of consultations are listed in Section A.2.6.2 in Volume II, Appendix A. Two tribes, the Cheyenne and Arapaho Tribes of Oklahoma and the Comanche Nation of Oklahoma responded to initial scoping letters and indicated that they had no interest or properties in the area of the proposed action. Nine (9) tribes responded to additional outreach efforts. Altogether 11 tribes have responded to USAF requests for information or consultation. Additional direct communication efforts (phone calls and emails) were conducted for tribes that did not respond to USAF mailings. Section 106 consultation is considered complete for all tribes and NAS JRB Fort Worth will continue to coordinate with interested tribes throughout the EIS process.

All communications with tribes will be completed in accordance with 54 *United States Code (USC)* 300101 *et seq.*, *National Historic Preservation of Act of 1966, as amended* (NHPA); 36 *Code of Federal Regulations (CFR)* § 800, *Protection of Historic Properties;* Executive Order (EO) 13175, *Consultation and Coordination with Indian Tribal Governments;* and DoDI 4710.02, *DoD Interactions with Federally-Recognized Tribes.*

FW2.5.3.2 State Historic Preservation Officer Consultation

NAS JRB Fort Worth determined that no historic properties would be affected by implementing the AFRC F-35A mission at the installation. Initially the Texas State Historic Preservation Officer (SHPO) concurred with this finding in a letter received on 22 June 2018 (Volume II, Appendix A, Section A.2.6.3). After concurrence was received, two additional projects were added and NAS JRB Fort Worth determined that no historic properties would be affected by the new projects. SHPO concurred with this finding in a letter dated 11 April 2019 (Volume II, Appendix A, Section A.2.6.3).

FW2.5.3.3 U.S. Fish and Wildlife Service Consultation

Because no federally listed threatened, endangered, or candidate species and/or designated critical habitat occur near NAS JRB Fort Worth, no impacts to federally listed species would result from implementation of the proposed AFRC F-35A mission. Although a variety of federally listed species have the potential to occur under the primary airspace and ranges proposed for use, the potential impacts would not be significant. In an email dated 27 June 2018, the U.S. Fish and Wildlife Service (USFWS) agreed that Endangered Species Act (ESA) Section 7 requirements had been applied and that no further Section 7 consultation is required (Volume II, Appendix A, Section A.2.6.4).

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FW3.0 NAVAL AIR STATION JOINT RESERVE BASE FORT WORTH AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

FW3.1 AIRSPACE MANAGEMENT AND USE

FW3.1.1 Base Affected Environment

FW3.1.1.1 Airfield Operations

Baseline annual airfield operations at NAS JRB Fort Worth are described in Section FW2.3 and shown in Table FW2-4. The primary runway at NAS JRB Fort Worth, Runway 18/36, is described in Section FW1.0 and shown on Figure FW1-2. Runway 18 (takeoffs/landings to the south) is the higher use runway for standard daily operations.

The NAS JRB Fort Worth air traffic control (ATC) tower is responsible for airfield operations within the Class D airspace surrounding this airfield. This Class D area extends from the surface (field elevation 650 feet MSL) up to and including 3,000 feet MSL within a 4.5-mile radius of the airfield except where it abuts the Meacham Airport Class D airspace to the east. This airspace area extends 2 nautical miles (NM) to both the north and south with a 1.3 NM width on both sides of the north/south Tactical Air Navigation (TACAN) radials aligned with the runway. These extensions provide the additional controlled airspace needed for the instrument approaches to this airfield/runway environment.

The Fort Worth Air Route Traffic Control Center (ARTCC) has delegated the more highly regulated Class B airspace established around the Dallas-Fort Worth Airport to the Dallas-Fort Worth Terminal Radar Approach Control (TRACON) (Regional Approach) for controlling the high-density air traffic at this international airport and the local area, including NAS JRB Fort Worth. This Class B airspace is subdivided into 14 different areas (A through N) with varying floor altitudes that extend up to 11,000 feet MSL. Two areas (J and M) overlie the NAS JRB Fort Worth Class D area. The structure of this Class B airspace is designed to separate Dallas-Fort Worth instrument flight rules (IFR) aircraft from the NAS JRB Fort Worth and other airport Class D and E areas within this air traffic environment. Nearly 650,000 air traffic operations were conducted in this Class B airspace by the TRACON in 2017 that included military and civilian air traffic.

The airfield Instrument Landing System (ILS) and TACAN navigational aids provide instrument approach (10), departure (7) and Standard Terminal Arrival Route (STAR) (4) published procedures for aircraft navigating to the airfield. Global Positioning System (GPS) guided Radio Navigation (RNAV) approach and STAR procedures are also available for directing aircraft to the airfield. These published procedures, coupled with those standard operating procedures pilots are to follow while transiting between the base and the different training areas, provide a safe, efficient means for ATC to separate these daily routine flights from other IFR traffic.

FW3.1.2 Base Environmental Consequences

FW3.1.2.1 Airfield Operations

Implementation of the AFRC F-35A mission at NAS JRB Fort Worth would result in an increase of 3,056 annual airfield operations (12.1 percent) from current operations, as shown in Table FW2-4. This increase in operations would have a minimal effect on the existing airspace, where more than 650,000 operations per year are currently conducted. The percentage of operations flown during environmental night by AFRC F-35A pilots would be less than the percentage currently conducted by F-16 pilots. No modifications would be required for this airspace structure or the manner in which ATC manages airfield arrival/departure operations.

FW3.1.3 Airspace Affected Environment

FW3.1.3.1 Airspace and Range Use

The training areas (MOAs, ATCAAs, RAs, and ranges) currently used by pilots from NAS JRB Fort Worth and projected for use by AFRC F-35A pilots are identified in Table FW2-5. The published floor/ceiling altitudes in which training activities are contained are also shown in Table FW2-5. The different training areas are located in regions where aircraft using those areas are controlled by either the Houston ARTCC or the Fort Worth ARTCC. Table FW3-1 notes the baseline and projected AFRC F-35A sortie operations for each training complex as well as the responsible military agency for coordinating and scheduling the use of each airspace/range area.

FW3.1.4 Airspace Environmental Consequences

FW3.1.4.1 Airspace and Range Use

Implementation of the AFRC F-35A mission would result in replacing the baseline 3,197 F-16 sorties with the 4,632 F-35A sorties. The AFRC F-35A mission would increase overall training sorties by 1.2 percent, as noted in Table FW3-1. While most of the training airspace and ranges would experience decreases in annual sorties, sorties would increase in the Lancer, Washita, and Sheppard 1 MOAs. The Lancer MOA would experience 1,776 more annual sorties. The Washita MOA would see an increase of 565 annual sorties and the Sheppard 1 MOA an increase of 214 annual sorties.

Table FW3-1. Baseline and AFRC F-35A Annual Sorties

Training Airspace/Ranges[a]	Using/Scheduling Agency	Baseline Total	AFRC F-16	AFRC F-35A	Proposed Total	Percent Change
Brady Hi and Low MOA	301 FW, NAS JRB Fort Worth	1,687	-596	0	1,091	-35.0
Brady Hi, Low, North, and Brownwood 1, 2, & 3 Combined		2,490	-664	497	2,323	-6.7
Brownwood 1 & 2 East MOAs		2,332	-607	276	2,001	-14.2
Brownwood 1 & 2 West MOA		2,331	-606	236	1,961	-15.9
Brownwood 3 & 4 MOAs		2,333	-607	118	1,844	-21.0
Lancer MOA	7th Bomb Wing, Dyess AFB	1,058	0	1,776	2,834	167.9
Rivers MOA	138th Fighter Wing, Tulsa International	308	-266	157	199	-35.4
Falcon Range R-5601 A, B, C, D, E, F, G, H, & J; R-5602A & B	USAFCOE, Fort Sill	3,026	-145	146	3,027	0.0
Washita MOA	80th FTW, Sheppard AFB	3,847	-196	761	4,412	14.7
Sheppard 1 MOA		6,701	-326	540	6,915	3.2
Fort Hood R-6302 A, B, C, & D with Hood MOA and Gray MOA	III Corps, Fort Hood	58,205	-43	125	58,290	0.1
Total		**77,445**	**-3,715**	**4,632**	**78,362**	**1.2**

[a] AFRC F-35A training airspace and ranges also includes the high-altitude ATCAA above the MOAs. Airspace areas in this table have been grouped due to similarity of training use and for noise modeling purposes.

Key: USAFCOE = U.S. Army Fires Center of Excellence

The Lancer MOA/ATCAA was evaluated for 2,350 sorties in the EIS for Realistic Bomber Training Initiative (USAF 2000) and is currently using less than half of that capacity. The AFRC F-35A annual sorties would increase the proposed total annual sorties in the Lancer MOA to 2,834. AFRC F-35A sorties would require deconfliction with existing 7th Bomb Wing sorties who are the scheduling agency for this MOA and have priority for training. Scheduling coordination within the USAF would avoid conflicts within the airspace and the addition of 484 sorties above the currently analyzed sorties is not anticipated to impact existing training.

Implementation of the AFRC F-35A mission would not result in the creation of new SUA or change the boundaries of existing SUA. Therefore, no major changes to civilian operations are anticipated as the current boundaries of the Lancer MOA would remain unchanged. The FAA controls the airspace when the Lancer MOA/ATCAA is activated, ensuring that there are no conflicts with the use of the jet routes and airways. Minor rerouting of flights along these routes and/or scheduling of specific portions of the MOA/ATCAA could alleviate potential conflicts.

The Washita and Shepard 1 MOAs are high-density student training areas used by the Air Education and Training Center at Shepard Air Force Base (AFB). Operations in the Washita and Sheppard 1 MOA would require coordination within the USAF to avoid conflicts in the use of those MOAs.

FW3.1.5 Summary of Impacts to Airspace Management and Use

Implementation of the AFRC F-35A mission would involve a one-for-one exchange of F-16 aircraft with F-35A aircraft, and would not require any changes to airspace or to how the airfield is managed. Eventual replacement of F-16 aircraft at NAS JRB Fort Worth with F-35A aircraft would result in a 12.1 percent increase in airfield operations. This increase would have a minimal effect on the current airspace surrounding NAS JRB Fort Worth. AFRC F-35A sorties proposed for the airspace could be accommodated in the training airspace, ranges, and while en route to/from these areas without adversely affecting other airspace uses throughout the affected region. Therefore, impacts to airspace around NAS JRB Fort Worth and the airspace proposed for use would not be significant.

FW3.2 NOISE

Although noise can affect several resource areas, this section describes potential noise impacts on human annoyance and health, physical effects on structures, and potential impacts to animals in the care of humans. Noise impacts on biological resources (e.g., wildlife), cultural resources, land use and recreation, socioeconomics (e.g., property values), and environmental justice/protection of children are discussed in sections dedicated to those resources. Chapter 3, Section 3.2, defines terms used to describe the noise environment as well as methods used to calculate noise levels and assess potential noise impacts. These terms and analytical methods are uniformly applied to all four bases. A summary of noise metrics used in this EIS is also provided in Table FW3-2.

For consistency, the dB unit is used throughout this EIS. However, all subsonic aircraft noise levels described in this EIS are measured in dBA. In compliance with current DoD Noise Working Group (DNWG) guidance, the overall noise environment is described in this EIS using the day-night average sound level (DNL) metric. During scoping, people submitted comments expressing concern about use of the DNL metric. The DNL metric is used because it is the preferred noise metric of the U.S. Department of Housing and Urban Development (HUD), FAA, U.S. Environmental Protection Agency (USEPA), and DoD. Studies of community annoyance in response to numerous types of environmental noise show that there is a correlation between DNL and the percent of the population that can be expected to be highly annoyed by the noise. In addition to the DNL metric, supplemental noise metrics are used to provide a more complete picture of noise and particular types of noise impacts (Table FW3-2). Operations occurring during environmental nighttime hours are assessed a 10-dB penalty applied in calculation of DNL (refer to Chapter 3, Section 3.2.3, for more detailed resource definition and methodology used to evaluate impacts).

Table FW3-2. Summary of Noise Metrics Used in this EIS

Different noise measurements (or metrics) quantify noise. These noise metrics are as follows:

- The A-weighted decibel (dBA) is used to reflect a weighting process applied to noise measurements to filter out very low and very high frequencies of sound in order to replicate human sensitivity to different frequencies of sound and reflect those frequencies at which human hearing is most sensitive. Environmental noise is typically measured in dBA.
- Day-Night Average Sound Level (DNL) combines the levels and durations of noise events, the number of events over a 24-hour period, and more intrusive nighttime noise to calculate an average noise exposure.
- Onset Rate-Adjusted Day-Night Average Sound Level (L_{dnmr}) adds to the DNL metric the startle effects of an aircraft flying low and fast where the sound can rise to its maximum very quickly. Because the tempo of operations is so variable in airspace areas, L_{dnmr} is calculated based on the average number of operations per day in the busiest month of the year.
- C-Weighted Day-Night Average Sound Level (CDNL) is a day-night average sound level computed for impulsive noise such as sonic booms. Peak overpressure, measured in pounds per square foot (psf), characterizes the strength of impulsive noise.
- Sound Exposure Level (SEL) accounts for the maximum sound level and the length of time a sound lasts by compressing the total sound exposure for an entire event into a single second.
- Maximum Noise Level (L_{max}) is the highest sound level measured during a single event in which the sound level changes value with time (e.g., an aircraft overflight).
- Equivalent Noise Level (L_{eq}) represents aircraft noise levels decibel-averaged over a specified time period and is useful for considering noise effects during a specific time period such as a school day (denoted $L_{eq(SD)}$ and measured from 8:00 A.M. to 4:00 P.M.).

In this EIS, multiple noise metrics are used to describe the noise environment at each alternative base. This approach, which is in accordance with DoD policy (DoD 2009), provides a more complete picture of the current and expected noise experience than can be provided by any one noise metric alone.

Comments received during scoping indicated a broad range of concerns and requested a comprehensive presentation of noise impacts. Therefore, this analysis covers a wide variety of potential noise impact categories. Additional details are provided in Volume II, Appendix B.

FW3.2.1 Base Affected Environment

This section discusses noise impacts near the installation. Noise generated in the training airspace and during training to and from the training airspace is discussed in Section FW3.1.

Under baseline conditions, 25,292 airfield operations are conducted annually at NAS JRB Fort Worth. This includes 8,524 operations flown by AFRC F-16 pilots, and 1,106 operations flown by Lockheed Martin F-16 pilots. Lockheed Martin pilots also conduct 1,486 F-35A operations, 306 F-35B operations, and 42 F-35C operations annually. USMC pilots conduct 1,426 F-18 operations and 1,070 C-130 operations annually. An additional 7,096 airfield operations are flown by pilots from other tenant units, including the TANG (C-130), Naval Air Reserve (C-40A), Army Reserve (C-12 and UC-35), and the `Auxiliary Security Force (H-60 and CH-47). Transient aircraft pilots conduct a total of 4,236 operations annually. Transient aircraft pilots use the airfield for a variety of purposes (e.g., stop-over during cross country flights, unfamiliar airfield for practice approaches, divert landing location during severe weather), and transient aircraft could potentially include any aircraft type.

Approximately 2 percent of total airfield operations are conducted between 10:00 P.M. and 7:00 A.M. Less than 1 percent of 301 FW airfield operations are conducted between 10:00 P.M. and 7:00 A.M.

FW3.2.1.1 Noise Exposure

Because the Lockheed Martin Assembly Plant is located on the west side of the runway, both F-16 and F-35A aircraft currently operate at NAS JRB Fort Worth, and people who live around the base have experienced noise generated by overflights of each aircraft type. Table FW3-3 compares F-16 and F-35A individual overflight noise levels at a representative noise-sensitive location southwest of the runway (Brewer Middle School). The noise levels listed in Table FW3-3 reflect flight procedures at NAS JRB Fort Worth (e.g., pattern altitudes) and are not directly applicable to other installations. The specific types of flight departure, arrival, or closed pattern procedures listed in the table were selected because they generate the highest dB sound exposure level (SEL) of any departure, arrival, or closed pattern procedure flown by that aircraft at the location studied. The same set of NAS JRB Fort Worth-specific flight procedures used to calculate DNL noise contours was also used to calculate noise levels in Table FW3-3.

Table FW3-3. Comparison of F-16 and F-35A Noise Levels at the Brewer Middle School near NAS JRB Fort Worth

Aircraft	Operation Type	Engine Power	Airspeed (knots)	Altitude (feet AGL)	Slant Distance (feet)	SEL (dB)	L_{max} (dB)
AFRC F-35A (Military Power)	Departure	100% ETR	300	1,443	3,580	103	95
AFRC F-35A (Afterburner)[a]		100% ETR	300	1,529	3,598	104	96
Lockheed F-35A (Military Power)[b]		100% ETR	300	1,437	3,579	104	95
AFRC F-16C (Military Power)[c]		104% NC	300	2,124	3,774	97	87
AFRC F-16C (Afterburner)[c]		104% NC	350	2,676	4,013	100	96
Lockheed F-16C (Afterburner)[c]		93% NC	300	1,959	3,721	100	93
AFRC F-35A (Overhead Break)[b]	Arrival	40% ETR	170	765	3,509	92	78
Lockheed F-35A (Straight-in)[b]		40% ETR	160	782	3,509	87	77
AFRC F-16C (Overhead Break)[c]		87% NC	350	2,921	2,636	81	70
Lockheed F-16C (Straight-in)[c]		80% NC	160	782	3,509	75	66
AFRC F-35A (Practice Precautionary Pattern)[b]	Closed Pattern	100% ETR	300	2,716	3,592	104	94
Lockheed F-35A (Visual Flight Rules Touch and Go)[b]		100% ETR	300	1,698	1,417	112	107
AFRC F-16C (Visual Flight Rules Low Approach)[c]		97% NC	200	1,977	3,059	94	83
Lockheed F-16C (Visual Flight Rules Touch and Go)[c]		95% NC	300	1,698	1,417	113	109

[a] For a detailed explanation of why F-35A afterburner departures might have lower SEL and L_{max} values than military power departures, see Chapter 3, Section 3.2.3.1. Essentially, during afterburner takeoffs, the aircraft reaches the required takeoff speed and leaves the ground sooner, and is at a slightly higher altitude throughout the flight profile. As a result, the aircraft altitude and slant distance at the location studied are both typically higher for the afterburner departure. Typically, the afterburner is turned off at approximately 10,000 feet from brake release, which occurs before the aircraft is over the location studied. The engine power (i.e., ETR) setting of the aircraft when it is above the location studied is the same for both the military power and the afterburner departure.

[b] Although AFRC F-35A pilots and Lockheed Martin test pilots would fly the same aircraft type (F-35A), the Lockheed Martin test mission requires different flight profiles than would be used by AFRC pilots during training. Therefore, noise levels would differ between the two missions even though the aircraft are the same.

[c] AFRC F-16C aircraft are equipped with General Electric engines, and Lockheed F-16C aircraft are equipped with Pratt and Whitney engines.

Notes: Noise levels presented were calculated at Brewer Middle School for the departure, arrival, and closed pattern flight that has the highest SEL at that location. Actual individual overflight noise levels vary from the noise levels listed because of variations in aircraft configuration, flight track, altitude, and atmospheric conditions. Representative noise levels were calculated using NOISEMAP Version 7.3 and the same operational data (e.g., flight tracks and flight profiles) used to calculate the DNL contours.

Key: ETR = Engine Thrust Request; NC = core engine speed

Several comments received during scoping requested the USAF provide individual overflight noise levels quantified using the SEL noise metric. The information on SELs shown in Table FW3-4 was calculated based on local flying procedures and conditions using methods described in Chapter 3, Section 3.2.3.1. Specifically, Table FW3-4 lists only the highest SEL generated by any flight procedure (e.g., arrival, departure or closed pattern) by any based or transient aircraft type. The table also states the number of times per year that the flight procedure occurs during "acoustic day" (7:00 A.M. to 10:00 P.M.) and "acoustic night" (10:00 P.M. to 7:00 A.M.). It is worth noting that the noise environment at a particular location is complex and the highest SEL is only one descriptor of this complex situation. In addition, actual flight paths vary, due to weather, winds, aircrew technique, and other factors, from the most-frequently followed (representative) flight paths used in noise modeling. Therefore, individual flight events could be closer to, or be farther away from, the representative noise-sensitive location, resulting in noise levels being slightly higher or lower than indicated in Table FW3-4.

Table FW3-4. Highest SEL at Representative Noise-Sensitive Locations near NAS JRB Fort Worth Under Baseline Conditions

Representative Noise-Sensitive Location			Flight Procedure with the Highest SEL					SEL (dB)[a,b]
			Aircraft	Aircraft Group	Operation Type	Annual Operations at this SEL		
Type	ID	Description				7:00 A.M. to 10:00 P.M.	10:00 P.M. to 7:00 A.M.	
Library	L01	White Settlement Library	F-16C	B	Closed Pattern	24	0	113
Park	P01	North Z Boaz Park	F-35B	B	Departure	12	0	114
	P02	Vinca Circle Park	F/A-18E/F	T	Arrival	284	0	118
	P03	Malaga Park	F-35B	B	Closed Pattern	36	0	115
	P04	Casino Park	F/A-18E/F	T	Arrival	110	0	119
	P05	Leonard Park	F-35B	B	Departure	12	0	104
	P06	Lake Worth Public Park	F/A-18E/F	T	Closed Pattern	47	0	115
	P07	Plover Circle Park	F-35B	B	Departure	5	0	122
School[c]	S01	Brewer Middle School	F-35B	B	Closed Pattern	36	0	114
	S02	Effie Morris Elementary School	F-35B	B	Departure	5	0	112
	S03	Luelle Merritt Elementary School	F/A-18E/F	T	Closed Pattern	74	0	115

[a] SELs were calculated using NOISEMAP Version 7.3 and the same operational data (e.g., flight tracks and flight profiles) used to calculate the DNL contours.
[b] SEL accounts for the maximum sound level and the length of time a sound lasts by compressing the total sound exposure for an entire event into a single second.
[c] For the purposes of this noise analysis, noise levels at schools are described throughout this EIS using representative schools; discussion of noise at schools may not include all schools in the area.
Key: T = Transient aircraft or non-NAS JRB Fort Worth-based aircraft involved in training exercise; B = Based aircraft

Several factors, including, but not limited to, weather conditions, the precise flight path followed, and whether the aircraft is flying in formation, affect the sound level of individual overflights (Chapter 3, Section 3.2.3). Formation flights involve multiple aircraft, usually of the same type, flying together. The maximum noise level experienced during a formation overflight depends on the spacing and arrangement of the formation's member aircraft. If the aircraft are spaced close together, then doubling the number of aircraft would add as much as 3 dB to the maximum noise level (L_{max}) of the event. Since the SEL metric is an exposure-based metric, doubling the number of aircraft of a single aircraft type adds 3 dB to the event sound level. For example, a two-aircraft formation would generate an SEL that is 3 dB higher than single aircraft SEL listed in Table FW3-3.

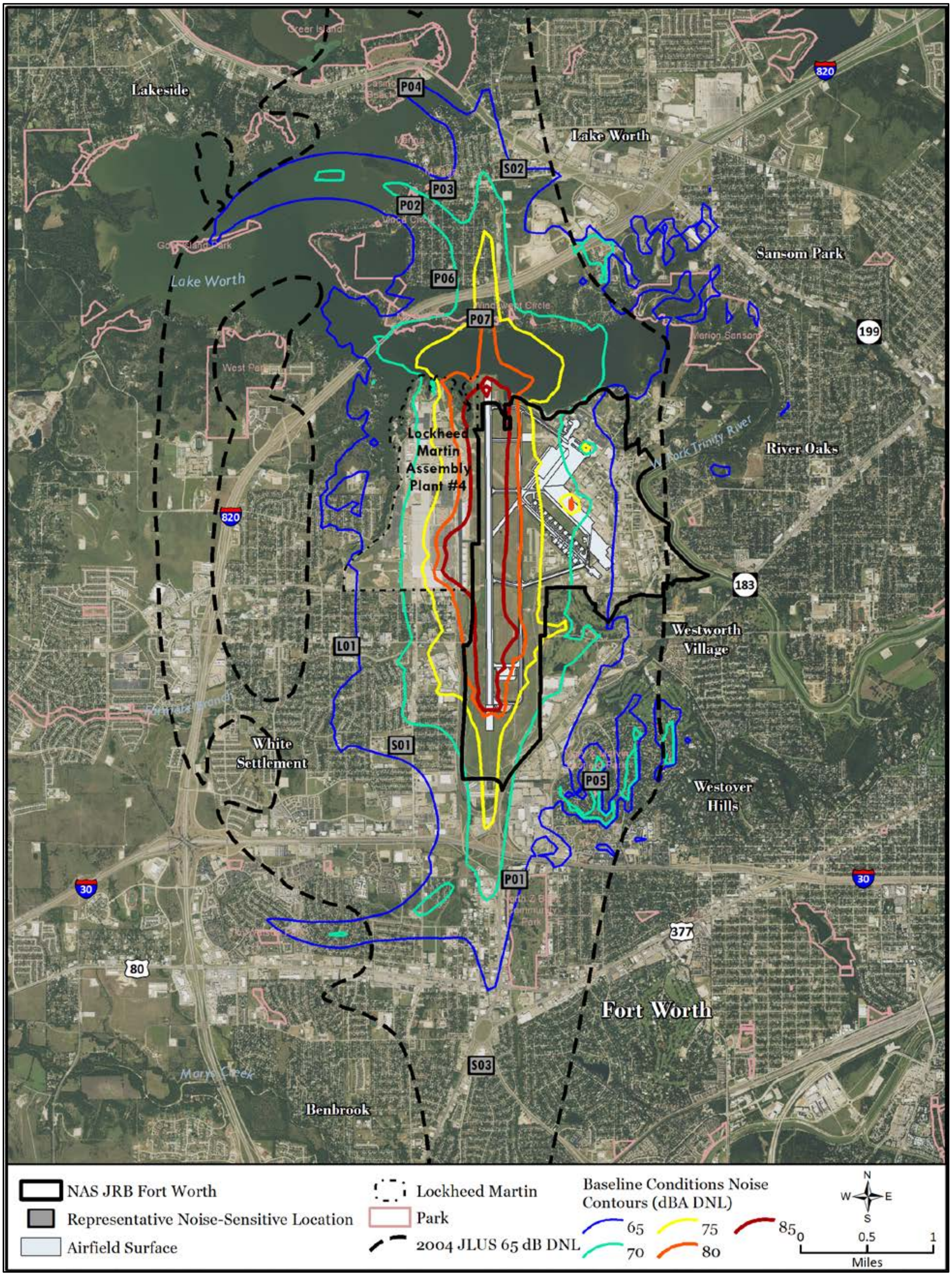

Figure FW3-1. Baseline DNL Contours at NAS JRB Fort Worth

Figure FW3-1 shows baseline DNL contours in 5-dB increments. Areas with the highest DNL are located along the runway and extended runway centerline and in areas near the airfield where aircraft static engine runs are conducted. The shape of the noise contours reflects the effects of topography on noise propagation. In the Westover Hills neighborhood, hill slopes facing toward the airfield experience higher noise levels than hill slopes facing away. A series of ridges extending north-south in this area results in irregularly-shaped and non-contiguous areas being exposed to DNL of 65 dB or greater. The effect of water bodies on noise distribution is apparent at Lake Worth. Because noise propagates more efficiently over water (i.e., with less energy being lost), DNL greater than 65 dB extends farther than if the underlying surface were land. Land on the north shore of the lake sloping upwards from the lakes surface experiences higher noise levels both because of the reduced impedance of the lake's surface and because the rising hill slope faces toward the aircraft flight paths.

The area surrounding NAS JRB Fort Worth is urbanized, and much of the area currently affected by noise levels is residential. In total, 5,499 acres and an estimated 13,093 residents are currently exposed to DNL greater than 65 dB (Table FW3-5). People living in areas exposed to higher DNL are more likely to become highly annoyed by the noise. DoD land use guidelines state that, unless the structures provide at least 25 dB of noise level reduction, residences are incompatible with DNL between 65 and 69 dB. The guidelines state that residences are incompatible with DNL of 70 to 74 dB unless the structures provide at least 30 dB of noise level reduction. The guidelines also state that residential uses in areas exposed to DNL greater than 75 dB are not compatible and should be prohibited. Additional details on annoyance and land use recommendations for areas exposed to elevated noise levels are provided in Chapter 3, Section 3.2.3, and Volume II, Appendix B.

The NCTCOG published a JLUS in 2017 which references historical noise levels for planning purposes (NCTCOG 2017). The JLUS recommends several measures related to aircraft noise near NAS JRB Fort Worth. These recommendations include a recommendation that local governments pass zoning ordinances to prevent additional incompatible land development in areas exposed to high noise levels. The JLUS defines incompatible land use based on noise level compatibility guidelines that mirror DoD guidelines. Implications of the JLUS for the land use resource area are discussed in section FW3.8. Although it does not directly affect the current experience of noise, the 65 dB DNL contour from the JLUS document has been included on Figure FW3-1 for reference. The number of acres and estimated population exposed to JLUS DNL greater than 65 dB are listed in Table FW3-5 for reference.

Table FW3-5. Off-Base Acres and Estimated Population Exposed to DNL of 65 dB or Greater Under Baseline Conditions at NAS JRB Fort Worth

DNL (dB)	Acres		Estimated Population	
	JLUS	Baseline	JLUS	Baseline
65 – 69	8,062	3,435	21,968	9,992
70 – 74	3,316	1,204	8,450	2,673
75 – 79	1,364	522	2,415	372
80 – 84	395	200	287	56
≥85	218	138	0	0
Total	**13,355**	**5,499**	**33,120**	**13,093**

Table FW3-6 lists baseline DNL at several representative noise-sensitive locations around the base. These include a library as well as several parks and schools. The representative noise-sensitive locations are in residential areas, and baseline DNL in the residential areas are similar to those listed in Table FW3-6. Ten (10) of the 11 locations listed are exposed to DNL of 65 dB or greater. The JLUS identifies a neighborhood park with DNL greater than 75 dB as an incompatible use. Plover Circle Park is currently exposed to DNL of 78 dB and is therefore an incompatible land use.

Areas outside the 65 dB DNL contour line could also experience noise that can be disturbing at times. Although noise events are less frequent and/or less intense in locations below 65 dB DNL than in locations above 65 dB DNL, loud and potentially disturbing noise events do occur. Some people are more noise-sensitive than others as a result of physical, psychological, and emotional factors. People with autism and people afflicted with post-traumatic stress disorder (PTSD) may be particularly sensitive to sudden loud noises such as those that occur near an airbase. The DNL metric is useful for describing the noise environment at a location with a single number, but it does not provide a complete description of the noise environment. In accordance with current DoD policy (DoD 2009), this EIS makes use of several supplemental noise metrics (e.g., SEL, L_{max}, number of events exceeding dB threshold) to provide a more complete description of the noise experience.

Table FW3-6. DNL at Representative Noise-Sensitive Locations near NAS JRB Fort Worth Under Baseline Conditions

Type	ID	Description	DNL (dB)
Library	L01	White Settlement Library	65
Park	P01	North Z Boaz Park	66
	P02	Vinca Circle Park	69
	P03	Malaga Park	66
	P04	Casino Park	65
	P05	Leonard Park	70
	P06	Lake Worth Public Park	68
	P07	Plover Circle Park	78
School	S01	Brewer Middle School	67
	S02	Effie Morris Elementary School	65
	S03	Luelle Merritt Elementary School	62

FW3.2.1.2 Speech Interference

Speech interference is possible when noise levels exceed 50 dB. For the purposes of this analysis, any change to normal speech patterns is counted as an interference event. Table FW3-7 lists the number of events exceeding L_{max} of 50 dB in buildings with windows open, in buildings with windows closed, and outdoors. Predictions of indoor speech interference events account for standard values of 15 dB or 25 dB of noise attenuation provided by buildings with windows open or closed, respectively. Many of the parks listed in Table FW3-7 are near residential areas, and noise levels are similar. Flight paths are variable and speech interference events sometimes occur far from standard NAS JRB Fort Worth flight patterns.

Table FW3-7. Potential Speech Interference Under Baseline Conditions at NAS JRB Fort Worth

Type	ID	Description	Annual Average Daily Daytime (7:00 A.M. to 10:00 P.M.) Events per Hour		
			Windows Open[a]	Windows Closed[a]	Outdoor
Library	L01	White Settlement Library	2	2	3
Park	P01	North Z Boaz Park	2	2	3
	P02	Vinca Circle Park	3	2	3
	P03	Malaga Park	2	2	3
	P04	Casino Park	2	1	3
	P05	Leonard Park	2	1	3
	P06	Lake Worth Public Park	3	3	3
	P07	Plover Circle Park	3	3	3

[a] Number of events per average hour with an indoor L_{max} of at least 50 dB; assumes standard values of 15 dB and 25 dB noise level reductions for windows open and closed, respectively.

FW3.2.1.3 Interference with Classroom Learning

Noise interference with learning in schools is of particular concern because noise can interrupt communication or interfere with concentration. When considering intermittent noise caused by aircraft overflights, guidelines for classroom interference indicate that an appropriate criterion is a limit of 35 to 40 dB (depending on classroom size) on indoor background equivalent noise levels during the school day ($L_{eq(SD)}$) and a 50 dB L_{max} limit on single events. In accordance with DNWG recommendations, estimated interior $L_{eq(SD)}$ exceeding 40 dB was taken as an indication that American National Standards Institute (ANSI) criteria are being exceeded (DNWG 2013). Table FW3-8 lists $L_{eq(SD)}$ and the average number of events per hour exceeding 50 dB L_{max} at several schools near NAS JRB Fort Worth when windows are open and when windows are closed. Currently, indoor noise levels at all three of the schools studied exceed 40 dB $L_{eq(SD)}$ when windows are open, and indoor noise levels at Brewer Middle School and Effie Morris Elementary School exceed 40 dB $L_{eq(SD)}$ when windows are closed. Indoor and outdoor noise levels temporarily exceed 50 dB L_{max} at a rate ranging from two to three events per hour. The number of outdoor events per hour with potential to interfere with speech between 7:00 A.M. and 10:00 P.M. is not directly related to classroom noise level, but is relevant during recess and to other activities that could occur outside the school building. Additional information on schools within the noise contours is discussed in FW3.10.1.

Table FW3-8. Indoor Classroom Learning Disruption Under Baseline Conditions at NAS JRB Fort Worth

Type	ID	Description	Windows Open[a]		Windows Closed[a]		Outdoor
			$L_{eq(SD)}$ (dB)	Events per Hour[b]	$L_{eq(SD)}$ (dB)	Events per Hour[b]	Events per Hour[c]
School	S01	Brewer Middle School	54	3	44	2	3
	S02	Effie Morris Elementary School	52	3	42	2	3
	S03	Luelle Merritt Elementary School	49	2	39	1	2

[a] Assumes standard values of 15 dB and 25 dB of noise level reductions for windows open and closed, respectively.
[b] Average number of events per hour at or above an indoor L_{max} of 50 dB during an average 8-hour school day (8:00 A.M. to 4:00 P.M.).
[c] Average number of events per hour at or above an outdoor L_{max} of 50 dB during daytime (7:00 A.M. to 10:00 P.M.).
Key*:* $L_{eq(SD)}$ is the equivalent noise level during a school day (defined as 8:00 A.M. to 4:00 P.M.).

FW3.2.1.4 Sleep Disturbance

Nighttime flying, which is required as part of training for certain missions, has an increased likelihood of causing sleep disturbance. The lack of quality sleep has the potential to affect health and concentration. The probability of being awakened at least once per night was calculated using a method described by the ANSI (ANSI 2008). The method first predicts the probability of awakening associated with each type of flying event (higher SELs yield higher probability of awakening) and then sums the probabilities associated with all event types. The overall probability of awakening at least once per night reflects all flying events that occur between 10:00 P.M. and 7:00 A.M., when most people sleep (Table FW3-9). The analysis also accounts for standard building attenuation of 15 dB and 25 dB with windows open and closed, respectively. Sleep disturbance probabilities listed for parks and schools are used because they are indicative of impacts in nearby residential areas are not intended to imply that people regularly sleep in schools or at parks. Results apply only to people who sleep during the night. People who sleep during the day experience additional noise events, resulting in higher probabilities of awakening.

Table FW3-9. Average Probability of Awakening Under Baseline Conditions at NAS JRB Fort Worth

Type	ID	Description	Annual Average Nightly (10:00 P.M. to 7:00 A.M.) Probability of Awakening (%)	
			Windows Open[a]	Windows Closed[a]
Library	L01	White Settlement Library	1	<<1
Park	P01	North Z Boaz Park	1	1
	P02	Vinca Circle Park	1	1
	P03	Malaga Park	1	1
	P04	Casino Park	1	1
	P05	Leonard Park	1	<<1
	P06	Lake Worth Public Park	1	1
	P07	Plover Circle Park	2	1
School	S01	Brewer Middle School	1	<<1
	S02	Effie Morris Elementary School	1	1
	S03	Luelle Merritt Elementary School	1	1

[a] Assumes standard values of 15 dB and 25 dB noise level reduction for windows open and closed, respectively.
Key: <<1 indicates that the number of potential speech interference events (>50 dB) per hour resulting from NAS JRB Fort Worth-based aircraft overflights is low (rounding to zero).

FW3.2.1.5 Potential for Hearing Loss

The risk of hearing loss was assessed using the methodology prescribed by DoD policy, which is described in Chapter 3, Section 3.2.3, and Volume II, Appendix B. Potential for hearing loss (PHL) risk is calculated based on the 24-hour equivalent noise level (L_{eq24}) noise metric. Under baseline conditions, an estimated 49 residents are currently exposed to outdoor noise levels that could potentially be harmful to hearing (Table FW3-10). The DNL noise metric results in a greater number of residents exposed because DNL applies a noise penalty to events during acoustic night. An estimated 56 persons (Table FW3-5) are currently exposed to DNL of 80 dB or greater. The census-based population estimate may be higher or lower than the actual population. Seven residential land parcels are exposed to these noise levels. These parcels are located on Lake Worth opposite Runway 36. Some of these parcels are located in the Clear Zone (CZ) and all of these parcels are located in areas zoned by the City of Fort Worth as high noise areas.

Table FW3-10. Estimated Population Exposed to Noise Levels that Could Result in Noise-Induced Permanent Threshold Shift Under Baseline Conditions at NAS JRB Fort Worth

L_{eq24} (dB)	Estimated Population
80-81	41
81-82	8
82-83	0
Total	**49**

FW3.2.1.6 Occupational Noise

In on-base areas with high noise levels, existing USAF occupational noise exposure prevention procedures, such as hearing protection and monitoring, are implemented to comply with all applicable Occupational Safety and Health Administration (OSHA) and USAF occupational noise exposure regulations.

FW3.2.1.7 Non-auditory Health Impact

During scoping, the question of the potential for non-auditory health effects from noise was raised. Studies have been performed to see whether noise can cause health effects other than hearing loss.

The premise is that annoyance causes stress. Prolonged stress is known to be a contributor to a number of health disorders. Cantrell (1974) confirmed that noise can provoke stress, but noted that results on cardiovascular health have been contradictory. Some studies have found a connection between aircraft noise and blood pressure (e.g., Michalak et al. 1990; Rosenlund et al. 2001), while others have not (e.g., Pulles et al. 1990).

Kryter and Poza (1980) noted, "It is more likely that noise related general ill-health effects are due to the psychological annoyance from the noise interfering with normal everyday behavior, than it is from the noise eliciting, because of its intensity, reflexive response in the autonomic or other physiological systems of the body."

The connection from annoyance to stress to health issues requires careful experimental design, and the resulting data are subject to different interpretations. Some of the highly publicized research reports on the impacts of noise on human health effects are unsubstantiated or not based on sound science. Meecham and Shaw (1979) apparently found a relation between noise levels and mortality rates in neighborhoods under the approach path to Los Angeles International Airport. When the same data were analyzed by others (Frerichs et al. 1980), no relationship was found. Jones and Tauscher (1978) found a high rate of birth defects for the same neighborhood. But when the Centers For Disease Control performed a more thorough study near Hartsfield-Jackson Atlanta International Airport, no relationships were found for levels greater than 65 dB (Edmonds et al. 1979).

A carefully designed study, Hypertension and Exposure to Noise near Airports (HYENA), was conducted around six European airports from 2002 through 2006 (Jarup et al. 2005, 2008). There were 4,861 subjects, aged between 45 and 70. Blood pressure was measured, and questionnaires were administered for health, socioeconomic, and lifestyle factors, including diet and physical exercise. Hypertension was defined by World Health Organization (WHO) blood pressure thresholds (WHO 2003). Noise from aircraft and highways was predicted from models.

The HYENA results were presented as an odds ratio (OR). An OR of 1 indicates there is no added risk, while an OR of 2 indicates risk is doubled. An OR of 1.14 was found for nighttime aircraft noise, measured by the equivalent noise level during nighttime hours (L_{night}). For daytime aircraft noise, measured by 16-hour equivalent noise level (L_{eq16}), the OR was 0.93. For road traffic noise, measured by L_{eq24}, the OR was 1.1.

Note that OR is a statistical measure of change, not the actual risk. Risk itself and the measured effects were small, and not necessarily distinct from other events. Haralabidis et al. (2008) reported an increase in systolic blood pressure of 6.2 millimeters of mercury (mmHg) for aircraft noise, and an increase of 7.4 mmHg for other indoor noises such as snoring.

For these studies, aircraft noise was a factor only at night, while traffic noise is a factor for the full day. Aircraft noise results varied among the six countries. The result is therefore pooled across all data. Traffic noise results were consistent across the six countries.

One interesting conclusion from a 2013 study of the HYENA data (Babisch et al. 2013) states there is some indication that noise level is a stronger predictor of hypertension than annoyance. That is not consistent with the idea that annoyance is a link in the connection between noise and stress. Babisch et al. (2012) present interesting insights on the relationship of the results to various modifiers.

Two studies examined the correlation of aircraft noise with hospital admissions for cardiovascular disease. Hansell et al. (2013) examined neighborhoods around London's Heathrow Airport. Correia et al. (2013) examined neighborhoods around 89 airports in the United States. Both studies included areas of various noise levels. They found associations that were consistent with the HYENA results. During the Draft EIS public comment period, several commenters provided citations of research papers and requested additional information from these research papers be included in the Final EIS. Please refer to Chapter 3, Section 3.2.3.1.7, for additional information that has been added to the Final EIS.

The current state of scientific knowledge cannot yet support inference of a causal or consistent relationship between aircraft noise exposure and non-auditory health consequences for exposed residents. The large scale HYENA study (Jarup et al. 2005, 2008) and the recent studies by Hansell et al. (2013) and Correia et al. (2013) offer indications, but it is not yet possible to establish a quantitative cause and effect based on the currently available scientific evidence.

FW3.2.1.8 Structural Damage

Noise that does not exceed 130 dB in any 1/3-octave frequency band or last for more than 1 second does not typically have the potential to damage structures in good repair (CHABA 1977). The term “frequency bands” refers to noise energy in a certain range of frequencies and is similar in concept to frequency bands employed on home stereo equalizers to control relative levels of bass and treble. Noise energy in certain frequency bands has increased potential to vibrate and/or damage structures. Noise exceeding 130 dB in any 1/3-octave frequency band and lasting for more than 1 second of that intensity and duration does not occur except on the flightline immediately adjacent to jet aircraft. The installation has not received any claims for noise-induced property damage.

Noise-induced structural vibration and secondary vibrations (i.e., “rattle”) of objects within structures can occur during loud overflights. Rattling of objects such as dishes, hanging pictures, and loose window panes can cause residents to fear damage. Rattling objects have the potential to contribute to annoyance along with other potential noise effects (e.g., speech interference, sleep disturbance).

FW3.2.1.9 Animals in the Care of Humans

Potential noise impacts on wildlife are described in Section FW3.6. However, pets, other domesticated animals, and animals kept in zoos live in different circumstances than wild animals and often react differently to human-generated noises, particularly when enclosed in small spaces. Negative reactions to loud overflights are possible under baseline conditions.

FW3.2.2 Base Environmental Consequences

Implementation of the AFRC F-35A mission would replace the 24 AFRC F-16 aircraft currently assigned at NAS JRB Fort Worth with 24 F-35A aircraft. The number of airfield operations flown annually by AFRC jets would increase from 8,524 to 11,580, resulting in a 12.1 percent increase in the total number of airfield operations flown by all aircraft at NAS JRB Fort Worth.

AFRC F-35A pilots would fly less than 1 percent of initial approaches to the runway during the late-night time period between 10:00 P.M. and 7:00 A.M. This is approximately the same percentage of total flights that are conducted by AFRC F-16 pilots late at night. As is currently the case with F-16 pilots, AFRC F-35A pilots would not typically conduct departures or closed patterns (i.e., multiple practice approaches) between 10:00 P.M. and 7:00 A.M.

Based on context and intensity, noise impacts resulting from implementation of the proposed AFRC F-35A mission at NAS JRB Fort Worth would be considered significant. As described in Section 2.5, the USAF considered several potential noise mitigation measures. None of the measures considered were determined to be operationally feasible. Local flight procedures at NAS JRB Fort Worth are internally reviewed on a regular basis for changes that create the best balance between safety (paramount concern), mission and training effectiveness, and minimizing noise impacts. Furthermore, the base maintains open lines of communication with the City of Fort Worth and local community leaders to develop and implement potential noise abatement procedures when possible. Currently, no additional noise abatement procedures have been identified that would reduce noise impacts without also adversely affecting safety of flight and/or mission effectiveness.

Operating procedures at NAS JRB Fort Worth already include several procedures to minimize noise impacts. These procedures, which have been developed over several years as part of regularly-occurring procedural review process, have been selected to minimize mission impacts while maintaining operational efficiency and flexibility; these procedures would be applied to any new aircraft at the installation, including the F-35A. Noise modeling conducted as part of this EIS analysis reflects the following procedures:

- Quiet hours are observed from 10:00 P.M. to 7:00 A.M. Monday through Saturday and from 10:00 P.M. to 12:00 P.M. on Sunday. During these times, departures are not authorized except with Operations Officer approval; only straight-in to full-stop landings are allowed; and low-power static engine runs are permitted;
- Aircrews are instructed to climb expeditiously to assigned altitudes. Departing aircraft are not authorized to turn prior to reaching 1,700 feet MSL unless an operational necessity exists;
- Afterburner must be de-selected prior to the airfield boundary unless required for safe operation;
- Aircraft in the visual flight rules (VFR) traffic pattern must turn prior to Interstate (I)-30 during approaches to Runway 18 and prior to I-820 during approaches to Runway 36; and
- Aircrews are instructed to avoid low-altitude flight over populated areas to the extent practicable.

Construction and demolition (C&D) projects in support of the proposed AFRC F-35 mission would generate short-term, localized increases in noise. However, the installation is currently exposed to elevated aircraft noise levels as well as noise generated by the day-to-day operation and maintenance (O&M) of vehicles and equipment. Construction would occur during normal working hours (i.e., 7:00 A.M. to 5:00 P.M.), and construction equipment would be equipped with mufflers. Workers would wear hearing protection in accordance with applicable regulations. Transportation of materials and equipment to and from the construction sites would generate noise similar to heavy trucks currently operating on base and along local roadways. In the context of ongoing frequent and intense aircraft noise events on an active military installation, construction noise generated by the AFRC F-35A mission would not result in significant impacts.

FW3.2.2.1 Noise Exposure

FW3.2.2.1.1 Scenario A

The difference in individual overflight sound level between F-35A and F-16 aircraft depends on the specific flight configurations being used by each aircraft and the aircraft's location relative to the listener (both of which are heavily dependent on the aircraft's performance characteristics). Lockheed Martin test pilots currently fly F-35A, B and C aircraft at NAS JRB Fort Worth and many people living near the base are familiar with the sound of F-35 aircraft overflights. Single overflight event noise levels (L_{max} and SEL) for F-35A and F-16 aircraft at a location near NAS JRB Fort Worth are listed in Table FW3-3. The noise levels in this table were calculated in NOISEMAP based on field measurements (obtained under past controlled test conditions at other locations) of noise levels generated by both aircraft types and information on local conditions and flying procedures.

As noted in Chapter 3, Section 3.2.3, computer noise modeling was conducted in compliance with current USAF and DoD-approved methods. The modeling accounted for the effects of terrain relief (e.g., hills and valleys) near NAS JRB Fort Worth as well as surface type (e.g., land and water) on the propagation of sound. Noise modeling at NAS JRB Fort Worth used median atmospheric conditions for sound propagation based on local climate records. The modeling does not reflect possible future climates in part because the degree to which the climate will change and the timeframe in which change will occur are not known at this time. Noise levels were calculated for an average annual day, which is a day with 1/365th of annual total operations. The computer noise model NOISEMAP references a database of field-measured sound levels for aircraft in various flight configurations. The model also uses data on flight procedures for current and proposed aircraft operations (e.g., where, how often, what time of day, and what configurations are used) based on recent inputs provided by all pilots operating from NAS JRB Fort Worth and ATC. Because flight procedures, surrounding terrain, and other factors are different at each base, application of noise results generated for another airfield would be inappropriate. F-35A flight parameters (e.g., altitude, airspeed, and engine power setting) that are expected to be used at NAS JRB Fort Worth were developed based on information provided by F-35A pilots at bases where the aircraft is operating currently, such as Luke, Hill, and Eglin AFBs. These flight parameters were used to generate results specific to NAS JRB Fort Worth.

Several comments received during scoping requested that the USAF provide individual predicted overflight noise levels using the SEL noise metric. Information is provided on the flight procedure with the highest SEL at several representative noise-sensitive locations in Table FW3-11. A flight procedure is a specific type of operation (e.g., afterburner departure) on a specific flight path, by a specific aircraft type. Actual flight paths vary as a result of weather, winds, aircrew technique, and other factors, and individual flights would deviate in position and noise level from those listed in Table FW3-11. In addition, the flight procedure with the highest SEL is one aspect of a complex sound environment which includes many other flight procedures (e.g., flaps or gear position) as well as other noise sources.

Table FW3-11. Highest SEL at Representative Noise-Sensitive Locations near NAS JRB Fort Worth Under Baseline and AFRC F-35A Mission Conditions

Scenario	Representative Noise-Sensitive Location			Flight Procedure with the Highest SEL					SEL (dB)[a, b]
	Type	ID	Description	Aircraft	Aircraft Group	Operation Type	Annual Operations at this SEL 7:00 A.M. to 10:00 P.M.	Annual Operations at this SEL 10:00 P.M. to 7:00 A.M.	
Baseline	Library	L01	White Settlement Library	F-16C	B	Closed Pattern	24	0	113
	Park	P01	North Z Boaz Park	F-35B	B	Departure	12	0	114
		P02	Vinca Circle Park	F/A-18E/F	T	Arrival	284	0	118
		P03	Malaga Park	F-35B	B	Closed Pattern	36	0	115
		P04	Casino Park	F/A-18E/F	T	Arrival	110	0	119
		P05	Leonard Park	F-35B	B	Departure	12	0	104
		P06	Lake Worth Public Park	F/A-18E/F	T	Closed Pattern	47	0	115
		P07	Plover Circle Park	F-35B	B	Departure	5	0	122
	School	S01	Brewer Middle	F-35B	B	Closed Pattern	36	0	114
		S02	Effie Morris Elementary	F-35B	B	Departure	5	0	112
		S03	Luelle Merritt Elementary	F/A-18E/F	T	Closed Pattern	74	0	115

Table FW3-11. Highest SEL at Representative Noise-Sensitive Locations near NAS JRB Fort Worth Under Baseline and AFRC F-35A Mission Conditions (Continued)

Scenario	Representative Noise-Sensitive Location			Flight Procedure with the Highest SEL					SEL (dB)[a, b]
	Type	ID	Description	Aircraft	Aircraft Group	Operation Type	Annual Operations at this SEL: 7:00 A.M. to 10:00 P.M.	Annual Operations at this SEL: 10:00 P.M. to 7:00 A.M.	
AFRC F-35A Mission[c]	Library	L01	White Settlement Library	F/A-18E/F	T	Closed Pattern	151	0	112
	Park	P01	North Z Boaz Park	F-35B	B	Departure	12	0	114
		P02	Vinca Circle Park	F/A-18E/F	T	Arrival	284	0	118
		P03	Malaga Park	F-35B	B	Closed Pattern	36	0	115
		P04	Casino Park	F/A-18E/F	T	Arrival	110	0	119
		P05	Leonard Park	F-35B	B	Departure	12	0	104
		P06	Lake Worth Public Park	F/A-18E/F	T	Closed Pattern	47	0	115
		P07	Plover Circle Park	F-35B	B	Departure	5	0	122
	School	S01	Brewer Middle	F-35B	B	Closed Pattern	36	0	114
		S02	Effie Morris Elementary	F-35B	B	Departure	5	0	112
		S03	Luelle Merritt Elementary	F/A-18E/F	T	Closed Pattern	74	0	115

[a] SELs were calculated using NOISEMAP Version 7.3 and the same operational data (e.g., flight tracks and flight profiles) used to calculate the DNL contours.

[b] SEL accounts for the maximum sound level and the length of time a sound lasts by compressing the total sound exposure for an entire event into a single second.

[c] Military power and afterburner power departure SELs at the noise-sensitive locations are within 1 dB of each other and the numbers of annual operations include all three afterburner scenarios.

Key: T = Transient or non-NAS JRB Fort Worth-based aircraft involved in training exercise; B = Based aircraft

At all of the locations, the highest SEL would remain the same or decrease as a result of the new mission relative to baseline conditions. At several locations, F-35B aircraft operated by Lockheed Martin pilots or transient F/A-18E/F aircraft generate the highest SEL under baseline conditions, and would continue to follow the same flight procedures as well as other noise sources. At the White Settlement Library, the highest SEL would decrease by 1 dB because an F-16 flight procedure would discontinue and AFRC F-35A aircraft nor any other aircraft would regularly fly as close to this particular library. Following the proposed beddown, the frequency of F-35A operations would increase substantially, and impacts of this increase are reflected in the DNL noise metric.

Figure FW3-2 shows the DNL contours in 5-dB increments that would result from Scenario A overlain on the baseline noise contours for comparison. Approximately 726 acres of the 2,350 acres that would be newly exposed to DNL of 65 dB is designated as water or undesignated land and approximately 640 acres is residential land. The estimated number of residents exposed to DNL of 65 dB or greater would increase by 8,593 to a total of 21,686 (Table FW3-12). As described in Chapter 3, Section 3.2.3, the affected population was estimated based on U.S. Census data at the Block Group (BG) level with adjustments to remove non-residential areas from calculations (USCB 2016a). Implementation of the AFRC F-35A mission would increase the number of estimated residents in residential areas exposed to DNL of 75 dB or greater by 458 (from 428 under baseline conditions to 886). Both in intensity and in context, this would constitute a significant impact.

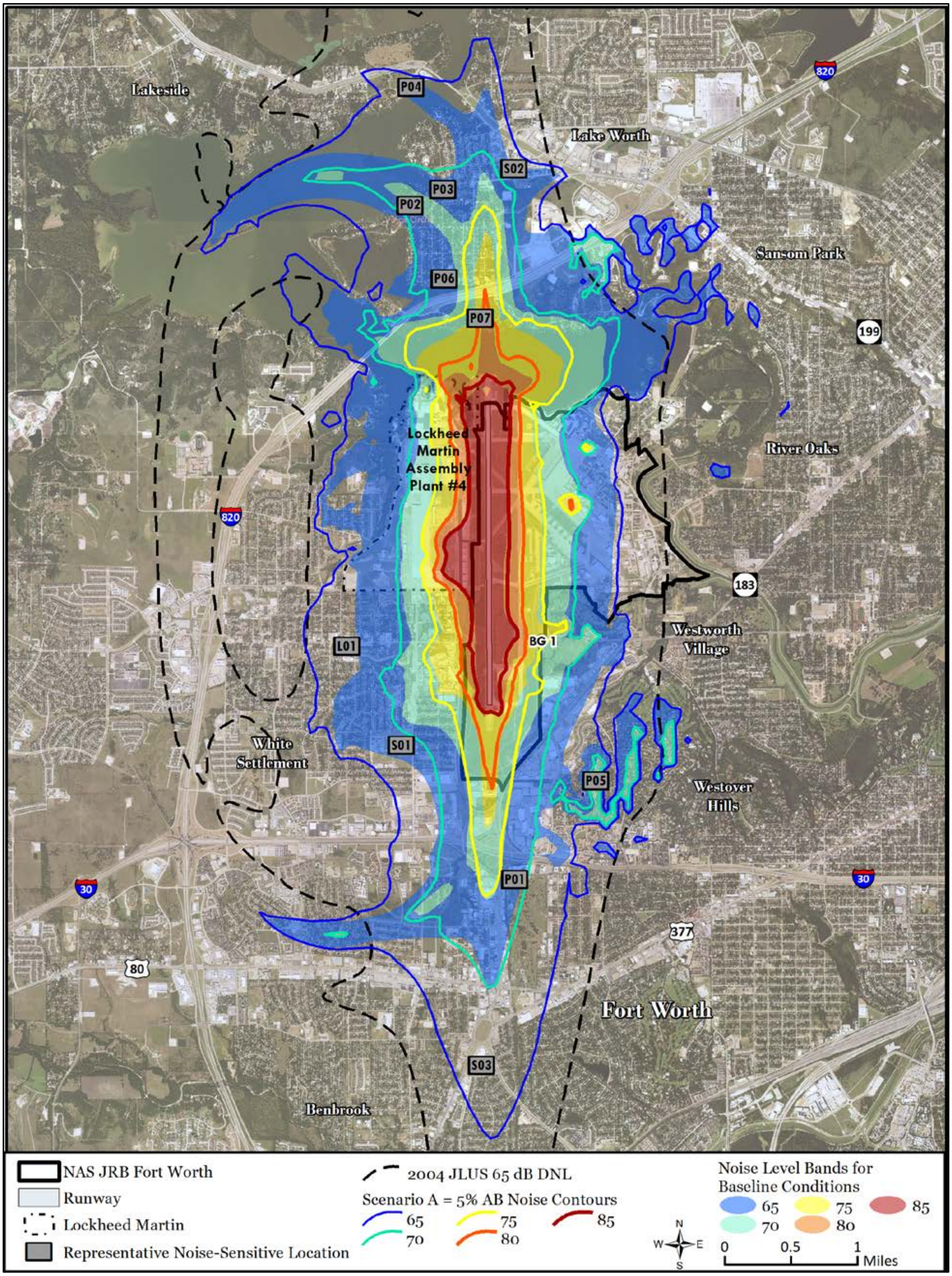

Figure FW3-2. AFRC F-35A Scenario A DNL Contours at NAS JRB Fort Worth

Table FW3-12. Off-Base Acres and Population Exposed to DNL of 65 dB or Greater Under Baseline and Scenario A Conditions at NAS JRB Fort Worth

DNL (dB)	Acres				Estimated Population			
	JLUS	Baseline	Scenario A	Change[a]	JLUS	Baseline	Scenario A	Change[a]
65 – 69	8,062	3,435	4,667	1,232	21,968	9,992	15,899	5,907
70 – 74	3,316	1,204	2,003	799	8,450	2,673	4,901	2,228
75 – 79	1,364	522	758	236	2,415	372	793	421
80 – 84	395	200	261	61	287	56	93	37
≥85	218	138	160	22	0	0	0	0
Total	**13,355**	**5,499**	**7,849**	**2,350**	**33,120**	**13,093**	**21,686**	**8,593**

[a] Change equals the difference between baseline acreage and acres exposed to noise resulting from the AFRC F-35A mission.

As noted in Chapter 3, Section 3.2.3, the probability that an individual would become annoyed by noise is impossible to predict with confidence because of differing physical and emotional variables between individuals (Newman and Beattie 1985). These variables include, but are not limited to, the person's feeling about the necessity or preventability of the noise, the person's attitude about the environment, and any feelings of fear the person might have about the noise source. It can be said with confidence that people in communities exposed to increased DNL would be more likely to become highly annoyed by the noise (Schultz 1978, Finegold et al. 1994, Meidema and Vos 1998). Studies conducted by Schultz in 1978 and Finegold et al. in 1994 indicated that approximately 12 percent of people exposed to DNL of 65 dB and 36 percent of people exposed to DNL of 75 dB could be expected to be highly annoyed by the noise (Schultz 1978, Finegold et al. 1994). More recent studies suggest that the percentage of people highly annoyed by noise–and aircraft noise in particular–might be higher than previously thought. A study conducted by Meidema and Vos in 1998 indicated that 28 percent of people could be expected to be annoyed by DNL of 65 dB, and 48 percent of people could be expected to be highly annoyed by DNL of 75 dB (Meidema and Vos 1998). Additional details on the prevalence of annoyance in high noise communities are contained in Volume II, Appendix B.

USAF land use compatibility guidelines classify residential land uses as incompatible with DNL greater than 65 dB unless the residences meet minimum structural noise reduction goals. Residential land uses are considered compatible if measures are incorporated which achieve outdoor-to-indoor noise level reduction of at least 25 dB in areas exposed to DNL of 65 to 69 dB and 30 dB in areas exposed to DNL of 70 to 74 dB. Structural elements with better-than-average temperature insulation properties (e.g., double-paned windows) tend to also provide better-than-average noise level reduction. The guidelines state that residential uses in areas exposed to DNL greater than 75 dB are not compatible and should be prohibited. The NCTCOG has published a JLUS that incorporates land use guidelines mirroring DoD guidelines and recommends that local governments take steps to prevent additional incompatible land development (NCTCOG 2017). A more detailed discussion of land use compatibility is contained in Section FW3.8.

The DNL changes that would result from Scenario A are shown in Table FW3-13. Noise levels at the locations listed are similar to noise levels in nearby residential areas. At all 11 locations studied, DNL would exceed 65 dB, at 6 of the locations DNL would exceed 70 dB, and at 1 location DNL would exceed 75 dB. The DNL at North Z Boaz Park would increase by 6 dB. DNL at Malaga Park and Luelle Merritt Elementary School would increase by 5 dB. The DNL at the other locations would increase by 1 to 4 dB.

Table FW3-13. DNL at Representative Noise-Sensitive Locations near NAS JRB Fort Worth Under Baseline and Scenario A Conditions

Type	ID	Description	DNL (dB)		
			Baseline	Scenario A	Change
Library	L01	White Settlement Library	65	68	3
Park	P01	North Z Boaz Park	66	72	6
	P02	Vinca Circle Park	69	72	3
	P03	Malaga Park	66	71	5
	P04	Casino Park	65	67	2
	P05	Leonard Park	70	71	1
	P06	Lake Worth Public Park	68	72	4
	P07	Plover Circle Park	78	79	1
School	S01	Brewer Middle School	67	68	1
	S02	Effie Morris Elementary School	65	67	2
	S03	Luelle Merritt Elementary School	62	67	5

FW3.2.2.1.2 Scenario B

The sole difference between Scenario B and Scenario A is that, under Scenario B, 50 percent rather than 5 percent of departures would use afterburner. All flight procedures flown under the two scenarios would be the same, and there would be no difference in the highest SEL experienced at representative noise-sensitive locations (Table FW3-11). Military power and afterburner power departures generate SELs within 1 dB of each other, and the numbers of annual operations in Table FW3-11 include all three afterburner scenarios.

As discussed in Section FW3.2.2.1.1, people exposed to increases in DNL are more likely to become highly annoyed by the noise, and some land uses are not considered compatible at DNL greater than 65 dB. The Scenario B 65 dB DNL contour is slightly larger than the Scenario A 65 dB DNL contour in areas to the right and left of the runway, but is slightly smaller in areas farther out along departure flight paths (Figure FW3-3). The DNL contours are shown in 5-dB intervals ranging from 65 to 85 dB on Figure B-26 in Appendix B, Section B.4. The relatively minor differences in noise contour extent between afterburner percent usage scenarios reflects the fact that baseline flying operations, which are constant under all scenarios, generate high time-averaged noise levels. In this context, the changing percentage of AFRC F-35A departures that use afterburner would have a minimal effect on overall noise levels. The 2,369 acres and estimated 8,622 people that would be newly exposed to DNL greater than 65 dB under Scenario B differ by less than 1 percent from the number of acres and estimated population that would be exposed to this level of noise under Scenario A (Table FW3-14).

Table FW3-14. Off-Base Acres and Population Exposed to DNL of 65 dB or Greater Under Baseline and Scenario B Conditions at NAS JRB Fort Worth

DNL (dB)	Acres				Estimated Population			
	JLUS	Baseline	Scenario B	Change[a]	JLUS	Baseline	Scenario B	Change[a]
65 – 69	8,062	3,435	4,662	1,227	21,968	9,992	15,871	5,879
70 – 74	3,316	1,204	2,013	809	8,450	2,673	4,940	2,267
75 – 79	1,364	522	763	241	2,415	372	810	438
80 – 84	395	200	264	64	287	56	94	38
≥85	218	138	166	28	0	0	0	0
Total	**13,355**	**5,499**	**7,868**	**2,369**	**33,120**	**13,093**	**21,715**	**8,622**

[a] Change equals the difference between baseline acreage and acres exposed to noise resulting from the AFRC F-35A mission.

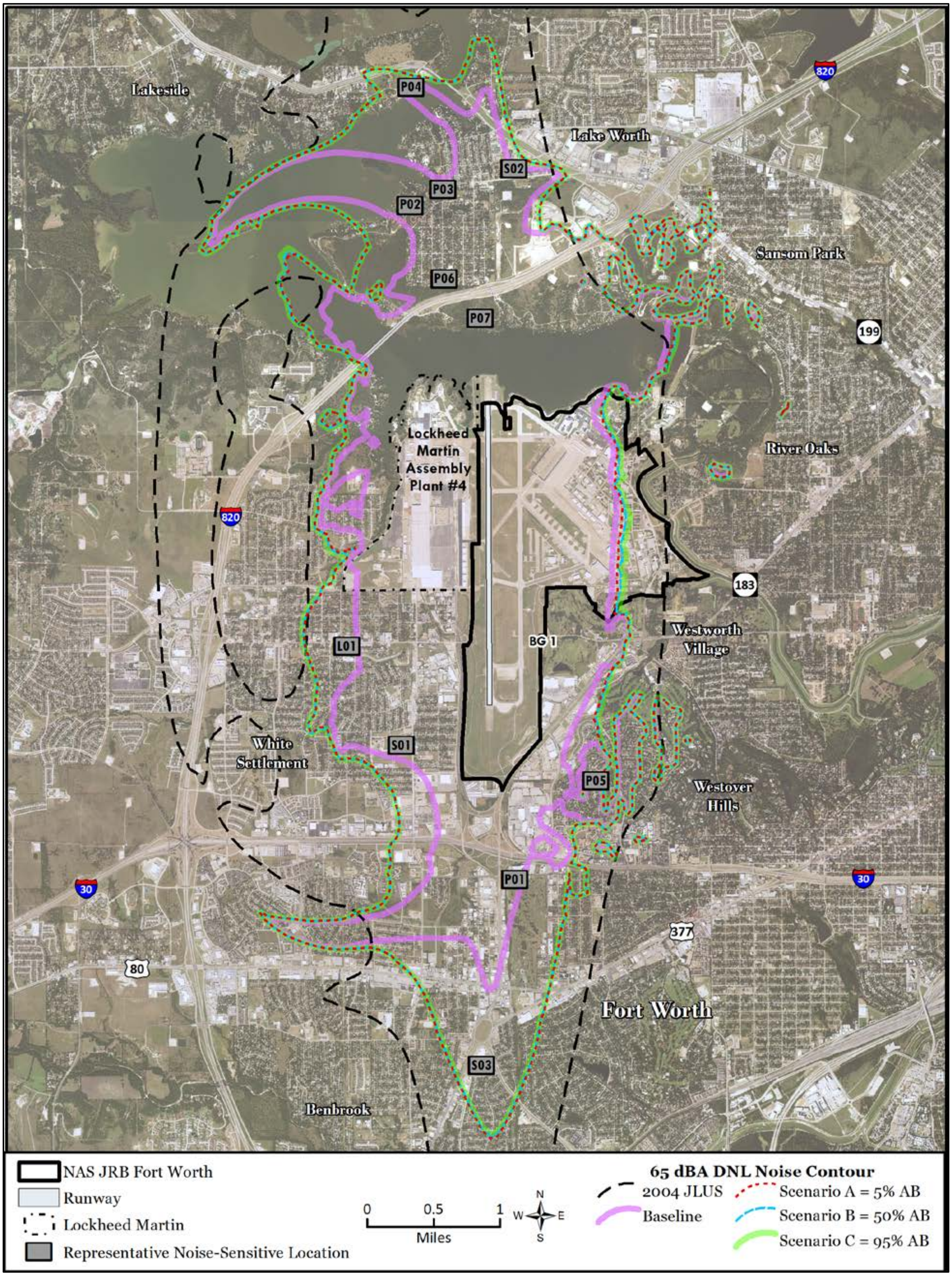

Figure FW3-3. AFRC F-35A Mission 65 dB DNL Contours (Scenarios A, B, and C) at NAS JRB Fort Worth

The DNL at representative noise-sensitive locations under Scenario B would be the same as under Scenario A (see Table FW3-13) except at White Settlement Library, which would be exposed to DNL of 68 dB rather than 67 dB.

FW3.2.2.1.3 Scenario C

Under Scenario C, 95 percent of afterburner departures would use afterburner as opposed to 50 percent under Scenario B or 5 percent under Scenario A. The highest SELs experienced at representative noise-sensitive locations would be the same under Scenario C as shown for Scenario A in Table FW3-11. Military power and afterburner power departures would generate SELs within 1 dB of each other at each of the locations studied, and the number of events per year listed in Table FW3-11 reflect both departure types.

As discussed in Section FW3.2.2.1.1, people exposed to increases in DNL are more likely to become highly annoyed by the noise, and some land uses are not considered compatible at DNL greater than 65 dB. As discussed in Section FW3.2.2.1.2, adjusting the percent of total F-35A departures using afterburner has minimal effect on DNL because baseline flying operations, which are constant under all scenarios, generate a context in which noise levels are already relatively high. The 65 dB DNL noise contours under Scenario C are shown on Figure FW3-3. The DNL contours are shown in 5-dB intervals ranging from 65 to 85 dB on Figure B-27 in Appendix B, Section B.4. The 2,386 acres and estimated 8,648 people newly exposed to DNL of 65 dB under Scenario C (Table FW3-15) would differ by less than 1 percent from the number of acres and estimated population exposed to this noise level under Scenario A or B.

Table FW3-15. Off-Base Acres and Population Exposed to DNL of 65 dB or Greater Under Baseline and Scenario C Conditions at NAS JRB Fort Worth

DNL (dB)	Acres				Estimated Population			
	JLUS	Baseline	Scenario C	Change[a]	JLUS	Baseline	Scenario C	Change[a]
65 – 69	8,062	3,435	4,655	1,220	21,968	9,992	15,836	5,844
70 – 74	3,316	1,204	2,025	821	8,450	2,673	4,984	2,311
75 – 79	1,364	522	768	246	2,415	372	826	454
80 – 84	395	200	268	68	287	56	95	39
≥85	218	138	169	31	0	0	0	0
Total	**13,355**	**5,499**	**7,885**	**2,386**	**33,120**	**13,093**	**21,741**	**8,648**

[a] Change equals the difference between baseline acreage and acres exposed to noise resulting from the AFRC F-35A mission.

The DNL at representative-noise sensitive locations would the same under Scenario C as under Scenario B. Noise levels at these locations would also be the same as under Scenario A (see Table FW3-13) except that White Settlement Library would be exposed to DNL of 68 dB rather than 67 dB.

FW3.2.2.2 Speech Interference

The number of daytime (7:00 A.M. to 10:00 P.M.) events per hour that could potentially interfere with speech are listed in Table FW3-16. Any aircraft noise event exceeding L_{max} of 50 dB was assumed to have some potential to interfere with speech. The interference would be for a few seconds for each overflight. Noise levels at the locations listed are similar to noise levels in nearby residential areas. Calculations with windows closed and with windows open assume standard values of 25 dB and 15 dB of noise attenuation provided by buildings, respectively. Noise levels at the locations listed are similar to noise levels in nearby residential areas. The number of indoor events per hour with windows open, with windows closed, and outdoor events would increase by one event or less. Any increases in the frequency of disruptions in communication have a high likelihood of being annoying. Impacts to speech interference resulting from implementation of the AFRC F-35A mission would be the same regardless of which afterburner scenario is selected.

Table FW3-16. Potential Speech Interference Resulting from the AFRC F-35A Mission at NAS JRB Fort Worth

Type	ID	Description	Annual Average Daily Daytime (7:00 A.M. to 10:00 P.M.) Events per Hour					
			AFRC F-35A Mission			Change		
			Windows Open[a]	Windows Closed[a]	Outdoor	Windows Open[a]	Windows Closed[a]	Outdoor
Library	L01	White Settlement Library	3	2	4	1	0	1
Park	P01	North Z Boaz Park	3	2	4	1	0	1
	P02	Vinca Circle Park	3	2	4	0	0	1
	P03	Malaga Park	3	2	4	1	0	1
	P04	Casino Park	3	2	4	1	1	1
	P05	Leonard Park	3	2	4	1	1	1
	P06	Lake Worth Public Park	3	3	4	0	0	1
	P07	Plover Circle Park	4	3	4	1	0	1

[a] Number of events per average hour with an indoor L_{max} of at least 50 dB; assumes standard values of 15 dB and 25 dB noise level reductions for windows open and closed, respectively.

FW3.2.2.3 Interference with Classroom Learning

Table FW3-17 presents changes in classroom noise levels with windows open and closed. As described in Section FW3.2.1.3, all of the representative schools with windows open are currently exposed to $L_{eq(SD)}$ greater than 40 dB under baseline conditions and the Luelle Merritt Elementary School is currently exposed to $L_{eq(SD)}$ of 39 dB with windows closed. In accordance with DNWG recommendations, estimated interior $L_{eq(SD)}$ exceeding 40 dB was taken as an indication that ANSI criteria are being exceeded (DNWG 2013). Under the proposed action, the three schools evaluated would be exposed to noise levels above recommended background levels with windows open and closed. At the Luelle Merritt Elementary School with windows closed, the $L_{eq(SD)}$ would increase from 39 to 44 dB. The number of events per hour with potential to interrupt speech indoors with windows closed, with windows open, and outdoors would increase by one or less. Interference with classroom learning resulting from implementation of the AFRC F-35A mission would be the same regardless of which afterburner scenario is selected.

Table FW3-17. Indoor Classroom Learning Disruption Resulting from the AFRC F-35A Mission at NAS JRB Fort Worth

Type	ID	Description	AFRC F-35A Mission					Change				
			Windows Open[a]		Windows Closed[a]		Outdoor	Windows Open[a]		Windows Closed[a]		Outdoor
			$L_{eq(SD)}$ (dB)	Events per Hour[b]	$L_{eq(SD)}$ (dB)	Events per Hour[b]	Events per Hour[c]	$L_{eq(SD)}$ (dB)	Events per Hour[b]	$L_{eq(SD)}$ (dB)	Events per Hour[b]	Events per Hour[c]
School	S01	Brewer Middle School	55	3	45	2	4	1	0	1	0	1
	S02	Effie Morris Elementary School	54	3	44	2	4	2	0	2	0	1
	S03	Luelle Merritt Elementary School	54	2	44	2	3	5	0	5	1	1

[a] Assumes standard values of 15 dB and 25 dB noise level reductions for windows open and closed, respectively.
[b] Average number of events per hour at or above an indoor L_{max} of 50 dB during an average 8-hour school day (8:00 A.M. to 4:00 P.M.).
[c] Average number of outdoor events per hour at or above L_{max} of 50 dB during daytime (7:00 A.M. to 10:00 P.M.).

FW3.2.2.4 Sleep Disturbance

As noted in Chapter 3, Section 3.2.3, the probability of sleep being disturbed at least once per night is estimated based on the number of overflight events and the SEL of each event. The number of late-night flights by AFRC F-35A pilots would be similar to the number currently conducted by AFRC F-16 pilots, and the probability of awakening with windows open would not increase at any location except near the Effie Morris Elementary School and Lake Worth Public Park (i.e., residential areas near the school and park) where the probability would increase by 1 percent. With windows closed, the probability of awakening would increase by 1 percent near Plover Circle Park (Table FW3-18). Impacts to sleep disturbance resulting from implementation of the AFRC F-35A mission would be the same regardless of which afterburner scenario is selected. Results apply only to people who sleep during the night. People who sleep during the day would experience additional noise events, resulting in higher probabilities of awakening.

Table FW3-18. Average Probability of Awakening Resulting from the AFRC F-35A Mission at NAS JRB Fort Worth

Type	ID	Description	Annual Average Nightly (10:00 P.M. to 7:00 A.M.) Probability of Awakening (%)			
			AFRC F-35A Mission		Change	
			Windows Open[a]	Windows Closed[a]	Windows Open[a]	Windows Closed[a]
Library	L01	White Settlement Library	1	0	0	0
Park	P01	North Z Boaz Park	1	1	0	0
	P02	Vinca Circle Park	1	1	0	0
	P03	Malaga Park	1	1	0	0
	P04	Casino Park	1	1	0	0
	P05	Leonard Park	1	0	0	0
	P06	Lake Worth Public Park	2	1	1	0
	P07	Plover Circle Park	2	2	0	1
School	S01	Brewer Middle School	1	0	0	0
	S02	Effie Morris Elementary School	2	1	1	0
	S03	Luelle Merritt Elementary School	1	1	0	0

[a] Assumes standard values of 15 dB and 25 dB noise level reductions for windows open and closed, respectively.

FW3.2.2.5 Potential for Hearing Loss

FW3.2.2.5.1 Scenario A

The risk of hearing loss was assessed using the methodology prescribed by DoD policy, which is described in Chapter 3, Section 3.2.3, and Volume II, Appendix B. PHL risk is calculated based on the L_{eq24} noise metric. The estimated number of residents exposed to outdoor L_{eq24} exceeding 80 dB would increase by 41 people to a total estimated population of 90 (Table FW3-19). The DNL noise metric results in a greater number of people exposed because DNL applies a noise penalty to events during acoustic night. The DNL metric results in 93 persons exposed to DNL of 80 dB or greater under Scenario A (Table FW3-12).

Three (3) residential land parcels would be newly exposed to this level of DNL. As described in Section FW3.2.1.5, these parcels are located on the shore of Lake Worth, opposite Runway 36. Some of these parcels are located in the CZ, and all are of these parcels are located in a high noise zone as zoned by the City of Fort Worth. The census-based population estimate of 90 persons for this area could be higher or lower than the actual population depending on the types and density of residential use.

Table FW3-19. Estimated Population Exposed to Noise Levels that Could Result in Noise-Induced Permanent Threshold Shift Under Baseline and Scenario A Conditions at NAS JRB Fort Worth

L_{eq24} (dB)	Estimated Population		
	Baseline	Scenario A	Change
80 – 81	41	40	-1
81 – 82	8	36	28
82 – 83	0	14	14
Total	**49**	**90**	**41**

FW3.2.2.5.2 Scenario B

Under Scenario B, the estimated number of residents exposed to outdoor L_{eq24} exceeding 80 dB would increase by 42 to a total estimated population of 91 residents (Table FW3-20). An estimated 94 people would be exposed to DNL greater than 80 dB under Scenario B.

Table FW3-20. Estimated Population Exposed to Noise Levels that Could Result in Noise-Induced Permanent Threshold Shift Under Baseline and Scenario B Conditions at NAS JRB Fort Worth

L_{eq24} (dB)	Estimated Population		
	Baseline	Scenario B	Change
80 – 81	41	40	-1
81 – 82	8	37	29
82 – 83	0	14	14
Total	**49**	**91**	**42**

FW3.2.2.5.3 Scenario C

Under Scenario C, the estimated number of residents exposed to outdoor L_{eq24} exceeding 80 dB would increase by 44 to a total estimated population of 93 residents (Table FW3-21). An estimated 95 people would be exposed to DNL greater than 80 dB under Scenario C.

Table FW3-21. Estimated Population Exposed to Noise Levels that Could Result in Noise-Induced Permanent Threshold Shift Under Baseline and Scenario C Conditions at NAS JRB Fort Worth

L_{eq24} (dB)	Estimated Population		
	Baseline	Scenario C	Change
80 – 81	41	41	0
81 – 82	8	37	29
82 – 83	0	15	15
Total	**49**	**93**	**44**

FW3.2.2.6 Occupational Noise

USAF occupational noise exposure prevention procedures (e.g., hearing protection and monitoring) would be implemented under the AFRC F-35A mission, regardless of which afterburner scenario is selected. These procedures would comply with all applicable OSHA and USAF occupational noise exposure regulations.

FW3.2.2.7 Non-auditory Health Impacts

As noted in Section FW3.2.1.7, the current state of scientific knowledge does not yet support a consistent causal relationship between exposure to aircraft noise and non-auditory health impacts (i.e., impacts other than hearing loss). Several types of potential health impacts have been investigated in multiple studies with contradictory results (Meecham and Shaw 1979; Frerichs et al. 1980; Jones and Tauscher 1978; Edmonds et al. 1979). The premise of the studies is that annoyance causes stress, and prolonged stress is known to be a contributor to a number of health disorders. The connection from annoyance to stress to health issues requires careful experimental design, and the resulting data are subject to different interpretations. A recent, large-scale study indicated that nighttime aircraft noise could be linked to increases in the likelihood of hypertension (Jarup et al. 2005, 2008). However, extensive reviews of recent literature conducted by several groups support the conclusion that it is not yet possible to establish a quantitative cause and effect based on the currently available scientific evidence (Basner et al. 2017; FICAN 2018; van Kempen et al. 2018).

As discussed in Section FW3.2.2.5, under Scenario A, an estimated 41 residents (10 residential land parcels) would be newly exposed to noise levels that are associated with an increased risk of measureable noise-induced hearing loss under certain circumstances. Under Scenarios B and C, an estimated 42 and 44 people, respectively, would be newly exposed to these noise levels. Consistent with this high risk, and as noted in Section FW3.1.1.1, the USAF and the NCTCOG JLUS recommend applying land use guidelines for communities subject to DNL greater than 65 dB. These guidelines state that residential uses in areas subject to DNL greater than 75 dB are not compatible and should be prohibited.

Studies are consistent with identifying the effects of nighttime aircraft noise on systolic blood pressure as small, but greater than daytime noise. At NAS JRB Fort Worth, 2 percent of total airfield operations are conducted between 10:00 P.M. and 7:00 A.M. Less than 1 percent of AFRC F-35A operations would be flown between 10:00 P.M. and 7:00 A.M. Additional information on the potential for non-auditory health impacts is contained in Section FW3.2.1.7 and Volume II, Appendix B.

FW3.2.2.8 Structural Damage

Damage to structures is not anticipated to result from AFRC F-35A subsonic noise because noise resulting from implementation of the AFRC F-35A mission would not exceed 130 dB in any 1/3-octave frequency band at distances of greater than 250 feet (CHABA 1977).

Furthermore, studies conducted on vibrations induced by subsonic aircraft overflights generating noise levels similar to those that result from operation of the F-35A in ancient Anasazi ruins indicate that vibrations would not occur at or near potentially damaging levels (Battis 1983). Additional discussion of the effects of noise on cultural resources is contained in Section FW3.7. Noise-induced structural vibration and secondary vibrations (i.e., “rattle”) of objects in structures would continue to occur. Induced vibrations do not normally result in structural damage, but the rattling of objects does have the potential to contribute to annoyance. Although the risk posed to structures by noise would be minimal, a process exists for dealing with any such damage. Any claims from USAF-related damage would begin by contacting the NAS JRB Fort Worth Public Affairs Office with details of the claim. The claim would then be investigated to establish the exact nature and extent of the damage.

FW3.2.2.9 Animals in the Care of Humans

The reactions of animals in the care of humans (e.g., pets, other domesticated animals, and animals kept in zoos) to an increased number of loud overflight events was a concern raised in several scoping comments. An animal’s reaction to noise depends on several factors including the animal’s temperament, training, and past experiences associated with the noise. Certain domesticated species (e.g., horses) are more likely to have strong reactions to noise than others. Potential noise impacts on wildlife are described in Section FW3.6.

In the airfield environment, aircraft typically operate at slower speeds than are used in training airspace. Although these slower speeds mean that elevated overflight sound levels last longer, they also mean that there is a time lag between when the aircraft is first heard and maximum overflight noise level. Sounds with slow rise-times are less likely to induce panic than sudden onset noise (USAF 1995). Because F-35 and F-16 aircraft operate at similar speeds in the airfield environment, the rise times of noise generated by the two aircraft are similar.

One of the most important factors affecting an animal's reaction to noise is the level of familiarity with the noise source. Lockheed Martin pilots currently operate F-35 aircraft at NAS JRB Fort Worth. As described in Section FW2.0, the replacement of AFRC F-16 aircraft with F-35A aircraft would occur over approximately 2 years, and the tempo of F-35A operations would increase slowly as the new airframe gets established at the base. Around the base, AFRC F-35A pilots would use similar flight paths and altitudes to those currently used by the Lockheed Martin test pilots and F-16 pilots. For the purposes of this analysis, all noise impacts show the full impact of 24 aircraft. Because the reactions of domestic animals depends on several factors (e.g., species, situation, predisposition), there is no single noise level below which animals will never react negatively to noise. However, if it is assumed that noise events with the potential to interfere with human conversation could also be bothersome to animals, then the number of noise events per hour with potential to interfere with speech (Table FW3-16) could be an indicator of how frequently animals could be bothered by noise. It is recognized that this metric of noise events per hour with potential to interfere with speech is an arbitrary metric for determining how frequently animals would be bothered by noise. The metric is used purely as a measure of relative change between the No Action Alternative and proposed action.

FW3.2.3 Airspace Affected Environment

This section presents noise levels in training airspace and ranges that would be used by AFRC F-35A pilots. As described in Section FW2.4.1, NAS JRB Fort Worth-based AFRC F-35A pilots would operate in existing MOAs, RAs, and ATCAAs performing combat training missions similar to those currently conducted by AFRC F-16 pilots. The noise analysis accounts for subsonic and supersonic flight noise generated in locations where supersonic flight is authorized. As noted in Chapter 3, Section 3.2.1.1, subsonic noise in training airspace is quantified using the onset-rate adjusted day-night average sound level (L_{dnmr}) and supersonic noise levels are quantified using C-weighted day-night average sound level (CDNL) as well as the number of booms per month that would be heard on the ground. The location, types and number of munitions used during F-35A training would be similar to that used during F-16 training. Therefore, munitions noise levels would remain approximately the same as under baseline conditions.

FW3.2.3.1 Subsonic Noise

Figure FW3-4 shows baseline subsonic noise levels beneath airspace proposed for use by AFRC F-35A pilots from NAS JRB Fort Worth. L_{dnmr} beneath the Brady, Brownwood, Hood, Lancer, Rivers, Sheppard, and Washita MOAs and R-5601/R-5602 are less than 45 dB. The area beneath R-6302 is exposed to L_{dnmr} of 56 dB.

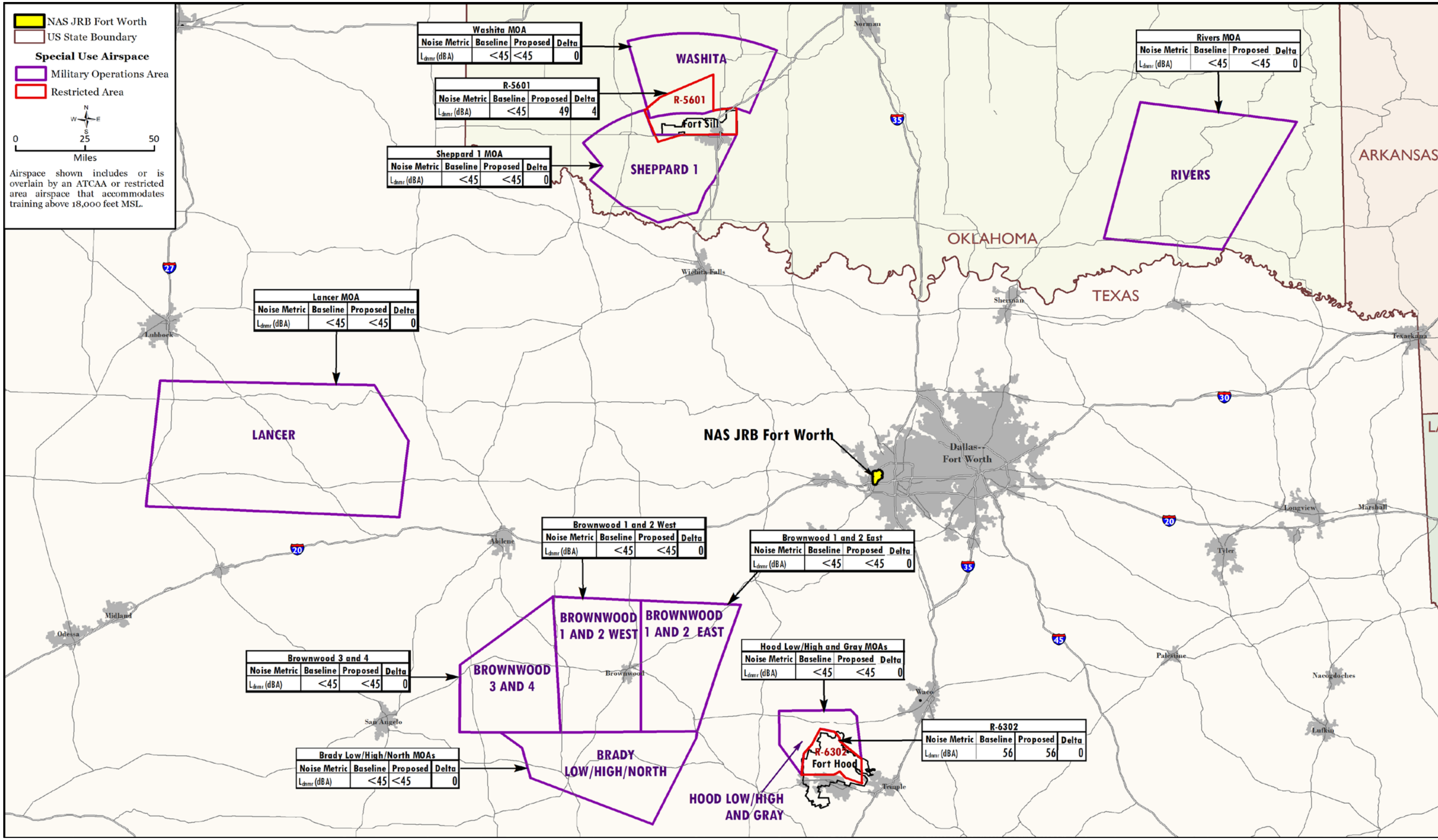

Figure FW3-4. Noise Levels in Training Airspace used by NAS JRB Fort Worth

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FW3.2.3.2 Supersonic Noise

Supersonic flight is permitted in airspace above the Brownwood MOAs at altitudes of 30,000 feet MSL or higher. A sonic boom is created whenever an aircraft exceeds the speed of sound. Whether the sonic boom is experienced at the surface depends on a variety of factors, including the maneuvers of the aircraft creating the sonic boom, the meteorological conditions at different altitudes, the shape of the aircraft, and other factors. Sonic booms generated at altitudes above 30,000 feet MSL often do not ever reach the surface because a sonic boom tends to be refracted upward by the denser air at lower altitudes. The area beneath the Brownwood MOAs currently experiences less than one sonic boom per annual average day and the resulting CDNL is 24 dB.

FW3.2.4 Airspace Environmental Consequences

FW3.2.4.1 Subsonic Noise

Changes in sortie tempo under the AFRC F-35A mission are discussed in Chapter 2, Section 2.3.4.1, and Section FW2.4.1. Late-night training (10:00 P.M. to 7:00 A.M.) by AFRC F-35A pilots would only be conducted in rare contingencies and special mission training. As shown on Figure FW3-4, L_{dnmr} would remain less than 45 dB L_{dnmr} beneath the Brownwood, Hood, Lancer, Rivers, Sheppard, and Washita MOAs. These training airspace areas are very large, and training operations are sufficiently spread out such that intense overflight noise events at any one location are infrequent. Individual overflight noise levels (SEL) generated by F-16 and F-35A aircraft are listed in Chapter 3, Table 3-4. AFRC F-35A pilots would primarily use high altitudes, with 94 percent of total training time being spent at altitudes above 10,000 feet MSL. Training flights are concentrated in a smaller area within R-6302 (Fort Hood Range) and R-5601/R-5602 (Falcon Range). In R-6302, L_{dnmr} would remain at 56 dB under the proposed action, and L_{dnmr} would increase from below 45 dB to 49 dB in R-5601/R-5602. The number of sorties flown annually in R-5601/R-5602 would remain the same, but the F-35A is somewhat louder than the F-16.

Low time-averaged noise levels (e.g., L_{dnmr}) do not imply that loud overflights do not or would not occur. Rather, they should be interpreted to mean that intense overflight noise events occur less frequently (or less frequently between 10:00 P.M. and 7:00 A.M.) than in other areas.

Overflight noise events have the potential to interfere with activities. An increase in the number of loud events, as reflected in increased L_{dnmr}, would be expected to increase the percentage of the population that is highly annoyed by noise.

During scoping, several comments expressed concerns about overflight noise while the aircraft are transiting from the airfield to and from the airspace proposed for use. Aircrews transiting from the installation to training airspace and back again typically use a set of existing prescribed routes. Actual ground tracks of transiting aircraft vary based on several factors, and non-standard routing may be used, as needed, in response to air traffic, weather, or other time-varying conditions. F-35A pilots would typically transit at high altitudes and in cruise configuration using lowered engine power settings to reduce noise impacts and improve fuel efficiency. In addition, flight at these altitudes allows the aircraft to arrive at the training airspace at an appropriate altitude to begin training. Single overflight event noise levels generated by F-35A aircraft in cruise configuration are listed in Chapter 3, Tables 3-3 and 3-4.

Although AFRC F-35A pilots would implement measures to reduce noise, the noise generated by transiting aircraft can be disturbing, particularly when overflight noise affects national parks and other noise-sensitive places where ambient noise levels are low. Detailed discussion of recreation impacts is contained in Section FW3.8.

FW3.2.4.2 Supersonic Noise

AFRC F-35A pilots would conduct supersonic training above the Brownwood MOAs at altitudes of 30,000 feet MSL or higher, similar to training conducted by F-16 pilots under baseline conditions. Most of the sonic booms generated at or above 30,000 feet MSL never reach the ground (Volume II, Appendix B). The number of training sorties flown in the Brownwood MOAs would decrease under the proposed action, and the number of sonic booms would decrease proportionally.

FW3.2.5 Summary Noise Impacts

Implementation of Scenario A would expose an additional 2,350 acres of off-base land and an estimated 8,593 people to DNL of 65 dB or greater. Implementation of Scenario B would expose 2,369 additional acres and an estimated 8,622 additional people to DNL greater than 65 dB. Implementation of Scenario C would expose 2,386 additional acres and an estimated 8,648 additional people to DNL greater than 65 dB. DNL would increase from 1 dB to 6 dB at all of the representative noise-sensitive locations around NAS JRB Fort Worth. These impacts would be the same regardless of which afterburner scenario is selected. Ten (10) of the 11 representative locations are within the 65 dB or greater DNL contour under baseline conditions. All 11 locations would be within the 65 dB or greater DNL contour under the AFRC F-35A mission. Under all three scenarios, indoor events with potential to interfere with speech would increase from one event per hour to two events per hour at Luelle Merritt Elementary School when windows are closed. The frequency of indoor events would not change at Luelle Merritt Elementary School when windows are open, or at any other representative school when windows are open or closed. The frequency of outdoor events would increase by one event per hour at each representative school under all three scenarios. The number of residents newly exposed to outdoor L_{eq24} exceeding 80 dB would increase by 41 under Scenario A, 42 under Scenario B, and 44 under Scenario C. These individuals would be exposed to noise levels that are associated with an increased risk of measureable noise-induced hearing loss under certain circumstances. Based on context and intensity, noise impacts to the area surrounding NAS JRB Fort Worth resulting from implementation of the proposed AFRC F-35A mission would be considered significant.

Regarding noise in the training airspace, subsonic noise levels would remain below 45 dB L_{dnmr} in the majority of the airspace proposed for use. Noise levels in R-6302 would remain unchanged at 56 dB L_{dnmr} and areas under R-5601/R-5602 would experience a 4-dB increase to a level of 49 dB L_{dnmr}. Supersonic flights would continue to occur above the Brownwood MOAs at altitudes of 30,000 feet MSL or higher. However, AFRC F-35A pilots would fly fewer sorties in this airspace. Less than one sonic boom per day currently reaches the ground, and this number would decrease with implementation of the AFRC F-35A mission.

FW3.3 AIR QUALITY

The proposed AFRC F-35A mission at NAS JRB Fort Worth would result in net changes in air emissions due to the replacement of existing aircraft operations with operations from the proposed mission in the base region and associated airspace. The following section describes the air quality affected environment and estimations of impacts due to proposed construction and operational activities within these project regions.

FW3.3.1 Base Affected Environment

Air emissions resulting from implementation of the proposed AFRC F-35A mission at NAS JRB Fort Worth would affect air quality within Tarrant County and surrounding counties. The TCEQ has adopted the National Ambient Air Quality Standards (NAAQS) for purposes of regulating criteria air pollutant levels within Texas. Table 3-6 in Chapter 3, Section 3.3, of this EIS presents the NAAQS.

FW3.3.1.1 Region of Influence and Existing Air Quality

Identifying the Region of Influence (ROI) for air quality requires knowledge of the pollutant type, source emission rates, the proximity of project emission sources to other emission sources, and local and regional meteorology. For inert pollutants (such as carbon monoxide [CO] and particulates in the form of dust), the ROI is generally limited to a few miles downwind from a source. The ROI for reactive pollutants such as ozone (O_3) may extend much farther downwind than for inert pollutants. Ozone is formed in the atmosphere by photochemical reactions of previously emitted pollutants called precursors. Ozone precursors are mainly nitrogen oxides (NO_x) and photochemically reactive volatile organic compounds (VOCs). In the presence of solar radiation, the maximum effect of precursor emissions on O_3 levels usually occurs several hours after they are emitted and many miles from their source.

The USEPA designates all areas of the United States in terms of having air quality better (attainment) or worse (nonattainment) than the NAAQS. An area is in attainment of a NAAQS if its pollutant concentration remains below the standard value, as defined by the annual to tri-annual metrics described in Chapter 3, Section 3.3.1. Former nonattainment areas that have attained a NAAQS are designated as maintenance areas. Currently, Tarrant County is in attainment of all NAAQS, except that it is in moderate nonattainment of the 2008 O_3 standard and in marginal nonattainment of the 2015 O_3 standard (TCEQ 2018a). Tarrant County is within the Dallas-Fort Worth O_3 nonattainment area. The nonattainment area for the 2008 O_3 standard includes Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Rockwell, Tarrant, and Wise Counties. The nonattainment area for the 2015 O_3 standard comprises the same counties, except it also includes Hood and excludes Wise Counties.

FW3.3.1.2 Regional Air Emissions

Table FW3-22 summarizes annual emissions generated by activities within Tarrant County for year 2014. Emissions for Tarrant County were obtained from the National Emissions Inventory (NEI) process (USEPA 2018). The majority of emissions within these regions occur from (1) on-road and nonroad mobile sources (VOCs, CO, NO_x, sulfur oxides [SO_x], and carbon dioxide equivalent [CO_2e]), (2) fuel combustion by industrial sources (NO_x and SO_x), (3) solvent/surface coating usages (VOCs), (4) fugitive dust from paved/unpaved roads (particulate matter less than or equal to 10 micrometers in diameter [PM_{10}]), and (5) commercial cooking (particulate matter less than or equal to 2.5 micrometers in diameter [$PM_{2.5}$]).

Table FW3-22. Annual Emissions for Tarrant County, Texas, 2014

Source Type	Air Pollutant Emissions (tons per year)						
	VOCs	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$	CO_2e (mt)
Stationary Sources	26,012	12,462	5,799	345	16,200	3,467	NA
Mobile Sources	11,820	137,668	28,227	552	1,874	1,205	4,020,139
Total Emissions[a]	**37,832**	**150,130**	**34,026**	**897**	**18,073**	**4,672**	**4,020,139**

[a] Calculated values and totals have been rounded; therefore, sum totals may not match the totals row.
Key: CO_2e (mt) = carbon dioxide equivalent in metric tons; NA = not available
Source: USEPA 2018

FW3.3.1.3 NAS JRB Fort Worth Emissions

The AFRC F-35A mission at NAS JRB Fort Worth would replace activities associated with the 301 FW. This unit operates 24 F-16 aircraft at NAS JRB Fort Worth. The proposed F-35A aircraft replacement action at NAS JRB Fort Worth would primarily replace existing emissions from (1) F-16 operations, (2) F-16 engine maintenance and testing, and (3) Aerospace Ground Equipment (AGE). While the decrease of 102 personnel that would result from implementation of the AFRC F-35A mission at NAS JRB Fort Worth would result in virtually inconsequential changes in emissions from other base sources associated with the 301 FW (e.g., onsite government motor vehicles or privately owned vehicles), those reductions have been calculated as part of the build-out emission calculations for the action. Nonetheless, the main focus of the project air quality analysis remains emissions from existing and proposed aircraft-specific source categories to determine the net changes in emissions from the F-16 aircraft to the proposed F-35A mission.

To estimate emissions from F-16 aircraft operations and AGE usages associated with the 301 FW mission at NAS JRB Fort Worth, the analysis employed the USAF Air Conformity Applicability Model (ACAM) version 5.0.13a (Solutio Environmental, Inc. 2019). FW3-19 summarizes the annual emissions estimated for the existing F-16 operations of the 301 FW. Volume II, Appendix C, presents details of the emission calculations presented in Table FW3-23. The net emissions change from the decrease of 102 personnel (e.g., emissions from government and privately owned vehicle miles traveled by those 102 personnel) were calculated as a net reduction in the build-out emission calculations for the action.

Table FW3-23. Annual Emissions of Existing 301 FW F-16 Operations at NAS JRB Fort Worth

Activity Type	Air Pollutant Emissions (tons per year)						
	VOCs	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$	CO_2e (mt)
Flight Operations and Engine Trim Tests – F-16Cs	14.38	45.28	34.69	3.14	5.48	4.73	8,765
Aircraft Engine Test Cells – F-16C	0.23	0.46	1.22	0.08	0.13	0.12	224
Aerospace Ground Equipment	6.56	11.51	18.88	1.32	1.95	1.89	904
Total Emissions[a]	**21.16**	**57.25**	**54.80**	**4.54**	**7.50**	**6.73**	**9,893**

[a] Calculated values and totals have been rounded; therefore, sum totals may not match the totals row.
Key: CO_2e (mt) = carbon dioxide equivalent in metric tons

FW3.3.1.4 Regional Climate

Meteorological data collected at NAS JRB Fort Worth are used to describe the climate of the NAS JRB Fort Worth project region (National Weather Service 2018a).

Temperature. Tarrant County has hot and humid summer months and mild to cool conditions during the winter. The average high and low temperatures during the summer months at NAS JRB Fort Worth range from about 96 to 68 degrees Fahrenheit (°F). The average high and low temperatures during the winter months range from 69 to 36 °F.

Precipitation. The average annual precipitation for NAS JRB Fort Worth is 34.2 inches. Annual precipitation in the region peaks in late spring, with a secondary peak in the fall (October). The peak monthly average precipitation of 4.6 inches occurs in May. Winter is the driest season, although the lowest monthly average precipitation of 1.6 inches occurs in August. The base averages about two inches of snow per year.

Prevailing Winds. Wind data collected in the Dallas-Fort Worth area are used to describe the wind climate of the NAS JRB Fort Worth project region (National Climatic Data Center 1998).

The annual average wind speed at NAS JRB Fort Worth is 11 miles per hour. February through April is the windiest period, with March having the highest monthly average wind speed of 13 miles per hour. However, the strongest instantaneous winds can occur most of the year in association with thunderstorms and tornados. Tarrant County as a whole experienced 1.4 tornados per year during the 1950 to 2017 period (National Weather Service 2018b). Winds prevail from the south during each month of the year.

FW3.3.1.5 Applicable Regulations and Standards

The TCEQ is responsible for enforcing air pollution regulations in Texas. The TCEQ enforces the NAAQS by monitoring air quality and developing rules to regulate and to permit stationary sources of air emissions. The TCEQ air quality regulations are found in Title 30, Part I of the Texas Administrative Code (TCEQ 2018b).

Historically, the Dallas-Fort Worth area has not attained the O_3 NAAQS. To comply with the requirements of the Clean Air Act (CAA), the TCEQ has developed plans that would demonstrate attainment or progress towards attainment of the O_3 NAAQS. These plans include measures that would reduce future emissions within the region from both stationary and mobile sources. Once adopted by the state of Texas, these control measures are included in the Texas State Implementation Plan (SIP). The TCEQ approved the latest revision to the attainment plan for the 2008 O_3 standard for the Dallas-Fort Worth area on 8 August 2018. On 12 December 2018, the TCEQ also approved a proposal to request the USEPA to re-designate the Dallas-Fort Worth area to attainment for the revoked 1-hour and 1997 8-hour ozone NAAQS and to provide a maintenance plan that demonstrates the area will remain in attainment of these NAAQS through 2032 (TCEQ 2018c).

FW3.3.2 Base Environmental Consequences

The air quality analysis estimated the magnitude of emissions that would result from construction and operation of the proposed AFRC F-35A mission at NAS JRB Fort Worth. The estimation of operational impacts is based on the net change in emissions due to the replacement of existing F-16 aircraft operations with those of the proposed AFRC F-35A mission. Volume II, Appendix C, of this EIS presents the calculations used to estimate air pollutant emissions from proposed construction and operational sources at NAS JRB Fort Worth.

The air quality analysis for the AFRC mission at NAS JRB Fort Worth evaluates F-35A takeoff operations based on the three afterburner scenarios. Activity levels and resulting emissions for all other proposed operational activities would remain the same under each afterburner scenario.

Tarrant County is in moderate nonattainment of the 2008 O_3 standard, in marginal nonattainment of the 2015 O_3 standard, and in attainment of all other NAAQS. Therefore, the analysis used the USEPA General Conformity Rule (GCR) *de minimis* thresholds of 100 tons per year for VOCs and NO_x, and the prevention of significant deterioration permitting threshold of 250 tons per year for all other criteria pollutants as indicators of the significance of projected air quality impacts within the NAS JRB Fort Worth project region.

FW3.3.2.1 Construction

The AFRC F-35A mission at NAS JRB Fort Worth would require demolition and construction/renovation of airfield facilities such as training facilities and maintenance and storage facilities. Air quality impacts resulting from the proposed construction activities would occur from (1) combustive emissions due to the use of fossil fuel-powered equipment and (2) fugitive dust emissions (PM_{10}/$PM_{2.5}$) resulting from the operation of equipment on exposed soil.

Construction activity data were developed to estimate construction equipment usages and areas of disturbed ground due to the proposed F-35A mission. These data were used as inputs to ACAM, which was used to estimate air emissions from proposed construction activities at NAS JRB Fort Worth. The air quality analysis assumed that all construction activities for the proposed mission would begin in 2021 and be completed in 2023.

Inclusion of standard construction practices and LEED Silver certification into proposed construction activities would potentially reduce fugitive dust emissions generated from the use of construction equipment on exposed soil by 50 percent from uncontrolled levels. Chapter 3, Section 3.3.3.1, of this EIS describes the standard construction practices that would control fugitive dust.

Table FW3-24 presents estimates of emissions from the infrastructure improvements for the AFRC F-35A mission at NAS JRB Fort Worth. These data show that even if total construction emissions occurred in one year, the construction emissions would be well below the annual indicator thresholds. Therefore, temporary construction emissions associated with the proposed AFRC F-35A mission would not result in significant air quality impacts.

Table FW3-24. Total Construction Emissions from the AFRC F-35A Mission at NAS JRB Fort Worth

Construction Activity	Air Pollutant Emissions (tons)						
	VOCs	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$	CO_2e (mt)
Demolish Buildings	0.03	0.20	0.16	0.00	0.06	0.01	35
Renovate/Construct Buildings	0.58	3.15	2.81	0.01	0.12	0.12	609
Total Emissions[a]	**0.61**	**3.35**	**2.97**	**0.01**	**0.18**	**0.13**	**644**
Annual Indicator Threshold	**NA**	**250**	**NA**	**250**	**250**	**250**	**NA**
General Conformity *De Minimis* Threshold	**100**	**NA**	**100**	**NA**	**NA**	**NA**	**NA**

[a] Calculated values and totals have been rounded; therefore, sum totals may not match the totals row.
Key: NA = not applicable

FW3.3.2.2 Operations

The proposed AFRC F-35A mission at NAS JRB Fort Worth would primarily generate air emissions from (1) F-35A aircraft operations, (2) F-35A engine maintenance and testing, and (3) AGE. The analysis also includes emissions that would occur from the net change in commuting activities between the proposed F-35A and existing F-16 missions at NAS JRB Fort Worth. Because the mission would result in a net reduction of 102 personnel, this would produce a net reduction in emissions from commuting activities. To estimate emissions from the F-35A mission at NAS JRB Fort Worth, the analysis employed the ACAM. The air quality analysis assumed that the proposed mission would reach full operations and resulting emissions in 2024 after the completion of all required infrastructure improvements.

The analysis of proposed aircraft operations is limited to operations that would occur in the lowest 3,000 feet of the atmosphere, as this is the typical depth of the atmospheric mixing layer, where the release of aircraft emissions would affect ground-level pollutant concentrations. In general, aircraft emissions released above the mixing layer would not appreciably affect ground-level air quality.

During scoping, people submitted comments regarding the pollutant impacts that could result from implementation of the proposed AFRC F-35A mission. Table FW3-25 summarizes the annual operational emissions that would result from implementation of the proposed mission at NAS JRB Fort Worth. The data in Table FW3-25 show that the replacement of existing F-16 aircraft operations with the proposed AFRC F-35A operations would result in a reduction of VOC emissions and increases in all other pollutant emissions for the three afterburner scenarios. The data in Table FW3-25 also show that scenario emissions would increase with increasing afterburner use rates. Implementation of Scenario C (95 percent afterburner rate) would result in the most emissions, but the emissions would increase by less than 6 percent for any criteria pollutant compared to Scenario A (5 percent afterburner rate). These emission increases would not exceed any annual indicator threshold or applicable General Conformity threshold for NO_x or VOCs. Therefore, operational emissions associated with the proposed AFRC F-35A mission at NAS JRB Fort Worth would not result in significant air quality impacts.

Table FW3-25. Projected Annual Emissions from AFRC F-35A Mission Operations at NAS JRB Fort Worth, 2024 – All Afterburner Scenarios

Afterburner Scenario/Activity Type	Air Pollutant Emissions (tons per year)[a]						
	VOCs	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$	CO_2e (mt)
Scenario A							
Flight Operations and Engine Trim Tests – F-35As	0.14	61.35	54.62	6.04	9.64	8.66	16,724
Aircraft Engine Test Cells – F-35As	0.00	0.41	1.95	0.13	0.17	0.15	375
Aerospace Ground Equipment	8.20	14.39	23.60	1.65	2.43	2.36	1,130
Net Commuting Activities (F-35A - F-16 staff)	(0.17)	(1.97)	(0.14)	0.00	0.00	0.00	(164)
Total F-35A Mission Emissions	**8.17**	**74.18**	**80.03**	**7.82**	**12.24**	**11.17**	**18,064**
Existing 301 FW Emissions	**21.16**	**57.25**	**54.80**	**4.54**	**7.50**	**6.73**	**9,893**
F-35A Mission Minus 301 FW Emissions	**(13.00)**	**16.93**	**25.24**	**3.28**	**4.74**	**4.43**	**8,172**
Scenario B							
Total F-35A Mission Emissions	**8.18**	**76.30**	**80.33**	**7.92**	**12.33**	**11.26**	**18,003**
F-35A Mission Minus 301 FW Emissions	**(12.99)**	**19.05**	**25.54**	**3.38**	**4.83**	**4.52**	**8,111**
Scenario C							
Total F-35A Mission Emissions	**8.19**	**78.41**	**80.48**	**8.01**	**12.41**	**11.33**	**17,920**
F-35A Mission Minus 301 FW Emissions	**(12.98)**	**21.16**	**25.69**	**3.47**	**4.91**	**4.59**	**8,028**
Annual Indicator Threshold	**NA**	**250**	**NA**	**250**	**250**	**250**	**NA**
General Conformity *De Minimis* Threshold	**100**	**NA**	**100**	**NA**	**NA**	**NA**	**NA**

[a] Calculated values and totals have been rounded; therefore, sum totals may not match the totals row.
Key: NA = not applicable; ( ) = negative values and net reductions in emissions

The VOC emission reductions estimated to result from implementation of the proposed AFRC F-35A mission at NAS JRB Fort Worth would result in the following positive effect within the Dallas-Fort Worth region:

- Proposed operations would generate hazardous air pollutants (HAPs), primarily in the form of VOCs and particulates from the combustion of aviation fuel in F-35A aircraft and AGE. Because the decrease in VOC emissions from the proposed mission would be greater than the increases in PM_{10} and $PM_{2.5}$ emissions, implementation of the proposed mission would result in a net reduction of HAPs. These emission reductions would result in a net benefit to ambient HAP levels.

FW3.3.2.3 General Conformity Statement

The previous analyses show that the net change in annual emissions resulting from implementation of the AFRC F-35A mission at NAS JRB Fort Worth would remain below the applicable VOCs and NO_x conformity *de minimis* thresholds. As a result, the proposed AFRC F-35A mission at NAS JRB Fort Worth would not require a conformity determination under the GCR.

FW3.3.3 Airspace Affected Environment

Projected AFRC F-35A aircraft operations in the airspace proposed for use and along the flight routes between these locations and NAS JRB Fort Worth would affect air quality within these portions of northcentral Texas and southern Oklahoma. All of the regions below these areas are currently in attainment of all of the NAAQS.

FW3.3.4 Airspace Environmental Consequences

AFRC F-35A pilots operating from NAS JRB Fort Worth would operate in the same airspace and training areas as existing 301 FW pilots, but at higher altitudes. The proposed AFRC F-35A operations in these areas would occur above 3,000 feet above ground level (AGL) about 99 percent of the time (Table FW2-6) and therefore these operations would not appreciably affect ground-level air quality. Compared to existing 301 FW operations, F-16 operations occur below 3,000 feet AGL approximately 21 percent of the time. AFRC F-35A pilots would fly about 1.2 percent more sorties in the airspace compared to existing 301 FW F-16 aircraft.

To quantify the air quality effects of the F-35A mission within the NAS JRB Fort Worth airspaces and training areas, the analysis employed the ACAM to estimate the net change in emissions between the replacement of existing F-16 aircraft operations with proposed F-35A aircraft operations within these areas. The analysis used aircraft flight profiles developed by the project noise analyses as inputs to the ACAM. The analysis focused on operations within the lowest 3,000 feet of the atmosphere.

Table FW3-26 presents the annual operational emissions that would result from implementation of the F-35A mission within the NAS JRB Fort Worth airspaces and training areas. These data show that the proposed changes in aircraft operations within these areas would result in net reductions in all air pollutant emissions within 3,000 feet AGL. Therefore, implementing the proposed AFRC F-35A mission in existing airspace and training areas would not result in significant air quality impacts.

Table FW3-26. Projected Annual Emissions from the AFRC F-35A Mission Operations within NAS JRB Fort Worth Airspaces and Training Areas - 2024

Activity Type	Air Pollutant Emissions (tons per year)[a]						
	VOCs	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$	CO_2e (mt)
Existing 301 FW Flight Operations – F-16	(11.08)	(5.33)	(181.55)	(6.63)	(8.24)	(7.43)	(20,026)
AFRC Mission Flight Operations – F-35A	0.00	0.22	11.89	0.58	0.63	0.57	1,748
F-35A Mission Minus 301 FW Emissions	**(11.08)**	**(5.11)**	**(169.66)**	**(6.05)**	**(7.60)**	**(8.63)**	**(18,278)**
Indicator Threshold	**250**	**250**	**250**	**250**	**250**	**250**	**NA**

[a] Calculated values and totals have been rounded; therefore, sum totals may not match the totals row.
Key: CO_2e (mt) = carbon dioxide equivalent in metric tons; NA = not applicable; ( ) = negative values and net reductions in emissions

FW3.3.5 Summary of Impacts to Air Quality

Tarrant County is in nonattainment of the 2008 and 2015 O_3 standards, but is in attainment of all other NAAQS. As shown in Table FW3-27, calendar year annual emissions from construction activities and the net change in aircraft operations around the base would not exceed any annual indicator threshold. Emissions would decrease in training airspace. Therefore, implementation of the proposed AFRC F-35A mission at NAS JRB Fort Worth would not result in significant air quality impacts.

Table FW3-27. Summary of Calendar Year Annual Emissions from the AFRC F-35A Mission at NAS JRB Fort Worth

Activity/Year	Air Pollutant Emissions (tons)						
	VOCs	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$	CO_2e (mt)
Construction – Year 2021	0.20	1.42	1.26	0.00	0.10	0.06	271
Construction – Year 2022	0.41	1.93	1.72	0.01	0.08	0.08	372
Construction – Year 2023	0.00	0.00	0.00	0.00	0.00	0.00	0
Net Change in Operations – Most Emissive Afterburner Scenario C – Year 2024+	**(12.98)**	**21.16**	**25.69**	**3.47**	**4.91**	**4.59**	**8,028**
Annual Indicator Threshold	**NA**	**250**	**NA**	**250**	**250**	**250**	**NA**
General Conformity *De Minimis* Threshold	**100**	**NA**	**100**	**NA**	**NA**	**NA**	**NA**

Key: CO_2e (mt) = carbon dioxide equivalent in metric tons; NA = not applicable; ( ) = negative values and net reductions in emissions

FW3.4 SAFETY

Air Force Instruction (AFI) 90-801, *Environment, Safety, and Occupational Health Councils*, implements the risk management guidance within Air Force Policy Directive (AFPD) 90-8, *Environment, Safety, and Occupational Health Management and Risk Management* (USAF 2013). All USAF missions and daily routines involve risk. Requirements outlined in this document provide for a process to maintain readiness in peacetime and achieve success in combat while safeguarding people and resources. The safety analysis contained in the following sections addresses issues related to the health and well-being of both military personnel and civilians living on or near NAS JRB Fort Worth and under the training airspace.

Specifically, this section provides information on explosive safety; fire risk and management; hazards associated with aviation safety (Accident Potential Zones [APZs]); aircraft mishaps; and Bird/Wildlife Aircraft Strike Hazard [BASH]).

The FAA is responsible for ensuring safe and efficient use of U.S. airspace by military and civilian aircraft and for supporting national defense requirements. To fulfill these requirements, the FAA has established safety regulations, airspace management guidelines, a civil-military common system, and cooperative activities with the DoD. The primary safety concern with regard to military training flights is the potential for aircraft mishaps (i.e., crashes) to occur, which could be caused by mid-air collisions with other aircraft or objects, weather difficulties, mechanical failures, pilot error, or bird-aircraft strikes.

FW3.4.1 Base Affected Environment

FW3.4.1.1 Explosive Safety

Explosive safety quantity-distance (ESQD) arcs at NAS JRB Fort Worth include the area around the magazines north of the taxiways, the ready-alert facilities, and the southern end of the main runway. The ESQD arcs are shown on Figure FW2-1.

FW3.4.1.2 Fire Risk and Management

Day-to-day O&M activities conducted at the base are performed in accordance with applicable USAF safety regulations, published USAF Technical Orders (TOs), and standards prescribed by Air Force Occupational Safety and Health (AFOSH) requirements including AFI 91-202, *The US Air Force Mishap Prevention Program*. Aircraft Rescue Firefighting services are available on a

24-hour basis. Upon notification of an in-flight or ground emergency, the crash and rescue services personnel would coordinate emergency services.

The NAS JRB Fort Worth Fire and Emergency Services provides 24-hour crash, structural, and emergency medical first response; technical rescue; hazardous material and weapons-of-mass-destruction incident response; and fire prevention, safety, and training/education services to NAS JRB Fort Worth. Equipment includes two command vehicles, two ambulances, three fire engines, three aircraft crash response apparatuses, a hazardous material response vehicle and a rescue boat. Base Fire and Emergency Services holds mutual aid agreements with the Lockheed-Martin Aeronautics Company and the Cities of Sansom Park, Benbrook, Fort Worth, Lake Worth, River Oaks, and White Settlement.

NAS JRB Fort Worth adheres to specific emergency-response procedures contained in TO 00-105E-9, *Aerospace Emergency Rescue and Mishap Response Information*, for aircraft mishaps involving composite materials. TO 00-105E-9 contains a section (Chapter 3) on Mishap Composite Awareness.

FW3.4.1.3 Accident Potential Zones

In accordance with DoDI 4165.57, APZs are established at military airfields to delineate recommended compatible land uses for the protection of people and property on the ground. APZs define the areas of a military airfield that would have the highest potential to be affected if an aircraft mishap were to occur. Air Installations Compatible Use Zones (AICUZ) guidelines identify three types of APZs for airfields based on aircraft mishap patterns: the CZ, APZ I, and APZ II. Safety zones (CZs/APZs) have been established to delineate recommended surrounding land uses for the protection of people and property on the ground. Runway 18/36 at NAS JRB Fort Worth has cone-shaped CZs encompassing an area 1,500 to 2,284-feet-wide (1,500 feet in width at the runway threshold and 2,284 feet in width at its outer edge) by 3,000-feet-long. APZ I is 3,000-feet-wide by 5,000-feet-long and APZ II is 3,000-feet-wide by 7,000-feet-long. The boundaries of the CZs and APZs have been provided to local governments for their use in planning documents. If needed, to reflect different departure and arrival patterns, both the shape and size of APZs can be modified. Figure FW3-5 depicts the CZs and APZs at NAS JRB Fort Worth.

Multiple land uses are found in the CZs and APZs including residential, retail, parks, and industrial. The northern APZ I primarily consists of single-family residential, park lands and industrial properties. Howry Junior High and Effie Morris Elementary are located within APZ II. The remainder of the APZ II is primarily residential and commercial, with some industrial uses.

To the south, APZ I and APZ II cross the installation boundary into the community. A majority of the southern CZ is contained within NAS JRB Fort Worth property, the remaining acreage, approximately 77 acres, is either privately owned and currently vacant or roadway. The only exceptions are two structures located within the southeast corner of the CZ. APZ I primarily consists of commercial and industrial properties, including portions of Ridgmar Mall and Z. Boaz Park. Many dwelling units exist within the southernmost portion of the APZ I and II areas (DFW Advisors Ltd. 2008).

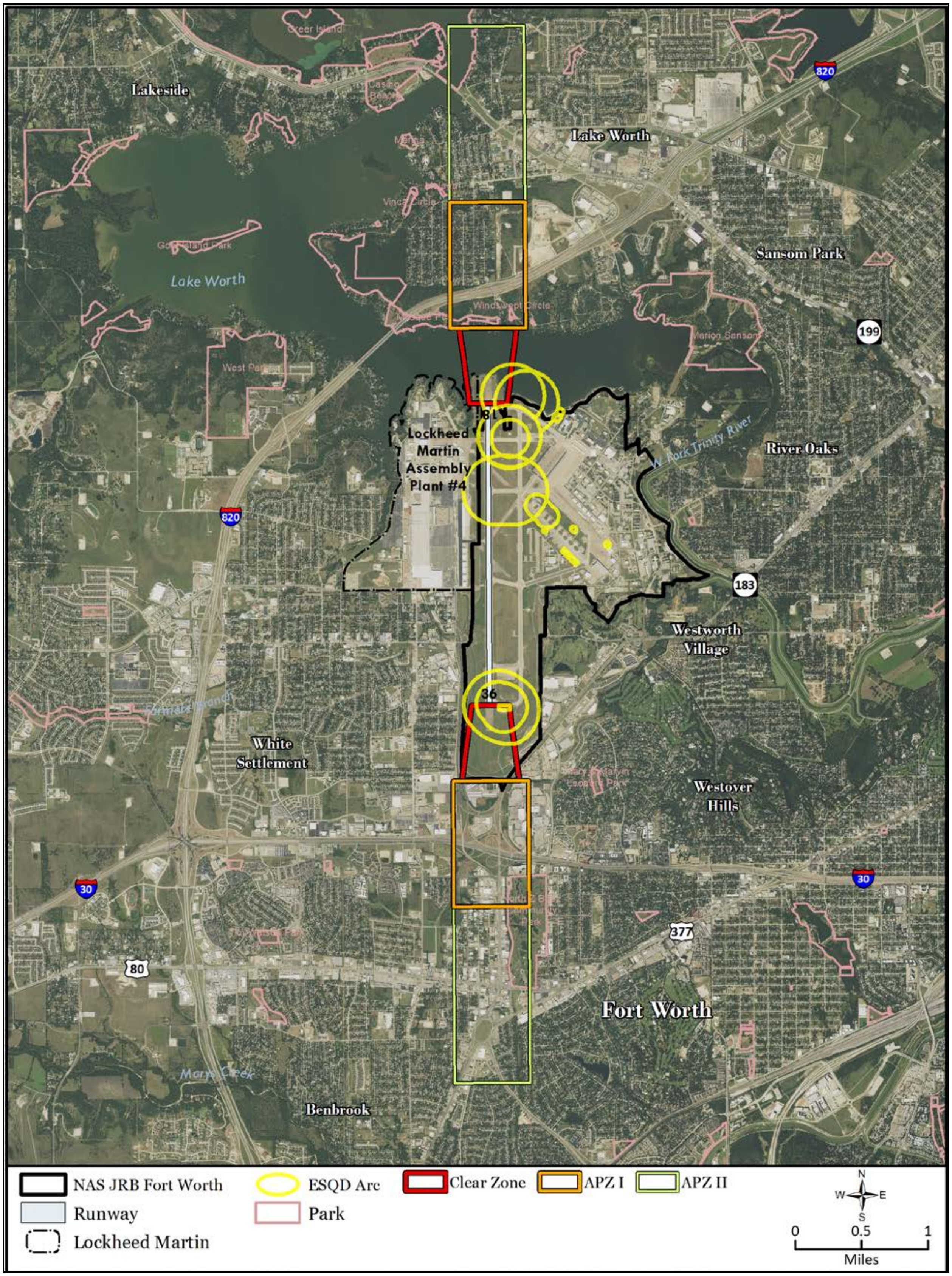

Figure FW3-5. CZs and APZs at NAS JRB Fort Worth

FW3.4.1.4 Aircraft Mishaps

Mishaps are defined as any damage that occurs on the ground or in flight. As shown in Table FW3-28, mishaps are classified into four categories, based on the severity of the mishap relative to property damage or personnel injury. Class A mishaps are the most severe with total property damage of $2 million or more or a fatality and/or permanent total disability. Comparison of Class A mishap rates for various engine types, as calculated per 100,000 flying hours provide the basis for evaluating risks among different aircraft and levels of operations. This safety section analyzes existing and projected Class A mishap potentials based on flying hours and aircraft types.

Table FW3-28. Aircraft Class Mishaps

Mishap Class	Total Property Damage	Fatality/Injury
A	$2,000,000 or more and/or aircraft destroyed	Fatality or permanent total disability
B	$500,000 or more but less than $2,000,000	Permanent partial disability or three or more persons hospitalized as inpatients
C	$50,000 or more but less than $500,000	Nonfatal injury resulting in loss of one or more days from work beyond day/shift when injury occurred
D	$20,000 or more but less than $50,000	Recordable injury or illness not otherwise classified as A, B, or C

Aircraft flight operations at NAS JRB Fort Worth are governed by standard flight rules. Aircrews ensure flight safety when operating at the airfield by complying with all safety and aircraft operating requirements. No Class A or B mishaps have occurred during the past 3 years at NAS JRB Fort Worth. The F-16 has a lifetime Class A mishap rate of 3.35 (11,278,471 cumulative hours through 2019) (USAF 2019).

FW3.4.1.5 Bird/Wildlife-Aircraft Strike Hazard

Bird and wildlife-aircraft strikes and the hazards they present form another safety concern for aircraft operations. Bird/wildlife-aircraft strikes constitute a safety concern because of the potential for damage to aircraft or injury to aircrews or local populations if an aircraft crash should occur in a populated area.

According to the Air Force Safety Center (AFSEC) BASH statistics, from 1995 to 2016, where altitude at time of strike was known, more than 50 percent of the strikes occurred below 400 feet AGL, and 90 percent occurred below 2,000 feet AGL (USAF 2017). Waterfowl generally present the greatest BASH potential due to their flocking flight patterns and because, when migrating, they can be encountered at altitudes up to 20,000 feet AGL. Raptors also present a substantial hazard due to their size and soaring flight patterns. In general, the threat of bird-aircraft strikes increases during March and April and from August through November due to migratory activities. The USAF BASH Team maintains a database that documents all reported bird/wildlife-aircraft strikes. Historic information across the USAF for the past 20 years indicates that 11 USAF aircraft have been destroyed and five fatalities have occurred from bird/wildlife-aircraft strikes, with the last Class A mishap occurring in 2016 (USAF 2017).

The USAF BASH program was established to minimize the risk for collisions of birds and aircraft and the subsequent loss of life and property. AFI 91-202 requires each flying unit in the USAF to develop a BASH plan to reduce hazardous bird/animal activity relative to airport flight operations. The intent of each plan is to reduce BASH issues at the airfield by creating an integrated hazard abatement program through awareness, avoidance, monitoring, and actively controlling bird and animal population movements. Some of the procedures outlined in the plan include monitoring the airfield for bird activity, issuing bird hazard warnings, initiating bird avoidance procedures when potentially hazardous bird activities are reported, and submitting BASH reports for all incidents.

NAS JRB Fort Worth developed a Wildlife Hazard Management Plan (WHMP) to integrate wildlife, BASH, environmental, and military concerns to make safety a top priority to pilots, the public, and equipment.

From 2012 to 2017, NAS JRB Fort Worth personnel recorded 109 bird strikes in the airfield and airspace. The concentration of birds at and around NAS JRB Fort Worth poses a risk to flying operations. The terrain, bodies of water, and climate are ideal living conditions for birds year-round, as well as migratory species.

The WHMP provides the final BASH program component, combining the local BASH program concept of operations and wildlife hazards identified in the Wildlife Hazard Assessment with specific integrated wildlife damage management actions to mitigate, control, remove, or depredate those hazards to local airfield operations. The WHMP infuses risk management into resource planning by identifying habitat modification techniques and wildlife management actions for priority funding which will provide the greatest improvement to aviation safety.

The WHMP establishes implementation procedures and actions to minimize the potential of bird-aircraft strikes. Such measures include eliminating seed producing vegetation, eliminating grasshoppers, and maintaining grass heights between 7 and 14 inches. BASH reduction techniques currently employed by the base include surveys, harassment (various types), habitat management, effigies, nest removal or destruction, depredation, exclusion devices, and others. Most bird activity is between May to June and September to October. During this time, the NAS JRB Fort Worth operates under BASH Phase 2 procedures: Minimum altitude of 1,000 feet AGL and if significant bird activity is observed, low altitude operations will terminate (NAS JRB Fort Worth 2017b).

FW3.4.2 Base Environmental Consequences

O&M activities conducted on NAS JRB Fort Worth would continue to be performed in accordance with all applicable safety directives. No specific aspects of F-35A O&M would create any unique or extraordinary safety issues. Refer to Chapter 2, Section 2.3.4.2, for a discussion of the types of defensive countermeasures and ordnance that would be used by AFRC F-35A pilots. Only approved weapons systems would be used by AFRC F-35A pilots on the impact training ranges and pilots would adhere to all flare and live-fire use restrictions.

No unique construction practices or materials would be required as part of any of the demolition, renovation, or construction projects associated with the proposed AFRC F-35A mission. All renovation and construction activities would be completed in compliance with all applicable OSHA regulations to protect workers. In addition, the newly constructed buildings would be built in compliance with antiterrorism/force protection requirements and explosives safety requirements. The USAF does not anticipate any significant safety impacts to result from construction, demolition, or renovation if all applicable AFOSH and OSHA requirements are implemented. In addition, O&M of the new munitions buildings would not result in significant safety impacts.

Although F-35A aircraft are currently being operated at NAS JRB Fort Worth, base emergency and mishap response plans would be updated to include procedures and response actions necessary to address a mishap involving AFRC F-35A aircraft and associated equipment. With this update, airfield safety conditions would remain similar to baseline conditions. As indicated in Section FW3.4.2.2, base fire and emergency services would continue to be party to mutual-aid support agreements with nearby communities.

FW3.4.2.1 Explosive Safety

The construction and operation of the proposed facilities would comply with Department of Defense Explosives Safety Board Standard (DDESB) 6055.09, *DoD Ammunition and Explosives Safety Standards* (DoD 2008), Air Force Manual (AFMAN) 91-201, *Explosives Safety Standards* (USAF 2017) and AFMAN 32-1084, *Facility Requirements* (USAF 2016). No new requirements for ESQD arcs are anticipated. No changes to explosive safety would result from the construction and operation of the proposed facilities at NAS JRB Fort Worth.

FW3.4.2.2 Fire Risk and Management

Fire and crash response would continue to be provided by NAS JRB Fort Worth Fire and Emergency Services. TO 00-105E-9 provides guidance on fire response to aircraft containing composite materials, including the F-35A. Firefighters would continue to be fully trained and appropriately equipped for crash and rescue response and the proposed AFRC F-35A beddown would not change these abilities. Aircraft pre-incident plans would be developed for the F-35A. Aircraft pre-incident plans are required to be reviewed, validated and/or updated annually or anytime there is a change to TO 00-105E-9 for the applicable aircraft. Equipment and training specific to addressing F-35A mishaps would be obtained and conducted prior to beddown. Additionally, NAS JRB Fort Worth would keep local firefighting departments informed about any new information or firefighting techniques associated with composite materials should an accident occur.

FW3.4.2.3 Accident Potential Zones

No changes to existing APZs or CZs would be required to accommodate AFRC F-35A operations. As documented in Section FW3.8.1.1, there is incompatible residential development within the CZs and APZs. For the reasons described below, implementation of the AFRC F-35A mission would not increase the safety risk to these or other off-base areas. NAS JRB Fort Worth would continue to work with communities and developers to apply the AICUZ guidelines. Implementation of flight safety procedures and compliance with all flight safety requirements would minimize the potential for significant impacts to result from aircraft mishaps in the APZs and CZs.

FW3.4.2.4 Aircraft Mishaps

Implementation of the proposed AFRC F-35A mission at NAS JRB Fort Worth would replace the existing F-16 mission operated by the 301 FW. During public scoping, several commenters were concerned with the flight safety of the single-engine F-35A, as well as the increased use of composite aerospace materials in the construction of the F-35A. Approximately 13 percent of the F-16, by weight, is comprised of composite materials, while approximately 42 percent of the F-35A, by weight, is comprised of composite materials (Air Force Research Laboratory 2015).

FW3.4.2.4.1 Flight Safety

As of November 2019, the F-35A has amassed more than 96,000 hours of flight time with three Class A mishaps, resulting in a mishap rate of 3.11 (Table FW3-29). These mishaps included an engine failure during takeoff preparation (the aircraft was safely brought to a halt), an aborted takeoff with damage confined to the engine, and a hydraulic failure resulting in collapsed nose landing gear that occurred after landing and parking. No injuries occurred during these events. Because the F-35A has not yet reached 100,000 hours, this mishap rate is not directly comparable to other aircraft (Chapter 3, Section 3.4.3) with more flying hours. However, this rate does provide some indication of the overall safety of the F-35A aircraft. For example, this rate is lower than the 8.86 rate of the F-16 after a comparable amount of hours. It is also lower than the 9.24 rate of the A-10 after the A-10 reached 152,977 hours.

Table FW3-29. F-35A Class A Flight Mishap History

Fiscal Year	Class A		Destroyed		Fatal		Hours Flown Per Year	Cumulative Flight Hours
	Number of Mishaps	Rate	Aircraft	Rate	Pilot	All		
2010	0	0.00	0	0.00	0	0	0	0
2011	0	0.00	0	0.00	0	0	0	0
2012	0	0.00	0	0.00	0	0	215	215
2013	0	0.00	0	0.00	0	0	1,283	1,498
2014	1	37.54	0	0.00	0	0	2,664	4,162
2015	0	0.00	0	0.00	0	0	7,467	11,629
2016	0	0.00	0	0.00	0	0	11,343	22,972
2017	0	0.00	0	0.00	0	0	22,714	45,686
2018	2	11.90	0	0.00	0	0	30,514	76,200
2019	0	0	0	0.00	0	0	20,113	96,313
Lifetime	**3**	**3.11**	**0**	**0.00**	**0**	**0**	**-**	**96,313**

Note: Flight "rates" are number of mishaps per 100,000 flight hours. Only aviation "Flight" mishaps are reported here. An aviation "Flight" mishap is any mishap in which there is intent for flight and reportable damage to a DoD aircraft.
Source: USAF 2019

Historical trends of USAF aircraft show that mishaps of all types decrease the longer an aircraft is operational. For example, when the last single-engine fighter fielded by the USAF (F-16) surpassed 100,000 hours in 1982, its Class A rate was 15.83 with four fatal mishaps (USAF 2017). Since then, the mishap rate for the F-16 has decreased substantially. In 2019, the F-16 had a lifetime Class A mishap rate of 3.35, and its rate for the last 10 years is 1.84 (USAF 2019). Similarly, in 1979, when the A-10 surpassed 100,000 hours, its Class A rate was 9.24 with four fatalities recorded (USAF 2019). The A-10 has a lifetime Class A mishap rate of 1.88, and its rate for the last 10 years is 0.45 (USAF 2019). The mishap rate for the F-35A is expected to decline as the aircraft becomes operationally mature. The Pratt & Whitney F135 engine used in the F-35A was derived from the F119 engine, which is used in the F-22 Raptor. The F-22 features a 0.92 lifetime engine-related Class A flight mishap rate (USAF 2020).

In addition, aircraft with newer engines and designs generally have fewer mishaps than aircraft with older engines and designs. Table FW3-30 demonstrates the decreases in engine-related and lifetime mishap rates for 11 historic and current single-engine aircraft.

Table FW3-30. Class A Flight Mishap Rates

Decade Introduced	Aircraft/Engine	Engine-Related Cumulative Class A Mishap Rate	Engine-Related Class A Mishap Rate Last 6 Quarters	Lifetime Class A Mishap Rate
1950s	F-100/ J57	5.61	No longer in service	21.22
	F-102/ J57	3.41	No longer in service	NA
	F-104/ J79	9.48	No longer in service	NA
	F-105/ J75	4.56	No longer in service	12.15
	F-106/ J75	2.04	No longer in service	NA
1960s	A-7/TF41	1.73	No longer in service	5.71
1970s	F-16/ F100-200	1.84	No longer in service	3.43
1980s	F-16/ F110-100	1.06	0.76	
	F-16/ F100-220	0.96	0	
1990s	F-16/ F110-129	0.85	0	
	F-16/ F100-229	0	0	

Key: NA = not available

During scoping, some comments were received regarding safety deficiencies of the F-35A aircraft. In a review of the production program for all models of the F-35 (A, B, and C), the Government Accountability Office has noted various deficiencies as this advanced aircraft is developed and brought into production (GAO 2018). These deficiencies are being addressed as full-rate production is approached. The USAF recognizes that certain components have yet to reach full capability. The USAF would not operate any aircraft should safety-of-flight concerns be present.

FW3.4.2.4.2 Composite Aerospace Materials

Advanced composites have been used in aircraft construction since the late 1960s, when a boron-epoxy rudder was installed on the F-4 jet. As composite technology has advanced, the percentage of composite material used in modern aircraft has increased. Types of composites include carbon fiber (e.g., graphite used in sporting equipment), metal-matrix composites (e.g., materials used on spacecraft and racing bicycles), and ceramic-matrix composites (e.g., medical implants). As noted by members of the public during scoping, one disadvantage of certain composites is that these materials can degrade under extreme temperatures, resulting in the production of toxic fumes and airborne fibers. Because of these characteristics, composite aerospace materials present unique hazards to mishap responders. A burning aircraft could release toxic products, exposing personnel and the environment. Individuals exposed to a crash site could experience dermatological and respiratory problems. Exposure to these hazards would not necessarily end when a fire is extinguished; exposure to recovery crews, site security, the surrounding population, and others could continue (NAVFAC 2016). Sampling at mishap sites of aircraft containing composite materials indicated the presence of respirable fibers/dusts in the air. In addition, laboratory studies have identified respirable fiber products and toxic gases (including high levels of CO, NO_x, and hydrogen cyanide) from burning composite materials (NAVFAC 2016).

Due to the rarity of mishaps involving composite aerospace materials, no epidemiological data are available on personnel exposure to burning composites. Similarly, no studies have assessed the toxicology of carbon fibers generated in a fire scenario with extended post-exposure duration. Synergistic interactions between the solid, vapor, and gaseous combustion products have also not been determined. However, research and experience during several crash responses do indicate that composite fiber release is relatively low (Air Force Research Laboratory 2015).

In the event of a crash of an aircraft containing composite materials, the USAF would follow the guidance contained in the *Mishap Response Checklist for Advanced Aerospace Materials/Composites* (USAF Advanced Composites Program Office 1993).

- Areas in the immediate vicinity of the mishap site affected by direct and dense fallout from the fire/explosion-generated smoke plume would be evacuated, along with easily mobile critical equipment. Aircraft and flight operations exposed to the immediate fallout area would be altered or moved. All unprotected personnel would be restricted from assembling downwind of the crash site.
- The fire would be extinguished and composites cooled to below 300°F. Only firefighters equipped with a self-contained breathing apparatus would be authorized in the immediate vicinity of a burning/smoking mishap site until the fire chief declares the area safe. If possible, high-pressure water break-up and dispersal of composite structures would be avoided.
- The mishap site would be roped or cordoned off and a single entry/exit point would be established upwind of the wreckage. Only sufficiently protected individuals would be authorized in the immediate mishap site and peripheral areas.

- Should personnel other than those at the accident site be directly and substantially exposed to adverse material hazards, the medical staff would be consulted for evaluation and tracking. Time permitting, the otherwise un-threatened populace in affected or fallout areas would be advised to do the following:
  - Remain indoors;
  - Shut external doors and windows;
  - Turn off forced air intakes; and
  - Await further notification.
- Specific aircraft hazards would be identified by inspection and consultation with the crew chief or aircraft specialists. Composite and other hazardous materials would be identified to mishap response personnel. The On-Scene Commander would be advised of all findings and recommendations.
- When exiting the crash site, personnel would use a high-efficiency particulate air-filtered vacuum, if available, to remove asbestos-containing materials (ACM) from their outer clothing, work gloves, boots, headgear, and equipment. If unavailable, efforts would be made to wipe or brush off as much contamination as possible. Clean sites (i.e., tent or trailer) would be set up for donning/removal of personal protective equipment if practical.
- Non-disposable clothing involved with crash/fire-damaged composite parts would be removed and laundered as determined by the base environmental engineer. Personnel should shower (in cool water) prior to going off-duty to preclude injury from loose fibers. Portable showers would be provided, if necessary.
- Burned/mobile composite fragments and loose ash/particulate residue would be secured with firefighting foam or a fine water mist until a hold-down fixant material is applied to immobilize the fibers. Initial actions should concentrate on debris containment. Investigators, specific aircraft authority, and the base environmental engineer would be consulted before applying any fixant.

FW3.4.2.4.3 Aircraft Mishap Summary

Aviation in all forms has inherent risk and it is not possible to guarantee the future flight-safety risk of any aircraft. However, due to the current F-35A record, the increasing safety trend for single-engine fighter aircraft, and increases in safety as an airframe matures operationally, it is reasonable to expect nominal changes in flight-safety risk to result from implementation of the AFRC F-35 mission at NAS JRB Fort Worth.

FW3.4.2.5 Bird/Wildlife-Aircraft Strike Hazards

The 12.1 percent airfield operations increase resulting from the AFRC F-35A mission could increase the risk of bird/wildlife-aircraft strike. However, strict adherence to the WHMP and the active BASH program activities would minimize these risks. The WHMP would remain in place to reduce the risk of bird/wildlife-aircraft strikes.

FW3.4.3 Airspace Affected Environment

The airspace proposed for use by AFRC F-35A pilots from NAS JRB Fort Worth includes RAs, MOAs, and ATCAAs (Table FW2-5 and Figure FW2-2). Aircraft flight operations are governed by standard flight rules. The volume of airspace encompassed by the combination of airspace elements constitutes the ROI for airspace safety. These training areas allow military flight operations to occur without exposing civil aviation users, military aircrews, or the general public to hazards associated with military training and operations. This section describes the existing safety procedures in the airspace proposed for use and the following section evaluates changes that would occur with the introduction of the F-35A.

FW3.4.3.1 Fire Risk and Management

Fires attributable to flares are rare for three reasons. First, the altitude and other restrictions on flare use minimize the possibility for burning material to contact the ground. Second, to start a fire, burning flare material must contact vegetation that is susceptible to burning at the time. The probability of a flare igniting vegetation is expected to be equally minimal. Third, the amount and density of vegetation, as well as climate conditions, must be capable of supporting the continuation and spread of fire.

Aircraft based at NAS JRB Fort Worth utilize two live fire ranges, the Falcon Range at Fort Sill in Oklahoma and the Fort Hood Range in Texas. Both Fort Sill and Fort Hood conduct prescribed burning and maintain firebreaks to contain fires originating from live-fire areas. Prescribed burning is controlled by the Directorate of Emergency Services and is conducted by qualified personnel. The number of acres treated each season depends on weather conditions and the availability of areas not occupied for training. Areas are usually treated on a 5- to 7-year burn cycle, depending on the success of each burn, although some areas might go for longer periods without treatment (Fort Hood 2013) (USAFACFS 2014).

FW3.4.3.2 Aircraft Mishaps

Aircraft flight operations are governed by standard flight rules. Specific safety requirements are contained in standard operating procedures that must be followed by all aircrews operating from the airfield (AFI 11-2F-16V3, *Flying Operations F-16 Operations Procedures*) to ensure flight safety.

FW3.4.3.3 Bird/Wildlife-Aircraft Strike Hazard

The primary threat to military aircraft operating in the airspace is migratory birds. The exact number of birds struck in the airspace areas is difficult to assess because small birds are not detected until post-flight maintenance checks and the location of such strikes cannot be determined. Refer to Section FW3.4.1.5 for more information regarding BASH and the actions that are implemented to minimize bird strikes.

FW3.4.4 Airspace Environmental Consequences

The addition of F-35A aircraft to the airspace would not require changes to the management or structure of existing airspace. AFRC F-35A pilots would fly mission profiles similar to those currently flown by F-16 pilots operating from NAS JRB Fort Worth, only at higher average altitudes, including air-to-ground ordnance delivery and air combat training operations. Implementation of the proposed AFRC F-35A mission would result in a 1.2 percent increase overall airspace sorties in the existing airspace proposed for use. As described in Section FW3.1.4.1, total sorties would remain within the capability and capacity of the airspace and ranges proposed for use.

FW3.4.4.1 Fire Risk and Management

Flare and ordnance deployment in authorized ranges and airspace is governed by a series of regulations based on safety and environmental considerations and limitations. These regulations establish procedures governing the use of flares over ranges, other government-owned and -controlled lands, and nongovernment-owned or -controlled areas. Chapter 2, Section 2.3.4.2, details the flares and ordnance proposed for use by AFRC F-35A pilots.

The frequency of flare use would remain the same or decrease from baseline conditions. AFRC F-35A pilots would only use flares in compliance with existing airspace altitude and seasonal restrictions to ensure fire safety. Based on the emphasis of flight at higher altitudes, roughly 90 percent of F-35A flares released throughout the authorized airspace would occur above 15,000 feet MSL, further reducing the potential risk for accidental fires. Lands surrounding the air-to-ground training impact areas underlying airspace ensure public protection by restricting access to areas associated with laser use, emitters, and ordnance delivery. All guidance, regulations, and instructions for ordnance delivery at the ranges would be adhered to by AFRC F-35A pilots. Mutual fire response and suppression agreements would continue.

FW3.4.4.2 Aircraft Mishaps

Continued maintenance of situational awareness and use of available communications for tracking the scheduled and near real-time status of the SUAs would help maintain a safe flying environment for all concerned. Any changes to those capabilities and the current or future areas in which this service is provided would be appropriately addressed and communicated through those same venues. The majority of flight operations would be conducted over remote areas; however, in the unlikely event that an aircraft accident occurs, existing response, investigation, and follow-on procedures would be enforced to ensure the health and safety of underlying populations and lands. Implementation of flight safety procedures and compliance with all flight safety requirements would minimize the chances for aircraft mishaps.

FW3.4.4.3 Bird/Wildlife-Aircraft Strike Hazards

AFRC F-35A pilots would operate the aircraft in the same airspace environment as other pilots from NAS JRB Fort Worth, albeit at a higher altitude than current aircraft. Therefore, the overall potential for bird-aircraft strikes would be reduced following the beddown of the F-35A. When BASH risk increases due to time of year, limits are and would continue to be placed on low-altitude flights. Briefings are provided to pilots when the potential exists for greater bird-strike risks within the airspace; AFRC F-35A pilots would also be subject to these procedures. Implementation of the AFRC F-35A mission would not result in significant BASH risks in the airspace proposed for use.

FW3.4.5 Summary of Impacts to Safety

No unique construction practices or materials would be required as part of any of the demolition, renovation, or construction projects associated with the proposed AFRC F-35A mission. All new construction would incorporate antiterrorism/force protection requirements and would comply with applicable safety regulations.

As of November 2019, the F-35A has amassed more than 96,000 hours of flight time with a Class A mishap rate of 3.11. As the F-35A becomes operationally mature, the F-35 mishap rate would be expected to continue to decline, as supported by the documented decline in mishap rates for the F-16 and A-10.

NAS JRB Fort Worth has an active BASH program and the changes in operations could increase BASH incidents. This increase is not anticipated to be significant. With regard to airspace, AFRC F-35A pilots would use the same airspace used by 924 FG pilots. Impacts to safety resulting from implementation of the new mission are not anticipated to be significant.

FW3.5 SOIL AND WATER RESOURCES

FW3.5.1 Base Affected Environment

FW3.5.1.1 Soil Resources

NAS JRB Fort Worth is located in the Grand Prairie section of the Central Lowlands of north-central Texas (NAS JRB Fort Worth 2015a). This area is characterized as a broad, gently sloping terrace. The predominant soil type at NAS JRB Fort Worth is the Urban land soil complex. Soils in this complex have been altered and disturbed from previous development to the extent that they cannot be classified (Soil Survey Staff 2018). Additional information on soils at the base is provided on the Web Soils Survey (Soil Survey Staff 2018).

FW3.5.1.2 Water Resources

FW3.5.1.2.1 Surface Water

The base and all of Tarrant County are located in the Trinity River Watershed. Surface water on or adjacent to the base includes Lake Worth, Farmers Branch Creek, Kings Branch, and the West Fork of the Trinity River. Lake Worth is a man-made impoundment that serves as the northern border for the installation. Water quality concerns in Lake Worth include polychlorinated biphenyls (PCBs) and dioxins. The Texas Department of State Health Services (TDSHS) has issued a fish consumption advisory for Lake Worth and recommends people limit or avoid consumption of various species of fish (TDSHS 2018). The segment of the West Fork of the Trinity River adjacent to the base is listed on the State of Texas Clean Water Act Section 303 (d) List of Threatened and Impaired Water Bodies. Farmers Branch Creek conveys water from the west side of the installation into the West Fork of the Trinity River. This creek extends under the runways and taxiways through a drainage culvert (NAS JRB Fort Worth 2015a).

The majority of the base is drained by a system of swales, inlets, ditches, and canals. The system also includes a sub-surface storm drainage system. Runoff from the northern part of the base is directed into the Lake Worth outfall. Runoff from the southern part of the base is routed to Farmers Branch Creek and the central and eastern portion of the base is drained into the West Fork of the Trinity River (USAF 1995). Residential and commercial development occurring west of the installation in the City of White Settlement and other areas has the potential to increase stormwater flow over the airfield. Although two 15-foot culverts are located under the runway, the area has infrequently flooded in the past, causing potential runway closures (NAS JRB Fort Worth 2015a).

Regarding water permits, discharges from the base are authorized under Texas Pollutant Discharge Elimination System (TPDES) Multi-Sector General Permit (MSGP) No. TXR050000. The MSGP is valid through 13 July 2021. As part of the MSGP, the base is required to prepare, implement and maintain a Stormwater Pollution Prevention Plan (SWPPP) (NAVFAC 2016). The most recent version of the SWPPP was prepared in 2016 to address the requirements of the MSGP. The plan is reviewed annually and revised as necessary. The plan identifies 42 different drainage areas on the installation, each with its own outfall. Six of the outfalls (1, 3, 4, 5, 6, and 7) are permitted by TPDES for industrial stormwater discharges. With the exception of outfall 7 (because it is substantially similar to outfall 5), stormwater discharge monitoring is conducted at the outfalls that are permitted for industrial discharge. Both visual and analytical monitoring is conducted at each of the six outfalls. The visual monitoring is conducted quarterly and the analytical monitoring is conducted annually.

Section 1.3.1 of the SWPPP includes reference to the TPDES Construction General Permit TXR150000 permit which establishes requirements for construction sites disturbing greater than one acre of soil, including lay-down, ingress and egress areas. Although deicing is discussed in the SWPPP and NAS JRB Fort Worth has a deicing pad, the SWPPP states that, for three years prior to 2016, deicing activities have not been conducted at the installation. In addition, analytical monitoring is only required when 100,000 gallons or more of glycol-based deicing chemicals and/or 100 tons or more of urea are used at the installation in any of the three prior calendar years.

FW3.5.1.2.2 Groundwater

Five major hydrogeologic units are located below the base. The units are described as an upper zone of perched water in alluvial terrace deposits; an aquitard in the Goodland, Limestone, and Walnut Formations; an aquifer in the Paluxy Formation; an aquitard in the Glen Rose Formation; and, an aquifer in the Twin Mountain Formation (NAS JRB Fort Worth 2004). There are no active groundwater supply wells on the base. All of the potable water used on base is received from the City of Fort Worth.

FW3.5.1.2.3 Floodplains

As shown on Figure FW1-2, the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) identifies areas of the 100- and 500- year floodplain located adjacent to Lake Worth, along the West Fork of the Trinity River and along Farmers Branch Creek as it extends under the southern end of the runway and flightline. The majority of the installation is located outside of any floodplains.

FW3.5.2 Base Environmental Consequences

FW3.5.2.1 Soil Resources

Implementation of the projects identified in Table FW2-1 would disturb approximately 7.7 acres of land, most of which has been previously disturbed. Impacts to soil resources near each of the project sites would result from ground disturbance (e.g., compaction; vegetation removal; and excavation for foundations, footings, or utilities). Onsite soils (Urban land) have been disturbed to the point that classification of the soils is not possible (Soil Survey Staff 2018). Implementation of management practices would minimize impacts to soil resources. These actions could include, but would not be limited to, installation of silt fencing and sediment traps, application of water sprays to keep soil from becoming airborne, and revegetation of disturbed areas as soon as possible, as appropriate. Therefore, potential impacts to soil resources would be minimal, and no significant impacts to soil resources would occur as a result of implementation of the proposed AFRC F-35A mission.

FW3.5.2.2 Water Resources

FW3.5.2.2.1 Surface Water

Impacts to surface water can result from land clearing, grading, and moving soil leading to localized increases in stormwater runoff volume and intensity. Approximately 1.2 acre of new impervious surfaces would be created and pollutants have the potential to be introduced into construction areas. In accordance with UFC 3-210-10, *Low Impact Development* (LID) (as amended, 2016) and the Emergency Independence and Security Act (EISA) Section 438 (42 *USC* §17094), any potential increase in surface water runoff as a result of the proposed construction would be attenuated through the use of temporary and/or permanent drainage management features (i.e., use of porous materials, directing runoff to permeable areas, and use of detention basins to release runoff over time). The integration of LID concepts incorporates site design and stormwater management principles to maintain the site's pre-development runoff rates and volumes to further minimize potential adverse impacts associated with increases in impervious surface area.

All of the projects proposed for the new mission are located near the north end of the runway in existing developed areas. With the exception of the trailer maintenance expansion on Building 3355 (Drainage Area 1), all of the proposed development is in Drainage Area 3. Prior to construction, the contractor would be required to obtain coverage under the TPDES Construction General Permit (TXR150000) by filing a NOI with the TCEQ and prepare a site-specific SWPPP to manage stormwater discharges during and after construction until the area is revegetated. The Navy would specify compliance with the stormwater discharge permit in all of the contractor construction requirements. The contractor would be required to prepare the SWPPP in accordance with the TPDES SWPPP Instructions (TCEQ 2018). The plan would include site-specific management practices to eliminate or reduce sediment and non-stormwater discharges. Other management practices in the plan could include the use of water sprays during construction to keep soil from becoming airborne, use of silt fences, covering soil stockpiles, using secondary containment for hazardous materials and revegetating the site in a timely manner.

Drainage Area 1 is approximately 53 acres and drains stormwater from the grassy areas between Taxiway Alpha 2, Foxtrot, and the parking apron. Stormwater is collected through a series of pipes and inlets until it exits through the magazine area, through Outfall 1, and into Lake Worth. The Building 3355 expansion project would occur on existing pavement and no additional impervious surface would be added to this drainage area.

Drainage Area 3 is approximately 280 acres and is the third largest drainage area on the base. This drainage area is composed primarily of impervious surface (NAVFAC 2016). This area drains into a large open channel ditch which directs runoff into large subsurface pipes. A stormwater diversion system behind Building 1803 diverts light precipitation flow towards basin four. During moderate to heavy precipitation flow, stormwater from this area flows over the diversion and through Outfall 3 and into the West Fork of the Trinity River. Approximately one acre of impervious surface would be added to this drainage area accounting for less than a one percent increase in impervious surface.

The existing NAS JRB Fort Worth SWPPP also identifies control practices to be followed for spill prevention and response, routine inspection of discharges at sites, and proper training of employees. As part of the SWPPP, the base has identified individuals to be part of the Stormwater Pollution Prevention Team (SWPPT). The SWPPT meets annually, is responsible for all aspects of the SWPPP and provides recommendations to the Environment, Safety, and Occupational Health Leadership Committee regarding the SWPPP status, any deficiencies, deicing usage data and outfall monitoring data.

No changes to the existing aircraft deicing operations would be necessary with implementation of the new mission. For 3 years prior to 2016, deicing activities have not been conducted at the installation and deicing is not anticipated to be required with the new mission. However, if deicing is required, Building 4199 has a deicing pad and the SWPPP contains provisions for inspections and monitoring when necessary.

Implementation of the AFRC F-35A mission at NAS JRB Fort Worth would not result in significant impacts to water resources.

FW3.5.2.2.2 Groundwater

Implementation of the AFRC F-35A mission would result in a decrease (-102) in personnel, and no additional demand for water from the City of Fort Worth would be required. Implementation of the proposed mission is not anticipated to result in impacts to groundwater resources.

FW3.5.2.2.3 Floodplains

No floodplains are located near any of the areas proposed for infrastructure development on NAS JRB Fort Worth. Therefore no impacts to floodplains would result from implementation of the proposed AFRC F-35A mission.

FW3.5.3 Summary of Impacts to Soil and Water Resources

Implementation of the proposed action would disturb approximately 7.7 acres of land. Approximately 1.2 acres of new impervious surface would be added, resulting in less than a 1 percent increase in impervious surface in this drainage area. No floodplains or groundwater would be impacted. Implementation of management practices would minimize impacts to soil and water resources and projects would be designed and implemented in accordance with LID and EISA to minimize impacts to soil and water resources. Therefore, potential impacts to soil and water resources would be minimal, and no significant impacts to these resources would result from implementation of the proposed action.

FW3.6 BIOLOGICAL RESOURCES

The ROI for biological resources is defined as the land area (habitats) that could be affected by the infrastructure and construction projects on the base, and the primary airspace where AFRC F-35 pilots would predominantly fly. For the purposes of this biological resources analysis, the ROI for the proposed action and No Action Alternative includes Tarrant County, Texas.

FW3.6.1 Base Affected Environment

FW3.6.1.1 Vegetation

NAS JRB Fort Worth is located within a transition zone between the Cross Timbers and Blackland Prairie ecoregions of north-central Texas. This area was once dominated by alternating woodlands and broad tall-grass prairies. Historical vegetation included areas of oak-hickory, open savannah, and dense brush of post and blackjack oaks. Areas surrounding the installation are now primarily developed, with the exception of the shorelines of Lake Worth to the north.

NAS JRB Fort Worth is comprised mostly of improved and semi-improved grounds, with mowed grassland as the primary vegetation community. Little bluestem (*Schizachyrium scoparium*), Indian grass (*Sorghastrum nutans*), big bluestem (*Andropogon gerardi*), and buffalo grass (*Buchloe dactyloides*) are the most common species. Due to historical urban sprawl, the majority of native vegetation that was once present on the installation has now been replaced with non-native grasses and ornamental trees (NAS JRB Fort Worth 2004).

Unimproved areas of the installation include small woodland and riparian patches and the shorelines of Lake Worth. Post oak (*Quercus stellata*), blackjack oak (*Q. marilandica*), cedar elm (*Ulmus crassifolia*), American elm (*U. americana*), hackberry (*Celtis laevigata*), and sumac (*Rhus* spp.) are the most common species of trees. Stream edges and riparian areas are dominated by a thick understory of trumpet vine and shrubs (*Campsis radicans*) and honeysuckle (*Lonicera* spp.). Sporadic patches of rush species (*Juncus* spp.), black willow (*Salix nigra*), and cattails (*Typha* spp.)

are present near the shoreline of Lake Worth. Vegetation management at NAS JRB Fort Worth is guided by the WHMP (NAS JRB Fort Worth 2017b).

FW3.6.1.2 Wildlife

Information on wildlife occurring on NAS JRB Fort Worth is provided in the historical Integrated Natural Resources Management Plan (INRMP) and the WHMP (NAS JRB Fort Worth 2004, 2017b). Grassland and wooded habitats at NAS JRB Fort Worth support numerous small mammals, birds, reptiles, and amphibians. Mammals such as coyotes (*Canis latrans*) and black-tailed hares (*Lepus californicus*) are typically found in the upland grassy areas and along the runways, while cottontail rabbits (*Sylvilagus floridanus*), fox squirrels (*Sciurus niger*), and opossums (*Didelphis virginiana*) inhabit the wooded lowlands. Common bird species include mourning dove (*Zenaidura macroura*), brown-headed cowbird (*Molothrus ater*), western meadowlark (*Sturnella neglecta*), common grackle (*Quiscalus quiscula*), European starling (*Sturnus vulgaris*), and red-tailed hawk (*Buteo jamaicensis*). Although amphibian and reptile surveys have not been conducted on base, the wooded and wet areas along Lake Worth likely support a wide variety of reptiles and amphibians including various species of toads, frogs, turtles, lizards, and snakes.

FW3.6.1.3 Threatened, Endangered, and Special Status Species

FW3.6.1.3.1 Federally Listed Species

The USFWS's Information for Planning and Consultation (IPaC) online system was accessed on 8 February 2018 to identify current USFWS trust resources (e.g., migratory birds, species proposed or listed under the ESA, inter-jurisdiction fishes, specific marine mammals, wetlands, and USFWS National Wildlife Refuge System lands) with potential to occur within the ROI for biological resources at NAS JRB Fort Worth.

On 8 February 2018, the USFWS provided an automated *Official Species List* via Section 7 letter that identified two endangered species protected under the ESA (16 *USC* § 1531 et seq.) that could occur in Tarrant County, Texas. Neither of these two species has been seen on NAS JRB Fort Worth. Table FW3-31 presents these species.

Table FW3-31. Federally Listed Species with Potential to Occur in Tarrant County, Texas

Common Name	Scientific Name	Federal Listing Status	Habitat	Historically Observed at NAS JRB Fort Worth?
Birds				
Least Tern	*Sterna antillarum*	FE	Least terns nest on barren to sparsely vegetated sandbars along rivers, sand and gravel pits, lake and reservoir shorelines, and occasionally on gravel rooftops.	No
Whooping Crane	*Grus americana*	FE	Whooping cranes winter on the Gulf Coast, primarily in Texas's Aransas National Wildlife Refuge. The species nest in potholes dominated by bulrushes and containing other aquatic plants (e.g., cattails, sedge, and muskgrass). Farther inland, their range includes sandy, gently rolling grasslands with live oak, red bay, and bluestem plants. Migrating birds feed in croplands and roost in shallow, freshwater wetlands.	No

Key: FE = federally endangered; FT = federally threatened
Source: NAS JRB Fort Worth 2004; USFWS 2001, 2005, 2014, 2018a, b

No federally listed species are currently known to occur on NAS JRB Fort Worth. This assessment is based on historical surveys completed by the TPWD and subsequent survey work conducted as part of the INRMP (NAS JRB Fort Worth 2004; 2018). Additionally, no critical habitat occurs on or near NAS JRB Fort Worth (USFWS 2018a).

FW3.6.1.3.2 Migratory Birds

Migratory bird species protected under the Migratory Bird Treaty Act (MBTA) (16 *USC* §§ 703–712) could occur as residents or migrants near NAS JRB Fort Worth. The Lake Worth area located directly north of the installation attracts a variety of water birds such as wood duck (*Aix sponsa*), mallard (*Anas platyrhynchos*), pintail (*A. acuta*), golden eye (*Buchepala clangula*), common merganser (*Mergus merganser*), and great blue heron (*Ardea herodias*). Other birds observed near the lake shoreline include killdeer (*Charadrius vociferus*), rock doves (*Columba livia*), house sparrows (*Passer domesticus*), and northern cardinals (*Cardinalis cardinalis*). Although no suitable nesting habitat is present on NAS JRB Fort Worth, peregrine falcons (*Falco peregrinus tundrius*), bald eagles (*Haliaeetus leucocephalus*), interior least terns (*Sterna antillarum athalassos*), various species of gulls, and whooping cranes (*Grus americana*) have been reported to use Lake Worth as stopover habitat during migrations (NAS JRB Fort Worth 2004). The installation WHMP serves as the BASH plan and provides an active program to minimize bird/aircraft strikes, and is based on known hazards from both resident and seasonal bird populations that utilize the area (NAS JRB Fort Worth 2017b).

FW3.6.1.3.3 Bald and Golden Eagles

Bald eagles protected under the Bald and Golden Eagle Protection Act (BGEPA) (16 *USC* 668-668c), have not been observed at NAS JRB Fort Worth. However, bald eagles have been historically observed foraging near Lake Worth within the undisturbed tracts of bottomland forest habitat (TPWD 2018a). There are no known golden eagle (*Aquila chrysaetos*) occurrences on or near NAS JRB Fort Worth (Texas A&M 2007).

FW3.6.1.3.4 State-Listed Species

The TPWD online list of Rare, Threatened, and Endangered Species of Texas by County was reviewed for state-listed species with potential to occur within the ROI for biological resources at NAS JRB Fort Worth (TPWD 2018b). No state-listed species are known to occur at NAS JRB Fort Worth (NAS JRB Fort Worth 2004, 2018b).

FW3.6.1.4 Wetlands

According to the INRMP, NAS JRB Fort Worth contains a single 1.3 acre jurisdictional wetland, as determined by the U.S. Army Corps of Engineers (USACE) under Section 404 of the Clean Water Act (CWA) (NAS JRB Fort Worth 2004). The wetland is located along a fence that controls access between the base and the West Fork of the Trinity River, east of Knights Lake Road and the NAS JRB Fort Worth Chapel (NAS JRB Fort Worth 2004).

FW3.6.2 Base Environmental Consequences

FW3.6.2.1 Vegetation

Activities associated with construction, demolition, and renovation projects would occur in developed or disturbed areas within the commercial land use area of NAS JRB Fort Worth. Revegetation of temporarily disturbed areas would be conducted as directed by the base natural resource manager to minimize the potential for erosion and dust generation. No significant impacts to vegetation would result from implementation of the AFRC F-35A mission at NAS JRB Fort Worth.

FW3.6.2.2 Wildlife

Potential impacts to wildlife could include ground disturbance and construction noise from the associated facility and infrastructure projects. In addition, airfield operations can result in bird/wildlife-aircraft strikes and noise impacts.

The areas planned for development for the proposed AFRC F-35A mission at NAS JRB Fort Worth are highly disturbed and provide little habitat for wildlife species. The existing turfgrass and landscaped areas provide some urban adapted wildlife species with limited habitat. This habitat would be lost with construction of the proposed facilities and infrastructure projects.

Noise resulting from the proposed construction, demolition, and renovation activities would be localized, short-term, and only occur during daylight hours. Areas proposed for construction are in a military industrial land use with frequent elevated noise levels. Impacts to wildlife from construction noise would be minimal.

Annual airfield operations are anticipated to increase by approximately 12.1 percent (Section FW2.3). Any increase in operations could increase the potential for bird/wildlife-aircraft strikes. NAS JRB Fort Worth would continue to adhere to the installation's WHMP and employ wildlife dispersal methods as outlined in the USFWS issued Depredation Permit to minimize the risk of strikes.

Impacts to wildlife and domestic animals that could result from aircraft noise are summarized below and discussed in more detail in Volume II, Appendix B. As described in Section FW3.2.2, there would be an increase in the number of acres exposed to DNL of 65 dB or greater. This increase in noise levels surrounding NAS JRB Fort Worth would result in an increase in the numbers of animals exposed to higher noise levels. Animals hear noise at different levels, in different frequency ranges, and tolerate noise differently than humans. These differences make comparing the noise metrics created for evaluating human impacts to animal impacts difficult. However, the number of noise events per hour with potential to interfere with speech (Table FW3-16) can be used as an indicator of changing frequency noise events that could affect animals. For example, under baseline conditions animals in Malaga Park currently experience four events per hour that are at a sufficient level to interfere with human speech. Implementation of the proposed mission would increase this number by one event per hour.

Volume II, Appendix B, summarizes a number of scientific studies that have been conducted on the effects of aircraft noise on animals. These studies have shown that animal species have a wide range of responses to aircraft noise. One conclusion of these studies is that a general response to noise by domestic animals and wildlife is a startle response. These responses vary from flight, trampling, stampeding, jumping, or running to the movement of the head in the directions of the noise. These studies report that the intensity and duration of the startle response decreases with time, suggesting no long-term, adverse effects. The majority of the studies suggest that domestic animal species and wildlife show behaviors characteristic of adaptation, acclimation, and habituation to repeated aircraft noise (Volume II, Appendix B). Therefore, significant impacts to wildlife are not anticipated in the ROI surrounding NAS JRB Fort Worth.

FW3.6.2.3 Threatened, Endangered, and Special Status Species

FW3.6.2.3.1 Federally Listed Species

Because no federally listed threatened, endangered, or candidate species and/or designated critical habitat occur in the ROI near NAS JRB Fort Worth, no impacts would result from implementation of the proposed AFRC F-35A mission in the areas surrounding NAS JRB Fort Worth. In an email dated 27 June 2018, the USFWS agreed that ESA Section 7 requirements had been applied and that no further Section 7 consultation is required (Volume II, Appendix A, Section A.2.6.4).

FW3.6.2.3.2 Migratory Birds

Implementation of the AFRC F-35A mission at NAS JRB Fort Worth would result in a 12.1 percent increase in total annual airfield operations. Any increase in operations could result in an increased opportunity for bird-aircraft strikes to occur. Adherence to the existing WHMP would minimize the risk of bird-aircraft strikes including those for migratory birds to negligible levels (Section FW3.4.1). Noise-related impacts to migratory birds nesting near NAS JRB Fort Worth would be the same as those described for other wildlife. Minimal impacts to migratory birds protected under the MBTA would result from implementation of the proposed AFRC F-35 mission in the ROI near NAS JRB Fort Worth.

FW3.6.2.3.3 Bald and Golden Eagles

No bald or golden eagles or eagle nesting is known to occur at NAS JRB Fort Worth or in the immediate vicinity of the installation and therefore impacts to sensitive nesting habitat would not occur. Bald eagles are known to forage near the installation and noise-related impacts to these bald eagles would be similar to that described for other wildlife. No significant impacts to eagles protected under the BGEPA are anticipated to result from implementation of the proposed AFRC F-35A mission in the ROI near NAS JRB Fort Worth.

FW3.6.2.3.4 State-Listed Species

No state-listed species are known to occur at NAS JRB Fort Worth and therefore no impacts to state-listed species would result from implementation of the proposed AFRC F-35A mission at NAS JRB Fort Worth.

In a letter dated 2 May 2018, the TPWD provided recommendations regarding the proposed AFRC F-35A mission and biological resources at NAS JRB Fort Worth. See Volume II, Appendix A, Section A.2.6.1, for a copy of the scoping letter. The TPWD identified specific state-listed species that have a greater potential of being impacted by the proposed project. These included the timber rattlesnake (*Crotalus horridus*), Western burrowing owl (*Athene cunicularia hypugaea*), plains spotted skunk (*Spilogale putorius interrupta*), and Texas garter snake (*Thamnophis sirtalis annectens*). The TPWD also provided recommendations to address species protected under the MBTA, ESA, and habitats for state-listed species were provided.

All of the proposed facility and infrastructure projects would occur entirely in developed or disturbed areas within the improved or semi-improved grounds on base. No construction activities would occur in riparian or stream corridors. As described in Section FW3.6.2.2, wildlife habitat in the proposed construction areas is limited. The only potential habitat in the proposed construction area would be for the Western burrowing owl. These owls are known to nest in developed and semi-developed areas. No populations of the Western burrowing owl have been observed at

NAS JRB Fort Worth and no other suitable habitats for state-listed species are known to occur in the proposed construction areas.

The TPWD letter also addressed the use of artificial nighttime lighting and subsequent adverse impacts such as disorientation and exhaustion to night-migrating birds. The TPWD recommends the USAF use the minimum amount of night-time lighting needed for safety and security and to use dark-sky friendly lighting that is on only when needed, down-shielded, as bright as needed, to minimize blue light emissions. Under the proposed action, NAS JRB Fort Worth would continue to employ Pilot Controlled Lighting (PCL) phase, within the runway, taxiway, and approach to minimize any use of artificial nighttime lighting. Under the PCL phase, lighting is manually controlled by the pilots during takeoff or landing in the evenings when the tower is closed. See Section FW3.6.3.3.2 for an additional discussion on migratory birds within the airspace proposed for use. No impacts to state-listed species would result from implementation of the proposed AFRC F-35 mission at NAS JRB Fort Worth.

FW3.6.2.4 Wetlands

Construction, demolition, and renovation projects associated with the proposed action would not occur within or near any wetland areas. Therefore, there would be no impacts to wetlands at NAS JRB Fort Worth.

FW3.6.3 Airspace Affected Environment

The primary airspace and range area proposed for use by AFRC F-35A pilots comprises the ROI for biological resources.

FW3.6.3.1 Vegetation

The airspace proposed for use by AFRC F-35A pilots from NAS JRB Fort Worth covers approximately 16,133 square miles of land in north-central Texas and southern Oklahoma. Primary range area covers approximately 491 square miles of land in Oklahoma and primary airspace covers approximately 4,224 square miles of land in north-central Texas (Figure FW2-2). Vegetation communities under the airspace proposed for use includes those of the Cross Timbers ecoregion. Native vegetation of this area was once dominated by woodlands (oak-hickory and post-oak savannah) and irregular plains and prairies with tall-growing grasses such as big bluestem (*Andropogon gerardii*), little bluestem (*Schizachyrium scoparium*), Indian grass (*Sorghastrum nutans*), and switchgrass (*Panicum virgatum*). However, crop production and cattle ranching have drastically changed the landscape (TPWD 2018c).

FW3.6.3.2 Wildlife

The Cross Timbers ecoregion supports a wide range of wildlife species. Common mammal species known from the region include white-tailed deer (*Odocoileus virginianus*), mule deer (*O. hemionus*), desert bighorn sheep (*Ovis canadensis nelsoni*), pronghorn antelope (*Antilocapra americana*), gray squirrel (*Sciurus carolinensis*), fox squirrel, and collared peccary (*Pecari tajacu*). Common bird species of the region include eastern turkey (*Meleagris gallopavo silvestris*), various quail species (*Colinus virginianus*, *Callipepla squamata*, *C. gambelii*, *Cyrtonyx montezumae*),) ducks, geese, coots, rails, snipes, woodcock, and doves (mourning, white-tipped or white-fronted). Common reptiles and amphibians of the region include a wide variety of lizards (e.g., collard lizards [*Crotaphytus collaris*], spiny lizards [*Sceloporus* spp.], and horned lizards [*Phrynosoma* spp.], whiptails (*Aspidoscelis* sp.), snakes, turtles, skinks (*Plestiodon* spp.), alligators, geckos, frogs (*Pseudacris* spp., *Hyla* spp.), and toads (*Bufo* spp.).

FW3.6.3.3 Threatened, Endangered, and Special Status Species

FW3.6.3.3.1 Federally Listed Species

Federally listed threatened, endangered, and/or candidate species that could occur within the 14 counties included in the analysis of primary airspace and range areas proposed for use are presented in Table FW3-32. Due to the limited nature of ground disturbance in the areas under the primary airspace, plant, invertebrate, and fish species were excluded from further analysis. No critical habitat is present under the primary airspace and ranges.

Table FW3-32. Federally Listed Species with Potential to Occur Under Primary Airspace and Primary Ranges Associated with the Proposed Action at NAS JRB Fort Worth

Common Name	Scientific Name	Federal Listing Status	Habitat
Birds			
Least Tern	*Sterna antillarum*	FE	Least terns nest on barren to sparsely vegetated sandbars along rivers, sand and gravel pits, lake and reservoir shorelines, and occasionally on gravel rooftops.
Whooping Crane	*Grus americana*	FE	Whooping cranes winter on the Gulf Coast, primarily in Texas's Aransas National Wildlife Refuge. The species nests in potholes dominated by bulrushes and containing other aquatic plants (e.g., cattails, sedge, and muskgrass). Farther inland, their range includes sandy, gently rolling grasslands with live oak, red bay, and bluestem plants. Migrating birds feed in croplands and roost in shallow, freshwater wetlands.
Piping Plover	*Charadrius melodus*	FT	Piping plovers are found on mudflats, sandy beaches, and shallow wetlands with sparse vegetation. The species can also be found along the margins of lakes and large rivers where there is exposed (bare) sand or mud.
Red Knot	*Calidris canutus rufa*	FT	The red knot migrates annually between its breeding grounds in the Canadian Arctic and wintering regions, including the southeast United States, the northwest Gulf of Mexico, northern Brazil, and the southern tip of South America.
Golden-cheeked Warbler	*Dendroica chrysoparia*	FE	Golden-cheeked warbler habitat includes woodlands with tall Ashe juniper (colloquially “cedar”), oaks, and other hardwood trees.

Key: FE = federally endangered; FT = federally threatened
Source: NAS JRB Fort Worth 2004; ODWC 2011, 2017; USFWS 2001, 2005, 2014, 2018b, c; TPWD 2018d

FW3.6.3.3.2 Migratory Birds

The primary airspace and range areas proposed for use are located in the USFWS designated Bird Conservation Region 21 Oaks and Prairies under the Central Flyway (USFWS 2008). Under AFI 91-202 and AFI 91-212, *Bird/Wildlife Aircraft Strike Hazard (BASH) Management Program*, NAS JRB Fort Worth employs a WHMP that serves as the BASH program that establishes an overall bird/wildlife control program to minimize aircraft exposure to potentially hazardous wildlife strikes.

FW3.6.3.3.3 Bald and Golden Eagles

Habitat and historic range for the bald eagle includes the primary airspace and range areas proposed for use. Habitat for the bald eagle in Texas generally includes large aquatic environments such as ocean coasts, reservoirs, large lakes and rivers, marshes and swamps where they can forage and scavenge for prey (Texas A&M 2007).

FW3.6.3.3.4 USFWS National Wildlife Refuge System Lands

The primary airspace and range areas proposed for use occur over the Wichita Mountains National Wildlife Refuge (WMWR) adjacent to Fort Sill Army post in Lawton, Oklahoma. The 59,020-acre WMWR is an ecosystem management partner of Fort Sill, collaborating on special status species management, wildfire protection, fish stocking, and trespass issues (USAFACFS 2014).

FW3.6.4 Airspace Environmental Consequences

Impacts to biological resources occurring under the airspace proposed for use by AFRC F-35A pilots could result from overflights and associated noise, sonic booms, the use of munitions and flares, and bird-aircraft collisions. A review of current literature evaluating potential noise effects on wildlife is presented in Volume II, Appendix B.

FW3.6.4.1 Vegetation

Ground disturbance beneath the airspace proposed for use would be limited to the use of flares and munitions, which would be less than or the same as what is currently being used by F-16 pilots from NAS JRB Fort Worth and would only occur in areas that are currently approved for such use. No significant impacts to vegetation would result from implementation of the AFRC F-35 mission in the areas under the airspace proposed for use by AFRC F-35A pilots stationed at NAS JRB Fort Worth.

FW3.6.4.2 Wildlife

All airspace proposed for use by AFRC F-35A pilots is currently used as active military airspace by military jet aircraft; therefore, no new types of impacts would be introduced into these areas as a result of introducing the F-35A aircraft. Potential impacts for overflights and associated noise, sonic booms, munitions and flares, and bird-aircraft collisions are described as follows.

As shown on Figure FW3-4, L_{dnmr} would remain less than 45 dB beneath the Brownwood, Hood, Lancer, Rivers, Sheppard, and Washita MOAs. Wildlife that are under the path of training overflights would be exposed to short, but intense noise events from overflights. These training airspace areas are very large, and training operations are sufficiently spread out such that intense overflight noise events at any one location are infrequent.

In R-6302, L_{dnmr} would remain at 55 dB, and L_{dnmr} would increase from below 45 dB to 49 dB in R-5601/R-5602. Low time-averaged noise levels (e.g., L_{dnmr}), such as those modeled for R-6302, do not imply that loud overflights do not or would not occur. Rather, they should be interpreted to mean that intense overflight noise events occur less frequently than in other areas.

Some physiological/behavioral responses (from both subsonic and supersonic noise) such as increased hormonal production, increased heart rate, and reduction in milk production have been described in a small percentage of studies. A majority of the studies focusing on these types of effects have reported short-term or no effects.

The relationships between physiological effects and how species interact with their environments have not been thoroughly studied. Therefore, the larger ecological context issues regarding physiological effects of jet aircraft noise (if any) and resulting behavioral pattern changes are not well understood.

Animal species exhibit a wide variety of responses to noise. It is therefore difficult to generalize animal responses to noise disturbances or to draw inferences across species, as reactions to jet aircraft noise appear to be species-specific. Consequently, some animal species could be more sensitive than other species and/or may exhibit different forms or intensities of behavioral responses. For instance, the results of one study indicate that wood ducks appear to be more sensitive to noise and more resistant to acclimation to jet aircraft noise than Canada geese (Edwards et al. 1979). Similarly, wild ungulates (e.g., deer) seem to be more easily disturbed than domestic animals.

Animal responses to aircraft noise appear to be somewhat dependent on, or influenced by, the size, shape, speed, proximity (vertical and horizontal), engine noise, color, and flight profile of planes (see Volume II, Appendix B2.14 for additional information). Other factors influencing response to jet aircraft noise may include wind direction, speed, and local air turbulence; landscape structures (i.e., amount and type of vegetative cover); and, in the case of bird species, whether the animals are in the incubation/nesting phase. Proposed AFRC F-35A training would primarily occur at high altitudes, with 94 percent of total training time being spent at altitudes above 10,000 feet MSL. The higher flight profile could reduce the response of wildlife to aircraft noise.

The literature does suggest that common responses include the “startle” (or “fright”) response and, ultimately, habituation. It has been reported that the intensities and durations of the startle response decrease with the numbers and frequencies of exposures, suggesting no long-term adverse effects. The majority of the literature suggests that domestic animal species (cows, horses, chickens) and wildlife species exhibit adaptation, acclimation, and habituation after repeated exposure to jet aircraft noise and sonic booms.

In summary adverse behavioral responses ranging from mild to severe could occur in individual animals as a result of loud overflights or sonic booms. Mild responses include head raising, body shifting, or turning to orient toward the aircraft. Moderate disturbance could be nervous behaviors, such as trotting a short distance. Escape is the typical severe response (Volume II, Appendix B).

AFRC F-35A pilots would conduct supersonic training above the Brownwood MOAs at altitudes of 30,000 feet MSL or higher, as is currently conducted by F-16 pilots under baseline conditions. The number of training sorties flown in the Brownwood MOAs would decrease under the proposed action, and the number of sonic booms is anticipated to decrease proportionally. Therefore no additional impacts related to supersonic noise are anticipated.

Flares would be used as a defensive countermeasure by AFRC F-35A pilots during training operations. Flares would only be used in airspace areas currently approved for flare use. Flare use by AFRC F-35A pilots would conform to existing altitude and seasonal restrictions to ensure fire safety. Based on the emphasis on flight at higher altitudes for the F-35A, roughly 90 percent of flares released throughout the authorized airspace would occur above 15,000 feet MSL, further reducing the potential risk for accidental fires or adverse impacts to underlying land areas and habitats. Ordnance delivery would only occur in ranges authorized for use. AFRC F-35A pilots would use the same amount of flares and ordnance as the current F-16 pilots, resulting in no change to the potential for adverse impacts to wildlife under the training airspace.

AFRC F-35A pilots would fly at higher altitudes than F-16 pilots, with the majority (99 percent) of operations occurring above 5,000 feet AGL (operations under 5,000 feet AGL would occur less frequently than baseline operations). Most birds fly below 500 feet, except during migration (Section FW3.6.4.3.2). No F-35A low-level flight training is expected to occur below 500 feet AGL and the potential for bird-aircraft collisions would be minor.

FW3.6.4.3 Threatened, Endangered, and Special Status Species

FW3.6.4.3.1 Federally Listed Species

Potential impacts to federally listed species and critical habitats that could occur under the airspace proposed for use would be the same as those described for wildlife. Therefore, it is anticipated that significant adverse impacts to federally listed species would not result from implementation of the AFRC F-35A mission.

FW3.6.4.3.2 Migratory Birds

Implementation of the AFRC F-35A mission at NAS JRB Fort Worth would result in slight increase (1.2 percent) in aircraft sorties in the training airspace. Increased operations could result in an increased opportunity for bird-aircraft strikes. The chances of such bird-aircraft strikes are considered unlikely for the following reasons. AFRC F-35A pilots would predominantly fly above 5,000 feet AGL. Most bird strikes (95 percent) occur below 5,000 feet AGL. Except during migration most birds spend the majority of their time below 500 feet. Migrations typically occur in ranges from 500 to 2,000 feet. The highest known flight of a North American migratory bird species is that of the mallard duck (*Anas platyrhynchos*), which has been observed to fly as high as 21,000 feet (World Atlas 2016). Vultures *(Aegypius monachus)* sometimes rise to elevations higher than 10,000 feet in order to scan larger areas for food and to watch the behavior of distant vultures for clues to the location of food sources (Stanford University 1988). Due to the predominant use of higher altitudes, implementation of the proposed AFRC F-35A mission would result in minimal impacts to migratory birds protected under the MBTA.

Current procedures for avoiding flight operations during periods of high concentrations of migratory birds (both in space and time) would continue. Adherence to the existing, BASH program would minimize the risk of bird-aircraft strikes including those for migratory birds to negligible levels (see Section FW3.4). NAS JRB Fort Worth would continue to adhere to conditions outlined under the WHMP and implement BASH program activities to minimize bird/aircraft strikes. The WHMP would remain in place to reduce bird/wildlife-aircraft strike risks. Due to the predominant use of higher altitudes, implementation of the proposed AFRC F-35A mission would result in minimal impacts to migratory birds protected under the MBTA.

FW3.6.4.3.3 Bald and Golden Eagles

Potential impacts to bald and golden eagles and habitats that occur in areas under the primary airspace and range areas would be similar to those described in Section FW3.6.4.3.2. AFRC F-35A pilots would fly at higher altitudes than F-16 pilots, further reducing the potential for BASH and noise-related impacts. As such, no impacts to eagles would result from implementation of the proposed AFRC F-35A mission at NAS JRB Fort Worth.

FW3.6.5 Summary of Impacts to Biological Resources

Construction activities on the base would occur in previously disturbed areas. Impacts to wetlands and protected species would not result from implementation of the proposed action. Noise resulting from construction activities would not adversely affect wildlife or protected species because areas where construction is proposed are currently exposed to high noise levels. The increase in aircraft operations near the base and in the airspace proposed for use could result in slight increases in bird-aircraft strikes. Aircraft operations near NAS JRB Fort Worth and in the airspace proposed for use would expose some animal and wildlife species to increased levels of noise. The majority of the studies suggest that domestic animal species and wildlife show behaviors characteristic of adaptation, acclimation, and habituation to repeated aircraft noise. Therefore, only minor impacts to animals and wildlife are not anticipated in the ROI surrounding NAS JRB Fort Worth.

FW3.7 CULTURAL RESOURCES

Cultural resources are historic districts, sites, buildings, structures, or objects considered important to a culture, subculture, or community for scientific, traditional, religious, or other purposes. They include archaeological resources, architectural/engineering resources, and traditional resources. Cultural resources that are eligible for listing on the National Register of Historic Places (NRHP) are known as historic properties.

FW3.7.1 Base Affected Environment

FW3.7.1.1 Architectural Resources

Historical building inventories at NAS JRB Fort Worth (USAF 1993, Earth Technologies Inc. 1994) have identified two buildings that are eligible for listing in the NRHP. Building 247 is a private residence that was constructed around 1930 and is located in the base housing area to the east of the airfield. Building 4175 is a crew readiness facility constructed in 1960 and located off the north end of the runway. NAS JRB Fort Worth has concluded that no other NRHP-eligible buildings are present on the installation.

FW3.7.1.2 Archaeological Resources

In 1990, an archaeological survey was conducted on the former Carswell AFB (now NAS JRB Fort Worth). The survey report indicates no significant potential for undiscovered sites exists at the installation (NAS JRB Fort Worth 2004). The Texas SHPO concurred with these findings in a letter dated 5 March 1991.

FW3.7.1.3 Traditional Resources

NAS JRB Fort Worth has identified 16 tribes potentially affiliated with the installation. These tribes, listed in Table A-1 in Volume II, Appendix A, Section A.6.2, were asked to provide information on any properties to which they attach religious or cultural significance. No known tribal sacred sites or properties of traditional religious and cultural importance are located on NAS JRB Fort Worth.

FW3.7.2 Base Environmental Consequences

Implementation of the proposed AFRC F-35A mission at NAS JRB Fort Worth would include the construction of five new facilities, demolition of five buildings, and 12 renovation projects (Table FW2-1 and Figure FW2-1). Initially all buildings within the Area of Potential Effects (APE) had been evaluated for NRHP eligibility and determined non-eligible, and the Texas SHPO concurred with these findings (see letter dated 22 June 2018 Volume II, Appendix A, Section A.6.3). After concurrence was received from the SHPO, two additional projects were added to the proposed action. NAS JRB Fort Worth determined that no historic properties would be affected by the addition of the two projects, and the SHPO concurred with this determination (see letter dated 11 April 2019 Volume II, Appendix A, Section A.6.3).

No impacts to known archaeological resources would result from implementation of the proposed AFRC F-35A mission at NAS JRB Fort Worth. All portions of the base with proposed construction are either in areas that have already been disturbed by previous construction or have been inventoried for archaeological resources. No NRHP-eligible archaeological resources have been identified in the APE. Because ground-disturbing activities would occur in previously disturbed and inventoried areas, it is extremely unlikely that any previously undocumented archaeological resources would be encountered during facility demolition, renovation, addition, or construction. In the case of unanticipated or inadvertent discoveries, the USAF would comply with NHPA and Native American Graves Protection and Repatriation Act (NAGPRA) regulations.

NRHP-eligible facilities located on the installation (Buildings 247 and 4175) are located outside the APE and there would be no direct impact to historic properties. Indirect impacts on cultural resources from population changes, noise or visual intrusions would be extremely unlikely. The total authorized personnel for NAS JRB Fort Worth would decrease slightly (1.1 percent) with the proposed action. This small population change would not have an indirect impact on cultural resources at the installation. Building 247 is located within the current 65 to 70 dB DNL contour and would remain in that contour with implementation of the proposed action. Building 4175 is located within the current 70 to 75 dB DNL contour and would remain in that contour with implementation of the proposed action. These facilities have been part of the active military installation including exposure to aircraft related noise since their construction with no adverse impacts. Visual intrusion from the proposed action would not be a significant issue. Buildings 247 and 4175 derive their historical significance from association with military activities and their setting within a military installation. New construction would occur in the context of an active military base, where changes in the infrastructure are common. The viewshed of remaining historic properties would not be affected by the proposed construction.

No Section 106 impacts to tribal resources or traditional cultural properties are anticipated to result from implementation of the AFRC F-35A mission. As required by Sections 101(d)(6)(B) and 106 of the NHPA; implementing regulations prescribed in 36 *CFR* Section 800.2(c)(2); EO 13175, *Consultation and Coordination with Indian Tribal Governments;* DoDI 4710.02; and AFI 90-2002, *Air Force Interactions with Federally-Recognized Tribes*, NAS JRB Fort Worth initiated Section 106 government-to-government consultation with 16 tribes to identify traditional cultural properties. Volume II, Appendix A, Section A.2.6.2 contains a record of these consultations. The consultation correspondence included an invitation to participate in the NEPA and Section 106 process, and an invitation to consult directly with the NAS JRB Fort Worth Commander regarding any comments, concerns, and suggestions.

The Cheyenne and Arapaho Tribes of Oklahoma and the Comanche Nation of Oklahoma responded to initial scoping letters and indicated that they had no interest or no properties in the APE of the proposed action. Nine (9) other tribes responded to additional outreach efforts. Altogether 11 tribes have responded to USAF requests for information or consultation. Section 106 consultation is considered complete for all tribes and NAS JRB Fort Worth will continue to coordinate with interested tribes throughout the EIS process.

FW3.7.3 Airspace Affected Environment

Table FW3-33 presents the NRHP-listed sites and Native American Reservation lands under the airspace currently used by military pilots and proposed for use by AFRC F-35A pilots from NAS JRB Fort Worth. The NAS JRB Fort Worth training airspace overlies at least part of 18 Oklahoma counties (Atoka, Bryan, Caddo, Choctaw, Comanche, Cotton, Grady, Jackson, Jefferson, Kiowa, Latimer, Le Flore, McCurtain, Pittsburg, Pushmataha, Stephens, Tillman, and Washita) and 22 Texas counties (Bell, Borden, Brown, Callahan, Coleman, Comanche, Concho, Coryell, Dawson, Eastland, Erath, Fisher, Garza, Kent, Llano, Lynn, McCulloch, Mills, Runnels, San Saba, Scurry, and Stonewall). Ninety-six (96) NRHP-listed properties have been identified under NAS JRB Fort Worth airspace. Twenty-three (23) of these are located under the primary airspace and range areas. Nine (9) Native American tribes are known to own land under the proposed airspace (Kiowa Tribe of Oklahoma, Comanche Nation of Oklahoma, Apache Tribe of

Oklahoma, Fort Sill Apache Tribe of Oklahoma, Choctaw Nation of Oklahoma, Caddo Nation of Oklahoma, Wichita and Affiliated Tribes, Delaware Nation, and Cheyenne and Arapaho Tribes of Oklahoma). No known traditional cultural resources have been identified under the airspace. It is possible that such resources could exist in the area as the exact location of some traditional cultural resources is confidential.

Table FW3-33. NRHP-Listed Sites and Native American Reservation Lands Under NAS JRB Fort Worth Training Airspace

Airspace Designations	Number of NRHP Properties Under Airspace[a]	Native American Reservation Lands Under Airspace[a]
Brady High/Low/North MOA	3	None
Brownwood 1 and 2 East MOA	14	None
Hood Hi and Low and Gray MOAs	1	None
Lancer MOA	6	None
R-5601/R-5602	17	Kiowa Tribe of Oklahoma Comanche Nation of Oklahoma Apache Tribe of Oklahoma Fort Sill Apache Tribe of Oklahoma
Rivers MOA	23	Choctaw Nation of Oklahoma
Sheppard 1 MOA	22	None
Washita MOA	10	Kiowa Tribe of Oklahoma Comanche Nation of Oklahoma Apache Tribe of Oklahoma Fort Sill Apache Tribe of Oklahoma Caddo Nation of Oklahoma Wichita and Affiliated Tribes Delaware Nation Cheyenne and Arapaho Tribes, Oklahoma

[a] Due to the sensitivity of the locations, archaeological sites are not included in this table or shown on any figures.

FW3.7.4 Airspace Environmental Consequences

Implementation of the proposed action would result in a 1.2 percent increase in the total sorties conducted annually in the airspace proposed for use. As described in Section FW3.2.4.2, subsonic noise levels under the training airspace would generally remain the same. L_{dnmr} would increase by 4 dB in R-5601/R-5602 and would not exceed 56 dB in any of the training airspace areas. Supersonic flights would continue to occur above the Brownwood MOAs at altitudes of 30,000 feet MSL or higher. However, AFRC F-35A pilots would fly fewer sorties in this airspace. Less than one sonic boom per day currently reaches the ground, and this number would decrease with implementation of the AFRC F-35A mission.

No impacts on historic properties under the NAS JRB Fort Worth training airspace are expected. Scientific studies of the effects of noise and vibration on historic properties have considered potential impacts on historic buildings, prehistoric structures, water tanks, archaeological cave/shelter sites, and rock art. These studies have concluded that overpressures generated by supersonic overflight were well below established damage thresholds and that subsonic operations would be even less likely to cause damage (Volume II, Appendix B, Section B.2.10).

Use of ordnance and flares would continue in areas where they are currently used. No additional ground disturbance would occur. Existing use of flares and ordnance is not known to have impacted historic resources under the airspace; therefore, the continued use of flares and ordnance from F-35A aircraft is not expected to result in impacts.

FW3.7.4.1 Native American Concerns

During scoping, the USAF contacted 16 federally affiliated Native American tribes to invite them to attend the public meetings and express their concerns about the potential F-35A beddown at NAS JRB Fort Worth. Two (2) tribes, the Comanche Nation of Oklahoma and the Cheyenne and Arapaho Tribes of Oklahoma, replied that they had no interest in the project or no properties in the project area. No other tribal comments or concerns were received during the public scoping process.

In accordance with Section 106 of the NHPA and EO 13175, the USAF has contacted the remaining 14 tribes to consult on a government-to-government basis regarding their concerns about potential impacts on traditional cultural resources and traditional cultural properties under airspace associated with NAS JRB Fort Worth. Nine (9) additional Native American tribes have responded to the Section 106 Consultation letters. Section 106 consultation is considered complete for all tribes and NAS JRB Fort Worth will continue to coordinate with interested tribes throughout the EIS process.

FW3.7.5 Summary of Impacts to Cultural Resources

No known archaeological sites or NRHP-eligible facilities are located in any of the proposed construction footprints at NAS JRB Fort Worth. No historic properties would be impacted through the implementation of the AFRC F-35A mission in the airspace proposed for use. Therefore, the USAF has determined that no historic properties would be impacted by the implementation of the AFRC F-35A mission. Section 106 consultation with the Texas SHPO is complete. NAS JRB Fort Worth will continue to coordinate with interested tribes throughout the EIS process. Implementation of the AFRC F-35A mission is not anticipated to result in significant impacts to cultural resources.

FW3.8 LAND USE AND RECREATION

FW3.8.1 Base Affected Environment

FW3.8.1.1 Land Use

On-base construction would be consistent with established base land uses. Because potential land use consequences would primarily be noise-related, the discussion in this section focuses on noise-related land use regulations and compatibility constraints. The following paragraphs address federal, state, and local statures, regulations, programs, and plans that are relevant to the analysis of land use for NAS JRB Fort Worth and the surrounding areas.

Installation Development Plan (IDP). The NAS JRB Fort Worth IDP guides future development and land use decisions at NAS JRB Fort Worth (NAS JRB Fort Worth 2015a).

Regional Joint Land Use Study (JLUS). The JLUS for NAS JRB Fort Worth was published in 2017 as part of the Joining Forces Process in Texas (NCTCOG 2017). The JLUS was developed to reduce or, when feasible, eliminate non-compatibility issues between the military and surrounding civilian land uses. The JLUS is a planning tool which includes several cities in Tarrant County: Fort Worth, Benbrook, Lake Worth, River Oaks, Sansom Park, Westover Hills, Westworth Village, and White Settlement. The JLUS focuses on and uses the CZ and APZs to work with communities in support of compatible land uses. Noise contours are identified in the JLUS and land use compatibility for noise levels is explained. As described in the JLUS, new development pressures and flight obstructions are the two primary concerns associated with this installation.

City of Fort Worth 2018 Comprehensive Plan. The comprehensive plan for Fort Worth is the official guide for making decisions about growth and development. This plan was shaped by citizens' comments and lays a successful foundation for the future of Fort Worth (Fort Worth 2018).

City of Lake Worth Comprehensive Land Use Plan Update. The City of Lake Worth 2035 Comprehensive Plan was adopted on 10 April 2018. The 2018 update to the Comprehensive Plan focuses on the future development pattern in the form of the future land use plan. NAS JRB Fort Worth is listed in this plan as a special land use consideration.

Cities of Benbrook, River Oaks, Sansom Park, Westover Hills, Westworth Village and White Settlement Comprehensive Plans. Through the Planning for Livable Military Communities plan, the NCTCOG has assisted cities throughout North Central Texas with the development of comprehensive plans, all of which contain information about NAS JRB Fort Worth.

Texas Statutes. During its 85th Regular Session the Texas Legislature passed House Bill 890, which provides information to the public and purchasers of real property on the impact of military installations. Effective 1 September 2017, the legislation requires counties and cities in which a military installation is located to ensure the public availability of the most recent AICUZ or JLUS. A Seller's Disclosure Notice must also acknowledge if a property may be near a military installation and subject to high noise, AICUZ, or other operations.

Local Regulations and Ordinances. NAS JRB Fort Worth and surrounding communities have been working on compatibility planning since the 2008 JLUS (NCTCOG 2008). The base actively participates in ongoing community planning initiatives. Similarly, two surrounding communities have adopted regulatory overlays to address noise and air safety impacts. The NAS JRB Fort Worth compatibility menu identifies 39 strategies for land use planning.

On-Base Land Use. NAS JRB Fort Worth occupies approximately 1,805 acres, much of which is developed for use on a daily basis. Land use on the base is generally divided into eight planning districts, the largest of which is the Carswell Airfield District.

Surrounding Land Use. NAS JRB Fort Worth is located in the western portion of Fort Worth in Tarrant County, south of Lake Worth. The Lockheed Martin assembly plant is located to the west on government-owned and contractor-operated land. Land use surrounding the base is generally compatible with the mission (NAS JRB Fort Worth 2015a). The 2017 JLUS provides recommendations to help ensure continued compatibility with the base. The installation is bounded to the west and south by the Cities of White Settlement and Westworth Village, to the east by the City of River Oaks, and to the north across Lake Worth by the City of Lake Worth.

As identified in Table FW3-34, under baseline conditions, land uses exposed to DNL of 65 dB or greater primarily consist of undesignated land or water and residential lands, followed by open land, industrial, and recreational land uses. Baseline conditions represent the noise levels as modeled using the current conditions and operations at NAS JRB Fort Worth. Table FW3-34 also identifies land use within the JLUS contour. The JLUS contour represents land that current zoning requirements already treat as if it is in a high-noise environment (i.e. DNL of 65 dB or greater). The JLUS Report land use guidelines state that residential land use is incompatible in the JLUS-designated DNL zones between 65 and 69 dB unless the structures provide at least 25 dB of noise level reduction. The JLUS Report guidelines state that residential land use is incompatible in the JLUS-designated DNL zones 70 and 74 dB unless the structures provide at least 30 dB of noise level reduction. The JLUS recognizes that there are existing incompatible land uses in the 65 dB or greater DNL JLUS contour (2,948 acres). Under baseline conditions, 977 acres of residential land are currently exposed to DNL of 65 dB and greater, 965 acres of which are located in the 65 dB DNL JLUS contour.

Table FW3-34. Off-Base Acres Currently Exposed to DNL of 65 dB or Greater at NAS JRB Fort Worth

Land Use Category[a]	DNL (dB)											
	65–69		70–74		75–79		80–84		≥ 85		Total	
	JLUS	Baseline	JLUS	Baseline	JLUS	Baseline	JLUS	Baseline	JLUS	Baseline	JLUS	Baseline
Commercial	607	367	394	113	270	45	49	1	1	<1	1,321	526
Industrial	95	125	120	171	222	146	150	88	85	54	672	584
Open	1,419	517	394	135	126	40	44	1	1	<1	1,984	693
Public/Quasi-Public	492	191	197	36	54	7	22	40	107	81	872	355
Recreational	913	400	434	123	107	10	5	0	0	0	1,459	533
Residential	1,982	739	749	209	199	27	18	2	0	0	2,948	977
Undesignated[b] or Water	2,554	1,096	1,028	417	386	247	107	68	24	3	4,099	1,831
Total	**8,062**	**3,435**	**3,316**	**1,204**	**1,364**	**522**	**395**	**200**	**218**	**138**	**13,355**	**5,499**

[a] All numbers are in units of acres.
[b] Undesignated land includes roads, retention basins, and other municipal features that might not be shown on Figure FW3-6.
Note: Numbers may not sum due to rounding. To best represent the level of accuracy achieved, acreage numbers are displayed as whole numbers in the text and tables, whereas calculations are based on the raw number of acres. The resulting summations and change calculations are then rounded to whole numbers.
Source: City of Fort Worth 2017

FW3.8.1.2 Recreation

NAS JRB Fort Worth offers a variety of both indoor and outdoor recreational facilities. The Lake Worth waterfront area includes a recreational marina with boat slip rentals, property storage, and boat storage. The outdoor recreation rental and recreation program provides items and programs for outdoor leisure activities. Services include rental of camping equipment and gear for outdoor trips and activities. The aquatic center is an indoor swimming pool that provides unit training and fitness swim, water aerobics, swim lessons, and special events throughout the year. The TEN bowling center features 10 bowling lanes with pinsetters and automatic scoring. Other outdoor facilities include baseball and multi-purpose fields and opportunities for biking and jogging.

The City of Fort Worth has a wide variety of recreational facilities, including more than 200 parks and public spaces as well as recreational activities and educational programming. Fort Worth hosts numerous community centers, each offering different opportunities for recreation, including pools and all types of sports. The FWNC&R was designated a National Landmark by the Department of Interior in 1980. The FWNC&R encompasses approximately 3,621 acres of land and is a natural area comprised of forests, prairies, and wetlands. Table FW3-35 identifies seven recreational facilities near NAS JRB Fort Worth, along with the baseline noise levels and JLUS compatibility. Plover Circle Park is currently exposed to DNL greater than 75 dB, resulting in a use determination of incompatible.

Table FW3-35. Recreation Facilities near NAS JRB Fort Worth

ID	Recreational Facility	Activities	Current DNL (dB)	Compatibility (Y/N)
P01	North Z Boaz Park	Playground, pet area, small pond area	66	Y
P02	Vinca Circle Park	Open areas	69	Y
P03	Malaga Park	Open areas, hiking	66	Y

Table FW3-35. Recreation Facilities near NAS JRB Fort Worth (Continued)

ID	Recreational Facility	Activities	Current DNL (dB)	Compatibility (Y/N)
P04	Casino Park	Boating, fishing, barbeque pits	65	Y
P05	Leonard Park	Playground, hiking,	70	Y
P06	Lake Worth Public Park	Playground, ball fields, barbeque pits, skate park, concession stand, picnic areas, hiking	68	Y
P07	Plover Circle Park	Open areas, hiking	78	N

Source: http://fortworthtexas.gov/parks/

FW3.8.2 Base Environmental Consequences

FW3.8.2.1 Land Use

FW3.8.2.1.1 Physical Development

The facilities that would be developed and constructed to support the proposed AFRC F-35A mission at NAS JRB Fort Worth would occur in previously disturbed areas near the flightline. On-base land use would be consistent with the NAS JRB Fort Worth land uses designated for the proposed use. The proposed on-base development would have no impact to off-base land use. Impacts associated with physical development would be the same regardless of which afterburner scenario is selected.

FW3.8.2.1.2 Aircraft Operations

This analysis includes an evaluation of the potential noise impacts to on- and off-base land uses resulting from the three afterburner scenarios for the proposed AFRC F-35A mission at NAS JRB Fort Worth. Volume II, Appendix B, Section B.2.2, presents the noise compatibility guidelines for noise exposure to various land uses.

<u>Scenario A</u>

Implementation of Scenario A would increase the area surrounding NAS JRB Fort Worth exposed to DNL of 65 dB or greater by a total of approximately 2,350 acres (Table FW3-36 and Figure FW3-6). The largest increase in acreage exposed to additional noise would be undesignated or water areas, followed by residential and recreational land uses. Acreage of commercial, industrial, open, public/quasi-public, and residential land uses exposed to DNL of 65 dB or greater would also increase. Residences that would be newly exposed to DNL of 65 dB or greater, and which did not achieve the JLUS recommended noise level reductions in the structure, would constitute an incompatible land use (see Section FW3.8.1.1). Approximately 640 acres of land classified as residential use would be newly exposed to DNL of 65 dB or greater. Of the 640 acres, approximately 408 acres would be newly exposed to DNL of 65 to 69 dB, 193 acres would be newly exposed to DNL of 70 to 74 dB, and 39 acres would be newly exposed to DNL greater than 75 dB. Although an additional estimated 8,593 off-installation residents reside in the residential land (640 acres) that would be newly exposed to DNL of 65 dB or greater, much of this land (638.5 acres) is currently in the JLUS noise level zones. Therefore, these areas have been under the same zoning requirements as if they were already in the 65 dB or greater DNL contour. Residential land use exposed to DNL of 65 to 85 dB, where sound attenuation was not incorporated into the structures, would constitute an adverse impact to the affected land use.

Table FW3-36. Off-Base Acres Exposed to DNL of 65 dB or Greater at NAS JRB Fort Worth under Scenario A

Land Use Category[a]	DNL (dB)																							
	65–69				70–74				75–79				80–84				≥ 85				Total			
	JLUS	Baseline	AFRC F-35A Mission	Change[b]	JLUS	Baseline	AFRC F-35A Mission	Change[b]	JLUS	Baseline	AFRC F-35A Mission	Change[b]	JLUS	Baseline	AFRC F-35A Mission	Change[b]	JLUS	Baseline	AFRC F-35A Mission	Change[b]	JLUS	Baseline	AFRC F-35A Mission	Change[b]
Commercial	607	367	437	70	394	113	287	174	270	45	89	44	49	1	2	1	1	<1	0	0	1,321	526	815	289
Industrial	95	125	123	-2	120	171	177	6	222	146	153	7	150	88	95	7	85	54	61	7	672	584	609	25
Open	1,419	517	567	50	394	135	271	136	126	40	77	37	44	1	5	4	1	<1	0	0	1,984	693	920	227
Public/Quasi-Public	492	191	268	77	197	36	67	31	54	7	8	1	22	40	32	-8	107	81	92	11	872	355	467	112
Recreational	913	400	627	227	434	123	214	91	107	10	22	12	5	0	1	1	0	0	0	0	1,459	533	864	331
Residential	1,982	739	1,147	408	749	209	402	193	199	27	65	38	18	2	3	1	0	0	0	0	2,948	977	1,617	640
Undesignated or Water	2,554	1,096	1,498	402	1,028	417	585	168	386	247	344	97	107	68	123	55	24	3	7	4	4,099	1,831	2,557	726
Total	**8,062**	**3,435**	**4,667**	**1,232**	**3,316**	**1,204**	**2,003**	**799**	**1,364**	**522**	**758**	**236**	**395**	**200**	**261**	**61**	**218**	**138**	**160**	**22**	**13,355**	**5,499**	**7,849**	**2,350**

[a] All numbers are in units of acres.
[b] Change equals the difference between baseline acreage and acres exposed to noise resulting from the AFRC F-35A mission.
Note: Numbers may not sum due to rounding. To best represent the level of accuracy achieved, acreage numbers are displayed as whole numbers in the text and tables, whereas calculations are based on the raw number of acres. The resulting summations and change calculations are then rounded to whole numbers.

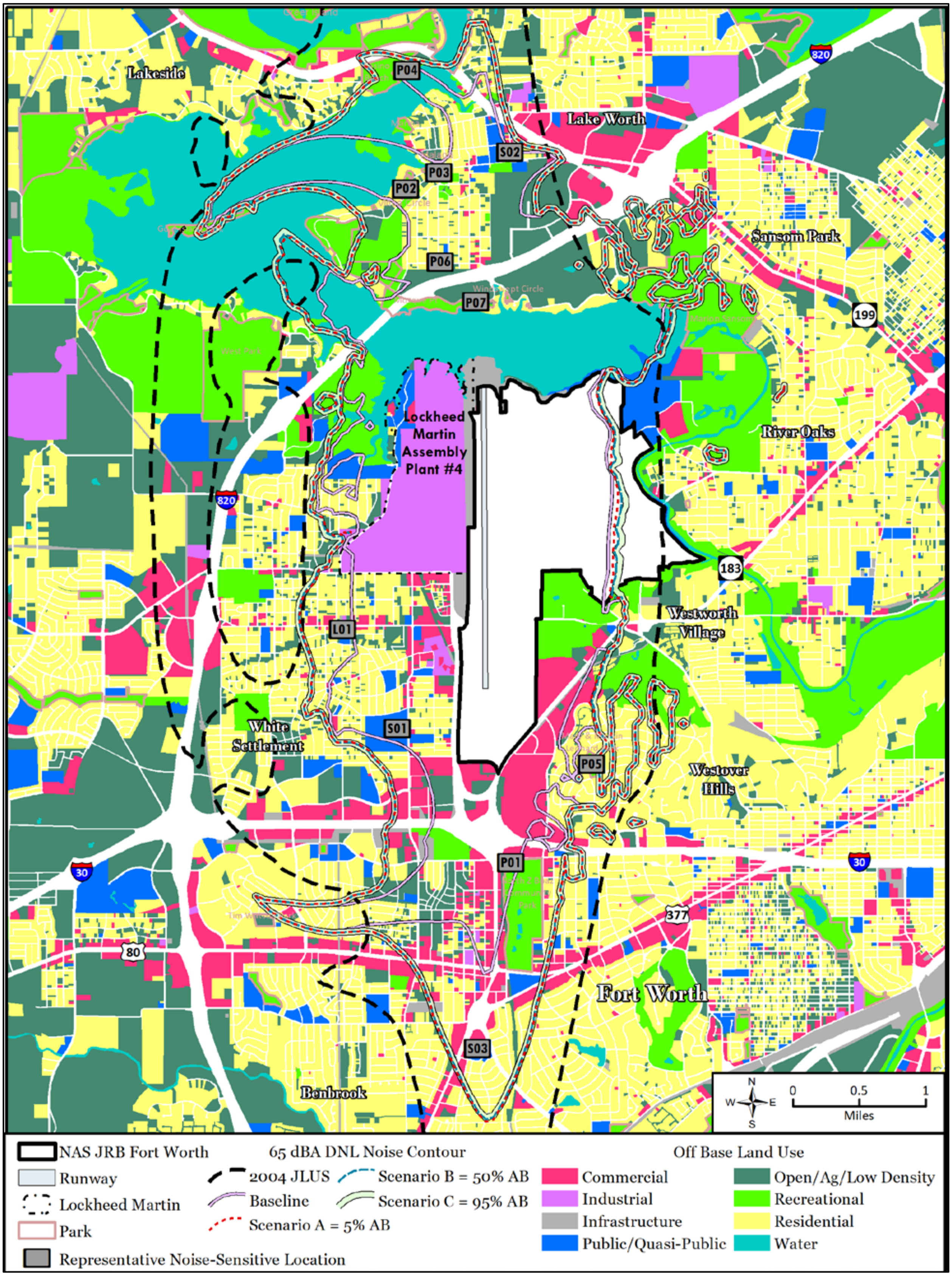

Figure FW3-6. Baseline, JLUS, and AFRC F-35A Mission DNL Contours Relative to Land Use at NAS JRB Fort Worth

Scenario B

Implementation Scenario B would increase the area surrounding NAS JRB Fort Worth exposed to DNL of 65 dB or greater by a total of approximately 2,369 acres (Table FW3-37 and Figure FW3-6). The largest increase in acreage exposed to additional noise would be undesignated or water areas, followed by residential and recreational land uses. Acreage of commercial, industrial, open, public/quasi-public, and residential land uses exposed to DNL of 65 dB or greater would also increase. Residences that would be newly exposed to DNL of 65 dB or greater, and which did not achieve the JLUS-recommended noise level reductions in the structure, would constitute an incompatible land use (see Section FW3.8.1.1). Approximately 643 acres of land classified as residential use would be newly exposed to DNL of 65 dB or greater. Of the 643 acres, approximately 406 acres would be newly exposed to DNL of 65 to 69 dB, 197 acres would be newly exposed to DNL of 70 to 74 dB, 38 acres would be newly exposed to DNL of 75 to 79 dB, and 2 acres would be newly exposed to DNL of 80 to 84 dB. Although an additional 8,622 off-installation residents reside in the 643 acres that would be newly exposed to DNL of 65 dB or greater, much of this land (641.5 acres) is currently in the JLUS noise level zones (i.e., current zoning requirements treat these areas as if they were already in the 65 dB or greater DNL contour). Residential land use exposed to DNL of 65 to 85 dB, where sound attenuation was not incorporated into the structures, would constitute an adverse impact to the affected land use.

Scenario C

Implementation Scenario C would increase the area surrounding NAS JRB Fort Worth exposed to DNL of 65 dB or greater by a total of approximately 2,386 acres (Table FW3-38 and Figure FW3-6). The largest increase in acreage exposed to additional noise would be undesignated or water areas, followed by residential and recreational land uses. Acreage of commercial, industrial, open, public/quasi-public, and residential land uses exposed to DNL of 65 dB or greater would also increase. Residences that would be newly exposed to DNL of 65 dB or greater, and which did not achieve the JLUS-recommended noise level reductions in the structure, would constitute an incompatible land use (see Section FW3.8.1.1). Approximately 643 acres of land classified as residential use would be newly exposed to DNL of 65 dB or greater. Of the 643 acres, approximately 402 acres would be newly exposed to DNL of 65 to 69 dB, 200 acres would be newly exposed to DNL of 70 to 74 dB, 39 acres would be newly exposed to DNL of 75 to 79 dB, and 2 acres would be newly exposed to DNL of 80 to 84 dB. Although an additional 8,648 off-installation residents reside in the 643 acres that would be newly exposed to DNL of 65 dB or greater, much of this land (641.5 acres) is currently in the JLUS noise level zones (i.e., current zoning requirements treat these areas as if they were already in the 65 dB or greater DNL contour). Residential land use exposed to DNL of 65 to 85 dB, where sound attenuation was not incorporated into the structures, would constitute an adverse impact to the affected land use.

Table FW3-37. Off-Base Acres Exposed to DNL of 65 dB or Greater at NAS JRB Fort Worth under Scenario B

Land Use Category[a]	DNL (dB)																							
	65–69				70–74				75–79				80–84				≥ 85				Total			
	JLUS	Baseline	AFRC F-35A Mission	Change[b]	JLUS	Baseline	AFRC F-35A Mission	Change[b]	JLUS	Baseline	AFRC F-35A Mission	Change[b]	JLUS	Baseline	AFRC F-35A Mission	Change[b]	JLUS	Baseline	AFRC F-35A Mission	Change[b]	JLUS	Baseline	AFRC F-35A Mission	Change[b]
Commercial	607	367	438	71	394	113	287	174	270	45	90	45	49	1	3	2	1	<1	0	0	1,321	526	818	292
Industrial	95	125	118	-7	120	171	177	6	222	146	155	9	150	88	95	7	85	54	63	9	672	584	608	24
Open	1,419	517	564	47	394	135	272	137	126	40	77	37	44	1	4	3	1	<1	0	0	1,984	693	917	224
Public/Quasi-Public	492	191	268	77	197	36	68	32	54	7	9	2	22	40	31	-9	107	81	94	13	872	355	470	115
Recreational	913	400	630	230	434	123	216	93	107	10	23	13	5	0	1	1	0	0	0	0	1,459	533	870	337
Residential	1,982	739	1,145	406	749	209	406	197	199	27	65	38	18	2	4	2	0	0	0	0	2,948	977	1,620	643
Undesignated or Water	2,554	1,096	1,499	403	1,028	417	587	170	386	247	344	97	107	68	126	58	24	3	9	6	4,099	1,831	2,565	734
Total	**8,062**	**3,435**	**4,662**	**1,227**	**3,316**	**1,204**	**2,013**	**809**	**1,364**	**522**	**763**	**241**	**395**	**200**	**264**	**64**	**218**	**138**	**166**	**28**	**13,355**	**5,499**	**7,868**	**2,369**

[a] All numbers are in units of acres.

[b] Change equals the difference between baseline acreage and acres exposed to noise resulting from the AFRC F-35A mission.

Note: Numbers may not sum due to rounding. To best represent the level of accuracy achieved, acreage numbers are displayed as whole numbers in the text and tables, whereas calculations are based on the raw number of acres. The resulting summations and change calculations are then rounded to whole numbers.

Table FW3-38. Off-Base Acres Exposed to DNL of 65 dB or Greater at NAS JRB Fort Worth under Scenario C

Land Use Category[a]	DNL (dB)																							
	65–69				70–74				75–79				80–84				≥ 85				Total			
	JLUS	Baseline	AFRC F-35A Mission	Change[b]	JLUS	Baseline	AFRC F-35A Mission	Change[b]	JLUS	Baseline	AFRC F-35A Mission	Change[b]	JLUS	Baseline	AFRC F-35A Mission	Change[b]	JLUS	Baseline	AFRC F-35A Mission	Change[b]	JLUS	Baseline	AFRC F-35A Mission	Change[b]
Commercial	607	367	437	70	394	113	286	173	270	45	90	45	49	1	3	2	1	<1	<1	<1	1,321	526	816	290
Industrial	95	125	112	-13	120	171	178	7	222	146	156	10	150	88	97	9	85	54	65	11	672	584	608	24
Open	1,419	517	566	49	394	135	274	139	126	40	79	39	44	1	4	3	1	<1	<1	<1	1,984	693	923	230
Public/Quasi-Public	492	191	267	76	197	36	69	33	54	7	9	2	22	40	30	-10	107	81	95	14	872	355	470	115
Recreational	913	400	634	234	434	123	218	95	107	10	24	14	5	0	1	1	0	0	0	0	1,459	533	877	344
Residential	1,982	739	1,141	402	749	209	409	200	199	27	66	39	18	2	4	2	0	0	0	0	2,948	977	1,620	643
Undesignated or Water	2,554	1,096	1,498	402	1,028	417	591	174	386	247	344	97	107	68	129	129	24	3	9	6	4,099	1,831	2,571	808
Total	**8,062**	**3,435**	**4,655**	**1,220**	**3,316**	**1,204**	**2,025**	**821**	**1,364**	**522**	**768**	**246**	**395**	**200**	**268**	**68**	**218**	**138**	**169**	**31**	**13,355**	**5,499**	**7,885**	**2,386**

[a] All numbers are in units of acres.
[b] Change equals the difference between baseline acreage and acres exposed to noise resulting from the AFRC F-35A mission.
Note: Numbers may not sum due to rounding. To best represent the level of accuracy achieved, acreage numbers are displayed as whole numbers in the text and tables, whereas calculations are based on the raw number of acres. The resulting summations and change calculations are then rounded to whole numbers.

FW3.8.2.2 Recreation

Construction in support of the proposed AFRC F-35A mission would occur in the existing cantonment area. Surrounding parks, schools, and recreational facilities are too far from the installation to be affected by construction noise. Increased truck traffic to the installation during the 2-year construction period could cause temporary effects to traffic flow on local roads, but this is not anticipated to interfere with access to recreational areas around the installation. New facilities would not alter any sensitive views that have important recreational value.

Implementation of the AFRC F-35A mission at NAS JRB Fort Worth would result in a net loss of 102 personnel with dependents as a result of the drawdown of the AFRC F-16 mission as the F-35A aircraft arrive. This change in the number of people would have no discernable effect on recreational resources. Noise impacts to recreational resources would be the same regardless of which afterburner scenario is selected.

Average noise levels would increase at the recreational facilities near NAS JRB Fort Worth. Noise modeling results summarized in Table FW3-39 show the baseline DNL at various recreational facilities near NAS JRB Fort Worth and the DNL that would result from implementation of the proposed mission at NAS JRB Fort Worth. Noise impacts to recreational facilities would be the same regardless of which afterburner scenario is selected.

Table FW3-39. Noise Effects on Recreation Facilities near NAS JRB Fort Worth

ID	Recreational Facility	DNL (dB)	
		Baseline Conditions	AFRC F-35A Mission
P01	North Z Boaz Park	66	72
P02	Vinca Circle Park	69	72
P03	Malaga Park	66	71
P04	Casino Park	65	67
P05	Leonard Park	70	71
P06	Lake Worth Public Park	68	72
P07	Plover Circle Park	78	79

Source: http://fortworthtexas.gov/parks/

The use of some outdoor recreation facilities such as outdoor sports fields and ball courts is marginally compatible with DNL up to 75 dB. Plover Circle Park would remain incompatible with DNL greater than 75 dB. Noise increases could reduce the quality and enjoyment of outdoor activities for some persons. One measure of annoyance is the potential for speech interference. As described in Section FW3.2.2.2, 50 dB L_{max} is the metric used to determine potential speech interference. As shown in Table FW3-16, all of the recreational facilities evaluated would experience one additional outdoor noise event per hour at L_{max} greater than 50 dB.

Another noise metric that can be used to evaluate potential impacts to recreational uses is SEL. As shown in Table FW3-11, SEL would not increase at any of the recreational facilities analyzed. Although the SEL from a single overflight would not change, certain recreational areas could experience an increase in the number of overflights at existing SEL values and experience an increased DNL.

FW3.8.3 Airspace Affected Environment

FW3.8.3.1 Land Use

This section summarizes land ownership and affected Special Use Land Management Areas (SULMAs) under the airspace proposed for use by pilots from NAS JRB Fort Worth. SULMAs include selected areas managed by federal and state agencies that provide recreational and scenic opportunities (e.g., parks, monuments, and scenic river corridors), solitude or wilderness experiences (e.g., forests and wilderness areas), conservation of natural or cultural resources (e.g., wildlife refuge areas and national monuments), and other special management functions (e.g., Native American reservation lands). SULMAs often provide a combination of these attributes. Some SULMAs could include recreation-oriented sites such as campgrounds, trails, and visitor centers; recreation is addressed in Section FW3.8.3.2. Pilots from NAS JRB Fort Worth currently use airspace in Texas and Oklahoma, with most areas in Texas. Figure FW3-7 identifies the airspace currently used along with the SULMAs aggregated by ownership (i.e., USACE, USFWS, state land, etc.). The majority of public land under this airspace is administered by the States of Texas and Oklahoma, followed by lands managed by the USFWS.

FW3.8.3.2 Recreation

Recreational opportunities under the airspace used by pilots from NAS JRB Fort Worth are similar to those described in Section FW3.8.1.2. The underlying land reflects the same mosaic of federal, state, and private ownership, with a similar range of outdoor recreational activities. The public lands support a variety of recreational opportunities and activities, with some areas having particular qualities or recreational purposes. SULMAs in this region include Native American Reservation lands, lakes managed by the USACE, refuges managed by the USFWS, and numerous state-owned lands managed for recreational purposes.

Southwest Texas and Southern Oklahoma host habitats that support a wide variety of birds, particularly along waterways and in mountainous areas. These areas are popular for recreational bird watching. Public access is permitted to limited portions of Fort Sill and Fort Hood for recreation. The Sikes Act stipulates that access for wildlife-oriented recreation shall be provided to the extent possible with military use, while maintaining the priority of the military purpose and safety of public users. Recreational activities within Fort Sill and Fort Hood include, hunting, off-highway vehicle uses in designated areas, and viewing of cultural and natural resources of interest.

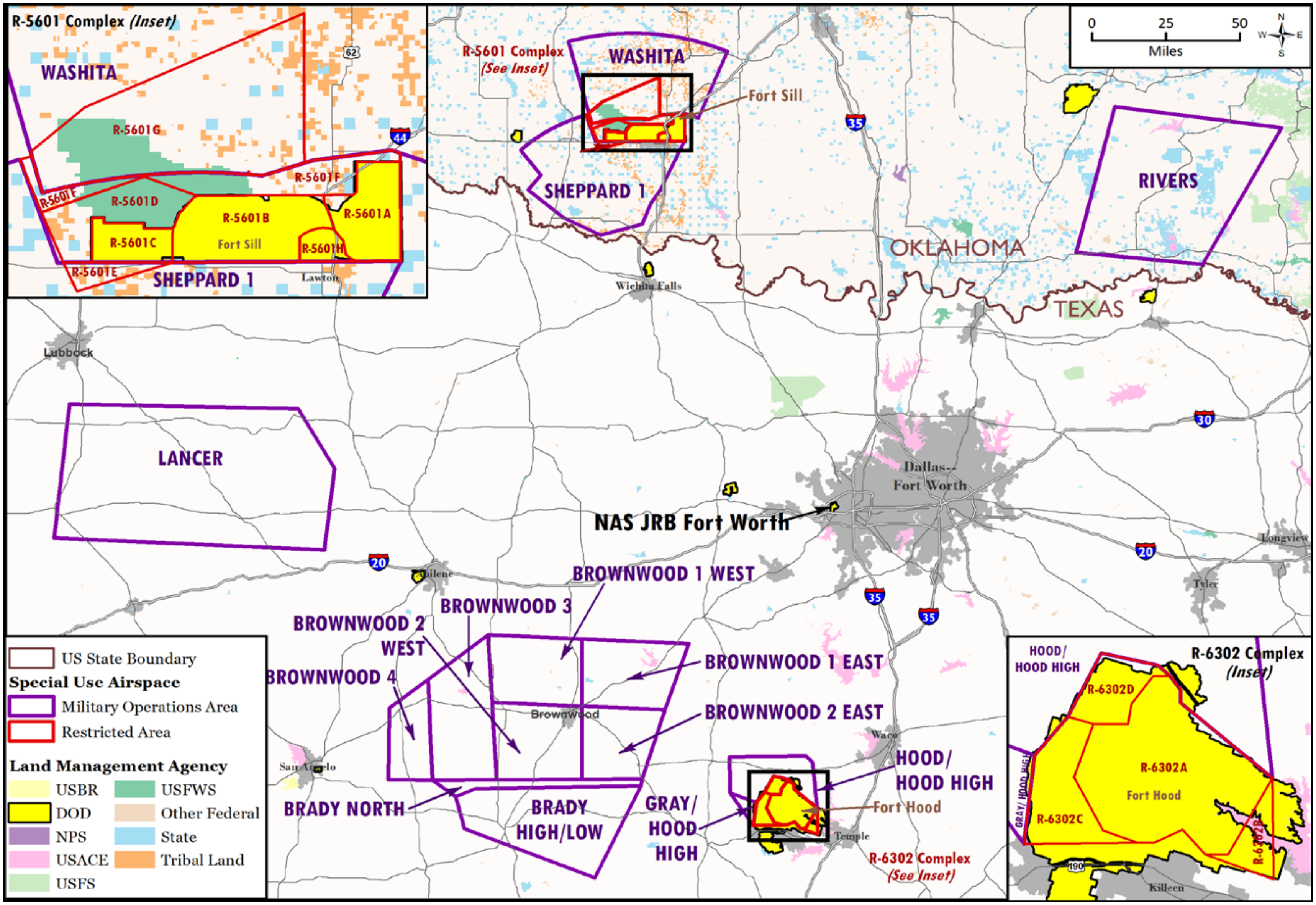

Figure FW3-7. SULMAs Beneath NAS JRB Fort Worth Airspace

FW3.8.4 Airspace Environmental Consequences

FW3.8.4.1 Land Use

With the exception of R-5601/R-5602 at Fort Sill and R-6302 at Fort Hood, implementation of the proposed AFRC F-35A operations from NAS JRB Fort Worth would not result in any average subsonic noise increases below any of the airspace proposed for use. Table FW3-40 identifies the SULMAs that occur under the airspace that would be exposed to subsonic noise that would increase L_{dnmr} by 4 dB above baseline conditions. Table FW3-40 also presents the SULMA total acres along with the percentage of each SULMA covered by the respective airspace.

When compared to baseline conditions, subsonic L_{dnmr} at the Falcon Range on Fort Sill and areas below the R-5601/R-5602 complex would experience a noticeable 4-dB increase (from less than 45 to 49 dB). However, the Fort Sill Installation Compatible Use Zone Study identifies the Wichita Mountains Wilderness Area (WMWA) as a moderate noise complaint risk (Fort Sill 2015).

Table FW3-40. Special Use Land Management Areas Exposed to Subsonic Noise Increases of 1 dB or Greater from the AFRC F-35A Mission at NAS JRB Fort Worth

SULMA Name	SULMA Acreage	Percentage of SULMA Under Airspace	Baseline Conditions	AFRC F-35A Mission	
			L_{dnmr}	L_{dnmr}	Change
Falcon Range R-5601/R-5602					
WMWR	58,860	99.4	<45	49	4
WMWA	9,787	100	<45	49	4

Supersonic aircraft operations are only authorized in the Brownwood ATCAA at altitudes of 30,000 feet MSL or higher. AFRC F-35A pilots would conduct supersonic training above the Brownwood MOAs at altitudes of 30,000 feet MSL or higher, as currently conducted by F-16 pilots under baseline conditions. Most of the sonic booms generated at or above 30,000 feet MSL never reach the ground (Volume II, Appendix B). The number of training sorties flown in the Brownwood ATCAA would decrease, and the number of sonic booms would decrease proportionally.

FW3.8.4.2 Recreation

A synopsis of issues and methodology for addressing potential impacts from military training on recreational resources under the airspace proposed for use are provided in Chapter 3, Section 3.8. Chapter 3, Section 3.8.2, describes typical recreational impacts that could be expected to result from the AFRC F-35A mission at NAS JRB Fort Worth. In general, a diverse range of active and passive recreational activities occurring throughout the region already coexists within a context of exposure to military overflight and supersonic events. Increased numbers of sorties in some airspace would discernibly affect the noise levels and could result in recreational participants experiencing startle effects from these events. This could continue to result in some degradation in enjoyment for those affected and loss of opportunity for quiet recreational environments under the airspace. Increased noise could diminish opportunities for visitors to experience natural soundscapes in national park units, and could similarly diminish the qualities of natural quiet that are intrinsic to recreational opportunities in wilderness areas, roadless areas, national forests and other remote locations.

Table FW3-40 lists special use areas with high recreational value or opportunity under military training airspace that would be exposed to subsonic noise that would increase L_{dnmr} by 4 dB above baseline conditions.

The F-35A would generate sonic booms, similar to other aircraft using the areas above the Brownwood MOAs. The potential for isolated events to interfere with persons who are engaging in recreational activities throughout the affected area would still exist, but the frequency of these events is not expected to increase. Areas supporting recreational uses sensitive to loud, intrusive noise (e.g., wilderness areas and wildlife refuges) would benefit from fewer sonic booms.

Federal agencies are generally mandated to manage wilderness areas for their wilderness qualities. This includes maintaining the natural setting and allowing minimal human disturbance and development. Wilderness management goals could be negatively affected by increased noise and disturbance associated with military overflights. Increased noise in wilderness areas, recreation areas, and other specially managed lands could also be perceived by some recreational users as affecting their recreation experience.

FW3.8.5 Summary of Impacts to Land Use and Recreation

Land use and recreational resources would not be impacted by any of the construction because all of the construction would be conducted in compatible use zones on the base. Implementation of Scenarios A, B, or C would expose an additional 2,350, 2,369, or 2,386 acres, respectively, to DNL of 65 dB or greater. Of the residential land newly exposed under Scenarios A, B, or C, approximately 1.5 acres are located outside of the JLUS noise contour (under all afterburner scenarios), rendering those acres incompatible. Noise levels would also increase for some off-installation recreational facilities. Noise increases could reduce the quality and enjoyment of outdoor activities for some persons

Regarding impacts to land use and recreation under the airspace proposed for use, average subsonic noise would not increase in the majority of the lands under the airspace proposed for use. Noise would increase in R-5601/R-5602, exposing the WMWR and the WMWA to an L_{dnmr} increase of 4 dB. Impacts to land use and recreational resources near NAS JRB Fort Worth would not be significant.

FW3.9 SOCIOECONOMICS

Socioeconomics refers to features or characteristics of the social and economic environment. The factors affecting socioeconomic resources are the change in personnel, construction of new facilities, renovations and modifications to existing facilities, and noise from F-35A aircraft at NAS JRB Fort Worth. These factors are evaluated relative to the existing population, employment, earnings, housing, education, and public and base services. NAS JRB Fort Worth is located approximately 5 miles west of the central business district of Fort Worth in Tarrant County, Texas. Impacts to socioeconomic resources would extend beyond the base boundaries. Therefore, for the purposes of this socioeconomics analysis, the ROI for the proposed action and No Action Alternative is Tarrant County, with an emphasis on NAS JRB Fort Worth.

FW3.9.1 Base Affected Environment

FW3.9.1.1 Population

Population estimates for Tarrant County totaled more than 2.05 million persons in 2017 (USCB 2018). Between 2010 and 2017, the county population increased at an average annual rate of 1.8 percent, with a total increase of approximately 245,441 persons over the 7-year period (USCB 2018). The State of Texas has an estimated population of 28.3 million (USCB 2018). Average annual population growth in the county has been nearly the same as the state (Table FW3-41).

Table FW3-41. Population in the ROI for NAS JRB Fort Worth

Location	2010 Census	2017 Estimates	Annual Percent Change (2010–2017)
Tarrant County	1,809,034	2,054,475	1.8
Texas	25,145,561	28,304,596	1.7

Source: USCB 2018

As shown in Table FW2-3, the total current authorized personnel at the base is 9,600 persons. Of the total authorized base personnel, approximately 18 percent (1,751 persons) are associated with AFRC.

FW3.9.1.2 Economic Activity (Employment and Earnings)

In 2016, employment in Tarrant County totaled 1,209,868 jobs (BEA 2017a). The largest employment sector in Tarrant County was retail trade (10.3 percent), followed by government and government services (9.7 percent) and health care and social assistance (9.7 percent) (BEA 2017). Construction accounted for 6.0 percent of total employment. Over the last several years, the average annual unemployment rate in the county has steadily declined from 6.0 percent in 2013 to 3.7 percent in 2017 (BLS 2018a). During this same time the average annual unemployment rate for Texas has also declined from 6.3 percent to 4.3 percent (BLS 2018b). Per capita personal income in Tarrant County is estimated at $48,050, which is more than the estimated $46,274 per capita personal income in the state (BEA 2017b).

NAS JRB Fort Worth is an important economic contributor to Tarrant County. Estimated contributions of NAS JRB Fort Worth include 47,256 direct and indirect jobs, $4.3 billion in gross domestic product, and $2.7 billion in annual disposable personal income (Texas Comptroller of Public Accounts 2015). The total economic impact of the base on the surrounding communities in 2015 was $6.6 billion (Texas Comptroller of Public Accounts 2015). Based on the Impact Analysis for Planning (IMPLAN) economic model, the on-base authorized employment of 9,600 personnel supports an estimated additional 2,353 secondary jobs in the community.

FW3.9.1.3 Housing

Table FW3-42 presents census-derived housing data for Tarrant County. The county has an estimated 740,355 total housing units (houses), of which 8 percent (57,388 units) were vacant in 2016 (USCB 2016). Less than half (40 percent) of the occupied houses in the county are renter-occupied and the remaining 60 percent are owner-occupied. The median value of owner-occupied houses in Tarrant County is estimated at $148,100. The median gross rent was $944 in 2016 (USCB 2016). As described in Section FW3.2.1.1, an estimated 13,093 residents and approximately 5,255 houses in Tarrant County are currently exposed to DNL of 65 dB or greater from aircraft operations at NAS JRB Fort Worth.

Table FW3-42. Housing Data in the ROI for NAS JRB Fort Worth

Location	Houses	Occupied	Vacant
Tarrant County	740,355	682,967	57,388

Source: USCB 2016

The recent real estate market in Texas is characterized by rising demand and severe shortages of inventory, particularly for homes less than $300,000. Since 2012, Texas incomes have not been keeping pace with rising housing prices, resulting in a decline in housing affordability. Between 2012 and 2016, the average annual increase in incomes was 2.8 percent, compared to a 7.4 percent average annual increase in housing prices (Torres 2017). Fort Worth had the highest affordability conditions compared to Austin, Dallas, Houston, and San Antonio, despite posting the largest percentage increase in median price per square foot at 10.5 percent year over year (TAMU 2018). Reasons cited for the recent conditions include the state's population and economic growth due to the most recent oil boom and lightly regulated commercial development (Torres 2017). As of March 2018, the median home price in Fort Worth rose 1.7 percent year to date to $230,200, which is slightly less than the Texas median home price of $231,600 (TAMU 2018).

Accompanied and unaccompanied housing is available on base at NAS JRB Fort Worth. Military family housing at NAS JRB Fort Worth is privatized and owned by Balfour Beatty Communities. Four neighborhoods on base provide a total of 83 units for service members. Estimated waiting times for family housing varies depending on the size of the unit and the rank; at up to 2 years, four-bedroom size units have the longest wait times (CNIC 2018).

FW3.9.1.4 Education

Tarrant County has 20 independent school districts. No schools are located on NAS JRB Fort Worth. School-aged children living on base who attend public schools attend schools within the four school districts that serve NAS JRB Fort Worth. The Fort Worth Independent School District is the largest in the area with 86,869 students enrolled in one of the 143 schools during 2016. The student to teacher ratio is 15.5:1 (Texas Education Agency 2016). Five schools are known to be currently exposed to DNL of 65 dB or greater from aircraft operations at NAS JRB Fort Worth. These schools include Brewer Middle School, Effie Morris Elementary, Mesa High School, Liberty Elementary, and N.A. Howry Intermediate.

FW3.9.1.5 Public Services

Fire and emergency services, law enforcement and protection, and medical services are available throughout Tarrant County. Tarrant County Emergency Services District No. 1 includes 25 contracted fire departments (Tarrant County 2018). Fire and emergency services are available on base. The Fort Worth Police Department provides law enforcement and safety services to residents in the City of Fort Worth. As of December 2017, the Fort Worth Police Department employed 1,759 civil service and 459 civilian staff members. The officer-to-population ratio was 1:497 in 2017 (Fort Worth Police Department 2017).

FW3.9.1.6 Base Services

Base services at NAS JRB Fort Worth include Morale, Welfare and Recreation Facilities, commissary, and an exchange.

FW3.9.2 Base Environmental Consequences

FW3.9.2.1 Population

The current personnel at NAS JRB Fort Worth and the projected change anticipated to support the AFRC F-35A mission are provided in Table FW2-3. Implementation of the AFRC F-35A mission would result in a net decrease of 102 full-time mission personnel. This would result in a 1.1 percent decline in the existing base employment and a less than 0.1 percent decrease in the existing county population. Calculation of this potential decrease in the county population is based on the assumption that all 102 personnel would be full-time and be reassigned to other bases, and that the personnel and any dependents would migrate out of the area. Employment opportunities in the Fort Worth area would be expected to absorb any reduction in secondary employment. For purposes of the EIS analysis, a change in personnel assumes those personnel will leave the area. It is possible that these personnel could remain in the area and associated changes in housing, schools, etc. would not occur. Impacts for such a small change in personnel would be negligible.

FW3.9.2.2 Economic Activity (Employment and Earnings)

Implementation of the AFRC F-35A mission at NAS JRB Fort Worth would decrease the full-time work force assigned to the base by 102 total personnel (Table FW2-3). Using the IMPLAN model, the direct effect of a net decrease of 102 full-time personnel at NAS JRB Fort Worth would have a negative estimated indirect and induced effect of a loss of up to 25 jobs in service industries in Tarrant County (IMPLAN 2018). This number of jobs would not be noticed in the regional economy.

Construction activities provide economic benefits to the surrounding areas through the employment of construction workers and the purchase of materials and equipment. Construction activities would be temporary and provide a limited amount of economic benefit. Noise associated with construction activities would be limited to within the base boundaries and would not impact economic activity. The USAF estimates that a total of $21.7 million in MILCON expenditures during 2021-2023 would be associated with implementation of the AFRC F-35A mission at NAS JRB Fort Worth. The total expenditures could generate up to 74 jobs, primarily within the construction industry, and to a lesser extent in retail, wholesale trade, real estate, architectural, engineering, and related services, and truck transportation (IMPLAN 2018). Jobs generated by construction expenditures in the area would offset induced and indirect jobs associated with a decrease in personnel. With a labor force of more than 1.03 million people and an unemployment rate of 3.7 percent, the local labor force would be sufficient to fill construction-related jobs without a migration of workers into the area. Implementation of the AFRC F-35A mission and projected total MILCON expenditures of $21.7 million at NAS JRB Fort Worth would generate an estimated $11.4 million in direct, indirect, and induced labor income in the ROI. The jobs and related income generated would be temporary (i.e., during the construction activity).

FW3.9.2.3 Housing

Military housing is available at NAS JRB Fort Worth. Assuming that all 102 full-time personnel reside off-base in separate units and would be reassigned out of the area, approximately 102 units could become available for sale or rent in the Fort Worth market. Recent real-estate trends in the Fort Worth area suggest that additional supply of units would be beneficial to the area, which is experiencing a shortage of residential properties.

During scoping, individuals raised concerns about the potential impact of noise on surrounding property values. As discussed in more detail in Chapter 3, Section 3.9.3, studies have shown a relation between noise and property values. A study conducted by Trojanek et al (2017) summarized the results from 79 studies; the majority of those studies found that housing values decreased from 0.26 to 1 percent for every decibel increase in DNL above 65 dB. Some of the studies had values that decreased less than this range and others decreased more. It is a reasonable assumption, based on these studies, that increases in noise could cause some reduction in the rate of increase in housing prices. The percent of effect is dependent upon a number of factors, including the noise indicators used, thresholds, types of properties evaluated, proximity to employment, schools, and other factors.

Table FW3-43 shows the total estimated number of houses that would be newly exposed to DNL of 65 dB or greater from the AFRC F-35A mission, although many of these homes are located in areas zoned for high noise levels. The estimated number of residents newly exposed to this level of noise is identified in Tables FW3-12, FW3-14, and FW3-15. As explained in Section FW3.8.1.1, residential land use exposed to DNL of 65 to 74 dB is identified in the JLUS as a compatible use where the structures have sound attenuation of at least 25 to 30 dB. Residential land is incompatible with DNL greater than 75 dB. Residential land exposed to DNL greater than 65 dB where sound attenuation was not incorporated into the structures would constitute an adverse impact to housing.

Table FW3-43. Estimated Houses Exposed to DNL of 65 dB or Greater from Baseline and AFRC F-35A Mission Conditions at NAS JRB Fort Worth

DNL (dB)	Estimated Houses							
	JLUS	Baseline	Scenario A	Change	Scenario B	Change	Scenario C	Change
65 – 69	10,397	4,138	6,982	2,844	6,973	2,835	6,961	2,823
70 – 74	3,470	1,010	1,908	898	1,928	918	1,949	939
75 – 79	828	98	213	115	217	119	220	122
80 – 84	81	9	15	6	15	6	15	6
≥85	0	0	0	0	0	0	0	0
Total	14,776	**5,255**	9,118	**3,863**	9,133	**3,878**	9,145	**3,890**

Prices for homes in the Fort Worth region have been increasing over the last several years due to economic and population growth in the region. These recent upward price trends in the local real estate market are expected to continue into the near future, although housing newly affected by increased DNL greater than 65 dB would be expected to experience a lesser price increase when compared with housing not affected by increased DNL.

FW3.9.2.4 Education

As described in Chapter 3, Section 3.9.3, the total number of dependents, including spouse and children, was estimated at 2.5 times 65 percent of full-time active duty and full-time active reserve. The total number of children was estimated at 1.5 times 65 percent of full-time personnel, because it was assumed each military member would be accompanied by a spouse. Thus, it is estimated that up to 100 dependents would be of school age and would no longer attend schools in Tarrant County. The projected number of students leaving would represent a 0.12 percent decrease of the current total enrollment of the Fort Worth Independent School District. Based on the number and size of the school district in the ROI, as well as class size for the state, it is anticipated that the capacity of the schools in the county would not be noticeably affected by the reduction in students.

During scoping, several people expressed concern about the impacts of noise on children and educational facilities. Results of recent reviews on how chronic aircraft noise exposure at school or at home has been associated with children having poorer reading and memory skills (Basner et al., 2018). Studies also suggest that "children exposed to chronic aircraft noise at school have poorer performance on standardized achievement tests compared to children who are not exposed to aircraft noise" (Basner et al., 2018).

Five off-base schools (Brewer Middle School, Effie Morris Elementary, Mesa High School, Liberty Elementary, and N.A. Howry Intermediate) are currently exposed to DNL of 65 dB or greater resulting from aircraft operations at NAS JRB Fort Worth. With the exception of Liberty Elementary, these schools would continue to be exposed to DNL greater than 65 dB resulting from the proposed AFRC F-35A mission (Table FW3-44). Liberty Elementary is currently exposed to DNL of 65 dB but would be exposed to DNL of 70 dB from the new mission. Two additional schools (Applied Learning Academy/International Newcomer Academy and Luella Merrett Elementary) would be newly exposed to DNL of 65 dB (Table FW3-44). Classrooms with sound attenuation are identified in the JLUS as compatible land uses up to an outside DNL of 75 dB. Noise impacts to students have been identified as interfering with learning (Section FW3.2.2.3). The number of students impacted by increased noise would constitute an adverse impact. These impacts would be the same regardless of which afterburner scenario is selected.

Table FW3-44. Representative Schools Exposed to DNL of 65 dB or Greater from Baseline and AFRC F-35A Mission Conditions at NAS JRB Fort Worth

Schools	dB DNL Contour	
	Baseline	AFRC F-35A Mission
Brewer Middle School[a]	65 – 69	65 – 69
Effie Morris Elementary[a]	65 – 69	65 – 69
Mesa High School	65 – 69	65 – 69
Liberty Elementary	65 – 69	70 – 74
N.A. Howry Intermediate	65 – 69	65 – 69
Applied Learning Academy/International Newcomer Academy	NA	65 – 69
Luella Merret Elementary[a]	NA	65 – 69

[a] These schools were used as representative noise-sensitive locations. Additional information on noise impacts are discussed in Section FW3.2.2.3.
Key: NA = Not applicable, does not apply

FW3.9.2.5 Public Services

Tarrant County represents a large community with police, fire, and other services. The estimated reduction of 102 full-time, USAF-related personnel and dependents would represent an indiscernible decrease of approximately 0.01 percent of the existing Tarrant County population. Implementation of the AFRC F-35A mission would result in no discernible affects to public services.

During scoping, people submitted comments regarding the potential impact that noise from the F-35A aircraft would have on the quality of life and health of residents. Aircraft noise has the potential to cause a variety of effects such as annoyance, speech interference, sleep interference, hearing loss, and non-auditory health effects (Section FW3.2.2). Potential non-auditory health impacts due to aircraft noise are discussed in more detail in Section FW3.2.2.7 and Volume II, Appendix B. The USAF continually works with local governments and communities to assess and manage aircraft noise in the environment and attempts to reduce, where possible, the potential impacts of noise to people. When possible, the AFRC F-35A pilots would intentionally avoid overflying identified noise-sensitive locations.

FW3.9.2.6 Base Services

The population on military bases is constantly in flux as deployments and mission personnel changes are assigned; therefore, a change in 102 personnel to a base with 9,600 authorized personnel would have no discernible effect on revenue-generating services on base.

FW3.9.3 Summary of Impacts to Socioeconomics

The personnel decreases and community service requirements of the AFRC F-35A mission (Scenario A, B, or C) at NAS JRB Fort Worth would not result in adverse socioeconomic impacts. However, the noise increases to houses and schools would constitute adverse socioeconomic impacts.

FW3.10 ENVIRONMENTAL JUSTICE AND PROTECTION OF CHILDREN

The environmental justice analysis considers affected populations that meet certain characteristics based on income and age. Analysis of environmental justice and other sensitive receptors is conducted pursuant to EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations* *and Low-Income Populations*, and EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*. Environmental justice addresses impacts to minority and low-income populations. This analysis focuses on increased noise resulting from the proposed action as the primary impact to these populations. The USAF guidelines for environmental analysis use census data (i.e., percentages of populations identifying themselves as minority, low-income, etc.) to determine potential impacts to these populations. The guidelines also address children (under 18) and elderly (65 and older) as additional sensitive populations. (Minority, low-income, children, and elderly populations are henceforth referred to as environmental justice populations.) Tables FW3-12, FW3-14, and FW3-15 list the number of people exposed to DNL of 65 dB or greater from baseline and the three afterburner scenario conditions at NAS JRB Fort Worth.

This analysis is completed to determine if there are existing disproportionate noise impacts to environmental justice populations (i.e., baseline DNL of 65 dB or greater) and if implementation of the proposed action would result in disproportionate noise impacts to environmental justice populations (i.e., AFRC F-35A mission DNL of 65 dB or greater).

Environmental justice analysis overlays the 65 dB DNL contour on the census data polygons. The smallest census data which has the information necessary for analysis of potential impacts to environmental justice populations is used to determine potential impacts. The smallest group of census data which contain the needed information for this analysis is the Census BG. Each BG that is partially or wholly encompassed by the 65 dB DNL contour is defined as an ROI. There could be few or many ROIs for a specific environmental justice analysis, depending on the extent of the noise contour and the size of the BGs. The next higher level of census data is the Census Tract (CT). Each CT contains a number of BGs (ROIs).

Census blocks are the smallest unit for which the USCB collects census information. **Block Groups (BGs)** are comprised of a combination of census blocks and are a subdivision of **census tracts (CTs)**. Census tracts are a small, relatively permanent statistical subdivision of a county delineated by a local committee of census data users for the purpose of presenting census data. This EIS uses **BGs** and **CTs** in the environmental justice analysis. The **BGs** also comprise the **Region of Influence (ROI)** analyzed in the EIS.

In order to identify disproportionate impacts from baseline or proposed action noise levels, a Community of Comparison (COC) is needed. The COC is defined by summing the population in all the CTs which contain any part of an ROI affected by the 65 dB DNL contour. The percentages of minority and low-income persons are calculated for each ROI (i.e., BG). The ROI and COC percentages are then compared. If the percentage of minorities or low-income persons in an ROI is equal to or greater than the percentage of minorities or low-income persons in the COC, there is a disproportionate impact to the environmental justice population in that ROI (USAF 2014). Chapter 3, Section 3.10.3, provides a description of the method applied to calculate the proportion of the population in the ROIs.

For NAS JRB Fort Worth, there are 17 CTs containing 38 ROIs which are partially or wholly exposed to DNL of 65 dB or greater from the AFRC F-35A mission. Figure FW3-8 presents an overlay of the baseline and AFRC F-35A mission 65 dB DNL contour on the ROIs and the COC.

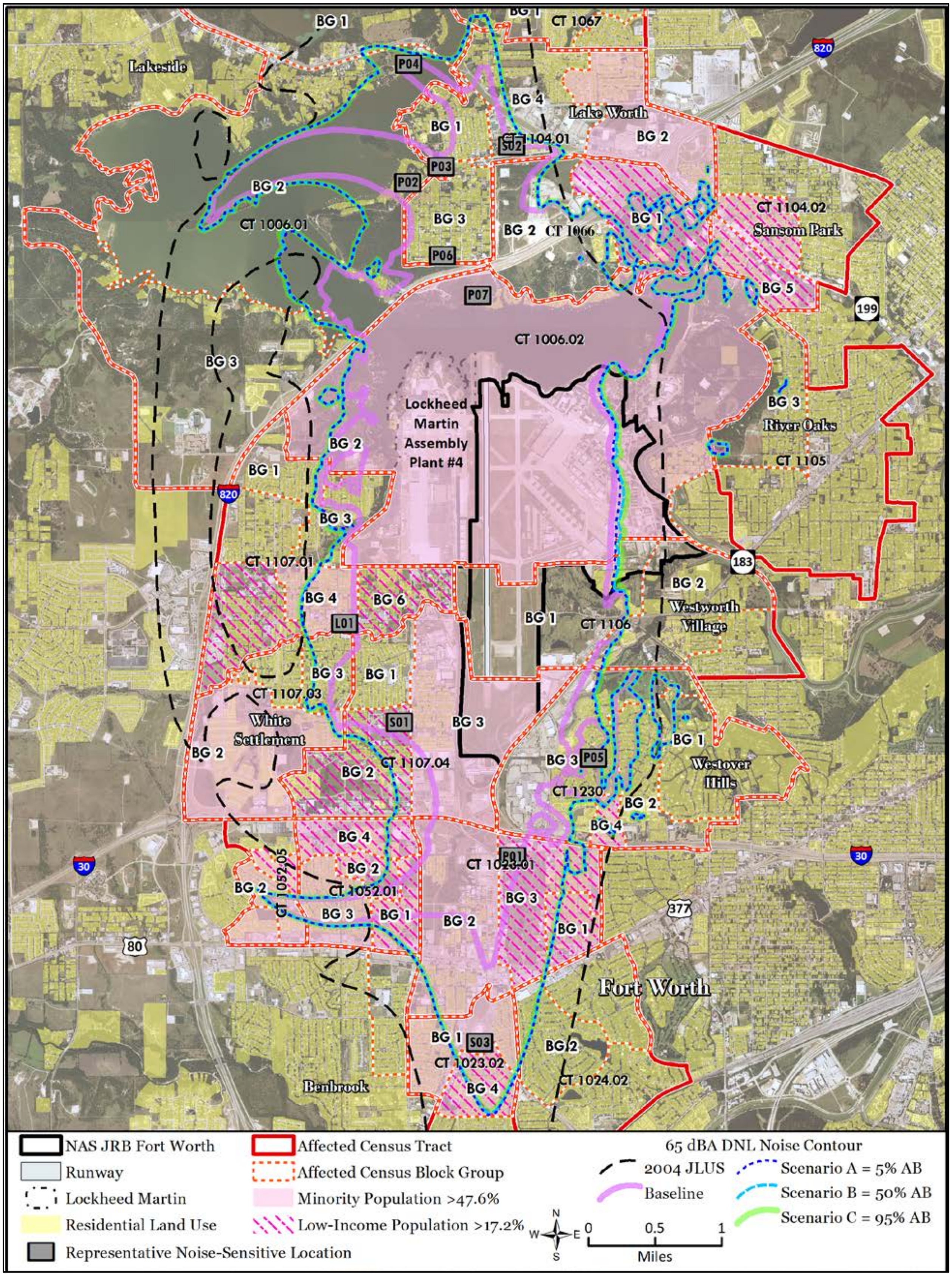

Figure FW3-8. NAS JRB Fort Worth Census Tracts and Block Groups Exposed to DNL of 65 dB or Greater Under Baseline and AFRC F-35A Mission Conditions

FW3.10.1 Base Affected Environment

Table FW3-45 provides baseline demographic conditions in Tarrant County, where NAS JRB Fort Worth is located. Also shown in Table FW3-45 is the existing proportion of environmental justice populations in the 17 CTs located in the proposed action affected area at NAS JRB Fort Worth. The 17 CTs are the COC for the environmental justice analysis. Table FW3-45 includes minority, low-income, children, and elderly population numbers and percentages for county, state, and nation census categories to show context and to help determine the intensity of impacts. As shown in Table FW3-45, the COC has a lower proportion of minority and children populations than Tarrant County and the State of Texas, but a larger proportion than the nation. The COC also has a higher proportion of low-income populations than the county, state, or nation.

Table FW3-46 lists the percentages of environmental justice populations residing in the 38 ROIs (BGs) exposed to DNL of 65 dB or greater from baseline and AFRC F-35A mission conditions. Table FW3-46 shows that under baseline conditions 12 ROIs (BGs) have higher percentages of minority populations than the percentage of minority populations living in the COC. This means that there are existing disproportionate impacts to minority persons living in these 12 ROIs. Thirteen (13) ROIs (BGs) encompassed by the baseline 65 dB or greater DNL contour have higher percentages of low-income populations than the percentage of low-income populations living in the COC. This means that there are existing disproportionate impacts to low-income persons living in these13 ROIs. Table FW3-47 documents that children and elderly populations in the ROIs also are currently exposed to DNL of 65 dB or greater. Under baseline conditions, 2,833 children and 1,754 elderly persons reside in areas exposed to DNL 65 dB or greater.

Five off-base schools are currently exposed to DNL of 65 to 69 dB. These schools are Brewer Middle School, Effie Morris Elementary, Mesa High School, Liberty Elementary, and N.A. Howry Intermediate. For more information about potential noise impacts as modeled for representative schools, refer to Section FW3.2.1.3.

Figure FW3-9 maps the census data minority and low-income populations and Figure FW3-10 maps the children and elderly populations exposed to DNL of 65 dB or greater resulting from the AFRC F-35A mission at NAS JRB Fort Worth. Both figures also show the Census BGs and the CTs used for the environmental justice analysis. The letter designations on the figure represent noise-sensitive locations identified and described in Section FW3.2.1.1.

Table FW3-45. Environmental Justice Populations and Demographics for NAS JRB Fort Worth

Geographic Unit	Total Population	Population for Whom Poverty is Determined[a]	Minority		Low-Income		Children		Elderly	
			Percent	Number	Percent	Number	Percent	Number	Percent	Number
1006.01	2,415	2,406	20.2	488	13.4	324	13.9	336	16.3	393
1006.02	3,872	1,996	52.9	2,048	7.7	298	12.0	463	7.9	307
1023.01	3,258	3,258	68.3	2,225	16.9	551	22.7	738	9.6	313
1023.02	5,653	5,645	58.9	3,332	20.9	1,181	30.1	1,699	8.8	500
1024.02	4,639	4,639	16.2	751	4.6	213	23.5	1,090	17.9	830
1052.01	5,459	5,445	68.7	3,752	34.1	1,862	34.3	1,875	8.4	460
1052.05	5,627	5,612	68.9	3,878	29.6	1,666	29.7	1,673	6.2	348
1066.00	2,349	2,349	52.4	1,232	30.6	719	28.7	674	6.5	152
1067.00	2,124	2,117	34.9	742	14.7	312	25.3	537	12.0	254
1104.01	4,898	4,662	34.5	1,688	9.0	441	25.1	1,230	14.5	708
1104.02	5,027	4,884	69.4	3,489	21.0	1,056	29.8	1,499	8.7	435
1105.00	8,733	8,733	54.3	4,739	17.4	1,520	27.2	2,376	10.1	882
1106.00	2,678	2,673	34.4	922	9.2	246	22.1	592	12.6	337
1107.01	7,161	7,161	37.6	2,695	14.8	1,060	23.2	1,664	11.3	807
1107.03	5,240	5,030	42.1	2,204	11.8	618	28.4	1,490	9.7	509
1107.04	4,734	4,427	36.7	1,737	16.4	776	24.0	1,137	16.8	793
1230.00	5,614	5,614	34.3	1,926	15.1	848	11.7	659	26.9	1,510
COC	**79,481**	**76,651**	**47.6**	**37,848**	**17.2**	**13,691**	**24.8**	**19,732**	**12.0**	**9,538**
Tarrant County	1,983,675	1,957,580	48.3	959,103	13.5	264,575	26.9	534,079	10.5	208,089
State of Texas	27,419,612	26,794,198	57.1	15,664,119	16.0	4,291,384	26.3	7,213,117	11.7	3,215,906
United States	321,004,407	313,048,563	38.5	123,726,618	14.6	45,650,345	22.9	73,601,279	14.9	47,732,389

[a] Poverty status was determined for all people except institutionalized people, people in military group quarters, people in college dormitories, and unrelated individuals under 15 years of age.

Note: Numbers may not sum due to rounding. To best represent the level of accuracy achieved, population group numbers are displayed as whole numbers in the text and tables, whereas calculations are based on the raw population group numbers containing multiple decimal points. The resulting summations and change calculations are then rounded to whole numbers.

Source: USCB 2017a-e

FW3.10.2 Base Environmental Consequences

FW3.10.2.1 Scenario A

Based on the analysis shown in Table FW3-46, implementation of Scenario A would result in disproportionate noise impacts to minority and low-income populations. Table FW3-46 identifies the ROIs (BGs) exposed to DNL of 65 dB or greater under baseline and Scenario A conditions.

The percentage of the population that identifies themselves as minority in four ROIs (BGs) that would be newly exposed to DNL of 65 dB or greater exceeds the percentage of minority populations in the COC. The percentage of the population that is considered below poverty (low-income) in two newly exposed ROIs (BGs) is greater than the percentage of low-income populations in the COC. The areas where these populations are located are shown on Figure FW3-9. Because the percentages of minority and low-income populations in these ROIs are greater than or equal to the corresponding percentages in the COC, disproportionate impacts to environmental justice populations in these ROIs would result from the implementation of Scenario A.

Because implementation of Scenario A would result in disproportionate impacts, potential mitigation measures were evaluated. The USAF considered a number of different measures to mitigate noise impacts, but none of these measures were determined to be operationally feasible (Chapter 2, Section 2.5).

The other sensitive populations evaluated in this analysis are children and elderly. Table FW3-47 identifies the ROIs (BGs) where youth and elderly are exposed to DNL of 65 dB or greater under baseline and AFRC F-35A mission conditions. Implementation of Scenario A would expose an additional estimated 2,188 children and 1,126 elderly persons to DNL of 65 dB or greater. The areas where these populations are located are shown on Figure FW3-10.

Sections FW3.2.2.2 and FW3.2.2.3 describe speech interference and classroom learning disruption associated with increased overflight and noise levels, which would adversely impact children and elderly populations.

Table FW3-46. Minority and Low-Income Populations Exposed to DNL of 65 dB or Greater Under Baseline and AFRC F-35A Mission Conditions at NAS JRB Fort Worth (Scenario A)

Geographic Units		Baseline					AFRC F-35A Mission (Newly Exposed)				
Census BG (ROI)/COC	Population in the Census Area	Population in the Area Encompassed by DNL of 65 dB or Greater	Minority (%)	Disproportionate	Low-Income (%)	Disproportionate	Population in the Area Encompassed by DNL of 65 dB or Greater	Minority (%)	Disproportionate	Low-Income (%)	Disproportionate
CT 1006.01											
2[a]	979	126	24.9	No	15.8	No	129	24.9	No	15.8	No
3	653	0	25.9	No[b]	10.1	No[b]	1	25.9	No	10.1	No
CT 1006.02											
2[a]	2,866	1,122	50.2	Yes	10.3	No	15	50.2	Yes	10.3	No
CT 1023.01											
1	1,178	0	64.9	No[b]	18.6	No[b]	255	64.9	Yes	18.6	Yes
2[a]	1,323	397	69.8	Yes	13.8	No	810	69.8	Yes	13.8	No
3[a]	757	1	71.1	Yes	19.8	Yes	401	71.1	Yes	19.8	Yes
CT 1023.02											
1	2,259	0	60.8	No[b]	6.5	No[b]	794	60.8	Yes	6.5	No
4	953	0	63.4	No[b]	29.2	No[b]	591	63.4	Yes	29.2	Yes
CT 1024.02											
2	1,264	0	10.8	No[b]	1.0	No[b]	166	10.8	No	1.0	No
CT 1052.01											
1[a]	1,566	683	91.1	Yes	57.1	Yes	650	91.1	Yes	57.1	Yes
2[a]	1,346	157	73.4	Yes	36.1	Yes	184	73.4	Yes	36.1	Yes
3[a]	1,796	660	47.0	Yes	9.1	No	151	47.0	Yes	9.1	No
4	751	0	65.5	No[b]	42.5	No[b]	117	65.5	Yes	42.5	Yes
CT 1052.05											
2[a]	1,741	247	69.3	Yes	15.7	No	95	69.3	Yes	15.7	No
CT 1066.00											
1[a]	1,541	457	62.0	Yes	41.0	Yes	48	62.0	Yes	41.0	Yes
2[a]	808	564	34.3	No	10.6	No	12	34.3	No	10.6	No

Table FW3-46. Minority and Low-Income Populations Exposed to DNL of 65 dB or Greater Under Baseline and AFRC F-35A Mission Conditions at NAS JRB Fort Worth (Scenario A) (Continued)

Geographic Units	Population in the Census Area	Baseline					AFRC F-35A Mission (Newly Exposed)				
Census BG (ROI)/COC		Population in the Area Encompassed by DNL of 65 dB or Greater	Minority (%)	Disproportionate	Low-Income (%)	Disproportionate	Population in the Area Encompassed by DNL of 65 dB or Greater	Minority (%)	Disproportionate	Low-Income (%)	Disproportionate
CT 1067.00											
1	1,682	0	36.9	No[b]	12.1	No[b]	19	36.9	No	12.1	No
CT 1104.01											
1[a]	1,255	827	27.3	No	11.0	No	428	27.3	No	11.0	No
2[a]	1,259	10	51.3	Yes	12.7	No	2	51.3	Yes	12.7	No
3[a]	1,569	1,519	35.3	No	5.1	No	50	35.3	No	5.1	No
4[a]	815	64	17.9	No	8.5	No	214	17.9	No	8.5	No
CT 1104.02											
5[a]	626	15	48.2	Yes	25.6	Yes	2	48.2	Yes	25.6	Yes
CT 1105.00											
3[a]	925	1	41.3	No	8.6	No	1	41.3	No	8.6	No
CT 1106.00											
1[a]	617	85	36.8	No	15.9	No	12	36.8	No	15.9	No
2[a]	900	0	23.6	No[b]	10.1	No[b]	10	23.6	No	10.1	No
CT 1107.01											
1[a]	1,311	104	15.9	No	7.6	No	148	15.9	No	7.6	No
3[a]	1,221	578	32.4	No	11.5	No	303	32.4	No	11.5	No
4[a]	1,638	76	57.1	Yes	4.3	No	1,088	57.1	Yes	4.3	No
6[a]	970	970	39.0	No	33.6	Yes	-1	39.0	No	33.6	No[c]
CT 1107.03											
2[a]	2,830	34	47.1	No	12.6	No	38	47.1	No	12.6	No
3[a]	810	173	31.1	No	11.5	No	452	31.1	No	11.5	No

Table FW3-46. Minority and Low-Income Populations Exposed to DNL of 65 dB or Greater Under Baseline and AFRC F-35A Mission Conditions at NAS JRB Fort Worth (Scenario A) (Continued)

Geographic Units		Baseline					AFRC F-35A Mission (Newly Exposed)				
Census BG (ROI)/COC	Population in the Census Area	Population in the Area Encompassed by DNL of 65 dB or Greater	Minority (%)	Disproportionate	Low-Income (%)	Disproportionate	Population in the Area Encompassed by DNL of 65 dB or Greater	Minority (%)	Disproportionate	Low-Income (%)	Disproportionate
CT 1107.04											
1[a]	1,327	1,311	27.9	No	13.5	No	16	27.9	No	13.5	No
2[a]	2,213	204	31.9	No	19.5	Yes	630	31.9	No	19.5	Yes
3[a]	1,194	1,192	55.3	Yes	14.0	No	1	55.3	Yes	14.0	No
CT 1230.00											
1[a]	640	31	2.0	No	8.0	No	1	2.0	No	8.0	No
2[a]	1,538	445	25.9	No	10.3	No	47	25.9	No	10.3	No
3[a]	1,984	819	15.7	No	16.1	No	581	15.7	No	16.1	No
4	1,452	221	82.8	Yes	22.0	Yes	131	82.8	Yes	22.0	Yes
ROI Totals	**51,340**	**13,093**	**NA**	**NA**	**NA**	**NA**	**8,593**	**NA**	**NA**	**NA**	**NA**
COC	79,481	NA	47.6	NA	17.2	NA	79,481	47.6	NA	17.2	NA

[a] Indicates this ROI (BG) is currently encompassed by the baseline 65 dB or greater DNL contour.
[b] No disproportionate impacts because this ROI (BG) is not encompassed by the baseline 65 dB or greater DNL contour.
[c] Although the percentage of environmental justice populations in this ROI (BG) is higher than the COC, there are no persons affected in this area, thus no disproportionate impact to people.
Notes: Shading indicates that implementation of the AFRC F-35A mission and or baseline conditions result in disproportionate noise impacts to the BG (ROI). Numbers may not sum due to rounding. To best represent the level of accuracy achieved, population group numbers are displayed as whole numbers in the text and tables, whereas calculations are based on the raw population group numbers containing multiple decimal points. The resulting summations and change calculations are then rounded to whole numbers.
Key: NA = Not applicable, does not apply
Source: USCB 2017a-e

Table FW3-47. Children and Elderly Populations Exposed to DNL of 65 dB or Greater Under Baseline and AFRC F-35A Mission Conditions (Scenario A) at NAS JRB Fort Worth (Scenario A)

Geographic Units	Population in the Census Area	Baseline					AFRC F-35A Mission (Newly Exposed)				
Census BG (ROI)/COC		Population in the Area Encompassed by DNL of 65 dB or Greater	Children (<18 years)		Elderly (65 years or >)		Population in the Area Encompassed by DNL of 65 dB or Greater	Children (< 18 years)		Elderly (65 years or >)	
			Percent	Number	Percent	Number		Percent	Number	Percent	Number
CT 1006.01											
2[a]	979	126	20.8	26	16.5	20	129	20.8	27	16.5	23
3	653	0	6.1	0	13.5	0	1	6.1	0	13.5	0
CT 1006.02											
2[a]	2,866	1,122	8.0	89	6.9	77	15	8.0	1	6.9	2
CT 1023.01											
1	1,178	0	22.7	0	7.9	0	255	22.7	58	7.9	20
2[a]	1,323	397	16.3	65	12.8	51	810	16.3	132	12.8	104
3[a]	757	1	33.8	0	6.6	0	401	33.8	136	6.6	27
CT 1023.02											
1	2,259	0	24.8	0	6.6	0	794	24.8	197	6.6	52
4	953	0	29.1	0	14.5	0	591	29.1	172	14.5	86
CT 1024.02											
2	1,264	0	26.8	0	21.8	0	166	26.8	45	21.8	36
CT 1052.01											
1[a]	1,566	683	44.3	303	2.4	16	650	44.3	287	2.4	15
2[a]	1,346	157	33.2	52	9.5	15	184	33.2	61	9.5	17
3[a]	1,796	660	35.4	233	13.7	90	151	35.4	54	13.7	21
4	751	0	13.2	0	6.5	0	117	13.2	15	6.5	8
CT 1052.05											
2[a]	1,741	247	36.9	91	11.6	29	95	36.9	35	11.6	11
CT 1066.01											
1[a]	1,541	457	31.9	146	7.5	34	48	31.9	15	7.5	4
2[a]	808	564	22.5	128	4.6	26	12	22.5	2	4.6	1
CT 1067.00											
1	1,682	0	26.3	0	9.6	0	19	26.3	5	9.6	2
CT 1104.01											
1[a]	1,255	827	18.8	156	19.8	163	428	18.8	80	19.8	85
2[a]	1,259	10	28.8	3	10.2	1	2	28.8	0	10.2	0
3[a]	1,569	1,519	33.0	500	8.9	134	50	33.0	16	8.9	5
4[a]	815	64	14.0	9	23.7	15	214	14.0	30	23.7	51

Table FW3-47. Children and Elderly Populations Exposed to DNL of 65 dB or Greater Under Baseline and AFRC F-35A Mission Conditions at NAS JRB Fort Worth (Scenario A) (Continued)

Geographic Units	Population in the Census Area	Baseline					AFRC F-35A Mission (Newly Exposed)				
Census BG (ROI)/COC		Population in the Area Encompassed by DNL of 65 dB or Greater	Children (<18 years)		Elderly (65 years or >)		Population in the Area Encompassed by DNL of 65 dB or Greater	Children (< 18 years)		Elderly (65 years or >)	
			Percent	Number	Percent	Number		Percent	Number	Percent	Number
CT 1104.02											
5[a]	626	15	23.2	3	32.4	5	2	23.2	1	32.4	0
CT 1105.00											
3[a]	925	1	29.6	0	19.2	0	1	29.6	1	19.2	0
CT 1106.00											
1[a]	617	85	18.2	15	0.0	0	12	18.2	3	0.0	0
2	900	0	14.2	0	22.6	0	11	14.2	2	22.6	2
CT 1107.01											
1[a]	1,311	104	23.7	25	8.7	9	148	23.7	35	8.7	13
3[a]	1,221	578	14.7	85	20.1	116	303	14.7	45	20.1	61
4[a]	1,638	76	33.2	25	5.1	4	1088	33.2	361	5.1	56
6[a]	970	970	8.9	86	17.4	168	-1	8.9	0	17.4	1
CT 1107.03											
2[a]	2830	34	25.0	8	12.2	4	38	25.0	10	12.2	5
3[a]	810	173	24.8	43	8.6	15	452	24.8	112	8.6	39
CT 1107.4											
1[a]	1,327	1,311	24.7	324	13.9	182	16	24.7	4	13.9	2
2[a]	2,213	204	25.9	53	22.2	45	630	25.9	163	22.2	140
3[a]	1,194	1,192	19.7	253	9.8	117	1	19.7	0	9.8	-1
CT 1230.00											
1[a]	640	31	23.6	8	36.3	11	1	23.6	0	36.3	0
2[a]	1,538	445	5.7	25	30.0	133	47	5.7	2	30.0	15
3[a]	1,984	819	10.8	89	37.3	306	581	10.8	62	37.3	216
4[a]	1,452	221	14.3	31	5.3	12	131	14.3	19	5.3	7
ROI Totals	**51,340**	**13,093**	**NA**	**2,856**	**NA**	**1,798**	**8,593**	**NA**	**2,188**	**NA**	**1,126**
COC	79,481	NA	24.8	19,711	12.0	9,538	NA	24.8	19,711	12.0	9,538

[a] Indicates this ROI (BG) is currently encompassed by the baseline 65 dB or greater DNL contour.

Note: Numbers may not sum due to rounding. To best represent the level of accuracy achieved, population group numbers are displayed as whole numbers in the text and tables, whereas calculations are based on the raw population group numbers containing multiple decimal points. The resulting summations and change calculations are then rounded to whole numbers.

Key: NA = Not applicable, does not apply

Source: USCB 2017a-e

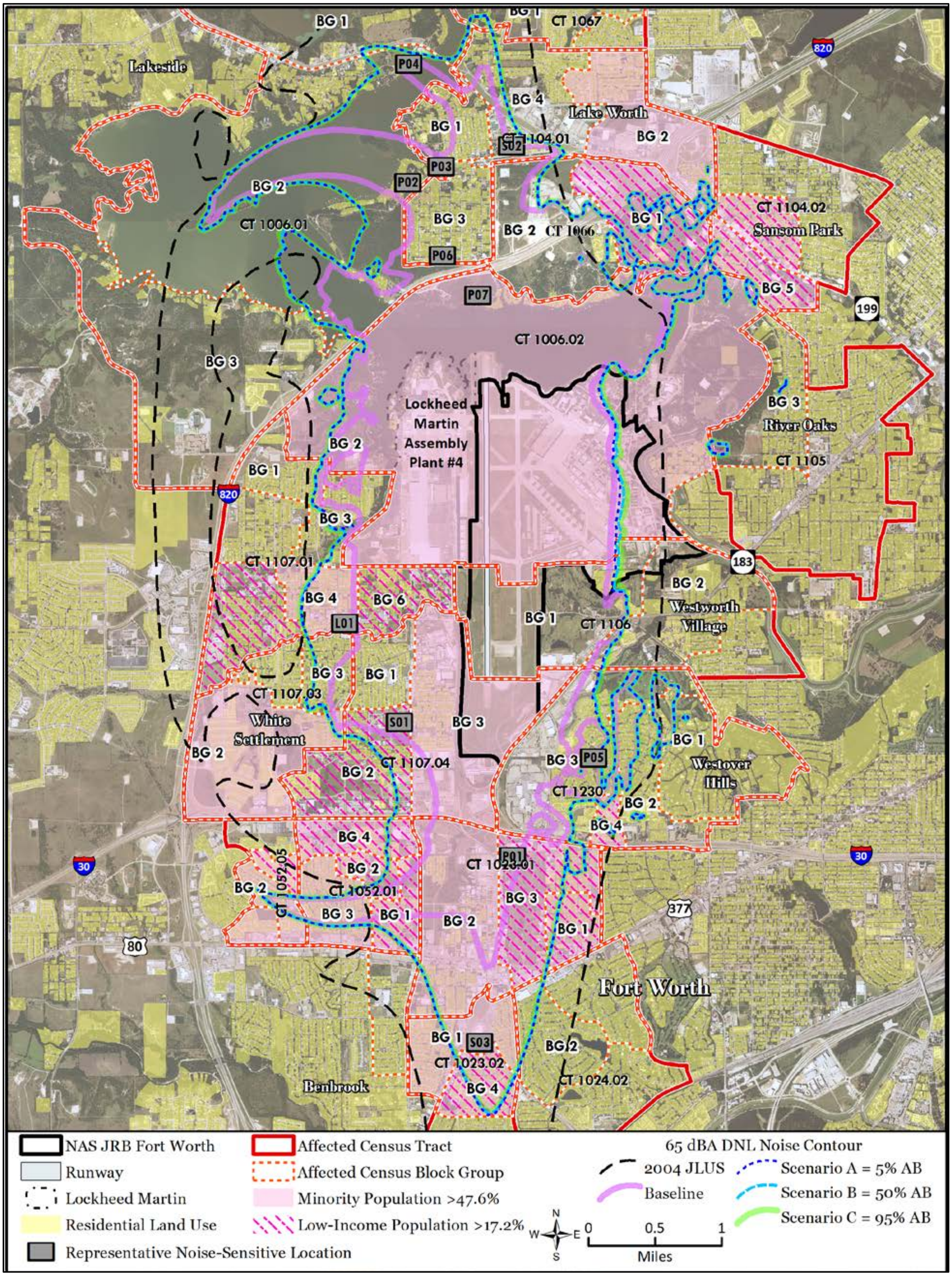

Figure FW3-9. Minority and Low-Income Populations Exposed to DNL of 65 dB or Greater Under Baseline and AFRC F-35A Mission Conditions at NAS JRB Fort Worth

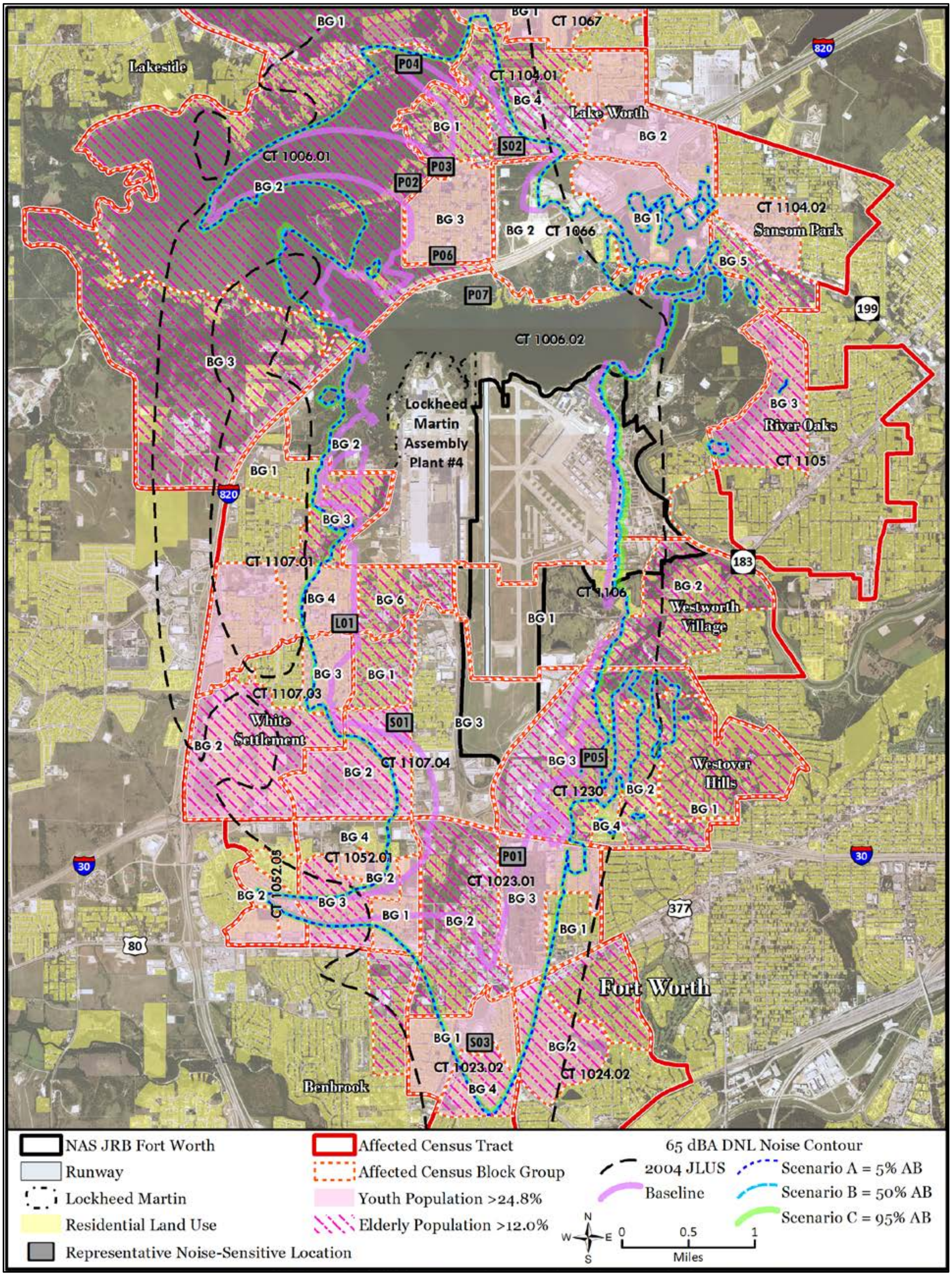

Figure FW3-10. Youth and Elderly Populations and Noise-Sensitive Receptors Exposed to DNL of 65 dB or Greater Under Baseline and AFRC F-35A Mission Conditions at NAS JRB Fort Worth

FW3.10.2.2 Scenario B

Implementation of Scenario B would result in disproportionate noise impacts to minority and low-income populations in an additional four ROIs (BGs) evaluated for this analysis (Table FW3-48 and Figure FW3-9). Implementation of this scenario would also expose an additional estimated 2,192 children and 1,129 elderly persons to DNL of 65 dB or greater (Table FW3-49 and Figure FW3-10). Because implementation of Scenario B would result in disproportionate impacts, potential mitigation measures were evaluated. The USAF considered a number of different measures to mitigate noise impacts, but none of these measures were determined to be operationally feasible (Chapter 2, Section 2.5).

Table FW3-48. Minority and Low-Income Populations Exposed to DNL of 65 dB or Greater Under Baseline and AFRC F-35A Mission Conditions at NAS JRB Fort Worth (Scenario B)

Geographic Units	Population in the Census Area	Baseline					AFRC F-35A Mission (Newly Exposed)				
Census BG (ROI)/COC		Population in the Area Encompassed by DNL of 65 dB or Greater	Minority (%)	Disproportionate	Low-Income (%)	Disproportionate	Population in the Area Encompassed by DNL of 65 dB or Greater	Minority (%)	Disproportionate	Low-Income (%)	Disproportionate
CT 1006.01											
2[a]	979	126	24.9	No	15.8	No	129	24.9	No	15.8	No
3	653	0	25.9	No[b]	10.1	No[b]	1	25.9	No	10.1	No
CT 1006.02											
2[a]	2,866	1,122	50.2	Yes	10.3	No	18	50.2	Yes	10.3	No
CT 1023.01											
1	1,178	0	64.9	No[b]	18.6	No[b]	251	64.9	Yes	18.6	Yes
2[a]	1,323	397	69.8	Yes	13.8	No	805	69.8	Yes	13.8	No
3[a]	757	1	71.1	Yes	19.8	Yes	399	71.1	Yes	19.8	Yes
CT 1023.02											
1	2,259	0	60.8	No[b]	6.5	No[b]	782	60.8	Yes	6.5	No
4	953	0	63.4	No[b]	29.2	No[b]	564	63.4	Yes	29.2	Yes
CT 1024.02											
2	1,264	0	10.8	No[b]	1.0	No[b]	157	10.8	No	1.0	No
CT 1052.01											
1[a]	1,566	683	91.1	Yes	57.1	Yes	649	91.1	Yes	57.1	Yes
2[a]	1,346	157	73.4	Yes	36.1	Yes	185	73.4	Yes	36.1	Yes
3[a]	1,796	660	47.0	Yes	9.1	No	150	47.0	Yes	9.1	No
4	751	0	65.5	No[b]	42.5	No[b]	118	65.5	Yes	42.5	Yes
CT 1052.05											
2[a]	1,741	247	69.3	Yes	15.7	No	97	69.3	Yes	15.7	No
CT 1066.00											
1[a]	1,541	457	62.0	Yes	41.0	Yes	53	62.0	Yes	41.0	Yes
2[a]	808	564	34.3	No	10.6	No	12	34.3	No	10.6	No

Table FW3-48. Minority and Low-Income Populations Exposed to DNL of 65 dB or Greater Under Baseline and AFRC F-35A Mission Conditions at NAS JRB Fort Worth (Scenario B) (Continued)

Geographic Units	Population in the Census Area	Baseline					AFRC F-35A Mission (Newly Exposed)				
Census BG (ROI)/COC		Population in the Area Encompassed by DNL of 65 dB or Greater	Minority (%)	Disproportionate	Low-Income (%)	Disproportionate	Population in the Area Encompassed by DNL of 65 dB or Greater	Minority (%)	Disproportionate	Low-Income (%)	Disproportionate
CT 1067.00											
1	1,682	0	36.9	No[b]	12.1	No[b]	18	36.9	No	12.1	No
CT 1104.01											
1[a]	1,255	827	27.3	No	11.0	No	428	27.3	No	11.0	No
2[a]	1,259	10	51.3	Yes	12.7	No	2	51.3	Yes	12.7	No
3[a]	1,569	1,519	35.3	No	5.1	No	50	35.3	No	5.1	No
4[a]	815	64	17.9	No	8.5	No	214	17.9	No	8.5	No
CT 1104.02											
5[a]	626	15	48.2	Yes	25.6	Yes	2	48.2	Yes	25.6	Yes
CT 1105.00											
3[a]	925	1	41.3	No	8.6	No	1	41.3	No	8.6	No
CT 1106.00											
1[a]	617	85	36.8	No	15.9	No	17	36.8	No	15.9	No
2[a]	900	0	23.6	No[b]	10.1	No[b]	14	23.6	No	10.1	No
CT 1107.01											
1[a]	1,311	104	15.9	No	7.6	No	152	15.9	No	7.6	No
3[a]	1,221	578	32.4	No	11.5	No	305	32.4	No	11.5	No
4[a]	1,638	76	57.1	Yes	4.3	No	1,112	57.1	Yes	4.3	No
6[a]	970	970	39.0	No	33.6	Yes	0	39.0	No	33.6	No[c]
CT 1107.03											
2[a]	2,830	34	47.1	No	12.6	No	39	47.1	No	12.6	No
3[a]	810	173	31.1	No	11.5	No	462	31.1	No	11.5	No

Table FW3-48. Minority and Low-Income Populations Exposed to DNL of 65 dB or Greater Under Baseline and AFRC F-35A Mission Conditions at NAS JRB Fort Worth (Scenario B) (Continued)

Geographic Units		Baseline					AFRC F-35A Mission (Newly Exposed)				
Census BG (ROI)/COC	Population in the Census Area	Population in the Area Encompassed by DNL of 65 dB or Greater	Minority (%)	Disproportionate	Low-Income (%)	Disproportionate	Population in the Area Encompassed by DNL of 65 dB or Greater	Minority (%)	Disproportionate	Low-Income (%)	Disproportionate
CT 1107.04											
1[a]	1,327	1,311	27.9	No	13.5	No	16	27.9	No	13.5	No
2[a]	2,213	204	31.9	No	19.5	Yes	646	31.9	No	19.5	Yes
3[a]	1,194	1,192	55.3	Yes	14.0	No	2	55.3	Yes	14.0	No
CT 1230.00											
1[a]	640	31	2.0	No	8.0	No	1	2.0	No	8.0	No
2[a]	1,538	445	25.9	No	10.3	No	50	25.9	No	10.3	No
3[a]	1,984	819	15.7	No	16.1	No	590	15.7	No	16.1	No
4	1,452	221	82.8	Yes	22.0	Yes	131	82.8	Yes	22.0	Yes
ROI Totals	**51,340**	**13,093**	**NA**	**NA**	**NA**	**NA**	**8,622**	**NA**	**NA**	**NA**	**NA**
COC	79,481	NA	47.6	NA	17.2	NA	79,481	47.6	NA	17.2	NA

[a] Indicates this ROI (BG) is currently encompassed by the baseline 65 dB or greater DNL contour.
[b] No disproportionate impacts because this ROI (BG) is not encompassed by the baseline 65 dB or greater DNL contour.
[c] Although the percentage of environmental justice populations in this ROI (BG) is higher than the COC, there are no persons affected in this area, thus no disproportionate impact to people.
Notes: Shading indicates that implementation of the AFRC F-35A mission and or baseline conditions result in disproportionate noise impacts to the BG (ROI). Numbers may not sum due to rounding. To best represent the level of accuracy achieved, population group numbers are displayed as whole numbers in the text and tables, whereas calculations are based on the raw population group numbers containing multiple decimal points. The resulting summations and change calculations are then rounded to whole numbers.
Key: NA = Not applicable, does not apply
Source: USCB 2017a-e

Table FW3-49. Children and Elderly Populations Exposed to DNL of 65 dB or Greater Under Baseline and AFRC F-35A Mission Conditions (Scenario A) at NAS JRB Fort Worth (Scenario B)

Geographic Units	Population in the Census Area	Baseline					AFRC F-35A Mission (Newly Exposed)				
Census BG (ROI)/COC		Population in the Area Encompassed by DNL of 65 dB or Greater	Children (<18 years)		Elderly (65 years or >)		Population in the Area Encompassed by DNL of 65 dB or Greater	Children (< 18 years)		Elderly (65 years or >)	
			Percent	Number	Percent	Number		Percent	Number	Percent	Number
CT 1006.01											
2[a]	979	126	20.8	26	16.5	20	129	20.8	27	16.5	23
3	653	0	6.1	0	13.5	0	1	6.1	0	13.5	0
CT 1006.02											
2[a]	2,866	1,122	8.0	89	6.9	77	18	8.0	0	6.9	1
CT 1023.01											
1	1,178	0	22.7	0	7.9	0	251	22.7	57	7.9	20
2[a]	1,323	397	16.3	65	12.8	51	805	16.3	130	12.8	103
3[a]	757	1	33.8	0	6.6	0	399	33.8	135	6.6	26
CT 1023.02											
1	2,259	0	24.8	0	6.6	0	782	24.8	194	6.6	51
4	953	0	29.1	0	14.5	0	564	29.1	164	14.5	82
CT 1024.02											
2	1,264	0	26.8	0	21.8	0	157	26.8	42	21.8	34
CT 1052.01											
1[a]	1,566	683	44.3	303	2.4	16	649	44.3	287	2.4	15
2[a]	1,346	157	33.2	52	9.5	15	185	33.2	62	9.5	18
3[a]	1,796	660	35.4	233	13.7	90	150	35.4	53	13.7	21
4	751	0	13.2	0	6.5	0	118	13.2	16	6.5	8
CT 1052.05											
2[a]	1,741	247	36.9	91	11.6	29	97	36.9	36	11.6	11
CT 1066.01											
1[a]	1,541	457	31.9	146	7.5	34	53	31.9	17	7.5	4
2[a]	808	564	22.5	128	4.6	26	12	22.5	2	4.6	0
CT 1067.00											
1	1,682	0	26.3	0	9.6	0	18	26.3	5	9.6	2
CT 1104.01											
1[a]	1,255	827	18.8	156	19.8	163	428	18.8	80	19.8	85
2[a]	1,259	10	28.8	3	10.2	1	2	28.8	0	10.2	0
3[a]	1,569	1,519	33.0	500	8.9	134	50	33.0	17	8.9	5
4[a]	815	64	14.0	9	23.7	15	214	14.0	30	23.7	51

Table FW3-49. Children and Elderly Populations Exposed to DNL of 65 dB or Greater Under Baseline and AFRC F-35A Mission Conditions at NAS JRB Fort Worth (Scenario B) (Continued)

Geographic Units	Population in the Census Area	Baseline					AFRC F-35A Mission (Newly Exposed)				
Census BG (ROI)/COC		Population in the Area Encompassed by DNL of 65 dB or Greater	Children (<18 years)		Elderly (65 years or >)		Population in the Area Encompassed by DNL of 65 dB or Greater	Children (< 18 years)		Elderly (65 years or >)	
			Percent	Number	Percent	Number		Percent	Number	Percent	Number
CT 1104.02											
5[a]	626	15	23.2	3	32.4	5	2	23.2	1	32.4	0
CT 1105.00											
3[a]	925	1	29.6	0	19.2	0	1	29.6	1	19.2	0
CT 1106.00											
1[a]	617	85	18.2	15	0.0	0	17	18.2	4	0.0	0
2	900	0	14.2	0	22.6	0	14	14.2	2	22.6	3
CT 1107.01											
1[a]	1,311	104	23.7	25	8.7	9	152	23.7	36	8.7	13
3[a]	1,221	578	14.7	85	20.1	116	305	14.7	45	20.1	61
4[a]	1,638	76	33.2	25	5.1	4	1112	33.2	369	5.1	57
6[a]	970	970	8.9	86	17.4	168	0	8.9	0	17.4	1
CT 1107.03											
2[a]	2830	34	25.0	8	12.2	4	39	25.0	10	12.2	5
3[a]	810	173	24.8	43	8.6	15	462	24.8	115	8.6	40
CT 1107.4											
1[a]	1,327	1,311	24.7	324	13.9	182	16	24.7	4	13.9	2
2[a]	2,213	204	25.9	53	22.2	45	646	25.9	167	22.2	144
3[a]	1,194	1,192	19.7	253	9.8	117	2	19.7	0	9.8	0
CT 1230.00											
1[a]	640	31	23.6	8	36.3	11	1	23.6	0	36.3	0
2[a]	1,538	445	5.7	25	30.0	133	47	5.7	2	30.0	15
3[a]	1,984	819	10.8	89	37.3	306	581	10.8	62	37.3	216
4[a]	1,452	221	14.3	31	5.3	12	131	14.3	19	5.3	7
ROI Totals	**51,340**	**13,093**	**NA**	**2,856**	**NA**	**1,798**	**8,622**	**NA**	**2,192**	**NA**	**1,129**
COC	79,481	NA	24.8	19,711	12.0	9,538	NA	24.8	19,711	12.0	9,538

[a] Indicates this ROI (BG) is currently encompassed by the baseline 65 dB or greater DNL contour.

Note: Numbers may not sum due to rounding. To best represent the level of accuracy achieved, population group numbers are displayed as whole numbers in the text and tables, whereas calculations are based on the raw population group numbers containing multiple decimal points. The resulting summations and change calculations are then rounded to whole numbers.

Key: NA = Not applicable, does not apply

Source: USCB 2017a-e

FW3.10.2.3 Scenario C

Implementation of Scenario C would result in disproportionate noise impacts to minority and low-income populations in four additional ROIs (BGs) that were evaluated for this analysis (Table FW3-50 and Figure FW3-9). Implementation of this scenario would expose an additional estimated 2,200 children and 1,129 elderly persons to DNL of 65 dB or greater (Table FW3-51 and Figure FW3-10). Because implementation of Scenario C would result in disproportionate impacts, potential mitigation measures were evaluated. The USAF considered a number of different measures to mitigate noise impacts, but none of these measures were determined to be operationally feasible (Chapter 2, Section 2.5).

Table FW3-50. Minority and Low-Income Populations Exposed to DNL of 65 dB or Greater Under Baseline and AFRC F-35A Mission Conditions at NAS JRB Fort Worth (Scenario C)

Geographic Units	Population in the Census Area	Baseline					AFRC F-35A Mission (Newly Exposed)				
Census BG (ROI)/COC		Population in the Area Encompassed by DNL of 65 dB or Greater	Minority (%)	Disproportionate	Low-Income (%)	Disproportionate	Population in the Area Encompassed by DNL of 65 dB or Greater	Minority (%)	Disproportionate	Low-Income (%)	Disproportionate
CT 1006.01											
2[a]	979	126	24.9	No	15.8	No	127	24.9	No	15.8	No
3	653	0	25.9	No[b]	10.1	No[b]	2	25.9	No	10.1	No
CT 1006.02											
2[a]	2,866	1,122	50.2	Yes	10.3	No	22	50.2	Yes	10.3	No
CT 1023.01											
1	1,178	0	64.9	No[b]	18.6	No[b]	246	64.9	Yes	18.6	Yes
2[a]	1,323	397	69.8	Yes	13.8	No	799	69.8	Yes	13.8	No
3[a]	757	1	71.1	Yes	19.8	Yes	397	71.1	Yes	19.8	Yes
CT 1023.02											
1	2,259	0	60.8	No[b]	6.5	No[b]	767	60.8	Yes	6.5	No
4	953	0	63.4	No[b]	29.2	No[b]	536	63.4	Yes	29.2	Yes
CT 1024.02											
2	1,264	0	10.8	No[b]	1.0	No[b]	148	10.8	No	1.0	No
CT 1052.01											
1[a]	1,566	683	91.1	Yes	57.1	Yes	649	91.1	Yes	57.1	Yes
2[a]	1,346	157	73.4	Yes	36.1	Yes	184	73.4	Yes	36.1	Yes
3[a]	1,796	660	47.0	Yes	9.1	No	153	47.0	Yes	9.1	No
4	751	0	65.5	No[b]	42.5	No[b]	119	65.5	Yes	42.5	Yes
CT 1052.05											
2[a]	1,741	247	69.3	Yes	15.7	No	96	69.3	Yes	15.7	No
CT 1066.00											
1[a]	1,541	457	62.0	Yes	41.0	Yes	57	62.0	Yes	41.0	Yes
2[a]	808	564	34.3	No	10.6	No	12	34.3	No	10.6	No

Table FW3-50. Minority and Low-Income Populations Exposed to DNL of 65 dB or Greater Under Baseline and AFRC F-35A Mission Conditions at NAS JRB Fort Worth (Scenario C) (Continued)

Geographic Units	Population in the Census Area	Baseline					AFRC F-35A Mission (Newly Exposed)				
Census BG (ROI)/COC		Population in the Area Encompassed by DNL of 65 dB or Greater	Minority (%)	Disproportionate	Low-Income (%)	Disproportionate	Population in the Area Encompassed by DNL of 65 dB or Greater	Minority (%)	Disproportionate	Low-Income (%)	Disproportionate
CT 1067.00											
1	1,682	0	36.9	No[b]	12.1	No[b]	18	36.9	No	12.1	No
CT 1104.01											
1[a]	1,255	827	27.3	No	11.0	No	428	27.3	No	11.0	No
2[a]	1,259	10	51.3	Yes	12.7	No	2	51.3	Yes	12.7	No
3[a]	1,569	1,519	35.3	No	5.1	No	50	35.3	No	5.1	No
4[a]	815	64	17.9	No	8.5	No	214	17.9	No	8.5	No
CT 1104.02											
5[a]	626	15	48.2	Yes	25.6	Yes	3	48.2	Yes	25.6	Yes
CT 1105.00											
3[a]	925	1	41.3	No	8.6	No	1	41.3	No	8.6	No
CT 1106.00											
1[a]	617	85	36.8	No	15.9	No	21	36.8	No	15.9	No
2[a]	900	0	23.6	No[b]	10.1	No[b]	18	23.6	No	10.1	No
CT 1107.01											
1[a]	1,311	104	15.9	No	7.6	No	158	15.9	No	7.6	No
3[a]	1,221	578	32.4	No	11.5	No	308	32.4	No	11.5	No
4[a]	1,638	76	57.1	Yes	4.3	No	1,137	57.1	Yes	4.3	No
6[a]	970	970	39.0	No	33.6	Yes	0	39.0	No	33.6	No
CT 1107.03											
2[a]	2,830	34	47.1	No	12.6	No	41	47.1	No	12.6	No
3[a]	810	173	31.1	No	11.5	No	471	31.1	No	11.5	No

Table FW3-50. Minority and Low-Income Populations Exposed to DNL of 65 dB or Greater Under Baseline and AFRC F-35A Mission Conditions at NAS JRB Fort Worth (Scenario C) (Continued)

Geographic Units	Population in the Census Area	Baseline					AFRC F-35A Mission (Newly Exposed)				
Census BG (ROI)/COC		Population in the Area Encompassed by DNL of 65 dB or Greater	Minority (%)	Disproportionate	Low-Income (%)	Disproportionate	Population in the Area Encompassed by DNL of 65 dB or Greater	Minority (%)	Disproportionate	Low-Income (%)	Disproportionate
CT 1107.04											
1[a]	1,327	1,311	27.9	No	13.5	No	16	27.9	No	13.5	No
2[a]	2,213	204	31.9	No	19.5	Yes	660	31.9	No	19.5	Yes
3[a]	1,194	1,192	55.3	Yes	14.0	No	1	55.3	Yes	14.0	No
CT 1230.00											
1[a]	640	31	2.0	No	8.0	No	1	2.0	No	8.0	No
2[a]	1,538	445	25.9	No	10.3	No	53	25.9	No	10.3	No
3[a]	1,984	819	15.7	No	16.1	No	600	15.7	No	16.1	No
4	1,452	221	82.8	Yes	22.0	Yes	133	82.8	Yes	22.0	Yes
ROI Totals	**51,340**	**13,093**	**NA**	**NA**	**NA**	**NA**	**8,648**	**NA**	**NA**	**NA**	**NA**
COC	79,481	NA	47.6	NA	17.2	NA	79,481	47.6	NA	17.2	NA

[a] Indicates this ROI (BG) is currently encompassed by the baseline 65 dB or greater DNL contour.

[b] No disproportionate impacts because this ROI (BG) is not encompassed by the baseline 65 dB or greater DNL contour.

Notes: Shading indicates that implementation of the AFRC F-35A mission and or baseline conditions result in disproportionate noise impacts to the BG (ROI). Numbers may not sum due to rounding. To best represent the level of accuracy achieved, population group numbers are displayed as whole numbers in the text and tables, whereas calculations are based on the raw population group numbers containing multiple decimal points. The resulting summations and change calculations are then rounded to whole numbers.

Key: NA = Not applicable, does not apply

Source: USCB 2017a-e

Table FW3-51. Children and Elderly Populations Exposed to DNL of 65 dB or Greater Under Baseline and AFRC F-35A Mission Conditions (Scenario A) at NAS JRB Fort Worth (Scenario C)

Geographic Units	Population in the Census Area	Baseline					AFRC F-35A Mission (Newly Exposed)				
Census BG (ROI)/COC		Population in the Area Encompassed by DNL of 65 dB or Greater	Children (<18 years)		Elderly (65 years or >)		Population in the Area Encompassed by DNL of 65 dB or Greater	Children (< 18 years)		Elderly (65 years or >)	
			Percent	Number	Percent	Number		Percent	Number	Percent	Number
CT 1006.01											
2[a]	979	126	20.8	26	16.5	20	127	20.8	27	16.5	21
3	653	0	6.1	0	13.5	0	2	6.1	0	13.5	0
CT 1006.02											
2[a]	2,866	1,122	8.0	89	6.9	77	22	8.0	1	6.9	0
CT 1023.01											
1	1,178	0	22.7	0	7.9	0	246	22.7	56	7.9	19
2[a]	1,323	397	16.3	65	12.8	51	799	16.3	130	12.8	103
3[a]	757	1	33.8	0	6.6	0	397	33.8	135	6.6	26
CT 1023.02											
1	2,259	0	24.8	0	6.6	0	767	24.8	190	6.6	50
4	953	0	29.1	0	14.5	0	536	29.1	156	14.5	78
CT 1024.02											
2	1,264	0	26.8	0	21.8	0	148	26.8	40	21.8	32
CT 1052.01											
1[a]	1,566	683	44.3	303	2.4	16	649	44.3	287	2.4	15
2[a]	1,346	157	33.2	52	9.5	15	184	33.2	61	9.5	17
3[a]	1,796	660	35.4	233	13.7	90	153	35.4	55	13.7	21
4	751	0	13.2	0	6.5	0	119	13.2	16	6.5	8
CT 1052.05											
2[a]	1,741	247	36.9	91	11.6	29	96	36.9	36	11.6	11
CT 1066.01											
1[a]	1,541	457	31.9	146	7.5	34	57	31.9	18	7.5	4
2[a]	808	564	22.5	128	4.6	26	12	22.5	2	4.6	0
CT 1067.00											
1	1,682	0	26.3	0	9.6	0	18	26.3	5	9.6	2
CT 1104.01											
1[a]	1,255	827	18.8	156	19.8	163	428	18.8	80	19.8	85
2[a]	1,259	10	28.8	3	10.2	1	2	28.8	0	10.2	0
3[a]	1,569	1,519	33.0	500	8.9	134	50	33.0	17	8.9	5
4[a]	815	64	14.0	9	23.7	15	214	14.0	30	23.7	51

Table FW3-51. Children and Elderly Populations Exposed to DNL of 65 dB or Greater Under Baseline and AFRC F-35A Mission Conditions at NAS JRB Fort Worth (Scenario C) (Continued)

Geographic Units	Population in the Census Area	Baseline					AFRC F-35A Mission (Newly Exposed)				
Census BG (ROI)/COC		Population in the Area Encompassed by DNL of 65 dB or Greater	Children (<18 years)		Elderly (65 years or >)		Population in the Area Encompassed by DNL of 65 dB or Greater	Children (< 18 years)		Elderly (65 years or >)	
			Percent	Number	Percent	Number		Percent	Number	Percent	Number
CT 1104.02											
5[a]	626	15	23.2	3	32.4	5	3	23.2	1	32.4	1
CT 1105.00											
3[a]	925	1	29.6	0	19.2	0	1	29.6	1	19.2	0
CT 1106.00											
1[a]	617	85	18.2	15	0.0	0	21	18.2	4	0.0	0
2	900	0	14.2	0	22.6	0	18	14.2	3	22.6	4
CT 1107.01											
1[a]	1,311	104	23.7	25	8.7	9	158	23.7	37	8.7	14
3[a]	1,221	578	14.7	85	20.1	116	308	14.7	46	20.1	62
4[a]	1,638	76	33.2	25	5.1	4	1137	33.2	377	5.1	58
6[a]	970	970	8.9	86	17.4	168	0	8.9	0	17.4	2
CT 1107.03											
2[a]	2830	34	25.0	8	12.2	4	41	25.0	11	12.2	5
3[a]	810	173	24.8	43	8.6	15	471	24.8	117	8.6	41
CT 1107.4											
1[a]	1,327	1,311	24.7	324	13.9	182	16	24.7	4	13.9	2
2[a]	2,213	204	25.9	53	22.2	45	660	25.9	171	22.2	147
3[a]	1,194	1,192	19.7	253	9.8	117	1	19.7	0	9.8	0
CT 1230.00											
1[a]	640	31	23.6	8	36.3	11	1	23.6	0	36.3	0
2[a]	1,538	445	5.7	25	30.0	133	53	5.7	2	30.0	15
3[a]	1,984	819	10.8	89	37.3	306	600	10.8	64	37.3	223
4[a]	1,452	221	14.3	31	5.3	12	133	14.3	19	5.3	7
ROI Totals	**51,340**	**13,093**	**NA**	**2,856**	**NA**	**1,798**	**8,648**	**NA**	**2,200**	**NA**	**1,129**
COC	79,481	NA	24.8	19,711	12.0	9,538	NA	24.8	19,711	12.0	9,538

[a] Indicates this ROI (BG) is currently encompassed by the baseline 65 dB or greater DNL contour.

Note: Numbers may not sum due to rounding. To best represent the level of accuracy achieved, population group numbers are displayed as whole numbers in the text and tables, whereas calculations are based on the raw population group numbers containing multiple decimal points. The resulting summations and change calculations are then rounded to whole numbers.

Key: NA = Not applicable, does not apply

Source: USCB 2017a-e

FW3.10.3 Summary of Impacts to Environmental Justice and Protection of Children

Based on the analysis shown in Table FW3-52, implementation of the AFRC F-35A mission would result in disproportionate impacts to minority and low-income populations. The estimated number of children and elderly people exposed to DNL of 65 dB or greater from each afterburner scenario are listed in Table FW3-52.

Table FW3-52. Summary of the Minority, Low-Income, Children, and Elderly Populations Exposed to DNL of 65 dB or Greater Under Baseline and the Three Afterburner Scenarios for the AFRC F-35A Mission at NAS JRB Fort Worth

Scenarios and Baseline/No Action	Disproportionate Impact		Newly Exposed Individuals	
	Minority Populations - Census BGs (ROIs)	Low-Income Populations - Census BGs (ROIs)	Children	Elderly Persons
Baseline/No Action[a]	13 of 38[a]	8 of 38[a]	2,856[a]	1,798[a]
Scenario A	17 of 38	10 of 38	2,188	1,126
Scenario B	17 of 38	10 of 38	2,192	1,129
Scenario C	17 of 38	10 of 38	2,200	1,129

[a] Baseline/No Action is the existing conditions and does not include the values for any of the other scenarios.

FW3.11 INFRASTRUCTURE

FW3.11.1 Base Affected Environment

FW3.11.1.1 Potable Water System

Water is obtained from the City of Fort Worth. The installation's housing area is required to follow the city's policies with regard to water restrictions. The system is in fair to good condition. There are projects to replace laterals, and most of the mains were replaced in 2007 and 2008. Peak demand of the installation is approximately 1.6 million gallons per day (MGD), and the 3-year average demand of NAS JRB Fort Worth is 0.92 MGD (NAS JRB Fort Worth 2015a).

One potable water storage tank/tower (1449) with a 300,000-gallon capacity is located on NAS JRB Fort Worth. Several fire suppression tanks are located throughout the installation. The installation has the ability to close off incoming water from the city and use only water from the tower (NAS JRB Fort Worth 2015a).

FW3.11.1.2 Wastewater

There is no on-site wastewater treatment; all wastewater goes directly to the City of Fort Worth. The system consists of gravity-fed lines and lift stations that connect to the city mainline. The City of Fort Worth does not measure the outflow of wastewater from the base. NAS JRB Fort Worth is billed for wastewater based on potable water use. The wastewater system has been reported as being in adequate condition (NAS JRB Fort Worth 2015a).

FW3.11.1.3 Stormwater System

The majority of NAS JRB Fort Worth is drained by a system of swales, ditches, and canals. The system also consists of an underground storm drainage system that is reportedly in good condition. Routine maintenance is required, and no major issues have been reported (NAS JRB Fort Worth 2015a).

Development on the west side of the installation has been identified as a concern relative to stormwater runoff and increasing flow over the airfield. Two 15-foot culverts are located under the runway; however, flooding has occurred in this area in the past and flooding in these areas has the potential to impact runway operations (NAS JRB Fort Worth 2015a).

FW3.11.1.4 Electrical System

The local electric utility company in the Dallas-Fort Worth area is Oncor; however, with the deregulation that started in 2002, Texas residents can choose their electric company provider. Oncor delivers electricity that can be bought from different retail electric providers.

The installation’s peak load is approximately 30.2 megawatts (MW), and the 3-year average load is 6.6 MW. Essential facilities on the installation have backup generators. The electrical capacity at NAS JRB Fort Worth is adequate for current needs. The electrical distribution system is in good physical condition (NAS JRB Fort Worth 2015a).

FW3.11.1.5 Natural Gas System

Natural gas at the installation is purchased from Atmos Energy Company. Use varies based on weather and is highest during winter months, when natural gas is used for heating. The 3-year average use is 7,800 million British thermal units (MMBTUs) per month and can peak at 25,000 MMBTUs per month. The natural gas mains were replaced in 2008, and the laterals will need to be replaced in the next 10 years. The natural gas distribution system is in good physical condition (NAS JRB Fort Worth 2015a).

FW3.11.1.6 Solid Waste Management

NAS JRB Fort Worth generates more than 1 ton of non-hazardous solid waste per day and thus must follow the solid waste reporting, management planning, recycling, and affirmative procurement requirements outlined in OPNAVINST 5090.1D, *Environmental Readiness Program*, Chapter 28, Solid Waste Management and Resource Recovery Ashore. Solid waste at the installation is managed according to the NAS JRB Fort Worth Integrated Solid Waste Management Plan (ISWMP) (NAS JRB Fort Worth 2015b), which complies with OPNAVINST 5090.1D; OPNAV M-5090.1, *Environmental Readiness Program Manual;* federal laws, regulations, and policies; and Texas and Tarrant County laws, ordinances, policies, and regulations.

The DoD goal for solid waste reduction is to divert 65 percent of non-hazardous solid waste by 2020 and 60 percent of C&D debris by 2018 (DoD 2012). NAS JRB Fort Worth solid waste and C&D debris diversion rates in 2016 were 23.85 and 84.41 percent, respectively.

Municipal solid waste generated at NAS JRB Fort Worth is collected by contractors. The contractors remove and dispose of the refuse in nearby off installation landfills (Southeast Landfill, Westside Transfer Station, etc.). There are no active municipal landfills on the installation. Collection of C&D debris generated during contracted facility demolition, renovations, or new construction activity is the responsibility of the contractor performing the work (NAS JRB Fort Worth 2015b).

FW3.11.1.7 Transportation

NAS JRB Fort Worth is located about 2 miles north of I-30 and is connected to it by State Highway 183. All active gates are located on local roads that can be accessed from Highway 183. I-30 connects into I-20, which is a major east/west connector, and I-35, which is a major north/south connector.

Dallas/Fort Worth International Airport is approximately 30 miles northeast of the installation and serves most major airlines.

Mass transit is available within the region through the Fort Worth Transit Authority. Ridgmar Mall is approximately 2 miles south of the installation’s main gate and is a transfer center with access to multiple bus routes.

FW3.11.1.8 Gate Access

Vehicle access to the base is provided through the main gate and the East Gate. Main gate is north of the Pumphrey Drive and Nimitz Road intersection. The main gate is the major access point for the base and sees the majority of traffic. East Gate provides access from Carswell access road and connects the base to the City of River Oaks.

FW3.11.1.9 On-Base Traffic Circulation

Circulation on the installation is handled through a system of primary and secondary streets. Five roads make up the primary road system: Military Parkway, Carswell Avenue, Hensley Avenue, Burke Avenue/Boyington Drive, and Perimeter Road/Hercules Road. Secondary roads serve as connectors between these primary routes. There is minimal signage to direct traffic throughout the installation, and as a result, many parking lots are used as cut-throughs (NAS JRB Fort Worth 2015a).

The road network intersects active taxiways at two locations. There is a crossing at Taxiway Alpha to access the flight operations building and a crossing at Taxiway Charlie to access the Charlie District. The Taxiway Charlie crossing is the most problematic because of the amount of traffic that has to cross this active taxiway. This causes an increase in chances for foreign object debris damage to aircraft and creates a higher chance of mishaps between privately owned vehicles and planes on the flightline (NAS JRB Fort Worth 2015a).

Parking on the installation is generally adequate; however, because this is a Reserve installation, parking can become an issue on drill weekends. Parking lots are associated with every building on the installation and are generally sized appropriately for the size and functions of those buildings. However, with the transition from an Active Duty installation to a Reserve installation, some facilities were upgraded and capacities changed without the creation of additional parking (NAS JRB Fort Worth 2015a).

FW3.11.2 Base Environmental Consequences

The projected change in population that would result from implementation of the proposed AFRC F-35A mission at NAS JRB Fort Worth is a reduction of 102 base personnel or approximately 1.1 percent of the base population. This projected change in population and development was used to determine the impact on infrastructure. Since the proposed AFRC F-35A mission results in the loss of base personnel, it is assumed that the current demand for the potable water, wastewater, electric, and natural gas systems is sufficient to support the projected change in population. The impact of the proposed AFRC F-35A mission on the transportation infrastructure, would be negligible based on the potential minor reduction of on-base traffic.

FW3.11.2.1 Potable Water System

Based on the average usage rate of 130 gallons per day (GPD) (usgs.gov) per person, it is anticipated that the decrease in population (i.e., 102 people) associated with the proposed AFRC F-35A mission would reduce the water use demand by 13,260 GPD. This decrease would have no effect on the existing peak usage at NAS JRB Fort Worth and would not affect the City of Fort Worth water system capacity. Therefore, the impacts would not be significant.

FW3.11.2.2 Wastewater

The USEPA estimates that the average person generates approximately 120 GPD of wastewater between showering, toilet use, and general water use (USEPA 2014). Based on this rate, the proposed decrease in population (i.e., 102 people) would result in a reduction of wastewater discharge from

NAS JRB Fort Worth by 12,240 GDP. Since this is an anticipated reduction in wastewater generated, the City of Fort Worth has adequate capacity to handle the wastewater and the impacts of the proposed AFRC F-35A mission would not be significant.

FW3.11.2.3 Stormwater System

As described in Section FW3.5.2, all construction would comply with LID (as amended, 2016) and the EISA Section 438 (42 *USC* §17094), any potential increase in surface water runoff as a result of the proposed construction would be attenuated through the use of temporary and/or permanent drainage management features (i.e., use of porous materials, directing runoff to permeable areas and use of detention basins to release runoff over time). The existing stormwater system with the modifications required by the new construction is adequate to handle the stormwater runoff from the new facilities.

FW3.11.2.4 Electrical System

The U.S. Energy Information Administration (USEIA) estimates that the average household in Texas uses 13.6 megawatt hours (MWh) per year (USEIA 2014). Based on the anticipated reduction of personnel by 102, the annual reduction in electrical use at NAS JRB Fort Worth would be 1,387 MWh per year (13.6 MWh/year x 102). This decrease would not affect the peak load of approximately 30.2 MW and impacts would not be significant.

FW3.11.2.5 Natural Gas System

The USEIA estimates that the average person in Fort Worth, Texas uses 7.6 MCF of natural gas per year (USEIA 2016). Based on this rate, the proposed decrease in population of 102 would decrease natural gas use at NAS JRB Fort Worth by 7.75 MCF per year. This decrease represents a less than 0.01 percent change natural gas usage of and the impacts would not be significant.

FW3.11.2.6 Solid Waste Management

Solid waste would continue to be managed in accordance with the ISWMP with the implementation of the proposed AFRC F-35A mission at NAS JRB Fort Worth. Using methodology developed by the USEPA (USEPA 2009b), it is estimated that implementation of the proposed AFRC F-35A mission would generate approximately 1,054 tons of C&D debris for recycling or removal to landfills. Application of the 60 percent DoD target diversion rate (DoD 2012) for C&D debris would result in approximately 632 tons being reused or recycled, and approximately 422 tons being placed in regional landfills. However, NAS JRB Fort Worth's current C&D debris diversion rate is greater than 60 percent (84.4 percent in 2016) with the installation requiring their C&D contractors to properly dispose of all construction debris only after recyclable materials are segregated (NAS JRB Fort Worth 2015b). It is anticipated that the regional landfills would be able to accommodate this short-term minor increase in C&D debris.

Implementation of the AFRC F-35A mission at NAS JRB Fort Worth would result in a reduction of 102 personnel and their associated dependents resulting in a minor decrease in municipal solid waste generation having little effect on the municipal solid program (collection, disposal, etc.). The overall impacts would not be significant.

Contractors would be required to comply with federal, state, and local regulations for the collection and disposal of municipal solid waste from the base. C&D debris, including debris contaminated with hazardous waste, ACM, lead-based paint (LBP), or other hazardous components, would be managed in accordance with OPNAVINST 5090.1D.

FW3.11.2.7 Transportation

Implementation of the facilities and infrastructure projects associated with the proposed AFRC F-35A mission at NAS JRB Fort Worth would require the delivery of materials to, and removal of construction-related debris from, demolition, renovation, and new construction sites. Construction-related traffic would comprise a small portion of the total existing traffic volume in the area and at the base. Increased traffic associated with these activities could contribute to increased congestion at the entry gates, delays in the processing of access passes, and degradation of the affected road surfaces. Traffic delays would be temporary in nature, ending once construction activities have ceased. As a result, no long-term impacts to on- or off-base transportation systems are anticipated.

Implementation of the proposed AFRC F-35A mission at NAS JRB Fort Worth would result in a minor decrease of 102 on-base mission personnel, which would result in a slight reduction in daily commuting traffic to and from the base. No significant impacts to infrastructure are anticipated to result as a result from implementation of the proposed AFRC F-35A mission at NAS JRB Fort Worth.

FW3.11.3 Summary of Impacts to Infrastructure

Implementation of the AFRC F-35A mission would not result in changes to any of the utility infrastructure (potable water, wastewater, stormwater, electricity, natural gas, and solid waste) on NAS JRB Fort Worth. In addition, the new mission would also not require any changes to transportation resources including any of the base gates. Therefore, implementation of the new mission would result in negligible impacts to infrastructure.

FW3.12 HAZARDOUS MATERIALS AND WASTE

FW3.12.1 Base Affected Environment

FW3.12.1.1 Hazardous Materials

Hazardous materials used by Navy, USAF, and contractor personnel at NAS JRB Fort Worth are managed in accordance with OPNAVINST 5090.1D, which identifies requirements and responsibilities for the centralized control and management of hazardous materials within the Consolidated Hazardous Material Reutilization and Inventory Management Program (CHRIMP). OPNAVINST 5090.1D and the CHRIMP also provide instruction and guidance for the procurement, handling, storage, and issuance of hazardous materials and turn-in, recovery, reuse, or recycling of hazardous materials at NAS JRB Fort Worth.

FW3.12.1.1.1 Aboveground and Underground Storage Tanks

Bulk Jet-A at NAS JRB Fort Worth is stored in three aboveground storage tanks (ASTs) at the Bulk Fuel Storage Tank Farm (Facility 1156). These three ASTs have a combined storage capacity of approximately 5,040,000 gallons. There are various other ASTs at NAS JRB Fort Worth that store Jet-A, gasoline, diesel, oil, and used oil. NAS JRB Fort Worth also manages two underground storage tanks (USTs). NAS JRB Fort Worth used approximately 9,725,000 gallons of Jet-A in 2017, with the 301 FW F-16 mission using approximately 4,550,000 gallons. NAS JRB Fort Worth receives fuel through commercial tank trucks with 40,000 to 50,000 gallons of Jet-A delivered per day (Monday through Friday). Jet-A is delivered from the Bulk Fuel Storage Tank Farm to aircraft on the flightline via fourteen (14) 6,000-gallon fuel trucks. Six (6) of the fuel trucks are operated by the USAF (NAS JRB Fort Worth 2014).

All tanks at NAS JRB Fort Worth are managed in accordance with the base Spill Prevention, Control, and Countermeasures (SPCC) Plan (NAS JRB Fort Worth 2014). This plan addresses storage locations and proper handling procedures for all hazardous materials to minimize the potential for spills and releases. The Facility Response Plan (FRP) describes the response procedures for spills or discharges of petroleum products and other hazardous materials at NAS JRB Fort Worth (NAS JRB Fort Worth 2013a). Implementation of the SPCC and FRP provide measures to prevent petroleum product discharges from occurring and prepare the base to respond in a safe, effective, and timely manner to mitigate the impacts of an uncontrolled discharge. These plans also address roles, responsibilities, and response actions for all major spills (NAS JRB Fort Worth 2014 and 2013a).

FW3.12.1.1.2 Toxic Substances

Toxic substances at NAS JRB Fort Worth are managed in accordance with OPNAVINST 5090.1D which identifies the requirements and installation's responsibilities applicable to the protection of human health and the environment from substances regulated under the Toxic Substances Control Act (TSCA) (ACM, LBP, and PCBs). The Navy's policy for use, handling, maintenance, and removal of ACM is contained in OPNAVINST 5100.23G, *Navy Safety and Occupational Health Program Manual*. This instruction establishes management responsibilities and presents workplace control practices to ensure personnel and facilities are not exposed to excessive levels of airborne asbestos fibers. The Civil Engineering Squadron maintains a permanent file documenting asbestos-related activities. All proposed facility construction, repair, maintenance, demolition, and renovation or self-help projects must be reviewed, to the extent possible, to identify the presence of ACM prior to work beginning. Work on ACM projects would only be performed by individuals with current license from the TDSHS and training in accordance with OSHA and USEPA standards. For any project on base, ACM wastes are removed by the contractor performing the work and handled and disposed of in accordance with federal, state, and local regulations at a waste disposal site authorized to accept such waste.

OPNAVINST 5100.23G also contains the Navy's policy, with regard to industrial and construction work, to prevent lead intoxication and related injuries during the use, handling, removal and melting of materials containing lead. This includes any repair, renovation, or other activities that disturb lead-containing materials. The base complies with all federal, state, and local requirements regarding LBP and lead containing materials, activities, and hazards. NAS JRB Fort Worth is reportedly PCB-free (Jersey 2018).

FW3.12.1.2 Hazardous Waste Management

NAS JRB Fort Worth is classified as a Large-Quantity Generator. Typical hazardous wastes generated during O&M activities include flammable solvents, contaminated fuels and lubricants, stripping chemicals, waste oils, blast media, absorbents, adhesives, and other miscellaneous wastes.

Hazardous waste generated, stored, transported, or disposed of by NAS JRB Fort Worth is regulated by the State of Texas under authority granted to the state by the USEPA. The base is classified as a municipal waste generator by the TCEQ.

Hazardous wastes at NAS JRB Fort Worth are managed in accordance with the Hazardous Waste Management Plan (HWMP) (NAS JRB Fort Worth 2013b). This plan covers the control and management of hazardous wastes from the point the material becomes a hazardous waste to the point of ultimate disposal, as required by federal and state laws and regulations. In 2017, the base generated approximately 37,680 pounds of hazardous waste, which was disposed of at off-base permitted disposal facilities.

FW3.12.1.3 Environmental Restoration Program

Three active Environmental Restoration Program (ERP) sites (one former skeet range, one pistol range, and one former machine gun range) at NAS JRB Fort Worth are administered in accordance with the Department of the Navy Environmental Restoration Program Manual 2018. This manual is a policy and guidance tool that describes the organization, responsibilities, and procedures used to implement the ERP at NAS JRB Fort Worth. Environmental response actions are planned and executed under the ERP in a manner consistent with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and other applicable laws. NAS JRB Fort Worth is not listed on the USEPA's National Priorities List but USAF Plant #4, on the Lockheed Martin F-35 manufacturing facility side of the airfield, was listed on August 30, 1990. The USAF Plant #4 Superfund Site is defined by a trichloroethylene (TCE) groundwater plume. There is a groundwater pump and treat system at the east parking lot on the Lockheed Martin side of the airfield and a USAF installed 1,170-foot long, 2-foot wide, and 35-foot deep Permeable Reactive Barrier wall across the leading edge of the southern lobe of the plume on the NAS JRB Fort Worth side of the airfield (USEPA 2015).

Perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA) are members of a family of emerging contaminants known as per- and polyfluoroalkyl substances (PFAS) that are directly related to the former use or release of Aqueous Film Forming Foam (AFFF), a fire suppressing agent that was used by the DoD. The USEPA has not issued regulatory limits on PFAS. However, the USEPA has issued a 70 parts per trillion Lifetime Health Advisory level for PFOS/PFOA in drinking water. The Navy is currently working with regulatory agencies to complete a site inspection for PFAS at NAS JRB Fort Worth. If necessary, the Navy's response would be consistent with DoDI 4715.18, *Emerging Chemicals (ECs) of Environmental Concern,* and the Defense Environmental Restoration Program (DERP), which is very similar to the CERCLA process.

The Navy and USAF have removed AFFF from all of their hangars and fire response vehicles on the installation. The replacement foam product used at NAS JRB Fort Worth meets the Military Specification (MILSPEC) standard for PFAS concentrations. The new foam meets both the MILSPEC requirements for firefighting and the goals of the USEPA 2010/2015 PFOA Stewardship Program (Navy 2016).

FW3.12.2 Base Environmental Consequences

FW3.12.2.1 Hazardous Materials Management

Implementation of the proposed AFRC F-35A mission at NAS JRB Fort Worth would not add any new hazardous materials that would exceed the base's current hazardous waste processes. Existing procedures for the centralized management of the procurement, handling, storage, and issuance of hazardous materials through the CHRIMP are adequate to accommodate the changes anticipated with the replacement of the F-16 mission with the AFRC F-35A mission.

The F-35A was designed to reduce the quantities and types of hazardous materials needed for maintenance of the aircraft. Unlike the F-16 aircraft, the F-35A aircraft does not use hydrazine, cadmium fasteners, chrome plating, copper-beryllium bushings, or primers containing cadmium and hexavalent chromium. No adverse impacts are anticipated to result from implementation of the AFRC F-35A mission at NAS JRB Fort Worth. Long-term environmental benefits from the reduced use of hazardous materials are anticipated.

The F-35A aircraft is composed of composite materials (e.g., carbon fiber) and stealth coatings (e.g., low observable material), which could pose a health risk under specific circumstances (e.g., during maintenance or when burned as a result of an aircraft crash). The only maintenance of the stealth coating that would occur at the base would be done using a brush or roller to apply coatings, bonding materials, or applying tape. Depot-level maintenance of the low observable material (including spray capability) would be conducted off-site; therefore, the composite material for major repairs to the low observable material would not be stored on base. Section FW3.4.2.4.2 discusses composite materials and emergency crash response.

FW3.12.2.1.1 Aboveground and Underground Storage Tanks

New and remodeled facilities would require the addition of new ASTs to support generators, as well as new hazardous material and waste containers. The new and remodeled facilities would be constructed with berms and drains leading to oil-water separators (OWSs), if required, to contain potential uncontrolled releases of petroleum products. None of the proposed demolition or renovation projects would require the removal of existing ASTs. The NAS JRB Fort Worth SPCC Plan and FRP would subsequently need to be revised to incorporate any changes in facility design, construction operation, or maintenance that materially affects the potential for an uncontrolled release of petroleum products (NAS JRB Fort Worth 2014 and 2013a).

FW3.12.2.1.2 Toxic Substances

Several demolition and renovation projects are planned as part of the proposed AFRC F-35A mission. Any construction, demolition, or renovation project proposed at NAS JRB Fort Worth would be reviewed to determine if ACM is present. As shown in Table FW3-53, Buildings 1602, 1604, 1628, 1643, 1648, 1650, 1655, 1790, and 1792 are proposed for modification and contain ACM. All handling and disposal of ACM wastes would be performed in compliance with federal, state, and local regulations. Before initiating any demolition or ACM work, required notifications to the TDSHS would be completed no less than 10 working days before beginning work. This notification can be made by using the online asbestos notification system or by completing and mailing the Asbestos Abatement/Demolition Notification Form. Work on ACM projects would only be conducted by persons with a current license from the TDSHS and training in accordance with standards established by OSHA and the USEPA. All ACM wastes would be disposed of at an approved landfill.

Table FW3-53. Toxic Substances Associated with Projects for the AFRC F-35A Mission at NAS JRB Fort Worth

Project	Year Constructed	ACM	LBP	PCBs
Demolition				
Building 1604	1985	X	X	[a]
Building 1606	1998	[b]	[b]	[a]
Building 1608	2000	[b]	[b]	[a]
Building 1632	1994	[b]	[b]	[a]
Building 1641	1994	[b]	[b]	[a]

Table FW3-53. Toxic Substances Associated with Projects for the AFRC F-35A Mission at NAS JRB Fort Worth (Continued)

Project	Year Constructed	ACM	LBP	PCBs
Renovation				
Building 1602 electrical upgrade	1942	X	X	[a]
Building 1628 electrical and ventilation upgrades	1981	X	X	[a]
Building 1637 renovate for logistics readiness, addition for battery storage	2006	[b]	[b]	[a]
Building 1643 electrical upgrade, classified storage, renovate egress shop	1953	X	X	[a]
Building 1648 renovate for gun maintenance and expand vault door	1981	X	[b]	[a]
Building 1650 renovate for Logistics Readiness Squadron parts storage	1963	X	X	[a]
Building 1655 replace hoist and expand door	1990	X	[b]	[a]
Building 1656 electrical upgrade	1991	[b]	[b]	[a]
Building 1790 electrical and ventilation upgrades	1970	X	[c]	[a]
Building 1792 renovate for logistics system	1978	X	X	[a]
Building 3355 expand trailer maintenance area	1951	[d]	[c]	[a]

[a] NAS JRB Fort Worth is reportedly PCB-free (Jersey 2018).
[b] Buildings constructed after 1980 are presumed to not contain ACM or LBP.
[c] Buildings constructed before 1980 are presumed to contain LBP.
[d] Buildings constructed before 1980 are assumed to potentially contain ACM (thermal system insulation and surfacing materials) (OPNAVINST 5100.23G).
Key: X = Toxic substance known to occur in the building

All construction, demolition, and renovation projects proposed at NAS JRB Fort Worth would be reviewed to determine if LBP or lead containing materials are present, and whether such materials would be disturbed. To the extent possible, the presence of lead within the work area would be identified prior to work beginning. Buildings 1602, 1604, 1628, 1643, 1650, and 1792 are proposed for modification and are known to contain LBP or lead-containing material. Table FW3-53 lists two additional buildings (1790 and 3355) proposed for modification that have the potential to contain lead. If the presence of lead containing material in the project work area is unknown, the shop and real property records would be reviewed to determine the presence of lead. If the presence of lead containing material in the work area is still unknown, sampling and analysis for lead would be conducted. The handling and disposal of lead wastes would be conducted in compliance with federal, state, and local requirements and regulations. NAS JRB Fort Worth is reportedly PCB-free (Jersey 2018).

Although minor increases in the management requirements for ACM and LBP removal are anticipated, no adverse impacts are anticipated to result from implementation of the AFRC F-35A mission at NAS JRB Fort Worth. Long-term environmental benefits from removal of toxic substances are anticipated.

FW3.12.2.2 Hazardous Waste Management

NAS JRB Fort Worth would continue to operate as a Large Quantity Generator and would generate hazardous wastes during various O&M activities associated with the proposed AFRC F-35A mission. Waste-associated maintenance materials include adhesives, sealants, conversion coatings, corrosion prevention compounds, hydraulic fluids, lubricants, oils, paints, polishes, thinners, cleaners, strippers, tapes, and wipes. No new hazardous materials would be added that exceed the base's current hazardous waste processes. The NAS JRB Fort Worth HWMP (NAS JRB Fort Worth 2013b) would be updated to reflect any change in disposal procedures or hazardous waste generators and waste accumulation points. Implementation of the AFRC F-35A operational beddown and mission at NAS JRB Fort Worth would have a beneficial impact on hazardous waste management. Transition from the F-16 to the F-35A would decrease the volume and types of hazardous waste and waste streams because operations and maintenance involving hydrazine, cadmium and hexavalent chromium primer, and various heavy metals have been eliminated or greatly reduced. All hazardous wastes would be handled and managed in accordance with federal, state, and local regulations.

FW3.12.2.3 Environmental Restoration Program

None of the proposed construction, demolition, or renovation projects associated with the proposed AFRC F-35A mission at NAS JRB Fort Worth are on or directly adjacent to active ERP sites. However, there is the possibility that undocumented contaminated soils and/or groundwater from historical fuel spills may be present. If encountered during C&D-related excavations, storage/transport/disposal of contaminated groundwater/soils would be conducted in accordance with applicable federal, state, and local regulations; and base policies. Should soil or groundwater contaminants be encountered during C&D activities, health and safety precautions, including worker awareness training, would be required. ERP sites at NAS JRB Fort Worth would continue to be administered in accordance with the Department of the Navy Environmental Restoration Program Manual 2018.

If deemed necessary by the results of the ongoing site inspection for PFAS at NAS JRB Fort Worth, the Navy's response would be consistent with and comply with DoDI 4715.18 and the DERP. None of the areas proposed for construction as part of the F-35A beddown at NAS JRB Fort Worth are located at known AFFF release locations.

FW3.12.3 Summary of Impacts to Hazardous Materials and Waste

Implementation of the new mission would not add any new hazardous materials that would exceed the base's current processes. No ASTs, USTs or OWSs would be removed. Nine of the buildings proposed for demolition or renovation could contain ACM and/or LBP. Prior to demolition or renovation, NAS JRB Fort Worth would complete the appropriate notifications and complete the abatement work in accordance with applicable plans and per all local, state and federal requirements. None of the construction would affect ERP sites. Should contaminated media be encountered during construction, storage/transport/disposal of contaminated media would be conducted in accordance with base plans and applicable regulations. Implementation of the new mission would not result in significant impacts to hazardous materials and wastes.

FW4.0 CUMULATIVE EFFECTS AND IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Council on Environmental Quality (CEQ) regulations stipulate that the cumulative effects analysis should consider the potential environmental impacts resulting from "the incremental impacts of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person (federal or non-federal) undertakes such other actions" (40 *CFR* 1508.7). In this section, an effort has been made to identify past and present actions in the NAS JRB Fort Worth region and those reasonably foreseeable actions that are in the planning phase or unfolding at this time. Actions that have a potential to interact with the AFRC F-35A mission at NAS JRB Fort Worth are included in this cumulative analysis. This approach enables decision makers to have the most current information available so that they can evaluate the environmental consequences of the AFRC F-35A mission at NAS JRB Fort Worth and in associated airspace.

NAS JRB Fort Worth is an active military installation that undergoes changes in mission and training requirements in response to defense policies, current threats, and tactical and technological advances. As a result, the installation requires new construction, facility improvements, infrastructure upgrades, and other maintenance/repairs on a nearly continual basis. Although known construction and upgrades are a part of the analysis contained in this document, some future requirements cannot be predicted. As those requirements surface, future NEPA analyses will be conducted, as necessary.

FW4.1 PAST, PRESENT, AND REASONABLY FORESEEABLE ACTIONS

The construction of an air base on the east side of Tarrant Field was authorized by Congress after Pearl Harbor was attached by the Japanese. In 1948, the installation was named Carswell AFB and the first B-36 was delivered to the USAF at the base. In 1991, the Base Realignment and Closure (BRAC) Commission identified the base for closure and the base was officially closed on 30 September 1993. On 1 October 1993, the installation was established as an active Naval Air Reserve Base and renamed in 1994 as NAS JRB Fort Worth. Since 1994, the base has undergone substantial change and re-development. The 136 AW moved to the installation in 1998 and currently operates and maintains C-130H aircraft at NAS JRB Fort Worth. Since 2000, approximately 54 buildings have been constructed on the installation. The Lockheed Martin assembly plant is located on the west side of Runway 18/36 on government-owned and contractor-operated land. Since 2006, F-35 aircraft from the assembly plant have used NAS JRB Fort Worth for initial flight operations.

Table FW4-1 summarizes past, present, and reasonably foreseeable actions within the region that could interact with the AFRC F-35A mission at NAS JRB Fort Worth. Table FW4-1 briefly describes each identified action, presents the proponent or jurisdiction of the action and the timeframe (e.g., past, present/ongoing, future), and indicates which resources potentially interact with the AFRC F-35A mission at NAS JRB Fort Worth. Recent past and ongoing military actions in the region were considered as part of the baseline or existing conditions in the region surrounding NAS JRB Fort Worth and training airspace.

Table FW4-1. Past, Present, and Reasonably Foreseeable Actions at NAS JRB Fort Worth and Associated Region

Action	Proponent/Location	Timeframe	Description	Resource Interaction
Military Actions				
NAS JRB Fort Worth IDP	Navy	Present and Future	The IDP includes 23 short-term projects, 12 medium-term projects and 17 long-term projects. Projects include expansion of munitions storage, reconstruction and relocation of the main gate, and various other renovation, repair, or demolition projects.	Noise, Air Quality, Safety, Soil and Water Resources, Transportation
Relocate the Commissary and Base Exchange	Navy	Future	This project would move the base commissary and exchange to a larger facility.	Noise, Air Quality, Soil and Water Resources, Transportation, Land Use and Recreation
Repair the perimeter fence, remove vegetation and secure drainage culverts under airfield	Navy	Future	The perimeter fence at the base is in need of repair along with several drainage culverts that need to be secured.	Soil and Water, Transportation, Land Use and Recreation
Move CH-47 helicopter mission on NAS JRB Fort Worth	Texas Army National Guard	Future	The Texas Army National Guard CH-47 mission is currently located at an unsecure facility. This project would move the equipment and people to NAS JRB Fort Worth.	Noise, Airspace, Air Quality, Soil and Water Resources, Transportation, Land Use, Socioeconomics
Reconstruct the Main Gate	Navy	Past	This project would reconstruct the Entry Control Facility on the base.	Noise, Air Quality, Soil and Water Resources, Transportation, Land Use and Recreation
B-21 Bomber Mission	USAF	Future	Dyess AFB along with three other bases have been selected by the USAF as reasonable alternatives for the B-21 bomber mission. The B-21 mission would replace the B-1 mission that currently uses the Lancer MOA for training. Delivery of the first B-21 bombers is anticipated to begin in the mid-2020s.	Noise, Air Quality, Safety, Soil and Water Resources, Biological Resources, Cultural Resources, Land Use and Recreation
Reconstruct meandering road and construct traffic circle	Navy	Future	Transportation upgrades on the installation.	Noise, Air Quality, Soil and Water Resources, Transportation, Land Use and Recreation
Non-Military (Federal) Actions				
Crossroads of West Texas Connector Project	U.S. Department of Transportation	Future	This project would construct a new roadway to connect McMahon-Wrinkle Airpark to Highway 87.	Noise, Airspace, Air Quality, Transportation
Rio Grande Project	U.S. Bureau of Reclamation	Future	This is a full irrigation project for 178,000 acres of land in West Texas and South Central New Mexico.	Soil and Water Resources, Land Use and Recreation

Table FW4-1. Past, Present, and Reasonably Foreseeable Actions at NAS JRB Fort Worth and Associated Region (Continued)

Action	Proponent/Location	Timeframe	Description	Resource Interaction
Non-Military (Private Actions)				
Lockheed Martin F-35 Production	Lockheed Martin	Past, Present and Future	In 2017, 66 F-35s were produced by Lockheed Martin. This number is planned to increase to 91 aircraft in 2018 in Fort Worth, reach as many as 160+ a year at the Fort Worth plant by 2023, and remain at that level for approximately 20 years. Production would depend on funding and purchases of F-35 aircraft by other nations and could be spread across other assembly facilities.	Noise, Air Quality, Safety, Land Use and Recreation
Monarch City Mixed-use development complex	Hughes Corporation/Allen	Future	This project consists of an 8.7 million square foot mixed-use development complex in the southwest corner of North Central Expressway and the Sam Rayburn Tollway.	Noise, Air Quality, Socioeconomics
Panther Island Development	Encore Multi-Family LLC/Fort Worth	Present and Future	300-unit apartment community	Noise, Air Quality, Socioeconomics
State and Local				
Fort Worth Capital Improvement Plan	City of Fort Worth/Fort Worth, Texas	Present and Future	This plan includes more than two billion dollars' worth of projects planned from 2018 through 2022. These projects include new schools, utility (water) infrastructure, fire and police, parks, libraries and transportation projects. http://fortworthtexas.gov/PlanningandDevelopment/plans/compplan/pdf-2018/appendix-d-5-yr-cip.pdf	Noise, air quality, socioeconomics
Panther Island Bridges	TDOT-Trinity River Vision Authority/Fort Worth	Present and Future	New bridge to carry North Main street traffic over a re-routed portion of the Trinity River. https://trinityrivervision.org/	Noise, Air Quality, Transportation, Biological Resources, Land Use and Recreation

FW4.2 CUMULATIVE IMPACTS

The following analysis considers how the impacts of the actions in Table FW4-1 might affect or be affected by the AFRC F-35A mission at NAS JRB Fort Worth. The analysis considers whether such a relationship would result in potentially significant impacts not identified when the AFRC F-35A mission at NAS JRB Fort Worth is considered alone. Table FW4-2 provides a summary of the cumulative effects. As shown in Table FW4-2, safety, cultural resources, infrastructure, and hazardous materials and waste are not anticipated to contribute to cumulative effects. Cumulative effects are described for airspace, noise, air quality, soil and water resources, biological resources, land use and recreation, socioeconomics, and environmental justice and protection of children. Climate change is also described in this section because changes in climate have the potential to cumulatively impact other resource areas.

Table FW4-2. Summary of Cumulative Effects for NAS JRB Fort Worth

Resource Area	AFRC F-35A Mission	Past, Present, and Reasonably Foreseeable Actions[a]	Cumulative Effects
Airspace	◘	◘	◘
Noise	●	●	●
Air Quality	○	◘	○
Safety	○	○	○
Soils and Water	◘	◘	◘
Biological Resources	◘	◘	◘
Cultural Resources	○	○	○
Land Use and Recreation	◘	◘	◘
Socioeconomics	◘	◘	◘
Environmental Justice and Protection of Children	◘	◘	◘
Infrastructure	○	○	○
Hazardous Materials and Waste	○	○	○

[a] When determining the potential for significance, past and ongoing actions in the region were considered as part of the baseline or existing conditions in the region surrounding NAS JRB Fort Worth and the airspace (e.g., the cumulative noise impact of past and present missions at NAS JRB Fort Worth were modeled under baseline conditions).

Key: ○ = not affected or beneficial impacts
◘ = affected but not significant, short to medium term, impacts that range from low to high intensity
● = significant impacts, high in intensity or are long-term

FW4.2.1 Airspace

FW4.2.1.1 Airfield Operations

Implementation of the AFRC F-35A mission at NAS JRB Fort Worth would generate the operational changes shown in Table FW2-4. Airfield operations would increase by 12.1 percent at NAS JRB Fort Worth. The only known projects with the potential to increase airfield operations near NAS JRB Fort Worth are the beddown of a new helicopter mission and the projected increase in F-35A production at the nearby Lockheed Martin plant. The operations anticipated from these projects, in addition to the increase in operations that would result from implementation of the AFRC F-35A mission at NAS JRB Fort Worth, would not present a significant impact to airspace use in an environment that experienced more than 650,000 air traffic operations in 2017.

Military actions with major changes in aircraft types or operations would undergo additional environmental analysis to determine the exact number of operations and the potential for additional impacts within the airspace.

No present and/or known reasonable foreseeable future actions, when combined with the increase in airfield operations that would result from the proposed AFRC F-35A mission at NAS JRB Fort Worth, would result in any cumulative impacts to airfield operations or the management and configuration of the airspace surrounding this airfield environment.

FW4.2.1.2 Training Airspace

The primary training airspace proposed for use by AFRC F-35A pilots would be the Lancer MOA. The Lancer MOA is currently used by B-1 bomber pilots from Dyess AFB in Texas. Dyess AFB is also being considered for the beddown of the B-21 Bomber. Should Dyess AFB be selected for the new bomber mission, it is anticipated that the training airspace would see a change in the number of operations conducted in that airspace.

The operations anticipated from these projects, in addition to the increase in operations that would result from implementation of the AFRC F-35A mission at NAS JRB Fort Worth, would not present a significant impact to airspace use. Any potential conflicts in the use of airspace would be deconflicted by the scheduling agency. Any changes to SUA or charting of new SUA would require separate environmental analysis.

No present and/or known reasonable foreseeable future actions, when combined with the minor increase in airfield operations that would result from the AFRC F-35A mission, would result in any cumulative impacts to airspace management in the SUAs proposed for use.

The primary range proposed for use by AFRC F-35A pilots would be the Falcon Range at Fort Sill. Although several airspace actions have been completed in the recent past above the Falcon Range and Fort Sill, none of them would have the potential to combine with the implementation of the AFRC F-35A mission to result in significant cumulative effects to airspace. In 2016, the FAA created R-5601G and R-5601H above Fort Sill to accommodate longer standoff weapons used at the Falcon Range. In 2017, Fort Sill completed an EA for the Temporary Creation of RA above Fort Sill for the demonstration of combat lasers. In 2018, Fort Sill completed a Supplemental EA to create additional permanent airspace above Fort Sill to be classified as R-5602A and R-5602B, and the FAA published this airspace in 2018.

In general, the resource management actions by the various federal land managers and tribal entities are implemented on the ground and would not overlap with the use of regional airspace. However, some projects could interact and require local coordination, such as controlled burning, which can cause localized smoke that could be hazardous to high-speed military flying operations. The planning and siting of future tall structures, such as transmission lines, wind farms, and communication towers, pose compatibility concerns. Nonetheless, impacts would be similar to those described in EIS resource sections (e.g., Noise and Land Use and Recreation). A military airspace regional coordinator could serve as a representative to assist with mutually compatible long-term sustainable solutions between responsible federal agencies.

FW4.2.2 Noise

Cumulative noise impacts were evaluated for construction related noise and for the impact of aircraft noise resulting from operations in the airfield and airspace environments near NAS JRB Fort Worth. C&D projects associated with the proposed AFRC F-35A beddown would occur near other ongoing and future C&D projects (e.g., IDP projects), during the same time periods. C&D projects are a regular occurrence on and near active DoD installations such as NAS JRB Fort Worth. C&D noise would be localized and temporary. Construction work is generally limited to normal working hours (i.e., 7:00 A.M. to 5:00 P.M.). Furthermore, the projects are or would be located in an acoustic environment that includes elevated aircraft operations noise levels. In the instance that multiple C&D projects affect a single area at the same time, construction noise would be a slightly more noticeable component of the acoustic environment. Several projects listed in Table FW4-1 have the potential to increase noise levels surrounding NAS JRB Fort Worth.

The aircraft noise analysis in this EIS is a cumulative analysis which includes those defined projects listed in Table FW4-1. Actions occurring within the present timeframe (e.g., Lockheed Martin production aircraft operations at a rate of 36 production aircraft per year) are accounted for in calculated baseline and AFRC F-35A mission aircraft noise levels. The rate at which Lockheed Martin produces F-35 aircraft at NAS JRB Fort Worth is planned to increase to 160 per year by 2023, resulting in increases in flying operations tempo and time-averaged noise levels (USAF 2015). Production rates at NAS JRB Fort Worth are dependent on Congressional funding levels, foreign purchases, and which of three possible Lockheed Martin plants is selected for aircraft assembly. Increases in time-averaged noise levels would scale with the rate of aircraft production. Although there is uncertainty about the rate of F-35 production at Fort Worth, production is expected to continue for approximately 20 years, depending on demand for the aircraft.

Moving the Texas Army National Guard CH-47 mission to NAS JRB Fort Worth could also increase noise levels around the installation. The number of annual helicopter operations that would result from this action is unknown at this time, but any increase in helicopter operations would increase noise levels. The helicopter flights would occur in an area dominated by jet aircraft noise.

As described in Section FW3.2.5, implementation of the AFRC F-35A mission at NAS JRB Fort Worth would result in significant noise impacts. The cumulative impact of aircraft noise from the planned growth in F-35 production and noise from the CH-47 mission, combined with noise from the AFRC F-35A mission, could be expected to increase the off-base land area and population exposed to DNL of 65 dB or greater beyond the land areas and populations identified in this EIS. This would result in significant noise impacts.

Regarding the airspace proposed for use, replacement of the B-1 mission at Dyess AFB with a B-21 mission would affect noise levels beneath training airspace units, such as Lancer MOA, that are used by Dyess-AFB-based aircraft and which would also be used by the proposed AFRC F-35A mission. Because the B-21 has not yet been designed, the nature of the changes in noise level are not known at this time.

Because one of the endpoints of the proposed route would be located at the boundary of Lancer MOA, which is proposed for use by the AFRC F-35A mission, combined noise effects of the two projects are possible. Because the spatial overlap of the proposed route and airspace proposed for use by the AFRC F-35A mission is minimal, any cumulative effects would be limited in geographic scope.

Private and state/municipal government-sponsored land development actions could potentially affect noise impacts in the long-term by increasing the number of noise-sensitive locations in areas exposed to elevated noise levels. The JLUS contains guidance to have land development be compatible with expected noise conditions. Military planners assess such projects for mission compatibility on a case by case basis, and contribute the results of their assessment as part of the civilian development planning process. Noise generated on-site during the construction and operation of privately owned properties is localized and qualitatively consistent with surrounding existing noise environments in adjacent developed areas.

FW4.2.3 Air Quality

C&D projects associated with the proposed AFRC F-35A mission would occur near other ongoing and future C&D projects (e.g., IDP projects) during the same time periods. C&D projects have been and will continue to be a regular occurrence on and near installations such as NAS JRB Fort Worth. These projects would generate the same types of construction related impacts as described for the proposed AFRC F-35A mission (e.g., fugitive dust emissions, increases in construction related criteria pollutant emissions). Although, implementation of the AFRC F-35A mission would result in minor increases in all air pollutant emission except VOCs, these increases, combined with air emission increases from past, present, and reasonably foreseeable future actions, would not be expected to prevent this area from maintaining NAAQS or result in significant cumulative impacts to the air quality.

FW4.2.4 Soil and Water Resources

C&D projects associated with the proposed AFRC F-35A mission would occur near other ongoing and future C&D projects (e.g., IDP projects) during the same time periods. C&D projects have been and will continue to be a regular occurrence on and near installations such as NAS JRB Fort Worth. These construction projects would increase the amount of soil disturbed and have the potential to increase erosion and sedimentation into surface water features. Cumulative impacts resulting from implementation of the proposed AFRC F-35A mission in conjunction with past, present, and reasonably foreseeable future actions on the soil and water resources at NAS JRB Fort Worth would not be significant.

FW4.2.5 Biological Resources

Operations of the AFRC mission at NAS JRB Fort Worth were found to have no significant impacts to wildlife including threatened and endangered species and migratory birds. Projects such as the proposed beddown of new missions with aircraft operations would have similar impacts to wildlife as those described in this EIS. Cumulative impacts resulting from implementation of the proposed AFRC F-35A mission in conjunction with past, present, and reasonably foreseeable future actions on the biological resources at NAS JRB Fort Worth would not be significant.

FW4.2.6 Land Use and Recreation

C&D projects associated with the proposed AFRC F-35A mission would occur near other ongoing and future C&D projects (e.g., IDP projects, construction from private and state and local development) during the same time periods. C&D projects have been and will continue to be a regular occurrence on and near installations such as NAS JRB Fort Worth. Construction projects that occur inside the area of the latest AICUZ and noise contours would comply with applicable building codes for noise attenuation and Regional Coordination Committee Development Review Web Tool for land use compatibility. Land use compatibility is explained in the JLUS and land use requirements have been implemented to minimize adverse impacts to land use from incompatible development. Cumulative impacts would not be expected as long as development is consistent with the JLUS guidelines.

Increased noise from flight operations of planned additional F-35 production could result in greater impacts to land use than identified in this EIS. There are existing noise impacts to land use from DNL greater than 65 dB and the AFRC F-35A mission, in conjunction with past, present, and reasonably foreseeable future actions (specifically increased flight operations of production F-35 aircraft), would result in cumulative impacts on land use and recreation at NAS JRB Fort Worth.

Under the training airspaces, the aircraft operations resulting from the proposed AFRC F-35A mission combined with the aircraft operations from the Lockheed Martin Assembly Plant could increase noise levels in some recreational areas in Texas. These increased noise levels would occur in areas that are currently exposed to military aircraft noise. Although some users of these recreational areas would be annoyed by these noise increases, significant impacts to these recreational areas would not result from these actions.

FW4.2.7 Socioeconomics

The C&D projects associated with the AFRC F-35A mission would provide short-term, economic benefits to surrounding areas through employment of construction workers and through the purchase of materials and equipment. The short-term impact of implementing the proposed mission combined with any or all of the projects listed in Table FW4-1 would result in negligible cumulative impacts to socioeconomics in the area. In addition, the decrease in personnel associated with the proposed mission is also not anticipated to result in cumulative impacts to housing, schools, or other socioeconomic resources. The Fort Worth area is growing and the loss of 102 positions combined with other economic activity in the Fort Worth area would result in negligible impacts to socioeconomic resources. However, the noise increases to houses and schools would constitute adverse socioeconomic impacts.

FW4.2.8 Environmental Justice and the Protection of Children

Noise resulting from the operation of F-35A aircraft would affect people living near the installation. As discussed in Section FW3.10.2, there are existing disproportionate impacts to minority and low-income populations from aircraft operations at NAS JRB Fort Worth. Implementation of the AFRC F-35A mission at NAS JRB Fort Worth would result in disproportionate impacts to minority populations in four ROIs and to low-income populations in two ROIs (i.e., these populations would be newly exposed to DNL of 65 dB or greater). Section FW3.10.2 quantifies the existing and projected number of children and elderly exposed to DNL of 65 dB or greater. Implementation of the proposed action, combined with implementation of one or more of the past, present, and reasonably foreseeable future actions (specifically increased flight operations of production F-35 aircraft), would not be expected to result in cumulative impacts from noise to environmental justice and other sensitive populations beyond those described in this EIS as a result of the proposed action.

FW4.2.9 Climate Change

Texas and the surrounding region could experience a continuing of recent upward trends in average temperatures and extreme heat, an increase in extreme precipitation events, and an increase in drought intensity (USGCRP 2017).

Increases in temperature, extreme heat events, extreme precipitation events, and drought intensity could interact with resource areas such as air quality, water resources, and socioeconomics. Increasing temperatures have been shown to increase ground level ozone and particulates (Orru et al. 2017). Increases in drought intensity could impact water availability. Potential socioeconomic impacts could include increased costs associated with poor air quality and water availability.

While NAS JRB Fort Worth has operations to manage the recent temperature changes, exacerbation of climate conditions in the future could increase the cost of proposed operations and could impede operations during extreme events. Additional measures could be needed to mitigate such impacts over the operational life expectancy of the F-35A.

FW4.3 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Irreversible and irretrievable resource commitments are related to the use of nonrenewable resources and the effects that the uses of these resources have on future generations. Irreversible effects primarily result from the use or destruction of a specific resource (e.g., energy and minerals) that cannot be replaced within a reasonable timeframe. Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored as a result of the action.

For the beddown of F-35A aircraft at NAS JRB Fort Worth, most resource commitments are neither irreversible nor irretrievable. Most impacts are short-term (e.g., air emissions from construction) or longer lasting but negligible (e.g., public service increases). Those limited resources that may involve a possible irreversible or irretrievable commitment are discussed as follows.

Should the AFRC F-35A mission be located at NAS JRB Fort Worth, some land in the cantonment area would be disturbed. Much of this land has been previously disturbed and is heavily influenced by airfield development. Construction and renovation of base facilities would require the consumption of limited amounts of material typically associated with interior renovations (e.g., wiring, insulation, windows, and drywall) and exterior construction (e.g., concrete, steel, sand, and brick). An undetermined amount of energy to conduct renovation, construction, and operation of these facilities would be expended and irreversibly lost.

Training operations would continue and involve consumption of nonrenewable resources, such as gasoline used in vehicles and jet fuel used in aircraft. None of these activities are expected to significantly decrease the availability of minerals or petroleum resources. Privately owned vehicle use by the personnel continuing to support the existing missions would consume fuel, oil, and lubricants. The amount of these materials used would increase slightly; however, this additional use is not expected to significantly affect the availability of the resources.

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CHAPTER 4

BASE ALTERNATIVE: WHITEMAN AIR FORCE BASE

WH1.0 WHITEMAN AIR FORCE BASE OVERVIEW

Whiteman Air Force Base (AFB) is located in Johnson County, Missouri, approximately 2 miles south of the City of Knob Noster and 70 miles southeast of Kansas City, Missouri. The installation encompasses approximately 5,520 acres and is predominantly surrounded by agricultural land use, with some minor residential development to the east (Figure WH1-1). The primary runway at Whiteman AFB, Runway 01/19, is 12,400-feet long and 200-feet wide (Figure WH1-2).

The 509th Bomb Wing (509 BW) of the U.S. Air Force (USAF) Global Strike Command is the host unit at Whiteman AFB. As the host unit, the mission of the 509 BW is to (1) develop and sustain the world's best stealth war fighting capability through innovative planning, training, and exercising; (2) develop and maintain the highest level of readiness to support worldwide contingency operation; (3) create and foster a 509 BW quality culture through leadership and teamwork; (4) make safety a priority in the air, on the ground, on or off duty; (5) provide resources, time, and opportunity to promote wellness and continually improve; and (6) improve the environment through comprehensive education and aggressive compliance. The 509 BW flies the B-2 Stealth bomber and T-38 Talon trainer at Whiteman AFB.

The primary tenants at Whiteman AFB include the Air Force Reserve Command (AFRC) 442nd Fighter Wing (442 FW), the 1-135th Attack Reconnaissance Battalion (1-135 ARB) of the Missouri Air National Guard (MO ANG), the 131st Bomb Wing (131 BW), the 72nd Test and Evaluation Squadron (72 TES), the 325th Weapons Squadron (325 WPS), the USAF Office of Special Investigations (OSI), and the 20th Reconnaissance Squadron (20 RS) Remote Split Operations. The 442 FW operates 24 A-10 Thunderbolt II aircraft and the 1-135 ARB flies AH-64 Apache helicopters at Whiteman AFB.

Refer to Chapter 1 for the purpose and need for the AFRC F-35A mission, a description of the F-35A aircraft characteristics, and information about public involvement and agency coordination. Refer to Chapter 2 for the description of the proposed action and alternatives, and a description of the strategic basing and alternative identification processes. In the base-specific sections that follow, Section WH2 presents the description of the proposed action at Whiteman AFB. Section WH3 addresses baseline conditions and environmental consequences that could result from implementation of the proposed action at Whiteman AFB. Section WH4 identifies other, unrelated past, present, and reasonably foreseeable future actions in the affected environment and evaluates whether these actions would cause cumulative effects when considered along with the AFRC F-35A beddown. This section also presents the irreversible and irretrievable resources that would be committed should the proposed action be implemented at Whiteman AFB.

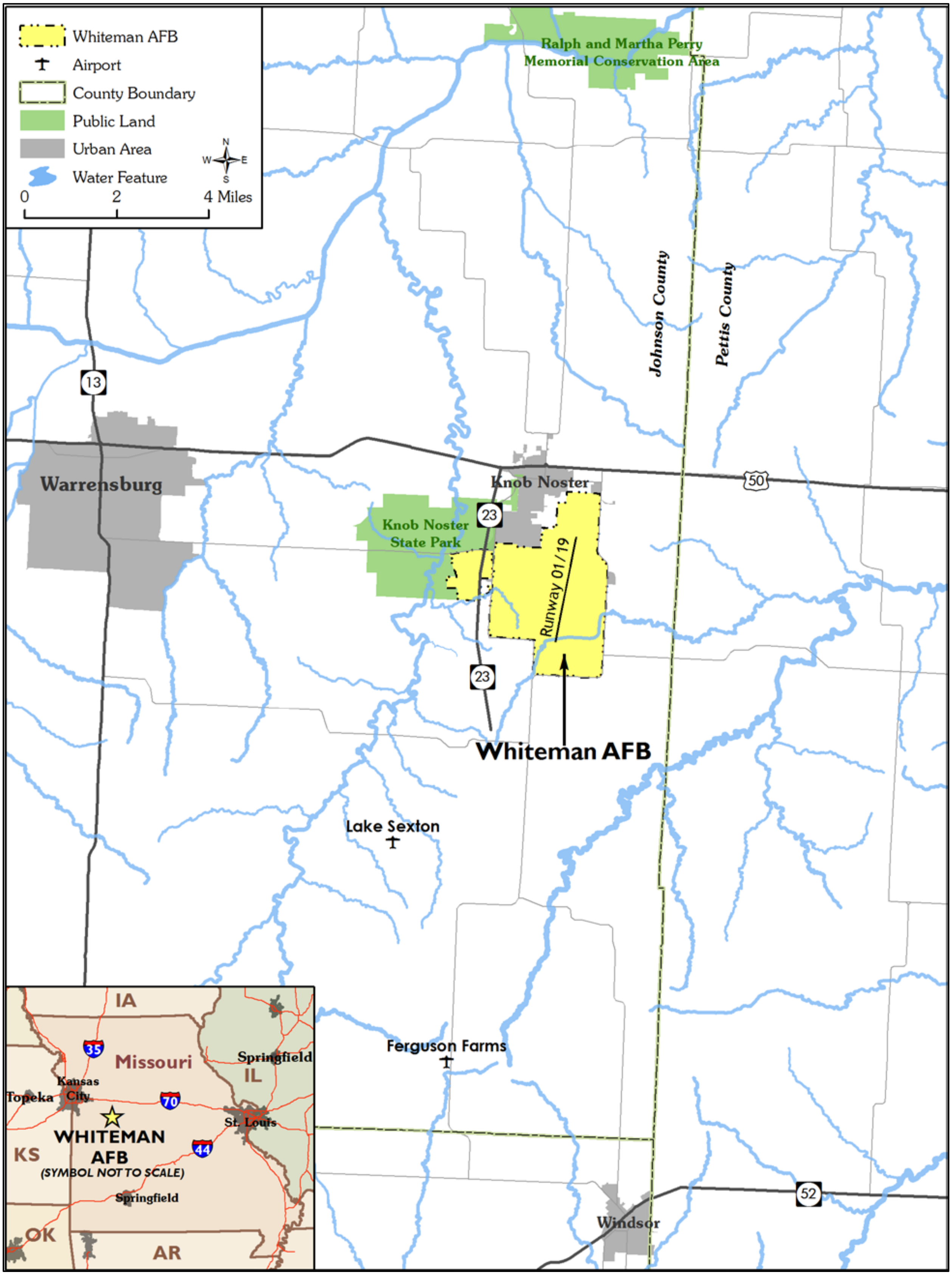

Figure WH1-1. Regional Location of Whiteman AFB

Figure WH1-2. Primary Runways at Whiteman AFB

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WH2.0 WHITEMAN AIR FORCE BASE ALTERNATIVE

This section presents the specifics of the proposed action at Whiteman AFB. Four elements of the proposed action have the potential to affect the base and associated airspace: (1) facility and infrastructure projects to support the F-35A beddown; (2) personnel changes necessary to meet F-35A requirements; (3) airfield operations conducted by AFRC F-35A pilots; and (4) airspace and range use by AFRC F-35A pilots. Each element is explained in the following subsections. In addition, this section also presents state and federal consultation efforts and associated permits that would be required should Whiteman AFB be selected to receive the AFRC F-35A mission.

Under the proposed action, 24 Primary Aerospace Vehicles Authorized (PAA) F-35A aircraft would start to arrive at Whiteman AFB in early 2024. Delivery of the full complement of 24 F-35A aircraft and 2 Backup Aircraft Inventory (BAI) is anticipated to take 2 years. At that time, the F-35A aircraft would completely replace the existing 24 A-10 aircraft assigned to the 442 FW. The A-10 aircraft that would be replaced by the F-35A aircraft would be reassigned or removed from the USAF inventory.

WH2.1 FACILITIES AND INFRASTRUCTURE

To support the AFRC F-35A mission, additional infrastructure and facility modifications would be required at Whiteman AFB (Table WH2-1). A total of 12 different improvement projects and 1 demolition project would be implemented in 2021 (Figure WH2-1). The USAF estimates that $32.5 million in Military Construction (MILCON) expenditures would be required to implement the proposed AFRC F-35A mission at Whiteman AFB.

Table WH2-1. Facilities and Infrastructure Projects for the AFRC F-35A Mission at Whiteman AFB

Project[a]	Size (ft^2)[b]
Demolition	
Building 706	29,400
Demolition Total	**29,400**
Renovation	
Building 41 renovation for squadron operations	10,497[c]
Building 91 renovation for engine repair	NA[d]
Building 1117 electrical and ventilation upgrades	NA[d]
Building 1118 electrical upgrade	NA[d]
Building 1119 egress shop – relocation from building 1117	NA[d]
Airfield pavement repair	500
A-10 parking apron repair	14,348
North ramp repair	699,654
Renovation Total	**724,999**
New Construction	
Recessed arresting cable and barriers	500
Construct an F-35A flight simulator building	13,650
Construct six sunshades	38,400
Construct a munitions maintenance building (not shown)	5,000
New Construction Total	**57,500**

[a] Data in this table were obtained from interviews conducted at Whiteman AFB (Whiteman AFB 2017).
[b] Size is the area covered by the footprint of the proposed facilities and consists of the designed limits of the structure, facility, apron, road, access, and/or parking lot.
[c] Interior renovation only.
[d] Includes minor interior upgrade projects that do not have a square footage.

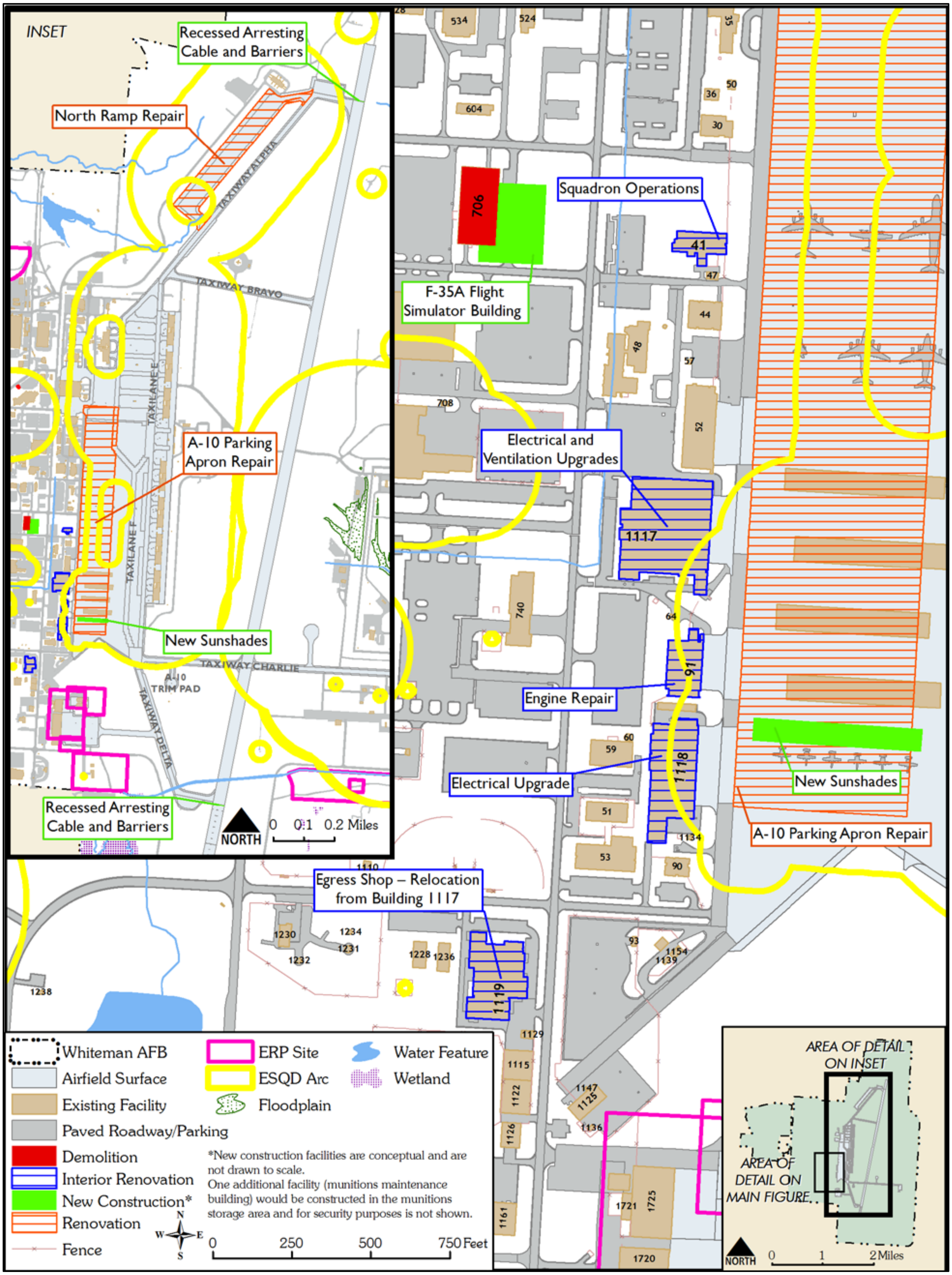

Figure WH2-1. Facilities and Infrastructure Projects for the AFRC F-35A Mission at Whiteman AFB

New construction and facility additions would require construction grading, clearing, and equipment laydown space. To account for this disturbance, this analysis also includes disturbance areas in addition to the facility size. These disturbance areas encompass 20 feet adjacent to linear features (e.g., roads, utility extensions, etc.) and 50 feet around the facility footprint for all other facilities. Repairs of existing aircraft concrete aprons or ramps are not included in these calculations because these repairs would occur on paved or concrete surfaces. Interior renovations are also not included in these calculations because these renovations would not create ground disturbance or a change in impervious surfaces.

New construction and facility additions would also result in changes to existing impervious surfaces. It is assumed that any demolition would include demolition of the building slab and result in a reduction in impervious surfaces. In some cases, demolished facilities would be replaced by new construction or pavements. This increase in impervious surfaces is accounted for in the new construction. Table WH2-2 provides a summary of the ground disturbance and changes in impervious surfaces.

Table WH2-2. Summary of Facility and Infrastructure Projects for Whiteman AFB

Project Type	Ground Disturbance (Acres)	Change in Impervious Surfaces (Acres)
Demolition	1.7	-0.7
Renovation[a]	0	0
New Construction[b]	1.2	+0.3
Total	**2.9**	**-0.4**

[a] Does not include interior renovation, runway or ramp renovation projects.
[b] Does not include the arresting barrier and cables or construction of the sunshades.

Facility siting on military installations is predominantly functional use-based (i.e., locating facilities with like functional uses adjacent to one another). However, safety and compliance with policies and regulations are also used as planning factors. During the planning phase for a new aircraft mission beddown, military planners consider a variety of alternatives necessary to meet the requirements of the new mission, including the use of existing facilities that can be partially or entirely used to meet mission requirements. Depending on available infrastructure, facilities, and, to some degree, personnel available to support the AFRC F-35A mission, proposed construction, demolition, and renovation projects vary between alternatives. The facility siting analysis for each alternative base considered the functional requirements of the AFRC F-35A mission and compared them with the existing infrastructure and environmental constraints at each alternative base.

New construction siting is a stepwise process that includes identifying suitable sites relative to existing facilities and base infrastructure to provide operational efficiencies and suitable cost-benefit values. Utility siting, including the re-routing of existing utilities or the installation of new utility infrastructure (e.g., power, water, sewer, and communication lines), could also be required to accommodate the new mission. The siting process for utilities focused on using existing conduits and previously disturbed areas or areas that would also be disturbed for facility modifications. Temporary construction laydown areas could also be required to support construction. Construction laydown areas would be located in developed or semi-developed areas, or previously disturbed or paved areas. Construction laydown areas not proposed for permanent disturbance would be returned to their pre-construction state upon completion of construction. All construction contracts would be managed under Unified Facilities Criteria (UFC) 3-101-01, *Best Management Practices*, and attainment of a Leadership in Energy and Environmental Design (LEED) Silver certification.

Construction and renovation projects within the 65-decibel (dB) noise contour would include acoustical design considerations for façade elements and interior design requirements per UFC 3-101-01. Land use would be consistent with Department of Defense Instruction (DoDI) 4165.57, *Air Installations Compatible Use Zones*, and Air Force Handbook (AFH) 32-7084, *AICUZ Program Manager's Guide.*

WH2.2 PERSONNEL

Implementation of the AFRC F-35A mission at Whiteman AFB would require sufficient and appropriately skilled military and civilian personnel to operate and maintain the F-35A aircraft and to provide other necessary support services. Implementation of the AFRC F-35A mission at Whiteman AFB would require an additional 11 positions. This would constitute a 0.1 percent increase in base staffing (Table WH2-3).

Table WH2-3. Personnel Changes for the AFRC F-35A Mission at Whiteman AFB

Baseline Personnel			Proposed F-35A Authorized Personnel			Percent Change to Total Personnel
Total Authorized Personnel	AFRC Authorized Personnel	Percent of Total Authorized Based Personnel	AFRC F-35A	Change to AFRC Unit Personnel Positions	Percent Change to AFRC Unit Personnel	
12,642	1,009	7.98%	1,020	11	1.09%	0.1%

WH2.3 AIRFIELD OPERATIONS

The 442 FW is an integral part of the Combat Air Forces (CAF). The CAF defends the homeland of the United States and deploys forces worldwide to meet threats and ensure the security of the nation. To fulfill this role, the 442 FW must train as it would fight.

The USAF anticipates that once the full complement of aircraft is received, the 24 F-35A aircraft would be used to fly 11,580 airfield operations per year from the airfield. Based on the proposed requirements and deployment patterns, AFRC F-35A pilots would fly additional operations during deployments, or at other locations for exercises or in preparation for deployments. In addition, AFRC F-35A pilots stationed at Whiteman AFB could participate in remote training exercises. Some of these missions could involve ordnance delivery training or missile firing exercises within the scope of existing (National Environmental Policy Act [NEPA] documentation) at ranges approved for such use (e.g. Cannon Range on Fort Leonard Wood, Missouri).

Conducting 11,580 F-35A operations per year at Whiteman AFB would represent an increase of 5,770 annual airfield operations compared to current A-10 aircraft operations (Table WH2-4). Of the 33,180 total airfield operations currently conducted at Whiteman AFB, 17.5 percent are conducted by the 442 FW. Implementation of the AFRC F-35A mission at Whiteman AFB would result in a 17.4 percent increase in annual total airfield operations.

Table WH2-4. Whiteman AFB Baseline A-10 and Proposed F-35A Annual Airfield Operations

Total Baseline Operations[a]		Proposed AFRC F-35A Mission
Based A-10	5,810	0
Proposed F-35A	0	11,580
Other Aircraft	27,370	27,370
Total Airfield Operations	33,180	38,950
	Percent Change	**17.4%**

[a] Total baseline operations is for the last year. Data in this table were collected from the operations staff at Whiteman AFB in 2017.

AFRC F-35A pilots would perform departure and landing procedures similar to those currently conducted by the A-10 pilots at the installation. Due to differences in aircraft characteristics and performance, the flight profiles and tracks used by AFRC F-35A pilots would slightly vary from those currently used by A-10 pilots. A-10 pilots from the 442 FW average 260 flying days per year. For the purposes of this analysis and to compare the alternatives on an equal basis, the total number of possible flying days for AFRC F-35A pilots is also assumed to be 260, including both Saturday and Sunday (on Unit Training Assembly [UTA] weekends).

Although the AFRC A-10 aircraft do not have afterburners, other military aircraft operating at Whiteman AFB use afterburners on occasion when additional power is needed. As described in Chapter 2, Section 2.3.3, the USAF evaluated three different scenarios for afterburner use. Scenario A is afterburner use on 5 percent of takeoffs. Scenario B is afterburner use on 50 percent of takeoffs. Scenario C is afterburner use on 95 percent of takeoffs.

AFRC F-35A pilots would operate similar to the A-10 pilots. Currently, A-10 operations primarily begin at 7:00 A.M. and conclude by 10:00 P.M. on weekdays and UTA weekends (except when weather contingencies or special exercises cause operations to occur after 10:00 P.M.). After-dark training is normally scheduled to be completed before 10:00 P.M. After-dark training for AFRC F-35A pilots would also be scheduled to be completed before 10:00 P.M. Because of the capabilities and expected tactics of the F-35A aircraft, AFRC F-35A pilots are predicted to generally follow the same night requirement as AFRC A-10 pilots depending on weather or special exercises.

WH2.4 AIRSPACE AND RANGE USE

Table WH2-5 identifies the Federal Aviation Administration (FAA)-designated airspace currently used by Whiteman AFB A-10 pilots that is also proposed for use by AFRC F-35A pilots. Implementation of the AFRC F-35A mission would not require any new airspace or changes to existing airspace boundaries, and the type and number of ordnance used at the any of the ranges approved for such use could decrease.

Table WH2-5. Whiteman AFB Training Airspace

FAA-Designated Airspace[a]	Floor[b] (feet MSL unless otherwise noted)	Ceiling (feet MSL unless otherwise noted)
Ada East & West MOAs	7,000	UTBNI 18,000
Bison MOA	1,000 AGL	UTBNI 18,000
Cannon A MOA	300 AGL	UTBNI 18,000
Cannon B MOA	100 AGL	UTBNI 18,000
Eureka Low MOA	6,000	UTBNI 18,000
Eureka High MOA	2,500	UTBNI 6,000
Lindbergh A MOA	7,000	UTBNI 18,000
Lindbergh B & C MOAs	8,000	UTBNI 18,000
Lindbergh D and West ATCAA[c]	39,000	UTBNI 43,000
Riley MOA	7,000	UTBNI 18,000
Salem MOA	Surface	UTBNI 7,000
Shirley A, B, & C MOAs	11,000	UTBNI 18,000
Smoky High MOA	5,000	UTBNI 18,000
Smoky Low MOA	500 AGL	UTBNI 5,000
Truman A & B MOAs	8,000	UTBNI 18,000
Truman C MOA	500 AGL	UTBNI 18,000
Cannon Range R-4501A	Surface	UTBNI 2,200
Cannon Range R-4501B	Surface	4,300
Cannon Range R-4501C	2,200	5,000

Table WH2-5. Whiteman AFB Training Airspace (Continued)

FAA-Designated Airspace[a]	Floor[b] (feet MSL unless otherwise noted)	Ceiling (feet MSL unless otherwise noted)
Cannon Range R-4501D	5,000	12,000
Cannon Range R-4501E	12,000	UTBNI 18,000
Cannon Range R-4501F & H	Surface	3,200 AGL
Fort Riley Range R-3602A & B	Surface	29,900
Smoky Hill Range R-3601A	Surface	UTBNI 18,000

[a] Airspace used by F-35A pilots would include Air Traffic Control Assigned Airspaces (ATCAAs) that occur over the Military Operations Areas (MOAs) included in the table. The ATCAAs will accommodate training above 18,000 feet mean sea level (MSL).
[b] Floor altitudes could exclude certain areas. See FAA Sectional Charts for exclusions.
[c] Lindbergh ATCAAs are called out in the table and figures for reference because no MOAs are located beneath these areas.
Note: MSL is the elevation (on the ground) or altitude (in the air) of an object, relative to the average sea level. The elevation of a mountain, for example, is marked by its highest point and is typically illustrated as a small circle on a topographic map with the MSL height shown in either feet or meters or both. Because aircraft fly across vast landscapes, where points above the ground can and do vary, MSL is used to denote the "plane" on which the floors and ceilings of Special Use Airspace (SUA) are established and the altitude at which aircraft must operate within that SUA.
Key: AGL = above ground level; UTBNI = Up To But Not Including
Source: FAA Kansas City 2018 and Wichita 2018 Sectional Charts

WH2.4.1 Airspace Use

AFRC F-35A pilots would conduct missions and training activities necessary to fulfill the multi-role responsibility of this aircraft. All F-35A flight activities would occur in existing airspace. AFRC F-35A pilots would operate in the airspace used by A-10 pilots from the 442 FW, but at higher altitudes. A-10 pilots from the 442 FW use Military Operations Areas (MOAs), Restricted Areas (RAs), and Air Traffic Control Assigned Airspace (ATCAA) (Table WH2-5 and Figure WH2-2). To support realistic training, A-10 pilots schedule and use multiple adjacent airspaces together.

The FAA-designated airspace identified in Table WH2-4 is also used by other USAF pilots operating A-10, F-15, and F-16 aircraft. A-10 pilots from the 442 FW conduct approximately 35 percent of the total sorties flown in the airspace identified in Table WH2-5. Although AFRC F-35A pilots would conduct missions similar to those of A-10 pilots, the capabilities of the F-35A aircraft allow for supersonic and higher altitude flight. Regardless of the altitude structure and percent use indicated in Table WH2-6, AFRC F-35A pilots (as do existing military aircraft pilots) would adhere to all established floors and ceilings of existing FAA-designated airspace. For example, the floor of the Riley MOA is 7,000 feet mean sea level (MSL). While in this MOA, AFRC F-35A pilots would not fly below that altitude. Rather, AFRC F-35A pilots would adapt training to this and other airspace with lower floors.

Table WH2-6. Current and Proposed Aircraft Altitude Distribution in the Airspace

Altitude (feet)	Percentage of Use	
	A-10	AFRC F-35A
100 – 500 AGL	7%	0%
500 AGL – 2,000 AGL	30%	1%
2,000 – 5,000 AGL	26%	0%
5,000 AGL – 10,000 MSL	33%	5%
10,000 – 18,000 MSL	4%	23%
18,000 – 30,000 MSL	0%	60%
+30,000 MSL	0%	11%

A-10 pilots from the 442 FW generally operate 100 percent of the time at or below 18,000 feet MSL. In contrast, AFRC F-35A pilots would operate 71 percent of the time at or above 18,000 feet MSL, with 11 percent of the flight time above 30,000 feet MSL.

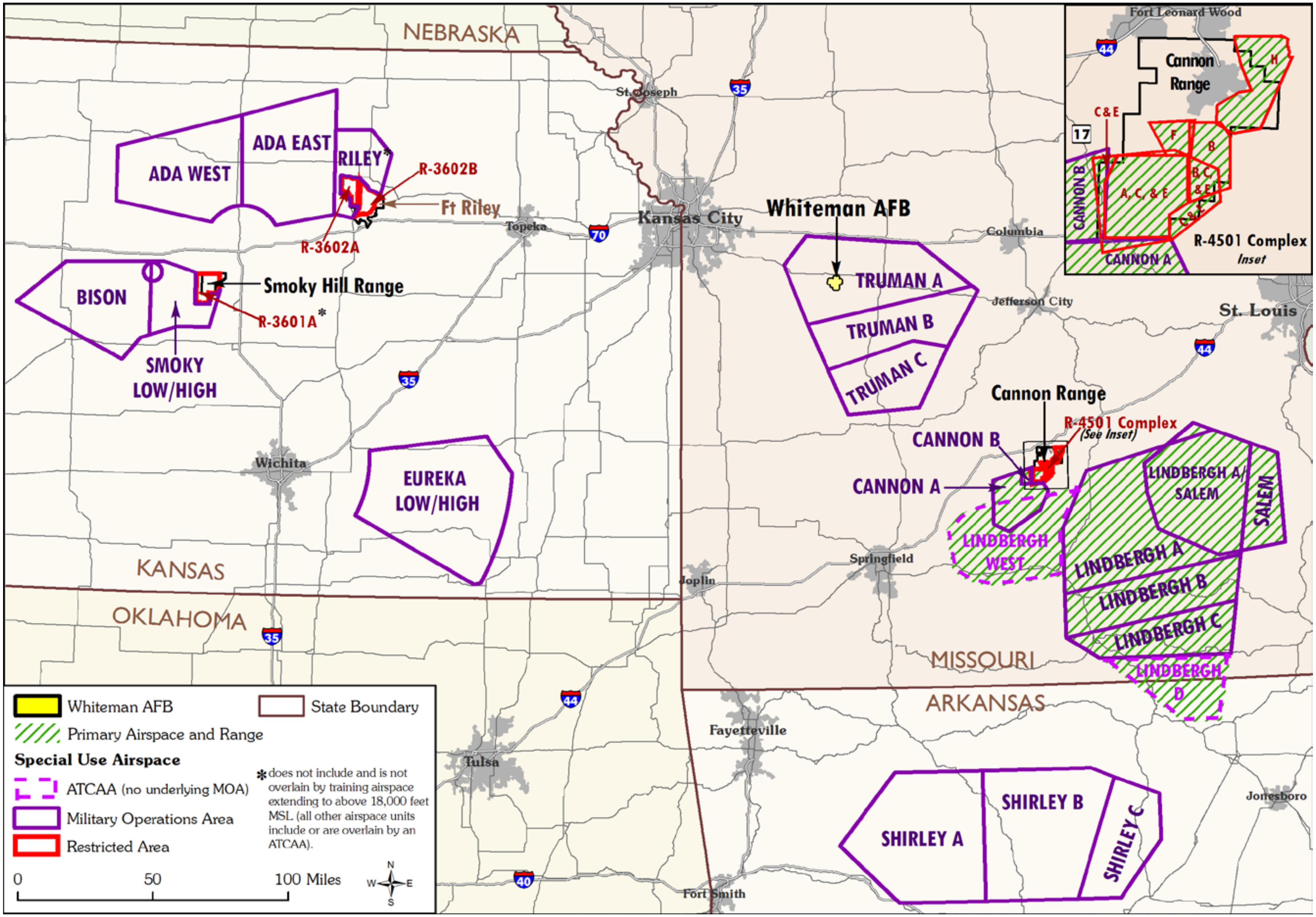

Figure WH2-2. Airspace Associated with Whiteman AFB

By 2030, total annual sorties would decrease by 5.9 percent from baseline levels (Table WH2-7).

Table WH2-7. AFRC F-35A Airspace Sorties Flown from Whiteman AFB

Airspace[a]	Total Baseline	A-10 Baseline	AFRC F-35A Sorties	Net Change (Total)	Percent Change (Total)
Central United States	15,739	5,563	4,632	-931	-5.9%
Total	**15,739**	**5,563**	**4,632**	**-931**	**-5.9%**

[a] Includes all airspace identified in Table WH2-5.

To train with the full capabilities of the aircraft, AFRC F-35A pilots would conduct supersonic flight at altitudes and within airspace already authorized for such activities. Due to the capability of the F-35A aircraft, the USAF anticipates that approximately 10 percent of the time spent in air combat training would involve supersonic flight.

AFRC F-35A missions would last approximately 45 to 115 minutes, including takeoff, transit to and from the training airspace, training activities, and landing. Depending upon the distance and type of training activity, AFRC F-35A pilots would fly approximately 20 to 60 minutes in the training airspace. Occasionally, AFRC F-35A pilots could fly up to 90-minute long missions. AFRC F-35A pilots would not fly in Special Use Airspace (SUA) during environmental night (10:00 P.M. to 7:00 A.M.), except for rare contingencies and special mission training.

WH2.4.2 Range Use

AFRC F-35A pilots would only use existing ranges. AFRC F-35A pilots stationed at Whiteman AFB would use the Cannon Range at Fort Leonard Wood in Missouri and the Smoky Hill and Fort Riley Ranges in Kansas.

Most air-to-ground training would be simulated (i.e., nothing is released from the aircraft and electronic scoring is used). However, as described in Chapter 2, Section 2.3.4.2, the F-35A (like the A-10) is capable of carrying and using several types of air-to-air and air-to-ground ordnance, and pilots would require training in their use. The type and number of ordnance used by AFRC F-35A pilots could decrease from that currently used by A-10 pilots. If in the future the USAF identifies weapon systems that are either new or could exceed currently approved levels, appropriate NEPA documentation would be completed prior to their use.

Similar to A-10 pilots, AFRC F-35A pilots would use flares as defensive countermeasures in training. Flares are one of the defensive mechanisms dispensed by military aircraft to avoid attack by enemy aircraft and air defense systems. For the purposes of this analysis, it is estimated that flare use by AFRC F-35A pilots would be less than or equal to that of A-10 pilots. Chapter 2, Section 2.3.4.2.1, provides details on the composition and characteristics of flares. Flares would only be used in areas currently approved for such use. Current restrictions on the altitude of flare use would also apply. Use of flares by AFRC F-35A pilots would either increase or decrease in proportion to net changes in aircraft operations. Approximately 70 percent of F-35A flare releases would occur above 15,000 feet MSL. At this altitude, most flares would be released more than 21 times higher than the minimum altitude required (700 feet) to ensure complete combustion of each flare.

WH2.5 PUBLIC, AGENCY, AND TRIBAL INVOLVEMENT

WH2.5.1 Scoping Process

The public scoping period for the AFRC F-35A Environmental Impact Statement (EIS) began on 22 March 2018 with publication of the Notice of Intent (NOI) in the *Federal Register*. During the following weeks, notification letters were mailed to federal, state, and local agencies; elected officials; federally recognized tribes (tribes)[1]; nongovernmental organizations; and interested individuals as a part of an interagency/intergovernmental coordination process. Through this process, concerned federal, state, and local agencies are notified and allowed sufficient time to evaluate potential environmental impacts of a proposed action.

Volume II, Appendix A, provides sample notification letters, the notification mailing lists, and the agency comments and concerns received by the USAF during the public scoping period. For the Whiteman AFB alternative, newspaper advertisements announcing the intent to prepare an EIS and hold a public scoping meeting were published in three different local newspapers. These advertisements were published in the weeks preceding the scheduled public scoping meeting.

For the Whiteman AFB alternative, one public scoping meeting was held on 26 April 2018 at Knob Noster High School (504 South Washington, Knob Noster, Missouri 65336). This meeting was held in an open-house format where attendees could sign in, if desired, review display boards about the proposed AFRC F-35A mission, and provide written comments on the project. During this meeting, USAF personnel presented information on the project through the use of display boards and fact sheets. The Whiteman AFB public scoping meeting was attended by 26 people, including residents, an elected official, local business leaders, military affairs committee members, base employees, local media, and others.

Throughout the public scoping period, the USAF offered multiple ways in which comments could be submitted. Comments were submitted at the public scoping meeting and through the project website, via email, and via regular mail or courier. The public scoping period closed on 11 May 2018, and seven comments were received regarding the Whiteman AFB alternative. Some comments were received after the public scoping period closed but were still considered during development of the Draft EIS.

After the public scoping period closed, the USAF was made aware that the address provided for submittal of courier-delivered (e.g., Federal Express or United Parcel Service) public scoping comments was incorrect. Consequently, the USAF provided the correct address and an additional 10 working days to resubmit scoping comments from the time resubmittal instructions were published in the *Federal Register* on 13 August 2018 and in three different local newspapers. During this second public scoping period, no additional comments were received regarding the Whiteman AFB alternative.

The majority of comments received for the Whiteman AFB alternative were generally supportive of the proposed mission. Some people expressed concerns about airspace, air quality, biological resources, hazardous materials and hazardous waste, infrastructure, land use, and soil and water resources.

WH2.5.1.1 Airspace Management and Use

Comments related to airspace included those that requested the EIS analyze any changes in airspace use, creation of new airspace, or alterations in flight paths.

[1] Per DoDI 4710.02, *DoD Interactions with Federally-Recognized Tribes*, "tribe" refers to a federally recognized Indian or Alaska Native tribe, band, nation, pueblo, village, or community that the Secretary of the Interior acknowledges (DoDI 4710.02, Section 3.5). Although not included as federally recognized tribes in the list, the USAF similarly must consult with Native Hawaiian organizations in accordance with DoDI 4710.03, *Consultation with Native Hawaiian Organizations (NHOs).*

WH2.5.1.2 Air Quality

A comment was submitted expressing concern about jet fuel, exhaust, and the potential for adverse health effects to areas surrounding the base. The same commenter expressed concerns about tree removal and carbon footprint offsets.

WH2.5.1.3 Soil and Water Resources

A comment was received regarding stormwater run-off from the runway and potential impacts to water supplies, local creeks, and streams.

WH2.5.1.4 Biological Resources

A commenter expressed concern regarding the installation's carbon footprint and the potential for offsets through the creation of greenspace. Concern was expressed about light pollution and potential impacts to wildlife corridors.

WH2.5.1.5 Land Use and Recreation

One commenter expressed concern about the new mission potentially requiring land acquisition. The commenter wanted to know if land would be acquired through eminent domain.

WH2.5.1.6 Infrastructure

A commenter asked if the USAF would use solar power in the new construction to supply some of the power to the new facilities, and if buildings would incorporate green building practices and be LEED-certified.

WH2.5.1.7 Hazardous Waste

The Missouri Department of Natural Resources (MDNR) indicated that most of the legacy cleanup sites are at or nearing the response complete phase.

WH2.5.1.8 Socioeconomics

A commenter asked if there would be efforts to actively recruit local citizens for employment during and after construction.

WH2.5.2 Draft EIS Public and Agency Review

A Draft EIS public hearing was held on 12 March 2020 at Knob Noster High School in Knob Noster, Missouri. A total of seven people signed in at the public hearing, but some attendees did not sign in. The verbatim transcript of the Whiteman AFB public hearing is contained in Appendix A, Section A.6.4. Five comments were received from the public and agencies regarding the proposed AFRC F-35A mission at Whiteman AFB prior to close of the comment period. See Chapter 1, Section 1.5, of the EIS for more details on the public involvement process. A synopsis of the comments received specific to Whiteman AFB on the Draft EIS are listed as follows. See Appendix A, Section A.2, for responses to the substantive Draft EIS comments.

1) General support of the proposed beddown.
2) General complaint about air quality, noise, land use, and associated socioeconomic impacts to adjacent landowners and schools.

WH2.5.3 Consultation

WH2.5.3.1 Government-to-Government Consultation

In January 2012 the U.S. Department of Defense (DoD) updated its Annotated American Indian and Alaska Native Policy, which emphasizes the importance of respecting and consulting with tribal governments on a government-to-government basis. This policy requires an assessment, through consultation, of the effect of proposed DoD actions that may have the potential to significantly affect protected tribal resources, tribal rights, and Indian lands before decisions are made by the respective DoD services. In an ongoing effort to identify significant cultural resources, tribal resources, or other issues of interest to tribes, and as part of the NEPA scoping process, combined notification and Section 106 consultation letters were submitted to the federally-recognized American Indian tribes associated with Whiteman AFB.

Following standard USAF practice for government-to-government correspondence, tribal consultation was initiated by base Commanders who represent key leadership points of contact. Whiteman AFB initiated Section 106 government-to-government consultation with eleven tribes to identify traditional cultural properties. These tribes along with a record of consultations are listed in Volume II, Appendix A, Section A.7.2. Additional direct communication efforts (phone calls and emails) occurred for tribes that did not respond to USAF mailings. All communications with tribes will be completed in accordance with 54 *United States Code (USC)* 300101 *et seq.*, *National Historic Preservation of Act of 1966, as amended* (NHPA); 36 *Code of Federal Regulations (CFR)* § 800, *Protection of Historic Properties;* Executive Order (EO) 13175, *Consultation and Coordination with Indian Tribal Governments;* and DoDI 4710.02, *DoD Interactions with Federally-Recognized Tribes.*

WH2.5.3.2 State Historic Preservation Officer Consultation

Whiteman AFB has determined that no historic properties would be affected by implementing the AFRC F-35A mission at the installation. The Missouri State Historic Preservation Officer (SHPO) concurred with this finding in a letter dated 13 June 2018 (Volume II, Appendix A, Section A.7.3).

WH2.5.3.3 U.S. Fish and Wildlife Service Consultation

Because no federal listed threatened, endangered, or candidate species and/or designated critical habitat occur in the Region of Influence (ROI) near Whiteman AFB, no impacts would result from implementation of the proposed AFRC F-35A mission in the areas surrounding Whiteman AFB. On 14 May 2018, the U.S. Fish and Wildlife Service (USFWS) indicated that should this project involve the removal of less than 10 acres of suitable bat habitat, and should the trees be cleared during the bat hibernation season (1 November to 31 March), the USFWS does not anticipate adverse effects to the three listed bat species. In a follow-up email dated 24 May 2018, the USFWS indicated that it was not within the USFWS's purview to concur with findings of no effect, but they had no concerns regarding the project (see email dated 14 May 2018, Volume II, Appendix A, Section A.2.7.4).

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WH3.0 WHITEMAN AIR FORCE BASE AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

WH3.1 AIRSPACE MANAGEMENT AND USE

WH3.1.1 Base Affected Environment

WH3.1.1.1 Airfield Operations

Baseline annual airfield operations at Whiteman AFB are described in Section WH2.3 and shown in Table WH2-4. The primary runway at Whiteman AFB, Runway 01/19, is described in Section WH1.0 and shown on Figure WH1-2. Runway 19 is the primary use runway for noise abatement considerations.

The Whiteman AFB air traffic control (ATC) tower is responsible for controlling and managing airfield operations within the Class D airspace depicted on the FAA Kansas City Sectional Aeronautical Chart (FAA Kansas City 2018). The Whiteman AFB Class D airspace abuts or is within close proximity to Class E airspace surrounding the Skyhaven Airfield to the west and the Sedalia Regional Airport to the east. These charted airspace areas, along with the coordinated efforts of the respective airfield managers and ATC facilities, ensure the separation of the differing airfield flight activities.

The FAA Kansas City Air Route Traffic Control Center (ARTCC) manages the airspace in this region and has delegated terminal airspace to the Whiteman AFB Radar Approach Control (RAPCON) facility. The RAPCON is responsible for providing radar ATC services for all instrument flight rules (IFR) aircraft operations at Whiteman AFB and within 30-50 NM of the base from the surface up to 9,000 feet MSL. Control of this airspace reverts to the Kansas City ARTCC during those later periods when the RAPCON is not operational. Both runways 01 and 19 have Instrument Landing System (ILS) and Tactical Air Navigation (TACAN) navigational aid coverage that provide 10 published instrument approach procedures for this runway environment.

WH3.1.2 Base Environmental Consequences

WH3.1.2.1 Airfield Operations

The Whiteman AFB alternative for the AFRC F-35A mission would result in the changes to the airfield operational levels noted in Table WH2-4. Replacing the 5,810 A-10 operations with a projected 11,580 AFRC F-35A operations while other aircraft operations remain constant would increase overall airfield operations by about 17.4 percent. Such increase could be accommodated by the tower, RAPCON and Kansas City ARTCC within this airfield, Class D, and approach control airspace environment without adversely affecting other airspace uses. The percentage of operations flown during environmental night by AFRC F-35A pilots would be less than the percentage currently conducted by A-10 pilots. This beddown would not require any modifications to the current airspace structure nor those operating procedures that support present airfield and airspace operations at this location.

WH3.1.3 Airspace Affected Environment

WH3.1.3.1 Airspace and Range Use

The MOAs, ATCAAs, RAs, and range training areas currently used by pilots from Whiteman AFB and projected for AFRC F-35A operations are listed in Table WH2-5. This table also notes the floor and ceiling altitudes for each MOA, ATCAA, and RA in which all flight training activities must be contained. Table WH3-1 notes the baseline and projected AFRC F-35A sortie operations for each airspace/range area. While the MOAs are in close proximity to the base with the Truman MOAs directly overlying this area, the ranges are approximately 100-200 NM from the base where Smoky Hill is the more highly used range. Kansas City ARTCC is the controlling agency for the airspace encompassing these training areas. Table WH3-1 notes the military agency responsible for coordinating and scheduling the airspace and range uses with the requesting units for meeting individual and joint training requirements.

Table WH3-1. Baseline and AFRC F-35A Annual Sorties

Training Airspace/Ranges[a]	Using/Scheduling Agency	Baseline Total	AFRC A-10	AFRC F-35A	Proposed Total	Percent Change
Ada East & West MOAs	ANG, 184th Intelligence Wing, Detachment 1, Smokey Hill	37	0	472	509	1,275.7
Eureka Low & High MOAs	ANG, 138 FW, Tulsa	1,208	0	157	1,365	13.0
Shirley A, B, & C MOAs	Arkansas ANG, 188 FW, Ft. Smith	140	0	306	446	218.6
Truman A, B, & C MOAs	509 BW, Whiteman AFB	6,554	-3,999	158	2,713	-58.6
Salem/Cannon/Lindbergh MOAs	131st Tactical Fighter Wing, MO ANG Lambert-St. Louis International	608	-280	459	787	29.4
Cannon Range R-4501A, B, C, D, E, F, & H, & Salem/Cannon/Lindbergh MOAs[b]	U.S. Army, Ft Leonard Wood/ 131st Tactical Fighter Wing	1,395	-1,284	2,031	2,142	53.5
Fort Riley Range R-3602A & B with Riley MOA	U.S. Army, Fort Riley	4	0	736	740	18,400.0
Smoky Hill Range R-3601A with Bison & Smoky Low and High MOAs	ANG, 184th Detachment 1, Air Refueling Wing, Salina	5,793	0	313	6,106	5.4
	Total	**15,739**	**-5,563**	**4,632**	**14,808**	**-5.9**

[a] AFRC F-35A training airspace and ranges also includes the high-altitude ATCAA above the MOAs. Airspace areas in this table have been grouped due to similarity of training use and for noise modeling purposes.
[b] Primary Use Airspace and Ranges

WH3.1.4 Airspace Environmental Consequences

WH3.1.4.1 Airspace and Range Use

Table WH3-1 shows that the AFRC F-35A sorties projected for the different MOAs/ATCAAs, RAs, and ranges coupled with loss of the A-10 sorties would result in a 5.9 percent decrease in overall annual sorties. The projected distribution of those AFRC F-35A sorties would differ from how the A-10s currently use these areas. With the exception of the Truman MOAs, all airspace areas would experience an increase in annual sorties. The largest increases by percentage would be in the Fort Riley Range and Riley MOA and in the Ada MOAs. While the increases in these MOAs are large in terms of percentage, the actual number of sorties is small compared to the large areas available for training in these airspace areas. The percent increases are also inflated due to the small number of sorties currently occurring in the airspace. For example, the Fort Riley Range and Riley MOA currently have a baseline of four annual sorties. Since this MOA is currently used on an infrequent basis, the proposed increase of 736 sorties requirements could be effectively coordinated and scheduled to meet F-35A and other user training requirements.

The Canon Range, Shirley MOA, and the Salem/Cannon/Lindbergh MOAs would also see large percentage increases in the number of annual sorties. Mission requirements in these airspace areas would require coordination and scheduling with existing USAF units to meet training requirements for both the AFRC F-35A mission and the mission of existing units.

Implementation of the AFRC F-35A mission would not result in the creation of new SUA or change the boundaries of existing SUA. Therefore, no major changes to civilian operations are anticipated. The Kansas City ARTCC would continue to manage all military and civilian aircraft within activated MOAs to ensure no conflicts with civil aviation.

WH3.1.5 Summary of Impacts to Airspace Management and Use

Implementation of the AFRC F-35A mission would involve a one-for-one exchange of A-10 aircraft with F-35A aircraft, and would not require any changes to airspace or to how the airfield is managed. Eventual replacement of A-10 aircraft at Whiteman AFB with F-35A aircraft would result in a 17.4 percent increase in airfield operations. This operational increase would not affect how local air traffic is managed. In addition, the AFRC F-35A sorties proposed for the airspace could be accommodated in the training airspace, ranges, and while en route to/from these areas without adversely affecting other airspace uses throughout the affected region. Therefore, impacts to airspace around Whiteman AFB and the airspace proposed for use would not be significant.

WH3.2 NOISE

Although noise can affect several resource areas, this section describes potential noise impacts on human annoyance and health, physical effects on structures, and potential impacts to animals in the care of humans. Noise impacts on biological resources (e.g., wildlife), cultural resources, land use and recreation, socioeconomics (e.g., property values), and environmental justice /protection of children are discussed in sections dedicated to those resources. Chapter 3, Section 3.2, defines terms used to describe the noise environment as well as methods used to calculate noise levels and assess potential noise impacts. These terms and analytical methods are uniformly applied to all four bases. A summary of noise metrics used in this EIS is also provided in Table WH3-2.

For consistency, the dB unit is used throughout this EIS. However, all subsonic aircraft noise levels described in this EIS are measured in dBA. In compliance with current DoD Noise Working Group (DNWG) guidance, the overall noise environment is described in this EIS using the day-night average sound level (DNL) metric. During scoping, people submitted comments expressing concern about use of the DNL metric. The DNL metric is used because it is the preferred noise metric of the U.S. Department of Housing and Urban Development (HUD), FAA, U.S. Environmental Protection Agency (USEPA), and DoD. Studies of community annoyance in response to numerous types of environmental noise show that there is a correlation between DNL and the percent of the population that can be expected to be highly annoyed by the noise. In addition to the DNL metric, supplemental noise metrics are used to provide a more complete picture of noise and particular types of noise impacts (Table WH3-2). Operations occurring during environmental nighttime hours are assessed a 10-dB penalty applied in calculation of DNL (refer to Chapter 3, Section 3.2.3, for more detailed resource definition and methodology used to evaluate impacts).

Comments received during scoping indicated a broad range of concerns and requested a comprehensive presentation of noise impacts. Therefore, this analysis covers a wide variety of potential noise impact categories. Additional details are provided in Volume II, Appendix B.

Table WH3-2. Summary of Noise Metrics Used in this EIS

Different noise measurements (or metrics) quantify noise. These noise metrics are as follows:

- The A-weighted decibel (dBA) is used to reflect a weighting process applied to noise measurements to filter out very low and very high frequencies of sound in order to replicate human sensitivity to different frequencies of sound and reflect those frequencies at which human hearing is most sensitive. Environmental noise is typically measured in dBA.
- Day-Night Average Sound Level (DNL) combines the levels and durations of noise events, the number of events over a 24-hour period, and more intrusive nighttime noise to calculate an average noise exposure.
- Onset Rate-Adjusted Day-Night Average Sound Level (L_{dnmr}) adds to the DNL metric the startle effects of an aircraft flying low and fast where the sound can rise to its maximum very quickly. Because the tempo of operations is so variable in airspace areas, L_{dnmr} is calculated based on the average number of operations per day in the busiest month of the year.
- C-Weighted Day-Night Average Sound Level (CDNL) is a day-night average sound level computed for impulsive noise such as sonic booms. Peak overpressure, measured in pounds per square foot (psf), characterizes the strength of impulsive noise.
- Sound Exposure Level (SEL) accounts for the maximum sound level and the length of time a sound lasts by compressing the total sound exposure for an entire event into a single second.
- Maximum Noise Level (L_{max}) is the highest sound level measured during a single event in which the sound level changes value with time (e.g., an aircraft overflight).
- Equivalent Noise Level (L_{eq}) represents aircraft noise levels decibel-averaged over a specified time period and is useful for considering noise effects during a specific time period such as a school day (denoted $L_{eq(SD)}$ and measured from 8:00 A.M. to 4:00 P.M.).

In this EIS, multiple noise metrics are used to describe the noise environment at each alternative base. This approach, which is in accordance with DoD policy (DoD 2009), provides a more complete picture of the current and expected noise experience than can be provided by any one noise metric alone.

WH3.2.1 Base Affected Environment

This section discusses noise impacts near the installation. Noise generated in the training airspace and during training to and from the training airspace is discussed in Section WH3.1.

Under baseline conditions, 33,180 airfield operations are conducted annually at Whiteman AFB. This includes 5,810 operations by the 442 FW AFRC A-10 pilots. Pilots from the 509 BW and 131 BW conduct 6,198 B-2 operations and 15,284 T-38 operations annually. MO ANG pilots conduct 4,808 H-60 operations annually. Transient aircraft pilots conduct 1,080 operations annually. Transient aircraft pilots use the airfield for a variety of purposes (e.g., stop-over during cross country flights, unfamiliar airfield for practice approaches, divert landing location during severe weather), and transient aircraft could potentially include any aircraft type. Approximately 7 percent of total airfield operations are conducted between 10:00 P.M. and 7:00 A.M. Approximately 4 percent of 442 FW A-10 airfield operations are conducted between 10:00 P.M. and 7:00 A.M.

WH3.2.1.1 Noise Exposure

Several comments received during scoping requested the USAF provide individual overflight noise levels quantified using the sound exposure level (SEL) metric. The information on SELs shown in Table WH3-3 was calculated based on local flying procedures and conditions using methods described in Chapter 3, Section 3.2.3.1. Specifically, Table WH3-3 lists only the highest SEL generated by any flight procedure (e.g., departure, arrival or closed pattern) by any based or transient aircraft type. The table also states the number of times per year that the flight procedure occurs during "acoustic day" (7:00 A.M. to 10:00 P.M.) and "acoustic night" (10:00 P.M. to 7:00 A.M). It is worth noting that the noise environment at a particular location is complex and the highest SEL is only one descriptor of this complex situation. In addition, actual flight paths vary, due to weather, winds, aircrew technique, and other factors, from the most-frequently followed (representative) flight paths used in noise modeling. Therefore, individual flight events could be closer to, or be farther away from, the representative noise-sensitive location, resulting in noise levels being slightly higher or lower than indicated in Table WH3-3.

Table WH3-3. Highest SEL at Representative Noise-Sensitive Locations near Whiteman AFB Under Baseline Conditions

Representative Noise-Sensitive Location			Flight Procedure with the Highest SEL					SEL (dB) [a,b]
Type	ID	Description	Aircraft Group	Aircraft	Operation Type	Annual Operations at this SEL: 7:00 A.M. to 10:00 P.M.	Annual Operations at this SEL: 10:00 P.M to 7:00 A.M.	
Park	P01	Knob Noster State Park campground	T	F/A-18A/C	Departure	103	3	91
Residential	R01	Residential Area 1	B	B-2A	Closed Pattern	151	101	109
	R02	Residential Area 2	T	F/A-18A/C	Arrival	65	4	109
	R03	Residential Area 3	T	F/A-18A/C	Departure	103	3	102
School[c]	S01	Knob Noster Elementary	B	B-2A	Closed Pattern	41	27	109
	S02	Knob Noster High School	B	B-2A	Closed Pattern	41	27	99

[a] SELs were calculated using NOISEMAP Version 7.3 and the same operational data (e.g., flight tracks and flight profiles) used to calculate the DNL contours.
[b] SEL accounts for the maximum sound level and the length of time a sound lasts by compressing the total sound exposure for an entire event into a single second.
[c] For the purposes of this noise analysis, noise levels at schools are described throughout this EIS using representative schools; discussion of noise at schools may not include all schools in the area.
Key: T = Transient aircraft or non-Whiteman AFB-based aircraft involved in training exercise; B = Based aircraft

Several factors, including, but not limited to, weather conditions, the precise flight path followed, and whether the aircraft is flying in formation, affect the noise level of individual overflights (Chapter 3, Section 3.2.3). Formation flights involve multiple aircraft, usually of the same type, flying together. The maximum noise level experienced during a formation overflight depends on the spacing and arrangement of the formation's member aircraft. If the aircraft are spaced close together, then doubling the number of aircraft would add as much as 3 dB to the maximum sound level (L_{max}) of the event. Since the SEL metric is an exposure-based metric, doubling the number of aircraft of a single aircraft type adds 3 dB to the event noise level.

Figure WH3-1 shows baseline DNL contours in 5-dB increments. Areas with the highest DNL are located along the runway, beneath the most heavily-used flight paths, and in areas near the airfield where aircraft static engine runs are conducted.

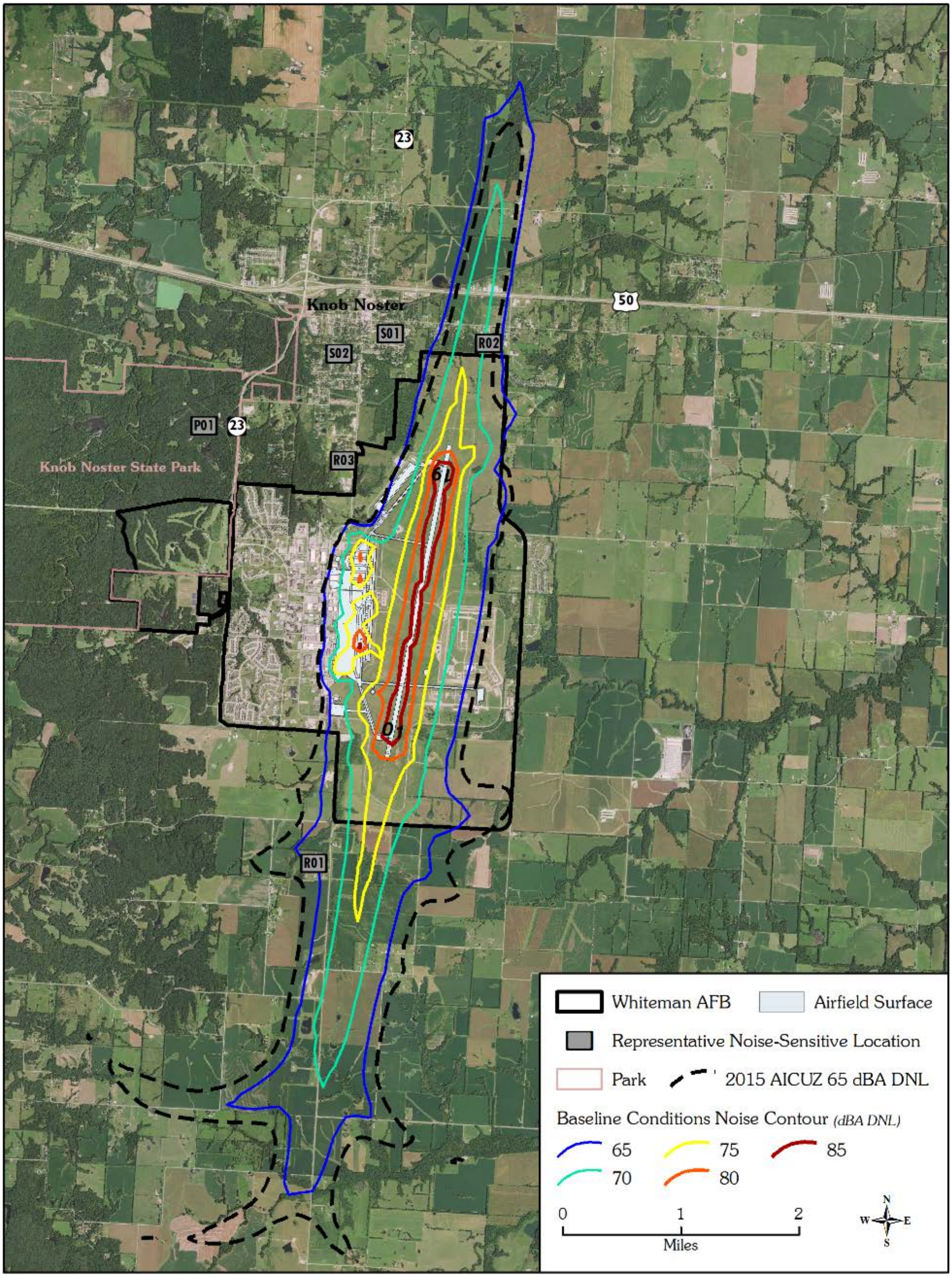

Figure WH3-1. Baseline DNL Contours at Whiteman AFB

Under baseline conditions, 2,089 acres and an estimated 580 residents are currently exposed to DNL of 65 dB or greater (Table WH3-4). People living in areas exposed to higher DNL are more likely to become highly annoyed by the noise. USAF land use guidelines state that residences are incompatible with DNL of 65 to 69 dB unless the structure provides at least 25 dB noise level reduction, and the same recommendations state that residences are incompatible with DNL of 70 to 74 dB unless the structure provides at least 30 dB noise level reduction. Additional details on annoyance and land use recommendations for areas exposed to elevated noise levels are contained in Chapter 3, Section 3.2.3, and Volume II, Appendix B.

Table WH3-4. Off-Base Acres and Population Exposed to DNL of 65 dB or Greater Under Baseline Conditions at Whiteman AFB

DNL (dB)	Acres	Estimated Population
65 – 69	1,500	462
70 – 74	537	118
75 – 79	52	0
80 – 84	0	0
≥85	0	0
Total	**2,089**	**580**

Table WH3-5 lists baseline DNL at several representative noise-sensitive locations, which include a state park, residential areas, and schools. Baseline DNLs at the representative noise-sensitive locations are similar to and indicative of DNLs in surrounding areas. The DNLs at Residential Area 1 and Residential Area 2 are 65 dB or greater.

Table WH3-5. DNL at Representative Noise-Sensitive Locations near Whiteman AFB Under Baseline Conditions

Type	ID	Description	DNL (dB)
Park	P01	Knob Noster State Park campground	48
Residential	R01	Residential Area 1	65
	R02	Residential Area 2	68
	R03	Residential Area 3	57
School	S01	Knob Noster Elementary School	61
	S02	Knob Noster High School	55

Areas outside the 65 dB DNL contour line could also experience noise that can be disturbing at times. Although noise events are less frequent and/or less intense in areas exposed to DNL less than 65 dB, loud and potentially disturbing noise events do occur. Some people are more noise-sensitive than others as a result of physical, psychological, and emotional factors. People with autism and people afflicted with post-traumatic stress disorder (PTSD) could be particularly sensitive to sudden loud noises such as those that occur near an airbase. The DNL metric is useful for describing the noise environment at a location with a single number, but it does not provide a complete description of the noise environment. In accordance with current DoD policy (DoD 2009), this EIS makes use of several supplemental noise metrics (e.g., SEL, L_{max}, number of events exceeding dB threshold) to provide a more complete description of the noise experience.

WH3.2.1.2 Speech Interference

Speech interference is possible when noise levels exceed 50 dB. For the purposes of this analysis, any change to normal speech patterns is counted as an interference event. Table WH3-6 lists the number of events exceeding L_{max} of 50 dB in buildings with windows open, in buildings with windows closed, and outdoors. Flight paths are variable and speech interference events sometimes occur far from standard Whiteman AFB flight patterns.

Table WH3-6. Potential Speech Interference Under Baseline Conditions at Whiteman AFB

Type	ID	Description	Annual Average Daily Daytime (7:00 A.M. to 10:00 P.M.) Events per Hour		
			Windows Open[a]	Windows Closed[a]	Outdoor
Park	P01	Knob Noster State Park campground	1	<<1	3
Residential	R01	Residential Area 1	3	2	3
	R02	Residential Area 2	3	3	4
	R03	Residential Area 3	3	2	4

[a] Number of events per average hour with an indoor L_{max} of at least 50 dB; assumes standard values of 15 dB and 25 dB noise level reductions for windows open and closed, respectively.

Key: <<1 indicates that the number of potential speech interference events (>50 dB) per hour resulting from Whiteman AFB-based aircraft overflights is low (rounding to zero)

WH3.2.1.3 Interference with Classroom Learning

Noise interference with learning in schools is of particular concern because noise can interrupt communication or interfere with concentration. When considering intermittent noise caused by aircraft overflights, guidelines for classroom interference indicate that an appropriate criterion is a limit of 35 to 40 dB (depending on classroom size) on indoor background equivalent noise levels during the school day ($L_{eq(SD)}$) and a 50 dB L_{max} limit on single events. In accordance with DNWG recommendations, estimated interior $L_{eq(SD)}$ exceeding 40 dB was taken as an indication that American National Standards Institute (ANSI) criteria are being exceeded (DNWG 2013). The background $L_{eq(SD)}$ at Knob Noster Elementary School and Knob Noster High School both exceed 40 dB when windows are open, but do not exceed 40 dB with windows closed (Table WH3-7). Currently, at both schools, an average of one noise event per hour exceeds 50 dB indoors if windows are closed and an average of two events per hour exceed 50 dB indoors if windows are open. The number of outdoor events per hour with potential to interfere with speech between 7:00 A.M. and 10:00 P.M. is not directly related to classroom noise level, but is relevant during recess and to other activities that could occur outside the school building.

Table WH3-7. Indoor Classroom Learning Disruption Under Baseline Conditions at Whiteman AFB

Type	ID	Description	Windows Open[a]		Windows Closed[a]		Outdoor
			$L_{eq(SD)}$ (dB)	Events per Hour[b]	$L_{eq(SD)}$ (dB)	Events per Hour[b]	Events per Hour[c]
School	S01	Knob Noster Elementary School	43	2	<35	1	4
	S02	Knob Noster High School	40	2	<35	1	4

[a] Assumes standard values of 15 dB and 25 dB of noise level reductions for windows open and closed, respectively.
[b] Average number of events per hour at or above an indoor L_{max} of 50 dB during an average 8-hour school day (8:00 A.M. to 4:00 P.M.).
[c] Average number of events per hour at or above an outdoor L_{max} of 50 dB during daytime (7:00 A.M. to 10:00 P.M.).
Key*:* $L_{eq(SD)}$ is the equivalent noise level during a school day (defined as 8:00 A.M. to 4:00 P.M.).

WH3.2.1.4 Sleep Disturbance

Nighttime flying, which is required as part of training for certain missions, has an increased likelihood of causing sleep disturbance. The lack of quality sleep has the potential to affect health and concentration. The probability of being awakened at least once per night was calculated using a method described by the ANSI (ANSI 2008). The method first predicts the probability of awakening associated with each type of flying event (higher SELs yield higher probability of awakening) and then sums the probabilities associated with all event types. The overall probability of awakening at least once per night reflects all flying events that occur between 10:00 P.M. and 7:00 A.M., when most people sleep (Table WH3-8). Sleep disturbance probabilities listed for parks and schools are not intended to imply that people regularly sleep in parks or schools, but instead are indicative of impacts in nearby residential areas. Results apply only to people who sleep during the night. People who sleep during the day experience additional noise events, resulting in higher probabilities of awakening.

Table WH3-8. Average Probability of Awakening Under Baseline Conditions at Whiteman AFB

Type	ID	Description	Annual Average Nightly (10:00 P.M. to 7:00 A.M.) Probability of Awakening (%)	
			Windows Open[a]	Windows Closed[a]
Park	P01	Knob Noster State Park campground	2	1
Residential	R01	Residential Area 1	7	4
	R02	Residential Area 2	9	6
	R03	Residential Area 3	5	2
School	S01	Knob Noster Elementary School	5	2
	S02	Knob Noster High School	5	2

[a] Assumes standard values of 15 dB and 25 dB noise level reductions for windows open and closed, respectively.

WH3.2.1.5 Potential for Hearing Loss

Potential for Hearing Loss (PHL) applies to people living in high noise environments where they can experience long-term (40 years) hearing effects resulting from DNL greater than 80 dB (USD 2009). PHL is not an issue of concern because no residences are exposed to DNL greater than 80 dB.

WH3.2.1.6 Occupational Noise

In on-base areas with high noise levels, existing USAF occupational noise exposure prevention procedures, such as hearing protection and monitoring, are implemented to comply with all applicable Occupational Safety and Health Administration (OSHA) and USAF occupational noise exposure regulations.

WH3.2.1.7 Non-auditory Health Impact

During scoping, the question of the potential for non-auditory health effects from noise was raised. Studies have been performed to see whether noise can cause health effects other than hearing loss. The premise is that annoyance causes stress. Prolonged stress is known to be a contributor to a number of health disorders. Cantrell (1974) confirmed that noise can provoke stress, but noted that results on cardiovascular health have been contradictory. Some studies have found a connection between aircraft noise and blood pressure (e.g., Michalak et al. 1990; Rosenlund et al. 2001), while others have not (e.g., Pulles et al. 1990).

Kryter and Poza (1980) noted, “It is more likely that noise related general ill-health effects are due to the psychological annoyance from the noise interfering with normal everyday behavior, than it is from the noise eliciting, because of its intensity, reflexive response in the autonomic or other physiological systems of the body.”

The connection from annoyance to stress to health issues requires careful experimental design, and the resulting data are subject to different interpretations. Some of the highly publicized research reports on the impacts of noise on human health effects are unsubstantiated or not based on sound science. Meecham and Shaw (1979) apparently found a relation between noise levels and mortality rates in neighborhoods under the approach path to Los Angeles International Airport. When the same data were analyzed by others (Frerichs et al. 1980), no relationship was found. Jones and Tauscher (1978) found a high rate of birth defects for the same neighborhood. But when the Centers For

Disease Control performed a more thorough study near Hartsfield-Jackson Atlanta International Airport, no relationships were found for levels greater than 65 dB (Edmonds et al. 1979).

A carefully designed study, Hypertension and Exposure to Noise near Airports (HYENA), was conducted around six European airports from 2002 through 2006 (Jarup et al. 2005, 2008). There were 4,861 subjects, aged between 45 and 70. Blood pressure was measured, and questionnaires were administered for health, socioeconomic, and lifestyle factors, including diet and physical exercise. Hypertension was defined by World Health Organization (WHO) blood pressure thresholds (WHO 2003). Noise from aircraft and highways was predicted from models.

The HYENA results were presented as an odds ratio (OR). An OR of 1 indicates there is no added risk, while an OR of 2 indicates risk is doubled. An OR of 1.14 was found for nighttime aircraft noise, measured by the equivalent noise level during nighttime hours (L_{night}). For daytime aircraft noise, measured by 16-hour equivalent noise level (L_{eq16}), the OR was 0.93. For road traffic noise, measured by 24-hour equivalent noise level (L_{eq24}), the OR was 1.1.

Note that OR is a statistical measure of change, not the actual risk. Risk itself and the measured effects were small, and not necessarily distinct from other events. Haralabidis et al. (2008) reported an increase in systolic blood pressure of 6.2 millimeters of mercury (mmHg) for aircraft noise, and an increase of 7.4 mmHg for other indoor noises such as snoring.

For these studies, aircraft noise was a factor only at night, while traffic noise is a factor for the full day. Aircraft noise results varied among the six countries. The result is therefore pooled across all data. Traffic noise results were consistent across the six countries.

One interesting conclusion from a 2013 study of the HYENA data (Babisch et al. 2013) states there is some indication that noise level is a stronger predictor of hypertension than annoyance. That is not consistent with the idea that annoyance is a link in the connection between noise and stress. Babisch et al. (2012) present interesting insights on the relationship of the results to various modifiers.

Two studies examined the correlation of aircraft noise with hospital admissions for cardiovascular disease. Hansell et al. (2013) examined neighborhoods around London's Heathrow Airport. Correia et al. (2013) examined neighborhoods around 89 airports in the United States. Both studies included areas of various noise levels. They found associations that were consistent with the HYENA results. During the Draft EIS public comment period, several commenters provided citations of research papers and requested additional information from these research papers be included in the Final EIS. Please refer to Chapter 3, Section 3.2.3.1.7, for additional information that has been added to the Final EIS.

The current state of scientific knowledge cannot yet support inference of a causal or consistent relationship between aircraft noise exposure and non-auditory health consequences for exposed residents. The large-scale HYENA study (Jarup et al. 2005, 2008) and the recent studies by Hansell et al. (2013) and Correia et al. (2013) offer indications, but it is not yet possible to establish a quantitative cause and effect based on the currently available scientific evidence.

WH3.2.1.8 Structural Damage

Noise that does not exceed 130 dB in any 1/3-octave frequency band or last for more than 1 second does not typically have the potential to damage structures in good repair (CHABA 1977). The term "frequency bands" refers to noise energy in a certain range of frequencies and is similar in concept to frequency bands employed on home stereo equalizers to control relative levels of bass and treble. Noise energy in certain frequency bands has increased potential to vibrate and/or damage structures.

Noise exceeding 130 dB in any 1/3-octave frequency band and lasting for more than 1 second of that intensity and duration does not occur except on the flightline immediately adjacent to jet aircraft.

Noise-induced structural vibration and secondary vibrations (i.e., "rattle") of objects within structures can occur during loud overflights. Rattling of objects such as dishes, hanging pictures, and loose window panes can cause residents to fear damage. Rattling objects have the potential to contribute to annoyance along with other potential noise effects (e.g., speech interference, sleep disturbance).

WH3.2.1.9 Animals in the Care of Humans

Potential noise impacts on wildlife are discussed in Section WH3.6. However, pets, other domesticated animals, and animals kept in zoos live in different circumstances than wild animals and often react differently to human-generated noises, particularly when enclosed in small spaces. Negative reactions to loud overflights are possible under baseline conditions.

WH3.2.2 Base Environmental Consequences

Implementation of the AFRC F-35A mission would replace the 24 A-10 aircraft currently assigned to the 442 FW with 24 F-35A aircraft. The number of airfield operations flown annually by the 442 FW would increase from 5,810 to 11,580. The total number of airfield operations flown by all aircraft at Whiteman AFB would increase by 17.4 percent.

AFRC F-35A pilots would fly approximately 7 percent of initial approaches to the runway during the late-night time period between 10:00 P.M. and 7:00 A.M. This is the same percentage of initial approaches that are currently conducted by 442 FW A-10 pilots late at night. As is currently the case with A-10 pilots, AFRC F-35A pilots would not typically conduct departures or closed patterns (i.e., multiple practice approaches) between 10:00 P.M. and 7:00 A.M.

Based on context and intensity, noise impacts resulting from implementation of the proposed AFRC F-35A mission at Whiteman AFB would be considered significant. As described in Section 2.5, the USAF considered several potential noise mitigation measures. None of the measures considered were determined to be operationally feasible. Local flight procedures at Whiteman AFB are internally reviewed on a regular basis for changes that create the best balance between safety (paramount concern), mission and training effectiveness, and minimizing noise impacts. Furthermore, the base maintains open lines of communication with the City of Knob Noster and local community leaders to develop and implement potential noise abatement procedures when possible. Currently, no additional noise abatement procedures have been identified that would reduce noise impacts without also adversely affecting safety of flight and/or mission effectiveness.

Operating procedures already include several procedures to minimize noise impacts. These procedures, which have been developed over several years as part of regularly-occurring procedural review process, have been selected to minimize mission impacts while maintaining operational efficiency and flexibility; these procedures would be applied to any new aircraft at the installation, including the F-35A. Noise modeling conducted as part of this EIS analysis reflects the following procedures:

- Flying and static engine run activities are minimized between 10:00 P.M. and 7:00 A.M.;
- Flight paths are routed to avoid populated areas where practicable; and
- Aircraft conducting VFR second approach patterns must avoid direct overflight of the City of Knob Noster at less than 2,000 feet MSL.

Construction and demolition (C&D) projects in support of the proposed AFRC F-35 mission would generate short-term, localized increases in noise. However, the installation is currently exposed to elevated aircraft noise levels as well as noise generated by the day-to-day operation and maintenance (O&M) of vehicles and equipment. Construction would occur during normal working hours (i.e., 7:00 A.M. to 5:00 P.M.), and construction equipment would be equipped with mufflers. Workers would wear hearing protection in accordance with applicable regulations. Transportation of materials and equipment to and from the construction sites would generate noise similar to heavy trucks currently operating on base and along local roadways. In the context of ongoing frequent and intense aircraft noise events on an active military installation, construction noise generated by the AFRC F-35A mission would not result in significant impacts.

WH3.2.2.1 Noise Exposure

WH3.2.2.1.1 Scenario A

The F-35A aircraft is substantially louder than the A-10 aircraft, although the precise difference in noise level depends on the specific flight configurations being used by each aircraft and the aircraft's location relative to the listener (both of which are heavily dependent on the aircraft's performance characteristics). Table WH3-9 compares A-10 and F-35A individual overflight noise levels at a representative noise-sensitive location northwest of the runway (Knob Noster Elementary School). The noise levels listed in Table WH3-9 reflect flight procedures at Whiteman AFB (e.g., pattern altitudes) and are not directly applicable to other installations. The specific types of flight departure, arrival, or closed pattern procedures listed in the table were selected because they generate the highest dB SEL of any departure, arrival, or closed pattern procedure flown by that aircraft at the location studied. The same set of Whiteman AFB-specific flight procedures used to calculate DNL noise contours was also used to calculate noise levels in Table WH3-9.

Table WH3-9. Comparison of A-10 and F-35A Noise Levels at the Knob Noster Elementary School near Whiteman AFB

Aircraft	Operation Type	Engine Power	Airspeed (knots)	Altitude (feet AGL)	Slant Distance (feet)	SEL (dB)	L_{max} (dB)
F-35A (Military Power)	Departure	100% ETR	300	2,305	3,865	102	94
F-35A (Afterburner Power)[a]		100% ETR	300	2,436	3,919	102	94
A-10[b]		100% NC	240	1,681	5,939	79	70
F-35A (Overhead Break)	Arrival	50% ETR	200	2,370	2,892	97	84
A-10[b]		85% NC	200	1,899	2,669	80	73
F-35A (VFR Low Approach)	Closed Pattern	60% ETR	190	1,787	1,747	105	94
A-10[b]		NA	NA	NA	NA	NA	NA

[a] For a detailed explanation of why F-35A afterburner departures might have lower SEL and L_{max} values than military power departures, see Chapter 3, Section 3.2.3.1. Essentially, during afterburner takeoffs, the aircraft reaches the required takeoff speed and leaves the ground sooner, and is at a slightly higher altitude throughout the flight profile. As a result, the aircraft altitude and slant distance at the location studied are both typically higher for the afterburner departure. Typically, the afterburner is turned off at approximately 10,000 feet from brake release, which occurs before the aircraft is over the location studied. The engine power (i.e., ETR) setting of the aircraft when it is above the location studied is the same for both the military power and the afterburner departure.

[b] A-10 aircraft are not equipped with afterburner and do not regularly fly closed pattern (i.e., multiple practice approach) operations at Whiteman AFB.

Notes: Noise levels presented were calculated at Knob Noster Elementary School for the departure, arrival, and closed pattern flight that has the highest SEL at this location. Actual individual overflight noise levels vary from the noise levels listed because of variations in aircraft configuration, flight track, altitude, and atmospheric conditions. Representative noise levels were calculated using NOISEMAP Version 7.3 and the same operational data (e.g., flight tracks and flight profiles) used to calculate the DNL contours.

Key: ETR = Engine Thrust Request; NC = core engine speed; NA = not applicable

AFRC F-35A pilots conducting afterburner departures would only use the afterburner for a short period of time (see Chapter 3, Figure 3-1), and then continue their climb in military power (i.e., the same power setting used throughout the departure during non-afterburner departures). During afterburner departures, the afterburner would be de-selected long before the aircraft would overfly Knob Noster Elementary School. Because afterburner and non-afterburner departures are at the same power setting as they pass near the school, overflight noise levels generated by the two types of departures are the same at this school.

As noted in Chapter 3, Section 3.2.3, computer noise modeling was conducted in compliance with current USAF and DoD-approved methods. The modeling accounted for the effects of terrain relief (e.g., hills and valleys) near Whiteman AFB as well as surface type on the propagation of sound. In accordance with standard modeling procedures, noise modeling at Whiteman AFB used median atmospheric conditions for sound propagation based on local climate records. The modeling does not reflect possible future climates in Missouri, in part because the degree to which the climate will change and the timeframe in which change would occur are not known at this time. Noise levels were calculated for an average annual day, which is a day with 1/365th of annual total operations. The computer noise model NOISEMAP references a database of field-measured sound levels for aircraft in various flight configurations. The model also uses data on flight procedures for current and proposed aircraft operations (e.g., where, how often, what time of day, and what configurations are used) based on recent inputs provided by Whiteman AFB pilots and ATC. Application of noise results generated for another airfield would be inappropriate because flight procedures, terrain, and several other factors are different at other airfields. F-35A flight parameters (e.g., altitude, airspeed, and engine power setting) that are expected to be used at Whiteman AFB were developed based on information provided by F-35A pilots at bases where the aircraft is operating currently, such as Luke, Hill, and Eglin AFBs. These flight parameters were used to generate results specific to Whiteman AFB.

Several comments received during scoping requested that the USAF provide individual predicted overflight noise levels using the SEL noise metric. Information is provided on the flight procedure with the highest SEL at several representative noise-sensitive locations in Table WH3-10. A flight procedure is a specific type of operation (e.g., afterburner departure) on a specific flight path, by a specific aircraft type. Actual flight paths vary as a result of weather, winds, aircrew technique, and other factors, and individual flights would deviate in position and noise level from those listed in Table WH3-10. In addition, the flight procedure with the highest SEL is one aspect of a complex sound environment which includes many other flight procedures (e.g., flaps or gear position) as well as other noise sources. At all of the representative noise-sensitive locations except for the Knob Noster Elementary School and the Knob Noster High School, the highest SEL would increase by 2 to 7 dB. The new procedure resulting in the highest SEL would be the arrival of an F-35A aircraft. At the Knob Noster Elementary School, the highest SEL is generated by a based B-2 departure and this would continue to be the case with implementation of the new mission. At the Knob Noster High School, the highest whole number SEL would remain the same, but a based F-35A arrival would generate a higher SEL (less than 1 dB higher) than the based B-2 closed pattern which generates the highest SEL at that location under baseline conditions.

Table WH3-10. Highest SEL at Representative Noise-Sensitive Locations near Whiteman AFB Under Baseline and AFRC F-35A Mission Conditions

Scenario	Representative Noise-Sensitive Location			Flight Procedure with the Highest SEL					SEL (dB)[a,b]
	Type	ID	Description	Aircraft Group	Aircraft	Operation Type	Annual Operations at this SEL: 7:00 A.M. to 10:00 P.M.	Annual Operations at this SEL: 10:00 P.M. to 7:00 A.M.	
Baseline	Park	P01	Knob Noster State Park campground	T	F/A-18A/C	Departure	103	3	91
Baseline	Residential	R01	Residential Area 1	B	B-2A	Closed Pattern	151	101	109
Baseline	Residential	R02	Residential Area 2	T	F/A-18A/C	Arrival	65	4	109
Baseline	Residential	R03	Residential Area 3	T	F/A-18A/C	Departure	103	3	102
Baseline	School	S01	Knob Noster Elementary School	B	B-2A	Closed Pattern	41	27	109
Baseline	School	S02	Knob Noster High School	B	B-2A	Closed Pattern	41	27	99
AFRC F-35A Mission[c]	Park	P01	Knob Noster State Park campground	B	F-35A	Closed Pattern	3,465	0	96
AFRC F-35A Mission[c]	Residential	R01	Residential Area 1	B	F-35A	Closed Pattern	1,213	0	111
AFRC F-35A Mission[c]	Residential	R02	Residential Area 2	B	F-35A	Closed Pattern	397	0	114
AFRC F-35A Mission[c]	Residential	R03	Residential Area 3	B	F-35A	Closed Pattern	588	0	109
AFRC F-35A Mission[c]	School	S01	Knob Noster Elementary School	B	B-2A	Closed Pattern	41	27	109
AFRC F-35A Mission[c]	School	S02	Knob Noster High School	B	F-35A	Arrival	1,515	148	99

[a] SELs were calculated using NOISEMAP Version 7.3 and the same operational data (e.g., flight tracks and flight profiles) used to calculate the DNL contours.
[b] SEL accounts for the maximum sound level and the length of time a sound lasts by compressing the total sound exposure for an entire event into a single second.
[c] Military power and afterburner power departure SELs at the noise-sensitive locations are within 1 dB of each other and the numbers of annual operations include all three afterburner scenarios.
Key: T = Transient or non-Whiteman AFB aircraft involved in training exercise; B = Based aircraft

Figure WH3-2 shows the DNL contours in 5-dB increments that would result from Scenario A overlain on the baseline noise contours for comparison. An additional 2,421 acres and an estimated 2,226 additional residents would be newly exposed to DNL of 65 dB or greater (Table WH3-11). As described in Chapter 3, Section 3.2.3, the affected population was estimated based on U.S. Census data at the Block Group (BG) level with adjustments to remove non-residential areas from calculations (USCB 2016b).

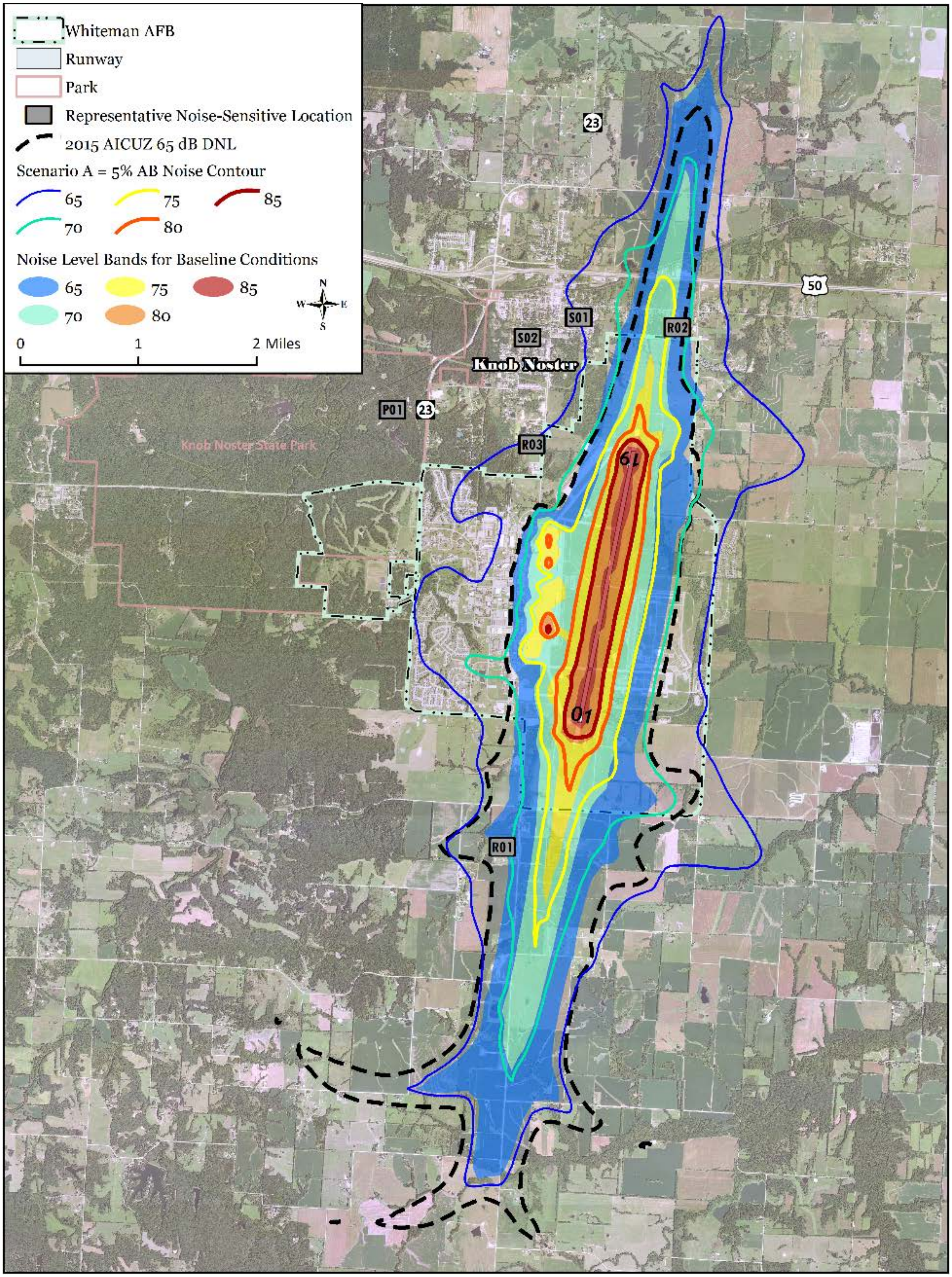

Figure WH3-2. AFRC F-35A Scenario A DNL Contours at Whiteman AFB

Table WH3-11. Off-Base Acres and Estimated Population Exposed to DNL of 65 dB or Greater from Scenario A at Whitman AFB

DNL (dB)	Acres			Estimated Population		
	Baseline	Scenario A	Change[a]	Baseline	Scenario A	Change[a]
65 – 69	1,500	3,351	1,851	462	2,353	1,891
70 – 74	537	959	422	118	449	331
75 – 79	52	200	148	0	4	4
80 – 84	0	0	0	0	0	0
≥85	0	0	0	0	0	0
Total	**2,089**	**4,510**	**2,421**	**580**	**2,806**	**2,226**

[a] Change equals the difference between baseline acreage and acres exposed to noise resulting from the AFRC F-35A mission.

As noted in Chapter 3, Section 3.2.3, the probability that an individual will become annoyed by noise is impossible to predict with confidence because of differing physical and emotional variables between individuals (Newman and Beattie 1985). These variables include, but are not limited to, the person's feeling about the necessity or preventability of the noise, the person's attitude about the environment, and any feelings of fear the person might have about the noise source. It can be said with confidence that people in communities exposed to increased DNL would be more likely to become highly annoyed by the noise (Schultz 1978, Finegold et al. 1994, Meidema and Vos 1998). Studies conducted by Schultz in 1978 and Finegold et al. in 1994 indicated that approximately 12 percent of people exposed to DNL of 65 dB and 36 percent of people exposed to DNL of 75 dB could be expected to be highly annoyed by the noise (Schultz 1978, Finegold et al. 1994). More recent studies suggest that the percentage of people highly annoyed by noise–and aircraft noise in particular–might be higher than previously thought. A study conducted by Meidema and Vos in 1998 indicated that 28 percent of people could be expected to be annoyed by DNL of 65 dB, and 48 percent of people could be expected to be highly annoyed by DNL of 75 dB (Meidema and Vos 1998). Additional details on the prevalence of annoyance in high noise communities are contained in Volume II, Appendix B.

USAF land use compatibility guidelines classify residential land uses as incompatible with DNL of 65 to 69 dB unless the structure provides at least 25 dB noise level reduction. Residences are considered incompatible with DNL of 70 to 74 dB unless the structure provides at least 30 dB noise level reduction. Structural elements with better-than-average temperature insulation properties (e.g., double-paned windows) tend to also provide better-than-average noise level reduction. At DNL greater than 75 dB, residential land uses are always considered to be incompatible. A more detailed discussion of land use compatibility is contained in Section WH3.8.

The DNL changes that would result from the proposed new mission are shown in Table WH3-11. Noise levels resulting from the new mission at non-residential locations listed (e.g., schools) are similar to noise levels in any nearby residential areas. Increases in DNL at the locations studied would range from 4 to 9 dB. The DNL at Residential Area 3 and Knob Noster Elementary School would increase from less than 65 dB to 65 dB or greater and both would become incompatible land uses due to this level of noise. The DNL at Residential Area 1 would remain between 65 and 69 dB. The DNL at Residential Area 2 would increase from 65 to 69 dB to 70 to 74 dB.

Table WH3-12. DNL at Representative Noise-Sensitive Locations near Whiteman AFB Under Baseline and Scenario A Conditions

Type	ID	Description	DNL (dB)		
			Baseline	Scenario A	Change
Park	P01	Knob Noster State Park campground	48	54	6
Residential	R01	Residential Area 1	65	69	4
	R02	Residential Area 2	68	73	5
	R03	Residential Area 3	57	66	9
School	S01	Knob Noster Elementary School	61	65	4
	S02	Knob Noster High School	55	62	7

WH3.2.2.1.2 Scenario B

Under Scenario B, 50 percent of F-35A departures would use afterburner power, whereas 5 percent of F-35A departures would use afterburner power under Scenario A. All other aspects of the F-35A mission would be the same under Scenario B as Scenario A. There would be no difference in the highest SELs experienced at noise-sensitive locations under Scenario B relative to those listed for Scenario A in Table WH3-10. Military power and afterburner power departure SELs at the noise-sensitive locations are within 1 dB of each other, and the numbers of annual operations in Table WH3-10 include all three afterburner scenarios.

As discussed in Section WH3.2.2.1.1, people exposed to increases in DNL are more likely to become highly annoyed by the noise, and some land uses are not considered compatible at DNL greater than 65 dB. The Scenario B 65 dB DNL contour is slightly larger than the Scenario A 65 dB DNL contour in areas to the right and left of the runway but slightly smaller in areas farther out along departure flight paths (Figure WH3-3). The DNL contours are shown in 5-dB intervals ranging from 65 to 85 dB on Figure B-29 in Appendix B, Section B.4. There would be 2,517 acres and an estimated 2,507 people newly exposed to DNL greater than 65 dB under Scenario B (Table WH3-13).

Table WH3-13. Off-Base Acres and Estimated Population Exposed to DNL of 65 dB or Greater from Scenario B at Whiteman AFB

DNL (dB)	Acres			Estimated Population		
	Baseline	Scenario B	Change[a]	Baseline	Scenario B	Change[a]
65 – 69	1,500	3,445	1,945	462	2,639	2,177
70 – 74	537	964	427	118	444	326
75 – 79	52	197	145	0	4	4
80 – 84	0	0	0	0	0	0
≥85	0	0	0	0	0	0
Total	**2,089**	**4,606**	**2,517**	**580**	**3,087**	**2,507**

[a] Change equals the difference between baseline acreage and acres exposed to noise resulting from the AFRC F-35A mission.

The DNL at representative noise-sensitive locations under Scenario B would be the same as under Scenario A (see Table WH3-12) except at Knob Noster Park, where DNL would be 55 dB rather than 54 dB.

WH3.2.2.1.3 Scenario C

Under Scenario C, 95 percent of F-35A departures would use afterburner power, but all other aspects of the AFRC F-35A mission would be identical to Scenarios A and B. The highest SELs experienced at noise-sensitive locations would be the same under Scenario C as under Scenario A (see Table WH3-10).

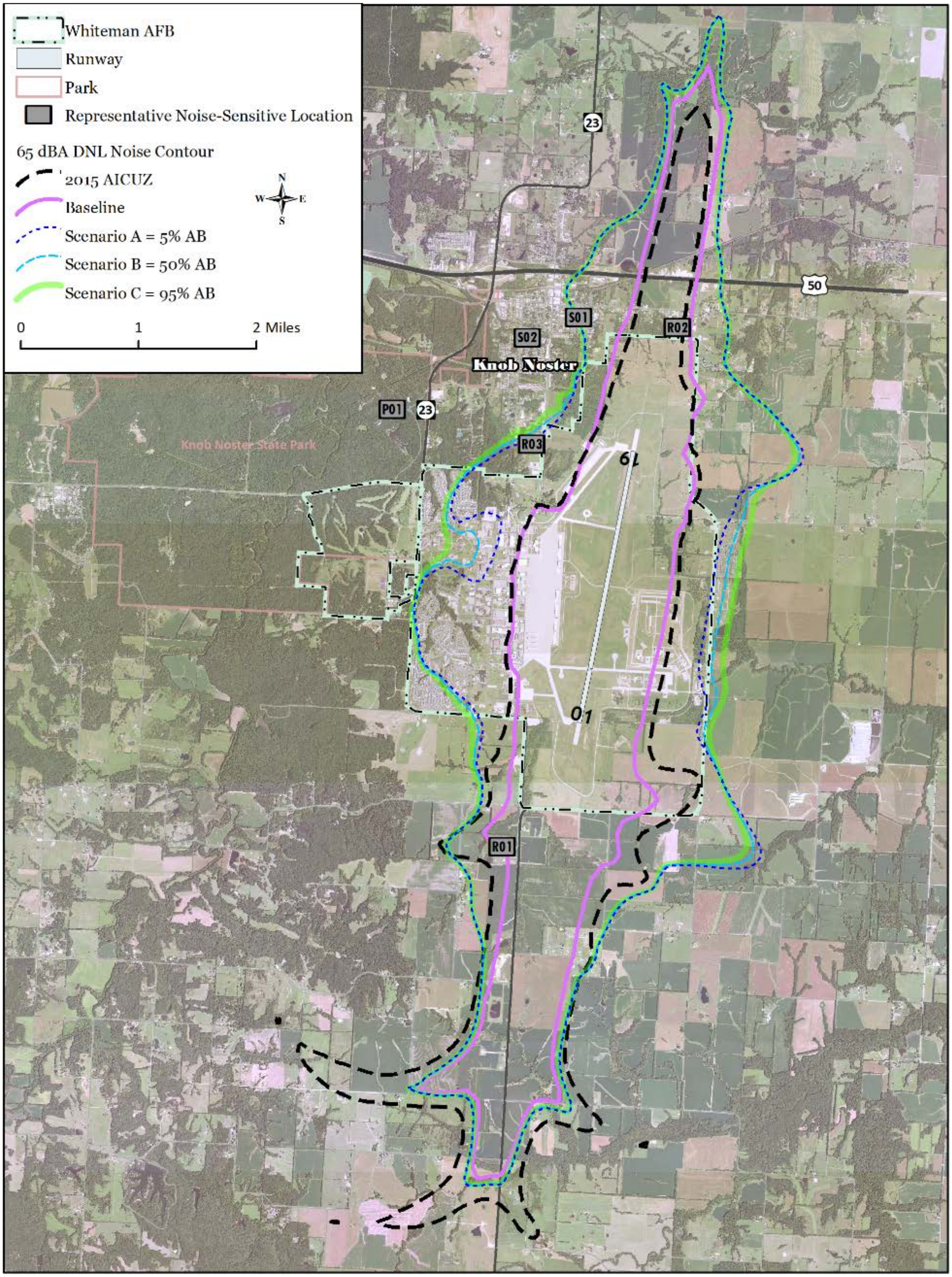

Figure WH3-3. AFRC F-35A Mission 65 dB DNL Contours (Scenarios A, B, and C) at Whiteman AFB

As discussed in Section WH3.2.2.1.1, people exposed to increases in DNL are more likely to become highly annoyed by the noise, and some land uses are not considered compatible at DNL greater than 65 dB. In areas to the right and left of the runway, the Scenario C 65 dB DNL contour is slightly larger than the Scenario A or B contours, but the Scenario C 65 dB DNL contour is slightly smaller than the Scenario A or B 65 dB DNL contour farther out along departure flight paths (see Figure WH3-3). The DNL contours are shown in 5-dB intervals ranging from 65 to 85 dB on Figure B-30 in Appendix B, Section B.4. There would be 2,620 acres and an estimated 2,804 people newly exposed to DNL greater than 65 dB under Scenario C (Table WH3-14).

Table WH3-14. Off-Base Acres and Estimated Population Exposed to DNL of 65 dB or Greater from Scenario C at Whiteman AFB

DNL (dB)	Acres			Estimated Population		
	Baseline	Scenario C	Change[a]	Baseline	Scenario C	Change[a]
65 – 69	1,500	3,547	2,047	462	2,942	2,480
70 – 74	537	968	431	118	438	320
75 – 79	52	194	142	0	4	4
80 – 84	0	0	0	0	0	0
≥85	0	0	0	0	0	0
Total	**2,089**	**4,709**	**2,620**	**580**	**3,384**	**2,804**

[a] Change equals the difference between baseline acreage and acres exposed to noise resulting from the AFRC F-35A mission.

The DNL at representative noise-sensitive locations under Scenario C would be the same as under Scenario A (see Table WH3-12) except at Knob Noster Park, where DNL would be 55 dB rather than 54 dB, and at Residential Area 3, where DNL would be 67 dB rather than 66 dB.

WH3.2.2.2 Speech Interference

WH3.2.2.2.1 Scenario A

The number of daytime (7:00 A.M. to 10:00 P.M.) events per hour that could potentially interfere with speech are listed in Table WH3-15. Any aircraft noise event exceeding 50 dB L_{max} was assumed to have some potential to interfere with speech. The interference would be for a few seconds for each overflight. Noise levels at the locations listed are similar to noise levels in nearby residential areas. The number of indoor events per hour with windows open, indoor events with windows closed, and outdoor events would increase by two or less. Any increases in the frequency of disruptions in communication have a high likelihood of being annoying.

Table WH3-15. Potential Speech Interference Resulting from Scenario A at Whiteman AFB

Type	ID	Description	Annual Average Daily Daytime (7:00 A.M. to 10:00 P.M.) Events per Hour					
			Scenario A			Change		
			Windows Open[a]	Windows Closed[a]	Outdoor	Windows Open[a]	Windows Closed[a]	Outdoor
Park	P01	Knob Noster State Park campground	3	1	4	2	1	1
Residential	R01	Residential Area 1	4	3	5	1	1	2
	R02	Residential Area 2	4	3	5	1	0	1
	R03	Residential Area 3	4	3	5	1	1	1

[a] Number of events per average hour with an indoor L_{max} of at least 50 dB; assumes standard values of 15 dB and 25 dB noise level reductions for windows open and closed, respectively.

WH3.2.2.2.2 Scenario B

The number of potential speech interference events under Scenario B would be the same as under Scenario A (see Table WH3-15) except that Residential Area 2 would experience four rather than three potential speech interference events per hour with windows closed.

WH3.2.2.2.3 Scenario C

Under Scenario C, the number of potential speech interference events would be the same as under Scenario B. The number of speech interference events would differ from Scenario A (see Table WH3-15) only in that Residential Area 2 would experience four rather than three events per hour with windows closed.

WH3.2.2.3 Interference with Classroom Learning

WH3.2.2.3.1 Scenario A

Table WH3-16 presents changes in classroom noise levels with windows open and closed. As described in Section WH3.2.1.3, both the Knob Noster Elementary School and the Knob Noster High School with windows open are currently exposed to $L_{eq(SD)}$ greater than 40 dB. In accordance with DNWG recommendations, estimated interior $L_{eq(SD)}$ exceeding 40 dB was taken as an indication that ANSI criteria are being exceeded (DNWG 2013). Under the proposed action, both schools would continue to be exposed to $L_{eq(SD)}$ greater than 40 dB when windows are open and the Knob Noster Elementary School would be exposed to $L_{eq(SD)}$ greater than 40 dB while windows are closed. Indoor background noise levels at Knob Noster High School would remain below 40 dB $L_{eq(SD)}$. The average number of events per hour that would exceed 50 dB would increase by one indoors with windows open, indoors with windows closed, and outdoors.

Table WH3-16. Indoor Classroom Learning Disruption Resulting from Scenario A at Whiteman AFB

ID	Description	Scenario A					Change				
		Windows Open[a]		Windows Closed[a]		Outdoor	Windows Open[a]		Windows Closed[a]		Outdoor
		$L_{eq(SD)}$ (dB)	Events per Hour[b]	$L_{eq(SD)}$ (dB)	Events per Hour[b]	Events per Hour[c]	$L_{eq(SD)}$ (dB)	Events per Hour[b]	$L_{eq(SD)}$ (dB)	Events per Hour[b]	Events per Hour[c]
S01	Knob Noster Elementary School	51	3	41	2	5	8	1	6	1	1
S02	Knob Noster High School	47	3	37	2	5	7	1	2	1	1

[a] Assumes standard values of 15 dB and 25 dB noise level reduction for windows open and closed, respectively.
[b] Average number of events per hour at or above an indoor L_{max} of 50 dB during an average 8-hour school day (8:00 A.M. to 4:00 P.M.).
[c] Average number of events per hour at or above an outdoor L_{max} of 50 dB during daytime (7:00 A.M. to 10:00 P.M.).

WH3.2.2.3.2 Scenario B

Under Scenario B, the $L_{eq(SD)}$ at Knob Noster High School would increase to 48 dB with windows open and to 38 dB with windows closed (Table WH3-17). The $L_{eq(SD)}$ at Knob Noster Elementary School would be the same as under Scenario A with windows open or closed and the number of events with potential to interfere with speech would be the same under Scenario B as under Scenario A at both schools with windows open or closed.

Table WH3-17. Indoor Classroom Learning Disruption Resulting from Scenario B at Whiteman AFB

ID	Description	Scenario B					Change				
		Windows Open[a]		Windows Closed[a]		Outdoor	Windows Open[a]		Windows Closed[a]		Outdoor
		$L_{eq(SD)}$ (dB)	Events per Hour[b]	$L_{eq(SD)}$ (dB)	Events per Hour[b]	Events per Hour[c]	$L_{eq(SD)}$ (dB)	Events per Hour[b]	$L_{eq(SD)}$ (dB)	Events per Hour[b]	Events per Hour[c]
S01	Knob Noster Elementary School	51	3	41	2	5	8	1	6	1	1
S02	Knob Noster High School	48	3	38	2	5	8	1	3	1	1

[a] Assumes standard values of 15 dB and 25 dB noise level reduction for windows open and closed, respectively.
[b] Average number of events per hour at or above an indoor L_{max} of 50 dB during an average 8-hour school day (8:00 A.M. to 4:00 P.M.).
[c] Average number of events per hour at or above an outdoor L_{max} of 50 dB during daytime (7:00 A.M. to 10:00 P.M.).

WH3.2.2.3.3 Scenario C

Under Scenario C, $L_{eq(SD)}$ and potential speech interference would be the same as under Scenario B (see Table WH3-17) except that the number of events per hour at Knob Noster High School with the potential to interfere with speech would be three rather than two.

WH3.2.2.4 Sleep Disturbance

As noted in Chapter 3, Section 3.2.3, the probability of sleep being disturbed at least once per night is estimated based on the number of overflight events and the SEL of each event. Although AFRC F-35A pilots would continue to conduct only initial approaches between 10:00 P.M. and 7:00 A.M., the noise level generated by the approaches would be higher and the number of sorties would increase. The probability of awakening would increase by 2 percent or less at the locations studied - and in any residential areas near the locations studied (Table WH3-18). Impacts to sleep disturbance resulting from implementation of the AFRC F-35A mission would be the same regardless of which afterburner scenario is selected. Results apply only to people who sleep during the night. People who sleep during the day would experience additional noise events, resulting in higher probabilities of awakening.

Table WH3-18. Average Probability of Awakening Resulting from the AFRC F-35A Mission at Whiteman AFB

Type	ID	Description	Annual Average Nightly (10:00 P.M. to 7:00 A.M.) Probability of Awakening (%)			
			AFRC F-35A Mission		Change	
			Windows Open[a]	Windows Closed[a]	Windows Open[a]	Windows Closed[a]
Park	P01	Knob Noster State Park campground	4	2	2	1
Residential	R01	Residential Area 1	8	5	1	1
	R02	Residential Area 2	11	7	2	1
	R03	Residential Area 3	6	3	1	1
School	S01	Knob Noster Elementary School	7	3	2	1
	S02	Knob Noster High School	6	3	1	1

[a] Assumes standard values of 15 dB and 25 dB noise level reductions for windows open and closed, respectively.

WH3.2.2.5 Potential for Hearing Loss

Implementation of the AFRC-F-35A mission (with any of the three afterburner scenarios selected) would not expose any on-base or off-base residences to DNL greater than 80 dB. Therefore, PHL would not result from implementation of the AFRC F-35A mission.

WH3.2.2.6 Occupational Noise

USAF occupational noise exposure prevention procedures (e.g., hearing protection and monitoring) would be implemented under the AFRC F-35A mission, regardless of which afterburner scenario is selected. These procedures would comply with all applicable OSHA and USAF occupational noise exposure regulations.

WH3.2.2.7 Non-auditory Health Impacts

As noted in Section DM3.2.1.7, the current state of scientific knowledge does not yet support a consistent causal relationship between exposure to aircraft noise and non-auditory health impacts (i.e., impacts other than hearing loss). Several types of potential health impacts have been investigated in multiple studies with contradictory results (Meecham and Shaw 1979; Frerichs et al. 1980; Jones and Tauscher 1978; Edmonds et al. 1979). The premise of the studies is that annoyance causes stress, and prolonged stress is known to be a contributor to a number of health disorders. The connection from annoyance to stress to health issues requires careful experimental design, and the resulting data are subject to different interpretations. A recent, large-scale study indicated that nighttime aircraft noise could be linked to increases in the likelihood of hypertension (Jarup et al. 2005, 2008). However, extensive reviews of recent literature conducted by several groups support the conclusion that it is not yet possible to establish a quantitative cause and effect based on the currently available scientific evidence (Basner et al. 2017; FICAN 2018; van Kempen et al. 2018).

WH3.2.2.8 Structural Damage

Damage to structures is not anticipated to result from AFRC F-35A subsonic noise because noise resulting from implementation of the AFRC F-35A mission would not exceed 130 dB in any 1/3-octave frequency band at distances of greater than 250 feet (CHABA 1977).

Furthermore, studies conducted on vibrations induced by subsonic aircraft overflights generating noise levels similar to those that result from operation of the F-35A in ancient Anasazi ruins indicate that vibrations would not occur at or near potentially damaging levels (Battis 1983). Additional discussion of the effects of noise on cultural resources is contained in Section WH3.7. Noise-induced structural vibration and secondary vibrations (i.e., “rattle”) of objects in structures would continue to occur. Induced vibrations do not normally result in structural damage, but the rattling of objects does have the potential to contribute to annoyance. Although the risk posed to structures by noise would be minimal, a process exists for dealing with any such damage. Any claims from USAF-related damage would begin by contacting the Whiteman AFB Public Affairs Office with details of the claim. The USAF would then investigate the claim to establish the exact nature and extent of the damage.

WH3.2.2.9 Animals in the Care of Humans

The reactions of animals in the care of humans (e.g., pets, other domesticated animals, and animals kept in zoos) to an increased number of loud overflight events was a concern raised in several scoping comments. An animal’s reaction to noise depends on several factors including the animal’s temperament, training, and past experiences associated with the noise. Certain domesticated animal species (e.g., horses) are more likely to have strong reactions to noise than others. Potential noise impacts on wildlife are discussed in Section WH3.6.

In the airfield environment, aircraft typically operate at slower speeds than are used in training airspace. Although these slower speeds mean that elevated overflight sound levels last longer, they also mean that there is a time lag between when the aircraft is first heard and maximum overflight noise level. Sounds with slow rise-times are less likely to induce panic than sudden onset noise (USAF 1994). Because F-35 and A-10 aircraft operate at similar speeds in the airfield environment, the rise times of noise generated by the two aircraft are similar.

One of the most important factors affecting an animal's reaction to noise is the level of familiarity with the noise source. As described in Section WH2.0, the replacement of A-10 aircraft with F-35A aircraft would occur over approximately 2 years, and the tempo of F-35A operations would increase slowly as the new airframe gets established at the base. Around the base, AFRC F-35A pilots would use similar flight paths and altitudes to those currently used by A-10 pilots. For the purposes of this analysis, all noise impacts show the full impact of 24 aircraft. Because the reactions of domestic animals depends on several factors (e.g., species, situation, predisposition) there is no single noise level below which behavioral reactions would never occur. However, if it is assumed that noise events with the potential to interfere with human conversation could also be bothersome to animals, then the number of noise events per hour with potential to interfere with speech (Table WH3-15) could be an indicator of how frequently animals could be bothered by noise. It is recognized that this metric of noise events per hour with potential to interfere with speech is an arbitrary metric for determining how frequently animals would be bothered by noise. The metric is used purely as a measure of relative change between the No Action Alternative and proposed action.

WH3.2.3 Airspace Affected Environment

This section presents noise levels in training airspace and ranges that would be used by AFRC F-35A pilots. As described in Section WH2.4.1, Whiteman AFB-based AFRC F-35A pilots would operate in existing MOAs, RAs, and ATCAAs performing combat training missions similar to those currently conducted by Whiteman AFB-based A-10 pilots currently. Because no supersonic-authorized airspace is available, AFRC F-35A pilots would not conduct supersonic training within the ROI. As noted in Chapter 3, Section 3.2.1.1, subsonic noise in training airspace is quantified using the onset-rate adjusted day-night average sound level (L_{dnmr}). The location, types and number of munitions used during AFRC F-35A training would be similar to that used during A-10 training. Therefore, munitions noise levels would remain approximately the same as under baseline conditions.

WH3.2.3.1 Subsonic Noise

Figure WH3-4 shows baseline subsonic noise levels beneath airspace proposed for use by AFRC F-35A pilots from Whiteman AFB. In the Smoky Low and High MOAs and R-3601, the noise levels are 48 and 53 dB L_{dnmr}, respectively. Noise levels beneath all of the other MOAs and RAs are below 45 dB L_{dnmr}.

WH3.2.3.2 Supersonic Noise

None of the airspace in the ROI is approved for supersonic flight. Therefore, sonic booms do not occur in the ROI under normal circumstances.

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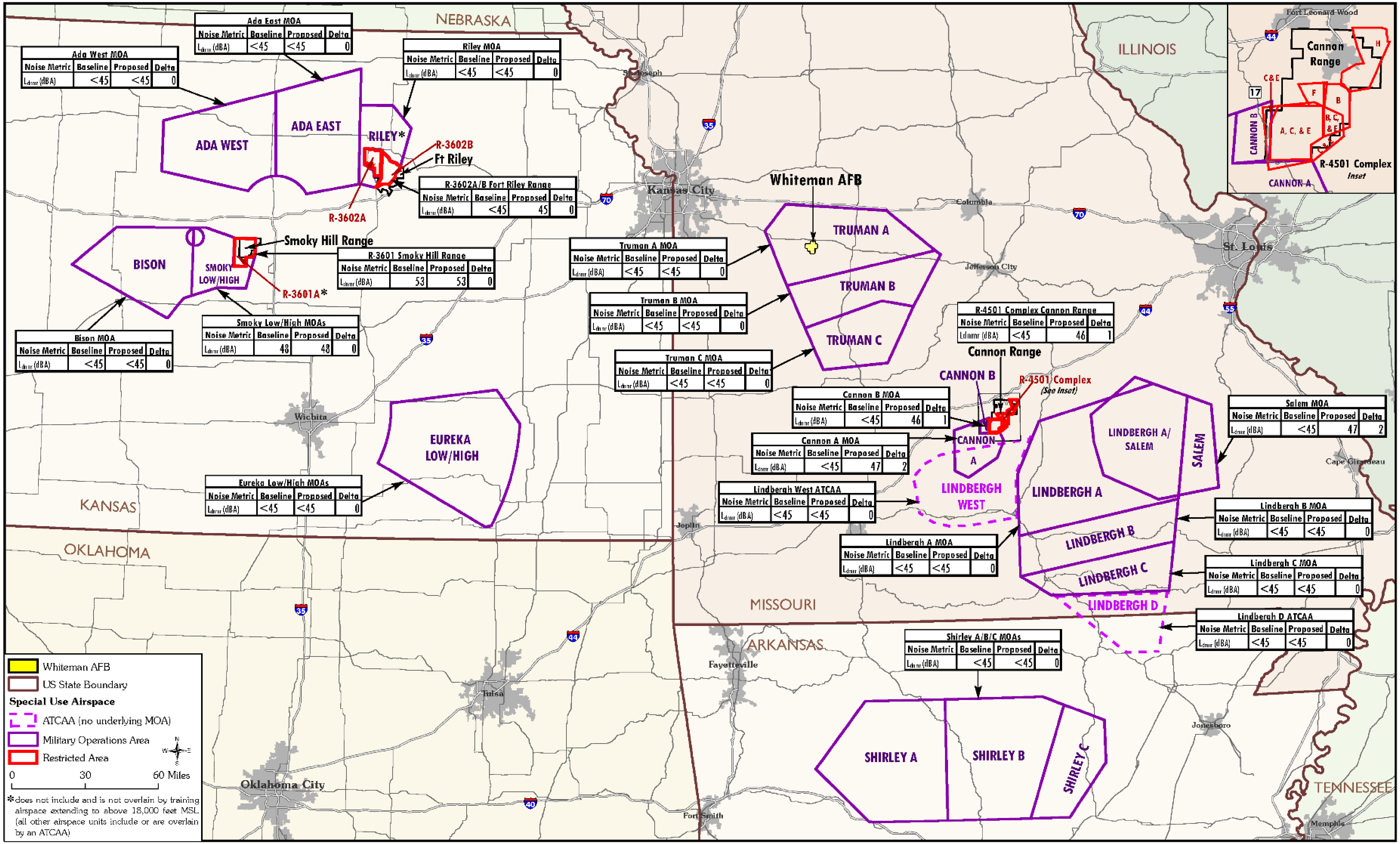

Figure WH3-4. Noise Levels in Training Airspace used by Whiteman AFB Pilots

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WH3.2.4 Airspace Environmental Consequences

WH3.2.4.1 Subsonic Noise

Changes in sortie tempo under the proposed action are discussed in Chapter 2, Section 2.3.4.1, and Section WH2.4.1. Late-night training (10:00 P.M. to 7:00 A.M.) by AFRC F-35A pilots would only be conducted in rare contingencies and as part of special mission training. Individual overflight noise levels (SEL) generated by A-10 and F-35A aircraft are listed in Chapter 3, Table 3-4. The proposed AFRC F-35A training sorties would occur in several large training airspace areas. Because training operations would be spread over a very large area, overflights of any particular location would be infrequent. As shown in Table WH2-6, approximately 94 percent of F-35A training time is spent at altitudes above 10,000 feet MSL. Because training would occur across a very large area, and because most of the training would be at high altitudes, the loudest of the overflights (i.e., overhead at low altitudes) would be rare. The L_{dnmr} in the Ada, Bison, Eureka, Lindbergh, Riley, Shirley, and Truman MOAs would remain below 45 dB because the number of training sorties is low relative to the size of the training airspace. The Smoky MOAs and R-3601 are currently used for 6,067 sorties annually, and in this context the addition of 313 F-35A sorties would not increase L_{dnmr} by more than 1 dB. In the Cannon and Salem MOAs and in R-4501, the number of sorties would increase by as much as 54 percent, and L_{dnmr} would increase by up to 2 dB. Overflight noise events have the potential to interfere with activities. An increase in the number of loud events, as reflected in increased L_{dnmr}, would be expected to increase the percentage of the population that is highly annoyed by noise.

During scoping, several comments expressed concerns about overflight noise while the aircraft are transiting from the airfield to and from the airspace proposed for use. Pilots transiting from the installation to training airspace and back again typically use a set of existing prescribed routes. Actual ground tracks of transiting aircraft vary based on several factors, and non-standard routing may be used, as needed, in response to air traffic, weather, or other time-varying conditions. AFRC F-35A pilots would typically transit at high altitudes and in cruise configuration using lowered engine power settings to reduce noise impacts and improve fuel efficiency. In addition, flight at these altitudes allows the aircraft to arrive at the training airspace at an appropriate altitude to begin training. Single overflight event noise levels generated by F-35A aircraft in cruise configuration are listed in Chapter 3, Tables 3-3 and 3-4.

Although AFRC F-35A pilots would implement measures to reduce noise, the noise generated by transiting aircraft can be disturbing, particularly when overflight noise affects national parks and other noise-sensitive places where ambient noise levels are low. Detailed discussion of recreation impacts is contained in Section WH3.8.

WH3.2.4.2 Supersonic Noise

No supersonic-authorized airspace is located in the ROI. Therefore, no supersonic training or sonic booms would occur in the ROI with implementation of the proposed action.

WH3.2.5 Summary of Noise Impacts

Implementation of the AFRC F-35A mission would expose an additional 2,421 acres, 2,517 acres, and 2,620 acres of land to DNL of 65 dB or greater, respectively, under Scenarios A, B, and C. The estimated additional people exposed to DNL of 65 dB or greater would be 2,226 under Scenario A, 2,507 under Scenario B, and 2,804 under Scenario C. The DNL at Knob Noster Elementary School would increase from less than 65 dB to 65 dB under all three scenarios, and would become an incompatible land use due to this level of noise unless special measures are taken to reduce interior noise levels. DNL would increase from 4 dB to 9 dB at the representative noise-sensitive locations around Whiteman AFB. DNL at 4 of the 6 representative noise-sensitive locations would increase to or exceed 65 dB under all three afterburner scenarios. Under Scenario A and B, both schools identified for evaluation in the EIS would experience an increase of one indoor event per hour causing speech interference (windows open and closed). Under Scenario C, Knob Noster High School would experience an additional two events per hour with windows closed that have the potential to interfere with speech.

Regarding noise under the airspace proposed for use, L_{dnmr} in the Ada, Bison, Eureka, Lindbergh, Riley, Shirley, and Truman MOAs would remain below 45 dB because the number of training sorties is low compared to the size of the training airspace. The Smoky MOAs and R-3601 are currently used for 6,067 sorties annually, and in this context the addition of 313 F-35A sorties would not increase L_{dnmr} by 1 dB. In the Cannon and Salem MOAs and in R-4501, the number of operations would increase by as much as 54 percent, and L_{dnmr} would increase by up to 2 dB. Overflight noise events have the potential to interfere with activities. An increase in the number of loud events, as reflected in increased L_{dnmr}, would be expected to increase the percentage of the population that is highly annoyed by noise. No supersonic-authorized airspace is located in the airspace proposed for use. Therefore, no supersonic training or sonic booms would occur.

Based on context and intensity, noise impacts to the area surrounding Whiteman AFB resulting from implementation of the proposed AFRC F-35A mission would be considered significant.

WH3.3 AIR QUALITY

The proposed AFRC F-35A mission at Whiteman AFB would result in net changes in air emissions due to the replacement of existing aircraft operations with operations from the proposed mission in the base region and associated airspace. The following section describes the air quality affected environment and estimations of impacts due to proposed construction and operational activities within these project regions.

WH3.3.1 Base Affected Environment

Air emissions resulting from implementation of the proposed AFRC F-35A mission at Whiteman AFB would primarily affect air quality within Johnson County and to lesser extent, Pettis County to the east. The MDNR has adopted standards that are the same as the National Ambient Air Quality Standards (NAAQS) for purposes of regulating criteria air pollutant levels within Missouri. Table 3-6 in Chapter 3, Section 3.3, of this EIS presents the NAAQS.

WH3.3.1.1 Region of Influence and Existing Air Quality

Identifying the ROI for air quality requires knowledge of the pollutant type, source emission rates, the proximity of project emission sources to other emission sources, and local and regional meteorology. For inert pollutants (such as carbon monoxide [CO] and particulates in the form of dust), the ROI is generally limited to a few miles downwind from a source. The ROI for reactive pollutants such as ozone (O_3) can extend much farther downwind than for inert pollutants. Ozone is formed in the atmosphere by photochemical reactions of previously emitted pollutants called precursors. Ozone precursors are mainly nitrogen oxides (NO_x) and photochemically reactive volatile organic compounds (VOCs). In the presence of solar radiation, the maximum effect of precursor emissions on O_3 levels usually occurs several hours after they are emitted and many miles from their source.

The USEPA designates all areas of the United States in terms of having air quality better (attainment) or worse (nonattainment) than the NAAQS. An area is in attainment of a NAAQS if its pollutant concentration remains below the standard value, as defined by the annual to tri-annual metrics described in Chapter 3, Section 3.3.1. Former nonattainment areas that have attained a NAAQS are designated as maintenance areas. Currently, Johnson County is in attainment of the NAAQS for all pollutants (USEPA 2018a).

WH3.3.1.2 Regional Air Emissions

Table WH3-19 summarizes estimates of annual emissions generated by activities in Johnson County for the year 2014. Emissions for Johnson County were obtained from the National Emissions Inventory (NEI) process (USEPA 2018b). The majority of emissions within this region occur from (1) on-road and nonroad mobile sources (VOCs, CO, NO_x, and carbon dioxide equivalent [CO_2e), (2) prescribed fires (CO and sulfur oxides [SO_x]), (3) solvent/surface coating usages (VOCs), and (4) fugitive dust from unpaved roads and agricultural activities (particulate matter less than or equal to 10 micrometers in diameter [PM_{10}]/particulate matter less than or equal to 2.5 micrometers in diameter [$PM_{2.5}$]).

Table WH3-19. Annual Emissions for Johnson County, Missouri, 2014

Source Type	Air Pollutant Emissions (tons per year)						
	VOCs	**CO**	**NO_X**	**SO_X**	**PM_{10}**	**$PM_{2.5}$**	**CO_2e (mt)**
Stationary Sources	1,162	3,166	164	27	16,477	2,280	NA
Mobile Sources	792	7,655	1,633	6	101	74	224,743
Total Emissions[a]	**1,954**	**10,821**	**1,797**	**34**	**16,578**	**2,354**	**224,743**

[a] Calculated values and totals have been rounded; therefore, sum totals may not match the totals row.
Key: CO_2e (mt) = carbon dioxide equivalent in metric tons; NA = not available
Source: USEPA 2018b

WH3.3.1.3 Whiteman AFB Emissions

The AFRC F-35A mission at Whiteman AFB would replace activities associated with the 442 FW. This unit operates 24 A-10 aircraft at Whiteman AFB. The proposed AFRC F-35A aircraft replacement action at Whiteman AFB would primarily affect existing emissions from (1) A-10 operations, (2) A-10 engine maintenance and testing, and (3) Aerospace Ground Equipment (AGE). While the addition of 11 personnel that would result from implementation of the AFRC F-35A mission at Whiteman AFB would result in virtually inconsequential changes in emissions from other base sources associated with the 442 FW (e.g., onsite government motor vehicles or privately-owned vehicles), those changes have been calculated as part of the build-out emission calculations for the action. Nonetheless, the main focus of the project air quality analysis remains emissions from existing and proposed aircraft-specific source categories to determine the net changes in emissions from the AFRC F-35A mission.

To estimate emissions from A-10 aircraft operations and AGE usages associated with the 442 FW mission at Whiteman AFB, the analysis employed the USAF Air Conformity Applicability Model (ACAM) version 5.0.13a (Solutio Environmental, Inc. 2019). Table WH3-20 summarizes the annual emissions estimated for the existing A-10 operations of the 442 FW. Volume II, Appendix C, presents details of the emission calculations presented in Table WH3-20. The net emissions change from the increase of 11 personnel (e.g., emissions from government and privately owned vehicle miles traveled by those 11 personnel) were included as part of the build-out emission calculations for the action.

Table WH3-20. Annual Emissions of Existing 442 FW A-10 Operations at Whiteman AFB

Activity Type	Air Pollutant Emissions (tons per year)						
	VOCs	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$	CO_2e (mt)
Flight Operations and Engine Trim Tests – A-10s	1.59	44.14	3.21	1.14	7.36	3.53	3,167
Aircraft Engine Test Cells – A-10	0.02	0.54	0.18	0.03	0.16	0.09	90
Aerospace Ground Equipment	27.25	37.95	57.86	2.83	7.38	7.15	1,860
Total Emissions[a]	**28.86**	**82.63**	**61.26**	**4.01**	**14.90**	**10.76**	**5,117**

[a] Calculated values and totals have been rounded; therefore, sum totals may not match the totals row.
Key: CO_2e (mt) = carbon dioxide equivalent in metric tons

WH3.3.1.4 Regional Climate

Meteorological data collected at Sedalia and Concordia, approximately 17 miles east and 17 miles north, respectively, of Whiteman AFB, are used to describe the climate of the Whiteman AFB project region (Midwestern Region Climate Center 2018).

Temperature. Johnson County is known for warm summer months and cool conditions during the winter. The average high and low temperatures during the summer months at Whiteman AFB range from about 87 to 55 degrees Fahrenheit (°F). The average high and low temperatures during the winter months range from 54 to 19 °F.

Precipitation. Average annual precipitation for Whiteman AFB is 44.3 inches. Annual precipitation in the region peaks in the last spring. The peak monthly average rainfall of 5.6 inches occurs in June. Winter is the driest season, as the lowest monthly average of 1.6 inches occurs in January. The region averages 15 inches of snow per year.

Prevailing Winds. Wind data collected in the Kansas City area, about 55 miles west-northwest of Whiteman AFB, are used to describe the wind climate of the Whiteman AFB project region (National Climatic Data Center 1998). The annual average wind speed at Whiteman AFB is 11 miles per hour. March and April are the windiest months of the year and have monthly average speeds of 12 miles per hour. The winds prevail from the south for most of the year, expect in January and February, when they prevail from the south-southwest.

WH3.3.1.5 Applicable Regulations and Standards

The MDNR Air Pollution Control Program is responsible for enforcing air pollution regulations in Missouri. The Air Pollution Control Program enforces the NAAQS by monitoring air quality, developing rules to regulate and to permit stationary sources of air emissions, and overseeing air quality attainment planning processes. The air quality regulations for the State of Missouri are found in Title XL, Chapter 643 (Air Conservation) of the State of Missouri Revisor of Statutes and Title 10, Division 10 (Air Conservation Commission) of the Missouri *Code of State Regulations (CSR).*

WH3.3.2 Base Environmental Consequences

The air quality analysis estimated the magnitude of emissions that would result from construction and operation of the proposed AFRC F-35A mission at Whiteman AFB. The estimation of operational impacts is based on the net change in emissions due to the replacement of existing A-10 aircraft operations with those of the proposed AFRC F-35A mission. Volume II, Appendix C, of this EIS presents the calculations used to estimate air pollutant emissions from proposed construction and operational sources at Whiteman AFB.

The air quality analysis for the AFRC mission at Whiteman AFB evaluates F-35A takeoff operations based on the three afterburner scenarios. Activity levels and resulting emissions for all other proposed operational activities would remain the same under each afterburner scenario.

The immediate area surrounding Whiteman AFB within Johnson and Pettis Counties currently attains all of the NAAQS. Therefore, the analysis compares the annual net change in emissions to the 250 tons per year prevention of significant deterioration permitting threshold. The prevention of significant deterioration permitting threshold represents the level of potential new emissions below which a new or existing minor, non-listed, stationary source may acceptably emit without triggering the requirement to obtain a permit. Thus, if the intensity of any net emissions increase for a project alternative is below 250 tons per year in the context of an attainment criteria pollutant, the indication is the air quality impacts would be insignificant for that pollutant.

WH3.3.2.1 Construction

The AFRC F-35A mission at Whiteman AFB would require C&D and/or renovation of airfield facilities such as training facilities, airfield surfaces, and maintenance facilities. Air quality impacts resulting from the proposed construction activities would occur from (1) combustive emissions due to the use of fossil fuel-powered equipment and (2) fugitive dust emissions (PM_{10}/$PM_{2.5}$) from the operation of equipment on exposed soil.

Construction activity data were developed to estimate construction equipment usages and areas of disturbed ground due to the proposed mission. These data were used as inputs to ACAM, which was used to estimate air emissions from proposed construction activities at Whiteman AFB. The air quality analysis assumed that all construction activities for the proposed AFRC F-35A mission would begin in 2021 and be completed in 2023.

During scoping, one commenter expressed concern about green building practices. As part of the beddown process, the USAF would require LEED Silver certification into proposed construction activities. Requiring LEED Silver certification along with standard construction practices would potentially reduce fugitive dust emissions generated from the use of construction equipment on exposed soil by 50 percent from uncontrolled levels. Chapter 3, Section 3.3.3.1, of this EIS describes the standard construction practices that would control fugitive dust.

Table WH3-21 presents estimates of emissions from the infrastructure improvements for the AFRC F-35A mission at Whiteman AFB. These data show that even if total construction emissions occurred in one year, the construction emissions would be well below the annual indicator thresholds. Therefore, temporary construction emissions associated with the proposed AFRC F-35A mission would not result in significant air quality impacts.

Table WH3-21. Total Construction Emissions from the AFRC F-35A Mission at Whiteman AFB

Construction Activity	Air Pollutant Emissions (tons)						
	VOCs	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$	CO_2e (mt)
Demolish Buildings	0.02	0.11	0.12	0.00	0.19	0.00	28
Renovate/Construct Buildings	0.47	2.42	2.15	0.01	0.19	0.09	470
Street/Ramp/Runway Repairs	0.28	1.54	1.77	0.00	4.06	0.08	411
Total Emissions[a]	**0.77**	**4.07**	**4.04**	**0.01**	**4.45**	**0.18**	**909**
Annual Indicator Threshold	**250**	**250**	**250**	**250**	**250**	**250**	**NA**

[a] Calculated values and totals have been rounded; therefore, sum totals may not match the totals row.

Key: CO_2e (mt) = carbon dioxide equivalent in metric tons; NA = not applicable

WH3.3.2.2 Operations

The proposed AFRC F-35A mission at Whiteman AFB would primarily generate air emissions from (1) F-35A aircraft operations, (2) F-35A engine maintenance and testing, and (3) AGE. The analysis also includes emissions that would occur from the net change in commuting activities between the proposed F-35A and existing A-10 missions at Whiteman AFB. Because the mission would result in a net increase of 11 personnel, this would produce a net increase in emissions from commuting activities. To estimate emissions from the AFRC F-35A mission at Whiteman AFB, the analysis employed the ACAM. The air quality analysis assumed that the proposed mission would reach full operations and resulting emissions in 2024 after the completion of all required infrastructure improvements.

The analysis of proposed aircraft operations is limited to operations that would occur within the lowest 3,000 feet of the atmosphere, as this is the typical depth of the atmospheric mixing layer, where the release of aircraft emissions would affect ground-level pollutant concentrations. In general, aircraft emissions released above the mixing layer would not appreciably affect ground-level air quality.

During scoping, people submitted comments regarding the air pollutant impacts that could result from implementation of the proposed AFRC F-35A mission. Table WH3-22 summarizes the annual operational emissions that would result from implementation of the proposed AFRC F-35A mission at Whiteman AFB. The data in Table WH3-22 show that the replacement of existing A-10 aircraft operations with the proposed F-35A operations would result in reductions of VOC, CO, and PM_{10}, emissions and increases in all other pollutant emissions for the three afterburner scenarios. The data in Table WH3-22 also show that scenario emissions would increase with increasing afterburner use rates. Implementation of Scenario C (95 percent afterburner rate) would result in the most emissions, but the emissions would increase by less than 6 percent for any criteria pollutant compared to Scenario A (5 percent afterburner rate). The emission increases of NO_x, SO_x, and $PM_{2.5}$ would not exceed any annual indicator threshold. Therefore, operational emissions associated with the proposed AFRC F-5A mission at Whiteman AFB would not result in significant air quality impacts.

Table WH3-22. Projected Annual Emissions from AFRC F-35A Mission Operations at Whiteman AFB, 2024 – All Afterburner Scenarios

Afterburner Scenario/Activity Type	Air Pollutant Emissions (tons per year)[a]						
	VOCs	**CO**	**NO_X**	**SO_X**	**PM_{10}**	**$PM_{2.5}$**	**CO_2e (mt)**
Scenario A							
Flight Operations and Engine Trim Tests – F-35A	0.14	61.22	55.35	6.14	9.76	8.77	16,975
Aircraft Engine Test Cells – F-35A	0.00	0.41	1.95	0.13	0.17	0.15	375
Aerospace Ground Equipment	8.20	14.39	23.60	1.65	2.43	2.36	1,130
Net Commuting Activities (F-35A - A-10 staff)	0.02	0.22	0.02	0.00	0.00	0.00	17
Total AFRC F-35A Mission Emissions	**8.36**	**76.24**	**80.92**	**7.91**	**12.36**	**11.28**	**18,497**
Existing 442 FW Emissions	**28.86**	**82.63**	**61.26**	**4.01**	**14.90**	**10.76**	**5,117**
AFRC F-35A Mission Minus 442 FW Emissions	**(20.50)**	**(6.38)**	**19.67**	**3.91**	**(2.54)**	**0.51**	**13,380**
Scenario B							
Total F-35A Mission Emissions	**8.29**	**77.61**	**81.17**	**8.01**	**12.45**	**11.37**	**18,368**
F-35A Mission Minus 442 FW Emissions	**(20.50)**	**(4.27)**	**19.97**	**4.01**	**(2.45)**	**0.60**	**13,318**
Scenario C							
Total F-35A Mission Emissions	**8.29**	**79.73**	**81.55**	**8.11**	**12.55**	**11.46**	**18,322**
F-35A Mission Minus 442 FW Emissions	**(20.50)**	**(2.15)**	**20.35**	**4.11**	**(2.35)**	**0.69**	**13,272**
Indicator Threshold	**250**	**250**	**250**	**250**	**250**	**250**	**NA**

[a] Calculated values and totals have been rounded; therefore, sum totals may not match the totals row.

Key: CO_2e (mt) = carbon dioxide equivalent in metric tons; NA = not applicable; ( ) = negative values and net reductions in emissions

The VOC, CO, and PM_{10} emission reductions estimated to result from the proposed AFRC F-35A mission at Whiteman AFB would result in the following positive effects within the Johnson/Pettis County region:

- VOC emission reductions would result in a net benefit to ambient O_3 levels, because the decrease in VOC emissions that would result from implementation of the proposed mission would be greater than the resulting increase in NO_x emissions.
- Reductions in VOC and PM_{10} emissions would reduce the potential for people off base to be exposed to odors from fuel combustion.
- CO and PM_{10} emission reductions would result in net benefits to these ambient pollutant levels.
- Proposed operations would generate hazardous air pollutants (HAPs), primarily in the form of VOCs and particulates from the combustion of aviation fuel in F-35A aircraft and AGE. The reduction in VOC and PM_{10} emissions would result in a corresponding net reduction of HAPs. These emission reductions would result in similar net benefits to ambient HAP levels.

WH3.3.3 Airspace Affected Environment

Projected AFRC F-35A aircraft operations in the airspace proposed for use and along the flight routes between these locations and Whiteman AFB would affect air quality within these portions of Missouri, eastern Kansas, and northern Arkansas. All of the regions below and adjacent to these areas currently attain all of the NAAQS, except that the immediate area surrounding the intersections of Iron, Dent, and Reynolds Counties in Missouri currently does not attain the NAAQS for lead (known as the Buick/Viburnum Trend lead nonattainment area) (DNR 2009 and USEPA 2018a).

WH3.3.4 Airspace Environmental Consequences

AFRC F-35A pilots operating from Whiteman AFB would operate in the same airspace and training areas as existing 442 FW pilots, but at higher altitudes. The proposed AFRC F-35A operations in these areas would occur above 3,000 feet above ground level (AGL) about 99 percent of the time (Table WH2-6) and therefore these operations would not appreciably affect ground-level air quality. Compared to existing 442 FW operations, A-10 operations occur below 3,000 feet AGL 46 percent of the time.

To quantify the air quality effects of the F-35A mission within the Whiteman AFB airspaces and training areas, the analysis employed the ACAM to estimate the net change in emissions between the replacement of existing A-10 aircraft operations with proposed F-35A aircraft operations within these areas. The analysis used aircraft flight profiles developed by the project noise analyses as inputs to the ACAM. The analysis focused on operations within the lowest 3,000 feet of the atmosphere.

Table WH3-23 presents the annual operational emissions that would result from implementation of the F-35A mission within the Whiteman AFB airspaces and training areas. These data show that the proposed changes in aircraft operations within these areas would result in net reductions in all air pollutant emissions within 3,000 feet AGL. Therefore, the AFRC F-35A mission at Whiteman AFB would result in a net improvement to ground-level air quality in the existing airspace and training areas, which would not result in significant air quality impacts. This also would be the case for potential impacts from the AFRC F-35A mission to the Buick/Viburnum Trend lead nonattainment area.

Table WH3-23. Projected Annual Emissions from the AFRC F-35A Mission Operations within Whiteman AFB Airspaces and Training Areas - 2024

Activity Type	Air Pollutant Emissions (tons per year)[a]						
	VOCs	**CO**	**NO_X**	**SO_X**	**PM_{10}**	**$PM_{2.5}$**	**CO_2e (mt)**
Existing 442 FW Flight Operations – A-10	(0.90)	(17.19)	(83.59)	(8.36)	(20.78)	(13.13)	(25,266)
AFRC Mission Flight Operations – F-35A	0.00	0.22	11.89	0.58	0.63	0.57	1,748
F-35A Mission Minus 442 FW Emissions	**(0.90)**	**(16.97)**	**(71.70)**	**(7.78)**	**(20.15)**	**(12.56)**	**(23,518)**
Indicator Threshold	**250**	**250**	**250**	**250**	**250**	**250**	**NA**

[a] Calculated values and totals have been rounded; therefore, sum totals may not match the totals row.
Key: CO_2e (mt) = carbon dioxide equivalent in metric tons; NA = not applicable; ( ) = negative values and net reductions in emissions

WH3.3.5 Summary of Impacts to Air Quality

Johnson County is in attainment for all criteria pollutants. As shown in Table WH3-24, calendar year annual emissions from construction activities and the net change in aircraft operations around the base would not exceed the indicator threshold levels. Emissions would decrease in training airspace. Impacts to air quality resulting from the AFRC F-35A beddown would not be significant.

Table WH3-24. Summary of Calendar Year Annual Emissions from the AFRC F-35A Mission at Whiteman AFB

Activity/Year	Air Pollutant Emissions (tons)						
	VOCs	**CO**	**NO_X**	**SO_X**	**PM_{10}**	**$PM_{2.5}$**	**CO_2e (mt)**
Construction – Year 2021	0.14	0.99	0.90	0.00	0.32	0.04	203
Construction – Year 2022	0.63	3.08	3.14	0.01	4.12	0.14	705
Construction – Year 2023	0.00	0.00	0.00	0.00	0.00	0.00	0
Net Change in Operations – Most Emissive Afterburner Scenario C – Year 2024+	**(20.50)**	**(2.15)**	**20.35**	**4.11**	**(2.35)**	**0.69**	**13,272**
Annual Indicator Threshold	**250**	**250**	**250**	**250**	**250**	**250**	**NA**

Key: CO_2e (mt) = carbon dioxide equivalent in metric tons; NA = not applicable; ( ) = negative values and net reductions in emissions

WH3.4 SAFETY

Air Force Instruction (AFI) 90-801 *Environment, Safety, and Occupational Health Councils,* implements the risk management guidance within Air Force Policy Directive (AFPD) 90-8, *Environment, Safety, and Occupational Health Management and Risk Management*. All USAF missions and daily routines involve risk. Requirements outlined in this document provide for a process to maintain readiness in peacetime and achieve success in combat while safeguarding people and resources. The safety analysis contained in the following sections addresses issues related to the health and well-being of both military personnel and civilians living on or near Whiteman AFB and under the training airspace.

Specifically, this section provides information on explosive safety; fire risk and management; hazards associated with aviation safety (Accident Potential Zones [APZs]); aircraft mishaps; and Bird/Wildlife Aircraft Strike Hazard [BASH]).

The FAA is responsible for ensuring safe and efficient use of U.S. airspace by military and civilian aircraft and for supporting national defense requirements. To fulfill these requirements, the FAA has established safety regulations, airspace management guidelines, a civil-military common system, and cooperative activities with the DoD. The primary safety concern with regard to military training flights is the potential for aircraft mishaps (i.e., crashes) to occur, which could be caused by mid-air collisions with other aircraft or objects, weather difficulties, mechanical failures, pilot error, or bird-aircraft strikes.

WH3.4.1 Base Affected Environment

WH3.4.1.1 Explosive Safety

Two explosive safety quantity-distance (ESQD) arcs at Whiteman AFB cover approximately 1,490 acres (28 percent) of the installation and include the munitions storage area. The ESQD arcs are shown on Figure WH2-1.

WH3.4.1.2 Fire Risk and Management

Day-to-day O&M activities conducted at the base are performed in accordance with applicable USAF safety regulations, published USAF Technical Orders (TOs), and standards prescribed by Air Force Occupational Safety and Health (AFOSH) requirements including AFI 91-202, *The US Air Force Mishap Prevention Program*. Aircraft Rescue Firefighting services are available on a 24-hour basis. Upon notification of an in-flight or ground emergency, the crash and rescue services personnel would coordinate emergency services.

Whiteman AFB Fire Emergency Services responds to many different types of emergencies within their area of responsibility. These include, but are not limited to, aircraft and rescue firefighting emergencies, structural response, emergency medical services, hazardous material and technical rescue response such as confined space emergencies. The base is equipped with three structural fire engines, four ARFF units, one 5,000-gallon water tanker, two 1,000-gallon foam trailers, a specialized rescue vehicle, a special operations vehicle, a hazardous materials response trailer, and two command vehicles. The Fire Emergency Services Flight also has local mutual-aid agreements with the Johnson County and Pettis County Fire Protection Districts and the cities of Warrensburg, Knob Noster, and Sedalia.

Whiteman AFB adheres to specific emergency-response procedures contained in TO 00-105E-9, *Aerospace Emergency Rescue and Mishap Response Information,* for aircraft mishaps involving composite materials (USAF 2018). TO 00-105E-9 contains a section (Chapter 3) on Mishap Composite Awareness.

WH3.4.1.3 Accident Potential Zones

In accordance with DoDI 4165.57, APZs are established at military airfields to delineate recommended compatible land uses for the protection of people and property on the ground. APZs define the areas of a military airfield that would have the highest potential to be affected if an aircraft mishap were to occur. Air Installations Compatible Use Zones (AICUZ) guidelines identify three types of APZs for airfields based on aircraft mishap patterns: the Clear Zone (CZ), APZ I, and APZ II. The standard USAF CZ for Class B runways such as Runway 01/19 at Whiteman AFB is a rectangle area that extends 3,000 feet from the end of a runway, is 3,000 feet wide, and identifies the area with the highest probability for mishaps. APZ I, which typically extends 5,000 feet from the end of the CZ, has a lower mishap probability, and APZ II, which typically extends 7,000 feet from the end of APZ I, has the lowest mishap probability of the three zones. If needed, to reflect different departure and arrival patterns, both the shape and size of APZs can be modified.

The northern CZ is entirely within installation boundaries. Land in the northern APZ I consists primarily of open space/low-density use with some residential, commercial, and public/quasi-public uses. Residential land use is incompatible with APZ I. Commercial land use is conditionally compatible. Land in the northern APZ II consists primarily of open space/low-density use but includes a large commercial parcel just north of Missouri Highway 50, which is conditionally compatible. The residential land in the northern APZ II along Highway NE 175 is compatible because it has density of less than one to two dwellings per acre (USAF 2015).

The southern CZ is entirely within installation boundaries. The majority of the southern APZs consist of open space/low-density land, which are compatible and however there are 37 acres of conditionally compatible residential land use in APZ II (USAF, 2015). Figure WH3-5 depicts the CZs and APZs at Whiteman AFB.

WH3.4.1.4 Aircraft Mishaps

Mishaps are defined as any damage that occurs on the ground or in flight. As shown in Table WH3-25, mishaps are classified into four categories, based on the severity of the mishap relative to property damage or personnel injury. Class A mishaps are the most severe with total property damage of $2 million or more or a fatality and/or permanent total disability. Comparison of Class A mishap rates for various engine types, as calculated per 100,000 flying hours provide the basis for evaluating risks among different aircraft and levels of operations. This safety section analyzes existing and projected Class A mishap potentials based on flying hours and aircraft types.

Table WH3-25. Aircraft Class Mishaps

Mishap Class	Total Property Damage	Fatality/Injury
A	$2,000,000 or more and/or aircraft destroyed	Fatality or permanent total disability
B	$500,000 or more but less than $2,000,000	Permanent partial disability or three or more persons hospitalized as inpatients
C	$50,000 or more but less than $500,000	Nonfatal injury resulting in loss of 1 or more days from work beyond day/shift when injury occurred
D	$20,000 or more but less than $50,000	Recordable injury or illness not otherwise classified as A, B, or C

Aircraft flight operations at Whiteman AFB are governed by standard flight rules. Aircrews ensure flight safety when operating at the airfield by complying with all safety and aircraft operating requirements. No Class A or B mishaps have occurred during the past 3 years at Whiteman AFB. The lifetime Class A mishap rate for the A-10 is 1.88 for every 100,000 hours of flight time (USAF 2019).

WH3.4.1.5 Bird/Wildlife-Aircraft Strike Hazard

Bird and wildlife-aircraft strikes and the hazards they present form another safety concern for aircraft operations. Bird/wildlife-aircraft strikes constitute a safety concern because of the potential for damage to aircraft or injury to aircrews or local populations if an aircraft crash should occur in a populated area.

According to the Air Force Safety Center (AFSEC) BASH statistics, from 1995 to 2016, where altitude at time of strike was known, more than 50 percent of the strikes occurred below 400 feet AGL, and 90 percent occurred below 2,000 feet AGL (USAF 2017). Waterfowl generally present the greatest BASH potential due to their flocking flight patterns and because, when migrating, they can be encountered at altitudes up to 20,000 feet AGL. Raptors also present a substantial hazard due to their size and soaring flight patterns. In general, the threat of bird-aircraft strikes increases during April and May and from August through November due to migratory activities. The USAF BASH Team maintains a database that documents all reported bird/wildlife-aircraft strikes. Historic information across the USAF for the past 20 years indicates that 11 USAF aircraft have been destroyed and five fatalities have occurred from bird/wildlife-aircraft strikes, with the last Class A mishap occurring in 2016 (USAF 2017).

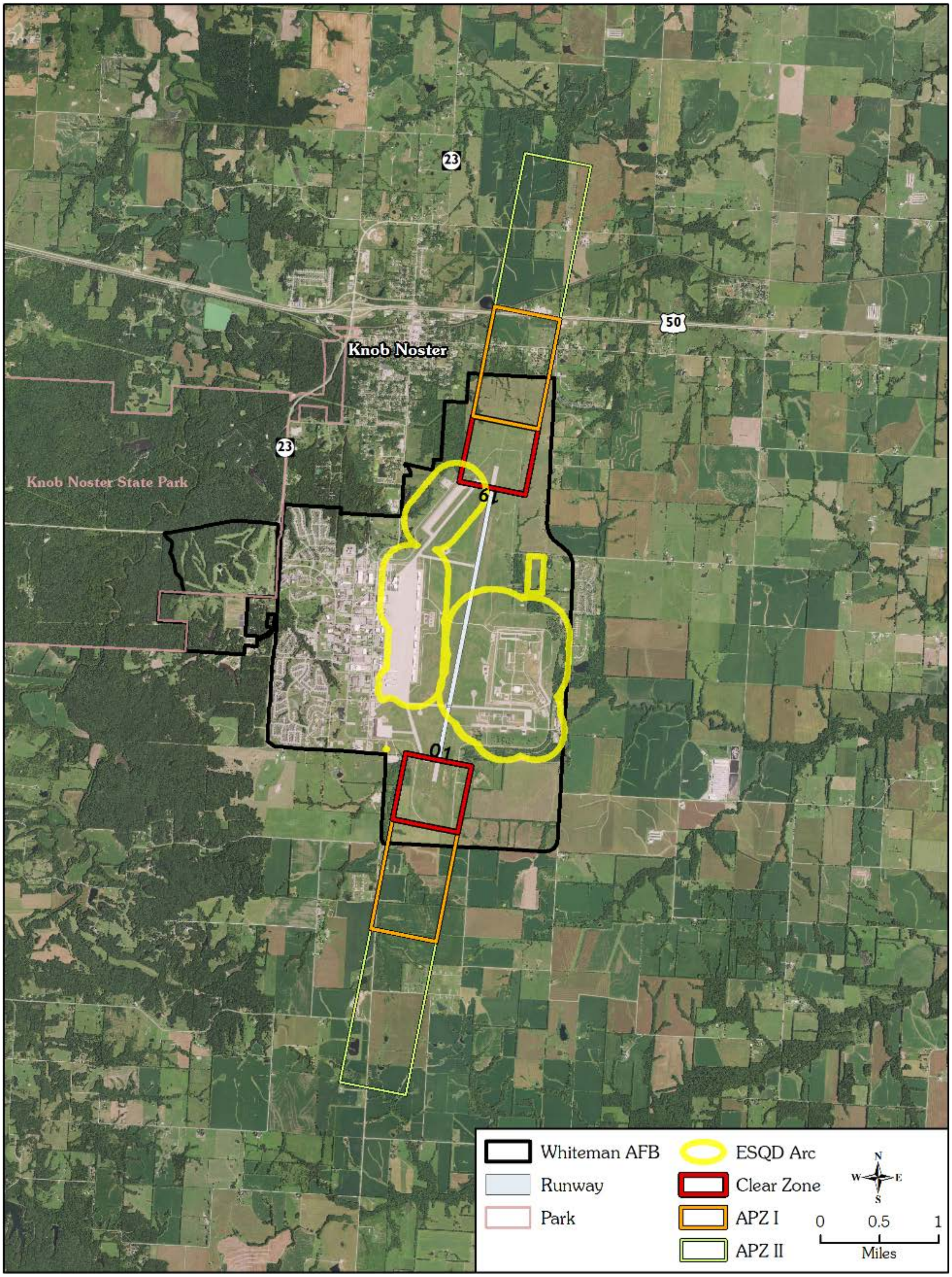

Figure WH3-5. CZs and APZs at Whiteman AFB

The USAF BASH program was established to minimize the risk for collisions of birds and aircraft and the subsequent loss of life and property. AFI 91-202 requires each flying unit in the USAF to develop a BASH plan to reduce hazardous bird/animal activity relative to airport flight operations. The intent of each plan is to reduce BASH issues at the airfield by creating an integrated hazard abatement program through awareness, avoidance, monitoring, and actively controlling bird and animal population movements. Some of the procedures outlined in the plan include monitoring the airfield for bird activity, issuing bird hazard warnings, initiating bird avoidance procedures when potentially hazardous bird activities are reported, and submitting BASH reports for all incidents. The Whiteman AFB BASH Plan provides specific guidance and assigns responsibilities in developing an effective bird strike hazard reduction program for Whiteman AFB (509 BW 2014).

The concentration of birds at and around Whiteman AFB poses a risk to flying operations. Whiteman AFB specific wildlife hazards to air operations historically include small perching birds, black birds, pigeons, waterfowl, and raptors (hawks and falcons). Whiteman AFB is also home to other wildlife including turkey, deer, and coyotes (509 BW 2014).

The Whiteman AFB BASH Plan is implemented in two phases. The first phase is implemented outside of migration season. During this phase aircraft are operated according to current Bird Watch Conditions (BWC), which are categorized as Low, Moderate, or Severe. BWC Severe or Moderate requires action from the installation's wildlife dispersal team to reduce the BWC to Low as soon as possible. BASH Phase II is implemented during migratory bird seasons and is in effect during the spring (1 April to 30 May) and fall (15 August to 15 November). Phase II periods could be adjusted from year to year due to seasonal weather changes and migratory bird movement. Phase II elements include procedures for operations that occur one hour before to one hour after sunrise/sunset and or any other designated BASH window (509 BW 2014).

The BASH Plan also establishes implementation procedures and actions to minimize the potential of bird-aircraft strikes. Such measures include eliminating broad-leaf weeds, maintaining grass heights between 7 and 14 inches, planning of bare areas, removing dead vegetation and animals. BASH reduction techniques currently employed by the base include abating nuisance avian species, pyrotechnics, and depredation when necessary (509 BW 2014).

WH3.4.2 Base Environmental Consequences

O&M activities conducted on Whiteman AFB would continue to be performed in accordance with all applicable safety directives. No specific aspects of F-35A O&M would create any unique or extraordinary safety issues. Refer to Chapter 3, Section 2.3.4.2 for a discussion of the types of defensive countermeasures and ordnance that would be used by AFRC F-35A pilots. Only approved weapons systems would be used by AFRC F-35A pilots on the impact training ranges and pilots would adhere to all flare and live-fire use restrictions.

No unique construction practices or materials would be required as part of any of the demolition, renovation, or construction projects associated with the proposed AFRC F-35A mission. All renovation and construction activities would be completed in compliance with all applicable OSHA regulations to protect workers. In addition, the newly constructed buildings would be built in compliance with antiterrorism/force protection requirements and explosives safety requirements. The USAF does not anticipate any significant safety impacts to result from construction, demolition, or renovation if all applicable AFOSH and OSHA requirements are implemented. In addition, O&M of the new munitions buildings would not result in significant safety impacts.

Although emergency and mishap response plans would be updated, the proposed AFRC F-35A mission at Whiteman AFB is not expected to create new or unique ground safety issues. Emergency and mishap response plans would be updated to include procedures and response actions necessary to address a mishap involving AFRC F-35A aircraft and associated equipment. With this update, airfield safety conditions would remain similar to baseline conditions. As indicated in Section WH3.5.2.1, base fire and emergency services would continue to participate in mutual-aid support agreements with nearby communities.

WH3.4.2.1 Explosive Safety

The construction and operation of the new munitions maintenance building would comply with Department of Defense Explosives Safety Board (DDESB) Standard 6055.09, *DoD Ammunition and Explosives Safety Standards* (DoD 2008), Air Force Manual (AFMAN) 91-201, *Explosives Safety Standards* and AFMAN 32-1084, *Facility Requirements*. The new buildings' ESQD arcs would be calculated and sited to remain within current ESQD arcs as well as be compatible with existing facilities. No changes to explosive safety would result from the construction and operation of the proposed facilities at Whiteman AFB.

WH3.4.2.2 Fire Risk and Management

Fire and crash response would continue to be provided by Whiteman AFB Fire and Emergency Services. TO 00-105E-9 provides guidance on fire response to aircraft containing composite materials, including the F-35A. Firefighters would continue to be fully trained and appropriately equipped for crash and rescue response and the proposed AFRC F-35A beddown would not change these abilities. Aircraft pre-incident plans would be developed for the F-35A. Aircraft pre-incident plans are required to be reviewed, validated and/or updated annually or anytime there is a change to TO 00-105E-9 for the applicable aircraft. Equipment and training specific to addressing F-35A mishaps would be obtained and conducted prior to beddown. Additionally, Whiteman AFB would keep local firefighting departments informed about any new information or firefighting techniques associated with composite materials should an accident occur.

WH3.4.2.3 Accident Potential Zones

No changes to existing APZs or CZs would be required to accommodate AFRC F-35A operations. For the reasons described in Section WH3.4.2.3, implementation of the AFRC F-35A mission would not increase the safety risk to these or other off-base areas. Whiteman AFB would continue to work with communities and developers to apply the AICUZ guidelines.

WH3.4.2.4 Aircraft Mishaps

Implementation of the proposed AFRC F-35A mission at Whiteman AFB would replace the existing A-10 mission operated by the 442 FW. During public scoping, several commenters were concerned with the flight safety of the single-engine F-35A, as well as the increased use of composite aerospace materials in the construction of the F-35A. Although the A-10 does have some composite material in wing leading edges, composites were not extensively used in A-10 construction. Approximately 42 percent of the F-35A, by weight, is comprised of composite materials (Air Force Research Laboratory 2015).

WH3.4.2.4.1 Flight Safety

In general, twin-engine aircraft have a lower mishap rate than single-engine aircraft. However, it is also true that aircraft with newer engines and designs have a lower mishap rate than aircraft with older engines and designs (Table WH3-26) and that the safety and reliability of single-engine USAF fighter aircraft has increased substantially over time. Table WH3-26 demonstrates the decreases in engine-related and lifetime mishap rates for 11 historic and current single-engine aircraft. The Pratt &

Whitney F135 engine used in the F-35A was derived from the F119 engine, which is used in the F-22 Raptor. The F-22 features a 0.92 lifetime engine-related Class A flight mishap rate (USAF 2020).

Table WH3-26. Class A Flight Mishap Rates

Decade Introduced	Aircraft/Engine	Engine-Related Cumulative Class A Mishap Rate	Engine-Related Class A Mishap Rate Last 6 Quarters	Lifetime Class A Mishap Rate
1950s	F-100/ J57	5.61	No longer in service	21.22
	F-102/ J57	3.41	No longer in service	NA
	F-104/ J79	9.48	No longer in service	NA
	F-105/ J75	4.56	No longer in service	12.15
	F-106/ J75	2.04	No longer in service	NA
1960s	A-7/TF41	1.73	No longer in service	5.71
1970s	F-16/ F100-200	1.84	No longer in service	3.43
1980s	F-16/ F110-100	1.06	0.76	
	F-16/ F100-220	0.96	0	
1990s	F-16/ F110-129	0.85	0	
	F-16/ F100-229	0	0	

Key: NA = not available

Historical trends of USAF aircraft show that mishaps of all types decrease the longer an aircraft is operational. For example, when the last single-engine fighter fielded by the USAF (F-16) surpassed 100,000 hours in 1982, its Class A rate was 15.83 with four fatal mishaps (USAF 2018).

Since then, the mishap rate for the F-16 has decreased substantially. In 2019, the F-16 had a lifetime Class A mishap rate of 3.35, and its rate for the last 10 years is 1.84 (USAF 2019). Similarly, in 1979, when the A-10 surpassed 100,000 hours, its Class A rate was 9.24 with four fatalities recorded (USAF 2019). The A-10 has a lifetime Class A mishap rate of 1.88, and its rate for the last 10 years is 0.45 (USAF 2019).

As of November 2019, the F-35A has amassed more than 96,000 hours of flight time with three Class A mishaps, resulting in a mishap rate of 3.11 (Table WH3-27). These mishaps included an engine failure during takeoff preparation (the aircraft was safely brought to a halt), an aborted takeoff with damage confined to the engine, and a hydraulic failure resulting in collapsed nose landing gear that occurred after landing and parking. No injuries occurred during these events.

Table WH3-27. F-35A Class A Flight Mishap History

Fiscal Year	Class A		Destroyed		Fatal		Hours Flown Per Year	Cumulative Flight Hours
	Number of Mishaps	Rate	Aircraft	Rate	Pilot	All		
2010	0	0.00	0	0.00	0	0	0	0
2011	0	0.00	0	0.00	0	0	0	0
2012	0	0.00	0	0.00	0	0	215	215
2013	0	0.00	0	0.00	0	0	1,283	1,498
2014	1	37.54	0	0.00	0	0	2,664	4,162
2015	0	0.00	0	0.00	0	0	7,467	11,629
2016	0	0.00	0	0.00	0	0	11,343	22,972
2017	0	0.00	0	0.00	0	0	22,714	45,686
2018	2	11.90	0	0.00	0	0	30,514	76,200
2019	0	0	0	0.00	0	0	20,113	96,313
Lifetime	**3**	**3.11**	**0**	**0.00**	**0**	**0**	**-**	**96,313**

Note: Flight "rates" are number of mishaps per 100,000 flight hours. Only Aviation "Flight" mishaps are reported here. An aviation "Flight" mishap is any mishap in which there is intent for flight and reportable damage to a DoD aircraft.
Source: USAF 2019

Because the F-35A has not yet reached 100,000 hours, this rate is not directly comparable to other aircraft (Chapter 3, Section 3.4.3) with more flying hours. However, this mishap rate does provide some indication of the overall safety of the F-35A aircraft. For example, this rate is lower than the 18.86 rate of the F-16 after a comparable amount of hours. It is also lower than the 9.24 rate of the A-10 after the A-10 reached 152,977 hours. The mishap rate for the F-35A is expected to decline as the aircraft becomes operationally mature.

During scoping, some comments were received regarding safety deficiencies of the F-35A aircraft. In a review of the production program for all models of the F-35 (A, B, and C), the Government Accountability Office, has noted various deficiencies as this advanced aircraft is developed and brought into production (GAO 2018). These deficiencies are being addressed as full-rate production is approached. The USAF recognizes that certain components have yet to reach full capability. The USAF would not operate any aircraft should safety-of-flight concerns be present.

WH3.4.2.4.2 Composite Aerospace Materials

Advanced composites have been used in aircraft construction since the late 1960s, when a boron-epoxy rudder was installed on the F-4 jet. As composite technology has advanced, the percentage of composite material used in modern aircraft has increased. Types of composites include carbon fiber (e.g., graphite used in sporting equipment), metal-matrix composites (e.g., materials used on spacecraft and racing bicycles), and ceramic-matrix composites (e.g., medical implants). As noted by members of the public during scoping, one disadvantage of certain composites is that these materials can degrade under extreme temperatures, resulting in the production of toxic fumes and airborne fibers. Because of these characteristics, composite aerospace materials present unique hazards to mishap responders. A burning aircraft could release toxic products, exposing personnel and the environment. Individuals exposed to a crash site could experience dermatological and respiratory problems. Exposure to these hazards would not necessarily end when a fire is extinguished; exposure to recovery crews, site security, the surrounding population, and others could continue (Navy 2016). Sampling at mishap sites of aircraft containing composite materials indicated the presence of respirable fibers/dusts in the air. In addition, laboratory studies have identified respirable fiber products and toxic gases (including high levels of CO, NO_x, and hydrogen cyanide) from burning composite materials (Navy 2016).

Due to the rarity of mishaps involving composite aerospace materials, no epidemiological data are available on personnel exposure to burning composites. Similarly, no studies have assessed the toxicology of carbon fibers generated in a fire scenario with extended post-exposure duration. Synergistic interactions between the solid, vapor, and gaseous combustion products have also not been determined. However, research and experience during several crash responses do indicate that composite fiber release is relatively low (Air Force Research Laboratory 2015).

In the event of a crash of an aircraft containing composite materials, the USAF would follow the guidance contained in the *Mishap Response Checklist for Advanced Aerospace Materials/Composites* (USAF Advanced Composites Program Office 1993).

- Areas in the immediate vicinity of the mishap site affected by direct and dense fallout from the fire/explosion-generated smoke plume would be evacuated, along with easily mobile critical equipment. Aircraft and flight operations exposed to the immediate fallout area would be altered or moved. All unprotected personnel would be restricted from assembling downwind of the crash site.
- The fire would be extinguished and composites cooled to below 300°F. Only firefighters equipped with a self-contained breathing apparatus would be authorized in the immediate

vicinity of a burning/smoking mishap site until the fire chief declares the area safe. If possible, high-pressure water break-up and dispersal of composite structures would be avoided.

- The mishap site would be roped or cordoned off and a single entry/exit point would be established upwind of the wreckage. Only sufficiently protected individuals would be authorized in the immediate mishap site and peripheral areas.
- Should personnel other than those at the accident site be directly and substantially exposed to adverse material hazards, the medical staff would be consulted for evaluation and tracking. Time permitting, the otherwise un-threatened populace in affected or fallout areas would be advised to do the following:
    - Remain indoors;
    - Shut external doors and windows;
    - Turn off forced air intakes; and
    - Await further notification.
- Specific aircraft hazards would be identified by inspection and consultation with the crew chief or aircraft specialists. Composite and other hazardous materials would be identified to mishap response personnel. The On-Scene Commander would be advised of all findings and recommendations.
- When exiting the crash site, personnel would use a high-efficiency particulate air-filtered vacuum, if available, to remove asbestos-containing materials (ACM) from their outer clothing, work gloves, boots, headgear, and equipment. If unavailable, efforts would be made to wipe or brush off as much contamination as possible. Clean sites (i.e., tent or trailer) would be set up for donning/removal of personal protective equipment if practical.
- Non-disposable clothing involved with crash/fire-damaged composite parts would be removed and laundered as determined by the base environmental engineer. Personnel should shower (in cool water) prior to going off-duty to preclude injury from loose fibers. Portable showers would be provided, if necessary.
- Burned/mobile composite fragments and loose ash/particulate residue would be secured with firefighting foam or a fine water mist until a hold-down fixant material is applied to immobilize the fibers. Initial actions should concentrate on debris containment. Investigators, specific aircraft authority, and the base environmental engineer would be consulted before applying any fixant.

WH3.4.2.4.3 Aircraft Mishap Summary

Aviation in all forms has inherent risk and it is not possible to guarantee the future flight-safety risk of any aircraft. However, due to the current F-35A record, the increasing safety trend for single-engine fighter aircraft, and increases in safety as an airframe matures operationally, it is reasonable to expect nominal changes in flight-safety risk to result from implementation of the AFRC F-35 mission at Whiteman AFB.

WH3.4.2.5 Bird/Wildlife-Aircraft Strike Hazards

The 17.4 percent airfield operations increase resulting from the AFRC F-35A mission could increase the risk of bird/wildlife-aircraft strikes. However, strict adherence to the BASH plan and continuation of active BASH program activities would minimize these risks. The BASH plan would remain in place to reduce the risk of bird/wildlife-aircraft strikes.

WH3.4.3 Airspace Affected Environment

The airspace proposed for use by AFRC F-35A pilots from Whiteman AFB includes RAs, MOAs, and ATCAAs (Table WH2-5 and Figure WH2-2). Aircraft flight operations are governed by standard flight rules. The volume of airspace encompassed by the combination of airspace elements constitutes the ROI for airspace safety. These training areas allow military flight operations to occur without exposing civil aviation users, military aircrews, or the general public to hazards associated with military training and operations. This section describes the existing safety procedures in the airspace proposed for use and the following section evaluates changes that would occur with the introduction of the F-35A.

WH3.4.3.1 Fire Risk and Management

Fires attributable to flares are rare for three reasons. First, the altitude and other restrictions on flare use minimize the possibility for burning material to contact the ground. Second, to start a fire, burning flare material must contact vegetation that is susceptible to burning at the time. The probability of a flare igniting vegetation is expected to be equally minimal. Third, the amount and density of vegetation, as well as climate conditions, must be capable of supporting the continuation and spread of fire.

Aircraft based at Whiteman AFB utilize three live fire ranges, the Cannon Range at Fort Leonard Wood in Missouri and the Smoky Hill and Fort Riley Ranges in Kansas. Fort Riley manages fires in accordance with an Integrated Wildland Fire Management Plan. The Directorate of Emergency Services, Fire and Emergency Services Division, is responsible for controlling wildland fires. The primary goal of the plan is to provide a safe, sustainable training platform. All prairie areas on post are burned at least two years out of every five to reduce wildfire likelihood and to maintain tall grass prairie (Fort Riley 2016).

WH3.4.3.2 Aircraft Mishaps

Aircraft flight operations are governed by standard flight rules. Specific safety requirements are contained in standard operating procedures that must be followed by all aircrews operating from the airfield to ensure flight safety.

WH3.4.3.3 Bird/Wildlife-Aircraft Strike Hazard

The primary threat to military aircraft operating in the airspace is migratory birds. The exact number of birds struck in the airspace areas is difficult to assess because small birds are not detected until post-flight maintenance checks and the location of such strikes cannot be determined. Refer to Section WH3.4.1.5 for more information regarding BASH and the actions that are implemented to minimize bird strikes.

WH3.4.4 Airspace Environmental Consequences

The addition of F-35A aircraft to the airspace would not require changes to the management or structure of the airspace. AFRC F-35A pilots would fly mission profiles similar to those currently flown by A-10 pilots operating from Whiteman AFB, only at substantially higher average altitudes, including air-to-ground ordnance delivery and air combat training operations. Implementation of the AFRC F-35A mission would result in a 5.9 percent decrease in overall airspace sorties in the existing airspace proposed for use. As described in Section WH3.1.4, total sorties would remain within the capability and capacity of the airspace and ranges proposed for use.

WH3.4.4.1 Fire Risk and Management

Flare and ordnance deployment in authorized ranges and airspace is governed by a series of regulations based on safety and environmental considerations and limitations. These regulations establish procedures governing the use of flares over ranges, other government-owned and -controlled lands, and nongovernment-owned or -controlled areas. Chapter 2, Section 2.3.4.2, details the flares and ordnance proposed for use by AFRC F-35A pilots.

The frequency of flare use would decrease or stay the same as baseline conditions. AFRC F-35A pilots would only use flares in compliance with existing airspace altitude and seasonal restrictions to ensure fire safety. Based on the emphasis of flight at higher altitudes, roughly 90 percent of F-35A flares released throughout the authorized airspace would occur above 15,000 feet MSL, further reducing the potential risk for accidental fires. Lands surrounding the air-to-ground training impact areas underlying airspace ensure public protection by restricting access to areas associated with laser use, emitters, and ordnance delivery. All guidance, regulations, and instructions for ordnance delivery at the ranges would be adhered to by AFRC F-35A pilots. Mutual fire response and suppression agreements would continue.

WH3.4.4.2 Aircraft Mishaps

Continued maintenance of situational awareness and use of available communications for tracking the scheduled and near real-time status of the SUAs would help maintain a safe flying environment for all concerned. Any changes to those capabilities and the current or future areas in which this service is provided would be appropriately addressed and communicated through those same venues. The majority of flight operations would be conducted over remote areas; however, in the unlikely event that an aircraft accident occurs, existing response, investigation, and follow-on procedures would be enforced to ensure the health and safety of underlying populations and lands. Implementation of flight safety procedures and compliance with all flight safety requirements would minimize the chances for aircraft mishaps.

WH3.4.4.3 Bird/Wildlife-Aircraft Strike Hazards

AFRC F-35A pilots would operate the aircraft in the same airspace environment as other pilots from Whiteman AFB, albeit at a higher altitude than current aircraft. Therefore, the overall potential for bird-aircraft strikes would be reduced following the beddown of the F-35A. When BASH risk increases due to time of year, limits are and would continue to be placed on low-altitude flights. Briefings are provided to pilots when the potential exists for greater bird-strike risks within the airspace; AFRC F-35A pilots would also be subject to these procedures. Implementation of the AFRC F-35A mission would not result in significant BASH risks in the airspace proposed for use.

WH3.4.5 Summary of Impacts to Safety

No unique construction practices or materials would be required as part of any of the demolition, renovation, or construction projects associated with the proposed AFRC F-35A mission. All new construction incorporates antiterrorism/force protection requirements. All construction would be conducted in compliance with DDESB Standard 6055.09, AFMAN 91-201, and AFMAN 32-1084, and the ESQD arcs would not change. As of November 2019, the F-35A has amassed more than 96,000 hours of flight time with a Class A mishap rate of 3.11. Since the F-35A has not yet reached 100,000 hours, this rate is not directly comparable to other aircraft. As the F-35A becomes operationally mature, the F-35 mishap rate would be expected to continue to decline, as supported by the documented decline in mishap rates for the F-16 and A-10. Whiteman AFB has an active BASH program and the 17.4 percent increase in aircraft operations at Whiteman AFB could increase

BASH incidents near the airfield. However, this increase is not anticipated to be significant. With regard to airspace, AFRC F-35A pilots would use the same airspace used by 442 FW pilots. Impacts to safety resulting from implementation of the new mission are not anticipated to be significant.

WH3.5 SOIL AND WATER RESOURCES

WH3.5.1 Base Affected Environment

WH3.5.1.1 Soil Resources

Whiteman AFB is located in the Central Lowlands physiographic province. This area is characterized by flat to gently rolling topography with soils that are composed of alluvium, loess, and residuum (Whiteman AFB 2015a). The alluvium consists of unconsolidated stratified sand and gravel, silty clay and silt loam. Silt, silty clay, and fine sandy silt comprise the loess. Weathering of bedrock has produced clayey silt or sandy silty clay soils derived from residuum (Whiteman AFB 2015a). The most common soil type found on Whiteman AFB is the Haplaquents-Urban land complex. Other common soils include Haig silt loam, Mandeville silt loam, and Sampsel silty clay loam. All these soils, except Mandeville silt loam, are deep, poorly drained soils. The Mandeville silt loam is a moderately deep, well-drained soil (Soil Survey Staff 2018). All these soils have a slight susceptibility to wind and water erosion. More detailed descriptions of the soils types on the base are available from the Web Soil Survey (Soil Survey Staff 2018).

WH3.5.1.2 Water Resources

WH3.5.1.2.1 Surface Water

The base is located within the Missouri River Drainage Basin and the Missouri River-Blackwater Subregion. A north south ridge divides the installation with the west side of the installation draining to Brewer’s Branch and an unnamed creek. These drainages flow off the base and into Clear Fork Creek and eventually into the Blackwater River. The east side of the installation drains to Long Branch which then flows off base into Muddy Creek. Other surface water features on the installation include Nugent, Skelton, North West, and North Lakes.

Whiteman AFB has a general stormwater National Pollutant Discharge Elimination System (NPDES) permit issued to the installation under Permit No. MO-R80F035 by the State of Missouri. The MDNR Missouri Clean Water Commission administers the state’s NPDES program. The MDNR requirements for stormwater permitting are contained in 10 *CSR* 20-6.200 and are not substantially different from the federal guidelines contained in 40 *CFR* 122 (Whiteman AFB 2010b). To satisfy the requirements of the NPDES permit the USAF has prepared and currently implements a Stormwater Pollution Prevention Plan (SWPPP) (Whiteman 2010). The plan is annually reviewed and revised as necessary. The Whiteman AFB SWPPP references the NPDES Permit No. MO-R10A000 which is a land disturbance permit that applies, in part, to construction or other projects that will have a land disturbance greater than 1 acre.

WH3.5.1.2.2 Groundwater

Whiteman AFB is located within the Central Midwest Regional Aquifer System and the Deep Ordovician and Cambrian aquifers provide the primary water source for Whiteman AFB and the surrounding areas. Whiteman AFB draws its water from nine wells drilled into these aquifers at depths down to 1,171 feet (Whiteman AFB 2015a).

WH3.5.1.2.3 Floodplains

No Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRMs) are available for Whiteman AFB. A floodplain study conducted in 2006 concluded that portions of the installation near Long Branch are within the 100-year floodplain (Figure WH1-2). No other floodplains are known to occur on the installation.

WH3.5.2 Base Environmental Consequences

WH3.5.2.1 Soil Resources

Implementation of the projects identified in Table WH2-1 would disturb approximately 2.9 acres of land, most of which has been previously disturbed. Impacts to soil resources near each of the project sites would result from ground disturbance (e.g., compaction; vegetation removal; and excavation for foundations, footings or utilities). Onsite soils (predominantly Haplaquents-Urban land complex) have a slight potential for wind and water erosion (Soil Survey Staff 2018). Implementation of management practices would minimize impacts to soil resources. These actions could include, but would not be limited to, installation of silt fencing and sediment traps, application of water sprays to keep soil from becoming airborne, and revegetation of disturbed areas as soon as possible, as appropriate. Therefore, potential impacts to soil resources would be minimal, and no significant impacts to soil resources would result from implementation of the new mission.

WH3.5.2.2 Water Resources

WH3.5.2.2.1 Surface Water

During scoping, one individual submitted a comment regarding run-off from the runways and the resulting impacts to local creeks and streams. No changes to the runway stormwater management system would result from implementation of the AFRC F-35A mission. Stormwater runoff from construction sites would be managed as described below.

Impacts to surface water can result from land clearing, grading, and moving soil, resulting in localized increases in stormwater runoff volume and intensity. In accordance with UFC 3-210-10, *Low Impact Development* (LID) (as amended, 2016) and the Emergency Independence and Security Act (EISA) Section 438 (42 *USC* §17094), any increase in surface water runoff as a result of the proposed construction would be attenuated through the use of temporary and/or permanent drainage management features (i.e., use of porous materials, directing runoff to permeable areas, and use of detention basins to release runoff over time). The integration of LID concepts incorporates site design and stormwater management principles to maintain the site's pre-development runoff rates and volumes to further minimize potential adverse impacts. Implementation of the AFRC F-35A mission would result in a 0.4-acre net decrease in impervious surfaces.

Prior to construction, the contractor would be required to obtain coverage under NPDES Permit No. MO-R10A000 by filing a NOI with the MDNR and preparing a site-specific SWPPP to manage stormwater discharges during and after construction until the area is revegetated. Upon revegetation, the contractor would file the Notice of Termination with the MDNR to terminate permit coverage. The USAF would specify compliance with the stormwater discharge permit in all of the contractor construction requirements. Other management practices that would be considered include the use of water sprays during construction to keep soil from becoming airborne, use of silt fences, covering soil stockpiles, using secondary containment for hazardous materials, and revegetating the site in a timely manner.

The existing Whiteman AFB SWPPP also identifies control practices to be followed for spill prevention and response, routine inspection of discharges at sites, and proper training of employees. As part of the SWPPP, the base has identified individuals to be part of the Stormwater Pollution Prevention Team (SWPPT). The SWPPT meets annually, is responsible for all aspects of the SWPPP, and provides recommendations to the Environment, Safety, and Occupational Health Leadership Committee regarding the SWPPP status, any deficiencies, and deicing usage and outfall monitoring data.

No changes to the existing aircraft deicing operations would be necessary with implementation of the new mission. F-35A deicing activities would be conducted away from storm drains to prevent deicing effluent from entering the stormwater system.

WH3.5.2.2.2 Groundwater

Implementation of the AFRC F-35A mission would result in an increase (11) in personnel and a negligible increase in demand for potable water. No additional requirements for groundwater withdrawals are expected. Groundwater wells would not be disturbed as part of the proposed mission. No impacts to groundwater are anticipated.

WH3.5.2.2.3 Floodplains

No floodplains are located near any of the areas proposed for infrastructure development on Whiteman AFB. Therefore, no impacts to floodplains would result from implementation of the new mission.

WH3.5.3 Summary of Impacts to Soil and Water Resources

Implementation of the AFRC F-35A mission would disturb approximately 2.9 acres of land with a reduction of approximately 0.4 acres of impervious surface. No floodplains would be impacted and a SWPPP would be prepared for the proposed construction. Implementation of management practices would minimize impacts to soil resources, and projects would be designed and implemented in accordance with LID and EISA to minimize impacts to soil and water resources. Therefore, potential impacts to soil and water resources would be minimal, and no significant impacts to soil or water resources would result from implementation of the proposed action.

WH3.6 BIOLOGICAL RESOURCES

The ROI for biological resources is defined as the land area (habitats) that could be affected by the infrastructure and construction projects on the base, and the primary airspace where AFRC F-35A pilots would predominantly fly. For the purposes of this biological resources analysis, the ROI for the proposed action and No Action Alternative includes Johnson County, Missouri.

WH3.6.1 Base Affected Environment

WH3.6.1.1 Vegetation

Whiteman AFB is located in the Prairie Division of the Humid Temperate Domain ecoregion. Vegetation associated with this ecoregion includes a mosaic of oak-hickory woodland and bluestem prairie. Historical land use of the area included a mosaic of woodland, cropland, and grassland or rangeland habitat.

Current vegetative surface areas at Whiteman AFB are either improved or semi-improved grounds, primarily consisting of landscaped areas and mowed former agricultural fields. Unimproved grounds at the installation include open prairie, mixed wood and hardwood urban forests, green belt areas, streams and ponds. Vegetation management at Whiteman AFB is guided by the Integrated Natural Resources Management Plan (INRMP), Urban Forest Management Plan, and the BASH Plan (Whiteman AFB 2014, 2015a).

WH3.6.1.2 Wildlife

Information on wildlife occurring on Whiteman AFB is provided in the INRMP (Whiteman AFB 2015a). Whiteman AFB supports a diversity of wildlife species common to an agricultural landscape. Common wildlife species include deer mice (*Peromyscus maniculatus*), fox (*Vulpes vulpes*), white-tailed deer (*Odocoileus virginianus*), wild turkey (*Meleagris gallopavo*), coyote (*Canis latrans*), blackbirds (*Turdus merula*), robins (*Turdus migratorius*), crows (*Corvus brachyrhynchos*), barn swallows (*Hirundo rustica*), blue jays (*Cyanocitta cristata*), turkey vultures (*Cathartes aura*), downy woodpeckers (*Picoides pubescens*) and field sparrows (*Spizella pusilla*). Hardwood forests and riparian habitats support a wide variety of amphibian and reptile species, including toads, frogs, lizards, turtles, and snakes. Fish species are limited to the installation ponds that are periodically stocked with largemouth bass (*Micropterus salmoides*), crappie (*Pomoxis* spp.), and bluegill (*Lepomis macrochirus*) for recreational fishing.

WH3.6.1.3 Threatened, Endangered, and Special Status Species

WH3.6.1.3.1 Federally Listed Species

The USFWS's Information for Planning and Consultation (IPaC) online system was accessed on 8 February 2018 to identify current USFWS trust resources (e.g., migratory birds, species proposed or listed under the Endangered Species Act (ESA), inter-jurisdiction fishes, specific marine mammals, wetlands, and USFWS National Wildlife Refuge System lands) with potential to occur in the ROI for biological resources at Whiteman AFB.

On 8 February 2018, the USFWS provided an automated *Official Species List* via a letter that identified three threatened and endangered species protected under the ESA (16 *USC* § 1531 et seq.) and one USFWS National Wildlife Refuge near Johnson County, Missouri. Table WH3-28 presents these species.

No federally listed threatened, endangered, or candidate species are currently known to occur on Whiteman AFB. This assessment is based on historical surveys completed by the U.S. Department of Agriculture (USDA) in 1992, the Missouri Department of Conservation (MDC) in 1994, and subsequent survey work conducted in part of the INRMP (Whiteman AFB 2015a). Additionally, no critical habitat occurs on or near Whiteman AFB (USFWS 2018).

Table WH3-28. Federally Listed Species with Potential to Occur in Johnson County, Missouri

Common Name	Scientific Name	Federal Listing Status	Habitat	Historically Observed at Whiteman AFB?
Mammals				
Gray Bat	*Myotis grisescens*	Endangered	Gray bats roost in caves or mines year-round and use water features and forested riparian corridors for foraging and travel.	No
Indiana Bat	*Myotis sodalis*	Endangered	The Indiana bat and northern long-eared bat hibernate in caves or mines during the winter. During the active season in Missouri (April 1 to October 31), these species roost in forest and woodland habitats. Suitable summer habitat for Indiana bats and northern long-eared bats consists of a wide variety of forested/wooded habitats where they roost, forage, and travel and could also include some adjacent and interspersed non-forested habitats (e.g., emergent wetlands and adjacent edges of agricultural fields, old fields, and pastures). This includes forests and woodlots containing potential roosts (i.e., live trees and/or snags that are 5 inches in diameter at breast height for the Indiana bat and 3 inches in diameter at breast height for the northern long-eared bat, and that have exfoliating bark, cracks, crevices, and/or hollows), as well as linear features such as fencerows, riparian forests, and other wooded corridors. Northern long-eared bats have also been observed roosting in human-made structures (e.g., buildings, barns, bridges, and bat houses); therefore, these structures should also be considered potential summer habitat and evaluated for use by bats.	No
Northern Long-eared Bat	*Myotis septentrionalis*	Threatened		

Key: FE = federally endangered; FT = federally threatened
Source: Whiteman AFB 2015a; USFWS 2016a,b; USFWS 2017; USFWS 2018

WH3.6.1.3.2 Migratory Birds

Migratory bird species protected under the Migratory Bird Treaty Act (MBTA) (16 *USC* §§ 703–712) could occur as residents or migrants near Whiteman AFB. Migratory birds, including waterfowl, raptors, and neo-tropical migrants, have been observed on base (Whiteman AFB 2015a). Under AFI 91-202 and AFI 91-212, *Bird/Wildlife Aircraft Strike Hazard (BASH) Management Program,* Whiteman AFB maintains a BASH Plan that establishes an overall bird/wildlife control program to minimize aircraft exposure to potentially hazardous wildlife strikes. The BASH Plan delineates responsibilities for minimizing potential hazards in the areas where tasked units assigned to Whiteman AFB conduct flying operations. In coordination with the MDC, Whiteman AFB annually reports to the USFWS Migratory Bird Office regarding migratory bird activity and other wildlife control at the installation (Donaldson 2018). Additionally, a USDA wildlife biologist employed at Whiteman AFB manages potential wildlife hazards by removal, dispersal, and wildlife control methods to avoid any BASH incidents. Commonly controlled avian species include turkey vultures, pigeons (*Columba livia*), blackbirds, and wild turkeys (Whiteman AFB 2014). BASH habitat is managed intensively around the airfield environment to reduce the threat to human health and safety.

WH3.6.1.3.3 Bald and Golden Eagles

No bald or golden eagles protected under the Bald and Golden Eagle Protection Act (BGEPA) (16 *USC* 668-668c) have been observed at Whiteman AFB. Although suitable bald eagle habitat is present in the mixed forest and open water habitats near the vicinity of the base, bald eagles have not been reported in Johnson County, Missouri (MDC 2018a). Golden eagles do not live in Missouri year-round, but could occur as winter migrants in small numbers.

WH3.6.1.3.4 USFWS National Wildlife Refuge System Lands

The USFWS IPaC report identified the Big Muddy National Fish and Wildlife Refuge as a natural resource area of potential concern (USFWS 2018). The refuge encompasses more than 17,000 acres of riverine area along the Missouri River and provides valuable bottomland and wet prairie habitat to a wide variety of fish, amphibians, reptiles, migratory birds, and mammals (USFWS 2013).

WH3.6.1.3.5 State-Listed Species

The MDC Missouri Natural Heritage Program was accessed to identify state-listed species (protected under the Rule 3 *CSR* 10-4.111 of the Wildlife Code of Missouri) with potential to occur within the ROI for biological resources at Whiteman AFB (MDC 2018b). Two state-listed species have been historically observed at Whiteman AFB. Neither species has been seen at the installation since the early 1990s. These species include the northern crawfish frog (*Lithobates areolatus circulosus*) and the greater prairie-chicken (*Tympanuchus cupido*). In 1994 the MDC collected a northern crawfish frog from a mowed field within the cantonment area. The greater prairie-chicken was also observed and known to establish leks on the flightline; however, no occurrences have been confirmed since the spring of 1993 (Whiteman AFB 2015a; Donaldson 2018).

WH3.6.1.4 Wetlands

Wetland delineations were completed at Whiteman AFB in 1995 and 1999 (Whiteman AFB 2015a). Approximately 88.29 acres of wetlands were identified on the installation. The wetlands occur primarily within the airfield between the runway and the parking apron. Drainage ditches associated with the airfield and the ammunition storage area, two holding ponds, and two large lakes on the base were previously identified as non-jurisdictional wetland habitats. Bear Lake is the only jurisdictional wetland on the base (Whiteman AFB 2015a).

WH3.6.2 Base Environmental Consequences

WH3.6.2.1 Vegetation

Activities associated with construction, demolition, and renovation projects would occur in developed or disturbed areas within the Community Commercial land use area of Whiteman AFB. Revegetation of temporarily disturbed areas would be conducted as directed by the base natural resource manager to minimize the potential for erosion and dust generation. No significant impacts to vegetation are anticipated to result from implementation of the AFRC F-35A mission at Whiteman AFB.

WH3.6.2.2 Wildlife

Potential impacts to wildlife could include ground disturbance and construction noise from the associated facility and infrastructure projects. In addition, airfield operations can result in bird/wildlife-aircraft strikes and noise impacts.

The areas planned for development for the proposed AFRC F-35A mission at Whiteman AFB are highly disturbed and provide little habitat for wildlife species. The existing turfgrass and landscaped areas provide some urban adapted wildlife species with limited habitat. This habitat would be lost with construction of the proposed facilities and infrastructure projects.

Noise resulting from the proposed construction, demolition, and renovation activities would be localized, short-term, and only occur during daylight hours. Areas proposed for construction are in a military industrial land use with frequent elevated noise levels. Impacts to wildlife from construction noise would be minimal.

Annual airfield operations are anticipated to increase by approximately 17.4 percent (Section WH2.3). Any increase in operations could increase the potential for bird/wildlife-aircraft strikes. Whiteman AFB would continue to adhere to the installation's BASH Plan and annually coordinate with the MDC regarding migratory bird activity and other wildlife control at the installation. Wildlife would continue to be controlled per the recommendations of MDC in coordination with the USFWS Migratory Bird Office and BASH habitat would be managed intensively around the airfield environment to minimize the risk of strikes.

Impacts to wildlife and domestic animals that could result from aircraft noise are summarized below and discussed in more detail in Section WH3.2.2 and in Volume II, Appendix B. As described in Section WH3.2.2, the number of acres exposed to DNL greater than 65 dB would increase. Because additional land would be exposed to DNL greater than 65 dB, additional animals would also be exposed to this noise. Animals hear noise at different levels, in different frequency ranges, and tolerate noise differently than humans. These differences make comparing the noise metrics created for evaluating human impacts to animal impacts difficult. However, the number of noise events per hour with potential to interfere with speech (Table WH3-15) can be used as an indicator of changing frequency noise events that could affect animals. For example, under baseline conditions, animals near the Knob Noster State Park campground currently experience four events per hour that are at a sufficient level to interfere with human speech. Implementation of the new mission would increase this number by one event per hour.

Volume II, Appendix B, summarizes a number of scientific studies that have been conducted on the effects of aircraft noise on animals. These studies have shown that animal species have a wide range of responses to aircraft noise. One conclusion of these studies is that a general response to noise by domestic animals and wildlife is a startle response. These responses vary from flight, trampling, stampeding, jumping, or running, to the movement of the head in the directions of the noise. These studies report that the intensity and duration of the startle response decreases with time, suggesting no long-term, adverse effects. The majority of the studies suggest that domestic animal species and wildlife show behaviors characteristic of adaptation, acclimation, and habituation to repeated aircraft noise (Volume II, Appendix B). Therefore, significant impacts to animals in the ROI would not result from implementation of the AFRC F-35A mission at Whiteman AFB.

WH3.6.2.3 Threatened, Endangered, and Special Status Species

WH3.6.2.3.1 Federally Listed Species

On 14 May 2018 the USFWS indicated that if this project involves the removal of less than 10 acres of suitable bat habitat and the trees would be cleared during the bat hibernation season (1 November to 31 March), they do not anticipate adverse effects to the three listed bat species. Because no trees would be cleared and no federally listed threatened, endangered, or candidate species and/or designated critical habitat occurs in the ROI near Whiteman AFB, no impacts to protected species are anticipated to result from implementation of the proposed AFRC F-35A mission.

WH3.6.2.3.2 Migratory Birds

Implementation of the AFRC F-35A mission at Whiteman AFB would result in a 17.4 percent increase in annual total airfield operations. Any increase in operations could result in an increased opportunity for bird-aircraft strikes to occur. Adherence to the existing BASH program would minimize the risk of bird-aircraft strikes including those for migratory birds to negligible levels (Section 3.4.1.5). Noise-related impacts to migratory birds nesting near Whiteman AFB would be the same as those described for other wildlife. Minimal impacts to migratory birds would result from implementation of the proposed AFRC F-35A mission in the ROI near Whiteman AFB.

WH3.6.2.3.3 Bald and Golden Eagles

No bald or golden eagles occur on Whiteman AFB and therefore, no impacts to eagles would result from implementation of the proposed AFRC F-35A mission.

WH3.6.2.3.4 USFWS National Wildlife Refuge System Lands

The Big Muddy National Fish and Wildlife Refuge was identified by the USFWS IPaC report as an area near the base. None of the airspace proposed for training use overlies the Big Muddy National Fish and Wildlife Refuge. No impacts to this refuge would result from implementation of the proposed AFRC F-35A mission.

WH3.6.2.3.5 State-Listed Species

No state-listed species are known to occur on Whiteman AFB and therefore, no impacts to state-listed species would result from implementation of the proposed AFRC F-35A mission.

WH3.6.2.4 Wetlands

Construction, demolition, and renovation projects associated with the proposed action would not occur within or near any wetland areas. Therefore, there would be no impacts to wetlands at Whiteman AFB.

WH3.6.3 Airspace Affected Environment

The ROI for biological resources under airspace is defined as the primary airspace and ranges where AFRC F-35A pilots would predominantly fly.

WH3.6.3.1 Vegetation

The airspace proposed for use by AFRC F-35A pilots from Whiteman AFB covers approximately 23,514 square miles of land over Missouri, Kansas, and Arkansas. Primary range and airspace proposed for use covers approximately 7,805 acres of land over Missouri (Figure WH2-2). Vegetation communities under the primary airspace proposed for use includes those of the Ozark Highlands ecoregion. Vegetation communities are dominated by open oak-hickory and shortleaf pine woodlands and forests, including an assemblage of various types of fens, forests, wetlands, fluvial features, and carbonate and siliceous glades (USGS 2009).

WH3.6.3.2 Wildlife

The Ozark Highlands ecoregion supports more than 200 species of terrestrial and aquatic fauna (USGWS 2009). Common mammal species known to the region include vole (*Microtus* sp.), chipmunks (*Tamias striatus*), squirrels (*Sciurus niger, S. carolinensis*), white-tailed deer, bobcats (*Lynx rufus*), coyotes, and multiple species of mice and bats. The region supports a wide diversity of avian species including flycatchers, vireos, larks, wrens, finches, warblers, woodpeckers, and various waterfowl such as ducks, geese, and teals. Wooded and open habitats support a range of raptor species such as hawks, falcons, and various owl species. A wide variety of reptiles and amphibians are present including various species of turtles, snakes, lizards, frogs, toads, salamanders, and newts.

WH3.6.3.3 Threatened, Endangered, and Special Status Species

WH3.6.3.3.1 Federally Listed Species

Federally listed threatened, endangered, and/or candidate species that could occur within the 22 counties included in the analysis of primary airspace and range areas proposed for use are presented in Table WH3-29. Due to the limited nature of ground disturbance in the areas under the primary airspace, plant, invertebrate, and fish species were excluded from further analysis. No critical habitat was identified under the primary airspace and range areas.

Table WH3-29. Federally Listed Species with Potential to Occur Under Primary Airspace and Primary Ranges Associated with the Proposed Action at Whiteman AFB

Common Name	Scientific Name	Federal Listing Status	Habitat
Mammals			
Gray Bat	*Myotis grisescens*	Endangered	Gray bats roost in caves or mines year-round and use water features and forested riparian corridors for foraging and travel.
Indiana Bat	*Myotis sodalis*	Endangered	Indiana bats and northern long-eared bats hibernate in caves or mines during the winter. During the active season in Missouri (April 1 to October 31) these species roost in forest and woodland habitats. Suitable summer habitat for Indiana bats and northern long-eared bats consists of a wide variety of forested/wooded habitats where they roost, forage, and travel and could also include some adjacent and interspersed non-forested habitats (e.g., emergent wetlands and adjacent edges of agricultural fields, old fields, and pastures). This includes forests and woodlots containing potential roosts (i.e., live trees and/or snags 5 inches in diameter at breast height for the Indiana bat and 3 inches in diameter at breast height for northern long-eared bat, and that have exfoliating bark, cracks, crevices, and/or hollows), as well as linear features such as fencerows, riparian forests, and other wooded corridors. Northern long-eared bats have also been observed roosting in human-made structures (e.g., buildings, barns, bridges, and bat houses); therefore, these structures should also be considered potential summer habitat and evaluated for use by bats.
Northern Long-eared Bat	*Myotis septentrionalis*	Threatened	
Birds			
Red-cockaded Woodpecker	*Picoides borealis*	FE	The red-cockaded woodpecker prefers relatively open, parklike stands of pure pine with sparse hardwood midstories. Active colonies can be found in pine stands with a wide range of overstory stocking, but the birds do not tolerate dense hardwood stocking in the midstory. The species typically forages in pine or pine hardwood stands 30 years old or older.
Amphibians			
Ozark Hellbender	*Cryptobranchus alleganiensis bishopi*	FE	Ozark hellbenders need cool, clear streams and rivers with many large rocks.

Key: FE = federally endangered; FT = federally threatened
Source: USDA 2018; USFWS 2011, 2016a,b, 2017, 2018; Whiteman AFB 2015a

WH3.6.3.3.2 Migratory Birds

The primary airspace and range areas proposed for use are located in the USFWS-designated Bird Conservation Region 24 Central Hardwoods under the Mississippi Flyway (USFWS 2008). Under AFI 91-202 and AFI 91-212, Whiteman AFB employs a BASH Program that establishes an overall bird/wildlife control program to minimize aircraft exposure to potentially hazardous wildlife strikes.

WH3.6.3.3.3 Bald and Golden Eagles

Bald eagles are common migrants and winter residents throughout Missouri. Habitat includes estuaries, large lakes, reservoirs, and rivers. During winter, eagles congregate near rivers and reservoirs with open water and often near large concentrations of waterfowl. Golden eagles are also winter migrants in Missouri, but occur in much smaller numbers than bald eagle populations. Wintering eagles are known to perch near open water that provides favorable foraging habitat (MDC 2015).

WH3.6.4 Airspace Environmental Consequences

Impacts to biological resources occurring under the airspace proposed for use by AFRC F-35A pilots could result from overflights and associated noise, the use of munitions and flares, and bird-aircraft collisions. A review of current literature evaluating potential noise effects on wildlife is presented in Volume II, Appendix B.

WH3.6.4.1 Vegetation

Ground disturbance beneath the airspace proposed for use would be limited to the use of flares and munitions, which would be less than or the same as what is currently being used by A-10 pilots from Whiteman AFB and would only occur in areas that are currently approved for such use. Significant impacts to vegetation would not result from implementation of the AFRC F-35A mission in the areas under the airspace proposed for use by AFRC F-35A pilots stationed at Whiteman AFB.

WH3.6.4.2 Wildlife

All airspace proposed for use by AFRC F-35A pilots is currently used as active military airspace by military jet aircraft; therefore, no new types of impact would be introduced into these areas as a result of introducing the F-35A aircraft. Potential impacts for overflights and associated noise, munitions and flares, and bird-aircraft collisions are described as follows.

As shown on Figure WH3-4, L_{dnmr} would remain less than 45 dB beneath the Ada, Bison, Eureka, Lindbergh, Riley, Shirley, and Truman MOAs. Wildlife that are under the path of training overflights would be exposed to short, but intense noise events from overflights. These training airspace areas are very large, and training sorties are sufficiently spread out such that intense overflight noise events at any one location are infrequent. The L_{dnmr} would not change below the Smoky MOAs and R-3601. In the Cannon and Salem MOAs and in R-4501, the number of sorties would increase by as much as 54 percent, and L_{dnmr} would increase by up to 2 dB.

Low time-averaged noise levels (e.g., L_{dnmr}) do not imply that loud overflights do not or would not occur. Rather, they should be interpreted to mean that intense overflight noise events occur less frequently than in other areas. Wildlife in the MOAs and airspace where the L_{dnmr} is unchanged with the implementation of the proposed action would be exposed to noise events less frequently than those where the L_{dnmr} is increasing. In the Cannon and Salem MOAs and in R-4501 wildlife would have a greater frequency of exposure to aircraft noise that is potentially of high intensity and short duration. AFRC F-35A pilots would train at higher altitudes than the current A-10 pilots and this would tend to reduce the noise exposure.

Some physiological/behavioral responses (from both subsonic and supersonic noise) such as increased hormonal production, increased heart rate, and reduction in milk production have been described in a small percentage of studies. A majority of the studies focusing on these types of effects have reported short-term or no effects.

The relationships between physiological effects and how species interact with their environments have not been thoroughly studied. Therefore, the larger ecological context issues regarding physiological effects of jet aircraft noise (if any) and resulting behavioral pattern changes are not well understood.

Animal species exhibit a wide variety of responses to noise. It is therefore difficult to generalize animal responses to noise disturbances or to draw inferences across species, as reactions to jet aircraft noise appear to be species-specific. Consequently, some animal species could be more sensitive than other species and/or could exhibit different forms or intensities of behavioral responses. For instance, the results of one study indicate that wood ducks appear to be more sensitive to noise and more resistant to acclimation to jet aircraft noise than Canada geese (Edwards et al. 1979). Similarly, wild ungulates (e.g., deer) seem to be more easily disturbed than domestic animals.

Animal responses to aircraft noise appear to be somewhat dependent on, or influenced by, the size, shape, speed, proximity (vertical and horizontal), engine noise, color, and flight profile of planes. Other factors influencing response to jet aircraft noise could include wind direction, speed, and local air turbulence; landscape structures (i.e., amount and type of vegetative cover); and, in the case of bird species, whether the animals are in the incubation/nesting phase. Proposed AFRC F-35A training would primarily occur at high altitudes, with 94 percent of total training time being spent at altitudes above 10,000 feet MSL. The higher flight profile could reduce the response of wildlife to aircraft noise.

The literature does suggest that common responses include the “startle” (or “fright”) response and, ultimately, habituation. It has been reported that the intensities and durations of the startle response decrease with the numbers and frequencies of exposures, suggesting no long-term adverse effects. The majority of the literature suggests that domestic animal species (cows, horses, chickens) and wildlife species exhibit adaptation, acclimation, and habituation after repeated exposure to jet aircraft noise.

In summary, adverse behavioral responses ranging from mild to severe could occur in individual animals as a result of loud overflights. Mild responses include head raising, body shifting, or turning to orient toward the aircraft. Moderate responses could include nervous behaviors, such as trotting a short distance. Escape is the typical severe response (Volume II, Appendix B).

None of the airspace proposed for use by AFRC F-35A pilots operating from Whiteman AFB is approved for supersonic flight. Therefore, AFRC F-35A pilots operating from Whiteman AFB would not conduct supersonic flights in the airspace proposed for use and no impacts related to supersonic noise would occur.

Flares would be used as a defensive countermeasure by AFRC F-35A pilots during training operations. Flares would only be used in airspace areas currently approved for such use. Flare use by AFRC F-35A pilots would conform to existing altitude and seasonal restrictions to ensure fire safety. Based on the emphasis on flight at higher altitudes for the F-35A, roughly 90 percent of flares released throughout the authorized airspace would occur above 15,000 feet MSL, further reducing the potential risk for accidental fires or adverse impacts to underlying land areas and habitats. Ordnance delivery would only occur in ranges authorized for use. AFRC F-35A pilots would use the same amount of flares and ordnance as the current A-10 pilots, resulting in no change to the potential for adverse impacts to wildlife under the training airspace.

AFRC F-35A pilots would fly at higher altitudes than A-10 pilots, with the majority (99 percent) of operations occurring above 5,000 feet AGL (operations under 5,000 feet AGL would occur less frequently than baseline operations). Most birds fly below 500 feet, except during migration (Section WH3.6.4.3.2). No F-35A low-level flight training is expected to occur below 500 feet AGL and the potential for bird-aircraft collisions would be minor.

WH3.6.4.3 Threatened, Endangered, and Special Status Species

WH3.6.4.3.1 Federally Listed Species

Potential impacts to federally listed species and critical habitats that could occur under the airspace proposed for use would be the same as those described for wildlife. Therefore, it is anticipated that significant adverse impacts to federally listed species would not result from implementation of the AFRC F-35A mission.

WH3.6.4.3.2 Migratory Birds

Implementation of the AFRC F-35A mission at Whiteman AFB would result in a 5.9 percent decrease in aircraft sorties. A decrease in sorties could result in a decreased opportunity for bird-aircraft strikes. The chances of such bird-aircraft strikes are considered unlikely for the following reasons. AFRC F-35A pilots would predominantly fly above 5,000 feet AGL. Most bird strikes (95 percent) occur below 5,000 feet AGL. Except during migration most birds spend the majority of their time below 500 feet. Migrations typically occur in ranges from 500 to 2,000 feet. The highest known flight of a North American migratory bird species is that of the mallard duck (*Anas platyrhynchos*), which has been observed to fly as high as 21,000 feet (World Atlas 2016). Vultures (*Aegypius monachus*) sometimes rise to elevations higher than 10,000 feet in order to scan larger areas for food and to watch the behavior of distant vultures for clues to the location of food sources (Stanford University 1988). Due to the predominant use of higher altitudes, implementation of the proposed AFRC F-35A mission would result in minimal impacts to migratory birds protected under the MBTA.

WH3.6.4.3.3 Bald and Golden Eagles

Potential impacts to bald and golden eagles and habitats that occur in areas under the primary airspace and range areas would be similar to those described in Section WH3.6.4.3.2. AFRC F-35A pilots would fly at higher altitudes than A-10 pilots, reducing the potential for BASH. As such, no impacts to eagles would result from implementation of the proposed AFRC F-35A mission at Whiteman AFB.

WH3.6.5 Summary of Impacts to Biological Resources

Construction activities on the base would occur in previously disturbed areas. Impacts to wetlands and protected species would not result from implementation of the proposed action. Noise resulting from construction activities would not affect wildlife or protected species because areas where construction is proposed are currently exposed to high noise levels. Aircraft operations near Whiteman AFB and in the airspace proposed for use would expose some wildlife species to increased levels of noise and the 17.4 percent increase in aircraft operations near the base could result in increased bird-aircraft strikes. However, because these species are currently exposed to military and commercial aircraft noise, impacts to biological resources are not anticipated to be significant.

WH3.7 CULTURAL RESOURCES

Cultural resources are historic districts, sites, buildings, structures, or objects considered important to a culture, subculture, or community for scientific, traditional, religious, or other purposes. They include archaeological resources, architectural/engineering resources, and traditional resources. Cultural resources that are eligible for listing on the National Register of Historic Places (NRHP) are known as historic properties.

WH3.7.1 Base Affected Environment

WH3.7.1.1 Architectural Resources

Historical building inventories at Whiteman AFB (Weitze et al. 2009; Klinger and Smith 1997) have identified two buildings that are eligible for listing in the NRHP, Building 1230 and Building 4017. Building 1230 is designated as Site Oscar-01 and is a former Minuteman missile alert facility. Building 1230 is located in the southern portion of the main installation, north of Skelton Lake. Building 4017 is designated as a Strategic Air Command special storage facility and was an ordnance storage igloo associated with the Cold War-era. Building 4017 is located east of the airfield. Whiteman AFB has concluded that no other NRHP-eligible buildings are present on the installation.

WH3.7.1.2 Archaeological Resources

Numerous archaeological surveys have been conducted on Whiteman AFB (Klinger and Smith 1997). No NRHP-eligible sites were identified in these surveys and the survey reports have concluded that there is a low probability for significant archaeological resources in the developed portions of the installation.

WH3.7.1.3 Traditional Resources

Eleven (11) tribes have been identified that are potentially affiliated with the installation. These tribes, listed in Table A-1 in Volume II, Appendix A, Section A.7.2, have been asked to provide information on any properties to which they attach religious and cultural significance. No known tribal sacred sites or properties of traditional religious and cultural importance are located on Whiteman AFB.

WH3.7.2 Base Environmental Consequences

Implementation of the proposed AFRC F-35A mission at Whiteman AFB would include the construction of four new facilities, demolition of one building, and eight renovation projects (Table WH2-1 and Figure WH2-1). All buildings within the Area of Potential Effects (APE) have been evaluated for NRHP eligibility and determined non-eligible and Whiteman AFB has made a finding of no historic properties affected for this action. The Missouri SHPO has concurred with these findings (see letter dated 13 June 2018, Volume II, Appendix A, Section A.7.3).

No impacts to known archaeological resources would result from implementation of the proposed AFRC F-35A mission at Whiteman AFB. All portions of the base with proposed construction are either in areas that have already been disturbed by previous construction or have been inventoried for archaeological resources. No NRHP-eligible archaeological resources have been identified in the APE. Because ground-disturbing activities would occur in previously disturbed and inventoried areas, it is extremely unlikely that any previously undocumented archaeological resources would be encountered during facility demolition, renovation, addition, or construction. In the case of unanticipated or inadvertent discoveries, the USAF would comply with NHPA and Native American Graves Protection and Repatriation Act (NAGPRA) regulations.

NRHP-eligible facilities located on the installation (Buildings 1230 and 4017) are located outside the APE and there would be no direct impact to historic properties. Indirect impacts on cultural resources from population changes, noise or visual intrusions would be extremely unlikely. The total authorized personnel at Whiteman AFB would increase (11 persons) with the proposed action. This small population change would not have an indirect impact on cultural resources at the installation. Both Buildings 1230 and 4017 would be located between the 70 and 75 dB DNL contour lines. As described in Section WH3.2.3 the noise levels in these zones would not be at high enough levels to cause structural impacts to buildings. Visual intrusion from the proposed action would not be a significant issue. Both NRHP-eligible buildings derive their historical significance from association with military activities and their setting within a military installation. New construction would occur in the context of an active USAF base, where changes in the infrastructure are common. The viewshed of remaining historic properties would not be affected by the proposed construction.

No Section 106 impacts to tribal resources or traditional cultural properties are anticipated to result from implementation of the AFRC F-35A mission. As required by Sections 101(d)(6)(B) and 106 of the NHPA; implementing regulations prescribed in 36 *CFR* Section 800.2(c)(2); EO 13175, *Consultation and Coordination with Indian Tribal Governments;* DoDI 4710.02; and AFI 90-2002, *Air Force Interactions with Federally Recognized Tribes*, Whiteman AFB initiated Section 106 government-to-government consultation with eleven tribes to identify traditional cultural properties. Volume II, Appendix A, Section A.2.7.2, contains a record of these consultations. The consultation correspondence included an invitation to participate in the NEPA process, and an invitation to consult directly with the Whiteman AFB Commander regarding any comments, concerns, and suggestions.

WH3.7.3 Airspace Affected Environment

Table WH3-30 presents the NRHP-listed sites and Native American Reservation lands under the airspace proposed for use. The Whiteman AFB training airspace overlies at least part of 29 Missouri counties (Benton, Camden, Carter, Cooper, Crawford, Dent, Henry, Hickory, Howell, Iron, Johnson, Laclede, Lafayette, Moniteau, Morgan, Oregon, Pettis, Phelps, Pulaski, Reynolds, Ripley, Saline, Shannon, St. Clair, St. Francois, Texas, Washington, Wayne, and Wright); 27 Kansas counties (Barton, Butler, Chautauqua, Clay, Cloud, Crowley, Dickinson, Elk, Ellsworth, Geary, Greenwood, Lincoln, McPherson, Mitchell, Montgomery, Osborne, Ottowa, Pottawatomie, Republic, Rice, Riley, Rush, Russell, Saline, Washington, Wilson, and Woodson) and 15 Arkansas counties (Baxter, Cleburne, Conway, Faulkner, Independence, Izard, Jackson, Johnson, Newton, Pope, Searcy, Sharp, Stone, Van Buren, and White).

Four hundred thirteen (413) NRHP-listed properties have been identified under the Whiteman AFB airspace. Fifty-five (55) of these are located under the primary airspace and range areas. No known traditional cultural resources have been identified under the airspace. It is possible that such resources could exist in the area as the exact location of some traditional cultural resources is confidential.

Table WH3-30. NRHP-Listed Sites and Native American Reservation Lands Under Whiteman AFB Training Airspace

Airspace Designations	Number of NRHP Properties Under Airspace[a]	Native American Reservation Lands Under Airspace[a]
Ada East and West MOAs	18	None
Bison MOA	14	None
Eureka High/Low MOAs	19	None
Lindbergh A/B/C MOAs	33	None
Riley MOA	2	None

Table WH3-30. NRHP-Listed Sites and Native American Reservation Lands Under Whiteman AFB Training Airspace (Continued)

Airspace Designations	Number of NRHP Properties Under Airspace[a]	Native American Reservation Lands Under Airspace[a]
Salem MOA	14	None
Shirley A/B/C MOAs	227	None
Smoky MOA	7	None
Truman A/B/C MOAs	62	None
Lindbergh West ATCAA	7	None
Lindbergh D ATCAA	10	None

[a] Due to the sensitivity of the locations, archaeological sites are not included in this table or shown on any figures.

WH3.7.4 Airspace Environmental Consequences

Implementation of the proposed action would result in a 5.9 percent decrease in the total sortie-operations conducted annually in the airspace proposed for use. As described in Section WH3.2.4, L_{dnmr} under the training airspace would remain the same (0 dB increase) or slightly increase (1 to 2 dB), and the highest L_{dnmr} would remain at 53 dB. No supersonic flights would occur in the Whiteman AFB training airspace. No impacts on historic properties under the Whiteman AFB training airspace are expected. Scientific studies of the effects of noise and vibration on historic properties have considered potential impacts on historic buildings, prehistoric structures, water tanks, archaeological cave/shelter sites, and rock art. These studies have concluded that overpressures generated by supersonic overflight were well below established damage thresholds and that subsonic operations would be even less likely to cause damage (see Volume II, Appendix B, Section B.2.10).

WH3.7.4.1 Native American Concerns

During scoping, the USAF contacted 11 federally affiliated Native American tribes to invite them to attend the public meetings and express their concerns about the potential AFRC F-35A mission at Whiteman AFB. During the scoping process, including the public meetings, no comments regarding potential impacts on traditional cultural resources or traditional cultural properties were received.

In accordance with Section 106 of the NHPA and EO 13175, USAF also has contacted the 11 tribes to consult on a government-to-government basis regarding their concerns about potential impacts on traditional cultural resources and traditional cultural properties under airspace associated with Whiteman AFB. Four tribes have responded to the request for consultation. Three of the tribes indicated concurrence, approval, or no interest in the project. One tribe requested a copy of the Draft EIS. USAF coordination with interested tribes regarding airspace actions will continue throughout the EIS process.

WH3.7.5 Summary of Impacts to Cultural Resources

No archaeological sites are located in any of the proposed construction footprints at Whiteman AFB. In the case of unanticipated or inadvertent discoveries, the USAF would comply with Section 106 of the NHPA. All buildings within the APE have been evaluated for NRHP eligibility and determined non-eligible and the Missouri SHPO has concurred with this finding. Section 106 consultation is considered complete and Whiteman AFB will continue to coordinate with interested tribes throughout the EIS process. No impacts to historic properties under the airspace proposed for use are expected. Implementation of the AFRC F-35A mission is not anticipated to result in significant impacts to cultural resources.

WH3.8 LAND USE AND RECREATION

WH3.8.1 Base Affected Environment

WH3.8.1.1 Land Use

On-base construction would be consistent with established base land uses. Because potential land use consequences would primarily be noise-related, the discussion in this section focuses on noise-related land use regulations and compatibility constraints. The following paragraphs address federal, state, and local statures, regulations, programs, and plans that are relevant to the analysis of land use for Whiteman AFB and the surrounding areas.

Installation Development Plan (IDP). The Whiteman AFB IDP guides future development and land use decisions at Whiteman AFB (USAF 2015).

Joint Land Use Study (JLUS). The JLUS for Whiteman AFB was published in 2008 with the City of Knob Noster and Johnson County serving as participating communities. The JLUS was developed to encourage cooperative land use planning between the military and surrounding civilian land uses, to seek a cooperative means to anticipate and minimize the impacts of military operations on adjacent lands, and to protect and promote the future operational mission of Whiteman AFB.

The 2009 Military Airport Comprehensive Plan for the Unincorporated Area of Johnson County, Missouri. In 2009, after the JLUS was completed, the Johnson County Airport Zoning Commission published the comprehensive plan to focus on the necessary restrictions to allow for the safe and secure daily activities of both the public and the government (JCAZC 2009).

Local Regulations and Ordinances. Whiteman AFB and surrounding communities have been working on compatibility planning since the 2008 JLUS. The Johnson County Military Airport Zoning Commission was developed to provide encroachment protection for the base by limiting population density near the base and establishing reasonable limits for acreage minimums for residential development. The base actively participates in providing information to support ongoing community planning initiatives. Similarly, two surrounding communities have adopted regulatory overlays to address noise and air safety impacts. The Whiteman AFB compatibility menu identifies 39 strategies for land use planning.

On-Base Land Use. Whiteman AFB occupies approximately 5,419 acres (3,879 owned and 362 leased) with 1,178 acres of easements of federally owned or leased land at the eastern edge of Johnson County, Missouri. Land use on the base is generally divided into six planning districts. The Airfield District, which encompasses approximately 2,423 acres of the base, is the largest.

Surrounding Land Use. Whiteman AFB is located in west-central Missouri, directly south of Knob Noster and 7 miles east of Warrensburg. Land use surrounding the base is generally rural, agricultural land with wooded, flat, and rolling terrain.

As identified in Table WH3-31, under baseline conditions, land uses exposed to DNL of 65 dB or greater primarily consist of open areas, followed by residential, commercial and industrial areas. Approximately 98 acres of residential land is currently exposed to DNL of 65 dB or greater, resulting in incompatible use.

Table WH3-31. Off-Base Acres Currently Exposed to DNL of 65 dB or Greater at Whiteman AFB

Land Use Category[a]	DNL (dB)					
	65–69	70–74	75–79	80–84	≥ 85	Total
Commercial	17	12	0	0	0	29
Industrial	23	2	0	0	0	25
Open	1,381	504	52	0	0	1,937
Public/Quasi-Public	0	0	0	0	0	0
Recreational	0	0	0	0	0	0
Residential	79	19	0	0	0	98
Water	0	0	0	0	0	0
Total	**1,500**	**537**	**52**	**0**	**0**	**2,089**

[a] All numbers are in units of acres.

Note: Numbers may not sum due to rounding. To best represent the level of accuracy achieved, acreage numbers are displayed as whole numbers in the text and tables, whereas calculations are based on the raw number of acres. The resulting summations and change calculations are then rounded to whole numbers.

Source: USAF 2015

WH3.8.1.2 Recreation

Whiteman AFB hosts an outdoor track, a 16-lane bowling center, an 18-hole golf course, two basketball courts, several baseball and soccer fields, tennis courts, and two swimming pools. The fitness center hosts state-of-the-art exercise machines and a gym with a basketball court. Although Whiteman AFB offers a variety of both indoor and outdoor recreational facilities, the IDP identified a need to pursue a consolidated recreation complex to leverage connections with the adjacent Knob Noster State Park (Whiteman AFB 2015b). Fishing, skeet, and archery are the only activities actively managed by the outdoor recreation office on base. Three ponds are open to recreational fishing on the base. The ponds are not regularly stocked but host a variety of species, including catfish, bluegill, and bass.

Knob Noster State Park is adjacent to the base and offers opportunities for camping, hiking, fishing, picnic areas, horseback riding, bicycle trails, and boating (Table WH3-32). Whiteman AFB is located in close proximity to multiple other recreational areas such as Truman Lake and Lake of the Ozarks. Multiple MDC Wildlife Areas offer hunting and fishing opportunities along with areas for hosting picnics and hiking.

Table WH3-32. Recreation Facilities near Whiteman AFB

ID	Recreational Facility	Activities	Current DNL (dB)	Compatibility (Y/N)
P01	Knob Noster State Park campground	Picnic areas, fishing, hiking, camping, bicycling, horseback riding	48	Y

WH3.8.2 Base Environmental Consequences

WH3.8.2.1 Land Use

WH3.8.2.1.1 Physical Development

The physical development associated with the proposed AFRC F-35A mission at Whiteman AFB would primarily occur in previously disturbed areas near the flightline where airfield and aircraft O&M support activities occur on a daily basis. None of the physical development associated with implementation of the proposed mission at Whiteman AFB would impact land use because the proposed construction and renovation would occur in land uses designated for the proposed use.

Subsequent O&M activities for the proposed mission would conform to current and future land uses on the base and traffic, noise, dust, and similar effects from construction equipment would be reduced through construction plans and practices agreed to by contractors. During scoping one commenter expressed concern about possible base expansion. No plans to expand the base or acquire land are part of the proposed AFRC F-35A mission. The physical changes and daily activities on the ground would be confined to the base. The proposed on-base development would have no impact to off-base areas. Impacts associated with physical development would be the same regardless of which afterburner scenario is selected.

WH3.8.2.1.2 Aircraft Operations

This analysis includes an evaluation of the potential noise impacts to on- and off-base land uses resulting from the proposed AFRC F-35A mission at Whiteman AFB. Volume II, Appendix B, Section B.2.2, presents the USAF noise compatibility guidelines for noise exposure to various land uses.

<u>Scenario A</u>

Implementation of Scenario A would increase the area surrounding Whiteman AFB exposed to DNL of 65 dB or greater by approximately 2,421 acres (Table WH3-33 and Figure WH3-6). This would result in an increase of approximately 3,045 off-installation estimated residents and an additional 307 acres of residential land exposed to DNL of 65 dB or greater.

Table WH3-33. Off-Base Acres Exposed to DNL of 65 dB or Greater at Whiteman AFB under Scenario A

Land Use Category[a]	DNL (dB)																	
	65–69			70–74			75–79			80–84			≥ 85			Total		
	Baseline	AFRC F-35A Mission	Change[b]	Baseline	AFRC F-35A Mission	Change[b]	Baseline	AFRC F-35A Mission	Change[b]	Baseline	AFRC F-35A Mission	Change[b]	Baseline	AFRC F-35A Mission	Change[b]	Baseline	AFRC F-35A Mission	Change[b]
Commercial	17	22	5	12	22	10	0	0	0	0	0	0	0	0	0	29	44	15
Industrial	23	57	34	2	11	9	0	1	1	0	0	0	0	0	0	25	69	44
Open	1,381	2,925	1,544	504	844	340	52	198	146	0	0	0	0	0	0	1,937	3,967	2,030
Public/Quasi-Public	0	25	25	0	0	0	0	0	0	0	0	0	0	0	0	0	25	25
Recreational	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Residential	79	322	243	19	82	63	0	1	1	0	0	0	0	0	0	98	405	307
Water	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**1,500**	**3,351**	**1,851**	**537**	**959**	**422**	**52**	**200**	**148**	**0**	**0**	**0**	**0**	**0**	**0**	**2,089**	**4,510**	**2,421**

[a] All numbers are in units of acres.
[b] Change equals the difference between baseline acreage and acres exposed to noise resulting from the AFRC F-35A mission.
Note: Numbers may not sum due to rounding. To best represent the level of accuracy achieved, acreage numbers are displayed as whole numbers in the text and tables, whereas calculations are based on the raw number of acres. The resulting summations and change calculations are then rounded to whole numbers.
Source: USAF 2015

The JLUS identifies residential (except for mobile home parks), commercial, industrial, open, and public/quasi-public land uses as compatible, or generally compatible, with DNL from 65 to 75 dB when measures to achieve overall noise level reduction are included in facility design and construction.

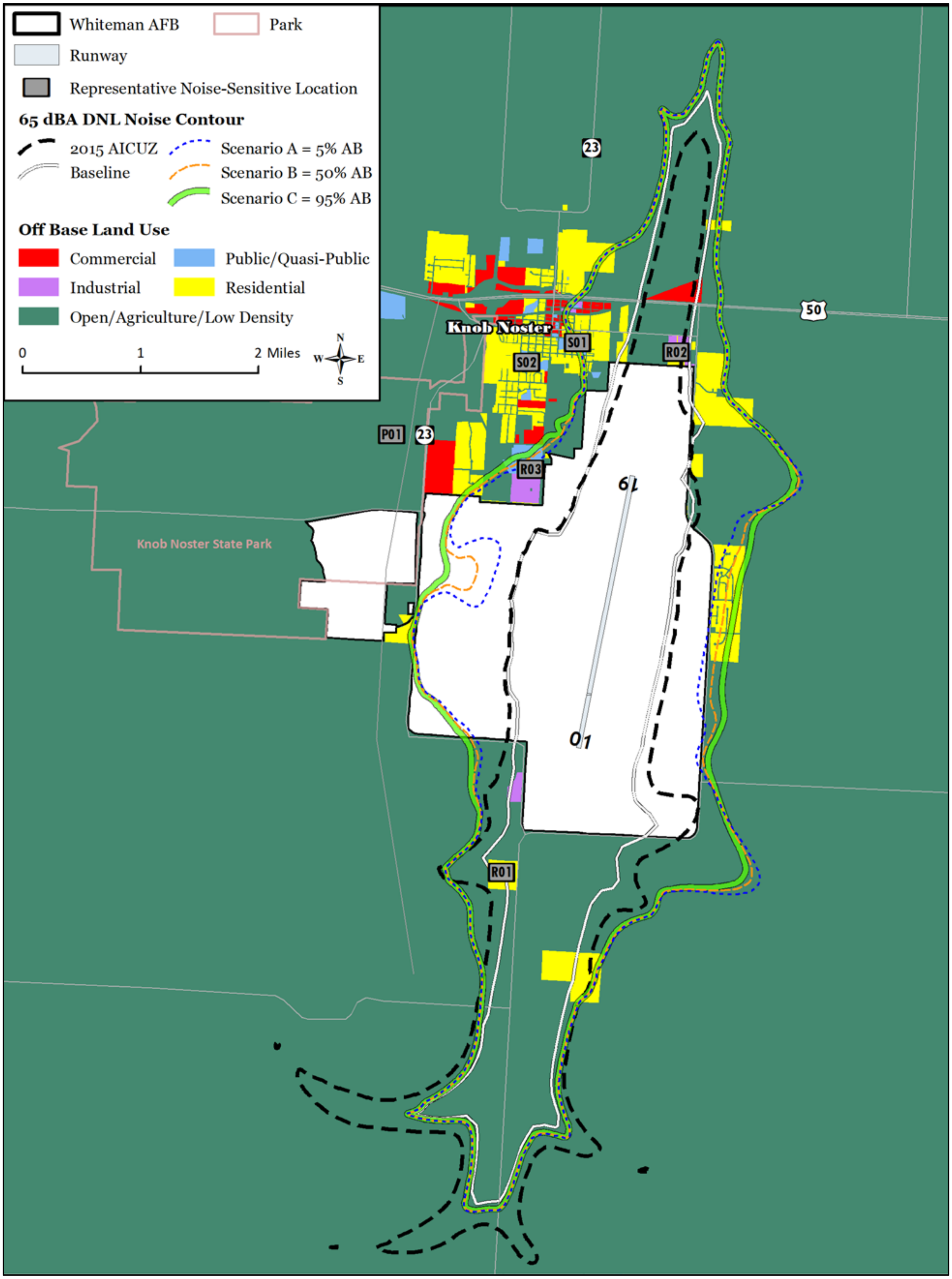

Figure WH3-6. Baseline, JLUS, and AFRC F-35A Mission DNL Contours Relative to Land Use at Whiteman AFB

Two mobile home parks would be impacted by increased noise from the AFRC F-35A mission. One park represented by point R02 is currently exposed to 68 dB DNL under baseline conditions. Implementation of Scenario A would result in a 5 dB DNL increase. A second mobile home park, represented by point R03, would be exposed to an increase of 9 dB DNL (66 dB DNL). The baseline and proposed action noise levels are and would be incompatible with this land use. As described in Section WH3.2.2, there would be significant noise-related impacts to residents in these areas. Land impacts are assessed in part on the change in the suitability of a location for its current or planned use (see Chapter 3, Section 3.8.3.1). The EIS identifies potential significant noise-related impacts to people in the vicinity of the base. However, from a land use perspective, the land use compatibility of the points represented by R02 and R03 would remain unchanged.

No recreational land would be exposed to DNL of 65 dB or greater. The largest increase in acreage exposed to additional noise would be open areas, followed by residential, commercial, industrial, and other land uses. Implementation of the AFRC F-35A mission (Scenario A) would not result in significant impacts to land use.

Scenario B

Implementation of Scenario B would increase the area surrounding Whiteman AFB exposed to DNL of 65 dB or greater by approximately 2,517 acres (Table WH3-34 and Figure WH3-6). This would result in an increase of an estimated 3,341 off-installation residents and an additional 354 acres of residential land exposed to DNL of 65 dB or greater. The same mobile home parks impacted by implementation of Scenario A would also be impacted by implementation of Scenario B.

Table WH3-34. Off-Base Acres Exposed to DNL of 65 dB or Greater at Whiteman AFB under Scenario B

Land Use Category[a]	DNL (dB)																	
	65–69			70–74			75–79			80–84			≥ 85			Total		
	Baseline	AFRC F-35A Mission	Change[b]	Baseline	AFRC F-35A Mission	Change[b]	Baseline	AFRC F-35A Mission	Change[b]	Baseline	AFRC F-35A Mission	Change[b]	Baseline	AFRC F-35A Mission	Change[b]	Baseline	AFRC F-35A Mission	Change[b]
Commercial	17	22	5	12	22	10	0	0	0	0	0	0	0	0	0	29	44	15
Industrial	23	55	32	2	12	10	0	1	1	0	0	0	0	0	0	25	68	43
Open	1,381	2,963	1,582	504	849	345	52	195	143	0	0	0	0	0	0	1,937	4,007	2,070
Public/Quasi-Public	0	35	35	0	0	0	0	0	0	0	0	0	0	0	0	0	35	35
Recreational	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Residential	79	370	291	19	81	62	0	1	1	0	0	0	0	0	0	98	452	354
Water	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**1,500**	**3,445**	**1,945**	**537**	**964**	**427**	**52**	**197**	**145**	**0**	**0**	**0**	**0**	**0**	**0**	**2,089**	**4,606**	**2,517**

[a] All numbers are in units of acres.
[b] Change equals the difference between baseline acreage and acres exposed to noise resulting from the AFRC F-35A mission.
Note: Numbers may not sum due to rounding. To best represent the level of accuracy achieved, acreage numbers are displayed as whole numbers in the text and tables, whereas calculations are based on the raw number of acres. The resulting summations and change calculations are then rounded to whole numbers.
Source: USAF 2015

No recreational land would be exposed to DNL of 65 dB or greater. The largest increase in acreage exposed to additional noise would be open areas, followed by residential, commercial, industrial, and other land uses. Implementation of the AFRC F-35A mission (Scenario B) would not result in significant impacts to land use.

Scenario C

Implementation of Scenario C would increase the area surrounding Whiteman AFB exposed to DNL of 65 dB or greater by approximately 2,620 acres (Table WH3-35 and Figure WH3-6). This would result in an increase of an estimated 3,699 off-installation residents and an additional 405 acres of residential land exposed to DNL of 65 dB or greater. The same mobile home parks impacted by implementation of Scenarios A or B would also be impacted by implementation of Scenario C.

Table WH3-35. Off-Base Acres Exposed to DNL of 65 dB or Greater at Whiteman AFB under Scenario C

Land Use Category[a]	DNL (dB)																	
	65–69			70–74			75–79			80–84			≥ 85			Total		
	Baseline	AFRC F-35A Mission	Change[b]	Baseline	AFRC F-35A Mission	Change[b]	Baseline	AFRC F-35A Mission	Change[b]	Baseline	AFRC F-35A Mission	Change[b]	Baseline	AFRC F-35A Mission	Change[b]	Baseline	AFRC F-35A Mission	Change[b]
Commercial	17	22	5	12	22	10	0	0	0	0	0	0	0	0	0	29	44	15
Industrial	23	54	31	2	13	11	0	1	1	0	0	0	0	0	0	25	68	43
Open	1,381	3,003	1,622	504	853	349	52	192	140	0	0	0	0	0	0	1,937	4,048	2,111
Public/Quasi-Public	0	46	46	0	0	0	0	0	0	0	0	0	0	0	0	0	46	46
Recreational	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Residential	79	422	343	19	80	61	0	1	1	0	0	0	0	0	0	98	503	405
Water	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**1,500**	**3,547**	**2,047**	**537**	**968**	**431**	**52**	**194**	**142**	**0**	**0**	**0**	**0**	**0**	**0**	**2,089**	**4,709**	**2,620**

[a] All numbers are in units of acres.
[b] Change equals the difference between baseline acreage and acres exposed to noise resulting from the AFRC F-35A mission.
Note: Numbers may not sum due to rounding. To best represent the level of accuracy achieved, acreage numbers are displayed as whole numbers in the text and tables, whereas calculations are based on the raw number of acres. The resulting summations and change calculations are then rounded to whole numbers.
Source: USAF 2015

No recreational land would be exposed to DNL of 65 dB or greater. The largest increase in acreage exposed to additional noise would be open areas, followed by residential, commercial, industrial, and other land uses. Implementation of the AFRC F-35A mission (Scenario C) would not result in significant impacts to land use.

WH3.8.2.2 Recreation

Construction in support of the AFRC F-35A mission would occur in the existing cantonment area. Surrounding parks, schools, and recreational facilities are too far from the installation to be affected by construction noise. Increased truck traffic to the installation during the 2-year construction period could cause temporary effects to traffic flow on local roads, but this is not anticipated to interfere with access to recreational areas near Whiteman AFB. New facilities would not alter any sensitive views that have important recreational value.

Implementation of the AFRC F-35A mission at Whiteman AFB would result in a net increase of 11 personnel with dependents as a result of the drawdown of the AFRC A-10 mission as the F-35A aircraft arrive. This change in the number of people would have no discernable effect on recreational resources.

Implementation of Scenario A would result in a DNL increase of 6 dB at the Knob Noster State Park campground. Implementation of Scenarios B or C would result in the same DNL at recreational facilities as implementation of Scenario A, except at Knob Noster State Park, where DNL would be 55 dB rather than 54 dB for both Scenarios B and C. Noise modeling results summarized in Table WH3-36 indicate that implementation of the AFRC F-35A mission at Whiteman AFB would not result in DNL greater than 65 dB at the Knob Noster State Park campground. However, a DNL increase of 6 dB above baseline conditions would be noticeable.

Table WH3-36. Noise Effects on Recreation Facilities Around Whiteman AFB Resulting from Scenario A

Recreational Facility	DNL (dB)	
	Baseline Conditions	AFRC F-35A Mission
Knob Noster State Park campground	48	54

The use of some outdoor recreational facilities such as outdoor sports fields and ball courts is compatible with DNL below 75 dB, with the installation of special sound buffering, although noise increases could reduce the quality and enjoyment of outdoor activities for some persons. One measure of annoyance is the potential for speech interference. As described in Section WH3.2.2.2, 50 dB L_{max} is the metric used to determine potential speech interference. As shown in Table WH3-15, recreational users at the Knob Noster State Park campground would experience one additional outdoor noise event (an increase from three to four) per hour at L_{max} greater than 50 dB.

Another noise metric that can be used to evaluate potential impacts to recreational uses is SEL. The SEL of the loudest overflight event experienced regularly at the Knob Noster State Park campground would increase by 5 dB (Table WH3-10). Recreational users at the Knob Noster State Park campground would experience an increase in the number of these loudest overflight events from less than 1 per day to up to nearly 10 per day at the highest SEL.

WH3.8.3 Airspace Affected Environment

WH3.8.3.1 Land Use

This section summarizes land ownership and identifies affected Special Use Land Management Areas (SULMAs) under the airspace currently used by pilots from Whiteman AFB. SULMAs include selected areas managed by federal and state agencies that provide recreational and scenic opportunities (e.g., parks, monuments, and scenic river corridors), solitude or wilderness experiences (e.g., forests and wilderness areas), conservation of natural or cultural resources (e.g., wildlife refuge areas and national monuments), and other special management functions (e.g., Native American reservation lands). SULMAs often provide a combination of these attributes. Some SULMAs could include recreation-oriented sites such as campgrounds, canoeing opportunities, trails, and visitor centers; recreation is addressed separately in Section WH3.8.3.2.

Pilots from Whiteman AFB use airspace in Missouri, Arkansas, and Kansas with most areas being in Missouri (see Figure WH3-7). The SULMAs under the airspace used by pilots stationed at Whiteman AFB include wilderness areas, National Forests, National Wildlife Refuges, state Wildlife Management Areas and parks, and Native American reservation lands. The majority of federal land under the airspace used is administered by the U.S. Forest Service (USFS), followed by the USFWS. Figure WH3-7 identifies the airspace currently used along with the SULMAs aggregated by ownership (i.e., USFS, USFWS, state land, etc.).

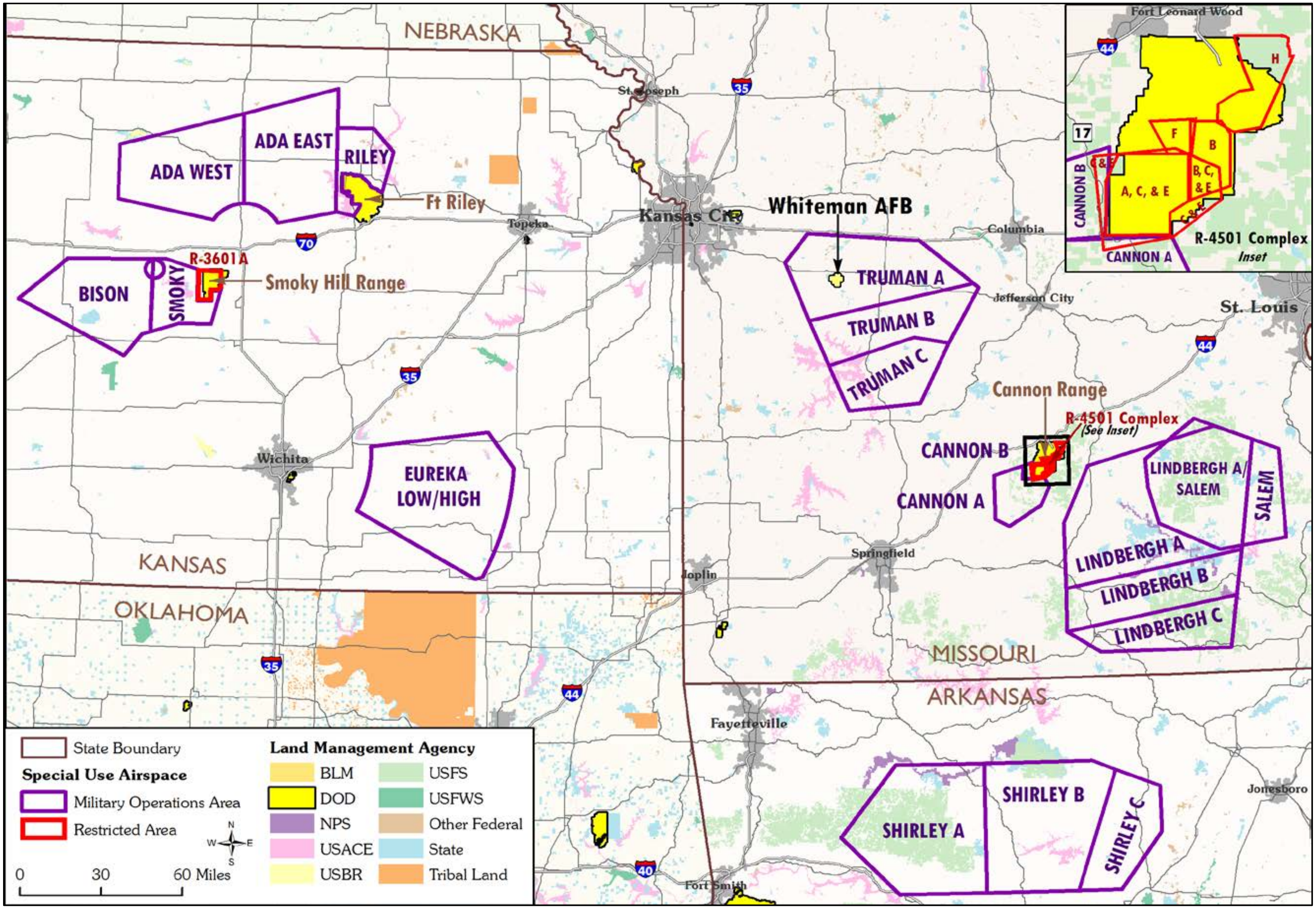

Figure WH3-7. SULMAs Beneath Whiteman AFB Airspace

WH3.8.3.2 Recreation

Recreational opportunities under the airspace currently used are similar to those described in Section WH3.8.1.2. The underlying land reflects the same mosaic of federal, state, and private ownership, with a similar range of outdoor recreational activities. The public lands support a variety of recreational opportunities and activities, with some areas having particular qualities or recreational purposes.

Examples of these include one National Forest, one National Wildlife Refuge and numerous state parks, lakes and conservation areas. Southern Missouri and Northern Arkansas host habitats that support a wide variety of species, particularly throughout the oak-hickory woodlands that dominate this area. These areas are popular for recreational bird watching. In addition, many of the national forests and state lands offer opportunities for hunting and fishing and a variety of different outdoor recreational opportunities. Eastern and central Kansas also offers numerous recreational opportunities and habitats for a wide variety of both game and non-game species. Public access is permitted to limited portions of both Fort Leonard Wood and Fort Riley for recreation. The Sikes Act stipulates that access for wildlife-oriented recreation shall be provided to the extent possible with military use, while maintaining the priority of the military purpose and safety of public users. Recreational activities within the designated areas of Fort Leonard Wood and Fort Riley include camping, driving, fishing, hunting, off-highway vehicle uses in designated areas, and viewing natural resources of interest.

WH3.8.4 Airspace Environmental Consequences

WH3.8.4.1 Land Use

Table WH3-37 identifies the SULMAs that occur under the airspace proposed for use by AFRC F-35A pilots operating from Whiteman AFB that would be exposed to subsonic noise that would increase L_{dnmr} up to 2 dB above baseline conditions. In all cases, SULMAs under the airspace proposed for use would not experience subsonic L_{dnmr} greater than 47 dB.

Table WH3-37. Special Use Areas Land Management Areas Exposed to Subsonic Noise Increases of 1 dB or Greater from the AFRC F-35A Mission at Whiteman AFB

SULMA Name	SULMA Acreage	Percentage of SULMA Under Airspace	Baseline Conditions	AFRC F-35A Mission	
			L_{dnmr}	L_{dnmr}	Change
Cannon A MOA					
Allen (Wilbur) Memorial Conservation Area	383	100	<45	47	2
Mark Twain National Forest	1,505,503	3	<45	47	2
Cannon B MOA					
Mark Twain National Forest	1,505,503	<1	<45	46	1
R-4501					
Mark Twain National Forest	1,505,503	<1	<45	46	1
Salem MOA					
Anderson Mountain Rare II Study Area	2,741	7	<45	47	2
Bell Mountain Wilderness	9,183	100	<45	47	2
Bismarck Conservation Area	1,159	94	<45	47	2
Buford Mountain Conservation Area	3,919	100	<45	47	2
Cedar Mountain Conservation Area	117	100	<45	47	2
Champion Springs Conservation Area	173	100	<45	47	2
Clearwater Recreation Area	1,8714	39	<45	47	2
Current River Conservation Area	29,734	19	<45	47	2

Table WH3-37. Special Use Areas Land Management Areas Exposed to Subsonic Noise Increases of 1 dB or Greater from the AFRC F-35A Mission at Whiteman AFB (Continued)

SULMA Name	SULMA Acreage	Percentage of SULMA Under Airspace	Baseline Conditions	AFRC F-35A Mission	
			L_{dnmr}	L_{dnmr}	L_{dnmr}
Salem MOA					
Dillard Mill State Historic Site	131	100	<45	47	2
Elephant Rocks State Park	128	100	<45	47	2
Fort Davidson State Historic Site	68	100	<45	47	2
Funk Memorial State Forest And Wildlife Area	182	100	<45	47	2
Graves Mountain Conservation Area	3,236	34	<45	47	2
Indian Trail Conservation Area	12,863	100	<45	47	2
Johnson's Shut-Ins State Park	8,304	100	<45	47	2
Ketcherside Mountain Conservation Area	3,451	100	<45	47	2
Logan Creek Conservation Area	11,985	94	<45	47	2
Lower Taum Sauk Lake	1,347	100	<45	47	2
Mark Twain National Forest	1,505,503	23	<45	47	2
Pilot Knob National Wildlife Refuge	118	100	<45	47	2
Riverside Conservation Area	2,696	100	<45	47	2
Rocky Creek Conservation Area	37,652	3	<45	47	2
Sunklands Conservation Area	3,2407	6	<45	47	2
Taum Sauk Mountain State Park	2,125	100	<45	47	2

AFRC F-35A operations would result in minor subsonic L_{dnmr} increases of 2 dB above baseline. Subsonic L_{dnmr} would remain below 65 dB under all of the airspace proposed for use. None of the airspace proposed for use is approved for supersonic aircraft operations.

WH3.8.4.2 Recreation

A synopsis of issues and methodology for addressing potential impacts from military training on recreational resources under training airspace are provided in Chapter 3, Section 3.8.2. In general, a diverse range of active and passive recreational activities occurring throughout the region already coexists within a context of some exposure to military overflight. Increased number of sorties in some airspaces would continue exposure of recreational participants to subsonic noise and potential startle effects from overflights. This could cause some degradation in enjoyment for those affected and loss of opportunity for quiet recreational environments in the region. Subsonic noise could diminish opportunities for visitors to experience natural soundscapes in national forests, and could affect the qualities of natural quiet that are intrinsic to recreational opportunities in wilderness areas, national wild and scenic rivers, and other remote locations.

Average subsonic noise levels under the airspace proposed for use would remain the same, except for areas under the Canon and Salem MOAs, where L_{dnmr} increases of 1 to 2 dB would occur. These increases would be barely discernable and would not result in substantial effects on the noise environment or recreation in underlying areas.

Federal agencies are generally mandated to manage wilderness areas for their wilderness qualities. This includes maintaining the natural setting and allowing minimal human disturbance and development. Although the noise increases are small, wilderness management goals could be negatively affected by increased noise and visual effects associated with military overflights. Increased noise in wilderness areas, recreation areas, and other specially managed lands could also be perceived by some recreational users as affecting their recreation experience.

WH3.8.5 Summary of Impacts to Land Use and Recreation

Land use and recreational resources would not be impacted by any of the construction because all of the construction would be conducted on the base in compatible land use areas. Implementation of Scenarios A, B, or C would expose an additional 2,421, 2,517, or 2,620 acres, respectively, of off-installation land to DNL of 65 dB or greater. The JLUS identifies the residential areas (expect for the mobile home parks) within this area as compatible, or generally compatible, with DNL from 65 to 75 dB when measures to achieve overall noise level reductions are included in the facility design and construction. Impacts to land use would not be considered significant under any of the afterburner scenarios.

None of the recreational areas identified for study around the base would be exposed to DNL greater than 65 dB. However, under Scenario A, DNL would increase at Knob Noster State Park campground by 6 dB (from 48 dB to 54 dB), which would be noticeable. Under Scenarios B or C, the DNL would increase to 55 dB. Regarding impacts to land use and recreation under the airspace proposed for use, DNL would remain below 47 dB beneath all of the airspace proposed for use and the increase in aircraft operations would be minor. In addition, none of the airspace proposed for use is approved for supersonic aircraft operations and therefore no sonic booms would occur.

WH3.9 SOCIOECONOMICS

Socioeconomics refers to features or characteristics of the social and economic environment. The factors affecting socioeconomic resources are the change in personnel, construction of new facilities, renovations and modifications to existing facilities, and noise from F-35A aircraft at Whiteman AFB. These factors are evaluated relative to population, employment, earnings, housing, education, and public and base services. Whiteman AFB is located approximately 2 miles south of Knob Noster in Johnson County, Missouri. Impacts to socioeconomic resources would extend beyond the base boundaries. Therefore, for the purposes of this socioeconomics analysis, the ROI for the proposed action and No Action Alternative is Johnson County, with an emphasis on Whiteman AFB.

WH3.9.1 Base Affected Environment

WH3.9.1.1 Population

Population estimates for Johnson County totaled 53,897 persons in 2017 (USCB 2018). Between 2010 and 2017, the county population increased at an average annual rate of 0.3 percent, with a total increase of approximately 1,302 persons over the 7-year period (USCB 2018). The State of Missouri has an estimated population of 6.1 million (USCB 2018). Average annual population growth in the county has been the same as the state (Table WH3-38).

Table WH3-38. Population in the ROI for Whiteman AFB

Location	2010 Census	2017 Estimates	Annual Percent Change (2010–2017)
Johnson County	52,595	53,897	0.3
Missouri	5,988,927	6,113,532	0.3

Source: USCB 2018

As shown in Table WH2-3, the total current authorized personnel at the base is 12,642 persons. Of the total authorized base personnel, 7.98 percent (1,009 persons) are associated with AFRC.

WH3.9.1.2 Economic Activity (Employment and Earnings)

In 2016, employment in Johnson County totaled 27,086 jobs (BEA 2017a). The largest employment sector in Johnson County was government and government enterprises (40.6 percent), followed by retail trade (8.4 percent), and accommodation and food services (7.3 percent) (BEA 2017a). Construction accounted for 4.1 percent of total employment. Over the last several years, the average annual unemployment rate in the county has steadily declined from 7.2 percent in 2013 to 4.4 percent in 2017 (BLS 2018a). During this same time, the state average annual unemployment rate also declined annually but remained lower than the county. Per capita personal income in Johnson County is estimated at $33,236, which is less than the estimated $42,926 per capita personal income in the state (BEA 2017b).

Whiteman AFB is an important economic contributor to the region through employment of military and civilian personnel, and expenditures for goods and services. The total economic impact of the base on the surrounding communities (defined within a 50-mile radius) in fiscal year 2016 was more than $668 million (Whiteman AFB 2016). Of the total economic impact estimated, approximately 19 percent was for annual expenditures. These included construction; services; and materials, equipment, and supplies procurement (Whiteman AFB 2016). The total payroll for military, DoD civilians, and other base personnel exceeded $346 million (Whiteman AFB 2016). Based on the Impact Analysis for Planning (IMPLAN) economic model, the on-base authorized employment of 12,642 personnel supports an estimated additional 3,448 secondary jobs in the community.

WH3.9.1.3 Housing

Table WH3-39 presents census-derived housing data for Johnson County. The county has an estimated 21,803 total housing units (houses), of which 9 percent (1,869 units) were vacant in 2016 (USCB 2016a). Less than half (40.6 percent) of the occupied houses in the county are renter-occupied and the remaining 59.4 percent are owner-occupied. The median value of owner-occupied houses in Johnson County is estimated at $142,800. The median monthly gross rent was $744 in 2016 (USCB 2016a). As described in Section WH3.2.1.1, an estimated 580 residents and approximately 174 houses are currently exposed to DNL of 65 dB or greater from aircraft operations at Whiteman AFB.

Table WH3-39. Housing Data in the ROI for Whiteman AFB

Location	Houses	Occupied	Vacant
Johnson County	21,803	19,934	1,869

Source: USCB 2016a

As of April 2018, the median listing price of a home in Knob Noster, Missouri, was $165,000. This is more than the nearby city of Odessa, which has a median list price of $160,000, and less than the nearby city of Warrensburg, which has a median list price of $175,000 (Realtor.com 2018). Data collected in 2015 and 2018 show that housing sale prices increased by approximately 16 percent during this timeframe. This is consistent with the state growth in housing sale prices following the preceding economic recession. Recent upward price trends in the local real estate market are expected to continue into the near future.

Accompanied and unaccompanied housing is available on base at Whiteman AFB. Military family housing is privatized and owned by Balfour Beatty Communities. Eight neighborhoods on base are for service members. Estimated waiting times for family housing varies depending on the size of the unit and the rank (Balfour Beatty Communities 2018).

WH3.9.1.4 Education

One elementary school, Whiteman Elementary, is located on base and is part of the Knob Noster Public School District. The Knob Noster Public School District serves more than 1,800 students. Children of school age that reside on base most likely attend one of the off-base schools in the Knob Noster Public School District, the Warrensburg School District, or Sedalia School District 200. Whiteman AFB contains one child development center with a capacity of 169 children ages 6 weeks to 5 years (MyBaseGuide 2018). No schools on or off base are known to be currently exposed to DNL of 65 dB or greater.

WH3.9.1.5 Public Services

Fire and emergency services, law enforcement and protection, and medical services are available throughout Johnson County. The Johnson County Fire Protection District provides rescue and fire suppression to the eastern two-thirds of Johnson County not including the Cities of Knob Noster and Warrensburg, which each have their own fire departments. The Johnson County Fire District has 11 fire departments/fire stations and 130 volunteers (JCFPD 2018). Sheriff and police departments throughout the county provide law enforcement and public safety to the residents of Johnson County. The Western Missouri Medical Center is located in Johnson County and has 75 licensed beds available (Health 2018).

WH3.9.1.6 Base Services

Base services at Whiteman AFB include shopping and dining facilities, airman and family services, a community activity center, an exchange shop, a family support building, education and training facilities, and outdoor and indoor recreational facilities (MyBaseGuide 2018).

WH3.9.2 Base Environmental Consequences

WH3.9.2.1 Population

The current personnel at Whiteman AFB and the projected change anticipated to support the AFRC F-35A mission are provided in Table WH2-3. Implementation of the AFRC F-35A mission would potentially add up to 11 full-time mission personnel. This increase in personnel would increase the existing base population by approximately 0.1 percent and increase the existing county population by less than 0.1 percent. No increase in population would result from the estimated three secondary jobs associated with the increase in base personnel. Implementation of the AFRC F-35A mission would have no discernible effect on population.

WH3.9.2.2 Economic Activity (Employment and Earnings)

As shown in Table WH2-3, implementation of the AFRC F-35A mission at Whiteman AFB would increase the full-time work force assigned to Whiteman AFB by 11 total personnel. Using the IMPLAN model, the direct effect of 11 full-time personnel at Whiteman AFB would have an estimated indirect and induced effect of up to three jobs. During scoping, one commenter asked if the USAF would actively recruit local citizens for employment during and after construction. It is anticipated that the local labor force would be sufficient to fill these new secondary jobs.

Construction activities provide economic benefits to the surrounding areas through the employment of construction workers and the purchase of materials and equipment. Construction activities would be temporary and provide a limited amount of economic benefit. Noise associated with construction activities would be limited to within the base boundaries and would not impact economic activity.

The USAF estimates that a total of $32.5 million in MILCON expenditures during 2021-2023 would be associated with implementation of the AFRC F-35A mission at Whiteman AFB. The total expenditures could generate up to 120 jobs, primarily in the construction industry or related industries, and to a lesser extent in wholesale trade, retail stores (i.e., non-store retailers, miscellaneous store, general merchandise, and gasoline stations), hospitals, and limited-service and full-service restaurants. Construction activities would occur during a 2-year period. With a labor force of 23,157 and an unemployment rate of 4.4 percent, it is expected that the local labor force in the ROI and in the surrounding areas would be sufficient to fill these new jobs. Implementation of the AFRC F-35A mission and projected total MILCON expenditures of $32.5 million at Whiteman AFB would generate an estimated $8.0 million in direct, indirect and induced income in the ROI. The jobs and related income generated would be temporary (i.e., during the construction activity).

WH3.9.2.3 Housing

Assuming all incoming full-time personnel would require off-base housing, there would be a potential need for 11 off-base houses. Based on the number of vacant houses in the ROI, it is anticipated that the housing market in the ROI and surrounding communities and counties would support this need. These impacts would be the same regardless of which afterburner scenario is selected.

During scoping, people raised concerns about the potential impact of noise on surrounding property values. As discussed in more detail in Chapter 3, Section 3.9.3, studies have shown a relation between noise and property values. A study conducted by Trojanek et al. (2017) summarized the results from 79 studies; the majority of those studies found that housing values decreased from 0.26 to 1 percent for every decibel increase in DNL above 65 dB. Some of the studies had values that decreased less than this range and others decreased more. It is a reasonable assumption, based on these studies, that increases in noise could cause some reduction in the rate of increase in housing prices. The percent of effect is dependent upon a number of factors, including the noise indicators used, thresholds, types of properties evaluated, and other factors. The general impact on home pricing would be the same regardless of which afterburner scenario is selected.

Table WH3-40 shows the total estimated number of houses that would be exposed to DNL of 65 dB or greater compared to the existing conditions. The estimated number of residents exposed to this level of noise is from each afterburner scenario is identified in Tables WH3-11, WH3-13, and WH3-14. The JLUS identifies residential land use (except for mobile home parks) to be generally compatible with DNL between 65 and 70 dB with noise attenuation. Residential land exposed to DNL of 70 to 75 dB can be compatible uses, although the JLUS notes that measures to achieve an overall noise level reduction do not solve all noise annoyance issues. Residential land use is incompatible with DNL greater than 75 dB.

Table WH3-40. Estimated Houses Exposed to DNL of 65 dB or Greater from Baseline and AFRC F-35A Mission Conditions at Whiteman AFB

DNL (dB)	Estimated Houses						
	Baseline	Scenario A	Change	Scenario B	Change	Scenario C	Change
65 – 69	163	864	701	960	797	1,060	897
70 – 74	40	164	124	161	121	160	120
75 – 79	0	2	2	2	2	2	2
80 – 84	0	0	0	0	0	0	0
≥85	0	0	0	0	0	0	0
Total	**203**	1,030	**827**	1,123	**920**	1,222	**1,019**

WH3.9.2.4 Education

As described in Chapter 3, Section 3.9.3, the total number of dependents, including spouse and children, was estimated at 2.5 times 65 percent of full-time active associate, active reserve, dual status technician, and non-dual status technician. The total number of children was estimated at 1.5 times 65 percent of full-time personnel, because it was assumed each military member would be accompanied by a spouse. Thus, it is estimated that 11 dependents would be of school age and would enter any of the schools in the three surrounding school districts. The projected number of incoming students would represent a 0.61 percent increase of the current total enrollment in the Knob-Noster Public School District. Based on the size of the school district in the ROI, schools in Johnson County would not be noticeably affected by the increase of 11 students.

During scoping, people submitted comments regarding the potential noise impacts on children and education facilities. One off-base childcare facility (Rau's Day Care) and one off-base school (Knob Noster Elementary) would be newly exposed to DNL of 65 to 69 dB (Section WH3.2.2.1). Educational services are identified in the JLUS as a generally compatible use with sound attenuation measures within the 65 to 70 dB DNL contour. Results of recent reviews on how chronic aircraft noise exposure at school or at homes has been associated with children having poorer reading and memory skills (Basner et al. 2018). Studies also suggest that "children exposed to chronic aircraft noise at school have poorer performance on standardized achievement tests compared to children who are not exposed to aircraft noise" (Basner et al. 2018). Implementation of Scenarios A, B, or C would expose students at Knob Noster Elementary School and Knob Noster High School to an increase in overflight events per hour (see Section WH3.2.2.3), which would disrupt classroom learning.

WH3.9.2.5 Public Services

The estimated addition of 11 USAF-related personnel and dependents would represent less than a 0.1 percent increase of the existing Johnson County population. This would be an indiscernible increase in the county population and would have no measurable effect on county services.

During scoping, people submitted comments regarding the potential impact that noise from the F-35A aircraft would have on the quality of life and health of residents. Aircraft noise has the potential to cause a variety of effects such as annoyance, speech interference, sleep interference, hearing loss, and non-auditory health effects (Section WH3.2.2). Potential non-auditory health impacts due to aircraft noise are discussed in more detail in Section WH3.2.2.7 and Volume II, Appendix B. The USAF continually works with local governments and communities to assess and manage aircraft noise in the environment and attempts to reduce, where possible, the potential impacts of noise to people. When possible, the AFRC F-35A pilots would intentionally avoid overflying identified noise-sensitive locations.

WH3.9.2.6 Base Services

Base services would have adequate capacity to support 11 additional personnel on base associated with the AFRC F-35A mission.

WH3.9.3 Summary of Impacts to Socioeconomics

The personnel increase (11 full-time mission personnel) and community service requirements of the AFRC F-35A mission (Scenario A, B, or C) at Whiteman AFB would not result in significant impacts to population, economic activity, housing availability, or public services. Implementation of Scenario A, B, or C would result in an estimated 827, 920, or 1,019 houses exposed to DNL greater than 65 dB from AFRC F-35A aircraft operations. One school would be exposed to DNL greater than 65 dB from AFRC F-35A aircraft operations under Scenarios A, B, or C. Implementation of the AFRC F-35A mission would not result in significant socioeconomic impacts.

WH3.10 ENVIRONMENTAL JUSTICE AND PROTECTION OF CHILDREN

The environmental justice analysis considers affected populations that meet certain characteristics based on income and age. Analysis of environmental justice and other sensitive receptors is conducted pursuant to EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations,* and EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks.* Environmental justice addresses impacts to minority and low-income populations. This analysis focuses on increased noise resulting from the proposed action as the primary impact to these populations. The USAF guidelines for environmental justice analysis use census data (i.e., percentages of populations identifying themselves as minority, low-income, etc.) to determine potential impacts to these populations. The guidelines also address children (under 18) and elderly (65 and older) as additional sensitive populations. (Minority, low-income, children, and elderly populations are henceforth referred to as environmental justice populations.) Tables WH3-11, WH3-13, and WH3-14 list the number of people exposed to DNL of 65 dB or greater from baseline and the three afterburner scenario conditions at Whiteman AFB.

This analysis is completed to determine if there are existing disproportionate noise impacts to environmental justice populations (i.e., baseline DNL of 65 dB or greater) and if implementation of the proposed action would result in disproportionate noise impacts to environmental justice populations (i.e., AFRC F-35A mission DNL of 65 dB or greater).

Environmental justice analysis overlays the 65 dB DNL contour on the census data polygons. The smallest census data which has the information necessary for analysis of potential impacts to environmental justice populations is used to determine potential impacts. The smallest group of census data which contain the needed information for this analysis is the Census BG. Each BG that is partially or wholly encompassed by the 65 dB DNL contour is defined as an ROI. There could be few or many ROIs for a specific environmental justice analysis, depending on the extent of the noise contour and the size of the BGs. The next higher level of census data is the Census Tract (CT). Each CT contains a number of BGs (ROIs).

> Census blocks are the smallest unit for which the USCB collects census information. **Block Groups (BGs)** are comprised of a combination of census blocks and are a subdivision of **census tracts (CTs)**. Census tracts are a small, relatively permanent statistical subdivision of a county delineated by a local committee of census data users for the purpose of presenting census data. This EIS uses **BGs** and **CTs** in the environmental justice analysis. The **BGs** also comprise the **Region of Influence (ROI)** analyzed in the EIS.

In order to identify disproportionate impacts from baseline or proposed action noise levels, a Community of Comparison (COC) is needed. The COC is defined by summing the population in all the CTs which contain any part of an ROI affected by the 65 dB DNL contour. The percentages of minority and low-income persons are calculated for each ROI (i.e., BG). The ROI and COC percentages are then compared. If the percentage of minorities or low-income persons in an ROI is equal to or greater than the percentage of minorities or low-income persons in the COC, there is a disproportionate impact to the environmental justice population in that ROI (USAF 2014). Chapter 3, Section 3.10.3, provides a description of the method applied to calculate the proportion of the population in the ROIs.

For Whiteman AFB, there are three CTs containing the five ROIs (BGs) which are partially or wholly affected by DNL of 65 dB or greater from the AFRC F-35A mission. Figure WH3-8 presents an overlay of the baseline and AFRC F-35A mission 65 dB DNL contour on the ROIs and the COC.

WH3.10.1 Base Affected Environment

Table WH-41 provides baseline demographic conditions in Johnson County, where Whiteman AFB is located. Table WH3-41 includes minority, low-income, children, and elderly population numbers and percentages for county, state, and nation census categories to show context and to help determine the intensity of impacts. The three CTs are the COC for the environmental justice analysis. The COC has a higher proportion of minority and children populations than Johnson County, but lower than the State of Missouri or the nation. The COC has a lower low-income and elderly population than the county, state, or the nation.

Table WH3-41 shows that under baseline conditions three ROIs (BGs) have higher percentages of low-income populations and two ROIs (BGs) have higher percentages of minority populations than the percentage of those populations living in the COC. This means that there are existing disproportionate impacts to low-income and minority populations living in these ROIs.

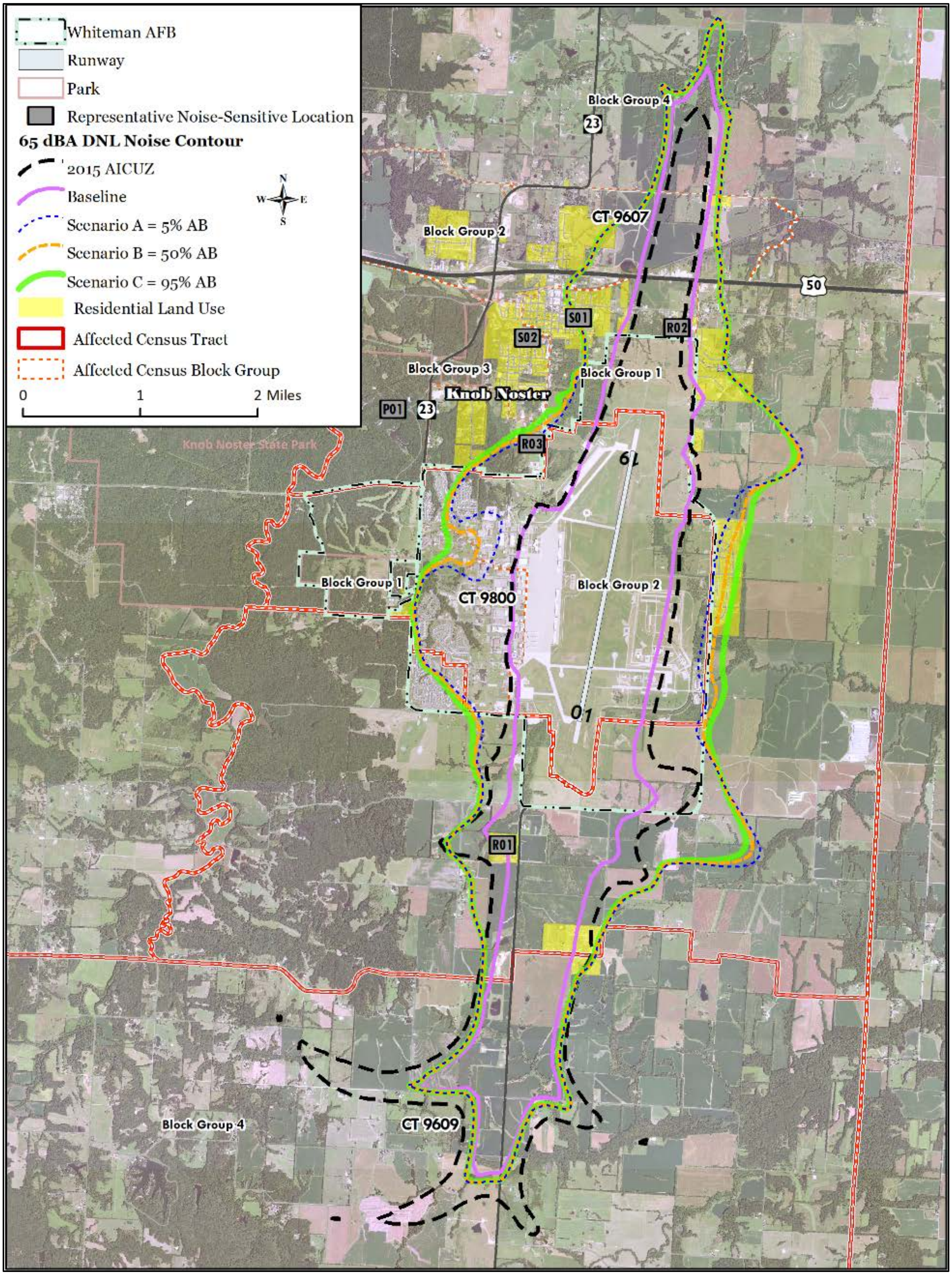

Figure WH3-8. Whiteman AFB Census Tracts and Block Groups Exposed to DNL of 65 dB or Greater Under Baseline and AFRC F-35A Mission Conditions

Table WH3-41. Environmental Justice Populations and Demographics for Whiteman AFB

Geographic Unit	Total Population	Population for Whom Poverty is Determined[a]	Minority		Low-Income		Children		Elderly	
			Number	Percent	Number	Percent	Number	Percent	Number	Percent
CT 9607.00	5,621	5,603	1,115	19.8	512	9.1	1,627	28.9	359	6.4
CT 9609.00	4,826	4,812	222	4.6	650	13.5	1,184	24.5	742	15.4
COC	**10,447**	**10,415**	**1,337**	**12.8**	**1,162**	**11.2**	**2,811**	**26.3**	**1,101**	**10.5**
Johnson County	53,941	49,182	7,467	13.8	7,953	16.2	11,696	21.7	6,348	11.8
State of Missouri	6,075,300	5,891,760	1,226,232	20.2	861,679	14.6	1,389,409	22.9	956,032	15.7
United States	321,004,407	313,048,563	38.5	123,726,618	14.6	45,650,345	22.9	73,601,279	14.9	47,732,389

[a] Poverty status was determined for all people except institutionalized people, people in military group quarters, people in college dormitories, and unrelated individuals under 15 years of age.

Note: Numbers may not sum due to rounding. To best represent the level of accuracy achieved, population group numbers are displayed as whole numbers in the text and tables, whereas calculations are based on the raw population group numbers containing multiple decimal points. The resulting summations and change calculations are then rounded to whole numbers.

Source: USCB 2017a-e

WH3.10.2 Base Environmental Consequences

WH3.10.2.1 Scenario A

The analysis of environmental justice populations at Whiteman AFB identified three ROIs with disproportionally high minority populations and one ROI with disproportionally high low-income populations. These populations are currently exposed to DNL of 65 dB or greater and would continue to be exposed to DNL of 65 dB or greater after implementation of the proposed action. Therefore, implementation of the AFRC F-35A mission would not result in disproportionate impacts to minority or low-income populations. The areas where these populations are located are shown on Figure WH3-9.

The other sensitive populations evaluated in this analysis are children and elderly. As shown in Table WH3-43, an additional estimated 669 children and an additional estimated 196 elderly persons who reside in the ROIs would be exposed to DNL of 65 dB or greater with implementation Scenario A. The areas where these populations are located are shown on Figure WH3-10. Implementation of Scenario A would expose one off-base childcare facility (Rau's Day Care) and one off-base school (Knob Noster Elementary) to DNL of 65 to 69 dB.

Sections WH3.2.2.2 and WH3.2.2.3 describe speech interference and classroom learning disruption associated with increased overflight and noise levels, which would adversely impact children and elderly populations.

Implementation of the Scenario A would not expose any hospitals (on-base or off-base) or parks to DNL of 65 dB or greater. The Trails Regional Library Knob Noster Branch would be exposed to DNL of 65 to 69 dB. Noise-sensitive locations such as libraries are included in education services and are identified in the JLUS as a compatible use, with sound attenuation, in areas exposed to DNL of 65 to 70 dB. For more information about potential noise impacts to schools, refer to Section WH3.2.2.3.

Table WH3-42. Minority and Low-Income Populations Exposed to DNL of 65 dB or Greater Under Baseline and AFRC F-35A Mission Conditions at Whiteman AFB (Scenario A)

Geographic Unit	Population in the Census Area	Baseline					Proposed (newly affected)				
Census BG (ROI)/COC		Population in the Area Encompassed by DNL of 65 dB or Greater	Minority (%)	Disproportionate	Low-Income (%)	Disproportionate	Additional Population in the Area Encompassed by DNL of 65 dB or Greater	Minority (%)	Disproportionate	Low-Income (%)	Disproportionate
CT 96070.00											
1[a]	1,136	97	18.7	Yes	22.1	Yes	363	18.7	Yes	22.1	Yes
2[a]	939	5	29.7	Yes	9.3	No	69	29.7	Yes	9.3	No
4[a]	2,596	474	13.7	Yes	2.3	No	1,191	13.7	Yes	2.3	No
CT 96090.00											
4[a]	984	4	0.8	No	8.2	No	603	0.3	No	8.2	No
ROI Totals	**5,655**	**580**	**NA**	**NA**	**NA**	**NA**	**2,226**	**NA**	**NA**	**NA**	**NA**
COC	10,447	NA	12.8	NA	11.2	NA	NA	12.8	NA	11.2	NA

[a] Indicates this ROI (BG) is currently encompassed by the baseline 65 dB or greater DNL contour.

Notes: Shading indicates that implementation of the AFRC F-35A mission and or baseline conditions result in disproportionate noise impacts to the BG (ROI). Numbers may not sum due to rounding. To best represent the level of accuracy achieved, population group numbers are displayed as whole numbers in the text and tables, whereas calculations are based on the raw population group numbers containing multiple decimal points. The resulting summations and change calculations are then rounded to whole numbers.

Key: NA = Not applicable, does not apply

Source: USCB 2017a-e

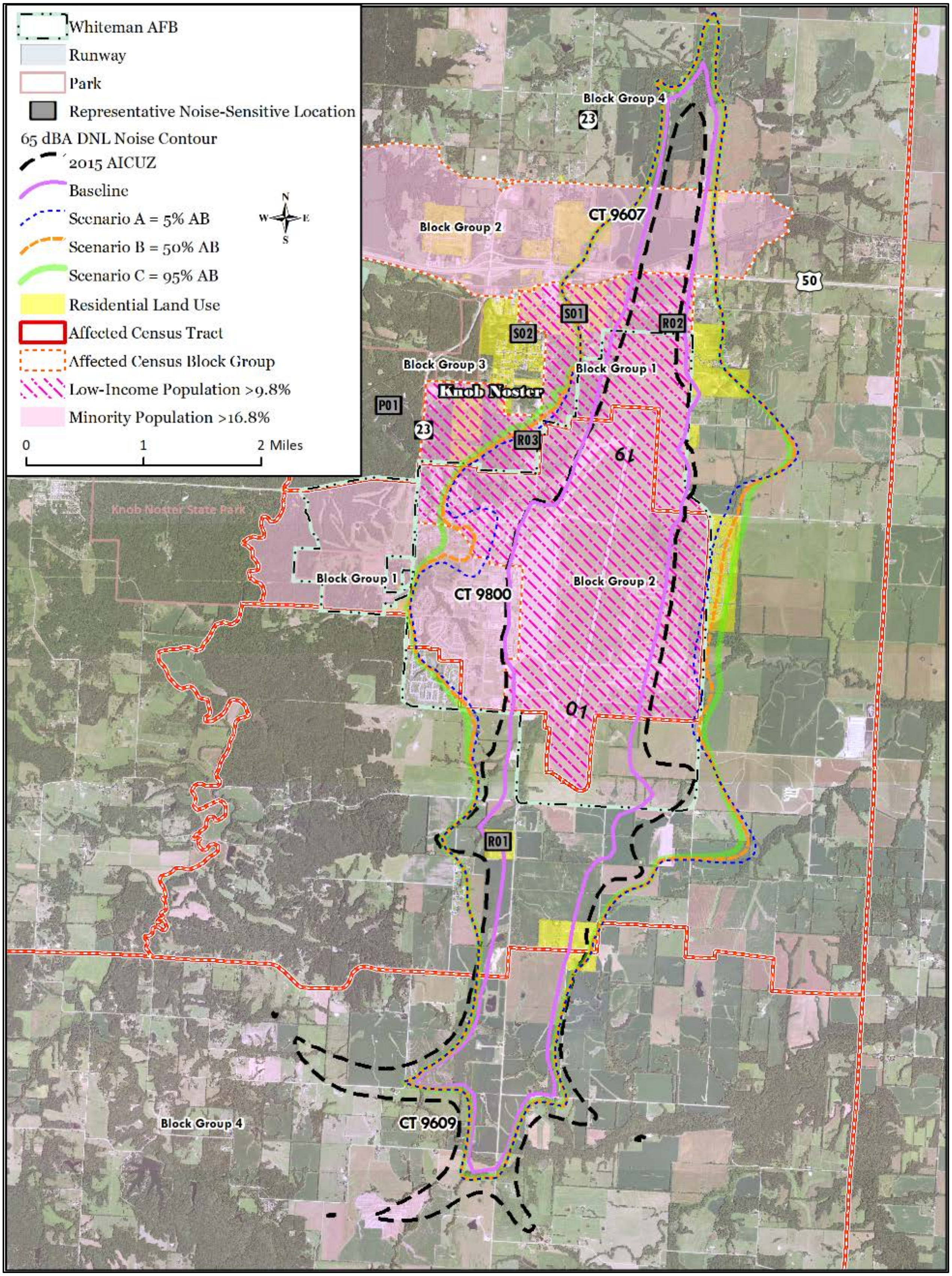

Figure WH3-9. Minority and Low-Income Populations Exposed to DNL of 65 dB or Greater Under Baseline and AFRC F-35A Mission Conditions at Whiteman AFB

Table WH3-43. Children and Elderly Populations Exposed to DNL of 65 dB or Greater Under Baseline and AFRC F-35A Mission Conditions at Whiteman AFB (Scenario A)

Geographic Units	Population in the Census Area	Baseline					Proposed (Newly Affected)				
Census BG (ROI)/COC		Population in the Area Encompassed by DNL of 65 dB or Greater	Children (<18 years)		Elderly (65 years or >)		Additional Population in the Area Encompassed by DNL of 65 dB or Greater	Children (<18 years)		Elderly (65 years or >)	
			Percent	Number	Percent	Number		Percent	Number	Percent	Number
CT 96070.00											
1	1,136	97	25.1	24	6.3	6	373	25.1	91	6.3	24
2	939	5	32.4	2	12.4	1	67	32.4	22	12.4	9
4	2,596	474	33.2	157	5.0	24	1,482	33.2	395	5.0	61
CT 96090.00											
4	984	4	26.7	1	15.0	1	585	26.7	161	14.8	90
Total	**5,655**	**580**	**NA**	**144**	**NA**	**32**	**2,226**	**NA**	**669**	**NA**	**196**
COC	10,447	NA	26.9	2,811	10.5	1,101	NA	26.9	3,349	10.5	1,281

Notes: Numbers may not sum due to rounding. To best represent the level of accuracy achieved, population group numbers are displayed as whole numbers in the text and tables, whereas calculations are based on the raw population group numbers containing multiple decimal points. The resulting summations and change calculations are then rounded to whole numbers.
Key: NA = Not applicable, does not apply
Source: USCB 2017a-e

WH3.10.2.2 Scenario B

Implementation of Scenario B would not result in disproportionate noise impacts to minority or low-income populations (Table WH3-44 and Figure WH3-9). This scenario would expose an additional estimated 764 children and 194 elderly persons to DNL of 65 dB or greater (Table WH3-45 and Figure WH3-10).

Implementation of Scenario B would expose one off-base childcare facility (Rau’s Day Care) and one off-base school (Knob Noster Elementary) to DNL of 65 to 69 dB. This scenario would not expose any hospitals (on base or off base) or parks to DNL of 65 dB or greater. The Trails Regional Library Knob Noster Branch would be exposed to DNL of 65 to 69 dB. For more information about potential noise impacts to schools and a description of speech interference and classroom learning disruption, refer to Sections WH3.2.1.3, WH3.2.2.2 and WH3.2.2.3.

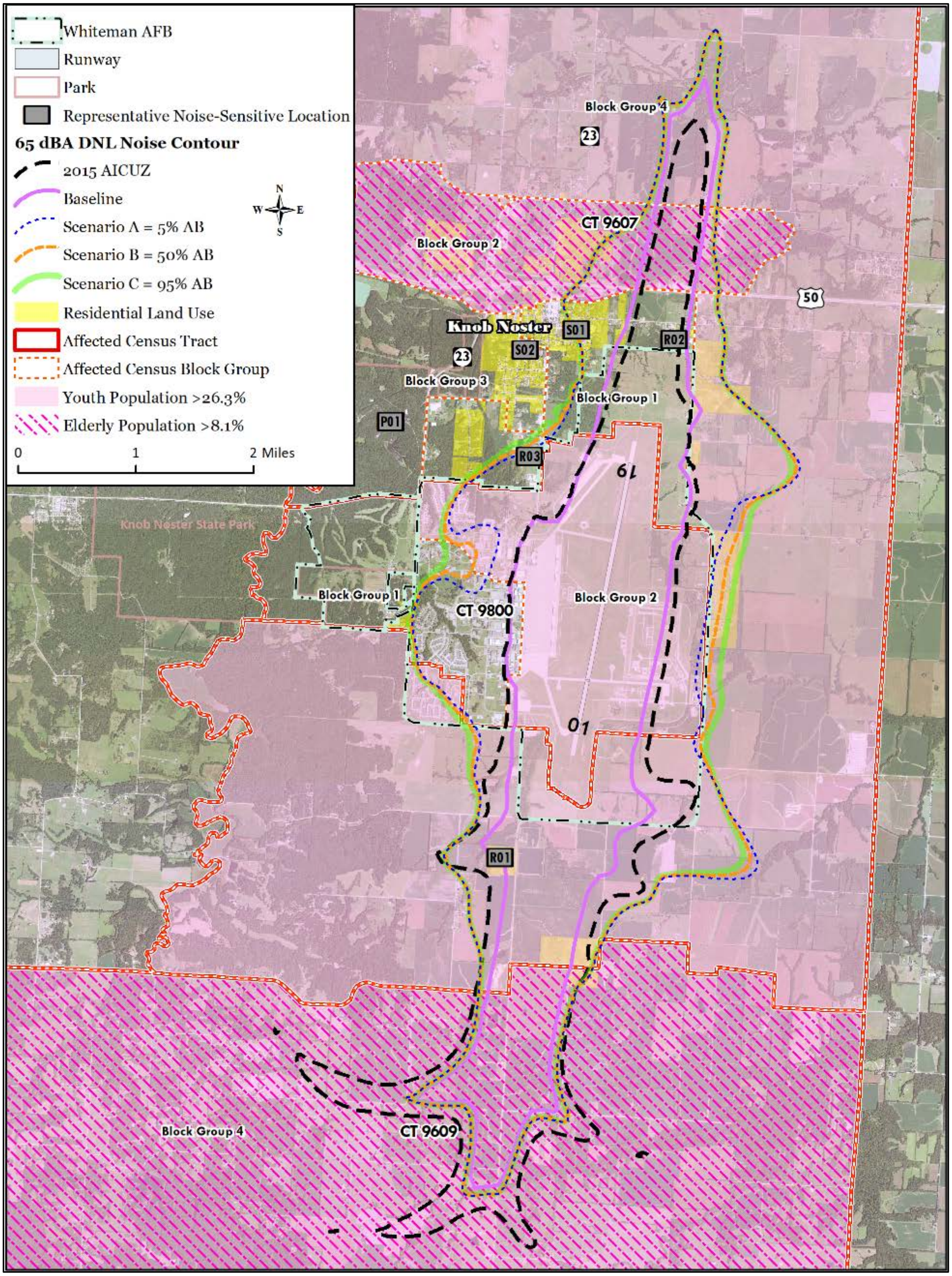

Figure WH3-10. Youth and Elderly Populations and Noise-Sensitive Receptors Exposed to DNL of 65 dB or Greater Under Baseline and AFRC F-35A Mission Conditions at Whiteman AFB

Table WH3-44. Minority and Low-Income Populations Exposed to DNL of 65 dB or Greater Under Baseline and AFRC F-35A Mission Conditions at Whiteman AFB (Scenario B)

Geographic Unit		Baseline					Proposed (newly affected)				
Census BG (ROI)/COC	Population in the Census Area	Population in the Area Encompassed by DNL of 65 dB or Greater	Minority (%)	Disproportionate	Low-Income (%)	Disproportionate	Additional Population in the Area Encompassed by DNL of 65 dB or Greater	Minority (%)	Disproportionate	Low-Income (%)	Disproportionate
CT 96070.00											
1[a]	1,136	98	18.7	Yes	22.1	Yes	373	18.7	Yes	22.1	Yes
2[a]	939	6	29.7	Yes	9.3	No	67	29.7	Yes	9.3	No
4[a]	2,596	368	13.7	Yes	2.3	No	1,482	13.7	Yes	2.3	No
CT 96090.00											
4[a]	984	4	0.8	No	8.2	No	585	0.8	No	8.2	No
ROI Totals	**5,655**	**580**	**NA**	**NA**	**NA**	**NA**	**2,507**	**NA**	**NA**	**NA**	**NA**
COC	10,447	NA	12.8	NA	11.2	NA	NA	12.8	NA	11.2	NA

[a] Indicates this ROI (BG) is currently encompassed by the baseline 65 dB or greater DNL contour.

Notes: Shading indicates that implementation of the AFRC F-35A mission and or baseline conditions result in disproportionate noise impacts to the BG (ROI). Numbers may not sum due to rounding. To best represent the level of accuracy achieved, population group numbers are displayed as whole numbers in the text and tables, whereas calculations are based on the raw population group numbers containing multiple decimal points. The resulting summations and change calculations are then rounded to whole numbers.

Key: NA = Not applicable, does not apply

Source: USCB 2017a-e

Table WH3-45. Children and Elderly Populations Exposed to DNL of 65 dB or Greater Under Baseline and AFRC F-35A Mission Conditions at Whiteman AFB (Scenario B)

Geographic Units	Population in the Census Area	Baseline					Proposed (Newly Affected)				
Census BG (ROI)/COC		Population in the Area Encompassed by DNL of 65 dB or Greater	Children (<18 years)		Elderly (65 years or >)		Additional Population in the Area Encompassed by DNL of 65 dB or Greater	Children (<18 years)		Elderly (65 years or >)	
			Percent	Number	Percent	Number		Percent	Number	Percent	Number
CT 96070.00											
1	1,136	97	25.1	24	6.3	6	373	25.1	94	6.3	24
2	939	5	32.4	2	12.4	1	67	32.4	22	12.4	8
4	2,596	474	33.2	157	5.0	24	1,482	33.2	492	5.0	74
CT 96090.00											
4	984	4	26.7	1	15.0	1	585	26.7	156	14.8	88
Total	**5,655**	**580**	**NA**	**184**	**NA**	**32**	**2,507**	**NA**	**764**	**NA**	**194**
COC	10,447	NA	26.9	2,811	10.5	1,101	NA	26.9	3,349	10.5	1,281

Notes: Numbers may not sum due to rounding. To best represent the level of accuracy achieved, population group numbers are displayed as whole numbers in the text and tables, whereas calculations are based on the raw population group numbers containing multiple decimal points. The resulting summations and change calculations are then rounded to whole numbers.

Key: NA = Not applicable, does not apply

Source: USCB 2017a-e

WH3.10.2.3 Scenario C

Implementation of Scenario C would not result in disproportionate noise impacts to minority or low-income populations (Table WH3-46 and Figure WH3-9). All of the ROIs currently exposed to DNL of 65 dB or greater would continue to be exposed to this noise level under Scenario C. This scenario would expose an additional estimated 863 children and 207 elderly persons to DNL of 65 dB or greater (Table WH3-47 and Figure WH3-10).

Implementation of Scenario C would expose one off-base childcare facility (Rau's Day Care) and one off-base school (Knob Noster Elementary) to DNL of 65 to 69 dB. This scenario would not expose any hospitals (on base or off base) or parks to DNL of 65 dB or greater. The Trails Regional Library Knob Noster Branch would be exposed to DNL of 65 to 69 dB. For more information about potential noise impacts to schools and a description of speech interference and classroom learning disruption, refer to Sections WH3.2.1.3, WH3.2.2.2 and WH3.2.2.3.

Table WH3-46. Minority and Low-Income Populations Exposed to DNL of 65 dB or Greater Under Baseline and AFRC F-35A Mission Conditions at Whiteman AFB (Scenario C)

Geographic Unit	Population in the Census Area	Baseline					Proposed (newly affected)				
Census BG (ROI)/COC		Population in the Area Encompassed by DNL of 65 dB or Greater	Minority (%)	Disproportionate	Low-Income (%)	Disproportionate	Additional Population in the Area Encompassed by DNL of 65 dB or Greater	Minority (%)	Disproportionate	Low-Income (%)	Disproportionate
CT 96070.00											
1[a]	1,136	97	18.7	Yes	22.1	Yes	386	18.7	Yes	22.1	Yes
2[a]	939	5	29.7	Yes	9.3	No	67	29.7	Yes	9.3	No
4[a]	2,596	474	13.7	Yes	2.3	No	1,793	13.7	Yes	2.3	No
CT 96090.00											
4[a]	984	4	0.8	No	8.2	No	558	0.3	No	8.2	No
ROI Totals	**5,655**	**580**	**NA**	**NA**	**NA**	**NA**	**2,804**	**NA**	**NA**	**NA**	**NA**
COC	10,447	NA	12.8	NA	11.2	NA	NA	12.8	NA	11.2	NA

[a] Indicates this ROI (BG) is currently encompassed by the baseline 65 dB or greater DNL contour.

Notes: Shading indicates that implementation of the AFRC F-35A mission and or baseline conditions result in disproportionate noise impacts to the BG (ROI). Numbers may not sum due to rounding. To best represent the level of accuracy achieved, population group numbers are displayed as whole numbers in the text and tables, whereas calculations are based on the raw population group numbers containing multiple decimal points. The resulting summations and change calculations are then rounded to whole numbers.

Key: NA = Not applicable, does not apply

Source: USCB 2017a-e

Table WH3-47. Children and Elderly Populations Exposed to DNL of 65 dB or Greater Under Baseline and AFRC F-35A Mission Conditions at Whiteman AFB (Scenario C)

Geographic Units	Population in the Census Area	Baseline					Proposed (Newly Affected)				
Census BG (ROI)/COC		Population in the Area Encompassed by DNL of 65 dB or Greater	Children (<18 years)		Elderly (65 years or >)		Additional Population in the Area Encompassed by DNL of 65 dB or Greater	Children (<18 years)		Elderly (65 years or >)	
			Percent	Number	Percent	Number		Percent	Number	Percent	Number
CT 96070.00											
1	1,136	97	25.1	24	6.3	6	386	25.1	97	6.3	25
2	939	5	32.4	2	12.4	1	67	32.4	22	12.4	8
4	2,596	474	33.2	157	5.0	24	1,793	33.2	595	5.0	90
CT 96090.00											
4	984	4	26.7	1	15.0	1	588	26.7	149	14.8	84
Total	**5,655**	**580**	**NA**	**144**	**NA**	**32**	**2,804**	**NA**	**863**	**NA**	**207**
COC	10,447	NA	26.9	2,811	10.5	1,101	NA	26.9	3,349	10.5	1,281

Notes: Numbers may not sum due to rounding. To best represent the level of accuracy achieved, population group numbers are displayed as whole numbers in the text and tables, whereas calculations are based on the raw population group numbers containing multiple decimal points. The resulting summations and change calculations are then rounded to whole numbers.
Key: NA = Not applicable, does not apply
Source: USCB 2017a-e

WH3.10.3 Summary of Impacts to Environmental Justice and Protection of Children

Implementation of the AFRC F-35A mission would not result in disproportionate noise impacts to minority or low-income populations. The estimated number of children and elderly people exposed to DNL of 65 dB or greater from each afterburner scenario are listed in Table WH3-48.

Implementation of any of the three afterburner scenarios would expose one off-base childcare facility (Rau's Day Care) and one off-base school (Knob Noster Elementary) to DNL of 65 to 69 dB. This scenario would not expose any hospitals (on base or off base) or parks to DNL of 65 dB or greater. The Trails Regional Library Knob Noster Branch would be exposed to DNL of 65 to 69 dB.

Table WH3-48. Summary of the Minority, Low-Income, Children, and Elderly Populations Exposed to DNL of 65 dB or Greater Under Baseline and the Three Afterburner Scenarios for the AFRC F-35A Mission at Whiteman AFB

Scenarios and Baseline/No Action	Disproportionate Impact		Newly Exposed Individuals	
	Minority Populations - Census BGs (ROIs)	Low-Income Populations - Census BGs (ROIs)	Children	Elderly Persons
Baseline/No Action[a]	3 of 4[a]	1 of 4[a]	144[a]	32[a]
Scenario A	3 of 4	1 of 4	669	196
Scenario B	3 of 4	1 of 4	764	194
Scenario C	3 of 4	1 of 4	863	207

[a] Baseline/No Action is the existing conditions and does not include the values for any of the other scenarios.

WH3.11 INFRASTRUCTURE

WH3.11.1 Base Affected Environment

WH3.11.1.1 Potable Water System

Whiteman AFB obtains potable water from 10 active water supply wells installed within the Gasconade and Roubideaux Formations. The base has a permit through MDNR to dispense drinking water. The supply capacity of the aquifer poses no limits to the amount of drinking water that could be supplied to the base. Whiteman AFB has adequate water supply and supporting infrastructure. The water system at Whiteman AFB consists of 331,227 linear feet of distribution pipes, 29,297 linear feet of supply mains, 1,250,000 gallons of storage, and a 26,000-gallon treatment facility (Whiteman AFB 2015b).

According to the 2009 Natural Infrastructure Assessment (NIA), the water distribution system is capable of supporting the mission. The water meets the primary and secondary drinking water standards (Whiteman AFB 2009a).

WH3.11.1.2 Wastewater

One government-owned Wastewater Treatment Plant (WWTP) is located on the installation. According to the 2009 NIA for Whiteman AFB, the WWTP capacity is fully capable of supporting the mission. This plant handles all industrial and domestic wastewater. It operates under a USEPA NPDES permit, administered by the MDNR. The treatment plant is monitored on a daily, weekly, or periodic basis for different point source discharges (Whiteman AFB 2015b).

The sanitary sewer system collects sewage and sends it to the treatment plant through a series of lift stations. The treatment plant is located west of Missouri Route 23, adjacent to the golf course. The capacity of the treatment plant is approximately 2.2 million gallons per day (MGD), and it currently treats an average of 0.58 MGD, which is approximately 26 percent of its capacity (Whiteman AFB 2015b).

The wastewater infrastructure is well maintained and in operable condition. Wastewater is discharged into a receiving body that is not degraded (Whiteman AFB 2015b).

Requirements to improve the system include replacing original aging equipment in the WWTP. Original pumps, valves, and piping require replacing in the following processes: trickling filter, grit removal, sludge transfer, and anaerobic digester (Whiteman AFB 2015b).

WH3.11.1.3 Stormwater System

Whiteman AFB is in the Clear Fork of the Blackwater River and Long Branch watersheds. Stormwater from Whiteman AFB flows to the Missouri River Drainage Basin in the Gasconade-Osage Rivers subregion. The 2010 SWPPP states that surface drainage flows through drainage basins and 47 associated outfalls that collect and drain stormwater from Whiteman AFB. The SWPPP was updated in 2016 and new drainage basins and outfalls were catalogued at that time (Whiteman AFB 2015b).

The southeastern corner of Whiteman AFB is within the 100-year floodplain of Long Branch Creek. Annual storms cause localized flooding and ponding on several parts of the installation, though no significant flooding has been reported in recent years. Frequent flooding from Long Branch Creek affects certain uses of low-lying areas of the base, including the Weapons Storage Area. Forecasted increases in the intensity and/or frequency of severe weather events could escalate the flooding challenge (Whiteman AFB 2015b).

Stormwater is monitored on Whiteman AFB through a USEPA NPDES permit administered by MDNR. The SWPPP requires a monthly inspection of stormwater discharge. Noncompliance has not been an issue under this permit (Whiteman AFB 2015b).

According to the 2009 NIA, the stormwater discharge system is fully capable of supporting the mission with no system failures occurring in the 36-month evaluation period. The stormwater system meets the demands of normal rainfall (Whiteman AFB 2015b).

WH3.11.1.4 Electrical System

The West Central Electric Cooperative (Touchstone) supplies electrical power to Whiteman AFB. Two 30-megawatt (MW) substations provide electricity to Whiteman AFB with excess capacity. There are two separate feeds for the substations. One is from Sedalia, the other from Warrensburg. The electrical distribution system has a maximum capacity of 525,600,000 kilowatt hours (kWh) per year. Whiteman AFB purchased 86.6 million kWh in 2013, approximately 16.5 percent of capacity. Whiteman AFB's mission necessitates a redundant power supply for mission-critical loads. Several areas on the base have been identified for adding redundancy. The electrical system condition is adequate. All installation electrical lines are underground (Whiteman AFB 2015b).

WH3.11.1.5 Natural Gas System

There are approximately 174,000 linear feet of natural gas distribution lines installed on the base. The system has two regulatory stations. The natural gas system on Whiteman AFB is adequate. The system is capable of providing 26,702 million British thermal units (MMBTUs)/day. Current usage is 1,075 MMBTU/day, 4 percent of system capacity. Missouri Gas Company provides natural gas to Whiteman AFB. During times of peak demand, Whiteman AFB uses alternative systems for industrial purposes. Variations in the supply and cost of natural gas could necessitate further consideration of alternative forms of heating in the future (Whiteman AFB 2015b).

WH3.11.1.6 Solid Waste Management

Solid waste at Whiteman AFB is managed in accordance with AFI 32-7042, *Waste Management.* In general, AFI 32-7042 establishes the requirements for installations to have a solid waste management program to incorporate a solid waste management plan; procedures for handling, storage, collection and disposal of solid waste; record-keeping and reporting; and pollution prevention. Whiteman AFB's Integrated Solid Waste Management Plan (ISWMP) provides guidance for managing municipal solid waste, compostable materials, C&D debris, and industrial solid waste to ensure compliance with applicable requirements for solid waste disposal, waste minimization, recycling, and reuse (Whiteman AFB 2013).

In accordance with the AFI 32-7042, Whiteman AFB strives to divert as much of their solid waste stream in the most cost-effective manner possible, keeping in mind the cost savings and cost avoidance that result from diverting solid waste from landfill disposal. The installation's nonhazardous solid waste and C&D debris diversion rates in 2012 were 45.11 and 99.4 percent, respectively (Whiteman AFB 2013).

Municipal solid waste generated at Whiteman AFB is collected by a contractor. Solid waste that is not reused or recycled is removed by the contractor and landfilled at the Show-Me Landfill located South off DD highway, east of Warrensburg, Missouri. No operating sanitary or C&D debris landfills are located on the installation. C&D contracts include requirements that C&D debris be recycled at off-site facilities (Whiteman AFB 2013).

WH3.11.1.7 Transportation

The transportation network is adequately handling the current level of traffic on base. Whiteman AFB has 45.7 miles of paved roads. Missouri Route 23 provides access to Whiteman AFB and connects the installation to U.S. Highway 50 to the north (Whiteman AFB 2015b).

Some of the high-traffic streets such as Arnold Avenue are showing alligator cracking and rutting from loading stresses. There are local ponding areas where storm runoff does not flow to the stormwater runoff system along Flightline Road, resulting in pavement deterioration from standing water. However, the transportation systems on Whiteman AFB are capable of supporting the mission (Whiteman AFB 2015b).

WH3.11.1.7.1 Gate Access

Three entry control facilities provide access to Whiteman AFB. An arterial street network connects the installation gates: Spirit Gate on the west, Arnold Gate on the north, and LeMay Gate on the south (Whiteman AFB 2015b).

WH3.11.1.7.2 On-Base Traffic Circulation

Missouri Route 23 divides the base to the west and provides access through Spirit Gate. The presence of Missouri Route 23 and its division of the base property remains a security concern. Secondary access to the base is provided through Arnold Gate, located on the north side of the base on Highway J. Arnold Gate is used for access to and from Knob Noster. Secondary access is also provided on a limited basis via LeMay Gate, located on the south side of the base on Highway D. LeMay Gate is also the contractor and commercial delivery gate (Whiteman AFB 2015b).

During peak access hours and under heightened security, traffic at Spirit Gate causes delays on Missouri Route 23 and Spirit Boulevard. Apart from this interference, the gates adequately accommodate the current volume of base traffic (Whiteman AFB 2015b).

WH3.11.2 Base Environmental Consequences

The projected change in population that would result from implementation of the proposed AFRC F-35A mission at Whiteman AFB is an increase of 11 base personnel or approximately 0.1 percent of the base population. This projected change in population and development was used to determine the impact on infrastructure. The maximum demand or impact on capacity was calculated for the potable water, wastewater, electric, and natural gas systems based on the projected change in population. To identify maximum demand or impact on these systems, any change in population was assumed to reside on base. The impact of the proposed AFRC F-35A mission on the transportation infrastructure, was considered negligible based on the potential minor increase of base personnel and on-base traffic.

WH3.11.2.1 Potable Water System

Based on the average usage rate of 94 gallons per day (GPD) (USGS 2018) per person in Johnson County, Missouri, it is anticipated that the increase in population associated with the proposed AFRC F-35A mission (i.e., 11 persons) would create an additional water use demand of 0.001 MGD. This increase, combined with the existing peak usage at Whiteman AFB, would not exceed the water system capacity and impacts would not be significant.

WH3.11.2.2 Wastewater

The USEPA estimates that the average person generates approximately 120 GPD of wastewater between showering, toilet use, and general water use (USEPA 2014). Based on this rate, the proposed increase in population (i.e., 11 persons) would increase wastewater discharge from Whiteman AFB by 0.001 MGD. The capacity of the treatment plant is approximately 2.2 MGD, and it currently treats an average of 0.58 MGD. Therefore, the increase in wastewater discharge would be well below the treatment plant's maximum capacity and the impacts would not be significant.

WH3.11.2.3 Stormwater System

The proposed AFRC F-35A mission would require demolition of facilities and construction of new facilities near the existing developed flightline and cantonment areas. The total disturbed area associated with these projects would not exceed 5 acres (approximately 2.9 acres) and impacts would not be significant.

During the short-term construction period, all contractors would be required to comply with applicable statutes, standards, regulations, and procedures regarding stormwater management. During the design phase, a variety of stormwater controls could be incorporated into construction plans. These could include planting vegetation in disturbed areas as soon as possible after construction; constructing retention facilities; and implementing structural controls (e.g., interceptor dikes, swales [excavated depressions], silt fences, straw bales, and other storm drain inlet protection), as necessary, to prevent sediment from entering inlet structures.

WH3.11.2.4 Electrical System

The West Central Electric Cooperative (Touchstone) reports the average household used 17.1 MWh per year (1.425 MWh per month). Converting this rate to an hourly rate and assuming 11 new households (i.e., one new household for each new authorized personnel on base), the proposed increase in population would increase electrical use at Whiteman AFB by 188.1 MWh per year. The electrical distribution system has a maximum capacity of 525,600 MWh per year. The increase due to implementing the proposed action would not exceed the West Central Electric Cooperative energy supply limit or the capacity of the base distribution system and impacts would not be significant.

WH3.11.2.5 Natural Gas System

The U.S. Energy Information Administration (USEIA) estimates that the average person in Missouri uses 6.4 MCF of natural gas per year (USEIA 2016). Based on this rate, the proposed increase in population (11) would increase natural gas use at Whiteman AFB by approximately 70.4 MCF per year. The current system is operating at approximately 4 percent of maximum capacity; therefore, implementation of the proposed AFRC F-35A mission would result in a very minor increase in usage and the impacts would not be significant.

WH3.11.2.6 Solid Waste Management

Solid waste would continue to be managed in accordance with AFI 32-7042 and the ISWMP with the implementation of the proposed AFRC F-35A mission at Whiteman AFB. Using methodology developed by the USEPA (USEPA 2009), it is estimated that implementation of the proposed AFRC F-35A mission would generate approximately 2,504 tons of C&D debris for recycling or removal to landfills. Application of the 60 percent DoD target diversion rate (DoD 2012) for C&D debris would result in approximately 1,503 tons being reused or recycled, and approximately 1,002 tons being placed in the Show-Me Landfill or other landfills in the region. However, Whiteman AFB's current

C&D debris diversion rate is greater than 99 percent, with the installation requiring their C&D contractors to recycle C&D debris at off-site facilities (Whiteman AFB 2015b). Regardless, the Show-Me Landfill has an estimated life span of 42 years, has more than 3,500,000 tons of remaining capacity, and would be able to accommodate the material resulting from the proposed AFRC F-35A mission (Stevens 2018). Additionally, solid waste generated from the proposed renovation and repair of the airfield pavement, apron, and ramp projects (Table WH2-1), would be recycled and reused as aggregate for the concrete and asphalt used in those projects.

The addition of 11 personnel and their associated dependents would generate additional municipal solid waste but have little effect on the municipal solid program (collection, disposal, etc.). The overall impacts would not be significant.

Contractors would be required to comply with federal, state, and local regulations for the collection and disposal of municipal solid waste from the base. C&D debris, including debris contaminated with hazardous waste, ACM, lead-based paint (LBP), or other hazardous components, would be managed in accordance with AFI 32-7042 and the installation's ISWMP.

WH3.11.2.7 Transportation

The addition of 11 personnel to the base as a result of implementing the proposed AFRC F-35A mission would have an almost imperceptible change in the traffic on the base. Therefore, no significant impacts to infrastructure are anticipated to result as a result from implementation of the proposed AFRC F-35A mission at Whiteman AFB.

WH3.11.3 Summary of Impacts to Infrastructure

Implementation of the AFRC F-35A mission would not result in changes to any of the utility infrastructure (i.e., potable water, wastewater, stormwater, electricity, natural gas, and solid waste) on Whiteman AFB. In addition, the new mission would also not require any changes to transportation resources including any of the base gates. Therefore, implementation of the new mission would result in negligible impacts to infrastructure.

WH3.12 HAZARDOUS MATERIALS AND WASTE

WH3.12.1 Base Affected Environment

WH3.12.1.1 Hazardous Materials

Hazardous materials used by USAF and contractor personnel at Whiteman AFB are managed in accordance with the Hazardous Materials Management Plan (Whiteman AFB 2003). This plan is written in accordance with AFI 32-7086, *Hazardous Materials Management.* Hazardous materials are controlled through the base Hazardous Materials Storage Facility. The purpose of the Hazardous Materials Storage Facility is to minimize and track the ordering, storage, distribution, use, reuse, recycling, and disposal of hazardous materials through the use of single point control.

WH3.12.1.1.1 Aboveground and Underground Storage Tanks

Bulk Jet-A+ at Whiteman AFB is stored in eight aboveground storage tanks (ASTs) at the Bulk Fuel Storage Area and Type IV Hydrant Tank Area. These eight ASTs have a combined storage capacity of approximately 4,440,160 gallons. Various other ASTs at Whiteman AFB are used to store Jet-A+, gasoline, diesel, oil, and used oil. Whiteman AFB also manages eight underground storage tanks (USTs) (Whiteman AFB 2015c). Whiteman AFB used approximately 17,500,000 gallons of Jet-A+ in 2017 with approximately annual capacity of 36,000,000 gallons. Whiteman AFB receives all liquid fuels via commercial tank trucks. Jet-A+ is delivered from the Bulk Fuel Storage Area to the A-10 aircraft parking ramp via six R-11 6,000-gallon refueling trucks (Whiteman AFB 2015b).

All tanks at Whiteman AFB are managed in accordance with the base Spill, Prevention, Control, and Countermeasure (SPCC) Plan and Facility Response Plan (FRP) (Whiteman AFB 2015a). This plan addresses storage locations and proper handling procedures for all hazardous materials to minimize the potential for spills and releases. This plan also describes the response procedures for spills or discharges of petroleum products and other hazardous materials at Whiteman AFB. Implementation of the SPCC Plan and FRP provide measures to prevent petroleum product discharges from occurring, and prepare the base to respond in a safe, effective, and timely manner to mitigate the impacts of an uncontrolled discharge. The SPCC Plan and FRP also address roles, responsibilities, and response actions for all major spills (Whiteman AFB 2015c).

WH3.12.1.1.2 Toxic Substances

The Asbestos Management and Operating Plan outlines management roles and responsibilities and establishes procedures to protect personnel who live and work on Whiteman AFB from exposure to excessive levels of airborne asbestos fibers. The plan also describes how the base will carry out ACM-related work and ensures compliance with all USAF, federal, state, and local regulation dealing with ACM (Whiteman AFB 1997). The Civil Engineering Squadron maintains an electronic asbestos database documenting asbestos-related activities. Based on the plan, all proposed facility construction, demolition, and renovation or self-help projects must be reviewed, to the extent possible, to identify the presence of ACM prior to work beginning. Work on ACM projects would only be performed by a Missouri-registered asbestos abatement contractor trained in accordance with OSHA and USEPA standards. For any project on base, ACM wastes are removed by the contractor performing the work and handled and disposed of in accordance with federal, state, and local regulations at a waste disposal site authorized to accept such waste.

The Whiteman AFB Lead-Based Paint Management Plan (Whiteman AFB 2009b) was designed to bring the base into compliance with USEPA and MDNR policies and laws governing LBP management. The plan also provides guidance and establishes procedures for the management of LBP and the implementation of the LBP program. The Lead-Based Paint Management Plan also defines management and organizational responsibilities and procedures for ensuring that personnel at Whiteman AFB are not exposed to lead poisoning. The Civil Engineering Squadron maintains permanent LBP records to document the location of LBP. These records are updated after each abatement project. The design of building alteration projects, demolitions, and requests for self-help projects are reviewed to determine if lead-containing materials are present in the proposed work area. For every project on Whiteman AFB, LBP wastes are removed by the contractor and disposed of in accordance with the Whiteman AFB Hazardous Waste Management Plan and state and federal regulations at a permitted off-base landfill (Whiteman AFB 2017b).Whiteman AFB is reportedly free of polychlorinated biphenyls (PCBs) (Golson 2018).

WH3.12.1.2 Hazardous Waste Management

Whiteman AFB is classified as a Large-Quantity Generator. Typical hazardous wastes generated during O&M activities include flammable solvents, contaminated fuels and lubricants, paint/coating, stripping chemicals, waste oils, blast media, waste paint-related materials, and other miscellaneous wastes.

Hazardous waste generated, used, treated, stored, transported, or disposed of by Whiteman AFB is regulated by the State of Missouri under authority granted to the state by the USEPA. The base is registered as a hazardous waste generator with the MDNR.

Hazardous wastes at Whiteman AFB are managed in accordance with the U.S. Air Force Hazardous Waste Management Plan (Whiteman AFB 2017b). This plan describes the handling and management of hazardous wastes from the point the material becomes a hazardous waste to the point of ultimate disposal, as required by federal and state laws and regulations. In 2017, the base generated approximately 20,100 pounds of hazardous waste, which was disposed of at off-base permitted disposal facilities.

WH3.12.1.3 Environmental Restoration Program

There are 44 Environmental Restoration Program (ERP) sites at Whiteman AFB. Thirty-three (33) of these sites are closed with no further action or with additional actions that have been completed. The remaining 11 ERP sites have been closed with long-term management activities and institutional controls under the authority of both the state and USEPA (Whiteman AFB 2010a, Whiteman AFB 2015b). Environmental response actions at Whiteman AFB are planned and executed under the ERP in a manner consistent with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Resource Conservation and Recovery Act (RCRA), and other applicable laws. Whiteman AFB is not listed on the USEPA's National Priorities List.

Perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA) are members of a family of emerging contaminants known as per- and polyfluoroalkyl substances (PFAS) that are directly related to the former use of Aqueous Film Forming Foam (AFFF), a fire suppressing agent that was used by the DoD. The USEPA has not issued regulatory limits on PFAS. However, the USEPA has issued a 70 parts per trillion Lifetime Health Advisory level for PFOS/PFOA in drinking water. In October 2018, consistent with CERCLA, Whiteman AFB completed the on-base portion of a site inspection of AFFF release areas (Whiteman AFB 2018). The site inspection identified four AFFF areas. If the CERCLA risk assessment process ultimately determines there is a need for cleanup action, federal and state cleanup standards will be evaluated under the CERCLA process to see if there are Applicable or Relevant and Appropriate Requirements (ARARs) at any of the four on-base sites. The off-base portion of the AFFF site inspection has not been completed.

Whiteman AFB has transitioned to firefighting foam that meets the Military Specification (MILSPEC) standard for PFAS concentrations. The new foam meets both the MILSPEC requirements for firefighting and the goals of the USEPA 2010/2015 PFOA Stewardship Program (Whiteman AFB 2018).

WH3.12.2 Base Environmental Consequences

WH3.12.2.1 Hazardous Materials Management

Implementation of the proposed AFRC F-35A mission at Whiteman AFB would not add any new hazardous materials that would exceed the base's current hazardous waste processes. Existing procedures for the centralized management of the ordering, storage, distribution, use, reuse, recycling, and disposal of hazardous materials through the base Hazardous Materials Storage Facility are adequate to accommodate the changes anticipated with the replacement of the A-10 mission with the AFRC F-35A mission.

The F-35A was designed to reduce the quantities and types of hazardous materials needed for maintenance of the aircraft. Unlike the A-10 aircraft, the F-35A aircraft does not use cadmium fasteners, chrome plating, copper-beryllium bushings, or primers containing cadmium and hexavalent chromium. No adverse impacts are anticipated to result from implementation of the AFRC F-35A mission at Whiteman AFB. Long-term environmental benefits from the reduced use of hazardous materials are anticipated.

The F-35A aircraft is composed of composite materials (e.g., carbon fiber) and stealth coatings (e.g., low observable material), which could pose a health risk under specific circumstances (e.g., during maintenance or when burned as a result of an aircraft crash). The only maintenance of the stealth coating that would occur at the base would be done using a brush or roller to apply coatings, bonding materials, or applying tape. Depot-level maintenance of the low observable material (including spray capability) for the F-35A would be conducted off-site; therefore, the composite material for major repairs to the low observable material would not be stored on base. Section WH3.4.2.4.2 discusses composite materials and emergency crash response.

WH3.12.2.1.1 Aboveground and Underground Storage Tanks

New and remodeled facilities would require the addition of new ASTs to support generators, as well as new hazardous material and waste containers. The new and remodeled facilities would be constructed with berms and drains leading to oil-water separators (OWSs), if required, to contain potential uncontrolled releases of petroleum products. The Whiteman AFB SPCC Plan and FRP would subsequently need to be revised to incorporate any changes in facility design, construction operation, or maintenance that materially affects the potential for an uncontrolled release of petroleum products (Whiteman AFB 2015c).

WH3.12.2.1.2 Toxic Substances

Several demolition and renovation projects are planned as part of the proposed AFRC F-35A mission. Any construction, demolition, or renovation project proposed at Whiteman AFB would be reviewed to determine if ACM is present. As shown in Table WH3-49, Building 706 is proposed for demolition and could potentially contain ACM. All handling and disposal of ACM wastes would be performed in accordance with the Whiteman AFB *Asbestos Management and Operating Plan* (Whiteman AFB 1997) and in compliance with federal, state, and local regulations. Before initiating any demolition or ACM work, required notifications to the MDNR, Air Pollution Control Program, would be completed. This notification (MO 780-1923, if applicable) will be submitted 20 working days before beginning work. MDNR requires a 10-working-day notification, but the Asbestos Management and Operating Plan requires a 20-working-day notification. Work on ACM projects would only be conducted by a Missouri registered asbestos abatement contractor with current certificates of training in accordance with standards established by OSHA and the USEPA. All ACM wastes would be disposed of at an approved landfill (Whiteman AFB 1997).

Table WH3-49. Toxic Substances Associated with Projects for the AFRC F-35A Mission at Whiteman AFB

Project	Year Constructed	ACM	LBP	PCBs
Demolition				
Building 706	1980	[a]	[b]	[c]
Renovation				
Building 41 renovation for squadron operations	2009	[d]	[d]	[c]
Building 91 renovation for engine repair	1991	[d]	[d]	[c]
Building 1117 electrical and ventilation upgrades	1995	[d]	[d]	[c]
Building 1118 electrical upgrade	1995	[d]	[d]	[c]
Building 1119 egress shop – relocation from building 1117	1995	[d]	[d]	[c]

[a] Buildings constructed before 1980 are assumed to potentially contain ACM (AFI 32-1052, *Facility Asbestos Management*).
[b] Buildings constructed before 1980 are presumed to potentially contain LBP (Whiteman AFB 2009b).
[c] Whiteman AFB is reportedly PCB-free (Golson 2018).
[d] Buildings constructed after 1980 are presumed to not contain ACM or LBP.

All construction, demolition, and renovation projects proposed at Whiteman AFB would be reviewed to determine if LBP or lead-containing materials are present, and whether such materials would be disturbed. To the extent possible, the presence of lead within the work area would be identified prior to work beginning. As shown in Table WH3-49, Building 706 is proposed for demolition and could potentially contain LBP or lead-containing material. If the presence of lead-containing material in the project work area is unknown, the shop and real property records would be reviewed to determine the presence of lead. If the presence of lead-containing material in the work area is still unknown, sampling and analysis for lead would be conducted. The handling and disposal of lead wastes would be conducted in accordance with the Whiteman AFB Hazardous Waste Management Plan (Whiteman AFB 2017b), and in compliance with federal, state, and local requirements and regulations.

Although minor increases in the management requirements for ACM and LBP removal are anticipated, no adverse impacts are anticipated to result from implementation of the AFRC F-35A mission at Whiteman AFB. Long-term environmental benefits from removal of toxic substances are anticipated.

WH3.12.2.2 Hazardous Waste Management

Whiteman AFB would continue to operate as a Large-Quantity Generator and would generate hazardous wastes during various O&M activities associated with the proposed AFRC F-35A mission. Waste-associated maintenance materials include adhesives, sealants, conversion coatings, corrosion prevention compounds, hydraulic fluids, lubricants, oils, paints, polishes, thinners, cleaners, strippers, tapes, and wipes. No new hazardous materials would be added that exceed the base's current hazardous waste processes. The U.S. Air Force Hazardous Waste Management Plan (Whiteman AFB 2017b) would be updated to reflect any change in disposal procedures or hazardous waste generators and waste accumulation points. Implementation of the AFRC F-35A operational beddown and mission at Whiteman AFB would potentially have a beneficial impact on hazardous waste management. Transition from the A-10 to the F-35A would decrease the volume and types of hazardous waste and waste streams because O&M involving cadmium and hexavalent chromium primer, and various heavy metals have been eliminated or greatly reduced. All hazardous wastes would be handled and managed in accordance with federal, state, and local regulations.

WH3.12.2.3 Environmental Restoration Program

There are 44 ERP sites at Whiteman AFB that are closed with no further action or closed with long-term management activities and institutional controls under the authority of both the state and USEPA (Whiteman AFB 2010a, Whiteman AFB 2015b). None of the proposed construction, demolition, or renovation projects associated with the proposed AFRC F-35A mission at Whiteman AFB are on or directly adjacent to the ERP sites. However, there is the possibility that undocumented contaminated soils and/or groundwater from historical fuel spills could be present. If encountered during C&D-related excavations, storage/transport/disposal of contaminated groundwater/soils would be conducted in accordance with applicable federal, state, and local regulations; AFIs; and base policies. Should soil or groundwater contaminants be encountered during C&D activities, health and safety precautions, including worker awareness training, would be required.

Whiteman AFB identified four AFFF (PFAS) release areas for site inspection on base. These sites are currently being evaluated in accordance with the CERCLA process. Whiteman AFB will comply with Air Force Guidance Memorandum (AFGM) 2019-32-01, *AFFF-Related Waste*

Management Guidance, to manage waste streams containing PFAS. The AFGM will be updated as needed to address changes in regulatory requirements, DoD determinations of risk, or development of new technologies. If PFOS/PFOA attributable to DoD actions is found in drinking water at levels that exceed USEPA's Lifetime Health Advisory, the DoD takes immediate action to stop human exposure by providing alternate drinking water sources.

In addition to groundwater contamination as it relates to drinking water, other PFAS contamination considerations relative to the proposed AFRC F-35A mission include worker safety during implementation of the projects and proper management of any PFAS-impacted environmental media that is identified in the project footprint. As part of implementation of the new mission, excavations for new buildings would occur. Based on review of known historical releases of AFFF at Whiteman AFB, none of the projects associated with the AFRC F-35A mission would potentially impact or be impacted by the known AFFF areas (Whiteman AFB 2018). The next step in the CERCLA process is the remedial investigation. During the remedial investigation, the USAF will collect detailed information to characterize site conditions, determine the nature and extent of the contamination, and evaluate risks to human health and the environment posed by the site conditions by conducting a baseline ecological and human health risk assessment. The CERCLA process will continue regardless of any construction activities. Construction activities, to include the handling, mitigation, and disposal or other disposition of contamination discovered before or during the construction activity, will proceed in accordance with all applicable legal requirements. The ERP manager would be consulted during the CERCLA process and prior to implementation of this project to ensure worker safety.

WH3.12.3 Summary of Impacts to Hazardous Materials and Waste

Implementation of the new mission would not add any new hazardous materials that would exceed the base's current processes. No ASTs, USTs or OWSs would be removed. The building proposed for demolition is assumed to be free of ACM and LBP. However, prior to any demolition or renovation, plans are reviewed and if ACM or LBP are identified, Whiteman AFB would complete the appropriate notifications and complete the abatement work in accordance with applicable plans and per all local, state and federal requirements. None of the construction would affect ERP sites. Should contaminated media be encountered during construction, storage/transport/disposal of contaminated media would be conducted in accordance with base plans and applicable regulations. Implementation of the new mission would not result in significant impacts to hazardous materials and wastes.

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WH4.0 CUMULATIVE EFFECTS AND IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Council on Environmental Quality (CEQ) regulations stipulate that the cumulative effects analysis should consider the potential environmental impacts resulting from "the incremental impacts of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person (federal or non-federal) undertakes such other actions" (40 *CFR* 1508.7). In this section, an effort has been made to identify past and present actions in the Whiteman AFB region and those reasonably foreseeable actions that are in the planning phase or unfolding at this time. Actions that have a potential to interact with the AFRC F-35A mission at Whiteman AFB are included in this cumulative analysis. This approach enables decision makers to have the most current information available so that they can evaluate the environmental consequences of the AFRC F-35A mission at Whiteman AFB and in associated airspace.

Whiteman AFB is an active military installation that undergoes changes in mission and training requirements in response to defense policies, current threats, and tactical and technological advances. As a result, the installation requires new construction, facility improvements, infrastructure upgrades, and other maintenance/repairs on a nearly continual basis. Although known construction and upgrades are a part of the analysis contained in this document, some future requirements cannot be predicted. As those requirements surface, future NEPA analyses will be conducted, as necessary.

WH4.1 PAST, PRESENT, AND REASONABLY FORESEEABLE ACTIONS

Whiteman AFB was activated in 1942 as Sedalia Army Airfield during the mobilization efforts following the Japanese attack on Pearl Harbor. The base closed in 1947 as part of the post-World War II demobilization. In 1951, the base returned to serve as Sedalia AFB under the Strategic Air Command, beginning with two years of reconstruction. The first aircraft arrived at Whiteman AFB in 1953. These included the B-47 Stratojet and the KC-97 tankers in 1954. In 1955 the base was redesignated as Whiteman AFB in honor of Lieutenant George A. Whiteman, a Sedalia native killed at Pearl Harbor. Construction continued through the 1950s. The period of 1960-1970 was stable for Whiteman AFB, but construction began again in the late 1980s when the base was identified as the future home of the B-2 Stealth Bomber. The AFRC operating the A-10 moved to the base in 1994 from Richards-Gebaur AFB near Kansas City. The primary mission at Whiteman AFB is to maintain pilot proficiency and combat readiness for the 509 BW flying the B-2 bomber and the AFRC 442 Fighter Wing operating the A-10. The 1-135 ARB is an ANG unit that provides ground forces with air support and direct close combat attack.

Table WH4-1 summarizes past, present, and reasonably foreseeable actions within the region that could interact with the AFRC F-35A mission at Whiteman AFB. The table briefly describes each identified action, presents the proponent or jurisdiction of the action and the timeframe (e.g., past, present/ongoing, future), and indicates which resources potentially interact with the AFRC F-35A mission at Whiteman AFB. Recent past and ongoing military actions in the region were considered as part of the baseline or existing conditions in the region surrounding Whiteman AFB and training airspace.

Table WH4–1. Past, Present, and Reasonably Foreseeable Actions at Whiteman AFB and Associated Region

Action	Proponent/Location	Timeframe	Description	Resource Interaction
Military Actions				
Whiteman AFB IDP	509 BW	Present and Future	The IDP includes 17 short-range projects, 12 medium-range projects, and 3 long-range projects. The short-range projects range in size from as large as the construction of a new Joint Mobility Center to an addition on the Fitness Center. Medium-range development projects include large projects such as the construction of a consolidated sports complex. Long range development project include a consolidated base exchange/commissary complex, fuels hydrant system extensions and a depot-level maintenance facility. The top MILCON project for the facility is the construction of a Stealth Operations Facility to replace the current squadron operations and mission planning facilities.	Noise, Air Quality, Safety, Soil and Water Resources, Transportation, Infrastructure
B-21 Bomber Mission	USAF	Future	Whiteman AFB along with three other bases has been selected by the USAF as a reasonable alternative for the B-21 bomber mission. The B-21 mission could replace the current B-2 mission at Whiteman AFB. Delivery of the first B-21 Bombers is anticipated to begin in the mid-2020s.	Noise, Air Quality, Safety, Soil and Water Resources, Biological Resources, Cultural Resources, Land Use and Recreation
Non-Military (Federal) Actions				
None				
Non-Military (Private Actions)				
Cahill Residential Development	Private Developer/City of Warrensburg	Present and Future	This project includes the construction of 231 single-family, two-story homes on 130 acres.	Noise, Air Quality, Land Use and Recreation
Timber Glen at Hawthorne Estates Development	Private Developer/City of Warrensburg	Present and Future	This project includes the development of 48 single-family homes.	Noise, Air Quality, Land Use and Recreation
Construction of a $42 million mixed use facility	University of Central Missouri	Past	This facility will feature apartments, a Starbucks, a restaurant, the university store, and a convenience store.	Noise, Air Quality, Land Use and Recreation
Construction of a steel rebar manufacturing plant	Nucor Steel	Present and Future	Approximately 250 acres of land on the northeast side of Sedalia has been annexed by the City for Nucor to construct a new steel plant to be fully functional in 2019.	Noise, Air Quality, Land Use and Recreation, Socioeconomics
State and Local				
Warrensburg Capital Projects	City of Warrensburg	Present and Future	These projects will include street, curb, and sidewalk repair, maintenance, and improvement projects, as well as Veterans Road extension, traffic signal upgrades, Hawthorne & Maguire Round-About, and ongoing Downtown Revitalization.	Noise, Air Quality, Land Use, Infrastructure, Socioeconomics
Warrensburg Capital Projects	City of Warrensburg	Future	This project includes the development of a new Industrial-Business Park.	Noise, Air Quality, Land Use, Infrastructure, Socioeconomics
Warrensburg Capital Projects	City of Warrensburg	Future	This project includes the installation of a new fiber optic communication system.	Noise, Air Quality, Land Use, Infrastructure, Socioeconomics

WH4.2 CUMULATIVE IMPACTS

The following analysis considers how the impacts of the actions in Table WH4-1 might affect or be affected by the AFRC F-35A mission at Whiteman AFB. The analysis considers whether such a relationship would result in potentially significant impacts not identified when the AFRC F-35A mission at Whiteman AFB is considered alone.

Table WH4-2 provides a summary of the cumulative effects. As shown in Table WH4-2, safety, cultural resources, infrastructure, and hazardous materials and waste are not anticipated to contribute to cumulative effects. Cumulative effects are described for airspace, noise, air quality, soil and water resources, biological resources, land use and recreation, socioeconomics, and environmental justice and protection of children. Climate change is also described in this section because changes in climate have the potential to cumulatively impact other resource areas.

Table WH4-2. Summary of Cumulative Effects for Whiteman AFB

Resource Area	AFRC F-35A Mission	Past, Present, and Reasonably Foreseeable Actions[a]	Cumulative Effects
Airspace	◘	◘	◘
Noise	•	◘	◘
Air Quality	○	◘	○
Safety	○	○	○
Soil and Water Resources	◘	◘	◘
Biological Resources	◘	◘	◘
Cultural Resources	○	○	○
Land Use and Recreation	◘	◘	◘
Socioeconomics	◘	◘	◘
Environmental Justice and Protection of Children	◘	◘	◘
Infrastructure	○	○	○
Hazardous Materials and Waste	○	○	○

[a] When determining the potential for significance, past and ongoing actions in the region were considered as part of the baseline or existing conditions in the region surrounding Whiteman AFB and the airspace (e.g., the cumulative noise impact of past and present missions at Whiteman AFB were modeled under baseline conditions).

Key: ○ = not affected or beneficial impacts
◘ = affected but not significant, short to medium term, impacts that range from low to high intensity
● = significant impacts, that are high in intensity or are long-term

WH4.2.1 Airspace

WH4.2.1.1 Airfield Operations

As noted in Section WH2.3, implementation of the AFRC F-35A mission at Whiteman AFB would increase overall airfield operations by approximately 17.4 percent. Should Whiteman AFB be selected for the B-21 Bomber mission, additional impacts to airfield operations would be anticipated. The number of operations could increase or decrease based on the new mission requirements. Based on the best available information at this time, no known present and/or reasonable foreseeable future actions, when combined with the increased AFRC F-35A operations, would result in any significant cumulative impacts to airfield operations or the management and configuration of the airspace currently surrounding this airfield environment.

Military actions with major changes in aircraft types or operations would undergo additional environmental analysis to determine the exact number of operations and the potential for additional impacts within the airspace.

WH4.2.1.2 Training Airspace

Several of the SUA areas proposed for use by the AFRC F-35A mission at Whiteman AFB would see increased use should the mission be located at Whiteman AFB. The increased use is not anticipated to have significant impacts to military training or civilian aircraft in these areas.

Of the projects described in Table WH4-1, only the potential beddown of the B-21 Bomber mission at Whiteman AFB would have a potential to increase airspace usage. The number of sorties for this unit is not known at this time and additional NEPA analysis would occur prior to a change in mission at Whiteman AFB. Because the mission would be a replacement mission, it is not anticipated that there would be a significant change in airspace use. Any potential conflicts in the use of airspace would be deconflicted by the scheduling agency. Any changes to SUA or charting of new SUA would require separate environmental analysis.

No present and/or known reasonable foreseeable future actions, when combined with the increase in airspace sorties that would result from the AFRC F-35A mission at Whiteman AFB, would result in any cumulative impacts to airspace management in the SUAs proposed for use.

WH4.2.2 Noise

C&D projects associated with the proposed AFRC F-35A mission would occur near other ongoing and future C&D projects (e.g., IDP projects) occurring during the same time periods. C&D projects are a regular occurrence on and near active USAF installations such as Whiteman AFB. C&D noise would be localized and temporary. Construction work is generally limited to normal working hours (i.e., 7:00 A.M. to 5:00 P.M.). Furthermore, the projects are or would be located in an acoustic environment that includes elevated aircraft operations noise levels. In the instance that multiple C&D projects affect a single area at the same time, construction noise would be a slightly more noticeable component of the acoustic environment.

As described in Section WH3.2.2, the AFRC F-35A mission at Whiteman AFB would result in increased noise from the proposed aircraft operations. It was determined that the increase in noise would be a significant impact to the environment surrounding Whiteman AFB. The hypothetical future beddown of a B-21 bomber mission (Table WH4-1) would also affect noise levels near the installation. However, the B-21 bomber has not yet been designed, and noise levels that would be generated by the aircraft during flight are not known.

Private and state/local government-funded land development projects have the potential to increase noise impacts by increasing the noise-sensitivity of areas exposed to elevated aircraft noise levels. However, major development projects listed in in Table WH4-1 are located in Warrensburg, which is more than 5 miles from Whiteman AFB, and would not be exposed to DNL of 65 dB or greater from the AFRC F-35A mission. Implementation of the AFRC F-35A mission, combined with past, present, and reasonably foreseeable projects, would not result in significant cumulative noise impacts.

WH4.2.3 Air Quality

C&D projects associated with the proposed AFRC F-35A mission would occur near other ongoing and future C&D projects (e.g., IDP projects) during the same time periods. C&D projects have been and will continue to be a regular occurrence on and near installations such as Whiteman AFB. These projects would generate the same types of construction related air quality impacts as described for the proposed AFRC F-35A mission (e.g. fugitive dust emissions, increases in construction related criteria pollutant emissions). Although implementation of the AFRC F-35A mission would result in minor increases in emissions of NO_x, SO_x, $PM_{2.5}$ and CO_{2e}, these increases, combined with air emission increases from past, present, and reasonably foreseeable future actions, would not prevent this area from maintaining NAAQS or result in significant cumulative impacts to the air quality.

The implementation of the proposed AFRC F-35A mission at Whiteman AFB would not result in significant impacts to air quality. No known projects, when added to the emissions from the AFRC F-35A mission, would result in significant impacts to air quality.

WH4.2.4 Soil and Water Resources

C&D projects associated with the proposed AFRC F-35A mission would occur near other ongoing and future C&D projects (e.g., IDP projects) during the same time periods. C&D projects have been and will continue to be a regular occurrence on and near installations such as Whiteman AFB. These construction projects would increase the amount of soil disturbed and have the potential to increase erosion and sedimentation into surface water features. Impacts to soil and water resources resulting from implementing the AFRC F-35A projects at Whiteman AFB, combined with impacts to soil and water resources from past, present, and reasonably foreseeable future actions, would not result in significant cumulative impacts to the soil and water resources.

WH4.2.5 Biological Resources

The additional C&D projects described in Table WH4-1 would be anticipated to have similar types of impacts to vegetation, wildlife, and special status species as those impacts described for the construction impacts for the proposed AFRC F-35A mission. Cumulative impacts resulting from implementation of the proposed AFRC F-35A mission in conjunction with past, present, and reasonably foreseeable future actions on biological resources at Whiteman AFB would not be significant.

The aircraft operations associated with implementation of the AFRC F-35A mission at Whiteman AFB would not result in significant impacts to wildlife, including threatened and endangered species and migratory birds. Projects such as the B-21 Bomber mission could result in similar impacts to wildlife as those described in this EIS. Cumulative impacts resulting from implementation of the proposed AFRC F-35A mission in conjunction with past, present, and reasonably foreseeable future actions on the biological resources at Whiteman AFB would not be significant.

WH4.2.6 Land Use and Recreation

C&D projects associated with the proposed AFRC F-35A mission would occur near other ongoing and future C&D projects (e.g., IDP projects, construction from private and state and local development) during the same time periods. C&D projects have been and will continue to be a regular occurrence on and near installations such as Whiteman AFB. Construction projects would continue to comply with existing zoning ordinance. Cumulative impacts resulting from implementation of the proposed AFRC F-35A mission in conjunction with past, present, and reasonably foreseeable future actions on land use and recreation at Whiteman AFB would not be significant.

Aircraft operations associated with implementation of the AFRC F-35A mission at Whiteman AFB would not result in significant impacts to land use and recreation. Increased noise would impact some recreational facilities and could reduce the enjoyment of those facilities for some persons. Projects such as the B-21 Bomber mission could increase noise in the region surrounding Whiteman AFB and add to the impacts from the AFRC F-35A mission. Additional NEPA analysis would be conducted for future beddown missions to quantify any additional impacts.

WH4.2.7 Socioeconomics

The C&D projects associated with the AFRC F-35A mission would provide short-term, economic benefits to surrounding areas through employment of construction workers and through the purchase of materials and equipment. The short-term impact of implementing the proposed mission combined with any or all of the projects listed in Table WH4-1 would result in negligible cumulative impacts to socioeconomics in the area. The addition of 11 personnel associated with the proposed mission is also not anticipated to result in cumulative impacts to housing, schools, or other socioeconomic resources in this area.

WH4.2.8 Environmental Justice and the Protection of Children

The proposed C&D projects on and near Whiteman AFB would not result in any cumulative impacts to environmental justice populations. Noise resulting from the operation of F-35A aircraft would affect people living near the installation. As discussed in Section WH3.10.2, implementation of the AFRC F-35A mission at Whiteman AFB would not result in disproportionate impacts to minority or low-income populations. Projects such as the B-21 Bomber mission could increase noise in the region surrounding Whiteman AFB and add to the impacts from the AFRC F-35A mission. Additional NEPA analysis would be conducted for future beddown missions to quantify any additional impacts.

WH4.2.9 Climate Change

Missouri and the surrounding region could experience a continuing of recent upward trends in average temperatures and below average occurrence of extremely cold days, an increase in heavy rain events and winter precipitation, and an increase in the intensity of naturally occurring droughts (USGCRP 2017).

Increases in temperature, heavy precipitation events, and drought intensity could interact with resource areas such as air quality, water resources, and socioeconomics. Increasing temperatures have been shown to increase ground level ozone and particulates (Orru et al. 2017). Increases in heavy precipitation events lead to increased risk of flooding and spring planting delays. Increases in drought intensity could impact water availability. Potential socioeconomic impacts could include increased costs associated with poor air quality, flooding damage, and decreased harvests.

While the recent impacts of climate change have been minor in the Missouri region and operations at Whiteman AFB have remained relatively unchanged, exacerbation of climate conditions in the future could increase the cost of proposed operations and could impede operations during extreme events. Additional measures could be needed to mitigate such impacts over the operational life expectancy of the F-35A.

WH4.3 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Irreversible and irretrievable resource commitments are related to the use of nonrenewable resources and the effects that the uses of these resources have on future generations. Irreversible effects primarily result from the use or destruction of a specific resource (e.g., energy and minerals) that cannot be replaced within a reasonable timeframe. Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored as a result of the action.

For the beddown of F-35A aircraft at Whiteman AFB, most resource commitments are neither irreversible nor irretrievable. Most impacts are short-term (e.g., air emissions from construction) or longer lasting but negligible (e.g., public service increases). Those limited resources that could involve a possible irreversible or irretrievable commitment are discussed below.

Should the AFRC F-35A mission be located at Whiteman AFB, some land in the cantonment would be disturbed. However, much of this land has been previously disturbed and is heavily influenced by airfield development. Construction and renovation of base facilities would require the consumption of limited amounts of material typically associated with interior renovations (e.g., wiring, insulation, windows, and drywall) and exterior construction (e.g., concrete, steel, sand, and brick). An undetermined amount of energy to conduct renovation, construction, and operation of these facilities would be expended and irreversibly lost.

Training operations would continue and involve consumption of nonrenewable resources (e.g., gasoline used in vehicles and jet fuel used in aircraft). None of these activities are expected to significantly decrease the availability of minerals or petroleum resources. Privately owned vehicle use by the personnel continuing to support the existing missions would consume fuel, oil, and lubricants. The amount of these materials used would increase; however, this additional use is not expected to significantly affect the availability of the resources.

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CHAPTER 4

NO ACTION ALTERNATIVE

NA1.0 NO ACTION ALTERNATIVE

Analysis of the No Action Alternative provides a benchmark, enabling decision makers to compare the magnitude of the environmental effects of the proposed action or alternatives. Section 1502.14(d) of the National Environmental Policy Act (NEPA) requires an Environmental Impact Statement (EIS) to analyze the No Action Alternative. No action for this EIS means that the proposed Air Force Reserve Command (AFRC) F-35A beddown would not occur at any base at this time. Implementation of the No Action Alternative would not establish the AFRC F-35A mission at any base.

The No Action Alternative has been carried forward in the EIS per Council on Environmental Quality (CEQ) regulations and as a baseline of existing impact continued into the future against which to compare impacts of the action alternatives.

Under the No Action Alternative:

- AFRC would not be provided a location to operate the F-35A aircraft; AFRC would not be able to efficiently and effectively maintain combat capability and mission readiness; and AFRC would not integrate F-35A squadrons into the existing U.S. Air Force (USAF) structure. In addition, AFRC would not be able to organize, train, equip, and support F-35A pilots to meet a full range of military operations.
- There would be no change in based aircraft at Davis-Monthan Air Force Base (AFB); operations at Davis-Monthan AFB and in the airspace would continue. The 924th Fighter Group (924 FG) would continue to operate the existing A-10 aircraft, there would be no F-35A-related changes to infrastructure or personnel.
- There would be no change in based aircraft at Homestead Air Reserve Base (ARB) and aircraft operations around Homestead ARB and in the associated airspace would continue. The 482nd Fighter Wing (482 FW) would continue to fly air missions with the existing F-16 aircraft. The Special Operations Command South and other major units at the base would continue operating as described in baseline conditions.
- At Naval Air Station (NAS) Joint Reserve Base (JRB) Fort Worth, there would be no change in based aircraft and aircraft operations around the installation and in the airspace would continue. The 301st Fighter Wing (301 FW) would continue to fly the existing F-16 aircraft. Twenty-four [24]-hour equivalent noise levels (L_{eq24}) greater than or equal to 80 decibels (dB) would continue to affect off-base residential areas, posing some long-term risk of noise-induced permanent threshold shift (NIPTS) for the affected population.
- The A-10 mission would continue at Whiteman AFB and aircraft operations around the base and in the associated airspace would remain unchanged. The 442nd Fighter Wing (442 FW) and the 509th Bomb Wing (509 BW) would continue to fly missions.

Implementation of the No Action Alternative is explained by resource area below. For some resource areas, implementing the No Action Alternative would be the same for all four bases and is generally described for those resource areas. For other resource areas, implementing the No Action Alternative would be base-specific and is described separately by base.

NA1.1 AIRSPACE MANAGEMENT AND USE

Under the No Action Alternative at all four alternative bases, the Air Force would continue to use and manage airspace as it is today. Flying operations and airspace use would continue with no F-35A-related increase or decrease in air traffic.

NA1.2 NOISE

Under the No Action Alternative at Davis-Monthan AFB, Homestead ARB, NAS JRB Fort Worth and Whiteman AFB, existing aircraft operations would continue and construction associated with the AFRC F-35A beddown would not occur. Noise levels at each of the four installations would remain as they are today and there would be no new F-35A-related noise impacts. At NAS JRB Fort Worth, Lockheed Martin would continue to build F-35 aircraft at the adjacent assembly facility and Lockheed Martin pilots would continue to conduct F-35 test flights for the new aircraft.

NA1.3 AIR QUALITY

Under the No Action Alternative, air quality conditions at Davis-Monthan AFB, Homestead ARB, NAS JRB Fort Worth and Whiteman AFB would remain as described in Sections DM3.3.1 and DM3.3.3, HS3.3.1 and HS3.3.3, FW3.3.1 and FW3.3.3 and WM3.3.1 and WM3.3.3. No F-35A-related changes that could affect air quality would occur at any of the base or in the associated airspace.

NA1.4 SAFETY

Under the No Action Alternative, no F-35A aircraft would be based at any of the four bases. In addition, no F-35A-related personnel changes would occur and construction would not be completed. The AFRC and the other flying units at each base would continue their existing missions. All aspects of ground safety and safety in the airspace would remain as described in Sections DM3.4.1 and DM3.4.3, HS3.4.1 and HS3.4.3, FW3.4.1 and FW3.4.3 and WM3.4.1 and WM3.4.3.

NA1.5 SOIL AND WATER RESOURCES

Under the No Action Alternative, soil and water resources at each base would remain as described in Sections DM3.5.1, HS3.5.1, FW3.5.1 and WM3.5.1. None of the proposed construction to support the AFRC F-35A mission would occur, and no F-35A-related impacts to soil and water resources would occur.

NA1.6 BIOLOGICAL RESOURCES

Under the No Action Alternative, biological resources at each of the four bases and associated airspace would remain as described in Sections DM3.6.1 and DM3.6.3, HS3.6.1 and HS3.6.3, FW3.6.1 and FW3.6.3 and WM3.6.1 and WM3.6.3. Vegetation and wildlife habitat would not be disturbed as a result of not implementing the proposed AFRC F-35A mission. No F-35A-related impacts on biological resources are anticipated. At Homestead ARB, biological resources would continue to be managed in accordance with the new Biological Opinion (BO) and in coordination with the U.S. Fish and Wildlife Service (USFWS).

NA1.7 CULTURAL RESOURCES

Under the No Action Alternative, no F-35A-related building renovation, demolition, or construction would occur at any of the four bases. In addition, there would be no F-35A-related changes in the airspace resulting in no changes to cultural resources under the airspace currently used by pilots from each of the four bases. Implementation of the No Action Alternative would result in no effect to cultural resources and/or historic properties.

NA1.8 LAND USE AND RECREATION

Under the No Action Alternative, land use and recreational resources at each base and under the airspace would remain as described in Sections DM3.8.1 and DM3.8.3, HS3.8.1 and HS3.8.3, FW3.8.1 and FW3.8.3 and WM3.8.1 and WM3.8.3. Residential land at NAS JRB Fort Worth and Whiteman AFB would continue to remain incompatible with existing noise levels and noise levels at recreational areas near each of the bases and below the airspace proposed for use would remain unchanged.

NA1.9 SOCIOECONOMICS

Under the No Action Alternative, socioeconomic conditions would remain as described in Sections DM3.9.1, HS3.9.1, FW3.9.1 and WM3.9.1. No personnel increases or decreases would occur at any of the bases. No F-35A-related construction would occur.

NA1.10 ENVIRONMENTAL JUSTICE AND PROTECTION OF CHILDREN

Under the No Action Alternative, there would be no F-35A-related changes that would result in impacts to environmental justice or child populations. Conditions at Davis-Monthan AFB, Homestead ARB, NAS JRB Fort Worth and Whiteman AFB would remain as described in Sections DM3.10.1, HS3.10.1, FW3.10.1 and WM3.10.1.

Disproportionate impacts to minority and low income populations would continue to occur at NAS JRB Fort Worth and Whiteman AFB and children and elderly persons would continue to be exposed to day-night average sound levels (DNL) of 65 dB or greater at both of these installations.

NA1.11 INFRASTRUCTURE

Under the No Action Alternative, the infrastructure at each base would remain as described in the Sections DM3.11.1, HS3.11.1, FW3.11.1, and WM3.11.1. No new F-35A-related construction would occur and no F-35A-related personnel would arrive or decrease at any of the bases. No impacts on the infrastructure system at any of the bases would occur.

NA1.12 HAZARDOUS MATERIALS AND WASTE

Under the No Action Alternative, hazardous materials would continue to be used and hazardous wastes would continue to be generated at each base as described in Sections DM3.12.1, HS3.12.1, FW3.12.1, and WM3.12.1. Implementation of the No Action Alternative would result in no F-35A-related changes to hazardous materials and waste at any of the bases.

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CHAPTER 5

REFERENCES

5.0 REFERENCES

5.1 CHAPTER 1: PURPOSE AND NEED FOR THE AIR FORCE RESERVE COMMAND F-35A OPERATIONAL BEDDOWN

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USAF 2013. U.S. Air Force. *United States Air Force F-35A Operational Basing Environmental Impact Statement.* Volume 1. Final. September 2013.

5.1.1 Chapter 1 Public Documents

5.1.1.1 Air Force Documents

AFMAN 32-7003 – Environmental Conservation

5.1.1.2 Air Force Instructions

AFI 90-2002 – Air Force Interactions with Federally-Recognized Tribes

5.1.1.3 Code of Federal Regulations

32 *CFR* 775 – Procedures for Implementing the National Environmental Policy Act

32 *CFR* 989 – Environmental Impact Analysis Process (EIAP)

40 *CFR* 1500-1508 – CEQ Regulations for Implementing the Procedural Provisions of NEPA

40 *CFR* 1508.5 – Cooperating Agency

5.1.1.4 Executive Orders

EO 13175 – Consultation and Coordination with Indian Tribal Governments

5.1.1.5 United States Code

42 *USC* 4331 et seq. – Congressional Declaration of National Environmental Policy

5.2 CHAPTER 2: DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

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5.2.1.2 Code of Federal Regulations

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40 *CFR* 1502.14(d) – Environmental Impact Statement; Alternatives Including the Proposed Action; Include the Alternative of No Action

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AFPD 13-2 – Space, Missile, Command, and Control; Air Traffic, Airfield, Airspace, and Range Management

5.3.1.2 Air Force Instructions

AFI 13-201 – Space, Missile, Command, and Control; Airspace Management

AFI 13-212 – Nuclear Space, Missile, or Command and Control Operations; Range Planning and Operations

AFI 32-1015 – Integrated Installation Planning

AFI 32-7042 – Solid and Hazardous Waste Compliance

AFI 32-7064 – Integrated Natural Resources Management

AFI 48-127 – Occupational Noise and Hearing Conservation Program

AFI 90-2002 – Air Force Interactions with Federally Recognized Tribes

5.3.1.3 Code of Federal Regulations

14 *CFR* 77 – Objects Affecting Navigable Airspace

29 *CFR* 1910.95 – Occupational Noise Exposure

33 *CFR* 323.3 – Discharges Requiring Permits

33 *CFR* 328.3 – Definition of Waters of the United States

30 *CFR* 329 – Definition of Navigable Waters of the United States

36 *CRF* 60 – National Register of Historic Places

36 *CFR* 60.4 – National Register of Historic Places

36 *CFR* 63 – Determinations of Eligibility for Inclusion in the National Register

36 *CFR* 79 – Curation of Federally Owned and Administered Archaeological Collections

36 *CFR* 800 – Protection of Historic Properties

36 *CFR* 800.16(d) – Definition of Area of Potential Effects

36 CFR 800.16(l) – Protection of Historic Properties; definition of "Effect"

40 *CFR* 61 – National Emission Standards for Hazardous Air Pollutants

40 *CFR* 93, Subpart B – Determining Conformity of General Federal Actions to State or Federal Implementation Plans

40 *CFR* 112 – Spill Prevention, Control and Countermeasure (SPCC) Rule

40 *CFR* 225.1 to 233.71 – Ocean Dumping

40 *CFR* 240 through 244 – Guidelines for Solid Waste

40 *CFR* 257 – Criteria for Classification of Solid Waste Disposal Facilities and Practices

40 *CFR* 258 – Criteria for Municipal Solid Waste Landfills

40 *CFR* 261 – USEPA Regulation on Identification and Listing of Hazardous Waste

40 *CFR* 279 – USEPA Regulation on Standards for the Management of Used Oil

40 *CFR* 302 – USEPA Regulation on Designation, Reportable Quantities, and Notification

40 *CFR* 700–766 – Toxic Substances Control Act (TSCA) of 1976

40 *CFR* 1508.27 – Council on Environmental Quality Regulations for Implementing the Procedural Provisions of NEPA; definition of "Significantly"

40 *CFR* 1508.27(b) – Council on Environmental Quality

43 *CFR* 7 – Protection of Archaeological Resources

5.3.1.4 Department of Defense Directives and Instructions

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DoDI 4165.57 – Air Installations Compatible Use Zones (AICUZ)

DoDI 4710.02 – Department of Defense Interactions with Federally-Recognized Tribes

DoDI 4715.16 – Cultural Resources Management

DoDI 6055.12 – Hearing Conservation Program

DoDI 6055.09, DoD Ammunition and Explosives Safety Standard

5.3.1.5 Federal Aviation Administration (FAA) Orders

FAA Order 7400.2L 2017 – Procedures for Handling Airspace Matters

5.3.1.6 Executive Orders

EO 11593 – Protection and Enhancement of the Cultural Environment

EO 11988 – Floodplain Management

EO 11990 – Protection of Wetlands

EO 12898 – Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations

EO 13007 – Indian Sacred Sites

EO 13045 – Protection of Children from Environmental Health Risks and Safety Risks

EO 13175 – Consultation and Coordination with Indian Tribal Governments

EO 13287 – Preserve America

EO 13514 – Federal Leadership in Environmental, Energy, and Economic Performance

5.3.1.7 United States Code

15 *USC* 2651 – Asbestos Hazard Emergency Response Act

16 *USC* 668-668d – Protection of Bald and Golden Eagles; Availability of Appropriations for Migratory Bird Treaty Act

16 *USC* 703-712 – Migratory Bird Treaty Act

16 *USC* 1536 – Interagency Cooperation

33 *USC* 1251 et seq. – Congressional declaration of goals and policy

42 *USC* 6901 et seq. – Resource Conservation and Recovery Act (RCRA) of 1976

42 *USC* 7506(c) – Limitations on Certain Federal Assistance; Activities Not Conforming to Approved or Promulgated Plans

42 *USC* 9601-9675 – Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986

42 *USC* 9620 – Community Environmental Response Facilitation Act of 1992

42 *USC* 11001-11050 – Emergency Planning and Community Right-to-Know (EPCRA) Act of 1986

42 *USC* §17094 – Storm Water Runoff Requirements for Federal Development Projects

49 *USC* 40102 – Transportation; Definitions

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5.4.1.1 Fighter Wing Documents

354 FW Instruction 11-250 – Local Flying Procedures

5.4.1.2 Air Force Documents

AFGM 2019-32-01 – AFFF-Related Waste Management Guidance

AFH 32-7084 – AICUZ Program Manager's Guide

AFPAM 91-212 – Bird Aircraft Strike Hazard (BASH) Management Techniques

AFPD 32-10 – Installations and Facilities

5.4.1.3 Air Force Instructions

AFI 90-801 – Environment, Safety, and Occupational Health Councils

AFI 91-201 – Explosives Safety Standards

AFI 91-202 – The U.S. Air Force Mishap Prevention Program

AFI 32-1052 – Facility Asbestos Management

AFI 32-7042 – Solid and Hazardous Waste Compliance

5.4.1.4 Arizona Revised Statutes

ARS 28-8480 Title 28, Article 7, Airport Zoning & Regulation, Section 8480 Military airport continuation; land acquisition

ARS 28-8481 Title 28, Article 7, Airport Zoning & Regulation, Section 8481 Planning and zoning; military airport and ancillary military facility's operation compatibility; compliance review; penalty; definitions

ARS 28-8482 Title 28, Article 7, Airport Zoning & Regulation, Section 8482 Incorporation of sound attenuation standards in building codes

5.4.1.5 Code of Federal Regulations

36 *CFR* 800 – Protection of Historic Properties

40 *CFR* 112.20(e) – Facility Response Plans - Determination and Evaluation of Required Response Resources for Facility Response Plans

40 *CFR* 1508.7 – Cumulative Impact

5.4.1.6 Department of Defense Instructions

DoDI 4165.57 – Air Installations Compatible Use Zones (AICUZ)

DoDI 4710.02 – Department of Defense Interactions with Federally-Recognized Tribes

5.4.1.7 Executive Orders

EO 12898 – Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations

EO 13045 – Protection of Children from Environmental Health Risks and Safety Risks

EO 13175 – Consultation and Coordination with Indian Tribal Governments

5.4.1.8 Technical Orders

TO 00-105E-9 – Aerospace Emergency Rescue and Mishap Response Information

5.4.1.9 Unified Facilities Criteria

UFC 2-100-29-01 – Installation Master Planning

UFC 3-101-01 – Architecture

5.4.1.10 United States Code

16 *USC* 668-668c – Bald and Golden Eagle Protection Act

16 *USC* §§ 703-712 – Migratory Bird Treaty Act

16 *USC* § 1531 et seq. – Endangered Species Act - Congressional Findings and Declaration of Purposes and Policy

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5.5.1 Chapter 4 Homestead Air Reserve Base Public Documents

5.5.1.1 Local Legal Documents

Miami-Dade Code of Ordinances, Chapter 33, Article XXXV – Homestead Air Force Base Zoning

5.5.1.2 Air Force Documents

AFGM 2019-32-01 – AFFF-Related Waste Management Guidance

AFH 32-7084 – AICUZ Program Manager's Guide

AFPAM 91-212 – Bird Aircraft Strike Hazard (BASH) Management Techniques

AFPD 90-8 – Environment, Safety, and Occupational Health

5.5.1.3 Air Force Instructions

AFI 11-2F-16V3, 482 Fighter Wing Supplement – F-16 Operations Procedures

AFI 32-7086 – Hazardous Material Management

AFI 32-1052 – Facility Asbestos Management

AFI 90-801 – Environment, Safety, and Occupational Health Councils

AFI 90-901 – Operational Risk Management

AFI 90-2002 – Air Force Interactions with Federally Recognized Tribes

AFI 91-201 – Explosives Safety Standards

AFI 91-202 – The U.S. Air Force Mishap Prevention Program

5.5.1.4 Chief of Naval Operations (OPNAV) Instructions

OPNAVINST 3550.1A – Range Air Installations Compatible Use Zones (RAICUZ) Program

5.5.1.5 Code of Federal Regulations

36 *CFR* 800 – Protection of Historic Properties

40 *CFR* 1508.7 – Cumulative Impact

50 *CFR* 21.15 – Authorization of Take Incidental to Military Readiness Activities

5.5.1.6 Department of Defense Instructions

DoDI 4165.57 – Air Installations Compatible Use Zones (AICUZ)

DoDI 4710.02 – Department of Defense Interactions with Federally-Recognized Tribes

5.5.1.7 Executive Orders

EO 12898 – Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations

EO 13045 – Protection of Children from Environmental Health Risks and Safety Risks

EO 13175 – Consultation and Coordination with Indian Tribal Governments

5.5.1.8 Technical Orders

TO 00-105E-9 – Aerospace Emergency Rescue and Mishap Response Information

5.5.1.9 Unified Facilities Criteria

UFC 3-101-01 – Architecture

UFC 3-210-10 – Low Impact Development

UFC 3-230-03 – Water Treatment

5.5.1.10 United States Code

16 *USC* 668-668c – Bald and Golden Eagle Protection Act

16 *USC* §§ 703-712 – Migratory Bird Treaty Act

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5.6.1.1 Air Force Documents

AFH 32-7084 – AICUZ Program Manager’s Guide

AFPAM 91-212 – Bird Aircraft Strike Hazard (BASH) Management Techniques

AFPD 90-8 – Environment, Safety, and Occupational Health

5.6.1.2 Air Force Instructions

AFI 11-2F-16V3 – Flying Operations – F-16 Operations Procedures

AFI 90-801 – Environment, Safety, and Occupational Health Councils

AFI 90-901 – Operational Risk Management

AFI 90-2002 – Air Force Interactions with Federally Recognized Tribes

AFI 91-201 – Explosives Safety Standards

AFI 91-202 – The U.S. Air Force Mishap Prevention Program

5.6.1.3 Chief of Naval Operations (OPNAV) Instructions

OPNAVINST 11010.36C – Air Installations Compatible Use Zones (AICUZ) Program

OPNAVINST 5090.1D – Environmental Readiness Program

OPNAVINST 5100.23G – Navy Safety & Occupational Health (SOH) Program Manual

5.6.1.4 Code of Federal Regulations

36 *CFR* 800 – Protection of Historic Properties

40 *CFR* 1508.7 – Cumulative Impact

50 *CFR* 21.15 – Authorization of Take Incidental to Military Readiness Activities

5.6.1.5 Department of Defense Instructions

DoDI 4165.57 – Air Installations Compatible Use Zones (AICUZ)

DoDI 4710.02 – Department of Defense Interactions with Federally-Recognized Tribes

DoDI 4715.18 – Emerging Chemicals (ECs) of Environmental Concern

5.6.1.6 Executive Orders

EO 12898 – Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations

EO 13045 – Protection of Children from Environmental Health Risks and Safety Risks

EO 13175 – Consultation and Coordination with Indian Tribal Governments

5.6.1.7 Technical Orders

TO 00-105E-9 – Aerospace Emergency Rescue and Mishap Response Information

5.6.1.8 Unified Facilities Criteria

UFC 3-101-01 – Architecture

UFC 3-210-10 – Low Impact Development

5.6.1.9 United States Code

16 *USC* 668-668c – Bald and Golden Eagle Protection Act

16 *USC* § 1531 et seq. – Endangered Species Act - Congressional Findings and Declaration of Purposes and Policy

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5.7.1 Chapter 4 Whiteman Air Force Base Public Documents

5.7.1.1 Air Force Documents

AFGM 2019-32-01 – AFFF-Related Waste Management Guidance

AFH 32-7084 – AICUZ Program Manager's Guide

AFPAM 91-212 – Bird Aircraft Strike Hazard (BASH) Management Techniques

AFPD 90-8 – Environment, Safety, and Occupational Health

5.7.1.2 Air Force Instructions

AFI 32-7086 – Hazardous Material Management

AFI 32-1052 – Facility Asbestos Management

AFI 90-801 – Environment, Safety, and Occupational Health Councils

AFI 90-901 – Operational Risk Management

AFI 90-2002 – Air Force Interactions with Federally Recognized Tribes

AFI 91-201 – Explosives Safety Standards

AFI 91-202 – The U.S. Air Force Mishap Prevention Program

5.7.1.3 Code of Federal Regulations

36 *CFR* 800 – Protection of Historic Properties

40 *CFR* 122 – EPA Administered Permit Programs: The National Pollutant Discharge Elimination System

40 *CFR* 1508.7 – Cumulative Impact

50 *CFR* 21.15 – Authorization of Take Incidental to Military Readiness Activities

5.7.1.4 Code of State Regulations

3 *CSR* 10-4.111 – Department of Conservation Division: Conservation Commission - Wildlife Code: General Provisions – Endangered Species

10 *CSR* 20-6.200 – Department of Natural Resources Division: Clean Water Commission - Permits - Storm Water Regulations

5.7.1.5 Department of Defense Instructions

DoDI 4165.57 – Air Installations Compatible Use Zones (AICUZ)

DoDI 4710.02 – Department of Defense Interactions with Federally-Recognized Tribes

5.7.1.6 Executive Orders

EO 12898 – Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations

EO 13045 – Protection of Children from Environmental Health Risks and Safety Risks

EO 13175 – Consultation and Coordination with Indian Tribal Governments

5.7.1.7 Technical Orders

TO 00-105E-9 – Aerospace Emergency Rescue and Mishap Response Information

5.7.1.8 Unified Facilities Criteria

UFC 3-101-01 – Architecture

UFC 3-210-10 – Low Impact Development

5.7.1.9 United States Code

16 *USC* 668-668c – Bald and Golden Eagle Protection Act

16 *USC* §§ 703-712 – Migratory Bird Treaty Act

16 *USC* § 1531 et seq. – Endangered Species Act - Congressional Findings and Declaration of Purposes and Policy

42 *USC* §17094 – Storm water runoff requirements for Federal development projects

54 *USC* 300101 et seq. – National Historic Preservation Act

5.8 CHAPTER 4: NO ACTION ALTERNATIVE

No citations.

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LIST OF PREPARERS

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City of Tucson, Arizona	Cooperating Agency
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LIST OF REPOSITORIES

LIST OF REPOSITORIES

Note: Due to the COVID-19 pandemic, the reference sections of some libraries are not available to the public, or some libraries are closed. The Final EIS is available for review online at www.AFRC-F35A-beddown.com. Some libraries offer computer services where the Final EIS can be reviewed online at the website listed above. Please contact your local library to determine computer hours and services available.

DAVIS-MONTHAN AIR FORCE BASE REPOSITORIES

- The reference sections of all Pima County libraries are currently closed to the public due to the COVID-19 pandemic.

DAVIS-MONTHAN AIR FORCE BASE AIRSPACE REPOSITORIES

- The libraries under the airspace proposed for use are currently closed to the public due to the COVID-19 pandemic.

HOMESTEAD AIR RESERVE BASE REPOSITORIES

- Homestead Branch Library, 700 N Homestead Boulevard, Homestead, FL 33030

HOMESTEAD AIR RESERVE BASE AIRSPACE REPOSITORIES

- Avon Park Library, 100 N Museum Avenue, Avon Park, FL 33825

NAVAL AIR STATION JOINT RESERVE BASE FORT WORTH REPOSITORIES

- Ridglea Library, 3628 Bernie Anderson Avenue, Fort Worth, TX 76116

NAVAL AIR STATION JOINT RESERVE BASE FORT WORTH AIRSPACE REPOSITORIES

- Scurry County Library, 1916 23rd Street, Snyder, TX 79549
- Lawton Public Library, 110 SW 4th Street, Lawton, OK 73501

WHITEMAN AIR FORCE BASE REPOSITORIES

- The reference sections of all libraries near Whiteman AFB are currently closed to the public due to the COVID-19 pandemic.

WHITEMAN AIR FORCE BASE AIRSPACE REPOSITORIES

- Waynesville Library, 306 Historic 66 West, Waynesville, MO 65583

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GLOSSARY


DAVIS-MONTHAN AIR FORCE BASE
2012 CINC Installation Excellence Award Winner
Best Installation in the USAF
WELCOME TO WHITEMAN
Whiteman AFB, MO
Davis-Monthan AFB, AZ
NAS JRB Fort Worth, TX
Homestead ARB, FL
NAVAL AIR STATION
FORT WORTH
JOINT RESERVE BASE
U.S. AIR FORCE

GLOSSARY

A-weighted decibel (dBA): The dBA metric is used to reflect a weighting process applied to noise measurements to filter out very low and very high frequencies of sound in order to replicate human sensitivity to different frequencies of sound and reflect those frequencies at which human hearing is most sensitive. Environmental noise is typically measured in dBA.

Above Ground Level (AGL): Altitude expressed in feet measured above the ground surface.

Accident Potential Zone (APZ)**:** An area near a runway that is based on historical military accident and operations data and the application of a margin of a safety that represents those areas where an accident is most likely to occur. APZs are normally 3,000 feet wide and extend up to 15,000 feet from the end of the runway.

Acoustic Night: The period between 10:00 P.M. and 7:00 A.M. when 10 decibels is added to aircraft noise levels due to increased sensitivity to noise at night.

Afterburner: A device present on some jet engines that provides additional power to an aircraft. This additional power can be used to quickly lift an aircraft from the runway or to increase the speed of an aircraft during training or combat situations.

Air Combat Command (ACC): The U.S. Air Force Command that operates combat aircraft assigned to bases within the contiguous 48 states, except those assigned to Air National Guard and the Air Force Reserve Command.

Air Force Instruction (AFI): Instructions implementing U.S. laws and regulations, and providing policy for USAF personnel and activities.

Air Force Reserve Command (AFRC): AFRC, a major command with headquarters at Robins Air Force Base, Georgia. AFRC is the federally controlled Air Reserve Component of the U.S. Air Force.

Air Installations Compatible Use Zones (AICUZ)**:** A land-use-planning program, used by the military, to protect the health, safety, and welfare of those living near military airfields while preserving the defense flying mission. AICUZ presents noise zones and accident potential zones for military airfields and recommendations for compatible land use.

Air Quality: The degree to which the ambient air is pollution-free, assessed by measuring a number of indicators of pollution.

Asbestos-containing Material (ACM): Any material containing more than 1 percent asbestos.

Beddown: The provision of facilities and other necessary infrastructure to support a new mission or weapon system.

Bird/Wildlife-Aircraft Strike Hazard (BASH): A U.S. Air Force program to reduce the possibilities of bird or wildlife collisions with aircraft.

C-Weighted Day-Night Average Sound Level (CDNL): CDNL is a day-night average sound level computed for impulsive noise such as sonic booms. Peak overpressure, measured in pounds per square foot (psf), characterizes the strength of impulsive noise.

Clean Air Act (CAA): This Act empowered the U.S. Environmental Protection Agency to establish standards for common pollutants that represent the maximum levels of background pollution that are considered safe, with an adequate margin of safety to protect public health and safety.

Clean Water Act (CWA): The primary federal law in the United States governing water pollution. The CWA established the goals of eliminating releases of high amounts of toxic substances into water, eliminating additional water pollution, and ensuring that surface waters would meet standards necessary for human sports and recreation.

Clear Zone (CZ): An accident potential zone constituting the innermost portions of the runway approach.

Composite Aerospace Materials (Composite Materials): Generally, a composite is a combination of two or more different materials that results in a superior product (e.g., reinforced concrete). As used in the EIS, this term most often refers to advanced composite materials, which are generally characterized by the use of more modern materials that combine a strong, stiff fiber within a resin matrix (e.g., carbon fiber and plastic).

Council on Environmental Quality (CEQ): The Council is within the Executive Office of the President and is composed of three members appointed by the President, subject to approval by the Senate. Members are to be conscious of and responsive to the scientific, economic, social, esthetic, and cultural needs of the nation; and to formulate and recommend national policies to promote the improvement of environmental quality.

Day-Night Average Sound Level (DNL): DNL is a noise metric combining the levels and durations of noise events and the number of events over an extended time period. It is a cumulative average computed over a 24-hour period to represent total noise exposure. DNL also accounts for more intrusive nighttime noise, adding a 10 dB penalty for sounds after 10:00 P.M. and before 7:00 A.M. DNL is the Federal Aviation Administration's (FAA) primary noise metric. FAA Order 1050.1E defines DNL as the yearly day/night average sound level.

Decibel (dB): A sound measurement unit.

De Minimis ***Threshold:*** The minimum threshold for which a conformity determination must be performed for various criteria pollutants in various areas.

Endangered Species: The Endangered Species Act of 1973 defined the term "endangered species" to mean any species (including any subspecies of fish or wildlife or plants, and any distinct population segment of any species or vertebrate fish or wildlife which interbreeds when mature) that is in danger of extinction throughout all or a significant portion of its range.

Environmental Justice: Pursuant to Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations*, review must be made as to whether a federal program, policy, or action presents a disproportionately high and adverse human health or environmental effect on minority and/or low-income populations.

Equivalent Noise Level (L_{eq}): Represents aircraft noise levels decibel-averaged over a specified time period and is useful for considering noise effects during a specific time period such as a school day (denoted $L_{eq(SD)}$ and measured from 8:00 A.M. to 4:00 P.M.).

Floodplain: An area of low-lying ground adjacent to a river, formed mainly of river sediments and subject to flooding.

Groundwater: Water held underground in the soil or in pores and crevices in rock.

Hazardous Material: Solids, liquids, or gases that can harm people, other living organisms, property, or the environment.

Hazardous Waste: Waste that poses substantial or potential threats to public health or the environment. In the United States, the treatment, storage and disposal of hazardous waste is regulated under the Resource Conservation and Recovery Act.

Joint Land Use Study (JLUS): A JLUS is a cooperative land use planning effort between military installations and surrounding communities that examines the positive and negative impacts that military installations have on surrounding communities, and vice versa.

Maximum Noise Level (L_{max}): The highest sound level measured during a single event in which the sound level changes value with time (e.g., an aircraft overflight).

Mean Sea Level (MSL): Altitude expressed in feet measured above average sea level.

Military Operations Area (MOA): Airspace below 18,000 feet above mean sea level established to separate military activities from Instrument Flight Rule traffic and to identify where these activities are conducted for the benefit of pilots using Visual Flight Rule.

Mobile Sources: Includes cars and light trucks, heavy trucks and buses, nonroad engines, equipment, and vehicles.

National Ambient Air Quality Standards (NAAQS): NAAQS are established by the U.S. Environmental Protection Agency for criteria pollutants that represent the maximum levels of background pollution considered safe, with an adequate margin of safety, to protect public health and safety.

National Environmental Policy Act (***NEPA):*** The National Environmental Policy Act of 1969 directs federal agencies to take environmental factors into consideration in their decisions.

National Historic Preservation Act (***NHPA):*** The National Historic Preservation Act of 1966, as amended, established a program for the preservation of historic properties throughout the United States.

National Register of Historic Places (NRHP): The NRHP is the Federal government's official list of districts, sites, buildings, structures, and objects deemed worthy of preservation.

NOISEMAP: *NOISEMAP* is a group of computer programs developed over a number of years by the U.S. Air Force for prediction of noise exposures in the vicinity of a military installation. NOISEMAP is the primary computer model used by the U.S. Department of Defense for evaluating military fixed-wing aircraft noise. It contains a suite of computer programs for prediction of noise exposure from aircraft flight, maintenance, and ground runup operations. NOISEMAP output includes noise contours, noise levels at preselected locations, and other supplemental metrics to assist users in analyzing impacts resulting from aircraft noise in the airfield environment.

Onset Rate-Adjusted Day-Night Average Sound Level (L_{dnmr}): The L_{dnmr} metric adds to the DNL metric the startle effects of an aircraft flying low and fast where the sound can rise to its maximum very quickly. Because the tempo of operations is so variable in airspace areas, L_{dnmr} is calculated based on the average number of operations per day in the busiest month of the year.

Operation: An operation consists of a single activity such as a landing or a takeoff by one aircraft. Each time a single aircraft flies into a different airspace unit, one operation is counted. During a single sortie, an aircraft could fly in several airspace units and conduct a number of operations; therefore, the number of operations exceeds the number of sorties.

Perfluorooctane sulfonate (PFOS)/perfluorooctanoic acid (PFOA): PFOS/PFOA are part of a larger group of per- and polyfluoroalkyl substances (PFAS) chemicals that are considered emerging chemicals of concern. PFAS are a group of manmade chemicals that have been in use since the 1940s, and are (or have been) found in many consumer products like cookware, food packaging, and stain repellants. PFAS manufacturing and processing facilities, airports, and military installations that use firefighting foams are some of the main sources of PFAS. PFAS may be released into the air, soil, and water, including sources of drinking water. PFOS and PFOA are the most studied PFAS and have been voluntarily phased out by industry, though they are still persistent in the environment.

Power Setting: The power or thrust output of an engine in terms of kilonewtons thrust for turbojet and turbofan engines or shaft power in terms of kilowatts for turboprop engines.

Primary Aerospace Vehicles Authorized (PAA): PAA consists of the aircraft authorized and assigned to perform a U.S. Air Force wing's mission.

Region of Influence (ROI): The geographic scope of potential consequences in an area.

Scoping: A National Environmental Policy Act process of identifying the main issues of concern at an early stage in planning in order to discover any alternatives and aid in site selection.

Sortie: A sortie consists of a single military aircraft flight from the initial takeoff through the final landing and includes all activities that occur during that mission. For this EIS, the term sortie is used when referring to the quantity of aircraft operations from the airfield. A sortie can include more than one operation.

Sound Exposure Level (SEL): SEL accounts for both the maximum sound level and the length of time a sound lasts. It provides a measure of the total sound exposure for an entire event. Federal Aviation Administration Order 1050.1E defines SEL as a single event metric that takes into account both the noise level and duration of the event and references to a standard duration of one second.

State Historic Preservation Office (SHPO): State department responsible for assigning protected status for cultural and historic resources.

Threatened Species: A species likely to become endangered within the foreseeable future throughout all, or a significant portion, of its range.

Traditional/Cultural Resource: Traditional and cultural resources are any prehistoric or historic district, site or building, structure, or object considered important to a culture, subculture, or community for scientific, traditional, religious, or other purposes.

Wetland, Jurisdictional: A jurisdictional wetland is a wetland that meets all three U.S. Army Corps of Engineers' criterion for jurisdictional status: appropriate hydrologic regime, hydric soils, and facultative to obligate wetland plant communities under normal growing conditions and is classified as a "Water of the US."

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2012 CINC Installation Excellence Award Winner
Best Installation in the USAF
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FINAL

F-35A OPERATIONAL BEDDOWN - AIR FORCE RESERVE COMMAND ENVIRONMENTAL IMPACT STATEMENT

Prepared for:
United States Air Force
United States Department of the Navy

VOLUME II

August 2020

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ACRONYMS AND ABBREVIATIONS

%HA	percentage highly annoyed
ACAM	Air Conformity Applicability Model
ACS	American Community Survey
AEZ	Airport Environs Zone
AFB	Air Force Base
AFCEC	Air Force Civil Engineer Center
AFE	above airfield elevation
AFEM	Air Force Encroachment Management
AFFF	Aqueous Film Forming Foam
AFGM	Air Force Guidance Memorandum
AFI	Air Force Instruction
AFMAN	Air Force Manual
AFOSH	Air Force Occupational Safety and Health
AFRC	Air Force Reserve Command
AFSEC	Air Force Safety Center
AFTO	Air Force Technical Order
AGE	Aerospace Ground Equipment
AGL	above ground level
AICUZ	Air Installations Compatible Use Zones
ANSI	American National Standards Institute
APU	auxiliary power unit
APZ	Accident Potential Zone
ARB	Air Reserve Base
ARS	Arizona Revised Statute
AS	average air speed
ASEL	A-weighted noise exposure level
ASLHA	American Speech-Language-Hearing Association
ATC	Air Traffic Control
BASH	Bird/Wildlife-Aircraft Strike Hazard
BG	Block Group
CDNL	C-weighted day-night average sound level
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	*Code of Federal Regulations*
CH_4	methane
CHABA	Committee on Hearing, Bioacoustics, and Biomechanics
CNEL	community noise equivalent level
CO	carbon monoxide
CO_2e	carbon dioxide equivalent
COC	community of comparison
CSEL	C-weighted sound exposure level
CT	Census Tract
CY	calendar year
dB	decibel(s)
dBA	A-weighted decibel(s)
dBC	C-weighted decibel(s)

ACRONYMS AND ABBREVIATIONS (Continued)

DERP	Defense Environmental Restoration Program
DNL	day-night average sound level
DNWG	DoD Noise Working Group
DoD	U.S. Department of Defense
DoDI	Department of Defense Instruction
DOT	U.S. Department of Transportation
EIAP	Environmental Impact Analysis Process
EIS	Environmental Impact Statement
EO	Executive Order
ETR	engine thrust request
FAA	Federal Aviation Administration
FICAN	Federal Interagency Committee on Aviation Noise
FICON	Federal Interagency Committee on Noise
FICUN	Federal Interagency Committee on Urban Noise
fps	foot/feet per second
FRP	Facility Response Plan
ft	foot/feet
ft^2	square foot/feet
ft^3	cubic foot/feet
GCR	General Conformity Rule
HAP	hazardous air pollutant
HDDV	heavy duty diesel vehicle
HDGV	heavy duty gasoline vehicle
HUD	U.S. Department of Housing and Urban Development
HVAC	heating, ventilation, and air conditioning
HYENA	Hypertension and Exposure to Noise near Airports
Hz	hertz
ISO	International Organization for Standardization
JDAM	Joint Direct Attack Munition
JLUS	Joint Land Use Study
JRB	Joint Reserve Base
JTD	Joint Technical Data
$kPa\text{-}s/m^2$	kilopascal-second(s) per square meter
kts	knots
L	threshold level
lb	pound(s)
LDDT	light duty diesel truck
LDDV	light duty diesel vehicle
LDGT	light duty gasoline truck
LDGV	light duty gasoline vehicle
L_{dnmr}	onset rate-adjusted day-night average sound level
L_{eq}	equivalent noise level
$L_{eq(8)}$	8-hour equivalent noise level
$L_{eq(24)}$	24-hour equivalent noise level
$L_{eq(h)}$	hourly equivalent noise level
$L_{eq(SD)}$	school day equivalent noise level

ACRONYMS AND ABBREVIATIONS (Continued)

L_{max}	maximum noise level
L_{pk}	peak sound pressure level
LTO	landing and takeoff
MC	methylene chloride
MILSPEC	Military Specification
mmHg	millimeters of mercury
MOA	Military Operations Area
MR_NMAP	Military Operating Area and Range Noise Model
MSL	mean sea level
MTR	Military Training Route
NA	number-of-events above
NAAQS	National Ambient Air Quality Standards
NAL	number-of-events above a threshold level
NAS	Naval Air Station
NATO	North Atlantic Treaty Organization
NC	engine core
NDI	Noise Depreciation Index
NEPA	National Environmental Policy Act
NF	engine fan
NH_3	ammonia
NHPA	National Historic Preservation Act
NIMH	National Institute of Mental Health
NIOSH	National Institute for Occupational Safety and Health
NIPTS	Noise-Induced Permanent Threshold Shift
NLR	noise level reduction
NM	nautical mile(s)
NOA	Notice of Availability
NOI	Notice of Intent
NORAH	Noise-Related Annoyance Cognition and Health
NO_x	nitrogen oxides
NSDI	Noise Sensitivity Depreciation Index
OR	odds ratio
OSHA	Occupational Safety and Health Administration
PAA	Primary Aerospace Vehicles Authorized
Pb	lead
PFAS	per- and polyfluoroalkyl substances
PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonate
PHL	Potential for Hearing Loss
$PM_{2.5}$	particulate matter less than or equal to 2.5 micrometers in diameter
PM_{10}	particulate matter less than or equal to 10 micrometers in diameter
POI	point of interest
POV	privately owned vehicle
psf	pounds per square foot
PTS	permanent threshold shift
PTSD	post-traumatic stress disorder

ACRONYMS AND ABBREVIATIONS (Continued)

RANCH	Road Traffic and Aircraft Noise Exposure and Children's Cognition and Health
RAP	Ready Aircrew Program
ROAA	Record of Air Analysis
ROCA	Record of Conformity Analysis
ROI	region of influence
RPM	revolution(s) per minute
SEL	sound exposure level
SHPO	State Historic Preservation Officer
SIL	Speech Interference Level
SLUCM	Standard Land Use Coding Manual
SO_2	sulfur dioxide
SO_x	sulfur oxides
SUA	Special Use Airspace
TA	time above
TAA	Tucson Airport Authority
TAL	time above a threshold level
TGO	touch-and-go
TIM	time in mode
TOLD	Takeoff and Landing Data
TTS	temporary threshold shift
TUS	Tucson International Airport
UKDfES	United Kingdom Department for Education and Skills
USAF	U.S. Air Force
USC	*United States Code*
USEPA	U.S. Environmental Protection Agency
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VFR	visual flight rules
VOC	volatile organic compound
WHO	World Health Organization
yd^3	cubic yard(s)

APPENDIX A

CORRESPONDENCE

This appendix is contained on the CD-ROM on the back cover of this document.

APPENDIX A CORRESPONDENCE

A.1 NOTICE OF INTENT AND NOTICE OF AVAILABILITY

The notice of intent (NOI) to prepare an environmental impact statement (EIS) was published in the *Federal Register* on 22 March 2018. On 13 August 2018, the U.S. Air Force (USAF) published a second NOI in response to public comments that an incorrect address was provided for submittal of courier-delivered comments.

A.1.1 NOTICE OF INTENT PUBLISHED 22 MARCH 2018

12568 **Federal Register** / Vol. 83, No. 56 / Thursday, March 22, 2018 / Notices

~~**SUMMARY:** On February 12, 2018, the Bureau of Consumer Financial Protection (Bureau) published a Request for Information Regarding Bureau Enforcement Processes (RFI), which provided that comments must be received on or before April 13, 2018. On February 22, 2018, the Bureau received a letter from two industry trade associations requesting a 30 day comment period extension for this RFI and for two other Bureau Requests for Information. The additional time is requested in order to allow commenters to develop meaningful responses to the RFI and the other identified Requests for Information. The Bureau believes the extension will allow all stakeholders the opportunity to provide more robust responses. In response to this request, the Bureau has determined that a 30 day extension of the comment period is appropriate.~~

~~**DATES:** The comment period for the Request for Information Regarding Bureau Enforcement Processes, published February 12, 2018, at 83 FR 5999 has been extended. Comments must now be received on or before May 14, 2018.~~

~~**ADDRESSES:** You may submit responsive information and other comments, identified by Docket No. CFPB–2018–0003, by any of the following methods:~~

- ~~*Electronic:* Go to *http://www.regulations.gov*. Follow the instructions for submitting comments.~~
- ~~*Email: FederalRegisterComments@cfpb.gov*. Include Docket No. CFPB–2018–0003 in the subject line of the message.~~
- ~~*Mail:* Comment Intake, Consumer Financial Protection Bureau, 1700 G Street NW, Washington, DC 20552.~~
- ~~*Hand Delivery/Courier:* Comment Intake, Consumer Financial Protection Bureau, 1700 G Street NW, Washington, DC 20552.~~

~~*Instructions:* The Bureau encourages the early submission of comments. All submissions must include the document title and docket number. Please note the number of the topic on which you are commenting at the top of each response (you do not need to address all topics). Because paper mail in the Washington, DC area and at the Bureau is subject to delay, commenters are encouraged to submit comments electronically. In general, all comments received will be posted without change to *http://www.regulations.gov*. In addition, comments will be available for public inspection and copying at 1700 G Street NW, Washington, DC 20552, on official business days between the hours of 10 a.m. and 5 p.m. eastern time. You can make an appointment to inspect the documents by telephoning 202–435–7275.~~

~~All submissions in response to this request for information, including attachments and other supporting materials, will become part of the public record and subject to public disclosure. Proprietary information or sensitive personal information, such as account numbers or Social Security numbers, or names of other individuals, should not be included. Submissions will not be edited to remove any identifying or contact information.~~

~~**FOR FURTHER INFORMATION CONTACT:** Mark Samburg, Counsel, at 202–435–9710. If you require this document in an alternative electronic format, please contact *CFPB_Accessibility@cfpb.gov*.~~

~~**Authority:** 12 U.S.C. 5511(c).~~

~~Dated: March 16, 2018.~~

~~**Mick Mulvaney,**~~

~~*Acting Director, Bureau of Consumer Financial Protection.*~~

~~[FR Doc. 2018–05784 Filed 3–21–18; 8:45 am]~~

~~BILLING CODE 4810–AM–P~~

DEPARTMENT OF DEFENSE

Department of the Air Force

Notice of Intent To Prepare an Environmental Impact Statement for the Air Force Reserve Command F–35A Operational Beddown

AGENCY: Department of the Air Force, Department of Defense.

ACTION: Notice of intent.

SUMMARY: The United States Air Force (USAF) is issuing this notice to advise the public of the intent to prepare an Environmental Impact Statement (EIS) for the Air Force Reserve Command (AFRC) F–35A Operational Beddown. The EIS will assess the environmental consequences that could result from the beddown and operation of 24 Primary Aerospace Vehicles Authorized (PAA) F–35A aircraft with 2 Backup Aircraft Inventory (BAI), facility and infrastructure development, and personnel changes at a military base in the continental United States where the AFRC conducts a global precision attack mission.

DATES: The USAF intends to hold public scoping meetings from 5:00 p.m. to 8:00 p.m. in the following communities on the following dates:

1. Homestead Air Reserve Base (ARB)—17 April 2018, at the William F. Dickenson Community Center, 1601 N Krome Avenue, Homestead, Florida 33030
2. Naval Air Station (NAS) Fort Worth Joint Reserve Base (JRB)—19 April 2018, at the Cendera Center, 3600 Benbrook Hwy., Fort Worth, Texas 76116
3. Davis-Monthan Air Force Base (AFB)—24 April 2018, at the Tucson Convention Center, 260 S Church Avenue, Tucson, Arizona 85701
4. Whiteman AFB—26 April 2018, at Knob Noster High School, 504 S Washington Avenue, Knob Noster, Missouri 65336.

ADDRESSES: The project website (*www.AFRC-F35A-Beddown.com*) provides more information on the EIS and can be used to submit scoping comments. Scoping comments can also be submitted to Mr. Hamid Kamalpour, U.S. Air Force, (210) 925–2738, AFCEC/CZN, 2261 Hughes Ave., Ste. 155, JBSA-Lackland AFB, Texas 78236–9853, *hamid.kamalpour@us.af.mil*.

For comments submitted by mail, a comment form is available for download on the project website. Comments will be accepted at any time during the environmental impact analysis process. However, to ensure the USAF has sufficient time to consider public input in the preparation of the Draft EIS, scoping comments should be submitted via the project website or to the address listed above by 11 May 2018.

SUPPLEMENTARY INFORMATION: The AFRC F–35A mission includes the beddown and operation of one squadron of 24 PAA F–35A aircraft with 2 BAI. The 24 PAA AFRC F–35A aircraft with 2 BAI would replace either 24 AFRC F–16 aircraft at Homestead ARB or NAS Fort Worth JRB or 24 AFRC A–10 aircraft at Davis-Monthan AFB or Whiteman AFB. The USAF has identified NAS Forth Worth JRB as the preferred alternative, and Davis-Monthan AFB, Homestead ARB, and Whiteman AFB as reasonable alternatives. Along with the No Action Alternative, all four bases will be evaluated as alternatives in the EIS. The United States Navy is a Cooperating Agency to the USAF for this EIS.

Scoping and Agency Coordination: To effectively define the full range of issues to be evaluated in the EIS, the USAF will solicit comments from interested local, state, and federal agencies and elected officials, Native American tribes, interested members of the public, and others. Public scoping meetings will be held in the local communities near the alternative bases. The scheduled dates, times, locations, and addresses for the

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public scoping meetings concurrently being published in local media.

Henry Williams,

Acting Air Force Federal Register Liaison Officer.

[FR Doc. 2018–05807 Filed 3–21–18; 8:45 am]

BILLING CODE 5001–10–P

~~DEPARTMENT OF DEFENSE~~

~~Department of the Army~~

~~**[Docket ID USA–2018–HQ–0009]**~~

~~Proposed Collection; Comment Request~~

~~**AGENCY:** Department of the Army, DoD.~~

~~**ACTION:** Information collection notice.~~

~~**SUMMARY:** In compliance with the *Paperwork Reduction Act of 1995*, the Department of the Army announces a proposed public information collection and seeks public comment on the provisions thereof. Comments are invited on: Whether the proposed collection of information is necessary for the proper performance of the functions of the agency, including whether the information shall have practical utility; the accuracy of the agency's estimate of the burden of the proposed information collection; ways to enhance the quality, utility, and clarity of the information to be collected; and ways to minimize the burden of the information collection on respondents, including through the use of automated collection techniques or other forms of information technology.~~

~~**DATES:** Consideration will be given to all comments received by May 21, 2018.~~

~~**ADDRESSES:** You may submit comments, identified by docket number and title, by any of the following methods:~~

- ~~*Federal eRulemaking Portal: http://www.regulations.gov*. Follow the instructions for submitting comments.~~
- ~~*Mail:* Department of Defense, Office of the Chief Management Officer, Directorate for Oversight and Compliance, 4800 Mark Center Drive, Mailbox #24, Suite 08D09B, Alexandria, VA 22350–1700.~~

~~*Instructions:* All submissions received must include the agency name, docket number and title for this **Federal Register** document. The general policy for comments and other submissions from members of the public is to make these submissions available for public viewing on the internet at *http://www.regulations.gov* as they are received without change, including any personal identifiers or contact information.~~

~~Any associated form(s) for this collection may be located within this same electronic docket and downloaded for review/testing. Follow the instructions at *http://www.regulations.gov* for submitting comments. Please submit comments on any given form identified by docket number, form number, and title.~~

~~**FOR FURTHER INFORMATION CONTACT:** To request more information on this proposed information collection or to obtain a copy of the proposal and associated collection instruments, please write to the Army Marketing and Research Group, ATTN: Mrs. Crystal C. Deleon, 2530 Crystal Drive, Suite 4150, Arlington, VA 22202, or call 703–545–3480.~~

~~**SUPPLEMENTARY INFORMATION:**~~

~~*Title; Associated Form; and OMB Number:* Marketing Army Civilian Employment Survey; OMB Control Number 0702–XXXX.~~

~~*Needs and Uses:* The information collection requirement is necessary to provide the data needed to understand the best marketing strategies to raise awareness of Army civilian employment opportunities with the ultimate goal of filling critical Department of the Army occupations.~~

~~*Affected Public:* Individuals or Households.~~

~~*Annual Burden Hours:* 1,667.~~

~~*Number of Respondents:* 5,000.~~

~~*Responses per Respondent:* 1.~~

~~*Annual Responses:* 5,000.~~

~~*Average Burden per Response:* 20 minutes.~~

~~*Frequency:* One-Time.~~

~~The purpose of this collection is to provide quantitative (survey) data to the Department of the Army on the civilian workforce's attitudes, perceptions, and awareness of civilian career opportunities within the Federal Government, and the Army. The Department of the Army maintains a listing of professional and technical skill sets that are critical to the Service's needs of today and tomorrow. The collection, compilation, and analysis of the proposed quantitative data is imperative to the Department of the Army's marketing and recruitment strategy for informing, identifying, and ultimately hiring those identified with the skill sets necessary for a sustainable Department of the Army. Information for this study will be collected as a survey which will be administered online.~~

~~The data collected will be supplemented with reviews of recent Army branding and marketing practices as well as of recent and projected hiring needs into Department of the Army Civilian jobs. Respondents for quantitative study will be individuals currently employed in the private sector in occupations deemed essential by the Army or individuals who are considering careers in these essential occupations. Quota groups will be established to ensure there is an adequate representation of career stage (pre-, early- and mid) among respondents. Participation in the quantitative study will be voluntary. This is a one-time data collection anticipated to be completed within approximately three months of OMB approval.~~

~~The data collection will focus on awareness and knowledge of Department of Army Civilian job opportunities; comparison of Department of Army Civilian vs. private jobs/careers across key dimensions; most important reasons to seek civilian employment in the Army; perceived negative aspects of Army Civilian employment; reactions to facts and marketing concepts concerning Army Civilian employment; and intended behaviors concerning applying for civilian employment in the Army or recommending to others that they do so.~~

~~Dated: March 19, 2018.~~

~~**Aaron Siegel,**~~

~~*Alternate OSD Federal Register, Liaison Officer, Department of Defense.*~~

~~[FR Doc. 2018–05812 Filed 3–21–18; 8:45 am]~~

~~BILLING CODE 5001–06–P~~

~~DEPARTMENT OF DEFENSE~~

~~Office of the Secretary~~

~~**[Docket ID DOD–2018–OS–0015]**~~

~~Proposed Collection; Comment Request~~

~~**AGENCY:** Office of the Under Secretary of Defense for Personnel and Readiness, DoD.~~

~~**ACTION:** Information collection notice.~~

~~**SUMMARY:** In compliance with the *Paperwork Reduction Act of 1995*, the Office of the Under Secretary of Defense for Personnel and Readiness announces a proposed public information collection and seeks public comment on the provisions thereof. Comments are invited on: Whether the proposed collection of information is necessary for the proper performance of the functions of the agency, including whether the information shall have practical utility; the accuracy of the agency's estimate of the burden of the proposed information collection; ways to enhance the quality, utility, and clarity of the information to be collected; and ways to minimize the burden of the information collection on~~

A.1.2 NOTICE OF INTENT PUBLISHED 13 AUGUST 2018

AUTHENTICATED U.S. GOVERNMENT INFORMATION GPO

39992 **Federal Register** / Vol. 83, No. 156 / Monday, August 13, 2018 / Notices

~~**ADDRESSES:** You may submit comments, identified by "OMB Control No. 3038–0085" by any of the following methods:~~

- ~~The Agency's website, at *http://comments.cftc.gov/*. Follow the instructions for submitting comments through the website.~~
- ~~*Mail:* Christopher Kirkpatrick, Secretary of the Commission, Commodity Futures Trading Commission, Three Lafayette Centre, 1155 21st Street NW, Washington, DC 20581.~~
- ~~*Hand Delivery/Courier:* Same as Mail above.~~

~~Please submit your comments using only one method. All comments must be submitted in English, or if not, accompanied by an English translation. Comments will be posted as received to *http://www.cftc.gov*.~~

~~**FOR FURTHER INFORMATION CONTACT:** Melissa D'Arcy, Special Counsel, Division of Clearing and Risk, Commodity Futures Trading Commission, (202) 418–5086; email: *mdarcy@cftc.gov*.~~

~~**SUPPLEMENTARY INFORMATION:** Under the PRA, 44 U.S.C. 3501 *et seq.*, Federal agencies must obtain approval from the Office of Management and Budget (OMB) for each collection of information they conduct or sponsor. "Collection of Information" is defined in 44 U.S.C. 3502(3) and 5 CFR 1320.3 and includes agency requests or requirements that members of the public submit reports, keep records, or provide information to a third party. Section 3506(c)(2)(A) of the PRA, 44 U.S.C. 3506(c)(2)(A), requires Federal agencies to provide a 60-day notice in the **Federal Register** concerning each proposed collection of information, including each proposed extension of an existing collection of information, before submitting the collection to OMB for approval. To comply with this requirement, the CFTC is publishing this notice of the proposed extension of the currently approved collection of information listed below. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number.~~

~~*Title:* Rule 50.50 End User Notification of Non-Cleared Swap (OMB Control No. 3038–0085). This is a request for an extension of a currently approved information collection.~~

~~*Abstract:* Rule 50.50 specifies the requirements for eligible end-users who elect the end-user exception from the Commission's swap clearing requirement, as provided under section 2(h)(7) of the Commodity Exchange Act ("CEA"). Rule 50.50 requires the counterparties to report certain information to a swap data repository registered with the Commission, or to the Commission directly, if one or more counterparties elects the end user exception. The rule establishes a reporting requirement that is required in order to ensure compliance with the Commission's clearing requirement under section 2(h)(1) of the CEA and is necessary in order for Commission staff to prevent abuse of the end user exception under section 2(h)(1) of the CEA and pursuant to Rule 50.50.~~

~~With respect to the collection of information, the CFTC invites comments on:~~

- ~~Whether the proposed collection of information is necessary for the proper performance of the functions of the Commission, including whether the information will have a practical use;~~
- ~~The accuracy of the Commission's estimate of the burden of the proposed collection of information, including the validity of the methodology and assumptions used;~~
- ~~Ways to enhance the quality, usefulness, and clarity of the information to be collected; and~~
- ~~Ways to minimize the burden of collection of information on those who are to respond, including through the use of appropriate automated electronic, mechanical, or other technological collection techniques or other forms of information technology; *e.g.*, permitting electronic submission of responses.~~

~~You should submit only information that you wish to make available publicly. If you wish the Commission to consider information that you believe is exempt from disclosure under the Freedom of Information Act, a petition for confidential treatment of the exempt information may be submitted according to the procedures established in § 145.9 of the Commission's regulations.[1]~~

~~The Commission reserves the right, but shall have no obligation, to review, pre-screen, filter, redact, refuse or remove any or all of your submission from *http://www.cftc.gov* that it may deem to be inappropriate for publication, such as obscene language. All submissions that have been redacted or removed that contain comments on the merits of the ICR will be retained in the public comment file and will be considered as required under the Administrative Procedure Act and other applicable laws, and may be accessible under the Freedom of Information Act.~~

~~*Burden Statement:*~~

- ~~*Collection 3038–0085—Rule 50.50 End-User Notification of Non-Cleared Swap (17 CFR 50.50: Exceptions to the Clearing Requirement)*~~

~~The Commission is revising its estimate of the burden for this collection for eligible end-users electing the end-user exception. The Commission is increasing the estimated number of respondents from 1,092 to 1,815 based on an observed increase in the number of entities electing the exception. The respondent burden for this collection is estimated to be as follows:~~

~~*Estimated Number of Respondents:* 1,815.~~

~~*Estimated Average Burden Hours per Respondent:* 0.58.~~

~~*Estimated Total Annual Burden Hours:* 1,053.~~

~~*Frequency of Collection:* On occasion; annually.~~

~~There are no capital costs or operating and maintenance costs associated with this collection.~~

~~(Authority: 44 U.S.C. 3501 *et seq.*)~~

~~Dated: August 8, 2018.~~

~~**Christopher Kirkpatrick,**~~

~~*Secretary of the Commission.*~~

~~[FR Doc. 2018–17337 Filed 8–10–18; 8:45 am]~~

~~BILLING CODE 6351–01–P~~

~~[1] 17 CFR 145.9.~~

DEPARTMENT OF DEFENSE

Department of the Air Force

Notice of Intent To Prepare an Environmental Impact Statement for the Air Force Reserve Command F–35A Operational Beddown

AGENCY: Department of the United States Air Force, Department of Defense.

ACTION: Amended notice of intent.

SUMMARY: The Air Force issued a Notice of Intent to Prepare an Environmental Impact Statement for the Air Force Reserve Command F–35A Operational Beddown Environmental Impact Statement (Vol. 83, No. 56 **Federal Register**, 12568, March 22, 2018) and is now being amended to correct the address for courier delivered public scoping comments.

DATES: The 10-working day resubmittal period begins on the date of this notice.

ADDRESSES: The address for courier delivered (*e.g.*, Federal Express or United Parcel Service) public scoping comments is: AFCEC/CZN, (ATTN: Mr. Hamid Kamalpour), 3515 S. General McMullen Drive, Suite 155, San Antonio, Texas 78226–1710.

The address for U.S. Postal Service mail delivery is the same as initially published on March 22, 2018: AFCEC/CZN, (ATTN: Mr. Hamid Kamalpour), 2261 Hughes Avenue, Suite 155, JBSA-

Federal Register / Vol. 83, No. 156 / Monday, August 13, 2018 / Notices 39993

Lackland Air Force Base, Texas 78236–9853.

Both the courier address and U.S. Postal Service address are listed on the project website (*www.AFRC-F35A-Beddown.com*), which also provides more information on the Environmental Impact Statement and related materials.

SUPPLEMENTARY INFORMATION: The Notice of Intent provided the public with instructions on how to submit scoping comments to the Air Force in consideration of the four alternatives being considered, which include: Homestead Air Reserve Base, Homestead FL; Naval Air Station Fort Worth Joint Reserve Base, Fort Worth, TX; Davis-Monthan Air Force Base, Tucson, AZ; and Whiteman Air Force Base, Knob Noster, MO. The Air Force has subsequently been made aware that the address provided for submittal of courier delivered public scoping comments (*e.g.,* Federal Express or United Parcel Service) was incorrect. This notice corrects the address for courier delivered public scoping comments and provides 10-working days for the interested public to submit scoping comments. During this 10-working day period, the Air Force is offering multiple ways in which comments can be submitted. Comments can be provided through the project website (*www.AFRC-F35A-Beddown.com*), via email to the email address provided below and via regular mail or via courier to the addresses listed below. The website also provides additional information on the Environmental Impact Statement and related materials. The Air Force will consider all scoping comments submitted.

Henry Williams,

Acting Air Force Federal Register Liaison Officer.

[FR Doc. 2018–17324 Filed 8–10–18; 8:45 am]

BILLING CODE 5001–10–P

~~DEPARTMENT OF ENERGY~~

~~Bonneville Power Administration~~

~~[BPA File No.: RP–18]~~

~~Final Rules of Procedure~~

~~**AGENCY:** Bonneville Power Administration (Bonneville), Department of Energy (DOE).~~

~~**ACTION:** Notice of final rules of procedure.~~

~~**SUMMARY:** These final rules of procedure revise the rules of procedure that govern Bonneville's hearings conducted under section 7(i) of the Pacific Northwest Electric Power Planning and Conservation Act (Northwest Power Act).~~

~~**DATES:** The final rules of procedure are effective on September 12, 2018.~~

~~**FOR FURTHER INFORMATION CONTACT:** Heidi Helwig, DKE–7, BPA Communications, Bonneville Power Administration, P.O. Box 3621, Portland, Oregon 97208; by phone toll-free at 1–800–622–4520; or by email to *hyhelwig@bpa.gov*.~~

~~*Responsible Official:* Mary K. Jensen, Executive Vice President, General Counsel, is the official responsible for the development of Bonneville's rules of procedure.~~

~~**SUPPLEMENTARY INFORMATION:**~~

~~Table of Contents~~

~~Part I—Introduction and Background~~

~~The Northwest Power Act provides that Bonneville must establish and periodically review and revise its rates so that they recover, in accordance with sound business principles, the costs associated with the acquisition, conservation, and transmission of electric power, including amortization of the Federal investment in the Federal Columbia River Power System over a reasonable number of years, and Bonneville's other costs and expenses. 16 U.S.C. 839e(a)(1). Section 7(i) of the Northwest Power Act, 16 U.S.C. 839e(i), requires that Bonneville's rates be established according to certain procedures, including notice of the proposed rates; one or more hearings conducted as expeditiously as practicable by a Hearing Officer; opportunity for both oral presentation and written submission of views, data, questions, and arguments related to the proposed rates; and a decision by the Administrator based on the record.~~

~~In addition, section 212(i)(2)(A) of the Federal Power Act, 16 U.S.C. 824k(i)(2)(A), provides in part that the Administrator may conduct a section 7(i) hearing to determine the terms and conditions for transmission service on the Federal Columbia River Transmission System under certain circumstances. Such a hearing must adhere to the procedural requirements of paragraphs (1) through (3) of section 7(i) of the Northwest Power Act, except that the Hearing Officer makes a recommended decision to the Administrator before the Administrator's final decision.~~

~~Bonneville last revised its procedures to govern hearings under section 7(i) of the Northwest Power Act in 1986. *See* Procedures Governing Bonneville Power Administration Rate Hearings, 51 FR 7611 (Mar. 5, 1986). Since the establishment of those procedures, there have been significant advancements in the technology available to conduct the hearings. The revised rules of procedure incorporate changes to reflect the manner in which Bonneville will apply these advancements. In addition, through conducting numerous hearings over the past few decades, Bonneville gained insight regarding the strengths and weaknesses of its procedures. The revised rules reflect changes to make the hearings more efficient and to incorporate procedures that were regularly adopted by orders of the Hearing Officers in previous hearings. Finally, the revised rules now explicitly apply to any proceeding under section 212(i)(2)(A) of the Federal Power Act.~~

~~In order to encourage public involvement and assist Bonneville in the development of the revisions to the rules, Bonneville met with customers and other interested parties on February 13, 2018, in Portland, Oregon, to discuss how the then-current rules might be revised. Bonneville also posted an initial draft of proposed revisions to the rules for public review and informally solicited written comments over a two-week period ending February 28, 2018. After reviewing the comments, Bonneville incorporated a number of revisions to the initial draft of proposed revisions to the rules. On May 2, 2018, Bonneville published a Notice of proposed revised rules of procedure in the **Federal Register**. *See* Proposed Revised Rules of Procedure and Opportunity for Review and Comment, 83 FR 19262 (May 2, 2018). Although rules of agency procedure are exempt from notice and comment rulemaking requirements under the Administrative Procedure Act, 5 U.S.C. 553(b)(3)(A), Bonneville nevertheless published notice of the proposed revisions to the procedural rules in the **Federal Register** to promote transparency and public participation. Bonneville accepted written comments on the proposed revisions until June 4, 2018.~~

~~Part II—Response to Comments and Changes to Proposed Rules~~

~~Bonneville received seven comments on its proposed revisions to the rules of procedure ("proposed rules"). In response to these comments, changes were made to the proposed rules as noted below. For purposes of clarity, if a term used in the discussion below is defined in the rules, the term has the meaning found in the rules. For example, "Party" refers to all~~

A.1.3 DRAFT ENVIRONMENTAL IMPACT STATEMENT NOTICE OF AVAILABILITY

The Draft EIS Notice of Availability (NOA) was published in the *Federal Register* on 14 February 2020.

A.1.3.1 Notice of Availability Published 14 February 2020

Federal Register / Vol. 85, No. 31 / Friday, February 14, 2020 / Notices **8585**

Applicable

To preference customers under contract (Contractor) with WAPA.

Power Formula Rate

Rate Formula Provisions are contained in the service agreement. Service agreements currently are Contract Nos. 94–SLC–0253, 94–SLC–0254, and 07–SLC–0601, as supplemented.

Billing

Billing will be as specified in the service agreement.

Adjustment for Losses

Not applicable.

[FR Doc. 2020–03019 Filed 2–13–20; 8:45 am]

BILLING CODE 6450–01–P

ENVIRONMENTAL PROTECTION AGENCY

[ER–FRL–9049–4]

Environmental Impact Statements; Notice of Availability

Responsible Agency: Office of Federal Activities, General Information 202–564–5632 or *https://www.epa.gov/nepa/*.

Weekly receipt of Environmental Impact Statements

Filed February 3, 2020, 10 a.m. EST through February 10, 2020, 10 a.m. EST

Pursuant to 40 CFR 1506.9.

Section 309(a) of the Clean Air Act requires that EPA make public its comments on EISs issued by other Federal agencies. EPA's comment letters on EISs are available at: *https://cdxnodengn.epa.gov/cdx-enepa-public/action/eis/search*.

EIS No. 20200030, Draft, USAF, TX, F–35A Operational Beddown—Air Force Reserve Command, Comment Period Ends: 03/30/2020, Contact: Hamid Kamalpour 210–925–2738

EIS No. 20200031, Final, BLM, MT, Missoula Proposed Resource Management Plan and Final EIS, Review Period Ends: 03/16/2020, Contact: Maggie Ward 406–329–3914

EIS No. 20200032, Final, BLM, MT, Lewistown Proposed Resource Management Plan and Final EIS, Review Period Ends: 03/16/2020, Contact: Dan Brunkhorst 406–538–1981

EIS No. 20200033, Final, BLM, NV, Coeur Rochester and Packard Mines POA11 Project, Review Period Ends: 03/16/2020, Contact: Kathleen Rehberg 775–623–1500

EIS No. 20200034, Draft, USFS, NC, Nantahala and Pisgah NFs DEIS for the Proposed Land Management Plan, Comment Period Ends: 05/14/2020, Contact: Heather Luczak 828–257–4817

EIS No. 20200035, Final Supplement, TVA, TN, Update of TVA's Natural Resource Plan, Review Period Ends: 03/16/2020, Contact: Matthew Higdon 865–632–8051

EIS No. 20200036, Final, BLM, ID, Programmatic EIS for Fuel Breaks in the Great Basin, Review Period Ends: 03/16/2020, Contact: Ammon Wilhelm 208–373–3824

EIS No. 20200037, Final, BLM, ID, Four Rivers Field Office Proposed Resource Management Plan and Final Environmental Impact Statement, Review Period Ends: 03/16/2020, Contact: Brent Ralston 208–384–3300

EIS No. 20200038, Final, FRA, MS, Port Bienville Railroad Combined Final Environmental Impact Statement and Record of Decision, Contact: Kevin Wright 202–493–0845

Under 23 U.S.C. 139(n)(2), FRA has issued a single document that consists of a final environmental impact statement and record of decision. Therefore, the 30-day wait/review period under NEPA does not apply to this action.

Dated: February 10, 2020.

Cindy S. Barger,

Director, NEPA Compliance Division, Office of Federal Activities.

[FR Doc. 2020–03027 Filed 2–13–20; 8:45 am]

BILLING CODE 6560–50–P

ENVIRONMENTAL PROTECTION AGENCY

[EPA–HQ–OAR–2011–0901; FRL–10005–26–OAR]

Proposed Information Collection Request; Comment Request; Prevention of Significant Deterioration and Nonattainment New Source Review (Renewal)

AGENCY: Environmental Protection Agency (EPA).

ACTION: Notice.

SUMMARY: The Environmental Protection Agency (EPA) is planning to submit an information collection request (ICR), "Prevention of Significant Deterioration and Nonattainment New Source Review" (EPA ICR No. 1230.33, OMB Control No. 2060–0003) to the Office of Management and Budget (OMB) for review and approval in accordance with the Paperwork Reduction Act (PRA). Before doing so, the EPA is soliciting public comments on specific aspects of the proposed information collection as described below. This is a proposed renewal of the ICR, which is currently approved through October 31, 2020. An Agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number.

DATES: Comments must be submitted on or before April 14, 2020.

ADDRESSES: Submit your comments, referencing Docket ID No. EPA–HQ–OAR–2011–0901, online using *www.regulations.gov* (our preferred method) by email to *a-and-r-docket@epa.gov*, or by mail to: EPA Docket Center, Environmental Protection Agency, Mail Code 28221T, 1200 Pennsylvania Ave. NW, Washington, DC 20460.

The EPA's policy is that all comments received will be included in the public docket without change including any personal information provided, unless the comment includes profanity, threats, information claimed to be Confidential Business Information (CBI) or other information whose disclosure is restricted by statute.

FOR FURTHER INFORMATION CONTACT: Ben Garwood, Air Quality Policy Division, Office of Air Quality Planning and Standards, C504–03, U.S. Environmental Protection Agency, Research Triangle Park, NC 27709; telephone number: (919) 541–1358; fax number: (919) 541–4028; email address: *garwood.ben@epa.gov*.

SUPPLEMENTARY INFORMATION: Supporting documents which explain in detail the information that the EPA will be collecting are available in the public docket for this ICR. The docket can be viewed online at *www.regulations.gov* or in person at the EPA Docket Center, WJC West Building, Room 3334, 1301 Constitution Ave. NW, Washington, DC. The telephone number for the Docket Center is (202) 566–1744. For additional information about the EPA's public docket, visit *https://www.epa.gov/dockets*.

Pursuant to section 3506(c)(2)(A) of the PRA, the EPA is soliciting comments and information to enable it to: (i) Evaluate whether the proposed collection of information is necessary for the proper performance of the functions of the Agency, including whether the information will have practical utility; (ii) evaluate the accuracy of the Agency's estimate of the burden of the proposed collection of information, including the validity of the methodology and assumptions used; (iii) enhance the quality, utility, and

A.1.3.2 Draft Environmental Impact Statement Notification Letter

DEPARTMENT OF THE AIR FORCE
AIR FORCE CIVIL ENGINEER CENTER
JOINT BASE SAN ANTONIO LACKLAND TEXAS

3 February 2020

MEMORANDUM FOR INTERESTED INDIVIDUALS, ORGANIZATIONS, PUBLIC GROUPS, GOVERNMENT AGENCIES AND OTHER

FROM: AFCEC/CZN
2261 Hughes Avenue, Suite 155
JBSA Lackland, TX 78236-9853

SUBJECT: Draft Environmental Impact Statement (EIS) for the Air Force Reserve Command (AFRC) F-35A Operational Beddown

1. We are pleased to provide you with a copy of the Draft EIS to evaluate the potential environmental consequences associated with the AFRC F-35A Operational Beddown. This document is provided in accordance with the National Environmental Policy Act (NEPA). Libraries are requested to have this document remain available throughout the 45-day public comment period, which ends on March 31, 2020. This document is also available online at: www.afrc-f35a-beddown.com/

2. Notification of the availability of the Draft EIS will appear in the *Federal Register* on February 14, 2020. The EIS analyzes alternative locations for the U.S. Air Force's (USAF's) proposal to beddown and conduct AFRC F-35A flight operations.

3. The USAF will hold four public hearings on the Draft EIS on the dates and at the locations listed below. The purpose of the hearings is to receive public and agency input on the proposed action/alternatives and the Draft EIS analysis. The hearings will also be announced through local media.

March 3, 2020	Homestead ARB	Miami Dade College – Homestead Campus, Building F, Room F222/F223, 500 College Terrace, Homestead, Florida
March 5, 2020	NAS Fort Worth JRB	Brewer High School Auditorium, 1025 W. Loop 820 N., Fort Worth, Texas
March 10, 2020	Davis-Monthan AFB	Tucson Convention Center, 260 South Church Ave., Tucson, Arizona
March 12, 2020	Whiteman AFB	Knob Noster High School, 504 South Washington, Knob Noster, Missouri

4. Substantive comments presented at the public hearings and submitted to the USAF will be considered in the Final EIS. Comments should be postmarked by March 31, 2020, to allow time for sufficient consideration and inclusion in the Final EIS. Comments on the Draft EIS can be submitted electronically via the website; verbally or in writing at public hearings; or by providing written comments to one of the following addresses. For email, please use HQAFRC.F-35.EIS@us.af.mil. For U.S. Postal Service delivery, please use AFCEC/CZN ATTN: Mr. Hamid Kamalpour, 2261 Hughes Avenue, Suite 155, JBSA Lackland Air Force Base, TX 78236-9853. For courier (e.g. Federal Express, United Parcel Service, etc.) delivery, use AFCEC/CZN, ATTN: Mr. Hamid Kamalpour, 3515 S. General McMullen Drive, Suite 155 San Antonio, TX 78226-1710. For electronic submittals, please use: www.afrc-f35a-beddown.com/

Sincerely,

HAMID KAMALPOUR, GS-13 (AFCEC/CZN)
Project Manager, NEPA Center
Environmental Directorate

A.1.3.3 Draft Environmental Impact Statement Postcard

Air Force Reserve Command
F-35A Operational Beddown EIS

The U.S. Air Force has made available for public review and comment a Draft Environmental Impact Statement (EIS) for the proposed Air Force Reserve Command (AFRC) F-35A Operational Beddown. The Draft EIS assesses the potential environmental impacts associated with the proposed beddown and flight operations of AFRC F-35A aircraft.

The U.S. Air Force will hold public hearings, advertised on the back of this postcard, to provide the public with an opportunity to learn about the proposal and provide input.

Review of the Draft EIS is an important part of the environmental process. Public input supports the U.S. Air Force in making informed decisions. Please review a copy of the Draft EIS and provide comments. Copies can be obtained as follows:

- ☒ Download a copy from: **www.AFRC-F35A-beddown.com**.
- ☒ Review a hardcopy at one of the libraries listed below.
- ☒ Request a hardcopy or electronic copy on CD from the contact listed to the right.

Please submit comments on the Draft EIS before March 31, 2020, at the public hearings or electronically at:
www.AFRC-F35A-beddown.com
or via email at:
HQAFRC.F-35.EIS@us.af.mil
or by U.S. Postal Service to:
AFCEC/CZN, ATTN: Mr. Hamid Kamalpour
2261 Hughes Avenue, Suite 155
JBSA Lackland AFB, TX 78236-9853
or by courier (e.g., Federal Express, United Parcel Service, etc.) to:
AFCEC/CZN, ATTN: Mr. Hamid Kamalpour
3515 S. General McMullen Drive, Suite 155
San Antonio, Texas 78226-1710

Libraries Holding Copies of the Draft EIS

Davis-Monthan Air Force Base (AFB)
Eckstrom-Columbus Branch, Murphy-Wilmont, Joel D. Valdez Main, Quincie Douglas, El Pueblo, Sierra Vista Public, Yuma County Main, Douglas Public, and Salazar-Ajo Libraries

Homestead Air Reserve Base (ARB)
Homestead Branch and Avon Park Libraries

Naval Air Station (NAS) Fort Worth Joint Reserve Base (JRB)
Fairmount Community, Fort Worth Central, Ridglea, White Settlement Public, NAS Fort Worth JRB, Scurry County, and Lawton Public Libraries

Whiteman AFB
Knob Noster Branch, Warrensburg Branch, Whiteman AFB, and Waynesville Libraries

AFRC F-35A EIS
13397 Lakefront Drive
Suite 100
Earth City, MO 63045

Public Hearing Meeting Dates and Locations – Please Attend!

The public hearing venues will open at 5:00 p.m. At approximately 5:30 p.m., the hearing will be called to order, followed by a U.S. Air Force presentation and an opportunity for oral comments. The hearing venue will close at 8:00 p.m.

March 3, 2020	Homestead ARB Miami Dade College - Homestead Campus Building F, Room F222/F223 500 College Terrace Homestead, Florida
March 5, 2020	NAS Fort Worth JRB Brewer High School Auditorium 1025 W. Loop 820 N. Fort Worth, Texas
March 10, 2020	Davis-Monthan AFB Tucson Convention Center 260 South Church Avenue Tucson, Arizona
March 12, 2020	Whiteman AFB Knob Noster High School 504 South Washington Knob Noster, Missouri

A.1.3.4 Draft Environmental Impact Statement Bi-Lingual Flyer (Davis Monthan Air Force Base Example)

The U.S. Air Force has made available for public review and comment a Draft Environmental Impact Statement (EIS) for the proposed Air Force Reserve Command (AFRC) F-35A Mission. The Draft EIS identifies Naval Air Station Fort Worth Joint Reserve Base as the Preferred Alternative with Davis-Monthan Air Force Base (AFB), Homestead Air Reserve Base, and Whiteman AFB as Reasonable Alternatives. The Draft EIS evaluates the potential environmental impacts that could result from the proposed mission and flight operations of AFRC F-35A aircraft.

You are invited to a public hearing to learn about the AFRC F-35A mission. The Draft EIS is available for you to review at the following public libraries: Eckstrom-Columbus Branch, Murphy-Wilmont, Joel D. Valdez Main, Quincie Douglas, El Pueblo, Sierra Vista Public, Yuma County Main, Douglas Public, and Salazar-Ajo libraries. The Draft EIS is also available on the internet: www.AFRC-F35A-beddown.com.

The public hearing will be on March 10, 2020, at 5:00 PM at the Tucson Convention Center, 260 South Church Avenue, Tucson, Arizona 85701. The U.S. Air Force is encouraging everyone to participate in the EIS process by attending the public hearing and providing comments. Comments can be submitted via the internet at the website above, via email to HQAFRC.F-35.EIS@us.af.mil, at the public hearing, or sent by U.S. mail to: HQAFRC F-35 EIS, 2261 Hughes Avenue, Suite 155, JBSA Lackland AFB, TX 78236-9853, or by courier to HQAFRC F-35 EIS, 515 S. General McMullen Drive, Suite 155, San Antonio, TX 78226-1710. Please submit comments by March 31, 2020.

La Fuerza Aérea de los EE. UU. ha puesto a disposición del público para su revisión y comentario un Borrador de Declaración de Impacto Ambiental (EIS) para la Misión F-35A del Comando de Reserva de la Fuerza Aérea (AFRC) propuesta. El Borrador de EIS identifica la Base de Reserva Conjunta de la Estación Aérea Naval de Fort Worth como la Alternativa Preferida con la Base de la Fuerza Aérea Davis-Monthan (AFB), la Base de Reserva Aérea Homestead y la AFB Whiteman como alternativas razonables. El Borrador de EIS evalúa los posibles impactos ambientales que podrían resultar de la misión propuesta y las operaciones de vuelo del avión AFRC F-35A.

Usted está invitado a una audiencia pública para conocer la misión AFRC F-35A. El Borrador de EIS está disponible para que lo revise en las siguientes bibliotecas públicas: Eckstrom-Columbus Branch, Murphy-Wilmont, Joel D. Valdez Main, Quincie Douglas, El Pueblo, Sierra Vista Public, Condado de Yuma Main, Douglas Public y Salazar-Ajo bibliotecas. El Borrador de EIS también está disponible en Internet: www.AFRC-F35A-beddown.com.

La audiencia pública será el 10 de marzo de 2020 a las 5:00 PM en el Centro de Convenciones de Tucson, 260 South Church Avenue, Tucson, Arizona 85701. La Fuerza Aérea de los Estados Unidos está alentando a todos a participar en el proceso de EIS asistiendo a la audiencia pública y proporcionando comentarios. Los comentarios se pueden enviar a través de Internet en el sitio web anterior, por correo electrónico a HQAFRC.F-35.EIS@us.af.mil, en la audiencia pública, o enviado por correo de los EE. UU. a: HQAFRC F-35 EIS, 2261 Hughes Avenue, Suite 155, JBSA Lackland AFB, TX 78236-9853, o por correo a HQAFRC F-35 EIS, 515 S. General McMullen Drive, Suite 155, San Antonio, TX 78226-1710. Envíe sus comentarios antes del 31 de marzo de 2020.

A.2 DRAFT ENVIRONMENTAL IMPACT STATEMENT PUBLIC REVIEW COMMENT SYNOPSIS AND AIR FORCE RESPONSES AND AGENCY LETTERS

The U.S. Air Force (USAF) would like to extend our appreciation to all who have shown interest in this proposal and have provided comments on the Draft Environmental Impact Statement (EIS). By taking an active part in the environmental impact analysis process, you help to ensure that this document is the best it can possibly be and that all substantive issues have been addressed.

Comments were received via email, the website, courier, U.S. Postal Service, hand-written in person at public hearings, or the transcript from the public hearings. The table below shows the comment title and where the comment and associated response are located. Comments were grouped into similar topics so that, in many cases, a single response was generated for multiple comments, thereby reducing redundancy in responses.

A total of 485 comments were received during the Draft EIS public comment period. Not all comments received were considered to be substantive, though all were fully considered and made part of the administrative record. Substantive comments were considered individually and collectively, and responded to in the following pages. Some comments were used to make corrections or modifications in the body of the EIS.

As discussed in the EIS (Section 1.5), substantive comments are those comments that generally challenge the analysis, methodologies, or information in the EIS as being factually inaccurate or analytically inadequate; that identify impacts not analyzed or developed and evaluate reasonable alternatives not considered by the USAF; or that offer specific information that could have a bearing on the decision, such as differences in interpretations of significance, scientific, or technical conclusions, or cause changes or revisions in the proposal. Non-substantive comments, which do not require a specific USAF response, are generally considered to be those comments that are non-specific; express a conclusion or an opinion, or agree, or disagree with the proposal; vote for or against the proposal itself, or some aspect of it; state a position for or against a particular alternative; or otherwise state a personal preference or opinion. Due to the large number of comments received on the Draft EIS and the sensitivity of Personally Identifiable Information, the USAF has summarized the comments. The following table of contents identifies where the reader can find comments and responses.

Comment	Page Number
3) Noise (Continued):	A.2-8
e. Commenters mentioned that they do not understand why the analysis leans heavily on the DNL metric as opposed to maximum noise level (L_{max}) and asked why the analysis did not use American National Standards Institute (ANSI) noise standards. In addition, some commenters stated that the EIS must state that annoyance is not triggered by DNL but by sound exposure level (SEL) and L_{max}, and that populations far beyond the 65-decibel (dB) DNL contour can be impacted. Concerns were also raised about other noise metrics used in the analysis. Commenters mentioned concern over sleep disturbance.	A.2-8
f. Commenters suggested that the USAF should include the 55- and 60-dB noise contours in the analysis, and that points of interest outside the 65-dB DNL contour should be evaluated.	A.2-9
g. Commenters mentioned that they believe that increased noise would have detrimental impacts to human health.	A.2-10
h. Commenters asked what protections/mitigations are provided for people who may spend part of the day outdoors or with windows open and thereby be affected by increased noise levels.	A.2-11
i. Commenters expressed concern about noise impacts to the structural integrity of residences near Davis-Monthan Air Force Base (AFB).	A.2-11
j. Commenters expressed concern about noise impacts to recreational areas, parks, and other sensitive receptors, including places of worship.	A.2-12
4) Air Quality:	A.2-12
a. Commenters provided general comments about the air quality analysis.	A.2-12
b. Commenters raised concerns about air quality impacts at the four installations.	A.2-13
5) Environmental Justice:	A.2-13
a. Commenters raised several general questions about the environmental justice analysis (e.g., concerns about minority, low-income, and/or child populations).	A.2-13
b. Commenters questioned the methodology for establishing the community of comparison (COC) for the environmental justice analysis. Commenters stated that the methodology significantly undercounts the number of minority and low-income residents who are disproportionately impacted.	A.2-13
c. Commenters stated that the Regions of Influence (ROIs) should not be determined by DNL contours but by metrics such as SEL or L_{max}.	A.2-14
6) Commenters expressed general concerns about noise impacts to domestic animals in captivity (e.g., animals in zoos) and/or pets.	A.2-14
7) Safety:	A.2-14
a. Commenters raised concerns about military aircraft flying over urban and residential areas and expressed concern about single-engine jets versus 2-engine jets and the potential for mishaps (e.g., concerns about the safety record of the F-35A and the possibility of the aircraft crashing in a neighborhood).	A.2-14
b. Commenters raised concerns about the EIS's use of USAF mishap statistics. Specifically, a commenter stated that the EIS did not compare the current 5-year annual mishap rate for the A-10 at Davis-Monthan AFB with the current 5-year annual mishap rate of the F-35A.	A.2-14
c. Commenters were concerned about the stealth coating and composite materials (carbon fiber) on the F-35A. Some were concerned about the material in the event of a crash, some were concerned with basic maintenance of the material on the planes, and some were concerned about how the public would be notified of harmful fumes and fibers in the event of a crash.	A.2-14
d. A commenter raised a question about what can be done to prevent bird strikes with aircraft.	A.2-15
8) Commenters raised concerns about socioeconomics (e.g., impacts to schools, universities, businesses, and tourism).	A.2-15
9) Commenters expressed a general concern about impacts to wildlife (endangered species, birds) from F-35A operations.	A.2-16

Comment	Page Number
10) Commenter identified concerns with actions that are outside the scope of the proposed F-35A beddown (e.g., comments related to war/peace or the military industrial complex).	A.2-16
11) Afterburner Use:	A.2-16
a. Commenters questioned whether 5 percent afterburner use is reasonable, because F-35A pilots at other locations are using a far higher percentage; there were requests to model afterburner at 5, 10, 15, 20, percent, etc.	A.2-16
b. Commenters stated that the EIS must explain how the USAF will ensure afterburner use will be limited to 5 percent of takeoffs and explain why it has evaluated scenarios for 50 and 95 percent use.	A.2-17
c. Several commenters asked when pilots turn off the afterburner.	A.2-17
12) Commenters raised concerns about property values and rental rates near the airfield and the potential for decreases to the local tax base. One commenter specifically called out Table DM3-43 and asked that the EIS state that Table DM3-43 does not demonstrate the impact of aircraft noise on property values. Another commenter requested an analysis of housing values in the 65-dB DNL contour at bases where the F-35A is operated, such as at Luke AFB, Hill AFB, and Eglin AFB.	A.2-17
13) Land use issues:	A.2-18
a. Commenters expressed concern about general land use issues.	A.2-18
b. Commenters asked if the new mission would require any land acquisition.	A.2-18
14) Commenters asked why current and proposed flights need to approach and take off over populated areas.	A.2-18
15) Noise Mitigation:	A.2-19
a. Commenters expressed concern about noise mitigation.	A.2-19
b. Commenters noted that the EIS states that certain residences in the Airport Environs Zone (AEZ) near Davis-Monthan AFB were retrofitted to improve sound attenuation. Commenters requested an explanation of the source of this information.	A.2-19
c. Commenters expressed concern about the EIS stating that mitigation measures were not operationally feasible while in other sections the EIS state that measures to reduce noise impacts could include modification of aircraft operations.	A.2-20
16) Hazardous Materials and Wastes:	A.2-20
a. Commenters expressed a general concern about hazardous materials and wastes.	A.2-20
b. Commenters expressed concerns about perfluorooctane sulfonate (PFOS)/perfluorooctanoic acid (PFOA).	A.2-20
17) Commenters expressed concerns about cumulative impacts at Davis-Monthan AFB.	A.2-21
18) Commenters asked why they were not notified about the public meeting or had other concerns about public outreach and involvement.	A.2-22
19) Commenters questioned why the 2019 EIS is different from other F-35 EIS documents regarding how the F-35 is operated.	A.2-22
20) Commenters expressed concern about noise impacts to children/adults with special needs (e.g., autism, post-traumatic stress disorder [PTSD]).	A.2-22
21) Water quality:	A.2-23
a. Commenters raised general concerns about water quality.	A.2-23
b. Commenters raised concerns about particulate matter from aircraft operations and fuel spills from aircraft accidents that could impact Lake Worth, which is used as a water source.	A.2-23
22) Commenters provided comments about a wide range of impacts. For example, commenters indicated that the EIS understates noise impacts or the EIS does not evaluate impacts to air quality.	A.2-23
23) Commenters raised some general concern about wetlands.	A.2-24
24) A commenter raised general concerns about transient (non-based) aircraft and how the number of transient aircraft was obtained.	A.2-24
25) Commenters requested that the comment period be extended.	A.2-24

Comment	Page Number
26) Airspace:	A.2-24
a. Commenters requested the USAF change the air traffic route to avoid flying over Tucson or populated areas.	A.2-24
b. Commenters indicated concern that aircraft patterns at Naval Air Station (NAS) Joint Reserve Base (JRB) Fort Worth have changed and planes seem to fly lower.	A.2-24
c. Commenters asked why the flight path at Davis-Monthan AFB cannot pass over the railroad tracks or why aircraft flight paths cannot be spread out to spread out noise.	A.2-25
27) Additional noise concerns:	A.2-25
a. A commenter noted that the “use of DNL to assess Speech Interference Level (SIL) is inappropriate in addressing everyday life and safety issues (parking lots, job sites, child supervision) in low altitude jet operations areas.”	A.2-25
b. Commenters expressed concerns about noise impacts resulting in extreme startle response and PTSD episodes.	A.2-25
28) Commenters asked how significance is determined.	A.2-25
29) Commenters stated that if deficiencies are identified in one part of the EIS, all similar deficiencies throughout the EIS must be corrected.	A.2-26
30) Commenters claimed that there was a lack of adequate and comprehensive scientific and baseline information, and that detailed and thorough analysis was not conducted.	A.2-26
31) A commenter requested the EIS include the list of ranges where Joint Direct Attack Munition (JDAM) deliveries would occur from 20,000 to 40,000 feet.	A.2-26
32) A commenter requested the EIS include the costs to operate the F-35A at each base.	A.2-26
33) A commenter asked why the Draft EIS stated that aircrews are not instructed to fly over the University of Arizona but Flight Profile F35ACA02 shows flights right over the university.	A.2-26
34) A commenter noted that the EIS did not take into account the homes that were already in the AEZ at Tucson when the AEZ was established.	A.2-27
35) A commenter requested that the EIS include a comparison of civilian vehicular traffic accidents and fatality rates compared to military aircraft accidents and fatality rates.	A.2-27
36) A commenter had a question about the Amazon warehouse that was constructed south of the runway near Davis-Monthan AFB. The commenter noted that the warehouse was in a “high crash zone” and that workers would be exposed to noise levels sufficient to require hearing protection.	A.2-27
37) Commenters expressed concerns that ANSI criteria for classroom noise and recent research had not been accounted for; that the noise analysis did not consider background classroom noise from heating, ventilation, and air conditioning (HVAC), electrical, plumbing, or other facility utilities; and that this should have been considered under cumulative effects.	A.2-27
38) Commenters expressed concern regarding the amount of encroachment on installations and stated that the EIS must evaluate the impacts of current and future encroachment.	A.2-28
39) A commenter noted that the EIS indicates that Davis-Monthan AFB has not received any claims for noise-induced property damage. The commenter stated that this is false.	A.2-28
40) Commenters expressed concern that the deadline for the 45-day Draft EIS public comment period was published in the *Federal Register* as March 30 but all other information stated the deadline was March 31 to confuse the public.	A.2-28
41) A commenter noted that Pima County has indicated that mitigation must be required if the mission is assigned to Davis-Monthan AFB yet the USAF has indicated that they cannot fund mitigation and it is not operationally feasible.	A.2-29
42) Commenters requested that F-35A pilots conduct flyovers following patterns that would be used as part of the based F-35A flying mission.	A.2-29
43) Commenters stated that the EIS says the noise of F-35s would result in significant socioeconomic impacts, especially on minority and low-income populations, yet it does not explain why it is disregarding these impacts (and the people on whom they will be inflicted) in its conclusion that this F-35 beddown should occur at Davis-Monthan AFB.	A.2-29

Comment	Page Number
44) A commenter stated that studies have shown that home prices are affected by airport noise contours. However, the price is relatively small (0.5 to 2.0 percent - Streeting 1990), especially compared to the economic benefits of a large concentration of activity as is attendant with a USAF base.	A.2-30

Comment #1) Commenters asked to be added to the mailing list and to receive documents/information on the proposed action.

Response: During scoping, commenters, attendees, and others that have requested to be added to the project mailing list have been added. Please note that the EIS was made available throughout the EIS process via the project website at: https://www.afrc-f35a-beddown.com/. Furthermore, the USAF provided Courier (i.e. Federal Express, etc.), U.S. Postal Service and email addresses as follows: (a) AFCEC/CZN (ATTN: Mr. Hamid Kamalpour) 3515 S. General McMullen Drive, Suite 155, San Antonio, Texas 78226-1710; (b) AFCEC/CZN (ATTN: Mr. Hamid Kamalpour) 2261 Hughes Avenue, Suite 155 JBSA-Lackland Air Force Base, Texas 78236-9853; and (c) HQAFRC. F-35.EIS@us.af.mil.

Comment #2) Commenter indicated they were opposed to or in support of the Air Force Reserve Command (AFRC) F-35A mission or had another non-substantive comment.

Response: Thank you for your interest in this process and for taking the time to provide your comment.

Comment #3a) Commenters provided general comments about noise, including complaints, inadequacy of analysis, use of NOISEMAP, Karnes profiles and use of old references, and recommendations based on the World Health Organization (WHO) 2018 report titled *Environmental Noise Guidelines for the European Region*.

Response: The EIS was written consistent with USAF policy for evaluating noise impacts (see EIS Chapter 3, Section 3.2). In the EIS, the USAF conducted a detailed noise analysis for each of the four alternative bases and determined that impacts from aircraft noise near the airfield would be considered significant at Davis-Monthan Air Force Base (AFB), Naval Air Station (NAS) Joint Reserve Base (JRB) Fort Worth, and Whiteman AFB. The noise analysis is located in EIS Chapter 4, Sections DM3.2, HS3.2, FW3.2, and WH3.2. Terminology and concepts used to discuss acoustics in the EIS (e.g., decibel [dB] levels of common non-aircraft noise sources) are briefly discussed in Chapter 3, Section 3.2.1. Appendix B contains a more detailed description of acoustic concepts, analysis methods, and potential impacts (including impacts to structures from vibration, non-auditory human health impacts, and wildlife impacts).

As noted in EIS Chapter 3, Section 3.2.3.1, the computer program NOISEMAP was used to calculate aircraft noise levels near each of the four alternative bases. NOISEMAP references a database of field-measured sound levels generated by each aircraft type in various flight configurations measured under carefully controlled conditions. The use of NOISEMAP is the U.S Department of Defense (DoD)-approved standard model for installation-vicinity noise analysis, and its use has been upheld in court. The current version of NOISEMAP (version 7.3) accounts for the effects of topography (e.g., hills and valleys) on noise propagation. Contrary to statements made in some of the public comments received, the EIS did not use the "Karnes" F-35A flight profiles. The "Karnes" profiles were F-35A representative engine power/airspeed/altitude profiles developed based on flight simulator data that were used in calculation of noise impacts for other National Environmental Policy Act (NEPA) documents. As noted in Chapter 3, Section 3.2.3.1, the noise modeling for this EIS was based on flight profiles reported by pilots at installations where the F-35A is currently operated.

Representative F-35A flight profiles were applied to local flight procedures (e.g., commonly used flight paths and pattern altitudes) to generate noise results that allow for meaningful comparison between the alternative bases. Aircraft noise levels presented in the EIS were calculated using the current approved reference noise level data available for each aircraft type.

Several commenters stated that their personal experiences of aircraft noise differed from their interpretation of noise modeling results presented in the EIS. Noise modeling results contained in the EIS are not intended to replace or invalidate people's first-hand experiences of transient F-35 overflight noise. Individual overflights by based F-35A aircraft would generate noise levels similar to those generated by the transient F-35 aircraft operations that have been experienced by some commenters. However, the frequency of noise events and the variety of aircraft operations conducted by a based F-35A mission differs from transient operations, and is important in quantifying expected noise impacts.

The EIS focuses on aircraft noise, and on locations in which aircraft noise is the predominant contributor to overall noise levels. Ambient noise levels (e.g., road traffic) in the types of areas near each of the four alternative bases are discussed briefly in Appendix B, Section B.1.1.2. Estimation of location-specific noise levels generated by road traffic, equipment such as heating, ventilation, and air conditioning (HVAC), and other components of ambient noise levels at all locations throughout the Region of Influence (ROI) would require information that is not available, and is beyond the scope of this EIS.

Documents referenced in the EIS have been checked to confirm that they represent the current state of scientific knowledge. In cases in which a document's findings are valid, the document reference was not replaced solely on the basis of being older than some other document. Discussion of the findings of several additional documents has been added to the EIS in response to suggestions made by commenters. The findings of the newly added documents on the subjects of annoyance prediction, classroom interference, and non-acoustic health impacts did not substantively change the findings of the noise impact assessments in the EIS. For example, the relationship between time-averaged noise levels (e.g., day-night average sound level [DNL]) and the likelihood of annoyance has been the subject of study for several decades. Appendix B of the EIS describes the results of several studies dealing with this dose-response relationship. A description of the findings of the Noise-Related Annoyance Cognition and Health (NORAH) research initiative has now been added based on a commenter's suggestion. The NORAH study was conducted in an area in Germany where aircraft noise was the subject of ongoing controversy, and the authors of the study acknowledge that this factor could have resulted in increased responsiveness to noise (Wothge et al. 2018). The WHO document titled *Environmental Noise Guidelines for the European Region* recommends that European governments increase the stringency of their regulatory noise criteria to reflect the WHO's interpretation of recent findings relating to several noise impact categories (WHO 2018). Also in 2018, the U.S. Federal Interagency Committee on Aircraft Noise (FICAN) released a literature review which states that there are large differences between communities in responsiveness to noise (FICAN 2018). The FICAN review does not endorse the findings of any new studies as being universally applicable, and it does not make a recommendation to alter noise impact thresholds currently in use in the United States.

Classroom interference is discussed in the response to Comment 3e, and potential non-acoustic health impacts are discussed in the response to Comment 3g.

Comment #3b) Commenters were concerned that "incompatible" meant "uninhabitable" or "unlivable," and were concerned that they would have to move out of their homes.

Response: The following text was added to the 7th paragraph in EIS Chapter 3, Section 3.8.2.1; "however, incompatibility does not constitute a federal determination that any land use is acceptable or unacceptable under federal, state, or local law, and incompatibility is not used to determine if a structure is habitable or uninhabitable."

As stated in Chapter 3, Section 3.2.2, the USAF recognizes that noise-sensitive land uses are not compatible with elevated aircraft noise. The land use compatibility table (Table B-6 in Appendix B) used by the USAF is not meant to determine the acceptability or unacceptability of land use, and it is not used to determine if a structure is habitable or uninhabitable. The USAF has implemented the Air Installations Compatible Use Zones (AICUZ) program, as described in Air Force Instruction (AFI) 32-1015, *Integrated Installation Planning*, and Department of Defense Instruction (DoDI) 4165.57, *Air Installations Compatible Use Zones (AICUZ)*, to minimize impacts to incompatible land uses. In 1980, the Federal Interagency Committee on Urban Noise (FICUN) created a set of guidelines detailing which land uses are recommended as compatible at which noise levels. These guidelines have been adopted by the USAF as part of the AICUZ program. These guidelines are provided to state and local communities as recommendations only, and a recommendation that a certain land use is incompatible with residential use does not mean that the land is uninhabitable any more than extreme cold affects housing in arctic regions or extreme heat affects housing in tropical areas. The guidelines document a broad consensus opinion of the tolerance for ambient noise of land uses and their primary activities. They also provide the noise level reduction necessary to ameliorate an elevated exposure.

The use of DNL, combined with Table B-6 of Appendix B, provides one factor for local communities to use in predicting the compatibility, success, and cost of new development. Noise from outside sources, such as aircraft overflights and other transportation noise, can interfere with daily activities. The activities of some land uses are more noise-tolerant than others, and this is the basis of the compatibility guidance. However, all the factors affecting land use decisions must be assessed based on their cost and feasibility, and the needs and desires of each particular community. As indicated in the notes for Table B-6, residential areas, except mobile home parks, located in areas exposed to DNL less than 75 dB are conditionally compatible when an outdoor-to-indoor noise level reduction of 25 to 30 dB is provided by the structure (mobile homes are excepted because the walls and roof cannot accommodate that much sound insulation). For example, while not considered compatible, an existing mobile home park near Whiteman AFB is located in areas where the DNL is currently greater than 65 dB. People continue to reside there; while the noise levels in these areas could increase, the noise would not be expected to make the homes uninhabitable. Noise could impact some activities. For example, some instances of speech interference could be expected.

Comment #3c) Commenters provided comments specifically related to the noise level comparisons of different aircraft types in USAF documents.

Response: As noted above, representative F-35A flight profiles used in EIS noise modeling reflect information reported by F-35A pilots at installations where the aircraft is currently operated. Flight profile information was then adapted to local flight paths and procedures (e.g., pattern altitudes and typical flight routing) at each of the four alternative bases. Individual overflight noise level tables in the base-specific sections (Chapter 4, Tables DM3-3, HS3-3, FW3-3, and WH3-3), reflect aircraft noise generated during flights that adhere to local flight procedures and as heard from a local representative noise-sensitive location, and therefore the results are different for each of the four alternative bases. Noise levels are also presented in the non-base specific part of the EIS for comparing aircraft at standard altitudes (see Chapter 3, Tables 3-1 and 3-3). All aircraft noise levels stated in the EIS reflect the current approved reference noise level for each aircraft.

Comment #3d) Commenters expressed concerns about noise impacts (e.g., classroom interruptions) to schools, including the University of Arizona.

Response: Section B.2.8.1 of Appendix B has been revised to describe recently completed studies as per the commenters' suggestions, and to clarify statements summarizing research findings. The findings of the newly cited documents do not substantially alter the types or intensity of potential impacts described in the EIS.

Noise in classrooms generated by air ducts, plumbing, lighting fixtures, and similar sources are specific to each individual classroom within the region of impact and are not available for use in the EIS. Lacking other data, the EIS assumes that classrooms have been designed to keep background noise levels below American National Standards Institute (ANSI) criteria levels. Supplementation of school day equivalent noise level ($L_{eq(SD)}$) results with estimated average speech interference frequency provides a more complete description of the episodic noise events that are a primary concern with aircraft noise. Aircraft overflights that are loud enough to interfere with speech are typically substantially louder than vents and other facility-generated classroom background noises. The fact that aircraft noise creates discrete events while facility-generated noise is steady means that either one source or the other is the predominant determinant of overall noise level at any particular time. In response to a comment, the text in the EIS discussing the 2007 FICAN study titled *Findings of the FICAN Pilot Study on the Relationship Between Aircraft Noise Reduction and Changes in Standardized Test Scores* was revised to clarify that the findings were not discounted because the results were presented differently from those of other studies (FICAN 2007).

The EIS follows the method for quantification of classroom noise impacts recommended by the DoD Noise Working Group (DNWG) (DNWG 2013) and recognizes that increased aircraft noise would be expected to result in more frequent classroom interference. The recommended approach includes two parts. First, a time-averaged noise level during the school day (i.e., $L_{eq(SD)}$) is used to identify schools at which aircraft noise may exceed the classroom background noise level criteria stated in American National Standards Institute/Acoustical Society of America S12.60-2002 (R2009). The EIS has been revised to clearly state that DNWG classroom noise level criteria are based on the ANSI standard. Use of the school day equivalent noise level metric (i.e., $L_{eq(SD)}$) as an approximation of ANSI criteria is recommended in current DNWG guidance and also in the FICAN's 2018 literature review (FICAN 2018). The second part of classroom noise impacts assessment (as recommended by DNWG and used in the EIS) is to state the average frequency of noise events that have the potential to interfere with speech. As was noted by several commenters and confirmed by many studies, speech interference is a primary concern in the classroom.

Comment #3e) Commenters mentioned that they do not understand why the analysis leans heavily on the DNL metric as opposed to maximum noise level (L_{max}) and asked why the analysis did not use ANSI noise standards. In addition, some commenters stated that the EIS must state that annoyance is not triggered by DNL but by sound exposure level (SEL) and L_{max}, and that populations far beyond the 65 dB DNL contour can be impacted. Concerns were also raised about other noise metrics used in the analysis. Commenters mentioned concern over sleep disturbance.

Response: The EIS was written consistent with USAF policy for evaluating noise impacts (see EIS Chapter 3, Section 3.2). As discussed in the EIS (Chapter 3, Section 3.2.1.1), DNL is the preferred noise metric of the U.S. Department of Housing and Urban Development (HUD), Federal Aviation Administration (FAA), U.S. Environmental Protection Agency (USEPA), and DoD. Studies of community annoyance in response to numerous types of environmental noise show a positive correlation between DNL and the percent of the population that can be expected to be highly annoyed by the noise (refer to Appendix B for details). DNL is also specifically designed to account for additional annoyance caused by noise that occurs at night (after 10:00 P.M. and before 7:00 A.M.) and penalizes noise events occurring during this time. For all of these reasons, the USAF considers DNL to be the most useful overall metric for assessing potential annoyance and land use compatibility for noise.

For decades, DNL has been adopted by states, counties, municipal zoning authorities, and local neighborhoods as the metric to be used for noise analysis. For example, as described in EIS Chapter 4, Section DM3.8.1.1, in Arizona, the Arizona Revised Statutes (ARS) use day-night sound levels (L_{dn}, or DNL) as the metric to measure noise. The City of Tucson and Pima County both use DNL as the metric for noise and, on a more local scale, neighborhoods such as Arroyo Chico and the 12th Avenue-Valencia Road Area have adopted L_{dn} as the metric to measure noise. In Texas, as described in Chapter 4, Section FW3.8.1.1, the Regional Joint Land Use Study (JLUS) for NAS JRB Fort Worth that was published in 2017 and adopted by many of the surrounding municipalities uses DNL as the metric to measure noise. In Florida, as described in Chapter 4, Section HS3.8.1.1, the Florida statutes incorporate the AICUZ program and use DNL as the metric for noise analysis, and more locally, Miami-Dade County and the City of Homestead use DNL in their comprehensive plans.

As recommended by guidance documents, including DoD's *Improving Aviation Noise Planning, Analysis and Public Communications with Supplemental Metrics*, other metrics such as SEL and L_{max} are used in the EIS to provide additional insight into potential noise impacts (DNWG 2009a). These metrics are limited by the fact that they describe a single noise event and do not provide information on the frequency of that event or the multitude of other types of events that are heard at the same location. The EIS makes use of the Number of Events Above a Threshold Level metric to predict speech interference. The frequency of speech interference for people outdoors is estimated to be the same as the number of outdoor noise events per average hour exceeding 50 dB L_{max}. As described in Chapter 3, Section 3.2.3.1.2, structures are conservatively assumed to provide 15 dB of noise level reduction with windows open and 25 dB of reduction with windows closed. Therefore, the frequency of speech interference indoors (i.e., exceeding 50 dB L_{max}) with windows open and closed is estimated by calculating the number of events outdoors exceeding 65 and 75 dB L_{max}, respectively. As described in Section 3.2.3.1.2, SELs generated by each nighttime overflight event were used in combination with a sleep disturbance probability function to estimate the percentage of people that would be expected to be awakened at least once per night. Some commenters noted that their jobs require them to sleep during the day. Text has been added to Chapter 4, Sections DM3.2.1.4, HS3.2.1.4, FW3.2.1.4, and WH3.2.1.4, of the EIS acknowledging that "People who sleep during the day experience additional noise events, resulting in higher probabilities of awakening." As some commenters noted, it is possible to present supplemental metric results as contour lines. In this EIS, supplemental noise metric results are presented for several representative noise-sensitive locations in tabular form to allow a simpler presentation of impacts.

Comment #3f) Commenters suggested that the USAF should include the 55- and 60-dB noise contours in the analysis, and that points of interest outside the 65 dB DNL contour should be evaluated.

Response: The EIS was written consistent with USAF policy for evaluating noise impacts (see EIS Chapter 3, Section 3.2). Although the USAF recognizes that receptors outside of the 65-dB DNL contour can be impacted by noise, as described above for the response to Comment 3e, most federal agencies recognize 65 dB as the extent shown on noise contour maps. The federal government considers 65 dB to be an acceptable level of outdoor noise exposure; with the attenuation a dwelling typically provides, this also yields an acceptable interior noise level of 45 dB. However the USAF recognizes representative noise-sensitive locations located beyond the 65-dB DNL contour and included supplemental noise metrics (speech interference, interference with classroom learning and sleep disturbance) for those locations (see Chapter 4, Sections DM3.2.2, HS3.2.2, FW3.2.2, and WH3.2.2). By identifying the noise-sensitive locations outside of the 65-dB DNL contour and identifying the supplemental noise metrics for those locations, the USAF has completed a comprehensive analysis of the potential noise impacts that could result from implementation of the AFRC F-35A mission at each of the four alternative bases.

Comment #3g) Commenters mentioned that they believe that increased noise would have detrimental impacts to human health.

Response: Research continually refines our understanding of the effects of any pollutant or stressor on the human body. Many commenters provided citations and references for recent research into how noise could impact human health. The USAF appreciates the receipt of these citations and references, and has incorporated several into the text of the Final EIS. As noted in the response to Comment 3a, references in the EIS that happen to be old were not deleted solely on the basis of being old if their findings remain valid.

The EIS discusses the potential for hearing loss due to aircraft noise from the AFRC F-35A mission in Chapter 4, Sections DM3.2.2.5, HS3.2.2.5, FW3.2.2.5, and WH3.2.2.5. The DoD uses 80 dB DNL as the criteria to identify populations at the most risk of potential hearing loss if residents are exposed to aircraft noise over a period of several decades. The DoD criteria noise level was based, in part, on National Institute for Occupational Safety and Health (NIOSH) workplace noise level criteria designed to minimize the risk of hearing loss for employees exposed over a working lifetime of 40 years with exposure lasting 8 hours per day for 5 days per week. The intermittency of aircraft noise differs from noise experienced in many workplaces. As a result, criteria noise levels defined by NIOSH were adapted by DoD to apply to aircraft noise. At Davis-Monthan AFB, Homestead Air Reserve Base (ARB), and Whiteman AFB, noise levels at off-installation residences would remain well below the 80 dB DNL threshold. At NAS JRB Fort Worth, the threshold level would be exceeded at a limited number of residences. Estimates of the number of people and degree of potential hearing loss were accomplished following procedures outlined by the DNWG using the 24-hour equivalent noise level (Leq_{24}) noise metric (DoD 2013).

As noted in Sections DM3.2.2.6, HS3.2.2.6, FW 3.2.2.6, and WH3.2.2.6, people working on the installations in jobs requiring frequent exposure to elevated aircraft noise levels are at risk for hearing loss. In response, the DoD has implemented programs requiring workers in high-noise areas to wear hearing protection and to undergo regular hearing tests.

Commenters noted that several studies have been published recently on the possible links between aircraft noise and non-acoustic health (i.e., health effects other than hearing loss). A large number of studies referenced by commenters have been reviewed, and the findings are summarized in Section B.2.6 of Appendix B. After review of these documents, the USAF position, as stated in the 2013 DNWG *Technical Bulletin on Non-Auditory Health Effects of Aircraft Noise,* remains that current scientific knowledge does not support a relationship between aircraft noise and non-acoustic health impacts that is both causal and consistent. The 2018 FICAN *Research Review of Selected Aviation Noise Issues* found that research conducted to date demonstrates that chronic road traffic noise has non-auditory health effects. However, the FICAN review and separate USAF review of studies conducted to date do not support a similar quantifiable relationship.

As described in Section B.2.6 Appendix B, the link between noise and hypertension has been studied extensively in recent years. The prevalence of hypertension is known to be affected by several factors (e.g., diet, family history, and exercise) that are not related to aircraft noise, and large-scale, carefully designed studies are required to allow statistical normalization for these and other confounding factors. One such study, named the Hypertension and Exposure to Noise near Airports (HYENA) surveyed thousands of people but generated results that did not always fit expectations. While several of the studies conducted to date suggest that a relationship may exist, a causal and consistent relationship has not yet been demonstrated.

Regarding mental health issues, some commenters indicated that they identified current and past noise annoyances as risk factors for mental distress. Text has been added to Chapter 4, Sections DM3.2.1.1, HS3.2.1.1, FW3.2.1.1, and WH3.2.1.1, of the Final EIS summarizing the findings of studies on the topic of potential impacts of noise on mental health.

Comment #3h) Commenters asked what protections/mitigations are provided for people who may spend part of the day outdoors or with windows open and thereby be affected by the increased noise levels.

Response: Recognizing that residents near each of the four alternative bases enjoy time outdoors and/or keep windows open for large portions of the year, the EIS includes calculated outdoor noise levels and indoor noise levels with windows open in sections discussing annoyance, speech interference, and interference with classroom learning. The discussion of sleep disturbance includes impacts estimated with windows open and with windows closed. As noted in the response to Comment 3g, noise-induced hearing loss has been found to result from very high aircraft noise levels. To provide a conservative estimate of potential impacts, the EIS estimates hearing loss risk assuming that residents remain outdoors and fully exposed to any aircraft noise 100 percent of the time. The EIS also notes that many people spend at least part of their day indoors, where aircraft noise levels are lower, and provides impact predictions for a scenario in which residents spend the national average percent of the day (87 percent) indoors. The EIS considers workers on the installations whose jobs require them to spend a large fraction the workday outdoors and near aircraft operations. The DoD recognizes the potential for hearing loss exists in this situation and requires appropriate hearing protection and monitoring to minimize risk to workers. Because no physical structure exists to block noise generated by aircraft and because most people would not wish to wear noise hearing protection on a regular basis while outdoors, options for mitigation of outdoor noise are limited. As discussed in EIS Chapter 2, Section 2.5, several options have been considered for mitigation of noise but none were found to be operationally feasible.

Comment #3i) Commenters expressed concern about noise impacts to the structural integrity of residences near Davis-Monthan AFB.

Response: As described in Chapter 4, Section DM3.2.1.8, commenters from Tucson expressed concerns during scoping about increased noise resulting in structural damage to homes or other personal property. As a result of these concerns, the USAF included specific sections in the Draft EIS to address potential noise impacts to structures. As described in Sections DM3.2.1.8 and DM3.2.2.8, noise that does not exceed 130 dB in any 1/3-octave frequency band or last for more than 1 second does not have the potential to damage structures in good repair (CHABA 1977). As described in Section DM3.2.2.8, implementation of the AFRC F-35A mission would not result in this threshold being exceeded off-installation. Additional information regarding noise-induced vibration and potential structural damage is included in Section B2.10 of Appendix B. The USAF has a very specific process for working with the public regarding claims for USAF-related property damage. The process begins by contacting the Davis-Monthan AFB Public Affairs Office with the details of the claim. The USAF would then investigate the claim to establish the exact nature and extent of the damage.

The USAF recognizes that noise-induced structural vibration and secondary vibrations (i.e., "rattle") of objects within structures can occur during loud overflights, as commenters have stated. The USAF recognizes that rattling objects have the potential to contribute to annoyance along with other potential noise effects (e.g., speech interference, sleep disturbance).

Comment #3j Commenters expressed concern about noise impacts to recreational areas, parks, and other sensitive receptors, including places of worship.

Response: The impacts of noise to recreational areas, parks, and other sensitive receptors was a primary focus of the analysis contained in the EIS because of the number of scoping comments received regarding recreational areas and parks. EIS Chapter 3, Section 3.8.2, describes typical recreational impacts that could result from implementation of the AFRC F-35A mission. Potential noise impacts to recreational areas and parks are described in EIS Chapter 4, Sections DM3.8.4, HS3.8.4, FW3.8.4, and WH3.8.4. Recreational areas and parks near the airfields and under the airspace proposed for use were evaluated relative to the potential for noise impacts resulting from AFRC F-35A operations. Tables DM3-38, DM3-39, DM3-40, HS3-39, HS3-40, FW3-39, FW3-40, WH3-36, and WH3-37 show the baseline and proposed action noise levels at parks and recreation areas near each of the alternative bases and under the airspace proposed for use. For Davis-Monthan AFB, none of the recreational areas identified for study around the base would be exposed to DNL greater than 65 dB under any of the afterburner scenarios. However, DNL would increase from 3 dB to 7 dB at these locations, and this increase would be noticeable. At Homestead ARB, implementation of afterburner Scenarios A, B, or C would expose an additional 18, 16, or 13 acres, respectively, of recreational land to DNL of 75 dB or greater. At NAS JRB Fort Worth, average noise levels would increase at the recreational facilities near the installation. Noise impacts to recreational facilities would be the same regardless of which afterburner scenario is selected. At Whiteman AFB, none of the recreational areas identified for study around the base would be exposed to DNL greater than 65 dB. However, under Scenario A, DNL would increase at Knob Noster State Park campground by 6 dB (from 48 dB to 54 dB), which would be noticeable. Under Whiteman AFB Scenarios B or C, the DNL would increase to 55 dB. While no places of worship were specifically analyzed as representative noise-sensitive locations, a number of representative sensitive receptors were analyzed across each project area. Noise levels for places of worship or other sensitive receptors would be similar to nearby representative sensitive receptors. The services and other activities of most places of worship occur indoors, so they benefit from the attenuation provided by the structure.

Comment #4a) Commenters provided general comments about the air quality analysis.

Response: As discussed in EIS Chapter 4 (Sections DM3.3, HS3.3, FW3.3, and WH3.3) and Appendix C, the USAF conducted a detailed analysis of the air quality impacts from the proposed action and determined that impacts from the proposed action would not exceed regulatory thresholds and therefore would not be significant at any of the four bases. The air quality analyses considered all potential emissions from the proposed F-35A operations, including construction, aircraft operations, aerospace ground equipment (AGE), and personnel commuting activities. Reductions in volatile organic compound (VOC) or particulate matter (particulate matter less than or equal to 10 micrometers in diameter [PM_{10}] or particulate matter less than or equal to 2.5 micrometers in diameter [PM2.5]) emissions would result in corresponding net reductions of hazardous air pollutant (HAP) emissions. These emission reductions would result in a net benefit to health impacts to areas surrounding the alternative base.

Comment #4b) Commenters raised concerns about air quality impacts at the four installations.

Response: For Davis-Monthan AFB, as described in EIS Chapter 4, Section DM3.3.2.2, the replacement of existing A-10 aircraft operations with the proposed AFRC F-35A operations would result in reductions of all criteria pollutants. Reductions in VOC, PM_{10}, and $PM_{2.5}$ emissions also would result in similar net reductions of HAPs. These emission reductions would result in a net benefit to health impacts from airborne pollutants within the Davis-Monthan AFB project region. Section DM3.3.2.2 of the EIS also shows that the proposed AFRC F-35A mission would slightly increase greenhouse gas emissions, which would incrementally contribute to global warming.

For Homestead ARB, as described in EIS Chapter 4, Section HS3.3.2.2, the replacement of existing F-16 aircraft operations with the proposed AFRC F-35A operations would result in reductions of VOC emissions and increases of criteria pollutant emissions that would not exceed applicable indicator thresholds of significance.

For NAS JRB Fort Worth, as described in EIS Chapter 4, Section FW3.3.2.2, the replacement of existing F-16 aircraft operations with the proposed AFRC F-35A operations would result in reductions of VOC emissions and increases of criteria pollutant emissions that would not exceed applicable indicator thresholds of significance. Specifically for ambient ozone impacts, the ozone precursor emission thresholds (VOC and nitrogen oxides [NO_x]) used in the EIS analysis consider the ozone nonattainment rating of the project region and represent acceptable or *de minimis* levels of emissions, as defined by the USEPA General Conformity Regulation (GCR).

For Whiteman AFB, as described in EIS Chapter 4, Section WH3.3.2.2, the replacement of existing A-10 aircraft operations with the proposed AFRC F-35A operations would result in substantial reductions of VOC emissions (unburnt jet fuel) and minor reductions in particulate matter (PM_{10}) and carbon monoxide emissions. Reductions in VOC and PM_{10} emissions from the proposed F-35A basing missions would result in reductions in odor impacts within the Whiteman AFB project region.

Comment #5a) Commenters raised several general questions about the environmental justice analysis (e.g., concerns about minority, low-income, and/or child populations).

Response: The USAF identified and addressed disproportionately high and adverse human health or environmental effects of its activities on minority populations and low-income populations based on the Council on Environmental Quality (CEQ) *Environmental Justice Guidance Under NEPA*, December 10, 1997. In EIS Chapter 4, (Sections DM3.10, HS3.10, FW3.10, and WH3.10), the USAF conducted a detailed analysis of the noise impacts from the proposed AFRC F-35A mission to low-income and minority populations, and determined that impacts from aircraft noise near the airfield would be considered significant in some locations. The methodology used for the analysis of Environmental Justice and the Protection of Children is located in Chapter 3, Section 3.10.

Comment #5b) Commenters questioned the methodology for establishing the community of comparison (COC) for the environmental justice analysis. Commenters stated that the methodology significantly undercounts the number of minority and low-income residents who are disproportionately impacted.

Response: In the EIS (Chapter 3, Section 3.10.3), the methodology that was used to establish the COC follows Executive Order (EO) 12898 and EO 13045 as contained in the *Guide for Environmental Justice Analysis under the Environmental Impact Analysis Process* (EIAP), dated November 2014 (USAF 2014) which follows the CEQ guidance (Environmental Justice Guidance Under NEPA, December 10, 1997). Furthermore, the Census Tracts (CTs) were used to establish the COC, and the analysis used the smallest set of census data available (census Block Groups

[BGs]), which resulted in higher percentages of minority and low-income populations in the COC. If the methodology would have used broader populations such as adjacent cities or counties, the percentages of minority and low-income populations in the COC might not have been accurately reflected in the EIS.

The large number of CTs (i.e., ROIs) used in this EIS to identify the COC is consistent with the USAF methodology. The accuracy of the analysis is demonstrated by the example that, if the analysis used adjacent cities with larger populations, the analysis would have resulted in the same disproportionate ROI results. The EIS analysis consistently follows the USAF 2014 guidelines at the four installations and does not vary the basis for identifying the COC or the ROIs. The results of the environmental justice analysis at all four installations are consistent with the purpose and directions of the methodology and guidelines and it would be incorrect to have prepared the analysis differently.

Comment #5c) Commenters stated that the ROIs should not be determined by DNL contours but by metrics such as SEL or L_{max}.

Response: See response to Comment 3e.

Comment #6) Commenters expressed general concerns about noise impacts to domestic animals in captivity (e.g., animals in zoos) and/or pets.

Response: Potential noise impacts to domestic animals (e.g., pets) and animals in captivity (e.g., animals in zoos) are discussed in EIS Chapter 3 (Section 3.2.3.1.8), Chapter 4 (Sections DM3.2.2.9, HS3.2.2.9, FW3.2.2.9, and WH3.2.2.9), and Appendix B (Section B2.14).

Comment #7a) Commenters raised concerns about military aircraft flying over urban and residential areas and expressed concern about single-engine jets versus 2-engine jets and the potential for mishaps (e.g., concerns about the safety record of the F-35A the possibility of the aircraft crashing in a neighborhood).

Response: As discussed in EIS Chapter 4 (Sections DM3.3.4, HS3.3.4, FW3.3.4, and WH3.3.4), the USAF conducted a detailed analysis of safety, including fire/crash response, accident potential zones (APZs)/runway protection zones, explosive safety, and anti-terrorism/force protection.

Comment #7b) Commenters raised concerns about the EIS's use of USAF mishap statistics. Specifically, a commenter stated that the EIS did not compare the current 5-year annual mishap rate for the A-10 at Davis-Monthan AFB with the current 5-year annual mishap rate of the F-35A.

Response: EIS Chapter 4, Section DM3.4.2.4.1, describes both the historic rate of the A-10 and the current 10-year annual rate of the A-10 (0.55). The EIS lists a mishap rate of 3.94 for the F-35A and also notes that because the F-35A had not reached 100,000 hours at the time of the EIS, the mishap rate is not directly comparable.

Comment #7c) Commenters were concerned about the stealth coating and composite materials (carbon fiber) on the F-35A. Some were concerned about the material in the event of a crash, some were concerned with basic maintenance of the material on the planes, and some were concerned about how the public would be notified of harmful fumes and fibers in the event of a crash.

Response: EIS Chapter 4, Sections DM3.4, HS3.4, FW3.4, and WH3.4, describe the stealth coating, composite materials, and concerns regarding their characteristics in the event of an accident. Implementation of the AFRC F-35A mission would not result in significant impacts to safety at any of the installations. As they do today, the installations would keep local firefighting departments informed about any new information or firefighting techniques associated with composite materials should an accident occur. The only maintenance of the stealth coating (e.g., low observable material) that would be accomplished at the base would be done using a brush or roller to apply coatings, bonding materials, or applying tape. Depot-level maintenance of the low observable material (including spray capability) would be conducted off-site at a different base, and therefore the composite material for major repairs to the low observable material would not be stored on base. This information has been added to the EIS (Chapter 4, Sections DM3.12.2.1, HS3.12.2.1, FW3.12.2.1, and WH3.12.2.1).

With regard to public notification of an emergency or mishap, Chapter 4, Sections DM3.4.2, HS3.4.2, FW3.4.2, and WH3.4.2, state that emergency and mishap response plans would be updated to include procedures and response actions necessary to address a mishap involving F-35A aircraft and associated equipment. This includes responding to emergencies and mishaps involving stealth coatings and composite materials. The emergency and mishap response plans also include procedures for coordinating and communicating with nearby communities' emergency management entities. This includes notifying the nearby communities' emergency management entities if an incident results in a recommendation of either shelter in-place or evacuation for the protection of the general population. Each of the four installations would continue to be a party to mutual-aid support agreements with nearby communities.

Comment #7d) A commenter raised a question about what can be done to prevent bird strikes with aircraft.

Response: All four of the alternative bases analyzed in this EIS have extensive bird/wildlife-aircraft strike hazard (BASH) programs designed to minimize the potential for aircraft collisions with birds and other wildlife. Activities include monitoring the airfield for bird activity, issuing bird hazard warnings, initiating bird avoidance procedures when potentially hazardous situations are reported, and submitting BASH reports for all incidents. EIS Chapter 4, Sections DM3.4.1.5, HS3.4.1.5, FW3.4.1.5, and WH3.4.1.5, include additional information on BASH programs at each alternative base. Implementation of the F-35A mission would not result in significant impacts associated with bird strikes to aircraft.

Comment #8) Commenters raised concerns about socioeconomics (e.g., impacts to schools, universities, businesses and tourism).

Response: The USAF conducted a detailed analysis of socioeconomics, including population, housing, employment, earnings, and the installations' overall economic impact in EIS Chapter 4, Sections DM3.9, HS3.9, FW3.9, and WH3.9. These sections also provide specific analysis on potential economic input from temporary construction jobs and salaries from the addition or reduction of personnel.

There were multiple comments regarding the impacts to schools and education from the noise of F-35A operations associated with this action. See Comments 3d and 3e for information related specifically to noise impacts to education and schools.

There were several comments expressing concern about the potential for noise-related socioeconomic impact to the tourism industry. As indicated in EIS Chapter 3 (Section 3.8) and Chapter 4 (Sections DM3.8, HS3.8, FW3.8, and WH3.8), there are varying reactions to noise in a recreational setting. These reactions vary based on individual perspectives and on the type of activities being enjoyed. Some recreational users may view aircraft as a minor annoyance while others view it as extremely detrimental to outdoor activities. Some users may find the experience positive (e.g., overflights of sporting events). Given the varied perspective to aircraft overflight and a lack of research determining impacts to the tourism industry, it would be difficult for the EIS to either prove or disprove that the proposed action would negatively impact tourism.

Comment #9) Commenters expressed a general concern for wildlife (endangered species, birds) from F-35A operations.

Response: Refer to EIS Chapter 3, Section 3.2.3.1.8, for information about animals in the care of humans and Section B2.14 of Appendix B for information about the effects of noise on domestic animals and wildlife. Also see Chapter 4, Sections DM3.6, HS3.6, FW3.6, and WH3.6.

Comment #10) Commenter identified concerns with actions that are outside the scope of the proposed F-35A beddown (e.g. comments related to war/peace or the military industrial complex).

Response: Thank you for your interest in this process, and for taking the time to provide your comment. However, this comment is regarding a larger issue that is not within the scope of the NEPA process.

Comment #11a) Commenters questioned whether 5 percent afterburner use is reasonable, because F-35A pilots at other locations are using a far higher percentage; there were requests to model afterburner at 5, 10, 15, 20, percent, etc.

Response: Certain F-35A operational requirements, such as the use of afterburner, are mission- and situation-dependent. Afterburner use is dictated by the F-35A Joint Technical Data (JTD) and Air Force Manual (AFMAN) 11-2F-35A Vol 3. Based on airfield temperature, pressure, altitude, winds, aircraft weight/configuration (drag), and runway length, the JTD provides pilots all takeoff parameters based on the selected power setting, military or afterburner. This is called aircraft Takeoff and Landing Data (TOLD). The parameters provided in the JTD include takeoff distance, abort speed, rotation speed, takeoff speed, acceleration check speed, etc. AFI 11-2F-35A V3, *Flying Operations, F-35 – Aircrew Training,* guidelines state that F-35A pilots should not takeoff with military power if calculations, based on the relevant site conditions, indicate that the aircraft would require more than 50 percent of the available runway for takeoff when using military power. In short, the primary requirement for using afterburner is safety.

The F-35A Ready Aircrew Program (RAP) Tasking Memorandum, Aviation Schedule 2018, does not require afterburner use for takeoff. As described in Chapter 2, Section 2.3.3, of the EIS, the USAF evaluated the requirement for afterburner use during departures, calculated takeoff requirements, and determined that afterburner use would be required on approximately 5 percent of the total departures from each alternative base.

As the F-35A program has matured over the last several years, information from other USAF installations indicates that F-35A pilots are using afterburner on a higher number of takeoffs. Furthermore, afterburner use is mission and situation dependent, with safety being the primary requirement.

As discussed in Chapter 2, Section 2.3.3, AFRC determined that afterburner use would be required on approximately 5 percent of total departures (Scenario A). Additionally, two other afterburner scenarios have been evaluated to allow for consideration of noise impacts resulting from 50 percent (Scenario B) and 95 percent (Scenario C) of takeoffs in afterburner mode. Flight paths, pattern altitudes, and other operational parameters specific to each alternative base were used following current base procedures. Generally, afterburner takeoff overflight noise levels are often slightly less loud than standard military power takeoff noise levels at locations beyond the end of the runway due to the difference in the distance between the aircraft and the noise-sensitive location (see Chapter 3, Figure 3-1).

In part, the basis for afterburner use is the computed military power takeoff distance exceeding one-half of the available runway. Briefing guides will be augmented to ensure pre-flight briefings and debriefings include tracking afterburner use as a standard operating procedure. Afterburner use will be recorded reflecting computed need and afterburner use on mission data cards as part of the overall TOLD per AFI 11-2F-35A V3 (ref: §§2.9.1, 2.9.3., 3.6.2., and Atch 3, §A3.9.10.2.4.) and recorded in the Air Force Technical Order (AFTO) Form 781 "other things" column. This afterburner data will be provided in the debrief section of local aircrew debriefing guide via the operational utilization update screen in the Air Force Management Information System used to enter flying time information per AFI 21-101.

Comment #11b) Commenters stated that the EIS must explain how the USAF will ensure afterburner use will be limited to 5 percent of takeoffs and explain why it has evaluated scenarios for 50 and 95 percent use.

Response: See response to Comment 11a.

Comment #11c) Several commenters asked when pilots turn off the afterburner.

Response: As discussed in the response to Comment 3a, F-35A representative flight profiles used in the EIS were based on information provided by pilots at bases where the F-35A is currently operated. These pilots indicated that afterburner is de-selected at 10,000 feet from brake release. This distance was at the high-end of the range of locations for the F-35A. In accordance with AFI 32-1015, the USAF would re-evaluate actual F-35A operations once the full complement of F-35A aircraft is operational at the selected beddown installation. Should actual operations significantly differ from those described in the EIS, supplemental environmental impact analysis would be conducted.

Noise modeling reflects the propagation of noise from the aircraft and includes noise which travels forward from the aircraft. For a person directly beneath the flight path of an aircraft departing using afterburner, the direct overflight is the loudest part of the event and is the primary determinant of the overall event noise level. For many people, this means that the loudest part of a departure event is experienced after the aircraft has turned off afterburner.

Comment #12) Commenters raised concerns about property values and rental rates near the airfield and the potential for decreases to the local tax base. One commenter specifically called out Table DM3-43 and asked that the EIS state that Table DM3-43 does not demonstrate the impact of aircraft noise on property values. Another commenter requested an analysis of housing values in the 65-dB DNL contour at bases where the F-35A is operated, such as at Luke AFB, Hill AFB, and Eglin AFB.

Response: The EIS analysis uses published and reviewed results that relate noise to airfields. The necessary factor is the extent of the noise, not any specific aircraft type as the source of the noise. The noise model results in the EIS and the estimated percentage in change in housing value per dB over 65 dB DNL would apply to any housing and any aircraft type. Conducting an analysis of housing values at the small sample size which represents other bases where the F-35A is operated (or starting to be operated) would not be expected to result in any variation in the analysis. Such extensive studies are not within the scope of an EIS project and would not assist the decision-maker with determining which of the four installations should host the AFRC F-35A mission. In addition, the number of F-35A aircraft and flight operations at bases noted by the commenter are not the same as the AFRC mission described in the EIS, and all of the F-35A aircraft have not yet arrived at some of the commenter's recommended bases. The EIS correctly applies the results of peer-reviewed studies of noise effects on housing prices. As described below, numerous factors affect housing prices and the results of such an analysis would need to be used with caution. Although it has been documented that noise does affect housing values, overall regional economic conditions as well as other factors such as crime rates (Ihlanfeldt and Maycock 2009) or school quality (The Reinvestment Fund 2007) have been documented to affect housing values.

For Davis-Monthan AFB, the EIS addresses property value impacts in Chapter 4, Section DM3.9.2.3, and explains that the discount for property values in multiple samples of airports and airfields varies but a majority of studies have found that the value is calculated to be a 0.26 percent to 1 percent reduction in housing value per dB over 65 dB DNL for housing within the 65 dB DNL contour when compared with equivalent housing outside the 65 dB DNL contour. Housing cost data provided during development of the EIS demonstrate, as summarized in Table DM3-43, that the overall regional resurgence in housing prices following the 2008 recession appears to have resulted in a "bidding up" of Tucson area housing prices, and lower cost housing was in higher demand and "bid up" at a faster rate than higher cost housing. As noted by the public comment, Table DM3-43 does not document a statistical connection between airfield noise and changes in housing prices. References to Table DM3-43 have been removed from the Environmental Consequences section of the EIS to clarify.

The EIS has been modified to add the following statement. "The 0.26 percent to 1 percent reduction in value for every decibel increase in noise represents the average relative value when comparing equivalent units that are located inside or outside the 65 dB DNL contour. On average, housing subject to additional noise could have lower relative values of approximately 0.26 to 1 percent for those units in the 66 dB DNL contour up to approximately 1.5 to 6 percent for those units within the 70 dB DNL contour."

Comment #13a) Commenters expressed concern about general land use issues.

Response: The USAF conducted a detailed analysis of the potential impacts to land use, including compatibility of various land uses with certain levels of expected noise. This discussion of land use compatibility and methodology is located in EIS Chapter 3 (Section 3.8), and the analysis is located in EIS Chapter 4 (Sections DM3.8, HS3.8, FW3.8, and WH3.8), as well as Section B.2.2 of Appendix B. The USAF and Navy (NAS JRB Fort Worth only) work closely with states and local zoning authorities (counties, cities, etc.) to manage and control land use surrounding each base to ensure the safety and well-being of its neighbors. The USAF and Navy (NAS JRB Fort Worth only) recognize that encroachment has the potential to affect the mission. Through close coordination with states and local zoning authorities through the development of JLUSs, the USAF and Navy (NAS JRB Fort Worth only) recognize the importance of planning and managing land use near each of the installations and below the airspace proposed for use.

Comment #13b) Commenters asked if the new mission would require any land acquisition.

Response: Implementation of the AFRC F-35A mission would not require land acquisition at any of the four installations evaluated in the EIS.

Comment #14) Commenters asked why current and proposed flights need to approach and take off over populated areas.

Response: Pilots at each of the four alternative bases studied for the AFRC F-35A beddown currently implement procedures to minimize impacts to noise-sensitive receptors. Aircraft takeoffs and landings are largely dictated by the prevailing winds at the time of the operation. Local pattern operations are similarly limited by local operational restrictions (e.g., avoiding other local airspace traffic). Depending on the circumstance, local pattern operations could consist of a single aircrew not being able to safely land in a particular condition (wind, weather, etc.) and needing to circle for another landing. In other instances, use of local pattern procedures allows for multiple aircraft to arrive in a short period of time and all safely land (avoiding conflicts between them without requiring radar control for safe separation). In other cases, local pattern operations allow aircrews to practice particular types of approaches, maintaining perishable skills and meeting training requirements. More specifically, at Davis-Monthan AFB, the majority of flights take off to the southeast to avoid overflights to the northwest of the installation. However, when wind limitations exceed authorized tailwind allowances for takeoff, flights take off to the northwest.

Comment #15a) Commenters expressed concern about noise mitigation.

Response: As discussed in the EIS (Chapter 2, Section 2.5), the USAF considered measures to reduce noise at each of the four bases. The USAF found that, other than operational restrictions currently in place at individual installations, no other mitigations were operationally feasible without negatively affecting training or safety. Operating procedures to minimize noise specific to Davis-Monthan AFB, NAS JRB Fort Worth, and Whiteman AFB are described in EIS Chapter 4, Sections DM3.2.2, FW3.2.2, and WH3.2.2 3.1, respectively.

The USAF does not currently have congressionally approved authority to expend appropriated funds on facilities outside of the installation that are not under the control of the USAF. Land use recommendations are provided by the military installation to the local communities through the JLUS and AICUZ programs. Under these programs, the USAF and Navy (NAS JRB Fort Worth only) rely on local communities to control incompatible development through land use controls. After the beddown is complete and the full complement of aircraft are routinely operated at the installation selected for the new mission, a new AICUZ would be completed. However, the AICUZ program does not provide the authorization of funds to conduct off-base mitigation to structures within the community, and would be limited to an additional review of flight procedures to identify operational parameters that could be modified to minimize noise impacts. Update of the AICUZ does not imply that noise impacts would be reduced.

Although the USAF does not currently have the authority to fund noise mitigation, some states include provisions for noise mitigation in state laws. For example, ARS Title 26, Chapter 1, Article 7, Section 26-262, describes military installation funds, rules, application, review, award and use of monies. Subsection G, paragraph 1(d) includes provisions for the use of funds for structural renovations or construction of building modification or improvements that mitigate or attenuate impacts in high noise zones or APZs.

Numerous commenters stated that the EIS should include the analysis of costs to mitigate homes to reduce interior noise levels to acceptable standards. As described above, the USAF is currently not congressionally authorized to expend any funds on the evaluation or mitigation of facilities or structures that are not under the control of the USAF.

Comment #15b) Commenters noted that the EIS states that certain residences in the Airport Environs Zone (AEZ) near Davis-Monthan AFB were retrofitted to improve sound attenuation. Commenters requested an explanation of the source of this information.

Response: As described in EIS Chapter 3, Section DM3.2.1, Pima County and the City of Tucson adopted the AEZ in 2004 as part of the JLUS process. As shown on Figure DM3-6, the AEZ encompasses areas around Davis-Monthan AFB and the Tucson International Airport (TUS). The FAA has established a program that addresses noise and compatible land use near civilian airports. Title 14, *Code of Federal Regulations (CFR)* Part 150, *Airport Noise Compatibility Planning*, the implementing regulations of the *Aviation Safety and Noise Abatement Act of 1979*, as amended, provides a voluntary process an airport sponsor can use to mitigate significant noise impacts from airport users near TUS. Although the location of the residences that were retrofitted under this program were not disclosed in the JLUS, it is likely that they were located in the portion of the

AEZ near TUS. Part 150 program funding can only be applied to residences located in the 65 dB DNL contours associated with TUS. Part 150 program funding does not apply to residences located in the Davis-Monthan AFB 65-dB DNL contours. Section DM3.8.2.1.2 states that, "as noted in the JLUS, unlike similarly situated areas around TUS, there is no federal program currently available to retrofit residences in the areas near Davis-Monthan AFB for noise attenuation."

According to Section 6.2.17 of the JLUS, approximately 1,400 homes within the highest noise areas of the AEZ were retrofitted (https://www.insidetucsonbusiness.com/news/airport-in-final-stretch-sound-proofing-nearby-homes/article_fa4cd7b7-fe81-54d5-8757-653fed4e07c3.html) with acoustic windows and doors, ventilation systems, and other improvements to drastically reduce interior noise levels (Arizona Department of Commerce 2004). According to the Tucson Airport Authority (TAA) website, homes were retrofitted under the Residential Sound Insulation Program that was funded by grants from the FAA and the Arizona Department of Transportation as well as matching TAA funds (https://www.flytucson.com/ taa/about/noise/).

Comment #15c) Commenters expressed concern about the EIS stating that mitigation measures were not operationally feasible while in other sections the EIS state that measures to reduce noise impacts include modification of aircraft operations.

Response: As noted in EIS Chapter 2, Section 2.5, avoiding or reducing impacts to areas surrounding installations has always been a priority for the USAF, and current flight procedures at each alternative base reflect a balancing of several factors to achieve safe and efficient operations while also reducing noise. F-35A noise modeling mirrors flight procedures and noise abatement procedures being used by currently based aircraft. As described in Section 2.5, and as listed in Table 2-13, the USAF conducted an evaluation of several potential mitigation measures to reduce noise impacts near each of the four installations. Each category of potential mitigation measures was evaluated relative to operational feasibility and the effects that each measure would have on training and safety. No mitigation measures have been found that would be operationally feasible. EIS Chapter 4, Section DM3.9.2.4, has been revised to remove the statement about modification of flying operations to reduce noise impacts to schools.

Comment #16a) Commenters expressed a general concern about hazardous materials and wastes.

Response: As discussed in EIS Chapter 4, Sections DM3.12, HS3.12, FW3.12, and WH3.12, the USAF conducted a detailed analysis of the impacts of the proposed action associated with hazardous materials and wastes, and determined that there would be no new waste streams. Additionally, existing contamination from previous activities is actively being investigated and in some cases, remediation is ongoing. Impacts associated with hazardous materials/wastes from the proposed action would not be significant. See response to Comment 16b for more detailed information related specifically to perfluorooctane sulfonate (PFOS)/perfluorooctanoic acid (PFOA).

Comment #16b) Commenters expressed concerns about PFOS/PFOA.

Response: PFOS and PFOA are members of a family of emerging contaminants known as per- and polyfluoroalkyl substances (PFAS) that are directly related to the former use or release of Aqueous Film Forming Foam (AFFF), a fire suppressing agent that is used by the DoD. The USAF and the Navy are transitioning to an alternative firefighting foam that is considered more environmentally preferable and meets the Military Specification (MILSPEC) standard for PFAS concentrations. The USAF and Navy are also taking other steps to reduce the opportunity for the alternative formulation to enter the environment. Transition to use of this alternative foam in hangar systems at Davis-Monthan AFB, Homestead ARB, and Whiteman AFB was completed in 2019, and retrofitting of USAF fire response vehicles at these installations is more than 97 percent complete. At NAS JRB Fort Worth, the Navy and the USAF have removed AFFF from all of their hangars and fire response vehicles on the installation. The replacement foam product used at NAS JRB Fort Worth meets the MILSPEC standard for PFAS concentrations. The primary concern related to historical AFFF releases is groundwater contamination. The USEPA has not issued regulatory limits on PFAS. However, the USEPA has issued a 70 parts per trillion Lifetime Health Advisory level for PFOS/PFOA in drinking water. If PFOS/PFOA attributable to DoD actions is found in drinking water at levels that exceed the USEPA's Lifetime Health Advisory, the DoD takes immediate action to stop human exposure by providing alternate drinking water sources.

The Navy is currently working with regulatory agencies to complete a Site Inspection for PFAS at NAS JRB Fort Worth. If necessary, the Navy's response would be consistent with DoDI 4715.18, *Emerging Chemicals (ECs) of Environmental Concern*, and the Defense Environmental Restoration Program (DERP), which is very similar to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process described below. The Navy's policies concerning PFAS contamination will be updated as needed to address changes in regulatory requirements, DoD determinations of risk, or development of new technologies. The USAF has followed the established process set forth in the governing federal cleanup law, CERCLA, to protect human health and the environment. Consistent with the CERCLA cleanup process, Davis-Monthan AFB, Homestead ARB, and Whiteman AFB have completed Site Inspection Reports on PFAS. If necessary, the next step in the CERCLA process would be the Remedial Investigation, which would determine the nature and extent of contamination and assess the potential risk to human health and the environment. If the CERCLA risk assessment process ultimately determines there is a need for cleanup action, federal and state cleanup standards will be evaluated under the CERCLA process to see if there are Applicable or Relevant and Appropriate Requirements at the specific site. If so, they are incorporated into the cleanup levels that must be attained at the site.

In addition to groundwater contamination as it relates to drinking water, another PFOS and PFOA contamination concern relative to the proposed AFRC F-35A beddown is related to worker safety during implementation of the projects proposed for the AFRC F-35A beddown. As part of implementation of the new mission, excavations for new buildings and building additions would occur. Based on review of known historical releases of AFFF at each of the four installations, none of the areas proposed for construction as part of the F-35A beddown at any of the four bases are located at known AFFF release locations. Text regarding PFOS/PFOA has been added to EIS Chapter 4, Section FW3.12.1.3, indicating that the Navy will comply with DoDI 4715.18 and the DERP, and text has been added to Sections DM3.12.1.3, HS3.12.1.3, and WH3.12.1.3 indicating that the USAF will comply with Air Force Guidance Memorandum (AFGM) 2019-32-01, *AFFF-Related Waste Management Guidance,* to manage waste streams containing PFOS/PFOA (USAF 2019). The AFGM will be updated as needed to address changes in regulatory requirements, DoD determinations of risk, or development of new technologies.

Comment #17) Commenters expressed concern about cumulative impacts at Davis-Monthan AFB. Specific comments noted that classroom noise was a cumulative impact in terms of needing to consider HVAC and other background noise; that the EIS did not adequately analyze cumulative impacts of other noise-related actions (e.g., EC-130 rehost, HH-60 beddown) or possible future F-35A missions; and the fact that existing ongoing air traffic at nearby airports, neighborhood background noise, and other ambient noise was not considered as a cumulative impact. The commenter noted that the magnitude of all cumulative impacts should be quantified in the EIS.

Response: See Comment 3d regarding background noise relative to noise impacts in classrooms, and Comment 3a regarding background noise in other settings. Regarding future F-35 beddowns at Davis-Monthan AFB or TUS, as described in Table DM4-1 of the EIS, at this time it is unknown how long existing A-10 aircraft would remain at Davis-Monthan AFB or TUS and if those A-10 aircraft would be replaced by F-35A aircraft or a different aircraft mission. It is also unknown when or if Davis-Monthan AFB or TUS would be considered in those basing actions. All future beddowns would comply with NEPA and would be evaluated for environmental impacts.

As described in Section DM4.0, the EIS considered cumulative impacts of actions such at the EC-130 rehost and other beddown actions and noted that these actions could have impacts on noise levels. Cumulative impact analyses are always limited by the level of detail and the reasonably foreseeable information available at the time.

Text has been added to the Final EIS clarifying the fact that both Davis-Monthan AFB and TUS aircraft operations are audible from many portions of Tucson. The two airfields are separated by a distance of approximately 4 miles and utilize parallel traffic flows. Noise generated by aircraft during landings and takeoffs at each airfield substantially attenuates by the time it reaches the vicinity of the other airfield. Aircraft approaching and departing the two airfields overfly many of the same areas while several miles from the runway, but are at higher altitudes with correspondingly lower noise impacts. Because the lowest-altitude and loudest parts of landing and takeoffs occur several miles apart, noise generated at the two airfields does not combine to exceed threshold values.

Comment #18) Commenters asked why they were not notified about the public meeting or had other concerns about public outreach and involvement.

Response: The USAF notified the public of the release of the Draft EIS and the public hearings through a variety of means. The Notice of Availability (NOA) for the Draft EIS was published in the *Federal Register* on February 14, 2020. Newspaper advertisements were purchased and published approximately 2 weeks prior to each public hearing, including some in Spanish newspapers such as the La Estrella De Tucson and the EL Nuevo Herald. Press releases were distributed to local media (radio, television, print) organizations prior to the public hearings. Spanish and English Fact Sheets were distributed to local areas, and notification letters were mailed to those on the mailing lists and everyone that signed up to be on the mailing list during scoping. Updates were posted on the project website, and each of the four bases used their media outlets and social media to notify the general public. Appendix A of the EIS provides a list of individuals on the mailing list as well as federal, state, and local agencies that were provided notification letters and copies of the Draft EIS.

Comment #19) Commenters asked why this EIS is different from other F-35 EIS documents regarding how the F-35 is operated.

Response: See response to Comment 3a.

Comment #20) Commenters expressed concern about noise impacts to children/adults with special needs (e.g., autism, post-traumatic stress disorder [PTSD]).

Response: PTSD is a serious, life-altering condition. The National Institute of Mental Health (NIMH) offers guidance to understand the symptoms and reactions, as well as information to find treatment. The NIMH has specific links on their website at https://www.nimh.nih.gov/health/topics/post-traumatic-stress-disorder-ptsd/index.shtml. PTSD affects 6 to 8 percent of the population. Initiating events are highly varied, from military combat and natural disasters to car accidents and assault. Given the diverse causation and success rate of individual treatment, it is unlikely that basing the F-35A at any of the four installations would have a significant effect on persons suffering PTSD.

Groups vulnerable to environmental noise (such as those who suffer autism or other mental health issues) have been understudied and are generally underrepresented in study populations, and evidence of differential effects is still highly anecdotal. Clear effects are few, and this is partly due to the lack of targeted and well-designed studies making clear comparisons between the general population and the potentially susceptible groups and quantifying these differences in terms of noise levels. Setting specific limit values to protect susceptible groups is not yet possible based on the available evidence, although some suggestions have been made in the literature.

Comment #21a) Commenters raised general concerns about water quality.

Response: A detailed analysis of water quality was conducted for all four of the installations as part of the EIS process. Water quality is addressed in EIS Chapter 4, Sections DM3.5, HS3.5, FW3.5, and WH3.5. With regard to water quality, the proposed AFRC F-35A mission would be implemented at the selected installation, in accordance with all applicable federal, state, and local regulations. Please also see response to Comment 16b.

Comment #21b) Commenters raised concerns about particulate matter from aircraft operations and fuel spills from aircraft accidents that could impact Lake Worth, which is used as a water source.

Response: As described in EIS Chapter 4, Section FW3.3.5, implementation of the proposed F-35A mission at NAS JRB Fort Worth would not result in exceedances of any annual indicator threshold. The proposed F-35A operations would generate HAPs, primarily in the form of VOCs and particulates from the combustion of aviation fuel in F-35A aircraft and AGE. Because the decrease in VOC emissions from the proposed mission would be greater than the increases in PM_{10} and $PM_{2.5}$ emissions, implementation of the proposed mission would result in a net reduction of HAPs. These emission reductions would result in a net benefit to ambient HAP levels and reduce potential impacts to Lake Worth. The net change in annual emissions resulting from implementation of the AFRC F-35A mission at NAS JRB Fort Worth would remain below the applicable VOCs and NO_x conformity *de minimis* regulatory thresholds.

Concerning fuel spills affecting Lake Worth, the Navy and the USAF have implemented numerous measures to prevent spills from affecting Lake Worth or any other navigable waters. NAS JRB Fort Worth maintains a Facility Response Plan (FRP) that describes the response procedures for spills or discharges of petroleum products and other hazardous materials at the installation. In addition, the Navy maintains a Spill Prevention, Control, and Countermeasure (SPCC) Plan. The SPCC Plan establishes procedures, methods, equipment, and other criteria to prevent the discharge of oil products from NAS JRB Fort Worth into any navigable waters of the United States. As part of the SPCC Plan, NAS JRB Fort Worth maintains a supply of spill containment equipment that is available to address spills. In the unlikely event of a spill resulting in the release of fuel, oil, or other hazardous substances, the Navy would follow the procedures outlined in the SPCC Plan and FRP to complete the appropriate notifications and minimize impacts to water quality.

Comment #22) Commenters provided comments about a wide range of impacts. For example, commenters indicated that the EIS understates noise impacts or the EIS does not evaluate impacts to air quality.

Response: Table 2-12 in EIS Chapter 2, Section 2.4, provides a summary of the potential impacts that could result from implementation of the AFRC F-35A mission at each of the four installations. This table is separated by the 12 different resource areas analyzed in the EIS and provides summary-level information about the potential impacts to each resource. See EIS Chapter 4, for more detailed analysis for each alternative base.

Comment #23) Commenters raised some general concern about wetlands.

Response: No impacts to wetlands would result from implementation of the AFRC F-35A mission at any of the four installations. Wetlands are discussed in EIS Chapter 4, Sections DM3.6.2.4, HS3.6.2.4, FW3.6.2.4, and WH3.6.2.4.

Comment #24) A commenter raised general concerns about transient (non-based) aircraft and how the number of transient aircraft was obtained.

Response: As discussed in EIS Chapter 4, Sections DM3.1.2.1, HS3.1.2.1, FW3.1.2.1, and WH3.1.2.1, the noise analysis was developed based on all other aircraft activity maintaining the status quo and the AFRC fighter aircraft changing from the existing fighter (A-10 or F-16) to the F-35A aircraft. As part of the noise data collection and analysis, the Air Traffic Control (ATC) staff were interviewed at each of the four installations and "tower counts" for the last 5 years (2013-2017) were obtained to identify the number and type of transient aircraft that use the airfields at each of the four installations. The transient aircraft numbers and types were then used as inputs into the NOISEMAP model to develop the baseline (existing conditions) noise contours for each of the four installations.

Comment #25) Commenters requested that the comment period be extended.

Response: Although several commenters requested the comment period be extended, due to the beddown schedule, the comment period was not able to be extended. Per 40 *CFR* § 1502.19 and 1506.6, and 32 *CFR* § 989.19(c), the public comment period for the Draft EIS is at least 45 days starting from the publication of the NOA of the Draft EIS in the *Federal Register*. The NOA for this EIS was published in the *Federal Register* on February 14, 2020, and the comment period ended on March 31, 2020. Several commenters requested that the USAF extend the comment period due to the COVID-19 pandemic. The Draft EIS was available on the internet, and the project website was available for commenters to provide comments online from their homes. The Draft EIS and online comment forms were available for the full 45-day public comment period. Extending the public comment period would not have allowed additional opportunities to review the EIS or provide comments.

Comment #26a) Commenters requested the USAF change the air traffic route to avoid flying over Tucson or populated areas.

Response: Davis-Monthan AFB has a single runway that accommodates a variety of dissimilar aircraft that ATC must safely sequence. Davis-Monthan AFB is also constrained by the close proximity of TUS and their associated Class C airspace to visual flight rules (VFR) maneuvering air traffic north of Davis-Monthan AFB. The approach paths to Davis-Monthan AFB are based on alignment with the single 12,000-foot runway. The approach paths overlie populated areas. See responses to Comment 3 for noise-related concerns. See responses to Comment 7 for safety-related concerns.

Comment #26b) Commenters indicated concern that aircraft patterns at NAS JRB Fort Worth have changed and planes seem to fly lower.

Response: The published minimum altitudes for runway patterns at NAS JRB Fort Worth have remained consistent, with no changes for the past several years. Normal airfield pattern flow at NAS JRB Fort Worth is to the west, and aircraft are in close proximity parallel to the runway as the pilots position into the landing pattern. The 301st Fighter Wing has maintained normal aircraft operational training tempo for the past several years with the exception of an overseas deployment in 2019 that did result in greatly decreased local field operations during their deployment cycle. Currently, that deployment is complete and all aircraft and personnel are operating from NAS JRB Fort Worth as normal. NAS JRB Fort Worth is committed to the health, safety, and welfare of the public. NAS JRB Fort Worth will further investigate the reported aircraft fly-over in and around the Lake Vista community and will further ensure existing airfield noise mitigation procedures are followed.

Comment #26c) Commenters asked why the flight path at Davis-Monthan AFB cannot pass over the railroad tracks or why aircraft flight paths cannot be spread out to spread out noise.

Response: Several types of flight procedures require aircrews to line up with the runway at Davis-Monthan AFB. For example, precision instrument approaches require aircraft to align on the extended runway centerline several miles north of the runway threshold on Davis-Monthan AFB. The approach paths do not align with the railroad tracks to the northwest. In addition, the railroad tracks encompass a fairly narrow strip of land surrounded by populated areas that would also be affected by aircraft noise.

Regarding the spreading of aircraft flight paths to spread noise, standardization of flight paths has several benefits, including clear communication between ATC and the aircrew. For example, aircraft typically reference visual reporting points to confirm their location with ATC.

Flight procedures have been developed and refined over several decades to minimize noise impacts while also ensuring safe and efficient operations. As previously noted, current local flying procedures were applied to the F-35A mission for assessment of noise impacts.

Comment #27a) A commenter noted that the "use of DNL to assess Speech Interference Level (SIL) is inappropriate in addressing everyday life and safety issues (parking lots, job sites, child supervision) in low altitude jet operations areas."

Response: Following recommendations of the DNWG, the EIS uses an L_{max} of 50 dB as a screening threshold for potential speech interference (i.e., DNL is not used for this purpose). As discussed in Section B.2.3 of Appendix B, an L_{max} of 50 dB has been shown to provide 90 percent speech intelligibility for students situated throughout a classroom. It is recognized that speech interference, which encompasses interference with any communication-related activity, is a primary trigger of annoyance and is particularly important for noise-sensitive areas such as job sites and residences.

Comment #27b) Commenters expressed concerns about noise impacts resulting in extreme startle response and PTSD episodes.

Response: See responses to Comments 3e and 20.

Comment #28) Commenters asked how significance is determined.

Response: Analysis methodology is contained in Chapter 3 of the EIS for each resource area described. Per 40 *CFR* 1508.27, the term "significantly," as used in NEPA, requires consideration of both context and intensity. Significance varies with the setting of the proposed action. For instance, in the case of a site-specific action, significance would usually depend upon the effects in the locale rather than in the world as a whole. Both short- and long-term effects are relevant. The intensity of an action refers to the severity of its impacts. It is also important to note that there are not always quantitative "significance thresholds" for each resource area, and that some determinations of "significance" can be qualitative and/or situational.

Comment #29) Commenters stated that if deficiencies are identified in one part of the EIS, all similar deficiencies throughout the EIS must be corrected.

Response: All instances of deficiencies that were identified by commenters in substantive comments were reviewed, and any deficiencies found were corrected throughout the document**.**

Comment #30) Commenters claimed that there was a lack of adequate and comprehensive scientific and baseline information, and that detailed and thorough analysis was not conducted.

Response: The USAF completed a comprehensive analysis of the 12 resource areas at each of the four alternative bases. Each resource area was studied in depth at each of the alternative bases to develop a comprehensive environmental baseline (i.e., Affected Environment). Once the baseline was established, the USAF overlaid the potential impacts from the AFRC F-35A mission to determine, based on context and intensity, if significant impacts to the particular resource areas would occur. As demonstrated by the extensive and detailed text, the EIS is very comprehensive and the Affected Environment sections serve to establish a valid baseline to evaluate the impacts of the proposed mission. The USAF appreciates the time and effort that members of the general public expended to review the Draft EIS, provide comments on the Draft EIS, and provide literature that could potentially enhance or inform the analysis. The references and citations were reviewed for information that could inform the analysis.

Comment #31) A commenter requested the EIS include the list of ranges where Joint Direct Attack Munition (JDAM) deliveries would occur from 20,000 to 40,000 feet.

Response: As described in Chapter 2, Section 2.3.4.2, most air-to-ground ordnance delivery training would be simulated, and the USAF expects no changes in the numbers of JDAMs used by AFRC F-35A pilots when compared to those of F-16 or A-10 pilots. Live ordnance delivery training would only be conducted at ranges previously approved for ordnance use. No changes to range target configuration or ordnance types proposed for use are required for implementation of the AFRC F-35A mission. Should the USAF make any changes to the types of ordnance used at approved ranges, an appropriate level of environmental review would be conducted at that time.

Comment #32) A commenter requested the EIS include the costs to operate the F-35A at each base.

Response: As part of the strategic basing process, the USAF develops costs to operate aircraft at the enterprise of installations being evaluated for that particular mission. The USAF determines aircraft requirements to meet a syllabus or RAP and matches those requirements with training infrastructure (airspace/range/electronic ranges/other attributes). Each component of RAP requirements is evaluated, and this analysis results in an evaluation in the strategic basing process and site surveys against the approved selection criteria. The result is a set of color codes that are used in the selection process for bases that are already meeting RAP at each base for their current mission. The USAF uses this high-level information to assist with the process for selection of Preferred and Reasonable Alternative bases. For the AFRC F-35A mission, the USAF contracted with Lockheed Martin for a specific flying hour contract rate regardless of the location. Each operational F-35A has a certain amount of flying time per jet based on the utilizations rate contracted with Lockheed Martin. All four of the alternative bases evaluated in the AFRC F-35A EIS have the exact same number of hours contracted with Lockheed Martin for 24 Primary Aerospace Vehicles Authorized (PAA).

Comment #33) A commenter asked why the Draft EIS stated that aircrews are not instructed to fly over the University of Arizona but Flight Profile F35ACA02 shows flights right over the university.

Response: EIS Chapter 4, Section DM3.2.2, has been revised to state that overflights of the University of Arizona are avoided to the extent practicable while maintaining safety of flight at all times and meeting aircrew training requirements. Certain types of flight procedures require the pilot to line up with the runway several miles from the installation, such that the aircraft necessarily overflies the university campus. Flight Profile F35ACA02, which depicts an instrument-assisted approach to the airfield, is one such procedure. This particular procedure is designed to be flown when visibility is poor or to practice for flying with poor visibility. At Davis-Monthan AFB, visibility is good most of the year, and instrument procedures are used less frequently than at other installations. Flight patterns designed to be conducted when visibility is good avoid direct overflight of the University of Arizona campus. As noted in Section DM3.2.2.1.1, based F-35A aircraft would utilize the same flight paths currently used by other based aircraft types.

Comment #34) A commenter noted that the EIS did not take into account the homes that were already in the AEZ at Tucson when the AEZ was established.

Response: EIS Chapter 4, Section DM3.2.1, has been modified to state the following: "As part of the JLUS process, Pima County and the City of Tucson adopted the AEZ. Any use within the AEZ that legally existed prior to adoption of the most recent AEZ code amendment, which would have otherwise not been permitted or would not have conformed to the AEZ development standards was grandfathered (Pima County 2020)."

Comment #35) A commenter requested that the EIS include a comparison of civilian vehicular traffic accidents and fatality rates compared to military aircraft accidents and fatality rates.

Response: EIS Chapter 4, Sections DM3.4, HS3.4, FW3.4, and WH3.4, include comprehensive safety discussions. The Air Force Safety Center (AFSEC) oversees the collection and accuracy of flight safety data for the entire USAF. The AFSEC has established metrics to evaluate flight safety data for aircraft. The AFSEC assisted with development of the Draft EIS. Statistics provided by the AFSEC for the F-35A and used in the EIS are consistent with the USAF's current policies and procedures regarding use of flight safety data. The USAF evaluated the commenter's request to compare civilian traffic accidents and fatality rates to military aircraft accidents and fatality rates and determined that such a comparison could not be substantiated by the metrics developed by the AFSEC and would not assist the decision-maker to make a determination as to which one of the four alternative bases the AFRC F-35A mission would be located.

Comment #36) A commenter had a question about the Amazon warehouse that was constructed south of the runway near Davis-Monthan AFB. The commenter noted that the warehouse was in a "high crash zone" and that workers would be exposed to noise levels sufficient to require hearing protection.

Response: Parts of the site in question would be exposed to DNL of 65 to 70 dB from the AFRC F-35A mission. This noise level is compatible with industrial land uses in accordance with DoD guidelines. Overflight noise could momentarily interfere with communication. As stated in Chapter 4, Section DM3.2.1.5, aircraft noise levels outside the boundaries of Davis-Monthan AFB are associated with minimal risk of long-term potential for hearing loss, and this finding also applies to the proposed facility. The facility is located in APZ II. Amazon was aware of the location of its facility within APZ II and the approach and departure corridor, and the land use and density of usage is allowed per the current AEZ, JLUS, and City/Counting Zoning Codes.

Comment #37) Commenters expressed concerns that ANSI criteria for classroom noise and recent research had not been accounted for; that the noise analysis did not consider background classroom noise from HVAC, electrical, plumbing or other facility utilities; and that this should have been considered under cumulative effects.

Response: See response to Comment 3d.

Comment #38) Commenters expressed concern regarding the amount of encroachment on installations and stated that the EIS must evaluate the impacts of current and future encroachment.

Response: As described in Chapter 2, Section 2.2.2, encroachment is one of the factors that the USAF uses as a selection standard when considering installations for missions. Encroachment has been a primary focus of the USAF for many years. In 2015, the USAF identified the Air Force Civil Engineer Center (AFCEC) as the program office for the Air Force Encroachment Management (AFEM) program. The overall purpose of the AFEM program is to reach across the entire installation community to solve problems and preserve the USAF mission capability. As part of the program, each USAF installation has established cross-functional decision making teams or Installation Encroachment Management Teams. Encroachment plans have been developed for many USAF installations, and the USAF partners with states, cities, counties, local zoning authorities, and local military affairs committees to protect and preserve land around USAF installations to ensure developments planned to occur around USAF installations are compatible with the USAF mission.

Discussion of land use compatibility and methodology is contained in EIS Chapter 3 (Section 3.8), and the analysis is contained in Chapter 4 (Sections DM3.8, HS3.8, FW3.8, and WH3.8) as well as Section B.2.2 of Appendix B. The USAF and Navy (NAS JRB Fort Worth only) work closely with states and local zoning authorities (e.g., counties and cities) to provide specific recommendations on land use surrounding their respective bases to ensure the safety and well-being of all neighbors. The USAF and Navy (NAS JRB Fort Worth only) recognize that encroachment has the potential to affect the mission. Through close coordination with states and local zoning authorities through the development of JLUSs, the USAF and Navy (NAS JRB Fort Worth only) recognize the importance of planning and managing land use below the airspace proposed for use.

Comment #39) A commenter noted that the EIS indicates that Davis-Monthan AFB has not received any claims for noise-induced property damage. The commenter stated that this is false.

Response: The statement in EIS Chapter 4, Section DM3.2.1.8, stating that the USAF has not received any claims for noise-induced property damage was factually inaccurate. The commenter has correctly noted that Davis-Monthan AFB has received claims for noise-induced property damage in the past. After evaluating historical records, an aircraft associated with the USAF Thunderbirds operating out of Davis-Monthan AFB for the 2012 air show broke the sound barrier on April 13, 2012. Some homeowners reported broken windows caused by the noise. On April 19-20, 2012, USAF claims representatives from Davis-Monthan AFB made themselves available at the Murphy-Wilmot Library to discuss property damage claims and assist the general public with filing claims. The sentence stating that the installation has not received any claims for noise-induced property damage has been deleted from Section DM3.2.1.8.

Comment #40) Commenters expressed concern that the deadline for the 45-day Draft EIS public comment period was published in the *Federal Register* as March 30 but other information stated the deadline was March 31 to confuse the public.

Response: The NOA was published in the *Federal Register* on February 14, 2020. The official NOA stated that the 45-day comment period would end on March 30, 2020. The *Federal Register* NOA is the official tracking document for the start and end dates for the 45-day public comment period.

The Draft EIS was first made available to the public on the website on February 3, 2020, resulting in a total of 56 calendar days for public comments.

Comment #41) A commenter noted that Pima County has indicated that mitigation must be required if the mission is assigned to Davis-Monthan AFB yet the USAF has indicated that they cannot fund mitigation and it is not operationally feasible.

Response: See response to Comment 15a. The USAF does not currently have congressionally approved authority to expend appropriated funds on facilities outside of the installation that are not under the control of the USAF. Land use recommendations are provided by the military installation to the local communities through the AICUZ program. Under this program, the USAF relies on local communities to control incompatible development through land use controls. After the beddown is complete and the full complement of aircraft are routinely operating at the installation selected for the new mission, a new AICUZ would be completed. However, the AICUZ program does not provide the authorization of funds to conduct off-base mitigation to structures within the community, and would be limited to reviewing flight procedures to identify operational parameters that could be modified to minimize noise impacts. Update of the AICUZ does not imply that noise impacts would be reduced.

Although the USAF does not currently have the authority to fund noise mitigation, the state of Arizona does maintain a "Military Installation Fund." This fund is authorized under ARS Title 26, Chapter 1, Article 7, Section 26-262. This ARS describes the military installation fund, the rules, application for funds, review of applications, and award and use of monies. Subsection G, paragraph 1(d) includes provisions for the use of funds for structural renovations or construction of building modification or improvements that mitigate or attenuate impacts in high noise zones or APZs.

Comment #42) Commenters requested that F-35A pilots conduct flyovers following patterns that would be used as part of the based F-35A flying mission.

Response: Transient F-35A aircraft have flown into Davis-Monthan AFB and NAS JRB Fort Worth on multiple occasions in the past. Further, most installations' airshows have had F-35A aircraft participate over recent years. It is not possible to specifically schedule these aircraft into a local area specifically for civilian interest outside of the airshows due to their ongoing training and mission requirements.

Comment #43) Commenters stated that the EIS says the noise of F-35s would result in significant socioeconomic impacts, especially on minority and low-income populations, yet it does not explain why it is disregarding these impacts (and the people on whom they will be inflicted) in its conclusion that this F-35 beddown should occur at Davis-Monthan AFB.

Response: NEPA requires federal agencies to assess the environmental effects of proposed major federal actions prior to making decisions. Chapter 4, Sections DM3.9 and DM3.10, of the EIS address the impacts to minority and low-income populations. These sections present the potential impacts of implementing the proposed action at Davis-Monthan AFB to minority and low-income populations, just as similar sections in the EIS (HS3.9 and HS3.10, FW3.9 and FW3.10, and WH3.9 and WH3.10) present the potential impacts to minority and low-income populations at those alternative bases. The USAF decision maker will evaluate the potential impacts of the proposed action at each of the four alternative bases and weigh those impacts against the purpose and need of the proposed action before deciding which base will receive the AFRC F-35A mission. The EIS does not recommend or offer any conclusion as to which alternative the USAF should select. The ultimate decision on which base is selected will be made by the Secretary of the Air Force.

Comment #44) A commenter stated that studies have shown that home prices are affected by airport noise contours. However, the price is relatively small (0.5 to 2.0 percent - Streeting 1990), especially compared to the economic benefits of a large concentration of activity as is attendant with a USAF base.

Response: EIS Chapter 4, Sections DM3.9.1.2 and DM3.9.2.2, HS3.9.1.2 and HS3.9.2.2, FW3.9.1.2 and FW3.9.2.2, and WH3.9.1.2 and WH3.9.2.2, discuss the economic benefits of each base and of the proposed action.

GOVERNOR GREG ABBOTT

February 28, 2020

MAR 1 2020

The Honorable Barbara M. Barrett
Secretary of the U.S. Air Force
c/o Mr. Hamid Kamalpour, U.S. Air Force, AFCEC/CZN
2261 Hughes Avenue, Suite 155
JBSA-Lackland Air Force Base, Texas 78236-9853

Dear Secretary Barrett:

I write to express my continued support for the 301st Fighter Wing and NAS Fort Worth JRB. and for the U.S. Air Force to select this wing for basing the F-35 Lightning II. As you know, NAS Fort Worth serves as a high-quality training environment for active and reserve units from all branches of our armed services, and the U.S. Navy continues to maintain and invest in infrastructure and quality-of-life initiatives at the installation.

The 301st Fighter Wing is the ideal location for basing F-35s. The airfield, training areas, and MOAs already support F-35 manufacturing and test-flight activities. NAS Fort Worth and Lockheed Martin are co-located and utilize the same runway. The installation has proven its ability to support F-16s and has established infrastructure and relationships conducive to F-35 operations, maintenance, and training. In light of this history, basing F-35s at NAS Fort Worth should have a minimal environmental impact.

NAS Fort Worth has the airspace, MOAs, and ranges for F-35 training missions to support both air-to-air and air-to-ground flying operations. The training areas are within 70 miles of the installation and offer over five thousand square miles of high and low MOAs and access to extensive Military Training Routes. In addition, the Fort Worth region has superb year-round flying weather and provides easy access to joint operational partners.

The State of Texas has a long history of supporting the U.S. military, and it is a top priority for my office to ensure that Texas is the most military-friendly state in the country. The State of Texas, the Dallas/Fort Worth metropolitan area, and NAS Fort Worth provide large resources of reserve manpower and the infrastructure needed to support F-35 missions. The 301st Fighter Wing is ready, willing, and able to accept and support F-35 aircraft, pilots, and maintenance personnel.

POST OFFICE BOX 12428 AUSTIN, TEXAS 78711 512-463-2000 (VOICE) DIAL 7-1-1 FOR RELAY SERVICES

The Honorable Barbara M. Barrett
February 28, 2020
Page 2

I hope you will agree that NAS Fort Worth is the clear choice for F-35 basing. Thank you for your consideration and support.

Sincerely,

Greg Abbott

Greg Abbott
Governor

GA:kgk

State of Texas
House of Representatives

Charlie Geren

Capitol Office:
P.O. Box 2910
Austin, Texas 78768-2910
512-463-0610
Fax 512-463-8310

District Office:
1011 Roberts Cut-Off
River Oaks, Texas 76114
817-738-8333
Fax 817-738-8362

RECEIVED
MAR 15 2020
BY:

March 4, 2020

The Honorable Barbara M. Barrett
Secretary of the U.S. Air Force
c/o Mr. Hamid Kamalpour, U.S. Air Force, AFCEC/CZN
2261 Hughes Avenue, Suite 155
JBSA-Lackland Air Force Base, Texas 78236-9853

Dear Secretary Barrett:

The undersigned members of the Tarrant County legislative delegation write to express our support for the basing of the F-35 Lightning II at the 301st Fighter Wing at NAS Fort Worth JRB.

The 301st Fighter Wing are well-suited for basing F-35s. Not only does the airfield and its training areas already support F-35 manufacturing and test-flight activities, but NAS Fort Worth and Lockheed Martin are co-located and utilize the same runway. NAS Fort Worth also has the airspace, MOAs, and ranges suited to support both air-to-air and air-to-ground flying operations and training missions. Furthermore, given the installation's proven ability to support current F-16 operations, basing F-35s at NAS Fort Worth should have a minimal environmental impact.

The State of Texas and Tarrant County has a long history of supporting the U.S. military, and NAS Fort Worth provides the resources and infrastructure needed to support F-35 missions. We are confident the 301st Fighter Wing is ready, willing and able to accept and support F-35 aircraft, pilots, and maintenance personnel.

Thank you in advance for your consideration and support in this matter.

Sincerely,

Charlie Geren
State Representative
House District 99

RECEIVED
MAR 15 2020
BY:

Craig Goldman
State Representative
House District 97

Nicole Collier
State Representative
House District 95

Ramon Romero
State Representative
House District 90

Chris Turner
State Representative
House District 101

Tony Tinderholt
State Representative
House District 94

Bill Zedler
State Representative
House District 96

COUNTY ADMINISTRATOR'S OFFICE

PIMA COUNTY GOVERNMENTAL CENTER
130 W. CONGRESS, FLOOR 10, TUCSON, AZ 85701-1317
(520) 724-8661 FAX (520) 724-8171

C.H. HUCKELBERRY
County Administrator

March 11, 2020

AFCEC/CZN
ATTN: Mr. Hamid Kamalpour
2261 Hughes Avenue, Suite 155
JBSA Lackland Air Force Base, TX 78236-9853

Re: **Statement of Pima County Administrator Chuck Huckelberry Regarding Davis-Monthan Air Force Base F35 Environmental Impact Statement Public Hearing Comments for the Proposed Air Force Reserve Command (AFRC) F-35A Operational Beddown**

Dear Mr. Kamalpour:

Pima County has a 40-year history of cooperating with and supporting Davis-Monthan Air Force Base (DMAFB). Community support for DMAFB has been enduring and diversified.

In the 1980s, Pima County managed and implemented major transportation improvements on the periphery of DMAFB, improving accessibility to DMAFB and travel times throughout the growing urban region. These transportation projects led to the development of the Swan and Craycroft Roads Gates as they now exist.

In 2004, the voters of Pima County overwhelmingly approved a $10 million County bond program to reduce unwise urban encroachment in the DMAFB Flight Departure Corridors and Accident Potential Zones. The County has responsibility for land use planning in the unincorporated area and in this same timeframe, participated in a land use study designed to protect DMAFB flight and military operations from incompatible urban encroachment in a study known as DMAFB Joint Land Use Study (JLUS). The JLUS was approved and codified by the Board of Supervisors, to guide and control future development, primarily in the Departure Corridor, thereby preserving military flight missions of DMAFB as well as improve overall safety for both the community and DMAFB.

In 2013, Pima County successfully applied for and received State Military Installation Funds to improve Wilmot Road from Valencia Road north to the south entrance of DMAFB. Based on a long-range plan to downsize and secure the Swan entrance, all commercial and major truck traffic access to DMAFB will be moved to a more secure facility at a new gate located on Wilmot Road. Today, County and regional funded road improvements for the intersection of Wilmot and Valencia Roads are underway, which allows for major intersection improvements to accommodate the heavy volume of truck traffic anticipated to use this new entrance to DMAFB.

Mr. Hamid Kamalpour
Re: **Statement of Pima County Administrator Chuck Huckelberry Regarding Davis-Monthan Air Force Base F35 Environmental Impact Statement Public Hearing Comments for the Proposed Air Force Reserve Command (AFRC) F-35A Operational Beddown**
March 11, 2020
Page 2

The County continues to work cooperatively with DMAFB on the Readiness and Environmental Protection Integration (REPI) Program to fund and mitigate incompatible urban encroachment on DMAFB to ensure military training flights, testing and operations are not limited or impeded. Working as a funding partner with DMAFB, the base has been awarded $7.25 million in REPI funding. The County has matched this funding to date with $6.5 million in property restrictions based on County land acquisitions to minimize or eliminate urban encroachment.

The County has also worked with DMAFB to provide continuity of employment for separating military veterans to find meaningful and professional employment for spouses of military personnel assigned to DMAFB and to work on a host of other community engagement activities, including library, health, job training, recreation and other services delivered to the public as well as DMAFB personnel.

The cooperation and support exhibited by the County over the last 40 years will continue and we value DMAFB as an important military and community asset. We have and will support ongoing, future and expanded missions that may be assigned to DMAFB by the US Air Force.

With regard to the **Proposed Air Force Reserve Command (AFRC) F-35A Operational Beddown**, I have read and agree with the analysis and conclusion of the Draft Environmental Impact Statement and support the F-35A operational beddown at Davis-Monthan Air Force Base, provided noise mitigation occurs for those areas subjected to substantially increased noise levels.

Mitigation funding can and should be supported by federal, state and local sources, similar to past efforts to reduce urban encroachment in flight corridors. Mitigating noise impacts caused by this specific mission is no different than past actions to prevent encroachment. Preventing encroachment also insures future impacts from noise will be reduced.

Sincerely,

C.H. Huckelberry

C.H. Huckelberry
County Administrator

c: The Honorable Ramón Valadez, Vice Chair, Pima County Board of Supervisors
The Honorable Steve Christy, Member, Pima County Board of Supervisors
John Voorhees, Assistant County Administrator
Dr. John Moffatt, Director, Economic Development Office

Cutler Bay
FLORIDA

OFFICE OF THE MAYOR
Tim Meerbott
Mayor

March 23, 2020

Re: F35 Basing at Homestead Air Reserve Base Letter of Support

To Whom It May Concern:

I am writing in support of the application by South Florida Defense Alliance, a 501 (c)(6) non-profit organization, for consideration of basing F35 aircraft at the Homestead Air Reserve Base.

I strongly support the objectives of this project and concur that outcomes will position Homestead Air Reserve Base as a world-class regional, national and international airfield for the United States.
Homestead Air Reserve Base is currently home to the 482nd Fighter Wing of the Air Force Reserve Command's Tenth Air Force, as well as the headquarters of Special Operations Command South. For decades, dating back to 1955, the 482nd Fighter Wing has served this country in multi-role missions with the full support of our proud hometown community. Since 1994, the unit has deployed 11 times for combat operations.

Homestead Air Reserve Base is a great neighbor. Decades of community-based planning reassures its neighboring communities of zero environmental impact, zero encroachment and noise issues from Base operations. It has a well-established history of successfully managing state of the art runway and airfield electric systems and serves as a pioneer for environmental stewardship. Due to their dedication and continued efforts to clean up and prevent pollution of Air Force property from its surrounding communities, Homestead Air Reserve Base is the proud recipient of the General Thomas D. White Award for Team Excellence in the *Pollution Prevention* and *Restoration* categories.

One of my priorities as Mayor is to help find ways in supporting our local military personnel, spouses, family members and veterans. It is my wholehearted belief that the Homestead Air Reserve Base is the best choice for basing F35 aircraft as they currently have the qualified aircrew, maintenance, logistics, weapons loaders, intelligence, life support, communications, and base operations support staff necessary. It is strategically located, its infrastructure ready and it has overwhelming hometown community support.

I respectfully request your advocacy and support of this request.

Sincerely,

Tim Meerbott
Mayor

FGBC
10720 Caribbean Boulevard, Suite 105 • Cutler Bay, FL 33189 • (305) 234-4262 • www.cutlerbay-fl.gov

KAY GRANGER
12TH DISTRICT, TEXAS

APPROPRIATIONS COMMITTEE
RANKING MEMBER

Congress of the United States
House of Representatives

WASHINGTON OFFICE:
1026 LONGWORTH HOUSE OFFICE BUILDING
WASHINGTON, D.C. 20515
(202) 225-5071
FAX: (202) 225-5683

DISTRICT OFFICE:
SUITE 407
1701 RIVER RUN
FORT WORTH, TX 76107
(817) 338-0909
FAX: (817) 335-5852
kaygranger.house.gov

Greetings,

On behalf of my Texas Congressional District 12 constituents I want to take this opportunity to express our sincere hope that the US Air Force will make the most logical and efficient choice for the future basing of the F-35 Lightning II mission at NAS Fort Worth JRB. The 301st Fighter Wing at the JRB is the ideal location for basing F-35's. The airfield, training areas and military operating areas already support F-35 manufacturing and test flight activities. NAS Fort Worth and Lockheed Martin are co-located and utilize the same runways. This installation has proven its ability to support F-16's and has established infrastructure and relationships conducive to F-35 operations, maintenance and training. In light of the history here, basing F-35's at NAS Fort Worth will have a minimal environmental impact.

This 5th generation defense technology is best managed at the NAS because of the large contingent of local companies that support the Lockheed market and F-35 military personnel. In addition, the DFW metroplex provides a very large source of qualified employees to support the F-35 mission. And the centrally located JRB is ideal for global deployment and training.

Yours Respectfully,

Kay Granger

Member of Congress

Texas District 12

EMAIL ME BY VISITING KAYGRANGER.HOUSE.GOV/CONTACTME

PRINTED ON RECYCLED PAPER

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1201 ELM STREET, SUITE 500
DALLAS, TEXAS 75270-2102

March 27, 2020

Hamid Kamalpour
U.S. Air Force Reserve Command
AFCEC/CZN
2261 Hughes Avenue, Suite 155
JBSA-Lackland AFB, TX 78236

Dear Mr. Kamalpour:

The Region 6 office of the U.S. Environmental Protection Agency (EPA) has reviewed the U.S. Air Force Reserve Command (AFRC) F-35A Operational Beddown Draft Environmental Impact Statement (EIS) CEQ Number 20200030. The Draft EIS was reviewed pursuant to the National Environmental Policy Act (NEPA), the Council on Environmental Quality regulations (40 CFR Parts 1500 - 1508), and by our NEPA review authority under Section 309 of the Clean Air Act.

The purpose of the F-35A Operational Beddown Draft EIS is to determine the most suitable AFRC installation with existing fighter or ground attack aircraft needing to be replaced by the F-35A Joint Strike Fighter. The need for the aircraft replacements are a result of increased difficulties in maintaining aging aircraft, attrition, decreased service life and lack of manufacturing of additional aircraft with the same airframe. Four alternative bases are being considered for the beddown: Davis-Monthan Air Force Base (AFB) Arizona; Homestead Air Reserve Base, Florida; Naval Air Station (NAS) Fort Worth Joint Reserve Base (JRB), Texas; and Whiteman AFB, Missouri. NAS Fort Worth JRB has been selected as the preferred alternative and the other three installations as reasonable alternatives.

We appreciate the opportunity to review this Draft EIS. EPA has no comments on the proposed project. We look forward to reviewing the Final EIS related to this project. If you have any questions, please contact Gabe Gruta, the project review lead, at 214-665-2174 or gruta.gabriel@epa.gov.

Sincerely,

ARTURO
BLANCO

Digitally signed by ARTURO BLANCO
DN: c=US, o=U.S. Government, ou=Environmental Protection Agency, cn=ARTURO BLANCO, 0.9.2342.19200300.100.1.1=68001003651779
Date: 2020.03.27 15:18:42 -05'00'

Arturo J. Blanco
Director
Office of Communities, Tribes and
Environmental assessment

United States Department of the Interior

OFFICE OF THE SECRETARY
Office of Environmental Policy and Compliance
1001 Indian School Road NW, Suite 348
Albuquerque, New Mexico 87104

File 9043.1
ER 20/0072

March 30, 2020

AFCEC/CZN
ATTN: Hamid Kamalpour
US Air Force Reserve Command
2261 Hughes Ave., Suite 155
JBSA-Lackland Air Force Base, TX 78236

SUBJECT: Comments on the US Air Force Draft EIS for the F-35A Operational Beddown – Davis-Monthan Air Force Base, Arizona; Homestead Air Force Reserve Base, Florida; Naval Air Station Fort Worth Joint Reserve Base, Texas; and Whiteman Air Force Base, Missouri

Dear Mr. Kamalpour:

The U.S. Department of the Interior (Department) appreciates the opportunity to review and comment on the F-35A Operational Beddown Draft Environmental Impact Statement (EIS) and has these Departmental comments, from the National Park Service's Regional Office serving DOI Regions 6, 7, and 8.

The National Park Service (NPS) thanks the US Air Force (USAF) for collaborating with them during the EIS scoping period regarding potential impacts to resources and values under NPS stewardship. The preferred alternative (beddown at Naval Air Station Fort Worth Joint Reserve Base, Texas) appears to avoid impacts to resources and values of parks served by our regional office.

NPS notes that alternatives analyzed in detail include "Base Alternative: Davis Monthan Air Force Base." As described in May 2018 scoping comments, this alternative would create increased noise compared to existing aircraft operations, which could have adverse impacts to resources and values at Saguaro National Park, Arizona. Additionally, as the Draft EIS indicates, the Davis Monthan Air Force Base (AFB) alternative also has the potential to adversely impact the resources and values of Organ Pipe National Monument, Arizona. Appropriately, the Draft EIS recognizes Saguaro National Park and Organ Pipe National Monument as noise-sensitive locations, and NPS appreciates the effort the USAF made to assess potential impacts of the Davis Monthan AFB alternative on these park units.

As currently written, the Draft EIS does not include a full analysis of the impacts that increased noise the Davis Monthan AFB alternative would have on visitor experience, wildlife, wilderness, historic structures, and/or traditional uses at Saguaro National Park and Organ Pipe National Monument. As a result, should the USAF consider changing its preferred alternative in the Final EIS, or eventually select this as the alternative for implementation, USAF decision-makers, the NPS, and the public would not have a complete picture of the effects this alternative could have on these park units.

NPS looks forward to continued collaboration with the USAF to ensure potential impacts to NPS units served by Regions 6, 7, and 8 are identified and considered in your NEPA and decision-making processes. The individuals listed below would gladly provide additional information on how the Final EIS could better capture potential effects of the Davis Monthan AFB alternative on the resources and values of Saguaro National Park and Organ Pipe National Monument:

- Saguaro National Park: Jeff Conn, Chief of Science and Resource Management; 520-733-5170; jeffery_conn@nps.gov
- Organ Pipe National Monument: Rijk Morawe, Chief of Science and Resource Management: 520-387-6849; rijk_morawe@nps.gov

Sincerely,

SK

Susan King, Regional Environmental Officer
Albuquerque, New Mexico

U.S. Naval Air Station Joint Reserve Base Fort Worth (NAS JRB Fort Worth)
Regional Coordination Committee (RCC)

Voting Entities

City of Benbrook

City of Fort Worth

City of Lake Worth

City of River Oaks

City of Sansom Park

City of Westworth Village

City of White Settlement

Tarrant County

Non-Voting Entities

Benbrook Area Chamber of Commerce

DOD Office of Economic Adjustment

Fort Worth Chamber of Commerce

Fort Worth Independent School District

Fort Worth Transportation Authority

Lockheed Martin

Naval Air Station Joint Reserve Base Fort Worth

North Central Texas Council of Governments

Northwest Tarrant Chamber of Commerce

Tarrant Regional Water District

Texas Department of Transportation

Tri-City Area Chamber of Commerce

White Settlement Area Chamber of Commerce

March 30, 2020

Hamid Kamalpour
U.S. Air Force
AFCEC/CZN
2261 Hughes Ave, Ste.155
JBSA-Lackland, TX 78236

Dear Mr. Kamalpour:

On behalf of the Naval Air Station Joint Reserve Base Fort Worth (NAS JRB Fort Worth) Regional Coordination Committee (RCC) and its members, we would like to submit comments on EIS No. 20200030, Draft, USAF, TX, F-35A Operational Beddown—Air Force Reserve Command, published by the Environmental Protection Agency in the Federal Register on February 14, 2020. The RCC agrees with the conclusion of the draft EIS in selecting NAS JRB Fort Worth as the preferred alternative for the F-35A beddown.

The Regional Coordination Committee was formed out of a 2008 Joint Land Use Study (JLUS) surrounding the NAS JRB Fort Worth. The study results included a joint agreement by the cities of Benbrook, Fort Worth, Lake Worth, River Oaks, Sansom Park, Westworth Village, White Settlement, and Tarrant County, to collectively move forward on recommendations that promote the viability of the NAS JRB Fort Worth and its economic significance to the surrounding communities.

Over the years, the Regional Coordination Committee has helped push transportation and community improvements forward through planning studies and creative funding partnerships. For example, the Regional Transportation Council and North Central Texas Council of Governments (NCTCOG), who provide staff support to the committee, have programmed, in cooperation with the Texas Department of Transportation, $750 million in transportation improvements directly impacting NAS JRB Fort Worth. Many of these projects are now in design or under construction. In short, the Regional Coordination Committee provides the mechanism for open lines of communication between NAS JRB Fort Worth and the municipal members of the Committee.

Working with the Regional Coordination Committee, several local governments have passed zoning ordinances and building codes to prevent additional incompatible land development in areas exposed to high noise levels as defined by Department of Defense guidelines. As noted on p. FW4-7 of the draft EIS, these guidelines also inform the Regional Coordination Committee's online Development Review Tool. The tool is a feedback mechanism for communities planning projects located within or near the base's Air Installations Compatible Use Zone (AICUZ). In the past 10 years, the Committee has used the tool to recommend measures to prevent or mitigate incompatible land uses in dozens of cases involving both the base's noise contours and accident potential zones. These recommendations include sound attenuation measures.

The community around NAS JRB Fort Worth is familiar with noise from military aircraft. The base's runway is shared with Lockheed Martin, which assembles the F-35 at a plant neighboring the base and regularly uses the runway for its test flights. The runway is suitable for test flights because it is 4,000 feet longer than the minimum length required

www.nctcog.org/rcc

Local governments surrounding the Naval Air Station Joint Reserve Base Fort Worth have voluntarily formed the Regional Coordination Committee to promote and preserve the military mission at the installation. The Committee is responsible for encouraging compatible land use planning, conducting community outreach, and participating in military affairs surrounding NAS JRB Fort Worth.

Mr. Hamid Kamalpour
Page Two

March 30, 2020

for F-35A takeoffs. There are more than 25,000 annual flight operations of transient aircraft and those are based at NAS JRB Fort Worth. As with these aircraft, the F-35A mission would primarily operate from 7 am to 10 pm.

With the benefit of the sound attenuation measures mentioned above, the RCC does not anticipate issues with the slight 12.1 percent increase in total annual airfield operations. Furthermore, the number of sorties would only increase by 1.2 percent. A sortie is a single aircraft mission that includes multiple airfield operations, which is notable since the F-35A mission at NAS JRB Fort Worth would not require new airspace or changes to existing airspace boundaries, which are also used by Lockheed Martin for its F-35 test flights.

It should be noted Tarrant County is a part of the Dallas-Fort Worth metropolitan planning area in nonattainment for ozone. The proposed F-35A aircraft would primarily replace existing emissions from F-16 operations, maintenance and testing. The EIS found that for annual operations emissions under any of the three afterburner scenarios, the replacement of F-16s with F-35As would reduce volatile organic compounds and increase nitrogen oxides but would not require a general conformity determination. Both of these pollutants help create ozone. During the public scoping period, NCTCOG submitted a comment stating that it is prepared to offset any increase in emissions caused by the replacement aircraft, and this is still the case.

Finally, the RCC was interested in the noise contours for the baseline and three scenarios. We appreciate the description of the difference between the 65 dBA DNL noise contours compared with what is referred to at the "2004 JLUS" contour and would like to note that individuals in the community are familiar with the "2004 JLUS" area, as that is used in many city documents. The comparison provided in Table FW 3-15 shows that despite an increase in population from the baseline to Scenario C (the scenario with the highest population exposed to the 65 dBA DNL noise contour), there are still far fewer individuals exposed than under the "2004 JLUS" noise contours. Accordingly, the RCC also wishes to express its support for the U.S. Air Force's intention, as outlined in the Best Management Practices on p. 2-34, to validate the noise impacts and noise levels identified in this EIS in a new AICUZ after the F-35A beddown is complete.

Based on our review of the EIS, we do not currently see impacts that would give us concern or be inconsistent with our ongoing planning assumptions. As documented in the EIS, the Regional Coordination Committee has had success coordinating with communities to implement the recommendations of the most recent JLUS from 2017, especially building codes and ordinances. We look forward to continuing this partnership when the F-35A beddown at NAS JRB Fort Worth is finalized.

We appreciate the opportunity to provide these comments and look forward to working with the U.S. Air Force as it finalizes its recommendation. If you have any questions or concerns, please feel free to contact me at (817) 392-8807 or Amanda Wilson at (817) 695-9284.

Sincerely,

Dennis Shingleton, Chair
Regional Coordination Committee
Councilmember, City of Fort Worth

KR:kw

cc: Dan Kessler, Assistant Director of Transportation, NCTCOG
Amanda Wilson, Program Manager, NCTCOG
Captain Jonathan Townsend, Commanding Officer, NAS JRB Fort Worth

---

CITY OF HOMESTEAD

City Council

Steven D. Losner
Mayor

Patricia D. Fairclough-Staggers, Ed.S
Vice Mayor

Erica G. Avila
Councilwoman

Jenifer N. Bailey
Councilwoman

Sean L. Fletcher
Councilman

Larry Roth
Councilman

Stephen R. Shelley
Councilman

Cate McCaffrey
City Manager

City Hall

100 Civic Court
Homestead, FL 33030
305-224-4400
www.cityofhomestead.com

March 31, 2020

The Honorable Barbara M. Barrett
Secretary of the Air Force
1670 Air Force Pentagon
Washington, D.C. 20330-1670

Dear Secretary Barrett:

On behalf of the City of Homestead, Florida and its nearly 80,000 residents, I confirm support for basing the AFR F-35 aircraft at Homestead Air Reserve Base.

The history and success of both the City of Homestead and HARB are long and intertwined and each are integral to the viability of the other. Due to our strategic location and other advantages, in the aftermath of Hurricane Andrew in 1992, HARB arose from the ruins of Homestead Air Force Base which had been a crown jewel of the United States Air Force.

There is widespread community support for the placement of the F-35. The continued operational expansion of HARB and its benefit to the community and the safety of our nation can be ensured by the addition of the F-35 mission.

Thank you for your consideration and support, not only for HARB but the people of Homestead and the surrounding communities.

Sincerely,

Steven D. Losner,
Mayor

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A.3 AGENCY COORDINATION AND CONSULTATION

A.3.1 COOPERATING AGENCIES

DM50 PIMA COUNTY CITY OF TUCSON SOUTHERN ARIZONA DEFENSE ALLIANCE
LOCAL STRENGTH • NATIONAL DEFENSE

January 10, 2018

General James M. Holmes
Commander, Air Combat Command
205 Dodd Blvd., Suite 200
Joint Base Langley-Eustis, VA, 23665-2788

Lieutenant General Steven L. Kwast
Commander, Air Education and Training Command
1 F St, Suite 1
JBSA Randolph, TX, 78150-4324

Major General Bradley D. Spacy
Commander, Installation & Mission Support Center
2261 Hughes Ave., Suite 133
JBSA Lackland, TX, 78236-9853

Dear Generals Holmes, Kwast and Spacy:

The Air Force is preparing to conduct an Environmental Impact Statement (EIS) for the potential beddown of an Air Force Reserve F-35 squadron at Davis-Monthan AFB.

We are writing to offer our support to ensure a thorough and timely analysis of the Tucson portion of this F-35 EIS and any future mission analyses at Davis-Monthan AFB and the 162nd Wing at Tucson International Airport (TIA). Our objective is to facilitate the completion of any environmental process that the Air Force may undertake.

We wanted you to know that both Pima County and the City of Tucson would like to become Cooperating Agencies for ongoing and future NEPA processes being conducted at both Davis-Monthan and at TIA for the 162nd Wing (ANG). We believe that local government participation would provide quality information to enhance and streamline the Air Force NEPA process.

We want to offer our support to the 355th Fighter Wing, the 12th Air Force, Air Combat Command and the ANG. Obtaining meaningful baseline operations data for Davis-Monthan and TIA is not only in the Air Force's best interest, but also that of Tucson and Pima County, in our efforts to incorporate Air Force requirements into regional planning.

General James M. Holmes, Lieutenant General Steven L. Kwast and Major General Bradley D. Spacy
January 10, 2018
Page 2

Tucson strongly supports our Airmen and their mission. They are a source of immense pride to Tucsonans and community leaders. We look forward to continuing our longstanding and mutually-beneficial relationship with the Air Force.

Sincerely,

Sharon Bronson

Sharon Bronson, Chair
Pima County Board of Supervisors

Jonathan Rothschild, Mayor
City of Tucson

Bryan R Foulk

Bryan Foulk, President
DM 50

Amber Smith, President
Southern Arizona Defense Alliance

c: Lieutenant General Maryanne Miller, Chief, Air Force Reserve/Commander, Air Force Reserve Command
Lieutenant General Leon Scott Rice, Director, Air National Guard
Major General John K. McMullen, HQ ACC/CD
Major General Mark A. Brown, Deputy Commander, Air Education & Training Command
Colonel Matthew Benivegna, Deputy Director, AF Civil Engineering Center

DEPARTMENT OF THE AIR FORCE
WASHINGTON, DC

OFFICE OF THE ASSISTANT SECRETARY

MAR 2 0 2018

SAF/IEI
1665 Air Force Pentagon
Washington, DC 20330-1665

Mr. Michael J. Ortega, P.E.	Mr. Chuck Huckelberry
City Manager	County Administrator
City Hall, 10th Floor a	Pima County Arizona
255 W. Alameda	130 W. Congress Street, 10th
Tucson, Arizona 85701	Floor Tucson, Arizona 85701

Dear Mr. Ortega and Mr. Huckelberry

Thank you for your letter of January 10, 2018 about your participation as a Cooperating Agency for the proposed F-35 Beddown Environmental Impact Statement to consider Davis-Monthan Air Force Base as an alternative location.

The Air Force recognizes the City of Tucson and Pima County may provide special expertise in areas relevant to the Air Force's consideration of Davis Monthan Air Force Base as an alternative for an Air Force Reserve F-35A squadron. With respect to those areas, the Air Force accepts your offer to participate as a Cooperating Agency for this proposed action.

Due to the deliberative, predecisional nature of the Environmental Impact Statement process, the terms for participation as a Cooperating Agency will be memorialized in a Memorandum of Understanding signed between your offices and the Air Force. Please provide your professional staff points of contact to the Air Force as soon as possible so our staffs can finalize the details of this agreement.

Should you or your staff have questions regarding this letter, our points of contact are Mr. Steve Arenson, (571) 256-2471, (steven.l.arenson.civ@mail.mil) and Mr. Jack Bush, (703) 614-0237 (jack.bush@pentagon.af.mil).

Jennifer L Miller

JENNIFER L. MILLER, SES
Deputy Assistant Secretary of the Air Force
(Installations)

cc:
SAF/GCN
HQ AF/A4C
HQ AETC/CV
HQ ACC/CV
HQ AFRC/CV
HQ AFIMSC/CD
HQ AFCEC/CL
AFLOA/JAC

DEPARTMENT OF THE AIR FORCE
WASHINGTON DC

OFFICE OF THE ASSISTANT SECRETARY

SEP 22 2017

SAF/IEI
1665 Air Force Pentagon
Washington, DC 20330-1665

Dr. Sue Goodfellow
Acting Director, Energy and Environmental Readiness Division, OPNAV N45
2000 Navy Pentagon (Room 2E274)
Washington, DC 20350-2000

Dear Dr. Goodfellow,

The Air Force requests the Department of the Navy's participation as a cooperating agency in preparation of an environmental impact statement (EIS) for the F-35A Operations 7 basing alternative locations. Naval Air Station Joint Reserve Base Fort Worth is the alternative basing location for the EIS.

This participation arrangement is described in the Council on Environmental Quality National Environmental Policy Act Regulations, 40 CFR § 1501.6, *Cooperating Agencies*. As a cooperating agency, the Air Force requests the Department of the Navy participate in various portions of the EIS development. Specifically, the Air Force asks for your support as a cooperating agency by:

- Participating in the scoping process
- Assuming responsibility, upon request by the Air Force, for developing information and preparing analyses on issues for which the Department of the Navy has special expertise
- Making staff support available to enhance interdisciplinary review capability and provide specific comments (40 CFR §1503.3)
- Provide review and comments within the timelines prescribed in the program milestone schedule
- Responding, in writing, to this request

Our points of contact for this matter are Mr. Jack Bush at (703) 614-0237 (jack.bush@us.af.mil) and Mr. Mike Ackerman at (210) 925-2741 (michael.ackerman.2@us.af.mil).

Sincerely,

Jennifer L Miller

JENNIFER L. MILLER
Deputy Assistant Secretary of the Air Force
(Installations)

BREAKING BARRIERS...SINCE 1947

DEPARTMENT OF THE NAVY
OFFICE OF THE CHIEF OF NAVAL OPERATIONS
2000 NAVY PENTAGON
WASHINGTON DC 20350-2000

5090
Ser N45/17U132430
18 Oct 17

From: Chief of Naval Operations (OPNAV N45)
To: Deputy Assistant Secretary of the Air Force (Installations)

Subj: INVITATION TO BECOME A COOPERATING AGENCY ON THE ENVIRONMENTAL IMPACT STATEMENT FOR F-35A OPERATIONS BASING ALTERNATIVE LOCATIONS

Ref: (a) Your ltr of 22 Sep 17

1. Thank you for your letter requesting that the Department of the Navy (Navy) serve as a cooperating agency in the preparation of an Environmental Impact Statement (EIS) for F-35A operations basing alternatives.

2. I understand that the Navy's Naval Air Station Joint Reserve Base Fort Worth, Texas, is one of the alternative basing locations under consideration for the EIS. Accordingly, as described in reference (a), the Navy agrees to the following responsibilities and actions as a cooperating agency on this proposed action:

a. Participating in the scoping process;

b. Assuming responsibility, upon request by the Air Force, for developing information and preparing analyses on issues for which the Navy has special expertise;

c. Making staff support available to enhance interdisciplinary review capability and provide comments; and

d. Provide review and comments within the timelines prescribed in the program milestone schedule.

3. The point of contact for this matter is Mr. Royce Kemp from Navy Region Southeast at (904) 542-6899, or email: royce.kemp@navy.mil.

C. A. LAUTI

Copy to:
Commander, U.S. Pacific Fleet (N465/N7)
Commander, Naval Air Forces Pacific (N3)
Chief of Naval Air Training (N3)
Commander, Navy Installations Command (N45)
Commander, Navy Region Southeast

A.3.2 DAVIS-MONTHAN AIR FORCE BASE AGENCY COORDINATION AND CONSULTATION RESPONSES

A.3.2.1 Davis-Monthan Air Force Base Agency Coordination Responses

PIMA COUNTY

CITY OF TUCSON

January 10, 2018

Mr. Richard K. Hartley
Acting Assistant Secretary of the Air Force for Installations, Environment and Energy
1665 Air Force Pentagon
Washington DC 20330-1665

Dear Secretary Hartley:

The 355th FW, the 309th AMARG, 12th AF, the 55th ECG (Compass Call), 563rd Rescue Group and the US Customs and Border Protection Branch at Davis-Monthan Air Force Base and the 162nd Fighter Wing (ANG) at Tucson International Airport are sources of immense pride to local Tucsonans and community leaders. Pima County, the City of Tucson and local community leaders have embarked on a process to further enhance our strong support for these fine military units well into the future.

Over the last several years there have been many new or modified proposed missions for DM and the 162nd FW. We think that this trend will continue based on this region's military value. After much recent discussion, we believe that Pima County and the City of Tucson can help the Air Force in the mission transition processes by participating at the earliest possible time in the National Environmental Policy Act (NEPA) process as a Cooperating Agency (CA), as outlined in 40 CFR 1501.6 and 1508.5. Acting as a CA, based on jurisdiction by law and special expertise, is encouraged by the White House Council on Environmental Quality. We are convinced that with our extensive local knowledge, our participation as a CA would facilitate timely completion of any NEPA process that the Air Force may undertake in the City of Tucson and Pima County.

We look forward to your request of us to be a cooperating agency for future NEPA processes, including the imminent AF Reserve F-35 beddown EIS and any other environmental process you anticipate as a result of your strategic basing process.

Mr. Richard K. Hartley
January 10, 2018
Page 2

Tucson based point of contacts for this endeavor will be John Moffatt (520.724.4444) and Diana Durazo (520.724.8801) with Pima County and Andrew Greenhill (520.237.1776) with the City of Tucson.

Sincerely,

C. Duhelberry

C.H. Huckelberry
County Administrator

Michael J. Ortega, P.E.
City Manager

c: Jennifer L. Miller, SAF/IEI
Colonel Scott C. Campbell, 355 FW Commander
Jerry Kohns, SAF/GCN
Carol Ann Beda, SAF/IEIB
Jack Bush, HQ AF/A4CP
Suzanne W. Bilbrey, HQ AFCEC/CZ
Raquel R. Fischer, HQ AFCEC/CZN
Joe Miller, AFLOA/JACE-FSC
Michael R. Toriello, 355FW CES/CD

A.3.2.1 Davis-Monthan Air Force Base Agency Coordination Responses (Continued)

STATE OF ARIZONA
OFFICE OF THE GOVERNOR

DOUGLAS A. DUCEY
GOVERNOR

EXECUTIVE OFFICE

January 11, 2018

Mr. Richard K. Hartley
Acting Assistant Secretary of the Air Force for Installations, Environment and Energy
1665 Air Force Pentagon
Washington DC 20330-1665

Dear Secretary Hartley,

The City of Tucson and Pima County recently offered to provide whatever assistance they could to the Air Force to ensure a thorough and timely analysis of the Tucson portion of the Air Force Reserve F-35 Environmental Impact Statement and other future mission analyses at Davis Monthan AFB and the 162nd Wing at the Tucson International Airport. The State of Arizona fully supports and will augment those efforts in the areas where the State has legal jurisdiction.

I believe that the request by the City of Tucson and Pima County to be designated as Cooperating Agencies is in the best interest of the Air Force and our local communities. I encourage the Air Force leadership to work closely with Tucson area leaders in this matter.

Sincerely,

Douglas A. Ducey
Governor
State of Arizona

cc: Commander, Air Combat Command
Commander, Air Education & Training Command
Commander, USAF Civil Engineering Center

1700 WEST WASHINGTON STREET, PHOENIX, ARIZONA 85007
602-542-4331 • www.azgovernor.gov

United States Department of the Interior
Bureau of Indian Affairs
Southern Plains Regional Office
P. O. Box 368
Anadarko, Oklahoma 73005

IN REPLY REFER TO:
Executive Direction

Mr. James Schock
Regional Director
U.S. Bureau of Indian Affairs
Southern Plains Regional Office
WCD Office Complex
PO Box 368
Anadarko, OK 73005

March 27, 2018

Mr. Raquel R. Fischer
Air Force Civil Engineer Center NEPA Division (AFCEC/CZN)
2261 Hughes Ave, Suite 155
Lackland AFB TX 78235-9853

Dear Ms Fisher,

I received your Notice of Intent to Prepare an Environmental Impact Statement for the Air Force Reserve Command F-35A Operational Beddown, and I appreciate the notice. However, the letter was addressed to Mr. Dan Deerinwater who retired at the end of last calendar year and I want to inform you that I replaced Mr. Deerinwater. Please update your records to reflect that James Schock is the Regional Director for Southern Plains Region (address above).

Should you have any questions or comments, I can be reached at (405)247-6673, extension 230. If the Southern Plains Region has any comments concerning the Notice itself, those comments will be delivered in a separate letter.

Sincerely,

James "Jim" Schock
Southern Plains Regional Director

A.3.2.1 Davis-Monthan Air Force Base Agency Coordination Responses (Continued)

TRIBAL HISTORIC PRESERVATION
P.O. BOX 167
CONCHO, OKLAHOMA 73022

1-800-247-4612 Toll Free
405 422 7484 Telephone

April 4, 2018
THPO ID #: 440

Department of the Air Force
Raquel R. Fischer
2261 hughes Ave, Suite 155
Lackland AFB, TX 78235-9853

RE: Environmental Impact Statement to determine the effects of Air Force Reserve Command F-35A Operation Beddown

Dear Consultant:

On behalf of the Cheyenne and Arapaho Tribes, thank you for the notification of the EIS for effects from Operation Beddown. At this time, we have **No Interest**. We offer our best wishes and look forward to future projects.

Please contact me with the THPO ID number at (405) 422-7416 or mlooper@c-a-tribes.org, if you have any questions or concerns. Alternate contact is Virginia Richey; she can be reached directly at (405) 422-7484 or vrichey@c-a-tribes.org. Thank you again for your notification!

Best Regards,

Micah Looper
Research Analyst

CC: Virginia Richey
Tribal Historic Preservation Office/THPO Officer
Max Bear, Director

AOPA
your freedom to fly

50 F St. NW, Suite 750
Washington, D.C. 20001

T. 202-737-7950
F. 202-273-7951

April 10, 2018

Mr. Hamid Kamalpour
United States Air Force
AFCEC/CZN
2261 Hughes Ave, Ste 155
Lackland AFB, TX 78236-9853

Re: *Notice of Intent To Prepare an Environmental Impact Statement for the Air Force Reserve Command F 35A Operational Beddown*

Dear Mr. Kamalpour,

The Aircraft Owners and Pilots Association (AOPA), the world's largest aviation membership association, submits the following comment in response to the March 22, 2018, Federal Register notice advising the public of the United States Air Force Reserve Command's (AFRC) intent to prepare an Environmental Impact Statement (EIS) for the beddown of one F-35A squadron. First, AOPA fully supports the AFRC and understands the importance of military readiness. We appreciate this opportunity to provide feedback early in the process as the AFRC identifies which installation will be the home for these aircraft. AOPA believes it is important for the AFRC to consider General Aviation users that operate in and near the Special Use Airspace (SUA) that will be utilized by this squadron. We encourage the AFRC to emphasize the selection criteria that minimizes the impact of these new aircraft on other users of the National Airspace System (NAS).

Adequate preexisting SUA should be important selection criteria

It is an important requirement for the beddown location to have currently published SUA that meets the squadron's flying requirements, and the airfield should be located in close proximity to that SUA. We fully agree with these requirements and we believe this selection criteria deserves significant consideration as creating new SUA, or expanding SUA, can be a lengthy and expensive process. Additionally, the impacts of increased SUA negatively impact other users of the NAS. SUA can increase the cost of flying and affect operational efficiency as operators may need to detour around active SUA. We encourage the AFRC to select the location that has a short-term and long-term outlook of not needing expansion of the SUA to support this squadron and the F-35A operations.

As important as not expanding SUA dimensions is, minimizing the hours of usage is equally important. The AFRC notes that there would be a change to the type of aircraft based at the selected installation; therefore, there would be a change in the mix of aircraft using the associated SUA. AOPA encourages the AFRC to pick that beddown location that has SUA that will allow the F-35As to operate within the existing published hours. The AFRC should be clear what the change in local operations tempo will be and clearly communicate what SUA changes may be necessary to accommodate those operations.

A.3.2.1 Davis-Monthan Air Force Base Agency Coordination Responses (Continued)

Mr. Kamalpour
April 10, 2018
Page 2 of 2

Conclusion

AOPA recognizes and fully supports the AFRC's need to train as they fight. In order to understand the effect this beddown will have on General Aviation, we request the AFRC provide detailed analysis of anticipated SUA usage. The Draft EIS should clearly state any need for SUA expansion, including physical dimensions and activation times, and the plan for how that will be accomplished in a manner to minimize the negative effects on General Aviation. We appreciate the AFRC earnestly assessing the effect these new aircraft will have on other airspace users, and we encourage the usage of selection criteria that would avoid any SUA expansion.

Thank you for reviewing our comment on this important issue. Please feel free to contact me at 202-509-9515 if you have any questions.

Sincerely,

Rune Duke
Senior Director, Airspace and Air Traffic

The Aircraft Owners and Pilots Association (AOPA) is a not-for-profit individual membership organization of General Aviation Pilots and Aircraft Owners. AOPA's mission is to effectively serve the interests of its members and establish, maintain and articulate positions of leadership to promote the economy, safety, utility, and popularity of flight in General Aviation aircraft. Representing two-thirds of all pilots in the United States, AOPA is the largest civil aviation organization in the world.

AIRCRAFT OWNERS AND PILOTS ASSOCIATION

AIR FORCE RESERVE COMMAND F-35A OPERATIONAL BEDDOWN ENVIRONMENTAL IMPACT STATEMENT

Scoping Meeting Written Comment Form

For more information or to submit comments online, please go to: www.AFRC-F35A-Beddown.com

PLEASE PRINT LEGIBLY.

LOCATION: Davis Monthan Air Force Base DATE: April 19, 2018

The Tucson Hispanic Chamber supports bringing the F-35 to Tucson

The Air Force and the Tucson Hispanic business community have had a long standing, mutually beneficial relationship. As the third largest employer in the Tucson area, Air Force base needs are supported by local businesses throughout Southern Arizona. The airmen and their families and those that visit the base support local businesses too. Our chamber represents more than 1800 businesses in the region and many work closely with the Base in providing goods and services.

Local airmen, like the "DM 1st Sargeants Association" volunteer to support many non-profit organizations in our community, like Youth on their Own.

The Tucson Hispanic Chamber recognizes the positive economic and social contributions made by the Air Force to our community. We are interested in continuing our relationship with the Air Force for the long term.

**** CONTINUE ON BACK FOR MORE SPACE ****

Individual respondents may request confidentiality. If you wish to withhold your name or address from public review or from disclosure under the Freedom of Information Act (FOIA), you must state this prominently at the beginning of your comments. Such requests will be honored to the extent allowed by law. All submissions from organizations or businesses, and from individuals or officials representing organizations or businesses, will be made available for public inspection in their entirety.

Name: Lea Marquez Peterson, President/CEO

Organization: Tucson Hispanic Chamber

Address: 823 E Speedway

City/State/Zip: Tucson, AZ 85719

Please turn in this form at the registration desk or mail by May 11, 2018, to:

Mr. Hamid Kamalpour
United States Air Force, AFCEC/CZN
2261 Hughes Ave, Ste 155
Lackland AFB, Texas 78236-9853

A.3.2.1 Davis-Monthan Air Force Base Agency Coordination Responses (Continued)

Continuation Page

The F-35 represents the future. What is good for the future of the Air Force is also good for the future of Tucson and our local Hispanic business community

Thank you for your input.

April 22, 2018

Hamid Kamalpour
US Air Force

Dear Sir:

The Yuma 50 is a Countywide organization created to advocate for legislation, public policy and government programs that will maintain the viability of our two military installations; Marine Corps Air Station Yuma and Yuma Proving Ground. The Yuma 50 is a 501c Not for Profit who prides themselves in supporting active duty military and their families as a top priority through advocacy of good public policy and sufficient funding for critical programs that ensure the safety of those who serve.

As Chair of the Yuma 50 I am writing to you today in support of the reserve basing of the F-35 fighter jet at Davis-Monthan Air Force Base in Tucson. Speaking from a community that has two squadron of F-35 STOVL aircraft, we confidently recommend this new aircraft as a benefit to any community they reside within. Due to their speed and agility, this aircraft has a smaller noise impact than traditional aircraft Davis -Monthan is accustomed too. Yuma has found this aircraft to be exciting and positive for our area. I'm certain Davis-Monthan will experience the same result.

The Yuma 50 is in full support of the F-35 basing at Davis-Monthan Air Force Base.

Sincerely,

Julie Engel
Chair - Yuma 50

WWW.yuma50.o... 180 W. 1st Street, Suite D Yuma AZ 85364 928-376-0100

A.3.2.1 Davis-Monthan Air Force Base Agency Coordination Responses (Continued)

AIR FORCE RESERVE COMMAND F-35A OPERATIONAL BEDDOWN ENVIRONMENTAL IMPACT STATEMENT

Scoping Meeting Written Comment Form

For more information or to submit comments online, please go to: www.AFRC-F35A-Beddown.com

PLEASE PRINT LEGIBLY

LOCATION: DAVIS-MONTHAN AFB, ARIZONA DATE: 24 APR 18

Please see attached letter and associated attachments.

**** CONTINUE ON BACK FOR MORE SPACE ****

Individual respondents may request confidentiality. If you wish to withhold your name or address from public review or from disclosure under the Freedom of Information Act (FOIA), you must state this prominently at the beginning of your comments. Such requests will be honored to the extent allowed by law. All submissions from organizations or businesses, and from individuals or officials representing organizations or businesses, will be made available for public inspection in their entirety.

Name: DR. JOSEPH V. CUFFARI

Organization: OFFICE OF ARIZONA GOVERNOR DOUG DUCEY

Address: 1700 WEST WASHINGTON AVE, SUITE 800

City/State/Zip: PHOENIX, AZ 85007-2888

Please turn in this form at the registration desk or mail by May 11, 2018, to:

Mr. Hamid Kamalpour
United States Air Force, AFCEC/CZN
2261 Hughes Ave, Ste 155
Lackland AFB, Texas 78236-9853

STATE OF ARIZONA

DOUGLAS A. DUCEY
GOVERNOR

OFFICE OF THE GOVERNOR

EXECUTIVE OFFICE

May 1, 2018

Mr. Hamid Kamalpour
Air Force Civil Engineering Center NEPA Division (AFCEC/CZN)
2261 Hughes Avenue, Suite 155
Lackland AFB, Texas 78235-9853

Dear Mr. Kamalpour,

On behalf of all Arizonans, I welcome you and your team to our state to conduct an Environmental Impact Statement (EIS), which will enable you to evaluate Davis-Monthan AFB as a reasonable and advantageous alternative location for the Air Force Reserve Command's Operational Beddown of the F-35A mission.

Arizona proudly supports our military, their dependents, and our veterans who have served and sacrificed so much on our nation's behalf. In January 2018, I signed a letter supporting the EIS and the City of Tucson and Pima County's collaborative offer to be designated as Cooperating Agencies during that process. I understand that the Office of the Assistant Secretary of the Air Force for Installations, Environment, and Energy has approved those entities as Cooperating Agencies for this process. I remain committed to augmenting those agencies' efforts in areas where the State has legal jurisdiction.

Arizona is open for business and we support any enhanced mission set that the Department of Defense deems appropriate. We are blessed to have unmatched flying weather coupled with virtually immediate flying time access to world-class military training ranges. We are proud to support our state's six military installations and four major National Guard operations which are responsible for creating more than 76,000 direct and indirect jobs and account for approximately $11.5 billion in annual economic impact. Davis-Monthan AFB significantly contributes approximately $2.6 billion toward our growing economy thanks to the capable, talented, and dedicated men and women serving there.

Furthermore, Arizona shares senior military leaders' concerns regarding transitional opportunities for military members and their families as they relocate to our state. We have mindfully strived to minimize any adverse impacts that relocation may have on a spouse's chosen profession and ensure the seamless integration of their dependents into our schools.

1700 WEST WASHINGTON STREET, PHOENIX, ARIZONA 85007
602-542-4331 • www.azgovernor.gov

A.3.2.1 Davis-Monthan Air Force Base Agency Coordination Responses (Continued)

Mr. Hamid Kamalpour
May 1, 2018
Page 2

Thank you for the opportunity to showcase our base and the local community, and to provide additional comments.

Sincerely,

Douglas A. Ducey
Governor
State of Arizona

Attachments
Economic Impact of Arizona's Principal Military Operations ("The Maguire Report")
Summary of Enacted Legislation regarding Military & Veterans

May 3, 2018

Mr. Hamid Kamalpour
U.S. Air Force, AFCEC/CZN
2261 Hughes Ave., Suite 155
Lackland AFB, TX 78236-9853

Re: Scoping Comments for F-35A Operational Beddown EIS

Dear Mr. Kamalpour:

The Arizona Game and Fish Department (Department), by this letter, provides some general comments for consideration during scoping for the Environmental Impact Statement (EIS) for the F-35A Operational Beddown, specific to the Davis Monthan (DM) AFB alternative. We understand the Air Force will be consulting with the U.S. Fish and Wildlife Service regarding Threatened and Endangered Species and Critical Habitat. In addition to federally listed species, the Department has trust responsibilities for all wildlife species in the state of Arizona. We encourage the Air Force and its contractors to use the Arizona Online Environmental Review Tool administered by the Department's Heritage Data Management System (https://azhgis2.esri.com). The tool provides information on Special Status Species, Arizona's Species of Greatest Conservation Need (SGCN) and of Economic and Recreation Importance (SERI).

Species sensitive to aircraft operations should be avoided whenever possible. For example, bird migration corridors, such as along Cienega Creek and other riparian corridors, should be avoided. Additionally, eagle nesting locations and bighorn sheep lambing areas should also be avoided. Personnel at Davis Monthan AFB are already aware of the need to avoid burrowing owls and other nesting raptors near the DM flight line, therefore the Department encourages the continuance of avoidance measures already in place for existing operations.

The Department appreciates the opportunity to provide scoping comments and is available to provide additional information as the NEPA analysis develops. Please contact Kristin Terpening at 520-388-4447 or kterpening@azgfd.gov with any questions.

Sincerely,

Raul Vega
Supervisor, Region V Tucson

M18-03222835

azgfd.gov | 520.628.5376
TUCSON OFFICE: 555 N. GREASEWOOD ROAD, TUCSON AZ 85745
GOVERNOR: DOUGLAS A. DUCEY COMMISSIONERS: CHAIRMAN, JAMES R. AMMONS, YUMA | JAMES S. ZIELER, ST. JOHNS | ERIC S. SPARKS, TUCSON
KURT R. DAVIS, PHOENIX | LELAND S. "BILL" BRAKE, ELGIN DIRECTOR: TY E. GRAY DEPUTY DIRECTOR: TOM P. FINLEY

A.3.2.1 Davis-Monthan Air Force Base Agency Coordination Responses (Continued)

COUNTY ADMINISTRATOR'S OFFICE

PIMA COUNTY GOVERNMENTAL CENTER
130 W. CONGRESS, FLOOR 10, TUCSON, AZ 85701-1317
(520) 724-8661 FAX (520) 724-8171

C.H. HUCKELBERRY
County Administrator

May 3, 2018

Mr. Hamid Kamalpour
United States Air Force, AFCEC/CZN
2261 Hughes Ave, Ste. 155
Lackland AFB, Texas 78236-9853

Re: **Support of the F-35A Reserve Squadron Basing at Davis-Monthan Air Force Base in Tucson, Arizona**

Dear Mr. Kamalpour:

I am writing to you in support of the F-35A Reserve Squadron basing at Davis-Monthan Air Force Base (DMAFB) in Tucson, Arizona. DMAFB has been a major contributor to our community since its creation in 1927, transitioned into full military service in 1941, and finally being activated as DMAFB in September, 1951. Much of Tucson's growth in the 1950's and 1960's can be directly attributed to Air Force veterans that chose to come back to Tucson following their discharge from the Air Force.

Supporting this continuing tradition, the Pima County Veteran's One-Stop works to not only help current/retired military personnel but also their families to position themselves for and find work in the civilian world. The One-Stop also focuses on finding employment for spouses of airmen transferred to DMAFB. With tens of thousands of retired military living in our region, it clearly is a desirable place to live. While DMAFB is considered an urban base due to its location, we have seen no declines in population resulting from aircraft noise. According to the Tucson Association of Realtors statistics, we have not seen real estate values negatively impacted by the presence of Operation Snowbird in the past. Pima County's portion of tourism taxes continues to rise, and in some cases in double-digit percentages. Our community continues to flourish and is not negatively impacted by nearby activities at DMAFB. In fact, many visitors come because of Davis-Monthan, the Pima County Air and Space Museum, and the "Boneyard" operated by the 309th Aerospace Maintenance and Regeneration Group.

Mr. Hamid Kamalpour
Re: **Support of the F-35A Reserve Squadron Basing at Davis-Monthan AFB in Tucson, Arizona.**
May 3, 2018
Page 2

Including over $800,000 per year contributed by retired military, DMAFB contributes over $2.6 billion dollars to our local economy. I have attached a November 17, 2017 memorandum I wrote to the Pima County Board of Supervisors that summarizes the economic impact and other benefits for the region contributed by our military installations. Clearly, DMAFB is a major economic driver in our community.

But, it is not all about dollars. The interaction between DMAFB and our community is just as important. Our Pima County Library system has replaced the DMAFB Library. There are numerous community events where the airmen participate with and support our citizens, and there are many events where the community supports our airmen for football games, car shows, picnics, etc. Airmen and their families are eligible for treatment at our health department clinics at no charge. Airmen headed overseas can also get their immunizations at our Health Department as well. Our Crisis Response Center is available to airmen having psychological difficulties. Additionally, some of the activities mentioned above have been possible through the Air Force Community Partnership program. The collaborations through this Partnership program between Davis-Monthan, Pima County, City of Tucson, University of Arizona, non-profits and private businesses, has been an enormous win-win for the Base and the community. DMAFB is an integral part of this community.

In order for DMAFB to continue to be a viable part of the community, the Pima County Board of Supervisors voted for Resolution 2014-27, which is also attached. This resolution states that the Pima County Board of Supervisors supports ANY new mission selected for Davis-Monthan by the Air Force. Therefore, if in the Air Force's judgement, it is appropriate to base an F35A squadron at DMAFB, we will fully support that decision.

Working with the DMAFB Civil Engineering Squadron in being an early adopter of a Joint Land Use Study (JLUS) concept, DMAFB, Pima County, and the City of Tucson identified arrival/departure and noise contour corridors and established standards to minimize impact on housing and encourage compatible industrial growth in the departure corridor. In 2004, Pima County voters authorized $10 million in Bonds to acquire land with noncompatible zoning within the departure corridor. Those funds were fully expended to accomplish at least a part of the re-characterization of the area under the departure corridor. Pima County has also collaborated with DMAFB and Air Force Civil Engineering Center (AFCEC) in the implementation of their recently awarded REPI grant, now in its second year. We are fully invested in the long-term viability and sustainability of DMAFB.

Finally, Pima County along with the City of Tucson requested, and has been confirmed as having the opportunity to be a Cooperating Agency in the current F35A beddown EIS. As such, we can provide many of the community resource components needed as a part of the

A.3.2.1 Davis-Monthan Air Force Base Agency Coordination Responses (Continued)

Mr. Hamid Kamalpour
Re: **Support of the F-35A Reserve Squadron Basing at Davis-Monthan AFB in Tucson, Arizona.**
May 3, 2018
Page 3

Environmental Impact Study. We will do our part to ensure that the F35A beddown Environmental Impact Study has the optimum facts upon which to base a recommendation.

Sincerely,

C. Huckelberry

C.H. Huckelberry
County Administrator

CHH/mp

Enclosures

c: Michael J. Ortega, P.E., City Manager, City of Tucson
Colonel Scott Campbell, Commander, 355th Fighter Wing, Davis-Monthan AFB

MEMORANDUM

Date: November 17, 2017

To: The Honorable Chair and Members
Pima County Board of Supervisors

From: C.H. Huckelberry
County Administrator

Re: **Economic Impact of Arizona's Principal Military Operations**

U.S. military operations in Arizona have an estimated $11.46 billion annual economic impact and directly or indirectly account for more than 76,000 jobs, according to a recent study prepared for the state's Military Affairs Commission. Just over $3 billion of that impact is in Pima County as generated by Davis-Monthan Air Force Base ($2.6 billion), the 162nd Wing of the Arizona Air National Guard (AZANG) at Tucson International Airport ($383.6 million), and the Silver Bell Army Heliport ($147.4 million), which is just over the Pinal County line in north Marana. Combined, the three military operations provide nearly 20,000 direct and indirect jobs in our region with a combined annual payroll over $1.2 billion.

Additionally, Fort Huachuca in Cochise County has an estimated $2.9 billion annual economic impact, meaning over $6 billion, or more than half, of the annual economic impact noted in the study occurs in Southeast Arizona.

The study estimated that the economic effect of the principal military operations annually generates about $159 million in local taxes and about $97 million in state taxes, though the report didn't break those tax revenues down by region or county. However, since over half of the economic impact of these military operations occurs in Southeast Arizona, it is safe to assume that roughly half of the local tax revenue is collected in Pima and Cochise counties.

The study, prepared by Phoenix-based Maguire Company, is an update of similar reports in 2002 and 2008 and used the same criteria and methodology as the earlier studies to allow for comparisons over time. It only considered military installations and not overall Department of Defense spending in Arizona, which includes major employers such as Raytheon and Boeing. The report concluded that as an industry, military operations in Arizona, *"provides substantial, stable employment, draws on the same private, non-governmental vendors and suppliers as many private commercial enterprises in the state, and serves as an important building block in the state's overall economy."* Therefore, it recommends that *"maintaining these operations and the jobs and economic output they support should be a priority of state and local government."*

As a reminder, the latest update of the County's Economic Development Plan specifically calls for protecting the region's military installations and their associated jobs, noting that

A.3.2.1 Davis-Monthan Air Force Base Agency Coordination Responses (Continued)

The Honorable Chair and Members, Pima County Board of Supervisors
Re: Economic Impact of Arizona's Principal Military Operations
November 17, 2017
Page 2

"having any of these major employers suffer any type of mission or job reduction will hurt the entire economy of Pima County. While their economic wellbeing may depend largely on forces outside of the regional and State economy, Pima County needs to ensure we are doing everything possible to support the stability and job growth of these major employers."

Recent County or County-supported efforts to protect D-M and the 162nd AZANG include:

- As a major partner, Pima County entered into an encroachment management agreement with Davis-Monthan as part of its recently awarded $3.5 million grant under the Department of Defense's Readiness Environmental Protection Integration (REPI) grant program, which seeks to prevent, remove or mitigate incompatible land uses that restrict training, testing and operation of military installations, which can improve opportunities for mission growth.

- Passing a resolution that supports expediting the plan to move the current 162nd AZANG gate access at TIA from Valencia Road near Campbell to Park Avenue. The Valencia gate doesn't meet the Defense Department's force security requirements. Moving the gate west to Park would also resolve some congestion issues on Valencia Road.

- Partnering with the City, DM50, Southern Arizona Defense Alliance, and others to fund consulting activities designed to best position the base against future Base Realignment and Closure (BRAC) and to advocate for expanded missions for both Davis-Monthan and the 162nd Wing.

- Pima County is a major partner in the Air Force Community Partnership program and supports the DM and the 162nd in several ways:
  - The Pima County One-Stop assists in the Military Family Employment Initiative to help families of those stationed at military installations in the area find jobs;
  - Pima County successfully requested that PAG prioritize the funding for the expansion of south Wilmot Road from Valencia to an expanded south entry facility to be built by Davis-Monthan with Air Force funds.
  - The Pima County Emergency Management operation at PECOC integrated Davis-Monthan and the 162nd Wing into the regional and statewide Emergency Management systems including coordination of operations, testing, exercises, and reaction to real world events;
  - Pima County has been working with the State Military Installation Funds Program to eliminate excessive lease payments for private lands inside the Davis-Monthan fence.

CHH/mp

Attachment

c: John Moffatt, Director Economic Development Office

RESOLUTION NO. 2014- 27

A RESOLUTION OF THE PIMA COUNTY BOARD OF SUPERVISORS IN SUPPORT OF DAVIS-MONTHAN AIR FORCE BASE AND THE A-10 MISSION; REQUESTING ADDITIONAL FLYING MISSIONS; SUPPORTING EXPANSION AND EXTENSION OF BASE MILITARY OPERATIONS

WHEREAS, Davis-Monthan Air Force Base has been a fixture in Pima County since the nucleus of what would ultimately become the base was formally dedicated in 1927 by Charles Lindbergh, months after his crossing of the Atlantic; and

WHEREAS, Davis-Monthan transitioned to full military operations in 1940; and

WHEREAS, the first production A-10 Thunderbolt II jet aircraft was delivered to Davis-Monthan in October 1975 and it is now the main aircraft stationed at the Base; and

WHEREAS, the venerable jet has effectively served ground troops and been hailed for its maneuverability at low speeds and altitudes, as well as its ability to loiter near combat areas for extended periods of time; and

WHEREAS, significant financial investments have upgraded the aircraft's electronics and wings as a means to extend its life until at least 2028, and

WHEREAS, Davis-Monthan plays a key role in keeping America safe, with as many as 2,000 airmen deployed around the world, engaged in combat operations; and

WHEREAS, based on our unparalleled flying weather and training environment, which includes our proximity to critical training ranges, such as the Barry M. Goldwater Range, Davis-Monthan has assisted the United States Air Force in producing proficient and professional combat pilots; and

WHEREAS, in Fiscal Year 2012, Davis-Monthan Air Force Base contributed approximately $1.1 billion to the local community, employing more than 3,300 civilians and creating nearly 4,700 jobs in the region; and

WHEREAS, Pima County voters have long supported protecting Base operations, approving a 2004 bond question in the amount of $10 million to purchase open space to reduce the threat of encroachment by protecting the departure corridor; and

WHEREAS, Pima County is in the final stages of investing $500,000 to improve the road to the new South Wilmot Gate, which was built with funds from the 2012 Commander-In-Chief's Annual Award for Installation Excellence designating Davis-Monthan as the #1 Base in the United States Air Force; and

A.3.2.1 Davis-Monthan Air Force Base Agency Coordination Responses (Continued)

WHEREAS, Davis-Monthan is a positive contributor to our environment with the recent dedication of a 16.4 megawatt solar array that is the largest of its kind on any United States Department of Defense installation; and

WHEREAS, Davis-Monthan personnel are not only contributors to our economy, they are our neighbors and friends; and

WHEREAS, the Pima County region is proud of the role Davis-Monthan plays in the defense of our country; and

WHEREAS, the Pima County Board of Supervisors is strongly committed to supporting an ongoing presence and multiple missions at Davis-Monthan to assist the broad defense objectives of the United States Department of Defense.

NOW, THEREFORE, BE IT RESOLVED that the Pima County Board of Supervisors supports Davis-Monthan Air Force Base and the A-10 mission. Additionally, if the United States Air Force transitions to another mission at Davis-Monthan, the Board of Supervisors would be fully supportive of any new mission, flying or otherwise, that could be supported by Davis-Monthan or other bases in our region.

PASSED, ADOPTED AND APPROVED by the Board of Supervisors of Pima County this 11th day of March, 2014.

Sharon Bronson

Chair, Pima County Board of Supervisors

MAR 11 2014

ATTEST:

Robin Brigode

Clerk of the Board

APPROVED AS TO FORM:

TOBIN ROSEN

Deputy County Attorney

Rcd 6/12/18

TUCSON AIRPORT AUTHORITY

May 7, 2018

Hamid Kamalpour
U.S. Air Force Civil Engineer Center (AFCEC/CZN)
2261 Hughes Ave, Suite 155
Lackland AFB, TX. 78235-9853

RE: Air Force Reserve Command (AFRC) F-35A Operations Beddown – Environmental Impact Statement

Dear Mr. Kamalpour:

The Tucson Airport Authority (TAA) received a letter dated March 22, 2018 from Ms. Raquel Fischer, Air Force Civil Engineer Center NEPA Division, indicating the U.S. Air Force (USAF) is preparing an Environmental Impact Statement (EIS) to evaluate potential environmental consequences associated with the Air Force Reserve Command (AFRC) F-35A Operational Beddown. TAA understands that Naval Air Station Fort Worth Joint Reserve Base in Texas is the preferred alternative for the Beddown, and that Davis-Monthan Air Force Base (DMAFB) in Tucson, Arizona along with bases in Florida and Missouri are considered reasonable alternatives. According to the letter, the purpose of the scoping period is to solicit comments to help effectively define the full range of environmental issues to be analyzed in the EIS.

The TAA appreciates the long-term partnership it has with DMAFB and supports the DMAFB mission in multiple ways. TAA understands that one of the Environmental Resource Areas to be evaluated in the EIS is Community Infrastructure which includes Transportation. A recent economic study found the two airports operated by TAA (Tucson International Airport and Ryan Airfield) contribute $7.4 billion in annual economic impact to southern Arizona supporting approximately 43,000 jobs paying $2.3 billion in wages. Consequently, TAA requests that the EIS not only evaluate potential impacts to Environmental Resources in and around the Tucson area, but also specifically evaluate any potential environmental and economic impacts the Beddown may have on Tucson International Airport and its surrounding neighborhoods.

Thank you for the opportunity to participate in the public portion of the EIS.

Respectfully,

Bonnie Allin

Bonnie Allin, A.A.E.,
President/CEO

cc: Mike Smejkal, Vice President of Planning and Engineering
Eric Roudebush, Director of Environmental Services
Scott Robidoux, Senior Airport Planner

7250 S. Tucson Blvd, Suite 300 Tucson, AZ 85756 Tel: 520-573-8100 Fax: 520-573-8008 www.flytucson.com

A.3.2.1 Davis-Monthan Air Force Base Agency Coordination Responses (Continued)

United States Department of the Interior

NATIONAL PARK SERVICE
INTERMOUNTAIN REGION
12795 West Alameda Parkway
P.O. Box 25287
Denver, Colorado 80225-0287

IN REPLY REFER TO:

Mr. Hamid Kamalpour
U.S. Air Force
AFCEC/ CZN
2261 Hughes Ave., Ste. 155, JBSA
Lackland AFB, Texas 78236–9853

Dear Mr. Kamalpour,

The National Park Service (NPS) has reviewed the Notice of Intent to Prepare an Environmental Impact Statement for the Air Force Reserve Command F-35A Operational Beddown Project, Pima County, Arizona. We appreciate having the opportunity to provide our initial thoughts and comments about how this project may affect units of the National Park System.

We believe that the Davis-Monthan AFB alternative under consideration has the potential to impact Saguaro National Park, specifically by the increased noise levels that F-35A's could produce in comparison to the existing aircraft operations at Davis-Monthan AFB. Increased noise levels at the park have the potential to adversely affect wilderness qualities, wildlife and park visitor experience.

We would like to work with you on the analysis of potential impacts to park resources and values associated with the Davis-Monthan AFB alternative. For example, supplemental noise metrics may be appropriate for assessment of impacts to solitude in the Saguaro Wilderness (est. 1976, Public Law 94-567). Saguaro National Park has maps, geospatial data, and information from its wilderness character assessments that can be provided to assist with the environmental analysis. In addition, an acoustics monitoring report was published in 2016 that provides useful baseline data. This report can be found here: https://irma.nps.gov/DataStore/Reference/Profile/2237307 .

We look forward to working with on this project so we can help ensure potential impacts to Saguaro National Park resources and values are identified and considered in this decision making process. Our point of contact is Scott Stonum, Chief Science and Resource Management at Saguaro National Park. He can be reached at 520-733-5170 or by email at Scott_Stonum@nps.gov.

Sincerely,

Patrick O. Walsh
Associate Regional Director, Resource Stewardship and Science

---

SIERRA CLUB

Grand Canyon Chapter • Rincon Group
738 N 5th Ave # 214 • Tucson, Arizona 85705-8400
(520) 620-6401

May 10, 2018

Mr. Hamid Kamalpour
United States Air Force, AFCEC/CZN
2261 Hughes Ave, Ste 155
Lackland AFB, TX 78236

Re: F-35A Operational Beddown EIS

Dear Mr. Kamalpour,

Thank you for providing the public with the opportunity to submit comments during scoping for the subject EIS. Please accept these comments on behalf of Sierra Club's Rincon Group, part of the Grand Canyon (Arizona) Chapter, which has more than 60,000 members and supporters throughout Arizona.

Sierra Club's mission is "to explore, enjoy, and protect the wild places of the earth; to practice and promote the responsible use of the earth's ecosystems and resources; and to educate and enlist humanity to protect and restore the quality of the natural and human environments." Our members in southern Arizona have significant interest in this proposal, which will affect many in Tucson, surrounding communities, and Pima and Yuma counties.

The Rincon Group of the Sierra Club is concerned about the Air Force's proposal to bed down a squadron of F-35s at Davis-Monthan AFB. We ask specifically that the Environmental Impact Statement include the impacts of the proposal on noise, air pollution, safety, and environmental justice.

Noise

The F-35s would replace a squadron of A-10s, which are the primary fighter craft at DMAFB. According to Air Force statistics, the F-35 is eight times as loud as the A-10. For example, at 1,000 feet AGL, the A-10 is 90 dBA while the F-35 is 121 dBA; at 5,000 feet AGL, the A-10 is 63 dBA, while the F-35 is 99 dBA.

This eight-fold increase in noise will affect the livability of many of Tucson's residential neighborhoods. Because of the current noise of A-10s and other Davis-Monthan aircraft, some neighborhoods have already been classified as "not compatible with residential use," according to the standards used by several government agencies—including the Department of Defense. With the bed down of the F-35 squadron, potentially thousands of additional homes could be classified as "not compatible with residential use."

The noise also affects schools and businesses that are in the flight path. Even with the current quieter aircraft, conversations, instruction and business meetings are sometimes interrupted because the speaker cannot be heard above the aircraft noise. This will be even more common if new aircraft are significantly louder.

Many studies have analyzed the impacts of noise on students and on property values. Previous Air Force environmental analyses of proposed DMAFB operational changes have ignored recent literature on these impacts, and have instead cited studies that are 30 and 40 years old. We ask that the current EIS carefully consider recent studies on the impacts of aircraft noise on students, property values, and health.

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A.3.2.1 Davis-Monthan Air Force Base Agency Coordination Responses (Continued)

DMAFB aircraft frequently transit between the base and the Barry M. Goldwater Air Force Range. Depending on their flight paths, the aircraft fly over a national park, at least one county park, three national monuments, four wilderness areas, and two national wildlife refuges. We ask that the EIS evaluate the impacts of F-35 noise on wildlife and on the visitor experience in these areas. For this, evaluation on the basis of DNL will be entirely inappropriate. SEL and L_{max} will provide insights into the "startle factor," which is the primary effect on humans and wildlife in these areas.

Air Pollution

We ask that the EIS make a careful analysis of the F-35's impacts on air pollution. Cumulative impacts, particularly for the metropolitan area of Tucson, must be a part of the analysis.

In the past, Tucson has been in non-attainment status for carbon monoxide, and now must adhere to a federally imposed Limited Maintenance Plan for CO. The F-35's emission of carbon monoxide will be of particular concern.

Pima County, in which DMAFB and Tucson are situated, is now at 99 percent of EPA's allowable ozone concentration of 0.070 ppm. On some days, ozone in Tucson climbs to unhealthy levels. The F-35's emission of nitrogen oxides, which are a precursor to ground level ozone, is of particular concern.

South Tucson has exceeded EPA's allowable coarse particulate concentration of 150 $\mu g/m^3$. The F-35's emission of coarse particulates should be included in the analysis.

Safety

In 1978, a DMAFB single-engine A-7 crashed sixty feet from Mansfeld Junior High, which was filled with hundreds of students. The A-7 killed two sisters, both students at the nearby University of Arizona. Following the crash, the Air Force made a commitment to the residents of Tucson that only two-engine fighter craft would be bedded at DMAFB.

The base's A-10s, which have two engines and which can fly with one engine disabled, are the aircraft with which the Air Force maintains its commitment to the safety of Tucsonans.

If the Air Force replaces A-10s with single-engine F-35s, it will renege on its commitment.

The F-35 is in the language of the aircraft industry "immature." DoD's latest Operational Test and Evaluation report refers to hundreds of "unresolved performance deficiencies," with additional problems being discovered at the rate of about twenty per month. The deficiencies range from structural problems in the airframe to errors in the millions of lines of software code, resulting in poor stability performance. ALIS is vulnerable to hacking by enemy agents or by teenagers in their bedrooms; helmet displays are "operationally unusable and potentially unsafe," according to the report.

To maintain their proficiency, pilots must fly at least 30 hours per month. They are unable to do so, though, because F-35s' availability is only 50 percent. DoD's goal is 60 percent availability but, even at that, pilots will not have the opportunity to fly sufficient hours to attain and maintain their proficiency.

As the F-35s approach and depart the runway of DMAFB, they will fly over the residential neighborhoods of midtown Tucson. The F-35s will be flawed, and their pilots will lack proficiency.

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We ask that the EIS include a thorough analysis of the safety of flying single-engine F-35s, including landings and takeoffs, over the homes of tens of thousands of residents

Environmental Justice

The noise of F-35s will have its greatest impact on the neighborhoods of Alvernon Heights, Julia Keen, Barrio Centro, and Arroyo Chico. These are low-income and minority neighborhoods. An analysis of census tracts will yield specific data regarding the ethnic and economic makeup of these and other neighborhoods impacted by F-35 noise.

Federal guidelines, including Executive Order 12898; CEQ's Guidance regarding Environmental Justice under the National Environmental Policy Act; EPA's Guidance for Incorporating Environmental Justice Concerns in EPA's NEPA Compliance Analyses; and other documents, prescribe steps to reach out to minority and low-income communities during the EIS process.

During the scoping, the Air Force appears to have disregarded those prescriptions.

The Air Force's own "Guide for Environmental Justice Analysis with the Environmental Impact Analysis Process" states, "Public outreach and advertising of the process should be directed specifically toward minority and low-income groups, as well as toward the general public, to encourage those groups to identify themselves and their concerns. This effort should...identify target groups and the channels (including non-English language where necessary) that would reach these groups."

The Air Force appears to have disregarded even its own guidelines during the scoping process.

We ask that, as the EIS process moves forward, the Air Force identify all potentially affected minority and low-income communities. Further, we ask that the Air Force fully inform the minority and low-income communities of the proposal to bed down F-35s at DMAFB, and of the F-35s' potential impacts upon their communities.

As prescribed by the federal guidelines, the minority and low-income communities should be encouraged to participate in the public comment process.

Executive Order 12898 requires an analysis of "the environmental effects, including human health, economic and social effects of the Federal actions" on the minority and low-income communities affected by the proposed action.

The EIS must include a full analysis of Environmental Justice, as prescribed by Executive Order 12898 and other federal guidelines, including the Air Force's own guidelines.

Thank you for providing us with this opportunity to comment. We look forward to continuing participation in evaluation of this proposal.

Sincerely,

Meg Weesner

Meg Weesner, Chair
Sierra Club Rincon Group

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A.3.2.1 Davis-Monthan Air Force Base Agency Coordination Responses (Continued)

SAHBA
the community builder
Southern Arizona Home Builders Association

Southern Arizona Home Builders Association

2840 N. Country Club Rd.
Tucson, AZ 85716
P: 520.795.5114
F: 520.326.8665
www.sahba.org

President
David M. Godlewski

2018 Executive Officers

Chairman
Brent Davis
DR Horton

1st Vice Chairman
Tim Staring
TRS Custom Builders

2nd Vice Chairman
John Ward
KB Home

Secretary/Treasurer
Ginger Kneup
Bright Future Real Estate Research, LLC

Immediate Past Chair
Larry Hume
Accessible Home Remodeling

Affiliated With
NAHB

May 11, 2018

Mr. Hamid Kamalpour
U.S. Air Force, AFCEC/CZN
2261 Hughes Ave, Ste 155
Lackland AFB, Texas 78236-9853

Dear Mr. Kamalpour:

The Southern Arizona Home Builders Association (SAHBA) represents over 350 businesses who employ over 5,000 employees in Southern Arizona. Our community's strong support for Davis-Monthan AFB and its airmen and women would make the F-35 a welcome addition to Southern Arizona. Additionally, Southern Arizona's existing military and civilian assets would make the F-35 an easy and efficient addition for the U.S. Air Force.

Available air space, unmatched weather, and proximity to the U.S. southern border and to the Barry M. Goldwater Range make an F-35 mission in Southern Arizona a natural fit.

Tucson enjoys a stable economy and has adequate available housing (which is diverse in price point, product type and location. This would be of great benefit to the airmen and airwomen who would be needed to support an F35 mission at DM-AFB. The influx of people would further boost the housing and home improvement markets. In addition, the home building industry, particularly the construction trades, are in search of new employees to keep up with increased market activity. These jobs would be good opportunities for trailing spouses.

The direct and indirect jobs and added economic security provided by adding the F-35 mission would more than offset any possible environmental impacts on Southern Arizona.

Southern Arizona's home building industry strong supports the addition of the F-35 to Davis Monthan AFB. We encourage your strong consideration for making Southern Arizona the preferred location and future home of an F-35 reserve unit.

Sincerely,

David Godlewski
President

A.3.2.2 Davis-Monthan Air Force Base Tribal Consultation Responses

To support this EIS, the USAF consulted on a government-to-government basis with potentially affected tribes in the region of influence (ROI) for each base associated with the proposed Air Force Reserve Command (AFRC) F-35A operational beddown. The ROI includes each installation and the area surrounding the base. The following table contains a summarized list of USAF communication with tribes in the ROI for Davis-Monthan Air Force Base (AFB). All tribes listed in Table A-1 received a letter notifying the tribe of the project, as well as requesting government-to-government consultation under Section 106 of the National Historic Preservation Act (NHPA). Several tribes responded to consultation requests or coordination letters, and a brief summary of the responses is included in Table A-1.

Follow-up correspondence was conducted for tribes that did not respond to initial consultation and coordination efforts. This additional outreach included additional telephone and e-mail letter correspondence. Section 106 consultation is considered complete and Davis-Monthan AFB will continue to coordinate with interested tribes throughout the EIS process.

Table A-1. Davis-Monthan AFB Tribal Consultation

Tribe	Summary Response	NEPA Notification Letter	Section 106 Letter	Follow-Up Correspondence (email/phone calls)
Davis-Monthan AFB				
Ak-Chin Indian Community[a]	28 June 2018 letter received. Due to the location, defers to the Tohono O'odham Nation as the lead in consultation.	27 March 2018	14 June 2018	Tribal response received; no additional follow up was required.
Gila River Indian Community[a]	7 August 2018 letter indicated no traditional resources. Would like to continue to participate. Defers to the Tohono O'odham Nation as the lead in consultation.	27 March 2018	14 June 2018	Tribal response received; no additional follow up was required.
Hopi Tribe of Arizona[a]	22 June 2018 questionnaire requested a teleconference to discuss potential concerns. 14 November 2018 email response indicated agreement with the statement from Davis-Monthan AFB that no archaeological resources are in the project area and that the Hopi Tribe would be provided a copy of the Draft EIS.	27 March 2018	14 June 2018	9 November 2018, email.
Pascua Yaqui Tribe[a]	No response.	27 March 2018	14 June 2018	25 October 2018, email. 9 November 2018, email. 4 December 2018, phone.
Salt River Pima-Maricopa Indian Community of the Salt River Reservation, Arizona[a]	9 November 2018 email received. Defers to the Tohono O'odham Nation as the lead in consultation.	27 March 2018	14 June 2018	25 October 2018, email.

Table A-1. Davis-Monthan AFB Tribal Consultation (Continued)

Tribe	Summary Response	NEPA Notification Letter	Section 106 Letter	Follow-Up Correspondence (email/phone calls)
Davis-Monthan AFB				
San Carlos Apache Tribe[a]	No resources at Davis-Monthan AFB. 10 July 2018 consultation response letter indicated no interest and concurrence with report finding. No further updates required.	27 March 2018	14 June 2018	Tribal response received; no additional follow up was required.
Tohono O'odham Nation[a]	17 August 2018 memorandum received via email. No currently known archaeological, religious, or culturally significant sites in this project area. Would like to continue to receive project information.	27 March 2018	14 June 2018	Tribal response received; no additional follow up was required.
White Mountain Apache Tribe of the Fort Apache Reservation, Arizona[a]	21 June 2018 questionnaire indicated no traditional resources. Would like to continue to receive project information.	27 March 2018	14 June 2018	Tribal response received; no additional follow up was required.
Yavapai-Apache Nation of the Camp Verde Indian Reservation, Arizona[a]	20 June 2018 questionnaire requested a teleconference to discuss potential concerns. In a follow-up phone conversation on 4 January 2019, the Yavapai had no comments at the time and would like to continue to receive project information.	28 March 2018	14 June 2018	3 January 2019, phone. 4 January 2019, phone.
Fort Sill Apache Tribe of Oklahoma[a]	No response at this time.	28 March 2018	14 June 2018	25 October 2018, email. 9 November 2018, email. 4 December 2018, phone.
Jicarilla Apache Nation[a]	Per 14 November 2018 phone conversation, defers comments on projects in Arizona to the Arizona Apache Tribes.	28 March 2018	14 June 2018	25 October 2018, email. 9 November 2018, email. 14 November 2018, phone.
Mescalero Apache Tribe[a]	No response at this time.	28 March 2018	14 June 2018	25 October 2018, email. 9 November 2018, email. 14 November 2018, phone.
Tonto Apache Tribe of Arizona[a]	No response at this time.	28 March 2018	14 June 2018	25 October 2018, email. 9 November 2018, email. 14 November 2018, phone.
Pueblo of Zuni[a]	No concerns.	28 March 2018	14 June 2018	25 October 2018, email. 9 November 2018, email. 14 November 2018, phone.
Fort McDowell Yavapai Nation[a]	No response at this time.	Not applicable.	14 June 2018	25 October 2018, email. 9 November 2018, email. 14 November 2018, phone. 14 November 2018, email.

[a] Section 106 consultation is considered complete. Unless otherwise requested, tribes will continue to receive project information.
Key: NEPA = National Environmental Policy Act

A.3.2.2 Davis-Monthan Air Force Base Tribal Consultation Responses (Continued)

SECTION 106 CONSULTATION QUESTIONNAIRE

Project Name: Air Force Reserve Command (AFRC) F-35A Operational Beddown Environmental Impact Statement (EIS)

Please check the appropriate response(s) from the list below and use the back of this form or additional sheets if you wish to make comments. You may also respond via e-mail to kevin.wakefield.1@us.af.mil:

√ We have no traditional religious, cultural properties, or other interests that may be affected by the proposed project and further consultation is not required.

___ There are or may be issues of concern associated with this proposed project and we wish to be included as a Section 106 Consulting Party. We prefer:

___ Meeting with the Air Force at a tribal facility.

___ Communicating with the Air Force by scheduled teleconference.

√ We want to continue to receive project information by mail and participate in the public involvement process.

Name of designated contact for this proposed project: Mark Altaha THPO Phone: 928-338-3033

Please print email: markaltaha@wmat.us

Signed: Mark Altaha Date: June 21, 18

Additional comments or concerns may be written below or by separate attachment.

Fly overs over TCPs such as Mt. Graham,

Please mail response in provided postpaid envelope to:

Mr. Kevin Wakefield,
Davis-Monthan AFB,
Cultural Resources Manager
3775 South Fifth Street
Davis-Monthan AFB AZ 85707-3012

Or, e-mail to: kevin.wakefield.1@us.af.mil

SECTION 106 CONSULTATION QUESTIONNAIRE

Project Name: Air Force Reserve Command (AFRC) F-35A Operational Beddown Environmental Impact Statement (EIS)

Please check the appropriate response(s) from the list below and use the back of this form or additional sheets if you wish to make comments. You may also respond via e-mail to kevin.wakefield.1@us.af.mil:

___ We have no traditional religious, cultural properties, or other interests that may be affected by the proposed project and further consultation is not required.

X There are or may be issues of concern associated with this proposed project and we wish to be included as a Section 106 Consulting Party. We prefer:

___ Meeting with the Air Force at a tribal facility.

X Communicating with the Air Force by scheduled teleconference.

X We want to continue to receive project information by mail and participate in the public involvement process.

Name of designated contact for this proposed project: Gertrude Smith Phone: (928) 202-[illegible]

Please print email: Yavapaiculture@yan-tribe.org

Signed: [signature] Date: 6-20-18

Additional comments or concerns may be written below or by separate attachment:

Please mail response in provided postpaid envelope to:

Mr. Kevin Wakefield,
Davis-Monthan AFB,
Cultural Resources Manager
3775 South Fifth Street
Davis-Monthan AFB AZ 85707-3012

Or, e-mail to: kevin.wakefield.1@us.af.mil

A.3.2.2 Davis-Monthan Air Force Base Tribal Consultation Responses (Continued)

HOPI

SECTION 106 CONSULTATION QUESTIONNAIRE

Project Name: Air Force Reserve Command (AFRC) F-35A Operational Beddown Environmental Impact Statement (EIS)

Please check the appropriate response(s) from the list below and use the back of this form or additional sheets if you wish to make comments. You may also respond via e-mail to kevin.wakefield.1@us.af.mil:

___ We have no traditional religious, cultural properties, or other interests that may be affected by the proposed project and further consultation is not required.

✓ There are or may be issues of concern associated with the proposed project and we wish to be included as a Section 106 Consulting Party. We prefer:

__ Meeting with the Air Force at a tribal facility.

✓ Communicating with the Air Force by scheduled teleconference.

✓ We want to continue to receive project information by mail and participate in the public involvement process.

Name of designated contact for this proposed project:

John T [illegible] Phone: [illegible]

Please print email: [illegible]

Signed: [signature] Date: 6-22-18

Additional comments or concerns may be written below or by separate attachment:

If properties are identified that will be adversely affected please provide us with copies of the cultural resources survey report and the proposed treatment plans for review and comment

Please mail response in provided postpaid envelope to:

Mr. Kevin Wakefield,
Davis-Monthan AFB,
Cultural Resources Manager
3775 South Fifth Street
Davis-Monthan AFB AZ 85707-3012

Or, e-mail to: kevin.wakefield.1@us.af.mil

Received from Tribal Ack 08/21/18 VN
Translated 08/21/18 VN
Scanned 08/21/18 VN

SAN CARLOS APACHE TRIBE
Historic Preservation & Archaeology Department
P.O. Box 0
San Carlos Arizona 85550
Tel. (928) 475-5797, apachevern@yahoo.com

Tribal Consultation Response Letter

Date: July 10, 2018
Contact Name: Kevin Wakefield kevin.wakefield.1@us.af.mil
Company: Dept of the Air Force, 355th Fighter Wing, Davis-Monthan Air Force Base, AZ
Address: 3405 South Fifth Street, Davis-Monthan AFB AZ 85707
Project Name/#: Consult with Davis-Monthan AFB in preparing an EIS to assess the potential environmental consequences associated with the beddown of F-35A aircraft for the Air Force Reserve Command at one Air Force Installation in the continental US

Dear Sir or Madam:

Under Section 106 and 110 of the National Historic Preservation Act, we are replying to the above referenced project. Please see the appropriate marked circle, including the signatures of Vernelda Grant, Tribal Historic Preservation Officer (THPO), and the concurrence of the Chairman of the San Carlos Apache Tribe:

✓ **NO INTEREST/NO FURTHER CONSULTATION/NO FUTURE UPDATES**
We defer to the Tribe located nearest to the project area.

✓ **CONCURRENCE WITH REPORT FINDINGS & THANK YOU**

O **REQUEST ADDITIONAL INFORMATION**
I require additional information in order to provide a finding of effect for this proposed undertaking, i.e. Project description ___ Map ___ Photos ___ Other ___

O **NO EFFECT**
I have determined that there are no properties of religious and cultural significance to the San Carlos Apache Tribe that are listed on the National Register within the area of potential effect or that the proposed project will have no effect on any such properties that may be present.

O **NO ADVERSE EFFECT**
Properties of cultural and religious significance within the area of effect have been identified that are eligible for listing in the National Register for which there would be no adverse effect as a result of the proposed project.

O **ADVERSE EFFECT**
I have identified properties of cultural and religious significance within the area of potential effect that are eligible for listing in the National Register. I believe the proposed project would cause an adverse effect on these properties. Please contact the THPO for further discussion.

We were taught traditionally not to disturb the natural world in a significant way, and that to do so may cause harm to oneself or one's family. Apache resources can be best protected by managing the land to be as natural as it was in pre-1870s settlement times. Please contact the THPO, if there is a change in any portion of the project, especially if Apache cultural resources are found at any phase of planning and construction. Thank you for contacting the San Carlos Apache Tribe, your time and effort is greatly appreciated.

DIRECTOR/THPO: [signature] 08/03/18
Vernelda J. Grant, Tribal Historic Preservation Officer Date

CONCURRENCE: [signature] 8/21/18
Terry Rambler, Tribal Chairman Date

A.3.2.2 Davis-Monthan Air Force Base Tribal Consultation Responses (Continued)

SECTION 106 CONSULTATION QUESTIONNAIRE

Project Name: Air Force Reserve Command (AFRC) F-35A Operational Beddown Environmental Impact Statement (EIS)

Please check the appropriate response(s) from the list below and use the back of this form or additional sheets if you wish to make comments. You may also respond via e-mail to kevin.wakefield.1@us.af.mil:

_X_ We have no traditional religious, cultural properties, or other interests that may be affected OR that we know of at this time. by the proposed project and further consultation is not required.

____ There are or may be issues of concern associated with this proposed project and we wish to be included as a Section 106 Consulting Party. We prefer:

____ Meeting with the Air Force at a tribal facility.

____ Communicating with the Air Force by scheduled teleconference.

____ We want to continue to receive project information by mail and participate in the public involvement process.

Name of designated contact for this proposed project: Vernelda Grant Phone: (928) 475-5797

Please print email: apachevern@yahoo.com

Signed: ____ Date: 08/03/18

Additional comments or concerns may be written below or by separate attachment:

Please mail response in provided postpaid envelope to:

Mr. Kevin Wakefield,
Davis-Monthan AFB,
Cultural Resources Manager
3775 South Fifth Street
Davis-Monthan AFB AZ 85707-3012

Or, e-mail to: kevin.wakefield.1@us.af.mil

GILA RIVER INDIAN COMMUNITY
POST OFFICE BOX 2193, SACATON, AZ 85147

TRIBAL HISTORIC PRESERVATION OFFICE
(520) 562-7162
Fax: (520) 562-5083

August 7, 2018

Colonel Scott C. Campbell, Commander
Department of the Air Force
355th Fighter Wing (ACC)
3405 S. Fifth Street
Davis-Monthan Air Force Base, Arizona 85707

RE: Davis-Monthan Air Force Base Beddown of F-35A Aircraft Air Force Reserve Command (AFRC) Davis Monthan Air Force Base (DMAFB), Tucson, Arizona

Dear Colonel Campbell,

The Gila River Indian Community Tribal Historic Preservation Office (GRIC-THPO) has received your consultation letter dated June 12, 2018. The United States Air Force (USAF) is preparing an Environmental Impact Statement (EIS) assessing the environmental impacts of a proposed F-35A beddown at four different bases which include the DMAFB in Tucson, Arizona. The DMAFB is seeking information about the presence of sites with religious and cultural significance within the project area and about Tribal participation in the Section 106 consultation process regarding this proposed undertaking.

The GRIC-THPO, at this time, identifies no religious or culturally significant sites within the project area. The GRIC-THPO will continue to participate in the Section 106 consultation for this undertaking. The project area is within the ancestral lands of the Four Southern Tribes (Gila River Indian Community; Salt River Pima-Maricopa Indian Community; Ak-Chin Indian Community and the Tohono O'Odham Nation). The GRIC-THPO defers to the Tohono O'Odham Nation as lead in the consultation process.

Thank you for contacting the GRIC-THPO about this undertaking. If you have any questions please do not hesitate to contact me or Archaeological Compliance Specialist Larry Benallie, Jr. at 520-562-7162.

Respectfully,

Barnaby V. Lewis
Tribal Historic Preservation Officer
Gila River Indian Community

A.3.2.2 Davis-Monthan Air Force Base Tribal Consultation Responses (Continued)

AK-CHIN INDIAN COMMUNITY
Community Government
42507 W. Peters & Nall Road • Maricopa, Arizona 85138 • Telephone: (520) 568-1000 • Fax: (520) 568-1001

June 28, 2018

CEA 17 Aug 18

Scott C. Campbell, Colonel, USAF Commander
355th Fighter Wing
3405 South Fifth St.
Davis-Monthan AFB AZ 85707

Re: United States Air Force Environmental Impact Statement (EIS) to access the potential environmental consequences associated with the beddown of F-35A aircraft for the Air Force Reserve Command (AFRC)

Dear Mr. Campbell,

The Ak-Chin Indian Community received your letter dated June 12, 2018 inviting the Ak-Chin Indian Community to participate in consultation with Davis-Monthan AFB in preparation of an Environmental Impact Statement to access the potential environment consequences associated with the beddown of F-35A aircraft for the Air Force Reserve Command (AFRC) at one Air Force installation in the United States.

At this time, due to the location of the project the Ak-Chin Indian Community will defer all comments to the Tohono O'odham Nation Tribal Historic Preservation Office located in Sells, Arizona.

If you should have any questions or concerns please contact Him-Dak Director Ms. Elaine F. Peters @ (520) 568-1350 or Cultural Resource Office at (520) 568-1365.

Sincerely,

Gabriel L. Lopez, Vice-Chairman
Ak-Chin Indian Community

From: WAKEFIELD, KEVIN L GS-11 USAF ACC 355 CES/CEIE <kevin.wakefield.1@us.af.mil>
Sent: Monday, August 27, 2018 11:00 AM
Subject: EXTERNAL: FW: F-35 EIS

Here is the consultation memo I received from the Tohono O'odham Nation.

Kevin Wakefield, GS-11, DAFC
Base Natural and Cultural Resource Manager
EIAP Program Manager
355 CES/CEIE
3775 South Fifth Street
Davis-Monthan AFB AZ 85707-3012
Email: kevin.wakefield.1@us.af.mi
DSN: 228-4035
Comm: (520) 228-4035

-----Original Message-----
From: Peter Steere [mailto:Peter.Steere@tonation-nsn.gov]
Sent: Friday, August 17, 2018 1:01 PM
To: WAKEFIELD, KEVIN L GS-11 USAF ACC 355 CES/CEIE
<kevin.wakefield.1@us.af.mil>
Subject: [Non-DoD Source] RE: F-35 EIS

MEMORANDUM

DATE: August 17, 2018

TO: David Wakefield, David-Monthan AFB, Arizona

FROM: Peter L. Steere, THPO, Tohono O'odham Nation

RE: F-35 EIS

Thank you for consulting with the Tohono O'odham Nation on the F-35 EIS Project.

The Tohono O'odham Nation does not know of any archaeological, religious or culturally significant sites in this project area.

Please keep us informed of the progress of this project.

A.3.2.2 Davis-Monthan Air Force Base Tribal Consultation Responses (Continued)

If F-35s are stationed at Davis-Monthan AFB in the future and they have flights over the Tohono O'odham Nation there will need to be further consultation and evaluation of flight paths.

-----Original Message-----
From: WAKEFIELD, KEVIN L GS-11 USAF ACC 355 CES/CEIE [mailto:kevin.wakefield.1@us.af.mil]
Sent: Wednesday, August 8, 2018 1:21 PM
To: Peter Steere
Cc: WAKEFIELD, KEVIN L GS-11 USAF ACC 355 CES/CEIE
Subject: RE: F-35 EIS

Peter, can I get a letter or email stating the position of the nation for the project that I can send up the chain so they know we are working the consultation.

Just received the letter today from the Gila River Indian Community. In their letter they stated that "The GRIC THPO, at this time, identifies no religious or culturally significant sites within the project area. The GRIC-THPO will continue to participate in the Section 106 consultation for this undertaking."

Thank you,

Kevin Wakefield, GS-11, DAFC
Base Natural and Cultural Resource Manager EIAP Program Manager
355 CES/CEIE
3775 South Fifth Street
Davis-Monthan AFB AZ 85707-3012
Email: kevin.wakefield.1@us.af.mi
DSN: 228-4035
Comm: (520) 228-4035

-----Original Message-----
From: Peter Steere [mailto:Peter.Steere@tonation-nsn.gov]
Sent: Wednesday, August 8, 2018 12:55 PM
To: WAKEFIELD, KEVIN L GS-11 USAF ACC 355 CES/CEIE <kevin.wakefield.1@us.af.mil>
Subject: [Non-DoD Source] RE: F-35 EIS

Kevin

Thanks

2

peter

-----Original Message-----
From: WAKEFIELD, KEVIN L GS-11 USAF ACC 355 CES/CEIE [mailto:kevin.wakefield.1@us.af.mil]
Sent: Tuesday, August 7, 2018 10:26 AM
To: Peter Steere
Cc: WAKEFIELD, KEVIN L GS-11 USAF ACC 355 CES/CEIE
Subject: RE: F-35 EIS

Peter, I am sending you the survey by AMRDEC, it has two volumes.

Kevin Wakefield, GS-11, DAFC
Base Natural and Cultural Resource Manager EIAP Program Manager
355 CES/CEIE
3775 South Fifth Street
Davis-Monthan AFB AZ 85707-3012
Email: kevin.wakefield.1@us.af.mi
DSN: 228-4035
Comm: (520) 228-4035

-----Original Message-----
From: Peter Steere [mailto:Peter.Steere@tonation-nsn.gov]
Sent: Monday, August 6, 2018 2:39 PM
To: WAKEFIELD, KEVIN L GS-11 USAF ACC 355 CES/CEIE <kevin.wakefield.1@us.af.mil>
Subject: [Non-DoD Source] RE: F-35 EIS

Kevin

Thanks

peter

-----Original Message-----
From: WAKEFIELD, KEVIN L GS-11 USAF ACC 355 CES/CEIE [mailto:kevin.wakefield.1@us.af.mil]
Sent: Monday, August 6, 2018 2:14 PM
To: Peter Steere
Cc: WAKEFIELD, KEVIN L GS-11 USAF ACC 355 CES/CEIE
Subject: RE: F-35 EIS

Peter., I can send you the report electronically along with the SHPO Letter. The survey is large and I only have one hard copy for our files. We have reduced the number of hard copies we require the contractor to provide along with an electronic copy and several on CD.

3

A.3.2.2 Davis-Monthan Air Force Base Tribal Consultation Responses (Continued)

Kevin Wakefield, GS-11, DAFC
Base Natural and Cultural Resource Manager EIAP Program Manager
355 CES/CEIE
3775 South Fifth Street
Davis Monthan AFB AZ 85707-3012
Email: kevin.wakefield.1@us.af.mi
DSN: 228-4035
Comm: (520) 228-4035

-----Original Message-----
From: Peter Steere [mailto:Peter.Steere@tonation-nsn.gov]
Sent: Monday, August 6, 2018 1:09 PM
To: WAKEFIELD, KEVIN L GS-11 USAF ACC 355 CES/CEIE
<kevin.wakefield.1@us.af.mil>
Subject: [Non-DoD Source] RE: F-35 EIS

Kevin

Thank you

Sounds like there are no issues here, no sites will be impacted

Please send me hard copy of cultural resources survey report and EA when completed

peter

-----Original Message-----
From: WAKEFIELD, KEVIN L GS-11 USAF ACC 355 CES/CEIE
[mailto:kevin.wakefield.1@us.af.mil]
Sent: Friday, August 3, 2018 7:43 AM
To: Peter Steere
Cc: WAKEFIELD, KEVIN L GS-11 USAF ACC 355 CES/CEIE
Subject: F-35 EIS

Morning Peter, finally got our phone message, I was locked out for two days and could not check them. The EIS Project is for the Beddown of 24 F-35s at one of four bases, Davis Monthan is just one of the bases being considered.

The buildings that will be demolished do not have basements, but we will insure that if an inadvertent discovery is made that we will stop and consult with the SHPO and the T.O.

The area were the new construction will occur have all been surveyed, the survey was conducted by SRI as part of our Section 110 responsibilities, we handed out a copy of this survey on disk at the April meeting with the tribes. If you would like a copy of the survey I can send it to you by AMRDEC file transfer system.

Kevin Wakefield, GS-11, DAFC
Base Natural and Cultural Resource Manager EIAP Program Manager
355 CES/CEIE
3775 South Fifth Street
Davis-Monthan AFB AZ 85707-3012
Email: kevin.wakefield.1@us.af.ml
DSN: 228-4035
Comm: (520) 228-4035

Original Message
From: Anton, Shane [mailto:Shane.Anton@SRPMIC-nsn.gov]
Sent: Thursday, November 8, 2018 3:37 PM
To: WAKEFIELD, KEVIN L GS-11 USAF ACC 355 CES/CEIE
<kevin.wakefield.1@us.af.mil>
Cc: Peter Steere <Peter.Steere@tonation-nsn.gov>
Subject: [Non DoD Source] RE: FOLLOW UP Salt River Pima Maricopa Indian Community: Environmental Impact Statement (EIS) Air Force Reserve Command (AFRC) F-35A Beddown Government to Government Consultation (Section 106) Davis-Monthan Air Force Base

Good afternoon Kevin:
The Salt River Pima Maricopa Indian Community recognizes the Tohono O'Odham Nation as the lead tribe in this consultation and defers and supports comments made by the Nation. Please keep us informed on all pertinent information going forward. Thank you.

Shane Anton
Cultural Preservation Program Manager
480-362-6331 office
480-457-2561 cell
shane.anton@srpmic-nsn.gov
-----Original Message-----
From: WAKEFIELD, KEVIN L GS-11 USAF ACC 355 CES/CEIE
[mailto:kevin.wakefield.1@us.af.mil]
Sent: Thursday, October 25, 2018 8:13 AM
To: Anton, Shane <Shane.Anton@SRPMIC-nsn.gov>;
Angela.Garcia-Lewis@srpmic.nsn.gov
Cc: WAKEFIELD, KEVIN L GS 11 USAF ACC 355 CES/CEIE
<kevin.wakefield.1@us.af.mil>; BREWSTER, CHRISTOPHER L GS-12 USAF ACC 355 CES/CEIE <christopher.brewster@us.af.mil>; Daues, Tom V.
<THOMAS.V.DAUES@leidos.com>; Tutterow, Brian W.
<BRIAN.W.TUTTEROW@leidos.com>
Subject: FOLLOW-UP Salt River Pima-Maricopa Indian Community: Environmental Impact Statement (EIS) Air Force Reserve Command (AFRC) F-35A Beddown Government to Government Consultation (Section 106) Davis-Monthan Air Force Base
Good morning, writing to check the status of our request for Government-to-Government Consultation for the Environmental Impact Statement (EIS) Air Force Reserve Command (AFRC) F-35A Beddown at Davis-Monthan Air Force Base (DMAFB).

A.3.2.2 Davis-Monthan Air Force Base Tribal Consultation Responses (Continued)

In our original letter (mailed out on/or about 12 June 2018) we defined the Area of Potential Effect (APE) as the areas of ground disturbance associated with construction, demolition, and renovation at Davis-Monthan AFB and the primary ranges and airspace that will be used by the F-35A pilots. The USAF does not know of any properties of religious and cultural significance within the APE. Nevertheless, we ask for your assistance in identifying such properties of which we may be unaware, particularly those that may be affected by this proposal.

We would like to move forward with the project, comments from the Salt River Pima-Maricopa Indian Community would be greatly appreciated.

Sincerely,

Kevin Wakefield, GS-11, DAFC
Base Natural and Cultural Resource Manager
EIAP Program Manager
355 CES/CEIE
3775 South Fifth Street
Davis-Monthan AFB AZ 85707-3012
Email: kevin.wakefield.1@us.af.mi
DSN: 228-4035
Comm: (520) 228-4035

2

From: Terry Morgart
To: WAKEFIELD, KEVIN L GS-11 USAF ACC 355 CES/CEIE
Subject: [Non-DoD Source] RE: Section 106 Consultation Follow up for the F-35A Operational Beddown Environmental Impact Statement (EIS)
Date: Wednesday, November 14, 2018 11:45:34 AM

104

-----Original Message-----
From: WAKEFIELD, KEVIN L GS-11 USAF ACC 355 CES/CEIE (mailto:kevin.wakefield.1@us.af.mil)
Sent: Friday, November 09, 2018 10:07 AM
To: Terry Morgart
Cc: WAKEFIELD, KEVIN L GS-11 USAF ACC 355 CES/CEIE
Subject: FW: Section 106 Consultation Follow-up for the F-35A Operational Beddown Environmental Impact Statement (EIS)

Good morning Mr. Morgart, I am following up on the Section 106 Consultation Questionnaire submitted by the Hopi Tribe.

In the questionnaire it was noted that the Hopi may have concerns associated with this proposed project. Also stated that "If prehistoric sites are identified that will be adversely effected please provide us with copies of the cultural resources survey report and any proposed treatment plans for review and comment".

To date no prehistoric sites have been identified that would be adversely effected by the action and we would like to continue with the next step of the EIS. Once the draft EIS is made available for review I will send the Hopi Nation and you a copy for review and comment.

If you have any questions please call me at (520) 228-4035.

Sincerely,

Kevin Wakefield, GS-11, DAFC
Base Natural and Cultural Resource Manager
EIAP Program Manager
355 CES/CEIE
3775 South Fifth Street
Davis-Monthan AFB AZ 85707-3012
Email: kevin.wakefield.1@us.af.mi
DSN: 228-4035
Comm: (520) 228-4035

A.3.2.3 Davis-Monthan Air Force Base NHPA Section 106 State Historic Preservation Officer (SHPO) Consultation Response

SHPO - 2018-0921 (142822)
ARIZONA STATE HISTORIC PRESERVATION OFFICE

DEPARTMENT OF THE AIR FORCE
355TH CIVIL ENGINEER SQUADRON (ACC)
DAVIS-MONTHAN AIR FORCE BASE, ARIZONA

May 11, 2018

Christopher L. Brewster, GS-12, PE, DAFC
Chief, Environmental Complaince
355 CES/CEIE
3775 South Fifth Street
Davis-Monthan AFB, AZ 85707-3012

RECEIVED
MAY 14 2018
ARIZONA STATE HISTORIC PRESERVATION OFFICE

Ms. Kathryn Leonard
State Historic Preservation Officer
Arizona State Parks
State Historic Preservation Office
1100 W. Washington Street
Phoenix, AZ 85007

Subject: Section 106 Consultation on Proposed F-35A Operational Beddown Air Force Reserve Command Environmental Impact Statement

Dear Ms. Leonard,

The U.S. Air Force (USAF) is preparing an Environmental Impact Statement (EIS) to assess the potential environmental consequences associated with implementing the Air Force Reserve Command (AFRC) F-35A Operational Beddown. Naval Air Station (NAS) Fort Worth Joint Reserve Base (JRB), Texas, has been identified as the preferred alternative for the AFRC F-35A mission. Davis-Monthan Air Force Base (AFB), Arizona, along with Homestead Air Reserve Base (ARB), Florida, and Whiteman AFB, Missouri, have been identified as reasonable alternatives for this mission.

The proposed action would base 24 F-35A Primary Aerospace Vehicles Authorized (PAA) F-35A aircraft with 2 Backup Aircraft inventory (BAI) at one of the four installations. The F-35A aircraft would replace 24 aircraft at one of the four installations. Basing the aircraft at Davis-Monthan AFB would require the construction, demolition, and renovation of facilities to accommodate the new personnel and aircraft associated with the mission. Attachments 1 and 2 identify specific facilities on Davis-Monthan AFB that are included as part of this project.

In addition to the potential effects of construction, demolition, and renovation of facilities on the base, the EIS will address aircraft operations in existing military airspace and ranges (see Attachment 3). Due to advanced electronics, the ability to engage targets at higher altitudes and speed of the aircraft, F-35A pilots would primarily use Special Use Airspace (SUA) including Military Operations Areas (MOAs), Air Traffic Control Assigned Airspace (ATCAAs) and Restricted Areas (RAs). Additional information can be found on the project website at https://WWW.AFRC-F35A-beddown.com/.

The USAF has identified the Tombstone MOA as the primary airspace to be used by AFRC F-35A pilots potentially stationed at Davis-Monthan AFB. The Barry M. Goldwater and Fort Huachuca

Agile Combat Power

Ranges would be the primary ranges used by AFRC F-35A pilots. Other airspace and ranges shown in Attachment 3 would be used on an intermittent basis and operations would be less than those currently conducted by pilots flying the A-10 aircraft.

Operations in existing airspace would include the use of defensive flare countermeasures where appropriate, lasers and supersonic flight in authorized airspace, and the use of live munitions at approved military ranges. AFRC F-35A pilots would use the existing airspace and ranges currently used by A-10 pilots but will predominantly operate at higher altitudes. Preliminary noise analysis in the primary airspace (Tombstone MOA) indicates no change in the anticipated average noise levels as a result of the proposed action. Average noise levels within the Barry M. Goldwater Range and Fort Huachuca Ranges would also remain the same.

Pursuant to 54 *U.S. Code (U.S.C.)* § 306108 (commonly referred to as Section 106 of the National Historic Preservation Act) and 36 *Code of Federal Regulations (CFR)* 800, the USAF requests to enter into Section 106 consultation regarding the proposed undertaking. Davis-Monthan AFB has defined the area of potential effects (APE) as the areas of ground disturbance associated with construction, demolition, and renovation on Davis-Monthan AFB (see Attachment 1 and 2). The APE will also include the land areas below the primary airspace and ranges (Attachment 3).

Construction APE

Attachment 1 lists the buildings proposed for demolition and renovation for this undertaking within the construction APE and the National Register of Historic Places (NRHP) eligibility for those buildings. All five buildings within the APE (Buildings 404, 1358, [illegible], 5247, and 5241) have been evaluated for NRHP eligibility and determined non-eligible.

Numerous archaeological surveys have been conducted on Davis-Monthan AFB and approximately 74 percent of the base has been evaluated for archaeological resources. Some portions of the installation underlying parking lots or other existing facilities have not been surveyed. Only one new construction project would occur in a previously undisturbed location. This project, the Squadron Operations facility, would be located on a one acre parcel near the flight line (see Attachment 2). This parcel was evaluated in a recent archaeological survey (SRI 2017) and no cultural sites were identified at this location.

All of the remaining areas proposed for construction, demolition, and renovation on Davis-Monthan AFB are located in areas with previous disturbance or development. The likelihood of significant, undisturbed archaeological resources in these areas is considered low. Therefore, Davis-Monthan AFB has determined that there are no historic properties within the construction APE.

Airspace APE

Attachment 4 lists NRHP-listed resources underlying the primary airspace and ranges that would be used by AFRC F-35A pilots for training operations. There are 42 NRHP-listed resources located under the airspace APE. The average noise levels on the ground would remain the same below the airspace over these resources, and the proposed undertaking would have no effect on the integrity or setting of the 42 historic properties under the existing airspace. Therefore, Davis-Monthan AFB has determined that there would be *no historic properties affected* under the airspace APE. Davis-Monthan AFB requests concurrence on both the APEs for this undertaking and our determination of *no historic properties affected* in both the construction APE and the airspace APE.

A.3.2.3 Davis-Monthan Air Force Base NHPA Section 106 State Historic Preservation Officer (SHPO) Consultation Response (Continued)

Please review the material enclosed and contact Mr. Kevin Wakefield, Cultural Resource Manager, at (520) 228-4035 if you have any questions. If we do not hear from you within 30 days after you receive this letter, we will assume that you concur with the APEs and the determination of no historic properties affected. We will then proceed with the National Environmental Policy Act (NEPA) process for the EIS. Should there be a decision to implement the beddown of F-35A aircraft at Davis Monthan AFB, it would be subject to the provisions of 36 *CFR* 800.13 for treating historic properties inadvertently discovered during an undertaking.

Sincerely,

Christopher L. Brewster, GS-12, PE, DAFC
Chief, Environmental Compliance

Attachments:

- Attachment 1, Facilities and Infrastructure Development Table for Davis-Monthan AFB
- Attachment 2, Davis-Monthan AFB Project Map and Construction APE
- Attachment 3, Davis-Monthan AFB Airspace Map and Airspace APE
- Attachment 4, NRHP Listed Resources Under the Airspace AP

CONCUR

6/12/18

Arizona State Historic Preservation Office

A.3.2.4 Davis-Monthan Air Force Base U.S. Fish and Wildlife Service (USFWS) Section 7 Consultation Response

From: WAKEFIELD, KEVIN L GS-11 USAF ACC 355 CES/CEIE <kevin.wakefield.1@us.af.mil>
Sent: Tuesday, June 26, 2018 11:16 AM
To: Tutterow, Brian W. [US-US]; Daues, Tom V. [US-US]; KAMALPOUR, HAMID GS-13 USAF AFMC AFCEC/CZN
Cc: BREWSTER, CHRISTOPHER L GS-12 USAF ACC 355 CES/CEIE; WAKEFIELD, KEVIN L GS-11 USAF ACC 355 CES/CEIE
Subject: EXTERNAL: FW: [Non-DoD Source] Re: [EXTERNAL] Section 7 Consultation Air Force reserve Command F-35A Operational Beddown Environmental Impact Statement (EIS)
Signed By: kevin.wakefield.1@us.af.mil

Just received this from USFWS.

Kevin Wakefield, GS-11, DAFC
Base Natural and Cultural Resource Manager
EIAP Program Manager
355 CES/CEIE
3775 South Fifth Street
Davis-Monthan AFB AZ 85707-3012
Email: kevin.wakefield.1@us.af.mi
DSN: 228-4035
Comm: (520) 228-4035

-----Original Message-----
From: Richardson, Scott [mailto:scott_richardson@fws.gov]
Sent: Tuesday, June 26, 2018 9:12 AM
To: WAKEFIELD, KEVIN L GS-11 USAF ACC 355 CES/CEIE <kevin.wakefield.1@us.af.mil>
Subject: [Non-DoD Source] Re: [EXTERNAL] Section 7 Consultation Air Force reserve Command F-35A Operational Beddown Environmental Impact Statement (EIS)

Good Morning Kevin,

Thank you for your follow-up email on June 21st. It was a helpful reminder and good summary of the process. The U.S. Fish and Wildlife Service has reviewed your letter of May 10, 2018 and we find that you have correctly applied the section 7 requirements in determining that the proposed action will not affect any species or critical habitat protected under the Endangered Species Act. We appreciate your consideration of endangered and threatened species. No further actions related to section 7 consultation are required at this time. If the proposed action or the status or distribution of listed species changes, a reconsideration of your determination may be appropriate. Thank you for your assistance with this project.

Sincerely,

1

Scott Richardson
U.S. Fish and Wildlife Service
Tucson Suboffice
(520) 6706150 x 242

On Thu, Jun 21, 2018 at 9:29 AM, WAKEFIELD, KEVIN L GS-11 USAF ACC 355 CES/CEIE <kevin.wakefield.1@us.af.mil <mailto:kevin.wakefield.1@us.af.mil> > wrote:

> Dear Mr. Spangle, In early May of this year I sent you a letter stating that the Air Force is preparing an Environmental Impact Statement (EIS) to analyze the potential environmental consequences associated with implementing the beddown of the F-35A at four bases. Davis Monthan Air Force Base in Southern Arizona is being considered as one of the alternatives, Naval Air Station (NAS) Fort Worth Joint Reserve Base (JRB), Texas, has been identified as the preferred alternative. It was stated in the letter we have made the determination that there will be No Effects to federally listed species from the proposed action.
>
> I understand that since we made the determination of "No Effects" Section 7 Consolation is not required at this time, and that in the future the USFWS may provide comments once the draft EIS and its analysis is provided. I have attached a copy of the letter that was sent.
>
> However, we would like USFW to confirm that we have applied the Section 7 requirements correctly.
>
> Thank you,
>
> Kevin Wakefield, GS-11, DAFC
> Base Natural and Cultural Resource Manager
> EIAP Program Manager
> 355 CES/CEIE
> 3775 South Fifth Street
> Davis-Monthan AFB AZ 85707-3012
> Email: kevin.wakefield.1@us.af.mil
> DSN: 228-4035
> Comm: (520) 228-4035

A.3.3 HOMESTEAD AIR RESERVE BASE AGENCY COORDINATION AND CONSULTATION RESPONSES

A.3.3.1 Homestead Air Reserve Base Agency Coordination Responses

AOPA
your freedom to fly

50 F St. NW, Suite 750
Washington, D.C. 20001

T. 202-737-7950
F. 202-273-7951

April 10, 2018

Mr. Hamid Kamalpour
United States Air Force
AFCEC/CZN
2261 Hughes Ave, Ste 155
Lackland AFB, TX 78236-9853

Re: *Notice of Intent To Prepare an Environmental Impact Statement for the Air Force Reserve Command F-35A Operational Beddown*

Dear Mr. Kamalpour,

The Aircraft Owners and Pilots Association (AOPA), the world's largest aviation membership association, submits the following comment in response to the March 22, 2018, Federal Register notice advising the public of the United States Air Force Reserve Command's (AFRC) intent to prepare an Environmental Impact Statement (EIS) for the beddown of one F-35A squadron. First, AOPA fully supports the AFRC and understands the importance of military readiness. We appreciate this opportunity to provide feedback early in the process as the AFRC identifies which installation will be the home for these aircraft. AOPA believes it is important for the AFRC to consider General Aviation users that operate in and near the Special Use Airspace (SUA) that will be utilized by this squadron. We encourage the AFRC to emphasize the selection criteria that minimizes the impact of these new aircraft on other users of the National Airspace System (NAS).

Adequate preexisting SUA should be important selection criteria

It is an important requirement for the beddown location to have currently published SUA that meets the squadron's flying requirements, and the airfield should be located in close proximity to that SUA. We fully agree with these requirements and we believe this selection criteria deserves significant consideration as creating new SUA, or expanding SUA, can be a lengthy and expensive process. Additionally, the impacts of increased SUA negatively impact other users of the NAS. SUA can increase the cost of flying and affect operational efficiency as operators may need to detour around active SUA. We encourage the AFRC to select the location that has a short-term and long-term outlook of not needing expansion of the SUA to support this squadron and the F-35A operations.

As important as not expanding SUA dimensions is, minimizing the hours of usage is equally important. The AFRC notes that there would be a change to the type of aircraft based at the selected installation; therefore, there would be a change in the mix of aircraft using the associated SUA. AOPA encourages the AFRC to pick that beddown location that has SUA that will allow the F-35As to operate within the existing published hours. The AFRC should be clear what the change in local operations tempo will be and clearly communicate what SUA changes may be necessary to accommodate those operations.

Mr. Kamalpour
April 10, 2018
Page 2 of 2

Conclusion

AOPA recognizes and fully supports the AFRC's need to train as they fight. In order to understand the effect this beddown will have on General Aviation, we request the AFRC provide detailed analysis of anticipated SUA usage. The Draft EIS should clearly state any need for SUA expansion, including physical dimensions and activation times, and the plan for how that will be accomplished in a manner to minimize the negative effects on General Aviation. We appreciate the AFRC earnestly assessing the effect these new aircraft will have on other airspace users, and we encourage the usage of selection criteria that would avoid any SUA expansion.

Thank you for reviewing our comment on this important issue. Please feel free to contact me at 202-509-9515 if you have any questions.

Sincerely,

Rune Duke
Senior Director, Airspace and Air Traffic

The Aircraft Owners and Pilots Association (AOPA) is a not-for-profit individual membership organization of General Aviation Pilots and Aircraft Owners. AOPA's mission is to effectively serve the interests of its members and establish, maintain and articulate positions of leadership to promote the economy, safety, utility, and popularity of flight in General Aviation aircraft. Representing two-thirds of all pilots in the United States, AOPA is the largest civil aviation organization in the world.

AIRCRAFT OWNERS AND PILOTS ASSOCIATION

A.3.3.1 Homestead Air Reserve Base Agency Coordination Responses (Continued)

United States Department of the Interior

FISH AND WILDLIFE SERVICE
South Florida Ecological Services Office
1339 20th Street
Vero Beach, Florida 32960

April 30, 2018

Michael Andrejko, Ph.D.
Natural Resources and Pest Management Programs Manager
29350 Westover Street, B-232
Homestead Air Reserve Base, Florida 33039-1099

Service Consultation Code: 04EF2000-2018-TA-0345
Date Received: March 26, 2018
Project: Notice of Preparation, Environmental Impact Statement for F-35A Operational Beddown
Applicant: U.S. Air Force
County: Miami-Dade

Dear Mr. Andrejko:

The U.S. Fish and Wildlife Service (Service) received the U.S. Air Force's (USAF) notice of preparation for an Environmental Impact Statement (EIS) to assess the potential environmental consequences associated with implementing the Air Force Reserve Command (AFRC) F-35A Operational Beddown. Homestead Air Reserve Base (HARB), in Florida is currently being considered an alternative for this mission. Your letter requests input in identifying any additional federally listed species, general or specific issues, or areas of concern our agency believes should be considered in the EIS. This letter is submitted pursuant to our authorities under section 7 of the Endangered Species Act of 1973, as amended (Act) (87 Stat. 884; 16 U.S.C. 1531 *et seq.*)

We reviewed your list of species acquired from our Information for Planning and Consultation (IPaC) online system, and refined during further review. We recommend considering the species identified in the recent Integrated Natural Resources Management Plan (INRMP) developed for Homestead Air Reserve Base in 2015, Table 5-1 for additional species to consider. We identified several species that were considered likely to occur on the HARB in the INRMP that were not captured within your EIS list.

Based on the description of the proposed action, installing and renovating facilities to accommodate the new personnel and aircraft, the Service believes the following topics should be considered in the EIS.

Michael Andrejko **Page 2**

1) Florida bonneted bats are known to occur on HARB, and may be roosting within one of the buildings on the installation. Avoidance of any roosting should be considered to the greatest extent practicable. Roosting habitat is believed to be limited for this species.

2) Florida bonneted bats as well as listed birds such as wood storks are known to be adversely affected by aircraft operations. An evaluation on the effects of the F-35A operations with additional analysis considering the time of operations should be conducted.

3) Pine rockland habitat, a rare habitat that supports several listed plant species, occurs on HARB. Any construction of new facilities and/or additional maintenance should avoid and minimize impacts on pine rockland habitat to the greatest extent practicable.

Thank you for your cooperation in the effort to protect fish and wildlife resources. If you have any questions regarding this project, please contact Ashleigh Blackford at 772-469-4246.

Sincerely yours,

Roxanna Hinzman
Field Supervisor
South Florida Ecological Services Office

A.3.3.1 Homestead Air Reserve Base Agency Coordination Responses (Continued)

MIAMI INTERNATIONAL AIRPORT

Miami-Dade Aviation Department
P.O. Box 025504
Miami, Florida 33102-5504
T 305-876-7000 F 305-876-0948
www.miami-airport.com

miamidade.gov

Commercial Airport:
Miami International Airport

General Aviation Airports:
Dade-Collier Training & Transition
Homestead General
Kendall-Tamiami Executive
Opa-locka Executive

May 8, 2018

Mr. Hamid Kamalpour
U.S. Air Force, AFCEC/CZN
2261 Hughes Ave, Suite 155
Lackland AFB, TX 78236-9853
Hamid.Kamalpour@us.af.mil
WWW.AFRC-35A-BEDDOWN.COM

RE: Scoping Comments for the Environmental Impact Statement (EIS) for the F35A Operational Beddown at Homestead Air Reserve Base (HARB), Florida

Dear Mr. Kamalpour:

Thank you for allowing Miami-Dade Aviation Department (MDAD) to provide scoping comments to help guide the preparation of a draft Environmental Impact Statement (DEIS) for the proposed F35A Operational Beddown at Homestead Air Reserve Base (HARB). Even though the Notice of Intent to prepare an EIS, has HARB listed as a reasonable alternative and not as the preferred alternative we offer the following scoping suggestions for the evaluation and consideration of the potential direct, indirect and cumulative environmental impacts as a result of replacing the existing fleet of F-16s currently in use at the base with the F35A:

NOISE ANALYSIS:

- Analysis and comparison of the existing conditions (2017) Noise Contours with the proposed action (2020).
- Analysis and comparison of the existing conditions (2017) Noise Contours with the no action alternative.
- Analysis and comparison of the existing conditions (2017) Noise Contours with proposed action in the future (2025 forecast year).
- Analysis and comparison of the existing conditions (2017) Noise Contours with proposed action in the future (2030 forecast year).
- Any significant noise increase of DNL of 1.5dB or more over noise sensitive land uses within the 65 dB DNL and higher should be listed and what would be the proposed mitigation measures.
- Consider adding a section on the noise footprint of the F35A compared to the F16.

Page 2
Mr. Hamid Kamalpour
Scoping Comments F35A Beddown – MDAD

FLIGHT PATHS:

- Analysis of existing flight paths and corridors used by HARB existing F-16 operations vs the proposed action flight path for the F35A and forecast years.
- The evaluation of the direct and cumulative flight path impacts that all the public use airports (MIA, X51, TMB, OPF, TNT) in close proximity to HARB will experience if any, as a result of the proposed action and future conditions.
- If HARB is selected as the preferred alternative, the resulting aircraft operations from HARB cannot infringe and/or interfere (impact) with existing and future aircraft operations form the public service airports in South Florida.
- The development of RNAV departure and arrival procedures from the ground at HARB is highly recommended.

Miami-Dade Aviation Department appreciates the opportunity and willingness of the U.S. Air Force to consider the above listed scoping comments and we look forward to the Notice of Availability of the Draft EIS for the F35A Operational Beddown.

Should you require additional information please contact me at 305-876-00464

Sincerely

Norman Hegedus, Section Chief
Aircraft Noise & Environmental Planning, General Aviation Airports & Wildlife Control

cc: Ken Pyatt, Deputy Aviation Director
Dan Agostino, Assistant Aviation Director
Lonny Craven, Division Director

A.3.3.1 Homestead Air Reserve Base Agency Coordination Responses (Continued)

DEPARTMENT OF THE AIR FORCE
UNITED STATES AIR FORCE RESERVE COMMAND

24 May 2018

Michael J. Andrejko, PhD
482 MSG/CEV
NEPA, Natural Resources and Pest Management Programs Manager
29350 Westover St., B-232
Homestead Air Reserve Base, FL 33039-1099

Ms. Virginia Fay
Assistant Regional Administrator
National Oceanic and Atmospheric Administration Southwest Regional Office
Habitat Conservation Division & Protected Resources Division
263 13th Avenue South
Saint Petersburg, FL 33701

Dear Ms. Fay,

The U.S. Air Force (USAF) is preparing an Environmental Impact Statement (EIS) to analyze the potential environmental consequences associated with implementing the Air Force Reserve Command (AFRC) F-35A Operational Beddown. Naval Air Station (NAS) Fort Worth Joint Reserve Base (JRB), Texas, has been identified as the preferred alternative for the AFRC F-35A mission. Davis-Monthan Air Force Base (AFB), Arizona; Homestead Air Reserve Base (ARB), Florida; and Whiteman AFB, Missouri, have been identified as reasonable alternatives for this mission.

Project Description

The proposed action would base 24 F-35A Primary Aerospace Vehicles Authorized (PAA) F-35A aircraft with 2 Backup Aircraft Inventory (BAI) at one of the four installations. Basing the aircraft at Homestead ARB would require the construction, demolition, and renovation of facilities to accommodate the new personnel and aircraft associated with the mission. Specific facilities on Homestead ARB that would be included as part of this project are shown on Attachments 1 and 2.

In addition to the potential effects of construction, demolition, and renovation of facilities, the EIS will address aircraft operations in existing military airspace and ranges that would primarily be used by AFRC F-35A pilots (Attachment 3). Operations in existing airspace would include the use of defensive flare countermeasures where appropriate, supersonic flight in existing authorized airspace, and the use of live munitions at existing approved military ranges. AFRC F-35A pilots would use the existing airspace and ranges currently used by F-16 pilots but would predominantly operate at higher altitudes. Preliminary analysis indicates noise levels from these operations could be slightly higher or similar to noise levels associated with existing aircraft using these areas. Increases in noise levels are not anticipated to be significant.

U.S Marine Mammal Protection Act (MMPA)

Because operations associated with the proposed action would occur in existing airspace over the Gulf of Mexico and Atlantic Ocean (Attachment 3), species protected under the MMPA will be considered in the Draft EIS analysis. Additionally, critical habitat for the West Indian manatee (*Trichechus manatus*) under the proposed airspace will be considered. Potential impacts to species protected under Section 7 of the ESA (16 United States Code [USC] §§ 1531–1544, as amended) are being coordinated through the USFWS South Florida Ecological Services Field Office.

Essential Fish Habitat

Due to the nature of the proposed action, no ground disturbing activities will occur that could affect fish species or essential fish habitat. Fish species are not anticipated to be impacted by the airspace associated with the proposed action at Homestead ARB.

Sikes Act (16 U.S.C. 670a-670o, 74 Stat. 1052)

In accordance with the Sikes Act (16 U.S.C. 670a-670o, 74 Stat. 1052) and as part of the Air Force's Environmental Impact Analysis Process (EIAP), we request your input in identifying any additional general or specific issues or areas of concern you feel should be addressed in the EIS. In the meantime, if you have any comments or questions please contact me at (786) 415-7344 or refer to the project website at https://www.AFRC-F35A-beddown.com. Thank you for your assistance.

Sincerely,

MICHAEL J. ANDREJKO, PhD
482 MSG/CEV
NEPA, Natural Resources and Pest Management Programs Manager

Attachments:

- Attachment 1, Facilities and Infrastructure Projects for the AFRC F-35A Mission at Homestead ARB
- Attachment 2, Map of Facilities and Infrastructure Projects for the AFRC F-35A Mission at Homestead ARB
- Attachment 3, Map of Airspace Associated with Homestead ARB

cc: Hamid Kamalpour, AFCEC

A.3.3.1 Homestead Air Reserve Base Agency Coordination Responses (Continued)

ATTACHMENT 1.

FACILITIES AND INFRASTRUCTURE PROJECTS FOR THE AFRC F-35A MISSION AT HOMESTEAD ARB

Facilities and Infrastructure Projects for the AFRC F-35A Mission at Homestead ARB

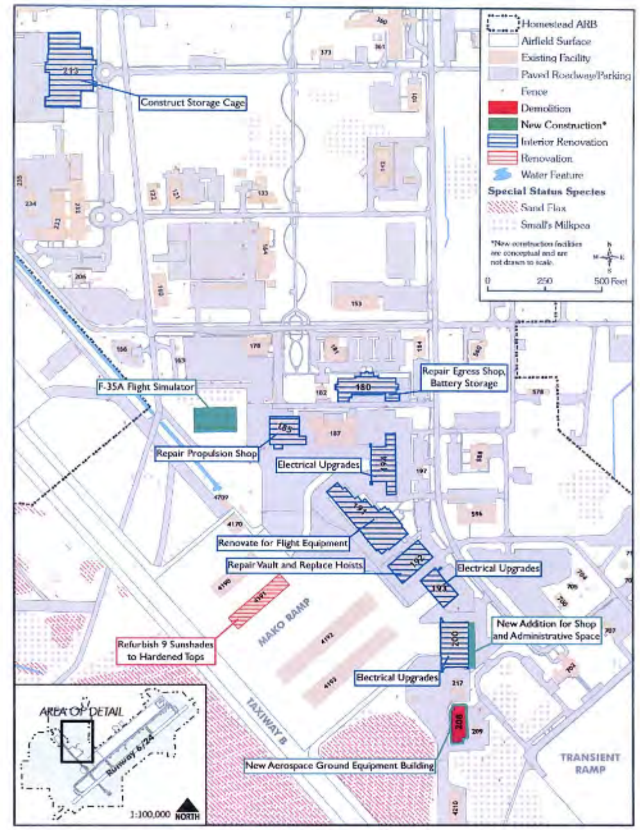
Project[a]	Size Area (ft^2)[b]
Demolition	
Building 208	8,786
Demolition Total	**8,786**
Renovation	
Building 180 repair egress shop, battery storage	500[c]
Building 185 repair propulsion shop	500[c]
Building 191 renovation for flight equipment	3,867[c]
Building 192 repair vault and replace hoists	763[c]
Building 193 electrical upgrades	NA[d]
Building 194 electrical upgrades	NA[d]
Building 200 electrical upgrades and new addition for shop and administrative space	5,050
Building 213 construct storage cage	500[c]
Renovation Total	**11,180**
New Construction	
Construct an aerospace ground equipment building	9,821
Construct an F-35A flight simulator building	13,650
New Construction Total	**23,471**

[a] Data in this table were obtained from AFRC in 2017.
[b] Size is the area covered by the footprint of the proposed facilities and consists of the designed limits of the structure, facility, apron, road, access, and/or parking lot.
[c] Interior renovation only.
[d] Includes minor interior upgrade projects that do not have a square footage.

A.3.3.1 Homestead Air Reserve Base Agency Coordination Responses (Continued)

ATTACHMENT 2.

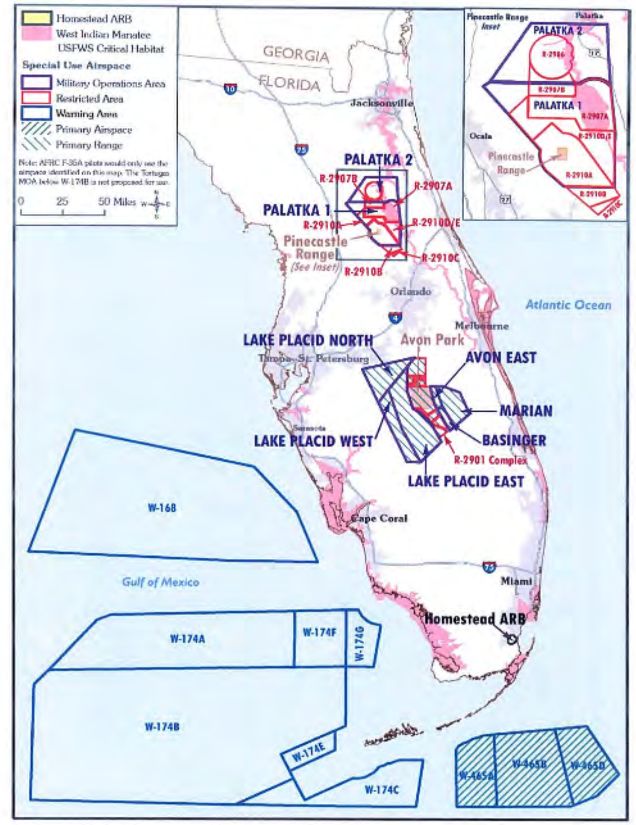
MAP OF FACILITIES AND INFRASTRUCTURE PROJECTS FOR THE AFRC F-35A MISSION AT HOMESTEAD ARB



A.3.3.1 Homestead Air Reserve Base Agency Coordination Responses (Continued)

ATTACHMENT 3.

MAP OF AIRSPACE ASSOCIATED WITH HOMESTEAD ARB



A.3.3.1 Homestead Air Reserve Base Agency Coordination Responses (Continued)

From: Virginia Fay - NOAA Federal [mailto:virginia.fay@noaa.gov]
Sent: Monday, July 16, 2018 10:03 AM
To: Rauch, Sarah B. [US-US]
Cc: Daues, Tom V. [US-US]
Subject: EXTERNAL: Re: Air Force Reserve Command (AFRC) F-35 Environmental Impact Statement (EIS)

Hi Sarah -

I believe Noah called you last Thursday or Friday. Generally, our process is to review the DEIS when it is out for public comment. That said - I'll send your email to Noah and check if he did call.

Thx
Ginny

On Mon, Jul 16, 2018 at 10:25 AM, Rauch, Sarah B. <SARAH.E.BRESNAN@leidos.com> wrote:

Leidos Proprietary

Good morning Ms. Fay,

We last spoke on the phone July 2nd regarding your office's receipt of the attached letter. I wanted to follow up to see if you had a chance to speak with the NEPA coordinator regarding the Air Force Reserve Command (AFRC) F-35 Environmental Impact Statement (EIS) project. We are in the process of writing the draft EIS document and would like to incorporate any comments or concerns your office may have in regards to the proposed action. Please call or email if you have any questions, or to indicate your office has no concerns at this time.

Thank you,

Sarah Bresnan Rauch | Leidos

leidos

sarah.e.bresnan@leidos.com | leidos.com/infrastructure

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--
Ginny Fay
Assistant Regional Administrator
Habitat Conservation Division
National Marine Fisheries Service Southeast Region
263 13th Avenue South
St. Petersburg, FL 33701

Office: 727-551-5739
Cell: 727-512-6789/240-606-7786
Fax: 727-824-5300
E-mail: Virginia.Fay@noaa.gov

A.3.3.2 Homestead Air Reserve Base Tribal Consultation Responses

To support this EIS, the USAF consulted on a government-to-government basis with potentially affected tribes in the ROI for each base associated with the proposed AFRC F-35A operational beddown. The ROI includes each installation and the area surrounding the base. The following table provides a summarized list of USAF communication with tribes in the ROI for Homestead Air Reserve Base (ARB). All tribes listed in Table A-2 received a letter notifying the tribe of the project, as well as requesting government-to-government consultation under Section 106 of the NHPA. All of the tribes responded to consultation requests or coordination letters, and a brief summary of the responses is included in Table A-2. Consultation is considered complete, and Homestead ARB will continue to coordinate with interested tribes.

Table A-2. Homestead ARB Tribal Consultation

Tribe	Summary Response	NEPA Notification Letter	Section 106 Letter	Follow-Up Correspondence (email/phone calls)
Homestead ARB				
Miccosukee Tribe of Indians of Florida[a]	11 July 2018 letter with completed questionnaire. Would like to continue to receive project information.	27 March 2018	20 June 2018	Tribal response received; no additional follow up was required.
Seminole Nation of Oklahoma[a]	12 July 2018 email request for archaeological surveys and for flora and fauna lists for the affected area. 19 January 2019 follow-up email with additional information was sent.	27 March 2018	20 June 2018	Follow-up email sent on 19 January 2019.
Seminole Tribe of Florida[a]	24 January 2019, email indicated no objections to the project at this time.	27 March 2018	20 June 2018	Follow-up email sent on 19 January 2019.
Muscogee (Creek) Nation[a]	5 July 2018 letter indicated Homestead ARB is located outside of the Muscogee (Creek) Nation historic area of interest. Consultation complete; no further coordination required.	Not applicable.	20 June 2018	Tribal response received; no additional follow up was required.
Poarch Band of Creek Indians[a]	18 July 2018 letter indicated the Poarch Band of Creek Indians is unaware of any religious or culturally significant sites in the project area. Consultation complete; no further coordination required.	Not applicable.	20 June 2018	Tribal response received; no additional follow up was required.

[a] Section 106 consultation is considered complete. Unless otherwise requested, tribes will continue to receive project information.

A.3.3.2 Homestead Air Reserve Base Tribal Consultation Responses (Continued)

THE
MUSCOGEE (CREEK) NATION

Historic and Cultural Preservation Department
PO Box 580 | Okmulgee, OK 74447
T 918.732-7733 | F 918.758-0649

JAMES R. FLOYD
PRINCIPAL CHIEF
LOUIS A. HICKS
SECOND CHIEF

July 05, 2018

Michael J. Andrejko, PhD
482 MSG/CEV
29350 Westover St., Bldg. 232
Homestead Air Reserve Base, Florida 33039-1099

RE: Proposed F-35A Operational Beddown – Air Force Reserve Command Environmental Impact Statement for Homestead Air Reserve Base (ARB)

Dear Mr. Michael Andrejko,

Thank you for contacting the Muscogee (Creek) Nation concerning the proposed project associated with the beddown of F-35A aircraft for the Air Force Reserve Command (ARFC) at Homestead Air Reserve Base, Florida. After reviewing the material provided, we found that the Homestead Air Reserve Base is located outside of the Muscogee (Creek) Nation historic area of interest. We respectfully defer to the other Tribes that have been contacted. Should further information or comments be needed, please do not hesitate to contact us at (918) 732-7852 or by email at lwendt@mcn-nsn.gov.

Thank you,
Robin Soweka Jr.

Robin Soweka Jr.
Historic and Cultural Preservation Department, Technical Specialist
Muscogee (Creek) Nation
P.O. Box 580 / Okmulgee, OK 74447
T 918.732.7852
F 918.758.0649
http://www.muscogeenation-nsn.gov/

SECTION 106 CONSULTATION QUESTIONNAIRE

Project Name: Air Force Reserve Command (AFRC) F-35A Operational Beddown Environmental Impact Statement (EIS)

Please check the appropriate response(s) from the list below and use the back of this form or additional sheets if you wish to make comments. You may also respond via e-mail to michael.andrejko@us.af.mil:

_✓_ We have no traditional religious, cultural properties, or other interests that may be affected by the proposed project and further consultation is not required.

____ There are or may be issues of concern associated with this proposed project and we wish to be included as a Section 106 Consulting Party. We prefer:

____ Meeting with the Air Force at a tribal facility.

____ Communicating with the Air Force by scheduled teleconference.

____ We want to continue to receive project information by mail and participate in the public involvement process.

Name of designated contact for this proposed project:

Robin Soweka Jr. Phone: 918-732-7852

Please print email: lwendt@mcn-nsn.gov

Signed: Robin Soweka Jr. Date: 7-5-18

Additional comments or concerns may be written below or by separate attachment:

The project is located outside of our historic area of interest so no further consultation is needed

Please mail response in provided postpaid envelope to:

Mr. Michael J. Andrejko, PhD.
482 MSG/CEV.
29350 Westover St., Bldg. 232.
Homestead Air Reserve Base, FL 33039-1099
Or, e-mail to: michael.andrejko@us.af.mil

A.3.3.2 Homestead Air Reserve Base Tribal Consultation Responses (Continued)

SECTION 106 CONSULTATION QUESTIONNAIRE

Project Name: Air Force Reserve Command (AFRC) F-35A Operational Beddown Environmental Impact Statement (EIS)

Please check the appropriate response(s) from the list below and use the back of this form or additional sheets if you wish to make comments. You may also respond via e-mail to michael.andrejko@us.af.mil:

____ We have no traditional religious, cultural properties, or other interests that may be affected by the proposed project and further consultation is not required.

____ There are or may be issues of concern associated with this proposed project and we wish to be included as a Section 106 Consulting Party. We prefer:

____ Meeting with the Air Force at a tribal facility.

____ Communicating with the Air Force by scheduled teleconference.

✓ We want to continue to receive project information by mail and participate in the public involvement process.

Name of designated contact for this proposed project: FRED E. DAYHOFF Phone: 239 6954360

Please print email: N/A

Signed: Date: JULY 11, 2013

NAGPRA SEC 106 HISTORIC PRES. OFFICER MICCOSUKEE TRIBE

Additional comments or concerns may be written below or by separate attachment:

CHAIRMAN IS NO LONGER COLLEY BILLIE
CHAIRMAN IS NOW BILLY CYPRESS
IN THE FUTURE WE WILL RESPOND BY TELEPHONE
NO SIGNED AGREEMENTS

Please mail response in provided postpaid envelope to:

Mr. Michael J. Andrejko, PhD,
482 MSG/CEV,
29350 Westover St., Bldg. 232,
Homestead Air Reserve Base, FL 33039-1099
Or, e-mail to: michael.andrejko@us.af.mil

SECTION 106 CONSULTATION QUESTIONNAIRE

Project Name: Air Force Reserve Command (AFRC) F-35A Operational Beddown Environmental Impact Statement (EIS)

Please check the appropriate response(s) from the list below and use the back of this form or additional sheets if you wish to make comments. You may also respond via e-mail to michael.andrejko@us.af.mil:

____ We have no traditional religious, cultural properties, or other interests that may be affected by the proposed project and further consultation is not required.

____ There are or may be issues of concern associated with this proposed project and we wish to be included as a Section 106 Consulting Party. We prefer:

____ Meeting with the Air Force at a tribal facility.

____ Communicating with the Air Force by scheduled teleconference.

✓ We want to continue to receive project information by mail and participate in the public involvement process.

Name of designated contact for this proposed project: FRED E. DAYHOFF Phone: 239 6954360

Please print email: N/A

Signed: Date: JULY 11, 2013

NAGPRA SEC 106 HISTORIC PRES. OFFICER MICCOSUKEE TRIBE

Additional comments or concerns may be written below or by separate attachment:

CHAIRMAN IS NO LONGER COLLEY BILLIE
CHAIRMAN IS NOW BILLY CYPRESS
IN THE FUTURE WE WILL RESPOND BY TELEPHONE
NO SIGNED AGREEMENTS

Please mail response in provided postpaid envelope to:

Mr. Michael J. Andrejko, PhD,
482 MSG/CEV,
29350 Westover St., Bldg. 232,
Homestead Air Reserve Base, FL 33039-1099
Or, e-mail to: michael.andrejko@us.af.mil

A.3.3.2 Homestead Air Reserve Base Tribal Consultation Responses (Continued)

From: Theodore Isham <isham.t@sno-nsn.gov>
Sent: Thursday, July 12, 2018 12:59 PM
To: ANDREJKO, MICHAEL J GS-12 USAF AFRC 482 BCE/CEV <michael.andrejko@us.af.mil>
Subject: [Non-DoD Source] SNO Response to USAF Project at Homestead ARB for F-35A Beddown

This *Opinion* is being provided by Seminole Nation of Oklahoma's Cultural Advisor, pursuant to authority vested by the Seminole Nation of Oklahoma General Council. The Seminole Nation of Oklahoma is an independently Federally-Recognized Indian Nation headquartered in Wewoka, OK.

In keeping with the National Environmental Policy Act (NEPA)d, and Section 106 of the National Historic Preservation Act (NHPA), 36 CFR Part 800, this letter is to acknowledge that the Seminole Nation of Oklahoma has received notice of the proposed projects at the above mentioned locations.

Based on the information provided and because the potential for buried cultural resources, the proposed projects have a probability of affecting archaeological resources, some of which may be eligible for listing in the National Register of Historic Places (NRHP), even in previously disturbed land.

The Seminole Nation of Oklahoma request that the cultural surveys of the APE be delivered to the tribes who have an interest in this project.
The Seminole Nation of Oklahoma requests that ALL flora within the affected areas be listed and sent to the tribes, plus that considerations of any TCPs be addressed. Mitigation plans will be needed to address any destruction of potential TCP areas concerning traditional medicinal plants within the affected areas. Replanting of affected areas is requested to include a traditionally appropriate consideration.

We do request that if cultural or archeological resource materials are encountered at all activity cease and the Seminole Nation of Oklahoma and other appropriate agencies be contacted immediately.

Furthermore, due to the historic presence of our people in the project area, inadvertent discoveries of human remains and related NAGPRA items may occur, even in areas of existing or prior development. Should this occur we request all work cease and the Seminole Nation of Oklahoma and other appropriate agencies be immediately notified

If you have any questions, please feel free to contact me at (405) 234-5218 or by e-mail at
isham.t@sno-nsn.gov.
Thank you for your time and cooperation in this matter.

Sincerely,

Theodore Isham
Seminole Nation of Oklahoma
Historic Preservation Officer
PO Box 1498
Wewoka, Ok 74884
Phone: 405-234-5218
e-mail: isham.t@sno-nsn.gov

A.3.3.2 Homestead Air Reserve Base Tribal Consultation Responses (Continued)

POARCH BAND OF CREEK INDIANS

5811 Jack Springs Road • Atmore, Alabama 36502
Tribal Offices: (251) 368-9136 • Administrative Fax: (251) 368-4502
www.poarchcreekindians-nsn.gov

July 18, 2018

David P. Garfield, Colonel, USAF
Commander, 482d Fighter Wing
29050 Coral Sea Blvd, Bldg. 360
Homestead Air Reserve Base, FL 33039-1299
Michael.andrejko@us.af.mil

RE: PBCI 2018-06-062
Proposed F-35A Operational Beddown

Dear Mr. Garfield:

The Poarch Band of Creek Indians (PBCI) is in receipt of your correspondence regarding the preparation of an Environmental Impact Statement for the proposed beddown of F-35A aircraft for the Air Force Reserve Command (AFRC) at one Air Force installation in the continental United States. We appreciate the invitation to be included as tribal consultant for this project.

The PBCI has a vital interest in protecting its historic and cultural resources. At this time, I am currently unaware of any religious or culturally significant sites in the survey area, as this area is not within the aboriginal homelands of the PBCI. I defer to Tribes whose lineage has been affirmed for this geographical region for the required Section 106 review of potential historic and cultural resources. Tribes historically associated with the site will be better suited to provide relevant input.

Thank you for notifying us of this proposed project. I may be contacted at the THPO Office at (251)368-9136 Ext. 2532 or by email at cwhite@pci-nsn.gov.

Sincerely,

Carolyn M. White

Carolyn M. White, MSW, LICSW
Regulatory Affairs Division Director
Acting Tribal Historic Preservation Officer

cc/cmw

cc: Stephanie A. Bryan, Tribal Chair

Seeking Prosperity and Self Determination

From: Victoria Menchaca <VictoriaMenchaca@semtribe.com>
Sent: Monday, August 6, 2018 9:28 AM
To: ANDREJKO, MICHAEL J GS-12 USAF AFRC 482 BCE/CEV <michael.andrejko@us.af.mil>
Subject: [Non-DoD Source] RE: Tribal letters re proposed F-35A bed down at Homestead ARB

SEMINOLE TRIBE OF FLORIDA
TRIBAL HISTORIC PRESERVATION OFFICE
AH-TAH-THI-KI MUSEUM

TRIBAL HISTORIC PRESERVATION OFFICE

SEMINOLE TRIBE OF FLORIDA
AH-TAH-THI-KI MUSEUM

TRIBAL OFFICERS

MARCELLUS W. OSCEOLA JR.
CHAIRMAN

MITCHELL CYPRESS
VICE CHAIRMAN

LAVONNE ROSE
SECRETARY

PETER A. HAHN
TREASURER

August 06, 2018

Michael J. Andrejko, PhD
NEPA, Natural and Cultural Resources Programs Manager
482 MSG/CEV
29350 Westover St., B-232
Homestead Air Reserve Base, FL 33039-1099
Comm: 786-415-7344
DSN: 535-7344
email: michael.andrejko@us.af.mil

Subject: Homestead ARB F-35A Operational Beddown, Miami-Dade County FL
THPO #: 0031173

Dear Dr. Andrejko

Thank you for contacting the Seminole Tribe of Florida – Tribal Historic Preservation Office (STOF-THPO) regarding the Homestead ARB F-35A Operational Beddown, Miami Dade County FL. The proposed undertaking does fall within in the STOF Area of Interest. We have reviewed the documents provided and would like to provide the following feedback. We would respectfully like to request that a Cultural Resources Assessment Survey meeting the professional standards set forth in the Florida Division of Historical Resources Module 3 Guidelines for Use by Historic Preservation Professionals be conducted for any areas that have not been previously disturbed by significant construction.

Thank you and feel free to contact us with any further questions.

Respectfully,

Victoria Menchaca

A.3.3.2 Homestead Air Reserve Base Tribal Consultation Responses (Continued)

Victoria L. Menchaca, MA, Compliance Review Specialist
STOF-THPO, Compliance Review Section
30290 Josie Billie Hwy, PMB 1004
Clewiston, FL 33440
Office: 863-983-6549 ext 12216
Email: victoriamenchaca@semtribe.com
Web: www.stofthpo.com

-----Original Message-----
From: ANDREJKO, MICHAEL J GS-12 USAF AFRC 482 BCE/CEV [mailto:michael.andrejko@us.af.mil]
Sent: Tuesday, July 31, 2018 9:15 AM
To: Victoria Menchaca
Subject: RE: Tribal letters re proposed F-35A bed down at Homestead ARB

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Hi back,

Thank you for the quick response. I just wanted to ensure that any concerns the Seminole Tribe of Florida might have are adequately addressed. Government planners tend to forget sometimes that the locations and size of reservations do not always coincide with ancestral lands.

-----Original Message-----
From: Victoria Menchaca <VictoriaMenchaca@semtribe.com>
Sent: Tuesday, July 31, 2018 8:58 AM
To: ANDREJKO, MICHAEL J GS-12 USAF AFRC 482 BCE/CEV <michael.andrejko@us.af.mil>
Subject: [Non-DoD Source] RE: Tribal letters re proposed F-35A bed down at Homestead ARB

Hi,

Thank you for checking on this with us! Mr. Osceola is the Chairman for the Seminole Tribe of Florida and it is quite possible that your letter got lost somehow as his office is in Hollywood and ours is on the Big Cypress Reservation. I will take a look at the things you have attached and see if I can get an official response by the end of the week.

Thanks,

Victoria Menchaca, M.A.
Compliance Review Specialist
Seminole Tribe of Florida
Tribal Historic Preservation Office
30290 Josie Billie Hwy, PMB 1004
Clewiston, FL 33440
Tel: 863-983-6549 Ext: 12216
Email: victoriamenchaca@semtribe.com

-----Original Message-----
From: ANDREJKO, MICHAEL J GS-12 USAF AFRC 482 BCE/CEV [mailto:michael.andrejko@us.af.mil]
Sent: Tuesday, July 31, 2018 8:04 AM
To: Victoria Menchaca
Subject: Tribal letters re proposed F-35A bed down at Homestead ARB

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A.3.3.2 Homestead Air Reserve Base Tribal Consultation Responses (Continued)

From: Victoria Menchaca <VictoriaMenchaca@semtribe.com>
Sent: Thursday, January 24, 2019 4:43 PM
To: ANDREJKO, MICHAEL J GS-12 USAF AFRC 482 BCE/CEV <michael.andrejko@us.af.mil>
Subject: [Non-DoD Source] RE: Homestead ARB F-35A Operational Beddown, Miami-Dade County FL THPO #: 0031173 - Seminole Tribe of Florida

SEMINOLE TRIBE OF FLORI
TRIBAL HISTORIC PRESERVATION
AH-TAH-THI-KI MUSEUM

TRIBAL HISTORIC PRESERVATION OFFICE
SEMINOLE TRIBE OF FLORIDA
AH-TAH-THI-KI MUSEUM
30290 JOSIE BILLIE HIGHWAY
PMB 1004
CLEWISTON, FL 33440
THPO PHONE: (863) 983-6549
MUSEUM PHONE: (863) 902-1113
FAX: (863) 902-1117
THPO WEBSITE: WWW.STOFTHPO.COM
MUSEUM WEBSITE: WWW.AHTAHTHIKI.COM

January 24, 2019

Michael J. Andrejko, PhD
NEPA, Natural and Cultural Resources Programs Manager
482 MSG/CEV
29050 Westover St., B-232
Homestead Air Reserve Base, FL 33039-1099
Comm: 786-415-7344
DSN: 535-7344
E-mail: michael.andrejko@us.af.mil

Subject: Homestead ARB F-35A Operational Beddown, Miami-Dade County FL

1

THPO #: 0031173

Dear Dr. Andrejko,

Thank you for the additional information regarding the Homestead ARB F-35A Operational Beddown, Miami-Dade County FL. The proposed undertaking does fall within the STOF Area of Interest. We have reviewed the documents provided and completed our assessment pursuant to Section 106 of the National Historic Preservation Act and its implementing authority, 36 CFR 800. We have no objections to the project at this time. However, please notify us if any archaeological, historical, or burial resources are inadvertently discovered.

Respectfully,

Victoria L. Menchaca, MA, Compliance Review Specialist
STOF-THPO, Compliance Review Section
30290 Josie Billie Hwy, PMB 1004
Clewiston, FL 33440
Office: 863-983-6549 ext 12216
Email: victoriamenchaca@semtribe.com
Web: www.stofthpo.com

-----Original Message-----
From: ANDREJKO, MICHAEL J GS-12 USAF AFRC 482 BCE/CEV [mailto:michael.andrejko@us.af.mil]
Sent: Wednesday, January 16, 2019 9:05 AM
To: Victoria Menchaca
Subject: Homestead ARB F-35A Operational Beddown, Miami-Dade County FL THPO #: 0031173 - Seminole Tribe of Florida

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2

A.3.3.3 Homestead Air Reserve Base NHPA Section 106 SHPO Consultation Response

FLORIDA DEPARTMENT *of* STATE

RICK SCOTT
Governor

KEN DETZNER
Secretary of State

Dr. Michael Andrejko, PhD
482 MSG/CEV
29350 Westover Street, BLDG 232
Homestead Air Reserve Base, Florida 33039-1099

November 27, 2018

Re: DHR Project File No.: 2018-1600 / Received: November 5, 2018
Section 106 Consultation on the Proposed F-35A Operational Beddown - Air Force Reserve Command Environmental Impact Statement
Homestead Air Reserve Base, Miami-Dade County

Dear Dr. Andrejko:

The Florida State Historic Preservation Officer reviewed the referenced project in accordance with Section 106 of the *National Historic Preservation Act of 1966*, as amended, and its implementing regulations in *36 CFR Part 800: Protection of Historic Properties.*

Based on the information provided, it is the opinion of this office that Buildings 180, 185, 191, 192, 193, 194, 200, 208 and 213 do not appear to meet the criteria for listing on the *National Register* and the proposed undertaking will have no effect on historic properties. Therefore, this office concurs with your finding that the proposed undertaking will have no effect on historic properties.

Please submit final hard copies of the Florida Master Site File Historical Structure forms and digital photographs for Buildings 194, 200 and 208.

If you have any questions concerning our comments, please contact Scott Edwards, Historic Preservationist, by electronic mail *scott.edwards@dos.myflorida.com*, or at 850.245.6333 or 800.847.7278.

Sincerely,

Jason Aldridge
For

Timothy A. Parsons, Ph.D.
Director, Division of Historical Resources
and State Historic Preservation Officer

Division of Historical Resources
R.A. Gray Building • 500 South Bronough Street• Tallahassee, Florida 32399
850.245.6300 • 850.245.6436 (Fax) • FLHeritage.com

Historical Resources

A.3.3.4 Homestead Air Reserve Base USFWS Section 7 Consultation Response

United States Department of the Interior

FISH AND WILDLIFE SERVICE
South Florida Ecological Services Office
1339 20th Street
Vero Beach, Florida 32960

September 24, 2019

Colonel David A. Piffarerio
Commander, 482d Fighter Wing
29050 Coral Sea Blvd, Bldg. 360
Homestead Air Reserve Base, FL 33039-1299

Service Consultation Code: 04EF2000-2017-F-0892
Service CPA Code: 04EF2000-2016-CPA-0051
Date Received: May 7, 2018
Consultation Initiation Date: May 7, 2018
Project: Homestead Air Reserve Base - Base Operations
County: Miami-Dade

Dear Colonel Piffarerio:

The U.S. Fish and Wildlife Service (Service) has received the Department of the Air Force's (USAF) request for consultation dated May 7, 2018 for the Homestead Air Reserve Base (Homestead ARB) Ongoing and Future Military and Non-Military Operations at Homestead ARB (Project). This document transmits the Service's biological opinion based on our review of the proposed Project located in Miami-Dade, Florida and its effects on Florida bonneted bat (*Eumops floridanus*), Sand Flax (*Polygala smallii*), and Small's Milkpea (*Galactia smallii*). It also includes and summarizes our concurrences for the USAF's determinations for American Alligator (*Alligator mississippiensis*), American Crocodile (*Crocodylus acutus*), Bartram's Scrub Hairstreak Butterfly (*Strymon acis bartrami*), Blodgett's Silverbush (*Argythamnia blodgettii*), Carter's Small-flowered Flax (*Linum carteri carteri*), Eastern Indigo Snake (*Drymarchon corais couperi*), Everglades Bully (*Sideroxylon reclinatum* ssp. *austrofloridense*), Everglade Snail Kite (*Rostrhamus sociabilis plumbeus*), Florida Brickell-bush (*Brickellia mosieri*), Florida Leafwing Butterfly (*Anaea troglodyta floridalis*), Florida Prairie-clover (*Dalea carthagenensis floridana*), Least Tern (*Sterna antillarum*), Piping Plover (*Charadrius melodus*), Red Knot (*Calidris canutus rufa*), Roseate Tern (*Sterna dougallii*), Tiny Polygala (*Polygala smallii*), West Indian Manatee (*Trichechus manatus*), and Wood Stork (*Mycteria americana*). This document is submitted in accordance with section 7 of the Endangered Species Act of 1973, as amended (Act) (87 Stat. 884; 16 U.S.C. 1531 *et seq.*).

This biological opinion is based on information provided in the March 2018 Programmatic Biological Assessment for Homestead ARB (BA), emails, and other sources of information. A complete record of this consultation is on file at the South Florida Ecological Services Office in Vero Beach, Florida.

Consultation history

On February 23, 2017, the USFWS signed the Integrated Natural Resource Management Plan (INRMP) for HARB and acknowledged the protection and enhancement of natural resources using ecosystem management, consistent with the military mission on HARB in a concurrence letter. In this letter, the USFWS recommended that Homestead ARB continue to coordinate with the USFWS and initiate consultation for these base operation activities as a result of a dead Florida bonneted bat that was found on the airfield in 2015.

On October 5, 2017, a meeting was held with representatives from USAF, HARB, Leidos and USFWS at the South Florida Ecological Service Office at Vero Beach, Florida. The focus of the meeting was to discuss any open concerns not resolved through the 2016 INRMP process. During this meeting, the USAF committed to preparing a BA to initiate formal Section 7 Consultation for the proposed action.

On May 7, 2018, a Programmatic Biological Assessment dated May 2018 (prepared by Leidos Engineering, Inc.) was submitted to the Service along with a letter requesting formal consultation on the Florida bonneted bat, sand flax, and Small's milkpea.

BIOLOGICAL OPINION

This Biological Opinion provides the Service's opinion as to whether the proposed Project is likely to jeopardize the continued existence of the Florida bonneted bat (FBB), Sand Flax, and Small's Milkpea. There is no designated critical habitat for the FBB, Sand Flax, or Small's Milkpea; therefore, this Biological Opinion will not address destruction or adverse modification of critical habitat.

ANALYTICAL FRAMEWORK FOR THE JEOPARDY

Jeopardy determination

Section 7(a)(2) of the Act requires that Federal agencies ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of listed species. "Jeopardize the continued existence of" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 CFR § 402.02).

The jeopardy analysis in this Biological Opinion relies on four components: (1) the Status of the Species, which describes the range-wide condition of the species, the factors responsible for that condition, and its survival and recovery needs; (2) the Environmental Baseline, which analyzes the condition of the species in the action area, the factors responsible for that condition, and the relationship of the action area to the survival and recovery of the species; (3) the Effects of the Action, which determine the direct and indirect impacts of the proposed Federal action and the effects of any interrelated or interdependent activities on the species; and (4) the Cumulative

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A.3.3.4 Homestead Air Reserve Base USFWS Section 7 Consultation Response (Continued)

Effects, which evaluate the effects of future, non-federal activities in the action area on the species.

In accordance with policy and regulation, the jeopardy determination is made by evaluating the effects of the proposed federal action in the context of the current status of the species, taking into account any cumulative effects, to determine if implementation of the proposed action is likely to cause an appreciable reduction in the likelihood of both the survival and recovery of the species in the wild.

DESCRIPTION OF THE PROPOSED ACTION

The proposed action is anticipated to occur on Homestead ARB from 2018 to 2028. Homestead ARB is located in unincorporated southern Miami-Dade County, directly east of Ronald Reagan Turnpike on Biscayne Drive at Latitude 25.489173°and Longitude -80.396311°. The purpose of the proposed action is to implement current and future operations that include: 1) daily activities and operations and maintenance (e.g., ground maintenance and landscaping such as mowing, trimming, maintaining drainage ditches, etc., and storm water management); 2) airfield and aircraft operations (both fixed wing and rotary); 3) planned facilities demolition, renovation, development and construction to support military-related activities; and 4) natural resource management.

- *Daily Activities and Operation and Maintenance* - Similar to any small city, a variety of activities occur on the installation every day. These activities include personnel driving, walking or biking to and from buildings, working in buildings and using area roads or paths to access different buildings on the base. The Homestead ARB Security Forces and Fire Department provide security and first responder services to all areas on the installation. The BCE Squadron is responsible for the maintenance of infrastructure (sidewalks, roads, sewers, outdoor lighting), buildings (painting, tuck pointing, roof replacement, etc.) and grounds maintenance. Grounds maintenance activities include mowing, trimming, edging, operating irrigation systems, maintaining drainage ditches, pruning shrubs, hedges and other plants, removing debris and litter as necessary, removing leaves and palm fronds and conducting pest and weed control.

  Homestead ARB maintains and operates a number of facilities and conducts activities associated with operating a military installation, including but not limited to:

  - Operation and maintenance of a liquid fuel storage area (Fuel Farm) contained in two (one 20,000 gallon and one 55,000 gallon) above-ground storage tanks;
  - Collection of solid waste, and disposal primarily at the local county landfills;
  - Maintenance of the network of roads, most of which are primary or collector streets in the Administrative and Industrial Support Area;
  - Recycling Center;
  - Maintenance of a perimeter security fence and an associated road adjacent to the fence;
  - Operation of a main gate to the installation on Westover Street;
  - Oversight of a ground maintenance contract for all land maintenance activities. The contract is for the Administrative and Industrial Support Area and all other areas on base;
  - Distribution and use of electricity;
  - Distribution, storage, and use of vehicle and aircraft fuels;
  - Operation of a Hazardous Material Pharmacy; and
  - Operation of a Hazardous Waste Storage Facility.

3

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- *Airfield and Aircraft Operations* - Homestead ARB is an active Air Force Reserve base with a variety of different flying missions. The airfield and runway at Homestead ARB comprise approximately 940 acres of the installation. Homestead ARB has one bi-directional runway, Runway 06/24 that is 11,200 ft long by 300 ft wide. The approach to Runway 06 is on the southwestern side of the airfield and the approach to Runway 24 is on the northeastern side of the airfield. The Mako Ramp is located on the west side of the airfield and a substantial aircraft parking apron is located along the entire west side of the runway. Aircraft depart and land to the northeast on Runway 06 and to the southwest on Runway 24. The FANG operate F-15C aircraft out of a secure complex at the north end of the runway where they are provided ready access to the runway via a dedicated taxiway. Support facilities including the Air Traffic Control Tower, a navigational aids building, an airfield operations building, an airfield fire and rescue station, hangars, and storage buildings are located on the northwest side of the airfield.

The various tenants at Homestead ARB that fly aircraft (both fixed wing and rotary) use the airfield in slightly different ways depending on the aircraft being used and the types of operations that are being flown. Actual operations can vary somewhat depending on specific training missions or need at any given time. An operation represents a single movement or individual flight at Homestead ARB. For example, one aircraft departing and returning would represent two airfield flight operations. The following types of airfield operations occur at Homestead ARB:

Departure. This involves an aircraft taking off, and equates to one operation.
Arrival. This involves aircraft returning and landing, and equates to one operation.
Closed Patterns. A closed pattern consists of two portions, a take-off/departure and an approach/landing, which equates to two operations. The basic types of closed patterns are:
Visual Touch-and-Go. Primarily training for fixed wing aircraft this training occurs when an aircraft lands and takes off on a runway without coming to a full stop. After landing, the pilot executes another take-off with minimal delay without taxiing clear of the runway.
Ground-controlled Approach. In this training event, air traffic controllers guide pilots to practice landings under adverse conditions.

A training event at Homestead ARB might include the following operations: a departure/takeoff from the airfield; climb to altitude for additional training; practice landings (closed pattern work); and then accomplish a final landing. For aircraft conducting an assigned mission (e.g. conducting a border patrol), the operations would

A.3.3.4 Homestead Air Reserve Base USFWS Section 7 Consultation Response (Continued)

still include a takeoff and landing but differ from a training event in that the mission is usually conducted away from the airfield.

Airport traffic patterns are developed to ensure that air traffic is flown into and out of the installation safely. The simplest of these patterns is an enlarged rectangle with one of the longer legs of the rectangle lining up with the runway (Figure 1). Military aircraft use somewhat more involved patterns (Figure 2) and flight profiles to practice takeoffs and landings similar to what would occur in combat.

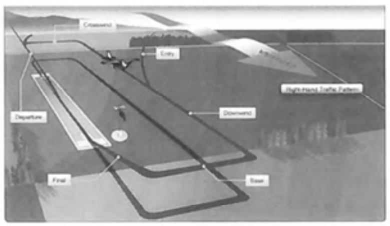

Figure 1 – Typical Aircraft Traffic Pattern

5

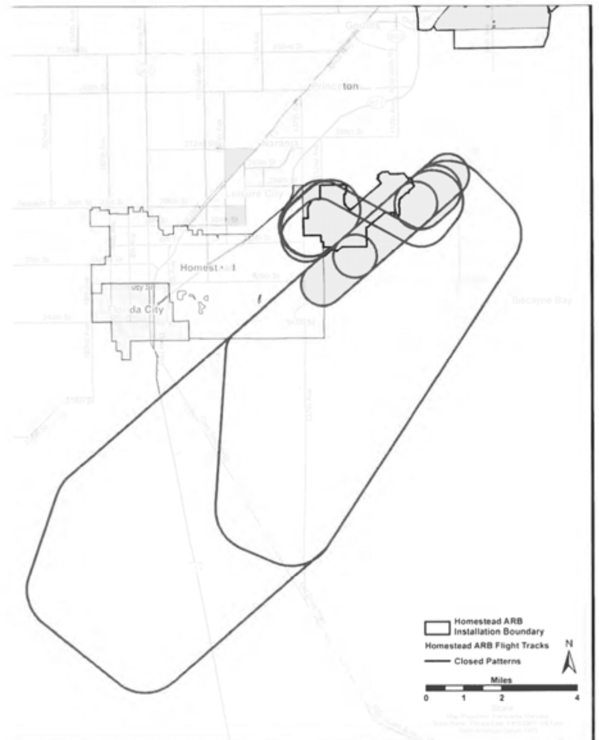

Figure 2 – Aircraft Traffic Patterns at Homestead ARB

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A.3.3.4 Homestead Air Reserve Base USFWS Section 7 Consultation Response (Continued)

The flight profile for an aircraft flying in the pattern or for aircraft flying on a flight track in the vicinity of Homestead ARB requires specific flight parameters (power settings and altitudes) for that aircraft. Figure 3-5 shows a representative flight profile for an F-16 aircraft conducting a landing approach, and Figure 3-6 shows the flight profile for an F-16 conducting a departure from the airfield.

As Figure 3-5 shows, F-16 pilots typically start their approach to Homestead ARB from the southwest to land on Runway 06. Figure 3-6 shows a typical F-16 departure with a quick "right turn" away from the installation and a rapid ascent to 20,000 ft above ground level (AGL) near the shoreline.

Rotary wing aircraft also practice departure, arrivals, and closed patterns at Homestead ARB. Rotary wing aircraft are more flexible in their approach and departure paths and have less defined flight tracks at the installation.

This PBA addresses the flight operations that occur in the vicinity of the airfield. This would include operations such as arrivals, departures, and closed patterns. Pilots operating both fixed- and rotary wing aircraft at Homestead ARB conducted 38,517 aircraft operations (i.e., any takeoff or landing) in 2017. Table 1 includes a total of these operations by organization. Transient aircraft comprise the highest number of total operations (37.9 percent), followed by the 482 FW (27.1 percent).

Table 1 - Annual Aircraft Operations by Organization at Homestead ARB

Organization	Fixed Wing Operations	Rotary Wing Operations	Total Operations	Percent of Total Operations
482 FW	10,428	0	10,428	27.1%
FANG	455	0	455	1.2%
CBP	4,380	3,242	7,622	19.8%
Golden Knights	4,608	0	4,608	12.0%
SOCSOUTH	788	0	788	2.0%
Other (transients)	13,980	636	14,616	37.9%
TOTAL	34,639	3,878	38,517	100.00%

Although Homestead ARB is open 7 days per week, the airfield closes at 11:00 P.M. every night except when weather contingencies or special exercises cause operations to occur after 11:00 P.M. The times of aircraft operations at Homestead ARB are listed in Table 2.

Table 2 - Aircraft Operation Times at Homestead

Time	Start and Stop Times	Percent of Aircraft Operations	Number of Aircraft Operations
Morning	5:00 A.M. to 9:00 A.M.	3%	1,156
Day	9:01 A.M. to 3:00 P.M.	75%	28,888
Evening	3:01 P.M. to 10:00 P.M.	20%	7,703
Night (when required)	10:01 P.M. to 4:59 A.M.	2%	770

7

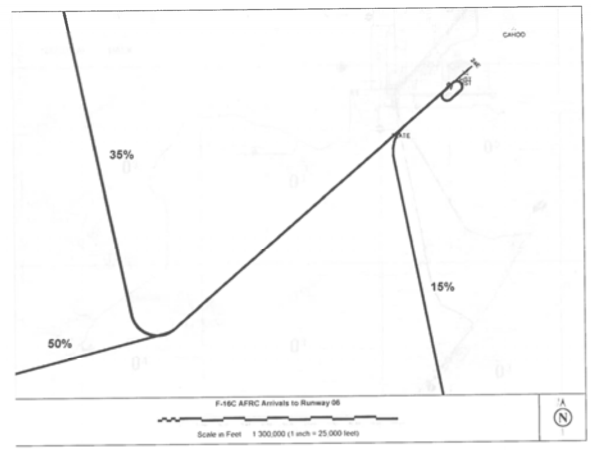

Figure 3 – Representative F-16 Arrival Flight Profile

8

A.3.3.4 Homestead Air Reserve Base USFWS Section 7 Consultation Response (Continued)

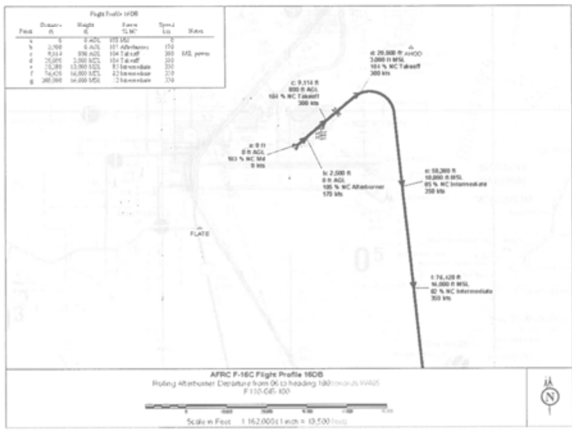

Figure 4 – Representative F-16 Departure Flight Profile

- *Planned Facilities Demolition, Renovation, Development and Construction* - Planned renovation, construction and demolition of facilities and development projects support mission-related activities. Future military construction projects normally occur throughout the installation within compatible land use areas. Facilities development projects include Military Construction (MILCON) USAF project upgrades, renovations, additions, demolitions, alterations or improvements to existing buildings. All projects completed on Homestead ARB are evaluated in the early planning stages to determine the potential effects on federally listed species.

  The future transportation plan includes the construction of a new entry control complex for which an Environmental Assessment (EA) and Biological Evaluation (BE) were recently completed. The entry control project includes road re-alignments near the new gate. In addition, the future transportation plan includes the re-alignment of Turner Road and the construction of a new parking lot with access from Westover Street.

  The Homestead ARB future land use plan primarily focuses on development on the flightline where a new F-16 hangar, a corrosion control facility, an Aerospace Ground Equipment (AGE) building and a weapons load training facility would be constructed.

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Additional projects on the flightline include a live ordnance load area (LOLA) which would include a six-ship LOLA area adjacent to taxiway Papa. In addition to the flightline facilities, the future land use plan also includes the construction of a new fitness facility, enclosing the CATM range, and constructing a Munitions Conveyer (MAC) pad in the MSA (Figure 3-7).

All future development projects are listed below and have been categorized into short-, medium-, and long-term future projects (Figure 5). Projects shown below are the current priorities for Homestead ARB. These priorities may change as some projects receive funding or as mission priorities change on the base. The projects and priorities listed below represent a snapshot of Homestead ARB's planned development at the time of this PBA.

Short-term future projects include:

- Addition to Building 200
- Construct a wash rack
- Construct a corrosion control facility
- Construct a new maintenance hangar
- Construct a weapons loading training facility
- Construct a new AGE facility
- Add a second story to Building 191
- Construct a new Privately Owned Vehicle (POV) parking lot with access from Westover Street

Medium-term future projects include:

- Addition to Building 178
- Addition to Building 180

Long-term future projects include:

- Construct a consolidated operations facility
- Re-alignment of Turner Road
- Construct a new flight simulator facility next to Building 596

In addition to construction, the future land use plan includes the demolition of Buildings 208, 700, 702, 704, 705, and 707 (Figure 5). Some of these buildings are very small and all of them have been determined to no longer be necessary for completion of the mission at Homestead ARB. Table E-1 provides a description of the buildings/structures proposed for demolition as part of the future land use plan in the IDP.

Table 3 – HARB Buildings Proposed for Demolition

Building #	Description
208	This two-story concrete frame building is an aerospace ground maintenance shop.

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A.3.3.4 Homestead Air Reserve Base USFWS Section 7 Consultation Response (Continued)

	The building has a flat roof on the main part of the structure and a pitched roof on the outer structure. Seven open bays are located at the south end of the building
700	This structure is an airfield lighting vault
702	This building is the base operations/airfield management facility
704	This structure is a small utility vault
705	This is a small backup generator building
707	This building is the aerial port training facility

11

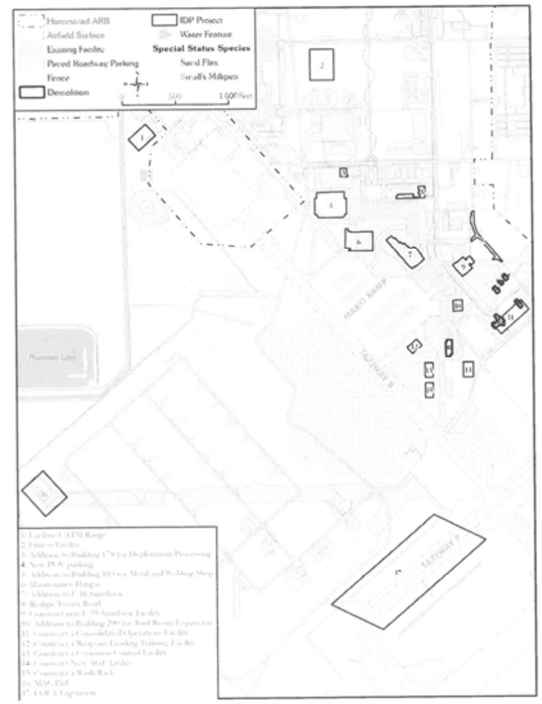

Figure 5 - Future Development Projects at Homestead ARB

- *Quality of Life Facilities for Community Support* - Community support land use includes facilities that support the individual service member and retiree with goods and services that provide aspects of Quality of Life (QOL), such as dining, AAFES, fitness center,

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A.3.3.4 Homestead Air Reserve Base USFWS Section 7 Consultation Response (Continued)

commissary, or club. Community support facilities can be classified as either commercial or service. Community commercial facilities provide goods that can be purchased or rented from an AAFES shoppette or outdoor recreation office. Community service facilities typically include facilities that provide QOL services such as the chapel, fitness center, or education center.

- *Housing* - Lodging facilities accommodate visiting service members on temporary duty or during Unit Training Assembly (UTA) weekends. Four lodging buildings (Buildings 475, 476, 477, and 478) are located at the north end of the installation adjacent to Coral Sea Boulevard. Each of these buildings is being renovated to meet USAF design guidelines. A new lodging facility (Building 401) was recently constructed on the northeast corner of Coral Sea Boulevard and St. Lo Boulevard.

- *Outdoor Recreation* - Natural resources-based outdoor recreational opportunities on Homestead ARB are limited because of the large portion of acreage that is developed and/or restricted due to safety and security requirements, including explosive safety arcs, the restricted airfield, and other restricted land for training. Hunting and fishing are not permitted on the base. There are no permitted recreational areas for off-road vehicle use. Access to the base is limited to active-duty and reserve military personnel assigned to work at the base, their dependents and accompanied guests; federal civilian employees, their dependents, and accompanied guests; and military retirees.

  There are three man-made lakes on Homestead ARB, which are managed for maintenance of a healthy, well-balanced fish and wildlife population. The 14.5-acre Phantom Lake is just north of the MSA along the western boundary of the base. A maintained unpaved road circles the lake and provides access. The Twin Lakes, also referred to as the North and South Flightline Lakes (7.7 and 8.0 acres, respectively), are southeast of the runway. Only the North Lake has a surface water connection to the Boundary Canal system.

  Although there are no bicycle paths on the installation, Homestead ARB has a unique transportation feature: a north/south spine pathway that links the administrative functions at the north end of the installation with the operations and maintenance functions at the south end. This linkage is wide enough to accommodate pedestrians, bicyclists, and electric golf carts simultaneously. The spine consists of a wide, straight golf cart path crisscrossed by a serpentine, pedestrian path. The spine is landscaped with trees to provide shade, and is lighted at night by electricity from solar collectors placed along the path.

- *Natural Resource Management* - The primary goal of the natural resources management program is to integrate the management and conservation of natural resources with the military mission and land use needs of Homestead ARB. Natural resources management practices at Homestead ARB are planned around the military mission requirement for the use of land within the installation boundary. Homestead ARB's land area is used for the military mission, a majority of which includes uses for ESQD arcs, runway primary and transitional surface zones, administrative and industrial support facilities, and airfield

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drainage. Therefore, management practices focus largely on ways to enhance the natural environment consistent with military mission requirements, including aircraft operational safety, airfield drainage, maintaining safety clearance zones, wetland management practices and initiatives, and grounds maintenance practices. Also, Homestead ARB does not sponsor or offer any opportunities for agricultural outleasing such as opportunities for livestock grazing and/or growing of crops on the property.

- Vegetation Management - Grasses and woody vegetation surrounding the airfield must be mowed and maintained to a certain height to deter nesting and foraging birds in compliance with the bird/wildlife aircraft strike hazard (BASH) program. All vegetation on the installation is managed per the requirements established in the grounds maintenance Statement of Work (SOW), the Protected Plant Management Plan (PPMP) and the Landscape Management Plan. The USAF establishes contracts with commercial landscape companies to maintain vegetation on the base. Because of the amount of vegetation required to be maintained on the installation and the complexities associated with the protected plants, Homestead ARB maintains a contract with a landscape company. One team of the contractor specifically maintains the airfield area and the MSA and the other team is responsible for maintaining the Administrative and Industrial Support Area, the canals and the perimeter fence. The grounds maintenance SOW is part of the contract and this company is required to comply with all of the requirements contained in the SOW. The grounds maintenance SOW includes a map of all mowed areas on the installation with established mowing heights to maintain the Small's milkpea and sand flax populations. The SOW identifies certain no cut areas to protect the plants and includes maintaining a mow height of 11 to 14 inches and suspending mowing activities between February and June, as long as the flying missions are not impacted. In areas where "weed whacking" occurs, heights of weed whacking have been increased to 6 inches above the ground to avoid cutting protected plants too low.

  Homestead ARB has a dedicated employee that is responsible for checking the mower height on all contractor mowers and checking the mowed vegetation heights throughout the year to maintain these populations. Regarding mowing frequencies, the airfield and the MSA area are mowed every 7 days. The Administrative and Industrial Support Area is mowed every 5 days. In addition to the airfield, MSA and Administrative and Industrial Support Areas, the contractors are required to maintain a path on the inside of the installation perimeter security fence. This path is also mowed and maintained every 14 days.

  In addition to mowing, the contractors use certain approved herbicides as described in the INRMP to reduce invasive species such as Brazilian pepper and Australian pine and maintain vegetation throughout the installation. Herbicides must be on the Armed Forces Pest Management Board (AFPMB) approved list, and the HARB-specific approved list. The contractors use an

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A.3.3.4 Homestead Air Reserve Base USFWS Section 7 Consultation Response (Continued)

airboat to spray herbicides approved for water use to maintain vegetation heights in the wetlands and canals where these areas cannot be accessed via land.

- Fire Management - Wildfire management on Homestead ARB is conducted to reduce wildfire potential, protect property, protect and enhance valuable natural resources, and promote ecosystem management goals (Homestead ARB 2009).

Three goals and objectives of the Homestead ARB WFMP include:

1. Safely and effectively protect human life and health (highest priority). The primary objective is to conduct wildland fire operations without human injury or death.
2. Protect property (both on- and off-base), with the objective of safely protecting all property and as many natural resources as practicable from wildland fire.
3. Effectively use fire as a tool to manage fuel loads and habitat when resources and environmental conditions permit.

The Chief of Fire and Emergency Services (Fire Chief) is the Wildland Fire Program Manager (WFPM) for Homestead ARB. The WFPM is authorized by the Installation Commander to certify wildland firefighter professional qualifications, and take all other actions in accordance with AFI 32-7064 and the INRMP. The WFPM can delegate this authority to one or more designees. The Wildland Fire Management organizational structure fits within the installation command structure with other Fire and Emergency Services, and is consistent with National Wildfire Coordinating Group (NWCG) Incident Command System standards.

Homestead ARB has developed or is developing regional partnerships for wildland fire management support by means of reciprocal agreements with other governmental agencies and local entities to share human, logistical, and operational resources. Emergency assistance and mutual aid agreements will conform to the guidelines stated in Department of Defense Instruction (DoDI) 6055.6, *DoD Fire and Emergency Services Certification Program,* and AFI 32-2001, *Fire Emergency Services Program*.

A Wildland Fire Management Plan (WFMP) will be developed in accordance with AFI 32-7064. The purpose of the WFMP is to reduce wildfire potential, protect property, protect and enhance valuable natural resources, and implement ecosystem management goals and objectives on Homestead ARB. The WFMP will directly support the military mission and will be consistent with installation emergency operations plans.

- Integrated Pest Management Plan - Homestead ARB maintains an Integrated Pest Management Plan (IPMP) in accordance with AFI 32-1053, *Pest*

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Management Program, which implements DoDI 4150.7, *DoD Pest Management Program.* The Homestead ARB IPMP describes pest management requirements, outlines the resources necessary for surveillance and control, and describes the administrative, safety, and environmental requirements of the program. Pests addressed in the plan include weeds and aquatic vegetation, mosquitoes, wasps, crawling insects, nesting birds, and other vertebrate pests such as mice and rats. Homestead ARB uses commercial pest control contractors to control insects, rodents, and unwanted vegetation. The U.S. Department of Agriculture (USDA) Animal and Plant Health Inspection Service (APHIS) also helps control larger wildlife at Homestead ARB. The Miami-Dade Public Works Department is contracted to control mosquitoes on Homestead ARB. Per Homestead ARB request, Miami-Dade County will bring mosquito spray vehicles on the installation to control mosquito populations. Actions addressing birds or other wildlife on or near the runway are discussed in the base's BASH program, which is contracted to the USDA-APHIS. As part of the BASH program, Homestead ARB has two employees dedicated to addressing birds or other wildlife on or near the runway. These actions are managed through a depredation permit issued by the USFWS.

Preparation and implementation of an invasive species management plan and development and implementation of an invasive species training course for Homestead ARB personnel are projects identified in the INRMP (see Chapter 8, Objectives 1.4 and 3.2). The invasive species management plan addresses initiatives to limit the spread of exotic species and to control or remove invasive species already present on-base. The training courses provide information to the appropriate Homestead ARB personnel on actions that can be taken to reduce the spread of these species.

Homestead ARB has worked with the National Park Service (NPS) on exotic plant and animal control projects, specifically eradication of golden beard grass (*Dichanthium annulatum*) and the Nile monitor lizard (*Varanus stellatus*) populations occurring on the installation. The Everglades Cooperative Invasive Species Management Area (ECISMA) aims to manage exotic species and restore the Everglades National Park. These efforts will improve habitat quality in the area, which will indirectly benefit the natural resources on Homestead ARB.

Homestead ARB recently applied for and received a special purpose permit through FFWCC to capture, hold, and relocate nuisance American alligators. The permit went into effect in July of 2014 and expires in July of 2019.

- Bird/Wildlife Aircraft Strike Hazard - Chapter 7 of AFI 91-202, *The U.S. Air Force Mishap Prevention Program,* and Air Force Pamphlet 91-212, *BASH Management Techniques,* establish procedures and guidelines for the development of the HQ 482 FW BASH Reduction Program Plan. The

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A.3.3.4 Homestead Air Reserve Base USFWS Section 7 Consultation Response (Continued)

purpose of the 482 FW BASH Plan, which is contracted to the USDA-APHIS, is to minimize aircraft exposure to potentially hazardous bird strikes or strikes with other wildlife. The plan is designed to:

- Establish procedures to identify high-hazard situations and to aid supervisors and pilots in altering/discontinuing flying operations when required;
- Establish aircraft and airfield operating procedures to avoid high-hazard conditions;
- Provide for disseminating information to all assigned and transient pilots on bird hazards and procedures for bird avoidance;
- Establish guidelines to decrease airfield attractiveness to birds;
- Provide guidelines for dispersing birds when they occur on the airfield; and
- Establish a Bird Hazard Working Group and designate responsibilities to its members.

MINIMIZATION AND CONSERVATION MEASURES

The conservation measures listed below are summarized and the details of each measure identified in this section are included in Appendix B of the BA. The proposed action will incorporate the following conservation measures to avoid, minimize, and/or compensate for direct adverse effects on federally listed and proposed species:

1. Biological Clearance Surveys and Monitoring Prior to Project Demolition, Development, Construction, and Other Mission Activities - If projects are proposed within areas that have the potential to support suitable habitat for federally listed species, one or more qualified biologist(s), approved by USFWS, will conduct surveys for federally listed species prior to project initiation. The biologist will be available as needed during building demolition, development, construction, and other mission activities.
2. Site Access Restrictions to Minimize Impacts to Sensitive Biological Resources - The project work areas will be accessed using existing roads to the extent possible. Parking, driving, lay-down, stockpiling, and vehicle and equipment storage will be limited to previously compacted and developed areas, or non-sensitive habitat areas. Limits of the demolition and construction areas will be clearly marked with flagging, fencing, or signposts and delineated in the field by a biologist. No unauthorized personnel or equipment (including off-road vehicle access) will be allowed in native habitats outside the construction limits or designated access routes. All project-related activities will occur within the designated construction boundary.
3. Environmental Education Program - All members of the action related crews will participate in an Environmental Education Program to be administered by a Homestead ARB biologist. The Education Program will be conducted during all project phases for crew personnel and will cover the potential presence of federally listed species; the requirements and boundaries of the project; the importance of complying with avoidance, minimization, and compensation measures; and problem reporting and resolution methods.
4. Minimize the Potential for Establishment of Invasive Plant and Wildlife Species - Project

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activities will minimize the potential for invasive or nuisance, exotic plant and wildlife species that may adversely affect the health of the ecosystem. The IPMP will be implemented and updated to prevent, detect and monitor invasive species as well as restore invaded habitats.
5. Avoid and Minimize Disturbance and Conserve and Protect Federally Listed Species Habitats - Disturbance to federally listed species habitat will be avoided and minimized to the extent practicable. If appropriate, prior to ground disturbance or construction activities, a site-specific Revegetation and Habitat Restoration Plan (RHRP) will be developed in consultation with USFWS. This plan would include a description of existing conditions in the action area, areas of impact, site preparation and revegetation methods, maintenance and monitoring criteria, performance standards, and adaptive management practices.
6. Develop a Landscape Management Plan and Wildfire Management Plan - A Landscape Management Plan and Wildfire Management Plan (that may incorporate the *Homestead Air Reserve Base Wildlife Management Program*) will be developed as described in the INRMP (Homestead ARB 2015), to promote environmentally sound landscaping practices, reduce water consumption and make maximum use of regionally native plants, avoid invasive and exotic species, reduce chemical use, minimize effects on natural habitats, and reduce maintenance.
7. Soil Stabilization – Where vegetation removal is required, appropriate BMPs and other measures to prevent erosion and sediment transport from projects proposed for HARB will be implemented.

Florida bonneted bat

As described in the INRMP, Homestead ARB has proposed and initiated preliminary acoustic monitoring survey that will determine presence of FBB on the installation and help identify hotspots in bat usage. This study is the initial step in establishing a continued FBB monitoring program and HARB will seek funding and partner support for routine monitoring that will provide a temporal component to FBB usage and behavior on the installation. Data obtained from all future monitoring efforts will inform HARB natural resources staff such that appropriate revisions and adjustments can be made to the existing management plans or future actions as they occur on the base.

During a site inspection it was identified that 3 of the six (Buildings 208, 700, & 702) have metal rooves that could potentially provide roosting habitat for the Florida bonneted bat. The extent of which bats maybe using these buildings as roost sites has not been investigated. In accordance with conservation measure 1 listed above, Homestead ARB will visually inspect the potential roost cavities associated with the metal rooves on buildings 208, 700, and 702 prior to the initiation of proposed demolition activities. If the surveys identify the presence of roosting bats, Homestead ARB will coordinate with the Service on how to proceed with demolition.

Sand flax and Small's milkpea

As described in the PPMP, Homestead ARB will ensure that mowing and weed whacking height recommendations are followed in areas occupied by sand flax and Small's milkpea. Height

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A.3.3.4 Homestead Air Reserve Base USFWS Section 7 Consultation Response (Continued)

recommendations were developed to ensure adequate seed propagation and dispersal to promote stable populations throughout the base. The grounds maintenance SOW identifies certain no cut areas to protect the plants and includes maintaining a mow height of 11 to 14 inches and suspending mowing activities between February and June, as long as the flying missions are not impacted.

Additionally, the PPMP states that Homestead ARB will conduct restoration efforts in the remnant pine rockland area and the grenade range to establish native pine rockland vegetation. As part of the restoration mature sand flax and Small's milkpea seeds will be collected from nearby on-site areas to be distributed within the remnant pine rockland area and grenade range.

The Homestead ARB IPMP describes pest management requirements and includes treatment of invasive exotic plants. The invasive species management plan addresses initiatives to limit the spread of exotic species and to control or remove invasive species already present on-base.

ACTION AREA

The action area for the project is defined as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action.

The action area is defined as all areas to be directly or indirectly affected by the proposed action. For the purposes of the analysis the action area encompasses Homestead ARB and immediate surrounding areas in which federally listed species may be affected by the proposed action. The biology and behavior of particular species or groups of species was used to determine the appropriate action area. The action area varies by species because the potential area for indirect impacts to non-mobile species such as plants would be smaller in scale than impacts to more mobile species such as bats or birds. For example, the action area for the Florida bonneted bat (*Eumops perotis*) and the federally listed birds includes lands that extend beyond the boundaries of the lands owned by the USAF. Thus the action area for the Florida bonneted bat and the federally listed birds was defined as the area under the 65-decibel (dB) or greater noise contour resulting from aircraft operations (Figure 6) (2007 Air Installation Compatible Use Zone [AICUZ]). In contrast, the action area for all other species carried forward is defined as the boundaries of Homestead ARB (Figure 7).

Figure 6 - Action Area for the Florida Bonneted Bat and Federally Listed Birds at Homestead ARB

A.3.3.4 Homestead Air Reserve Base USFWS Section 7 Consultation Response (Continued)

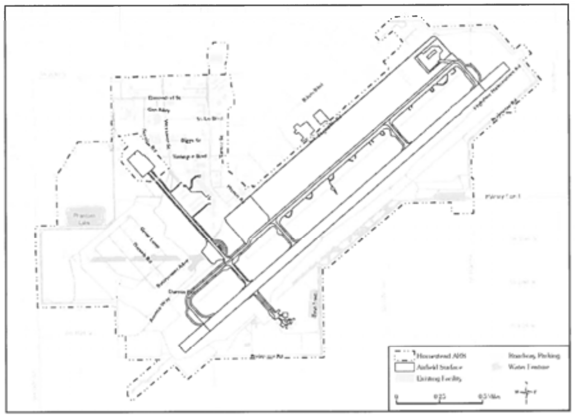

Figure 7 - Action Area for Insect and Plant Species at Homestead ARB

SPECIES NOT LIKELY TO BE ADVERSELY AFFECTED BY THE PROPOSED ACTION

Mammals

West Indian manatee - There have been observations of manatees in and near Black Creek (about 3 miles north of Homestead ARB's Military and Mowry Canals) and Convoy Point (about 2 miles south of Military Canal) near Homestead ARB. Between 1989 and 1984 there were three manatee sightings near Military Canal. Manatees have been observed in the Military Canal and travel as far as the Homestead ARB stormwater pump structure during the winter. However, the stormwater pump structure prevents manatees from accessing the base. USAF determined that due to the restricted access for manatees on the base, the proposed actions *May Affect but is not Likely to Adversely Affect* the West Indian Manatee. The Service concurs with USAF's determination that the Project may affect, but is not likely to adversely affect the West Indian manatee and no further consultation is required.

Birds

Everglades snail kite - The Everglade snail kite has rarely been observed on Homestead ARB and only for short durations. Homestead ARB is not located within the designated USFWS Everglade snail kite consultation area. Both native and non-native species of apple snails are known to occur on Homestead ARB, habitat on the base is limited and not considered high

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quality. Direct effects of construction, operation and maintenance activities within suitable foraging habitat could alter potential foraging areas for the Everglade snail kite. Avoiding and minimizing disturbance to foraging habitat (conservation measure 5) will reduce the potential for direct adverse impact to this species habitat. Permanent and temporary indirect adverse impacts could occur in activity-specific vicinities due to the presence of humans, increased noise levels, or visual disturbances. Direct adverse impacts (mortality) to the Everglade snail kite could result from aircraft strikes. Proactive management of BASH issues would continue on Homestead ARB and the BASH Plan would be followed to minimize and avoid direct adverse impacts to Everglade snail kite. Due to the infrequent occurrence of the Everglade snail kite at Homestead ARB, USAF determined that the proposed actions *May Affect but is not Likely to Adversely Affect* the Everglades snail kite. The Service concurs with USAF's determination that the Project may affect, but is not likely to adversely affect the Everglades snail kite and no further consultation is required.

Piping plover - The piping plover has not been detected to date on Homestead ARB; however potential suitable habitat is present. Construction, operation and maintenance activities could result in direct adverse impacts to foraging habitat and indirect impacts due to the introduction of invasive species. Direct adverse impacts could also occur from aircraft strikes. Avoiding and minimizing disturbance to wetlands and waterbodies (conservation measure 5) will reduce potential adverse impacts to the piping plover. Proactive management of BASH issues would continue on Homestead ARB and the BASH Plan would be followed to minimize and avoid direct adverse impacts to piping plover. USAF determined that due to the lack of detection of piping plover at HARB in spite of surveys being conducted the proposed action *May Affect but is not Likely to Adversely Affect* the Piping Plover. The Service concurs with USAF's determination that the Project may affect, but is not likely to adversely affect the piping plover and no further consultation is required.

Red knot - The rufa red knot has only been documented on Homestead ARB one time near the Hush House following a large storm that elevated water levels in the canal system. Construction, operation and maintenance activities could result in direct adverse impacts to foraging habitat and indirect impacts due to the introduction of invasive species. Direct adverse impacts could also occur from aircraft strikes. Avoiding and minimizing disturbance to rufa red knot habitat (conservation measure 5), and implementation of the BASH Plan will reduce potential adverse impacts to the rufa red knot. Due to the infrequent occurrence of the red knot at Homestead ARB, USAF determined that the proposed actions *May Affect but is not Likely to Adversely Affect* the red knot. The Service concurs with USAF's determination that the Project may affect, but is not likely to adversely affect the red knot and no further consultation is required.

Wood stork - Although Homestead ARB is located in the designated USFWS Consultation area for this species, no nesting has been reported on Homestead ARB, likely due to lack of suitable nesting habitat and human disturbance. Homestead ARB is not located with the core foraging area of any known nesting colonies, however the wood stork is known to occur in the shallow wetland areas at Homestead ARB. None of the proposed construction projects will occur in wood stork foraging habitat. Avoiding and minimizing disturbance to wood stork foraging habitat (conservation measure 5), and implementation of the BASH Plan will reduce potential adverse impacts to the wood stork. USAF determined that due to the lack of impacts to foraging

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A.3.3.4 Homestead Air Reserve Base USFWS Section 7 Consultation Response (Continued)

habitat and implementation of the BASH plan the proposed action *May Affect but is not Likely to Adversely Affect* the wood stork. The Service concurs with USAF's determination that the Project may affect, but is not likely to adversely affect the wood stork and no further consultation is required.

Least tern - The least tern occasionally stops at Homestead ARB near some of the standing water areas along Perimeter Road. The least tern has been reported to nest on the base in the past but no documentation of recent nesting activity exists. Construction, operation and maintenance activities could result in direct adverse impacts to foraging habitat and indirect impacts due to the introduction of invasive species. Direct adverse impacts could also occur from aircraft strikes. USAF determined that due to the lack of recent nesting activity and implementation of the BASH plan the proposed action *May Affect but is not Likely to Adversely Affect* the least tern. The Service concurs with USAF's determination that the Project may affect, but is not likely to adversely affect the least tern and no further consultation is required.

Roseate tern - The Roseate tern has not been detected to date on Homestead ARB though potential suitable habitat is present and they could likely occur during migration. Construction, operation and maintenance activities could result in direct adverse impacts to foraging and or nesting habitat and indirect impacts due to the introduction of invasive species. Direct adverse impacts could also occur from aircraft strikes, though unlikely to occur. Avoiding and minimizing disturbance to Roseate tern habitat (conservation measure 5), and implementation of the BASH Plan will reduce potential adverse impacts to the least tern. USAF determined that due to the lack of detection of roseate tern at HARB in spite of surveys being conducted the proposed action *May Affect but is not Likely to Adversely Affect* the roseate tern. The Service concurs with USAF's determination that the Project may affect, but is not likely to adversely affect the roseate tern and no further consultation is required.

Reptiles

American crocodile - A Caiman Removal Feasibility Study was conducted at Homestead ARB in 2012. The study identified two American crocodiles in Phantom and Twin Lakes. The canals and lakes on Homestead ARB provide habitat for the American crocodile and they can access the installation over land areas to gain access to waterbodies on Homestead ARB. Although vehicle traffic on roads and highways has the potential to directly impact this species, posted speed limits on the base do not exceed 25 mph. At these speeds, motorists would be able to slow down and avoid direct adverse impacts to this species. Indirect impacts from reduced water quality and invasive species could occur from project activities that may affect the waterways. Implementation of the SWPPP and BMPs (conservation measure 7) and minimizing disturbance to crocodile habitat (conservation measure 5), will reduce potential direct adverse impacts to the American crocodile. As such USAF determined the proposed action *May Affect but is not Likely to Adversely Affect* the American crocodile. The Service concurs with USAF's determination that the Project may affect, but is not likely to adversely affect the American crocodile and no further consultation is required.

Eastern indigo snake - The Florida Natural Areas Inventory reports indicate that indigo snakes were observed in March 1980 and in January 1981 along the Florida City Canal, approximately 2

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miles south of Homestead ARB, and an indigo snake was observed along the berm of Military Canal outside the boundaries of the base in July 1998. Suitable habitat is present along the boundary fringes of Homestead ARB. Construction, operation and maintenance activities could result in direct adverse impacts to habitat and indirect impacts due to the introduction of invasive species. Biological clearance surveys (conservation measure 1) and avoiding and minimizing disturbance to Eastern Indigo snake habitat (conservation measure 5) will reduce potential direct adverse impacts to the Eastern Indigo snake. Due to the infrequent occurrence of the Eastern indigo snake at Homestead ARB, USAF determined that the proposed actions *May Affect but is not Likely to Adversely Affect* the Eastern indigo snake. The Service concurs with USAF's determination that the Project may affect, but is not likely to adversely affect the Eastern indigo snake and no further consultation is required.

Invertebrates

Bartram's scrub hairstreak - The Bartram's scrub hairstreak has not been recorded from Homestead ARB, though their larval host plant is present in the remnant pine rocklands habitat on base. Although short-term disturbance to pine rockland habitat is anticipated in the Phantom Lake and Old Grenade Range Area, long-term beneficial impacts are anticipated to result by preserving known host plant locations and improving pine rockland habitat conditions (conservation measures 5 and 8). Furthermore, implementation of the IPMP (conservation measure 4) will reduce potential adverse impacts to the Bartram's scrub hairstreak. USAF determined that due to the lack of detection of Bartram's scrub hairstreak the proposed action *May Affect but is not Likely to Adversely Affect* the Bartram's scrub hairstreak. The Service concurs with USAF's determination that the Project may affect, but is not likely to adversely affect the Bartram's scrub hairstreak and no further consultation is required.

Florida leafwing butterfly - The Florida leafwing has not been recorded from Homestead ARB, though their larval host plant is present in the remnant pine rocklands habitat on base. Although short-term disturbance to pine rockland habitat is anticipated in the Phantom Lake and Old Grenade Range Area, long-term beneficial impacts are anticipated to result by preserving known host plant locations and improving pine rockland habitat conditions (conservation measures 5 and 8). Furthermore, implementation of the IPMP (conservation measure 4) will reduce potential adverse impacts to the Florida leafwing. USAF determined that due to the lack of detection of Florida leafwing the proposed action *May Affect but is not Likely to Adversely Affect* the Florida leafwing. The Service concurs with USAF's determination that the Project may affect, but is not likely to adversely affect the Florida leafwing and no further consultation is required.

Plants

Bodgett's silverbush, Carter's small flower flax, Everglades bully, Florida brickell-bush, Florida prairie-clover, and Tiny polygala – None of these species has been detected to date on the Homestead ARB, though potential suitable habitat exists. No direct removal or modification of pine rockland habitat provides a benefit to the all of these plant species over the long-term by preserving suitable habitat. Biological clearance surveys (conservation measure 1), protective measures for sensitive plants (conservation measure 8), minimize disturbance to habitat

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A.3.3.4 Homestead Air Reserve Base USFWS Section 7 Consultation Response (Continued)

(conservation measure 5) and reduce the potential for invasive plant species through implementation of the IPMP (conservation measure 4) will reduce potential adverse impacts to these listed plants. USAF determined that due to the lack of detection of these plants the proposed action *May Affect but is not Likely to Adversely Affect* Bodgett's silverbush, Carter's small flower flax, Everglades bully, Florida brickell-bush, Florida prairie-clover, and Tiny polygala. The Service concurs with USAF's determination that the Project may affect, but is not likely to adversely affect the Bodgett's silverbush, Carter's small flower flax, Everglades bully, Florida brickell-bush, Florida prairie-clover, and Tiny polygala and no further consultation is required.

STATUS OF THE SPECIES

Florida bonneted bat

Please see Enclosure for the Status of the Species for the Florida bonneted bat.

Summary of threats to the species

Threats to the FBB include loss of forested habitat, land use changes, land management practices involving the removal of trees with cavities, and loss of artificial structures. Loss and alteration of habitat in forested and urban areas are threats to the FBB (Belwood 1992; NatureServe 2009). In natural areas, this species may be impacted when forests are converted to other uses or when old trees with cavities are removed (Belwood 1992; NatureServe 2009). In urban settings, this species may be impacted when buildings with suitable roosts are demolished (Robson et al. 1989; NatureServe 2009) or when structures are modified to exclude bats. Small population size, restricted range, low fecundity, and few and isolated occurrences are considerable on-going threats. Other threats include direct and indirect harm by humans, competition for tree cavities, ecological light pollution, climate change and sea level rise, loss of foraging habitat, disease, routine maintenance of bridges and overpasses, and pesticides and contaminants. Threats that are relevant to this Project include land management practices involving the removal of trees with cavities, building demolition, and direct and indirect harm by humans (aircraft strikes).

Sand flax and Small's milkpea

Please see Enclosure for the Status of the Species for the sand flax and Small's milkpea.

Summary of threats to the species

Nearly all remaining populations of Small's milkpea and sand flax are threatened by development, fire suppression, road maintenance activities, exotic species and/or illegal dumping and clearing. Most threats to the species are ongoing and are considered imminent. Threats that are relevant to this Project include land development (building construction), management practices, and encroachment by invasive exotic species.

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ENVIRONMENTAL BASELINE

Florida bonneted bat

Status of the species within the action area

The FBB has one of the most restricted distributions of any species of bat in the New World, and it appears to be restricted to the southern portion of Florida, excluding the Keys. Southeast Florida (Monroe and Miami-Dade Counties) is one of four main geographic focal areas identified by the Service (2013). Within the Project action area and surrounding lands, the FBB has been recorded acoustically in Everglades National Park, Fairchild Tropical Botanical Garden, Zoo Miami, Larry and Penny Thompson Park, Martinez Preserve, and Snapper Creek Park (Service 2013). Although limited data are available on foraging and dispersal distances and home ranges for the FBB; one study using GPS-satellite tags at Babcock-Webb WMA, found that most FBB locations were within 1 mi of the roost (point of capture) (Ober 2016). However, FBBs also tended to take one longer foray, up to 7 mi, shortly after sunset each night. A second survey at Babcock-Webb WMA in 2016 tracked bats anywhere from 1 to 6 nights. Most bats took one long foray shortly after sunset each evening. The maximum distance a bat was detected from their capture site was 24 mi (Ober 2015 and 2016).

The Project site contains forested habitat types, is within a FBB focal area, and immediately adjacent to known habitat of the FBB.

Acoustic and mist net surveys were conducted between 2015 and 2016 (October 10, 2015, to May 25, 2016) at Homestead ARB. The acoustic survey results confirmed Florida bonneted bat usage of certain areas of the base for foraging. Although no Florida bonneted bats were captured and roosts were not located, the recording of bats immediately after sunset at multiple locations indicated the possibility of roosting locations, likely within one mile of the installation (Smart Sciences 2017). However, activity varied across the base. A total of 27 feeding buzzes and 76 social calls indicating both feeding and social activity were recorded. The most active foraging sites were near the Homestead ARB MSA and Former Homestead ARB property area (Smart Sciences 2017). Bats were also detected on the west side of the base near Phantom Lake and MSA, near a strangler fig tree (*Ficus aurea*), at the triple hangers (Building 779) on the SOCSOUTH parcel, as well as at the Air Base K-8 Center for International Education. The survey results suggest that there is a relatively large-sized population near Homestead ARB and that the base could contain roosts as well as foraging areas.

Factors affecting the species environment within the action area

The action area for the Florida bonneted bat includes large tracts of agriculture land used for tree farms and row crops. The most significant factor affecting the species in the action area is the air traffic into and out of the base. To date there has been two know collisions with aircraft and Florida bonneted bats on the base. Another factor affecting the species includes the potential for land use changes from agriculture lands to residential. This conversion could potentially eliminate both roosting and forage habitat for the Florida bonneted bat. A third factor affecting the Florida bonneted bat in the action area is the potential encroachment of invasive exotic

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vegetation. Invasive exotic vegetation can reduce the quality of or eliminate foraging and roosting habitat. Fortunately implementation of the IPMP at Homestead ARB has helped reduce the amount of invasive exotic plants within the action area.

Sand flax and Small's milkpea

Status of the species within the action area

In 2012 a baseline assessment of sand flax and Small's milkpea was conducted by the Institute for Regional Conservation on Homestead ARB within approximately 1000 acres of modified pine rockland habitat. Nineteen populations of sand flax were found with varying average densities; the lowest density 0.006/ m^2 and the highest 2.0/ m^2. The average density of sand flax is 0.213 ± 0.058 standard error (SE)/m^2. The population estimate for sand flax on HARB is estimated at 31,399±2,271 standard deviation (SD) plants. A total of 56 populations of Small's milkpea were mapped and quantified. Small's milkpea was found in varying quantities throughout the base with the lowest average density of 0.008/ square meter (m^2) and highest density of 3.12/ m^2. The average density is 0.379 ± 0.051 (SE)/m^2. The total population on HARB is estimated at 404,779±7,442 (SD).

Factors affecting the species environment within the action area

The action area for sand flax and Small's milkpea has been defined as the boundaries of Homestead ARB. The most important factor affecting these two plant species within the action area is loss of habitat from land development. Other factors affecting these two plants species is land management practices and encroachment of invasive exotic species. Both of these factors have the potential to reduce the quality of habitat by which sand flax and Small's milkpea depend on.

Climate Change

Our analyses under the Act include consideration of observed or likely environmental effects related to ongoing and projected changes in climate. As defined by the Intergovernmental Panel on Climate Change (IPCC), "climate" refers to average weather, typically measured in terms of the mean and variability of temperature, precipitation, or other relevant properties over time; thus "climate change" refers to a change in such a measure which persists for an extended period, typically decades or longer, due to natural conditions (e.g., solar cycles) or human-caused changes in the composition of the atmosphere or in land use (IPCC 2013, p. 1450). Detailed explanations of global climate change and examples of various observed and projected changes and associated effects and risks at the global level are provided in reports issued by the IPCC (2014 and citations therein). Information for the United States at national and regional levels is summarized in the National Climate Assessment (Melillo *et al*. 2014 entire and citations therein; see Melillo *et al.* 2014, pp.28-45 for an overview). Because observed and projected changes in climate at regional and local levels vary from global average conditions, rather than using global scale projections, we use "downscaled" projections when they are available and have been developed through appropriate scientific procedures, because such projections provide higher resolution information that is more relevant to spatial scales used for analyses of a given species

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and the conditions influencing it. (See Melillo *et al*. 2014, Appendix 3, pp. 760-763 for a discussion of climate modeling, including downscaling). In our analysis, we use our expert judgment to weigh the best scientific and commercial data available in our consideration of relevant aspects of climate change and related effects.

The effects resulting from climatic change, including sea level rise and coastal squeeze, are expected to become severe in the future and result in additional habitat losses, including the loss of roost sites and foraging habitat. Three subpopulations of the Florida bonneted bat occur in at-risk coastal locations (Gore et al. 2010), and the effects of sea level rise are expected to be a continual problem for species using coastal habitats (Saha et al. 2011). Within the species' range, low-lying areas in Collier, Lee, Miami-Dade, and Monroe Counties appear most vulnerable to inundation. Much of low-lying, coastal south Florida "will be underwater or inundated with saltwater in the coming century" (U. S. Climate Change Science Program (CCSP) 2008). This means that large portions of occupied, suitable, and potential roosting and foraging habitat for the Florida bonneted bat in low-lying areas will likely be either submerged or affected by increased flooding.

Climate change may result in sea level rise, altered weather patterns, and an increase in the intensity or frequency of tropical storms and hurricanes in Florida. The Atlantic Multi-decadal Oscillation (AMO) influences rain patterns in Florida. We are currently in an AMO wet phase that is predicted to persist through 2020 (Miller 2010). The increased rainfall associated with both of these factors could benefit the Blodgett's silverbush by increasing growth of the species. Conversely, increased rainfall could also reduce the amount of habitat suitable for sand flax and Small's milkpea by increasing the amount of lands inundated as well as the duration of inundation of seasonally wet areas. It is difficult to determine if the sand flax and Small's milkpea will be affected by climate change or exactly how it will be affected. The Service will use Strategic Habitat Conservation planning, an adaptive science-driven process that begins with explicit trust resource population objectives, as the framework for adjusting our management strategies in response to climate change (Service 2006).

EFFECTS OF THE ACTION

Adverse effects

Florida bonneted bat

Airfield and Aircraft Operations - Given the high level of bat activity, direct adverse impacts (i.e. strike) could result from aircraft operations that occur near roosting and foraging habitat including forested areas, man-made structures, wetlands and waterbodies, especially if activities were to occur during morning, evening and night when bats are typically active.

The greatest risk to the Florida bonneted bat is within an hour after sunset, at the northeast corner of the runway (near the triple hangers), Phantom Lake, Former Homestead AFB property and the Air Base K-8 Center for International Education (Smart Sciences 2017). The majority (75 percent) of aircraft operations at Homestead ARB occur during the day (Table 2-2). Of the remaining operations, 25 percent (20 percent occur in the evening [3:01 P.M. to 10:00 P.M.], 2

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A.3.3.4 Homestead Air Reserve Base USFWS Section 7 Consultation Response (Continued)

percent occur at night [10:01 P.M. to 4:59 A.M.], and 3 percent occur in the morning [5:00 A.M. to 9:00 A.M.]). Thus, because aircraft activities are planned during high risk times for bats, there is potential for aircraft operation to result in take of individuals. In 2015, one Florida bonneted bat was found dead on the airfield at Homestead ARB. Although the cause of mortality could not be determined, the autopsy report documented that the bat had suffered blunt trauma. Similarly, one Florida bonneted bat was found dead on the airfield in February 2018. There have been no other documented cases of aircraft strikes by Florida bonneted bats on Homestead ARB.

Demolition – The action plan proposes the demolition of six separate buildings on the base. During a site inspection it was identified that three of the six (Buildings 208, 700, & 702) have metal rooves that could potentially provide roosting habitat for the Florida bonneted bat. The extent of which bats maybe using these buildings as roost sites has not been investigated. It is possible that mortality of bats could occur as a result of the demolition of these three buildings. However, this adverse effect to Florida bonneted bat could be avoided and/or minimized through measures including pre-demolition surveys; scheduling building demolition outside the nesting season; restricting nonessential equipment and personnel access to affected areas and use of existing disturbed areas for access roads and laydown areas.

Operation and Maintenance and Construction – There are no anticipated adverse effects to the Florida bonneted bat as a result of these proposed project activities.

Sand flax Small's milkpea

Construction and Demolition – The proposed construction and demolition projects were identified to permanently remove approximately 7.9 acres of occupied sand flax and Small's milkpea habitat. Based on the baseline surveys conducted by Institute for Regional Conservation in 2012, it was determined that approximately 1,837 sand flax plants and 13,593 Small's milkpea plants would be affected as a result of the proposed construction and demolition projects. Adverse effects from construction and demolition will be minimized by clearly marking with flagging, fencing, or signposts and delineated in the field by a biologist the limits of the demolition and construction areas. No unauthorized personnel or equipment (including off-road vehicle access) will be allowed in native habitats outside the construction limits or designated access routes. All project-related activities will occur within the designated construction boundary.

Operation and Maintenance - All vegetation on the installation is managed per the requirements established in the grounds maintenance SOW, the PPMP and the Landscape Management Plan. There is potential for these maintenance activities to result in adverse effects to the sand flax and Small's milkpea such as direct mortality, loss of seed dispersal due to inappropriate mowing heights, and degradation of habitat due to encroachment of invasive exotic species. These adverse effects are minimized through implementation of the SOW and PPMP which specifies mowing and weed whacking heights in areas that are occupied by sand flax and Small's milkpea. The adverse effects are further minimized by implementation of the IPMP.

Airfield and Aircraft Operation - There are no anticipated adverse effects to the sand flax and Small's milkpea as a result of the aircraft and airfield operations.

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Interrelated and interdependent actions

An interrelated activity is an activity that is part of the proposed action and depends on the proposed action for its justification. An interdependent activity is an activity that does not have independent utility apart from the action under consultation. Interrelated or interdependent actions are not expected to result from the project.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, Tribal, local, or private actions that are reasonably certain to occur in the action area considered in this Biological Opinion. Future Federal actions unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

Urban development continues to occur in the area surrounding Homestead ARB and has the potential to reduce habitat in these areas. The Air Force Reserve Command works with the local planning communities to help plan compatible development under the installations noise contours. Recent development trends have seen areas that were formerly zoned as agricultural or were vacant converted to low to medium density residential areas. Increases in urban development have the potential to reduce foraging habitat for the Florida bonneted bat.

As limited information is available on Florida bonneted bat territory size and foraging ranges, nightly and seasonal movements, dispersal capabilities, dietary requirements, and locations of key roost sites, it is difficult to estimate how many bats may be disturbed by future non-Federal actions. The Service accounts for some habitat loss and changes in habitat quality through habitat restoration associated with reviewed projects, and encourages State and County entities responsible for permitting to pursue the Section 10 (HCP) process to account and mitigate for adverse effects to the Florida bonneted bat. Based on the above analysis, the Service believes the loss of the habitat associated with these lands is insignificant in the short term, but may adversely impact the Florida bonneted bat as development continues to occur.

As discussed above, the action area for the sand flax and Small's milkpea is defined as all lands within the boundaries of Homestead ARB. As such all future actions within the action area would constitute a Federal action and would require separate consultation pursuant to section 7 of the Act. Consequently, additional cumulative effects are not expected to occur in the action area for sand flax and Small's milkpea.

CONCLUSION

Florida bonneted bat

After reviewing the current status of the Florida bonneted bat, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects, it is the Service's Biological Opinion that development of the Project, as proposed, is not likely to jeopardize the continued existence of the Florida bonneted bat. We have reached this conclusion because: (1)

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A.3.3.4 Homestead Air Reserve Base USFWS Section 7 Consultation Response (Continued)

the majority (75 percent) of aircraft operations at Homestead ARB occur during the day when the bats are inactive; (2) of the remaining 25 percent (20 percent occur in the evening [3:01 P.M. to 10:00 P.M.], 2 percent occur at night [10:01 P.M. to 4:59 A.M.], and 3 percent occur in the morning [5:00 A.M. to 9:00 A.M.] it is likely that only about 5 percent or less of the aircraft operations occur during peak hours of Florida bonneted bat activity [1/2 hour before and after sunset and sunrise]; (3) the action area as described above for the Florida bonneted bat is is small compared to the hundreds of thousands of acres available throughout the range of the Florida bonneted bat; and (4) pre-demolition roost surveys will avoid direct mortality of Florida bonneted bats as a result of the proposed demolition activities.

Sand flax and Small's milkpea

After reviewing the current status of the sand flax and Small's milkpea, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects, it is the Service's Biological Opinion that development of the Project, as proposed, is not likely to jeopardize the continued existence of the sand flax and Small's milkpea. We have reached this conclusion because: (1) only a small amount of the on-site occupied habitat (approximately 7.0 acres) will be permanently lost as a result of the Project, which represents only 1.4% of the entire on-site occupied habitat on Homestead ARB; and (2) the establishment of protected plant management areas on Homestead ARB will help to ensure the sustainability of the on-site sand flax and Small's milkpea populations.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to, and not intended as part of the agency action, is not considered to be prohibited taking under the Act provided such taking is in compliance with the terms and conditions of this incidental take statement.

Sections 7(b)(4) and 7 (o)(2) of the Act generally do not apply to listed plant species. However, limited protection of listed plants from take is provided to the extent that the Act prohibits the removal and reduction to possession of Federally listed endangered plants or the malicious damage of such plants on areas under Federal jurisdiction, or the destruction of endangered plants on non-Federal areas in violation of State law or regulation or in the course of any violation of a State criminal trespass law.

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AMOUNT OR EXTENT OF TAKE ANTICIPATED

The Service has reviewed the biological information for the Florida bonneted bat, information presented by the Applicant, and other available information relevant to this action. The Service anticipates two Florida bonneted bats per year could be taken as a result of this proposed action. The incidental take is expected to be in the form of bats killed from the Airfield and Aircraft Operations.

The Service finds that no more than two Florida bonneted bats per year will be incidentally taken as a result of the proposed action. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided.

As indicated above, Sections 7(b)(4) and 7 (o)(2) of the Act generally do not apply to Federally listed plant species. Consequently, the sand flax and Smalls milkpea will not be discussed further in this incidental take statement.

EFFECT OF THE TAKE

In the accompanying Biological Opinion, the Service determined that this level of expected take is not likely to result in jeopardy to the Florida bonneted bat. Critical habitat has not been designated for the species and will not be affected.

REASONABLE AND PRUDENT MEASURES

Based on the implementation of the Project as described, the Service does not have any reasonable and prudent measures or terms and conditions. Reporting requirements and disposition of individuals taken are as described below.

MONITORING AND REPORTING REQUIREMENTS

Pursuant to 50 CFR § 402.14(i)(3), the Homestead ARB must provide adequate monitoring and reporting to determine if the amount or extent of take is approached or exceeded. In accordance with the base's BASH plan Homestead ARB must record and document all bird or other wildlife strikes that occur on base. An annual report summarizing all strikes should be provided to the Service. The report should include a summary of the number of Florida bonneted bats that were involved in strikes or otherwise found dead on the base. Additionally, an annual report that summarizes any on-site construction activities that involved the removal of sand flax and/or Small's milkpea. The report should include the number of plants relocated if any and the amount in acres of habitat removed that was occupied by sand flax and/or Small's milkpea. These reports should be provided annually no later than March 31st for the previous calendar year.

DISPOSITION OF DEAD OR INJURED SPECIMENS

Upon locating a dead, injured, or sick threatened or endangered species, initial notification must be made to the nearest Service Law Enforcement Office: 20501 Independence Blvd., Groveland,

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Florida 34736; 352-429-1037 as well as the biologist identified below at the South Florida Ecological Service Office, 772-562-3909. Secondary notification should be made to the Florida Fish and Wildlife Conservation Commission: (*3900 Drane Field Road; Lakeland, Florida; 33811-1299; 1-800-282-8002*). Care should be taken in handling sick or injured specimens to ensure effective treatment and in the handling of dead specimens to preserve biological material in the best possible state for later analysis as to the cause of death. In conjunction with the care of sick or injured specimens, or preservation of biological materials from a dead animal, the finder has the responsibility to carry out instructions provided by Law Enforcement to ensure that evidence intrinsic to the specimen is not unnecessarily disturbed.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The Service recommends the following:

1. Establish a "Conservation Management Area" for the purpose of protecting on-site pine rockland plant species. Preferably in the area of the grenade range.
2. Conduct a replanting effort to replace the plants affected by the proposed construction projects. Planting effort should be done at a ratio of 5:1 (# of plants replaced : # of plants affected) for the sand flax or 9,183 plants and a ratio of 3:1 for Small's milkpea or 40,778 plants over a 3 year period following the first removal of affected plants.
3. Reduce foot and vehicle traffic in replanting areas preferably through the posting of signage.
4. Monitor base populations of sand flax and Small's milkpea every 5 years.
5. Develop a management plan specifically for the "Conservation Management Area" that will focus on preservation of pine rockland plant species.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, the Service requests notification of the conservation recommendation carried out.

REINITIATION NOTICE

This concludes formal consultation on the action(s) outlined in the Programmatic BA. As written in 50 CFR § 402.16, reinitiation of formal consultation is required where discretionary Homestead ARB involvement or control over the action has been retained (or is authorized by law) and if: 1) the amount or extent of incidental take is exceeded (if more than two dead Florida bonneted bats per year are found); 2) new information reveals effects of the Homestead ARB action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; 3) the Homestead ARB action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or 4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the

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amount or extent of incidental take is exceeded, any operations causing such take must cease until reinitiation.

Thank you for your cooperation and effort in protecting federally listed species and fish and wildlife resources. If you have any questions regarding this project, please contact Brian Powell at 772-469-4315.

Sincerely yours,

Acting for

Roxanna Hinzman
Field Supervisor
South Florida Ecological Services Office

cc: (electronic only)
USAF, San Antonio Texas, (Kevin Porteck)
USAF, Homestead, Florida, (Micheal Andrejko)
Leidos Engineering, Inc., Earth City, MO (Tom Daues)

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Status of the Species – Florida bonneted bat
U.S. Fish and Wildlife Service
May 2019 *revised*

STATUS OF THE SPECIES – Florida bonneted bat (*Eumops floridanus*)

Legal status – Federal: *endangered*, 2013; State: *Federally-designated endangered*

The U.S. Fish and Wildlife Service (Service) proposed to list the Florida bonneted bat under the Endangered Species Act of 1973, as amended in 1998 (Act) (87 Stat. 884; 16 U.S.C. 1531 et seq.), on October 4, 2012 (Service 2012). The final listing determination published on October 2, 2013, and became effective November 1, 2013 (Service 2013).

This species is also listed as "Federally-designated endangered" on the Florida List of Endangered and Threatened Species under the Florida Administrative Code (Chapter 68A–27 rules (68A–27.0011 and 68A–27.003)).

Critical habitat has not been designated for this species.

Species Description

Appearance/Morphology

The Florida bonneted bat is a member of the Molossidae (free-tailed bats) family within the order Chiroptera. The species is approximately 130 to 165 millimeters (mm) (5.1 to 6.5 inches (in) in length (Timm and Genoways 2004) and the largest bat in Florida (Owre 1978; Belwood 1992; Florida Bat Conservancy [FBC] 2005). The length of the tail ranges from 46 to 57 mm (1.8 to 2.2 in), hind foot 11 to 15 mm (0.4 to 0.6 in), ear 20 to 30 mm (0.8 to 1.2 in), and forearm 60.8 to 66.0 mm (2.39 to 2.60 in) (Timm and Genoways 2004). Masses average 39.7 grams (g) (1.4 ounces [oz]) and range from 30.2 to 46.6 g (1.1 to 1.6 oz) (Owre 1978; Belwood 1981; Belwood 1992; Timm and Genoways 2004). A pregnant female with a single fetus weighed 55.4 g (2.0 oz) (Belwood 1981). Males are slightly larger and possess gular glands (Ober *et al.* 2017a). Timm and Genoways (2004) found no pattern of size-related geographic variation in this species.

Members of the genus *Eumops* have large, rounded pinnae (ears), arising from a single point or joined medially on the forehead (Best *et al.* 1997). The common name of "bonneted bat" originates from characteristic large broad ears, which project forward over the eyes (FBC 2005). Ears are joined at the midline of the head. This feature, along with its large size, distinguish the Florida bonneted bat from the smaller Brazilian (=Mexican) free-tailed bat (*Tadarida brasiliensis*) (Belwood 1992).

Wings of the members of the genus *Eumops* are among the narrowest of all molossids (Freeman 1981, as cited in Best *et al.* 1997) and are well-adapted for rapid, prolonged flight (Vaughan 1959, as cited in Best *et al.* 1997). This wing structure is conducive to high-speed flight in open areas (Findley *et al.* 1972, as cited in Best *et al.* 1997).

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The Florida bonneted bat's fur is short and glossy, with hairs sharply bicolored with a white base (Belwood 1992; Timm and Genoways 2004). Like other molossids, color is highly variable; color varies from black to brown to brownish-gray or cinnamon brown with ventral pelage paler than dorsal (Owre 1978; Belwood 1992; Timm and Genoways 2004). The basisphenoid pits (paired depressions in the basisphenoid bone) of the skull are ovoid (egg-shaped) and moderately deep (Timm and Genoways 2004). The tail projects beyond the interfemoral membrane (skin that stretches between the legs) (Owre 1978; Belwood 1992).

Taxonomy
The Florida bonneted bat (*Eumops floridanus*) was previously known as Florida mastiff bat, Wagner's mastiff bat, and mastiff bat (*E. glaucinus floridanus*) (Owre 1978; Belwood 1992; Best *et al.* 1997). While earlier literature found the Florida bonneted bat distinct at the subspecies level, the most current scientific information confirms that *E. floridanus* is a full species, and this taxonomic change has been accepted by the scientific community (Timm and Genoways 2004; McDonough *et al.* 2008; Timm 2012a; Baker *et al.* 2009). The International Union for Conservation of Nature and Natural Resources (Timm and Arroyo-Cabrales 2008), the Florida Natural Areas Inventory (FNAI) (2015), and the Florida Fish and Wildlife Conservation Commission (FWC) use the name *E. floridanus.*

Life History

The Florida bonneted bat is active year-round and does not have periods of hibernation or torpor, consequently, the species is likely dependent upon a constant and sufficient food supply, to maintain its high metabolism. Based upon limited information, Florida bonneted bats feed on flying insects of the following orders: Coleoptera (beetles), Diptera (true flies), Hemiptera (true bugs), and Lepidoptera (moths) (Belwood 1981; Belwood 1992; FBC 2005; Marks 2013). Foraging in open spaces, these bats use echolocation to detect prey at relatively long range, roughly 3 to 5 m (10 to 16 feet [ft]) (Belwood 1992). Individuals leave roosts to forage after dark, seldom occur below 10 m (33 ft) in the air, and produce loud, audible calls when flying (Belwood 1992; Best *et al.* 1997; Marks and Marks 2008a).

Like other molossids, the Florida bonneted bat's morphological characteristics make it capable of and generally adapted for low cost, swift, long distance travel from roost site to foraging areas (Norberg and Rayner 1987; Gillies 2012; Ober 2012). Data from a few satellite tagged Florida bonneted bat indicated that individuals foraged several miles (24 miles [39 km] maximum) from their roosts and cover long distances in one night (56 miles [91 km] maximum) (Ober 2016; Webb 2018a-b).

Habitat for the Florida bonneted bat primarily consists of foraging areas and roosting sites, which appear varied, with the species occurring in forested, suburban, and urban areas (Timm and Arroyo-Cabrales 2008). Echolocation calls have been recorded in a wide array of habitat types: pine flatwoods, pine rocklands, cypress, hardwood hammocks, scrubby flatwoods, mixed shrubs, mangroves, wetlands, swamps, rivers, lakes, ponds, canals, developed park lands, groves, tropical gardens, crop-based agriculture, disturbed nonnative areas, rural lands, residential areas, and urban landscapes. Open, fresh water and wetlands appear to be prime foraging areas for bats (Marks and Marks 2008c). During dry seasons, bats become more dependent on remaining ponds, streams, and wetland areas for foraging purposes (Marks and Marks 2008c).

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A.3.3.4 Homestead Air Reserve Base USFWS Section 7 Consultation Response (Continued)

The presence of roosting habitat is critical for day roosts, protection from predators, and the rearing of young (Marks and Marks 2008c). For most bats, the availability of suitable roosts is an important, limiting factor (Humphrey 1975). Roosting habitat for the Florida bonneted bat can be any habitat with tall, mature dead or live trees, tree snags, and trees with cavities, hollows, deformities, decay, crevices, or loose bark. At present, only 19 natural roost sites are known, and information on historical sites is scarce. Based upon limited information, the species roosts singly or in colonies consisting of a male and several (potentially over 50) females, in live trees and snags of pines, cypress, and palms (Belwood 1992; Arwood 2015; Ober *et al*. 2018). Florida bonnet bats will also use artificial structures, such as bat houses, utility poles, and buildings. In general, Florida bonneted bat roosts use areas with sufficient open space for obstacle-free emergence, which can occur in canopy gaps or edges, or above the canopy.

The maternity season for most bat species in Florida occurs from mid-April through mid-August (Marks and Marks 2008a). The Florida bonneted bat is a subtropical species, and limited data suggest the species may be polyestrous (having more than one period of estrous in a year) (Timm and Genoways 2004; FBC 2005; Ober *et al*. 2017b). The full extent of the maternity season is not well understood, but is a time of particular sensitivity with increased energy demands for females who leave young in roosts while making multiple foraging excursions to support lactation (Kurta *et al*. 1989; Kurta *et al*. 1990; Kunz *et al*. 1995; Marks and Marks 2008a; Ober 2014c). Preliminary data suggest a prolonged maternity season, as some pregnant and post-lactating females were observed in late August (Ober 2014b; Myers, 2014a–c). Reduced insect populations in urban areas may make it difficult for females to raise offspring successfully to maturity (Kurta *et al*. 1990; Kurta and Teramino 1992). Disturbance to summer maternity colonies of bats is extremely detrimental (Harvey *et al*. 1999). In general, maternity colonies of bats do not tolerate disturbance, especially when flightless newborns are present (Harvey *et al.* 1999). Newborns or immature bats may be dropped or abandoned by adults if disturbed (Harvey *et al.* 1999).

The Florida bonneted bat has low fecundity; litter size is one (FBC 2005; Timm and Arroyo-Cabrales 2008). Assuming a lifespan of 10 to 20 years for bats of this size (Wilkinson and South 2002), the average generation time is estimated to be 5 to 10 years (Gore *et al*. 2010). The species is not migratory, but there appears be seasonal shifts in roosting and foraging sites (Timm and Genoways 2004; Rizkalla 2018; Ridgely 2018).

Distribution

Endemic to Florida, the Florida bonneted bat has one of the most restricted distributions of any species of bat in the New World (Belwood 1992; Timm and Genoways 2004). Although numerous acoustical surveys for the Florida bonneted bat have been conducted in the past decade by various parties, the best scientific information indicates that the species exists only within a very restricted range, confined to south and south-central Florida. The core range currently appears to consist of habitat within Charlotte, Lee, Collier, Monroe, and Miami-Dade Counties. Recent data also indicate use of portions of Okeechobee, Polk, DeSoto, Hendry, and Broward Counties and possible use of areas within Glades and Highlands Counties. Surveys and research are ongoing to evaluate the current extent of the species range.

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Actual population size is not known, and no population viability analyses are available (FWC 2011a; 2013; Bohn 2012). Few roosts are known, and roost switching can occur, making precise counts difficult to obtain. However, population size is thought to be less than that needed for optimum viability (Timm and Arroyo-Cabrales 2008; Bohn 2012), possibly in the hundreds or less than 1,000 individuals (Marks and Marks 2008a; Marks and Marks 2012; FWC 2011b; FWC 2019).

Population Dynamics

The Florida bonneted bat was considered common in the Miami-Coral Gables area because of regular collection of specimens from 1951 to 1965 (Robson 1989; Belwood 1992). Jennings (1958) indicated the species was not abundant, noting a total of 20 individuals had been taken from 1936 to 1958. Prior to 1967, G.T. Hubbell regularly heard loud, distinctive calls at night as the bats foraged above buildings in the Miami area (Timm 2012b), and he routinely obtained several individuals per year that were collected from people's houses (Belwood 1992). Barbour and Davis (1969) indicated that, on average, about two individuals per year were brought to the Crandon Park Zoo in Miami, due to injuries, but no time period was specified.

Unpublished data from a survey of 100 pest control companies in 1982 on the southeastern coast of Florida showed that requests to remove "nuisance" bats from this area all but ceased beginning in the 1960s (Belwood 1992), indicating a sharp decline in bats in general. Timm and Genoways (2004) found only three records of Florida bonneted bats in the greater Miami area after 1965. The colony found near Punta Gorda in 1979 appeared to be the only recorded occurrence since 1967 (Belwood 1981). A 6-week field trip in 1980 to locate other occurrences was unsuccessful and led to the belief this species was ''probably extinct in Florida'' (Belwood 1992). No new evidence of this species was found from 1979 until 1988 when Robson *et al*. (1989) found a pregnant female in Coral Gables (Robson 1989).

Timm and Genoways (2004) surmised the Florida bonneted bat may have been uncommon for several decades, based upon the work of previous researchers (Barbour 1945, as cited in Timm and Genoways 2004; Jennings 1958; Layne 1974), who noted the scarcity of bats in southern Florida. Owre (1978) observed fewer than a dozen individuals in roughly 25 years and noted few mammologists had success in finding the species. Robson (1989) indicated the decline of specimens and sightings in the mid-1960s is reflected in the museum record and noted the 1950s and 1960s was a period of rapid growth in the Miami area. Robson (1989) suggested the resulting disturbance and destruction of native habitat may have flushed a large number of specimens out of established roosts, resulting in a high collection rate. A status survey conducted in 1989, encompassing 25 sites within natural areas within a nine county area, found no new evidence of this species (Robson 1989).

Results of the 2006-2007 range-wide survey suggested that the Florida bonneted bat is a rare species with limited range and low abundance (Marks and Marks 2008a). Based upon results of both the range-wide study and survey of select public lands, the species was found at 12 locations (Marks and Marks 2008b), but the number and status of the species at each location are unknown. Based upon the small number of locations where calls were recorded, the low numbers of calls recorded at each location, and the fact that the species forms small colonies, Marks and Marks (2008a) stated that it is possible that the entire population of Florida bonneted

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bats may number less than a few hundred individuals. As part of their evaluation of listing criteria for the species, Gore *et al.* (2010) found the extent of occurrence appears to have declined on the east coast, but trends on the west coast could not be inferred due to limited information.

In summary, we cannot accurately estimate population size at this time. This is in part because so few roosts are known, roost switching can occur, emergence counts have not conducted simultaneously (or even at the same time of year), and precise counts are difficult to obtain due to environmental conditions and the propensity for some individuals to remain within roosts during counts.

Threats

The uncertainty regarding the Florida bonneted bat's specific habitat needs and requirements (*i.e.*, location of roost sites) arguably contributes to the potential impacts from the following threats by increasing the likelihood of inadvertent impacts to and losses of habitat.

Habitat loss and alternation
Loss of native forested habitat and roost sites are major threats to the Florida bonneted bat (Belwood 1992; Timm and Arroyo-Cabrales 2008). The retention of old trees with hollows and cavities are particularly important to this species. In natural areas, this species may be impacted when forests are converted to other uses or when old trees with cavities are removed (Belwood 1992; Timm and Arroyo-Cabrales 2008). Habitat alteration during management practices may also impact natural roosting sites because the locations of such sites are unknown. For example, removal of old or live trees with cavities associated with forest management (*e.g.*, thinning, pruning), prescribed fire, exotic species treatment, or trail maintenance may inadvertently remove roost sites, if such sites are not known. Loss of an active roost or removal during critical life-history stages (*e.g.*, when females are pregnant or rearing young) can have increased ramifications, considering the species' small population size, low fecundity, and roost site fidelity.

Suitable natural roost sites appear limited (Ober *et al.* 2017b), and competition for available tree cavities may be greater now than historically. In 1992, Belwood (1992) stated that tree cavities were rare in southern Florida and that competition for available cavities from native wildlife (*e.g.*, southern flying squirrel, red-headed woodpecker, corn snake) was intense. Competition for cavities since that time has presumably increased, due largely to continued loss of cavity trees and habitat and the influx of nonnative or introduced species, which also vie for available roosting or nesting locations.

Pesticides and environmental contaminants
The impacts of pesticides and other environmental contaminants on bat species are largely unstudied, particularly in the case of the Florida bonneted bat. The life history of the Florida bonneted bat may make it susceptible to pesticide exposure from a variety of sources. Mosquito control spraying activities commonly begin at dusk when mosquitoes are most active (http://www.miamidade.gov/publicworks/mosquito-spraying.asp). Because the Florida bonneted bat forages at dusk and after dark, the possibility exists for individuals to be directly exposed to airborne mosquito control chemicals or to consume invertebrates containing pesticide residues

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from recent applications. Additionally, because the Florida bonneted bat has been documented to roost in residential areas (Belwood 1992), it is possible for individuals to be exposed directly or through diet to a variety of pesticide applications conducted by homeowners. The potential exposure to or impacts of agricultural chemical application on the Florida bonneted bat are largely unknown. A reduction in the number of flying insects is a potential secondary effect to consider when evaluating the impact of pesticides on the Florida bonneted bat. In his status survey for the Florida bonneted bat, Robson (1989) suggested that mosquito control programs are contributing to reduced food supplies for bats.

In addition to pesticide exposure, mercury represents another potential threat to the Florida bonneted bat that has not been investigated. According to the National Atmospheric Deposition Program, the mercury deposition rate in south Florida is among the highest in the United States (*http://nadp.isws.illinois.edu*). The movement of mercury through the aquatic system and into the terrestrial food web through emergent invertebrates has been documented in other areas (Cristol *et al.* 2008; Konkler and Hammerschmidt 2012). Assuming that a similar mechanism is occurring in south Florida, coupled with high mercury deposition rates, the consumption of such invertebrates may constitute a pathway for the Florida bonneted bat to be exposed to mercury.

Extreme weather, climate change, altered hydrology
This species is also vulnerable to stochastic weather events such as extreme cold and hurricanes, both potentially becoming more extreme and frequent due to climate change. Molossids appear to be an intermediate between tropical and temperate zone bat families (Arlettaz *et al.* 2000). Members of this family that inhabit the warmer temperate and subtropical zones incur much higher energetic costs for thermoregulation during cold weather events than those inhabiting northern regions (Arlettaz *et al.* 2000). At such temperatures, bats are likely unable to find food and cannot rewarm themselves. A stochastic with even a short-term (several days) temperature drop could potentially have a significant impact on the overall population.

Major impacts of intense storms and hurricanes may include direct mortality during the storm, exposure to predation immediately following the storm, loss of natural and artificial roost sites, and impacts on foraging areas and insect abundance (Timm and Genoways 2004; Marks and Marks 2008a; Kern, Jr. 2012;Timm 2012a). Due to the Florida bonneted bat's extended breeding season, hurricanes in Florida can occur at critical life-history stages—when females are pregnant or rearing young—possibly resulting in losses of pregnant females, newborns, or juvenile pups (Marks and Marks 2008a). Alternatively, less intense hurricanes or mild, isolated storms may create roosting opportunities, if tree snags (dead trees) are left in place.

Additional effects resulting from climatic change, including sea level rise and coastal squeeze, are expected to become severe in the future and result in additional habitat losses, including the loss of roost sites and foraging habitat. Three subpopulations of the Florida bonneted bat occur in at-risk coastal locations (Gore *et al.* 2010), and the effects of sea level rise are expected to be a continual problem for species using coastal habitats (Saha *et al.* 2011). Within the species' range, low-lying areas in Collier, Lee, Miami-Dade, and Monroe Counties appear most vulnerable to inundation. Much of low-lying, coastal south Florida "will be underwater or inundated with saltwater in the coming century" (U. S. Climate Change Science Program (CCSP) 2008). This means that large portions of occupied, suitable, and potential roosting and

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foraging habitat for the Florida bonneted bat in low-lying areas will likely be either submerged or affected by increased flooding. Climate change is likely to increase occurrence of saltwater intrusion as sea level rises (Intergovernmental Panel on Climate Change [IPCC] 2008), resulting in changes to plant species composition based upon tolerance to salinity and drought. Such changes in vegetation will likely impact the Florida bonneted bat, since the species uses forested areas and coastal habitats.

Hydrology also has a strong influence on plant distribution in these and other coastal areas (IPCC 2008). Such communities typically grade from salt to brackish to freshwater species. Human developments will be significant factors influencing whether natural communities can move and persist (IPCC 2008; CCSP 2008). Climate change, human population growth, forest management, and land use changes are also expected to increase water stress (water demand exceeding availability) within areas of the south, and south Florida is considered a hot spot for future water stress (Wear and Greis 2011). For the Florida bonneted bat, this means that some habitat in coastal areas will likely change as vegetation changes and additional human developments encroach.

Drier conditions and increased variability in precipitation are also expected to increase the severity of wildfire events. Climate changes are forecasted to extend fire seasons and the frequency of large fire events throughout the Coastal Plain (Wear and Greis 2011). Increases in the scale, frequency, or severity of wildfires could also have ramifications on the Florida bonneted bat, considering its forest-dwelling nature and general vulnerability. Climate changes may also affect foraging habitat and prey availability. Increased plant water stress is likely to impact vegetation community composition and chemical composition of plants, which would likely affect insect availability and the timing of insect availability to foraging bats (Ober 2012).

Land Management Practices
Although species occurrences on conservation lands are inherently more protected than those on private lands, habitat alteration during management practices may impact natural roosting sites because the locations of such sites are unknown. For example, removal of old or live trees with cavities during activities associated with forest management (*e.g.*, thinning, pruning), prescribed fire, exotic species treatment, or trail maintenance may inadvertently remove roost sites, if such sites are not known. Loss of an active roost or removal during critical life-history stages (*e.g.*, when females are pregnant or rearing young) would have a greater effect on the population, considering the species' low fecundity, and roost site fidelity.

Loss of Artificial Structures
Since the Florida bonneted bat will use human dwellings and other artificial structures, it is also vulnerable to habitat loss and alteration in urban environments (Belwood 1992; Timm and Arroyo-Cabrales 2008). Removal of buildings with spaces suitable for roosting is a threat to this species (Timm and Arroyo-Cabrales 2008). Robson (1989) stated that seemingly innocuous activities like destroying abandoned buildings and sealing barrel-tile roof shingles may have a severe impact on remaining populations in urban areas. The use of buildings or other structures inhabited by or near humans places bats at risk of inadvertent or purposeful removal and displacement.

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Disease or Predation
The effects of disease and predation are not well known. Given the Florida bonneted bat's overall vulnerability, both disease and predation could pose threats to its survival. White-nose syndrome (WNS) is an emerging infectious disease affecting insectivorous, cave-dwelling bats. WNS is caused by the cold-loving fungus, *Geomyces destructans,* a newly described fungus, and is named after the white fungal growth that often occurs on the muzzle of affected bats (Gargas *et al.* 2009; Lorch *et al.* 2011). In North America, *G. destructans* appears to infect bats only during winter hibernation. Because the Florida bonneted bat spends its entire life cycle outside of caves and mines and in subtropical environments where no torpor or hibernation is required, we do not anticipate that it will be adversely affected by WNS. With anticipated climatic changes and increased environmental stress, it is possible that disease will have a greater impact on the Florida bonneted bat in the future.

In general, animals such as owls, hawks, raccoons, skunks, and snakes prey upon bats (Harvey *et al.* 1999). However, few animals consume bats as a regular part of their diet (Harvey *et al.* 1999). There is only one record of natural predation on the Florida bonneted bat (Timm and Genoways 2004). A skull of one specimen was found in a regurgitated owl pellet at the Fakahatchee Strand Preserve State Park (FSPSP) in June 2000 (Timm and Genoways 2004; Marks and Marks 2008a). Although evidence of predation is lacking, the species is presumably affected by some level of predation from native wildlife (*e.g.*, hawks, owls, raccoons, rat snakes) and the large number of introduced and nonnative reptiles (*e.g.*, young Burmese pythons, boa constrictors) (Krysko *et al.* 2011; Ludlow 2012; Timm 2012a). Giant constrictors are habitat generalists, can grow and reproduce rapidly, and are arboreal when young, placing birds and arboreal mammals, such as bats, at risk (*http://www.fort.usgs.gov/FLConstrictors/*). Due to limited information, we are not able to determine the extent to which predation may be impacting the Florida bonneted bat at this time. However, given the overlap of habitat use of the species and invasive predators, it is reasonable to assume that predation is a potential threat, which may increase in the future.

Inadvertent and Purposeful Impacts from Humans
In general, bats using old or abandoned and new dwellings are at significant risk. Bats are often removed when they are no longer tolerated by humans or inadvertently killed or displaced when structures are demolished. Adverse human impacts on bats involve direct killing, persecution, vandalism, and disturbance of hibernating and maternity colonies (Harvey *et al.* 1999). Homeowners and professionals use a variety of methods to remove bats, including lethal means. Even when attempts are made to remove bats humanely, bats may be sealed into buildings. Despite regulations and efforts to raise awareness, in some situations, bats are still likely removed through inhumane and prohibited methods (*e.g.*, removed from roosts with vacuum cleaner–like apparatuses) and excluded from artificial roost sites during sensitive time periods (*e.g.*, inside the maternity season before young are volant (capable of flying)) (Kropp 2009). Since roosting sites are largely unknown, the potential to remove and exclude Florida bonneted bats from human dwellings and artificial structures, either inadvertently or accidentally, is high. Despite regulatory protections provided under Federal and Florida laws, direct and indirect threats from humans continue, especially in urban, suburban, and residential areas.

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Bonneted bats using urban or suburban areas may be negatively impacted by activities such as: routine landscaping, removing dead pine or royal palm trees, pruning or trimming trees (especially cabbage palms), sealing barrel-tile roof shingles with mortar, destroying abandoned buildings, and clearing lots of native vegetation (Robson 1989). As the species may also use palm fronds for roosting, the trimming of fronds and removal of mature palm trees for landscaping may negatively impact individuals (Gillies.2012). Disturbance to summer maternity colonies of bats is extremely detrimental (Harvey *et al*. 1999). In general, maternity colonies of bats do not tolerate disturbance, especially when flightless newborns are present (Harvey *et al.* 1999). Newborns or immature bats may be dropped or abandoned by adults if disturbed (Harvey *et al.* 1999). In short, wherever this species occurs in or near human dwellings or structures, it is at risk of inadvertent or purposeful removal, displacement, and disturbance.

Routine maintenance and repair of bridges and overpasses or other infrastructure are potential threats. Bats can use highway structures either as day or night roosts (Keeley and Tuttle 1999). An estimated 24 of the 45 species of bats in the United States have been documented to use bridges or culverts as roosts, and 13 other bat species are likely to use such structures based upon their known roosting preferences (Keeley and Tuttle 1999). To date, the Florida bonneted bat has not been documented to use these structures. However, like other molossids, bonneted bats can potentially use these structures for roosting (Keeley and Tuttle 1999). When bridges and overpasses are cleaned, bats may be subjected to high water pressure from hoses, which likely results in injury or death (Marks 2007). Incidences involving high pressure water hoses have reportedly decreased in Florida, and the FDOT is working with FWC to increase their efforts to protect bats during maintenance and repair activities at bridge sites with bats.

Competition for Tree Cavities

Suitable natural roost sites in south Florida appear limited, and competition for available tree cavities may be greater now than historically. In 1992, Belwood (1992) stated that tree cavities were rare in southern Florida and that competition for available cavities from native wildlife (*e.g.*, southern flying squirrel, red-headed woodpecker, corn snake) was intense. Competition for cavities since that time has presumably increased, due largely to continued loss of cavity trees and habitat and the influx of nonnative or introduced species, which vie for available roosting or nesting locations.

Proposed Wind Energy Facilities

Migratory, tree-dwelling, and insectivorous bat species are being killed at wind turbines in large numbers across North America (Kunz *et al.* 2007; Cryan and Barclay 2009). Based upon data modified from Johnson (2005, as cited in Arnett *et al.* 2008), researchers found that the Brazilian free-tailed bat comprised 85.6 percent of bat mortalities noted at a wind energy facility in Woodward, Oklahoma, and 41.3 percent of bat mortalities at a High Wind, California, wind energy facility. Since the Florida bonneted bat is also a free-tailed bat, it may demonstrate some similar behaviors that place it at risk when encountering wind energy facilities.

While bat fatalities from wind energy facilities are well documented, potential impacts to the Florida bonneted bat are difficult to evaluate at this time, partly due to the uncertainty involving many factors (*e.g.*, location of facilities, operations, foraging distance). Certain aspects of the species' status and life history may increase vulnerability to impacts from wind energy facilities.

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The species' high and strong flight capabilities and fast-hawking foraging behavior may increase risk. Conversely, as the species is non-migratory, potential impacts from wind energy facilities may not be as great in magnitude as perhaps other bat species that are migratory.

Ecological Light Pollution

Depending upon scale and extent, ecological light pollution can have demonstrable effects on behavioral and population ecology of organisms by: disrupting orientation (or causing disorientation), affecting movements (attraction or repulsion), altering reproductive behaviors, and influencing communication (Longcore and Rich 2004). The effects of artificial lighting on bats and their prey have been partially studied. A wide array of insects have been found to be attracted to lights (Frank 1988; Eisenbeis and Hassel 2000; Kolligs 2000, as cited in Longcore and Rich 2004). Although the primary prey items for the Florida bonneted bat are not known, it is possible that artificial lighting may be affecting insect abundance or availability and prey base in some locations. Longcore and Rich (2004) suggested that increased food concentration at artificial light sources may be a positive effect for those species that can exploit such sources, but it also could result in altered community structure. The Florida bonneted bat's behavioral response to ecological light pollution has not been examined, and effects are not known. The species' fast-flight and long range flight capabilities may make it more able to exploit insects congregated at artificial light sources or more susceptible to risks associated with such responses (*e.g.*, increased predation or harm from humans).

Effects of Small Population Size, Isolation, and Other Factors

The Florida bonneted bat is vulnerable to extinction due to its small population size, restricted range, few occupied areas, low fecundity, and relative isolation. The Florida bonneted bat only occurs in south, southwest, and south-central Florida and only in limited numbers (Timm and Genoways 2004; Marks and Marks 2008a; 2008b; 2012). Based on the small number of locations where calls were recorded, the low numbers of calls recorded at each location, and the fact that the species forms small colonies, Marks and Marks (2008a) stated that it is possible that the entire population of Florida bonneted bats may number less than a few hundred individuals. Other experts suggested the population may be ''in the hundreds or low thousands'' (FWC 2011b). In general, species with restricted ranges are often characterized by small population sizes and high habitat specialization and are, therefore, more vulnerable to stochastic, demographic, and environmental processes (Lande *et al.* 2003, as cited in Lee and Jetz 2011).

Slow reproduction and low fecundity are also serious concerns because this species produces only one young at a time and roosts singly or in small groups (FBC 2005; Timm and Arroyo-Cabrales 2008). Assuming a lifespan of 10 to 20 years for bats of this size (Wilkinson and South 2002), the average generation time is estimated to be 5 to 10 years (Gore *et al.* 2010). The small numbers within localized areas may also make the Florida bonneted bat vulnerable to extinction due to genetic drift (loss of unique genes through time), inbreeding depression (reduced fitness or survival due to low genetic diversity), extreme weather events (*e.g.*, hurricanes), and random or chance changes to the environment (Lande 1988; Smith 1990) that can significantly impact its habitat.

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In general, isolation, whether caused by geographic distance, ecological factors, or reproductive strategy, will likely prevent the influx of new genetic material and can result in low diversity, which may impact viability and fecundity (Chesser 1983). Distance between subpopulations or colonies, the small sizes of colonies, and the general low number of bats may make recolonization unlikely if any site is extirpated. Isolation of habitat can prevent recolonization from other sites and potentially result in extinction. The probability of extinction increases with decreasing habitat availability (Pimm *et al.* 1988; Noss and Cooperrider 1994; Thomas 1994; Kale 1996). Although changes in the environment may cause populations to fluctuate naturally, small and low density populations are more likely to fluctuate below a minimum viable population (*i.e.*, the minimum or threshold number of individuals needed in a population to persist in a viable state for a given interval) (Shaffer 1981; Shaffer and Samson 1985; Gilpin and Soule´ 1986). If populations become fragmented, genetic diversity will be lost as smaller populations become more isolated (Rossiter *et al.* 2000). Fragmentation and aspects of the species' natural history (*e.g.*, reliance on availability of suitable roost sites, constant supply of insects) can contribute to and exacerbate other threats facing the species.

Ongoing Conservation Efforts

Extensive conservation efforts are underway by researchers, government agencies, non-profit organizations, stakeholders, and private individuals. Efforts are focusing on: (1) filling information gaps regarding the species and its habitat needs and preferences; (2) conserving roosting and foraging habitats; (3) reducing known threats, wherever possible; and (4) increasing public awareness.

Research efforts continue to examine life history, population dynamics, and habitat needs for the Florida bonneted bat. Studies are being conducted to identify additional occupied areas, evaluate diet, determine roost site fidelity, examine population dynamics, understand movement and foraging distance, develop a protocol for attachment of radio transmitters, identify habitat needs, analyze effects of fire, and locate natural roost sites.

Identifying natural roost sites is particularly important. Finding additional roost sites is a key component to better understanding the species' habitat needs, which will greatly contribute to conservation of the species. Knowing where roosts occur and determining better methods to detect them will enhance endeavors to learn more about life history and help focus habitat protection efforts on specific locations, especially if roost sites may be a limited resource for the species.

The FWC's Species Action Plan details the actions necessary to improve the conservation status of the Florida bonneted bat. The Florida Bonneted Bat Working Group was established in 2012 to bring together a consortium of public and private agencies, organizations, and educational institutions to leverage available resources, prioritize conservation actions, and collaborate on research directives for the Florida bonneted bat. The Service intends to work with stakeholders to develop a recovery outline and recovery plan in the near future.

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STATUS OF THE SPECIES – Sand flax (*Polygala smallii*)

Sand flax was listed as endangered on October 31, 2016. The following discussion is summarized from the listing rule published in the Federal Register (81 FR 6684), most recent species assessment (Service 2012) and from recent research publications and monitoring reports.

Species/critical habitat description

Sand flax is a wiry, yellow-flowered herb (Bradley and Gann 1999; Bradley 2006). Bradley and Gann (1999) state sand flax "is a glabrous perennial herb; stems 1-several from the base, wiry, 35 to 53 cm tall; leaves mostly alternate, linear, 7 to 10 mm long, 0.6 to 1 mm wide, entire or with scattered marginal glands; stipules glandular, reddish; inflorescence a cyme of a few slender, spreading or ascending branches; pedicels 2 mm long or less; sepals lanceolate to ovate with a prominent midrib, 2.4 to 3.2 mm long; petals yellow, obovate, 4.5 to 5.5 mm long; fruit 2.1 to 2.5 mm long, 2 to 2.3 mm diameter, pyriform, dehiscing into ten segments; seeds ovate, 1.2 to 1.4 mm long, 0.7 to 0.8 mm wide. (Adapted from Rogers 1963)". The reproductive ecology and biology of this taxon has not been studied (Bradley and Gann 1999). No studies have been conducted on the ecology of the species (Bradley 2006).

No critical habitat has been designated for sand flax.

Life history

Sand flax is found in pine rockland, disturbed pine rockland, marl prairie, roadsides on rocky soils, and disturbed areas (Bradley and Gann 1999; Hodges and Bradley 2006). The pine rockland and marl prairie where this species occurs requires periodic wildfires in order to maintain an open, shrub free subcanopy and reduce litter levels (Bradley and Gann 1999). This taxon is currently rare in relatively undisturbed natural areas, with the exception of plants on Big Pine Key and the grounds of an office building on Old Cutler Road in Coral Gables (Bradley and Gann 1999; Hodges and Bradley 2006). Several occurrences are in scarified pine rockland fragments that are dominated by native pine rockland species, but have little or no canopy or subcanopy. One population in Miami-Dade County occurs entirely on a levee composed of crushed oolitic limestone in the middle of a sawgrass marsh (Bradley and Gann 1999; Hodges and Bradley 2006).

More recently, Hodges and Bradley (2006) found in the Keys sand flax seems to only rarely occur within intact pine rockland, but more frequently adjacent to it. Its persistence on roadsides is not fully understood, but it is possible this species has evolved to occur in this habitat as fire regimes and natural areas were altered and destroyed over the last several hundred years (Hodges and Bradley 2006).

Population dynamics

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In Miami-Dade County, Kernan and Bradley (1996) reported six mainland occurrences for sand flax. They estimated that approximately 1,000 plants occurred in Miami-Dade County, with about 600 at Homestead Air Reserve Base. In 2008, Bradley (pers. comm. 2008) estimated that hundreds of plants, possibly thousands, remained at this site, now owned by the Miami-Dade County Homeless Trust. In 2009, Bradley (2009) estimated that approximately 74,000 sand flax plants occur on the site, with densities ranging as high as 4.5 plants per 10.8 ft^2 (per 1.0 m^2). This is the largest known population in Miami-Dade, but a portion of it is threatened by development; the U.S. Army Special Operations Command Center South (SOCSOUTH) seeks to locate permanent headquarters at this site (Department of Defense 2009). Project plans include avoidance of the majority of the population with accompanying protection and management of approximately
60,000 individuals (Service 2011). However, this project will need to be carefully monitored because impacts would affect the largest known occurrence of the species.

An occurrence called Old Cutler contained 26 percent of the known individuals in Miami-Dade County, prior to being cleared (Bradley and Gann 1999). As of 1996, there were fewer than 200 plants in the remaining sites on the mainland (Kernan and Bradley 1996). According to Bradley (2006), the population size in 2006 in Miami-Dade County was unknown. A new occurrence has been confirmed recently in Miami-Dade County on a tract of land enrolled in the EEL program, which is an addition to Camp Owaissa Bauer Pineland (J. Possley, pers. comm. 2011).

More detailed information is available for the Keys. Neither Dickson (1955) nor Alexander and Dickson (1972) reported the species in their studies. Carlson et al. (1993) recorded it at a frequency of 1.3 percent in study plots (0.5 m^2) on Big Pine Key. Ross and Ruiz (1996) found sand flax on only 16 plots across 5 Big Pine Key transects. According to their analysis, sites most likely to support sand flax had a high relative representation of graminoids in the understory, abundant pine regeneration, and high cover of exposed rock (Ross and Ruiz 1996).

More recently, in the first comprehensive study of distribution and abundance in the Keys, Hodges and Bradley (2006) estimated that there were between 101 and 1,000 plants in the Keys outside of Big Pine Key. In a follow-up study, examining the distribution and population size of three pine rockland endemics on Big Pine Key, sand flax was found to be extremely rare, located at only five sample locations throughout the island and at three places not associated with sample locations (Bradley 2006). Bradley (2006) found a total of 33 plants, mostly in the interior of the island away from the coast. In the northern pinelands it was found in 6 of 427 plots (1.4 percent) at a density of 0.07 ± 0.09 plants/plot (Bradley 2006). In the southern pinelands, it was found in 1 of 114 plots (0.9 percent) at a density of .009 ± 0.91 plants/plot (Bradley 2006). The difference in density was significant (U = 32,978.5, P = 0.033). Since sand flax was found at such low densities in so few plots, the mean density had an extremely broad range; 95 percent confidence intervals showed a range from -3,353 to 56,404 individuals (Bradley 2006). All plants were found prior to Hurricane Wilma; sand flax was not found at all in surveys 8 to 9 weeks after the hurricane (Bradley 2006). In 2007, Bradley and Saha (2009) found sand flax in northern plots,

but did not find it in any of the southern plots. Additional surveys have not been conducted, so it is not possible to determine if sand flax has recovered.

Status and distribution

Historical Range/Distribution: Sand flax historically was distributed in Monroe County in the lower Keys and in central and southern Miami-Dade County (Bradley and Gann 1999). In Miami-Dade, the plant was widespread from the Coconut Grove area to southern Miami-Dade County, close to what is now the main entrance to ENP and Turkey Point (Bradley and Gann 1999). In Monroe County, the plant was recorded from Big Pine Key, Ramrod Key, Sugarloaf Key, Park Key, Boca Chica Key, and Middle Torch Key (Bradley and Gann 1999). Based upon Bradley and Gann (1999), Hodges and Bradley (2006), and data from IRC (K. Bradley, pers. comm. 2007), sand flax has been extirpated from the sites in Table 8.

Table 8. Extirpated occurrences of sand flax.

Site	Owner	County	Last Observation	Cause
Boca Chica Key	Department of Defense	Monroe	1912	unknown, probably development
Middle Torch Key	unknown	Monroe	1979	unknown
Park Key	unknown	Monroe	1961	unknown, probably development
Ramrod Key	unknown	Monroe	1979	unknown
Allapatah Linum Site	private	Miami-Dade	1996	land clearing
Camp Jackson Area	unknown	Miami-Dade	1907	unknown
Camp Owaissa Bauer	Miami-Dade County	Miami-Dade	1983	fire suppression
Cemetery Pineland	private	Miami-Dade	1996	property scarified, may regenerate
East of Naranja	unknown	Miami-Dade	1907	unknown
Homestead to Camp Jackson	unknown	Miami-Dade	1907	unknown
Homestead to Big Hammock Prairie	unknown	Miami-Dade	1911	unknown

Current Range/Distribution: Sand flax is currently known from four occurrences in the Keys and eight occurrences in Miami-Dade County (Bradley 2006; K. Bradley, pers. comm. 2007, 2011; J. Maschinski, FTBG, pers. comm. 2007, 2011; J. Possley, FTBG, pers. comm. 2011). Based upon

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Bradley and Gann (1999), Hodges and Bradley (2006), Bradley (2009), data from IRC (K. Bradley, pers. comm. 2007; Gann et al. 2001-2010), data from FTBG (Maschinski et al. 2002; J. Maschinski, pers. comm. 2007; J. Possley, pers. comm. 2011; J. Maschinski, pers. comm. 2011) and Bradley and Saha (2009), sand flax is extant at the sites in Table 9. On Big Pine Key, sand flax occurs at the Terrestris Preserve, which is owned by The Nature Conservancy (TNC); this occurrence is included within the Big Pine Key site in Table 9.

Table 9. Extant occurrences of sand flax.

Site	Owner	County	Population Size	Threats (site specific only)
Big Pine Key (primarily conservation lands)	NKDR, TNC, other public and private entities	Monroe	2,676	development, fire suppression, exotic plants
Lower Sugarloaf Key	Florida Department of Transportation (FDOT)	Monroe	101-1,000	road clearing or other maintenance, illegal dumping, exotic plants
Big Torch Key	Monroe County Department of Transportation	Monroe	11-100	road clearing or other maintenance, exotic plants
Middle Torch Key	Monroe County Department of Transportation	Monroe	2-10	road clearing or other maintenance, exotic plants
Village of Palmetto Bay	private	Miami-Dade	11-100	development, fire suppression, exotic plants
Cocoplum Development	private	Miami-Dade	11-100	development
Country Ridge Estates/ Camp Owaissa Bauer (partial conservation lands)	private / Miami-Dade County	Miami-Dade	11-100	development, herbicide
Homestead Air Reserve Base and adjacent land	Miami-Dade County Homeless Trust	Miami-Dade	74,000	development; proposed military facilities and operations
Homestead Bayfront Park (conservation lands)	Miami-Dade County	Miami-Dade	101-1,000	road clearing or other maintenance
IRC Preserve and adjacent canal bank (primarily conservation lands)	IRC and South Florida Water Management District	Miami-Dade	2-10	herbicide application on canal bank
Luis B. Martinez U.S. Army Reserve Station, Richmond Pine Rocklands	U.S. Army	Miami-Dade	30-50	not assessed
Camp Owaissa Bauer Pineland Addition #1 (conservation lands)	Miami-Dade County	Miami-Dade	1-10	not assessed

Hodges and Bradley (2006) initiated population surveys for sand flax in the Keys on Big Pine Key and other keys with potential habitat. The survey included extant occurrences, historic sites, and exploratory surveys of potential habitat. This project provided the first comprehensive survey of distribution and abundance for the area. Negative survey results (*i.e.*, location surveyed, but sand flax absent) included: Boca Chica Key (southern edge), No Name Key (roadside edges and NKDR), Ramrod Key (Dan Austin Site), roadsides from Little Torch Key to Lower Sugarloaf Key, and Upper Sugarloaf Key (NKDR) (Hodges and Bradley 2006).

In 2009, an assessment of rare plants and pine rockland habitat was conducted for the proposed SOCSOUTH headquarters at the site adjacent to the Homestead Air Reserve Base (Bradley 2009). During a survey of the 90-ac (36.4-ha) tract, Small's milkpea and sand flax were found in 27 different locations covering 13.2 ac (5.3 ha) in disturbed pine rocklands (Bradley 2009).

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A.3.3.4 Homestead Air Reserve Base USFWS Section 7 Consultation Response (Continued)

STATUS OF THE SPECIES – Small's Milkpea (*Galactia smallii*)

The following discussion is summarized from the final listing rule (50 FR 29345), the MSRP (Service 1999), the 5-year status review (Service 2007), and from recent research publications and monitoring reports. Small's milkpea (*Galactia smallii*) was listed as an endangered plant under the Endangered Species Act of 1973, as amended (Act) (87 Stat. 884; 16 U.S.C. 1531 et seq.) on July 18, 1985 (50 FR 29345). Small's milkpea is a perennial herb endemic to the pine rocklands of Miami-Dade County.

Species/critical habitat description

Small's milkpea is a perennial herb herb endemic to the pine rocklands of Miami-Dade County. Plants have numerous trailing stems radiating from large woody taproots and with relatively large flowers (calyx 6 to 8 mm [0.2 to 0.3 inch] long, standard and keel 1 to 1.5 cm [0.4 to 0.6 inch] long) (Herndon 1981). This species has compound leaves, usually with 3 elliptic leaflets 1.5 to 3 cm (0.6 to 1.2 inches) long. The stem pubescence is ascending or spreading-sericeous, and upper leaf surface is puberulent (hairs 0.1 to 0.2 mm [0.004 to 0.008 inch] long); hairs on stem less than 0.5 mm [0.02 inch] long) (Herndon 1981).

No critical habitat has been designated for Small's milkpea.

Life history

There is limited knowledge about the demographic features and trends of this plant. Small's milkpea is a perennial legume and, therefore, probably experiences little annual variation in population size (Fisher 2000, Bradley and Possley 2002). This species does not experience seasonal dieback and is thought to be long-lived, as most of the plants used in a pollination study survived over a period of 5 years (Bradley and Possley 2002). Flowering occurs throughout the year but most abundantly during the dry season. Because most flowers do not produce fruit, it may be self-incompatible (Bradley and Possley 2002). Once pollinated, seeds take several months to mature and often germinate in response to fire. Annual variability in flowering, seed production, seed viability, and establishment requirements are unknown (Bradley and Possley 2002). Fairchild Tropical Botanic Gardens (FTBG) is conducting propagation trials in order to expand the ex situ collection of this species. Because of the small size of seeds, seed storage has been difficult (Maschinski 2005).

Small's milkpea prefers open sun and little shade and can be threatened by shading from hardwoods and displacement by invasive exotic species in the absence of periodic fires. Disturbance, such as prescribed fire, is a necessary management tool to maintain suitable habitat for the species. Habitat degradation on these sites continues to be a moderate threat because vegetation restoration and management programs are costly and depend upon availability of funding.

Population dynamics

O'Brien (1998) located the species on 10 sites. In 2002, FTBG reported this species occurred on fewer than 12 sites located in a 6.5-mile (10.5-kilometer) area (Bradley and Possley 2002). The total population at that time was estimated to be less than 10,000 plants and ranged from 3 to over 1,000 individuals per site, with only two sites that contained over 1,000 plants (Bradley and Possley 2002). The most recent comprehensive survey of pine rocklands documented the presence of Small's milkpea on 24 sites (8 public, 16 private), with a total population size over 100,000 individuals. However, one location, Homestead Air Reserve Base (HARB), maintains the majority of the overall Small's milkpea population. The remaining 23 sites have populations ranging size from 3 to 1,000 individuals. Numerous sites have been purchased by Miami-Dade County for conservation purposes. The Miami-Dade County is working to restore and manage these lands.

Status and distribution

When this species was listed, it was known from two sites near Homestead in Miami-Dade County. The distribution of this species is correlated with soil depth and color in Redland pine rocklands. Small's milkpea appears to prefer calcareous soils with less quartz sands, but not at low elevations, and does not occur in pine forests off of the limestone rock ridge (O'Brien 1998). As elevation decreases southward along the Miami Rock Ridge, so does quartz sand (Bradley and Possley 2002). Preferred soils are mapped as Cardsound Rock outcrop complex and are porous and well-drained (Bradley and Possley 2002). The elevation where the plants occur generally ranges from 7 to 10 feet (2 to 3 m) with a smooth slope from 0 to 2 percent (Bradley and Possley 2002).

The distribution of this plant is fragmented. One study noted several sites had large numbers of plants distributed throughout each site with no well-defined population clusters (Fisher 2000). In 2002, this species occurred in less than 12 fragmented sites located along a 6.5-mile (10.5 kilometer) portion of the ridge (Bradley and Possley 2002). The total population at that time was estimated to be less than 10,000 plants and ranged from 3 to 1,000 individuals per site, with only 2 sites that contained over 1,000 plants (Bradley and Possley 2002). Results of a project to map extant pine rockland habitat indicated that the plants remained on 7 public and 15 private sites (The Institute for Regional Conservation [IRC] 2006, Bradley 2010a). Miami-Dade County owns six of the public sites, purchased for conservation purposes, and is working to restore and manage these lands through their Environmentally Endangered Lands (EEL) program. The remaining public site is owned by the County's Board of Education (Bradley, 2010b) and is, therefore, subject to future development. However, the EEL program is currently attempting to acquire this site (Guerra 2010).

In 2009, a large population containing as many 100,000 individuals was documented on an additional public property (County owned) adjacent to the Homestead Air Reserve Base (HARB) (Bradley 2009). Although HARB is seeking to develop these lands, they are also coordinating with the Service and IRC to retain and manage the plant at this site. Therefore, the most current assessment of natural forested communities in Miami-Dade County recorded the species on eight public sites (IRC 2006, Bradley 2009, Bradley, 2010a). Also in 2009, an additional small

A.3.3.4 Homestead Air Reserve Base USFWS Section 7 Consultation Response (Continued)

population was discovered on the private Palms Woodlawn Cemetery along Old Dixie Highway in Homestead (Bradley, 2010b). Because this species has no apparent mechanism for long-distance dispersal of seeds, it is presumed that these fragmented populations are relicts of larger populations prior to fragmentation (O'Brien 1998). Not much is known about how fragmentation has impacted the population dynamics of the species, but most likely populations have become isolated and more imperiled (O'Brien 2006 in litt.).

Less than 2 percent of the original acreage of pine rockland habitat remains (Bradley and Possley 2002). Most of that habitat occurs in small, isolated stands in an urban landscape that are difficult to protect and manage. Many of the fragments are overgrown and in need of restoration. The known sites where Small's milkpea occurs on public lands are protected from development, but these sites must be managed to prevent habitat degradation and potential loss of plants. Privately-owned sites remain at risk of being developed and management remains a concern.

Limited distribution renders the species vulnerable to random natural or human induced events, such as hurricanes and encroachment of invasive exotic species. All of the populations require active management, including exotic plant control, thinning of overgrown vegetation, and/or prescribed fire. The current number of individuals in wild populations is not known, therefore, trend analysis is not available. Although some demographic information is available, additional long-term research will be necessary to develop accurate population models.

There is an ongoing effort to conduct prescribed burns at the publicly-owned sites. Management of these small preserves is difficult because exotic plants are present within and near the properties. Habitat degradation on these sites continues to be a moderate threat because vegetation restoration and management programs are costly and depend upon availability of funding. Continued habitat loss and fragmentation, fire suppression, and invasion by exotic plant species threaten the existence of Small's milkpea (Service 2007).

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A.3.4 NAVAL AIR STATION JOINT RESERVE BASE FORT WORTH AGENCY COORDINATION AND CONSULTATION RESPONSES

A.3.4.1 Naval Air Station Joint Reserve Base Fort Worth Agency Coordination Responses

SHPO-2017-0690 (142000)

DEPARTMENT OF THE AIR FORCE
AIR FORCE CIVIL ENGINEER CENTER
JOINT BASE SAN ANTONIO LACKLAND TEXAS

22 March 2018

Ms. Raquel R. Fischer
Air Force Civil Engineer Center NEPA Division (AFCEC/CZN)
2261 Hughes Ave, Suite 155
Lackland AFB TX 78236-9853

RECEIVED
MAR 29 2017
ARIZONA STATE HISTORIC PRESERVATION OFFICE

Ms. Kathryn Leonard
State Historic Preservation Officer
Arizona State Parks
State Historic Preservation Office
1100 W. Washington Street
Phoenix, AZ 85007

Dear Ms. Leonard,

The U.S. Air Force (USAF) is preparing an Environmental Impact Statement (EIS) to evaluate the environmental consequences that could result from implementation of the Air Force Reserve Command (AFRC) F-35A Operational Beddown. Naval Air Station (NAS) Fort Worth Joint Reserve Base (JRB), Texas, has been identified as the preferred alternative for the AFRC F-35A mission. Davis-Monthan Air Force Base (AFB), Arizona; Homestead Air Reserve Base (ARB), Florida; and Whiteman AFB, Missouri, have been identified as reasonable alternatives for this mission.

The proposed project would base 24 Primary Aerospace Vehicles Authorized (PAA) F-35A aircraft with 2 Backup Aircraft Inventory (BAI) at one of the four installations. Basing the aircraft at an installation would require the construction, demolition, and renovation of facilities to accommodate the new personnel and aircraft associated with the mission. The EIS will also address aircraft operations in existing military airspace and at ranges. This proposed project does not include the creation of new airspace, and it does not seek to reconfigure any of the existing airspace.

The USAF will host an open-house public scoping meeting in the local area near each of the bases proposed for this action (see attached scoping brochure). The purpose of the meetings and the scoping period is to solicit written comments to help effectively define the full range of environmental issues to be analyzed in depth in the EIS. Written public and agency comments provided to the USAF during the scoping period will be considered in the preparation of the Draft EIS. Additional information can be found on the project website at www.AFRC-F35A-beddown.com and in the Notice of Intent (Attachment 1).

As a follow-up to this letter, the USAF will be sending you a separate letter defining the Area of Potential Effect (APE) for this undertaking with a determination of effects and a request for your concurrence. In the meantime, if you have any comments or questions please contact Mr. Hamid Kamalpour, U.S. Air Force, AFCEC/CZN; 2261 Hughes Ave, Ste. 155, Lackland AFB, TX 78236-9853 or refer to the project website at https://www.AFRC-F35A-beddown.com. To facilitate the incorporation of your comments into the Draft EIS, we request that comments be submitted by May 11, 2018. Thank you for your assistance.

Thank you for the information. Our office looks forward to consultation via the Section 106/NHPA process.
James Cogswell 4/10/18
AZ SHPO

Sincerely,

Raquel R. Fischer

RAQUEL R. FISCHER, GS-14, DAF
Chief, NEPA Division

Attachment
Notice of Intent
Scoping Brochure

From: Jody Loza [mailto:JLoza@nctcog.org]
Sent: Monday, April 02, 2018 2:28 PM
To: KAMALPOUR, HAMID GS-13 USAF AFMC AFCEC/CZN <hamid.kamalpour@us.af.mil>
Cc: Jenny Narvaez <JNarvaez@nctcog.org>; Vivek Thimmavajjhala <VThimmavajjhala@nctcog.org>
Subject: [Non-DoD Source] Notice of Intent To Prepare an Environmental Impact Statement for the Air Force Reserve Command F–35A Operational Beddown
Importance: High

Mr. Kamalpour,

Per our conversation, the North Central Texas Council of Governments, in preparation for the upcoming public scoping meeting at Naval Air Station (NAS) Fort Worth Joint Reserve Base (JRB)on April 19, 2018, is preparing an emissions comparison between the F-16 and F-35A aircraft. The Federal Aviation Administration's Aviation Environmental Design Tool (AEDT) is the software required to report aviation emissions. NCTCOG reached out to the Dallas-Fort Worth International Airport, who had access to the AEDT, in order to obtain emission factors for the F-16 engine and the F-35A engine. Unfortunately, the F-35A engine is not included in the AEDT software.

If there is a net increase in emissions as a result of removing the existing F-16's from NAS Fort Worth JRB's fleet and replacing them with F35A, NCTCOG stands ready with projects to offset any increase. In order to determine the air quality impacts of the F-35 Operational Beddown, NCTCOG is requesting guidance on how to obtain the emission factor(s) for the F-35A.

We appreciate any information or assistance you are able to provide.

Thanks,

Jody

Jody Purvis Loza
Senior Air Quality Planner
North Central Texas Council of Governments
P.O. BOX 5888
Arlington, TX 76005-5888
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A.3.4.1 Naval Air Station Joint Reserve Base Fort Worth Agency Coordination Responses (Continued)

Bryan W. Shaw, Ph.D., P.E., *Chairman*
Toby Baker, *Commissioner*
Jon Niermann, *Commissioner*
Stephanie Bergeron Perdue, *Interim Executive Director*

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

April 12, 2018

Mr. Hamid Kamalpour
U.S. Air Force Civil Engineer Center
AFCEC/CZN
2261 Hughes Ave., Ste. 155
Lackland AFB, Texas 78236-9853

Via: Mail

Re: TCEQ NEPA Request #2018 083. EIS Potential Environmental Consequences associated with AFRC: Fort Worth, Texas, Tarrant County

Dear Mr. Kamalpour:

The Texas Commission on Environmental Quality (TCEQ) has reviewed the above-referenced project and offers the following comments:

A review of the project for general conformity impact in accordance with 40 CFR Part 93 indicates that the proposed project is located in Tarrant County, which is currently classified by the United States Environmental Protection Agency as moderate nonattainment for the 2008 ozone National Ambient Air Quality Standard. Therefore, general conformity rules apply.

The two primary precursors to ozone formation are volatile organic compounds (VOCs) and nitrogen oxides (NOx). A general conformity analysis may be required when a project results in an emissions increase of 100 tons per year or greater for either VOCs or NOx. Because the emissions from this proposed project are expected to be below these thresholds it is not anticipated to impact the state implementation plan; therefore a general conformity analysis is not required.

The Office of Water does not anticipate significant long term environmental impacts from this project as long as construction and waste disposal activities associated with it are completed in accordance with applicable local, state, and federal environmental permits, statutes, and regulations. We recommend that the applicant take necessary steps to ensure that best management practices are used to control runoff from construction sites to prevent detrimental impact to surface and ground water.

Any debris or waste disposal should be at an appropriately authorized disposal facility. If the facility intends to store hazardous waste for more than 90 days, they need to coordinate with our Waste Permits Division to seek authorization prior to storage.

Thank you for the opportunity to review this project. If you have any questions, please contact the agency NEPA Coordinator, at (512) 239 3500 or NEPA@tceq.texas.gov.

Sincerely,

Ryan Vise
Division Director
Intergovernmental Relations

P.O. Box 13087 • Austin, Texas 78711-3087 • 512-239-1000 • tceq.texas.gov
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Fort Worth CHAMBER

April 19, 2018

Mr. Hamid Kamalpour
U.S. Air Force Civil Engineer Center, AFCEC/CZN
2261 Hughes Avenue, Suite 155
Lackland AFB, TX 78236-9853

Dear Mr. Kamalpour:

This letter is in regards to the Air Force Reserve Command (AFRC) F-35A Operational Beddown environmental impact statement (EIS). Fort Worth has a rich military history dating back to Carswell Air Force Base, now NAS Fort Worth JRB, and the Fort Worth Chamber of Commerce's advocacy efforts on behalf of the base have long been a focus that includes local, state and federal outreach.

Additionally, the communities surrounding the base have long realized the importance of this installation and created the Regional Coordination Committee (RCC) over ten years ago. At the time, the RCC was the first of its kind and has led to collaboration between governments, military and the public regarding growth and activities on the base. In fact, any proposed development near the base must be submitted online to be reviewed by all members of the committee to help ensure compatibility.

During the last Texas Legislative Session, three military affairs priorities were passed and signed by Governor Abbott. The first, Senate Bill 277, addresses encroachment by wind farms by prohibiting developments within twenty-five nautical miles of a military installation. Second, House Bill 890 requires sellers of property to include information on the impact of military installations nearby and includes the most recent joint land use study. It is important to note that NAS Fort Worth JRB has historically had very few noise complaints and zero within the last eighteen months. Third, House Bill 1643 prohibits drone usage over certain areas, including air space, and prohibits local governments from adopting ordinances without FAA approval.

This year, the RCC presented the new Joint Land Use Study (JLUS) to the community that has identified numerous strategies. Drone usage and land use management continue to be a priority along with implementing the real estate disclosure legislation to educate buyers on noise contours. Since the completion of the 2008 JLUS, the cities of Benbrook and Fort Worth have created zoning overlays. Fort Worth has updated building codes to require sound attenuation enhancing compatible development approaches.

NAS Fort Worth JRB shares a fence line and runway with Lockheed Martin Aeronautics, which produces the F-35 Lightning II. The runway was recently resurfaced and extended, which allows for additional capacity in training missions.

FORT WORTH CHAMBER OF COMMERCE
777 Taylor Street, Suite 900 ★ Fort Worth, Texas 76102-4997
817-336-2491 ★ Fax 817-877-4034 ★ www.FortWorthChamber.com

A.3.4.1 Naval Air Station Joint Reserve Base Fort Worth Agency Coordination Responses (Continued)

On behalf of the Fort Worth Chamber of Commerce and its 2,000 member businesses, we believe NAS Fort Worth JRB is the best location for the AFRC F-35A Operational Beddown. If you have any questions regarding this letter, please do not hesitate to call me at 817-338-3300.

Sincerely,

Bill Thornton
President & CEO
Fort Worth Chamber of Commerce

TEXAS PARKS & WILDLIFE

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May 2, 2018

Mr. Hamid Kamalpour
Air Force Civil Engineer Center NEPA Division (AFCEC/CZN)
2261 Hughes Ave, Suite 155
Lackland AFB TX 78235-9853

RE: EIS Scoping for Air Force Reserve Command F-35A Operational Beddown
TPWD Project 39808

Dear Mr. Hamid Kamalpour:

In preparation of an Environmental Impact Statement (EIS), the U.S. Air Force (USAF) has solicited comments from the Texas Parks and Wildlife Department (TPWD) to identify environmental issues or concerns associated with the above-referenced project.

Project Description

The USAF proposes an Air Force Reserve Command (AFRC) F-35A Operational Beddown to be located at one of four alternative sites to be evaluated in the EIS. The four sites under evaluation are the Davis-Monthan Air Force Base, Arizona; Homestead Air Reserve Base, Florida; Whiteman Air Force Base, Missouri; and Naval Air Station Fort Worth Joint Reserve Base (NAS Fort Worth JRB), Texas, which is also preliminarily identified as the preferred alternative. To enable fighter modernization, the mission includes the basing and operation of 24 Primary Aerospace Vehicles Authorized F-35A aircraft with 2 Backup Aircraft Inventory, facility and infrastructure development, and personnel changes at a military installation within the continental United States where the AFRC conducts a global precision attack mission.

Scoping materials indicate that the proposed action would eventually replace the existing 24 AFRC F-16 aircraft at NAS Fort Worth JRB and the AFRC F-16 mission would transition to the AFRC F-35A mission. Facility and infrastructure changes at NAS Fort Worth JRB would include re-use of existing and construction of new hangars, re-use of existing and construction of new buildings, aircraft parking, fuel facilities, and base service support infrastructure.

The USAF will address the following environmental resource areas in the EIS: airspace management and use, noise, air quality, flight and ground safety, soils and water, biological resources, community infrastructure, cultural resources, and human resources.

As the state agency with primary responsibility for protecting the state's fish and wildlife resources, in accordance with the authority granted by Parks and Wildlife Code §12.0011 and per coordination under the National Environmental Policy Act, TPWD hereby provides the following comments and recommendations to minimize potential adverse impacts to the state's fish and wildlife resources, including rare, threatened and endangered species, in the construction and operation of the proposed project that may occur in Texas.

4200 SMITH SCHOOL ROAD
AUSTIN, TEXAS 78744-3291
512.389.4800
www.tpwd.texas.gov

To manage and conserve the natural and cultural resources of Texas and to provide hunting, fishing and outdoor recreation opportunities for the use and enjoyment of present and future generations.

A.3.4.1 Naval Air Station Joint Reserve Base Fort Worth Agency Coordination Responses (Continued)

Mr. Hamid Kamalpour
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Federal Regulations

Migratory Bird Treaty Act (MBTA)

The MBTA prohibits taking, attempting to take, capturing, killing, selling/purchasing, possessing, transporting, and importing of migratory birds, their eggs, parts and nests, except when specifically authorized by the Department of the Interior. The U.S. Fish and Wildlife Service (USFWS) Migratory Bird Office can be contacted for more information.

The NAS Fort Worth JRB occurs within an urban setting and consists of previously-disturbed areas, maintained grassland, Lake Worth frontage, and few treed areas within the floodplain adjacent to the West Fork Trinity River. However, there is some potential for impacts to migratory birds during site preparation and grading activities through the disturbance of existing vegetation and bare ground that may harbor active bird nests, including nests that may occur in grass, shrubs and trees and on bare ground including gravel pads and roads.

Recommendation: If clearing vegetation during the nesting season is unavoidable, TPWD recommends surveying the construction area to ensure that no nests with eggs or young will be disturbed by construction. Any vegetation or bare ground areas where occupied nests are located should not be disturbed until the eggs have hatched and the young have fledged.

The project area is located within the Central Flyway, a major bird migration corridor that leads to the Texas coast and Central/South America. Artificial nighttime lighting can attract and disorient night-migrating birds. Birds circling the lights' glare can cause exhaustion mortality.

Recommendation: TPWD recommends the USAF use the minimum amount of night-time lighting needed for safety and security and to use dark-sky friendly lighting that is on only when needed, down-shielded, as bright as needed, and minimizes blue light emissions. Appropriate lighting technologies and best management practices (BMPs) can be found at the International Dark-Sky Association website.

Endangered Species Act (ESA)

Federally-listed animal species and their habitat are protected from take on any property by the ESA. Take of a federally-listed species can be allowed if it is incidental to an otherwise lawful activity and must be permitted in accordance with Section 7 or 10 of the ESA. Take of a federally-listed species or its habitat without allowance from USFWS is a violation of the ESA. The USFWS rare species lists can be obtained at the UFWS IPaC website.

Recommendation: TPWD recommends that the EIS identify the federally-listed and candidate species with potential to occur within the project area.

Mr. Hamid Kamalpour
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Recommendation: If impact to a federally-listed species is anticipated, TPWD recommends consultation with USFWS – Arlington Ecological Services at (817) 277-1100 pursuant to the ESA. The USFWS should be contacted for additional species occurrence data, guidance, permitting, survey protocols, and mitigation for federally-listed species.

The project study area is located within the approximately 200-mile wide corridor in which 95 percent of sightings of the Aransas/Wood Buffalo flock of the federal- and state-listed endangered whooping crane (*Grus americana*) have been documented during migration. Please note that the only wild migratory population of the whooping crane is the Aransas/Wood Buffalo flock which contained an estimated 431 individuals in 2017.

Recommendation: TPWD recommends that USAF consider the timing and location of migrating whooping cranes to incorporate appropriate BMPs into the flight plans for the mission to avoid or minimize potential collision impacts to whooping cranes. As technology improves the ability to track migrating wildlife, the USAF may be able to obtain real-time tracking information from USFWS to signal when cranes are within the airspace and to determine the elevation at which collisions would be a concern. For additional information regarding the whooping crane and threats to this species, please contact Dr. Wade Harrell, the USFWS Whooping Crane Recovery Coordinator, at (361) 286-3559.

State Regulations

State-Listed Species

Section 68.015 of the Parks and Wildlife Code regulates state-listed species. Please note that there is no provision for capture, trap, take, or kill (incidental or otherwise) of state-listed species. The *TPWD Guidelines for Protection of State-Listed Species* includes a list of penalties for capture, trap, take, or kill of state-listed species and can be found on the TPWD Wildlife Habitat Assessment Program website.

The TPWD Annotated County Lists of Rare, Threatened, and Endangered Species (RTEST) are available at http://tpwd.texas.gov/gis/rtest/. These lists provide information regarding state-listed and species of greatest conservation need (SGCN) that have potential to occur within each county in Texas. State-listed species could potentially be impacted if suitable habitat is present at or near the project site.

Recommendation: TPWD recommends the EIS identify the state-listed species with potential to occur in Tarrant County, identify whether the project area contains habitat suitable for state-listed species, and indicate if project activities would impact state-listed species or their habitats.

As indicated above, the NAS Fort Worth JRB within an urban setting and consists of previously-disturbed areas and maintained grassland within the floodplain adjacent to

A.3.4.1 Naval Air Station Joint Reserve Base Fort Worth Agency Coordination Responses (Continued)

Mr. Hamid Kamalpour
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West Fork Trinity River. Review of aerial imagery indicates there is minimal habitat for wildlife within the action area, however, some undeveloped woodland and riparian habitat occurring near the project area could support wildlife that may travel through the project site.

Of the terrestrial species listed for Tarrant County, the state-threatened timber rattlesnake (*Crotalus horridus*) is more at risk for being impacted by construction activities due to its limited mobility. Suitable riparian and/or upland woodland habitat occurring near the project area may provide suitable habitat for the timber rattlesnake.

Recommendation: TPWD encourages the USAF, AFRC, NAS Fort Worth JRB and its contractors to be informed of the federal- and state-listed species and species of greatest conservation need (SGCN) with potential to occur in the project county and to take precautions avoid impacts to rare species if encountered in the project area. Wildlife observed during construction should be allowed to safely leave the site.

Recommendation: For encounters with rare species that will not readily leave the premises, TPWD recommends a permitted individual translocate the animal. Translocations of reptiles should be the minimum distance possible no greater than one mile, preferably within 100-200 yards from the initial encounter location. For purposes of relocation, surveys, monitoring, and research, terrestrial state-listed species may only be handled by persons authorized through the TPWD Wildlife Permits Office.

Recommendation: Various small vertebrates including snakes, lizards, toads and mice fall into trenches and become trapped. Wildlife unable to escape from trenches are susceptible to loss from backfilling activities, exposure to elements, starvation, dehydration, and predation by other wildlife. When constructing trenches for utilities and footings, TPWD recommends that contractors keep trenching and backfilling timelines close together to minimize the amount of trenches left open at any given time during construction. TPWD recommends that open trenches or excavation areas be covered overnight and inspected each morning to ensure no reptiles or other wildlife species have been trapped. Trenches should be inspected for the presence of trapped reptiles prior to backfilling. If trenches cannot be backfilled the day of initial trenching, then escape ramps should be installed at least every 90 meters consisting of short lateral trenches or wooden planks sloping to the surface at an angle of less than 45 degrees.

Recommendation: For soil stabilization and/or revegetation of disturbed areas within the proposed project area, TPWD recommends erosion and seed/mulch stabilization materials that avoid entanglement hazards to snakes and other wildlife species. Because the mesh found in many erosion control blankets or mats pose an entanglement hazard to wildlife TPWD recommends the use of no-till drilling, hydromulching and/or hydroseeding rather than erosion control blankets or mats due to a reduced risk to wildlife. If erosion control blankets or mats will be used, the product should contain no netting or contain loosely woven, natural fiber netting in which the mesh design allows the threads to move, therefore allowing expansion of the mesh openings. Plastic mesh matting should be avoided.

Mr. Hamid Kamalpour
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May 2, 2018

Recommendation: To aid in the scientific knowledge of a species' status and current range, TPWD encourages reporting encounters of state-listed species and SGCN to the Texas Natural Diversity Database (TXNDD) according to the data submittal instructions found on the TXNDD website.

State Fish and Wildlife Resources

The Texas Conservation Action Plan (TCAP) provides guidance toward addressing Species of Greatest Conservation Need (SGCN) and important habitats. The TCAP includes a statewide handbook as well as handbooks for each ecoregion of the state that can be found on the TPWD website to help guide your planning efforts.

In addition to state- and federally-protected species, SCGN and natural plant communities are tracked in the TXNDD, and TPWD actively promotes their conservation. TPWD considers it important to evaluate and, if necessary, minimize impacts to rare species and their habitat to reduce the likelihood of endangerment and preclude the need to list as threatened or endangered in the future. SGCN are included in the above-referenced county RTEST application.

Based on the presence of suitable habitat in or near the NAS Fort Worth JRB and the species' limited mobility and life history requirements, terrestrial SGCN from the Tarrant County list with greater potential to be impacted by project activities include the Western burrowing owl (*Athene cunicularia hypugaea*), Plains spotted skunk (*Spilogale putorius interrupta*), and Texas garter snake (*Thamnophis sirtalis annectens*).

The TXNDD is intended to assist users in avoiding harm to rare species or significant ecological features. Given the small proportion of public versus private land in Texas, the TXNDD does not include a representative inventory of rare resources in the state. Please note that absence of information in the database does not imply that a species is absent from that area. Although it is based on the best data available to TPWD regarding rare species, the data from the TXNDD do not provide a definitive statement as to the presence, absence or condition of special species, natural communities, or other significant features within your project area. These data are not inclusive and **cannot be used as presence/absence data**. This information cannot be substituted for on-the-ground surveys. The TXNDD is updated continuously based on new, updated and undigitized records; for questions regarding a record or to obtain digital data, please contact TexasNatural.DiversityDatabase@tpwd.texas.gov.

A review of the TXNDD indicated no known occurrences of state-listed species within the vicinity of the project area, however, the TXNDD did reveal a recent occurrence of the Eastern spotted skunk (*Spilogale putorius*) within approximately 1 mile of the project area. Because the Plains spotted skunk is the only subspecies of the Eastern spotted skunk that is found in Texas, the TXNDD Eastern spotted skunk occurrence represents the Plains spotted skunk, which is an SGCN in Texas.

A.3.4.1 Naval Air Station Joint Reserve Base Fort Worth Agency Coordination Responses (Continued)

Mr. Hamid Kamalpour
Page 6
May 2, 2018

Recommendation: TPWD recommends that precautions be taken to avoid impact to SGCN flora and fauna and natural plant communities when working in Tarrant County or if encountered during project construction, operation and maintenance activities.

Recommendation: TPWD recommends the project actions be designed and placed to avoid impacts to streams, riparian corridors, and wetland areas and their associated riparian buffer. TPWD recommends utilizing areas of existing impervious cover to the extent feasible to minimize loss of greenspace and undeveloped areas.

Thank you for considering the fish and wildlife resources of Texas. If you have any questions, please contact me at Karen.Hardin@tpwd.texas.gov or (903) 322-5001.

Sincerely,

Karen B. Hardin
Wildlife Habitat Assessment Program
Wildlife Division

kbh/39808

Naval Air Station Fort Worth Joint Reserve Base (NAS Fort Worth JRB)
Regional Coordination Committee (RCC)

Voting Entities

City of Benbrook
City of Fort Worth
City of Lake Worth
City of River Oaks
City of Sansom Park
City of Westworth Village
City of White Settlement
Tarrant County

Non Voting Entities

Benbrook Area Chamber of Commerce
DOD Office of Economic Adjustment
Fort Worth Chamber of Commerce
Fort Worth Transportation Authority
Lockheed Martin
Naval Air Station Fort Worth Joint Reserve Base
North Central Texas Council of Governments
Northwest Tarrant Chamber of Commerce
Tarrant Regional Water District
Texas Department of Transportation - Fort Worth District
Tri-City Area Chamber of Commerce
White Settlement Area Chamber of Commerce

May 8, 2018

Mr. Hamid Kamalpour
United States Air Force, AFCEC/CZN
2261 Hughes Ave, Ste 155
Lackland AFB, TX 78236-9853

Dear Mr. Kamalpour:

On behalf of the Naval Air Station Fort Worth Joint Reserve Base (NAS Fort Worth JRB) Regional Coordination Committee (RCC) and it's eight member communities, we submit this statement of support for the preparation of an Environmental Impact Statement (EIS) for the Operational Beddown of the Air Force Reserve Command F-35A mission at the 301st Fighter Wing at NAS Fort Worth JRB.

Supporting the military mission is vital to the economy of Texas and the Dallas-Fort Worth area. The RCC recognizes the NAS Fort Worth JRB as a contributor to the region's economic base and a provider of jobs to military personnel, civilians, and contractors while providing national security. We look forward to the results of the EIS and the economic benefits that will result from the F-35 Beddown. Please let us know if we can provide any information or be of any assistance in the preparation of the EIS.

If you have any questions or concerns, please feel free to contact me at (817) 319-4455 or Rebekah Hernandez at (817) 704-2544.

Sincerely,

Dennis Shingleton, Chair
Regional Coordination Committee
Mayor Pro Tem, City of Fort Worth

KM/CLH

www.nctcog.org/rcc

Local governments surrounding the Naval Air Station Fort Worth Joint Reserve Base have voluntarily formed the Regional Coordination Committee to promote and preserve the military mission at the installation. The Committee is responsible for encouraging compatible land use planning, conducting community outreach, and participating in military affairs surrounding NAS Fort Worth JRB.

A.3.4.2 Naval Air Station Joint Reserve Base Fort Worth Tribal Consultation Responses

To support this EIS, the USAF consulted on a government-to-government basis with potentially affected tribes in the ROI for each base associated with the proposed AFRC F-35A operational beddown. The ROI includes each installation and the area surrounding the base. The following table provides a summarized list of USAF communication with tribes in the ROI for Naval Air Station (NAS) Joint Reserve Base (JRB) Fort Worth. Tribes listed in Table A-3 received a letter notifying the tribe of the project, as well as requesting government-to-government consultation under Section 106 of the NHPA. Several tribes responded to consultation requests or coordination letters, and a brief summary of the responses is included in Table A-3.

Follow-up correspondence was conducted for tribes that did not respond to initial consultation and coordination efforts. This additional outreach included telephone and e-mail correspondence.

Table A-3. NAS JRB Fort Worth Tribal Consultation

Tribe	Summary Response	NEPA Notification Letter	Section 106 Letter	Follow-Up Correspondence (email/phone calls)
NAS JRB Fort Worth				
Alabama-Coushatta Tribe of Texas[a]	10 October 2018 response via telephone confirmed receipt of letter and indicated no interest in the project area.	27 March 2018	23 August 2018	10 October 2018, phone.
Apache Tribe of Oklahoma[a]	Processing consultation letter and will provide response following review.	27 March 2018	23 August 2018	4 January 2019, phone. 7 January 2019, phone and email.
Caddo Nation of Oklahoma[a]	No response at this time.	27 March 2018	23 August 2018	10 October 2018, phone, email. 15 November 2018, email.
Cheyenne and Arapaho Tribes, Oklahoma[a]	4 April 2018 letter indicated no interest. Consultation is complete; no further action required.	27 March 2018	Tribal response received; no additional follow up was required.	Tribal response received; no additional follow up was required.
Choctaw Nation of Oklahoma[a]	12 October 2018 email response indicated no interest in the project area. Consultation is complete, no further action required.	27 March 2018	23 August 2018	10 October 2018, email.
Comanche Nation of Oklahoma[a]	14 May 2018 response letter indicated no properties in the project area. Consultation is complete and no further action required.	27 March 2018	Tribal response received; no additional follow up was required.	Tribal response received; no additional follow up was required.
Delaware Nation[a]	24 September 2018 email indicated concurrence with the proposed plan at this time. Would like to continue to receive project information via email.	27 March 2018	23 August 2018	Tribal response received; no additional follow up was required.

Table A-3. NAS JRB Fort Worth Tribal Consultation (Continued)

Tribe	Summary Response	NEPA Notification Letter	Section 106 Letter	Follow-Up Correspondence (email/phone calls)
NAS JRB Fort Worth				
Kickapoo Traditional Tribe of Texas[a]	16 November 2018 response letter indicated no issues with the proposed action. Consultation is complete; no further action required.	27 March 2018	23 August 2018	10 October 2018, phone, email. 15 November 2018, email.
Kiowa Tribe of Oklahoma[a]	No response at this time.	28 March 2018	23 August 2018	10 October 2018, phone. 15 October 2018, phone, email. 15 November 2018 email, phone.
Muscogee (Creek) Nation[a]	4 October 2018 email indicated no properties in project area.	28 March 2018	23 August 2018	Tribal response received; no additional follow up was required.
Osage Nation[a]	15 November 2018 response. Consultation is complete; no further action required.	28 March 2018	23 August 2018	10 October 2018, phone. 15 November 2018, email.
Quapaw Tribe of Indians[a]	30 August 2018 letter commented that the "project is outside of the current area of interest for the Quapaw Tribe; therefore, the Quapaw Tribe does not desire to comment on this project at this time."	28 March 2018	23 August 2018	Tribal response received; no additional follow up was required.
Fort Sill Apache Tribe of Oklahoma[a]	No response at this time.	28 March 2018	23 August 2018	11 October 2018, email. 19 November 2018, phone. 8 January 2019, phone.
Wichita and Affiliated Tribes[a]	No response at this time.	28 March 2018	23 August 2018	11 October 2018, email. 19 November 2018, phone (left message), email.
Tonkawa Tribe of Oklahoma[a]	14 February 2019 letter commented that the Tonkawa Tribe has no specifically designated sites in the area.	28 March 2018	23 August 2018	10 October 2018, phone. 19 November 2018, phone (left message). 9 January 2019, email.
Tunica-Biloxi Tribe[a]	No response at this time.	28 March 2018	23 August 2018	10 October 2018, phone. 26 November 2018, phone, email.

[a] Section 106 consultation is considered complete. Unless otherwise requested, tribes will continue to receive project information.

A.3.4.2 Naval Air Station Joint Reserve Base Fort Worth Tribal Consultation Responses (Continued)

TRIBAL HISTORIC PRESERVATION
P.O. BOX 167
CONCHO, OKLAHOMA 73022

1-800-247-4612 Toll Free
405-422-7484 Telephone

April 4, 2018
THPO ID #: 440

Department of the Air Force
Raquel R. Fischer
2261 Huges Ave, Suite 155
Lackland AFB, TX 78235-9853

RE: Environmental Impact Statement to determine the effects of Air Force Reserve Command F-35A Operation Beddown

Dear Consultant:

On behalf of the Cheyenne and Arapaho Tribes, thank you for the notification of the EIS for effects from Operation Beddown. At this time, we have **No Interest**. We offer our best wishes and look forward to future projects.

Please contact me with the THPO ID number at (405) 422-7416 or mdemery@c-a-tribes.org, if you have any questions or concerns. Alternate contact is Virginia Richey; she can be reached directly at (405) 422-7484 or vrichey@c-a-tribes.org. Thank you again for your notification!

Best Regards,

Micah Looper
Research Analyst

CC: Virginia Richey
Tribal Historic Preservation Office/THPO Officer
Max Bear, Director

COMANCHE NATION

Air Force Civil Engineer Center NEPA Division (AFCEC/CZN)
Attn: Mr. Hamid Kamalpour
2261 Hughes Ave, Ste. 155
Texas 78236-9853

May 14, 2018

Re: Air Force Reserve Command (AFRC) F-35A Operational Beddown

Dear Mr. Kamalpour:

In response to your request, the above reference project has been reviewed by staff of this office to identify areas that may potentially contain prehistoric or historic archeological materials. The location of your project has been cross referenced with the Comanche Nation site files, where an indication of ***"No Properties"*** have been identified. (IAW 36 CFR 800.4(d)(1)).

Please contact this office at (580) 595-9960/9618) if you require additional information on this project.

This review is performed in order to identify and preserve the Comanche Nation and State cultural heritage, in conjunction with the State Historic Preservation Office.

Regards

Comanche Nation Historic Preservation Office
Theodore E. Villicana , Technician
#6 SW "D" Avenue, Suite C
Lawton, OK. 73502

COMANCHE NATION P.O. BOX 908 / LAWTON, OK 73502
PHONE: 580-492-4988 TOLL FREE: 1-877-492-4988

A.3.4.2 Naval Air Station Joint Reserve Base Fort Worth Tribal Consultation Responses (Continued)

QUAPAW TRIBE OF OKLAHOMA

P.O. Box 765
Quapaw, OK 74363-0765

(918) 542-1853
FAX (918) 542-4694

August 30, 2018

Public Affairs Officer
301st Fighter Wing
1654 Lyons Drive, Suite 144
NAS Forth Worth JRB TX 76127-1060

Re: UAF preparing an EIS, Denton County, Forth Worth, Texas

To Whom It May Concern:

This project is outside of the current area of interest for the Quapaw Tribe; therefore, the Quapaw Tribe does not desire to comment on this project at this time. Thank you for your efforts to consult with us on this matter.

Sincerely,

Everett Bandy

Everett Bandy, THPO
Quapaw Tribe of Oklahoma
P.O. Box 765
Quapaw, OK 74363
(p) 918-238-3100

From: ALLEN, CANDICE N Maj USAF AFRC 301 FW/PA
Sent: Monday, September 24, 2018 6:09 PM
To: Kimberly Penrod <kpenrod@delawarenation.com>
Cc: VARNER, RANDY H GS-11 USAF AFRC 301 MSG/CEV <randy.varner@us.af.mil>
Subject: RE: RE: Air Force Reserve Command AFRC F-35A Operational Beddown Environmental Impact Statement

Kimberly –

Thank you for your response and your support with the current proposed plan to beddown F-35s at the 301st Fighter Wing at NAS Fort Worth JRB.

I recommend signing up on the AFRC F-35 website at https://www.afrc-f35a-beddown.com to receive the latest updates as well as the draft Environmental Impact Statement as soon as it is released.

We look forward to working with and updating you and the Delaware Nation on the progress.

Respectfully,
Candice

//SIGNED//
CANDICE N. ALLEN, Maj, USAF
Chief, Public Affairs
301st Fighter Wing
Voice: DSN 739-7450 / Comm (817) 782-7450
FAX: DSN 739-7603 / Comm (817) 782-7603
candice.allen@us.af.mil

From: Kimberly Penrod [mailto:kpenrod@delawarenation.com]
Sent: Monday, September 24, 2018 9:33 AM
To: ALLEN, CANDICE N Maj USAF AFRC 301 FW/PA <candice.allen@us.af.mil>
Subject: [Non-DoD Source] RE: Air Force Reserve Command AFRC F-35A Operational Beddown Environmental Impact Statement

Candice,
The protection of our tribal cultural resources and tribal trust resources will take all of us working together.
We look forward to working with you and your agency.
With the information you have submitted we can concur at present with this proposed plan.

As with any new project, we never know what may come to light until work begins.
The Delaware Nation asks that you keep us up to date on the progress of this project and if any discoveries arise please contact us immediately.

A.3.4.2 Naval Air Station Joint Reserve Base Fort Worth Tribal Consultation Responses (Continued)

Our department is trying to go as paper free as possible. If it is at all feasible for your office to send email correspondence we would greatly appreciate.

If you need anything additional from me please do not hesitate to contact me.

Respectfully,

Kim Penrod
Delaware Nation
Director, Historic Preservation
31064 State Highway 281
PO Box 825
Anadarko, OK 73005
(405)-247-2448 Ext. 1403 Office
(405)-924-9485 Cell
kpenrod@delawarenation.com

Unless someone like you cares a whole awful lot, nothing is going to get better. It's not. ~Dr. Seuss

From: Emman Spain
To: ALLEN, CANDICE N Maj USAF AFRC 301 FW/PA
Subject: [Non-DoD Source] F-35A aircraft beddown at Naval Air Station Ft. Worth
Date: Thursday, October 04, 2018 2:07:05 PM

Dear Sir,

The Muscogee (Creek) Nation has received the United States Air Force notice of preparing an Environmental Impact Statement to assess the potential impacts associated with the beddown of the F-35A aircraft at the Naval Air Station in Ft. Worth, Texas. Upon review of the information received, the Muscogee (Creek) Nation is unaware of any religious or culturally significant sites within the project area. Thank you.

Emman Spain
Historic and Cultural Preservation Department, NAGPRA Officer
Muscogee (Creek) Nation
P.O. Box 580 | Okmulgee, OK 74447
T 918 732 7730
F 918 758 0649
emspain@MCN-nsn.gov
www.mcn-nsn.gov

A.3.4.2 Naval Air Station Joint Reserve Base Fort Worth Tribal Consultation Responses (Continued)

From: Daniel R. Ragle
To: ALLEN, CANDICE N Maj USAF AFRC 301 FW/PA
Subject: [Non-DoD Source] RE: Scoping Letter - F-35 Environmental Impact Statement
Attachments: image001.gif
image002.jpg

Thank you for the correspondence regarding the above referenced project and I apologize for the very late response. This project lies outside of our area of historic interest. Therefore, the Choctaw Nation of Oklahoma respectfully defers to the other Tribes that have been contacted. If you have any questions, please contact me by email.

Daniel Ragle
Compliance Review Officer
Historic Preservation Dept.
Choctaw Nation of Oklahoma
(800) 522-6170 Ext. 2727
dragle@choctawnation.com
www.choctawnation.com
www.choctawnationculture.com

This message is intended only for the use of the individual or entity to which it is addressed and may contain information that is privileged, confidential and exempt from disclosure. If you have received this message in error, you are hereby notified that we do not consent to any reading, dissemination, distribution or copying of this message. If you have received this communication in error, please notify the sender immediately and destroy the transmitted information. Please note that any view or opinions presented in this email are solely those of the author and do not necessarily represent those of the Choctaw Nation.

TRADITIONAL COUNCIL

CHAIRMAN
Emavlo M. Elizondo, Sr., Menikapah

SECRETARY
David P. Valdez, Sr., Pietotulu

TREASURER
David Treviño, Wepikoda

MEMBERS
Kendall R. Scott, Metna
Daniel Gonzalez, Sr., Pietanokuko

KICKAPOO
TRADITIONAL TRIBE OF TEXAS

2212 Rosita Valley Rd.
Eagle Pass, Texas 78852

TRIBAL COUNCIL

November 16, 2018

Maj. Candice Allen, Public Affairs Officer
Department of the Army
Naval Air Station Fort Worth
Joint Reserve Base
1510 Chennault Avenue
Fort Worth, Texas 76127 5000

Re: Environmental Impact Statement (EIS) to assess the Potential Environmental Impacts Associated with the Beddown of F-35A Aircraft for the Air Force Reserve Command at one Air Force installation in the Continental United States.

Dear Ms. Allen:

Our office is in receipt of a letter dated August 21, 2018 by which the Kickapoo Traditional Tribe of Texas ("KTTT") is advised of the above mentioned project as required by law and regulations and pursuant to Section 106 of the National Historic Preservation Act.

In addition, you request our comments regarding properties of religious and/or cultural significance to the Tribe that may be affected by the proposed project to determine if the undertaking has the potential to adversely impact any identified sites.

In response to your letter, we hereby advise you that the Kickapoo Traditional Tribe of Texas does not own land located in the aforementioned site, nor would the proposed project affect any of the Tribe's historic and/or sacred sites that we are aware of. Nevertheless, the KTTT appreciates the opportunity it was granted to comment on this matter.

Should you have any questions regarding this matter please do not hesitate to contact this office at (830) 421 5388.

Respectfully,

Jason C. Nelson
KTTT General Counsel

Via: Email

"A Federal and State Recognized Sovereign Indian Nation"

A.3.4.2 Naval Air Station Joint Reserve Base Fort Worth Tribal Consultation Responses (Continued)

From: ALLEN, CANDICE N Maj USAF AFRC 926 WG/926 WG/PA <candice.allen@us.af.mil>
Sent: Thursday, December 20, 2018 3:30 PM
To: Daniel R. Ragle
Cc: HARVEY, MELISSA M TSgt USAF AFRC 301 FW/PA; ROMAN, JEREMY A MSgt USAF AFRC 301 FW/PA; Daues, Tom V. [US-US]; Tutterow, Brian W. [US-US]; VARNER, RANDY H GS-11 USAF AFRC 301 MSG/CEV; KAMALPOUR, HAMID GS-13 USAF AFMC AFCEC/CZN
Subject: EXTERNAL: RE: [Non-DoD Source] RE: NAS Fort Worth JRB Project; Preperation of an Environmental Impact Statement to assess the potential environmental impacts associated with the beddown of F-35A Aircraft for the AFRC at one Air Force Installation in th...

Daniel –

Thank you for your response.

I no longer work at the 301st Fighter Wing.

That said, I forwarded your email to the applicable points of contact (copied on this email). You can direct any future questions to Melissa Harvey, Jeremy Roman or Randy Varner (all copied on this email).

Respectfully,
Candice

CANDICE N. ALLEN, Maj, USAF
Public Affairs Officer, 926th Wing
4325 Plattsburg Ave, Bldg 334
Nellis AFB, NV 89191
DSN: 682-0253
Comm: (702) 652-0253
www.926wing.afrc.af.mil

Like us on Facebook – www.facebook.com/926thWing
Follow us on Twitter – www.twitter.com/926thWing

From: Daniel R. Ragle <dragle@choctawnation.com>
Sent: Thursday, December 20, 2018 1:19 PM
To: ALLEN, CANDICE N Maj USAF AFRC 926 WG/926 WG/PA <candice.allen@us.af.mil>
Subject: [Non-DoD Source] RE: NAS Fort Worth JRB Project; Preperation of an Environmental Impact Statement to assess the potential environmental impacts associated with the beddown of F-35A Aircraft for the AFRC at one Air Force Installation in the Continental ...

Thank you for the information regarding the above referenced project and I apologize for the late response. Since the project has passed the 30 day review period, we request that our office is contacted if any Native American cultural materials or remains are encountered. If you have any questions, please contact me by email.

1

Daniel Ragle
Compliance Review Officer
Historic Preservation Dept.
Choctaw Nation of Oklahoma
(800) 522-6170 Ext. 2727
dragle@choctawnation.com
www.choctawnation.com
www.choctawnationculture.com

Choctaw Nation
Faith•Family•Culture

2

A.3.4.2 Naval Air Station Joint Reserve Base Fort Worth Tribal Consultation Responses (Continued)

TONKAWA TRIBE OF OKLAHOMA
NATIVE AMERICAN GRAVES PROTECTION AND REPATRIATION ACT (NAGPRA)
1 RUSH BUFFALO ROAD - PHONE (580) 628-2561 - FAX (580) 628-2279
TONKAWA, OKLAHOMA 74653
www.tonkawatribe.com

February 14, 2019

DEPARTMENT OF THE NAVY
Naval Air Station Fort Worth-Joint Reserve Base
Attn: Mr. John T. Jersey
Environmental Protection Specialist/COR
1510 Chennault Avenue
Fort Worth, TX 76127-5000

Re: Section 106 Request for Consultation: **Environmental Impact Statement (EIS) for the Air Force Reserve Command (AFRC) F-35A Mission**, Naval Air Station (NAS) Joint Reserve Base (JRB) Forth Worth, Tarrant County, Texas

Dear Mr. Jersey:

On behalf of President Russell L. Martin and the Tonkawa Tribe of Oklahoma (TTO) in regards to the *Request for Consultation on the* ***Environmental Impact Statement (EIS) for the Air Force Reserve Command (AFRC) F-35A Mission****; the potential impacts resulting from basing and operating 24 F-35A Primary Aircraft Assigned (PAA) with two (2) Backup Aircraft Inventory (BAI), the EIS to assess the potential environmental impacts associated with the beddown of F-35A aircraft for AFRC will evaluate on-base related construction, demolition, and renovation of facilities along with off-base operational impacts of the F-35A; if NAS Fort Worth JRB is to receive the AFRC F-35A mission, the F-35A aircraft would replace existing F-16 aircraft, the types and number of flight operations would be similar to existing F-16 operations and would use existing airspace and ranges within the Area of Potential Effect (APE) Airspace as defined as the areas of ground disturbance associated with facility construction, demolition, and renovation at NAS Fort Worth JRB, and the land which underlies the primary ranges and airspaces that will be used by F-35A pilots outlined in the Airspace APE and the Installation APE; TTO concurs with the Airspace and Installation APE and is previously disturbed, no adverse effects would arise to any historic places/sites; Naval Air Station (NAS) Joint Reserve Base (JRB) Forth Worth, Tarrant County, Texas;* TTO submits the following:

The Tonkawa Tribe has no specifically designated historical, religious and/or cultural significance in the Proposed Project Area: *however*, if any human remains, funerary objects, or other evidence of historical or cultural significance is inadvertently discovered then the Tonkawa Tribe would certainly be interested in proper disposition thereof. The Tonkawa Tribe is willing to work with you and your representatives in any manner to uphold the provisions of NAGPRA to the extent of our capabilities as well as yours. *Great success on such a wonderful project and to those it will serve.*

Respectfully,

Lauren J. Norman-Brown, NAGPRA Coordinator/Consultant

lbrown@tonkawatribe.com

A.3.4.3 Naval Air Station Joint Reserve Base Fort Worth NHPA Section 106 SHPO Consultation

DEPARTMENT OF THE AIR FORCE
AIR FORCE RESERVE COMMAND

RESERVE

21 May 2018

Colonel Trina R. Hood, USAF
Commander
301 Mission Support Group
1660 Lyons Dr.
NAS Fort Worth JRB TX 76127-1060

CONCUR
by Caitlin Brashear
for Mark Wolfe
State Historic Preservation Officer
Date 06/22/2018
Track# 201810600

Mr. Mark Wolfe
State Historic Preservation Officer
Texas Historical Commission
1511 Colorado St.
Austin TX 78701

Dear Mr. Wolfe

The U.S. Air Force (USAF) is preparing an Environmental Impact Statement (EIS) to assess the potential environmental consequences associated with implementing the Air Force Reserve Command (AFRC) F-35A Operational Beddown. Naval Air Station (NAS) Fort Worth Joint Reserve Base (JRB), Texas, has been identified as the preferred alternative for the AFRC F-35A mission. Davis-Monthan Air Force Base (AFB), Arizona, along with Homestead Air Reserve Base (ARB), Florida, and Whiteman AFB, Missouri, have been identified as reasonable alternatives for this mission.

The proposed action would base 24 F-35A Primary Aerospace Vehicles Authorized (PAA) F-35A aircraft with 2 Backup Aircraft Inventory (BAI) at one of the four installations. The F-35A aircraft would replace 24 existing aircraft at one of the four installations. Basing the aircraft at NAS Forth Worth JRB would require the construction, demolition, and renovation of facilities to accommodate the new personnel and aircraft associated with the mission. Attachments 1 and 2 identify specific facilities on NAS Fort Worth JRB included as part of this project.

In addition to the potential effects of construction, demolition and renovation of facilities on the base, the EIS will address aircraft operations in existing military airspace and ranges (see Attachment 3). Due to advanced electronics, the ability to engage targets at higher altitudes, and speed of the aircraft, F-35A pilots would primarily use Special Use Airspace (SUA) including Military Operations Areas (MOAs), Air Traffic Control Assigned Airspace (ATCAAs), and Restricted Areas (RAs). Additional information can be found on the project website at https://WWW.AFRC-F35A-beddown.com/.

Operations in existing airspace would include the use of defensive flare countermeasures whereappropriate, lasers and supersonic flight in authorized airspace, and the use of live munitions at approved military ranges. AFRC F-35A pilots would use the existing airspace and ranges currently used by F-16 pilots but will predominantly operate at higher altitudes.

Preliminary noise analysis within the primary airspace (Lancer MOA) indicates that noise levels would remain consistent with existing operations in this MOA. Noise levels in the airspace were analyzed using onset rate-adjusted day-night average sound level (DNL_{mr}) with decibels measured using A-weighted levels. A DNL_{mr} is the measure used for aircraft noise in training airspaces and is calculated based on the average number of operations in a month. DNL_{mr} also takes into account situations in which the sound from fast moving aircraft can rise from ambient to a maximum level quickly and thereby sound louder than an unadjusted sound exposure level would suggest. DNL_{mr} adds a penalty based on the onset rate. A-weighted decibels (dBA) levels are sound levels adjusted to account for how the human ear perceives noise.

Noise within the primary range airspace (R-5601) would increase slightly by 4.0 dBA DNL_{mr}. The total average noise in this airspace would be 49 dBA DNL_{mr}. Various noise studies have shown that average annual noise levels below 55 dBA are not considered annoying by the majority (96.7 percent) of people (CHABA 1981; Finegold et al. 1994; Schultz 1978; Stusnick et al. 1992).

Pursuant to 54 *U.S. Code (U.S.C.)* § 306108 (commonly referred to as Section 106 of the National Historic Preservation Act) and 36 *Code of Federal Regulations (CFR 800)*, the USAF requests to enter into Section 106 consultation regarding the proposed undertaking. We have defined the area of potential effects (APE) as the areas of ground disturbance associated with construction, demolition, and renovation on NAS Forth Worth JRB (see Attachments 1 and 2). The APE will also include the land areas below the primary airspaces and ranges (Attachment 3).

Construction APE

Attachment 1 lists the buildings planned for demolition and renovation for this undertaking and the National Register of Historic Places (NRHP) eligibility for those buildings. None of the facilities have been determined eligible for listing on the NRHP.

An archaeological survey (Archeological Survey of High Probability Areas Report) conducted on Carswell AFB (NAS Fort Worth JRB) in 1990 indicated no NRHP-eligible properties were found, nor was there significant potential for undiscovered sites at the installation. The Texas SHPO concurred with these findings in a letter dated 5 March 1991 (Attachment 4). All of the areas proposed for construction, demolition, and renovation on NAS Fort Worth JRB are in the developed portions of the installation. Therefore, we have determined there are no historic properties within the construction APE.

Airspace APE

Attachment 5 shows NRHP-listed resources underlying the primary airspace and range units that would be utilized by AFRC F-35A pilots for training operations. There are 23 NRHP-listed resources located under the airspace APE. The increase in noise levels from approximately 44 to 49 dBA that would be experienced on the ground under the airspace APE would not be at levels that could damage structures on the ground and would have no effect on the integrity of materials or setting of the 23 historic properties under the existing airspace. Therefore, we have determined there would be no historic properties affected under the airspace APE. We request concurrence on the definition of both APEs for this undertaking and our determination of no historic properties affected in both the construction and airspace APE.

A.3.4.3 Naval Air Station Joint Reserve Base Fort Worth NHPA Section 106 SHPO Consultation (Continued)

Attachments 6 and 7 provide background information on historical facility inventory at NAS Fort Worth.

If we do not hear from you within 30 days after you receive this letter, we will assume you concur with the APEs and the determination of no historic properties affected by this proposed action. We will then proceed with the National Environmental Policy Act (NEPA) process for the EIS. Should there be a decision to implement the beddown of F-35A aircraft at NAS Fort Worth JRB, it would be subject to the provisions of 36 *CFR* 800.13 for treating historic properties newly discovered during an undertaking.

Please review the material enclosed and contact Mr. Randy Varner, Compliance Branch Chief at (817) 782-6475 if you have any questions.

Sincerely

HOOD.TRINA.RE
NEE.1082767734

TRINA R. HOOD, Colonel, USAF
Commander

7 Attachments:
1. Development Table for NAS Fort Worth JRB
2. NAS Forth Worth JRB Project Map and APE
3. NAS Forth Worth JRB Airspace Map and APE
4. March 5 1991 Concurrence Letter
5. NRHP Listed Resources under the Airspace APE
6. 1994 Historical Inventory
7. Excerpt from ICRMP

WINGS OF HERITAGE, SHAPING THE FUTURE

DEPARTMENT OF THE AIR FORCE
AIR FORCE RESERVE COMMAND

RESERVE

18 March 2019

Randy H. Varner
301 MSG/CEV
Compliance Branch Chief
1215 Military Pkwy
NAS Fort Worth JRB TX 76127-1060

Mr. Mark Wolfe
State Historic Preservation Officer
Texas Historical Commission
1511 Colorado St.
Austin TX 78701

Dear Mr. Wolfe

On 21 May 2018, Naval Air Station (NAS) Fort Worth Joint Reserve Base (JRB) submitted to the Texas Historical Commission (THC) a request to consult regarding the Air Force Reserve Command (AFRC) F-35A Operational Beddown (track# 201810600) pursuant to Section 106 of the National Historic Preservation Act. On 22 June 2018, we received THC concurrence on the determination of no historic properties affected (Attachment 1). This letter is to inform you that since then the project has increased. In addition to what was previously consulted on, construction of one new facility and renovation of Building 1650 will be required for the beddown.

Pursuant to 54 U.S.C. § 306108 and 36 CFR Part 800, the Air Force requests to re-enter into Section 106 consultation regarding the proposed undertaking related to Building 1650 and the construction of a new facility. In the 21 May 2018 letter, we defined the area of potential effects (APE) as the areas of ground disturbance associated with construction, demolition, and renovation on NAS Forth Worth JRB, which excludes these two undertakings. The APE will also include the land areas below the primary airspaces and ranges. The APE has been updated to include activities in Building 1650 (Attachment 2).

The proposed new construction project would be located in an area that was surveyed for archeological and historic resources in 1990. The survey recorded a prehistoric site and four historic sites in the vicinity that were determined not to be eligible for listing in the National Register of Historic Places (NRHP) with concurrence by the THC (See Attachments 3 and 4). The construction area does not include any existing standing structures. Construction involves creation of a 3,253 sq ft single-story Air Force Office of Special Investigation facility. The facility will be compatible with DOD, Air Force, and base design standards to include local construction techniques. This project

A.3.4.3 Naval Air Station Joint Reserve Base Fort Worth NHPA Section 106 SHPO Consultation (Continued)

consists of constructing a reinforced concrete foundation and floor slab and fire protection, mechanical, electrical, architectural, structural communications, and civil/site work.

Building 1650 was constructed in 1963 and serves as a Maintenance Squadron Headquarters to support maintenance and shop functions (parachute, avionics, and non-destructive inspections). The one story building measures 100 ft x 200 ft and two wings approximately 5 ft x 5 ft and 11.75 ft x 21 ft. Since its construction, the building has had 25 renovations, five of which have been major renovations. The building has not been evaluated for NRHP eligibility; however, due to aforementioned renovations the interior lacks historic integrity.

The Air Force proposes to convert Building 1650 from F-16 accommodations to a maintenance space to accommodate F-35A aircraft parts storage. The Air Force is proposing only to make interior renovations to Building 1650. Existing electrical and mechanical systems specific to F-16s would be demolished, adjustments would be made to structural openings to facilitate shipment/reception of aircraft parts; and space would be made to install a new mezzanine to include life safety, fire protection, and security systems. Asbestos and lead abatement would also occur where required. Exterior modification would not occur as part of this proposed action. The Air Force has determined that no historic properties would be affected by the proposed action that includes the new construction and Building 1650.

If we do not hear from you within 30 days after you receive this letter, we will assume you concur with the APEs and the Air Force's determination of no adverse affected by these proposed undertakings. We will then proceed with the National Environmental Policy Act (NEPA) process for the EIS. Should there be a decision to implement the beddown of F-35A aircraft at NAS Fort Worth JRB, it would be subject to the provisions of 36 CFR 800.13 for treating historic properties newly discovered during an undertaking.

Please review the material enclosed and contact me at (817) 782-6475 if you have any questions.

Sincerely,

RANDY H. VARNER, GS-11
Compliance Branch Chief

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2. NAS Forth Worth JRB Project Map and APE
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4. Excerpt from Integrated Cultural Resources Management Plan (May 2004) summarizing Steven L. De Vore's archeological survey of the site (formerly Carswell AFB)

DEPARTMENT OF THE AIR FORCE
AIR FORCE RESERVE COMMAND

RESERVE

21 May 2018

Colonel Trina R. Hood, USAF
Commander
301 Mission Support Group
1660 Lyons Dr.
NAS Fort Worth JRB TX 76127-1060

CONCUR
by Caitlin Brashear
for Mark Wolfe
State Historic Preservation Officer
Date 06/22/2018
Track# 201810600

Mr. Mark Wolfe
State Historic Preservation Officer
Texas Historical Commission
1511 Colorado St.
Austin TX 78701

Dear Mr. Wolfe

The U.S. Air Force (USAF) is preparing an Environmental Impact Statement (EIS) to assess the potential environmental consequences associated with implementing the Air Force Reserve Command (AFRC) F-35A Operational Beddown. Naval Air Station (NAS) Fort Worth Joint Reserve Base (JRB), Texas, has been identified as the preferred alternative for the AFRC F-35A mission. Davis-Monthan Air Force Base (AFB), Arizona, along with Homestead Air Reserve Base (ARB), Florida, and Whiteman AFB, Missouri, have been identified as reasonable alternatives for this mission.

The proposed action would base 24 F-35A Primary Aerospace Vehicles Authorized (PAA) F-35A aircraft with 2 Backup Aircraft Inventory (BAI) at one of the four installations. The F-35A aircraft would replace 24 existing aircraft at one of the four installations. Basing the aircraft at NAS Forth Worth JRB would require the construction, demolition, and renovation of facilities to accommodate the new personnel and aircraft associated with the mission. Attachments 1 and 2 identify specific facilities on NAS Fort Worth JRB included as part of this project.

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Operations in existing airspace would include the use of defensive flare countermeasures whereappropriate, lasers and supersonic flight in authorized airspace, and the use of live munitions

A.3.4.3 Naval Air Station Joint Reserve Base Fort Worth NHPA Section 106 SHPO Consultation (Continued)

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Please review the material enclosed and contact Mr. Randy Varner, Compliance Branch Chief at (817) 782-6475 if you have any questions.

Sincerely

HOOD.TRINA.RE
NEE 1082787734

TRINA R. HOOD, Colonel, USAF
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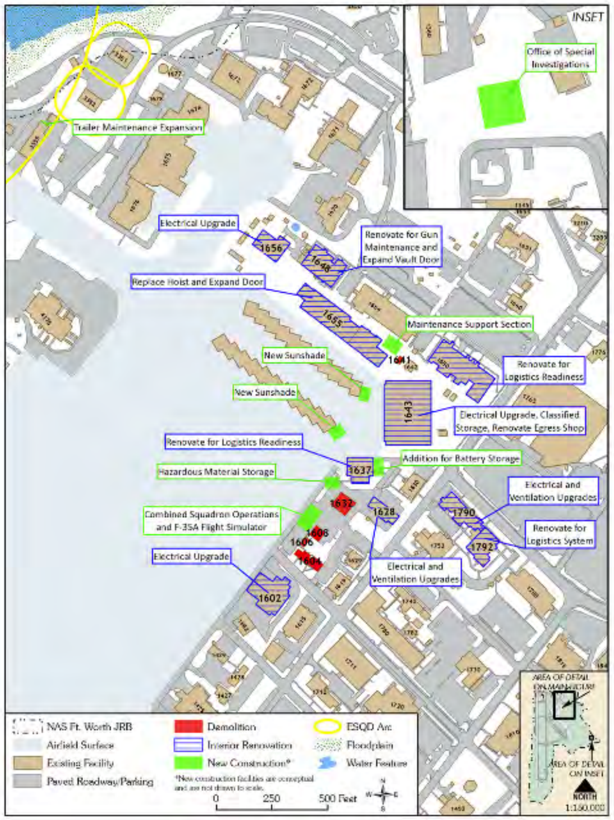
WINGS OF HERITAGE, SHAPING THE FUTURE

A.3.4.3 Naval Air Station Joint Reserve Base Fort Worth NHPA Section 106 SHPO Consultation (Continued)



TEXAS HISTORICAL COMMISSION

P.O. BOX 12276 AUSTIN, TEXAS 78711

March 5, 1991

Charles A. Jackson, Colonel, USAF
Base Civil Engineer
Attn: Roberto Y. Hernandez
Department of the Air Force
Headquarters 7th Combat Support Group (SAC)
Carswell Air Force Base, Texas 76127-5000

Re: Archeological Survey of High Probability Areas Report, Carswell Air Force Base, Tarrant County, Texas (AF, A5, A6, D1

Dear Sir:

Thank you for providing a copy of the above referenced document for our review. Mr. De Vore's report is very good, and we commend him for his efforts. Based on the information presented in the report, we concur with Mr. De Vore's assessment that neither the prehistoric site (41TR125) nor the four historic sites recorded during the survey are eligible for inclusion within the National Register of Historic Places. The Air Force need not to proceed with any construction plans in these site areas without further consultation with our office.

Overall, it appears that previous construction activities, periodic flooding of Farmers Branch, and channelization work may have destroyed other archeological sites once present in the area. While we do not recommend any further cultural resources investigations at Carswell at this time, it is always possible that buried, unrecorded archeological sites may be discovered during future construction activities. Should any such unrecorded sites be found during construction, work should cease in the immediate area; work can continue in the project area where no cultural materials are present. The Advisory Council on Historic Preservation should be contacted in accordance with 36CFR800.11.b.2. Please also notify the State Historic Preservation Officer at (512) 463-6096.

If we may be of further service, please advise.

Sincerely,

James E. Bruseth, Ph.D.
Deputy State Historic Preservation Officer

DP/JB/ctt

cc: Steven De Vore, NPS

K-2

The State Agency for Historic Preservation

A.3.4.3 Naval Air Station Joint Reserve Base Fort Worth NHPA Section 106 SHPO Consultation (Continued)

LITERATURE REVIEW

CULTURAL RESOURCE SURVEYS AND REPORTS

ARCHAEOLOGICAL RECONNAISSANCE SURVEY OF CARSWELL AIR FORCE BASE, TARRANT COUNTY, TEXAS. NATIONAL PARK SERVICE, 1990.

Steven L. De Vore, an archaeologist with the National Park Service, Interagency Archaeological Services, Denver, Colorado, undertook this study on behalf of the Strategic Air Command, Department of the Air Force. The survey examined 320 acres along tributaries of the Trinity River and other waterways and drainage areas within the base. The project archaeologist found that areas most likely to contain physical evidence of earlier human occupancy had been greatly disturbed. Two historic trash dumps, the foundation of a historic building, and an isolated prehistoric lithic (stone) find were the only archaeological sites identified. The project archaeologist concluded that all of the sites lacked sufficient integrity to be considered for the National Register of Historic Places (NRHP). Following its review of the survey report, the Texas SHPO concurred with the results, as noted in its letter of 5 March 1991.

HISTORIC STRUCTURES INVENTORY OF CARSWELL AIR FORCE BASE, TARRANT COUNTY, TEXAS. PREPARED BY STUDENTS FROM THE TEXAS TECH UNIVERSITY COLLEGE OF ARCHITECTURE, SEPTEMBER 1991-MAY 1992.

The historic structures survey conducted by students from Texas Tech University was the first such inventory completed for Carswell Air Force Base, and served as the basis for a 1993 study by the Air Force Center for Environmental Excellence. The inventory included 33 buildings and a cemetery, and made preliminary recommendations for NRHP eligibility, although the documentation provided contained insufficient information to arrive at conclusive determinations of NRHP eligibility.

DRAFT CARSWELL AIR FORCE BASE, TARRANT COUNTY, FORT WORTH, TEXAS, HISTORIC STRUCTURES SURVEY. AIR FORCE CENTER FOR ENVIRONMENTAL EXCELLENCE, 1993.

Following the decision by the 1991 Defense Base Closure and Realignment Commission (BRAC) to close Carswell AFB, the Air Force Center for Environmental Excellence oversaw the preparation of a study of historic properties at the base. The report includes an inventory of 114 properties erected on or before 1950 and relies heavily on a preliminary survey conducted between September 1991 and May 1992 by students from the Texas Tech University College of Architecture (see above). The report highlights 34 properties deemed the most significant and/or representative of other resources in the study area. The majority of the resources included in the study were recommended as ineligible for listing in the NRHP due to lack of integrity and/or significance. However, the report recommended Building Nos. 218, 233, 260, 280, 1414 and 1423 as potentially eligible for the NRHP. The Texas SHPO reviewed the document and requested

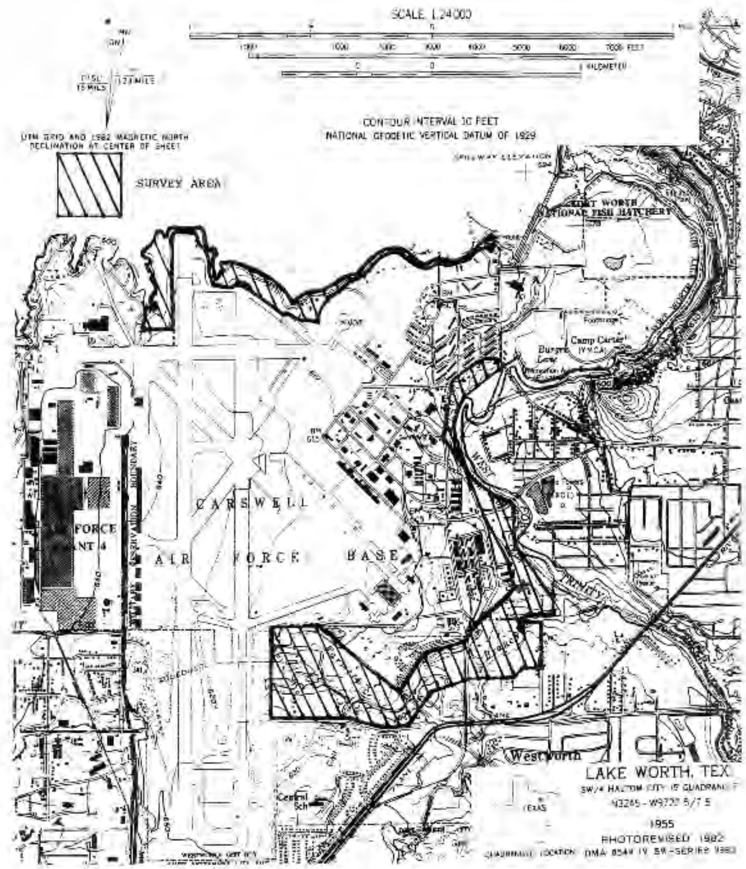


Figure 1. Project location in Tarrant County, Texas.

A.3.4.3 Naval Air Station Joint Reserve Base Fort Worth NHPA Section 106 SHPO Consultation (Continued)

DEPARTMENT OF THE AIR FORCE
AIR FORCE RESERVE COMMAND

RESERVE

18 March 2019

Randy H. Varner
301 MSG/CEV
Compliance Branch Chief
1215 Military Pkwy
NAS Fort Worth JRB TX 76127-1060

Mr. Mark Wolfe
State Historic Preservation Officer
Texas Historical Commission
1511 Colorado St.
Austin TX 78701

NO HISTORIC
PROPERTIES AFFECTED
PROJECT MAY PROCEED
by [signature]
for Mark Wolfe
State Historic Preservation Officer
Date 4/11/2019

Dear Mr. Wolfe

On 21 May 2018, Naval Air Station (NAS) Fort Worth Joint Reserve Base (JRB) submitted to the Texas Historical Commission (THC) a request to consult regarding the Air Force Reserve Command (AFRC) F-35A Operational Beddown (track# 201810600) pursuant to Section 106 of the National Historic Preservation Act. On 22 June 2018, we received THC concurrence on the determination of no historic properties affected (Attachment 1). This letter is to inform you that since then the project has increased. In addition to what was previously consulted on, construction of one new facility and renovation of Building 1650 will be required for the beddown.

Pursuant to 54 U.S.C. § 306108 and 36 CFR Part 800, the Air Force requests to re-enter into Section 106 consultation regarding the proposed undertaking related to Building 1650 and the construction of a new facility. In the 21 May 2018 letter, we defined the area of potential effects (APE) as the areas of ground disturbance associated with construction, demolition, and renovation on NAS Forth Worth JRB, which excludes these two undertakings. The APE will also include the land areas below the primary airspaces and ranges. The APE has been updated to include activities in Building 1650 (Attachment 2).

The proposed new construction project would be located in an area that was surveyed for archeological and historic resources in 1990. The survey recorded a prehistoric site and four historic sites in the vicinity that were determined not to be eligible for listing in the National Register of Historic Places (NRHP) with concurrence by the THC (See Attachments 3 and 4). The construction area does not include any existing standing structures. Construction involves creation of a 3,253 sq ft single-story Air Force Office of Special Investigation facility. The facility will be compatible with DOD, Air Force, and base design standards to include local construction techniques. This project consists of constructing a reinforced concrete foundation and floor slab and fire protection, mechanical, electrical, architectural, structural communications, and civil/site work.

Building 1650 was constructed in 1963 and serves as a Maintenance Squadron Headquarters to support maintenance and shop functions (parachute, avionics, and non-destructive inspections). The one story building measures 100 ft x 200 ft and two wings approximately 5 ft x 5 ft and 11.75 ft x 21 ft. Since its construction, the building has had 25 renovations, five of which have been major renovations. The building has not been evaluated for NRHP eligibility; however, due to aforementioned renovations the interior lacks historic integrity.

The Air Force proposes to convert Building 1650 from F-16 accommodations to a maintenance space to accommodate F-35A aircraft parts storage. The Air Force is proposing only to make interior renovations to Building 1650. Existing electrical and mechanical systems specific to F-16s would be demolished, adjustments would be made to structural openings to facilitate shipment/reception of aircraft parts; and space would be made to install a new mezzanine to include life safety, fire protection, and security systems. Asbestos and lead abatement would also occur where required. Exterior modification would not occur as part of this proposed action. The Air Force has determined that no historic properties would be affected by the proposed action that includes the new construction and Building 1650.

If we do not hear from you within 30 days after you receive this letter, we will assume you concur with the APEs and the Air Force's determination of no adverse affected by these proposed undertakings. We will then proceed with the National Environmental Policy Act (NEPA) process for the EIS. Should there be a decision to implement the beddown of F-35A aircraft at NAS Fort Worth JRB, it would be subject to the provisions of 36 CFR 800.13 for treating historic properties newly discovered during an undertaking.

Please review the material enclosed and contact me at (817) 782-6475 if you have any questions.

Sincerely,

[signature]

RANDY H. VARNER, GS-11
Compliance Branch Chief

4 Attachments

1. May 21, 2018 letter from the AF with SHPO June 22, 2018 concurrence
2. NAS Forth Worth JRB Project Map and APE
3. March 5, 1991 concurrence letter from Texas Historical Commission
4. Excerpt from Integrated Cultural Resources Management Plan (May 2004) summarizing Steven L. De Vore's archeological survey of the site (formerly Carswell AFB)

A.3.4.4 Naval Air Station Joint Reserve Base Fort Worth USFWS Section 7 Consultation Response

From:	VARNER, RANDY H GS-11 USAF AFRC 301 MSG/CEV <randy.varner@us.af.mil>
Sent:	Wednesday, June 27, 2018 12:02 PM
To:	ALLEN, CANDICE N Maj USAF AFRC 301 FW/PA; Daues, Tom V. [US-US]; Tutterow, Brian W. [US-US]; KAMALPOUR, HAMID GS-13 USAF AFMC AFCEC/CZN; Durig, Brock CIV NAVFAC SE, EV
Cc:	WILLIAMS, BRETT T GS-13 USAF AFRC 301 MSG/BCE/CC
Subject:	EXTERNAL: FW: [Non-DoD Source] F-35A Operations Beddown - No Effect determination regarding federally listed species

FYI everyone, see email below.

Randy Varner
Compliance Branch Chief
301 MSG/CEV
817 782-6475

-----Original Message-----
From: Edwards, Sean [mailto:sean_edwards@fws.gov]
Sent: Wednesday, June 27, 2018 11:00 AM
To: VARNER, RANDY H GS-11 USAF AFRC 301 MSG/CEV <randy.varner@us.af.mil>
Subject: [Non-DoD Source] F-35A Operations Beddown - No Effect determination regarding federally listed species

Mr. Varner,

We have received and reviewed the Department of the Air Force's May 9, 2018 letter regarding an Environmental Impact Statement for the Air Force Reserve Command F-35A Operational Beddown Project. The preferred alternative would occur at the Naval Air Station Fort Worth Joint Reserve Base in Tarrant County, Texas.

Your letter indicates that you utilized our IPaC online assessment system and have subsequently determined that the proposed actions would have "no effect" on any of the federally listed species known to occur in Tarrant County, Texas due to a lack of suitable habitats for these species within the project area. Upon review of your letter and our information, we acknowledge that this determination of "no effect" is sound and well supported. Therefore, we have no comments or concerns regarding the proposed actions. Please contact me with any further needs.

Kind Regards,

Sean Edwards
Supervisory Fish & Wildlife Biologist
Branch of Environmental Review, Classification & Recovery U.S. Fish & Wildlife Service
2005 NE Green Oaks Blvd., Ste 140
Arlington, Texas 76006
(817) 277-1100

1

A.3.5 WHITEMAN AIR FORCE BASE AGENCY COORDINATION AND CONSULTATION RESPONSES

A.3.5.1 Whiteman Air Force Base Agency Coordination Responses

AOPA
your freedom to fly

50 F St. NW, Suite 750
Washington, D.C. 20001

T. 202-737-7950
F. 202-273-7951

April 10, 2018

Mr. Hamid Kamalpour
United States Air Force
AFCEC/CZN
2261 Hughes Ave, Ste 155
Lackland AFB, TX 78236-9853

Re: *Notice of Intent To Prepare an Environmental Impact Statement for the Air Force Reserve Command F-35A Operational Beddown*

Dear Mr. Kamalpour,

The Aircraft Owners and Pilots Association (AOPA), the world's largest aviation membership association, submits the following comment in response to the March 22, 2018, Federal Register notice advising the public of the United States Air Force Reserve Command's (AFRC) intent to prepare an Environmental Impact Statement (EIS) for the beddown of one F-35A squadron. First, AOPA fully supports the AFRC and understands the importance of military readiness. We appreciate this opportunity to provide feedback early in the process as the AFRC identifies which installation will be the home for these aircraft. AOPA believes it is important for the AFRC to consider General Aviation users that operate in and near the Special Use Airspace (SUA) that will be utilized by this squadron. We encourage the AFRC to emphasize the selection criteria that minimizes the impact of these new aircraft on other users of the National Airspace System (NAS).

Adequate preexisting SUA should be important selection criteria

It is an important requirement for the beddown location to have currently published SUA that meets the squadron's flying requirements, and the airfield should be located in close proximity to that SUA. We fully agree with these requirements and we believe this selection criteria deserves significant consideration as creating new SUA, or expanding SUA, can be a lengthy and expensive process. Additionally, the impacts of increased SUA negatively impact other users of the NAS. SUA can increase the cost of flying and affect operational efficiency as operators may need to detour around active SUA. We encourage the AFRC to select the location that has a short-term and long-term outlook of not needing expansion of the SUA to support this squadron and the F-35A operations.

As important as not expanding SUA dimensions is, minimizing the hours of usage is equally important. The AFRC notes that there would be a change to the type of aircraft based at the selected installation; therefore, there would be a change in the mix of aircraft using the associated SUA. AOPA encourages the AFRC to pick that beddown location that has SUA that will allow the F-35As to operate within the existing published hours. The AFRC should be clear what the change in local operations tempo will be and clearly communicate what SUA changes may be necessary to accommodate those operations.

Mr. Kamalpour
April 10, 2018
Page 2 of 2

Conclusion

AOPA recognizes and fully supports the AFRC's need to train as they fight. In order to understand the effect this beddown will have on General Aviation, we request the AFRC provide detailed analysis of anticipated SUA usage. The Draft EIS should clearly state any need for SUA expansion, including physical dimensions and activation times, and the plan for how that will be accomplished in a manner to minimize the negative effects on General Aviation. We appreciate the AFRC earnestly assessing the effect these new aircraft will have on other airspace users, and we encourage the usage of selection criteria that would avoid any SUA expansion.

Thank you for reviewing our comment on this important issue. Please feel free to contact me at 202-509-9515 if you have any questions.

Sincerely,

Rune Duke
Senior Director, Airspace and Air Traffic

The Aircraft Owners and Pilots Association (AOPA) is a not-for-profit individual membership organization of General Aviation Pilots and Aircraft Owners. AOPA's mission is to effectively serve the interests of its members and establish, maintain and articulate positions of leadership to promote the economy, safety, utility, and popularity of flight in General Aviation aircraft. Representing two-thirds of all pilots in the United States, AOPA is the largest civil aviation organization in the world.

AIRCRAFT OWNERS AND PILOTS ASSOCIATION

A.3.5.1 Whiteman Air Force Base Agency Coordination Responses (Continued)

Eric R. Greitens
Governor

State of Missouri
OFFICE OF ADMINISTRATION
Post Office Box 809
Jefferson City, Missouri 65102
Phone: (573) 751-1851
Fax: (573) 751-1212

Sarah Steelman
Commissioner

April 10, 2018

Ms. Raquel Fischer
Department of the Air Force
2261 Hughes Ave
Suite 155
Lackland AFB, TX 78236-9853

Subject SAI: 1809042
Legal Name: Department of the Air Force
Project Description: Environmental Impact Statement (EIS) to evaluate the potential environmental consequences associated with the Air Force Reserve Command (AFRC) F-35A Operational Beddown

The Missouri Federal Assistance Clearinghouse, in cooperation with state and local agencies interested or possibly affected, has completed the review on the above project application.

None of the agencies involved in the review had comments or recommendations to offer at this time. This concludes the Clearinghouse's review.

A copy of this letter is to be attached to the application as evidence of compliance with the State Clearinghouse requirements.

Sincerely,

Sara VanderFeltz
Administrative Assistant

cc:

-----Original Message-----
From: DONALDSON, KEITH D GS-11 USAF AFGSC 509 CES/CEIEC [mailto:keith.donaldson.3@us.af.mil]
Sent: Monday, May 14, 2018 1:24 PM
To: GOLSON, GLENN S GS-12 USAF AFGSC 509 CES/CEIE; Daues, Tom V. [US US]
Cc: KAMALPOUR, HAMID GS-13 USAF AFMC AFCEC/CZN
Subject: EXTERNAL: FW: [Non-DoD Source] Re: AFRC F-35A

FYSA

Original Message
From: Herrington, Karen [mailto:karen_herrington@fws.gov]
Sent: Monday, May 14, 2018 1:12 PM
To: DONALDSON, KEITH D GS-11 USAF AFGSC 509 CES/CEIEC <keith.donaldson.3@us.af.mil>
Subject: [Non-DoD Source] Re: AFRC F-35A

Mr. Donaldson,

I received your letter (undated) regarding section 7 consultation for the F-35A Operational Beddown EIS project. The U.S. Fish and Wildlife Service does not concur with no effect determinations - that is within the action agency's purview; however, we do not have concerns about this project. Please let me know if you have any questions.

Karen

Karen Herrington
Field Supervisor, Missouri Ecological Service Field Office U.S. Fish and Wildlife Service
work: (573) 234-5031
cell: (850) 348-6495

On Wed, Apr 4, 2018 at 1:25 PM, Herrington, Karen <karen_herrington@fws.gov <mailto:karen_herrington@fws.gov> > wrote:

Mr. Donaldson,

I received your letter regarding the Environmental Impact Statement for the Air Force Reserve Command F-35A Operational Beddown project. The Missouri Ecological Services Field Office provides the following additional comments on this project beyond what was provided in the IPaC Trust Resource Report letter you received (03E14000-2018-E-01879). If this project involves removal of less than 10 acres of suitable bat habitat and the trees will be cleared during the bat hibernation season (November 1 to March 31), we do not anticipate adverse effects to the three listed bat species. We await your determination of effects for listed species. Please contact me if you have any questions.

Karen
Karen Herrington
Field Supervisor, Missouri Ecological Service Field Office
U.S. Fish and Wildlife Service
work: (573) 234-5031
cell: (850) 348-6495

A.3.5.2 Whiteman Air Force Base Tribal Consultation Responses

To support this EIS, the USAF consulted on a government-to-government basis with potentially affected tribes in the ROI for each base associated with the proposed AFRC F-35A operational beddown. The ROI includes each installation and the area surrounding the base. The following table provides a summarized list of USAF communication with tribes in the ROI for Whiteman AFB. All tribes listed in Table A-4 received a letter notifying the tribe of the project, as well as requesting government-to-government consultation under Section 106 of the NHPA. Several tribes responded to consultation requests or coordination letters, and a brief summary of the responses is included in Table A-4.

Follow-up correspondence was conducted for tribes that did not respond to initial consultation and coordination efforts. This additional outreach included telephone and e-mail correspondence.

Table A-4. Whiteman AFB Tribal Consultation

Tribe	Summary Response	NEPA Notification Letter	Section 106 Letter	Follow-Up Correspondence (email/phone calls)
Whiteman AFB				
Delaware Tribe of Indians[a]	No response at this time.	27 March 2018	7 September 2018	2 October 2018, email. 22 October 2018, phone.
Eastern Shawnee Tribe of Oklahoma[a]	No response at this time.	27 March 2018	7 September 2018	2 October 2018, email. 22 October 2018, phone.
Iowa Tribe of Kansas and Nebraska[a]	No response at this time.	27 March 2018	7 September 2018	2 October 2018, email. 22 October 2018, phone.
Iowa Tribe of Oklahoma[a]	No response at this time.	27 March 2018	7 September 2018	2 October 2018, email. 22 October 2018, phone.
Kaw Nation, Oklahoma[a]	11 September 2018 questionnaire indicated a conditional approval.	27 March 2018	7 September 2018	Tribal response received; no additional follow up was required.
Kiowa Indian Tribe of Oklahoma[a]	17 October 2018 letter indicated approval.	27 March 2018	7 September 2018	12 October 2018, email. 23 October 2018, phone.
Otoe-Missouria Tribe of Indians, Oklahoma[a]	No response at this time.	27 March 2018	7 September 2018	2 October 2018, email. 23 October 2018, phone.
The Osage Nation[a]	2 October 2018 initial email response requested additional information. 8 January 2019 letter requested a copy of the Draft EIS for review and comment.	27 March 2018	7 September 2018	2 October 2018, email. 24 October 2018, phone. 7 January 2019, email.
The Quapaw Tribe of Indians[a]	25 September 2018 letter indicated the project is outside of their area of interest, and they had no comments at that time.	27 March 2018	7 September 2018	2 October 2018, email. 24 October 2018, phone.
Citizen Potawatomi Nation, Oklahoma[a]	No response at this time.	28 March 2018	7 September 2018	2 October 2018, email. 24 October 2018, phone.
Eastern Band of Cherokee Indians[a]	No response at this time.	28 March 2018	7 September 2018	2 October 2018 email. 24 October 2018, phone.

[a] Section 106 consultation is considered complete. Unless otherwise requested, tribes will continue to receive project information.

A.3.5.2 Whiteman Air Force Base Tribal Consultation Responses (Continued)

SECTION 106 CONSULTATION QUESTIONNAIRE

Project Name: Air Force Reserve Command (AFRC) F-35A Operational Beddown Environmental Impact Statement (EIS)

Please check the appropriate response(s) from the list below and use the back of this form or additional sheets if you wish to make comments. You may also respond via e-mail to glenn.golson@us.af.mil:

____ We have no traditional religious, cultural properties, or other interests that may be affected by the proposed project and further consultation is not required.

X There are or may be issues of concern associated with this proposed project and we wish to be included as a Section 106 Consulting Party. We prefer:

____ Meeting with the Air Force at a tribal facility.

X Communicating with the Air Force by scheduled teleconference.

X We want to continue to receive project information by mail and participate in the public involvement process.

Name of designated contact for this proposed project:

Crystal Douglas THPO Phone: 580-269-2552

Please print email: Crystal-Douglas@kawnation.com

Signed: [signature] Date: 9-11-18

Additional comments or concerns may be written below or by separate attachment:

I understand this endeavor dose not include Construction However if this Changes please contact me. I will aprove this Project to move forward. as it is Right Now.

Please mail response in provided postpaid envelope to:

Mr. Glenn Golson,
Chief Environmental Engineer
660 10th Street, Suite 211
Whiteman AFB, MO 65305

Or, e-mail to: glenn.golson@us.af.mil

QUAPAW NATION

P.O. Box 765
Quapaw, OK 74363-0765

(918) 542-1853
FAX (918) 542-4694

September 25, 2018

Brigadier General John Nichols
Commander, 509th Bomb Wing
509 Spirit Blvd., Suite 116
Whiteman AFB, MO 65305

Re: Proposed F-35A Operational Beddown – Air Force Reserve Command Environmental Impact Statement for Whitman Air Force Base

To Whom It May Concern:

This project is outside of the current area of interest for the Quapaw Nation; therefore, the Quapaw Nation does not desire to comment on this project at this time. Thank you for your efforts to consult with us on this matter.

Sincerely,

Everett Bandy

Everett Bandy, THPO
Quapaw Nation
P.O. Box 765
Quapaw, OK 74363
(p) 918-238-3100

A.3.5.2 Whiteman Air Force Base Tribal Consultation Responses (Continued)

KIOWA TRIBE OF OKLAHOMA

P.O. Box 50 | Carnegie, OK 73015 | 405.203.2874

October 17, 2018

Brigadier General John Nichols
Commander, 509th Bomb Wing
Department of the Air Force
Global Strike Command
509 Spirit Blvd., Suite 116
Whiteman AFB, MO 65305

RE: Section 106 Consultation and Review for Proposed F-35A Operational Beddown - Air Force Reserve Command Environmental Impact Statement for Whiteman Air Force Base, Johnson County, MO

Dear Brigadier General Nichols,

The Kiowa Tribe Office of Historic Preservation has received the information and materials requested for our Section 106 Review and Consultation. Section 106 of the National Historic Preservation Act of 1966 (NHPA), and 36 CFR Part 800 requires consultation with the Kiowa Tribe.

Given the information provided, you are hereby notified that the proposal project location should have minimal potential to adversely affect any known Archaeological, Historical, or Sacred Kiowa sites. Therefore, in accordance with 36 CFR 800.4(d)(1), you may proceed with your proposed project. However, please be advised undiscovered properties may be encountered and must be immediately reported to the Kiowa Tribe Office of Historic Preservation under both the NHPA and NAGPRA regulations.

This information is provided to assist you in complying with 36 CFR Part 800 for Section 106 Consultation procedures. Please retain this correspondence to show compliance. Should you have any questions, please do not hesitate to contact me at kellie@tribaladminservices.org. Thank you for your time and consideration.

Sincerely,

Kellie J. Lewis
Acting Tribal Historic Preservation Officer (THPO)

SEAL OF OSAGE NATION

Osage Nation Historic Preservation Office

Date: **January 8, 2019** **File: 1819-2282MO-12**

RE: **DOD, Department of the Air Force, Global Strike Command, Proposed F-35A Operational Beddown - Air Force Reserve Command EIS for Whiteman Air Force Base, Johnson County, Missouri**

Whiteman Air Force Base
Brigadier General John Nichols, Commander, 509th Bomb Wing
509 Spirit Blvd., Suite 116
Whiteman AFB, MO 65305

Dear Mr. Nichols,

The Osage Nation Historic Preservation Office has received notification and accompanying information for the proposed project listed as DOD, Department of the Air Force, Global Strike Command, Proposed F-35A Operational Beddown - Air Force Reserve Command EIS for Whiteman Air Force Base, Johnson County, Missouri. **The Osage Nation requests a copy of the Draft Environmental Impact Statement (EIS) for review and comment.**

In accordance with the National Historic Preservation Act, (NHPA) [54 U.S.C. § 300101 et seq.] 1966, undertakings subject to the review process are referred to in 54 U.S.C. § 302706 (a), which clarifies that historic properties may have religious and cultural significance to Indian tribes. Additionally, Section 106 of NHPA requires Federal agencies to consider the effects of their actions on historic properties (36 CFR Part 800) as does the National Environmental Policy Act (43 U.S.C. 4321 and 4331-35 and 40 CFR 1501.7(a) of 1969).

The Osage Nation has a vital interest in protecting its historic and ancestral cultural resources. **The Osage Nation anticipates reviewing and commenting on the Draft Environmental Impact Statement for the proposed DOD, Department of the Air Force, Global Strike Command, Proposed F-35A Operational Beddown - Air Force Reserve Command EIS for Whiteman Air Force Base, Johnson County, Missouri.**

Should you have any questions or need any additional information please feel free to contact me at the number listed below. Thank you for consulting with the Osage Nation on this matter.

For

Andrea A. Hunter, Ph.D.
Director, Tribal Historic Preservation Officer

627 Grandview * Pawhuska, OK 74056 Telephone 918-287-5328 * Fax 918-287-5376

A.3.5.3 Whiteman Air Force Base NHPA Section 106 SHPO Consultation Response

Missouri Department of NATURAL RESOURCES dnr.mo.gov

Michael L. Parson, Governor Carol S. Comer, Director

June 13, 2018

Mr. Keith Donaldson
Biological Scientist
509 SES/CEIEC
Whiteman AFB, MO 65305

Re: **SHPO Project Number: 006-JO-18** Section 106 Consultation of Proposed F-35A Operational Beddown-Air Force Reserve Command Environmental Impact Statement, Whiteman Air Force Base, Johnson County, Missouri (DOD)

Dear Mr. Donaldson:

Thank you for submitting information about the above-referenced project for our review pursuant to Section 106 of the National Historic Preservation Act (P.L. 89-665, as amended) and the Advisory Council on Historic Preservation's regulation 36 CFR Part 800, which require identification and evaluation of cultural resources.

Based on the information provided, we concur that the area of potential effects (APE) for the direct and airspace APEs, as defined, are appropriate. In addition, we find that the proposed project will have **no adverse effect** to the 55 historic properties under the existing airspace and historic resources identified in Whiteman Air Force Base providing that only the buildings and areas for construction, identified in Attachment 1, are effected.

Please be advised that, if the project area is increased, cultural materials are encountered during construction or adjacent areas that may contain significant cultural resources may be adversely impacted, appropriate information must be provided to this office for further review and comment.

If you have any questions please write Missouri Department of Natural Resources, State Historic Preservation Office, Attn: Review and Compliance, P.O. Box 176, Jefferson City, Missouri 65102, or call Amanda Burke (573) 522-4641.

Promoting, Protecting and Enjoying our Natural Resources. Learn more at dnr.mo.gov

A.3.5.4 Whiteman Air Force Base USFWS Section 7 Consultation Response

From: DONALDSON, KEITH D GS-11 USAF AFGSC 509 CES/CEIEC
To: [US-US]
Subject: EXTERNAL: FW: [Non-DoD Source] Re: AFRC F-35A
Date: Thursday, May 24, 2018 12:18:31 PM

Here was the response from the letter sent.

-----Original Message-----
From: Herrington, Karen [mailto:karen_herrington@fws.gov]
Sent: Monday, May 14, 2018 1:12 PM
To: DONALDSON, KEITH D GS-11 USAF AFGSC 509 CES/CEIEC <keith.donaldson.3@us.af.mil>
Subject: [Non-DoD Source] Re: AFRC F-35A

Mr. Donaldson,

I received your letter (undated) regarding section 7 consultation for the F-35A Operational Beddown EIS project. The U.S. Fish and Wildlife Service does not concur with no effect determinations - that is within the action agency's purview; however, we do not have concerns about this project. Please let me know if you have any questions.

Karen

Karen Herrington
Field Supervisor, Missouri Ecological Service Field Office U.S. Fish and Wildlife Service
work: (573) 234-5031
cell: (850) 348-6495

On Wed, Apr 4, 2018 at 1:25 PM, Herrington, Karen <karen_herrington@fws.gov
<mailto:karen_herrington@fws.gov> > wrote:

Mr. Donaldson,

I received your letter regarding the Environmental Impact Statement for the Air Force Reserve Command F-35A Operational Beddown project. The Missouri Ecological Services Field Office provides the following additional comments on this project beyond what was provided in the IPaC Trust Resource Report letter you received (03E14000-2018-E-01879). If this project involves removal of less than 10 acres of suitable bat habitat and the trees will be cleared during the bat hibernation season (November 1 to March 31), we do not anticipate adverse effects to the three listed bat species. We await your determination of effects for listed species. Please contact me if you have any questions.

Karen

Karen Herrington
Field Supervisor, Missouri Ecological Service Field Office
U.S. Fish and Wildlife Service
work: (573) 234-5031
cell: (850) 348-6495

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A.4 FINAL ENVIRONMENTAL IMPACT STATEMENT DISTRIBUTION LIST

A.4.1 DAVIS-MONTHAN AIR FORCE BASE FINAL ENVIRONMENTAL IMPACT STATEMENT DISTRIBUTION LIST

Ms. Elaine Peters, Ak-Chin Indian Community
The Honorable Robert Miguel, Ak-Chin Indian Community
Ms. Bernadette Carra, Ak-Chin Indian Community
The Honorable Stephen R. Lewis, Gila River Indian Community
Mr. Barnaby Lewis, Gila River Indian Community
The Honorable Timothy Nuvangyaoma, Hopi Tribe of Arizona
Mr. Stewart Koyiyumptewa, Hopi Tribe of Arizona
The Honorable Robert Valencia, Pascua Yaqui Tribe
Mr. Davis Perez Pascua, Yaqui Tribe
Mr. Shane Anton, Salt River Pima-Maricopa Indian Community of the Salt River Reservation, Arizona
Ms. Angela Garcia-Lewis, Salt River Pima-Maricopa Indian Community of the Salt River Reservation, Arizona
The Honorable Delbert Ray, Salt River Pima-Maricopa Indian Community of the Salt River Reservation, Arizona
Ms. Vernelda Grant, San Carlos Apache Tribe
The Honorable Terry Rambler, San Carlos Apache Tribe
The Honorable Edward D. Manuel, Tohono O'odham Nation
Mr. Peter Steere, Tohono O'odham Nation
The Honorable Gwendena Lee-Gatewood, White Mountain Apache Tribe of the Fort Apache Reservation, Arizona
Mr. Ramon Riley, White Mountain Apache Tribe of the Fort Apache Reservation, Arizona
Mr. Mark Altaha, White Mountain Apache Tribe of the Fort Apache Reservation, Arizona
The Honorable Jane Russell-Winiecki, Yavapai-Apache Nation of the Camp Verde Indian Reservation, Arizona
Mr. Christopher Coder, Yavapai-Apache Nation of the Camp Verde Indian Reservation, Arizona
Mrs. Gertrude Smith, Yavapai-Apache Nation of the Camp Verde Indian Reservation, Arizona
The Honorable Tom O'Halleran, U.S. House of Representatives
The Honorable Ann Kirkpatrick, U.S. House of Representatives
The Honorable Raúl Grijalva, U.S. House of Representatives
The Honorable Paul Gosar, U.S. House of Representatives
The Honorable Kyrsten Sinema, U.S. Senate
The Honorable Martha McSally, U.S. Senate
The Honorable Gail Griffin, Arizona House of Representatives
The Honorable Becky Nutt, Arizona House of Representatives
The Honorable John Fillmore, Arizona House of Representatives
The Honorable Kelly Townsend, Arizona House of Representatives
The Honorable Rosanna Gabaldón, Arizona House of Representatives
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Mr. Jayme Lopez, Bureau of Land Management
Mr. Kerwin Dewberry, Coronado National Forest
Tonto National Forest
Ms. Helena (Abby) Tsosie, Tonto National Forest
Mr. Steve Spangle, U.S. Fish and Wildlife Service
Ms. Mike Stoker, United States Environmental Protection Agency
Ms. Marjory Blaine, US Army Corps of Engineers, Los Angeles District
Ms. Leslie Meyers, US Bureau of Reclamation
Mr. Ralph E. Ware, USDA Natural Resources Conservation Service
Mr. Mark Killian, Arizona Department of Agriculture
Mr. Misael Cabrera, PE, Arizona Department of Environmental Quality
Ms. Thomas Buschatzke, Arizona Department of Water Resources
Ms. Joyce Francis, Arizona Game and Fish Department
Mr. Ty Gray, Arizona Game and Fish Department
Ms. Kristiin Terpening, Arizona Game and Fish Department
Mr. Patrick D. Lyons, Ph.D., RPA Arizona State Museum
Ms. Kathryn Leonard, Arizona State Parks
Ms. Lisa A. Atkins, Arizona State Trust Land
Mr. Andrew Greenhill, Commission of Technology
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Ms. Ursula Nelson, Pima County
Lisa Shafer, Town of Marana
Mr. Michael Spaeth, Town of Oro Valley
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Mr. Paul Durham, Tucson City Council
Mr. David Sirota, Air Guardians
Ms. Ana Henderson, Arizona House of Representatives Candidate
Mr. Lee Stanfield, City of Tucson
Ms. Suzanne Elefante, DM 50 and Mama Louisa’s
Mr. John Moffatt, Pima County
Ms. Jocelyn Muzzin, Individual
Ms. Elizabeth Hubbard, Individual
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Mr. and Mrs. Jim and Pat Bedwell, Individual
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Mr. John Davis, Individual
Ms. Mary Darling, Individual
Ms. Shelley Kais, Individual
Mr. and Mrs. Stuart and Glenda Bavier, Individual
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Mr. Joe Watkins, Individual
Mr. Dennis McRitchie, Individual
Mr. Tom Swenson-Heally, Individual
Ms. Katy Brown, Individual
Ms. Wendy Emmert, Individual
Ms. Joan Concannon, Individual
Ms. Kim Crooks, Individual
Ms. Peggie Vincent, Individual
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Ms. Nancy Haase, Allegra
Ms. Patty Doar, Arizona Inn
Mr. Robert Tucker, Diamond Ventures Inc.
Mr. Bill Kelley, DM 50 and Diamond Ventures Inc.
Mr. Ghee Alexander, El Conquistador Hilton
Ms. Angel Segura, HSL Properties

A.4.1 DAVIS-MONTHAN AIR FORCE BASE FINAL ENVIRONMENTAL IMPACT STATEMENT DISTRIBUTION LIST (Continued)

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Ms. Christine Nunez, HSL Properties
Mr. Robert Lebsack, HSL Properties
Ms. Kelly Henry, HSL Properties
Mr. George Ramirez, HSL Properties
Mr. Jerry Fischer, HSL Properties
Mr. Humberto Lopez, HSL Properties
Ms. Jennifer Odom, HSL Properties
Ms. Laura Inman, HSL Properties
Mr. Heath Carnes, HSL Properties
Ms. Amanda Bellah, HSL Properties
Mr. Andrew Titche, HSL Properties
Ms. Sabrina Paris, HSL Properties, Skyline Gateway
Simi Steaken Tucson, Embedded Systems
Mr. Herman Lopez, City of South Tucson
Ms. Helen Bayly, U.S. Citizens
Ms. Diana Durazo, Pima County
Ms. Mary Sanchez, Eckstrom-Columbus Branch Library
Ms. Daphne Daly, Murphy-Wilmont Library
Ms. Amber Mathewson, Pima County Public Library
Ms. Marissa Alcorta, Quincie Douglas Library
Ms. Linda Lam, Salazar-Ajo Library
Ms. Debbie Kornmiller, *Arizona Daily Star*
Mr. John D'Orlando, *Arizona Daily Star*
Mr. Dylan Smith, *Tucson Sentinel*
Ms. Rebekah Zemansky, *Tucson Sentinel*
Mr. Jason Joseph, *Tucson Weekly*
Mr. Jim Nintzel, *Tucson Weekly*
Mr. Ken Kwilosz, KFMA 102.1 FM
Mr. Larry Mac, KFMA 102.1 FM
Mr. Tom Zlaket, KMIY, My 92.9 FM
Mr. Obi Wan-Kenobi, KNST AM 790
Mr. Paul Birmingham, KNST AM 790
Mr. Mike Rapp, KQTH 104.1 FM
Ms. Smokey Rivers, KQTH 104.1 FM
Mr. Tom Zlaket, KRQQ, 93.7 KRQ FM
Ms. Leslie Lois, KTGV 106.3 FM The Groove
Mr. Tom Zlaket, KYWD, 97.1 The Bull
Ms. Bea Rosen, KGUN 9 TV ABC
Mr. Leon Clark, KGUN 9 TV ABC
Ms. Denise McManus, KMSB 11 FOX/KTTU 19
Mr. Dan Marries, KMSB 11 FOX/KTTU 19
Mr. Joe Hengemuehler, KOLD News 13 CBS
Mr. Eric Breon, KOLD News 13 CBS
Mr. Bill Shaw, KVOA News 4 NBC

A.4.1 DAVIS-MONTHAN AIR FORCE BASE FINAL ENVIRONMENTAL IMPACT STATEMENT DISTRIBUTION LIST (Continued)

Ms. Cathie Batbie, KVOA News 4 NBC
Mr. Walter Saeger, Air Force Association
Ms. Lynne Wood, Angel Charity
Ms. Josefina Cardenas, Barrio Kroeger Lane Neighborhood Association
Mr. Bill Du Pont, Colonia Solana Homeowners' Association
Mr. George Larsen, DM 50
Mr. Robin McGeorge, DM 50
Mr. Tom Murphy, DM 50
Mr. Jim Lubinski, DM 50
Ms. Sarah Simmons, DM 50
Mr. Chuck Sawyer, DM 50
Mr. Vance Falbaum, DM 50
Mr. Michael Grassinger, DM 50 and Desert Thunder
Mr. Bruce Dusenberry, DM 50 and Desert Thunder
Mr. Steve Rosenberg, DM 50 and Military Affairs Committee
Ms. Ellen Jimenez, Military Affairs Committee
Mr. Jose Garcia, Military/Community Relations Committee
Mr. Richard Basye, Military/Community Relations Committee
Mr. Grant Anderson, Paragon Space Development Corporation
Ms. Patrice Mutchnick, Peaceful Gila Skies
Ms. Carol Fenn, Quiet Tucson Skies
Mr. Chris Tanz, Quiet Tucson Skies
Ms. Georgia Conroy, Raging Grannies
Ms. Mary Stith, Raging Grannies
Ms. Luise Levy, Raging Grannies
Ms. Martha Lynne, Raging Grannies
Mr. Rick Grinnell, Southern Arizona Business Coalition
Mr. Brent DeRaad, Southern Arizona Defense Alliance
Mr. David Godlewski, Southern Arizona Homebuilders Association
Mr. Mike Smejkal, Texas Apartment Association
Mr. Randy Rogers, Tucson Association of Realtors
Ms. Giuliana Donnelly, Tucson Forward
Ms. Anita Scales, Tucson Forward
Ms. Rosanna Salonia, Tucson Forward and Barrio Santa Rosa
Mr. Robert Medler, Tucson Metro Chamber
Mr. Scott Robidoux, Tucson Airport Authority
Ms. Bonnie A. Allin, Tucson International Airport
Mr. Anthony Pottor, Primavera Foundation
Mr. Ted Maxwell, Southern Arizona Leadership Council
Mr. William Ward, Pima Community College
Ms. Diana Imig, The Nature Conservancy
Ms. Tef Rodeffer, Western Archaeological Conservation Center
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Mr. Jim Plummer, Garza County
Ms. Jill Locke, Grady County
Ms. Robin Booker, Jackson County
Ms. Traci Smith, Jefferson County

A.4.6 NAVAL AIR STATION JOINT RESERVE BASE FORT WORTH FINAL ENVIRONMENTAL IMPACT STATEMENT DISTRIBUTION LIST FOR AIRSPACE (Continued)

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Ms. Nikki Dodd, Kiowa County
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Ms. Jane Dunlap, Pushmataha County
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Ms. Kim Wells, San Saba County
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Mr. J.D. Strong, Oklahoma Department of Wildlife Conservation
Mr. Bob Blackburn, Ph.D., Oklahoma History Center
Mr. Dick Dutton, Oklahoma Tourism and Recreation Department
USFWS Oklahoma Ecological Field Office
Mr. Mark Sweeney, Association of South Central Oklahoma Governments
Mr. Danny Baldwin, Kiamich Economic Development District of Oklahoma
Ms. Barbara McNally, Lawton Fort Sill Regional Airport

A.4.7 WHITEMAN AIR FORCE BASE FINAL ENVIRONMENTAL IMPACT STATEMENT DISTRIBUTION LIST

The Honorable Chester “Chet” Brooks, Delaware Tribe of Indians
Mr. Brice Obermeyer, Delaware Tribe of Indians
Mr. Brett Barnes, Eastern Shawnee Tribe of Oklahoma
The Honorable Glenna Wallace, Eastern Shawnee Tribe of Oklahoma
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Mr. Lance Foster, Iowa Tribe of Kansas and Nebraska
Mr. Bobby Walkup, Iowa Tribe of Oklahoma
Iowa Tribe of Oklahoma
The Honorable Jacque Secondine Hensley, Kaw Nation, Oklahoma
Ms. Crystal Douglas, Kaw Nation, Oklahoma
The Honorable Matthew Komalty, Kiowa Indian Tribe of Oklahoma
Ms. Andrea Hunter, Ph.D., Osage Nation
The Honorable John Shotton, Otoe-Missouria Tribe of Indians, Oklahoma
Ms. Elsie Whitehorn, Otoe-Missouria Tribe of Indians, Oklahoma

A.4.7 WHITEMAN AIR FORCE BASE FINAL ENVIRONMENTAL IMPACT STATEMENT DISTRIBUTION LIST (Continued)

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The Honorable John Berrey, The Quapaw Tribe of Indians
Mr. Everett Bandy, The Quapaw Tribe of Indians
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The Honorable Josh Hawley, U.S. Senate
The Honorable Roy Blunt, U.S. Senate
The Honorable Michael Parson, Office of Governor
The Honorable Mike Kehoe, Office of the Lieutenant Governor
The Honorable Dean Dohrman, Missouri House of Representatives
The Honorable Brad Pollitt, Missouri House of Representatives
The Honorable Dan Houx, Missouri House of Representatives
The Honorable Denny Hoskins, Missouri Senate
The Honorable Sandy Crawford, Missouri Senate
Mr. Rick Watson, Henry County
Mr. Joe Miniace, Federal Aviation Administration
Mr. Michael Casey, Federal Emergency Management Agency
Mr. Mark Frazier, U.S. Army Corps of Engineers
Mr. Scott Angelle, U.S. Department of the Interior
Ms. Cecilia Tapia, U.S. Environmental Protection Agency
Ms. Karen Herrington, U.S. Fish and Wildlife Service
Ms. Chris Chinn, Missouri Department of Agriculture
Mr. Alan Freeman, Missouri Department of Agriculture
Ms. Peggy Barry, Missouri Department of Conservation
Mr. Ruben Zamarripa, Missouri Department of Natural Resources
Mr. Bruce Stuart, Missouri Department of Natural Resources
Ms. Carol S. Comer, Missouri Department of Natural Resources
Ms. Toni Prawl, Ph.D., Missouri Department of Natural Resources
Missouri Federal Assistance Clearinghouse
Mr. Luke Lewis, City of Knob Noster
Ms. Amy Schouten, City of Knob Noster
The Honorable Adam Morton, City of Knob Noster
Mr. Doug Kermick, City of Knob Noster
Mr. Bud Thering, City of Knob Noster
Mr. Harold Stewart, City of Warrensburg
Mr. Bill Gabel, Johnson County
Mr. Chuck Barlow, Johnson County Military Airport Zoning Commission
Mr. Ken Guier, Knob Noster Chamber of Commerce
Ms. Leslie Walling, Knob Noster School Board
Ms. Kelly Davis, Knob Noster School Board
Mr. David Dick, Pettis County
Mr. Nick Lastrada, Pettis County
Mr. Norm Lucus, Pioneer Trails Regional Planning Commission
Mr. Susan Mergen, Sedaila Area Chamber of Commerce
Ms. Darinda Reberry, Warrensburg Chamber of Commerce
Mr. Jim Stone, Individual

A.4.7 WHITEMAN AIR FORCE BASE FINAL ENVIRONMENTAL IMPACT STATEMENT DISTRIBUTION LIST (Continued)

Ms. Theresa Ramsey, Individual
Ms. Becky Forest, Individual
Mr. Chris Walker, Individual
Mr. Rob Forrest, Individual
Mr. H. Keith Crumley, Whiteman Area Leadership Council
Mr. Greg Frencken, Whiteman Area Leadership Council, Base Community Council
Knob Noster State Park
Mr. Michael Cohron, Knob Noster R-VIII School District
Ms. Katie Huntsman, Knob Noster Schools
Mr. Jerrod Wheeler, Knob Noster Schools
Mr. Matthew Bridges, Knob Noster Schools
Ms. Hailey Bridges, Knob Noster Schools
Ms. Kristi Mellon, Knob Noster Schools
Ms. Jessica Stewart, Knob Noster Schools
Ms. Veronica Bames, Knob Noster Schools
Ms. Jennifer Goodrich, Knob Noster Schools

A.4.8 WHITEMAN AIR FORCE BASE FINAL ENVIRONMENTAL IMPACT STATEMENT DISTRIBUTION LIST FOR AIRSPACE

The Honorable Roger Marshall, U.S. House of Representatives
The Honorable Steven Watkins, U.S. House of Representatives
The Honorable Ron Estes, U.S. House of Representatives
The Honorable Rick Crawford, U.S. House of Representatives
The Honorable French Hill, U.S. House of Representatives
The Honorable Steve Womach, U.S. House of Representatives
The Honorable Bruce Westerman, U.S. House of Representatives
The Honorable Pat Roberts, U.S. Senate
The Honorable Jerry Moran, U.S. Senate
The Honorable Tom Cotton, U.S. Senate
The Honorable John Boozman, U.S. Senate
Angela Rolofson, Knob Noster School District
Anna Marie Dudte, Individual
Rick Johnson, Knob Noster Fire Department
Robert Forest, Individual
Susanne Taylor, Individual
Tom Charrette, Knob Noster, Ward 3 Alderman
Vivian Draper, Timberline Realty
The Honorable Cameron Cooper, Arkansas House of Representatives
The Honorable Jim Wooten, Arkansas House of Representatives
The Honorable Craig Christiansen, Arkansas House of Representatives
The Honorable Dwight Tosh, Arkansas House of Representatives
The Honorable Michelle Gray, Arkansas House of Representatives
The Honorable Stu Smith, Arkansas House of Representatives
The Honorable John Payton, Arkansas House of Representatives

A.4.8 WHITEMAN AIR FORCE BASE AIRSPACE FINAL ENVIRONMENTAL IMPACT STATEMENT DISTRIBUTION LIST FOR AIRSPACE (Continued)

The Honorable Rick Beck, Arkansas House of Representatives
The Honorable Josh Miller, Arkansas House of Representatives
The Honorable Stan Berry, Arkansas House of Representatives
The Honorable Aaron Pilkington, Arkansas House of Representatives
The Honorable Keith Slape, Arkansas House of Representatives
The Honorable Bob Ballinger, Arkansas Senate
The Honorable Gary Stubblefield, Arkansas Senate
The Honorable Mark Johnson, Arkansas Senate
The Honorable Breanne Davis, Arkansas Senate
The Honorable Missy Irvin, Arkansas Senate
The Honorable James Sturch, Arkansas Senate
The Honorable Ronald Caldwell, Arkansas Senate
The Honorable Doug Blex, Kansas House of Representatives
The Honorable Joe Newland, Kansas House of Representatives
The Honorable Tory Marie Arnberger, Kansas House of Representatives
The Honorable Troy Waymaster, Kansas House of Representatives
The Honorable Alicia Straub, Kansas House of Representatives
The Honorable Steven Johnson, Kansas House of Representatives
The Honorable Les Mason, Kansas House of Representatives
The Honorable Suzi Carlson, Kansas House of Representatives
The Honorable Lonnie Clark, Kansas House of Representatives
The Honorable John Barker, Kansas House of Representatives
The Honorable Francis Awerkemp, Kansas House of Representatives
The Honorable Bill Pannbacker, Kansas House of Representatives
The Honorable Tom Phillips, Kansas House of Representatives
The Honorable Susan Concannon, Kansas House of Representatives
The Honorable Dennis Pyle, Kansas Senate
The Honorable Bruce Givens, Kansas Senate
The Honorable Dan Goddard, Kansas Senate
The Honorable Tom Hawk, Kansas Senate
The Honorable Randall Hardy, Kansas Senate
The Honorable Mary Jo Taylor, Kansas Senate
The Honorable Rick Wilborn, Kansas Senate
The Honorable Elaine Bowers, Kansas Senate
The Honorable Asa Hutchinson, State of Arkansas
The Honorable Laura Kelly, State of Kansas
Ms. Donna J. Zimmerman, Barton County
Ms. Canda Reese, Baxter County
Ms. Susan Porterfield, Benton County
Ms. Tatum Stafford, Butler County
Ms. Todd Rowland, Camden County
Ms. Leona Stephens, Carter County
Ms. Niki Collier, Chautauqua County
Ms. Kayla Wang, Clay County
Ms. Rachelle Evans, Cleburne County

A.4.8 WHITEMAN AIR FORCE BASE AIRSPACE FINAL ENVIRONMENTAL IMPACT STATEMENT DISTRIBUTION LIST FOR AIRSPACE (Continued)

Ms. Sheila Thoman, Cloud County
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Ms. Sarah Herman, Cooper County
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Ms. Charlotte Scott-Schmidt, Montgomery County
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Ms. Mary Arganbright, Ottowa County
Mr. Nick La Strada, Pettis County
Ms. Pamela Grow, Phelps County
Ms. Pam Ennis, Pope County
Ms. Nancy McCarter, Pottawatomie County
Mr. David Ernst, Pulaski County
Ms. Kathleen Marsicek, Republic County
Mr. Mike Harper, Reynolds County
Ms. Alicia Showalter, Rice County
Mr. Rich Vargo, Riley County
Ms. Becky York, Ripley County
Ms. Corinne Baldwin, Rush County
Ms. Mary Nuss, Russell County

A.4.8 WHITEMAN AIR FORCE BASE AIRSPACE FINAL ENVIRONMENTAL IMPACT STATEMENT DISTRIBUTION LIST FOR AIRSPACE (Continued)

Ms. Jamie R. Allen, Saline County
Ms. Debbie Russell, Saline County
Ms. Debbie Loggins, Searcy County
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Ms. Alisa Black, Sharp County
Ms. Debbie Peden, St. Clair County
Mr. Kevin Engler, St. Francois County
Ms. Angie Hudspeth-Wade, Stone County
Ms. Laura Crowley, Texas County
Ms. Pam Bradford, Van Buren County
Ms. Diana Svanda, Washington County
Ms. Jenny Allen, Washington County
Mr. Kent Sisco, Wayne County
Ms. Carla Ervin, White County
Ms. Rhonda Willard, Wilson County
Ms. Tammy Porter, Woodson County
Ms. Nelda Masner, Wright County
U.S. Fish and Wildlife
U.S. Environmental Protection Agency
U.S. Fish and Wildlife
U.S. Department of Agriculture, Forest Service
Ms. Hollie Melroy, McPherson County
Kansas Game and Fish Commission
Intergovernmental Services
Kansas Department of Wildlife, Parks, and Tourism
Ms. Jennie Chinn, Kansas State Historic Preservation Office

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A.5 PUBLIC HEARING TRANSCRIPTS

A.5.1 DAVIS-MONTHAN AIR FORCE BASE PUBLIC HEARING TRANSCRIPT

(Transcript contained on the following pages.)

PUBLIC HEARING FOR DAVIS-MONTHAN AIR FORCE BASE

In Re: F-35A Operational Beddown.

TUCSON COMMUNITY CENTER
Tucson, Arizona
March 10, 2020
5:30 p.m.

Reported by: ANTHONY C. GARCIA, RDR, CR
Certified Reporter No. 50218

KATHY FINK & ASSOCIATES, INC.
2819 East 22nd Street
Tucson, Arizona 85713
(520) 624-8644

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PRESENT:

Colonel Tobin Griffeth
Hearing Officer

Lieutenant Colonel Ed Davies
Air Force Reserve Command

Hamid Kamalpour, AFCEC
EIS Project Manager Air Force NEPA Division

Tom V. Daues, PMP
Leidos Senior Project Manager
Environmental Planning Division

* * * *

BE IT REMEMBERED that the Public Hearing for Davis-Monthan Air Force Base was held at the Tucson Community Center, 260 South Church Avenue, in the City of Tucson, State of Arizona, before ANTHONY C. GARCIA, RDR, CR, Certified Reporter No. 50218, on the 10th day of March 2020, commencing at the hour of 5:30 p.m.

* * * *

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P R O C E E D I N G S

COLONEL GRIFFETH: The time is 5:30, and we will now start the hearing. I thank you for attending.

This public hearing is for the Draft Environmental Impact Statement, or Draft EIS -- you will hear that word several times -- for the proposed Air Force Reserve Command F-35 Operational Beddown, hereinafter referred to as the proposed mission.

I am Colonel Tobin C. Griffeth, and I am the Hearing Officer here tonight. I am an Air Force Judge, and I'll be acting as the moderator tonight. As a moderator, it is my role to ensure that the Air Force provides a fair, orderly and impartial hearing where you have an opportunity to make comments on the proposal. I do not work for anyone at the Air Force Reserve Command, the Air Force Civil Engineer Center, the Air Combat Command, or any of the bases under consideration for the proposed action. I am not involved in any way with the development of this Draft EIS, and I do not act as a legal advisor for the Air Force representatives working on this proposal.

This hearing is held in accordance with the

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provisions of the National Environmental Policy Act, or NEPA, as implemented by the Council on Environmental Quality Regulations and the Air Force. We are here tonight to present information on the environmental impact of the proposed beddown and to receive your comments on the Draft EIS.

Tonight's hearing is one of several opportunities for the public comment. This hearing is an opportunity for you to express your views, concerns about the adequacy of the environmental analysis contained in the Draft EIS, as well as any issues related to the NEPA process. This hearing is not a debate or a vote on the Draft EIS, and it is not a question-and-answer session. We will welcome your input on the environmental analysis presented in the Draft EIS. Comments about other unrelated issues can certainly be made, but they will not assist in the decision-making process for the Draft EIS.

I'd like to begin this hearing by introducing the NEPA team, beginning with the team leader, Lieutenant Colonel Ed Davies with the Air Force Reserve Command, who will present details on the proposed action and alternatives.

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Next, Mr. Hamid Kamalpour, the EIS Project Manager at the Air Force NEPA Division, who will discuss results of the NEPA process.

Representatives from Davis-Monthan Air Force Base, led by Colonel Michael Drowley from the 355th Wing Command, are present. Although not part of the analysis team, they have provided detailed base information, which is critical to a thorough analysis of the impact of the Draft EIS.

Lastly, representatives from the Leidos are here supporting the Air Force as the contractor.

Transcribing tonight's hearing is Anthony Garcia.

I would also like to recognize Francesca Samuel, who is available this evening for anyone who may need Spanish translation.

I would also like to recognize all federal, tribal, state or local officials who have chosen to attend here today.

Lieutenant Ed Davies will first present information on the proposed action and the alternatives, then Mr. Kamalpour will provide an overview of the NEPA process and will summarize the

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potential environmental consequences of the proposal.

After their presentations, which should take about 20 minutes, we will begin our verbal comment period, during which you can provide input on the proposed action, Draft EIS analysis, and potential environmental impacts. Your comments will become part of the official record of the Final EIS.

Please note that informal discussions or informal displays will not become part of the record. So, if you have items of concern about the analysis in the Draft EIS that you would like to bring to our attention, please do so during our formal comment opportunity or in writing. Let me emphasize this. Verbal and written comments are equally considered. If you do not choose to make a verbal comment, you can submit a written comment either by turning in a comment form this evening or by mailing it to the address shown on the screen. Comments may also be submitted online at www.AFRC-F35A-Beddown.com. I'll repeat that. Www.AFRC-F35A-Beddown.com.

If you've not had a chance to review the Draft EIS, it is available on the website or at one of the public libraries listed here. The Air Force

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welcomes public comments in writing at any time during the environmental impact analysis process. To receive timely consideration for the Final EIS, please submit your comments by March 31st of 2020. Your comments will provide the decision maker, the Secretary of the Air Force, with the information to assist in making decisions regarding where the mission will be located. Your comments during this process provide the benefit of your knowledge of the local area and your concerns about the environmental impact or analysis.

We will now move to the briefing. During the briefing our speakers will be reading from prepared scripts. The briefing is written to make certain that each speaker covers all the pertinent information, and that is consistent for all four hearings.

With that, I will turn the time over and the microphone over to Lieutentant Colonel Davies from the Air Force Reserve Command.

LIEUTENTANT COLONEL DAVIES: Good evening and welcome. I'm Lieutenant Colonel Ed Davies representing Air Force Reserve Command. I'm the Combat Air Force Fighter Bomber Program Manager for the Air Force Reserve. Welcome to this evening's meeting.

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As the team leader, I encourage you to assist the Air Force in meeting its requirements to comply with the NEPA process. Your attendance tonight indicates your interest in this proposed action. I hope your comments will provide us with additional information or areas where further analysis is needed. All comments will be properly reviewed and analyzed. Substantive comments will be addressed in the Final EIS.

The purpose of the proposed action involves the F-35A's role in the Air Force fighter modernization effort. The goal of this effort is to ensure future fighter aircraft are the best available to support a high-threat, multi-role war fighting capability to commanders worldwide. To perform this mission, trained pilots, maintenance and support personnel must be available to move F-35A inventory delivery dates as older aircraft are retired or reassigned. The F-35A provides several fighter modernization advantages, including efficiently and effectively maintaining combat capability and mission readiness as the U.S. Air Force faces deployment across a spectrum of conflict, provide for homeland defense, provide the U.S. Air

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Force with the most advanced fighter aircraft in the world, and an additional strategic location in the continental United States.

The Air Force is proposing to establish the AFRC operational beddown for the F-35A aircraft, along with required infrastructure and manpower at one Air Force installation in the continental United States where the Air Force Reserve Command leads a global precision attack mission. The missions utilizes pilots and support staff who operate and maintain the aircraft to support the joint strength fighter program. Implementation of the mission would require a variety of on-base development projects, including demolition, new construction and renovation.

At each base F-35A flight activities would occur in existing airspace within each training airspace unit. AFRC F-35A pilots would operate in the same airspace utilized by A-10 or F-16 pilots, but at higher altitudes. The Air Force analyzed three different afterburn scenarios at each base. The no-action alternative, as required by the National Environmental Policy Act, will be evaluated at each proposed beddown location to provide a baseline for the

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decision maker. The no-action alternative evaluates the environmental consequences of not basing the F-35 aircraft at any base.

In the Draft EIS the Air Force analyzed the environmental consequences of the beddown of F-35A aircraft and replacement of existing fighters for ground-attack aircraft at one of the following alternative bases: Davis-Monthan Air Force Base in Arizona, Homestead Air Reserve Base in Florida, Naval Air Station Fort Worth Joint Reserve Base in Texas, or Whiteman Air Force Base in Missouri.

In January of 2017 the Secretary of the Air Force announced Naval Air Station Fort Worth Joint Reserve Base as the preferred alternative for this mission. Davis-Monthan Air Force Base, Homestead Air Reserve Base and Whiteman Air Force Base were announced as reasonable alternatives for the mission.

This table summarizes the bases being considered and how the existing missions could be impacted. The following slides summarized the air path facilities and manpower changes anticipated to be required to support the mission.

Davis-Monthan Air Force Base has been

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identified as a reasonable alternative for a mission. If Davis-Monthan is selected to host the mission, the existing 24 A-10 aircraft operated by the 924th Fighter Group would be replaced by 24 F-35A aircraft, plus two backup inventory aircraft. Implementation of the mission would require a variety of on-base development projects, including demolition, new construction and renovation. This mission would decrease the area population by approximately 30 full-time mission personnel and would result in a 0.7 percent increase in annual aircraft operations at the installation and a five percent increase of total sorties within the airspace.

Homestead Air Reserve Base has been identified as a reasonable alternative for the mission. If Homestead is selected to host mission, the existing 24 F-16 aircraft would be replaced by 24 F-35A aircraft, plus two backup aircraft inventory. Implementation of the mission would require a variety of on-base development projects, including demolition new construction and renovation. This mission would decrease the area population by approximately 91 full-time mission personnel and would result in a

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three percent increase in annual aircraft operations at the installation and a 0.2 percent decrease of total sorties within the airspace.

Naval Air Station Fort Worth Joint Reserve Base has been identified as the preferred alternative for this mission. If Fort Worth is selected to host the mission, the existing 24 F-16 aircraft would be replaced by 24 F-35 aircraft, plus two backup aircraft inventory. Implementation of the mission would require a variety of on-base development projects, including demolition, new construction and renovation. This mission would decrease the area population by approximately 102 full-time mission personnel and would result in an approximate 12.1 percent increase in annual aircraft operations at the installation and a 1.2 percent increase of total sorties within the airspace.

Whiteman Air Force Base has been identified as a reasonable alternative for the mission. If Whiteman is selected to host the mission, the existing 24 A-10 aircraft would be replaced by 24 F-35A aircraft, plus two backup aircraft inventory. Implementation of the mission would require a variety

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of on-base development projects, including demolition, new construction and renovation. This mission would increase the area population by approximately 11 additional full-time personnel and would result in an approximate 17.4 percent increase in annual aircraft operations at the installation and a 5.9 percent decrease of total sorties within the airspace.

We would like to emphasize that although the preferred alternative for the mission has been announced, no final decision has been made on basing the mission currently under analysis in the Draft EIS. We look forward to inputs provided from the public and the affected communities as we proceed through the environmental impact analysis. Once the requirements of the environmental impact analysis process are complete, the Air Force will make its final basing decision.

Thank you for your attention. I will now turn the presentation over to Mr. Hamid Kamalpour, the Air Force Project Manager for EIS, to discuss the NEPA process and provide greater detail on potential impacts as described in the Draft EIS.

MR. KAMALPOUR: Good evening. I am Hamid

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Kamalpour, the Air Force NEPA Division Project Manager for analysis of the proposed action. I'm here tonight to discuss the results of the environmental impact analysis for the proposal presented by Major Davies.

The Draft EIS has been prepared in accordance with the requirements of the NEPA, National Environmental Policy Act, which requires federal agencies to analyze the potential environmental consequences of the proposed action and reasonable alternative, including a no-action alternative before any action is taken. The goal of conducting an EIS to support sound decisions through the assessment of potential environmental consequences, as well as involving the public in the process. The result of this analysis and other relevant factors will be considered before a decision is made by the Air Force on the proposal. Your input during the past public scoping period and this public comment period will help the Secretary of the Air Force to make the most informed decision possible on the proposal.

As you can see on this slide, there are several key steps to the environmental impact analysis process. We are currently at the public and agency

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Draft EIS review stage. The period begun with the Federal Register publication of Notice of Availability for the Draft EIS. At that time, copies of the Draft EIS were mailed to the local libraries, state and federal representative and individuals who requested copies during the scoping period.

The normal review period required by NEPA is 45 days. The Draft EIS public comment period will end on the 31st March 2020. The public hearings are being held in the same communities as the previous scoping meeting in order to provide the potentially affected communities with the opportunity to comment on the Draft EIS.

All the substantive comments received prior to the calls of the public comment period will be considered during preparation of the Final EIS. The Air Force responds to substantive comments on the Draft EIS comments in a Final EIS. The Final EIS is scheduled to be released in the summer of 2020 after the Final Notice of Availability is published in Federal Register. The Air Force must observe a waiting period of at least 30 days before signing the Final Record of Decision, or the ROD, to document which

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alternative the Air Force selected for implementation of the Air Force Reserve Command F-35 mission.

The Draft EIS presents information on the potential environmental consequences associated with implementing the proposed missions at each of the four basis. The potential environmental consequences are grouped into five categories shown on this slide. And a subcategory presented the 12 resources area evaluated at each base.

The next set of slides describes some of the potential environmental consequences at each of the four bases for the proposed -- for the purposes of the presentation. The potential environmental consequences at each base have been summarized in broad terms. For a more detailed evaluation of the potential consequences, please refer to Chapter 4 of the Draft EIS.

Implementation of the proposed mission at Davis-Monthan Air Force Base would result in significant noise impact from aircraft noise near Davis-Monthan Air Force Base. Approximately one percent of AFRC or Air Force Reserve Command F-35 flights would occur during environmental night. An

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additional 79 to 91 residential acres and an estimated 1361 to 1506 people would be exposed to day night hours sound levels of 65 decibel or greater. Significant impact to socioeconomic resources would also result from noise impact to schools. Implementation of the proposed mission would also result in disproportionate impact to minority and low-income population. No other resource area would be significantly impacted by implementation of the proposed mission.

Implementation of the proposed mission at Homestead Air Reserve Base would result in adverse but not significant noise impact. An additional six to 10 residential acres and an estimated 62 to 104 people would be exposed to day-night average sound levels of 65 decibel or greater. Approximately two percent of the AFRC F-35A flight would occur during environmental night. Implementation of the proposed mission would also result in disproportionate impact to minority and low-income population. No other resource areas would be significantly impact by implementation of the proposed mission.

Implementation of the proposed mission at Naval Air Station Fort Worth Joint Reserve Base would

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result in significant noise impact. An additional 640 to 642 residential acres and an estimated 8593 to 8648 people would be exposed to day-night average sound levels of 65 decibel or greater. Less than one percent of AFRC F-35 flights would occur during environmental night. Implementation of the proposed mission would also result in disproportionate impact to minority and low-income populations. No other resource area would be significantly impacted by implementation of the proposed mission.

Implementation of the proposed mission at Whiteman Air Force Base would result in significant noise impact. An additional 307 to 405 residential acres and an estimated 2072 to 2804 people would be exposed to day-night average sound levels of 65 decibel or greater. Approximately four percent of the AFRC F-35 flights would occur during environmental night. Implementation of the proposed mission would not result in disproportionate impact to low-income populations. Disproportionate impact to minority population would result from implementation of the new mission. No other resource areas would be significantly impacted by implementation of the proposed mission.

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That concludes the environmental consequences portion of our briefing. I will now turn the microphone over to our Hearing Officer.

COLONEL GRIFFETH: All right. So, we'll now move to the verbal comment part of the hearing for those wishing to speak here.

So, here's the format. Please fill out a white speaker card if you haven't already done so. And if you did not get one of these and you want to speak, please raise your hand and one of the staff will get you a speaker form. So, while we're doing that, it looks like we have a couple hands that are risen, we'll take about 10-minute break and then we'll start the public comment section.

So, we'll be in recess now for about 10 minutes.

(Recess.)

COLONEL GRIFFETH: Please be seated. The hearing is now called back to order.

I have a note here saying that the Tucson Convention Center has waived the parking fees for this hearing. We understand that some individuals may have been charged for the parking. We apologize for this.

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And if you were charged, please see one of the support staff with the name tag and present your parking receipt and you will be refunded. Thank you for your understanding.

So, this is the way it will work. When I called your name, you may approach the microphone here or right over here. And to help our stenographer in the front, please begin by stating your name and the name of your organization, if any, that you may represent. It will also help if you spell your last name. Please do not provide any personal information, such as your home address or phone number.

Again, your comments are recorded verbatim. They will be used to develop a transcript in a permanent record of this hearing and will be published in the Final EIS. Your name will be included along with your comments. Personal home addresses and phone numbers will not be published in the Final EIS.

Each speaker, because of the number we have, will be given two minutes. Timing will depend upon the number of speakers. But we're going to start with two minutes to provide his or her verbal comments on the proposed action and alternatives. We have a time

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keeper to help us keep track of the time.

Where are you at? Right there. All right.

So, he will hold up a yellow card when you have about 30 seconds left and a red card when your time is up. At that time, please conclude your comments so that I can call on the next person. Of course, there's no obligation to use the entire two minutes. You do not need to yield any remaining time to someone else. I will just move to the next speaker.

Also, in interest of time we ask that you submit any individual electronic presentations as written comments. Tonight's hearing is set to end at 8:00 p.m. If more people sign up to speak than would be allowed by the time the hearing closes at 8:00 p.m., the speakers will be called up to speak in this order: Federal, tribal, state, then local, and then -- will be going first, followed by the members of the general public in the order the speaker forms were received here today.

At 8:00 p.m., or once all the registered speakers have had opportunity to speak and other individuals desire to speak, I will adjourn the formal special comment portion of the hearing. If everyone

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who has been signed up to speak has had a chance to speak before that time, I will ask if any speakers would like another two minutes to expand upon your comments. If you want to do that, just let me know, and we'll restart the clock for you. If you want to add something later to your verbal comments or if you would rather not speak here at all tonight, you can submit written comments. The Air Force gives equal weight to verbal and written comments. Both become part of the official record and are included in the Final EIS.

Just a few reminders before we get started. First, please limit your comments to the analysis in the Draft EIS. That is the purpose of the public comment period. As I mentioned earlier, this is not a question-and-answer session. It is an opportunity for you to put in on the record your views, your concerns about the proposal that you want the decision maker to consider. Questions that you pose during your verbal testimony will become part of the record and will be considered. After we end the formal part of this hearing, the Air Force representatives will continue to be available for further discussion.

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I've been provided a list of individuals who would like to speak here today. Your name will be called in the order your speaker cards were received.

Our first speaker is Ron Barber on behalf of Congresswoman Ann Kirkpatrick.

MR. BARBER: Good evening. Thank you for the opportunity to speak with you tonight.

My name is Ron Barber. The last name is spelled B-A-R-B-E-R. I'm a former member of Congress and currently an Assistant Director with Congresswoman Ann Kirkpatrick.

Davis-Monthan Air Force is part of the Congressional District Two, which is represented by Congresswoman Kirkpatrick. She's asked me to read a letter on her behalf here tonight, because she's still in Washington, DC. And as I said, Mr. Kamalpour, earlier, we will send this to you electronically tomorrow.

So, here is the letter: Dear Mr. Kamalpour, I am pleased to write in support of utilizing Davis-Monthan Air Force Base as a training site for the F-35A and all flying missions. Tucsonans have a long history of supporting Davis-Monthan over its 80 years

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of military operation and will continue to support flying missions there. Activated nearly a century ago, Davis-Monthan Air Force Base is positioned as one of the Air Force's best choices for training missions for the same reason our civilian population chooses to live here, the amazing weather. Because of a lack of extreme weather events and natural disasters, southern Arizona's climate allows year-round air traffic capabilities. Ranked consistently as one of the top five sunniest cities in America, Tucson will provide an incredible environment not only for the F-35A training missions, but also for the airmen stationed at Davis-Monthan Davis-Monthan Air Force Base. It is also in close proximity to one of our nations best ranges, the Barry M. Goldwater Air Force Range, which allows flights to spend less time traveling to the range and more time training. This is especially important for an F-35A training mission, given the fleets reduced it range capabilities. The Air Force undoubtedly places a significant value on the valuable time available for airmen to train in flight, and Davis-Monthan Air Force would provide an excellent base for those needs.

I have no doubt that the Tucson community

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will continue to support the future Air Force missions at Davis-Monthan Air Force Base. And as Arizona's Second Congressional District has one of the largest military retiree and veteran populations in the country, I hope you will give full consideration of utilizing Davis-Monthan Air Force Base for an F-35 training mission in any future training missions.

Thank you for listening to our comments.

COLONEL GRIFFETH: Next is Pima County Supervisor Ramon Valdez. And after that will be Pima County Supervisor Steve Christy.

MR. VALDEZ: My name is a Ramon Valdez. I'm A County Supervisor for Pima County. V-A-L-D-E-Z.

I've had the pleasure of having Davis-Monthan in my legislative and supervisorial district for the past 24 years. Davis-Monthan is a part of our community, and together we've adapted to a wide range of missions and we have continued to adapt to the military missions as they change. Davis-Monthan has adapted to the needs of our community by changing landing patterns, approach patterns, minimizing nighttime operations and collaborating on encroachment Issues.

As one example of our partnership, Pima County created the first Veterans One Stop that is a model throughout the country in assisting separating military veterans and their families to become important members of our civilian work force, and they are most sought-after employees in our community. Pima County, through our Community Partnership Program, collaborated with DM50 in the development of Military Spouses Initiative to assist in finding employment for incoming spouses, often even before they arrive in Tucson.

The County supports the EIS process and understands the findings of the F-35A report. We further understand the basis behind the resultant increase in noise contours and potential impact on surrounding neighborhoods. Pima County expects that appropriate mitigations measures will be implemented that will ultimately minimize the impact on residents within the 65-dB noise contour.

As I walked the district that's in the approach pattern, the landing pattern for Davis-Monthan, we heard many stories, stories about people who have had their sliding doors broken, but

within a day Davis-Monthan has been responsive. Equally, we've heard from people who are very concerned about the fact that the house was not designed to keep the noise out. We've heard wonderful examples here, we have local examples here with the Tucson International Airport, through their FAA programs, demonstrating this type of noise mitigation successfully. Pima County fully supports the total-force mission of DM Air Force Base, and we believe that with the appropriate noise mitigation, the potential benefit of the F-35A in southern Arizona will be as successful as all our other missions.

Thank you.

COLONEL GRIFFETH: After Steve Christy will be Tom Murphy.

MR. CHRISTY: My name is Steve Christy, C-H-R-I-S-T-Y, member of the Board of Pima County Supervisors representing District Four.

As a native Tucsonan and A former owner and operator of a family of retail businesses for well over three decades, I can speak to the importance and value that Davis-Monthan Air Force Base has meant to our community on so many different and impactful levels.

To think of a Tucson and Pima County without Davis-Monthan or without having the benefits of the presence here in our community of Davis-Monthan is unfathomable. Davis-Monthan and our community are not only interchangeable, but one and the same. And without conveying personal anecdotes of what Davis-Monthan Air Force Base has meant to a personal and business level, which there are many, let me share some vital and actual dollars-and-cents facts illustrating what the economic importance of Davis-Monthan to our region is.

The impact of DM on the local economy measures \$2.6 billion to the southern Arizona economy. Almost 20,000 military retirees reside in the local community, with a total combined annual retirement paid of \$514 million. There are almost 6500 indirect jobs due to DM, with an approximate value of \$292 million in wages alone. The base receives 68,000 hours of direct community support annually, and combined operation and maintenance outlays total more than \$292 million annually.

Further statistics produced by the Tucson Association of Realtors demonstrate that DM has had a

positive impact on housing prices within one mile of the base, as home prices in the DM area have risen steadily over the last five years, surpassing the increase in home prices for the greater Tucson area each year.

And, finally, it is so important to note that the southern Arizona community supports any flying mission that the Air Force proposes to bring to Davis-Monthan. Surveys show there is clear support for DM among Tucsonans. 73 percent of the residents strongly support flying missions at DM, and 92 percent of all residents close to DM are supportive of the base. We need and support Davis-Monthan Air Force Base in our southern Arizona community so DM's mission can be accomplished and so that our region will continue to benefit from DM's positive presence.

Thank you.

COLONEL GRIFFETH: Next is Tom Murphy, Mayor of the Town of Sahuarita.

MR. MURPHY: Very good.

Good evening. My name is Tom Murphy, M-U-R-P-H-Y. I am the Mayor of the Town of Sahuarita, a community it 31,000 residents just south of Tucson.

My wife and I both served 21 years in the Air Force. I retired in 1994. My wife retired in 2009 from Davis-Monthan. We both are originally from New England, but we chose to stay here, probably for some of the reason that approximately 20,000 other military retirees call this home, great weather, a very supportive community and DM. We have hundreds of families, military families that call Sahuarita home, and contribute on a daily basis to our thriving community. And we're very proud of that.

I realize DM is not the preferred alternative, but I'm here to advocate why DM should be the reasonable alternative of choice as future F-35 aircraft transition in the future. Southern Arizona has supported flying missions here since the early 1900s, and for good reason; a supportive community, great weather to train in, and training airspace on the Goldwater Training Range that would be nearly impossible to duplicate in other areas of the country.

We were stationed at Homestead Air Force Base when Hurricane Andrew hit it and destroyed it in 1992. We are very fortunate to be here, not in the types of areas that have natural disasters and interruptions in

military readiness.

I understand that noise is always a concern on the mission of airframe changes over the years. I started on the RF-4C, transitioned to the 16, and retired working on the F-15E Strike Eagle. Bases go through the same transitions.

I've always considered that the sound of freedom and readiness then as I do today. I hope that you will keep the potential increase in decibel levels in perspective in comparison to other daily inconveniences, such as busy city traffic when deciding on this issue.

I was proud to be part of the community collaboration effort to support DM when they won for the second time Commander-in-Chiefs Installation Excellence Award in 2018. Davis-Monthan Air Force Base is one of the crown jewels and one of the best bases in the United States Air Force. Please never allow the sound of freedom and readiness to be silenced here in the City of Tucson.

Thank you.

COLONEL GRIFFETH: Next is Bryan Foulk from the Metro Water Board. After Bryan Foulk will be Fred

Pease.

MR. FOULK: Hello. Bryan Foulk, F-O-U-L-K, elected Board Member of Metropolitan Water.

I'm here to talk about part of the environmental assessment and water, sewer type things at Davis-Monthan, some of the concerns about water in the desert. I'm here to just talk about a few things that Davis-Monthan has done to keep their water supply strong and why future missions can be bedded down here without any issues.

The Tucson area and Tucson Water have a 100-year guaranteed water assurance here in the area due to the CAP system, Central Arizona Project, and SAWUA, Southern Arizona Water Use Association. So, any time new development or anything is done, we make sure that there is plenty of water to be done for the 100-year assurance.

Some of the things that they've done on base, water use has decreased from 63 gallons a square foot on base in 2007 to 38.2 gallons in 2019. The desert landscaping now has been put in the base, with all desert landscaping only irrigated for the first two years. The golf course has been closed, saving

45.1 million gallons a year. Artificial turf installations that have done to date save 8.5 gallons per year. Future artificial turf savings will be 7.36 million gallons a year, and the base will be undergoing a leak detection survey through '20 and '21, which should also find -- lower their water use.

In addition to that, the base has come up with an agreement with Pima County on sewer capacity funding, so we have inlet and outlet pretty much covered and saving the base money.

Tucson Electric Power also has a large plant that shares the aquifer near the base. They are replacing their steam turbines and they are going to go into automatic gas generators. The water use there was 685 million gallons a year. It will be dropping to 230 million gallons a year. So, the overall savings at the base in just the last few years is 515 million 580 million gallons of water. So, the water at the base should last for any future mission, this mission and future mission that goes forward.

Thank you.

COLONEL GRIFFETH: Brett Pease. And then we've got some chairs right here in the front if you

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want to come up to be ready.

Next will be Chuck Huckelberry and then Gene Santarelli.

MR. PEASE: Hello. My name is Fred Pease. I am a Tucson homeowner since 1993 and a resident here since 2014.

I was in the Air Force for 42 years as a flier in uniform and also as a senior civilian. The last half of my career was in the Pentagon. I was a Director of Ranges and Airspace, a Deputy Assistant Secretary for Base Realignment and Closure in 2005, a Director of Air Force Air Operations, also the Deputy Assistant Secretary for Environmental Safety and Occupational Health.

So, I made several comments during scoping, one of which -- and I'm going to bring those up now. One of -- the EIS says that the F-35 will occasionally practice conventional JDAM deliveries from 20 to 40,000 feet. And you have a list of ranges, but you don't have the ranges where you are going to do those deliveries, and you should put in the EIS.

The second thing, you suggested home values under the 65-dB contour in Tucson would go down about

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one percent, up to one percent, if the F-35 were based here. During scoping I asked for analysis of the 65-dB contour at those housing prices at Luke, Hill and Eglin, and I didn't see that in the EIS.

Also asked for an operational cost analysis. Every base is more or less efficient as another base. The cost analysis done was for construction and for personnel, but not for operating once the decision is made to beddown. And that should be in the EIS also.

The last thing is, you might hear some discussion of -- I certainly did when I was at the Pentagon -- about crashes here in Tucson 42, 53 years ago that had some tragic results. In the last three years, 200 people have died on Tucson streets of vehicular accidents. I asked the Air Force to put aircraft safety in a context of total risk to Tucsonans, and you didn't do that. I would like to see that in the EIS. The risk to Tucsonans, in my opinion, is predominantly traffic related, not aircraft related.

Thank you.

MR. HUCKLEBERRY: My name is Chuck Huckelberry, H-U-C-K-E-L-B-E-R-R-Y. I am a Pima County Administrator.

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Pima County has a 40-year history of support and cooperation with Davis-Monthan Air Force Base. Community support for the base is strong and enduring and will continue. That history starts back in the 1980s with the construction of major transportation corridors in and around the base, including what we now know as the Craycroft gate and the Swan gate.

More importantly, in 2004 the voters of Pima County actually voted to tax themselves for $10 million to actually acquire lands and protect the departure corridor at the base in order to minimize future conflicts and future impacts to residents who are business operators who would be in the vicinity of Davis-Monthan. In addition to that, the County fully cooperates and continues to work cooperatively with Davis-Monthan in what's called the Readiness and Environmental Protection Integration Program, which is really another program to continue this mitigation strategy for reducing conflicts associated with air operations at Davis-Monthan.

Finally, I have read the EIS statement, the draft statement, and support the F-35A Operational Beddown at Davis-Monthan Air Force Base provided noise

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mitigation is provided to those areas subjected to the 65-plus decibel noise levels. Mitigation funding, as demonstrated previously in our bond issues and our REPI program, can and will be made available, and can come from federal or state sources or even local sources to minimize the adverse impacts of those.

Thank you.

COLONEL GRIFFETH: Thank you.

After Gene Santarelli will be Jim Dugan.

MR. SANTARELLI: My name is Gene Santarelli, S-A-N-T-A-R-E-L-L-I. I've been a resident of Tucson since 1998, and I am retired Air Force and have been a commander multiple times, three times at the local level, one being Davis-Monthan Regional Commander, and retired as the Deputy Commander of the U.S. Air Forces in the Pacific.

Noise is a complex issue, and that's what I want to talk about. The EIS summary addresses noise from just one aspect. The negative impact of jet noise, as is put in the EIS, would or could provide a significant socioeconomic impact. The Final EIS should reflect either certainty, would, or possibility, could, when addressing the significant impact of noise. The executive summary -- in the executive summary jet noise is addressed in isolation and not in the context of total noise. As was noted before traffic noise, industrial noise, civil air traffic and others should be addressed in the Final EIS report.

The EIS does not balance the negative impact of military jet noise with the positive economic and socioeconomic impact of -- let me go to my last point. Lastly, the EIS does not discuss the efforts of local commanders to do everything safely possible to mitigate noise. As a previous commander who dealt with these issues, I can attest to the military efforts to mitigate noise. The Final EIS needs to discuss this and the other points I have mentioned to present the noise in a total context for our public awareness. Due to the importance this noise issue, both positive and negative socioeconomic impacts must be captured.

Thank you for hearing me out.

COLONEL GRIFFETH: Jim Dugan, if you could please come up. Next would be Chuck Martin.

Jim Dugan? Okay. We'll move on to Chuck Martin.

Martha Lynne. After Martha is Lee Stanfield.

MS. LYNNE: Hi. My name is Martha Lynne. I am a citizen of Tucson and speak as a citizen of Tucson.

First about the sound levels. The EIS is based on that the F-35 is two to three times louder than the F-16. That's simply not true. Sound physics specifies a logarithmic increase in sound as it is experienced by the human ear. They have their own formulae. If you do simple math, of course, 112 decibels at 2000 feet is 30 decibels louder than an F-16. But that is not correct. And you must use the formula -- the EIS must certainly use the formula of modern science, the physics of sound. Any perfunctory treatment of the meaning of sound, after having built an Air Force base on advanced math, is a bit shoddy, makes the EIS reflect poorly on the Air Force.

What I want to, however, zero in on a part of my comment, and I do want my comments here to be in the record. If you drop down to Table DM-320, it talks about that environmental night flight, which I think you said earlier was one percent of the overflights. Well, this table shows that the F-35's over the area of Tucson that is going to receive 65 decibels or more,

which runs from Davis-Monthan, up over 10 parks and eight schools, up over Reid Park, up over the University of Arizona, will -- intends that this F-35 intends to wake people up over this area from one to seven times a night. Now, you can close your windows -- you will close your windows permanently, I guarantee you -- and you will still get your sleep interrupted from one to four times a night.

The interpretation of this table then notes that there are health effects, but defensively asserts that no one has proven any, except for the one of high blood pressure. From a short search on the internet looking for the effects of being awakened at night by overflights in general from airports mostly, I easily found that the type of awakening is the startle effect, and that sets forth a parasympathetic cascade that we all know and learned in grade school as flight or fight.

COLONEL GRIFFETH: Martha, how much longer will you be?

MS. LYNNE: Have I already used three minutes?

COLONEL GRIFFETH: You have and then some.

MS. LYNNE: Oh.

COLONEL GRIFFETH: What I would ask, if you wrap up your comments, and then when time comes, please say, you can raise your hand and we'll get you back up.

THE WITNESS: Okay.

COLONEL GRIFFETH: Thank you.

MS. LYNNE: Yes. I wanted to go into the physiology just a little bit, because there are far more far reaching health implications involved, and they are not controversial.

A VOICE: I would like to yield my time up to her.

COLONEL GRIFFETH: Ma'am, as we explained earlier, there's no yielding of time. We'll just keep going in order, and then when everybody has gone you will get another opportunity.

So, next would be Martha Lynne.

A VOICE: She was Martha Lynne.

COLONEL GRIFFETH: I'm sorry. Lee Stanfield. Sorry about that.

MS. STANFIELD: Yes. I am Lee Stanfield. I've been living in Tucson since 1976.

The F-35, in terms of today's warfare, was obsolete before the first one actually flew. I'm just going to mention a few things. The EIS, this EIS, does not mention the numerous problems with the F-35. It has had major problems with the engine. It's a single-engine aircraft. It has had major problems with the helmet display systems, and it has run entirely -- the pilot has to rely entirely upon the helmet display to know all the factors involved in terms of elevation and direction, et cetera. It has numerous problems, and those problems are still being worked out, even though they are allowing this plane to be flown over densely populated areas like midtown Tucson.

That's what they want to do, is bring it here and fly it over us, the most densely populated part of Tucson. It has to take off in that direction, because they can't fly anywhere else. Davis-Monthan is surrounded by Tucson, and as such, it should be behaving in a manner more in accord with that responsibility, and it's not.

The fact is, that so long as Lockheed can continue paying lobbyists and funding our congresspersons' campaigns, they will continue to be able to sell these unneeded, obsolete monstrosities to

our military, and our Air Force will continue to trying to shove them down our throats. This EIS uses inappropriate tools to measure noise and safety, something that they have routinely only done over the years.

I've been at this microphone similar to this in the past speaking about these same things, and here we are again. The problem with it is that no matter what we do, in the EIS there's nothing saying that, even if we miss the beddown this time, that it won't come back to haunt us in the future. In fact, it's a given they will, because as long as Lockheed can make a profit of making more of these monstrosities, no matter how obsolete they are, they will be able to shove them down our throats.

Thank you.

COLONEL GRIFFETH: Darrell W. Reeves and then Larry T. Lucero.

MR. REEVES: Good evening. I'm a U.S. Air Force retiree, Air National Guard 182nd retiree.

I live on the back side of the Davis-Monthan Air Force Base, within few miles of the Wilmot gate. The sound of that aircraft will keep me at peace at

night when I hear it. Please bring it to this area.

The economic impact, I think, cannot be overestimated at all. There are only a few major employers in this town, Raytheon, University of Arizona, Pima County Government. I worked for Pima County Government for over 20 years. We need this here. The very fact, as has already been discussed regarding good weather, that's a huge part as far as I'm concerned. That's why you have AMARG here. That's one of the few money-making operations, I understand, of the Department of Defense.

Also, you stationed this 135 at Luke Air Force Base, at the preserve area there. That's another reason, I assume, you put it there, because of the good weather.

You know, down in Homestead Air Force Base you got hurricanes. And in retirement I worked in disaster response for over two years with Team Rubicon as a leader. I've seen the devastation that can occur.

My sister-in-law and brother-in-law were impacted by a hurricane in Panama City Beach, was devastated at that base. Missouri, they get bad weather, tornadoes. Texas, they get bad weather.

That's about all I got in play is the weather hand. Sorry.

So, I'm just saying this, bring the plane. Yes, there may be some noise impact. I would not underestimate that. But it will be the sound of freedom that I will want to hear every night and every day.

Thank you.

COLONEL GRIFFETH: Next is Larry Lucero, and then Glenn Bancroft.

MR. LUCERO: Thank you for the opportunity to speak. I'm Larry Lucero, L-U-C-E-R-O, former Chair of the Southern Arizona Defense Alliance, and I'm retired at this point.

I just simply want to remind the community that this facility has been here, as was mentioned earlier, over 100 years with respect to its various missions, and in particular, a highly successful flying experience for all of the reasons that have been already noted.

In my short time with the Southern Arizona Defense Alliance we made a concerted effort to try to take the pulse of the community, both with respect to what they knew about the missions as well as the opinion that the community had about its presence here. Overwhelmingly, the community supports the flying missions that are at Davis-Monthan. And as you get closer to the facility, you see even greater support for its presence in this community. They can't be -- that, hopefully, will offset the notion that there is a negative impact on low-income and sensitive neighborhoods around the base.

However, because of the efforts of our governance here with respect to noise mitigation, I think that at the end of the day we're going to find that the community will have the confidence that mitigation efforts that have been called for will be applied and will be successful in continuing a relationship with Davis-Monthan.

So, I wholeheartedly support your efforts to reconsider your provisional finding and elevate Davis-Monthan to its preferred alternative.

Thank you very much.

COLONEL GRIFFETH: Glenn Bancroft and Linda Morales.

MR. BANCROFT: Good evening. My name is

Glenn Bancroft, B-A-N-C-R-O-F-T. I am a local businessman, and I am a benefactor of the Air Force having sent me here in 1978. Rather than go on to med school with the Air Force, I decided to stay, get out and join the local population. I am a disabled vet.

I will echo the comments about the sound of freedom. I hear jets all the time. Love them.

In one of my businesses, I manage over 700 residential rental properties. In 40 years of operation of that business I have not heard one complaint about air traffic, not from TIA or from Davis-Monthan or the Air Guard. And there are literally -- you can track the thousands of retirees that -- Air Force, Navy, Marine Corps and Army that are all in the local area. It's a little difficult to get a handle on the number of us that decided not to make the Air Force a career and just stay. We stayed. We love it here. The support that we give to the base, the support that we have for the base is just unpromising. So, I think you ought to elevate -- I like Larry's comment. Elevate Davis-Monthan to the number one position.

COLONEL GRIFFETH: Linda Morales, then

Richard E. Basye.

MS. MORALES: Good evening, gentlemen. I'm Linda Morales.

And I have lived approximately just a little over a mile from Davis-Monthan for the last -- since 2006. And when we moved there, we were well aware of the proximity to the base and the fact that aircraft does fly over on a regular basis.

In fact, the week that we moved in was the Heritage Conference, so we got a variety of aircraft. We were super excited to see that as we were moving into our new home. And we look forward to that every very year for the variety and even the noisy things like the F-22 that come in during the conference, as well as the air show. And, in fact, my husband works out of the house, and we laugh that the only disruption that he has from aircraft flying over is when he runs out to see what new sound he's hearing and to look for the planes as they fly over. So, we are not concerned that the F-35 is going to have a negative impact on our daily lives in our house.

And as a certified professional planner for the past 25 years, I was involved in the JLUS study

done in 2004. And I was pleased to see in the EIS that the noise contours from that fall within those noise contours that were developed as part of that. And as part of that JLUS, the City of Tucson and Pima County both adopted zoning ordinances and policies that were based on those, and regulated land uses within that.

So, we've anticipated this, that a noisier aircraft would be coming to our area, and have reacted in an appropriate manner to prevent that incompatible land use. And that, combined with the County's participation with the Air Force base in the REPI program, has allowed us to compensate owners for incompatible land uses and prevent future incompatible land uses within the approach, departure corridors. We're protecting that airspace, we're protecting that ability to have flights and flying missions within Tucson.

All those things, along with the weather, the airspace and the proximity of the range make it an ideal location, and we would welcome the F-35 in our community.

Thank you.

COLONEL GRIFFETH: Richard E. Basye, then

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after that Rosana Solania.
MR. BASEY: I'm a retired Navy pilot. Richard E. Basye.
As far as the noise level, I understand it's an average over 24-hour period. And I would like to compare that to an earthquake that's hits you for a couple of minutes, you know. There's no consequence if you average it over a 24-hour period.
And second thing, is that this is a single-engine aircraft, so if its engine fails, it crashes wherever it is. And it may be the University or a shopping center or who knows where. It's unlikely I guess. I believe the A-7 that crashed over at the University was a single engine, and they decided after that there would be multi-engine aircraft that were to go into Davis-Monthan. I may be incorrect, but I think that's what they decided.
Finally, it uses a lot of fuel. If it's like the F-22, it gets less than a half a mile per gallon of gas. We're going to be polluting our air much more so with this aircraft.
And, finally, why don't we put the aircraft where they already are. The folks like them at Yuma.

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I have a statement here that says Yuma looks forward to the F-35's. And up at Luke Air Force Base. I don't think they need any EIS there. They are already there.
So, why not put them there, and let's put some drone headquarters at here at Davis-Monthan. Transport aircraft could be here too. Because as far as that fuel consumption goes, it's about $1500, as I figure it, just for an aircraft to get over to the Goldwater Range and back. It's half that from Luke, which is much closer, and no distance at all from Yuma to get to the Goldwater Range. Let's save the taxpayers a little money while we're at it.
That's all I got to say.
COLONEL GRIFFETH: After Rosana Solania is Manuel Davila.
MS. SALONIA: Hi. I'm a Tucson resident since --
COLONEL GRIFFETH: Everybody, please, for the stenographer and to make it so it can be on the record, spell your last name for the record so that we'll have it. Thank you.
MS. SALONIA: S-A-L-O-N-I-A. So, downtown Tucson resident since '95.

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I would like to say there are so many ways in which this unfortunate event would affect all of us here in the valley, but I'm going to focus on the point in the I -- I'm sorry, EIS, in which it admits that the noise of the F-35s, quote, would result in significant socioeconomic impacts. Close quote. Further, the F-35s, open quote, would result in disproportionate impact to minority and low-income populations. Close quote. The EIS must explain why basing F-35s at DM is more important than our socioeconomic well-being and the well-being of our low-income and minority the residents, please.
Furthermore, soundproofing could help protect our homes, businesses, churches and schools from the noise of F-35s. The EIS states, open quote, the USAF has considered several categories of potential noise mitigation for Davis-Monthan, but none of the measures would be operationally feasible. Close quote. The EIS does not consider soundproofing of buildings, except to say that no public funding is available.
The EIS fails to consider that the Department of Defense, with A 2019 budget of nearly $800 billion, of which 98.8 percent is discretionary, could easily

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finance such a program. If Department of Defense policy must be changed in order to fund soundproofing, so be it. The EIS must seriously consider this option.
If no public funds are available for soundproofing of residents and businesses, the EIS must analyze the impacts of the cost that their owners must bear in order to reduce interior noise levels to acceptable standards. Many of the houses in the neighborhoods most affected by aircraft noise are old, poorly maintained and constructed to outdated standards. These factors will increase the noise mitigation costs to their owners.
Do I have more time?
COLONEL GRIFFETH: I think you're done.
MS. SALONIA: Gotcha.
COLONEL GRIFFETH: Thank you.
MR. DAVILA: Good evening. My name is Manuel Davila, D-A-V-I-L-A. I am currently a Board Member at the Tucson Hispanic Chamber of Commerce and a local business owner.
The THC, Tucson Hispanic Chamber of Commerce, represents approximately 1300 small businesses, mid-size businesses and large corporations in Southern

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Arizona. Out of those businesses, we focus primarily on -- not that they focus -- primarily has more representation within the Hispanic community. Now, the Hispanic community, as many of you might know, is a very entrepreneurial community. They focus on economic growth, economic prosperity, and put that above any other aspect in their lives.

Now, with that being said, we highly support the F-35 presence in Tucson, in Pima County. The F-35 will bring business opportunities, such as prime contracts, subcontracts within government contracting. It will also bring more presence from Lockheed Martin, the country's number one government contractor. Lockheed Martin's presence in Tucson will provide more need for services, IT contracting logistics, which happen to be the areas most Hispanic businesses in Pima County focus in.

The F-35 is considered an immense asset to the economic prosperity of the Hispanic community. As a board member of the Hispanic Chamber of Commerce, once again, we highly support that in representation of our members.

Thank you.

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COLONEL GRIFFETH: Next is Matthew G. Yates, and then after that will be Gary A. Hunter.

MR. YATES: Hello. My name is Matthew, last name is Yates, Y-A-T-E-S.

My comments are in direct response to the EIS report. Read as follows: The EIS admits the number of schools and students impacted by increased noise would constitute a significant impact that could interfere with learning. The EIS does not expand on this statement. It has not considered the scientific studies that demonstrate just harmful the noise is to its students.

Many recent studies have unambiguously established the specific effects of aircraft noise on students' learning. One such publication is that of the Department of Defense itself entitled, Operation Noise Manual. The DOT publications states that students subjected to noise have lower motivation, lower reading scores and less patience for solving difficult problems.

By bringing the F-35 to DM, the Air Force with intentionally and knowingly impair the learning of Tucson's students. Their impaired academic performance

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with handicap them for the rest of their lives.

The Department of Defense, in its publication Operation Noise Manual, prescribes the noise in classrooms in conformance to specific specifications of the American National Standard Institute, or ANSI. Those specifications state that during the noisiest hour of the school day, noise inside classrooms should not exceed 40 decibels for more than six minutes. The EIS ignores the ANSI specification; instead, averages noise over the entire school day. This daylong average is improper and it's deceptive, because it's significantly lower than the six-minute limit of the noisiest hour. The EIS must correct that mistake. And, in addition, the EIS must apply the ANSI standard not just to a handful of schools, but to every school in Tucson that could be potentially impacted.

In section 3.2.3.1.7., the EIS rejects the many specifics studies that show links between aircraft noise and health problems. The EIS says, health effects of long-term noise exposure have not been documented, and the research studies regarding health effects of aircraft noise are ambiguous and often contradictory, and no unequivocal evidence exists

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supporting linking between noise and psychological health.

To support these claims, the EIS cites a single study known as Harris 1997, or 1997. That study, which is published by the U.S. Air Force itself, is 23 years out of date. It relies on nearly 100 other studies that are between 27 and 61 years out of date. Yes, Harris 1997 does suggest that these outdated studies are not conclusive, but after its introduction the very first sentence of Harris 1997 is this: There seems little doubt that noise under some conditions can have an effect on the health of people.

The EIS misrepresents the conclusion of Harris 1997.

Thank you.

COLONEL GRIFFETH: Gary A. Hunter, then Les Pierce.

MR. HUNTER: Hi, there. My name is Gary Hunter, H-U-N-T-E-R.

Table 2-12 of the EIS says, quote: Transient F-35As operate at Davis-Monthan.

Thanks to those transient F-35s, we midtown residents have some idea of just how loud the F-35s

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are. How loud are they?

Here is a message I received from a midtown resident. Quote: Noise is horrendous inside my house, but when I open the door it is almost indescribable noise, thundrous, excruciating noise, ear-splitting noise, vibrates everything.

Message from another resident. Quote: It's unbearably bad at my house.

And another: My God, they are awful.

And another: The windows and shutters rattle in my house. My dog starts to bark from a dead sleep when they fly over.

And another: They are frighteningly loud. It truly is frightening. The sound is excruciating. Windows rattle and shake, dogs bark and howl, car alarms are activated by the sound.

What does the Air Force think about a firsthand experiences with F-35 noise? Their opinion is right there in the EIS. Listen to this. It's section DM 3.2.2.1.1. Listen. Quote: The experience of hearing individual transient F-35A aircraft over flights does not provide all of the information about the noise. The most accurate method available to

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estimate noise impacts of an F-35A squadron involves computer noise modeling.

Really? So, the Air Force wants us to believe that to understand the impacts of F-35 noise on our lives, to understand the impacts on availability of our homes and neighborhoods, we should ignore what we actually experience when the F-35s fly over our homes; instead, we should rely on the Air Force's hypothetical computer-generated numbers. Does the Air Force really expect us to believe that? Really?

Thank you.

COLONEL GRIFFETH: Next will be Manon Getsi.

LES PIERCE: Good evening. My name is Les Pierce, P-I-E-R-C-E, as in piercing scream. I'm President of the Arroyo Chico Neighborhood Association.

To follow up on some of the points made before, I would just like to know that if the esteemed County Administrator is seriously asking for sound mitigation for homes in the 65-decibel contour to counteract the F-35s impacts, that in itself should be clear indication that the F-35 is incompatible with the residential use, as they currently surround the base.

Also, it was noted on one of the display

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boards that the potentially impacted properties in Tucson are in an airport environs, or an AEZ. Please do not under any circumstances assume this area has been, quote, written off, end quote, or is, quote, expendable, end quote. Do know that the AEZ was imposed in 2004 over loud and vehement protests and does not, does not, does not, in my opinion, represent the will and wishes of all Tucsonans.

Also, it has been suggested the F-35 pilots would be able to turn off the afterburner shortly after takeoff to get the jets to a higher altitude before they exit the installation boundary and, presumably, before they impact neighborhoods. As one who has experienced the sound of freedom, the sound of peace, the sound of preparedness on a routine basis -- and I have shattered and cracked windows to attest to it -- given how loud the afterburners are, how far away they can be heard, this will not mitigate the noise enough to be compatible with surrounding residential, commercial and educational uses, even if pilots complied 100 percent of the time. And that's not a dis against pilots. They are humans and they screw up like the rest of us. So, I don't think that would be a

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solution, and, therefore, it should not be there.

And also, I would like to note that a lot of us impacted residents we're not against the base. We understand it serves a purpose, and a lot of us have people who work for companies that work for the base or benefit from the soldiers. That's great. We just think this particular toy is too big for the sandbox, and perhaps send it somewhere else.

Thank you.

COLONEL GRIFFETH: After this will be Manon Getsi.

MS. GETSI: Hi. My name is Manon Getsi, G-E-T-S-I. I have lived in the Country Club Manor area since -- for 23 years.

The flight path was not over my home when I originally lived there. I lived there for approximately seven years before it was moved, and it was quite low at that time. And my partner, who is a firefighter and works 24 and 48-hour shifts, was not able to sleep when the flights were very low, a thousand feet over our homes. We got that up and things got better.

But before that happened, all of the

homeowners around me sold their homes. They had their homes paid off. They expected to stay there. They left the neighborhood. At that point, I was dealing with rental properties all around me, and still am.

Finally, things are getting a little bit better. My neighborhood is getting better. We have Barrio Bread right down on the street. It's lovely. Unfortunately, when the F-35s have gone over my ceiling has cracked. I am a half a block from an elementary school. All of their car alarms go off. All of them at once.

This is a larger situation of noise as people have been talking about. My windows rattle. And as far as my economic well-being, I work at home. I spend my time on Skype, What's Up, and the phone. I have to stop conversations that have been scheduled up to three weeks in advance when these kinds of large planes go over my head. The F-35 is different than the other jets that go over, and planes, because it actually shakes and vibrates, and this is why the car alarms go off.

Now, I am not far from the zoo. The zoo is getting ready to expand, and it is going to have a lot

more animals, which cannot move, have very sensitive nervous systems and hearing.

I would also like to mention that we have an Amazon Fulfillment Center that has been built not from the base. Do they know that they are going to have their 1500 employees have to wear ear protectant to comply with OSHA standards?

Thank you.

COLONEL GRIFFETH: Ted P. Maxwell, then after Mr. Maxwell will be Tim Stilb.

MR. MAXWELL: Good evening. I'm Ted Maxwell. That's M-A-X-W-E-L-L. I'm a retired Major General out of the U.S. Air Force. I served in Tucson since 1999. I retired in 2018 as the Commander of the Arizona Air National Guard.

I'm speaking today on behalf of the Southern Arizona Leadership Council, I'm also the Chair of the Southern Arizona Defense Alliance, and myself.

Heard of lot of words today, predominantly about noise. And I'll tell you that noise is a factor with aircraft. You can see it a flyby at an athletic event. You can see all the different responses amongst the people. Different people respond in different ways

to noise. There no doubt about it.

So, we can talk about the noise, the impact it's going to have on each one of us individually. And I understand all those concerns. What's not being said is that the leadership at Davis-Monthan Air Force Base, the leadership at the Air National Guard and the 162nd Fighter Wing has historically worked with the community to try to minimize the impact of noise. And that will go forward.

In the EIS, the 65-decibel contours are based on no mitigation, change of route, change of altitude based on current operations. And the history behind the leadership at Davis-Monthan has routinely showed that they are willing to change patterns, change altitudes, instill rules and regulations on our departure direction, and as well as use of power settings in the pattern. That will continue in the future, and that will make the F-35's impact potentially not as significant as it states in the EIS. I just wanted to make that be known.

The other thing that's important to state is one thing that the -- I believe the EIS did not do an effective job of doing is demonstrating the advantages

of air training in the State of Arizona, particularly in the western portion of the United States. The proximity to our ranges are closer than the other bases that are considered. They are also larger. And in the world of the F-35 and fifth-generation fighter aircraft, which are anything but obsolete, we need large space. And Davis-Monthan and Arizona is the only state that provides overland distances capable of supporting training for the F-35 and its mission.

Thank you very much.

MR. STILP: Hello. My name is Tim Stilb, S-T-I-L-B. I represent DM50, and I'm here to basically talk a little bit of that.

DM50 is an organization here that does -- our mission is to help support. Our group supports the base, the airmen, and help educate the community of what takes place on the base and how important it is for us to be here.

I want to say one thing here. Our leadership is amazing. They take every time they can make sure our community, which is our job is to get that message out, of what's taking placing on that base. And that's the reason why they won to CINC Award in 2012 and 2018, because they were working well with the community and making every effort they can to appease in those areas.

You've heard everything today from the economic impact of this. There's $2.6 billion it is that brings in a year, the number of jobs it brings. But I'm a long-time native Tucsonan. My family's a native Tucsonan, my parents are native Tucsonans, my brothers and sisters. We have always supported this base. And, yes, it is the sound of freedom. Kind of laugh about all this, but it's important to realize that, because we need these missions in Tucson like this. It's a continuous thing that we fight for to -- for our community, because the missions are important here for all of that.

One thing I do want to talk about real quick is that there is a state in this country that is very environmentally conscious, and they are going through the same things that we're going through right now. And they opened up the F-35 to their community with open arms. And that state's Vermont. You talk about a very environmentally-conscious area. Their groups have opened that. And you will see in the summer of 2022 they will have 20 of those F-35s there. We want to

back this. The DM50 supports this heavily.

Thank you.

COLONEL GRIFFETH: Next is Jack Clements and then Lisa McFarlane.

One more time, Jack Clements.

Go ahead, Ms. McFarlane.

MS. McFARLANE: My name is a Lisa McFarlane, M-C-F-A-R-L-A-N-E. I've been a resident since 1985. I came to go to graduate school. I got a Ph.D. in planetary science at the University of Arizona, worked on the Cassini spacecraft project. So, when I bought a house in 2003 -- my house was actually built in 1941. I think DM was basically sort of an airfield at that time.

So, the main thing I wanted to say is when I researched this when the JLUS was being looked at, I read a bunch of fairly highbrow books, and it was noted in there that people under the flight path oftentimes had very serious health problems, which I was shocked to see. I was younger at the time. I do live right under the flight path. There was nothing to indicate that there was a -- the flight path at the time. But I will say, too, that I live a closer to the University

of Arizona than I do to the Air Force base. So, people will say, oh, well, you know, you should have known better. Really, there was no indication that there was going to be a problem anyway.

My main issue is the health effects. I read about all these terrible health effects like cancer and so on. And, unfortunately, I have experienced two major health effects, having lived under the flight path, and I have met many people who have as well.

So, that's the main thing I want to highlight here.

Also, as was pointed out, this idea of using average DNL, I think day-night levels, or whatever they use, is kind of crazy. I was on several committees that had to -- several committees that looked into this. You know, the decibel levels or the peaks are what's important, and in fact, the power underneath the planes. These jets are much, much too loud. Eight times louder is way, way too loud. And I will say it's unbearably loud underneath the flight path. And I know people will say, well, gee, I live fairly close. But if you are not under the flight path, you really don't know what loud is.

Thank you.

COLONEL GRIFFETH: Jennifer Smith, then Sandy **A. Eghtesadi.**

MS. SMITH: Hi. Amber Smith, S-M-I-T-H. Moved here in '96. I am one of the founding members of Southern Arizona Defense Alliance, DM50 board member, former DM50 board member, and President and CEO of Tucson Metro Chamber. We represent 1500 companies and 150,000 employees. The Chamber has an extremely longstanding positive relationship with the base. In fact, our Military Affairs Committee just celebrated 90 years of existence due to that strong partnership as well.

The report has a blatant misrepresentation of the economic impact of the noise, and it ignores the documented positive socioeconomic impact of the base, especially the base is in close proximity. Tucson has over 90 percent of small businesses, many of which are minority owned, and those businesses in particular around the base are those minority-owned businesses that sustain and thrive due to the base's existence. We would like to see you correct the report and give proper weight to the positive economic benefit of both the direct and indirect income associated with the potential transition.

We have the fourth largest aerospace and defense industry in the country. That is because of our base in proximity to other installations and the number of companies that we have here. The continued strength and support of the base further supports that industry and only offers more opportunity for more businesses to locate here, with the noise not being negative impact.

Thank you very much.

COLONEL GRIFFETH: Next will be Katherine Eyde.

MS. EGHTESADI: Good evening. I thank you for being here. My name is Sandy Eghtesadi, E-G-H-T-E-S-A-D-I.

My husband and I moved here in 1980 from Berkley, California, because we wanted a nice community to raise our family in. And since then, we have raised two wonderful sons, a grandson, and none of them are having problems because of the noise. We lived at Holmes and Swan, and it was a great place to raise our family.

I own a Farmers Insurance agency, and as such I have over 30 years of experience and over 6000 customers. It's been a privilege to take care of the men and women of our Air Force. And as I have gotten to know them more and more, I've become more involved.

I currently serve on the Southern Arizona Defense Alliance, the Air Guardian, which is a group that supports the Guard and Reserve, and there hasn't been any mention of the Guard and Reserve. We have the 162nd here. And I think that the correlation in the support between the full-time military and the Guard and Reserve is really a critical part of what we have going on here. Our Air Force is the jewel of the Air Force, and it's recognized by ATC in the work that I have done.

One thing that I just want to bring to -- bring up is that our support of the airmen here is exponentially better than many other communities. We support them. We want to make sure that they have a good quality of life as they take care of us.

Thank you.

COLONEL GRIFFETH: Erica O'Dowd is up next.

MS. EYDE: Katherine Eyde. Last name is

E-Y-D-E.

I support Davis-Monthan Air Force Base. I don't think anybody here doesn't -- aren't happy that they are here. This isn't about not supporting the Air Force Base, how we benefit from it, how they are a part of our community.

My concern is safety. Flying over Tucson, training over Tucson, I asked a lot of people this question, but why is the test training path over the City of Tucson. Why can't it happen in the bigger, wider regions outside of Tucson? Dense populations of people, that's my concern.

There is error. There are things that are going to happen. And, yes, there was a very near miss in 1978 on a school. But do we really want to look at that?

How far and wide was this information for this meeting advertised? Because I just found out about it. And everybody that I talked to did not know about it. A lot of people in Tucson do not know that they even can give input or that they have a chance to voice their opinion. I'm not sure if that's going to make a difference, but I do feel like a lot of people

in Tucson should be able to weigh in and vote on this and say if they are for it or they are not for it, rather than just having a select number of people coming up here to talk. Like I said, it has nothing to do against being against the base. It's about flying over Tucson, flying this over Tucson.

Thank you.

COLONEL GRIFFETH: After Erica O'Dowd is Anita Scales.

MS. O'DOWD: Hi. My name is Erica O'Dowd, O apostrophe D-O-W-D.

I'm a native Tucsonan. My father is a native Tucsonan. My grandfather moved here when he was one, so he was not a native Tucson. My great-grandparents brought him here in 1911 before Arizona was a state. My family's been here a little bit longer than DM.

My whole life DM and Tucson have been partners. We've coexisted and we've thrived together, and for nearly 100 years DM has flown missions over Tucson. What's continued to change is the planes, the size, the speed and the noise of the planes. This plane is incompatible with Tucson. It just doesn't work. It's frustrating, I know, that it's not being

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welcomed, but that's because it's incompatible. It's incompatible not just because it interferes with the peaceful enjoyment of our town, but it also interferes with our health. Many here would look forward to supporting DM, but this plane just isn't it. This loud plane is not compatible with the community and people, your partners that it will impact.

If DM doesn't -- if the F-35 doesn't find its home here, Tucson will continue to thrive. Our greatest industry and economic engine, tourism, will thrive. Our other greatest economic driver, the U of A, will thrive, and most importantly, Tucsonans, your partners, will thrive, and our enjoyment and our health will thrive. But if it does go forward, those major economic drivers, the U of A and tourism, actually will be harmed. Of course, more importantly, the health of Tucsonans will be harmed.

It's not true that opposing this particular plane equals being against DM. DM is our partner and hope that it will act like it.

COLONEL GRIFFETH: When your name is called, if you could please come up here and sit so we don't lose time. It's going to be tight.

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Next is Alice Ritter after you.

MS. SCALES: My name is Anita Scales. I'm here to talk about effects of jet fuel and living in the flight path.

I purchased my home in midtown Tucson in 2001. I am two houses away from the Treat walkway. In 2002 I purchased a house on Stratford Drive, thinking of having my brother move here. The owner was dying of cancer. The sale had to go through very quickly so that the funds could go to pay for his mother's care in assisted living.

So, then, in 2014, two houses away from me, the owner there died from prostate cancer. In 2015, my next-door neighbor developed multiple myeloma, which he's still battling. In 2016, I was diagnosed with renal cancer, had a carcinoma removed, and I'm on yearly monitoring. The woman across the street from the Stratford house lost her husband to cancer to leukemia in 2011.

And my question is: Is this just is a coincidence or would it have anything to do with the effects of jet fuel raining down on us almost daily?

Thank you.

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COLONEL GRIFFETH: Go ahead.

MS. RITTER: Hello. My name is Alice Ritter, R-I-T-T-E-R. I want to quickly read my comments so I can state within the time limits, or close to it.

Number one, I am here as an Air Force retired active-duty reservist for 22 years; and, secondly, as a resident. I bought my home in 1977.

I'm going to speak against the F-35 being assigned to Davis-Monthan. Number one, at least the sound of the F-35's are actually three to four -- in fact, someone else, previous speaker, said they are even higher than that from the current rates of flights in the area.

Secondly, today, on today's -- on the news today there was the mention that Tucson has exceeded -- or at the 69 percent out of 70 percent pollution rate. They suggested that we drive our cars one day less a week. Well, I'm saying why not stop the Davis-Monthan aircraft flights, and that should help the total pollution reduction.

Number three. The Air Force is the largest military polluter. It is -- it has bombs, bullets, depleted uranium, and the sound of those -- it's a

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sound of terror to the people on the other end of the F-35, or any aircraft. We've been focusing on local issues. Think about worldwide and the pollution rate the worldwide and what it's caused to global warming.

The U.S. military and weapons manufacturer in the United States of America are the largest polluters in the world, therefore, I would suggest that people at Davis-Monthan Air Force Base would say -- I'm winding this up -- is saying use the staff from the military to help with humanitarian aid across the world.

Thank you.

COLONEL GRIFFETH: Next, Cara Bissell, then William Peterson.

MS. BISSELL: Cara Bissell, B-I-S-S-E-L-L, Veterans for Peace, Tucson, Chapter 13 President.

I want to talk about strategy. The EIS is not really talking about strategy. We as a country, since the end of World War II, the bombing of Hiroshima and Nagasaki, have come to a point where collateral deaths of civilians is considered just part of warfare, part of life. How can that be? It's against the principles that we have said in the United Nations.

We need to reduce, not increase, our military industrial Congressional complex. It's a moral issue, clear and simple.

That's all.

COLONEL GRIFFETH: After William Peterson is Bill Kelly and then Ryan Anderson.

MR. PETERSON: Good evening. I'm William Peterson, P-E-T-E-R-S-O-N. I'm an Air Force retiree and also a 15-year civil servant. I'm disabled now. But the EIS, F-35 -- I'm also Vice-President of Chapter 13, Tucson.

Part of what Veterans for Peace does is bring awareness of the cost to the public to the cost of war, all aspects of war, all instruments of war. And the F-35 is an instrument of war. This thing is bleeding money. Cost overruns when it was produced, it took years to get up in the air.

But we do not need it in Tucson because, first of all, it's supposed to be stealthy. And I don't think it's stealthy if I can hear it coming from Phoenix, Arizona. And the fact that this things bleeds money -- I think one airplane, if I'm correct, is, like, $80 million. Imagine what $80 million could do for the economy of Tucson. It could fix all kinds of

things. We're talking about putting a bunch of them here. No.

And the bottom line with this thing is we need to eliminate the F-35, the A-10s, the F-16s, all got to go. The bottom line with this airplane, this is not needed in Tucson. We already have enough airplanes in Tucson, fighter planes.

I've heard with the F-35 that the pilots in these airplanes black out at mach speed. You know, if they black out at mach speed, they're not controlling the airplane, it could eventually crash. Where is it going to crash? Somewhere around town.

Bottom line, the F-35 is not needed in Tucson. We do not need to bring this instrument of war to Tucson. It does not belong in Tucson and we need to oppose it at all costs.

Thank you.

MR. KELLEY: Thank you. I'm Bill Kelley, K-E-L-L-E-Y. I am the CFO of Diamond Ventures. I was raised here in Tucson. I had the privilege of living very close to Davis-Monthan as a kid. I lived at Fifth and Craycroft.

And I reached out to a few of my buddies

that, with me, went to Rincon High School, and figured out how did we do with all those jets flying over us. There were F-4s and F-100s. And all of us reported in that we did pretty well in life. We studied hard, we all graduated from the U of A. Two of the buddies lived right next to the base at 32nd Street and Columbus. And then we went on and had very successful careers in life. So, I don't think the noise was a factor in our lives growing up here in Tucson and being able to figure out things.

And, lastly, I have two boys. They grew up in Sam Hughes. One's an ER doc at Kino South, and the other is a Vice-President of Development with a big real estate firm in L.A. And they lived under those noises all their lives and did very well with their life.

So, I would encourage people to promote the F-35 here in Tucson, Arizona, and look forward to helping out wherever we can.

Thank you.

COLONEL GRIFFETH: Ryan Anderson. Ryan Anderson?

Mike Levin. After Mike Levin is David

Godlewski.

MR. LEVIN: Good evening. My name is Mike Levin, L-E-V-I-N. So, you pronounced it just the way it's spelled. Thank you very much for the opportunity to speak here this evening.

My family has lived here since 1969. We were stationed -- my dad was stationed here with the Titan Two missile silos, and that's what brought us to Tucson. And after getting out of active duty, we remained here because of the quality of life here. And so, I could really say with no doubt in my mind that because of Davis-Monthan that I am who I am today.

We, over the years, have grown our business here in town. And right now we have the Port of Tucson, which is a 700-acre industrial property south and east of town, and it is right within the airport environ zone and within the departure corridor ADC2. I work out there much more than my wife would probably like me to. And I can say unequivocally that I hear planes going overhead every single day, and I absolutely have no qualms about it whatsoever.

As part of what we do with our 700-acre business park, we have just over 2.4 million

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square feet of warehouse and industrial space right next to the Amazon facility, which I know from managing all the properties over that two million square feet worth of property, in the 20 years that we've had that property I've never had any complaints or commentary from any of our tenants, employees, or otherwise, about the noise levels or the aircraft going overhead, and that includes the F-35s that have been showing up on a more regular basis.

So, I stand here tonight just in full support of the F-35 and hope that, as others have said, that you elevate the -- that you elevate Davis-Monthan up on the list of alternative places for the beddown of the F-35.

Thank you.

COLONEL GRIFFETH: Thank you.

After David Godlewski will be Peter Dooley.

MR. GODLEWSKI: Good evening. My name is David Godlewski, G-O-D-L-E-W-S-K-I. I'm the president and CEO of the Southern Arizona Homebuilders Association.

On behalf of more than 350 member companies, we're here to support any and all future flying

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missions at Davis-Monthan Air Force Base, including the F-35. Our association clearly understands the importance of the economic and national security impact of DM. Our builders take pride in fulfilling the dream of homeownership for thousands of Tucson residents every year, including many who are in the Air Force.

Over the past several years we've seen an increase in home-building activity in the City of Tucson, including many subdivisions that are in the midtown areas or areas in relatively close proximity to the base. Permitting has actually been up 44 percent year over year in the City of Tucson.

Over the past several years we've also seen an appreciation in home values. There was a three percent increase in the median home price in 2009. The average price for our community is now approaching $360,000. So, from our perspective noise and proximity isn't a deterrent.

And specifically with relation to the Draft EIS, we have questions about the statements regarding the future housing values, and encourage the Air Force to take a look at the -- doing studies for home values around F-35 bases. Just anecdotally, we know that home

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values near Luke have appreciated over recent years. So, we would ask you to take another look at that portion of the EIS.

Thank you.

MR. DOOLEY: My name is Peter Dooley, D-O-O-L-E-Y. And I am a resident of the Julia Keen Neighborhood, which is south of Reid Park.

And I'm here to give -- just bear witness to the extreme, extreme noise that I experience daily. By the way, I do have a little kind of professional aspect of this. My field is workplace health and safety, so I totally support Davis-Monthan. To me, it's a big workplace, you know, and all those people out there are workers. And that's very valuable. I value that as a community. I'm a graduate of the U of A, by the way. And so -- but workplaces need to be a good neighbor. And this -- the F-35 has elevated -- I moved there 10 years ago. And I do noise surveys as part of my profession, by the way. You know, I'm an advocate for workers to be protected.

The F-35 has elevated the noise levels. I mean, this is painful levels. It's literally -- I mean, anybody who says they haven't heard any

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complaints from residents or neighbors, you haven't spent much time in Julia Keen neighborhood. This ain't the Foothills. This ain't, you know, Hughes whatever. This is serious, low economic working people, poor people, concentrated housing, old. Talk about mitigation. I mean, you can't even -- I can't even get any kind of -- I barely get my hands over my ears to stop the pain levels that occurs every time one of these planes go over. And I mean car alarms all over the neighborhood every single time.

And, by the way, I monitored the noise levels, because, you know, the federal government has a really good ap for -- it's called a sound level meter built for -- and so, these levels are way over what's allowed in the workplace. This is an environmental issue. So, talk about mitigation. I mean, how can you mitigate that?

Thank you.

COLONEL GRIFFETH: Next is Robin Stoddard, and then after Robin Stoddard is Janice Brundage

MR. STODDARD: My name is Robin Stoddard, S-T-O-D-D-A-R-D. Been in Tucson since 1981. I currently run the Children's Charity.

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Regarding the environmental impact of the F-35 training, most complaints of aircraft noise are from a handful of individuals who collectively arrived in this valley decades after the advent of jet aircraft at Davis-Monthan and Tucson International.

This jet noise is not something that has to be put up with. It's the noise of freedom, the noise of the chance to survive dreadful captivity. One Dachau survivor said the thing gave him and his fellow prisoners of the Nazis the most hope was the sound of American airplanes. Some of these would have been B-24s finished and flown right here in Tucson.

American and British POWs of the Japanese in World War II had similar memories. They knew the more American air power was their only hope after months or years of captivity.

In Afghanistan, some U.S. Army commanders predicted it would take over 100,000 troops over two years to remove the Taliban from power. In late 2001, early 2002, it took a few squads of Army Special Forces with American air power, like B-52s and A-10s and F-16s, all of which from very various times in the past were flown right here from Tucson. It was their noise

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and weapons that led to the toppling of a dictatorial Taliban regime.

I was in Afghanistan in 2002. An Afghan woman told me about her experiences with the Taliban. She saw her girlfriend, even though she was in a burqa, was being beaten by the Taliban for wearing white socks when they were told by the Taliban they shouldn't wear any white. It was an insult to the Taliban form of Islam. This Afghan woman praised the fact that American Special Forces and American air power saved her and her female friends from the Taliban. That air power of freedom came from places like Davis-Monthan. Some of the first strikes on the Taliban were from A-10s by pilots that were trained here. Others strikes were performed by F-16 pilots trained at Tucson International.

The sound of air power from prop and jet engines have been making the noise of freedom throughout the Tucson valley since the 1920s. It's a great sound. We welcome it. It's my experience that many of these noise complainers don't call in day or night noise complaints from loud cars or motorcycles or parties, only military noise.

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A squadron of F-35s will average about 10 to 20 takeoffs on about 250 days a year. The takeoff roar will last about 20 seconds per -- so a total six to seven minutes interspersed throughout the day or 1440 minutes. That's not 10 percent of the day, not even one percent. Out of .5 percent of the day you have a wonderful roar of freedom. Since most F-35s takeoffs would be to the southeast, most of that noise would not be readily hearable from the greater part of Tucson. The negative noise impact is negligible at best.

I urge the committee to proceed with the conclusion that the roar of jet engines is not something to be vilified, though a handful of recently arrived people seek to do so, and restate that it's only the day-and-night noise of the military that they complain about. This is to be cherished. We Tucsonans appreciate and support the F-35 in its future mission.

Thank you.

COLONEL GRIFFETH: Janice K. Brundage, then Kathleen Williams.

MS. WILLIAMSON: Williamson.

COLONEL GRIFFETH: Williamson.

Janice Brundage? Okay. We'll move on.

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Kathleen Williamson.

MS. WILLIAMSON: Good evening. My name is Kathleen Williamson, W-I-L-L-I-A-M-S-O-N. I'm currently a lawyer. I've been a lawyer in Tucson for over 30 years. I've lived in Tucson since 1986, in Arizona since 1974.

One of the gentleman that left here a little earlier that I chased after is an old friend of mine. He's -- I don't know if he is retired yet, but he was a judge at the Tucson City Court for many decades, Bobby Castillo, from Colonia Solana. And he's opposed to the F-35 coming, but he just couldn't sit here and listen to one more so-called Democrat politician, you know, can represent money instead of citizens.

And the citizens who are here tonight are here to save their lives, you know, our time and our energy trying to help this community. And we are trying for save our lives against the noise, the fumes, the fuel, the PFA, the water pollution, the groundwater pollution, the air pollution. It's been going on for years. And there's already too much noise now with the F-16s and so forth.

And what the EIS hasn't considered is the cumulative effect of all these jets. ANG now is trying to be bring in the Taiwanese Air Force F-16s and build on that too, and I don't think that cumulative effect has been built into this as well, and that's very important.

The leadership at DM and ANG supposedly has been working to minimize the sounds for decades, and it's already insufferable, even with their best efforts at minimizing it. And remediation of homes is not going to work. People are going to be -- talk about captivity from the Taliban. People are going to be in captivity insides their homes.

Everybody's talking about the weather in Tucson, and that's the big attraction. But the weather is what helps us to live outside and outdoors.

Is that a two-minute thing or --

COLONEL GRIFFETH: 30 seconds.

MS. WILLIAMSON: Okay. Anyway, as I said, I'm a lawyer, and the Air Force must understand that if it bases the F-35s at DM, Tucson residents will measure the decibel levels of the noise at the locations designated by the EIS as representative sector areas and representative noise-sensitive locations. If the

noise exceeds the levels claimed by the EIS, with or without afterburners, the Air Force will be subject to legal action. The Air Force would have known or should have known that the actual noise would -- it actually will be louder than that claimed by the EIS.

Thank you.

COLONEL GRIFFETH: Leonard Summers, then Elizabeth Hubbard.

MR. SUMMERS: My name is Leonard Summers, III. I spell the name S-U-M-M-E-R-S. I rue the day that there was a popular television series called the Bionic Woman. She didn't spell her name right, but that's the way it goes.

I am a Air Force retiree, 28 years, a member of the Air Force Association, 105 Chapter, and an Air Force Academy graduate, so you know where I'm coming from.

The fact is that I have three observations. First observation is thank you all for being here and for politely discussing diametrically-opposed issues in a civil manner. Thank you very much for that.

Secondly of all, thank you for a very, very good board and presentation with, hopefully, some

additives made for the next one.

The third observation I have is the fact that we fly A-10s and C-130 aircraft here. We're very, very spoiled by having two of the aircraft that are the lowest decibel planes that are in the Air Force inventory. And if you don't think so, just talk to the folks who live in North Carolina near Seymour Johnson that are used to the F-15. And the F-16 is also reasonably good in terms of its decibel level.

The one thing I want to point out about the bedding down the F-35, is that if you are against military aircraft or wars in general, that's another discussion. What we're talking about is where these planes will be bedded down. For the life of me, I can't figure out why Homestead Air Force Base, a reserve base now, was mentioned as a possible beddown location, but that's politics. Same thing with Fort Worth, but that's politics.

We need to be here for the reasons that -- we need to have the F-35 for the very same reasons that everyone else has had previously mentioned. We've got the range, we've got the Barry Goldwater Range, we've got excellent flying weather.

Thank you.

MR. SIMONS: My name is Leonard Simons, S-I-M-O-N-S.

I was in the military, in the Air Force in particular, for close to four years, had a top-secret clearance, I worked in an intelligence unit. I was living for those four years on a base, or most of those four years on a base with a lot of noisy jets. It was irksome at the time.

Now, for many other people who near -- by the way, I'm rather new to this area here in Tucson, but I've been in this country for 78 years, America. The thing is the noise is definitely a problem, as I understand. According to the information even provided by the government it's a problem, not to mention the testimony of many people here.

However, my concern is a bit different than the gentleman who just came here. Namely, when I was 19 I joined the military. I didn't know any better. I've learned a few things over the years, and not least of all there's no damn good reason to perpetuate in so many ways war. I'm a veteran for peace and I try to do whatever possible, instead of aiding and abetting death and destruction, which is essentially what war is all about, regardless whether this country or another country.

One or two other quick points. I'm concerned very much about the people who live in the flight path of these planes, or any planes, as a matter of fact, not least of all because of the health effects that have already been described. Even more, it's been mentioned, well, at least they've got the economic benefit. Well, perhaps. But the thing is, it's already been well established that, as a matter of fact, oftentimes -- most of the time as a matter of fact -- the money that goes into the military, the Department of Defense, the Department of War, is actually helping poor people a lot less than rich people.

Thank you.

COLONEL GRIFFETH: Elizabeth Hubbard, then Randy Rogers.

MS. HUBBARD: Hello. I'm Elizabeth Hubbard, H-U-B-B-A-R-D.

I'm going to start out -- Manon, she already spoke and she has a message for you that she forgot to

say. Hundreds of comment forms were not considered as a result of the military giving us the wrong mailing address to send the forms to. That needs to be investigated.

So, my comment is that we need to have a new dream. And it's very difficult to dream if you are being waken up by military sounds. I live under the flight pattern and I get woken up and it's disturbing. You don't know whether we're at war, what is happening. It's a nightmare. It's an American nightmare what we're living through. It's a dystopian, horrible thing that this, quote, freedom has given us.

And I walk in Reid Park a lot, and the military just kind of circles around before they go into Davis-Monthan. And these children, they can't -- you know, they are covering their ears. All of a sudden they are happy, and when they hear these planes, their faces change. You know, it no longer is a fun, happy time. You need to find shelter, shelter from the freedom.

And I am so moved by what my neighbors have said here. I am shocked by how much cancer there is in the neighborhood that I live in. I am honored to be

with all the peace activists here who have spoken out that this is a moral issue, which it is. Public health is a moral issue.

You don't care about children being disturbed in the classroom? I have seen a lot of corporate horrors here. You're disgusting.

COLONEL GRIFFETH: Your time is up.

Randy Rogers. And after Randy Rogers, Shane Cummings.

MR. ROGERS: Thank you. Randy Rogers, R-O-G-E-R-S. I'm the Chief Executive Officer of the Tucson Association of Realtors.

Certainly, this evening there's been a lot of opinions and emotions around this and what's happening with Davis-Monthan and the advent of the idea of the F-35. But I'm here to address some facts with the regards to the home values.

If you simply draw a circle around the base, and you can pick certain neighborhoods, but if you take a broad brush and draw a circle around the base you will see a dramatic increase in home values. Yes, we can echo that across the entire Tucson valley, but certainly in this area. It's also echoed in home

values in bases around the country that are similar to this. If you study those, you can look at the same thing.

In 2019 alone, median home sales have seen an increase from 175,000 to 191,000. That's a pretty dramatic increase in home values in that area. This compares to an overall Tucson median home sales of 232,000. So, I would say strongly that the values in that area have increased and are doing very well. These statistics in no way support the decrease in property values that are addressed. So, I would encourage the report to look closely at this.

Thank you very much.

MR. CUMMINGS: I'm Shane Cummings. I came to Tucson when I was a baby in 1970. Big snow.

And public relations is politics. There's no separation. This is a public relations event. We ought to be having a vote with the City of Tucson, not just a public hearing. High tide raises all boats. Economy is good, home prices raised across the city. Tourism brings in more snowbirds. It's happy for us. F-35 comes in, that will change. It will change around the Air Force base too. Businesses around the Air

Force base may get a little bump at the sacrifice of everybody else. It's pretty simple.

Eisenhower, 1956, on his way out said the largest threat to the American democracy was the American industrial complex. Here we are sacrificing one part of our community for another over and over again across the nation. Let's protect our beautiful city. Let's have a public vote. Let's not hide this under the rug in some little room while a hockey game goes on next door where people want to be. Let's change. We can do this together or we can suffer individually.

Thank you.

COLONEL GRIFFETH: David L. Culbertson. Then I'm having a hard time with this one, Therese Perreault.

MR. CULBERTSON: Good evening, everybody. I'm Dave Culbertson, C-U-L-B-E-R-T-S-O-N, Vice-President of the Catalina Madre IV Homeowners Association, member of the DM50, retired Air Force. I've been in the Active Guard and the Reserve, and that's what I'm focus my comments on tonight.

As a previous part-time reservist, of the

four choices that you have here, F-35, having had the opportunity to fly into all four of those locations and live in two of them, I want to strongly recommend that you bring the F-35 here for the part-time airmen of the Air Force Reserve Command. I can't imagine a better place, and we already have them here. And we see the benefits of having an environment like Davis-Monthan and the weather that we have here for the citizen airmen that train to operate the F-35. We've got great ranges. We've got a great community. As you've seen tonight, there isn't anybody here who doesn't support the Air Force mission. We just have different ideas how that should be done. I love that about Tucson. I love that about our country.

So, I strongly encourage you to consider Davis-Monthan and Tucson as a home for your F-35 beddown.

Thank you.

MS. PERREAULT: Hello. Good evening. My name is Therese Perreault, P-E-R-R-E-A-U-L-T.

I heard nothing about this meeting. I have a few good friends who posted it. And so, I guess, first of all, it would have been nicer to have a little bit

more notice. I'll try to be succinct in three minutes. It's a big issue for three minutes, though. And I guess for me -- I have two minutes. Oh, well, it's even bigger for two.

I guess it boils down to, not to be corny, but what we value. Do we value the money or do we value the quality of our life? I moved here for quality of life.

I'm not an Air Force person. I think they are great. I have nothing against DM, as many people have said. I am an American. My dad was in World War II, if that counts. But the problem here is that we haven't been notified.

The gentleman earlier talking about a vote, I think that sounds kind of reasonable. What doesn't sound reasonable is mitigation for something that isn't even here yet, and we're talking about how to mitigate it.

So, all in all, I think the noise is ridiculous. It's already loud. If something's coming that's louder, I'm not in favor of it. And I wish you would please consider a no-action alternative.

I think we've heard a lot tonight, and I hope

there's an opportunity for people to really -- people in other neighborhoods that are affected to be able to speak.

Thank you.

COLONEL GRIFFETH: As I mentioned, the hearing is scheduled to end at 8:00 p.m. We have heard from everybody who signed up to speak and we've run out of time. I apologize that we've run out of time before anybody would have a second chance to speak.

However, please submit in writing, either tonight or via the website at www.AFRC-F35A-Beddown.com. You can also email comments to the addresses shown on this site.

Again, verbal and written comments receive equal weight. In addition, the Air Force will consider your comments no matter when you send them, to the extent possible. However, the Air Force must consider all the comments received before the close of the public comment period, which is March 31st, 2020.

I thank you for your time and interest tonight. Tonight is not the end of your opportunity to participate in the environmental review process. Again, written comments sheets are available at the registration table. You can turn in these sheets tonight or mail them later.

If you would like your own copy of the Final EIS, please let one of the representatives at the registration table know, or send a letter or post card asking for your own copy. The Air Force will send copies of the Final EIS to you.

This hearing is now adjourned. Thank you.

(Hearing adjourned at 8:01 p.m.)

* * * *

CERTIFIED REPORTER'S CERTIFICATE

STATE OF ARIZONA)
) ss.
COUNTY OF PIMA)

BE IT KNOWN that I took the foregoing proceedings down in shorthand; that I was then and there a Certified Reporter, CR No. 50218, in the State of Arizona; that said proceedings were reduced to writing by me.

I DO FURTHER CERTIFY the ethical obligations set forth in ACJA 7-206 (J)(1)(g)(1) and (2) are in compliance; that I am not a relative or attorney of any party, or financially or otherwise interested in the action.

WITNESS MY HAND this 16th day of March 2020.

ANTHONY C. GARCIA, RDR, CR
Certified Reporter No. 50218

REPORTING FIRM CERTIFICATE

THIS FIRM CERTIFIES the ethical obligations set forth in ACJA 7-206 (J)(1)(g)(1) through (6) are in compliance and have been met.

WITNESS MY HAND this 16th day of March 2020.

KATHY FINK & ASSOCIATES, INC.
No. R1003

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A.5.2 HOMESTEAD AIR RESERVE BASE PUBLIC HEARING TRANSCRIPT

(Transcript contained on the following pages.)

F-35A OPERATIONAL BEDDOWN

PUBLIC HEARING

AIR FORCE RESERVE COMMAND

March 3, 2020

Public Hearing of the U.S. Air Force Reservce Command for the F-35A Operational Beddown held at the Miami-Dade College Homestead Campus, Building F, Room F222/F223, 500 College Terrace, Homestead, Florida 33030, on the 3rd day of March, 2020, commencing at or about 5:30 p.m. - 8:00 p.m., pursuant to Notice of Public Hearing.

___ ___ ___

The Record of the Proceedings of a Public Hearing of the F-35 Operational Beddown, Air Force Reserve Command, Environmental Impact Statement (EIS), on Tuesday, March 3, 2020, commencing at or about 5:30 p.m. to 8:00 p.m.:

___ ___ ___

NEPA TEAM MEMBERS

COLONEL TOBIN GRIFFETH, HAF/AF/JATA
HEARING OFFICER

MAJOR GORDON POLSTON, AFRC A5/A8P

MR. HAMID KAMALPOUR, AFCEC/CZN

Whereupon the following formal public hearing proceedings commenced as follows at approximately 5:30 p.m.:

THE HEARING OFFICER: If I can ask everybody to be seated so that we can start on time. I don't want to take your time.

All right. If everyone will please take your seats and silence your cellphones so that we can get started.

I would also like to remind you that if there is still any time permitting that the Air Force representatives you have been speaking to will remain after the formal hearing to discuss the proposal if you desire to speak with them.

The time is 5:30 and we will now start the hearing. I want to thank you for attending.

This Public Hearing is for the Draft Environmental Impact Statement or what you will hear many times referred to as an EIS. If I ever say that, that is what it means.

For the proposed Air Force Reserve Command F-35A Operational Beddown; herein after referred to as the Proposed Mission.

I am Colonel Tobin C. Griffeth and I am your Hearing Officer here tonight. I am an Air

Force judge advocate and I will be acting as a moderator tonight.

As a moderator my role is to ensure that the Air Force provides a fair, orderly and impartial hearing, where you have the opportunity to make comments on the proposal. I do not work for anyone in the Air Force Reserve Command, the Air Force Civil Engineer Center or the Air Combat Command, or any of the bases under consideration for the proposed action.

I am not involved in any way with the development of this draft EIS and I do not act as a legal advisor to the Air Force representatives working on this proposal.

This hearing is held in accordance with the provisions of the National Environmental Policy Act, or what you will hear called NEPA, as implemented by Council on Environmental Quality Regulations and the Air Force.

We are here tonight to present information on the enviromental impact of the proposed beddown and to receive your comments on the draft EIS.

Tonight's hearing is one of several

opportunities for public comments. This hearing is an opportunity for you to express your views, concerns, about the adequacy of the environmental analysis contained in the draft EIS, as well as any other issues related to the NEPA process.

This hearing is not a debate or a vote on the draft EIS and it is not a question and answer session. We welcome your input on environmental analysis presented in the draft EIS.

Comments about other unrelated issues can certainly be made, but they will not assist in the decision-making process for the draft EIS.

I would like to begin this hearing by introducing the NEPA team, beginning with the team leader, Major Gordon Polston, to my right, with the Air Force Reserve Command, who will present details of a proposed action and alternatives.

Next to him is Mr. Hamid Kamalpour, the EIS project manager, at the Air Force NEPA Division, who will the discuss results of the NEPA process.

Representatives from Homestead Reserve

Base, led by Colonel Meyers, are present here today, and although they are not part of their analysis team, they have provided detailed base information, which is critical to you for a thorough analysis of the impacts of the draft EIS.

Lastly representatives from Leidos are here supporting the Air Force as a contractor.

Transcribing tonight's hearing is Mr. Alan Levine. And we will also have some bilingual translators: Nelida Estrada and William Carillon.

I would also like to recognize the following individuals that I know are here at this meeting: Councilwoman Jennifer Bailey, from the City of Homestead, and Councilman Larry Roth, from the City of Homestead. And Mayor Tim Meerbott, from the Town of Cutler Bay.

Do you want that light off or do you --

MAJOR POLSTON: No.

THE HEARING OFFICER: Okay. Major Polston will first present information on the proposed action and the alternatives.

Then Mr. Kamalpour will provide an

overview of the NEPA process and will summarize the potential environmental consequences of the proposal.

After their presentations, which should take about 20 minutes, we will begin our verbal comment period, during which you can provide input on the proposed action, the draft EIS analysis and the potential environmental impacts.

Your comments will become part of the official record of the final EIS.

Please note that informal discussions at our informal displays will not become part of the EIS record.

So, if you have items of concern about the analysis in the draft EIS that you would like to bring to our attention, please do so during our formal comment opportunities or in writing.

Verbal and written comments -- I will say that again -- verbal and written comments are equally considered.

If you do not choose to make a verbal comment you can submit a written comment either by turning in a comment form this evening or by mailing it to the address shown on the screen.

Comments may also be submitted online. If you go to www.afrc-f35A-beddown.com. Once again, I will repeat that www.arfc-f35a-beddown.com.

If you have not had the chance to review the draft EIS it is available on the website or at one of the public libraries listed here.

The Air Force welcomes public comments in writing at any time during the environmental impact analysis process. To receive a timely consideration, however, for the final EIS, please submit your comments by March 31st, 2020.

Your comments will provide the decision-maker, who is the Secretary of the Air Force, with information to assist in making a decision regarding where the mission will be located.

Your comments during this process provide the benefit of your knowledge of the local area and your concerns about the environmental impacts or analysis.

We will now move into the briefing. During the briefing period our speakers will be reading from prepared scripts. The briefing is written to make certain that each speaker covers all aspects that are pertinent, and pertinent information, that is consistent for all four hearings.

With that I will turn and hand the microphone over to Major Polston from the Air Force Reserve Command.

MAJOR POLSTON: Good afternoon and welcome. I am Major Gordon Polston, representing the Air Force Reserve Command. I am the F-35 Program Manager at Robins Air Force Base Headquarters there in Middle, Georgia. Welcome to this meeting.

As a team leader I encourage you to assist the Air Force in meeting its requirements to comply with the NEPA process. Your attendance tonight indicates your interest in the proposed action and I hope your comments will provide us with additional information or areas where further analysis is needed.

All comments will be properly reviewed and analyzed. Substantive comments will be addressed in the final EIS.

The purpose of the proposed action involves the F-35A's role in the Air Force

fighter modernization effort.

The goal of this effort is to ensure fighter aircraft are the best available to support a high-threat, multi-role, war fighting capability to commanders worldwide.

To perform this mission, trained pilots, maintenance and support personnel must be available to meet F-35A inventory delivery dates as older aircraft are retired or reassigned.

The F-35A provides several fighter modernization advantages including:

Efficiently and effective maintained combat capability and mission readiness as U.S. Air Force faces deployments across a spectrum of conflicts.

Provide for Homeland defense.

Provide for the U.S. Air Force with the most advance fighter aircraft in the world at an additional strategic location within the continental United States.

The Air Force is proposing to establish the Air Force Reserve Command Operational Beddown for F-35A aircraft along with required infrastructure and manpower at one Air Force

installation in the continental United States where the Air Force Reserve Command leads a global precision attack mission.

The mission utilizes pilots and support staff who operate and maintain the aircraft to support the joint strike fighter program.

Implementation of the mission would require a variety of on-base developmental projects, including demolition, new construction and renovation.

At each base the F-35A flight activities would occur in existing airspace. Within each training airspace unit Air Force Reserve Command F-35A pilots would operate in the same airspace utilized by A-10 or F-16 pilots, but at a higher altitude.

The Air Force analyzed three different afterburner scenarios at each base. The no-action alternative is required by the National Environmental Policy Act and was evaluated at each proposed beddown location to provide a baseline for the decision-maker.

The no-action alternative evaluates the environmental consequences of not basing the F-35A aircraft at any base.

In the draft EIS the Air Force analyzed the environmental consequences of the beddown of the F-35A aircraft and replacement of existing fighter or ground attack aircraft at one of the following alternative bases:

Davis-Monthan Air Force Base in Arizona.

Homestead Air Reserve Base here in Florida.

Navel Air Station, Fort Worth Joint Reserve Base in Texas.

Or Whiteman Air Force Base in Missouri.

In January of 2017 the Secretary of the Air Force announced Navel Air Station Fort Worth Joint Reserve Base as the preferred alternative for this mission.

Davis-Monthan Air Force base, Homestead Air Reserve Base and Whiteman Air Force Base were announced as reasonable alternatives for this mission.

This table summarizes the bases being considered and how the existing missions could be impacted.

The following slide summarize the aircraft facilities and manpower changes anticipated to be required to support the mission.

Davis-Monthan Air Force Base has been identified as a reasonable alternative for the mission. If Davis-Monthan is selected to host the mission the existing 24 A-10 aircraft operated by the 924th fighter group would be replaced by 24 F-35A aircraft, plus two backup aircraft inventory.

Implementation of the mission would require a variety of on-base developmental projects, including demolition, new construction and renovation.

This mission would decrease the area of population by approximately 30 full-time mission personnel and would result in a 0.7 percent increase in annual aircraft operations at the installation and a five percent increase of total sorties within the airspace.

Homestead Air Reserve Base has been identified as a reasonable alternative for this mission. If Homestead is selected to host the mission the existing 24 F-16 aircraft would be replaced by 24 F-35A aircraft, plus two backup aircraft inventory.

Implementation of the mission would require a variety on-base developmental

projects, including demolition, new construction and renovation. This mission would decrease the area of population by approximately 91 full-time personnel and would result in a three percent increase in annual aircraft operations at the installation and a 0.2 percent decrease of total sorties within the airspace.

Naval Air Station Fort Forth Joint Reserve Base has been identified as the preferred alternative for this mission. If Fort Worth is selected to host the mission the existing 24 F-16 aircraft would be replaced by 24 F-35A aircraft plus to backup aircraft inventory.

Implementation of the mission would require a variety of on-base developmental projects, including demolition, new construction and renovation. This mission would decrease the area of population by approximately 102 full-time mission personnel and result in an approximate 12.1 percent increase in annual aircraft operations at the installation and a 1.2 percent increase in total sorties within the airspace.

Whiteman Air Force Base has been

identified as a reasonable alternative for this mission. If Whiteman is selected to host the mission the existing 24 A-10 aircraft would be replaced by 24 F-35A aircraft plus two backup aircraft inventory.

Implementation of the mission would require a variety of on-base developmental projects, including demolition, new construction and renovation.

This mission would increase the area of population by approximately 11 additional full-time personnel and result in an approximate 17.4 percent increase in annual aircraft operations at the installation and a 5.9 percent decrease of total sorties within the airspace.

We would like to emphasize that, although the preferred alternative for the mission has been announced, no final decision has been made on basing the mission currently under analysis in the draft EIS.

We look forward to inputs provided from public and the affected communities as we proceed through the environmental impact analysis. Once the requirements of the

environmental impact analysis process are complete, the Air Force will make its final basing decision.

Thank you for your attention. I will now turn the presentation over to Mr. Hamid Kamalpour, the Air Force project manager for the EIS, to discuss the NEPA process and provide greater detail on potential impacts as described in the draft EIS.

MR. KAMALPOUR: Good evening. I am Hamid Kamalpour, the Air Force NEPA Division project manager for the analysis of the proposed action. I am here tonight to discuss the results of the environmental impact analysis for the proposal presented by Major Gordon Polston.

The draft EIS has been prepared in accordance with the requirements of the National Environmental Policy Act, which requires the federal agencies to analyze the potential environmental consequences of the proposed action and reasonable alternatives, including a no-action alternative.

Before any action is taken the goal of conducting an EIS is to support sound decisions throughout the assessment of potential environmental consequences as well as involving the public in the process.

The result of this analysis and other relevant factors will be considered before a decision is made by the Air Force on this proposal.

Your input during the past public scoping period and this public comment period will help the Secretary of the Air Force to make the most informed decision possible on this proposal.

As you can see on this slide there are several key steps to the environmental impact analysis process. We are currently at the public and agency draft EIS review stage. This period began with the Federal Register of Publication of the Notice of Availability for the draft EIS. At that time copies of the draft EIS were mailed to local libraries, state and federal representatives and individuals who requested copies during the EIS scoping period.

The normal review period required by NEPA is 45 days. The draft EIS public comment period will end on the 31st of March, 2020. The public hearings are being held in the same

communities as the previous scoping meeting in order to provide the potentially affected communities with the opportunities to comment on the draft EIS.

All substantive comments received prior to the close of the public comment period will be considered during the preparation of the final EIS. The Air Force response to substantive comments on the draft EIS comments in the final EIS.

The final EIS is scheduled to be released in the summer of 2020 after the final EIS Notice of Availability is published in the Federal Register. The Air Force must observe a waiting period of at least 30 days before signing the final Record of Decision, or ROD, to document which alternative the Air Force selects for the implementation of the Air Force F-35 mission.

The draft EIS presents information on the potential environmental consequences associated with implementing the proposed mission at each of the four bases. The potential environmental consequences are grouped into the five categories shown on this slide and the

subcategories represent the twelve resource areas evaluated at each base.

The next set of slides describes some of the potential environmental consequences at each of the four bases. For the purpose of this presentation the potential environmental consequences at each base have been summarized in broad terms.

For a more detailed evaluation of the potential consequences please refer to Chapter 4 of the draft EIS.

Implementation of the proposed mission at Davis-Monthan Air Force Base would result in significant noise impact from aircraft noise near Davis-Monthan Air Force Base.

Approximately one percent of the Air Force Reserve Command F-35 flights would occur during the environmental night.

An additional 79 to 91 residential acres and an estimated 1,361 to 1,506 people would be exposed to the day-night average sound levels of 65 decibels or greater.

The significant impacts to socioeconomic resources would also result from the noise impact to schools.

Implementation of the proposed mission would also result in a disproportionate impact to the minority and low-income populations. No other resource areas will be significantly impacted but the implementation of the proposed mission.

Implementation of the proposed mission at Homestead Air Reserve Base would result in adverse but not significant noise impact. An additional six to ten residential acres and an estimated 62 to 104 people would be exposed to day-night average sound levels of 65 decibels or greater.

Approximately two percent of the AFRC F-35A flights would occur during the environmental night.

Implementation of the proposed mission would also result in a disproportionate impact to minority and low-income populations. No other resource areas would be significantly impacted by implementation of the proposed mission.

Implementation of the proposed mission at Naval Air Station Fort Worth Joint Reserve Base would result in significant noise impact. An additional 640 to 643 residential acres and an estimated 8,593 to 8,648 people would be exposed to day-night average sound levels of 65 decibels or greater.

Less than one percent of the Air Force Reserve Command F-35A flights would occur during the environmental night.

Implementation of the proposed mission would also result in a disproportionate impact to the minority and low-income population. No other resource area would be significantly impacted by the implementation of the proposed mission.

Implementation of the proposed mission at Whiteman Air Force Base would result in significant noise impact and an additional 307 to 405 residential acres and an estimated 2,072 to 2,804 people would be exposed to day-night average sound levels of 65 decibels or greater. Approximately four percent of the AFRC F-35A flight would occur during the environmental night.

Implementation of the proposed mission would not result in a disproportionate impact to the low-income populations.

Disproportionate impacts to minority populations would result from implementation of the new mission. No other resource areas would be significantly impacted by implementation of the proposed mission.

That concludes the environmental consequences portion of our briefing. I will now turn the microphone over to our hearing officer.

THE HEARING OFFICER: Could you please turn the light back on?

All right. So this is a -- this is a -- We are now moving over to the verbal comment period part of the hearing for those who want to speak here.

If you look here on the slide, the format will be as follows:

Please fill out the white speaker card. If you did not get one of these and you want to speak, please raise your and one of the staff will give you a speaker form.

We will now take about a ten-minute recess in order for us to collect all the forms and prepare for the public comments.

This meeting is now in recess for ten

minutes.

(Whereupon, the meeting was in recess at 5:56 p.m. until 6:07 p.m.)

THE HEARING OFFICER: All right. The hearing is now called to order. When I call your name you may approach the microphone here. There is also one right there. So you can step up there; that will allow the stenographer to be able to see your lips, to be able to record the things that are being said.

So to help the stenographer also if you will please begin by stating your name and the name of your organization, if any, that you represent.

It will also be helpful if you spell your last name.

Please do not provide any personal information such as your home address or your phone number.

Again, your comments are recorded verbatim. They will be used to develop a transcript and a permanent record of this hearing. And it will be published in the final EIS.

Your name will be included along with your

comments. The personal home addresses and phone numbers will not be published in the final EIS.

Each speaker will have three minutes to provide his or her verbal comments on the proposed action and alternatives.

We have a timekeeper to help keep track of the time, right there (indicating). This person will hold up a yellow card, when you have about 30 seconds left, and a red card when time is up. At that time please conclude your comments so that I can call on the next person.

Of course there is no obligation to using the entire three minutes. You do not need to yield any time to the remaining speakers or someone else. I will just move on to the next speaker when you are finished.

Also, in the interest of time, we ask that you submit any individual electronic presentations as written comments.

Tonight's hearing is set to end at 8:00 p.m. If more people sign up to speak than would be allowed by the time that the hearing closes at 8:00 p.m. the time to speak will be shortened two minutes per speaker.

The speakers will be called up to speak in the order in which the speaker forms were received.

At 8:00 p.m., or once all the registered speakers have had an opportunity to speak, and no other individuals desire to speak, I will adjourn the formal comment portion of the hearing.

If everyone who signed up to speak has had a chance to speak before that time, I will ask if any speakers would like another two to three minutes to expand on your comments. If you want to do that just let me know and we will restart the clock for you.

If you want to add something later to your verbal comments, or if you would rather not speak here tonight, you can submit written comments.

The Air Force, as I said before, gives equal weight to verbal and written comments. Both become part of the official record and are included in the final EIS.

Just a few reminders before we get started. First, please limit your comments to the analysis in the draft EIS. That is the

purpose of the public comment period.

As I mentioned earlier this is not a question-and-answer session. It is not an opportunity for you to put on the record your -- excuse me -- it is an opportunity for you to put on the record your views and concerns about the proposal and what you want the decision-makers to consider.

Questions that you pose during your verbal testimony will become part of the record and will be considered.

After we've completed the formal part of this hearing the Air Force representatives will continue to be available for discussion.

I have been provided with a list of individuals who would like to speak. I first would like to invite any elected officials. I don't think we received any comment cards from any of them. So I will give them in the order in which they have been received.

The first person is Dennis Daley. That should be on.

MR. DALEY: Okay. Thank you. Can you hear me up here? I am Dennis Daley. D-a-l-e-y, is my last name. The name of the

base, and the Villages of Homestead, which is very dear to me, the first quarter of the base.

I just wanted to say tonight that I am in favor of the F-35's coming to Homestead wholeheartedly. You know, the military has been the lifeblood to the community down there. And this is an 80,000 person community. It is not Miami. It is not Tuscan. It is an 80,000 person community and the military is a very big deal to it. And of course they drop about three hundred million in contracts and money back into the community.

But a lot of these contracts go to small minority and disadvantaged businesses, which is a very big deal to the South Dade and Homestead community.

You know, on return I think that the City has always supported the base wholeheartedly and I am sure they will with the F-35's as well.

They've built six new schools, upgrade schools, that are within three miles of the base. There are community, art and magnet charter schools.

They've built Baptist Hospital, which is

1.2 miles from the end of the base, which is also tracker provider and just a fabulous facility for all kinds of critical care.

The community leadership has stepped up when it needed to, and when they hadn't needed to, to protect the base. The 2012 airport ordinance, is a good testament to that.

And, if you look at the right north of ABZ 1 and 2, there is a tri-area retention pond, which the ABC line bisects it. That is because the City worked with the developers to put retention ponds and retention water there instead of housing. So that is how strong the support we've had from the community leadership in the past.

And now if you took a map of the area ten years ago, and relate it to now, you see the area around the base is much the same. And part of that is due to the synergy of Homestead Motor Speedway. So it is a synergistic effect to block encroachment from the speedway and to the base that will always protect the base in the future. So I am sure the track is not going anywhere in the future either.

Regarding noise and, you know, everybody talks about F-35 and noise and stuff: I think if you look at the houses built along 137th Avenue, they are all new construction, built since Hurricane Andrew to Dade County codes.

They got either impact windows or dual pane windows, which mitigate sound, as well as tile roofs and re-enforced walls.

So I think the building construction of the new projects built on or around the base, or near the base, are very good to retain the noise.

Lastly, my last comment, is that in the next 20 years I think it is all about the airspace. You know, it is like the F-35 is a fabulous performing airplane as the F-16s and absolutely love the F-35, but I think it is all about the airspace. And whoever has the airspace, airspace out over the gulf, for 150 miles surface to 60 or 70 thousand feet, we will have the best training advantages in the world.

So I appreciate the time. I do it all the time and thank you very much for coming.

THE HEARING OFFICER: All right. The next one we have is Edward J. Redly. Am I saying

that -- Or Lich, Redlich.

MR. REDLICH: Yes. Close enough.

THE HEARING OFFICER: Okay.

MR. REDLICH: Good evening, everyone. So again my name is Edward Redlich, R-e-d-l-i-c-h, proudly from Homestead, Florida. And I want to make a positive personal comment and a positive economic comment.

So, having lived in Homestead for 20 years I can tell you that every time, every time a plane flew over, we all stopped and we listened, we counted, and to hear those sounds of freedom, I remember where I was and how I heard it. And we were at football game and we were fishing in the Florida Everglades. And I can tell you for 40 years I fished at the Florida Everglades. And we would be out there fishing and there would be wading birds and everything. The planes would fly over. They didn't care. They went right along. So it really does not disturb them at all in my opinion. So I just want to say God bless you, guys, personally. Thank you very much.

And on the economic comment, the airbase is a huge economic tri -- or in Homestead.

When you think of Homestead you think of the Air Force base, number one.

Secondly, I can tell you that my mother was in residential real estate in Homestead. She is retired. She sold dozens of homes to Air Force basemen.

Okay. That helped pay the mortgage on our house. So I can you it was a huge economic impact that I didn't even know it was included in the three hundred million dollars; okay?

Secondly, right now, my day job is with commercial real estate. I created hundreds of jobs down here in South Dade and Homestead. There is nothing like the base of the economic impact.

So, keep up the great work. God bless America. Thank you.

THE HEARING OFFICER: The next speaker is Kurt H. Kadel.

MR. KADEL: Hello everyone. Kurt Kadel, K-a-d-e-l. I am here from the South Dade Chamber of Commence Military Affairs Committee. And I was not really prepared to speak today. I didn't write anything, but I just felt that it was important for me to get up here and

explain and say that the South Dade community is very close with the military community. You can see it with the involvement here. You can see it every day.

The Military Affairs Committee, our job is to help to promote that relationship between the folks on the base, all the military families and the community.

And we see it every day. The folks on the base are coming out into the community. They are helping in the community. They are volunteering in the community. Just like we, as a MAC, are going on to the base and helping those families and those military members.

It is a very close-knit relationship. You know, the base was a full-service base before Hurricane Andrew. The community supported it. The community loved it.

And unfortunately that storm really took its toll. But every year that base has gotten stronger and stronger. And one of the missions of the MAC is to really enhance the military viability here at Homestead Air Reserve Base.

And by adding missions like this, by increasing the missions of our little Homestead

Air Reserve Base, we can ensure that, that long-term viability is there and we can ensure that the military presence here in South Dade will continue.

And that is really what we want to see because we love out military folks. If you came down U.S. One and you saw that F-4, I think it is, out there on the highway -- It needs a paint job, I will say. We are working on that -- but, you know, that tells how proud we are to have the military here in Homestead.

So, again, I wasn't really prepared to speak, but I just wanted to say I probably represent the entire Military Affairs Committee, 50 community members, that are very strong and passionate; that go out there and really every day help that base and help people on the base and work with them to just try to continue this relationship that we have. So far it has been wonderful. Thank you very much.

THE HEARING OFFICER: The next speaker is Jonathan Borgert.

MR. BORGERT: B-o-r-g-e-r-t, Jonathan Borgert. Yes, sir.

Thank you for letting me speak. My name is Jonathan Borgert, B-o-r-g-e-r-t. I am also a Military Affairs Committee member and a Florida Defense Alliance member.

Kurt stole a bunch of my thunder. I want to mirror a lot of what he said. But I also want to say that, you know, we've kind of been forgotten about down here as far as the military community because we are a reserve base now. If you travel across the state you will see some very vibrant large bases and they got a lot of love and a lot of attention. I think getting the F-35 down here in Homestead I think would put us on the map even more in a greater way as far as the military presence.

I would also like to mirror what the other gentleman about growing up down here. I grew up down the road from the base and it has always been an integral part of our community, not only economically, but socially. A lot of great people and producers coming out of there. A lot of professionals that we like to have in our community. So, thank you.

THE HEARING OFFICER: All right. My last, the last name on this one, Justin Louis -- I

can't read the writing. Justin, what is the last name?

MR. BAYM: Justin Baym, B-a-y-m.

THE HEARING OFFICER: Okay.

MR. BAYM: Can you hear me? My name is Justin Louis Baym. I am actually a student here at Miami-Dade College. I am majoring in professional pilot technologies. So, you know, I am studying here to be a pilot, both in the military also.

You know, so aviation is so improved. I would like to say I grew up here in Homestead for like 20 years with the F-16s and everything. I would like to say that I am here for the F-35s mainly due to the fact that, you know, with the growing threat of terror. I think like without all the F-16s today, you know, they served their role, but I do think it is time for us to upgrade to the newer F-35's.

I also think that it will also give us, you know, it will give the Air Force the capability that they have never seen before. So I think it will help a lot and be better.

And pretty much I would like to say. Thank you very much.

THE HEARING OFFICER: Thank you, Justin.

All right. As I mentioned, the hearing is scheduled to end at 8:00 p.m.

We have heard from everyone who has signed up to speak. We still have some time left. Please raise your hand if you have not spoken yet and would like to do so. We will give you a card.

Those who have spoken, do any of them want to speak again?

Oh, I did not see that. That is why I have glasses.

MS. BLACK: My name is Kerry Black, B-l-a-c-k. I am the CEO of South Dade Chamber of Commerce. We've had the privilege of going on a civic leader's tour about two years ago. We got to see the next gen F-35 that was being demoed back at Lockheed Martin. It was a very impressive piece of machinery. It is fairly computerized with the wings and an engine or two attached to it. It goes very fast.

The whole point of having the South Dade Military Affairs Committee is to help them to ensure that they are always, always mission-ready.

And we all believe that the F-35s will help this 42nd, the world's famous fighter wing, be mission-ready at all times.

And so we are in support of that coming down. We know there is going to be some adjustments that need to be made, but from an economic standpoint it is a good move for our city, for our community, not just Homestead, but the entire region. That is why Mayor Meerbot was here just a little while ago, because he has been a resident as well.

The economic impact, just last year, rose up to 330 million dollars.

We see that raising every single year and it is good for our community and it is good to have military folks among us. And, like I said, they do a lot of volunteering in our community. Our schools have benefited tremendously from the mentorship that the men and women from the 42nd offer on a very regular basis. So, with that, I am finished.

THE HEARING OFFICER: Thank you very much.

MS. BLACK: Thank you.

MR. POLUMBO: Good evening everybody. Rob Polumbo, P-o-l-u-m-b-o. I am absolutely,

positively, in favor of the F-35 coming down this way.

Just for some background, Dennis Daley and I flew the Mako's for almost a couple of decades together. And so I came here in 1997 and flew in the reserve with him over that time span all the way to 2008.

And I can tell you that everything that we did was to set ourselves up for the fifth generation aircraft. Everything that we did on that base: Facilities, maintenance, training, rangers, how we aligned ourselves with other units so that we can rainbow and go down the range to fight continuously in southwest Asia.

Everything we did at that forethought of bringing fifth generation aircraft to Homestead. So this planning has been going on for two decades.

And I just want the community to know, and I know that the community is behind this, this possible change of aircraft, but I want you to know that, that base and our community have planned this for two decades.

And so I believe it is the right course for us. The F-35 is much like the F-16. It

has a multi-roll mission. It can go and do most any fighter mission around the world. And we need to continue this in the South Florida area.

We have a heritage and a legacy to continue here in South Florida. So I really want to tell you that this isn't a haphazard kind of thing that we are trying to do here. It is nothing that we are going to try and slip in the community.

The community and the base have been ready for this and working for this for two decades. So it is time to bring that fifth generation aircraft here. Thank you.

THE HEARING OFFICER: It looks like we got maybe one more.

MR. WILLIAMS: Steve J. Williams. You know, I am just -- I am a little confused on the noise. We are trying to downplaying the noise aspect of this; that it is only going to -- those little lines, that the noise level is not going to go outside that.

I mean, I am in favor of the aircraft, but I think it is being -- we are being a little disingenuous saying that it is only going to be

65 percent of this space, 65 for -- and my house is just outside that little area in Waterstone. When the planes fire up I can hear them on the runway. I can tell you exactly which aircraft it is firing up on the runway. So, in saying, "Oh, well that not 65 percent over there and is 65 percent over here."

I just think we are being a little disingenuous on the noise aspect of it.

And I am fine with it, but I do think, you know, you are downplaying that aspect of it, and the timings, the different times of the day. You can like set your clock by when you are going to come over and things like that.

So, it is not that -- it is not that it is -- it is not that big of a deal because you know that it is going to happen, but to say that, you know, those little lines, though it is going to be an increase here and an increase there. And, you know, when they are going to stare and go 95 percent of this line right here, but you are not going to hear it because you are outside this line is -- I think that is kind of ridiculous. Thank you.

THE HEARING OFFICER: Thank you. Is there

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anyone else?

Is there anybody who has already spoken who would like to speak again?

All right. Seeing that we have no remaining speakers, as I mentioned earlier, the Air Force representative will continue to be available at the display boards and continue discussions.

However, those discussions that take place at the boards up there will not be an official part of the record for the EIS.

So this hearing will be in recess until 8:00 o'clock and then we call it back to order. And I will remind you, once again, that written comments have the same weight as the oral ones.

And we will close it down. So, with that this hearing is in recess until 8:00 o'clock.

(Whereupon, the hearing was in recess at 6:31 p.m until 7:59 p.m.)

THE HEARING OFFICER: All right. I would like to begin. I would like to thank you for your time and interest. Tonight is not the end of your opportunity to participate in the environmental review process.

Again written comment sheets are available

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at the registration table. You can turn the sheets in tonight or mail them later.

If you would like your own copy of the final EIS please let one of the representatives at the registration table know or send a letter, of course, prior to asking for your copy. The Air Force will send the copies of the final EIS to you.

The hearing is adjourned.

(Whereupon the public hearing was adjourned at 8:00 o'clock p.m.)

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C E R T I F I C A T E

STATE OF FLORIDA) SS.

COUNTY OF MIAMI DADE)

I, Alan J Levine, being a court reporter and a Notary Public in and for the State of Florida at Large, do hereby certify that I was authorized to and did stenographically report the foregoing Public Hearing of the F-35A Operational Beddown at the Miami-Dade College Homestead Campus, Building F, Room F222/F223, 500 College Terrace, Homestead, Florida 33030, on March 3, 2020, at or about 5:30 p.m., to the best of my ability at the time and place aforesaid, and that the foregoing pages, numbered one to 42, inclusive, constitute a true record of the proceedings thereof.

I further certify that I am not a relative, employee, attorney or counsel of any of the parties, nor am I a relative or employee of any of the parties' attorney or counsel connected with this matter, nor am I financially interested in the outcome thereof.

The foregoing certification does not apply to any reproduction of this transcript by any means unless under the direct control and/or direction of the certifying court reporter.

Dated at Miami-Dade County, this 15th day of March, 2020.

Alan J. Levine, Court Reporter
Notary Public - State of Florida
My commission No.: GG 229869
Expires: October 11, 2022

A.5.3 NAVAL AIR STATION JOINT RESERVE BASE FORT WORTH PUBLIC HEARING TRANSCRIPT

(Transcript contained on the following pages.)

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TRANSCRIPT OF

F-35A OPERATIONAL BEDDOWN PUBLIC HEARING

MARCH 5, 2020

* *

This PUBLIC HEARING was taken on March 5, 2020, from 5:30 p.m. to 8:00 p.m., before Cheryl A. Dixon, RPR, CRR, Notary Public, in and for the State of Texas, reported by machine shorthand, at Brewer High School Auditorium, 1025 W. Loop 820 N. Fort Worth, Texas, 76108.

APPEARANCE OF SPEAKERS

NEPA Team Members:

Colonel Tobin Griffeth, HAF/AF/JATA, Hearing Officer

Major Gordon Polston, AFRC A5/A8P

Mr. Hamid Kamalpour, AFCEC/CZN

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P R O C E E D I N G S
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March 5, 2020 Fort Worth, Texas

HEARING OFFICER: The time is now 5:30 and we will now start the hearing. I want to thank you for attending this public hearing. This public hearing is a draft for the Environmental Impact Statement or Draft EIS, the propose -- that is proposed for the Air Force Reserve Command F-35A Operational Beddown, hereinafter referred to as the proposed mission.

I am Colonel Tobin C. Griffeth and I am your hearing officer here tonight. I'm an Air Force Judge and will be acting as the moderator tonight. As the moderator, my role is to ensure that the Air Force provides a fair, orderly, and impartial hearing where you have an opportunity to make comments on the proposal. Let me make very clear, I do not work for anyone at the Air Force Reserve Command, the Air Force Civil Engineer Center, the Air Combat Command, or any of the bases under consideration for the proposed action. I am not involved in any way with the development of this Draft EIS, and I do not act as a legal advisor to the Air Force representatives working on this proposal.

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This hearing is held in accordance with the provisions of the National Environmental Policy Act or "NEPA" -- you will hear that regularly; whenever you hear "NEPA" think the National Environmental Policy Act -- as implemented by the Council on Environmental Quality Regulations in the Air Force. We are here tonight to present information on the environmental impacts of the proposed beddown and to receive your comments on the Draft EIS.

Tonight's hearing is one of several opportunities for public comments. This hearing is an opportunity for you to express your views and concerns about the adequacy of the environmental analysis contained in the Draft EIS, as well as any issues related to the NEPA process. This hearing is not a debate or a vote on the Draft EIS and it is not a question-and-answer session. We welcome your input on the environmental analysis presented in the Draft EIS. Comments on the environmental analysis -- excuse me -- comments about other unrelated issues can certainly be made, but they will not assist in the decision-making process for the Draft EIS.

I'd like to begin this hearing by introducing the NEPA Team. Beginning with the team leader, Major Gordon Polston on my right, with the Air

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Force Reserve Command, who will present details of the proposed action and its alternatives. Next is Mr. Hamid Kamalpour. He is the EIS project manager at the Air Force NEPA Division who will discuss results of the NEPA process. Representatives from the Joint Base Station Fort Worth Joint Reserve Base, led by the Base Commander Captain Jon Townsend are present here tonight. Although not a part of the analysis team, they have provided detailed base information which has been critical throughout the analysis of the impacts of the Draft EIS. Lastly, representatives from Leidos are here supporting the Air Force as the contractor. Transcribing tonight's hearing is Ms. Cheryl A. Dixon.

I would also like to recognize that we have several both state -- federal, state, and local officials here. I will not go through them all. You will hear from many of them here today; but I do know I've received cards from a representative from Government Abbott's office; from the staff of U.S. Congressman Veasey; from the Fort Worth Councilman District 7 Dennis Shingleton; from Sterling L. Naron of -- I might have mispronounced that one, if I did, I apologize -- from the City of Westworth Village; and Mr. Mike Coleman representing Mayor Kelly Jones of Westworth Village. I'd also like to say thank you to

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any other military leaders and distinguished guests in which we have.

Major Polston will first present information on the proposed action and the alternatives. Then, Mr. Kamalpour will provide an overview of the NEPA process and will summarize the potential environmental consequences of the proposal.

After their presentations, which should take about 20 minutes, we will begin our verbal comment period, during which you can provide input on the proposed action, Draft EIS analysis, and potential environmental impacts. Your comments will become part of the official record of the Final EIS. Please note that information discussed during informational displays were off the record, if you will, and will not become part of the EIS record. So if you have items of concern about the analysis in the Draft EIS that you would like to bring to our attention, please do so during our formal comment opportunity or in writing. Verbal and written comments are equally considered. One isn't higher than the other. They both go into the EIS. If you do not choose to make a verbal comment, you can submit written comments either by turning in a comment form this evening or by mailing it to the address shown on the screen behind me. The comments may also be

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submitted online at www.afrc-f35a-beddown.com. I'll say that again, www.afrc-f35a-beddown.com.

If you have not had a chance to review the Draft EIS, it is available on the website, or at one of the public libraries listed here.

The Air Force welcomes public comments in writing at any time -- or any time during the environmental impact analysis process. To receive timely consideration for the Final EIS, please submit your comments by no later than March 31, 2020. Your comments will provide the decision-maker, who is the Secretary of the Air Force, with information to assist in making a decision regarding where the mission will be located. Your comments during this process provide the benefit of your knowledge of the local area and your concerns about the environmental impacts or analysis.

We will now move into the briefing. During the briefing, our speakers will be reading from prepared scripts. The briefing is written to make certain that each speaker covers all of the pertinent information and that it is consistent for all of our hearings.

With that, I will turn the microphone over to Major Polston from the Air Force Reserve Command.

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MAJOR POLSTON: Good afternoon and welcome. I'm Major Gordon Polston, representing Air Force Reserve Command. I'm the F-35 project manager at Headquarters AFRC Robins Air Force Base Georgia. Welcome to this meeting.

As the team leader, I encourage you to assist the Air Force in meeting its requirements to comply with the NEPA process. Your attendance tonight indicates your interest in this proposed attendance -- proposed action, and I hope your comments will provide us with additional information or areas where further analysis is needed. All comments will we properly reviewed and analyzed. Substantive comments will be addressed in the Final EIS.

The purpose of the proposed action involves the F-35A's role in the Air Force fighter modernization effort. The goal of this effort is to ensure future fighter aircraft are the best available to support a high-threat, multi-role war fighting capability to commanders worldwide. To perform this mission, train pilots, maintenance, and support personnel must be available to meet F-35A inventory delivery dates as older aircraft are retired or reassigned.

The F-35A provides several fighter

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modernizations advantages including:

Efficiently and effectively maintained combat capability and mission readiness as U.S. Air Force faces deployments across a spectrum of conflicts; provide for homeland defense; provide the U.S. Air Force with the most advanced fighter aircraft in the world at an additional strategic location in the Continental United States.

The Air Force is proposing to establish the Air Force Reserve Command Operational Beddown for F-35A aircraft along with required infrastructure and manpower at one Air Force installation in the Continental United States where the Air Force Reserve Command leads a global precision attack mission.

The mission utilizes pilots and support staff who operate and maintain the aircraft to support the Joint Strike Fighter Program.

Implementation of the mission would require a variety of on-base developmental projects including demolition, new construction and renovation.

At each base, the F-35A flight activities would occur in existing airspace. Within each training airspace unit, Air Force Reserve Command F-35A pilots would operate in the same airspace utilized by A-10 or F-16 pilots, but at higher altitudes. The Air Force

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analyzed three different afterburner scenarios at each base.

The no-action alternative is required by the National Environmental Policy Act and was evaluated at each proposed beddown location to provide a baseline for the decision-maker. The no-action alternative evaluates the environmental consequences of not basing the F-35A aircraft at any base.

In the Draft EIS, the Air Force analyzed the environmental consequences of the beddown of F-35A aircraft and replacement of existing fighter or ground-attack aircraft at one of the following alternative bases: Davis-Monthan Air Force Base in Arizona, Homestead Air Reserve Base in Florida, Naval Air Station Fort Worth Joint Reserve Base right here in Texas, or Whiteman Air Force Base in Missouri.

In January of 2017, the Secretary of the Air Force announced Naval Air Station Fort Worth Joint Reserve Base as the preferred alternative for this mission. Davis-Monthan Air Force Base, Homestead Air Reserve Base, and Whiteman Air Force Base were announced as reasonable alternatives for the mission. This table summarizes the bases being considered and how the existing missions could be impacted. The following slides summarize the aircraft facilities and manpower

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changes anticipated to require to support the mission.
Davis-Monthan Air Force Base has been identified as a reasonable alternative for the mission. If Davis-Monthan is selected to host the mission, the existing 24 A-10 aircraft operated by the 924 Fighter Group would be replaced by 24 F-35A aircraft, plus two backup aircraft inventory.

Implementation of the mission would require a variety of on-base developmental projects including demolition, new construction and renovation. This mission would decrease the area of population by approximately 30 full-time mission personnel and would result in a 0.7 increase in annual aircraft operations at the installation and a 5 percent increase of total sorties within the airspace.

Homestead Air Reserve Base has been identified as a reasonable alternative for the mission. If Homestead is selected to host the mission, the existing 24 F-16 aircraft would be replaced by 24 F-35A aircraft, plus two backup aircraft inventory.

Implementation of the mission would require a variety of on-base developmental projects including demolition, new construction and renovation. This mission would decrease the area of population by approximately 91 full-time mission personnel and would

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result in 3 percent increase in annual aircraft operations at the installation and a 0.2 percent decrease of total sorties within the airspace.

Naval Air Station Fort Worth Joint Reserve Base has been identified as the preferred alternative for this mission. If Fort Worth is selected to host the mission, the existing 24 F-16 aircraft would be replaced by 24 F-35A aircraft, plus two backup aircraft inventory.

Implementation of the mission would require a variety of on-base developmental projects including demolition, new construction and renovation. This mission would decrease the area of population by approximately 102 full-time mission personnel and would result in an approximate 12.1 percent increase in annual aircraft operations at the installation and a 1.2 percent increase of total sorties within the airspace.

Whiteman Air Force Base has been identified as a reasonable alternative for this mission. If Whiteman is selected to host the mission, the existing 24 A-10 aircraft would be replaced by 24 F-35A aircraft, plus two backup aircraft inventory.

Implementation of the mission would require a variety of on-base developmental projects including demolition, new construction and renovation.

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This mission would increase the area of population by approximately 11 additional full-time personnel and would result in an approximate 17.4 percent increase in annual aircraft operations at the installation and a 5.9 percent decrease of total sorties within the airspace.

We would like to emphasize that, although the preferred alternative for the mission has been announced, no final decision has been made on basing the mission currently under analysis in the Draft EIS. We look forward to inputs provided from the public and the affected communities as we proceed through the environmental impact analysis. Once the requirements of the environmental impact analysis process are complete, the Air Force will make its final basing decision.

Thank you for your attention. I will now turn the presentation over to Mr. Hamid Kamalpour, the Air Force project manager for the EIS, to discuss the NEPA process and provide greater detail on potential impacts as described in the Draft EIS.

MR. KAMALPOUR: Good evening. I'm Hamid Kamalpour, the Air Force NEPA Division Project Manager for the analysis of the proposed action. I'm here tonight to discuss the results of the environmental impact analysis for the proposal presented by Major Gordon Polston.

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The Draft EIS has been prepared in accordance with the requirement of National Environmental Policy Act Law, which requires federal agencies to analyze the potential environmental consequences of a proposed action, and reasonable alternatives -- including a no-action alternative -- before any action is taken. The goal of conducting an EIS is to support sound decisions throughout the assessment of potential environmental consequences as well as involving the public in the process. The results of this analysis and other relevant factors will be considered before a decision is made by the Air Force on the proposal. Your input during the past public scoping period and the public comment period will be the Secretary of the Air Force -- will help the Secretary of the Air Force make the most informed decision possible on this proposal.

As you can see on this slide, there are several key steps to the environmental impact analysis process. We are currently at the public and agency Draft EIS review stage. This period began with the Federal Register publication of the Notice of Availability for the Draft EIS. At that time, copies of the Draft EIS were mailed to local libraries, state and federal representatives and individuals who requested

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copies during the EIS scoping period.

The normal review process -- the normal review period required by NEPA is 45 days. The Draft EIS public comment period will end on the 31st March 2020. The public hearings are being held in the same communities as previous scoping meetings in order to provide the potentially affected communities with the opportunity to comment on the Draft EIS.

All substantive comments received prior to the close of the public comment period will be considered during preparation of the Final EIS. The Air Force responds to substantive comments on the Draft EIS comments in the Final EIS.

The Final EIS is scheduled to be released in the summer of 2020. After the Final EIS Notice Availability is published in the Federal Register, the Air Force must observe a waiting period of at least 30 days before signing the final Record of Decision or "ROD" to document which alternative the Air Force selected for implementation of the Air Force Reserve Command F-35 mission.

The Draft EIS presents information on the potential environmental consequences associated with implementing the proposed mission at each of the four bases. The potential environmental consequences are

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grouped into the five categories shown on this slide and subcategories represent the twelve resource areas evaluated at each base.

The next set of slides describes some of the potential environmental consequences at each of the four bases. For the purpose of this presentation, the potential environmental consequences at each base have been summarized in broad terms. For a more detailed evaluation of the potential consequences, please refer to the Chapter 4 of the Draft EIS.

Implementation of the proposed mission at Davis-Monthan Air Force Base would result in significant noise impacts from aircraft noise near Davis-Monthan Air Force Base. Approximately 1 percent of Air Force Reserve Command F-35 flights would occur during environmental night. An additional 79 to 91 residential acres and an estimated 1,361 to 1,506 people would be exposed to day-night average sound levels of 65 decibels or greater. Significant impacts of socioeconomic resources would also result from noise impacts to schools. Implementation of the proposed mission would also result in disproportionate impacts to minority and low-income populations. No other resource area would be significantly impacted by implementation of the proposed mission.

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Implementation of the proposed mission at Homestead Air Reserve Base would result in adverse but not significant noise impacts. An additional 6 to 10 residential acres and an estimated 62 to 104 people would be exposed to the day-night average sound levels of 65 decibels or greater. Approximately 2 percent of the Air Force Reserve Command F-35A flights would occur during environmental night. Implementation of the proposed mission would also result in disproportionate impacts to minority and low-income populations. No other resource areas would be significantly impacted by the implementation of the proposed mission.

Implementation of the proposed mission at Naval Air Station Fort Worth Joint Reserve Base would result in significant noise impacts. An additional 640 to 643 residential acres and an estimated 8,593 to 8,648 people would be exposed to the day-night average sound levels of 65 decibels or greater. Less than 1 percent of the Air Force Reserve Command F-35 flights would occur during environmental night. Implementation of the proposed mission would also result in disproportionate impacts to minority and low-income populations. No other resource areas would be significantly impacted by implementation of the proposed mission.

Implementation of the proposed mission at

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Whiteman Air Force Base would result in significant noise impacts. An additional 307 to 405 residential acres and an estimated 2,072 to 2,804 people would be exposed to day-night average sound levels of 65 decibels or greater. Approximately 4 percent of the Air Force Reserve Command F-35A flight would occur during environmental night. Implementation of the proposed mission would not result in disproportionate impacts to low-income populations. Disproportionate impacts to minority populations would result from implementation of the new mission. No other resource areas would be significantly impacted by implementation of the proposed mission.

That concludes the environmental consequences portion of our briefing. I will now turn the microphone over to our hearing officer.

HEARING OFFICER: Thank you. All right. We will now move into the verbal comment part of the hearing. For those wishing to speak, here is the format that we will follow. Please fill out a white speaker card. It looks like this. If you did not get one of these and you want to speak, please raise your hand right now and one of the staff will give you a speaker form.

So while we're doing it, anybody, hands,

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who hasn't already filled out a form who wants to speak here today? That one man.

We'll take a quick 10-minute break and then we'll start back up. So right now this hearing is in recess for ten minutes.

(Recess from 5:58 p.m. to 6:09 p.m.)

HEARING OFFICER: Please be seated. This hearing is now called to order.

When I call your name, you may approach the microphone here. To help the stenographer that we have, please begin by stating your name and the name of your organization, if any, that you represent. It will also be helpful if you spell your last name; but please, do not provide any other personal information such as your home address or phone number or anything like that. Again, your comments are reported verbatim. They'll be used to develop a transcript and a permanent record of this hearing, and will be published in the Final EIS. Your name will be included along with your comments. Personal home address and phone numbers will not be published in the Final EIS.

Each speaker will have three minutes to provide his or her verbal comments on proposed alternatives.

We have a timekeeper right here in front

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to help keep track. This person will hold up a yellow card when you have 30 seconds left and a red card when time is up. At that time, please conclude your comments so that I can call on the next person. There's no obligation, of course, to use your entire three minutes. You do not need to yield any remaining time to someone else. I will just move to the next speaker when you're finished. Also, in the interest of time, we ask that you submit any individual electronic presentations as written comments.

Tonight's hearing is set to end at 8:00 p.m. If more people sign up to speak than would be allowed by the time the hearing closes at 8:00 p.m., the time to speak will be shortened to two minutes per speaker. The speakers will be called up to speak with elected officials going first. We will start with Governor Abbott's office and then we'll go federal, state and local. And then with the general public in the orders in which they were received. At 8:00 p.m., or once all the registered speakers have spoken or had an opportunity to speak and no other individuals desire to speak, I will adjourn the formal verbal comment portion of the hearing. If everyone who signed up to speak had a chance to speak before that time, I will ask if any speaker would like another three minutes to

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expand upon your comments. If you want to do that just let me know and we will restart the clock for you.

If you want to add something later to your verbal comments or if you rather not speak at all tonight but you want your comments to be heard, you can submit them in written comments. The Air Force gives equal weight to verbal and written comments. Both become part of the official record and are included in the Final EIS.

Just a few reminders before we get started. First, please limit your comments to the analysis in the Draft EIS. That is the purpose of this public comment period. As I mentioned earlier, this is not a question-and-answer session. It is not an opportunity for you to put on the record your views and your concerns about or it is -- excuse me, it is an opportunity for you to put on record your views and concerns about the proposal that you want the decision-makers to consider. Questions that you pose during your verbal testimony will become part of the record and will be considered. After we've completed the formal part of this hearing, Air Force representatives will continue to be available for discussion until 8 o'clock.

I've been provided a list of individuals

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who would like to speak. We will first invite -- looks like -- Kevin E. Pottinger from Governor Abbott's office.

MR. POTTINGER: Hi. I'm Kevin Pottinger, Retired Major General, United States Air Force. P-o-t-t-i-n-g-e-r. And I'm here on behalf of Governor Abbott. I'm here to read a letter that he wrote to the Secretary of the Air Force.

"Dear Secretary Barrett: I write to express my continued support of the 301st Fighter Wing in the Naval Air Station Fort Worth Joint Reserve Base, and for the United States Air Force to select this Wing for basing the F-35 Lightning II. As you know, Naval Air Station Fort Worth serves as a head quality training environment for active and reserve units from all branches of our armed services; and the United States Navy continues to maintain and invest in infrastructure and quality of life initiatives at the installation.

The 301st Fighter Wing is the ideal location for basing F-35s. The airfield, training areas and MOAs, Military Operating Units, already support F-35 manufacturing and test flight activities. Naval Air Station Fort Worth and Lockheed Martin are co-located and utilize the same runway. The installation has proven its abilities for F-16s and has established

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infrastructure and relationships conducive to F-35 operations, maintenance, and training.

In light of this history, basing F-35s at the Naval Air Station Fort Worth should have a minimal impact -- a minimal environmental impact. Naval Air Station Fort Worth has the airspace, military operating areas, and ranges for F-35 training missions to support both air-to-air and air-to-ground flying operations. The training areas are within 70 miles of the installation and offer over 5,000 square miles of high and low military operating areas, and access to extensive military training routes.

In addition, the Fort Worth Region has superb year-round flying weather and provides easy access to joint operational partners.

The State of Texas has a long history of supporting the United States Military, and it is a top priority for my office to ensure that Texas is the most military-friendly state in the country.

The State of Texas, the Dallas/Fort Worth metropolitan area and the Naval Air Station Fort Worth provide large resources, Reserve manpower and the infrastructure needed to support F-35 missions.

The 301st Fighter Wing is ready, willing and able to accept and support F-35 aircraft, pilots and

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maintenance personnel. I hope you will agree that Naval Air Station Fort Worth is a clear choice for F-35 basing.

Thank you for your consideration and support. Sincerely, Greg Abbott, Governor of Texas."

Thank you.

HEARING OFFICER: Thank you.

Next will be Dennis Shingleton from Fort Worth Council District 7.

MR. SHINGLETON: Thank you. It's Shingleton, S-h-i-n-g-l-e-t-o-n, like shingles on a roof. Thank you very much.

I'm here as a city councilman but also as the president of the Regional Coordination Committee. I'll explain both. As a member of the Fort Worth City Council -- and I chair the Regional Coordination Committee. The Regional Coordination Committee was formed out of a 2008 Joint Land Use Study surrounding this very, very important base of ours, and with recommendations from the member -- the ten-member community surrounding the base, we continue to move forward on the economic significance of this base.

Lockheed Martin as its primary inhabitant and we help to push transportation and community improvements, while maintaining the operational

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effectiveness of the base. And that's key and important to us is that operational effectiveness.

In addition as a Fort Worth City Councilman, I represent the many neighbors and neighborhoods that surround Lake Worth and their interest, but we have ten members on this Regional Coordination Committee and we have passed several things. We've passed zoning ordinances and building codes to provide compatible land use and land development throughout this; but we also force developers to provide or at least develop land use such that there is a noise level guideline, and the noise level built into the homes, apartments, buildings that they have, that they've developed, and we have done that over the years for many times and have absolutely held to it, held to it with the help of those neighboring communities.

The committee has recommended measures to mitigate incompatible land use. And in dozens of cases involve both the bases -- the Joint Reserve Base's noise contours and accident prevention zones.

As part of this JLUS study, let me tell you that it also references the economic impact which is in the billions of dollars, not only for Lockheed Martin but for the surrounding communities that send employees

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and the offset of the trickle-down effect of that economic development. As part of that JLUS recommendation, the Regional Coordination Committee activily recommend sound continuation measures, as I've said, and each of one of those recommendations goes through the respective city managers. So the entire community is involved in this.

Stop. Thank you very much, sir.

HEARING OFFICER: Thank you very much, Councilman Shingleton.

Next up is Sterling Naron from Westworth Village.

MR. NARON: Thank you. My name is Sterling Naron, N-a-r-o-n, and I am the City Administrator for Westworth Village, home of the front door of NAS JRB.

As City Administrator, my job is to field any responses and issues in our community. And I want to take this moment to emphasize that I do this daily. However, I have not once, not once in my tenure as City Administrator have ever received a call about noise from aircraft operations at NAS JRB.

I also want to point out, the City of Westworth Village owns and operates an approximate 200-acre municipal golf course that spans about two

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miles of fence line to the base. The significant green space acts as a natural buffer to development encroachment towards NAS Fort Worth.

My staff remains committed to working with the operation with the Regional Coordination Committee Councilman Shingleton spoke of, and leadership at NAS Fort Worth to ensure the base as an embraced neighbor will always be able to fulfill its mission. Thank you.

HEARING OFFICER: Thank you.

Next up is Mr. Mike Coleman representing Mayor Kelly Jones out of Westworth Village.

MR. COLEMAN: Good evening. I'm Mike Coleman, former mayor City of Westworth Village. Coleman, C-o-l-e-m-a-n. I'm now just an ordinary citizen but I still have the opportunity to serve on the Regional Coordination Committee with Councilman Shingleton and that's a very worthwhile organization.

I'm here tonight representing Mayor Kelly Jones who has a City commitment but could not make it, but has submitted strongly her support to the Secretary of the Air Force for home basing the proposed squadron of F-35 aircraft with the 301st Fighter Wing at Naval Air Station Fort Worth. I'll read that shortly.

Just for background though, as Sterling

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kind of alluded to, the city of Westworth Village sits outside the base and has about 3,000 citizens.

Let me read the letter.

"Dear Secretary Barrett: For almost 80 years the citizens of Westworth Village have enjoyed a mutually beneficial relationship with NAS JRB Fort Worth, formally Carswell Air Force Base. The city council, citizens and staff of Westworth Village wholeheartedly support our local base and the 301st Fighter Wing and are confident that this is the optimum location to home base the new F-35A Lighting II.

What's not to like about NAS JRB Fort Worth with its proximity to Lockheed Martin with proven manufacturing and testing success, high quality environment for both active and reserve units of all service branches, excellent year-round weather, central location, and a vast resource of service and support of the surrounding area, why would you look anywhere else?

During the entire duration of our city's relationship with the base, many of our citizens have been active, reserve, or retired service members. We enjoy hearing the national anthem every morning at 8:00 a.m. over the base's PA system, and proudly observing our aircraft taking off and landing with that much love sound of freedom.

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Interestingly, the City of Westworth Village is nearing completion of $2 million federal and state grant project to install a citywide walking and biking trail with the grant being awarded to Westworth Village primarily to improve access and liveability for the men and women working, serving and living at the base.

We look forward to continuing to support NAS JRB Fort Worth, the 301st Fighter Wing and the new F-35A Lightning II and its successors for the next 80 years. I trust you can come to no other conclusion but that NAS JRB Fort Worth is a clear choice for the F-35A home basing.

Thank you for the consideration and support. Sincerely, L. Kelly Jones, Mayor, City of Westworth Village."

Thank you.

HEARING OFFICER: Thank you.

Next is Larry Marshe (phonetic).

MR. MARSHALL: Marshall.

HEARING OFFICER: Oh, Marshall? All right. Thank you.

MR. MARSHALL: Thank you for the opportunity. I'm Larry Marshall, and it's M-a-r-s-h-a-l-l. I represent the citizens of Benbrook.

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I'm a councilmember of Place 3 and also Mayor Pro Tem, City of Benbrook. We have about 24,000 citizens. And I'm also a member of the Regional Coordination Committee for the Council of Governments.

And as previously stated by all the presenters, we highly support this home basing for this F-35A; and we're well aware of the impact of this jet in our environment because of the flights that have already taken place over the last few years through our co-resident on the base being Lockheed.

I would just like to state that I live under the flight path and I appreciate that sound of freedom. I'm a retired Navy captain and I always lived on the flight paths of aircraft; but I will support the home basing for the F-35s for the future of this base. Thank you.

HEARING OFFICER: Thank you.

Next is Anne Pottinger.

MS. POTTINGER: It's Pottinger, P-o-t-t-i-n-g-e-r, and I'm the wife of Kevin Pottinger. And I just wanted to speak as just a plain citizen of somebody who went to high school at Arlington Heights High School, lived in Fort Worth. My father worked for General Dynamics. He was the F-16 program director so I know from being a child the impact of the sound of

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freedom. I heard it in high school. The B-52s were here in Fort Worth. I know what that sound is. I never once thought the sound was wrong to have that in our area.

And the location of NAS Fort Worth JRB is perfect. It's in the middle of the country. The planes can get wherever they need. The ranges are good. The weather is good. Lockheed is right there. If they ever have to bring people over to look at an operational squadron, it's right there right across the runway. What can be better than that? What's better for our economy than to support this unit? Thank you.

HEARING OFFICER: Thank you.

Next is Richard Irving.

MR. IRVING: My name is Richard Irving, it's I-r-v-i-n-g, and I'm a homeowner in the impact area and I bought my home about 33 years ago. When I bought my home, I knew that there was an Air Force base there called Carswell. So I'm not surprised at airplanes flying. I know I've seen every kind of airplane and heard every kind of airplane in the inventory of the United States Government.

And, you know, if we're going to look at noise we already have it because Lockheed Martin has built 500 F-35s and tested them in that area. And I can

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tell you that, you know, there may be a little bit of noise but it doesn't really bother me because the aircraft are coming -- if they're coming from the south they come right around my house and if they're taking off they come right over the house.

But one thing to consider is that, you know, I'm a real estate broker and I heard in the characterization that the people that were impacted were low income and minorities mostly, and I kind of disagree with that because I'm very familiar with the area and I don't think that that is a correct assessment. So you might want to review that because it impacts other people too, and I think it will be a broad spectrum of people, not just minorities and low income.

But I support the JRB and the NAS and I support the F-35 program. And as a homeowner, probably 95, maybe 98 percent of all of the homes in the impact area were built long after the Air Force base or the airfield was established. So, you know, we have noise but it's -- we live with it and I just want to say I support it. So...

HEARING OFFICER: Thank you.

Next is Marianne Armstrong.

MS. ARMSTRONG: I'm Marianne Armstrong and I'm the co-president of the Neighborhood Association

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for South Lake Worth. And in that position I emailed this notice to the 130-something houses that live on the south shore and got several responses that I want to share with you. Before I do that I want to kind of respond to the gentleman who just spoke.

You know, the Air Force Reserve has called this meeting and done this study. They have a social contract with us, with us neighbors. And the reason they've done that is because they are wanting to change the term of that social contract. Right now we do live with a certain amount of noise and a certain amount of flights from certain planes and we all know that. They're wanting to change that contract; and so they're the ones who have done this study and called us to meet today.

So one of the neighbor -- one of our neighbors who can't be here tonight took that study and I'd like to read to you his comments. This is from Bob Crow who grew up on the lake, has lived in the house that his parents built or rebuilt the house that his parents had. So he's been here for, I don't know how old is Bob, you know, 60 or 70 years.

"At the Naval Air Station Fort Worth an estimated population just under 9,000 Fort Worth residents would be subjected day and night, average

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sound levels of 65 decibels or greater within the local area. While noise level volumes would increase, they would also be magnified by a 36 percent increase in daily landings and takeoffs, including thunderous afterburner takeoffs. For Naval Air Station Fort Worth, 643 residential acres would be affected by the daily average sound levels of 65 decibels or greater, while only 307 residential acres are affected by Whiteman Air Force base in Missouri.

In 2015, Tarrant County was noted as marginal, non-attainment for the '03 ozone standard in pollutant emissions. They would increase with the proposed F-35 beddown.

Fort Worth continues to be one of the fastest growing metropolitan areas the U.S. As the area grows, air quality index values continue to be of great concern. An F-35 beddown here would add to this critical air quality concern.

At Whiteman Air Force Base Missouri net emissions were determined to be insignificant.

Naval Air Station Fort Worth runway adjoins Lake Worth shoreline on the north and parallels the west shoreline for several miles."

HEARING OFFICER: Ms. Armstrong, how much longer do you think you'll be?

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MS. ARMSTRONG: Two more minutes.

HEARING OFFICER: Your time is up. If you do me a favor and close it up what we'll do is when the others have gotten a chance to speak we'll reopen the floor, and if you want to speak again you can come back up.

MS. ARMSTRONG: Okay. Thank you. Thank you. So, you know, so Bob's point was that Whiteman and other bases would have much less impact on the surrounding neighbors than this base.

HEARING OFFICER: Thank you, Ms. Armstrong.

Next will be Jack B. Mills, Chief Master Sergeant, Retired.

MR. MILLS: Thank you the opportunity to speak. It's Mills, M-i-l-l-s. I'm here on my own behalf but also as a member of the local community, a small business owner, a member of the Fort Worth Airpower Council, a Retired Chief Master Sergeant with 33 years of service. And in full disclosure, I was the proposal manager of record through the Lockheed Martin Joint Strike Fighter over a decade ago. We now own and operate a small business. I've got family members that live within five miles of this base and have for decades. They can't imagine living anywhere else.

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I want to transition to some specific comments on the executive summary page 7 and 19. They spell out a loss of 102 personnel. No dispute about the loss, but I'd ask the committee to mitigate that loss by considering the population of the base. Captain Townsend and all the other organizations who have worked diligently to offset any loss of personnel right here in the local area. I, myself, commuted for ten years. There's plenty of other options in the commuting distance. So people aren't just going to be ultimately displaced, they might have to move to a different branch or a different assignment.

Cost and operational readiness. I want to bring this up just briefly because there's some advantages; and we saw this back when we did it. You're two miles from the manufacturer. If there's a problem or a defect anywhere, they could literally go two miles, look at military operational aircraft, run the troubleshooting and have an answer in hours instead of days. I can't begin to quantify the cost savings over the life of the program the federal government not only could realize just from that short of logistics table from a problem to a solution and back again.

I want to touch briefly on noise on page 14, 18 and 19 of executive summary there's this big

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spread of decibels, and most of them are showing 70 or less. We're probably talking 65 decibels. The Fort Worth City Ordinance -- and I'm not here to represent them but it is what it is -- it's 70 decibels of daytime operation. You violate no ordinance. It's 65 decibels at night. I'm sorry, 60 for night. So if they fly over Brewer at 10 o'clock at night and nobody is here who does it affect? And I know some people will be affected, but we're not talking about 85 decibels or any hearing protection or hearing conservation program. You probably can't hear 70 decibels in the parking lot right now over my voice just to put it in context.

Sustained operations, not specifically addressed when we look at the weather and the entire envelope. We're a good location to be at.

The last point I'd make just very briefly, NAS JRB Fort Worth does more joint service funerals than anyplace outside of Arlington National Cemetery. In the long-term if we start losing those people we won't be able to support what's one of the most substantial missions to the community of the NAS JRB. Thank you for being here. Thank you for listening. Appreciate your time. Thank you.

HEARING OFFICER: Next will be Joe Waller.

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MR. WALLER: Thank you. Waller, W-a-l-l-e-r. Well, we certainly all appreciate the good things about the Air Force base and the political support that it has. I'd like for you to consider a few things in comparing Fort Worth as an alternative to the others. Primarily we're talking about activity, noise, air quality and water as some of the impacts. I'm the former past president of the Lake Worth Alliance. I forgot to mention that for your records there.

So with respect to the group disturbance area quoting from your study, the Fort Worth area has a larger group disturbance area from 50 percent to 500 percent larger than any of the other alternatives. With respect to noise, the population affected by the DNL of 65 decibel or above is 8,500, give or take a couple hundred. The other alternatives range from 1,500 to 2,900 people. That's an increase of 300 to 500 percent Fort Worth -- other destinations compared to Fort Worth.

The air quality here has been referenced briefly once. I'd like to make a point that the engines on the F-35 are a lot larger and more powerful. There would be more particulate matter emitted, particularly on takeoffs, as you all well know. So contributing to ozone and other air quality issues.

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Perhaps as important but more important, Lake Worth is one of the reservoirs for the City's water supply; 25 percent of the water for the City of Fort Worth comes through Lake Worth. So if we're having takeoffs and landings and with bigger engines creating more particulate matter falling into the water this could maybe be the most serious concern of all.

Well, I think it's prudent to consider the alternatives, and if that's not possible Councilman Shingleton, who represents us out here on the lake, I live on the Lake Worth within that decibel area, with all due respect to that gentleman speaking, you can't hear -- we couldn't be having a conversation if I were outside of my house. It's great inside of the house with these remediations but outside the house it's we're on lake and it ain't no good. So the councilman is president of the RCC as well, perhaps you could help us with that in someway, recognizing that mitigation for noise would be great; however it can be done. I recognize they're problems. That's quoted and stated too. But adjusting flight times, I don't know, but please help us with that if it turns out to be here in Fort Worth. Thanks a lot.

HEARING OFFICER: Thank you, Mr. Waller.

Next is Gerald C. Murff.

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MR. MURFF: The last name is Murff; it's M-u-r-f-f. I'm very sensitive to the this is not a debate, views and concerns. My background is I worked at GD Lockheed for 39 years and consulted for a number of years. I was the weapon system design manager for the F-35. I've also lived on the shore of Lake Worth just off the end of the runway for 50 years. I remember B-58s and a lot of airplanes. I'm also a member of the East Lake Worth and the North Lake Worth Neighborhood Associations, and we have lots of meetings. All kind of people are there.

Many of us are what I think of as "airplane people," and the point being we hope Lockheed builds 500 F -- 35,000 F-35s in the next 40 years. We tolerate the noise. We understand and we know just to be quiet for a few moments while it passes over. And we occasionally have people that say "let's sign up a deal that says we should get rid of this base," and we say "actually you shouldn't have moved here and you should get out if you don't like what those airplane people are doing."

I marked out "environmental impact" and put down "economic impact" on my copy and I would like for us to think of it like that. And I'd like the preferred alternative to, in fact, become the selected

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deal. Thank you.

HEARING OFFICER: Thank you.

Next will be Roy Peimann.

MR. PEIMANN: It's Roger.

HEARING OFFICER: Roger, okay. Sorry. Roger.

MR. PEIMANN: Last name is Peimann, P-e-i-m-a-n-n. And my name is Roger Peimann. I'm a member of the Fort Worth Airpower Council. I've been supporting the military since 1958 in this area. I'd like to comment on the economic and community impact of the 301st Fighter Wing.

What the 301st Fighter Wing brings to the area and will continue to bring to the area with the F-35A: 2,500 reservists serving in the Wing; 2,000 spouses; that's about 4,500 individuals that are contributing to the economy, plus they're 5,000 children living within a 30-mile radius of the Naval Air Station Fort Worth JRB; 2,500 households at $50,000 a year, I think that's light, would contribute $125 million annually to the economy and the local community. Assume a 30-year life of the F-35A would result in a total economic impact of $3.75 billion. That's not a adjusted for inflation.

Community impact: 1,875 or 75 percent of

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the 2,500 reservists are employed in local civilian workforce; 1,500 of the spouses are in those local civilian workforce; 4,000 children in local schools. Consider the effect on schools, churches, local organizations, businesses, local government, construction, infrastructure, et cetera, if the F-35s were not here.

The F-35 will impact local education. Highly technical education and skills will be required. Additional advanced science, engineering, mathematics; STEM will be required. High-paying jobs at Lockheed will continue because of the upgrades of parts and avionics. This training and education will bring even more skilled jobs to the area. If the NAS JRB Fort Worth gets the F-35 the economy will grow. No F-35s, you must seriously consider that much of the economy would be decimated or not occur at all. Thank you.

HEARING OFFICER: Thank you, Mr. Peimann.

Next is Sid H. Eppes.

MR. EPPES: Eppes (pronouncing).

HEARING OFFICER: Eppes.

MR. EPPES: My name is Sid Eppes E-p-p-e-s, Chairman of the Airpower Foundation. We're here in support of the F-35 program continuing at the JRB. Just to let you know, this is kind of a little

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different spin.

As we know, we'll have new airmen to support the F-35. The Airpower Foundation, we support the airmen. We are a nonprofit in support of our military. I will assure you that the military personnel that come in here will be well cared for from the standpoint of the Airpower Foundation and things we do to support the military. We provide over $150,000 per year into the base to support different programs that take place in support of the airmen and the other military. So we would continue to do this and keep happy airmen will be happy fliers and happy family men; and that's our job with the Airpower Foundation is to see that the men and women that serve us are well cared for, and that's a part of the Airpower Foundation we still do.

We've been around since 1958 with the Airpower Council. The Airpower Foundation started in 1999, so we've been around 20 years doing this on a regular basis. Most of the past commanders from the base that leave here say they've never been treated as well as they have at this base by our operation and by the Council and the Foundation members, and we'd like to continue that.

If I was an F-35 I'd want to be bedded

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down at the JRB.

HEARING OFFICER: Next is Mary Lynn Holder.

MS. HOLDER: I'm Mary Lynn Holder, H-o-l-d-e-r, with the Lake Vista Homeowners Association. And I just want to make a comment and a request regarding the noise.

When we moved in a number of years ago to the west side of Lake Worth we knew there were going to be planes; and I had worked on the south side of the base for a number of years before that so I was used to them. And for, you know, a number of years that -- they were reasonable neighbors and what we expected. But I've noticed in our neighborhood over the last 18 months or so we've had a significant increase in noise. The planes seem to be flying at lower altitudes. We can kind of wave at the guys as they go over the house, and it's much more frequent and later at night. And to the point that, you know, several days a week I really can't spend time in the backyard or inside to talk over the phone without having to stop for a couple of minutes with the windows closed, you know, inside. And this is not -- it appears to me to just be because of the change in the flight plans, the routing and the altitude.

So it's just something that I would like

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to make a request that that's given significant attention to with any new plans that you might make because it's made a difference in our lifestyle. And like I said, we've lived with the planes for a number of years and that's what we expected but, you know, just to be aware that it has caused a difference. And I don't know if the increased decibels is over what we've had for a number of years before that or over what we're experiencing now, but it will definitely be very loud if it's over what we're experiencing now. So I think this could all be worked out, but I just would like to make the point that we consider that and, you know, hope that we continue to be a good neighbor in the future. Thank you.

HEARING OFFICER: Thank you, Ms. Holder. Next is Greg Muchow.

MR. MUCHOW: Hello. My name is Greg Muchow, M-u-c-h-o-w. You'll never get it by the spelling.

Okay. I support the Joint Reserve Base, and I support the efforts to go to the F-35 for the squadron. Based on a 2017 report by the Texas Comptroller of Public Accounts, Naval Air Station Fort Worth Joint Reserve Base directly employs almost 10,000 people and contributes at least $3.95 billion to the

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Texas economy.

I understand some residents are upset with the noise of the F-35. I live under the flight path, and the F-35s are a little louder than the F-16s. However, I can tell no difference in noise between the F-35 and the F-18s that the Navy is flying in.

A March 2008 report from the North Central Texas Council of Governments titled "Defending the Sound of Freedom" says "The ability of a military facility to complete its mission is vital to its continued existence. Encroachment negatively affects readiness is often gradual, going unnoticed until its impact cumulatively erodes the military's ability to complete the mission of training and deploying combat-ready troops and equipment."

My first concern is the continued existence of the Joint Reserve Base, and what I'm talking about is base realignment and closure, BRAC.

A May 24th, 2017 article in "Stars and Stripes" reports that President Donald Trump's Pentagon spending plan for 2018 sent to lawmakers includes new round of BRACs, a proposal that the Defense Department contends could save billions of dollars. Similar requests were sought by the Obama Administration. These requests did not take traction as many congressional

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lawmakers opposed the requests, citing potential harm to the community surrounding the bases. The Pentagon documents state that the Defense Department holds about 20 percent more infrastructure than is necessary to operate effectively. If or when base realignment and closure begins, I don't want all the communities around the country who are going to be trying to save their bases to use an argument that residents of this area oppose the Joint Reserve Base because the aircraft are too loud.

My second concern is the F-35s that are currently flying overhead are not from the Joint Reserve Base. They're from the Lockheed plant that builds them. If the jets are too loud for the Joint Reserve Base, are they too loud for the Lockheed plant to fly? The production line for the F-16s has been moved to South Carolina. How hard would it be for Lockheed to move the F-35 production out of our area? Thank you.

HEARING OFFICER: Thank you.

Next is Susan Howell Irvin.

MS. IRVIN: It's Irvin, I-r-v-i-n. My name is Susan Howell Irvin, I-r-v-i-n. I have lived here all of my life. I have been involved with -- through my father's company who makes testing equipment for jet aircraft, and I have watched the revolution of

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flight because what he invented made jet travel safe.

I've watched the world change exponentially as air travel has increased. My son has served 18 years as a flight combat medic. I cannot tell you how important our military is in keeping our country safe. And everywhere America has stepped it has benefited the world. But because of the extreme importance of the F-35 as our major strike force it is important that we support it. Are their hardships? Yes. There are definitely hardships. Are there things that are impactful? Yes. I've sent my son into war nine times. No mother should ever have to do that.

Because of the noise, because of what this gentleman said about the quality of whatever should be falling into the lake, we can fix that. We can filter it. We can make it happen. I'm sorry that people are impacted by the noise. However, our freedom is at stake here. And not only that, but our economy in this area, I have watched it over all of these years. I mean, 70s -- I don't want to tell you how old I am. But anyway, I have watched what the impact of the JRB has had on our economy and on our lives. And it is vital, absolutely vital, that we support our military, that we support all of the JRB base. It's a phenomenal base. We're the home of the F-52 -- I mean the B-52s for years

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and years and years, and when they moved them out it was a tremendous impact on our economy.

And I just I want to let you know that I really love America, and I love what we are accomplishing here in the JRB. Thank you.

HEARING OFFICER: Next is Tamiko Bailey.

MS. BAILEY: Good evening. My name is Tamiko and it's Bailey, B-a-i-l-e-y. I come before you tonight, I am a U.S. Air Force Veteran with two hazardous duty tours to Saudi Arabia. I am a naval spouse and a member of the Airpower Foundation and the Airpower Council. And I wanted to voice my support for the 301st Fighter Wing and having the F-35 program fielded at the base.

After I got out of the Air Force I actually had the opportunity to work on the F-35 program from all variants, the Marine Corps, Navy and Air Force variants. And my support for the program would be to strengthen our economy here in Fort Worth. And just as the other lady just mentioned, Ms. Irvin, that it would impact our community. And as a spouse and other workers and now a small business owner doing aircraft maintenance, you know, we look at mission readiness for the actual war fighter, and what we want to make sure, and I'm a firm believer, that having the F-35 next to

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Lockheed Martin it would increase mission capable rates and also readiness. So I would like to voice my support for the aircraft F-35s to be fielded at the NAS. Thank you.

HEARING OFFICER: Thank you.

Next is Drew M. Martin.

MR. MARTIN: Drew Martin, M-a-r-t-i-n. I'm a president of the Ridgmar Neighborhood which my house is less than one mile at the end of the south end of the runway. Member of the Real Estate Council here in Fort Worth. I was a part of the organization that helped put the overlays in for development around the base. As a father of a 5-year-old who has grown up in the house with the F-35 test program, other operations of the base have had no issues. Matter of fact, in the evenings a lot of times she requests to go to the top of the hill to the park to watch the airplanes fly. So as a neighbor of the base I support the 301st on the F-35.

As a noise standpoint, just to put in context for others who may or may not, as an architect by training, the normal conversation levels is 50 to 65 decibels. Laughter is 60 to 65 decibels. And your dishwasher in your house is 75 decibels. So from a noise perspective it's pretty mitigated. F-16 has been here for decades and the F-35 is comparable in noise.

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Therefore as a resident nearby I fully support the F-35 beddown at NAS Fort Worth JRB. Thank you.

HEARING OFFICER: Thank you.

Next is Evelyn D. Muelder.

MS. MUELDER: That's Muelder (pronouncing).

HEARING OFFICER: Spell it on the record just to make it clear.

MS. MUELDER: M-u-e-l-d-e-r. My name is Evelyn Muelder. I am president of the East Lake Worth Neighborhood Association but I'm here speaking for myself as an individual. I have talked with many members of my association about this before tonight, and most of us, despite the fact that we are in an area that probably gets a little more of the sound of freedom than most of us, nonetheless, I have been very supportive of the base over the years; and that has not changed. But we do have some concerns that we would like for you to consider.

Of course, noise is primary. And as I was reading the EIS, I came across some things that we think are significant. There will be not only the increase in individual plane noise but a 36 percent increase in sorties performed. And this will result in

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over 8,500 residents experiencing an increased level of noise. And they mention in the EIS that some 40 to 44 people could suffer hearing loss as a result of levels over 85 decibels.

And also, it mentioned that recreational facilities such as the 17 parks that surround Lake Worth would experience noise levels that would significantly affect enjoyment and appreciation of the parks' facilities.

Three more schools than we have now that are affected by noise levels would be affected by the extra noise of the F-35s, affecting a number of children. And the extra noise would also affect low income minority populations. And elderly and little people often really have less opportunity than the rest of us to go live somewhere else if the noise gets too loud. So we just wanted to phrase our comments as questions. What do we do to effectively mitigate the noise levels that are going to affect the health and education and quality of life of people who will be affected by them?

I see my time is almost up. We had a couple more concerns. One was air quality and the other was birds. We have a huge population of birds in the area. Bird trikes are always a problem around bases and

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airports. Okay. These are some hard questions, we feel like, they deserve consideration in addition to the F-35s. Thank you.

HEARING OFFICER: Thank you.

Next is Tal J. Milan.

MR. MILAN: Milan, M-i-l-a-n. It's okay, I like to Texanize it.

I'm the chairman of the Fort Worth Airpower Council. We have over 200 members and umpteen number of honorary members that are basically all in support of the F-35. I grew up in Lake Worth. The B-52s used to fly right over the school. Nobody had a problem with it. I've lived out at Eagle Mountain Lake the rest of these years and I'm literally on the highest plateau of when planes come over. I mean, you couldn't put me higher. I would love to be right there where I can high five when they come over.

These guys, you know, are our country and they are the war fighters that are going to be flying the fifth generation F-35. You know, a hundred years ago there was airfields all over the metroplex. A few years ago the City had a really neat exhibition of posters of all the airfields. So this city was based and born on planes. We've built more planes than anywhere in the world. So this city, we're very proud

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of it and Lockheed Martin is a gem. And it only makes sense, and it might not be understood perfectly by the government, but it only makes sense to have F-35s built over here, a squadron over on the other side of the runway.

So also there seems to be some misreading on the literature because the commanders have ensured us, and in the reading that we've done, there's literally the same amount of planes when the F-16s leave the F-35s, same squadron of, what, 24 planes. The sorties will be almost identical. So that 36 percent number I don't know where that came from. You need to check up on your numbers there because the literature that we've been briefed on multiple times on the base at the RCC meetings do not show that at all. It's literally one for one and so you need to learn about that.

Like I say, I grew up in this city. The city is proud of the base. The base would probably be a little bit smaller kind of town like Cowtown is known to be, but the Airpower Council is in total support of this base. The NAS JRB is, you know, the gem of the military. I mean, it literally has all the different branches of the service and we support them all. Our motto is helping the war fighters and their families.

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So we are definitely there since the 50s.

In the 20 years that I've been part of it and being a council chairman, we're adding on things all the time. We just added on a Christmas event that will be helping the kids on the base, and the City and the base get along great. So I hope that's in the records that there's no other base in America that has the support of a city like Fort Worth has for the NAS JRB.

I would like to make sure that we reiterate that you read the facts on those planes because there's not an additional amount of sorties like I'm hearing. I've been to many of their meetings and I've heard a lot of facts, so let's make sure we get that straight. So I guess I'll just leave it at that and I'll make a lot more notes in my written statement. But thank you for all being here because this is very important to our city and economic impact is huge. God bless America.

HEARING OFFICER: Thank you.

Next is Patty Rudder.

MS. RUDDER: It's Patty Rudder, R-u-d-d-e-r. I'm the secretary for the Ridgmar Neighborhood Association and we'd like to voice my support for choosing the F-35 program for NAS Fort Worth JRB.

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It gives economic impact for the west side of Fort Worth, and continuing support for Lockheed Martin. It encourages economic growth. We have 670 households in our neighborhood and we already have planes flying over our homes. The skies would be -- I'm sorry. We have additional -- the F-35s would add additional sky -- so sorry -- would add additional planes and we would be most welcome to have them fly over our homes, as it brings the sound of freedom. Thank you. Sorry.

HEARING OFFICER: No problem. Thank you.

Thank you for helping her.

Next is John Fissette.

MR. FISSETTE: It's John Fissette, F-i-s-s-e-t-t-e. How about them Cowboys? I'm just kidding. I just wanted to do that one time.

No, in all seriousness so I definitely support the F-35, and whether you support it or you don't know what it is, we would love to have it here. Maybe I can explain some of the technology, and there's a lot of professionals back there in beautiful flight suits I think can explain it better than me; but I'm going to relate it to football. Everybody in Texas understands football; right?

Imagine the Dallas Cowboys defense played

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the Philadelphia Eagles with no left or right tackle. How exposed is Carson Wentz? It's the same exposure the enemies will have with that F-35. The Dallas Cowboys could play the Philadelphia Eagles with no left or right tackle leave the quarterback completely exposed, leaving our enemy completely exposed to that stealth fighter. That's the technology we need.

I just want to thank Colonel Griffeth, Major Polston, Mr. Kamalpour, Congressman Granger's office, Rebecca Rodriguez, Congressman Veasey's office for coming out. I appreciate it.

You know, every afternoon those planes fly over my house. I live next to the speedway so I'm getting T-38s, F-18s, F-35s, 16s, C-130s and every day I grab my son who's four months old and we chase those planes from the front to the backyard, just kind of trying to identify which ones they are. We support the F-35. It is a matter of national security. We can train on the east coast, the west coast and what better place to train than right here in Fort Worth. Thank you.

HEARING OFFICER: Thank you.

Next is Thomas T. Dellinger.

MR. DELLINGER: My name is Thomas Dellinger, D-e-l-l-i-n-g-e-r. I live over here in the

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Overture Ridgmar community. I have seniors who live there. There's about 140 of us, comes and goes as the numbers go up and down. Most of us support the aircraft that we have and the F-35s. There is additional noise; we note that. I talked with many of them. I'm an Air Force retiree. I actually have been to many of the bases that were there when I served with the Reserves for a period of time. So I know what these are. I know what they do; how important the mission is. And like I said, we have a lot of military that live over there and they for the most part support it.

The biggest concern can be noise, and that's what I keep hearing. All the aircraft bring it. It depends on when they use the burners, the afterburners, at what point in time do they make their turn, their bank, and are those engines aimed at the buildings, and are they adding any thrust at that time to maintain their turn.

The other biggest part that tends to happen at later hours but not during the environmental night window that they talk about, greater than 10:00 p.m., although it sometimes occurs, and that is the engine test or the run-ups that they do out there at the base. We understand when there's a four-ship taken off at 8 o'clock for their dark period time when they're

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going to get their flying in and be back before 10:00. That they all understand. We all put our U-verse on pause and wait it out and we stop talking for a moment on the phone. Most of the folks over there support that. What they don't seem to like is those engine run-ups that just keep on going and going and going sometimes go to 10:30, 10:45. And that's pretty much it.

I definitely support the mission and support the base. A lot of our folks over there enjoy coming and using the facilities as retirees, as widows or widowers of military members who served. Thank you, all.

HEARING OFFICER: Thank you.

Next is Larry Patterson.

MR. PATTERSON: Hi. Yeah, Larry Patterson, P-a-t-t-e-r-s-o-n, President of Ridgmar Neighborhood Association. Been there since '73. I can see the end of the runway from my backyard. I was in the 301st for 32 years.

How many of you remember what happened when the base closed and the 301st was the only thing there and the economy on the west side of Forth Worth went this way? They rebuilt the JRB up. My friend General Bill Lawson back here was our commander and when

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we transitioned from the F-4 to the F-16, being right across the runway from Lockheed was a great help. I was in charge of the aircraft maintenance for all those years, and we would often get foreign nationals that were at Lockheed come over and go through our shops, see how we maintained the F-16. And I'm sure the same thing will happen with the F-35.

So this is obviously the only place that this should come because we're so close to the factory; we're already flying. We've got the guys who can do this transition and make this happen; I guarantee that. And of the 670 homes in Ridgmar, which is right next to the east side of the base, we totally support. So let's do it.

HEARING OFFICER: Thank you.

We'll now hear from Zim Zimmerman.

MR. ZIMMERMAN: My name is Zim Zimmerman, Z-i-m-m-e-r-m-a-n. I've been a native of Fort Worth since 1964. I graduated and came up here and went to work for General Dynamics. I have gone through F-11s, F-16s, and I also spent eight years on the Fort Worth City Council, along with Dennis, working to protect this base from the environment issues that come with encroachment. I was also an assistant during the BRAC days when they shut this base down.

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Although it likely would not happen, if the F-35 does not stay here or come here, this is one of the few joint reserve bases and it could be very susceptible to shutdown. If it shuts down that puts Lockheed Martin in kind of an interesting situation because the only way we were only to operate without changing our prices was the 301st stay here as a caretaker and kept the runways open and the tower operating.

You heard a lot about the impact economically. You know, noise is one of those things that you just can't live without having with an airplane. And as somebody pointed out, rightly so, an F-18 makes the same kind of noise that an F-35 does. I would suggest to you that we as a community and a city need to protect both the F-35 and the Joint Reserve Base and Lockheed Martin. They are a strong economic engine that makes this city great.

While I was on the council I used to say "We call ourselves Cowtown but we wouldn't be Cowtown or any kind of town without our military and the bases and Bell and Lockheed." So let's keep that military heritage. Thank you.

HEARING OFFICER: As I mentioned, the hearing is scheduled to end at 8:00 p.m. We've heard

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from everyone who signed up and gave us a card to speak and we still have some time left. So please raise your hand if you have not spoken but would like to speak and we'll get you a card.

UNIDENTIFIED MALE SPEAKER: I would like to come again please.

HEARING OFFICER: Give me just a moment.

Anybody who has not spoken who would like to speak? And then after that if anybody would like to speak again please raise your hand and we'll do that.

Sir, do you need a card?

UNIDENTIFIED MALE SPEAKER: I've already spoke.

HEARING OFFICER: Okay. Ma'am, go ahead and come up. We will now hear from Shari Mills.

MS. MILLS: Mills, M-i-l-l-s. I just wanted to say something. I am a retired teacher and I taught in the Lake Worth Independent School District, and it's true, the noise would come over and none of the kids even responded. They were used to it. I had to be quiet for a little bit. They were glad I was quiet for a little bit. The impact was so minimal that I don't even want to hear about school kids, and that's only during the day. They're not there at night anyway. So that's just what I wanted to say, that I lived through

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it, the kids lived through it and it was the sound of freedom.

HEARING OFFICER: I think we have a few individuals who want to speak again.

Please state your name and spell it for the record again.

MR. SHINGLETON: I will do so. Dennis Shingleton, City Council Fort Worth and thank you for the opportunity to kind of amend or augment my comments earlier. I have two items that I want to bring to your attention please.

First is on -- I may have a tough time reading this ES -- page ES-7 on the EIS-1, Summary of Alternatives Baseline/Proposed. And I want you to readdress or please take a look at. It says, "Baseline Annual Air Base Sorties," and it has for the Fort Worth 77,445. And then on the Proposed Annual Airspace sorties at 78,362, which is inconsistent with the three other bases in the similar number of aircraft, 24 aircraft down the line. Why is ours -- and it's got to be 80 percent higher. So if you take a look at those numbers we'd appreciate it. We just can't figure out and I have a crew of a bunch of people back there that are far more expert than I trying to sort that out. We cannot.

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The second thing I wanted to bring your attention to is the North Texas Central Council of Governments took a look at the emissions and the emissions found under the three -- let me back up just a second. I'm going to read which I'm -- "Proposed F-35 aircraft would primarily replace existing emissions from the F-16 operations, maintenance and testing. The EIS found that under any of the three afterburner scenarios, the replacements of F-16s with F-35s would reduce volatile organic compounds and decrease nitrogen oxides. Both of these pollutants help create the ozone. But during the public scoping period the North Texas Central Council of Governments submitted a comment stating that it is prepared to offset any increase in emissions caused by the replacing aircraft. Furthermore, the replacement F-35s would not meet the threshold requiring a general informatory determination. Based on the review of the EIS, we do not see any impacts that would give us concern or would be inconsistent with our ongoing planning assumptions."

Thank you very much for your time again and we appreciate your attendance this evening. Thank you.

MR. MILAN: Milan, M-i-l-a-n. I wanted to make a couple more comments. Lockheed has been

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making over now 500 planes have come off the runway and have been sold; so we're looking at 14 years of those. Someone was confused as Lockheed makes the planes so that's the noise you're hearing at night, the test engines, but that's been going on for over 14 years.

And I had a business at the end of the runway when they first were building those first two planes and I can tell you that we'd step out on the back just to watch. I mean thousands of cars along the highways would stop to watch the testing of the F-35. This city was so proud to have the F-35 being built at Lockheed Martin. And I always remember just seeing all of the cars over the hill in Lake Worth and looking out the back of our building watching those first test flights because there would be other planes flying with them, and that was a neat memory I had. But the fact is we've already built 500 of those beautiful fifth-generation planes and some of the testing is happening over at Lockheed Martin for those that think the base is testing those. Thank you.

MR. POTTINGER: Kevin Pottinger, P-o-t-t-i-n-g-e-r. I spoke on behalf of Governor Abbott the first time around. This is now Kevin Pottinger, a 25-year citizen of the Fort Worth area and former commander of the 301st Fighter Wing.

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Well, first of all, I'm going to say, and it's been touched on, the economic impact to the metroplex or to the Texas economy is about $3.95 billion. If we get this F-35 that's going to give us about 30 more years or another generation of at least that much money, and that does a lot for the economy here in Texas.

One of the really major point that I want to make, when I was a commander of the 301st Fighter Wing -- and by the way, every commander, every fighter commander or every aircraft wing commander that I talk to when I told them that I was the commander of the 301st Fighter Wing based in Fort Worth they all wanted to be me. And the reason why is because they knew we had the Dallas/Fort Worth Metroplex to draw talent from. This aircraft, the F-35, will be a national security asset. It is the most advanced fighter in the entire world. The type of people that are going to fly this airplane and the type of people that are going to work on this airplane, we need to have a big pool of people to draw from, and that's what we get right here in the metroplex.

So again, I'm just advocating as a citizen, 25-year citizen of Fort Worth and let's get that F-35 here. Thank you.

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HEARING OFFICER: Thank you, sir.
Anyone else that have spoken that would like to speak again?
Okay. We have no remaining speakers. As I mentioned earlier, Air Force representatives will continue to be available at the display boards to continue discussions and maybe answer some of your questions for you. However, the discussions that take place at the boards will not be part of the official record of this EIS. So once again I would like to stress that the verbal and written comments we see equal weight. So you can send it -- if you have a comment that you want to make, please send it to https://protect-us.mimecast.com/s/FKsfCL9Dv8fXQrvUBNnY1?domain=afrc-f35a-beddown.com or to the places in which were on the board.

In addition, the Air Force will consider your comments no matter when you send them to the extent possible. However, the Air Force must consider all comments received before the close of the public comment period, which is March 31, 2020.

We will now be in recess. I thank you for your time and interest tonight. Remember, it's not the end of your opportunity to participate in the environmental review process. Again written comments, as I said before, written comment sheets are available

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at the registration table. You can turn these sheets in tonight or mail them later.

If you would like your own copy of the Final EIS, please let one of the representatives at the registration table know or send a letter or postcard asking for your own copy. The Air Force will send copies of the Final EIS to you.

You are now in recess until 8 o'clock.

(Recess taken.)

(At 8:00 p.m. Colonel Griffeth called the Public Hearing back to order and asked if there was any others that would like to provide verbal comments. Nobody offered to provide any additional comments and Colonel Griffeth formally adjourned the Public Hearing at 8:00 p.m.)

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STATE OF TEXAS)
COUNTY OF TARRANT)

I, Cheryl A. Dixon, RPR, CRR, Notary Public in and for the State of Texas, certify that the foregoing proceedings were reported stenographically by me at the time and place indicated, to the best of my ability.

Given under my hand on this the 8th day of April, 2020.

____

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A.5.4 WHITEMAN AIR FORCE BASE PUBLIC HEARING TRANSCRIPT

(Transcript contained on the following pages.)

AIR FORCE RESERVE COMMAND
F-35A OPERATIONAL BEDDOWN PUBLIC HEARING

DATE: March 12, 2020

LOCATION: Knob Noster High School Gymnasium
504 South Washington Avenue
Knob Noster, Missouri 65336

SPEAKERS: Colonel Tobin C. Griffeth, Hearing Officer
Lieutenant Colonel Ed Davies,
Air Force Reserve Command
Mr. Hamid Kamalpour, EIS Project Manager

PUBLIC COMMENTS: Mr. Cullen L. Davidson
Ms. Susan Burch
Mr. Adam C. Morton
Mr. Jerrod Wheeler

STENOGRAPHER: Lori D. Mothersbaugh, CCR #0423

COLONEL TOBIN C. GRIFFETH: I'd like to ask everybody, the attendees, to please take your seats and silence your cellphones.

If you would, please be seated.

I'd like to remind everybody that if there's time left, and if there's still time permitting, Air Force representatives will remain afterwards, after the formal hearing, for further discussion of the proposal, for those that want to speak to them.

The time is now 5:30, and we'll start the hearing.

I'd like to thank you for attending this public hearing for the Draft Environmental Impact Statement, or Draft EIS, for the proposed Air Force Reserve Command F-35A Operational Beddown, herein after referred to as the "Proposed Mission."

I'm Colonel Tobin C. Griffeth. I'm your hearing officer here tonight. I'm the Air Force Judge and will be acting as the moderator tonight. As moderator, my role is to ensure that the Air Force provides a fair, orderly, and impartial hearing where you have an opportunity to make comments on the proposal.

Let me make it clear, I do not work for anyone at the Air Force Reserve Command, the Air Force Civil Engineer Center, the Air Combat Command, or any of the Bases that are under consideration for the Proposed Action. I am not involved in any way with the development of this Draft EIS, and I do not act as a legal advisor to the Air Force representatives working on this proposal.

The hearing is held in accordance with the provisions of the National Environmental Policy Act, or what you'll here on a regular basis called NEPA, as implemented by the council on the Environmental Quality Regulations and the Air Force. We are here tonight to present information on the environmental impacts of the proposed beddown and to receive your comments on the Draft EIS.

Tonight's hearing is one of several opportunities for public comments. This hearing is an opportunity for you to express your views and concerns and to tell us about the adequacy of the environmental analysis contained in the Draft EIS as well as any issues related to the NEPA process. This hearing is not a debate or

vote on the Draft EIS, and it is not a question and answer session. We welcome your input on the environmental analysis presented in the Draft EIS. Comments about other unrelated issues can certainly be made, but they will not assist in the decision-making process for the Draft EIS.

I'd like to begin this hearing by introducing the NEPA team. Beginning with the team leader, Lieutenant Colonel Ed Davies, with the Air Force Reserve Command, who will present details of the Proposed Action and alternatives. Next is Mr. Hamid Kamalpour, the EIS project manager at the Air Force NEPA Division. He will discuss the results of the NEPA process.

Representatives from Whiteman Air Force Base, led by the 442nd Fighter Wing Commander, Colonel Michael Schultz, is also here, and although not part of the analysis team, they provide a detailed Base information which is critical to a thorough analysis of the impacts in this Draft EIS.

Lastly, representatives from Leidos are here supporting the Air Force as the contractor. Transcribing tonight's hearing is Lori D.

Mothersbaugh. I would like to also recognize all the federal, private, state, and local representatives that may be here tonight.

Lieutenant Colonel Davies will first present information on the Proposed Action and the alternatives. Then Mr. Kamalpour will provide an overview of the NEPA process and will summarize the potential environmental consequences of the proposal. After their presentations, which should take about 20 minutes, we will begin our verbal comment period, during which you can provide input on the Proposed Action, Draft EIS analysis, and the potential environmental impacts. Your comments will become part of the official record of the Final EIS.

Please note that informal discussions at our informal displays will not become part of the record. So if you have items of concern about the analysis in the Draft EIS that you would like to bring to our attention, please do so during our formal comment opportunity or in writing. Verbal and written comments are equally considered.

If you do not choose to make a verbal

comment, you can submit your comments either by turning in a comment form this evening or by mailing it to the address as shown on the screen. Comments may also be submitted online at www.afrc-f35a-beddown.com. I'll say that again. Www.afrc-f35a-beddown.com.

If you have not had a chance to review the Draft EIS, it is available on the website or at one of the public libraries listed here. The Air Force welcomes public comments in writing at any time during the Environmental Impact Analysis process. To receive timely consideration for the Final EIS, please submit your comments by March 31st of 2020.

Your comments will provide the decision-maker, which is the Secretary of the Air Force, with information to assist in making a decision regarding where the Mission will be located. Your comments during this process provide the benefit of your knowledge of the local area and your concerns about the environmental impacts or analysis.

We will now move into the briefing. During the briefing, our speakers will be reading from prepared scripts. The briefing is written to

make sure that each speaker covers all the pertinent information and that it is consistent for all four of our hearings.

With that, I will turn the microphone over to Lieutenant Colonel Davies from the Air Force Reserve Command.

LIEUTENANT COLONEL ED DAVIES: Good evening, and welcome. I'm Lieutenant Colonel Ed Davies, representing Air Force Reserve Command where I am with the fighter and bomber program. As a team leader, I encourage you to assist the Air Force in meeting its requirements to comply with the NEPA process. Your attendance tonight indicates your interest in this Proposed Action, and I hope your comments will provide us with additional information or areas where further analysis is needed. All comments will be properly reviewed and analyzed. Substantive comments will be addressed in the Final EIS.

The purpose of the Proposed Action involves F-35A's role in the Air Force Fighter Modernization Effort. The goal of this effort is to ensure future fighter aircraft are the best available to support a high threat, multi-role war fighting capability to commanders

worldwide. To perform this Mission, trained pilots, maintenance, and support personnel must be available to meet F-35A inventory delivery dates as older aircraft are retired or reassigned.

The F-35A provides several fighter modernization advantages, including: Efficiently and effectively maintain combat capability and mission readiness as the U.S. Air Force faces deployments across a spectrum of conflicts; provide for homeland defense; and provide the U.S. Air Force with the most advanced fighter aircraft in the world at an additional strategic location in the Continental United States.

The Air Force is proposing to establish the AFRC Operational Beddown for F-35A aircraft, along with the required infrastructure and manpower at one Air Force installation in the Continental United States where the Air Force Reserve Command leads a Global Precision Attack Mission.

The Mission utilized pilots and support staff who operate and maintain the aircraft to support the Joint Strike Fighter Program.

Implementation of the Mission would require a variety of on-base development projects, including demolition, new construction, and renovation.

At each Base, F-35A flight activities would occur in existing airspace. Within each training airspace unit, AFRC F-35A pilots would operate in the same airspace utilized by A-10 or F-16 pilots, but at higher altitudes. The Air Force analyzed three different afterburner scenarios at each Base.

The No-Action Alternative is required by the National Environmental Policy Act and was evaluated at each proposed beddown location to provide a baseline for the decision-maker. The No-Action Alternative evaluates the environmental consequences of not basing the F-35A aircraft at any Base.

In the Draft EIS, the Air Force analyzed the environmental consequences of the beddown of F-35A aircraft and replacement of existing fighter or ground-attack aircraft at one of the following alternative Bases: Davis-Monthan Air Force Base in Arizona; Homestead Air Reserve Base in Florida; Naval Air Station in Fort Worth

Joint Reserve Base in Texas; or Whiteman Air Force Base in Missouri.

In January of 2017, the Secretary of the Air Force announced Naval Air Station Fort Worth Joint Reserve Base as the preferred alternative for this Mission. Davis-Monthan Air Force Base, Homestead Air Reserve Base, and Whiteman Air Force Base were announced as reasonable alternatives for the Mission.

This table summarizes the Bases being considered and how the existing missions could be impacted. The following slides summarize the aircraft facilities and manpower changes anticipated to be required to support the Mission.

Davis-Monthan Air Force Base has been identified as a reasonable alternative for the Mission. If Davis-Monthan is selected to host the Mission, the existing 24 A-10 aircraft operated by the 924 Fighter Group would be replaced by 24 F-35A aircraft with two additional back-up aircraft inventory.

Implementation of the Mission would require a variety of on-Base development projects, including demolition, new construction, and

renovation. This Mission would decrease the area population by approximately 30 full-time Mission personnel and would result in a 0.7 percent increase in annual aircraft operations at the installation and a 5 percent increase of total sorties within the airspace.

Homestead Air Reserve Base has been identified as a reasonable alternative for the Mission. If Homestead is selected to host the Mission, the existing 24 F-16 aircraft would be replaced by 24 F-35A aircraft, plus two back-up aircraft inventory.

Implementation of the Mission would require a variety of on-Base development projects, including demolition, new construction, and renovation. This Mission would decrease the area population by approximately 91 full-time Mission personnel and would result in a 3 percent increase in annual aircraft operations at the installation and a 0.2 percent decrease of total sorties within the airspace.

Naval Air Station Fort Worth Joint Reserve Base has been identified as the preferred alternative for this Mission. If Fort Worth is selected to host the Mission, the existing 24

F-16 aircraft would be replaced by 24 F-35A aircraft, plus two back-up aircraft inventory.

Implementation of the Mission would require a variety of on-Base development projects, including demolition, new construction, and renovation. This Mission would decrease the area population by approximately 102 full-time Mission personnel and would result in an approximate 12.1 percent increase in annual aircraft operations at the installation and a 1.2 percent increase of total sorties within the airspace.

Whiteman Air Force Base has been identified as a reasonable alternative for the Mission. If Whiteman is selected to host the Mission, the existing 24 A-10 aircraft would be replaced by 24 F-35A aircraft, plus two back-up aircraft inventory.

Implementation of the Mission would require a variety of on-Base development projects, including demolition, new construction, and renovation. This Mission would increase the area population by approximately 11 additional full-time Mission personnel and would result in an approximate 17.4 percent increase in annual aircraft operations at the installation and a 5.9 percent decrease of total sorties within the airspace.

We would like to emphasize that although the preferred alternative for the Mission has been announced, no final decision has been made on basing the Mission currently under analysis in the Draft EIS. We look forward to inputs provided from the public and the affected communities as we proceed through the Environmental Impact Analysis. Once the requirements of the Environmental Impact Analysis process are complete, the Air Force will make its final Basing decision.

Thank you for your attention. I will now turn the presentation over to Mr. Hamid Kamalpour, the Air Force Project Manager for the EIS, to discuss the NEPA process and provide greater detail on the potential impacts as described in the Draft EIS.

MR. HAMID KAMALPOUR: Good evening. I'm Hamid Kamalpour, the Air Force NEPA Division Project Manager for the analysis of the Proposed Action. I am here tonight to discuss the results of the Environmental Impact Analysis for

the proposal presented by Lieutenant Colonel Ed Davies.

The Draft EIS has been prepared in accordance with the requirements of National Environmental Policy Act laws, which requires federal agencies to analyze the potential environmental consequences of a Proposed Action, and reasonable alternatives, including a no-action alternative. Before any action is taken, the goal of conducting an EIS is to support sound decisions through the assessment of potential environmental consequences as well as involving the public in the process.

The results of this analysis and other relevant factors will be considered before a decision is made by the Air Force on the proposal. Your input during the past public scoping period and this public comment period will help the Secretary of the Air Force make the most informed decision possible on this proposal.

As you can see on this slide, there are several key steps to the Environmental Impact Analysis process. We are currently at the public and agency Draft EIS review stage. This

period began with the Federal Register Publication of the Notice of Availability for the Draft EIS. At that time, copies of the Draft EIS were mailed to local libraries, state, and federal representatives, and individuals who requested copies during the EIS scoping period.

The normal review period required by NEPA is 45 days. The Draft EIS public comment period will end on the 31st March, 2020. The public hearings are being held in the same communities as the previous scoping meetings in order to provide the potentially-affected communities with the opportunity to comment on the Draft EIS.

All substantive comments received prior to the close of the public comment period will be considered during preparation of the Final EIS. The Air Force responds to substantive comments on the Draft EIS comments in the Final EIS.

The Final EIS is scheduled to be released in the summer of 2020. After the Final EIS Notice of Availability is published in the Federal Register, the Air Force must observe a waiting period of at least 30 days before signing the final Record of Decision (ROD) to

document which alternative the Air Force selects for the implementation of the AFRC F-35A Mission.

The Draft EIS presents information on the potential environmental consequences associated with implementing the Proposed Mission at each of the four Bases. The potential environmental consequences are grouped into the five categories shown on this slide, and the subcategories represent the 12 resource areas evaluated at each Base.

The next set of slides describes some of the potential environmental consequences at each of the four Bases. For the purpose of this presentation, the potential environmental consequences at each Base have been summarized in broad terms. For a more detailed evaluation of the potential consequences, please refer to Chapter 4 of the Draft EIS.

Implementation of the Proposed Mission at Davis-Monthan Air Force Base would result in significant noise impacts from aircraft noise near Davis-Monthan Air Force Base. Approximately 1 percent of the Air Force Reserve Command F-35A flights would occur during environmental night. An additional 79 to 91 residential acres and an estimated 1,361 to 1,506 people would be exposed to day/night average sound levels of 65 decibels or greater. Significant impacts to socioeconomic resources would also result from noise impacts to schools. Implementation of the Proposed Mission would also result in disproportionate impacts to minority and low-income populations. No other resource areas would be significantly impacted by the implementation of the Proposed Mission.

Implementation of the Proposed Mission at Homestead Air Reserve Base would result in adverse but not significant noise impacts. An additional 6 to 10 residential acres and an estimated 62 to 104 people would be exposed to day/night average sound levels of 65 decibels or greater. Approximately 2 percent of the AFRC F-35A flights would occur during environmental night. Implementation of the Proposed Mission would also result in disproportionate impacts to minority and low-income populations. No other resource areas would be significantly impacted by implementation of the Proposed Mission.

Implementation of the Proposed Mission at

Naval Air Station Fort Worth Joint Reserve Base would result in significant noise impacts. An additional 640 to 643 residential acres and an estimated 8,593 to 8,648 people would be exposed to day/night average sound levels of 65 decibels or greater. Less than 1 percent of the AFRC F-35A flights would occur during environmental night. Implementation of the Proposed Mission would also result in disproportionate impacts to minority and low-income populations. No other resource areas would be significantly impacted by the implementation of the Proposed Mission.

Implementation of the Proposed Mission at Whiteman Air Force Base would result in significant noise impacts. An additional 307 to 405 residential acres and an estimated 2,072 to 2,804 people would be exposed to day/night average sound levels of 65 decibels or greater. Approximately 4 percent of the AFRC F-35A flights would occur during environmental night. Implementation of the Proposed Mission would not result in disproportionate impacts to low-income population. Disproportionate impacts to minority populations would result from implementation of the new Mission. No other

resource areas would be significantly impacted by implementation of the Proposed Mission.

That concludes the environmental consequences portion of our briefing. I will now turn the microphone over to our hearing officer.

COLONEL TOBIN C. GRIFFETH: We will now move into the verbal comment part of the hearing for those who wish to speak here tonight. Here's the format we're going to follow: If you wish to speak, you will fill out a blank speaker card. If you did not already get one of these and want to speak, please raise your hand, and one of the staff will give you a form. What I'll do is these comments will be -- you'll come up in the order in which they're received, and we'll explain that. While they're collecting your cards, we'll take a 10-minute break.

We will now go into a 10-minute recess in order for us to collect the forms and prepare for public comments.

This hearing is now in recess.

(Short recess.)

COLONEL TOBIN C. GRIFFETH: If everybody will please take their seats again.

Okay. The hearing is called back to order. When I call your name, you may approach the microphone right here. To help our stenographer, please begin by stating your name and the name of your organization, if any, you represent. It will also help if you spell your last name. Please do not provide any other personal information such as your home address or phone number.

Again, your comments are recorded verbatim. It will be used to develop a transcript and a permanent record of this hearing, and it will be published in the Final EIS. Your name will be included along with your comment. Any personal, home addresses, and phone numbers will not be published in the Final EIS.

Each speaker will have three minutes to provide his or her verbal comments on the Proposed Action and its alternatives. We have a timekeeper to help us keep track of the time. This person will hold up the yellow card when you have about 30 seconds left and a red card when the time is up. At that time please conclude your comments so that I can call on the next person. Of course, there's no obligation to take up the entire three minutes.

You do not need to yield any remaining time to someone else. I will just move on to the next speaker when you've finished. Also, in the interest of time, we ask that you submit any individual electronic presentations as written comments.

Tonight's hearing is set to end at 8 p.m. If more people are signed up to speak than would be allowed by the time the hearing closes at 8 p.m., the time to speak will be shortened to two minutes per speaker. Speakers will be called up to speak in the following order -- but I believe it will just be in the order received. But speakers will be called up to speak in the following order: Elected officials will go first in the order of federal, tribal, state, and then local, followed by members of the general public in the order the speaker forms were received.

At 8 p.m., or once all the registered speakers have had the opportunity to speak and no other individuals desire to speak, I will adjourn following the verbal comment portion of the hearing. If everyone who signed up to speak

has had a chance to speak before that time, I will ask if any speaker would like to have another three minutes to expand on your comments. If you want to do that, just let me know, and we'll restart the clock.

If you want to add something later to your verbal comments or if you'd rather not speak at all tonight, you can submit written comments. The Air Force gives equal weight to verbal and written comments, though it will become part of the official record and are included in the Final EIS.

Just a few reminders before we get started. First, please limit your comments to the analysis in the Draft EIS. That is the purpose of this public comment period. As I mentioned earlier, this is not a question and answer session. It's an opportunity for you to put on the record your views and concerns about the proposal that you want the decision-makers to consider. Questions that you pose during your verbal testimony will become part of the record and will be considered.

After we've completed the formal part of this hearing, Air Force representatives will

continue to be available for discussion.

I have been provided a list of individuals who would like to speak. The first name that I have is Cullen L. Davidson.

MR. CULLEN L. DAVIDSON: I'm Cullen Davidson, and I've lived around here for a few years. I was looking -- I made some comments about the areas. You know, this is a rural area, as you all know, out here in the country. We do have a town here that the airplanes fly over a lot, but those other areas are all densely populated and so forth. And one of the comments I had, I was looking at the study they did about the decibels of sound around the field. The one they did for Whiteman, they must have done on a night sunny day when the wind was coming out of the south, because all the turnouts that I see on there was -- unless I'm mistaken, was to the south and then some turnouts left and right. To the north it just showed one -- the high decibel was just one strip coming down, like right down the center line of the runway and then way the heck in the cornfields north of Highway 50. That ain't the way they fly around here.

And most of the meetings like this I've been to, there's three or four guys in the audience that are screaming and hollering and cussing about those damn airplanes that fly over their house all the time. Personally, I don't mind it. Sound of freedom. Hey, jets make noise. That's the way it goes.

There is a slight danger involved in that, though, and I know a lot about it. I did Air Force for 34 years. Sometimes the crew chief leaves a tool up in the wheel well of an airplane, and when you're fighting with those gears, sometimes the air -- if there's something there, it will depart. I'd hate to see it coming down in the middle of our town here or schoolyard or whatever.

And -- and I don't know how close you all have looked at it, but a lot of these airplanes, even the B-2's, they're turning to the south of the school even or over the school or over the middle of town and stuff. Shouldn't do that, but that's the way they do it, maybe to conserve fuel or get there quicker or something like that.

But I'd like to see the airplanes come

here. I think we can use the people and the economy and the whole thing. That's the way I feel about it. And again, sound of freedom. Bring them on. Just when you're cycling here, don't blow over my house.

Any questions for me? I just wanted to make a few comments on that issue. Thank you. Thanks a lot for your time.

COLONEL TOBIN C. GRIFFETH: Next is Susan Burch.

MS. SUSAN BURCH: Susan Burch, B-u-r-c-h, landowner. I have a question, No. 1, your air quality results. I know that as recent as March 10th, this week, when we went out between 1 and 3 in the afternoon, we could smell the jet fuel in our yard. There are rainy days when I go out to work in the garden early in the morning, and the jet fuel smell is so pronounced that it actually stings my eyes and my nose and I have to go back in my house.

Occasionally I can smell it in my house; it just depends on how the HVAC system is working. So I don't think that your air quality reports that you did reflect the actual conditions that are in town. The school is northeast of me

about a half a mile. I would think, with the prevailing southwest winds, a lot of whatever is in the air, particulates and the benzene, which we know have adverse health effects, are traveling toward that way.

So I would ask that maybe your environmental study actually looked -- they should have a record of the few times that I have called the Base, the public relations, to complain about that, and see what the air -- atmospheric conditions were that might have affected that or procedures out at the Air Force Base.

Secondly, the sound. The sound at 65 decibels on an average operating day would not also be a good sound -- or a good modeling, whatever you called it was. It was not accurate. There are many times when the -- the dishes rattle, the windows rattle. We have to turn the TV up to, you know, over 50, which is the highest volume that it will go, and you still cannot hear it or each other.

We have visited with people in our yard when planes are flying, and we simply have to stop talking. We know, living by an Air Force

Base, sound is a part of that, but I do not think that your modeling reflects accurately the decibels that are here in this community. And we only live less than a half mile from the high school. So I think that they -- probably a lot more than 65 decibels on a regular operating day.

Third thing would be, I would like to know if this proposed F-35 addition to the Whiteman Air Force Base, if it happened, would it require any land expansion by the Air Force Base. I question this, because in August 11, 2014, 420 of my acres was procured by Whiteman Air Force Base through eminent domain, meaning they forced landowners to give them that much acreage.

In addition, the Air Force bought, oh, another 6,000 acres in 2013 of landowners who were willing to give up their land for them for their offered price. So I would question that and give us -- because that would have socioeconomic impacts on the landowners and also the environmental impacts if that land is taken over by the Air Force Base versus under the stewardship of private landowners.

COLONEL TOBIN C. GRIFFETH: Thank you.

Next is Adam C. Morton.

MR. ADAM C. MORTON: Good evening. I'm Adam C. Morton, Mayor of Knob Noster. Morton is M-o-r-t-o-n. I'll keep my comments very brief, but just on behalf of the City, the Board of Alderman, and all the departments of the City, I am very ecstatic about the opportunity that Knob Noster and Whiteman Air Force Base has for potentially taking on this Mission.

As we all know, the A-10 aircraft is aging very quickly, and I'm very concerned that should the A-10 aircraft age and be discontinued, that our Air Force Base would be negatively impacted in that we would have a lot less operation happening, which would have a devastating impact on our community, on our schools, et cetera.

And so just from that angle, I find it very imperative that we come together as a community to advocate for this Mission just for the longevity of the Air Force Base and its very positive impact on our community and our area at large.

And, you know, like the gentleman said regarding the sound, I mean, I know that at times it can be hard to have conversations with our neighbors or, you know, even -- I'm a school teacher by day in the classroom. Sometimes we have to pause and just really take a -- take that sound in and just kind of cherish it, because it is a sound that -- that's just part of our way of life here in Knob Noster.

And I don't know anybody that moves to town who -- who doesn't know about that. It's just part of that way of life and something I think that the majority certainly would cherish. I know as mayor of the town, that the sound of freedom is very much a part of what makes us go, and so I'm very ecstatic to advocate for taking on this Mission, and thank you for your time.

COLONEL TOBIN C. GRIFFETH: Next is Jerrod Wheeler.

MR. JERROD WHEELER: Good evening. Jerrod Wheeler, Superintendent of Knob Noster Public Schools, J-e-r-r-o-d Wheeler. Also an officer at Whiteman Area Leadership Council and a member of the Whiteman Base Community Council. And I just wanted to talk a little bit about the human element involved in the environmental impact.

We recently had been made aware that the Air Force is looking very closely at the quality

of the school districts that serve installations, and, in fact, has listed that as one of their key criteria in future Base decisions. So I wanted to speak a little bit about what's going on in Knob Noster Public Schools.

We are founded on academic excellence, but before that, we focus on quality, character, citizenship, and patriotism as our fundamental outcomes that we seek in our students. It's our top priority, and we're very pleased at our progress in those areas.

Regarding to academics, Knob Noster High School is listed as Missouri's No. 1 Rural High School for 2019. That's something that we're very proud of. We also have a very robust robotics program. We're implementing computer science cyber security. Our JROTC program had the No. 1 and No. 2 cyber security teams in the state this year, and we're looking to expand those, all of which will develop the work force that will support the Mission and Mission needs for the future.

So we're very excited about what we can offer in terms of quality of life from an

educational standpoint and feel that we are emerging in Knob Noster Public Schools as a nationwide leader in terms of how best to support our military family students.

In Knob Noster School we are 70 percent military connected in terms of our student population, so that makes us one of about 24 heavily-military-impacted school districts in the country, so we are out in front and leading that charge. Two of the last three years Knob Noster Public Schools has been recognized by Military Job Education Coalition with the National Partnership of Excellence Award to exemplify the partnership that exists between our school district and Whiteman Air Force Base.

From a Whiteman Area Leadership perspective, we have great affordability, we have adequate housing, we're focusing on strengthening child care, and we will be implementing additional preschool options in our school in the near future.

And we're excited -- to follow up on Mayor Morton, we're excited about what we can offer here in terms of quality of life for our airmen should this Mission be placed here.

Last, but not least, the flight path comes right over my house over on the north side. We hear the noise, we feel the bombers going over, and it gives us a great opportunity in my household to say a quick "God Bless You" to our airmen that are carrying out the business of our country. So we are equally welcome to any Mission should you guys choose.

Thank you for your time.

COLONEL TOBIN C. GRIFFETH: Thank you. As I mentioned, the hearing is expected to end at 8 p.m. We've heard from everyone who signed up to speak. We still have time left. Please raise your hand if you have not spoken but would like to speak, and we'll get you a card.

(No response.)

COLONEL TOBIN C. GRIFFETH: Is there anyone who has already spoken who would like another 3 minutes?

(No response.)

COLONEL TOBIN C. GRIFFETH: Thank you. We have no remaining speakers. And as I mentioned earlier, the Air Force representative team will be available by the display board to continue discussion if you should wish to speak to them.

However, discussions placed at the boards will not be part of the official record of this EIS.

Again, I want to reiterate, verbal and written comments receive equal weight. In addition, the Air Force will consider your comments, no matter when you send them, to the extent possible. However, the Air Force must consider all comments received before the close of the public comment period, which is March 31st, 2020.

I thank you for your time and your interest tonight. Tonight is not the end of your opportunity to participate in the environmental review process. Once again, written comment sheets are available at the registration table. You can turn these sheets in tonight or mail them later.

If you would like your own copy of the Final EIS, please let one of the representatives at the registration table know or send a letter or postcard asking for your own copy. The Air Force will send copies of the Final EIS to you.

This hearing is in recess until 8:00. There will be no further speakers. We're in recess until 8:00.

(Off the record.)

COLONEL TOBIN C. GRIFFETH: This hearing is back in order. Thank you for coming out tonight. There being no more speakers, this hearing is hereby adjourned.

(Hearing adjourned.)

* * * * *

C E R T I F I C A T E

I, Lori D. Mothersbaugh, a Certified Court Reporter, CCR No. 0423, the officer before whom the foregoing hearing was taken, do hereby certify that the witness testimony which appears in the foregoing transcript was taken by me to the best of my ability and thereafter reduced to typewriting under my direction; that I am neither counsel for, related to, nor employed by any of the parties to the action in which this hearing was taken, and further, that I am not a relative or employee of any of the parties thereto, nor financially or otherwise interested in the outcome of the action.

Lori D. Mothersbaugh, CCR No. 0423

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APPENDIX B

NOISE MODELING, METHODOLOGY, AND EFFECTS

This appendix is contained on the CD-ROM on the back cover of this document.

APPENDIX B NOISE MODELING, METHODOLOGY, AND EFFECTS

Sound and noise potential effects on the human and natural environment are described in this appendix. This appendix also includes analyses of the potential effects of noise, focusing on effects on humans and also addressing effects on property values, terrain, structures, and animals.

B.1 NOISE AND SONIC BOOM

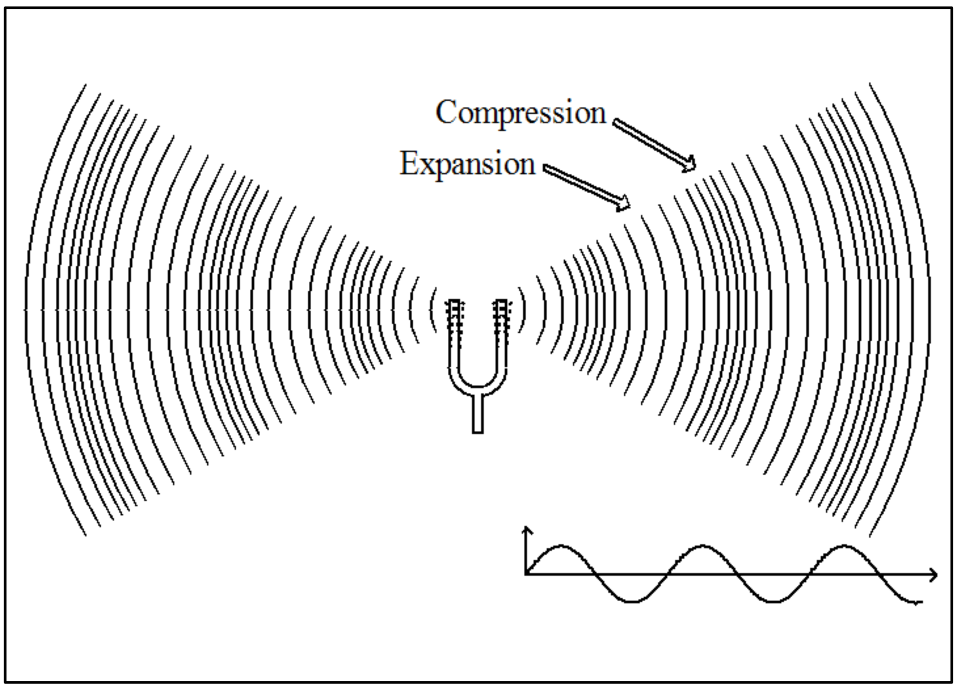
An overview of the basics of sound and noise is presented in Section B.1.1. The different metrics used to describe noise are defined in Section B.1.1.

B.1.1 BASICS OF SOUND

The following four subsections describe sound waves and decibels (dB), sounds levels and types of sounds, sonic boom, and workplace noise.

B.1.1.1 Sound Waves and Decibels

Sound consists of minute vibrations in the air that travel through the air and are sensed by the human ear. Figure B-1 is a sketch of sound waves from a tuning fork. The waves move outward as a series of crests where the air is compressed and troughs where the air is expanded. The height of the crests and the depth of the troughs are the amplitude or sound pressure of the wave. The pressure determines its energy or intensity. The number of crests or troughs that pass a given point each second is called the frequency of the sound wave.



Source: Wyle Laboratories

Figure B-1. Sound Waves from a Vibrating Tuning Fork

The measurement and human perception of sound involves three basic physical characteristics: intensity, frequency, and duration.

- *Intensity* is a measure of the acoustic energy of the sound and is related to sound pressure. The greater the sound pressure, the more energy carried by the sound and the louder the perception of that sound.
- *Frequency* determines how the pitch of the sound is perceived. Low-frequency sounds are characterized as rumbles or roars, while high-frequency sounds are typified by sirens or screeches.
- *Duration* or the length of time the sound can be detected.

As shown on Figure B-1, the sound from a tuning fork spreads out uniformly as it travels from the source. The spreading causes the sound's intensity to decrease with increasing distance from the source. For a source such as an aircraft in flight, the sound level will decrease by approximately 6 dB for every doubling of the distance. For a busy highway, the sound level will decrease by 3 to 4.5 dB for every doubling of distance.

As sound travels from the source it also gets absorbed by the air. The amount of absorption depends on the frequency composition of the sound, the temperature, and the humidity conditions. Sound with high frequency content gets absorbed by the air more than sound with low frequency content. More sound is absorbed in colder and drier conditions than in hot and wet conditions. Sound is also affected by wind and temperature gradients, terrain (elevation and ground cover) and structures.

The loudest sounds that can be comfortably heard by the human ear have intensities a trillion times higher than those of sounds barely heard. Because of this vast range, it is unwieldy to use a linear scale to represent the intensity of sound. As a result, a logarithmic unit known as the dB is used to represent the intensity of a sound. Such a representation is called a sound level. A sound level of 0 dB is approximately the threshold of human hearing and is barely audible under extremely quiet listening conditions. Normal speech has a sound level of approximately 60 dB. Sound levels greater than 120 dB begin to be felt inside the human ear as discomfort. Sound levels between 130 and 140 dB are felt as pain (Berglund and Lindvall 1995).

Because of the logarithmic nature of the dB unit, sound levels cannot simply be added or subtracted and are somewhat cumbersome to handle mathematically. However, some simple rules are useful in dealing with sound levels. First, if a sound's intensity is doubled, the sound level increases by 3 dB, regardless of the initial sound level. For example:

$$60 \text{ dB} + 60 \text{ dB} = 63 \text{ dB, and}$$

$$80 \text{ dB} + 80 \text{ dB} = 83 \text{ dB.}$$

Second, the total sound level produced by two sounds of different levels is usually only slightly more than the higher of the two. For example:

$$60.0 \text{ dB} + 70.0 \text{ dB} = 70.4 \text{ dB.}$$

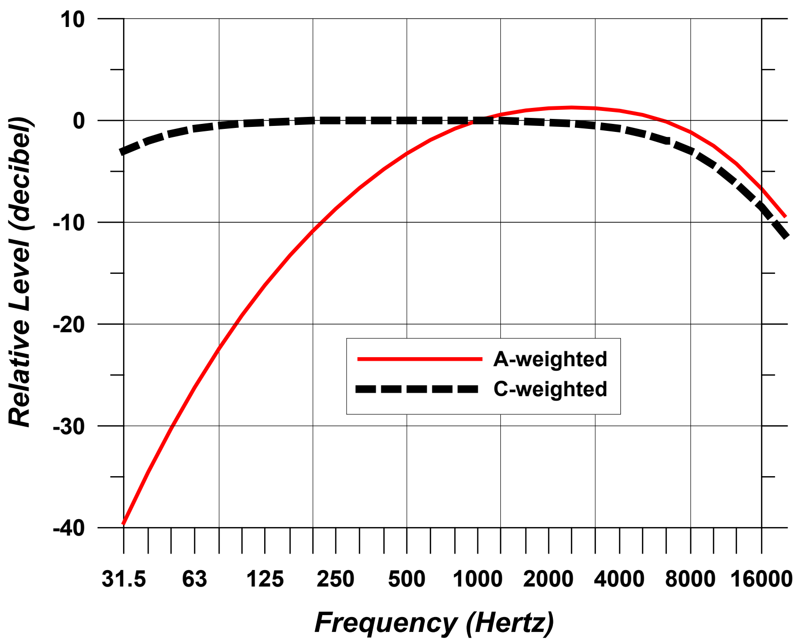
Because the addition of sound levels is different than that of ordinary numbers, this process is often referred to as "decibel addition."

The minimum change in the sound level of individual events that an average human ear can detect is approximately 3 dB. On average, a person perceives a change in sound level of approximately 10 dB as a doubling (or halving) of the sound's loudness. This relation holds true for loud and quiet sounds. A decrease in sound level of 10 dB actually represents a 90 percent decrease in sound intensity but only a 50 percent decrease in perceived loudness because the human ear does not respond linearly.

Sound frequency is measured in terms of cycles per second or hertz (Hz). The normal ear of a young person can detect sounds that range in frequency from approximately 20 to 20,000 Hz. As we get older, we lose the ability to hear high frequency sounds. Not all sounds in this wide range of frequencies are heard equally. Human hearing is most sensitive to frequencies in the 1,000 to 4,000 Hz range. The notes on a piano range from just over 27 to 4,186 Hz, with middle C equal to 261.6 Hz. Most sounds (including a single note on a piano) are not simple pure tones like the tuning fork on Figure B-1, but contain a mix, or spectrum, of many frequencies.

Sounds with different spectra are perceived differently even if the sound levels are the same. Weighting curves have been developed to correspond to the sensitivity and perception of different types of sound. A-weighting and C-weighting are the two most common weightings. These two curves, shown on Figure B-2, are adequate to quantify most environmental noises. A-weighting puts emphasis on the 1,000 to 4,000 Hz range.

Very loud or impulsive sounds, such as explosions or sonic booms, can sometimes be felt, and can cause secondary effects, such as shaking of a structure or rattling of windows. These types of sounds can add to annoyance, and are best measured by C-weighted decibels (dBC). C-weighting is nearly flat throughout the audible frequency range, and includes low frequencies that may not be heard but cause shaking or rattling. C-weighting approximates the human ear's sensitivity to higher intensity sounds.



Source: ANSI 1985

Figure B-2. Frequency Characteristics of A- and C-Weighting

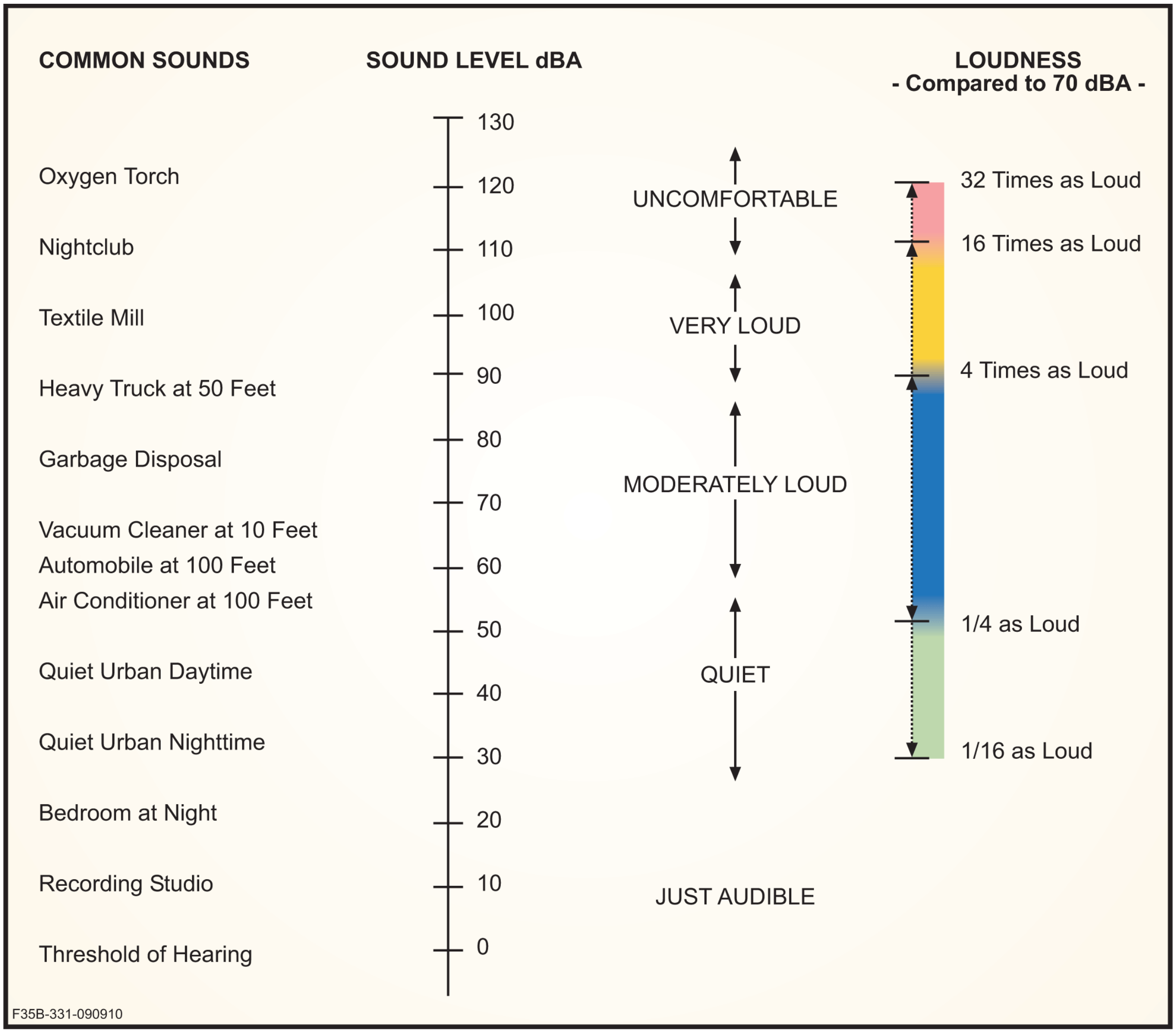
B.1.1.2 Sound Levels and Types of Sound

Most environmental sounds are measured using A-weighting. These sounds are measured in A-weighted decibels (dBA), and sometimes the unit dBA or dB(A) is denoted rather than dB. When the use of A-weighting is understood, the term "A-weighted" is often omitted and the unit dB is used. Unless otherwise stated, dB units refer to A-weighted decibels.

Sound becomes noise when it is unwelcome and interferes with normal activities, such as sleep or conversation. Noise is unwanted sound. Noise can become an issue when its level exceeds the ambient or background sound level. Ambient noise in urban areas typically varies from

60 to 70 dB, but can be as high as 80 dB in the center of a large city. Quiet suburban neighborhoods experience ambient noise levels around 45 to 50 dB (USEPA 1978).

Figure B-3 is a chart of A-weighted decibels from common sources. Some sources, like the air conditioner and vacuum cleaner, are continuous sounds whose levels are constant for some time. Some sources, like the automobile and heavy truck, are the maximum sound during an intermittent event like a vehicle pass-by. Some sources like "urban daytime" and "urban nighttime" are averages over extended periods. A variety of noise metrics have been developed to describe noise over different time periods. These are discussed in detail in Section B.2.



Sources: Harris 1979; FICAN 1997.

Figure B-3. Typical A-Weighted Sound Levels of Common Sounds

Aircraft noise consists of two major types of sound events: flight (including takeoffs, landings and flyovers), and stationary, such as engine maintenance run-ups. The former are intermittent and the latter primarily continuous. Noise from aircraft overflights typically occurs beneath main approach and departure paths, in local air traffic patterns around the airfield, and in areas near aircraft parking ramps and staging areas. As aircraft climb, the noise received on the ground drops to lower levels, eventually fading into the background or ambient levels.

Impulsive noises are generally short, loud events. Their single-event duration is usually less than 1 second. Examples of impulsive noises are small-arms gunfire, hammering, pile driving, metal impacts during rail-yard shunting operations, and riveting. Examples of high-energy impulsive sounds are quarry/mining explosions, sonic booms, demolition, and industrial processes that use high explosives, military ordnance (e.g., armor, artillery and mortar fire, and bombs), explosive ignition of rockets and missiles, and any other explosive source where the equivalent mass of dynamite exceeds 25 grams (ANSI 1996).

B.1.1.3 Sonic Booms

When an aircraft moves through the air, it pushes the air out of its way. At subsonic speeds, the displaced air forms a pressure wave that disperses rapidly. At supersonic speeds, the aircraft is moving too quickly for the wave to disperse, so it remains as a coherent wave. This wave is a sonic boom. When heard at the ground, a sonic boom consists of two shock waves (one associated with the forward part of the aircraft, the other with the rear part) of approximately equal strength and (for fighter aircraft) separated by 100 to 200 milliseconds. When plotted, this pair of shock waves and the expanding flow between them has the appearance of a capital letter “N,” so a sonic boom pressure wave is usually called an “N-wave.” An N-wave has a characteristic "bang-bang" sound that can be startling. The generation and evolution of a sonic boom N-wave under the aircraft is shown on Figure B-4. The sonic boom pattern for an aircraft in steady supersonic flight is shown on Figure B-5. The boom forms a cone that is said to sweep out a “carpet” under the flight track.

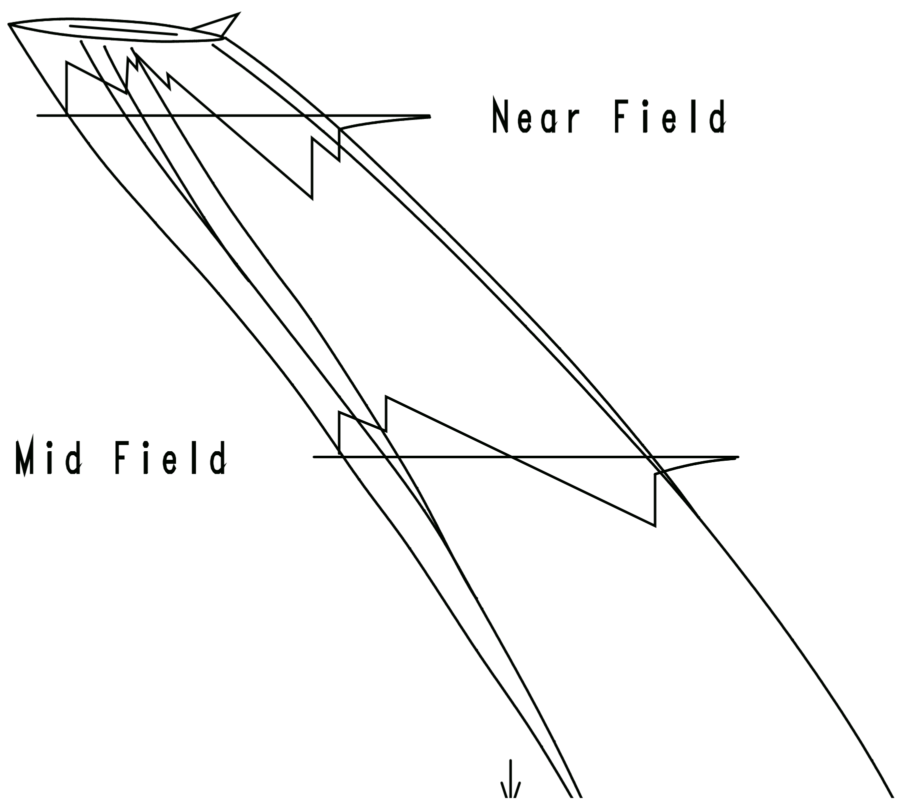


Figure B-4. Sonic Boom Generation and Evolution to N-Wave

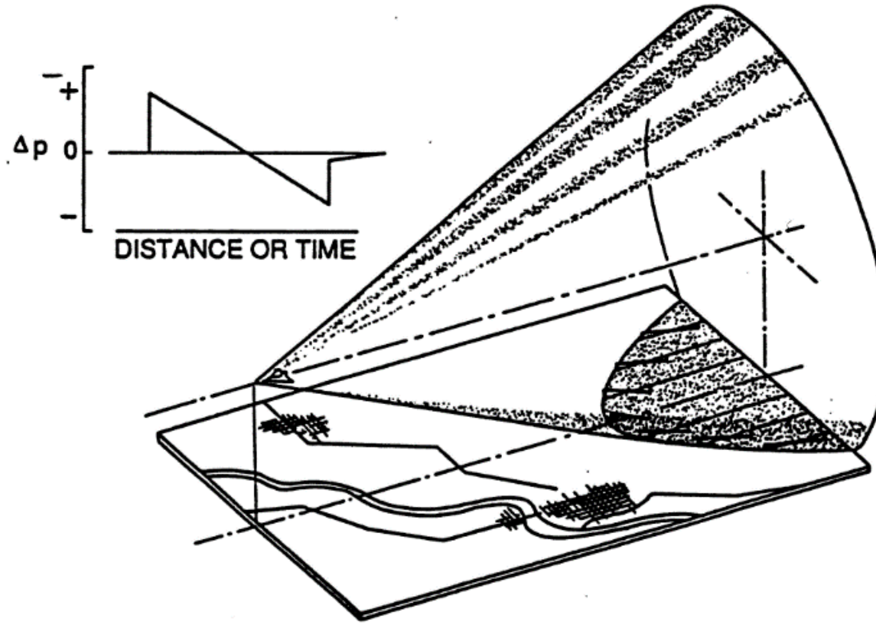


Figure B-5. Sonic Boom Carpet in Steady Flight

The complete ground pattern of a sonic boom depends on the size, shape, speed, and trajectory of the aircraft. Even for a nominally steady mission, the aircraft must accelerate to supersonic speed at the start, decelerate back to subsonic speed at the end, and usually change altitude. The complexity of a nominal full mission is illustrated on Figure B-6.

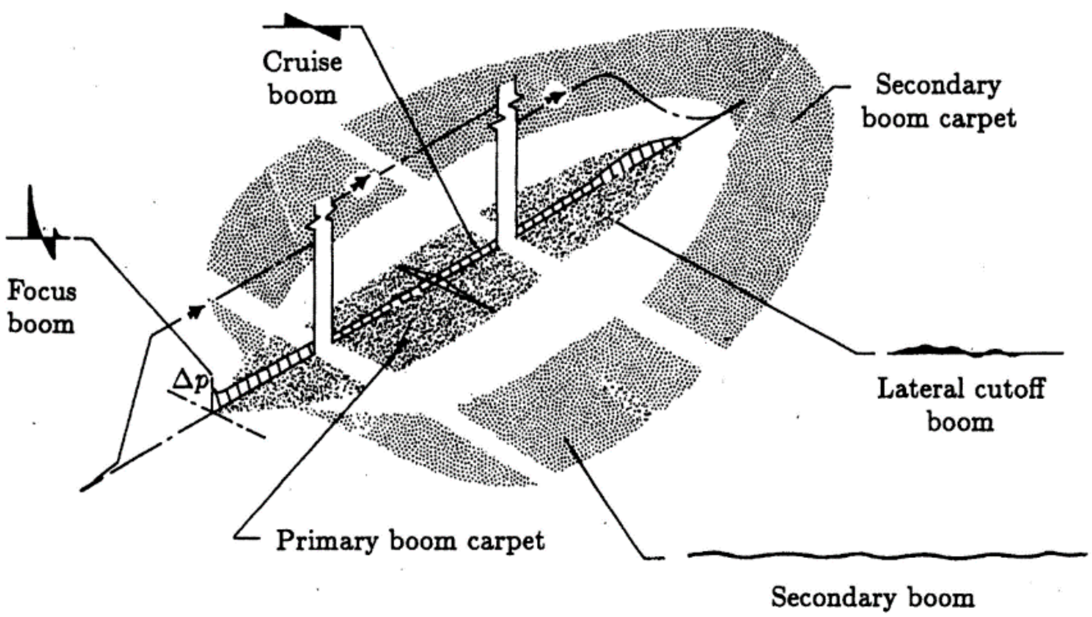


Figure B-6. Complex Sonic Boom Pattern for Full Mission

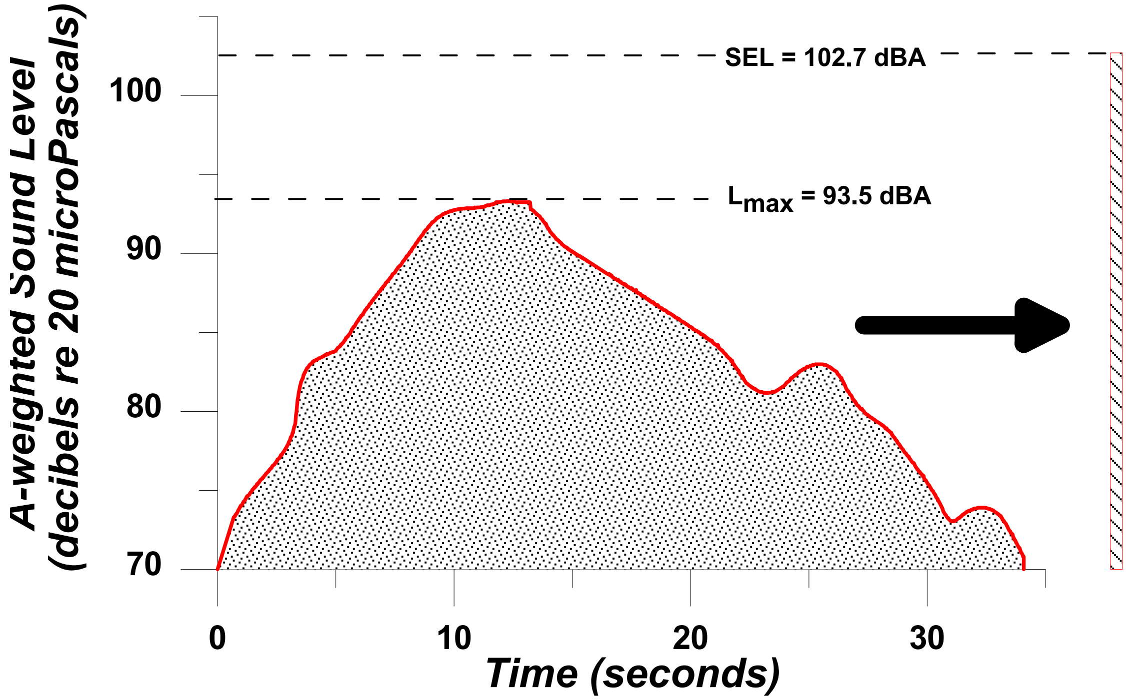
B.1.1.4 Workplace Noise

In 1972, the National Institute for Occupational Safety and Health (NIOSH) published a criteria document with a recommended exposure limit of 85 dB as an 8-hour time-weighted average. This exposure limit was reevaluated in 1998 when NIOSH made recommendations that went beyond conserving hearing by focusing on the prevention of occupational hearing loss (NIOSH 1998). Following the reevaluation using a new risk assessment technique, NIOSH published another criteria document in 1998 which reaffirmed the 85 dB recommended exposure limit (NIOSH 1998). Active-duty and reserve components of the U.S. Air Force (USAF) as well as civilian employees and contracted personnel working on USAF bases must comply with Air Force Occupational Safety and Health (AFOSH) Standard 48-20, *Occupational Noise and Hearing Conservation Program,* U.S. Department of Defense Instruction (DoDI) 6055.12, *DoD Hearing Conservation Program,* Title 29 of the *Code of Federal Regulations (CFR)* Section 1910.95, *Occupational Noise Exposure,* and Occupational Noise and Hearing Conservation Program (including material derived from the International Standards Organization 1999.2 Acoustics-Determination of Occupational Noise Exposure and Estimation of Noise Induced Impairment). Per AFOSH Standard 48-20, the Hearing Conservation Program is designed to protect workers from the harmful effects of hazardous noise by identifying all areas where workers are exposed to hazardous noise. The following are main components of the program:

- Identify noise hazardous areas or sources and ensure these areas are clearly marked.
- Use engineering controls as the primary means of eliminating personnel exposure to potentially hazardous noise. All practical design approaches to reduce noise levels to below hazardous levels by engineering principles shall be explored. Priorities for noise control resources shall be assigned based on the applicable risk assessment code. Where engineering controls are undertaken, the design objective shall be to reduce steady-state levels to less than 85 dBA, regardless of personnel exposure time, and to reduce impulse noise levels to less than 140 dB peak sound pressure level (L_{pk}).
- Ensure workers with an occupational exposure to hazardous noise complete an initial/reference audiogram within 30 days from the date of the workers' initial exposure to hazardous noise.
- Ensure new equipment being considered for purchase has the lowest sound emission levels that are technologically and economically possible and compatible with performance and environmental requirements. 42 *United States Code (USC)* § 4914, *Public Health and Welfare, Noise Control, Development of Low-Noise Emission Products*, applies.
- Education and training regarding potentially noise hazardous areas and sources, use and care of hearing protective devices, the effects of noise on hearing, and the Hearing Conservation Program.

B.1.2 NOISE METRICS

Noise metrics quantify sounds so they can be compared with each other, and with their effects, in a standard way. The simplest metric is the A-weighted level, which is appropriate by itself for constant noise such as an air conditioner. Aircraft noise varies with time. During an aircraft overflight, noise starts at the background level, rises to a maximum level as the aircraft flies close to the observer, then returns to the background as the aircraft recedes into the distance. This is sketched on Figure B-7, which also indicates two metrics (i.e., maximum noise level [L_{max}] and sound exposure level [SEL]) that are described in Sections B.2.1 and B.2.3 following. Over time there can be a number of events, not all the same.



Source: Wyle Laboratories

Figure B-7. Example Time History of Aircraft Noise Flyover

There are a number of metrics that can be used to describe a range of situations, from a particular individual event to the cumulative effect of all noise events over a long time. This section describes the metrics relevant to environmental noise analysis.

B.1.2.1 Single Events

B.1.2.1.1 Maximum Noise Level

The highest A-weighted decibels measured during a single event in which the sound changes with time is called the maximum A-weighted decibels (in L_{max}). The L_{max} is depicted for a sample event on Figure B-7.

The L_{max} is the maximum level that occurs over a fraction of a second. For aircraft noise, the "fraction of a second" is one-eighth of a second, denoted as "fast" response on a sound level measuring meter (ANSI 1988). Slowly varying or steady sounds are generally measured over 1 second, denoted "slow" response. L_{max} is important in judging if a noise event will interfere with conversation, TV or radio listening, or other common activities. Although it provides some measure of the event, it does not fully describe the noise, because it does not account for how long the sound is heard.

Table B-1 reflects L_{max} values for typical aircraft associated with this assessment operating at the indicated flight profiles and power settings. On takeoff through 1,000 feet (ft) above ground level (AGL), the F-22 has the highest L_{max} of 112 dB with the F-35A ranked a close second with 111 dB L_{max}. On approach through 1,000 ft AGL, the F-22 has the highest L_{max} of 104 dB with the B-1 and F-15 tied for second with 97 dB L_{max}.

Table B-1. Representative Instantaneous L_{max}[a]

Aircraft (Engine Type)	Power Setting	Power Unit	L_{max} (in dBA) at Varying Altitudes (in ft)				
			500	1,000	2,000	5,000	10,000
Takeoff/Departure Operations[b]							
A-10A	6,200	NF RPM	100	92	82	68	58
B-13	97.5%	RPM	113	105	97	84	72
F-15 (PW220)	90%	NC RPM	111	104	97	85	75
F-16 (PW229)	93%	NC RPM	114	106	98	86	76
F-22	100%	ETR	120	112	105	93	83
F-35A4	100%	ETR	119	111	103	91	81
Landing/Arrival Operations[c]							
A-10A	5,225	NF RPM	97	89	79	60	46
B-1	90%	RPM	104	97	89	76	65
F-15 (PW220)	75%	NC RPM	104	97	89	77	66
F-16 (PW229)	83.5%	NC RPM	93	86	78	66	56
F-22	43%	ETR	111	104	96	84	73
F-35A[d]	40%	ETR	100	93	85	73	62

[a] Power settings indicated may not be comparable across aircraft, that all numbers are rounded, and power settings are typical but not constant for departure/arrival operations.
[b] B-1 Takeoff/Departure modeled with afterburner, all other departure aircraft modeled without afterburner (if available).
[c] All Landing/Arrival aircraft modeled with "parallel-interpolation" power setting for gear down configuration (except if noted).
[d] Based on 2013 Edwards measurements.
Key: Engine Unit of Power: RPM = Revolution(s) per Minute; ETR = Engine Thrust Request; NC = Engine Core; and NF = Engine Fan
Source: NOISEMAP OPX file using standard weather conditions of 59 degrees Fahrenheit and 70 percent relative humidity.

B.1.2.1.2 Peak Sound Pressure Level

The L_{pk} is the highest instantaneous level measured by a sound level measurement meter. The L_{pk} is typically measured every 20 microseconds, and usually based on unweighted or linear response of the meter. A- or C-weighting is not applied. It is used to describe individual impulsive events such as sonic boom and blast noise. Because blast noise varies from shot to shot and varies with meteorological (weather) conditions, the U.S. Department of Defense (DoD) usually characterizes L_{pk} by the metric PK 15(met), which is the L_{pk} exceeded 15 percent of the time. The "met" notation refers to the metric accounting for varied meteorological or weather conditions.

For sonic booms, this is the peak pressure of the shock wave, as described in Section B.3.2. This pressure is usually presented in physical units of pounds per square foot (psf). Sometimes it is represented on the dB level scale, with symbol L_{pk}.

B.1.2.1.3 Sound Exposure Level

The SEL combines both the intensity of a sound and its duration. For an aircraft flyover, the SEL includes the maximum and all lower noise levels produced as part of the overflight, together with how long each part lasts. It represents the total sound energy in the event. Figure B-7 indicates the SEL for an example event, representing it as if all the sound energy were contained within 1 second.

Because aircraft noise events last more than a few seconds, the SEL value is larger than L_{max}. It does not directly represent the sound level heard at any given time, but rather the entire event. The SEL provides a much better measure of aircraft flyover noise exposure than L_{max} alone.

Table B-2 shows SEL values corresponding to the aircraft and power settings reflected in Table B-1. At 1,000 ft AGL on takeoff, the F-22 has the highest SEL of 121 dB, with the F-35A closed behind with 119 dB SEL. At 1,000 ft AGL on approach, the F-22 has the highest SEL of 109 dB, with the B-1 ranked second with 105 dB SEL.

C-weighted sound exposure level (CSEL) can be computed for impulsive sounds, and the results are denoted CSEL or LCE. A-weighted sound exposure level (ACEL) for A-weighted sound is sometimes denoted ASEL. Within this study, the SEL is used for A-weighted sounds and CSEL for C-weighted.

Table B-2. Representative SEL[a]

Aircraft (engine type)	Power Setting	Power Unit	SEL (in dBA) at Varying Altitudes (in ft)				
			500	1,000	2,000	5,000	10,000
Takeoff/Departure Operations[b,c]							
A-10A	6,200	NF RPM	105	99	91	80	71
B-1[4]	97.5%	RPM	119	113	106	96	86
F-15 (PW220)	90%	NC RPM	120	115	109	100	91
F-16 (PW229)	93%	NC RPM	119	114	107	98	89
F-22	100%	ETR	127	121	115	106	98
F-35A	100%	ETR	125	119	113	103	95
Landing/Arrival Operation[d]							
A-10A	5,225	NF RPM	98	92	83	67	55
B-1	90%	RPM	111	105	98	88	79
F-15 (PW220)	75%	NC RPM	99	94	88	79	71
F-16 (PW229)	83.5%	NC RPM	97	92	86	77	68
F-22	43%	ETR	115	109	103	94	85
F-35A[e]	40%	ETR	107	102	95	86	76

[a] Power settings indicated may not be comparable across aircraft, that all numbers are rounded, and power settings are typical but not constant for departure/arrival operations.
[b] Takeoff/Departure modeled at 160 knots airspeed for SEL purposes.
[c] B-1 Takeoff/Departure modeled with afterburner, all other departure aircraft modeled without afterburner (if available).
[d] All Landing/Arrival aircraft modeled at 160 knots airspeed for SEL purposes.
[e] Based on 2013 Edwards measurements.
Key: Engine Unit of Power: RPM = Revolution(s) per Minute; ETR = Engine Thrust Request; NC = Engine Core; and NF = Engine Fan
Source: NOISEMAP OPX file using standard weather conditions of 59 degrees Fahrenheit and 70 percent relative humidity.

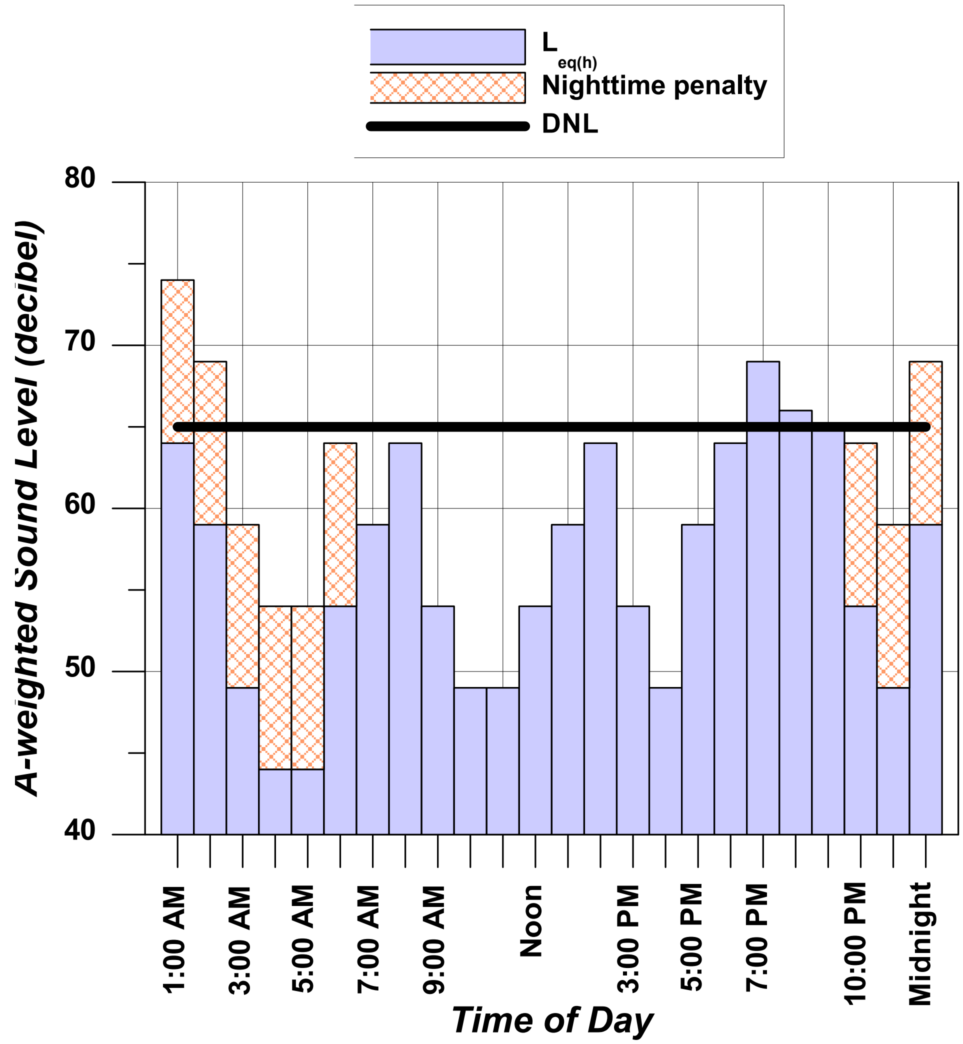
B.1.2.2 Cumulative Events

B.1.2.2.1 Equivalent Noise Level

Equivalent noise level (L_{eq}) is a "cumulative" metric that combines a series of noise events over a period of time. L_{eq} is the sound level that represents the dB average SEL of all sounds in the time period. Just as the SEL has proven to be a good measure of a single event, L_{eq} has proven to be a good measure of series of events during a given time period.

The time period of an L_{eq} measurement is usually related to some activity, and is given along with the value. The time period is often shown in parenthesis (e.g., 24-hour equivalent noise level [$L_{eq(24)}$]). The L_{eq} from 7:00 A.M. to 3:00 P.M. may give exposure of noise for a school day.

An example of $L_{eq(24)}$ using notional hourly equivalent noise levels ($L_{eq(h)}$) for each hour of the day as an example is shown on Figure B-8. The $L_{eq(24)}$ for this example is 61 dB.



Source: Wyle Laboratories

Figure B-8. Example of $L_{eq(24)}$, DNL Computed from Hourly Equivalent Sound Levels

B.1.2.2.2 Day-Night Average Sound Level

Day-night average sound level (DNL) (with the mathematical symbol for DNL denoted L_{dn}) is a cumulative metric that accounts for all noise events in a 24-hour period. However, unlike $L_{eq(24)}$, DNL contains a nighttime noise penalty. To account for our increased sensitivity to noise at night, DNL applies a 10 dB penalty to events during the nighttime period, defined as 10:00 P.M. to 7:00 A.M. The notations DNL and L_{dn} are both used for DNL and are equivalent.

For airports and military airfields outside of California, DNL represents the average sound level for annual average daily aircraft events. An example of DNL using notional $L_{eq(h)}$ for each hour of the day as an example is shown on Figure B-8. Note the $L_{eq(h)}$ for the hours between 10:00 P.M. and 7:00 A.M. have a 10 dB penalty assigned. A graphical representation comparing DNL to SEL is provided on Figure B-9. The DNL for this example is 65 dB. The ranges of DNL that occur in various types of communities are shown on Figure B-10. Under a flight path at a major airport the DNL may exceed 80 dB, while rural areas may experience DNL less than 45 dB.

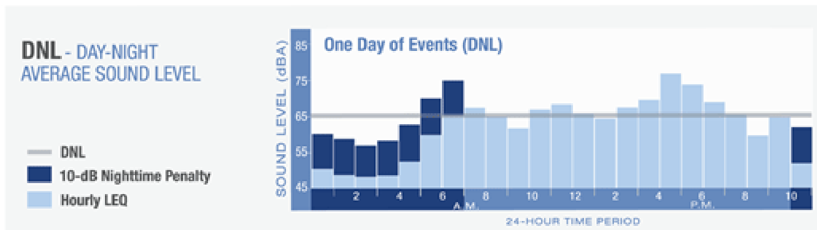
Aviation Noise

Fundamentals of Noise and Sound

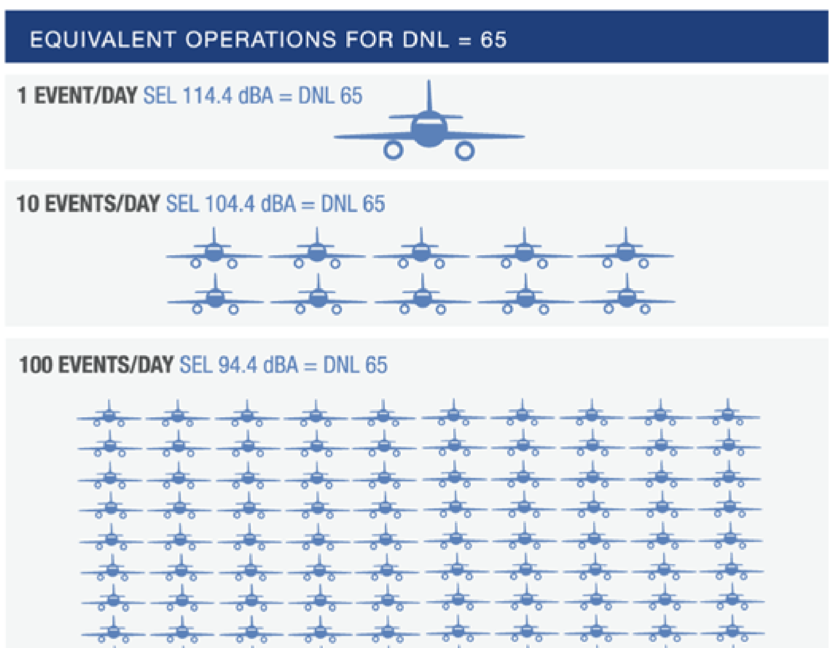
Community Response to Noise

FAA History of Noise

Finally, the **day-night average sound level (DNL)** noise metric is used to reflect a person's cumulative exposure to sound over a 24-hour period, expressed as the noise level for the average day of the year on the basis of annual aircraft operations. The DNL noise metric provides a mechanism to describe the effects of environmental noise in a simple and uniform way. DNL is the standard noise metric used for all FAA studies of aviation noise exposure in airport communities. (For more on DNL, see FAA History of Noise.) DNL and the closely related CNEL metric used in California are both similar to LEQ, but they differ in how noise is treated during the evening and nighttime.

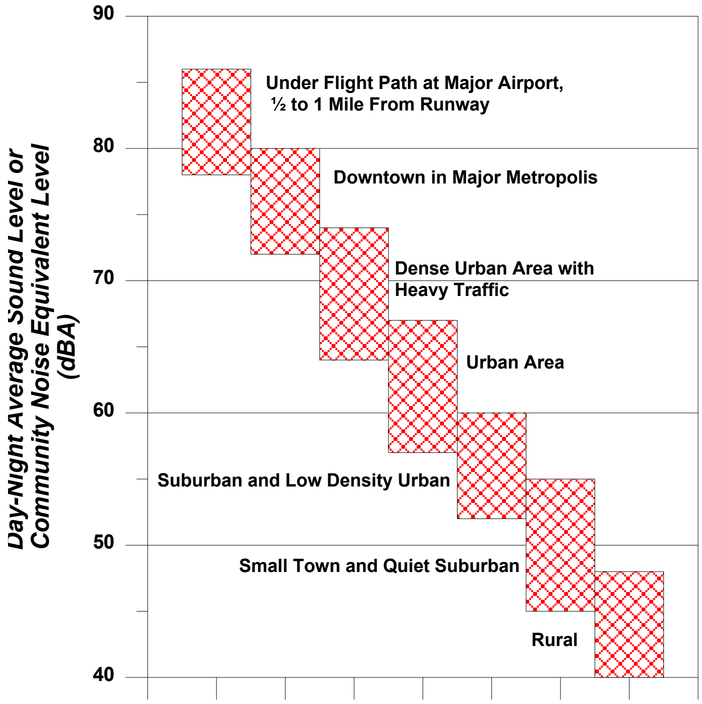


Because DNL takes into account both the amount of noise from each aircraft operation as well as the total number of operations flying throughout the day, there are many ways in which aircraft noise can add up to a specific DNL. Small numbers of relatively loud operations can result in the same DNL as large numbers of relatively quiet operations.



Source: https://www.faa.gov/regulations_policies/policy_guidance/noise/basics/ (FAA 2020)

Figure B-9. Graphical Representation of DNL versus SEL



Source: DoD 1978

Figure B-10. Typical DNL Ranges in Various Types of Communities

The dB summation nature of these metrics causes the noise levels of the loudest events to control the 24-hour average. As a simple example, consider a case in which only one aircraft overflight occurs during the daytime over a 24-hour period, creating a sound level of 100 dB for 30 seconds. During the remaining 23 hours, 59 minutes, and 30 seconds of the day, the ambient sound level is 50 dB. The DNL for this 24-hour period is 65.9 dB. Assume, as a second example that 10 such 30-second overflights occur during daytime hours during the next 24-hour period, with the same ambient sound level of 50 dB during the remaining 23 hours and 55 minutes of the day. The DNL for this 24-hour period is 75.5 dB. The averaging of noise over a 24-hour period does not ignore the louder single events and tends to emphasize both the sound levels and number of those events.

A feature of the DNL metric is that a given DNL value could result from a very few noisy events or a large number of quieter events. For example, 1 overflight at 90 dB creates the same DNL as 10 overflights at 80 dB.

DNL does not represent a level heard at any given time, but represent long term exposure. Scientific studies have found good correlation between the percentages of groups of people highly annoyed and the level of average noise exposure measured in DNL (Schultz 1978; USEPA 1978).

B.1.2.2.3 Onset Rate-Adjusted Monthly Day-Night Average Sound Level

Military aircraft utilizing Special Use Airspace (SUA) such as Military Training Routes (MTRs), Military Operations Areas (MOAs), and Restricted Areas/Ranges generate a noise environment that is somewhat different from that around airfields. Rather than regularly occurring operations like at airfields, activity in SUAs is highly sporadic. It is often seasonal, ranging from 10 per hour to less than 1 per week. Individual military overflight events also differ from typical community noise events in that noise from a low-altitude, high-airspeed flyover can have a rather sudden onset, with rates of up to 150 dB per second.

The cumulative daily noise metric devised to account for the “surprise” effect of the sudden onset of aircraft noise events on humans and the sporadic nature of SUA activity is the onset rate-adjusted day-night average sound level (L_{dnmr}). Onset rates between 15 and 150 dB per second require an adjustment of 0 to 11 dB to the event’s SEL, while onset rates less than 15 dB per second require no adjustment to the event’s SEL (Stusnick et al. 1992). The term ‘monthly’ in L_{dnmr} refers to the noise assessment being conducted for the month with the most operations or sorties—the so-called busiest month.

B.1.2.3 Supplemental Metrics

B.1.2.3.1 Number-of-Events Above a Threshold Level

The number-of-events above (NA) metric gives the total number of events that exceed a noise threshold level (L) during a specified period of time. Combined with the selected threshold, the metric is denoted number-of-events above a threshold level (NAL). The threshold can be either SEL or L_{max}, and it is important that this selection is shown in the nomenclature. When labeling a contour line or point of interest (POI), NAL is followed by the number of events in parentheses. For example, where 10 events exceed an SEL of 90 dB over a given period of time, the nomenclature would be NA90SEL(10). Similarly, for L_{max} it would be NA90L_{max}(10). The period of time can be an average 24-hour day, daytime, nighttime, school day, or any other time period appropriate to the nature and application of the analysis.

The NA metric is a supplemental metric. It is not supported by the amount of science behind DNL/CNEL, but it is valuable in helping to describe noise to the community. A threshold level and metric are selected that best meet the need for each situation. An L_{max} threshold is normally selected to analyze speech interference, while an SEL threshold is normally selected for analysis of sleep disturbance.

The NA metric is the only supplemental metric that combines single-event noise levels with the number of aircraft operations. In essence, it answers the question of how many aircraft (or range of aircraft) fly over a given location or area at or above a selected threshold noise level.

B.1.2.3.2 Time Above a Specified Level

The Time Above (TA) metric is the total time, in minutes, that the A-weighted noise level is at or above a threshold. Combined with the L, it is denoted time above a threshold level (TAL). The TA can be calculated over a full 24-hour annual average day, the 15-hour daytime and 9-hour nighttime periods, a school day, or any other time period of interest, provided there is operational data for that time.

The TA is a supplemental metric, used to help understand noise exposure. It is useful for describing the noise environment in schools, particularly when assessing classroom or other noise sensitive areas for various scenarios. The TA can be shown as contours on a map similar to the way DNL contours are drawn.

The TA helps describe the noise exposure of an individual event or many events occurring over a given time period. When computed for a full day, the TA can be compared alongside the DNL in order to determine the sound levels and total duration of events that contribute to the DNL. The TA analysis is usually conducted along with NA analysis so the results show not only how many events occur, but also the total duration of those events above the threshold.

B.2 NOISE AND SONIC BOOM EFFECTS

Noise is of concern because of potential adverse effects. The following subsections describe how noise can affect communities and the environment, and how those effects are quantified. The specific topics discussed are as follows:

- Annoyance;
- Land Use Compatibility
- Speech interference;
- Sleep disturbance;
- Noise-induced hearing impairment;
- Non-auditory health effects;
- Performance effects;
- Noise effects on children;
- Property values;
- Noise-induced vibration effects on structures and humans;
- Noise effects on terrain;
- Noise effects on historical and archaeological sites;
- Effects on domestic animals and wildlife; and
- Sonic Boom.

B.2.1 ANNOYANCE

With the introduction of jet aircraft in the 1950s, it became clear that aircraft noise annoyed people and was a significant problem around airports. Early studies, such as those of Rosenblith et al. (1953) and Stevens et al. (1953) showed that effects depended on the quality of the sound, its level, and the number of flights. Over the next 20 years considerable research was performed refining this understanding and setting guidelines for noise exposure. In the early 1970s, the U.S. Environmental Protection Agency (USEPA) published its "Levels Document" (USEPA 1974) that reviewed the factors that affected communities. DNL (still known as L_{dn} at the time) was identified as an appropriate noise metric, and threshold criteria were recommended.

Threshold criteria for annoyance were identified from social surveys, where people exposed to noise were asked how noise affects them. Surveys provide direct real-world data on how noise affects actual residents.

Surveys in the early years had a range of designs and formats, and needed some interpretation to find common ground. In 1978, Schultz showed that the common ground was the number of people "highly annoyed," defined as the upper 28 percent range of whatever response scale a survey used (Schultz 1978). With that definition, he was able to show a remarkable consistency among the majority of the surveys for which data were available. The result of his study relating DNL to individual annoyance measured by percent highly annoyed (%HA) is shown on Figure B-11.

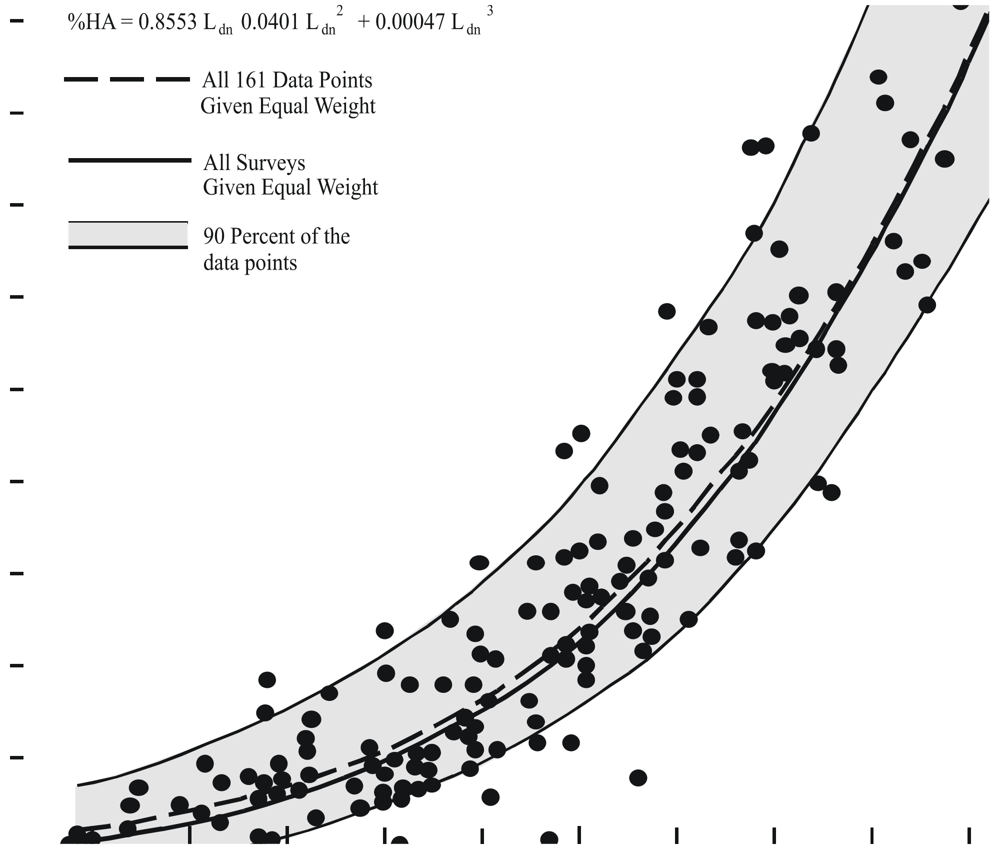


Figure B-11. Schultz Curve Relating Noise Annoyance to DNL (Schultz 1978)

Schultz's original synthesis included 161 data points. Revised fits of the Schultz data set are compared with an expanded set of 400 data points collected through 1989 (Finegold et al. 1994) on Figure B-12. The new form is the preferred form in the United States, endorsed by the Federal Interagency Committee on Aviation Noise (FICAN) (FICAN 1997). Other forms have been proposed, such as that of Fidell and Silvati (2004), but have not gained widespread acceptance.

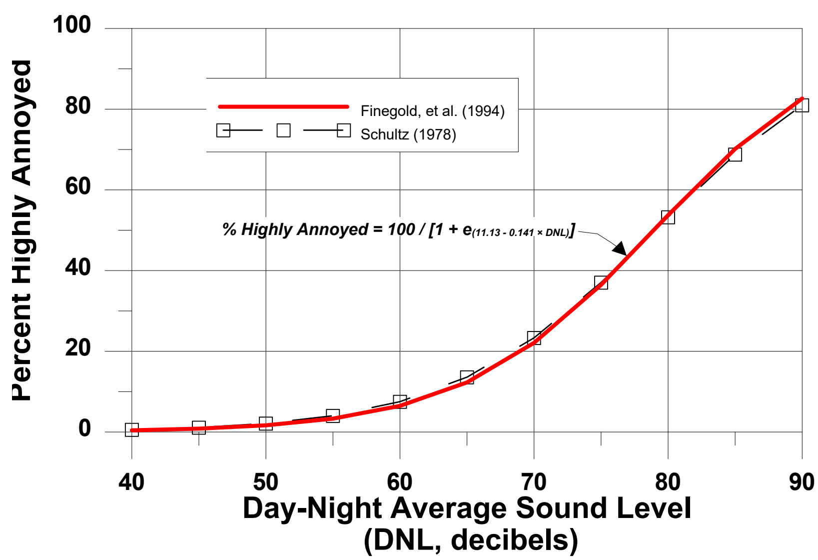


Figure B-12. Response of Communities to Noise; Comparison of Original Schultz (1978) with Finegold et al. (1994)

When the goodness of fit of the Schultz curve is examined, the correlation between groups of people is high, in the range of 85 to 90 percent. The correlation between individuals is lower, 50 percent or less. This is not surprising, given the personal differences between individuals. The surveys underlying the Schultz curve include results that show that annoyance to noise is also affected by non-acoustical factors. Newman and Beattie (1985) divided the non-acoustic factors into the emotional and physical variables shown in Table B-3.

Table B-3. Non-Acoustic Variables Influencing Aircraft Noise Annoyance

Emotional Variables
Feeling about the necessity or preventability of the noise;
Judgement of the importance and value of the activity that is producing the noise;
Activity at the time an individual hears the noise;
Attitude about the environment;
General sensitivity to noise;
Belief about the effect of noise on health; and
Feeling of fear associated with the noise.
Physical Variables
Type of neighborhood;
Time of day;
Season;
Predictability of the noise;
Control over the noise source; and
Length of time individual is exposed to a noise

Schreckenberg and Schuemer (2010) recently examined the importance of some of these factors on short-term annoyance. Attitudinal factors were identified as having an effect on annoyance. In formal regression analysis, however, sound level (in L_{eq}) was found to be more important than attitude.

A recent study by Plotkin et al. (2011) examined updating DNL to account for these factors. It was concluded that the data requirements for a general analysis were much greater than most existing studies. It was noted that the most significant issue with DNL is that it is not readily understood by the public, and that supplemental metrics such as TA and NA were valuable in addressing attitude when communicating noise analysis to communities (DoD 2009a).

A factor that is partially non-acoustical is the source of the noise. Miedema and Vos (1998) presented synthesis curves for the relationship between DNL and percentage "annoyed" and percentage "highly annoyed" for three transportation noise sources. Different curves were found for aircraft, road traffic, and railway noise. Table B-4 summarizes their results. Comparing the updated Schultz curve suggests that the percentage of people highly annoyed by aircraft noise may be higher than previously thought.

Table B-4. Percent Highly Annoyed for Different Transportation Noise Sources

DNL (dB)	Percentage Highly Annoyed (%HA)			
	Miedema and Vos			Schultz Combined
	Air	Road	Rail	
55	12	7	4	3
60	19	12	7	6
65	28	18	11	12
70	37	29	22	22
75	48	40	36	36

Source: Miedema and Vos 1998

As noted by the World Health Organization (WHO), however, even though aircraft noise seems to produce a stronger annoyance response than road traffic, caution should be exercised when interpreting synthesized data from different studies (WHO 1999).

The Noise Related Annoyance Cognition and Health (NORAH) study found larger percentages of surveyed Germans being highly annoyed by aircraft noise than were found in previous studies (Wothge, Belke, Möhler, Guski, and Schreckenberg 2017). The study was conducted in a part of Germany where aircraft noise was the subject of ongoing controversy, and study authors acknowledge that this factor could have resulted in increased responsiveness to noise. The WHO Regional Office for Europe document titled *Environmental Noise Guidelines for the European Region* recommends that European governments increase the stringency of their regulatory noise criteria to reflect the WHO's interpretation of recent findings relating to several noise impact categories (WHO 2018). Also in 2018, the FICAN released a document titled "Research Review of Selected Aviation Noise Issues," which notes that there are large differences between communities in responsiveness to noise (FICAN 2018). The FICAN review does not endorse the findings of any new studies as being universally applicable nor does it recommend alteration of noise impact thresholds.

Consistent with WHO recommendations, the Federal Interagency Committee on Noise (FICON) considered the Schultz curve to be the best source of dose information to predict community response to noise, but recommended further research to investigate the differences in perception of noise from different sources (FICON 1992).

Sonic boom exposure is assessed cumulatively with C-weighted day-night average sound level (CDNL). Correlation between CDNL and annoyance has been established, based on community reaction to impulsive sounds (Committee on Hearing, Bioacoustics and Biomechanics 1981). Values of the C-weighted equivalent to the Schultz curve are different than that of the Schultz curve itself. Table B-5 shows the relation between annoyance, DNL, and CDNL.

Table B-5. Relation Between Annoyance, DNL, and CDNL

DNL	Percentage Highly Annoyed (%HA)	CDNL
45	0.83	42
50	1.66	46
55	3.31	51
60	6.48	56
65	12.29	60
70	22.10	65

Interpretation of CDNL from impulsive noise is accomplished by using the CDNL versus annoyance values in Table B-3. CDNL can be interpreted in terms of an "equivalent annoyance" DNL. For example, CDNL of 52, 61, and 69 dB are equivalent to DNL of 55, 65, and 75 dB, respectively. If both continuous and impulsive noise occurs in the same area, impacts are assessed separately for each.

B.2.2 LAND USE COMPATIBILITY

As noted previously, the inherent variability between individuals makes it impossible to predict accurately how any individual will react to a given noise event. Nevertheless, when a community is considered as a whole, its overall reaction to noise can be represented with a high degree of confidence. As described previously, the best noise exposure metric for this correlation is the DNL or L_{dnmr} for military overflights. Impulsive noise can be assessed by relating CDNL to an "equivalent annoyance" DNL, as outlined in Section B.2.1.

In June 1980, an ad hoc Federal Interagency Committee on Urban Noise (FICUN) published guidelines (FICUN 1980) relating DNL to compatible land uses. This committee was composed of representatives from DoD, Transportation, and Housing and Urban Development; USEPA; and the Veterans Administration. Since the issuance of these guidelines, federal agencies have generally adopted these guidelines for their noise analyses.

Following the lead of the committee, the DoD adopted the concept of land-use compatibility as the accepted measure of aircraft noise effect. USAF guidelines are presented in Table B-6, along with the explanatory notes included in the regulation. These guidelines are not mandatory (note the footnote "*" in the table), rather they are recommendations to provide the best means for determining noise impact for communities adjacent to bases. Again, these are recommendations only; it is up to the city/county zoning and planning entities to determine what land uses are compatible and how they will deal with incompatibilities (e.g., what type of development is allowed, instituting residential buyouts, or whether noise attenuation efforts will be done in residential units). In general, residential land uses normally are not compatible with outdoor DNL values greater than 65 dB, and the extent of land areas and populations exposed to DNL of 65 dB and higher provides the best means for assessing the noise impacts of alternative aircraft actions. In some cases a change in noise level, rather than an absolute threshold, may be a more appropriate measure of impact.

Table B-6. USAF Land Use Compatibility Recommendations

Land Uses		Suggested Land Use Compatibility				
SLUCM NO.	**Category**	**DNL 65-69**	**DNL 70-74**	**DNL 75-79**	**DNL 80-84**	**DNL >85**
10	**Residential**					
11	Household units	N[a]	N[a]	N	N	N
11.11	Single units: detached	N[a]	N[a]	N	N	N
11.12	Single units: semidetached	N[a]	N[a]	N	N	N
11.13	Single units: attached row	N[a]	N[a]	N	N	N
11.21	Two units: side-by-side	N[a]	N[a]	N	N	N
11.22	Two units: one above the other	N[a]	N[a]	N	N	N
11.31	Apartments: walk-up	N[a]	N[a]	N	N	N
11.32	Apartment: elevator	N[a]	N[a]	N	N	N
12	Group quarters	N[a]	N[a]	N	N	N
13	Residential hotels	N[a]	N[a]	N	N	N
14	Mobile home parks or courts	N	N	N	N	N
15	Transient lodgings	N[a]	N[a]	N[a]	N	N
16	Other residential	N[a]	N[a]	N	N	N
20	**Manufacturing**					
21	Food and kindred products; manufacturing	Y	Y[b]	Y[c]	Y[d]	N
22	Textile mill products; manufacturing	Y	Y[b]	Y[c]	Y[d]	N
23	Apparel and other finished products; products made from fabrics, leather, and similar materials; manufacturing	Y	Y[b]	Y[c]	Y[d]	N
24	Lumber and wood products (except furniture); manufacturing	Y	Y[b]	Y[c]	Y[d]	N
25	Furniture and fixtures; manufacturing	Y	Y[b]	Y[c]	Y[d]	N
26	Paper and allied products; manufacturing	Y	Y[b]	Y[c]	Y[d]	N
27	Printing, publishing, and allied industries	Y	Y[b]	Y[c]	Y[d]	N
28	Chemicals and allied products; manufacturing	Y	Y[b]	Y[c]	Y[d]	N
29	Petroleum refining and related industries	Y	Y[b]	Y[c]	Y[d]	N

Table B-6. USAF Land Use Compatibility Recommendation (Continued)

Land Uses		Suggested Land Use Compatibility				
SLUCM NO.	**Category**	**DNL 65-69**	**DNL 70-74**	**DNL 75-79**	**DNL 80-84**	**DNL >85**
30	**Manufacturing**					
31	Rubber and misc. plastic products; manufacturing	Y	Y[b]	Y[c]	Y[d]	N
32	Stone, clay and glass products; manufacturing	Y	Y[b]	Y[c]	Y[d]	N
33	Primary metal products; manufacturing	Y	Y[b]	Y[c]	Y[d]	N
34	Fabricated metal products; manufacturing	Y	Y[b]	Y[c]	Y[d]	N
35	Professional scientific, and controlling instruments; photographic and optical goods; watches and clocks	Y	25	30	N	N
39	Miscellaneous manufacturing	Y	Y[b]	Y[c]	Y[d]	N
40	**Transportation, Communication, and Utilities**					
41	Railroad, rapid rail transit, and street railway transportation	Y	Y[b]	Y[c]	Y[d]	N
42	Motor vehicle transportation	Y	Y[b]	Y[c]	Y[d]	N
43	Aircraft transportation	Y	Y[b]	Y[c]	Y[d]	N
44	Marine craft transportation	Y	Y[b]	Y[c]	Y[d]	N
45	Highway and street right-of-way	Y	Y	Y	Y	N
46	Automobile parking	Y	Y	Y	Y	N
47	Communication	Y	25[e]	30[e]	N	N
48	Utilities	Y	Y[b]	Y[c]	Y[d]	N
49	Other transportation, communication, and utilities	Y	25[5]	30[e]	N	N
50	**Trade**					
51	Wholesale trade	Y	Y[b]	Y[c]	Y[d]	N
52	Retail trade – building materials, hardware, and farm equipment	Y	25	30	Y[4]	N
53	Retail trade – including shopping centers, discount clubs, home improvement stores, electronics superstores, etc.	Y	25	30	N	N
54	Retail trade – food	Y	25	30	N	N
55	Retail trade – automotive, marine craft, aircraft, and accessories	Y	25	30	N	N
56	Retail trade – apparel and accessories	Y	25	30	N	N
57	Retail trade – furniture, home, furnishings, and equipment	Y	25	30	N	N
58	Retail trade – eating and drinking establishments	Y	25	30	N	N
59	Other retail trade	Y	25	30	N	N
60	**Services**					
61	Finance, insurance, and real estate services	Y	25	30	N	N
62	Personal services	Y	25	30	N	N
62.4	Cemeteries	Y	Y[b]	Y[c]	Y[d,k]	Y[f,k]
63	Business services	Y	25	30	N	N
63.7	Warehousing and storage	Y	Y[b]	Y[c]	Y[d]	N
64	Repair services	Y	Y[b]	Y[c]	Y[d]	N
65	Professional services	Y	25	30	N	N
65.1	Hospitals, other medical facilities	25	30	N	N	N
65.16	Nursing homes	N[a]	N[a]	N	N	N
66	Contract construction services	Y	25	30	N	N
67	Government services	Y[a]	25	30	N	N
68	Educational services	25	30	N	N	N
68.1	Child care services, child development centers, and nurseries	25	30	N	N	N
69	Miscellaneous Services	Y	25	30	N	N
69.1	Religious activities (including places of worship)	Y	25	30	N	N
70	**Cultural, Entertainment, and Recreational**					
71	Cultural activities	25	30	N	N	N
71.2	Nature exhibits	Y[a]	N	N	N	N
72	Public assembly	Y	N	N	N	N
72.1	Auditoriums, concert halls	25	30	N	N	N
72.11	Outdoor music shells, amphitheaters	N	N	N	N	N

Table B-6. USAF Land Use Compatibility Recommendation (Continued)

Land Uses		Suggested Land Use Compatibility				
SLUCM NO.	Category	DNL 65-69	DNL 70-74	DNL 75-79	DNL 80-84	DNL >85
70	**Cultural, Entertainment, and Recreational**					
72.2	Outdoor sports arenas, spectator sports	Y[g]	Y[g]	N	N	N
73	Amusements	Y	Y	N	N	N
74	Recreational activities (including golf courses, riding stables, water recreation)	Y	25	30	N	N
75	Resorts and group camps	Y	25	N	N	N
76	Parks	Y	25	N	N	N
79	Other cultural, entertainment, and recreation	Y	25	N	N	N
80	**Resource Production and Extraction**					
81	Agriculture (except livestock)	Y[h]	Y[i]	Y[j]	Y[j,k]	Y[j,k]
81.5-81.7	Agriculture-Livestock farming including grazing and feedlots	Y[h]	Y[i]	N	N	N
82	Agriculture related activities	Y[h]	Y[i]	Y[j]	Y[j,k]	Y[j,k]
83	Forestry activities	Y[h]	Y[i]	Y[j]	Y[j,k]	Y[j,k]
84	Fishing activities	Y	Y	Y	Y	Y
85	Mining activities	Y	Y	Y	Y	Y
89	Other resource production or extraction	Y	Y	Y	Y	Y

[a] General Notes:

- Although local conditions regarding the need for housing may require residential use in these zones, residential use is discouraged in DNL 65 to 69 and strongly discouraged in DNL 70 to 74. The absence of viable alternative development options should be determined and an evaluation should be conducted locally prior to local approvals indicating that a demonstrated community need for the residential use would not be met if development were prohibited in these zones. Existing residential development is considered as pre-existing, non-conforming land uses.
- Where the community determines that these uses must be allowed, measures to achieve outdoor to indoor noise level reduction (NLR) of at least 25 dB in DNL 65 to 69 and 30 dB in DNL 70 to 74 should be incorporated into building codes and be considered in individual approvals; for transient housing, an NLR of at least 35 dB should be incorporated in DNL 75 to 79.
- Normal permanent construction can be expected to provide an NLR of 20 dB, thus the reduction requirements are often stated as 5, 10, or 15 dB over standard construction and normally assume mechanical ventilation, upgraded sound transmission class ratings in windows and doors, and closed windows year round. Additional consideration should be given to modifying NLR levels based on peak noise levels or vibrations.
- NLR criteria will not eliminate outdoor noise problems. However, building location, site planning, design, and use of berms and barriers can help mitigate outdoor noise exposure particularly from ground level sources. Measures that reduce noise at a site should be used wherever practical in preference to measures that only protect interior spaces.

[b] Measures to achieve NLR of 25 must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas, or where the normal noise level is low.

[c] Measures to achieve NLR of 30 must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas, or where the normal noise level is low.

[d] Measures to achieve NLR of 35 must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas, or where the normal noise level is low.

[e] If project or proposed development is noise sensitive, use indicated NLR; if not, land use is compatible without NLR.

[f] Buildings are not permitted.

[g] Land use is compatible provided special sound reinforcement systems are installed.

[h] Residential buildings require an NLR of 25.

[i] Residential buildings require an NLR of 30.

[j] Residential buildings are not permitted.

[k] Land use that involves outdoor activities is not recommended, but if the community allows such activities, hearing protection devices should be worn when noise sources are present. Long-term exposure (multiple hours per day over many years) to high noise levels can cause hearing loss in some unprotected individuals.

Key:

SLUCM = Standard Land Use Coding Manual, U.S. Department of Transportation (DOT).

Y (Yes) = Land use and related structures compatible without restrictions.

N (No) = Land use and related structures are not compatible and should be prohibited.

Y^x = Yes with restrictions. The land use and related structures generally are compatible. However, see note(s) indicated by the superscript.

N^x = No with exceptions. The land use and related structures are generally incompatible. However, see note(s) indicated by the superscript.

25, 30, or 35 = The numbers refer to NLR levels. NLR (outdoor to indoor) is achieved through the incorporation of noise attenuation into the design and construction of a structure. Land use and related structures are generally compatible; however, measures to achieve NLR of 25, 30, or 35 must be incorporated into design and construction of structures. However, measures to achieve an overall noise reduction do not necessarily solve noise difficulties outside the structure and additional evaluation is warranted. Also, see notes indicated by superscripts where they appear with one of these numbers.

CNEL = community noise equivalent level (normally within a very small dB difference of DNL).

B.2.3 SPEECH INTERFERENCE

Speech interference from noise is a primary cause of annoyance for communities. Disruption of routine activities such as radio or television listening, telephone use, or conversation leads to frustration and annoyance. The quality of speech communication is important in classrooms and offices. In the workplace, speech interference from noise can cause fatigue and vocal strain in those who attempt to talk over the noise. In schools it can impair learning.

There are two measures of speech comprehension:

1. *Word Intelligibility* – the percent of words spoken and understood. This might be important for students in the lower grades who are learning the English language, and particularly for students who have English as a Second Language.
2. *Sentence Intelligibility* – the percent of sentences spoken and understood. This might be important for high-school students and adults who are familiar with the language, and who do not necessarily have to understand each word in order to understand sentences.

B.2.3.1.1 U.S. Federal Criteria for Interior Noise

In 1974, the USEPA identified a goal of an indoor $L_{eq(24)}$ of 45 dB to minimize speech interference based on sentence intelligibility and the presence of steady noise (USEPA 1974). The effect of steady indoor background sound levels on sentence intelligibility is shown on Figure B-13. For an average adult with normal hearing and fluency in the language, steady background indoor sound levels of less than 45 dB L_{eq} are expected to allow 100 percent sentence intelligibility.

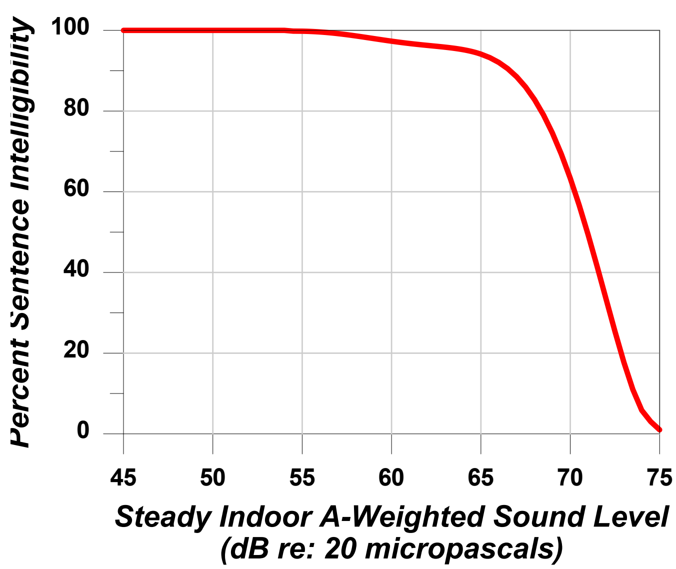


Figure B-13. Speech Intelligibility Curve (digitized from USEPA 1974)

The curve on Figure B-13 shows 99 percent intelligibility at L_{eq} less than 54 dB, and less than 10 percent greater than 73 dB. Recalling that L_{eq} is dominated by louder noise events, the USEPA $L_{eq(24)}$ goal of 45 dB generally ensures that sentence intelligibility will be high most of the time.

B.2.3.1.2 Classroom Criteria

For teachers to be understood, their regular voice must be clear and uninterrupted. Background noise has to be below the teacher's voice level. Intermittent noise events that momentarily drown out the teacher's voice need to be kept to a minimum. It is therefore important to evaluate the steady background level, the level of voice communication, and the single-event level due to aircraft overflights that might interfere with speech.

Lazarus (1990) found that for listeners with normal hearing and fluency in the language, complete sentence intelligibility can be achieved when the signal-to-noise ratio (i.e., a comparison of the level of the sound to the level of background noise) is in the range of 15 to 18 dB. The initial American National Standards Institute (ANSI) classroom noise standard (ANSI 2002) and American Speech-Language-Hearing Association (ASLHA) guidelines concur, recommending at least a 15 dB signal-to-noise ratio in classrooms (ASLHA 1995). If the teacher's voice level is at least 50 dB, the background noise level must not exceed an average of 35 dB. The National Research Council of Canada (Bradley 1993) and WHO (1999) agree with this criterion for background noise.

For eligibility for noise insulation funding, the Federal Aviation Administration (FAA) guidelines state that the design objective for a classroom environment is 45 dB L_{eq} during normal school hours (FAA 1985).

Most aircraft noise is not continuous. It consists of individual events like the one sketched on Figure B-7. Because speech interference in the presence of aircraft noise is caused by individual aircraft flyover events, a time-averaged metric alone, such as L_{eq}, is not necessarily appropriate. In addition to the background level criteria described previously, single-event criteria that account for those noisy events are also needed.

A 1984 study by Wyle for the Port Authority of New York and New Jersey recommended using Speech Interference Level (SIL) for classroom noise criteria (Sharp and Plotkin 1984). SIL is based on the L_{max} in the frequency range that most affects speech communication (500 to 2,000 Hz). The study identified an SIL of 45 dB as the goal. This would provide 90 percent word intelligibility for the short time periods during aircraft overflights. While SIL is technically the best metric for speech interference, it can be approximated by an L_{max} value. An SIL of 45 dB is equivalent to an A-weighted L_{max} of 50 dB for aircraft noise (Wesler 1986).

Lind et al. (1998) also concluded that an L_{max} criterion of 50 dB would result in 90 percent word intelligibility. Bradley (1985) recommends SEL as a better indicator. His work indicates that 95 percent word intelligibility would be achieved when indoor SEL did not exceed 60 dB. For typical flyover noise this corresponds to an L_{max} of 50 dB. While WHO (1999) only specifies a background L_{max} criterion, they also note the SIL frequencies and that interference can begin at around 50 dB.

The United Kingdom Department for Education and Skills (UKDfES) established in its classroom acoustics guide a 30-minute time-averaged metric of $L_{eq(30min)}$ for background levels and the metric of $L_{A1,30min}$ for intermittent noises, at thresholds of 30 to 35 and 55 dB, respectively. $L_{A1,30min}$ represents the A-weighted decibels that is exceeded 1 percent of the time (in this case, during a 30-minute teaching session) and is generally equivalent to the L_{max} metric (UKDfES 2003).

Table B-7 summarizes the criteria discussed. Other than the FAA (1985) 45 dB L_{max} criterion, they are consistent with a limit on indoor background noise of 35 to 40 dB L_{eq} and a single event limit of 50 dB L_{max}. It should be noted that these limits were set based on students with normal hearing and no special needs. At-risk students may be adversely affected at lower sound levels.

Table B-7. Indoor Noise Level Criteria Based on Speech Intelligibility

Source	Metric/Level (dB)	Effects and Notes
U.S. FAA (1985)	$L_{eq(during\ school\ hours)}$ = 45 dB	Federal assistance criteria for school sound insulation; supplemental single-event criteria may be used.
Lind et al. (1998), Sharp and Plotkin (1984), Wesler (1986)	L_{max} = 50 dB / SIL 45	Single event level permissible in the classroom.
WHO (1999)	L_{eq} = 35 dB L_{max} = 50 dB	Assumes average speech level of 50 dB and recommends signal to noise ratio of 15 dB.
U.S. ANSI (2010)	L_{eq} = 35 dB, based on Room Volume (e.g., cubic feet)	Acceptable background level for continuous and intermittent noise.
U.K. DFES (2003)	$L_{eq(30min)}$ = 30-35 dB L_{max} = 55 dB	Minimum acceptable in classroom and most other learning environs.

B.2.4 SLEEP DISTURBANCE

Sleep disturbance is a major concern for communities exposed to aircraft noise at night. A number of studies have attempted to quantify the effects of noise on sleep. This section provides an overview of the major noise-induced sleep disturbance studies. Emphasis is on studies that have influenced U.S. federal noise policy. The studies have been separated into two groups:

1. Initial studies performed in the 1960s and 1970s, where the research was focused on sleep observations performed under laboratory conditions.
2. Later studies performed in the 1990s up to the present, where the research was focused on field observations.

B.2.4.1 Initial Studies

The relation between noise and sleep disturbance is complex and not fully understood. The disturbance depends not only on the depth of sleep and the noise level, but also on the non-acoustic factors cited for annoyance. The easiest effect to measure is the number of arousals or awakenings from noise events. Much of the literature has therefore focused on predicting the percentage of the population that will be awakened at various noise levels.

FICON's 1992 review of airport noise issues (FICON 1992) included an overview of relevant research conducted through the 1970s. Literature reviews and analyses were conducted from 1978 through 1989 using existing data (Griefahn 1978; Lukas 1978; Pearsons et al. 1989). Because of large variability in the data, FICON did not endorse the reliability of those results.

FICON did recommend, however, an interim dose-response curve, awaiting future research. That curve predicted the percent of the population expected to be awakened as a function of the exposure to SEL. This curve was based on research conducted for the USAF (Finegold 1994). The data included most of the research performed up to that point, and predicted a 10 percent probability of awakening when exposed to an interior SEL of 58 dB. The data used to derive this curve were primarily from controlled laboratory studies.

B.2.4.2 Recent Sleep Disturbance Research – Field and Laboratory Studies

It was noted that early sleep laboratory studies did not account for some important factors. These included habituation to the laboratory, previous exposure to noise, and awakenings from noise other than aircraft. In the early 1990s, field studies in people's homes were conducted to validate the earlier laboratory work conducted in the 1960s and 1970s. The field studies of the 1990s found that 80 to 90 percent of sleep disturbances were not related to outdoor noise events, but rather to indoor noises and non-noise factors. The results showed that, in real life conditions, there was less of an effect of noise on sleep than had been previously reported from laboratory studies. Laboratory sleep studies tend to show more sleep disturbance than field studies because people who sleep in their own homes are used to their environment and, therefore, do not wake up as easily (FICAN 1997).

B.2.4.3 Federal Interagency Committee on Aviation Noise

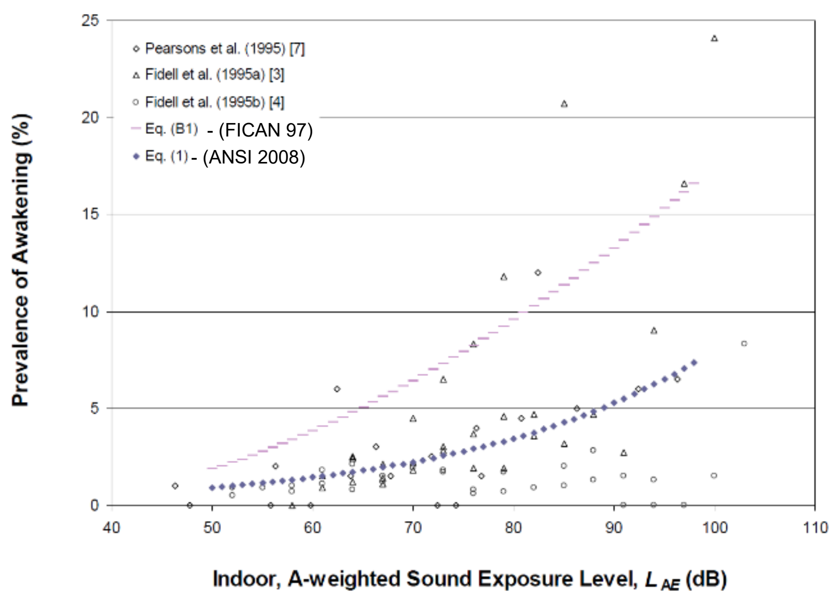
Based on this new information, in 1997 FICAN recommended a dose-response curve to use instead of the earlier 1992 FICON curve (FICAN 1997). FICAN's curve, the red dashed line, which is based on the results of three field studies shown on Figure B-14 (Ollerhead et al. 1992; Fidell et al. 1994; Fidell et al. 1995a, 1995b), along with the data from six previous field studies.

The 1997 FICAN curve represents the upper envelope of the latest field data. It predicts the maximum percent awakened for a given residential population. According to this curve, a maximum of 3 percent of people would be awakened at an indoor SEL of 58 dB. An indoor SEL of 58 dB is equivalent to an outdoor SEL of 83 dB, with the windows closed (73 dB with windows open).

B.2.4.4 Number of Events and Awakenings

It is reasonable to expect that sleep disturbance is affected by the number of events. The German Aerospace Center (i.e., DLR Laboratory) conducted an extensive study focused on the effects of nighttime aircraft noise on sleep and related factors (Basner 2004). The DLR study was one of the largest studies to examine the link between aircraft noise and sleep disturbance. It involved both laboratory and in-home field research phases. The DLR investigators developed a dose-response curve that predicts the number of aircraft events at various values of L_{max} expected to produce one additional awakening over the course of a night. The dose-effect curve was based on the relationships found in the field studies.

A different approach was taken by an ANSI standards committee (ANSI 2008). The committee used the average of the data shown on Figure B-14 (i.e., the blue dashed line) rather than the upper envelope, to predict average awakening from one event. Probability theory is then used to project the awakening from multiple noise events.



Source: DoD 2009

Figure B-14. Sleep Disturbance Dose-Response Relationship

Currently, there are no established criteria for evaluating sleep disturbance from aircraft noise, although recent studies have suggested a benchmark of an outdoor SEL of 90 dB as an appropriate tentative criterion when comparing the effects of different operational alternatives. The corresponding indoor SEL would be approximately 25 dB lower (at 65 dB) with doors and windows closed, and approximately 15 dB lower (at 75 dB) with doors or windows open. According to the ANSI (2008) standard, the probability of awakening from a single aircraft event at this level is between 1 and 2 percent for people habituated to the noise sleeping in bedrooms with windows closed, and 2 to 3 percent with windows open. The probability of the exposed population awakening at least once from multiple aircraft events at noise levels of 90 dB SEL is shown in Table B-8.

Table B-8. Probability of Awakening from the Number-of-Events Above a 90-Decibel Sound Exposure Level

Number of Aircraft Events at 90 dB SEL for Average 9-Hour Night	Minimum Probability of Awakening at Least Once (Percent)	
	Windows Closed	Windows Open
1	1	2
3	4	6
5	7	10
9 (1 per hour)	12	18
12 (2 per hour)	22	33
27 (3 per hour)	32	45

Source: DoD 2009

In December 2008, FICAN recommended the use of this new standard. FICAN also recognized that more research is underway by various organizations, and that work may result in changes to FICAN's position. Until that time, FICAN recommends the use of the ANSI (2008) standard (FICAN 2008).

B.2.4.5 Summary

Sleep disturbance research still lacks the details to accurately estimate the population awakened for a given noise exposure. The procedure described in the ANSI (2008) Standard and endorsed by FICAN is based on probability calculations that have not yet been scientifically validated. While this procedure certainly provides a much better method for evaluating sleep awakenings from multiple aircraft noise events, the estimated probability of awakenings can only be considered approximate.

B.2.5 NOISE-INDUCED HEARING IMPAIRMENT

Residents in surrounding communities express concerns regarding the effects of aircraft noise on hearing. This section provides a brief overview of hearing loss caused by noise exposure. The goal is to provide a sense of perspective as to how aircraft noise (as experienced on the ground) compares to other activities that are often linked with hearing loss.

B.2.5.1 Hearing Threshold Shifts

Hearing loss is generally interpreted as a decrease in the ear's sensitivity or acuity to perceive sound (i.e., a shift in the hearing threshold to a higher level). This change can either be a temporary threshold shift (TTS) or a permanent threshold shift (PTS) (Berger et al. 1995).

TTS can result from exposure to loud noise over a given amount of time. An example of TTS might be a person attending a loud music concert. After the concert is over, there can be a threshold shift that may last several hours. While experiencing TTS, the person becomes less sensitive to low-level sounds, particularly at certain frequencies in the speech range (typically near 4,000 Hz). Normal hearing eventually returns, as long as the person has enough time to recover within a relatively quiet environment.

A PTS usually results from repeated exposure to high noise levels, where the ears are not given adequate time to recover. A common example of PTS is the result of regularly working in a loud factory. A TTS can eventually become a PTS over time with repeated exposure to high noise levels. Even if the ear is given time to recover from TTS, repeated occurrence of TTS may eventually lead to permanent hearing loss. The point at which a TTS results in a PTS is difficult to identify and varies with a person's sensitivity.

B.2.5.2 Criteria for Permanent Hearing Loss

It has been well established that continuous exposure to high noise levels will damage human hearing (USEPA 1978). A large amount of data on hearing loss have been collected, largely for workers in manufacturing industries, and analyzed by the scientific/medical community. The Occupational Safety and Health Administration (OSHA) regulation of 1971 places the limit on workplace noise exposure at an average level of 90 dB over an 8-hour work period or 85 dB over a 16-hour period (U.S. Department of Labor 1971). Some hearing loss is still expected at those levels. The most protective criterion, with no measurable hearing loss after 40 years of exposure, is an average sound level of 70 dB over a 24-hour period.

The USEPA established 75 dB 8-hour equivalent noise level ($L_{eq(8)}$) and 70 dB $L_{eq(24)}$ as the average noise level standard needed to protect 96 percent of the population from greater than a 5 dB PTS (USEPA 1978). The National Academy of Sciences Committee on Hearing, Bioacoustics, and Biomechanics (CHABA) identified 75 dB as the lowest level at which hearing loss may occur (CHABA 1977). WHO concluded that environmental and leisure-time noise below an $L_{eq(24)}$ value of 70 dB "will not cause hearing loss in the large majority of the population, even after a lifetime of exposure" (WHO 1999).

B.2.5.3 Hearing Loss and Aircraft Noise

The 1982 USEPA Guidelines report (USEPA 1982) addresses noise-induced hearing loss in terms of the Noise-Induced Permanent Threshold Shift (NIPTS). This defines the permanent change in hearing caused by exposure to noise. Numerically, the NIPTS is the change in threshold that can be expected from daily exposure to noise over a normal working lifetime of 40 years. A grand average of the NIPTS over time and hearing sensitivity is termed the Average NIPTS, or Ave. NIPTS for short. The Ave. NIPTS that can be expected for noise measured by the $L_{eq(24)}$ metric is given in Table B-9 and assumes exposure to the full outdoor noise throughout the 24 hours. When inside a building, the exposure will be less (Eldred and von Gierke 1993).

Table B-9. Average NIPTS and 10th Percentile NIPTS as a Function of DNL

1251BDNL	1252BAve. NIPTS dB[a]	1253B10th Percentile NIPTS dB[a]
1254B75-76	1255B1.0	1256B4.0
1257B76-77	1258B1.0	1259B4.5
1260B77-78	1261B1.6	1262B5.0
1263B78-79	1264B2.0	1265B5.5
1266B79-80	1267B2.5	1268B6.0
1269B80-81	1270B3.0	1271B7.0
1272B81-82	1273B3.5	1274B8.0
1275B82-83	1276B4.0	1277B9.0

Table B-9. Average NIPTS and 10th Percentile NIPTS as a Function of DNL (Continued)

1251BDNL	1252BAve. NIPTS dB[a]	1253B10th Percentile NIPTS dB[a]
1278B83-84	1279B4.5	1280B10.0
1281B84-85	1282B5.5	1283B11.0
1284B85-86	1285B6.0	1286B12.0
1287B86-87	1288B7.0	1289B13.5
1290B87-88	1291B7.5	1292B15.0
1293B88-89	1294B8.5	1295B16.5
1296B89-90	1297B9.5	1298B18.0

[a] Rounded to the nearest 0.5 dB
Source: DoD 2012

The Ave. NIPTS is estimated as an average over all people exposed to the noise. The actual value of NIPTS for any given person will depend on their physical sensitivity to noise—some will experience more hearing loss than others. The USEPA Guidelines provide information on this variation in sensitivity in the form of the NIPTS exceeded by 10 percent of the population, which is included in the Table B-9 in the "10th Percentile NIPTS" column (USEPA 1982). For individuals exposed to $L_{eq(24)}$ of 80 dB, the most sensitive of the population would be expected to show degradation to their hearing of 7 dB over time.

To put these numbers in perspective, changes in hearing level of less than 5 dB are generally not considered noticeable or significant. Furthermore, there is no known evidence that a NIPTS of 5 dB is perceptible or has any practical significance for the individual. Lastly, the variability in audiometric testing is generally assumed to be ±5 dB (USEPA 1974).

The scientific community has concluded that noise exposure from civil airports has little chance of causing permanent hearing loss (Newman and Beattie 1985). For military airbases, DoD policy requires that hearing risk loss be estimated for population exposed to $L_{eq(24)}$ of 80 dB or higher (DoD 2012), including residents of on-base housing. Exposure of workers inside the base boundary is assessed using DoD regulations for occupational noise exposure.

Noise in low-altitude military airspace, especially along MTRs where L_{max} can exceed 115 dB, is of concern. That is the upper limit used for occupational noise exposure (e.g., U.S. Department of Labor 1971). One laboratory study (Ising et al. 1999) concluded that events with L_{max} greater than 114 dB have the potential to cause hearing loss. Another laboratory study of participants exposed to levels between 115 and 130 dB (Nixon et al. 1993), however, showed conflicting results. For an exposure to four events across that range, half the subjects showed no change in hearing, one quarter showed a temporary 5 dB decrease in sensitivity, and a quarter showed a temporary 5 dB increase in sensitivity. For exposure to eight events of 130 dB, subjects showed an increase in sensitivity of up to 10 dB (Nixon et al. 1993).

B.2.5.4 Summary

Aviation noise levels are not comparable to the occupational noise levels associated with hearing loss of workers in manufacturing industries. There is little chance of hearing loss at levels less than 75 dB DNL. Noise levels equal to or greater than 75 dB DNL can occur near military airbases, and DoD policy specifies that NIPTS be evaluated when exposure exceeds 80 dB $L_{eq(24)}$ (DoD 2009c). There is some concern about L_{max} exceeding 115 dB in low altitude military airspace, but no research results to date have definitely related permanent hearing impairment to aviation noise.

B.2.6 NON-AUDITORY HEALTH EFFECTS

Studies have been performed to see whether noise can cause health effects other than hearing loss. The premise is that annoyance causes stress. Prolonged stress is known to be a contributor to a number of health disorders. Cantrell (1974) confirmed that noise can provoke stress, but noted that results on cardiovascular health have been contradictory. Some studies have found a connection between aircraft noise and blood pressure (e.g., Michalak et al. 1990; Rosenlund et al. 2001), while others have not (e.g., Pulles et al. 1990).

Kryter and Poza (1980) noted, "It is more likely that noise related general ill-health effects are due to the psychological annoyance from the noise interfering with normal everyday behavior, than it is from the noise eliciting, because of its intensity, reflexive response in the autonomic or other physiological systems of the body."

The connection from annoyance to stress to health issues requires careful experimental design. Some highly publicized reports on health effects have, in fact, been rooted in poorly done science. Meecham and Shaw (1979) apparently found a relation between noise levels and mortality rates in neighborhoods under the approach path to Los Angeles International Airport. When the same data were analyzed by others (Frerichs et al. 1980), no relationship was found. Jones and Tauscher (1978) found a high rate of birth defects for the same neighborhood. But when the Centers For Disease Control performed a more thorough study near Atlanta's Hartsfield International Airport, no relationships were found for levels greater than 65 dB (Edmonds et al. 1979).

A carefully designed study, Hypertension and Exposure to Noise near Airports (HYENA), was conducted around six European airports from 2002 through 2006 (Jarup et al. 2005, 2008). There were 4,861 subjects, aged between 45 and 70. Blood pressure was measured, and questionnaires administered for health, socioeconomic, and lifestyle factors, including diet and physical exercise. Hypertension was defined by WHO blood pressure thresholds (WHO 2003). Noise from aircraft and highways was predicted from models.

The HYENA results were presented as an odds ratio (OR). An OR of 1 means there is no added risk, while an OR of 2 would mean risk doubles. An OR of 1.14 was found for nighttime aircraft noise, measured by L_{night}, the L_{eq} for nighttime hours. For daytime aircraft noise, measured by $L_{eq(16)}$, the OR was 0.93. For road traffic noise, measured by the full day $L_{eq(24)}$, the OR was 1.1.

Note that OR is a statistical measure of change, not the actual risk. Risk itself and the measured effects were small, and not necessarily distinct from other events. Haralabidis et al. (2008) reported an increase in systolic blood pressure of 6.2 millimeters of mercury (mmHg) for aircraft noise, and an increase of 7.4 mm Hg for other indoor noises such as snoring.

It is interesting that aircraft noise is a factor only at night, while traffic noise is a factor for the full day. Aircraft noise results varied among the six countries so that result is pooled across all data. Traffic noise results were consistent across the six countries.

One interesting conclusion from a 2013 study of the HYENA data (Babisch et al. 2013) states there is some indication that noise level is a stronger predictor of hypertension than annoyance. That is not consistent with the idea that annoyance is a link in the connection between noise and stress. Babisch et al. (2012) present interesting insights on the relationship of the results to various modifiers.

Two studies examined the correlation of aircraft noise with hospital admissions for cardiovascular disease. Hansell et al. (2013) examined neighborhoods around London's Heathrow airport. Correia et al. (2013) examined neighborhoods around 89 airports in the United States. Both studies included areas of various noise levels. They found associations that were consistent with the HYENA results. The authors of these studies noted that further research is needed to refine the associations and the causal interpretation with noise or possible alternative explanations. Rhee et al. (2008) found a significant association between military helicopter noise and the prevalence of hypertension but no significant effect due to exposure to fighter jet (fixed-wing) noise, also noting that more research is needed to better understand the observed effects (Rhee, Kim, Roh, Kim, and Kwon 2008).

Associations between aircraft noise and negative mental health outcomes has been the subject of several studies in recent years. Analysis of cross-sectional data of 15,010 Germans by Beutel et al. (2016) found significant associations between noise and increased prevalence of anxiety and depression. The authors acknowledge that annoyance due to aircraft noise could not be related directly to the negative outcomes, but establish that it was a major source of annoyance in the sample.

In a 2018 review of selected aviation noise research, the FICAN stated that, based on a large number of studies on the subject, they conclude chronic road traffic noise has non-acoustic (cardiovascular) health effects, but that there is a need for more and better-designed studies before a similar conclusion can be reached for aircraft noise. High road traffic noise levels have been associated by several studies with an increased risk of hypertension (Dzhambov et al. 2017) (Hahad, Prochaska, Daiber, and Münzel 2019) and stroke for people over the age of 64 (Sørensen et al. 2011). Recent studies provide novel insights into mechanisms of vascular damage which is attributed to noise (Münzel et al. 2018a) (Münzel et al. 2018b). The accumulated evidence to support association between aircraft noise and non-auditory health impacts (Münzel, Gori, Babish, and Basner 2014) (Willich, Wegscheider, Stallmann, and Keil 2006) is considered by FICAN to be less strong.

In 2018, van Kempen et al. conducted a systematic review of literature on cardiovascular and metabolic effects of noise at the behest of the WHO (van Kempen, Casas, Pershagen, and Foraster 2018). The quality of evidence available supporting associations between noise and a variety of potential noise impacts in hundreds of published studies was rated based on risk of bias, inconsistency, indirectness, imprecision, publication bias, strength of association, exposure-response gradient, and possible confounding in multiple categories of studies. For example, the reviewers judged the overall quality of evidence for an association between aircraft noise and prevalence of hypertension to be "low" due primarily to a "serious" risk of bias and inconsistency of data and a "small" strength of association in the cross-sectional and cohort studies considered. The quality of evidence to support an association between aircraft noise and prevalence of ischemic heart disease, as well as mortality due to ischemic heart disease, was judged to be "very low" or "low" for the cross-sectional and cohort studies considered. The association between aircraft noise and the prevalence of stroke was found to be "very low," while the evidence supporting association with mortality due to stroke were judged to be "moderate". The quality of evidence supporting and associations between aircraft noise and the prevalence of diabetes was judged to be "very low" while the association with the incidence of diabetes was judged to be "low". Evidence of an association between aircraft noise and the risk of obesity, as quantified using body mass index, was found to be "low," while the quality of evidence supporting an association with increased waist circumference was found to be "moderate".

A 2017 literature review by the International Civil Aviation Organization titled "Aviation Noise: State of the Science" concluded that "There is a good biological plausibility by which noise may affect health in terms of impacts on the autonomic system, annoyance and sleep disturbance. Studies are suggestive of impacts on cardiovascular health especially hypertension, but limited and inconclusive with respect to quantification of these, with a relatively small number of studies conducted to date. More studies are needed to better define exposure –response relationships, the relative importance of night versus daytime noise and the best noise metrics for health studies (e.g., number of aircraft noise events versus average noise level).” (Basner et al. 2017).

B.2.6.1 Summary

The current state of scientific knowledge cannot yet support inference of a causal or consistent relationship between aircraft noise exposure and non-auditory health consequences for exposed residents. The large scale HYENA study, and the recent studies by Hansell et al. (2013) and Correia et al. (2013) offer indications, but it is not yet possible to establish a quantitative cause and effect based on the currently available scientific evidence. These summary conclusions are supported by extensive reviews of recent literature conducted by several groups (Federal Interagency Comittee on Aircraft Noise 2018) (van Kempen, Casas, Pershagen, and Foraster 2018) (Basner et al. 2017).

B.2.7 PERFORMANCE EFFECTS

The effect of noise on the performance of activities or tasks has been the subject of many studies. Some of these studies have found links between continuous high noise levels and performance loss. Noise-induced performance losses are most frequently reported in studies where noise levels are greater than 85 dB. Little change has been found in low-noise cases. Moderate noise levels appear to act as a stressor for more sensitive individuals performing a difficult psychomotor task.

While the results of research on the general effect of periodic aircraft noise on performance have yet to yield definitive criteria, several general trends have been noted, including the following:

- A periodic intermittent noise is more likely to disrupt performance than a steady-state continuous noise of the same level. Flyover noise, due to its intermittent nature, might be more likely to disrupt performance than a steady-state noise of equal level.
- Noise is more inclined to affect the quality than the quantity of work.
- Noise is more likely to impair the performance of tasks that place extreme demands on workers.

B.2.8 NOISE EFFECTS ON CHILDREN

Recent studies on school children indicate a potential link between aircraft noise and both reading comprehension and learning motivation. The effects may be small but may be of particular concern for children who are already scholastically challenged.

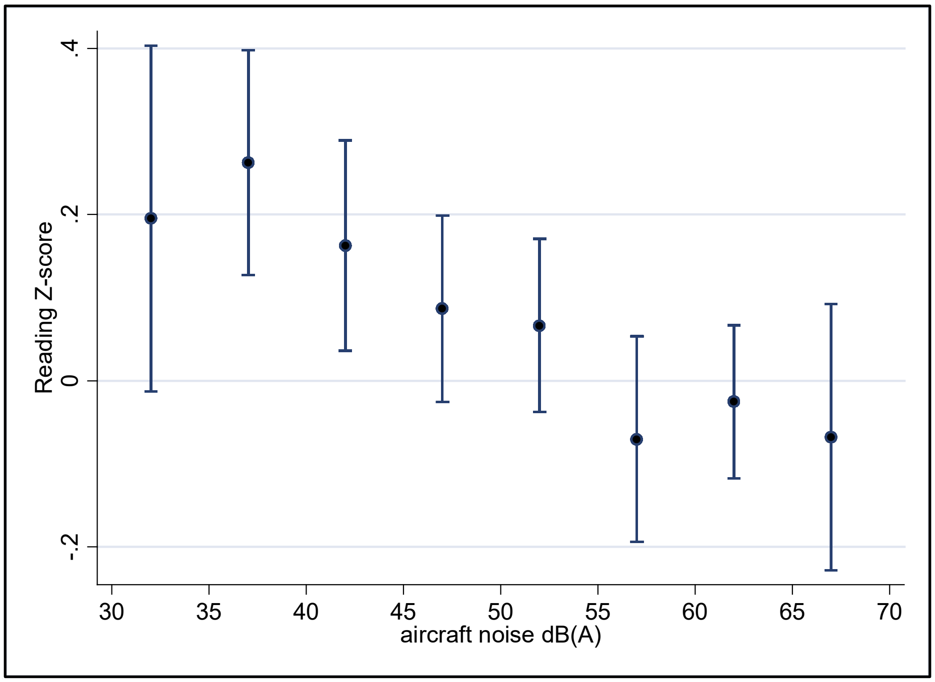
B.2.8.1 Effects on Learning and Cognitive Abilities

Early studies in several countries (Cohen et al. 1973, 1980, 1981; Bronzaft and McCarthy 1975; Green et al. 1982; Evans et al. 1998; Haines et al. 2002; Lercher et al. 2003) showed lower reading scores for children living or attending school in noisy areas than for children away from those areas. In some studies noise exposed children were less likely to solve difficult puzzles or more likely to give up.

More recently, the Road Traffic and Aircraft Noise Exposure and Children’s Cognition and Health (RANCH) study (Stansfeld et al. 2005; Clark et al. 2005) compared the effect of aircraft and road traffic noise on over 2,000 children in three countries. This was the first study to derive exposure-effect associations for a range of cognitive and health effects, and was the first to compare effects across countries.

The study found a linear relation between chronic aircraft noise exposure and impaired reading comprehension and recognition memory. No associations were found between chronic road traffic noise exposure and cognition. Conceptual recall and information recall surprisingly showed better performance in high road traffic noise areas. Neither aircraft noise nor road traffic noise affected attention or working memory (Stansfeld et al. 2005; Clark et al. 2006).

RANCH's result relating noise to reading comprehension is shown on Figure B-15. Reading falls below average (a z-score of 0) at L_{eq} greater than 55 dB, as shown on the figure. Because the relationship is linear, reducing exposure at any level should lead to improvements in reading comprehension.



Sources: Stansfeld et al. 2005; Clark et al. 2006

Figure B-15. RANCH Study Reading Scores Varying with L_{eq}

A 6-year follow-up to the RANCH study designed to examine long-term effects of aircraft noise found that children exposed to aircraft noise during primary school had increased noise annoyance but only non-significant negative association with reading comprehension (Clark, Head, and Stansfield 2013). Study authors felt that the lack of statically significant association between noise and reading comprehension was a result of smaller sample size (i.e., 461 children) available for follow-up.

FICAN funded a pilot study to assess the relationship between aircraft noise reduction and standardized test scores (Eagan et al. 2004; FICAN 2007). The study evaluated whether abrupt aircraft noise reduction within classrooms, from either airport closure or sound insulation, was associated with improvements in test scores. Data were collected in 35 public schools near three airports in Illinois and Texas. The study used several noise metrics. While the findings of this study are valid, the study make use of computed indoor levels, making it hard to compare with the outdoor levels used in most other studies.

The FICAN study found a significant association between noise reduction and a decrease in failure rates for high school students, but not middle or elementary school students. There were some weaker associations between noise reduction and an increase in failure rates for middle and elementary schools. Overall the study found that the associations observed were similar for children with or without learning difficulties, and between verbal and math/science tests. As a pilot study, it was not expected to obtain final answers, but provided useful indications (FICAN 2007).

A study conducted on school occupants exposed to 55 dB DNL and higher near the top 46 U.S. airports found associations between aircraft noise levels and scores on standardized tests in 3rd through 5th grades after accounting for school factors and demographics (National Academies of Sciences, Engineering, and Medicine 2014). It was shown that schools with good sound insulation have better test scores than those with less insulation. The study showed a greater effect of noise on the performance of non-disadvantaged students than on disadvantaged students, but study analysis does not provide rationale for this result. The study provides further support to the hypothesis that elevated background noise levels are negatively associated with student performance.

Case studies at eleven schools near Los Angeles International Airport identified factors at the individual classroom, student, and teacher level that influence the degree to which noise impacts student achievement (National Academies of Sciences, Engineering, and Medicine 2017). Classroom observations showed that the most common sources of distraction for students was other students (51 percent) followed by "other" non-aircraft events (30 percent). Even though no in-class distractions were directly attributed to individual aircraft noise events, teachers at schools where DNL exceeded 55 dB were more likely to report perceived interference with student attention, concentration, and performance.

While many factors can contribute to learning deficits in school-aged children, there is increasing awareness that chronic exposure to high aircraft noise levels may impair learning. This awareness has led WHO and a North Atlantic Treaty Organization (NATO) working group to conclude that daycare centers and schools should not be located near major sources of noise, such as highways, airports, and industrial sites (NATO 2000; WHO 1999). The awareness has also led to the classroom noise standard discussed earlier (ANSI 2002).

B.2.8.2 Health Effects

A number of studies, including some of the cognitive studies discussed previously, have examined the potential for effects on children's health. Health effects include annoyance, psychological health, coronary risk, stress hormones, sleep disturbance and hearing loss.

Annoyance. Chronic noise exposure causes annoyance in children (Bronzaft and McCarthy 1975; Evans et al. 1995). Annoyance among children tends to be higher than for adults, and there is little habituation (Haines et al. 2001a). The RANCH study found annoyance may play a role in how noise affects reading comprehension (Clark et al. 2005).

Psychological Health. Lercher et al. (2002) found an association between noise and teacher ratings of psychological health, but only for children with biological risk defined by low birth weight and/or premature birth. Haines et al. (2001b) found that children exposed to aircraft noise had higher levels of psychological distress and hyperactivity. Stansfeld et al. (2009) replicated the hyperactivity result, but not distress.

As with studies of adults, the evidence suggests that chronic noise exposure is probably not associated with serious psychological illness, but there may be effects on well-being and quality of life. Further research is needed, particularly on whether hyperactive children are more susceptible to stressors such as aircraft noise.

Coronary Risk. The HYENA study discussed earlier indicated a possible relation between noise and hypertension in older adults. Cohen et al. (1980, 1981) found some increase in blood pressure among school children, but within the normal range and not indicating hypertension. Hygge et al. (2002) found mixed effects. The RANCH study found some effect for children at home and at night, but not at school. Overall the evidence for noise effects on children's blood pressure is mixed, and less certain than for older adults. A systematic literature review conducted by Kempen et al. in 2018 judged the overall quality of evidence based on several factors present in available studies on a variety of potential noise impacts (van Kempen, Casas, Pershagen, and Foraster 2018). They judged the overall quality of evidence supporting an association between children's blood pressure and aircraft noise experienced at home or at school to be "very low." Similarly, the quality of evidence supporting an association between aircraft noise at home as well as at school and a change in children's blood pressure was also found to be "very low."

Stress Hormones. Some studies investigated hormonal levels between groups of children exposed to aircraft noise compared to those in a control group. Two studies analyzed cortisol and urinary catecholamine levels in school children as measurements of stress response to aircraft noise (Haines et al. 2001a, 2001b). In both instances, there were no differences between the aircraft-noise-exposed children and the control groups.

Sleep Disturbance. A sub-study of RANCH in a Swedish sample used sleep logs and the monitoring of rest/activity cycles to compare the effect of road traffic noise on child and parent sleep (Ohrstrom et al. 2006). An exposure-response relationship was found for sleep quality and daytime sleepiness for children. While this suggests effects of noise on children's sleep disturbance, it is difficult to generalize from one study.

Hearing loss. A few studies have examined hearing loss from exposure to aircraft noise. Noise-induced hearing loss for children who attended a school located under a flight path near a Taiwan airport was greater than for children at another school far away (Chen et al. 1997). Another study reported that hearing ability was reduced significantly in individuals who lived near an airport and were frequently exposed to aircraft noise (Chen and Chen 1993). In that study, noise exposure near the airport was greater than 75 dB DNL and L_{max} were approximately 87 dB during overflights. Conversely, several other studies reported no difference in hearing ability between children exposed to high levels of airport noise and children located in quieter areas (Andrus et al. 1975; Fisch 1977; Wu et al. 1995). It is not clear from those results whether children are at higher risk than adults, but the levels involved are higher than those desirable for learning and quality of life.

Ludlow and Sixsmith (1999) conducted a cross-sectional pilot study to examine the hypothesis that military jet noise exposure early in life is associated with raised hearing thresholds. The authors concluded that there were no significant differences in audiometric test results between military personnel who as children had lived in or near stations where fast jet operations were based, and a similar group who had no such exposure as children.

B.2.9 PROPERTY VALUES

Noise can affect the value of homes. Economic studies of property values based on selling prices and noise have been conducted to find a direct relation.

The value-noise relation is usually presented as the Noise Depreciation Index (NDI) or Noise Sensitivity Depreciation Index (NSDI), the percent loss of value per dB (measured by the DNL metric). An early study by Nelson (1978) at three airports found an NDI of 1.8 to 2.3 percent per dB. Nelson also noted a decline in NDI over time which he theorized could be due to either a change in population or the increase in commercial value of the property near airports. Crowley (1978) reached a similar conclusion. A larger study by Nelson (1980) looking at 18 airports found an NDI from 0.5 to 0.6 percent per dB.

In a review of property value studies, Newman and Beattie (1985) found a range of NDI from 0.2 to 2 percent per dB. They noted that many factors other than noise affected values.

Fidell et al. (1996) studied the influence of aircraft noise on actual sale prices of residential properties in the vicinity of a military base in Virginia and one in Arizona. They found no meaningful effect on home values. Their results may have been due to non-noise factors, especially the wide differences in homes between the two study areas.

Recent studies of noise effects on property values have recognized the need to account for non-noise factors. Nelson (2004) analyzed data from 33 airports, and discussed the need to account for those factors and the need for careful statistics. His analysis showed NDI from 0.3 to 1.5 percent per dB, with an average of approximately 0.65 percent per dB. Nelson (2007) and Andersson et al. (2013) discuss statistical modeling in more detail.

Enough data are available to conclude that aircraft noise has a real effect on property values. This effect falls in the range of 0.2 to 2 percent per dB, with the average on the order of 0.5 percent per dB. The actual value varies from location to location, and is very often small compared to non-noise factors.

B.2.10 NOISE-INDUCED VIBRATION EFFECTS ON STRUCTUES AND HUMANS

High noise levels can cause buildings to vibrate. If high enough, building components can be damaged. The most sensitive components of a building are the windows, followed by plaster walls and ceilings. Possibility of damage depends on the peak sound pressures and the resonances of the building. An evaluation of the peak sound pressures impinging on the structure is normally sufficient to determine the possibility of damage. In general, at unweighted sound levels greater than 130 dB, there is the possibility of structural damage (CHABA 1977). That is higher than expected from normal aircraft operations. Even low altitude flyovers of heavy aircraft do not reach the potential for damage (Sutherland 1990a). While certain frequencies (such as 30 Hz for window breakage) may be of more concern than other frequencies, conservatively, only sounds lasting more than one second above an unweighted sound level of 130 dB are potentially damaging to structural components (von Gierke and Ward 1991).

The sound from an aircraft overflight travels from the exterior to the interior of the house in one of two ways: through the solid structural elements and directly through the air. The sound transmission through a wall constructed with a brick exterior, stud framing, interior finish wall, and absorbent material in the cavity is shown on Figure B-16. The sound transmission starts with noise impinging on the wall exterior. Some of this sound energy will be reflected away and some will make the wall vibrate. The vibrating wall radiates sound into the airspace, which in turn sets the interior finish surface vibrating, with some energy lost in the airspace. This surface then radiates sound into the dwelling interior. As shown on the figure, vibrational energy also bypasses the air cavity by traveling through the studs and edge connections.

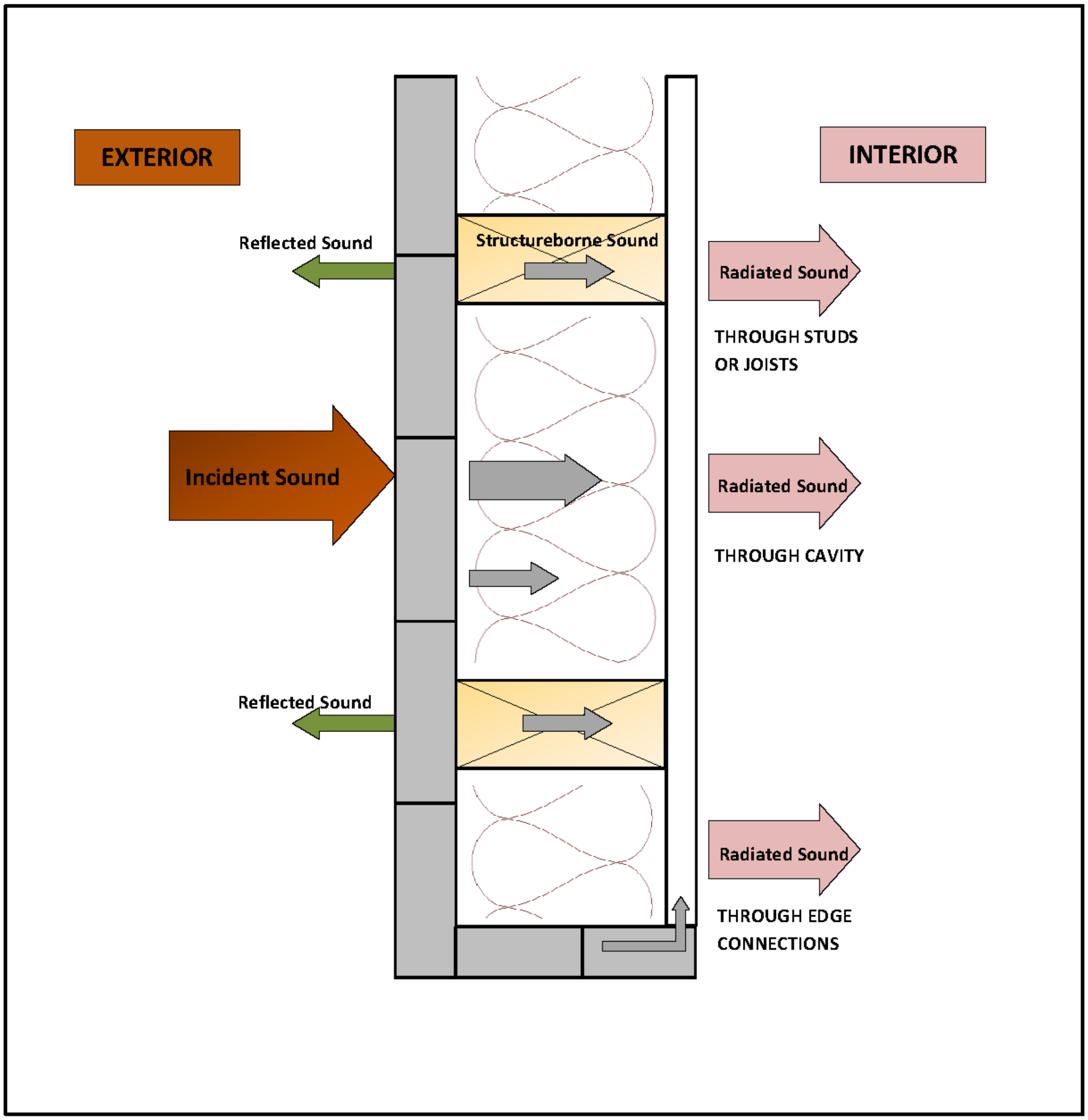


Figure B-16. Depiction of Sound Transmission through Built Construction

Noise-induced structural vibration may cause annoyance to dwelling occupants because of induced secondary vibrations, or "rattle," of objects within the dwelling—hanging pictures, dishes, plaques, and bric-a-brac. Loose window panes may also vibrate noticeably when exposed to high levels of airborne noise, causing homeowners to fear breakage. In general, rattling occurs at peak unweighted sound levels that last for several seconds at levels greater than 110 dB, which is well above that considered normally compatible with residential land use Thus, assessments of noise exposure levels for compatible land use will also be protective of noise-induced rattle.

In the assessment of vibration on humans, the following factors determine if a person will perceive and possibly react to building vibrations:

- Type of excitation: steady state, intermittent, or impulsive vibration.
- Frequency of the excitation. International Organization for Standardization (ISO) standard 2631-2 (ISO 1989) recommends a frequency range of 1 to 80 Hz for the assessment of vibration on humans.

- Orientation of the body with respect to the vibration.
- The use of the occupied space (i.e., residential, workshop, hospital).
- Time of day.

Table B-10 lists the whole-body vibration criteria from ISO 2631-2 for one-third octave frequency bands from 1 to 80 Hz.

Table B-10. Vibration Criteria for the Evaluation of Human Exposure to Whole-Body Vibration

Frequency (Hz)	Root Mean Square Acceleration (in meters per second squared)		
	Combined Criteria Base Curve	Residential Night	Residential Day
1.00	0.0036	0.0050	0.0072
1.25	0.0036	0.0050	0.0072
1.60	0.0036	0.0050	0.0072
2.00	0.0036	0.0050	0.0072
2.50	0.0037	0.0052	0.0074
3.15	0.0039	0.0054	0.0077
4.00	0.0041	0.0057	0.0081
5.00	0.0043	0.0060	0.0086
6.30	0.0046	0.0064	0.0092
8.00	0.0050	0.0070	0.0100
10.00	0.0063	0.0088	0.0126
12.50	0.0078	0.0109	0.0156
16.00	0.0100	0.0140	0.0200
20.00	0.0125	0.0175	0.0250
25.00	0.0156	0.0218	0.0312
31.50	0.0197	0.0276	0.0394
40.00	0.0250	0.0350	0.0500
50.00	0.0313	0.0438	0.0626
63.00	0.0394	0.0552	0.0788
80.00	0.0500	0.0700	0.1000

Source: ISO 1989

B.2.11 SONIC BOOMS

Sonic booms are commonly associated with structural damage. Most damage claims are for brittle objects, such as glass and plaster. Table B-11 summarizes the threshold of damage that might be expected at various overpressures. There is a large degree of variability in damage experience, and much damage depends on the pre-existing condition of a structure. Breakage data for glass, for example, spans a range of two to three orders of magnitude at a given overpressure. At 1 psf, the probability of a window breaking ranges from one in a billion (Sutherland 1990b) to one in a million (Hershey and Higgins 1976). These damage rates are associated with a combination of boom load and glass condition. At 10 psf, the probability of breakage is between 1 in 100 and 1 in 1,000. Laboratory tests of glass (White 1972) have shown that properly installed window glass will not break at overpressures less than 10 psf, even when subjected to repeated booms, but in the real world glass is not in pristine condition.

Table B-11. Possible Damage to Structures From Sonic Booms

Sonic Boom Overpressure Nominal (psf)	Type of Damage	Item Affected
0.5 - 2	Plaster	Fine cracks; extension of existing cracks; more in ceilings; over door frames; between some plaster boards.
	Glass	Rarely shattered; either partial or extension of existing.
	Roof	Slippage of existing loose tiles/slates; sometimes new cracking of old slates at nail hole.
	Damage to outside walls	Existing cracks in stucco extended.
	Bric-a-brac	Those carefully balanced or on edges can fall; fine glass, such as large goblets, can fall and break.
	Other	Dust falls in chimneys.
2 - 4	Glass, plaster, roofs, ceilings	Failures show that would have been difficult to forecast in terms of their existing localized condition. Nominally in good condition.
4 - 10	Glass	Regular failures within a population of well-installed glass; industrial as well as domestic greenhouses.
	Plaster	Partial ceiling collapse of good plaster; complete collapse of very new, incompletely cured, or very old plaster.
	Roofs	High probability rate of failure in nominally good state, slurry-wash; some chance of failures in tiles on modern roofs; light roofs (bungalow) or large area can move bodily.
	Walls (out)	Old, free standing, in fairly good condition can collapse.
	Walls (in)	Inside (“party”) walls known to move at 10 psf.
Greater than 10	Glass	Some good glass will fail regularly to sonic booms from the same direction. Glass with existing faults could shatter and fly. Large window frames move.
	Plaster	Most plaster affected.
	Ceilings	Plaster boards displaced by nail popping.
	Roofs	Most slate/slurry roofs affected, some badly; large roofs having good tile can be affected; some roofs bodily displaced causing gale-end and will-plate cracks; domestic chimneys dislodged if not in good condition.
	Walls	Internal party walls can move even if carrying fittings such as hand basins or taps; secondary damage due to water leakage.
	Bric-a-brac	Some nominally secure items can fall; e.g., large pictures, especially if fixed to party walls.

Source: Haber and Nakaki 1989

Damage to plaster occurs at similar ranges to glass damage. Plaster has a compounding issue in that it will often crack due to shrinkage while curing, or from stresses as a structure settles, even in the absence of outside loads. Sonic boom damage to plaster often occurs when internal stresses are high from these factors.

Some degree of damage to glass and plaster should thus be expected whenever there are sonic booms, but usually at the low rates noted previously. In general, structural damage from sonic booms should be expected only for overpressures greater than 10 psf.

B.2.12 NOISE AND SONIC BOOM EFFECTS ON TERRAIN

It has been suggested that noise levels associated with low-flying aircraft may affect the terrain under the flight path by disturbing fragile soil or snow, especially in mountainous areas, causing landslides or avalanches. There are no known instances of such events. It is improbable that such effects would result from routine subsonic aircraft operations.

In contrast to subsonic noise, sonic booms are considered to be a potential trigger for snow avalanches. Avalanches are highly dependent on the physical status of the snow, and do occur spontaneously. They can be triggered by minor disturbances, and there are documented accounts of sonic booms triggering avalanches. Switzerland routinely restricts supersonic flight during avalanche season. Landslides are not an issue for sonic booms. There was one anecdotal report of a minor landslide from a sonic boom generated by the Space Shuttle during landing, but there is no credible mechanism or consistent pattern of reports.

B.2.13 NOISE EFFECTS ON HISTORICAL AND ARCHAEOLOGICAL SITES

Noise that does not exceed 130 dB in any 1/3-octave frequency band and last for more than 1 second does not typically have the potential to damage structures in good repair (CHABA 1977). The term “frequency bands” refers to noise energy in a certain range of frequencies and is similar in concept to frequency bands employed on home stereo equalizers to control relative levels of bass and treble. Noise energy in certain frequency bands has increased potential to vibrate and/or damage structures. Noise exceeding 130 dB in any 1/3-octave frequency band and lasting for more than 1 second of that intensity and duration does not occur except on the flightline immediately adjacent to jet aircraft. The installation has not received any claims for noise-induced property damage.

Noise-induced structural vibration and secondary vibrations (i.e., “rattle”) of objects within structures can occur during loud overflights, as was noted in scoping comments. Rattling of objects such as dishes, hanging pictures, and loose window panes can cause residents to fear damage. Rattling objects have the potential to contribute to annoyance along with other potential noise effects (e.g., speech interference, sleep disturbance). Various studies have been completed to document the impact of noise. For example, one study involved measurements of noise and vibration in a restored plantation house, originally built in 1795. It is located 1,500 ft from the centerline at the departure end of Runway 19L at Washington Dulles International Airport. The aircraft measured was the Concorde. There was special concern for the building’s windows, because roughly half of the 324 panes were original. No instances of structural damage were found. Interestingly, despite the high levels of noise during Concorde takeoffs, the induced structural vibration levels were actually less than those induced by touring groups and vacuum cleaning (Wesler 1977).

As for conventional structures, noise exposure levels for normally compatible land uses should also be protective of historic and archaeological sites. Unique sites should, of course, be analyzed for specific exposure.

B.2.14 EFFECTS ON DOMESTIC ANIMALS AND WILDLIFE

Domestic animals and wildlife have different hearing thresholds, frequency response, and tolerance characteristics than do humans. There is a large difference in response even among different animal species. Evaluation of noise impacts on wildlife using metrics primarily intended for human impact should be done with caution and makes evaluation of impacts on wildlife even more difficult. As such, evaluations in this appendix have been based primarily on historical response to sounds rather than to absolute sound levels.

Hearing is critical to an animal’s ability to react, compete, reproduce, hunt, forage, and survive in its environment. While the existing literature does include studies on possible effects of jet aircraft noise and sonic booms on wildlife, there appears to have been little concerted effort in developing quantitative comparisons of aircraft noise effects on normal auditory characteristics. Behavioral effects have been relatively well described, but the larger ecological context issues, and the potential for drawing conclusions regarding effects on populations, has not been well developed.

The relationships between potential auditory/physiological effects and species interactions with their environments are not well understood. Manci et al. (1988), assert that the consequences that physiological effects may have on behavioral patterns are vital to understanding the long-term effects of noise on wildlife. Questions regarding the effects (if any) on predator-prey interactions, reproductive success, and intra-inter specific behavior patterns remain.

The following discussion provides an overview of the existing literature on noise effects (particularly jet aircraft noise) on animal species. The literature reviewed here involves those studies that have focused on the observations of the behavioral effects that jet aircraft and sonic booms have on animals.

A great deal of research was conducted in the 1960s and 1970s on the effects of aircraft noise on the public and the potential for adverse ecological impacts. These studies were largely completed in response to the increase in air travel and as a result of the introduction of supersonic jet aircraft. According to Manci et al. (1988), the foundation of information created from that focus does not necessarily correlate or provide information specific to the impacts to wildlife in areas overflown by aircraft at supersonic speed or at low altitudes.

The abilities to hear sounds and noise and to communicate assist wildlife in maintaining group cohesiveness and survivorship. Social species communicate by transmitting calls of warning, introduction, and other types that are subsequently related to an individual's or group's responsiveness.

Animal species differ greatly in their responses to noise. Noise effects on domestic animals and wildlife are classified as primary, secondary, and tertiary. Primary effects are direct, physiological changes to the auditory system, and most likely include the masking of auditory signals. Masking is defined as the inability of an individual to hear important environmental signals that may arise from mates, predators, or prey. There is some potential that noise could disrupt a species' ability to communicate or could interfere with behavioral patterns (Manci et al. 1988). Although the effects are likely temporal, aircraft noise may cause masking of auditory signals within exposed faunal communities. Animals rely on hearing to avoid predators, obtain food, and communicate with, and attract, other members of their species. Aircraft noise may mask or interfere with these functions. Other primary effects, such as ear drum rupture or temporary and permanent hearing threshold shifts, are not as likely given the subsonic noise levels produced by aircraft overflights.

Secondary effects may include non-auditory effects such as stress and hypertension; behavioral modifications; interference with mating or reproduction; and impaired ability to obtain adequate food, cover, or water. Tertiary effects are the direct result of primary and secondary effects, and include population decline and habitat loss. Most of the effects of noise are mild enough that they may never be detectable as variables of change in population size or population growth against the background of normal variation (Bowles 1995). Other environmental variables (e.g., predators, weather, changing prey base, ground-based disturbance) also influence secondary and tertiary effects, and confound the ability to identify the ultimate factor in limiting productivity of a certain nest, area, or region (Smith et al. 1988). Overall, the literature suggests that species differ in their response to various types, durations, and sources of noise (Manci et al. 1988).

Many scientific studies have investigated the effects of aircraft noise on wildlife, and some have focused on wildlife "flight" due to noise. Animal responses to aircraft are influenced by many variables, including size, speed, proximity (both height above the ground and lateral distance), engine noise, color, flight profile, and radiated noise. The type of aircraft (e.g., fixed wing versus rotor-wing [helicopter]) and type of flight mission may also produce different levels of disturbance, with varying animal responses (Smith et al. 1988). Consequently, it is difficult to generalize animal responses to noise disturbances across species.

One result of the Manci et al. (1988) literature review was the conclusion that, while behavioral observation studies were relatively limited, a general behavioral reaction in animals from exposure to aircraft noise is the startle response. The intensity and duration of the startle response appears to be dependent on which species is exposed, whether there is a group or an individual, and whether there have been some previous exposures. Responses range from flight, trampling, stampeding, jumping, or running, to movement of the head in the apparent direction of the noise source. Manci et al. (1988) reported that the literature indicated that avian species may be more sensitive to aircraft noise than mammals.

B.2.14.1 Domestic Animals

Although some studies report that the effects of aircraft noise on domestic animals is inconclusive, a majority of the literature reviewed indicates that domestic animals exhibit some behavioral responses to military overflights but generally seem to habituate to the disturbances over a period of time. Mammals in particular appear to react to noise at sound levels higher than 90 dB, with responses including the startle response, freezing (i.e., becoming temporarily stationary), and fleeing from the sound source. Many studies on domestic animals suggest that some species appear to acclimate to some forms of sound disturbance (Manci et al. 1988). Some studies have reported such primary and secondary effects as reduced milk production and rate of milk release, increased glucose concentrations, decreased levels of hemoglobin, increased heart rate, and a reduction in thyroid activity. These latter effects appear to represent a small percentage of the findings occurring in the existing literature.

Some reviewers have indicated that earlier studies, and claims by farmers linking adverse effects of aircraft noise on livestock, did not necessarily provide clear-cut evidence of cause and effect (Cottereau 1978). In contrast, many studies conclude that there is no evidence that aircraft overflights affect feed intake, growth, or production rates in domestic animals.

B.2.14.1.1 Cattle

In response to concerns about overflight effects on pregnant cattle, milk production, and cattle safety, the USAF prepared a handbook for environmental protection that summarized the literature on the impacts of low-altitude flights on livestock (and poultry) and includes specific case studies conducted in numerous airspaces across the country. Adverse effects have been found in a few studies but have not been reproduced in other similar studies. One such study, conducted in 1983, suggested that 2 of 10 cows in late pregnancy aborted after showing rising estrogen and falling progesterone levels. These increased hormonal levels were reported as being linked to 59 aircraft overflights. The remaining eight cows showed no changes in their blood concentrations and calved normally. A similar study reported abortions occurred in three out of five pregnant cattle after exposing them to flyovers by six different aircraft. Another study suggested that feedlot cattle could stampede and injure themselves when exposed to low-level overflights (USAF 1994a).

A majority of the studies reviewed suggests that there is little or no effect of aircraft noise on cattle. Studies presenting adverse effects to domestic animals have been limited. A number of studies (Parker and Bayley 1960; Casady and Lehmann 1967; Kovalcik and Sottnik 1971) investigated the effects of jet aircraft noise and sonic booms on the milk production of dairy cows. Through the compilation and examination of milk production data from areas exposed to jet aircraft noise and sonic boom events, it was determined that milk yields were not affected. This was particularly evident in those cows that had been previously exposed to jet aircraft noise.

A study examined the causes of 1,763 abortions in Wisconsin dairy cattle over a 1-year time period and none were associated with aircraft disturbances (USAF 1993). In 1987, researchers contacted seven livestock operators for production data, and no effects of low-altitude and supersonic flights were noted. Of the 43 cattle previously exposed to low-altitude flights, 3 showed a startle response to an F/A-18 aircraft flying overhead at 500 ft AGL and 400 knots by running less than 10 meters. They resumed normal activity within 1 minute (USAF 1994a). Beyer (1983) found that helicopters caused more reaction than other low-aircraft overflights, and that the helicopters at 30 to 60 ft overhead did not affect milk production and pregnancies of 44 cows in a 1964 study (USAF 1994a).

Additionally, Beyer (1983) reported that five pregnant dairy cows in a pasture did not exhibit fright-flight tendencies or disturb their pregnancies after being overflown by 79 low-altitude helicopter flights and 4 low-altitude, subsonic jet aircraft flights. A 1956 study found that the reactions of dairy and beef cattle to noise from low-altitude, subsonic aircraft were similar to those caused by paper blowing about, strange persons, or other moving objects (USAF 1994a).

In a report to Congress, the U.S. Forest Service (USFS) concluded that "evidence both from field studies of wild ungulates and laboratory studies of domestic stock indicate that the risks of damage are small (from aircraft approaches of 50 to 100 m), as animals take care not to damage themselves (USFS 1992). If animals are overflown by aircraft at altitudes of 50 to 100 m, there is no evidence that mothers and young are separated, that animals collide with obstructions (unless confined) or that they traverse dangerous ground at too high a rate." These varied study results suggest that, although the confining of cattle could magnify animal response to aircraft overflight, there is no proven cause-and-effect link between startling cattle from aircraft overflights and abortion rates or lower milk production.

B.2.14.1.2 Horses

Horses have also been observed to react to overflights of jet aircraft. Several of the studies reviewed reported a varied response of horses to low-altitude aircraft overflights. Observations made in 1966 and 1968 noted that horses galloped in response to jet flyovers (USAF 1993). Bowles (1995) cites Kruger and Erath as observing horses exhibiting intensive flight reactions, random movements, and biting/kicking behavior. However, no injuries or abortions occurred, and there was evidence that the mares adapted somewhat to the flyovers over the course of a month (USAF 1994a). Although horses were observed noticing the overflights, it did not appear to affect either survivability or reproductive success. There was also some indication that habituation to these types of disturbances was occurring.

LeBlanc et al. (1991), studied the effects of F-14 jet aircraft noise on pregnant mares. They specifically focused on any changes in pregnancy success, behavior, cardiac function, hormonal production, and rate of habituation. Their findings reported observations of "flight-fright" reactions, which caused increases in heart rates and serum cortisol concentrations. The mares, however, did habituate to the noise. Levels of anxiety and mass body movements were the highest after initial exposure, with intensities of responses decreasing thereafter. There were no differences in pregnancy success when compared to a control group.

B.2.14.1.3 Swine

Generally, the literature findings for swine appear to be similar to those reported for cows and horses. While there are some effects from aircraft noise reported in the literature, these effects are minor. Studies of continuous noise exposure (i.e., 6 hours, 72 hours of constant exposure) reported influences on short-term hormonal production and release. Additional constant exposure studies indicated the observation of stress reactions, hypertension, and electrolyte imbalances (Dufour 1980). A study by Bond et al. (1963), demonstrated no adverse effects on the feeding efficiency, weight gain, ear physiology, or thyroid and adrenal gland condition of pigs subjected to observed aircraft noise. Observations of heart rate increase were recorded; noting that cessation of the noise resulted in the return to normal heart rates. Conception rates and offspring survivorship did not appear to be influenced by exposure to aircraft noise.

Similarly, simulated aircraft noise at levels of 100 to 135 dB had only minor effects on the rate of feed utilization, weight gain, food intake, or reproduction rates of boars and sows exposed, and there were no injuries or inner ear changes observed (Gladwin et al. 1988; Manci et al. 1988).

B.2.14.1.4 Domestic Fowl

According to a 1994 position paper by the USAF on effects of low-altitude overflights (below 1,000 ft) on domestic fowl, overflight activity has negligible effects (USAF 1994b). The paper did recognize that given certain circumstances, adverse effects can be serious. Some of the effects can be panic reactions, reduced productivity, and effects on marketability (e.g., bruising of the meat caused during "pile-up" situations).

The typical reaction of domestic fowl after exposure to sudden, intense noise is a short-term startle response. The reaction ceases as soon as the stimulus is ended, and within a few minutes all activity returns to normal. More severe responses are possible depending on the number of birds, the frequency of exposure, and environmental conditions. Large crowds of birds, and birds not previously exposed, are more likely to pile up in response to a noise stimulus (USAF 1994b). According to studies and interviews with growers, it is typically the previously unexposed birds that incite panic crowding, and the tendency to do so is markedly reduced within five exposures to the stimulus (USAF 1994b). This suggests that the birds habituate relatively quickly. Egg productivity was not adversely affected by infrequent noise bursts, even at exposure levels as high as 120 to 130 dB.

Between 1956 and 1988, there were 100 recorded claims against the Navy for alleged damage to domestic fowl. The number of claims averaged three per year, with peak numbers of claims following publications of studies on the topic in the early 1960s. Many of the claims were disproved or did not have sufficient supporting evidence. The claims were filed for the following alleged damages: 55 percent for panic reactions, 31 percent for decreased production, 6 percent for reduced hatchability, 6 percent for weight loss, and less than 1 percent for reduced fertility (USAF 1994b).

B.2.14.2 Wildlife

Studies on the effects of overflights and sonic booms on wildlife have been focused mostly on avian species and ungulates such as caribou and bighorn sheep. Few studies have been conducted on marine mammals, small terrestrial mammals, reptiles, amphibians, and carnivorous mammals. Generally, species that live entirely below the surface of the water have also been ignored due to the fact they do not experience the same level of sound as terrestrial species (NPS 1994). Wild ungulates appear to be much more sensitive to noise disturbance than domestic livestock. This may be due to previous exposure to disturbances. One common factor appears to be that low-altitude flyovers seem to be more disruptive in terrain where there is little cover (Manci et al. 1988).

B.2.14.2.1 Mammals

Terrestrial Mammals

Studies of terrestrial mammals have shown that noise levels of 120 dB can damage mammals' ears, and levels at 95 dB can cause temporary loss of hearing acuity. Noise from aircraft has affected other large carnivores by causing changes in home ranges, foraging patterns, and breeding behavior. One study recommended that aircraft not be allowed to fly at altitudes below 2,000 ft AGL over important grizzly and polar bear habitat. Wolves have been frightened by low-altitude flights that were 25 to 1,000 ft AGL. However, wolves have been found to adapt to aircraft overflights and noise as long as they were not being hunted from aircraft (Dufour 1980).

Wild ungulates (American bison, caribou, bighorn sheep) appear to be much more sensitive to noise disturbance than domestic livestock (Weisenberger et al. 1996). Behavioral reactions may be related to the past history of disturbances by such things as humans and aircraft. Common reactions of reindeer kept in an enclosure exposed to aircraft noise disturbance were a slight startle response, rising of the head, pricking ears, and scenting of the air. Panic reactions and extensive changes in behavior of individual animals were not observed. Observations of caribou in Alaska exposed to fixed-wing aircraft and helicopters showed running and panic reactions occurred when overflights were at an altitude of 200 ft or less. The reactions decreased with increased altitude of overflights, and with more than 500 ft in altitude, the panic reactions stopped. Also, smaller groups reacted less strongly than larger groups. One negative effect of the running and avoidance behavior is increased expenditure of energy. For a 90-kilogram animal, the calculated expenditure due to aircraft harassment is 64 kilocalories per minute when running and 20 kilocalories per minute when walking. When conditions are favorable, this expenditure can be counteracted with increased feeding; however, during harsh winter conditions, this may not be possible. Incidental observations of wolves and bears exposed to fixed-wing aircraft and helicopters in the northern regions suggested that wolves are less disturbed than wild ungulates, while grizzly bears showed the greatest response of any animal species observed (Weisenberger et al. 1996).

It has been proven that low-altitude overflights do induce stress in animals. Increased heart rates, an indicator of excitement or stress, have been found in pronghorn antelope, elk, and bighorn sheep. As such reactions occur naturally as a response to predation, infrequent overflights may not, in and of themselves, be detrimental. However, flights at high frequencies over a long period of time may cause harmful effects. The consequences of this disturbance, while cumulative, are not additive. It may be that aircraft disturbance may not cause obvious and serious health effects, but coupled with a harsh winter, it may have an adverse impact. Research has shown that stress induced by other types of disturbances produces long-term decreases in metabolism and hormone balances in wild ungulates.

Behavioral responses can range from mild to severe. Mild responses include head raising, body shifting, or turning to orient toward the aircraft. Moderate disturbance may be nervous behaviors, such as trotting a short distance. Escape is the typical severe response.

Birds

Auditory research conducted on birds indicates that they fall between the reptiles and the mammals relative to hearing sensitivity. According to Dooling (1978), within the range of 1,000 to 5,000 Hz, birds show a level of hearing sensitivity similar to that of the more sensitive mammals. In contrast to mammals, bird sensitivity falls off at a greater rate to increasing and decreasing frequencies. Passive observations and studies examining aircraft bird strikes indicate that birds nest and forage near airports. Aircraft noise in the vicinity of commercial airports apparently does not inhibit bird presence and use.

High-noise events (like a low-altitude aircraft overflight) may cause birds to engage in escape or avoidance behaviors, such as flushing from perches or nests (Ellis et al. 1991). These activities impose an energy cost on the birds that, over the long term, may affect survival or growth. In addition, the birds may spend less time engaged in necessary activities like feeding, preening, or caring for their young because they spend time in noise-avoidance activity. However, the long-term significance of noise-related impacts is less clear. Several studies on nesting raptors have indicated that birds become habituated to aircraft overflights and that long-term reproductive success is not affected (Ellis et al. 1991; Grubb and King 1991). Threshold noise levels for significant responses range from 62 dB for Pacific black brant to 85 dB for crested tern (Brown 1990; Ward and Stehn 1990).

Songbirds were observed to become silent prior to the onset of a sonic boom event (F-111 jets), followed by “raucous discordant cries.” There was a return to normal singing within 10 seconds after the boom (Higgins 1974 in Manci et al. 1988). Ravens responded by emitting protestation calls, flapping their wings, and soaring.

Manci et al. (1988) reported a reduction in reproductive success in some small territorial passerines (i.e., perching birds or songbirds) after exposure to low-altitude overflights. However, it has been observed that passerines are not driven any great distance from a favored food source by a nonspecific disturbance, such as aircraft overflights (USFS 1992). Further study may be warranted.

A cooperative study between the DoD and the U.S. Fish and Wildlife Service (USFWS), assessed the response of the red-cockaded woodpecker to a range of military training noise events, including artillery, small arms, helicopter, and maneuver noise (Pater et al. 1999). The project findings show that the red-cockaded woodpecker successfully acclimates to military noise events. Depending on the noise level that ranged from innocuous to very loud, the birds responded by flushing from their nest cavities. When the noise source was closer and the noise level was higher, the number of flushes increased proportionately. In all cases, however, the birds returned to their nests within a relatively short period of time (usually within 12 minutes). Additionally, the noise exposure did not result in any mortality or statistically detectable changes in reproductive success (Pater et al. 1999). Red-cockaded woodpeckers did not flush when artillery simulators were more than 122 meters away and SELs were 70 dB.

Lynch and Speake (1978) studied the effects of both real and simulated sonic booms on the nesting and brooding eastern wild turkey in Alabama. Hens at four nest sites were subjected to between 8 and 11 combined real and simulated sonic booms. All tests elicited similar responses, including quick lifting of the head and apparent alertness for 10 to 20 seconds. No apparent nest failure occurred as a result of the sonic booms. Twenty-one (21) brood groups were also subjected to simulated sonic booms. Reactions varied slightly between groups, but the largest percentage of groups reacted by standing motionless after the initial blast. Upon the sound of the boom, the hens and poults fled until reaching the edge of the woods (approximately 4 to 8 meters). Afterward, the poults resumed feeding activities while the hens remained alert for a short period of time (approximately 15 to 20 seconds). In no instances were poults abandoned, nor did they scatter and become lost. Every observation group returned to normal activities within a maximum of 30 seconds after a blast.

Raptors

In a literature review of raptor responses to aircraft noise, Manci et al. (1988) found that most raptors did not show a negative response to overflights. When negative responses were observed they were predominantly associated with rotor-winged aircraft or jet aircraft that were repeatedly passing within 0.5 mile of a nest.

Ellis et al. (1991) performed a study to estimate the effects of low-level military jet aircraft and mid- to high-altitude sonic booms (both actual and simulated) on nesting peregrine falcons and seven other raptors (common black-hawk, Harris' hawk, zone-tailed hawk, red-tailed hawk, golden eagle, prairie falcon, bald eagle). They observed responses to test stimuli, determined nest success for the year of the testing, and evaluated site occupancy the following year. Both long- and short-term effects were noted in the study. The results reported the successful fledging of young in 34 of 38 nest sites (all eight species) subjected to low-level flight and/or simulated sonic booms. Twenty-two of the test sites were revisited in the following year, and observations of pairs or lone birds were made at all but one nest. Nesting attempts were underway at 19 of 20 sites that were observed long enough to be certain of breeding activity. Reoccupancy and productivity rates were within or greater than expected values for self-sustaining populations.

Short-term behavior responses were also noted. Overflights at a distance of 150 meters or less produced few significant responses and no severe responses. Typical responses consisted of crouching or very rarely, flushing from the perch site. Significant responses were most evident before egg-laying and after young were "well grown." Incubating or brooding adults never burst from the nest, thus preventing egg breaking or knocking chicks out of the nest. Jet passes and sonic booms often caused noticeable alarm; however, significant negative responses were rare and did not appear to limit productivity or re-occupancy. Due to the locations of some of the nests, some birds may have been habituated to aircraft noise. There were some test sites located at distances far from zones of frequent military aircraft usage, and the test stimuli were often closer, louder, and more frequent than would be likely for a normal training situation (Ellis et al. 1991).

Manci et al. (1988) noted that a female northern harrier was observed hunting on a bombing range in Mississippi during bombing exercises. The harrier was apparently unfazed by the exercises, even when a bomb exploded within 200 ft. In a similar case of habituation/non-disturbance, a study on the Florida snail-kite stated the greatest reaction to overflights (approximately 98 dB) was "watching the aircraft fly by." No detrimental impacts to distribution, breeding success, or behavior were noted.

Bald Eagle. A study by Grubb and King (1991) on the reactions of the bald eagle to human disturbances showed that terrestrial disturbances elicited the greatest response, followed by aquatic (i.e., boats) and aerial disturbances. The disturbance regime of the area where the study occurred was predominantly characterized by aircraft noise. The study found that pedestrians consistently caused responses that were greater in both frequency and duration. Helicopters elicited the highest level of aircraft-related responses. Aircraft disturbances, although the most common form of disturbance, resulted in the lowest levels of response. This low response level may have been due to habituation; however, flights less than 170 m away caused reactions similar to other disturbance types. Ellis et al. (1991) showed that eagles typically respond to the proximity of a disturbance, such as a pedestrian or aircraft within 100 m, rather than the noise level. Fleischner and Weisberg (1986) stated that reactions of bald eagles to commercial jet flights, although minor (e.g., looking), were twice as likely to occur when the jets passed at a distance of 0.5 mile or less. They also noted that helicopters were four times more likely to cause a reaction than a commercial jet and 20 times more likely to cause a reaction than a propeller plane.

The USFWS advised Cannon Air Force Base (AFB) that flights at or below 2,000 ft AGL from October 1 through March 1 could result in adverse impacts to wintering bald eagles (USFWS 1998). However, Fraser et al. (1985) suggested that raptors habituate to overflights rapidly, sometimes tolerating aircraft approaches of 65 ft or less.

Golden Eagle. In their guidelines for aerial surveys, USFWS (Pagel et al. 2010) summarized past studies by stating that most golden eagles respond to survey aircraft (fixed- and rotary-wing) by remaining on their nests, and continuing to incubate or roost. Surveys take place generally as close as 10 to 20 meters from cliffs (including hovering less than 30 seconds if necessary to count eggs) and no farther than 200 meters from cliffs depending on safety (Pagel et al. 2010).

Grubb et al. (2007) experimented with multiple exposure to two helicopter types and concluded that flights with a variety of approach distances (800, 400, 200, and 100 meters) had no effect on golden eagle nesting success or productivity rates within the same year or on rates of renewed nesting activity the following year when compared to the corresponding figures for the larger population of non-manipulated nest sites (Grubb et al. 2007). They found no significant, detrimental, or disruptive responses in 303 helicopter passes near eagles. In 227 AH-64 Apache helicopter experimental passes (considered twice as loud as a civilian helicopter also tested) at test distances of 0 to 800 meters from nesting golden eagles, 96 percent resulted in no more response than watching the helicopter pass. No greater reactions occurred until after hatching when individual golden eagles exhibited five flatten and three fly behaviors at three nest sites. The flight responses occurred at approach distances of 200 meters or less. No evidence was found of an effect on subsequent nesting activity or success, despite many of the helicopter flights occurring during early courtship and nest repair. None of these responding pairs failed to successfully fledge young, except for one nest that fell later in the season. Excited, startled, avoidance reactions were never observed. Non-attending eagles or those perched away from the nests were more likely to fly than attending eagles, but also with less potential consequence to nesting success (Grubb et al. 2007). Golden eagles appeared to become less responsive with successive exposures. Much of helicopter sound energy may be at a lower frequency than golden eagles can hear, thus reducing expected impacts. Grubb et al. (2007) found no relationship between helicopter sound levels and corresponding eagle ambient behaviors or limited responses, which occurred throughout recorded test levels (76.7 to 108.8 dB, unweighted). The authors thought that the lower than expected behavioral responses may be partially due to the fact that the golden eagles in the area appear acclimated to the current high levels of outdoor recreational, including aviation, activities. Based on the results of this study, the authors recommended reduction of existing buffers around nest sites to 100 meters (325 ft) for helicopter activity.

Richardson and Miller (1997) reviewed buffers as protection for raptors against disturbance from ground-based human activities. No consideration of aircraft activity was included. They stressed a clear line of sight as an important factor in a raptor's response to a particular disturbance, with visual screening allowing a closer approach of humans without disturbing a raptor. A GIS-assisted viewshed approach combined with a designated buffer zone distance was found to be an effective tool for reducing potential disturbance to golden eagles from ground-based activities (Richardson and Miller 1997). They summarized recommendations that included a median 0.5-mile (800-meter) buffer (range = 200 to 1,600 meters, n = 3) to reduce human disturbances (from ground-based activities such as rock climbing, shooting, vehicular activity) around active golden eagle nests from 1 February to 1 August based on an extensive review of other studies (Richardson and Miller 1997). Physical characteristics (i.e., screening by topography or vegetation) are important variables to consider when establishing buffer zones based on raptors' visual- and auditory-detection distances (Richardson and Miller 1997).

Osprey. A study by Trimper et al. (1998), in Goose Bay, Labrador, Canada, focused on the reactions of nesting osprey to military overflights by CF-18 Hornets. Reactions varied from increased alertness and focused observation of planes to adjustments in incubation posture. No overt reactions (e.g., startle response, rapid nest departure) were observed as a result of an overflight. Young nestlings crouched as a result of any disturbance until 1 to 2 weeks prior to fledging. Helicopters, human presence, float planes, and other ospreys elicited the strongest reactions from nesting ospreys. These responses included flushing, agitation, and aggressive displays. Adult osprey showed high nest occupancy rates during incubation regardless of external influences. The osprey observed occasionally stared in the direction of the flight before it was audible to the observers. The birds may have been habituated to the noise of the flights; however, overflights were strictly controlled during the experimental period. Strong reactions to float planes and helicopter may have been due to the slower flight and therefore longer duration of visual stimuli rather than noise-related stimuli.

Red-tailed Hawk. Anderson et al. (1989) conducted a study that investigated the effects of low-level helicopter overflights on 35 red-tailed hawk nests. Some of the nests had not been flown over prior to the study. The hawks that were naïve (i.e., not previously exposed) to helicopter flights exhibited stronger avoidance behavior (9 of 17 birds flushed from their nests) than those that had experienced prior overflights. The overflights did not appear to affect nesting success in either study group. These findings were consistent with the belief that red-tailed hawks habituate to low-level air traffic, even during the nesting period.

Upland Game Birds

Turkey hens exhibited only a few seconds of head alert behavior at the sound of the sonic boom. No hens were flushed off the nests, and productivity estimates revealed no effect from the booms. Twenty brood groups were also subjected to simulated sonic booms. In no instance did the hens desert any poults (young birds), nor did the poults scatter or desert the rest of the brood group. In every observation, the brood group returned to normal activity within 30 seconds after a simulated sonic boom. Similarly, researchers cited in Manci et al. (1988) observed no difference in hatching success of bobwhite quail (Colinus virginianus) exposed to simulated sonic booms of 100 to 250 micronewtons per square meter.

Migratory Waterfowl

Fleming et al. (1996) conducted a study of caged American black ducks found that noise had negligible energetic and physiologic effects on adult waterfowl. Measurements included body weight, behavior, heart rate, and enzymatic activity. Experiments also showed that adult ducks exposed to high noise events acclimated rapidly and showed no effects.

The study also investigated the reproductive success of captive ducks, which indicated that duckling growth and survival rates at Piney Island, North Carolina, were lower than those at a background location. In contrast, observations of several other reproductive indices (i.e., pair formation, nesting, egg production, and hatching success) showed no difference between Piney Island and the background location. Potential effects on wild duck populations may vary, as wild ducks at Piney Island have presumably acclimated to aircraft overflights. It was not demonstrated that noise was the cause of adverse impacts. A variety of other factors, such as weather conditions, drinking water and food availability and variability, disease, and natural variability in reproduction, could explain the observed effects. Fleming noted that drinking water conditions (particularly at Piney Island) deteriorated during the study, which could have affected the growth of young ducks. Further research would be necessary to determine the cause of any reproductive effects (Fleming et al. 1996).

Another study by Conomy et al. (1998) exposed previously unexposed ducks to 71 noise events per day that equaled or exceeded 80 dB. It was determined that the proportion of time black ducks reacted to aircraft activity and noise decreased from 38 percent to 6 percent in 17 days and remained stable at 5.8 percent thereafter. In the same study, the wood duck did not appear to habituate to aircraft disturbance. This supports the notion that animal response to aircraft noise is species-specific. Because a startle response to aircraft noise can result in flushing from nests, migrants and animals living in areas with high concentrations of predators would be the most vulnerable to experiencing effects of lowered birth rates and recruitment over time. Species that are subjected to infrequent overflights do not appear to habituate to overflight disturbance as readily.

Black brant studied in the Alaska Peninsula were exposed to jets and propeller aircraft, helicopters, gunshots, people, boats, and various raptors. Jets accounted for 65 percent of all the disturbances. Humans, eagles, and boats caused a greater percentage of brant to take flight. There was markedly greater reaction to Bell-206-B helicopter flights than fixed wing, single-engine aircraft (Ward et al. 1986).

The presence of humans and low-flying helicopters in the Mackenzie Valley North Slope area did not appear to affect the population density of Lapland longspurs, but the experimental group was shown to have reduced hatching and fledging success and higher nest abandonment. Human presence appeared to have a greater impact on the incubating behavior of the black brant, common eider, and Arctic tern than fixed-wing aircraft (Gunn and Livingston 1974).

Gunn and Livingston (1974) found that waterfowl and seabirds in the Mackenzie Valley and North Slope of Alaska and Canada became acclimated to float plane disturbance over the course of three days. Additionally, it was observed that potential predators (bald eagle) caused a number of birds to leave their nests. Non-breeding birds were observed to be more reactive than breeding birds. Waterfowl were affected by helicopter flights, while snow geese were disturbed by Cessna 185 flights. The geese flushed when the planes were less than 1,000 ft, compared to higher flight elevations. An overall reduction in flock sizes was observed. It was recommended that aircraft flights be reduced in the vicinity of premigratory staging areas.

Manci et al. 1988, reported that waterfowl were particularly disturbed by aircraft noise. The most sensitive appeared to be snow geese. Canada geese and snow geese were thought to be more sensitive than other animals such as turkey vultures, coyotes, and raptors (Edwards et al. 1979).

<u>Wading and Shorebirds</u>

Black et al. (1984) studied the effects of low-altitude (less than 500 ft AGL) military training flights with sound levels from 55 to 100 dB on wading bird colonies (i.e., great egret, snowy egret, tricolored heron, and little blue heron). The training flights involved three or four aircraft, which occurred once or twice per day. This study concluded that the reproductive activity—including nest success, nestling survival, and nestling chronology—was independent of F-16 overflights. Dependent variables were more strongly related to ecological factors, including location and physical characteristics of the colony and climatology.

Another study on the effects of circling fixed-wing aircraft and helicopter overflights on wading bird colonies found that at altitudes of 195 to 390 ft, there was no reaction in nearly 75 percent of the 220 observations. Approximately 90 percent displayed no reaction or merely looked toward the direction of the noise source. Another 6 percent stood up, 3 percent walked from the nest, and 2 percent flushed (but were without active nests) and returned within 5 minutes (Kushlan 1978). Apparently, non-nesting wading birds had a slightly higher incidence of reacting to overflights than nesting birds. Seagulls observed roosting near a colony of wading birds in another study remained at their roosts when subsonic aircraft flew overhead (Burger 1981). Colony distribution appeared to be most directly correlated to available wetland community types and was found to be distributed randomly with respect to MTRs. These results suggest that wading bird species presence was most closely linked to habitat availability and that they were not affected by low-level military overflights (USAF 2000).

Burger (1986) studied the response of migrating shorebirds to human disturbance and found that shorebirds did not fly in response to aircraft overflights, but did flush in response to more localized intrusions (i.e., humans and dogs on the beach). Burger (1981) studied the effects of noise from John F. Kennedy International Airport in New York on herring gulls that nested less than 1 kilometer from the airport. Noise levels over the nesting colony were 85 to 100 dB on approach and 94 to 105 dB on takeoff. Generally, there did not appear to be any prominent adverse effects of subsonic aircraft on nesting, although some birds flushed when the Concorde flew overhead and, when they returned, engaged in aggressive behavior. Groups of gulls tended to loaf in the area of the nesting colony, and these birds remained at the roost when the Concorde flew overhead. Up to 208 of the loafing gulls flew when supersonic aircraft flew overhead. These birds would circle around and immediately land in the loafing flock (USAF 2000).

In 1970, sonic booms were potentially linked to a mass hatch failure of sooty terns on the Dry Tortugas (Austin et al. 1970). The cause of the failure was not certain, but it was conjectured that sonic booms from military aircraft or an overgrowth of vegetation were factors. In the previous season, sooty terns were observed to react to sonic booms by rising in a "panic flight," circling over the island, usually settling down on their eggs again. Hatching that year was normal. Following the 1969 hatch failure, excess vegetation was cleared and measures were taken to reduce supersonic activity. The 1970 hatch appeared to proceed normally. A colony of noddies on the same island hatched successfully in 1969, the year of the sooty tern hatch failure.

Subsequent laboratory tests of exposure of eggs to sonic booms and other impulsive noises (Cottereau 1972; Cogger and Zegarra 1980; Bowles et al. 1991, 1994) failed to show adverse effects on hatching of eggs. A structural analysis by Ting et al. (2002) showed that, even under extraordinary circumstances, sonic booms would not damage an avian egg.

Burger (1981) observed no effects of subsonic aircraft on herring gulls in the vicinity of John F. Kennedy International Airport. The Concorde aircraft did cause more nesting gulls to leave their nests (especially in areas of higher density of nests), causing the breakage of eggs and the scavenging of eggs by intruder prey. Clutch sizes were observed to be smaller in areas of higher-density nesting (presumably due to the greater tendency for panic flight) than in areas where there were fewer nests.

B.2.14.2.2 Fish and Amphibians

The effects of overflight noise on fish and amphibians have not been well studied, but conclusions regarding their expected responses have involved speculation based upon known physiologies and behavioral traits of these taxa (Gladwin et al. 1988). Although fish do startle in response to low-flying aircraft noise, and probably to the shadows of aircraft, they have been found to habituate to the sound and overflights. Amphibians that respond to low frequencies and those that respond to ground vibration, such as spadefoot toads, may be affected by noise.

B.2.14.2.3 Summary

Some physiological/behavioral responses such as increased hormonal production, increased heart rate, and reduction in milk production have been described in a small percentage of studies. A majority of the studies focusing on these types of effects have reported short-term or no effects.

The relationships between physiological effects and how species interact with their environments have not been thoroughly studied. Therefore, the larger ecological context issues regarding physiological effects of jet aircraft noise (if any) and resulting behavioral pattern changes are not well understood.

Animal species exhibit a wide variety of responses to noise. It is therefore difficult to generalize animal responses to noise disturbances or to draw inferences across species, as reactions to jet aircraft noise appear to be species-specific. Consequently, some animal species may be more sensitive than other species and/or may exhibit different forms or intensities of behavioral responses. For instance, wood ducks appear to be more sensitive and more resistant to acclimation to jet aircraft noise than Canada geese in one study. Similarly, wild ungulates seem to be more easily disturbed than domestic animals.

The literature does suggest that common responses include the "startle" or "fright" response and, ultimately, habituation. It has been reported that the intensities and durations of the startle response decrease with the numbers and frequencies of exposures, suggesting no long-term adverse effects. The majority of the literature suggests that domestic animal species (cows, horses, chickens) and wildlife species exhibit adaptation, acclimation, and habituation after repeated exposure to jet aircraft noise and sonic booms.

Animal responses to aircraft noise appear to be somewhat dependent on, or influenced by, the size, shape, speed, proximity (vertical and horizontal), engine noise, color, and flight profile of planes. Helicopters also appear to induce greater intensities and durations of disturbance behavior as compared to fixed-wing aircraft. Some studies showed that animals that had been previously exposed to jet aircraft noise exhibited greater degrees of alarm and disturbance to other objects creating noise, such as boats, people, and objects blowing across the landscape. Other factors influencing response to jet aircraft noise may include wind direction, speed, and local air turbulence; landscape structures (i.e., amount and type of vegetative cover); and, in the case of bird species, whether the animals are in the incubation/nesting phase.

B.3 OPERATIONAL DATA AND NOISE MODELING METHODOLOGIES

B.3.1 BASE

It is important to note that all of the noise models draw from a database of actual aircraft noise measurements and sonic booms. These models are most appropriate for comparing "before-and-after" noise impacts, which would result from proposed changes or alternative actions, when the calculations are made in a consistent manner. The models allow noise predictions without the need for actual implementation or noise monitoring for the proposed action and alternatives.

For environments where DNL or L_{dnmr} are calculated to be less than 45 dB, the noise levels are stated as "<45." This annotation is used because in calculating time-averaged sound levels, the reliability of the results varies at lower levels. This arises from the increasing variability of individual aircraft sound levels at the longer distances (greater than a mile versus less than a mile) due to atmospheric effects on sound propagation and the presence of other ambient sources of noise. Time-average outdoor sound levels less than 45 dB are substantially less than any currently accepted guidelines for aircraft noise compatibility. As discussed under land use, most of the guidelines for the acceptability of aircraft noise are on the order of 65 dB (in DNL or L_{dnmr}) and greater.

The airfield noise analysis was conducted according to established DoD guidelines and best practices and employed the DoD NOISEMAP suite of computer-based modeling tools (Czech 2014; Wasmer and Maunsell 2006a; Wasmer and Maunsell 2006b). Elevation and impedance grid files were created to model the areas immediately surrounding each installation based on data obtained from the U.S. Geological Survey (USGS) (USGS 2014). Regarding impedance, areas of land are modeled as an acoustically "soft" surface (with a flow resistivity of 200 kilopascal-seconds per square meter [kPa-s/m^2]) and bodies of water, are modeled as "hard" (1,000,000 kPa-s/m^2).

The DNL analysis utilized annual average daily flight and run-up operations (i.e., annual operations divided by 365 days). For the proposed F-35A aircraft, the most up-to-date flight profiles (based on information provided by F-35A pilots at bases where the aircraft is currently operating) and local airfield course rules were used in the noise modeling.

B.3.1.1 Population, Household, and Acreage Counts

The number of off-base residents within each 5 dB DNL increment was estimated using U.S. Census 2014 American Community Survey (ACS) data at the block group level. First, the fraction of each census block that lies within each noise level increment was calculated. Then the census block's population was apportioned to inside or outside of the noise level increment based on the fraction of the census block affected. The accuracy of the population estimates was improved by excluding areas not classified as being used for residential purposes. This method assumes an even distribution of population within the residential portions of census blocks. The U.S. Census counts permanent residents; non-permanent residents are not counted using this method.

B.3.1.2 Points of Interest

Representative POIs include on- and off-base schools, daycare locations, places of worship, and residential areas derived from Google Earth satellite imagery and verified by base personnel.

B.3.1.3 Speech Interference

Interference with conversation and other communication-related activities is one of the most common complaints received about noise. Such interference is measured by the number of average daily indoor daytime (7:00 A.M. to 10:00 P.M.) events per hour subject to indoor L_{max} of at least 50 dB at representative locations. This measure also accounts for 15 or 25 dB of noise attenuation provided by buildings such as houses and schools with windows open or closed, respectively. Because modeling accounts for outdoor noise levels only, the associated outdoor L_{max} would be 65 and 75 dB for windows open and closed, respectively. Per the U.S. Department of Defense Noise Working Group (DNWG) guidelines, speech interference analysis determines the number of times with which speech would be interfered. Thus, NOISEMAP software is used to compute the number of events at or above a specified threshold (i.e., NA) with the thresholds being 65 and 75 dB L_{max} for the DNL daytime hours only.

B.3.1.4 Classroom Learning Interference

Because of the nature of activities in schools, different speech interference criteria are used. For schools, two additional classroom criteria have to be applied to evaluate if speech interference would inhibit classroom learning. When considering intermittent noise caused by aircraft overflights, guidelines for classroom interference indicate that an appropriate criterion is a limit on indoor background equivalent noise levels of 35 to 40 dB (L_{eq}) and a limit on single events of 50 dB L_{max}. The 50 dB L_{max} for single events equates to outdoor L_{max} of 65 and 75 dB for windows open and closed, respectively. Thus the number of annual average daily events whose L_{max} would be greater than or equal to 65 and 75 dB serve as the measure of potential classroom learning effects and are presented as NA65 L_{max} and NA75L_{max} for windows open and closed, respectively, on a per-hour basis. Because classrooms are in use during the day predominantly, these criteria are applied for aircraft operations occurring between 8:00 A.M. and 4:00 P.M. rather than between 7:00 A.M. and 10:00 P.M. for standard speech interference.

B.3.1.5 Sleep Disturbance

Sleep disturbance is a concern for communities exposed to nighttime noise. Sleep, or the lack of quality sleep, has the potential to affect health and concentration, although the relationship between noise levels and sleep disturbance is complex and not fully understood. To assess the potential for sleep disturbance, the analysis uses the SEL as the metric and calculates the probability of being awakened at least once from overflights occurring between 10:00 P.M. and 7:00 A.M. when most people sleep. The SEL from each overflight is based on the particular type of aircraft, flight track, power setting, speed, and altitude relative to the residential receptor. The analysis also accounts for standard building attenuation of 15 and 25 dB with windows open and closed, respectively. When summed, the probability of being awakened for a given location is determined.

B.3.1.6 Potential for Hearing Loss

Potential for Hearing Loss (PHL) applies to people living long-term (i.e., 40 or more years) in high noise environments. The threshold for screening PHL is exposure to DNL greater than or equal to 80 dB (Undersecretary of Defense for Acquisition Technology and Logistics 2009).

B.3.2 AIRSPACE

B.3.2.1 Subsonic

When aircraft flight tracks are not well defined, but are distributed over a wide area, such as in a MOA, Range/Restricted Areas, or MTR with wide corridors, cumulative noise exposure is assessed using the Military Operating Area and Range Noise Model (MR_NMAP), Version 2.2 (Lucas and Calamia 1994). Table B-12 lists the modeling parameters relevant to this study.

Table B-12. Airspace (Subsonic) Noise Modeling Parameters

Airspace (Subsonic) Noise Model	
Software	**Version**
MR_NMAP	2.2
Parameter	**Description**
Receiver Grid Spacing	3,394 ft in x and y
Operating Days Metric	Average Daily Operations during Busiest Month
Topography (n/a L_{dnmr} is Nap of the Earth)	
Modeled Weather (Same as Airfield)	

MR_NMAP allows for entry of airspace information, the horizontal distribution of operations, flight profiles (average power settings, altitude distributions, and speeds), and numbers of sorties. "Horizontal distribution of operations" refers to the modeling of lateral airspace utilization via three general representations:

1. broadly distributed operations throughout three-dimensional volumes of airspace for modeling of MOA and Range events,
2. operations distributed among parallel tracks for modeling of MTR events, and
3. operations on specific tracks for modeling of unique MOA, Range, MTR, or target area activity.

The core program, MR_NMAP, incorporates the number of average daily flight operations during the busiest month by time period, specified horizontal distributions, volume of the airspaces, and profiles of the aircraft to primarily calculate: (a) average L_{dnmr} for entire airspaces, or (c) maximum L_{dnmr} under MTRs or specific tracks. Grouping of airspace units used and scheduled together consistently were assessed as one area. This Environmental Impact Statement (EIS) presents tabulated levels for both baseline and proposed operations.

MR_NMAP does not have the capability to model varying terrain or ground impedance. It assumes all flight profiles' altitudes are relative to the elevation of the ground. The weather conditions for the airfield modeling were assumed to apply to the modeled flight areas.

B.3.2.2 Supersonic

Modeling of supersonic flight activity considers the following factors: airspace geometry, flight operations, flight durations, flight areas, flight profiles (altitude distribution, maneuver characteristics) and atmospheric effects. The DoD's PCBoom4 computer program (Plotkin and Grandi 2002) can be used to compute the complete sonic boom footprint for a given single event, accounting for details of a particular maneuver.

Supersonic operations for the proposed action and alternatives are, however, associated with air combat training, which cannot be described in the deterministic manner that PCBoom4 requires. Supersonic events occur as aircraft approach an engagement, break at the end, and maneuver for advantage during the engagement. Long time cumulative sonic boom exposure in terms of CDNL is more meaningful for this kind of environment.

BooMap96 is a program that computes CDNL contours in military air combat maneuver training airspaces based on published methodology (Frampton et al, 1993). CDNL contours in air combat maneuver arenas follow an elliptical pattern which depends on the size of the airspace and the sortie rate. Long-term sonic boom measurement projects have been conducted in four supersonic air combat training airspaces: White Sands, New Mexico (Plotkin et al. 1989); the eastern portion of the Goldwater Range, Arizona (Plotkin et al. 1992); the Elgin MOA at Nellis AFB, Nevada (Frampton et al. 1993); and the western portion of the Goldwater Range (Page et al. 1994). These studies included analysis of schedule and air combat maneuvering instrumentation data and supported development of the 1992 BooMap model (Plotkin et al. 1992). The current version of BooMap (Frampton et al. 1993) incorporates results from all four studies.

Because BooMap is directly based on long-term measurements, it implicitly accounts for such variables as maneuvers, statistical variations in operations, atmosphere effects, and other factors. Based upon that data, CDNL was determined as a function of the number of sorties per month and the dimensions of the elliptical flight area. The elliptical pattern is aligned with the "Available Airspace," or "Maneuver Ellipse," which is an elliptical maneuver region within the airspace. It is common for air combat maneuver arenas to have a single maneuver ellipse, with that region being the largest ellipse that can be inscribed within the airspace boundaries. Many supersonic areas have several maneuver ellipses, with operations divided among them.

BooMap96 allows the user to define up to 10 maneuver ellipses in an airspace, and assign monthly operations to each. The program draws upon published definitions of existing MOAs and Restricted areas or user-defined airspace boundaries. BooMap96 quantifies the size and shape of CDNL contours, and also numbers of booms per day, in air combat training airspaces. BooMap was used for prediction of cumulative sonic boom exposure in this analysis. The next section details the modeling parameters relevant to this study.

Sonic booms from air combat training activity typically have an elliptical pattern. Aircraft usually set-up at positions up to 100 nautical miles (NM) apart, then proceed toward each other for an engagement. Aircraft can become supersonic at various times during an engagement exercise. Supersonic events can occur as the aircraft accelerate toward each other, during dives in the engagement itself, and during disengagement. Maneuvers take place within a generally elliptical region aligned with the setup points. The long-term average noise exposure (i.e., CDNL) and where the booms occur also tend to be in elliptical shape.

A sample of supersonic flight tracks measured in the air combat training airspace at White Sands (Plotkin et al. 1989) is shown on Figure B-17. The tracks fall into an elliptical shape aligned with preferred engagement directions in the airspace. The CDNL contours that were fit to six months of measured booms in the White Sands airspace are shown on Figure B-18. The subsequent measurement programs refined the fit, and demonstrated that the elliptical maneuver area is related to the size and shape of the airspace (Frampton et al. 1993).

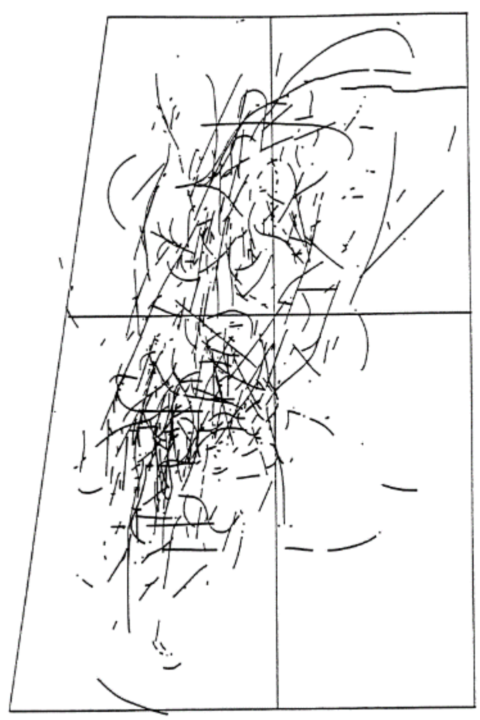


Figure B-17. Supersonic Flight Tracks in Supersonic Air Combat Training Airspace

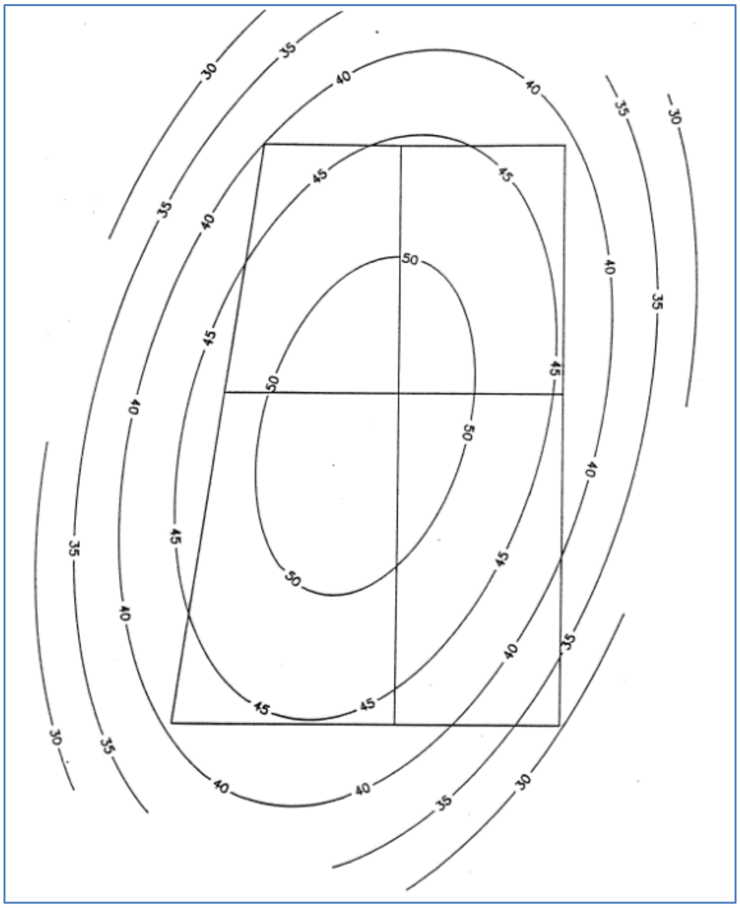


Figure B-18. Elliptical CDNL Contours in Supersonic Air Combat Training Airspace

B.4 AFTERBURNER SCENARIO DAY-NIGHT AVERAGE SOUND LEVEL CONTOURS

The DNL contours at each of the four alternative bases under each afterburner scenario are shown on Figures B-19 through B-30. The AFRC F-35A mission scenario DNL contours are shown in 5-dB increments and overlain on the baseline noise contours for comparison.

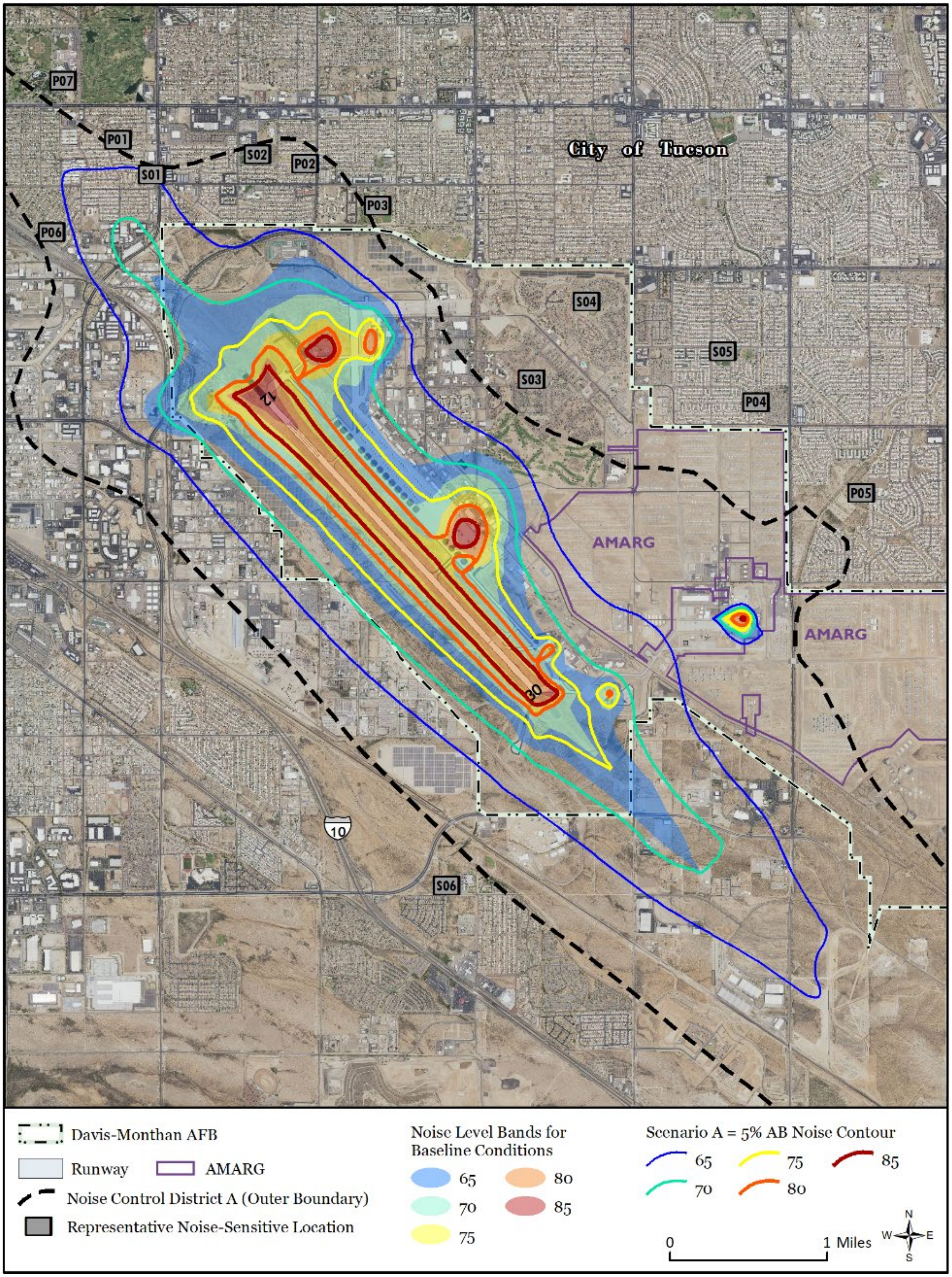


Figure B-19. AFRC F-35A Mission Scenario A DNL Contours at Davis-Monthan AFB

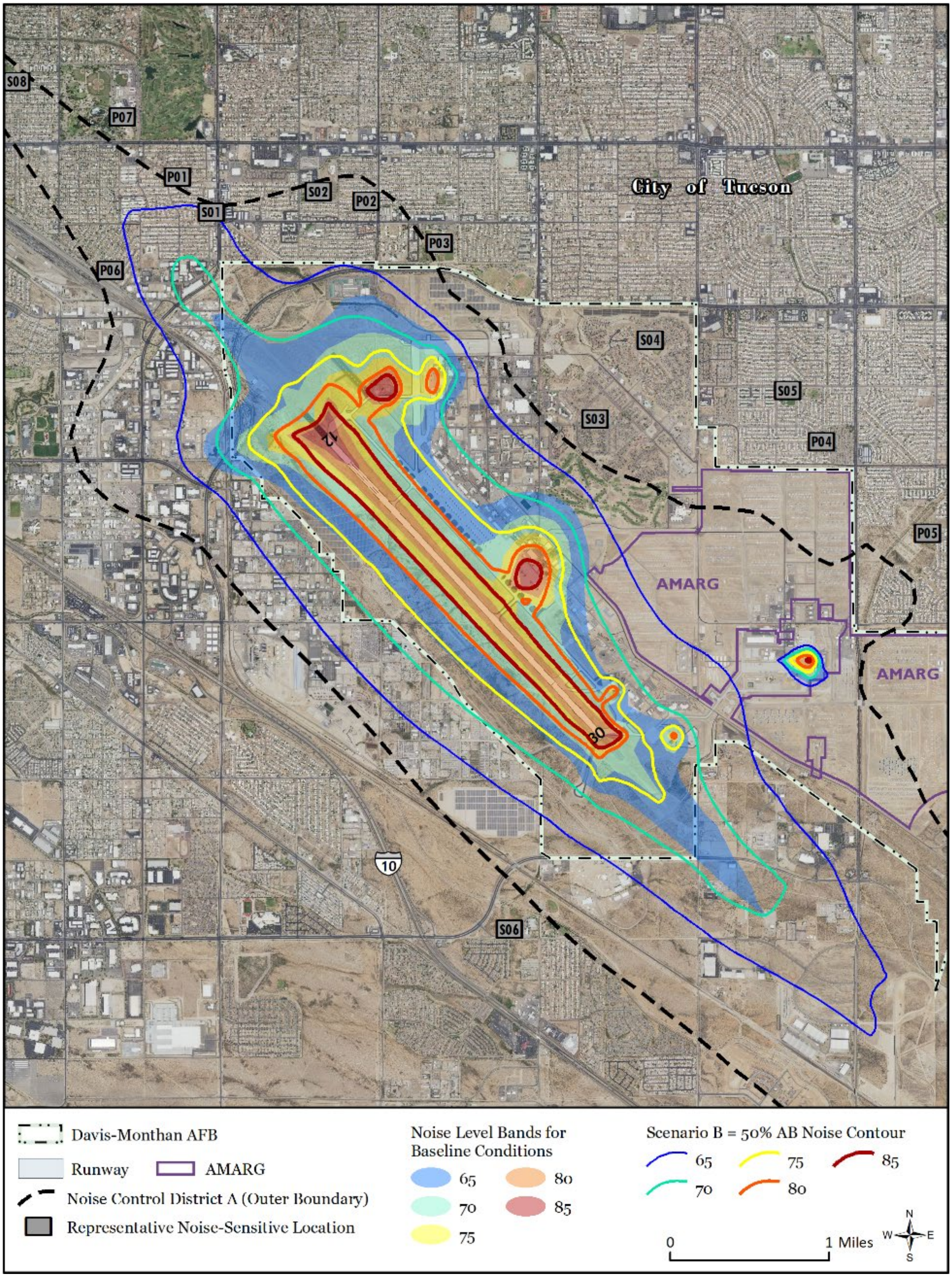


Figure B-20. AFRC F-35A Mission Scenario B DNL Contours at Davis-Monthan AFB

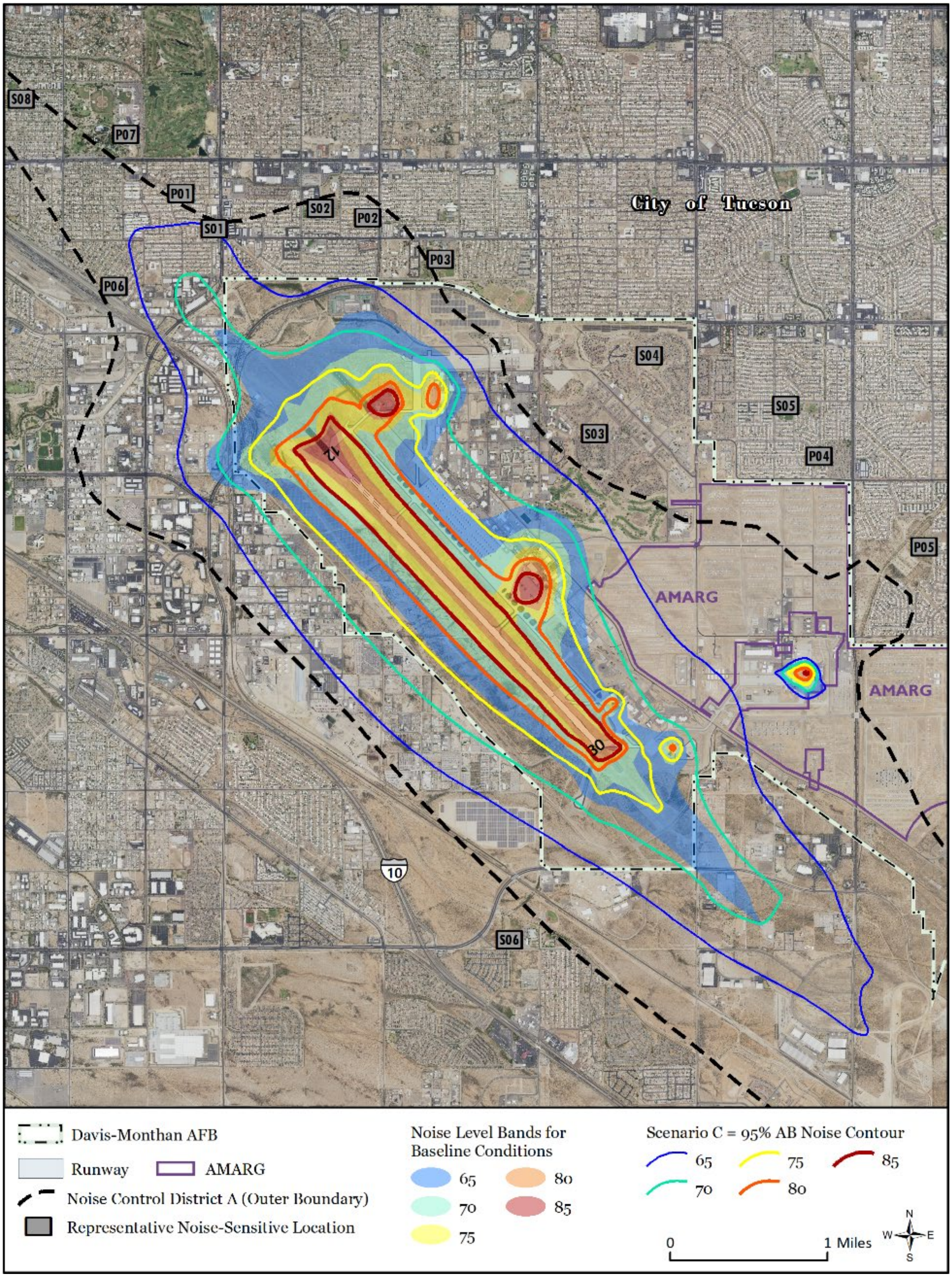


Figure B-21. AFRC F-35A Mission Scenario C DNL Contours at Davis-Monthan AFB

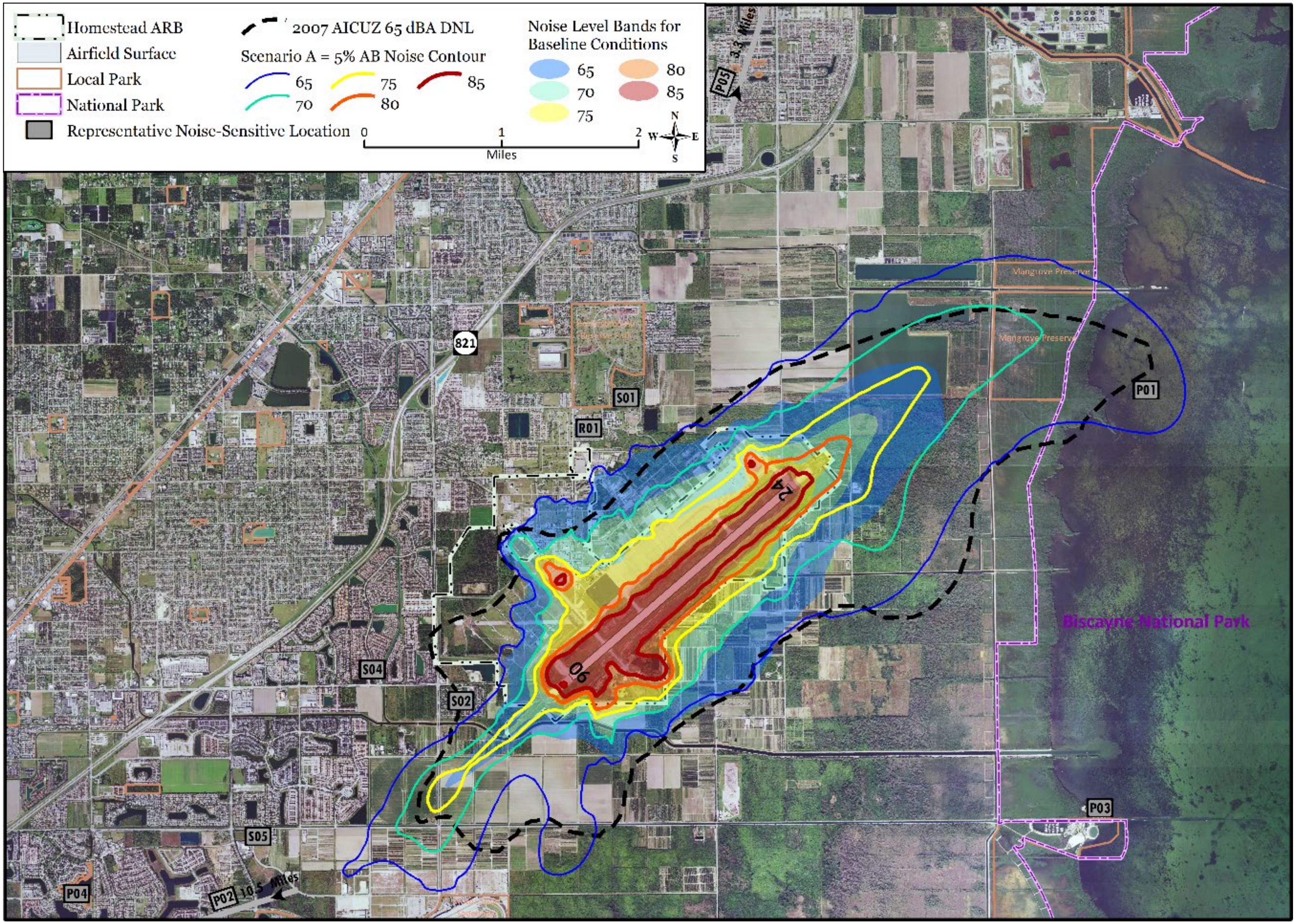


Figure B-22. AFRC F-35A Mission Scenario A DNL Contours at Homestead ARB

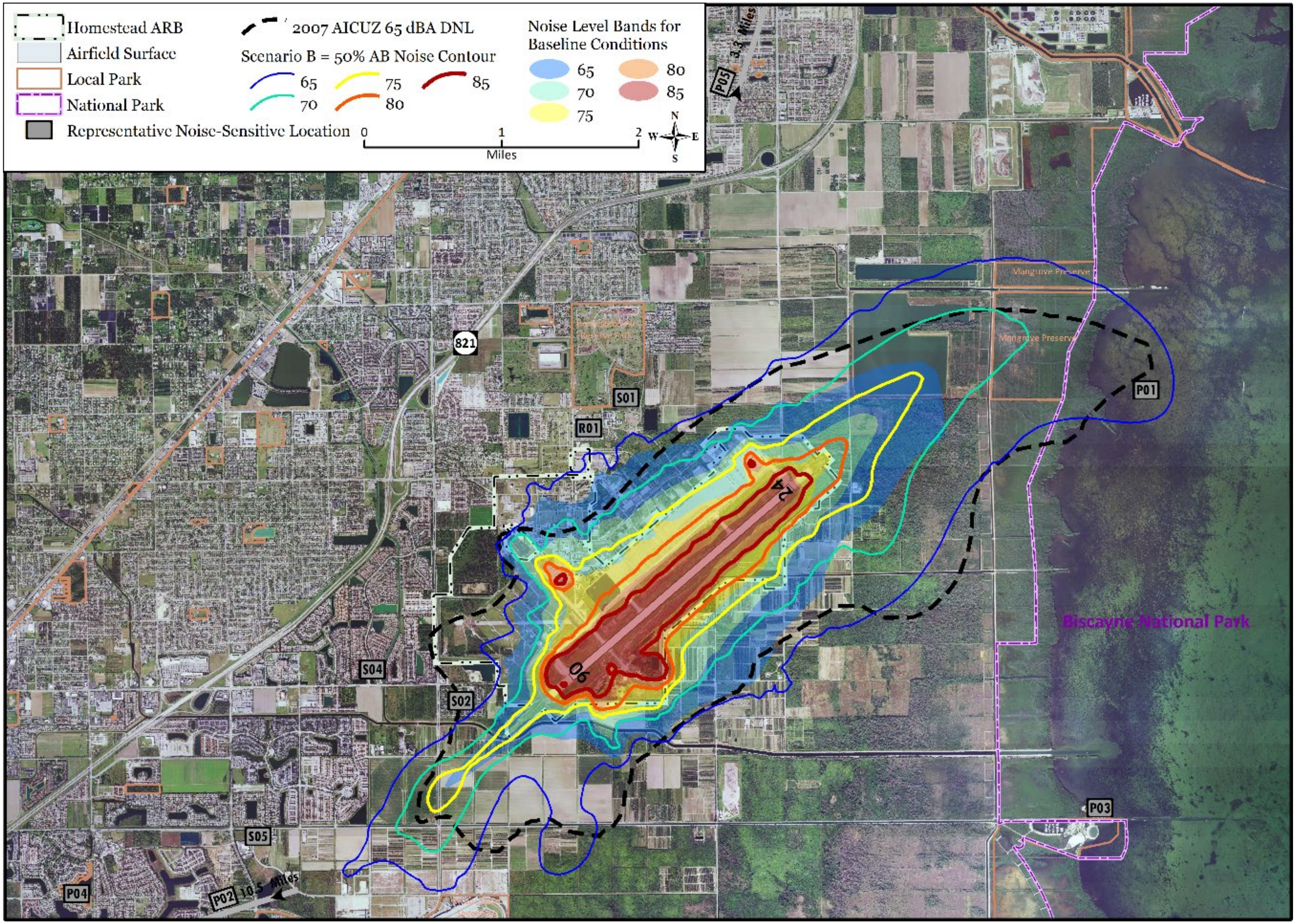


Figure B-23. AFRC F-35A Mission Scenario B DNL Contours at Homestead ARB

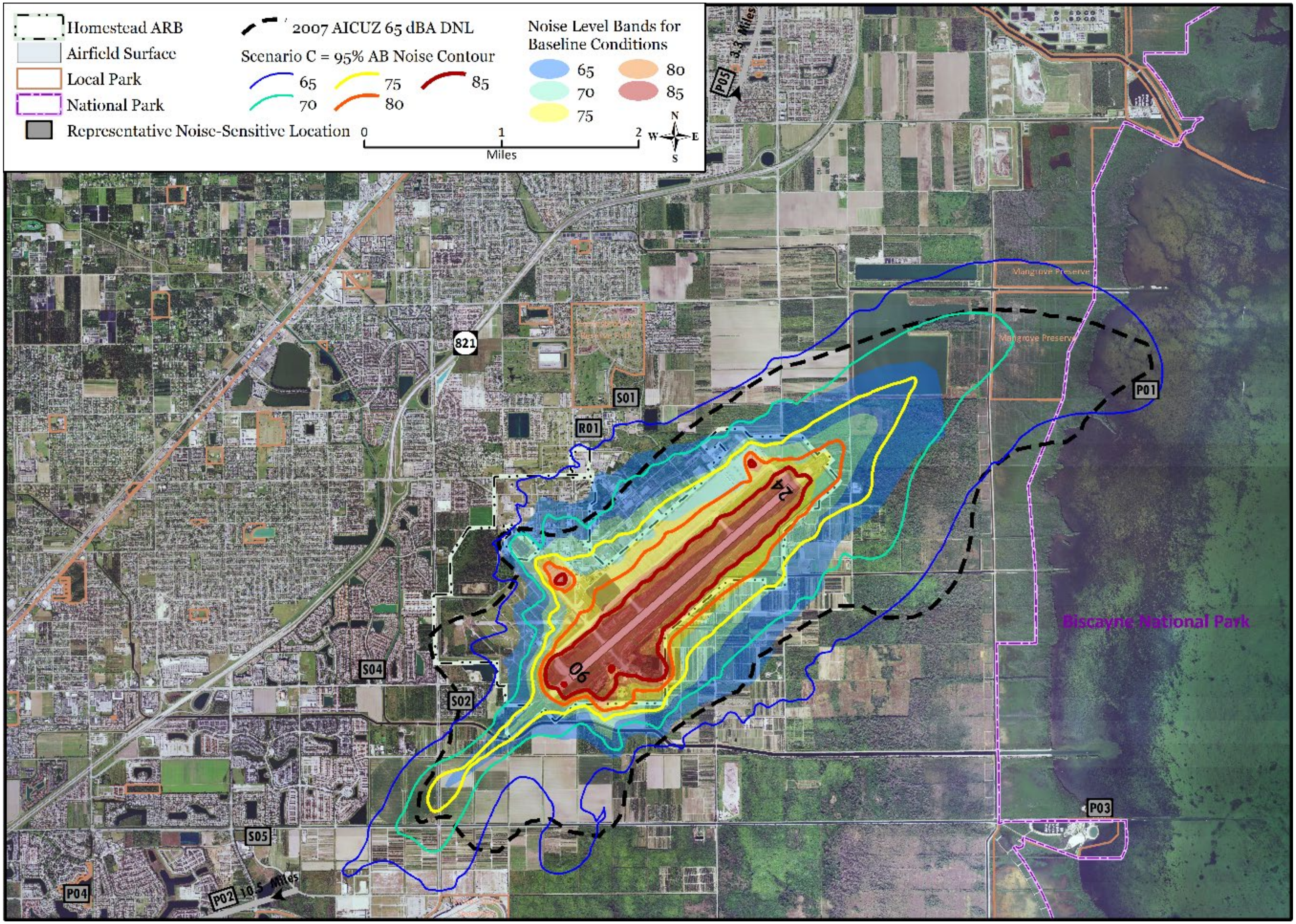


Figure B-24. AFRC F-35A Mission Scenario C DNL Contours at Homestead ARB

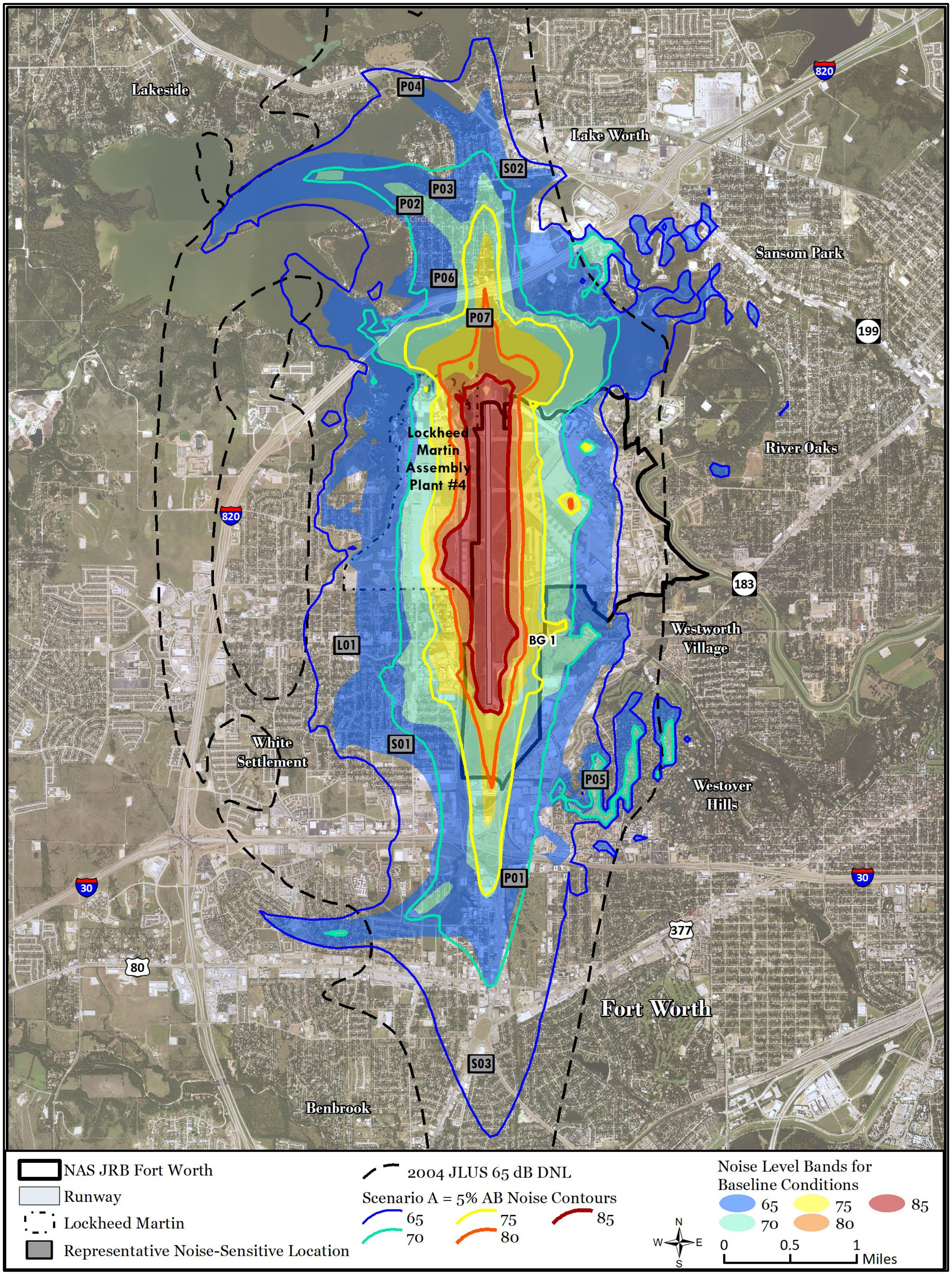


Figure B-25. AFRC F-35A Mission Scenario A DNL Contours at NAS JRB Fort Worth

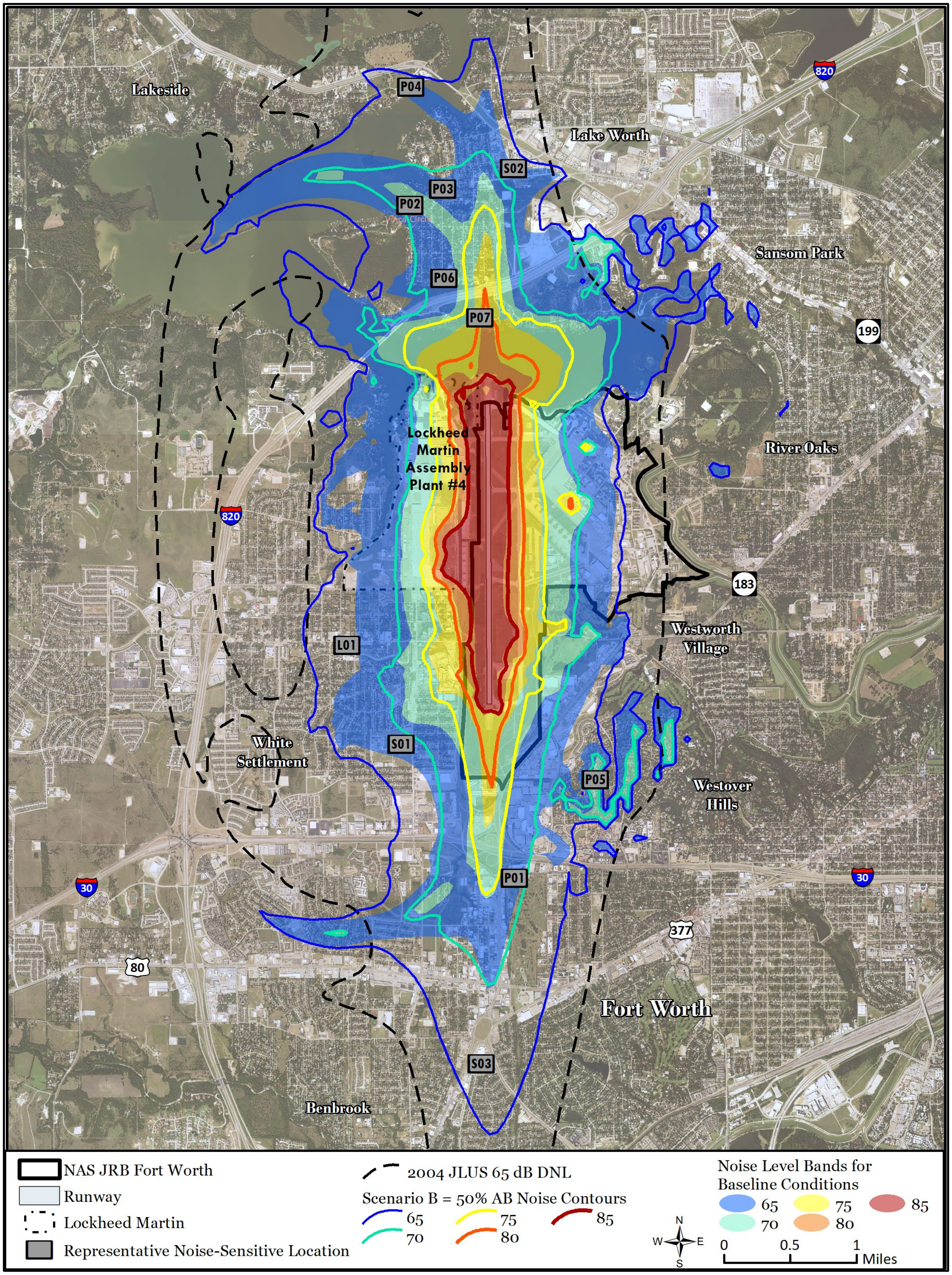


Figure B-26. AFRC F-35A Mission Scenario B DNL Contours at NAS JRB Fort Worth

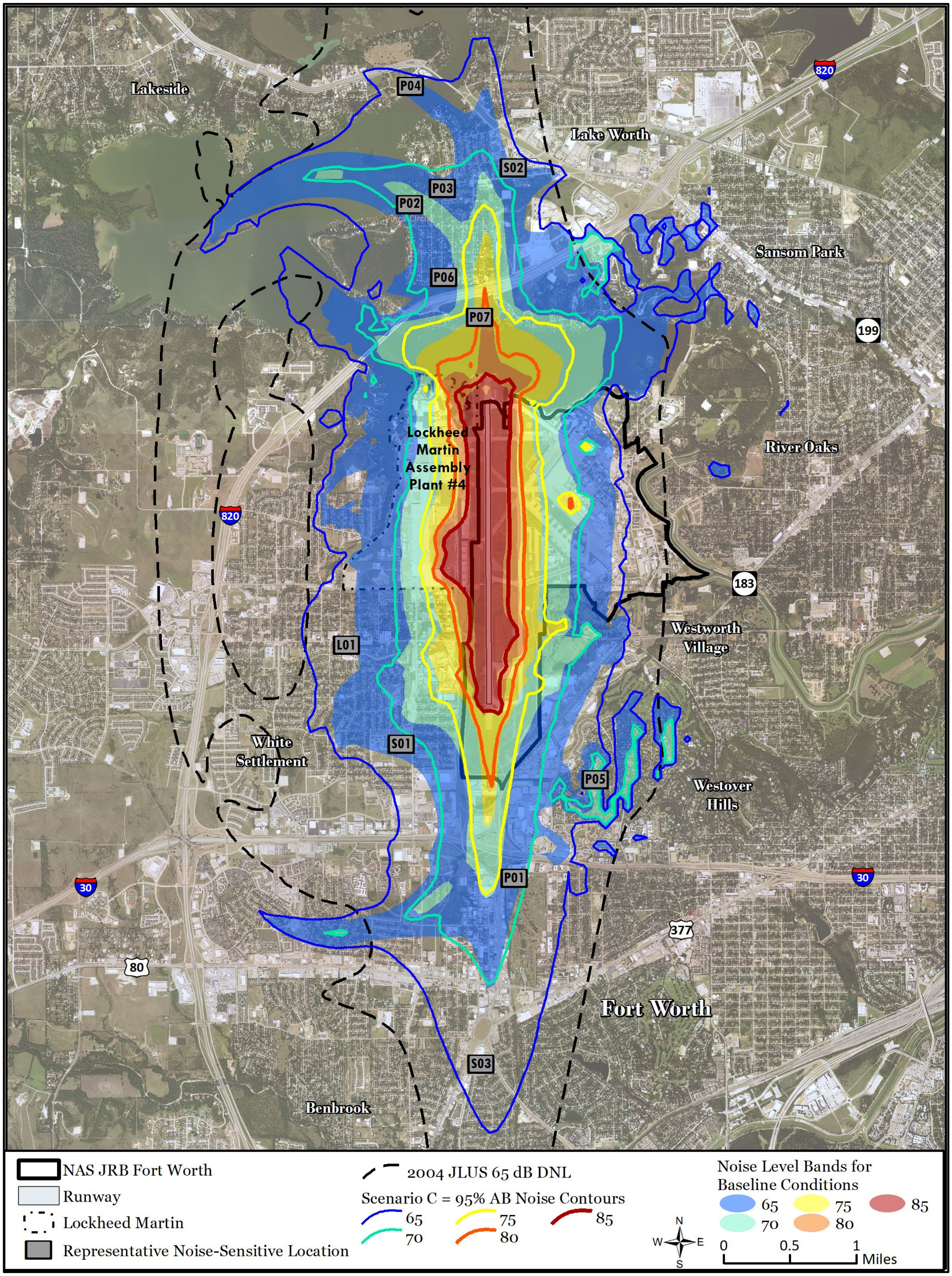


Figure B-27. AFRC F-35A Mission Scenario C DNL Contours at NAS JRB Fort Worth

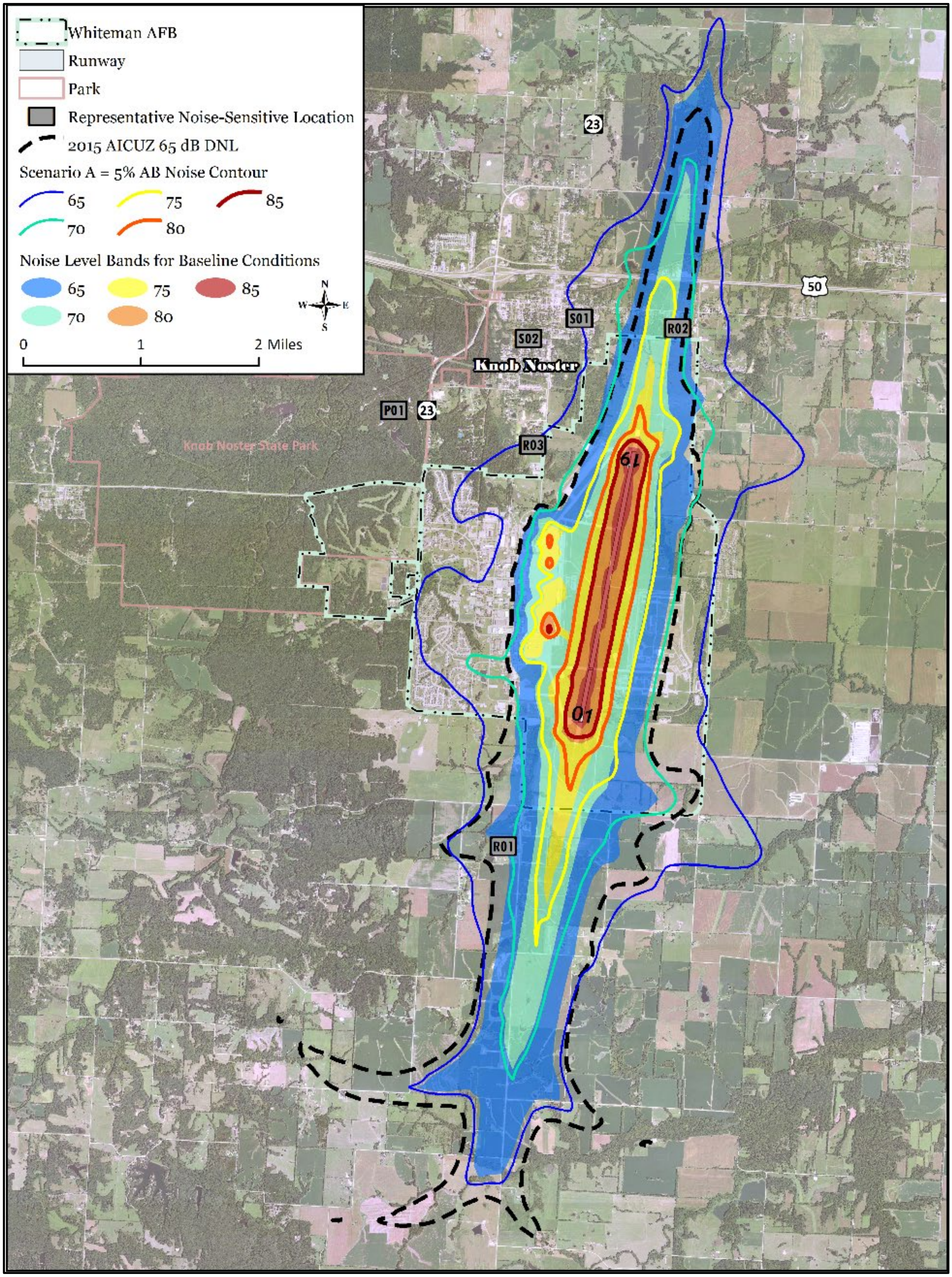


Figure B-28. AFRC F-35A Mission Scenario A DNL Contours at Whiteman AFB

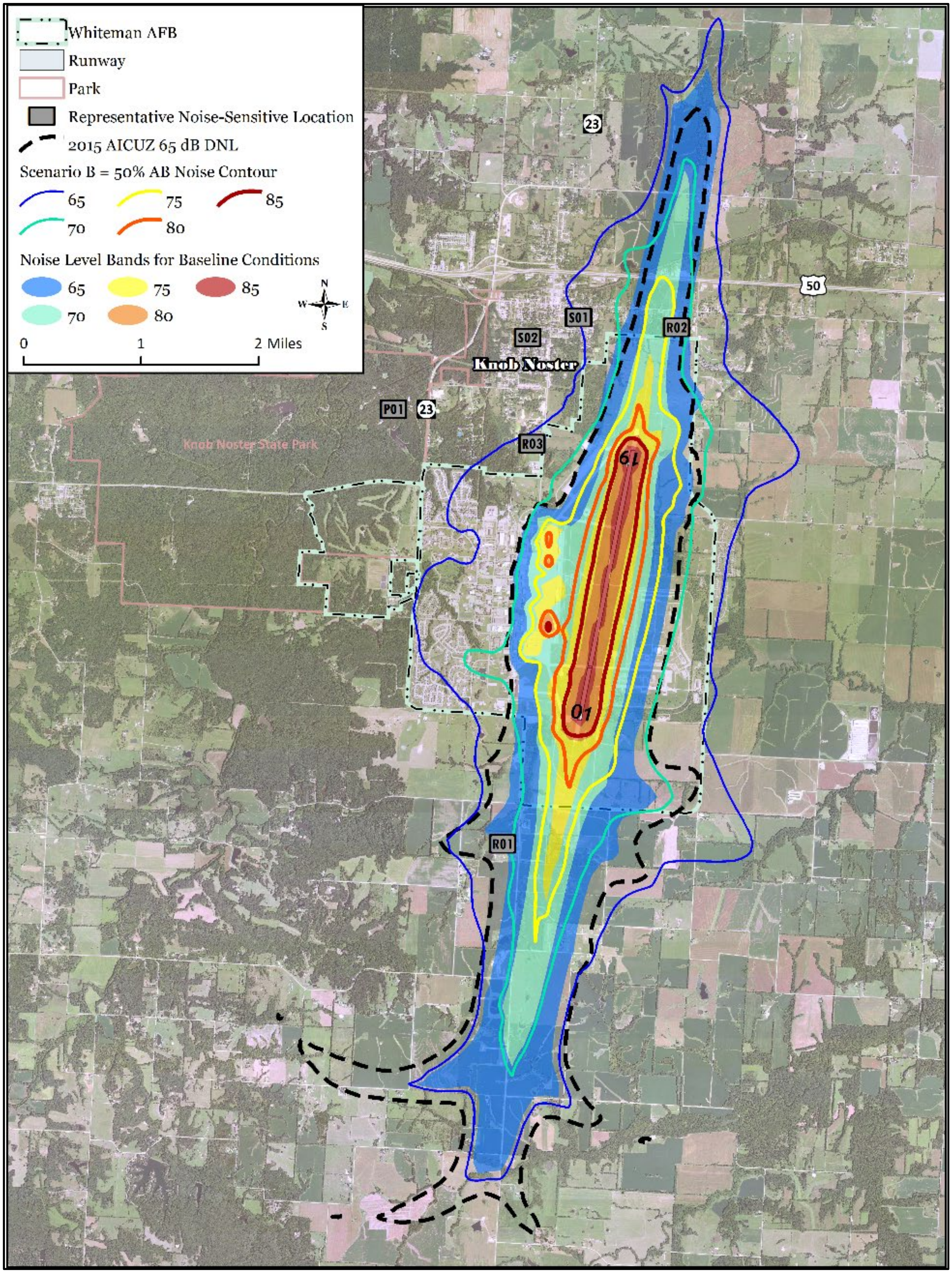


Figure B-29. AFRC F-35A Mission Scenario B DNL Contours at Whiteman AFB

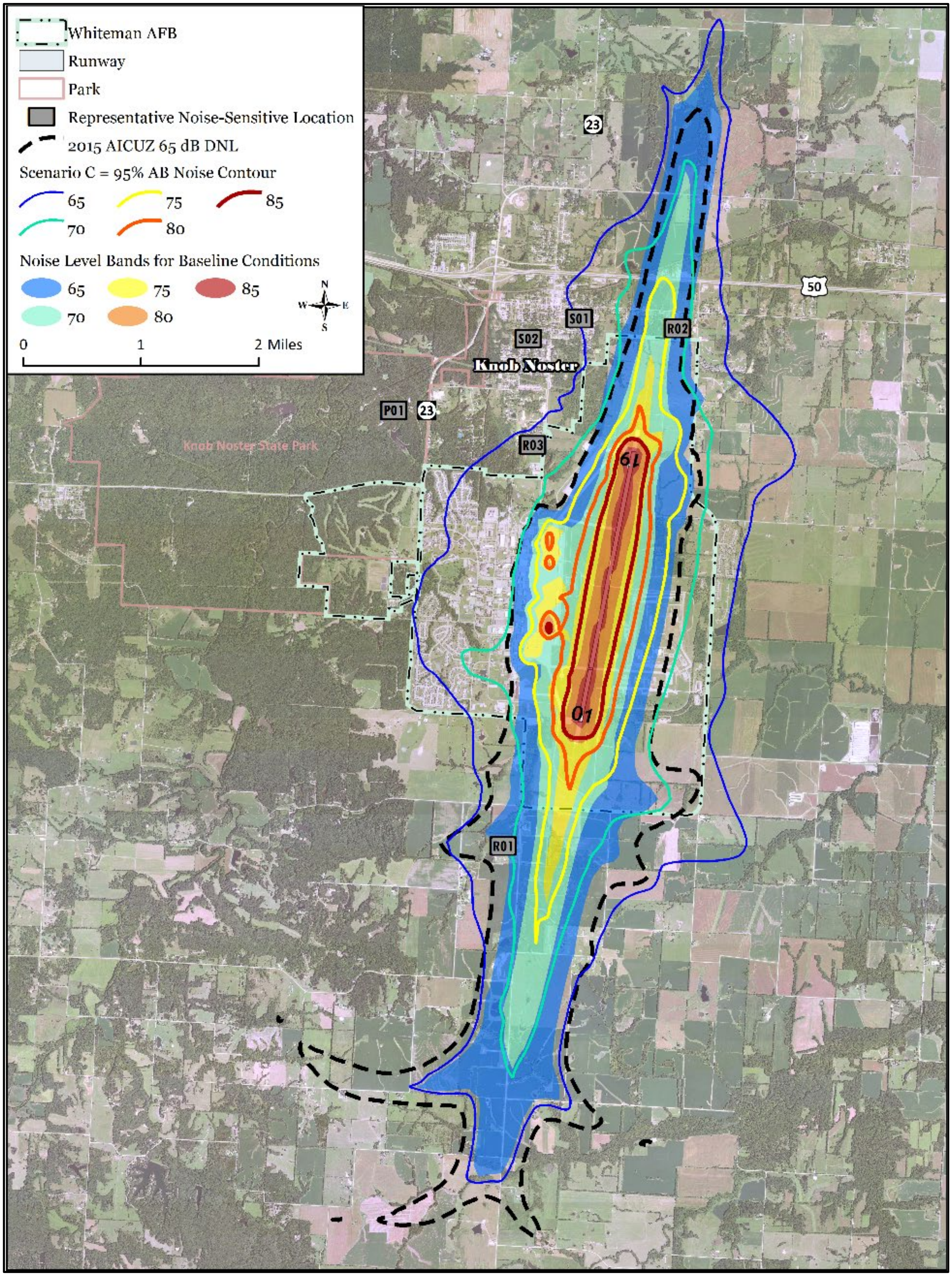


Figure B-30. AFRC F-35A Mission Scenario C DNL Contours at Whiteman AFB

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APPENDIX C

AIR QUALITY

This appendix is contained on the CD-ROM on the back cover of this document.

APPENDIX C AIR QUALITY

C.1 INTRODUCTION

This appendix describes the methods used to estimate construction and operational air emissions for the Air Force Reserve Command (AFRC) F-35A Operational Beddown Environmental Impact Statement (EIS). The analysis includes emissions estimations for proposed activities at the following four alternative basing locations: Davis-Monthan Air Force Base (AFB), Arizona; Homestead Air Reserve Base (ARB), Florida; Naval Air Station (NAS) Joint Reserve Base (JRB) Fort Worth, Texas; and Whiteman AFB, Missouri. Each F-35A basing alternative would require construction activities and would replace existing aircraft operations with operations from the proposed F-35A mission within the base region and associated airspaces.

C.2 EMISSION CALCULATION METHODS

Emissions associated with the proposed F-35A basing alternatives were evaluated in accordance with the tiered approach outlined in the *Air Force Air Quality Environmental Impact Analysis Process (EIAP) Guide – Fundamentals, Volume 1 of 2* (EIAP) (AFCEC 2017). The first step of this approach involved conducting an assessment to determine if the proposed action is exempt from air quality analyses. The proposed F-35A basing mission is not subject to any categorical exclusion or exemption identified in the General Conformity Rule (GCR). Therefore, this EIS analysis performs a quantitative assessment (Tier II). The Tier II assessment requires a formal evaluation of air impacts based on quantification of annual net total direct and indirect emissions of pollutants of concern.

The analysis used the Air Conformity Applicability Model (ACAM), Version 5.0.13a, to estimate construction and operational emissions from the proposed F-35A basing alternatives (AFCEC 2019). The ACAM provides a level of consistency with respect to emissions factors and calculations. Emissions considered in the analysis include the following:

- Volatile organic compounds (VOCs),
- Carbon monoxide (CO),
- Nitrogen oxides (NO_x),
- Sulfur dioxide (SO_2),
- Particulate matter less than 10 microns in diameter (PM_{10}),
- Particulate matter less than 2.5 microns in diameter ($PM_{2.5}$), and
- Carbon dioxide equivalent (CO_2e).

The ACAM also identifies whether a project region of analysis is in nonattainment, maintenance, or attainment of the national ambient air quality standards (NAAQS) for purposes of defining emission indicator thresholds to determine the significance of projected air quality impacts. The following sections provide details on the assumptions and methods used in the estimation of proposed construction and operational emissions. Attachments C-1 through C-4 of this appendix present documentation of these emissions estimates for each F-35A basing alternative.

C.2.1 CALCULATIONS FOR CONSTRUCTION

The ACAM evaluates emissions from the following types of construction activities:

- Demolition,
- Site Grading,

- Trenching/Excavation,
- Building Construction,
- Architectural Coating, and
- Paving.

Sources of air emissions associated with these activities include nonroad construction equipment, on-road trucks and worker vehicles, fugitive dust, and VOCs from architectural coatings and asphalt pavement off-gassing.

Each F-35A basing alternative would require several of the construction activities identified previously. Construction activity data for each alternative in terms of building demolition/renovation/construction volumes, areas of pavement construction, and areas of disturbed ground for fugitive dust were used as inputs to the ACAM. The analysis assumed that construction activities at each F-35A alternative location would begin in calendar year (CY) 2021 and would be completed in CY 2022.

C.2.2 CALCULATIONS FOR OPERATIONS

Each F-35A project alternative would replace aircraft operations from an existing mission with operations from the proposed F-35A mission within the affected base region and associated airspaces. The existing missions proposed for replacement include A-10C and F-16C aircraft operations. The ACAM evaluates emissions from a variety of stationary and mobile source activities associated with operation of a typical U.S. AFB. Each F-35A alternative would result in relatively minor net changes in personnel at its basing location and as a result would produce inconsequential changes in emissions from base sources other than aircraft operations, such as onsite government motor vehicles or stationary sources. Therefore, the analysis focused on emissions from existing and proposed aircraft-specific source categories to determine the net changes in emissions from each F-35A mission. These categories include the following:

- Aircraft ground and flight operations, including main engines and auxiliary power units;
- Aircraft engine test cells; and
- Aerospace ground equipment (AGE).

However, the analysis also estimates operational emissions for government motor vehicle and personal owned vehicle activities due to net increases or decreases in personnel between the proposed F-35A and existing missions at each basing location.

Existing mission and proposed F-35A mission aircraft operations were used as inputs to ACAM. The analysis assumed that each proposed F-35A aircraft replacement action would reach full operations and resulting emissions in CY 2024, after the completion of all required infrastructure improvements.

The analysis of aircraft operations is limited to operations that would occur within the lowest 3,000 feet (ft) of the atmosphere because this is the typical depth of the atmospheric mixing layer where the release of aircraft emissions would affect ground-level pollutant concentrations. In general, aircraft emissions released above the mixing layer would not appreciably affect ground-level air quality. The ACAM takes this factor into consideration when estimating emissions from aircraft operations at a basing location, such as a landing and takeoff (LTO) cycle. Likewise, for proposed aircraft operations within affected airspaces, the analysis considers only operations that would occur within 3,000 ft above ground level (AGL).

The analysis also used the ACAM to evaluate air quality impacts within affected airspaces and training areas. The proposed F-35A mission at each basing alternative location would operate in the same airspaces and training areas as existing aircraft missions, but at higher altitudes. Proposed F-35A operations within these areas would occur above 3,000 ft AGL approximately 99 percent of the time; therefore, these operations would not appreciably affect ground-level air quality. Compared to existing mission operations, A-10C and F-16C operations would occur below 3,000 ft AGL ranging from 6 to 46 percent of the time, depending on the aircraft and airspace. These proposed changes in aircraft operations would result in net reductions in all air pollutant emissions within 3,000 ft AGL of the affected airspaces and training areas.

Flight operations (including arrivals, departures, patterns, and airspace operations) for the F-35A aircraft were derived by utilizing the same site-specific operational data as the project noise impact analysis. Both analyses (i.e., noise and air quality) factor in the number and type of operations, location-specific landing and takeoff patterns, aircraft engine power settings, and other relevant details of the affected environment, the proposed action(s), and alternatives necessary to produce a consistent determination of environmental consequences and anticipated mitigations. The air quality impacts analysis at each proposed basing location was evaluated based on the U.S. Environmental Protection Agency (USEPA) Time In Mode (TIM) Model and site-specific representative TIM cycles. Representative TIM cycles factored in weighted frequency and times in each mode of flight operations (i.e., TIMs) that occur at or below 3,000 ft AGL, based on the site-specific flight profiles developed and the projected frequency of use of each flight profile.

The air quality analysis for the proposed AFRC mission at each basing location evaluates F-35A takeoff operations based on the following three afterburner scenarios: (A) 5 percent, (B) 50 percent, and (C) 95 percent of total take-offs in afterburner mode. Activity levels and resulting emissions for all other proposed operational activities would remain the same under each afterburner scenario.

Calculations showing the time-weighted average assigned to each flight pattern based on the TIM and its percentage of use, consistent with the operational data used throughout this analysis, are presented at the end of base-specific Attachments C-1 through C-4. The following section includes discussion of the methodologies and calculations used to derive representative TIM cycles from weighted averaging based on the flight profiles.

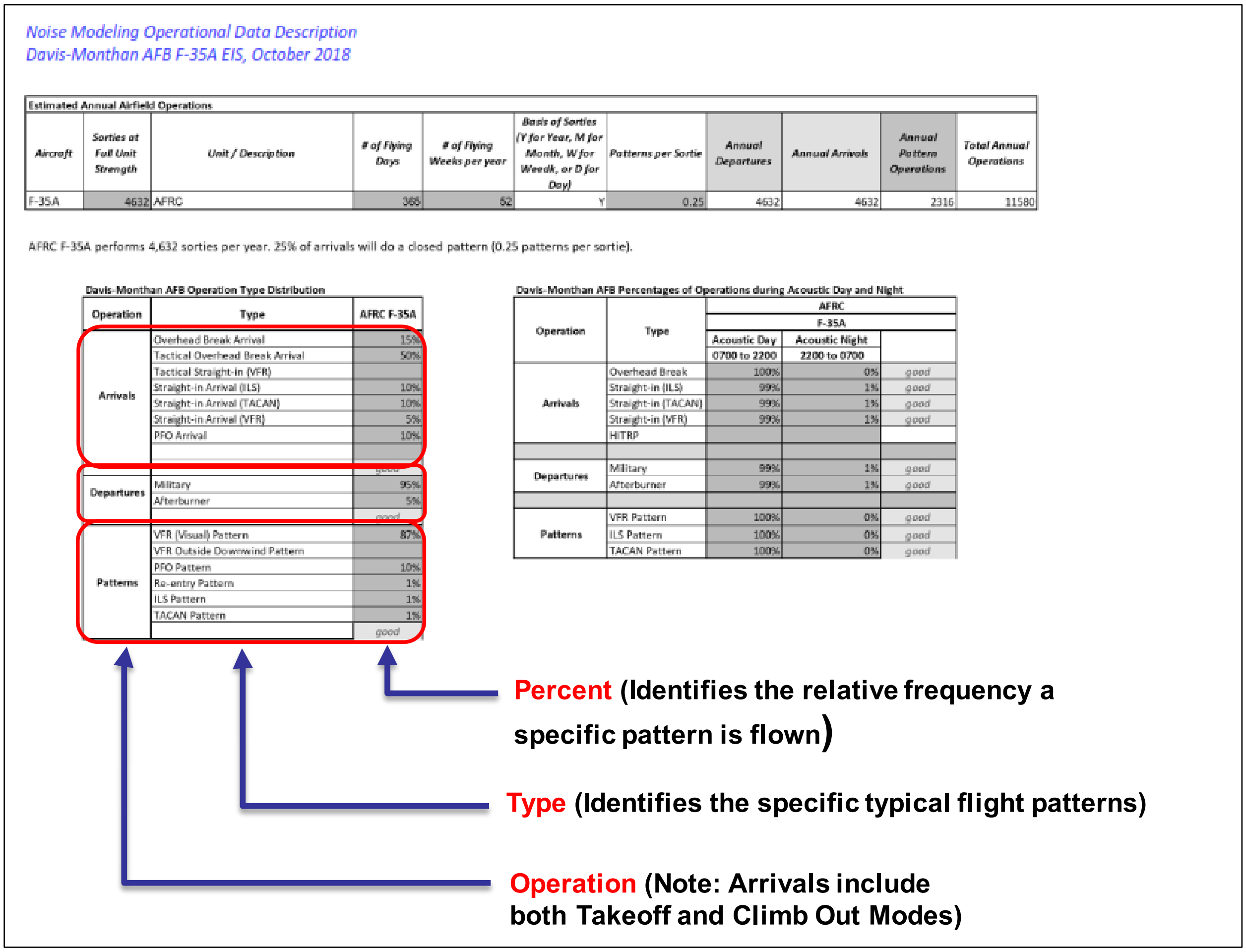
C.2.2.1 Standardized Procedures for Deriving Landing and Takeoff Cycles from Noise Profiles

Dependent on the data collection methodology, a potential to create a substantial amount of error exists. Therefore, a technical/statistical evaluation of the collection method must be performed to demonstrate the validity of the calculated values. This evaluation must include identification and propagation of errors associated with the data collection methodology, extrapolation and interpolation methodologies, and calculations.

A flight profile describes altitude values (in ft). These values sometimes are presented as above airfield elevation (AFE), AGL, or mean sea level (MSL). AFE and AGL values are equal, and MSL values can be adjusted to AFE values by subtracting the elevation of the airfield from the MSL value.

Step 1, Identify Flight Operations: In collecting noise data, several flight patterns are identified that are typical to the specific aircraft under evaluation. These typical patterns are usually summarized in a table that identifies parameters required to derive representative LTO and touch-and-go (TGO) cycles.

Example Table From a Noise Modeling Operational Data Description Document



Noise Modeling Operational Data Description
Davis-Monthan AFB F-35A EIS, October 2018

Estimated Annual Airfield Operations

Aircraft	Sorties at Full Unit Strength	Unit / Description	# of Flying Days	# of Flying Weeks per year	Basis of Sorties (Y for Year, M for Month, W for Weedk, or D for Day)	Patterns per Sortie	Annual Departures	Annual Arrivals	Annual Pattern Operations	Total Annual Operations
F-35A	4632	AFRC	365	52	Y	0.25	4632	4632	2316	11580

AFRC F-35A performs 4,632 sorties per year. 25% of arrivals will do a closed pattern (0.25 patterns per sortie).

Davis-Monthan AFB Operation Type Distribution

Operation	Type	AFRC F-35A
Arrivals	Overhead Break Arrival	15%
	Tactical Overhead Break Arrival	50%
	Tactical Straight-in (VFR)	
	Straight-in Arrival (ILS)	10%
	Straight-in Arrival (TACAN)	10%
	Straight-in Arrival (VFR)	5%
	PFO Arrival	10%
		good
Departures	Military	95%
	Afterburner	5%
		good
Patterns	VFR (Visual) Pattern	87%
	VFR Outside Downwind Pattern	
	PFO Pattern	10%
	Re-entry Pattern	1%
	ILS Pattern	1%
	TACAN Pattern	1%
		good

Davis-Monthan AFB Percentages of Operations during Acoustic Day and Night

Operation	Type	AFRC F-35A Acoustic Day 0700 to 2200	AFRC F-35A Acoustic Night 2200 to 0700	
Arrivals	Overhead Break	100%	0%	good
	Straight-in (ILS)	99%	1%	good
	Straight-in (TACAN)	99%	1%	good
	Straight-in (VFR)	99%	1%	good
	HITRP			
Departures	Military	99%	1%	good
	Afterburner	99%	1%	good
Patterns	VFR Pattern	100%	0%	good
	ILS Pattern	100%	0%	good
	TACAN Pattern	100%	0%	good

Step 2, Obtain Flight Patterns and Profiles: For each of the specific operations identified in the table (i.e., arrivals, departures, and patterns), compile the noise flight patterns and profiles for each "type" of operation. For example, the departures operation has two types: military departures and afterburner departures. Note that a noise flight pattern and profile is often used for the same "type" of operation.

Step 3, Interpolation of Critical Points: This step is performed for each "type" of operation identified in Step 2. The LTO Cycle Model has critical data points that represent the start and end of specific flight modes as defined by the model. Unfortunately, noise profiles do not usually fall on these critical data points; therefore, these critical data points must be extrapolated from the available noise data. Generally, data collected for noise are missing critical data points for takeoff at 500 ft AGL, for climb out at 3,000 ft AGL, and for approach at the 3,000 ft AGL. At each of these critical data points, which are missing in a noise profile, the distance (i.e., horizontal), height (i.e., altitude), power setting, and air speed must be approximated. For example, the following approach profile is missing the 3,000 ft AGL point where the approach mode would begin.

Example Noise Approach Profile

Point	Distance (ft)	Height (ft)	Power (% ETR)	Speed (kts)
a	209,442	10000	15	300
b	73,060	1500	35	300
c	42,864	1500	15	300
d	31,898	1500	35	210
e	21,932	1500	50	200
f	17,932	1500	15	200
g	11,966	1500	60	200
h	6,000	300	40	170
i	0	50	40	160

Missing 3,000 ft critical point

Extrapolation is *estimating* a value by *assuming that existing trends will continue;* however, noise profiles have very few data points from which to suggest any specific trend. Therefore, we must default to the even less precise method of *interpolation* to approximate the needed critical points. Linear interpolation is quick and easy, but this is a very imprecise method. *Linear interpolation error can be substantial* because the error is proportional to the square of the distance between the data points.

By assuming a linear relationship between points (which has been proven to not be true), we can approximate the distance (horizontal), power setting, and air speed for a given missing critical point. In a linear relationship, any point between the two known points can be derived with the point-slope equation of a straight line.

$$\boldsymbol{y = \frac{y_2 - y_1}{x_2 - x_1} \times (x - x_2) + y_2}$$

Therefore, for the previous example, the horizontal distance along flight track *(D),* power setting *(P),* and air speed *(S)* at an altitude *(A)* of 3,000 AGL can be approximated as follows.

$$\boldsymbol{D = \frac{D_b - D_a}{A_b - A_a} \times (A - A_b) + D_b}$$

$$\boldsymbol{D} = \frac{73060 - 209442}{1500 - 10000} \times (3000 - 1500) + 73060 = \mathbf{97{,}127\ ft}$$

$$\boldsymbol{P = \frac{P_b - P_a}{A_b - A_a} \times (A - A_b) + P_b}$$

$$\boldsymbol{P} = \frac{25 - 15}{1500 - 10000} \times (3000 - 1500) + 35 = \mathbf{31\%}$$

$$\boldsymbol{S = \frac{S_b - S_a}{A_b - A_a} \times (A - A_b) + S_b}$$

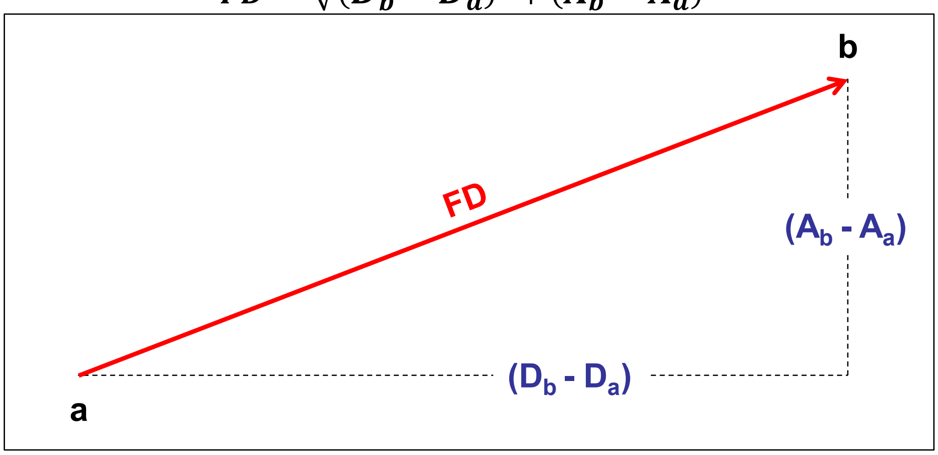
$$\boldsymbol{P} = \frac{300 - 300}{1500 - 10000} \times (3000 - 1500) + 300 = \mathbf{300\ kts}$$

Example Noise Profile with Extrapolation of Critical Point

Point	Distance (ft)	Height (ft)	Power (% ETR)		Speed (kts)
a	209,442	10000	15	Variable	300
	97,127	3000	31		300
b	73,060	1500	35	Variable	300
c	42,864	1500	15	Variable	300
d	31,898	1500	35	Variable	210
e	21,932	1500	50	Parallel	200
f	17,932	1500	15	Parallel	200
g	11,966	1500	60	Parallel	200
h	6,000	300	40	Parallel	170
i	0	50	40	Parallel	160

Step 4, Derive Flight Distances *(FD):* This step is performed for each "type" of operation identified in Step 2. Flight distance is the actual distance an aircraft travels between two points on a flight track (i.e., a segment). The variables used are the horizontal distance along flight track *(D)* and altitude *(A).* The altitude values and the distance along flight track values are presented in feet. Therefore, one can calculate approximate flight distance *(FD)* using the Pythagorean theorem.

$$\boldsymbol{FD} = \sqrt{(\boldsymbol{D_b} - \boldsymbol{D_a})^2 + (\boldsymbol{A_b} - \boldsymbol{A_a})^2}$$



Therefore, for the previous example, the flight distance *(FD)* between the critical point of 3,000 AGL and point "b" can be approximated as follows.

$$\boldsymbol{FD} = \sqrt{(\mathbf{97127} - \mathbf{73060})^2 + (\mathbf{3000} - \mathbf{1500})^2} = \mathbf{24,114\ ft}$$

Example Noise Profile with Derived Flight Distances

Point	Distance (ft)	Height (ft)	Power (% ETR)		Speed (kts)	True Flight Distance (ft)
a	209,442	10000	15	Variable	300	
	97,127	3000	31		300	
b	73,060	1500	35	Variable	300	24114
c	42,864	1500	15	Variable	300	30196
d	31,898	1500	35	Variable	210	10966
e	21,932	1500	50	Parallel	200	9966
f	17,932	1500	15	Parallel	200	4000
g	11,966	1500	60	Parallel	200	5966
h	6,000	300	40	Parallel	170	6085
i	0	50	40	Parallel	160	6005

Step 5, Convert Air Speed: This step is performed for each "type" of operation identified in Step 2. Noise profiles provide air speed (speed) in knots (kts) at the beginning and end of a segment, so the values must be converted to feet per second (fps), and an average air speed (AS) of the segment must be calculated. The conversion from kts to fps is 1 kts = 1.6878 fps or AS (fps) = AS (kts) x 1.6878 (fps/kts); therefore, AS is calculated with the following equation.

$$\boldsymbol{AS = \frac{Speed_a + Speed_b}{2} \times 1.6687}$$

Example Noise Profile with Derived Flight Distances and Air Speed

Point	Distance (ft)	Height (ft)	Power (% ETR)		Speed (kts)	True Flight Distance (ft)	Air Speed (fps)
a	209,442	10000	15	Variable	300		
	97,127	3000	31		300		
b	73,060	1500	35	Variable	300	24114	506
c	42,864	1500	15	Variable	300	30196	506
d	31,898	1500	35	Variable	210	10966	430
e	21,932	1500	50	Parallel	200	9966	346
f	17,932	1500	15	Parallel	200	4000	338
g	11,966	1500	60	Parallel	200	5966	338
h	6,000	300	40	Parallel	170	6085	312
i	0	50	40	Parallel	160	6005	278

Step 6, Approximate Time to Travel Segment: This step is performed for each "type" of operation identified in Step 2. Once the actual distance traveled between two points on a flight track (i.e., a segment) and AS is determined, the time to travel a specific segment can be approximated. Segment time *(ST)* is approximated by dividing the segment's flight distance *(FD)* by the AS of the segment.

$$ST = \frac{FD}{AS}$$

Example Noise Profile with Derived Segment Times

Point	Distance (ft)	Height (ft)	Power (% ETR)		Speed (kts)	True Flight Distance (ft)	Air Speed (fps)	Segment Time (sec)
a	209,442	10000	15	Variable	300			
	97,127	3000	31		300			
b	73,060	1500	35	Variable	300	24114	506	47.62
c	42,864	1500	15	Variable	300	30196	506	59.64
d	31,898	1500	35	Variable	210	10966	430	25.48
e	21,932	1500	50	Parallel	200	9966	346	28.80
f	17,932	1500	15	Parallel	200	4000	338	11.85
g	11,966	1500	60	Parallel	200	5966	338	17.67
h	6,000	300	40	Parallel	170	6085	312	19.49
i	0	50	40	Parallel	160	6005	278	21.56

Step 7, TIMs by Altitude Method: This step is performed for each "type" of operation identified in Step 2. The LTO cycle provides a basis for calculating aircraft emissions. According to USEPA guidance (EPA 420-R-92-009 and EPA 450/3-78-117):

> During each mode of operation, the aircraft engines operate at a fairly standard power setting for a given aircraft category. Emissions for one complete cycle for a given aircraft can be calculated by knowing emission factors for specific aircraft engines at those power settings. Then, if the activity of all aircraft in the modeling zone can be determined for the inventory period, the total emissions can be calculated.

Step 7a, Derive TIMs for Specific Noise Flight Profiles Based on Altitudes: For each mode of flight operations represented in a noise flight profile (i.e., takeoff, climb out, and approach), add all segment times that are associated with each specific mode as defined by altitude only.

- Takeoff TIM = time to fly from 0 ft (end of runway) to 500 ft (start of climb out mode)
- Climb Out TIM = time to fly from 500 ft (after takeoff mode) to 3,000 ft (mixing height)
- Approach TIM = time to fly from 3,000 to 0 ft (landing)

Example Noise Profile with Derived Takeoff and Climb Out TIMs

Point	Distance (ft)	Height (ft)	Power (% ETR)		Speed (kts)	True Flight Distance (ft)	Air Speed (fps)	Segment Time (sec)	
a	0	0	75	75% ETR	0				
b	3,000	0	100	Variable	150	3000	253	11.85	
c	3,500	7	100	Mil	174	500	273	1.83	Take Off = 33 sec
d	10,000	250	100	Variable	300	6505	400	16.26	
	11,582	500	100		305	1601	510	3.14	
e	27,400	3000	95	Variable	350	16015	552	28.99	Climbout= 29 sec
f	53,624	10000	35	Variable	350				
g	200,000	10000	35	Variable	350				

Example Noise Profile with Derived Approach TIM

Point	Distance (ft)	Height (ft)	Power (% ETR)		Speed (kts)	True Flight Distance (ft)	Air Speed (fps)	Segment Time (sec)	
a	209,442	10000	15	Variable	300				
	97,127	3000	31		300				
b	73,060	1500	35	Variable	300	24114	506	47.62	
c	42,864	1500	15	Variable	300	30196	506	59.64	
d	31,898	1500	35	Variable	210	10966	430	25.48	
e	21,932	1500	50	Parallel	200	9966	346	28.80	Approach = 232 sec
f	17,932	1500	15	Parallel	200	4000	338	11.85	
g	11,966	1500	60	Parallel	200	5966	338	17.67	
h	6,000	300	40	Parallel	170	6085	312	19.49	
i	0	50	40	Parallel	160	6005	278	21.56	

NOTE: Noise flight profiles do not include taxi in and taxi out data; therefore, taxi TIMs cannot be derived from noise profiles.

For each operation type identified in Step 1, tabulate the TIMs by mode derived in this step.

Example of Operations Type TIMs Tabulated by Modes

Mode		Arrivals					Departures	
		Overhead Break Arrival Lead (F35AO03)	Overhead Break Arrival - Wingman (F35AO04)	Straight in IFR Arrival (F35AA01)	straight in VFR Arrival (F35AA06)	PFO Arrival (F35AS01)	Mil Departure (F35ADM01)	Afterburner Departure (F35ADA01)
Takeoff Afterburner		0	0	0	0	0	0	30.85
Takeoff Military		0	0	0	0	0	33.08	27.23
Climb Out		0	0	0	0	0	28.99	0
Approach		217	232	120	230	34	0	0
Taxi/Idle Out/In		0	0	0	0	0	0	0
Frequency Flown =		15%	50%	20%	5%	10%	95%	5%

Step 7b, Derive Overall Representative TIMs Based on Altitudes: For each operation type identified in Step 1 and tabulated in Step 7a, calculate the percent-weighted representative TIMs for each mode (i.e., operation) by multiplying the time spent in a specified mode by the percent (i.e., frequency) the aircraft is flown in that specified mode for each operation type (i.e., profile).

$$\boldsymbol{TIM_{Mode_{Type}}} = \boldsymbol{time\ spent\ in\ a\ mode\ for\ a\ specific\ operation\ type}$$
$$= \boldsymbol{TIM_{Mode_{Type}}} \times \boldsymbol{Percent_{Type}}$$

For example, calculate the TIMs for the approach mode (using the values in the previous table).

$$TIM_{Approach_{F35Ao03}} = 217 \times 15\% = 32.57 \text{ sec}$$

Then, the representative TIMs are derived by adding all percent-weighted representative TIMs for each mode.

$$\text{Representative } TIM_{Mode} = \sum TIM_{Mode_{Type}}$$

For example, calculate the representative TIMs for the approach mode (using the values in the following table).

$$\text{Representative TIM}_{Approach} = 32.57 + 116.06 + 23.94 + 11.51 + 3.39$$
$$= 187.47 \text{ sec}$$

Example of Weighted Times Based on Noise Profiles (seconds)

Mode	Arrivals					Departures		Noise LTO
	Overhead Break Arrival Lead (F35AO03)	Overhead Break Arrival - Wingman (F35AO04)	Straight in IFR Arrival (F35AA01)	straight in VFR Arrival (F35AA06)	PFO Arrival (F35AS01)	Mil Departure (F35ADM01)	Afterburner Departure (F35ADA01)	Cycle Contributions
Takeoff Afterburner	0.00	0.00	0.00	0.00	0.00	0.00	1.54	1.54
Takeoff Military	0.00	0.00	0.00	0.00	0.00	31.42	1.36	32.79
Climb Out	0.00	0.00	0.00	0.00	0.00	27.54	0.00	27.54
Approach	32.57	116.06	23.94	11.51	3.39	0.00	0.00	187.47
Taxi/Idle Out/In	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Derived Representative TIMs

NOTE: The derived representative TIMs do not include a TIM for Taxi/Idle Out/In. Therefore, the existing Taxi/Idle Out/In value must be used.

Step 8, TIMs by Power Setting Method: This step is performed for each "type" of operation identified in Step 2. This method is a modification of the USEPA method (EPA 420-R-92-009 and EPA 450/3-78-117) described in Step 7. In this case, the altitudes are ignored except for 3,000 ft AGL, which is used to identify the end of a Climb Out and the beginning of the approach. Instead of altitudes to define the modes for flight operations, the engine's percent thrust range is used.

- Taxi/Idle TIM = time flown within the range of 0 to 18.5 percent thrust below 3,000 ft AGL
- Approach TIM = time flown within the range of 18.5 to 50 percent thrust below 3,000 ft AGL
- Climb Out TIM = time flown within the range of 50 to 92.5 percent thrust below 3,000 ft AGL
- Military Takeoff TIM = time flown within the range of 92.5 to 105 percent thrust below 3,000 ft AGL
- Afterburner Takeoff TIM = time flown within the range of 105 to 150 percent thrust below 3,000 ft AGL

Step 8a, Derive TIMs for Specific Noise Flight Profile Based on Power Settings: For each mode of flight operations represented in a noise flight profile (i.e., takeoff, climb out, and approach), add all segment times that are associated with each specific mode as defined by percent thrust range only.

Example Noise Profile with Derived Takeoff and Climb Out TIMs

Point	Distance (ft)	Height (ft)	Power (% ETR)		Speed (kts)	True Flight Distance (ft)	Air Speed (fps)	Segment Time (sec)	
a	0	0	75	75% ETR	0				
b	3,000	0	100	Variable	150	3000	253	11.85	← Millitary Take Off
c	3,500	7	100	Mil	174	500	273	1.83	← Millitary Take Off
d	10,000	250	100	Variable	300	6505	400	16.26	← Millitary Take Off
	11,582	500	100		305	1601	510	3.14	← Millitary Take Off
e	27,400	3000	95	Variable	350	16015	552	28.99	← Millitary Take Off
f	53,624	10000	35	Variable	350				← Climbout
g	200,000	10000	35	Variable	350				← Climbout

NOTE: In this scenario, the segment times for climb out mode are blank (i.e., 0.0 value) because the climb out power range starts above 3,000 ft AGL.

For each operation type identified in Step 1, tabulate the TIMs by mode that were derived in this step.

Example of Operations Type TIMs Tabulated by Mode

Mode	% Thrust Range		Arrivals					Departures	
			Overhead Break Arrival Lead (F35AO03)	Overhead Break Arrival - Wingman (F35AO04)	Straight in IFR Arrival (F35AA01)	straight in VFR Arrival (F35AA06)	PFO Arrival (F35AS01)	Mil Departure (F35ADM01)	Afterburner Departure (F35ADA01)
	>	≤							
Takeoff Afterburner	105	150	0.0	0.0	0.0	0.0	0.0	0.0	9.7
Takeoff Military	92.5	105	0.0	0.0	0.0	0.0	0.0	62.1	48.4
Climb Out	50	92.5	17.7	17.7	0.0	0.0	0.0	0.0	0.0
Approach	18.5	50	128.0	143.0	119.7	230.3	0.0	0.0	0.0
Taxi/Idle Out/In	0	18.5	71.5	71.5	0.0	0.0	33.9	0.0	0.0
Frequency Flown =			15%	50%	20%	5%	10%	95%	5%

Step 8b, Derive Overall Representative TIMs Based on Power Settings: For each operation type identified in Step 1 and tabulated in Step 7a, calculate the percent-weighted representative TIMs for each mode (i.e., operation) by multiplying the time spent in a specified mode by the percent (i.e., frequency) the aircraft is flown in that specified mode for each operation type (i.e., profile).

$$\boldsymbol{TIM_{Mode_{Type}} = time\ spent\ in\ a\ mode\ for\ a\ specific\ operation\ type}$$
$$\boldsymbol{= TIM_{Mode_{Type}} \times Percent_{Type}}$$

For example, calculate the TIMs for the approach mode (using the values in the previous table).

$$\boldsymbol{TIM_{Approach_{F35Ao03}} = 128 \times 15\% = 19.2\ \mathrm{sec}}$$

The representative TIMs are then derived by adding all percent-weighted representative TIMs for each mode.

$$\textbf{Representative } \boldsymbol{TIM_{Mode} = \sum TIM_{Mode_{Type}}}$$

For example, calculate the representative TIMs for the approach mode (using the values in the following table).

$$\textbf{Representative TIM}_{\textbf{\textit{Approach}}} = \mathbf{19.2 + 71.5 + 23.9 + 11.5 = 126.1\ sec}$$

$$\textbf{Representative TIM}_{\textbf{Mode}} = (\Sigma\ \textbf{TIM}_{\textbf{segement}}) \times \textbf{Percent}_{\textbf{Mode}}$$

Example of Weighted Times Based on Noise Profiles (seconds)

Mode	% Thrust Range		Arrivals					Departures		Noise LTO
			Overhead Break Arrival Lead (F35AO03)	Overhead Break Arrival - Wingman (F35AO04)	Straight in IFR Arrival (F35AA01)	straight in VFR Arrival (F35AA06)	PFO Arrival (F35AS01)	Mil Departure (F35ADM01)	Afterburner Departure (F35ADA01)	Cycle Contributions
	>	≤								
Takeoff Afterburner	105	150	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.5
Takeoff Military	92.5	105	0.0	0.0	0.0	0.0	0.0	59.0	2.4	61.4
Climb Out	50	92.5	2.7	8.8	0.0	0.0	0.0	0.0	0.0	11.5
Approach	18.5	50	19.2	71.5	23.9	11.5	0.0	0.0	0.0	126.1
Taxi/Idle Out/In	0	18.5	10.7	35.7	0.0	0.0	3.4	0.0	0.0	49.9

Derived Representative TIMs

Step 9, Derive Overall Average Representative TIMs: Given there are two viable methodologies for deriving representative LTO Cycle TIMs, the last step is to assume both methods are equally valid. Therefore, the TIMS for a representative LTO Cycle are derived by simply averaging the TIM values.

$$\textit{\textbf{Representative TIM}} = \frac{(\textbf{TIM by Altitude Method} + \textbf{TIM by Power Setting Method})}{\mathbf{2}}$$

For example, calculate the representative TIMs for the approach mode (using the previous example values).

$$\textit{\textbf{Representative TIM}}_{\textbf{Approach}} = \frac{(\mathbf{187 + 126})}{\mathbf{2}} = \mathbf{157\ sec = 2.61\ min}$$

C.3 ORGANIZATION OF EMISSIONS DATA IN ATTACHMENTS

Attachments C-1 through C-4 present construction and operational emissions data and estimates for each F-35A basing alternative. Each of the following attachments contains an individual "Air Conformity Applicability Model Report Record of Conformity Analysis (ROCA)" or "Air Conformity Applicability Model Report Record of Air Analysis (ROAA)" summary report, followed by a "Detail Air Conformity Applicability Model Report" for base activities and airspace operations, as output by the ACAM:

- Attachment C-1: Davis-Monthan Air Force Base - Air Conformity Applicability Model Reports,
- Attachment C-2: Homestead Air Reserve Base - Air Conformity Applicability Model Reports,
- Attachment C-3: Naval Air Station Joint Reserve Base Fort Worth - Air Conformity Applicability Model Reports, and
- Attachment C-4: Whiteman Air Force Base - Air Conformity Applicability Model Reports.

The ACAM summary reports include general project alternative information and summaries of total CY emissions. The ACAM detail reports include specific information on construction and operational source activities, emission factors, and emission calculation methods. Each attachment begins with ACAM summary reports for F-35A afterburner takeoff scenarios of (A) 5 percent, (B) 50 percent, and (C) 95 percent of total takeoffs in afterburner mode. Following these data reports is an ACAM detail report for the afterburner takeoff scenario of 5 percent.

C.3.1 ORGANIZATION OF CONSTRUCTION EMISSIONS DATA

The ACAM detail reports for each proposed F-35A basing alternative begins with construction emissions data, followed by operational emissions data. The construction emissions data include one or more of the following sections:

- General Information,
- Construction/Demolition,
- Trenching/Excavating Phase,
- Building Construction Phase,
- Architectural Coatings Phase,
- Site Grading Phase, and
- Paving Phase.

C.3.2 ORGANIZATION OF OPERATIONS EMISSIONS DATA

The ACAM detail reports for each F-35A basing alternative contain operations emissions data for the existing aircraft mission, followed by operations emissions data for the F-35A mission. These data occur in separate sections titled "Aircraft," and they include the following information:

- General Information and Timeline Assumptions,
- Aircraft and Engines,
- Flight Operations,
- Auxiliary Power Unit (APU) (F-16C only),
- Aircraft Engine Test Cell, and
- AGE.

After the "Aircraft" sections, the ACAM detail report includes a section titled "Personnel," which includes the operational emissions calculations for government motor vehicle and privately owned vehicle (POV) activities due to net increases or decreases in personnel for each basing alternative.

Following the ACAM summary and detail reports for base activities are ACAM summary and detail reports for the analyses of affected airspaces and training areas. The ACAM detail reports include "Aircraft" sections for the addition of F-35A aircraft and removal of existing A-10C or F-16C aircraft operations within these areas.

Each attachment ends with a section titled "F-35A Operations," which presents calculations of time-weighted averages assigned to flight patterns for each proposed basing location, as discussed previously in Section 2.2.1.

C.4 REFERENCES

AFCEC 2017. Air Force Civil Engineer Center, Compliance Technical Support Branch. *Air Force Air Quality Environmental Impact Analysis Process (EIAP) Guide – Fundamentals, Volume 1 of 2*. 2017.

AFCEC 2019. U.S. Air Force Civil Engineer Center. U.S. Air Force Air Conformity Applicability Model (ACAM). Developed by Solutio Environmental, Inc. Version 5.0.13a.

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ATTACHMENT C-1 DAVIS-MONTHAN AIR FORCE BASE - AIR CONFORMITY APPLICABILITY MODEL REPORTS

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AIR CONFORMITY APPLICABILITY MODEL REPORT
RECORD OF CONFORMITY ANALYSIS (ROCA)

1. General Information: The Air Force's Air Conformity Applicability Model (ACAM) was used to perform an analysis to assess the potential air quality impact/s associated with the action in accordance with the Air Force Instruction 32-7040, Air Quality Compliance And Resource Management; the Environmental Impact Analysis Process (EIAP, 32 CFR 989); and the General Conformity Rule (GCR, 40 CFR 93 Subpart B). This report provides a summary of the ACAM analysis.

a. Action Location:
Base: DAVIS-MONTHAN AFB
State: Arizona
County(s): Pima
Regulatory Area(s): Tucson, AZ

b. Action Title: AFRC F-35A EIS - Davis Monthan AFB

c. Project Number/s (if applicable): Replace 24 A-10Cs with 24 F-35As

d. Projected Action Start Date: 1 / 2021

e. Action Description:

Demolition/Renovation/Construction activities and replacement aircraft operations.

f. Point of Contact:
Name: Chris Crabtree, Leidos, Inc., and Austin N. Naranjo, Solutio
Title:
Organization:
Email:
Phone Number:

2. Analysis: Total combined direct and indirect emissions associated with the action were estimated through ACAM on a calendar-year basis for the "worst-case" and "steady state" (net gain/loss upon action fully implemented) emissions. General Conformity under the Clean Air Act, Section 1.76 has been evaluated for the action described above according to the requirements of 40 CFR 93, Subpart B.

Based on the analysis, the requirements of this rule are: _____ applicable
__X__ not applicable

Conformity Analysis Summary:

2021

Pollutant	Action Emissions (ton/yr)	GENERAL CONFORMITY	
		Threshold (ton/yr)	Exceedance (Yes or No)
Tucson, AZ			
VOC	0.368		
NOx	2.338		
CO	2.518	100	No
SOx	0.006		
PM 10	1.314		
PM 2.5	0.102		
Pb	0.000		
NH3	0.003		
CO2e	591.3		

AIR CONFORMITY APPLICABILITY MODEL REPORT
RECORD OF CONFORMITY ANALYSIS (ROCA)

2022

Pollutant	Action Emissions (ton/yr)	GENERAL CONFORMITY	
		Threshold (ton/yr)	Exceedance (Yes or No)
Tucson, AZ			
VOC	0.365		
NOx	2.172		
CO	2.375	100	No
SOx	0.005		
PM 10	0.106		
PM 2.5	0.105		
Pb	0.000		
NH3	0.002		
CO2e	503.6		

2023

Pollutant	Action Emissions (ton/yr)	GENERAL CONFORMITY	
		Threshold (ton/yr)	Exceedance (Yes or No)
Tucson, AZ			
VOC	0.309		
NOx	-0.039		
CO	-0.525	100	No
SOx	0.000		
PM 10	-0.001		
PM 2.5	-0.001		
Pb	0.000		
NH3	-0.003		
CO2e	-55.0		

2024

Pollutant	Action Emissions (ton/yr)	GENERAL CONFORMITY	
		Threshold (ton/yr)	Exceedance (Yes or No)
Tucson, AZ			
VOC	-98.993		
NOx	-66.900		
CO	-135.285	100	No
SOx	-0.899		
PM 10	-17.620		
PM 2.5	-11.470		
Pb	0.000		
NH3	-0.003		
CO2e	9219.1		

AIR CONFORMITY APPLICABILITY MODEL REPORT
RECORD OF CONFORMITY ANALYSIS (ROCA)

2025 - (Steady State)

Pollutant	Action Emissions (ton/yr)	GENERAL CONFORMITY	
		Threshold (ton/yr)	Exceedance (Yes or No)
Tucson, AZ			
VOC	-98.993		
NOx	-66.900		
CO	-135.285	100	No
SOx	-0.899		
PM 10	-17.620		
PM 2.5	-11.470		
Pb	0.000		
NH3	-0.003		
CO2e	9219.1		

None of estimated emissions associated with this action are above the conformity threshold values established at 40 CFR 93.153 (b); Therefore, the requirements of the General Conformity Rule are not applicable.

//Chris Crabtree, Austin Naranjo// 7/23/20

Chris Crabtree, Leidos, Inc., and Austin N. Naranjo, Solutio DATE

AIR CONFORMITY APPLICABILITY MODEL REPORT
RECORD OF CONFORMITY ANALYSIS (ROCA)

1. General Information: The Air Force's Air Conformity Applicability Model (ACAM) was used to perform an analysis to assess the potential air quality impact/s associated with the action in accordance with the Air Force Instruction 32-7040, Air Quality Compliance And Resource Management; the Environmental Impact Analysis Process (EIAP, 32 CFR 989); and the General Conformity Rule (GCR, 40 CFR 93 Subpart B). This report provides a summary of the ACAM analysis.

a. Action Location:
Base: DAVIS-MONTHAN AFB
State: Arizona
County(s): Pima
Regulatory Area(s): Tucson, AZ

b. Action Title: AFRC F-35A EIS - Davis Monthan AFB - 50% Afterburner Departures

c. Project Number/s (if applicable): Replace 24 A-10Cs with 24 F-35As

d. Projected Action Start Date: 1 / 2021

e. Action Description:

Demolition/Renovation/Construction activities and replacement aircraft operations.

f. Point of Contact:
Name: Chris Crabtree, Leidos, Inc., and Austin N. Naranjo, Solutio
Title:
Organization:
Email:
Phone Number:

2. Analysis: Total combined direct and indirect emissions associated with the action were estimated through ACAM on a calendar-year basis for the "worst-case" and "steady state" (net gain/loss upon action fully implemented) emissions. General Conformity under the Clean Air Act, Section 1.76 has been evaluated for the action described above according to the requirements of 40 CFR 93, Subpart B.

Based on the analysis, the requirements of this rule are: _____ applicable
__X__ not applicable

Conformity Analysis Summary:

2021

Pollutant	Action Emissions (ton/yr)	GENERAL CONFORMITY	
		Threshold (ton/yr)	Exceedance (Yes or No)
Tucson, AZ			
VOC	0.368		
NOx	2.338		
CO	2.518	100	No
SOx	0.006		
PM 10	1.314		
PM 2.5	0.102		
Pb	0.000		
NH3	0.003		
CO2e	591.3		

AIR CONFORMITY APPLICABILITY MODEL REPORT RECORD OF CONFORMITY ANALYSIS (ROCA)

2022

Pollutant	Action Emissions (ton/yr)	GENERAL CONFORMITY	
		Threshold (ton/yr)	Exceedance (Yes or No)
Tucson, AZ			
VOC	0.365		
NOx	2.172		
CO	2.375	100	No
SOx	0.005		
PM 10	0.106		
PM 2.5	0.105		
Pb	0.000		
NH3	0.002		
CO2e	503.6		

2023

Pollutant	Action Emissions (ton/yr)	GENERAL CONFORMITY	
		Threshold (ton/yr)	Exceedance (Yes or No)
Tucson, AZ			
VOC	0.309		
NOx	-0.039		
CO	-0.525	100	No
SOx	0.000		
PM 10	-0.001		
PM 2.5	-0.001		
Pb	0.000		
NH3	-0.003		
CO2e	-55.0		

2024

Pollutant	Action Emissions (ton/yr)	GENERAL CONFORMITY	
		Threshold (ton/yr)	Exceedance (Yes or No)
Tucson, AZ			
VOC	-98.990		
NOx	-66.588		
CO	-133.171	100	No
SOx	-0.805		
PM 10	-17.531		
PM 2.5	-11.389		
Pb	0.000		
NH3	-0.003		
CO2e	9151.6		

AIR CONFORMITY APPLICABILITY MODEL REPORT
RECORD OF CONFORMITY ANALYSIS (ROCA)

2025 - (Steady State)

Pollutant	Action Emissions (ton/yr)	GENERAL CONFORMITY	
		Threshold (ton/yr)	Exceedance (Yes or No)
Tucson, AZ			
VOC	-98.990		
NOx	-66.588		
CO	-133.171	100	No
SOx	-0.805		
PM 10	-17.531		
PM 2.5	-11.389		
Pb	0.000		
NH3	-0.003		
CO2e	9151.6		

None of estimated emissions associated with this action are above the conformity threshold values established at 40 CFR 93.153 (b); Therefore, the requirements of the General Conformity Rule are not applicable.

//Chris Crabtree, Austin Naranjo// 7/23/20

Chris Crabtree, Leidos, Inc., and Austin N. Naranjo, Solutio DATE

AIR CONFORMITY APPLICABILITY MODEL REPORT RECORD OF CONFORMITY ANALYSIS (ROCA)

1. General Information: The Air Force's Air Conformity Applicability Model (ACAM) was used to perform an analysis to assess the potential air quality impact/s associated with the action in accordance with the Air Force Instruction 32-7040, Air Quality Compliance And Resource Management; the Environmental Impact Analysis Process (EIAP, 32 CFR 989); and the General Conformity Rule (GCR, 40 CFR 93 Subpart B). This report provides a summary of the ACAM analysis.

a. Action Location:
Base: DAVIS-MONTHAN AFB
State: Arizona
County(s): Pima
Regulatory Area(s): Tucson, AZ

b. Action Title: AFRC F-35A EIS - Davis Monthan AFB - 95% Afterburner Departures

c. Project Number/s (if applicable): Replace 24 A-10Cs with 24 F-35As

d. Projected Action Start Date: 1 / 2021

e. Action Description:

Demolition/Renovation/Construction activities and replacement aircraft operations.

f. Point of Contact:
Name: Chris Crabtree, Leidos, Inc., and Austin N. Naranjo, Solutio
Title:
Organization:
Email:
Phone Number:

2. Analysis: Total combined direct and indirect emissions associated with the action were estimated through ACAM on a calendar-year basis for the "worst-case" and "steady state" (net gain/loss upon action fully implemented) emissions. General Conformity under the Clean Air Act, Section 1.76 has been evaluated for the action described above according to the requirements of 40 CFR 93, Subpart B.

Based on the analysis, the requirements of this rule are: _____ applicable
__X__ not applicable

Conformity Analysis Summary:

2021

Pollutant	Action Emissions (ton/yr)	GENERAL CONFORMITY	
		Threshold (ton/yr)	Exceedance (Yes or No)
Tucson, AZ			
VOC	0.368		
NOx	2.338		
CO	2.518	100	No
SOx	0.006		
PM 10	1.314		
PM 2.5	0.102		
Pb	0.000		
NH3	0.003		
CO2e	591.3		

AIR CONFORMITY APPLICABILITY MODEL REPORT
RECORD OF CONFORMITY ANALYSIS (ROCA)

2022

Pollutant	Action Emissions (ton/yr)	GENERAL CONFORMITY	
		Threshold (ton/yr)	Exceedance (Yes or No)
Tucson, AZ			
VOC	0.365		
NOx	2.172		
CO	2.375	100	No
SOx	0.005		
PM 10	0.106		
PM 2.5	0.105		
Pb	0.000		
NH3	0.002		
CO2e	503.6		

2023

Pollutant	Action Emissions (ton/yr)	GENERAL CONFORMITY	
		Threshold (ton/yr)	Exceedance (Yes or No)
Tucson, AZ			
VOC	0.309		
NOx	-0.039		
CO	-0.525	100	No
SOx	0.000		
PM 10	-0.001		
PM 2.5	-0.001		
Pb	0.000		
NH3	-0.003		
CO2e	-55.0		

2024

Pollutant	Action Emissions (ton/yr)	GENERAL CONFORMITY	
		Threshold (ton/yr)	Exceedance (Yes or No)
Tucson, AZ			
VOC	-98.988		
NOx	-66.438		
CO	-131.059	100	No
SOx	-0.718		
PM 10	-17.449		
PM 2.5	-11.315		
Pb	0.000		
NH3	-0.003		
CO2e	9060.3		

AIR CONFORMITY APPLICABILITY MODEL REPORT
RECORD OF CONFORMITY ANALYSIS (ROCA)

2025 - (Steady State)

Pollutant	Action Emissions (ton/yr)	GENERAL CONFORMITY	
		Threshold (ton/yr)	Exceedance (Yes or No)
Tucson, AZ			
VOC	-98.988		
NOx	-66.438		
CO	-131.059	100	No
SOx	-0.718		
PM 10	-17.449		
PM 2.5	-11.315		
Pb	0.000		
NH3	-0.003		
CO2e	9060.3		

None of estimated emissions associated with this action are above the conformity threshold values established at 40 CFR 93.153 (b); Therefore, the requirements of the General Conformity Rule are not applicable.

//Chris Crabtree, Austin Naranjo// — 7/23/20

Chris Crabtree, Leidos, Inc., and Austin N. Naranjo, Solutio — DATE

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

1. General Information

- Action Location
Base: DAVIS-MONTHAN AFB
State: Arizona
County(s): Pima
Regulatory Area(s): Tucson, AZ

- Action Title: AFRC F-35A EIS - Davis Monthan AFB

- Project Number/s (if applicable): Replace 24 A-10Cs with 24 F-35As

- Projected Action Start Date: 1 / 2021

- Action Purpose and Need:

- Action Description:
Demolition/Renovation/Construction activities and replacement aircraft operations.

- Point of Contact
Name: Chris Crabtree, Leidos, Inc., and Austin N. Naranjo, Solutio
Title:
Organization:
Email:
Phone Number:

- Activity List:

	Activity Type	Activity Title
2.	Construction / Demolition	Proposed Construction Activities - Davis-Monthan AFB AFRC F-35A EIS
3.	Aircraft	Remove 24 A-10Cs from Davis-Monthan AFB - AFRC F-35A EIS
4.	Aircraft	Add 24 F-35As LTO Weighted Average at Davis-Monthan AFB - AFRC EIS
5.	Aircraft	Add 24 F-35As TGO Weighted Average at Davis Monthan AFB - AFRC EIS
6.	Personnel	Removal of 30 Personnel

Emission factors and air emission estimating methods come from the United States Air Force's Air Emissions Guide for Air Force Stationary Sources, Air Emissions Guide for Air Force Mobile Sources, and Air Emissions Guide for Air Force Transitory Sources.

2. Construction / Demolition

2.1 General Information & Timeline Assumptions

- Activity Location
County: Pima
Regulatory Area(s): Tucson, AZ

- Activity Title: Proposed Construction Activities - Davis-Monthan AFB AFRC F-35A EIS

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Activity Description:

- Activity Start Date
Start Month: 1
Start Month: 2021

- Activity End Date
Indefinite: False
End Month: 3
End Month: 2024

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	1.088514
SO_x	0.011124
NO_x	4.509945
CO	4.895171
PM 10	1.419406

Pollutant	Total Emissions (TONs)
PM 2.5	0.207506
Pb	0.000000
NH_3	0.004789
CO_2e	1095.1

2.1 Demolition Phase

2.1.1 Demolition Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2021

- Phase Duration
Number of Month: 4
Number of Days: 0

2.1.2 Demolition Phase Assumptions

- General Demolition Information
Area of Building to be demolished (ft^2): 65850
Height of Building to be demolished (ft): 30

- Default Settings Used: Yes

- Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Concrete/Industrial Saws Composite	1	8
Rubber Tired Dozers Composite	1	1
Tractors/Loaders/Backhoes Composite	2	8

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

2.1.3 Demolition Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Concrete/Industrial Saws Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0443	0.0006	0.3176	0.3761	0.0170	0.0170	0.0040	58.563
Rubber Tired Dozers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.2015	0.0024	1.4660	0.7661	0.0581	0.0581	0.0181	239.53
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0407	0.0007	0.2505	0.3606	0.0112	0.0112	0.0036	66.890

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.254	000.002	000.190	002.971	000.007	000.006		000.023	00340.675
LDGT	000.315	000.003	000.335	004.077	000.009	000.008		000.024	00439.030
HDGV	000.779	000.005	001.076	017.040	000.020	000.018		000.047	00806.186
LDDV	000.109	000.003	000.126	002.489	000.004	000.004		000.008	00330.514
LDDT	000.258	000.004	000.367	004.320	000.007	000.006		000.008	00469.489
HDDV	000.320	000.013	003.837	001.396	000.177	000.163		000.026	01501.720
MC	002.525	000.003	000.716	012.738	000.026	000.023		000.051	00395.513

2.1.4 Demolition Phase Formula(s)

- Fugitive Dust Emissions per Phase
$PM10_{FD} = (0.00042 * BA * BH) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
0.00042: Emission Factor (lb/ft^3)
BA: Area of Building to be demolished (ft^2)
BH: Height of Building to be demolished (ft)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase
$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Vehicle Exhaust Emissions per Phase
$VMT_{VE} = BA * BH * (1 / 27) * 0.25 * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building being demolish (ft^2)
BH: Height of Building being demolish (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd^3 / 27 ft^3)
0.25: Volume reduction factor (material reduced by 75% to account for air space)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

2.2 Site Grading Phase

2.2.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 10
Start Quarter: 1
Start Year: 2021

- Phase Duration
Number of Month: 2
Number of Days: 0

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

2.2.2 Site Grading Phase Assumptions

- General Site Grading Information

Area of Site to be Graded (ft^2): 30000
Amount of Material to be Hauled On-Site (yd^3): 100
Amount of Material to be Hauled Off-Site (yd^3): 500

- Site Grading Default Settings

Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Graders Composite	1	6
Other Construction Equipment Composite	1	8
Rubber Tired Dozers Composite	1	6
Tractors/Loaders/Backhoes Composite	1	7

- Vehicle Exhaust

Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

2.2.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Graders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0860	0.0014	0.5212	0.5747	0.0247	0.0247	0.0077	132.93
Other Construction Equipment Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0533	0.0012	0.3119	0.3497	0.0121	0.0121	0.0048	122.61
Rubber Tired Dozers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.2015	0.0024	1.4660	0.7661	0.0581	0.0581	0.0181	239.53
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0407	0.0007	0.2505	0.3606	0.0112	0.0112	0.0036	66.890

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.254	000.002	000.190	002.971	000.007	000.006		000.023	00340.675
LDGT	000.315	000.003	000.335	004.077	000.009	000.008		000.024	00439.030
HDGV	000.779	000.005	001.076	017.040	000.020	000.018		000.047	00806.186
LDDV	000.109	000.003	000.126	002.489	000.004	000.004		000.008	00330.514
LDDT	000.258	000.004	000.367	004.320	000.007	000.006		000.008	00469.489
HDDV	000.320	000.013	003.837	001.396	000.177	000.163		000.026	01501.720
MC	002.525	000.003	000.716	012.738	000.026	000.023		000.051	00395.513

2.2.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD}$ = (20 * ACRE * WD) / 2000

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

VMT_{VE} = (HA_{OnSite} + $HA_{OffSite}$) * (1 / HC) * HT

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

2.3 Trenching/Excavating Phase

2.3.1 Trenching / Excavating Phase Timeline Assumptions

- Phase Start Date
Start Month: 9
Start Quarter: 1
Start Year: 2021

- Phase Duration
Number of Month: 2
Number of Days: 0

2.3.2 Trenching / Excavating Phase Assumptions

- General Trenching/Excavating Information
Area of Site to be Trenched/Excavated (ft^2): 10000
Amount of Material to be Hauled On-Site (yd^3): 500
Amount of Material to be Hauled Off-Site (yd^3): 100

- Trenching Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Excavators Composite	2	8
Other General Industrial Equipmen Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

2.3.3 Trenching / Excavating Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Graders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0860	0.0014	0.5212	0.5747	0.0247	0.0247	0.0077	132.93
Other Construction Equipment Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0533	0.0012	0.3119	0.3497	0.0121	0.0121	0.0048	122.61
Rubber Tired Dozers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.2015	0.0024	1.4660	0.7661	0.0581	0.0581	0.0181	239.53
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0407	0.0007	0.2505	0.3606	0.0112	0.0112	0.0036	66.890

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.254	000.002	000.190	002.971	000.007	000.006		000.023	00340.675
LDGT	000.315	000.003	000.335	004.077	000.009	000.008		000.024	00439.030
HDGV	000.779	000.005	001.076	017.040	000.020	000.018		000.047	00806.186
LDDV	000.109	000.003	000.126	002.489	000.004	000.004		000.008	00330.514
LDDT	000.258	000.004	000.367	004.320	000.007	000.006		000.008	00469.489
HDDV	000.320	000.013	003.837	001.396	000.177	000.163		000.026	01501.720
MC	002.525	000.003	000.716	012.738	000.026	000.023		000.051	00395.513

2.3.4 Trenching / Excavating Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD}$ = (20 * ACRE * WD) / 2000

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

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- Construction Exhaust Emissions per Phase
$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase
$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

2.4 Building Construction Phase

2.4.1 Building Construction Phase Timeline Assumptions

- Phase Start Date
Start Month: 5
Start Quarter: 1
Start Year: 2021

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Phase Duration
Number of Month: 18
Number of Days: 0

2.4.2 Building Construction Phase Assumptions

- General Building Construction Information
Building Category: Office or Industrial
Area of Building (ft^2): 146546
Height of Building (ft): 20
Number of Units: N/A

- Building Construction Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Cranes Composite	1	6
Forklifts Composite	2	6
Generator Sets Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8
Welders Composite	3	8

- Vehicle Exhaust
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

- Vendor Trips
Average Vendor Round Trip Commute (mile): 40 (default)

- Vendor Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

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2.4.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Cranes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0845	0.0013	0.6033	0.3865	0.0228	0.0228	0.0076	128.82
Forklifts Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0293	0.0006	0.1458	0.2148	0.0056	0.0056	0.0026	54.462
Generator Sets Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0362	0.0006	0.2977	0.2707	0.0130	0.0130	0.0032	61.074
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0407	0.0007	0.2505	0.3606	0.0112	0.0112	0.0036	66.890
Welders Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0280	0.0003	0.1634	0.1787	0.0088	0.0088	0.0025	25.665

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**Pb**	**NH_3**	**CO_2e**
LDGV	000.254	000.002	000.190	002.971	000.007	000.006		000.023	00340.675
LDGT	000.315	000.003	000.335	004.077	000.009	000.008		000.024	00439.030
HDGV	000.779	000.005	001.076	017.040	000.020	000.018		000.047	00806.186
LDDV	000.109	000.003	000.126	002.489	000.004	000.004		000.008	00330.514
LDDT	000.258	000.004	000.367	004.320	000.007	000.006		000.008	00469.489
HDDV	000.320	000.013	003.837	001.396	000.177	000.163		000.026	01501.720
MC	002.525	000.003	000.716	012.738	000.026	000.023		000.051	00395.513

2.4.4 Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = BA * BH * (0.42 / 1000) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.42 / 1000): Conversion Factor ft^3 to trips (0.42 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Vender Trips Emissions per Phase
$VMT_{VT} = BA * BH * (0.38 / 1000) * HT$

VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.38 / 1000): Conversion Factor ft^3 to trips (0.38 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

2.5 Architectural Coatings Phase

2.5.1 Architectural Coatings Phase Timeline Assumptions

- Phase Start Date
Start Month: 2
Start Quarter: 1
Start Year: 2023

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- Phase Duration
Number of Month: 3
Number of Days: 0

2.5.2 Architectural Coatings Phase Assumptions

- General Architectural Coatings Information
Building Category:
Total Square Footage (ft^2): 30625
Number of Units: N/A

- Architectural Coatings Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

2.5.3 Architectural Coatings Phase Emission Factor(s)

- Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.254	000.002	000.190	002.971	000.007	000.006		000.023	00340.675
LDGT	000.315	000.003	000.335	004.077	000.009	000.008		000.024	00439.030
HDGV	000.779	000.005	001.076	017.040	000.020	000.018		000.047	00806.186
LDDV	000.109	000.003	000.126	002.489	000.004	000.004		000.008	00330.514
LDDT	000.258	000.004	000.367	004.320	000.007	000.006		000.008	00469.489
HDDV	000.320	000.013	003.837	001.396	000.177	000.163		000.026	01501.720
MC	002.525	000.003	000.716	012.738	000.026	000.023		000.051	00395.513

2.5.4 Architectural Coatings Phase Formula(s)

- Worker Trips Emissions per Phase
$VMT_{WT} = (1 * WT * PA) / 800$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
1: Conversion Factor man days to trips (1 trip / 1 man * day)
WT: Average Worker Round Trip Commute (mile)
PA: Paint Area (ft^2)
800: Conversion Factor square feet to man days (1 ft^2 / 1 man * day)

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

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- Off-Gassing Emissions per Phase
VOC_{AC} = (AB * 2.0 * 0.0116) / 2000.0

VOC_{AC}: Architectural Coating VOC Emissions (TONs)
BA: Area of Building (ft^2)
2.0: Conversion Factor total area to coated area (2.0 ft^2 coated area / total area)
0.0116: Emission Factor (lb/ft^2)
2000: Conversion Factor pounds to tons

2.6 Paving Phase

2.6.1 Paving Phase Timeline Assumptions

- Phase Start Date
Start Month: 8
Start Quarter: 1
Start Year: 2022

- Phase Duration
Number of Month: 4
Number of Days: 0

2.6.2 Paving Phase Assumptions

- General Paving Information
Paving Area (ft^2): 463153

- Paving Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Pavers Composite	1	8
Paving Equipment Composite	2	6
Rollers Composite	2	6

- Vehicle Exhaust
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

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2.6.3 Paving Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Graders Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0860	0.0014	0.5212	0.5747	0.0247	0.0247	0.0077	132.93
Other Construction Equipment Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0533	0.0012	0.3119	0.3497	0.0121	0.0121	0.0048	122.61
Rubber Tired Dozers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.2015	0.0024	1.4660	0.7661	0.0581	0.0581	0.0181	239.53
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0407	0.0007	0.2505	0.3606	0.0112	0.0112	0.0036	66.890

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.254	000.002	000.190	002.971	000.007	000.006		000.023	00340.675
LDGT	000.315	000.003	000.335	004.077	000.009	000.008		000.024	00439.030
HDGV	000.779	000.005	001.076	017.040	000.020	000.018		000.047	00806.186
LDDV	000.109	000.003	000.126	002.489	000.004	000.004		000.008	00330.514
LDDT	000.258	000.004	000.367	004.320	000.007	000.006		000.008	00469.489
HDDV	000.320	000.013	003.837	001.396	000.177	000.163		000.026	01501.720
MC	002.525	000.003	000.716	012.738	000.026	000.023		000.051	00395.513

2.6.4 Paving Phase Formula(s)

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = PA * 0.25 * (1 / 27) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
PA: Paving Area (ft^2)
0.25: Thickness of Paving Area (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd^3 / 27 ft^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

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V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
VMT_{WT} = WD * WT * 1.25 * NE

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase
VOC_P = (2.62 * PA) / 43560

VOC_P: Paving VOC Emissions (TONs)
2.62: Emission Factor (lb/acre)
PA: Paving Area (ft^2)
43560: Conversion Factor square feet to acre (43560 ft2 / acre)^2 / acre)

3. Aircraft

3.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location
County: Pima
Regulatory Area(s): Tucson, AZ

- Activity Title: Remove 24 A-10Cs from Davis-Monthan AFB - AFRC F-35A EIS

- Activity Description:
Remove 24 A-10Cs

- Activity Start Date
Start Month: 1
Start Year: 2024

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- Activity End Date
Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-107.289754
SO_x	-8.669158
NO_x	-146.762769
CO	-209.940442
PM 10	-29.741319

Pollutant	Emissions Per Year (TONs)
PM 2.5	-22.535315
Pb	0.000000
NH_3	0.000000
CO_2e	-10588.5

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-41.592002
SO_x	-1.829141
NO_x	-7.354859
CO	-118.121791
PM 10	-11.870359

Pollutant	Emissions Per Year (TONs)
PM 2.5	-5.283840
Pb	0.000000
NH_3	0.000000
CO_2e	-5580.6

- Activity Emissions [Test Cell part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.135706
SO_x	-0.028060
NO_x	-0.204058
CO	-0.519485
PM 10	-0.126311

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.061166
Pb	0.000000
NH_3	0.000000
CO_2e	-85.6

- Activity Emissions [Aerospace Ground Equipment (AGE) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-65.562046
SO_x	-6.811956
NO_x	-139.203852
CO	-91.299166
PM 10	-17.744648

Pollutant	Emissions Per Year (TONs)
PM 2.5	-17.190309
Pb	0.000000
NH_3	0.000000
CO_2e	-4922.3

3.2 Aircraft & Engines

3.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine
Aircraft Designation: A-10C
Engine Model: TF34-GE-100
Primary Function: Combat
Aircraft has After burn: No
Number of Engines: 2

- Aircraft & Engine Surrogate
Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

3.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e
Idle	390.00	39.45	1.06	2.10	106.70	8.13	3.60	3234
Approach	920.00	2.19	1.06	5.70	16.30	6.21	2.12	3234
Intermediate	460.00	23.35	1.06	2.60	78.00	8.93	6.95	3234
Military	2710.00	0.12	1.06	10.70	2.20	2.66	1.68	3234
After Burn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3234

3.3 Flight Operations

3.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 24
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 5040
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 504
Number of Annual Trim Test(s) per Aircraft: 12

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 18.5
Takeoff [Military] (mins): 0.4
Takeoff [After Burn] (mins): 0
Climb Out [Intermediate] (mins): 0.8
Approach [Approach] (mins): 3.5
Taxi/Idle In [Idle] (mins): 11.3

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 12
Approach (mins): 27
Intermediate (mins): 9
Military (mins): 12
AfterBurn (mins): 0

3.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Aircraft Emissions for LTOs per Year

$AE_{LTO} = AEM_{IDLE\_IN} + AEM_{IDLE\_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{LTO}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{TGO}: Aircraft Emissions (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$

AE_{TRIM}: Aircraft Emissions (TONs)
$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

3.4 Auxiliary Power Unit (APU)

3.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: Yes

- Auxiliary Power Unit (APU) (default)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer

3.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e

3.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year

$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
APU: Number of Auxiliary Power Units
OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

3.5 Aircraft Engine Test Cell

3.5.1 Aircraft Engine Test Cell Assumptions

- Engine Test Cell
Total Number of Aircraft Engines Tested Annually: 48

- Default Settings Used: Yes

- Annual Run-ups / Test Durations
Annual Run-ups (Per Aircraft Engine): 1 (default)
Idle Duration (mins): 12 (default)
Approach Duration (mins): 27 (default)
Intermediate Duration (mins): 9 (default)
Military Duration (mins): 12 (default)
After Burner Duration (mins): 0 (default)

3.5.2 Aircraft Engine Test Cell Emission Factor(s)

- See Aircraft & Engines Emission Factor(s)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

3.5.3 Aircraft Engine Test Cell Formula(s)

- Aircraft Engine Test Cell Emissions per Pollutant & Power Setting (TONs)
$TestCellPS_{POL}$ = (TD / 60) * (FC / 1000) * EF * NE * ARU / 2000

$TestCellPS_{POL}$: Aircraft Engine Test Cell Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Total Number of Engines (For All Aircraft)
ARU: Annual Run-ups (Per Aircraft Engine)
2000: Conversion Factor pounds to TONs

- Aircraft Engine Test Cell Emissions per Year
TestCell = $TestCellPS_{IDLE}$ + $TestCellPS_{APPROACH}$ + $TestCellPS_{INTERMEDIATE}$ + $TestCellPS_{MILITARY}$ + $TestCellPS_{AFTERBURN}$

TestCell: Aircraft Engine Test Cell Emissions (TONs)
$TestCellPS_{IDLE}$: Aircraft Engine Test Cell Emissions for Idle Power Setting (TONs)
$TestCellPS_{APPROACH}$: Aircraft Engine Test Cell Emissions for Approach Power Setting (TONs)
$TestCellPS_{INTERMEDIATE}$: Aircraft Engine Test Cell Emissions for Intermediate Power Setting (TONs)
$TestCellPS_{MILITARY}$: Aircraft Engine Test Cell Emissions for Military Power Setting (TONs)
$TestCellPS_{AFTERBURN}$: Aircraft Engine Test Cell Emissions for After Burner Power Setting (TONs)

3.6 Aerospace Ground Equipment (AGE)

3.6.1 Aerospace Ground Equipment (AGE) Assumptions

- Default Settings Used: Yes

- AGE Usage
Number of Annual LTO (Landing and Take-off) cycles for AGE: 5040

- Aerospace Ground Equipment (AGE) (default)

Total Number of AGE	Operation Hours for Each LTO	Exempt Source?	AGE Type	Designation
1	2	No	Air Compressor	MC-1A - 18.4hp
1	8	No	Bomb Lift	MJ-1B
1	1	No	Generator Set	A/M32A-86D
1	2	No	Heater	H1
1	2	No	Hydraulic Test Stand	MJ-2A
1	2	No	Light Cart	NF-2
1	1	No	Start Cart	A/M32A-60A

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

3.6.2 Aerospace Ground Equipment (AGE) Emission Factor(s)

- Aerospace Ground Equipment (AGE) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e
MC-1A - 18.4hp	1.1	0.267	0.008	0.419	0.267	0.071	0.068	24.8
MJ-1B	0.0	3.040	0.219	4.780	3.040	0.800	0.776	141.2
A/M32A-86D	6.5	0.294	0.046	6.102	0.457	0.091	0.089	147.0
H1	0.4	0.100	0.011	0.160	0.180	0.006	0.006	8.9
MJ-2A	0.0	0.190	0.238	3.850	2.460	0.083	0.076	172.0
NF-2	0.0	0.010	0.043	0.110	0.080	0.010	0.010	22.1
A/M32A-60A	0.0	0.270	0.306	1.820	5.480	0.211	0.205	221.1

3.6.3 Aerospace Ground Equipment (AGE) Formula(s)

- Aerospace Ground Equipment (AGE) Emissions per Year

$AGE_{POL} = AGE * OH * LTO * EF_{POL} / 2000$

AGE_{POL}: Aerospace Ground Equipment (AGE) Emissions per Pollutant (TONs)
AGE: Total Number of Aerospace Ground Equipment
OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

4. Aircraft

4.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Pima
Regulatory Area(s): Tucson, AZ

- Activity Title: Add 24 F-35As LTO Weighted Average at Davis-Monthan AFB - AFRC EIS

- Activity Description:
Add 24 F-35As

- Activity Start Date
Start Month: 1
Start Year: 2024

- Activity End Date
Indefinite: Yes
End Month: N/A
End Year: N/A

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)	Pollutant	Emissions Per Year (TONs)
VOC	8.342326	PM 2.5	10.806635
SO_x	7.537951	Pb	0.000000
NO_x	76.144972	NH_3	0.000000
CO	75.028396	CO_2e	19152.4
PM 10	11.833868		

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)	Pollutant	Emissions Per Year (TONs)
VOC	0.139594	PM 2.5	8.293758
SO_x	5.750772	Pb	0.000000
NO_x	50.590402	NH_3	0.000000
CO	60.225011	CO_2e	17498.0
PM 10	9.231288		

- Activity Emissions [Test Cell part]:

Pollutant	Emissions Per Year (TONs)	Pollutant	Emissions Per Year (TONs)
VOC	0.000846	PM 2.5	0.152690
SO_x	0.134980	Pb	0.000000
NO_x	1.953343	NH_3	0.000000
CO	0.411673	CO_2e	411.8
PM 10	0.169634		

- Activity Emissions [Aerospace Ground Equipment (AGE) part]:

Pollutant	Emissions Per Year (TONs)	Pollutant	Emissions Per Year (TONs)
VOC	8.201885	PM 2.5	2.360187
SO_x	1.652199	Pb	0.000000
NO_x	23.601227	NH_3	0.000000
CO	14.391712	CO_2e	1242.6
PM 10	2.432946		

4.2 Aircraft & Engines

4.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: F-35A
Engine Model: F135-PW-100
Primary Function: Combat
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

4.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

4.3 Flight Operations

4.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	24
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft:	4632
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft:	0
Number of Annual Trim Test(s) per Aircraft:	12

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins):	18.5
Takeoff [Military] (mins):	0.77
Takeoff [After Burn] (mins):	0.02
Climb Out [Intermediate] (mins):	0.29
Approach [Approach] (mins):	2.6
Taxi/Idle In [Idle] (mins):	11.3

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

4.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$AE_{LTO} = AEM_{IDLE\_IN} + AEM_{IDLE\_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{LTO}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Aircraft Emissions per Mode for TGOs per Year
AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year
$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{TGO}: Aircraft Emissions (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year
$AEPS_{POL}$ = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year
$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$

AE_{TRIM}: Aircraft Emissions (TONs)
$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

4.4 Auxiliary Power Unit (APU)

4.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: Yes

- Auxiliary Power Unit (APU) (default)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer

4.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e

4.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year

$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
APU: Number of Auxiliary Power Units
OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

4.5 Aircraft Engine Test Cell

4.5.1 Aircraft Engine Test Cell Assumptions

- Engine Test Cell
Total Number of Aircraft Engines Tested Annually: 24

- Default Settings Used: Yes

- Annual Run-ups / Test Durations
Annual Run-ups (Per Aircraft Engine): 1 (default)
Idle Duration (mins): 12 (default)
Approach Duration (mins): 27 (default)
Intermediate Duration (mins): 9 (default)
Military Duration (mins): 9 (default)
After Burner Duration (mins): 3 (default)

4.5.2 Aircraft Engine Test Cell Emission Factor(s)

- See Aircraft & Engines Emission Factor(s)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

4.5.3 Aircraft Engine Test Cell Formula(s)

- Aircraft Engine Test Cell Emissions per Pollutant & Power Setting (TONs)
$TestCellPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * ARU / 2000$

$TestCellPS_{POL}$: Aircraft Engine Test Cell Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Total Number of Engines (For All Aircraft)
ARU: Annual Run-ups (Per Aircraft Engine)
2000: Conversion Factor pounds to TONs

- Aircraft Engine Test Cell Emissions per Year
$TestCell = TestCellPS_{IDLE} + TestCellPS_{APPROACH} + TestCellPS_{INTERMEDIATE} + TestCellPS_{MILITARY} + TestCellPS_{AFTERBURN}$

TestCell: Aircraft Engine Test Cell Emissions (TONs)
$TestCellPS_{IDLE}$: Aircraft Engine Test Cell Emissions for Idle Power Setting (TONs)
$TestCellPS_{APPROACH}$: Aircraft Engine Test Cell Emissions for Approach Power Setting (TONs)
$TestCellPS_{INTERMEDIATE}$: Aircraft Engine Test Cell Emissions for Intermediate Power Setting (TONs)
$TestCellPS_{MILITARY}$: Aircraft Engine Test Cell Emissions for Military Power Setting (TONs)
$TestCellPS_{AFTERBURN}$: Aircraft Engine Test Cell Emissions for After Burner Power Setting (TONs)

4.6 Aerospace Ground Equipment (AGE)

4.6.1 Aerospace Ground Equipment (AGE) Assumptions

- Default Settings Used: Yes

- AGE Usage
Number of Annual LTO (Landing and Take-off) cycles for AGE: 4632

- Aerospace Ground Equipment (AGE) (default)

Total Number of AGE	Operation Hours for Each LTO	Exempt Source?	AGE Type	Designation
1	0.33	No	Air Compressor	MC-1A - 18.4hp
1	1	No	Bomb Lift	MJ-1B
1	0.33	No	Generator Set	A/M32A-86D
1	0.5	No	Heater	H1
1	0.5	No	Hydraulic Test Stand	MJ-2/TTU-228 - 130hp
1	8	No	Light Cart	NF-2
1	0.33	No	Start Cart	A/M32A-60A

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

4.6.2 Aerospace Ground Equipment (AGE) Emission Factor(s)

- Aerospace Ground Equipment (AGE) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e
MC-1A - 18.4hp	1.1	0.267	0.008	0.419	0.267	0.071	0.068	24.8
MJ-1B	0.0	3.040	0.219	4.780	3.040	0.800	0.776	141.2
A/M32A-86D	6.5	0.294	0.046	6.102	0.457	0.091	0.089	147.0
H1	0.4	0.100	0.011	0.160	0.180	0.006	0.006	8.9
MJ-2/TTU-228 - 130hp	7.4	0.195	0.053	3.396	0.794	0.089	0.086	168.8
NF-2	0.0	0.010	0.043	0.110	0.080	0.010	0.010	22.1
A/M32A-60A	0.0	0.270	0.306	1.820	5.480	0.211	0.205	221.1

4.6.3 Aerospace Ground Equipment (AGE) Formula(s)

- Aerospace Ground Equipment (AGE) Emissions per Year

$AGE_{POL} = AGE * OH * LTO * EF_{POL} / 2000$

AGE_{POL}: Aerospace Ground Equipment (AGE) Emissions per Pollutant (TONs)
AGE: Total Number of Aerospace Ground Equipment
OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

5. Aircraft

5.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Pima
Regulatory Area(s): Tucson, AZ

- Activity Title: Add 24 F-35As TGO Weighted Average at Davis Monthan AFB - AFRC EIS

- Activity Description:
Add 24 F-35As

- Activity Start Date
Start Month: 1
Start Year: 2024

- Activity End Date
Indefinite: Yes
End Month: N/A
End Year: N/A

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- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	0.000714
SO_x	0.232844
NO_x	3.757372
CO	0.153390
PM 10	0.288290

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.259369
Pb	0.000000
NH_3	0.000000
CO_2e	710.4

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000714
SO_x	0.232844
NO_x	3.757372
CO	0.153390
PM 10	0.288290

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.259369
Pb	0.000000
NH_3	0.000000
CO_2e	710.4

5.2 Aircraft & Engines

5.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: F-35A
Engine Model: F135-PW-100
Primary Function: Combat
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

5.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

5.3 Flight Operations

5.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 24
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 0
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 1158
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	0.58
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	0.27
Approach [Approach] (mins):	1.1
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

5.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$AE_{LTO} = AEM_{IDLE\_IN} + AEM_{IDLE\_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{LTO}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Aircraft Emissions for TGOs per Year
$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{TGO}: Aircraft Emissions (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year
$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year
$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$

AE_{TRIM}: Aircraft Emissions (TONs)
$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

5.4 Auxiliary Power Unit (APU)

5.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: Yes

- Auxiliary Power Unit (APU) (default)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer

5.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

5.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year
$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
APU: Number of Auxiliary Power Units
OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

6. Personnel

6.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location
County: Pima
Regulatory Area(s): Tucson, AZ

- Activity Title: Removal of 30 Personnel

- Activity Description:

- Activity Start Date
Start Month: 1
Start Year: 2023

- Activity End Date
Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-0.045943
SO_x	-0.000361
NO_x	-0.039598
CO	-0.526464
PM 10	-0.001179

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.001036
Pb	0.000000
NH_3	-0.003316
CO_2e	-55.2

6.2 Personnel Assumptions

- Number of Personnel
Active Duty Personnel: 0
Civilian Personnel: 0
Support Contractor Personnel: 0
Air National Guard (ANG) Personnel: 30
Reserve Personnel: 0

- Default Settings Used: Yes

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Average Personnel Round Trip Commute (mile): 20 (default)

- Personnel Work Schedule
Active Duty Personnel: 5 Days Per Week (default)
Civilian Personnel: 5 Days Per Week (default)
Support Contractor Personnel: 5 Days Per Week (default)
Air National Guard (ANG) Personnel: 4 Days Per Week (default)
Reserve Personnel: 4 Days Per Month (default)

6.3 Personnel On Road Vehicle Mixture

- On Road Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	37.55	60.32	0	0.03	0.2	0	1.9
GOVs	54.49	37.73	4.67	0	0	3.11	0

6.4 Personnel Emission Factor(s)

- On Road Vehicle Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.254	000.002	000.190	002.971	000.007	000.006		000.023	00340.675
LDGT	000.315	000.003	000.335	004.077	000.009	000.008		000.024	00439.030
HDGV	000.779	000.005	001.076	017.040	000.020	000.018		000.047	00806.186
LDDV	000.109	000.003	000.126	002.489	000.004	000.004		000.008	00330.514
LDDT	000.258	000.004	000.367	004.320	000.007	000.006		000.008	00469.489
HDDV	000.320	000.013	003.837	001.396	000.177	000.163		000.026	01501.720
MC	002.525	000.003	000.716	012.738	000.026	000.023		000.051	00395.513

6.5 Personnel Formula(s)

- Personnel Vehicle Miles Travel for Work Days per Year
$VMT_P = NP * WD * AC$

VMT_P: Personnel Vehicle Miles Travel (miles/year)
NP: Number of Personnel
WD: Work Days per Year
AC: Average Commute (miles)

- Total Vehicle Miles Travel per Year
$VMT_{Total} = VMT_{AD} + VMT_C + VMT_{SC} + VMT_{ANG} + VMT_{AFRC}$

VMT_{Total}: Total Vehicle Miles Travel (miles)
VMT_{AD}: Active Duty Personnel Vehicle Miles Travel (miles)
VMT_C: Civilian Personnel Vehicle Miles Travel (miles)
VMT_{SC}: Support Contractor Personnel Vehicle Miles Travel (miles)
VMT_{ANG}: Air National Guard Personnel Vehicle Miles Travel (miles)
VMT_{AFRC}: Reserve Personnel Vehicle Miles Travel (miles)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Vehicle Emissions per Year

$V_{POL} = (VMT_{Total} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{Total}: Total Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Personnel On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

AIR CONFORMITY APPLICABILITY MODEL REPORT
RECORD OF CONFORMITY ANALYSIS (ROCA)

1. General Information: The Air Force's Air Conformity Applicability Model (ACAM) was used to perform an analysis to assess the potential air quality impact/s associated with the action in accordance with the Air Force Instruction 32-7040, Air Quality Compliance And Resource Management; the Environmental Impact Analysis Process (EIAP, 32 CFR 989); and the General Conformity Rule (GCR, 40 CFR 93 Subpart B). This report provides a summary of the ACAM analysis.

a. Action Location:
Base: DAVIS-MONTHAN AFB
State: Arizona
County(s): Pima
Regulatory Area(s): Ajo (Pima County), AZ; Tucson, AZ; Rillito, AZ

b. Action Title: AFRC F-35A EIS

c. Project Number/s (if applicable):

d. Projected Action Start Date: 1 / 2024

e. Action Description:

At Davis-Monthan AFB, remove 24 A-10Cs and add 24 F-35As. This analysis is only for net changes in airspace operations.

f. Point of Contact:
Name: Chris Crabtree, Leidos, Inc., and Austin N. Naranjo, Solutio
Title:
Organization: .
Email:
Phone Number:

2. Analysis: Total combined direct and indirect emissions associated with the action were estimated through ACAM on a calendar-year basis for the "worst-case" and "steady state" (net gain/loss upon action fully implemented) emissions. General Conformity under the Clean Air Act, Section 1.76 has been evaluated for the action described above according to the requirements of 40 CFR 93, Subpart B.

Based on the analysis, the requirements of this rule are: _____ applicable
__X__ not applicable

AIR CONFORMITY APPLICABILITY MODEL REPORT RECORD OF CONFORMITY ANALYSIS (ROCA)

Conformity Analysis Summary:

2024

Pollutant	Action Emissions (ton/yr)	GENERAL CONFORMITY	
		Threshold (ton/yr)	Exceedance (Yes or No)
Ajo (Pima County), AZ			
VOC	-0.206		
NOx	-7.251		
CO	-3.719		
SOx	-1.336	100	No
PM 10	-4.126		
PM 2.5	-2.438		
Pb	0.000		
NH3	0.000		
CO2e	-4037.5		
Ajo (Pima County), AZ			
VOC	-0.206		
NOx	-7.251		
CO	-3.719		
SOx	-1.336		
PM 10	-4.126	100	No
PM 2.5	-2.438		
Pb	0.000		
NH3	0.000		
CO2e	-4037.5		
Tucson, AZ			
VOC	-0.206		
NOx	-7.251		
CO	-3.719	100	No
SOx	-1.336		
PM 10	-4.126		
PM 2.5	-2.438		
Pb	0.000		
NH3	0.000		
CO2e	-4037.5		
Rillito, AZ			
VOC	-0.206		
NOx	-7.251		
CO	-3.719		
SOx	-1.336		
PM 10	-4.126	100	No
PM 2.5	-2.438		
Pb	0.000		
NH3	0.000		
CO2e	-4037.5		

AIR CONFORMITY APPLICABILITY MODEL REPORT
RECORD OF CONFORMITY ANALYSIS (ROCA)

2025 - (Steady State)

Pollutant	Action Emissions (ton/yr)	GENERAL CONFORMITY	
		Threshold (ton/yr)	Exceedance (Yes or No)
Ajo (Pima County), AZ			
VOC	-0.206		
NOx	-7.251		
CO	-3.719		
SOx	-1.336	100	No
PM 10	-4.126		
PM 2.5	-2.438		
Pb	0.000		
NH3	0.000		
CO2e	-4037.5		
Ajo (Pima County), AZ			
VOC	-0.206		
NOx	-7.251		
CO	-3.719		
SOx	-1.336		
PM 10	-4.126	100	No
PM 2.5	-2.438		
Pb	0.000		
NH3	0.000		
CO2e	-4037.5		
Tucson, AZ			
VOC	-0.206		
NOx	-7.251		
CO	-3.719	100	No
SOx	-1.336		
PM 10	-4.126		
PM 2.5	-2.438		
Pb	0.000		
NH3	0.000		
CO2e	-4037.5		
Rillito, AZ			
VOC	-0.206		
NOx	-7.251		
CO	-3.719		
SOx	-1.336		
PM 10	-4.126	100	No
PM 2.5	-2.438		
Pb	0.000		
NH3	0.000		
CO2e	-4037.5		

None of estimated emissions associated with this action are above the conformity threshold values established at 40 CFR 93.153 (b); Therefore, the requirements of the General Conformity Rule are not applicable.

//Chris Crabtree, Austin Naranjo// 7/23/20

Chris Crabtree, Leidos, Inc., and Austin N. Naranjo, Solutio DATE

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

1. General Information

- Action Location
Base: DAVIS-MONTHAN AFB
State: Arizona
County(s): Pima
Regulatory Area(s): Ajo (Pima County), AZ; Tucson, AZ; Rillito, AZ

- Action Title: AFRC F-35A EIS

- Project Number/s (if applicable):

- Projected Action Start Date: 1 / 2024

- Action Purpose and Need:
...

- Action Description:
At Davis-Monthan AFB, remove 24 A-10Cs and add 24 F-35As. This analysis is only for net changes in airspace operations.

- Point of Contact
Name: Chris Crabtree, Leidos, Inc., and Austin N. Naranjo, Solutio
Title:
Organization: .
Email:
Phone Number:

- Activity List:

Activity Type		Activity Title
2.	Aircraft	Airspace operations - A-10Cs
3.	Aircraft	Airspace operations - F-35As

Emission factors and air emission estimating methods come from the United States Air Force's Air Emissions Guide for Air Force Stationary Sources, Air Emissions Guide for Air Force Mobile Sources, and Air Emissions Guide for Air Force Transitory Sources.

2. Aircraft

2.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location
County: Pima
Regulatory Area(s): Ajo (Pima County), AZ; Ajo (Pima County), AZ; Rillito, AZ; Tucson, AZ

- Activity Title: Airspace operations - A-10Cs

- Activity Description:
Remove annual airspace operations for 24 A-10Cs.

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Activity Start Date
Start Month: 1
Start Year: 2024

- Activity End Date
Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-0.205725
SO_x	-1.914140
NO_x	-19.141403
CO	-3.935616
PM 10	-4.758517

Pollutant	Emissions Per Year (TONs)
PM 2.5	-3.005379
Pb	0.000000
NH_3	0.000000
CO_2e	-5785.4

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.205725
SO_x	-1.914140
NO_x	-19.141403
CO	-3.935616
PM 10	-4.758517

Pollutant	Emissions Per Year (TONs)
PM 2.5	-3.005379
Pb	0.000000
NH_3	0.000000
CO_2e	-5785.4

2.2 Aircraft & Engines

2.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine
Aircraft Designation: A-10C
Engine Model: TF34-GE-100
Primary Function: Combat
Aircraft has After burn: No
Number of Engines: 2

- Aircraft & Engine Surrogate
Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

2.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e
Idle	390.00	39.45	1.07	2.10	106.70	8.13	3.60	3234
Approach	920.00	2.19	1.07	5.70	16.30	6.21	2.12	3234
Intermediate	460.00	23.35	1.07	2.60	78.00	8.93	6.95	3234
Military	2710.00	0.12	1.07	10.70	2.20	2.66	1.68	3234
After Burn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3234

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

2.3 Flight Operations

2.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	24
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft:	1
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft:	0
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	39607
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	0
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

2.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$AE_{LTO} = AEM_{IDLE\_IN} + AEM_{IDLE\_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{LTO}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Aircraft Emissions per Mode for TGOs per Year
AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year
AE_{TGO} = $AEM_{APPROACH}$ + $AEM_{CLIMBOUT}$ + $AEM_{TAKEOFF}$

AE_{TGO}: Aircraft Emissions (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year
$AEPS_{POL}$ = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year
AE_{TRIM} = $AEPS_{IDLE}$ + $AEPS_{APPROACH}$ + $AEPS_{INTERMEDIATE}$ + $AEPS_{MILITARY}$ + $AEPS_{AFTERBURN}$

AE_{TRIM}: Aircraft Emissions (TONs)
$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

2.4 Auxiliary Power Unit (APU)

2.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: Yes

- Auxiliary Power Unit (APU) (default)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

2.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e

2.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year

$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
APU: Number of Auxiliary Power Units
OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

3. Aircraft

3.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Pima
Regulatory Area(s): Ajo (Pima County), AZ; Tucson, AZ; Rillito, AZ; Ajo (Pima County), AZ

- Activity Title: Airspace operations - F-35As

- Activity Description:
Add annual airspace operations for 24 F-35As

- Activity Start Date
Start Month: 1
Start Year: 2024

- Activity End Date
Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO_x	0.578310
NO_x	11.890494
CO	0.216191
PM 10	0.632358

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.567501
Pb	0.000000
NH_3	0.000000
CO_2e	1747.9

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO_x	0.578310
NO_x	11.890494
CO	0.216191
PM 10	0.632358

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.567501
Pb	0.000000
NH_3	0.000000
CO_2e	1747.9

3.2 Aircraft & Engines

3.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine
Aircraft Designation: F-35A
Engine Model: F135-PW-100
Primary Function: Combat
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate
Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

3.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)
Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

3.3 Flight Operations

3.3.1 Flight Operations Assumptions

- Flight Operations
Number of Aircraft: 24
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 1
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)
Taxi/Idle Out [Idle] (mins): 0
Takeoff [Military] (mins): 3413
Takeoff [After Burn] (mins): 0
Climb Out [Intermediate] (mins): 0
Approach [Approach] (mins): 0
Taxi/Idle In [Idle] (mins): 0

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

3.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$AE_{LTO} = AEM_{IDLE\_IN} + AEM_{IDLE\_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{LTO}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{TGO}: Aircraft Emissions (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Aircraft Emissions per Mode for Trim per Year
$AEPS_{POL}$ = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year
$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$

AE_{TRIM}: Aircraft Emissions (TONs)
$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

3.4 Auxiliary Power Unit (APU)

3.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: Yes

- Auxiliary Power Unit (APU) (default)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer

3.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e

3.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year
APU_{POL} = APU * OH * LTO * EF_{POL} / 2000

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
APU: Number of Auxiliary Power Units
OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

Davis-Monthan AFB
F-35A Operations

Sorties	4632	Total

Patterns	0.25	per Sortie
	1158	Total

Operations Type Distribution

Operation	Stated Type	Frequency (% of Time)	Count	Assumed Type
Arrivals	Overhead Break Arrival	15%	694.8	Overhead Break Arrival - Break at Midfield (F35ACO01)
	Tactical Overhead Break Arrival	50%	2316	
	Tactical Straight-in (VFR)			
	Straight-in Arrival (ILS)	10%	463.2	Straight-in IFR Arrival (F35ACA02)
	Straight-in Arrival (TACAN)	10%	463.2	Straight-in IFR Arrival (F35ACA02)
	Straight-in Arrival (VFR)	5%	231.6	Straight-in VFR Arrival (F35ACA05)
	PFO Arrival	10%	463.2	SFO Break Arrival (F35ACP01)
		good		
Departures	Military	95%	4400.4	Mil Departure (F35ACD01)
	Afterburner	5%	231.6	Afterburner Departure (F35ACD09)
Patterns	VFR (Visual) Pattern	87%	1007.46	VFR Pattern (F35ACC02)
	VFR Outside Downwind Pattern			
	PFO Pattern	10%	115.8	Multiple SFO Pattern (F35ACC05)
	Re-entry Pattern	1%	11.58	IFR ILS/LOC Pattern (F35ACC01)
	ILS Pattern	1%	11.58	IFR ILS/LOC Pattern (F35ACC01)
	TACAN Pattern	1%	11.58	IFR ILS/LOC Pattern (F35ACC01)
		good		

Davis-Monthan AFB

Representative Weighted Average T&GCycle TIMs By Power Setting Methods

Times Based on Power Setting Method Only (seconds)

Mode	% Thrust Range		T & G's VFR Pattern (F35ACC02)	T & G's Multiple SFO Pattern (F35ACC05)	T & G's IFR ILS/LOC Pattern (F35ACC01)
	>	<			
Takeoff Afterburner	105	150	0.00	0.00	0.00
Takeoff Military	92.5	105	36.81	24.01	4.97
Climb Out	50	92.5	16.09	7.14	46.20
Approach	18.5	50	67.88	0.00	238.06
Taxi/Idle Out/In	0	18.5	29.54	38.06	40.36
Frequency (% of Time) =			**87%**	**10%**	**3%**

Weighted Times Based on Noise Profiles Power Setting Times Weighted by Frequency (seconds)

Mode	% Thrust Range		T & G's VFR Pattern (F35ACC02)	T & G's Multiple SFO Pattern (F35ACC05)	T & G's IFR ILS/LOC Pattern (F35ACC01)	Noise LTO Cycle Contributions
	>	<				
Takeoff Afterburner	105	150	0.00	0.00	0.00	0.00
Takeoff Military	92.5	105	32.02	2.40	0.15	34.57
Climb Out	50	92.5	14.00	0.71	1.39	16.10
Approach	18.5	50	59.06	0.00	7.14	66.20
Taxi/Idle Out/In	0	18.5	25.70	3.81	1.21	30.71

Mode	% Thrust Range		Noise T&G Contributions (min)	Representative T&G Cycle (min)
	>	<		
Takeoff Afterburner	105	150	0.00	**0.00**
Takeoff Military	92.5	105	0.58	**0.58**
Climb Out	50	92.5	0.27	**0.27**
Approach	18.5	50	1.10	**1.10**
Taxi/Idle Out/In	0	18.5	0.51	**0.51**
Representative Weighted Average T&G Time (min) =				**2.46**

Davis-Monthan AFB

Representative Weighted Average TO Cycle TIMs By Power Setting & Altitude Method

Times Based on Power Setting & Altitude Method (seconds)

Mode	% Thrust Range		Arrivals				Departures	
			Overhead Break Arrival (F35ACO01)	Straight-in IFR Arrival (F35ACA02)	Straight-in VFR Arrival (F35ACA05)	SFO Break Arrival (F35ACP01)	Mil Departure (F35ACD01)	Afterburner Departure (F35ACD09)
	>	<						
Takeoff Afterburner	105	150	0.00	0.00	0.00	0.00	0.00	20.29
Takeoff Military	92.5	105	0.00	0.00	0.00	0.00	47.67	24.18
Climb Out	50	92.5	4.01	0.00	0.00	0.00	14.58	13.62
Approach	18.5	50	162.69	183.80	230.25	19.21	0.00	0.00
Taxi/Idle Out/In	0	18.5	40.25	0.00	0.00	19.21	0.00	0.00
Frequency (% of Time) =			65%	20%	5%	10%	95%	5%

Weighted Times Based on Noise Profiles Average Times Weighted by Frequency (seconds)

Mode	% Thrust Range		Arrivals				Departures		Noise LTO
			Overhead Break Arrival (F35ACO01)	Straight-in IFR Arrival (F35ACA02)	Straight-in VFR Arrival (F35ACA05)	SFO Break Arrival (F35ACP01)	Mil Departure (F35ACD01)	Afterburner Departure (F35ACD09)	Cycle Contributions
	>	<							
Takeoff Afterburner	105	150	0.00	0.00	0.00	0.00	0.00	1.01	1.01
Takeoff Military	92.5	105	0.00	0.00	0.00	0.00	45.29	1.21	46.50
Climb Out	50	92.5	2.60	0.00	0.00	0.00	13.85	0.68	17.13
Approach	18.5	50	105.75	36.76	11.51	1.92	0.00	0.00	155.94
Taxi/Idle Out/In	0	18.5	26.16	0.00	0.00	1.92	0.00	0.00	28.08

USAF Representative Value (default) for Taxi Out/In = **29.8** minutes

Mode	% Thrust Range		Noise LTO	LTO Missing Data	Representative LTO
			Cycle Contributions (min)	(min, use defaults)	Cycle (min)
	>	<			
Takeoff Afterburner	105	150	0.02		**0.02**
Takeoff Military	92.5	105	0.77		**0.77**
Climb Out	50	92.5	0.29		**0.29**
Approach	18.5	50	2.60		**2.60**
Taxi/Idle Out/In	0	18.5	0.47	29.8	**30.27**

Representative Weighted Average LTO Time (min) = 33.94

LTO Cycle TIMS BY Power Setting Method

Times Based on Noise Profiles Power Settings (seconds)

Mode	% Thrust Range		Arrivals				Departures	
			Overhead Break Arrival - Break at Midfield (F35ACO01)	Straight-in IFR Arrival (F35ACA02)	Straight-in VFR Arrival (F35ACA05)	SFO Break Arrival (F35ACP01)	Mil Departure (F35ACD01)	Afterburner Departure (F35ACD09)
	>	<						
Takeoff Afterburner	105	150	0.00	0.00	0.00	0.00	0.00	9.73
Takeoff Military	92.5	105	0.00	0.00	0.00	0.00	62.25	48.36
Climb Out	50	92.5	8.01	0.00	0.00	0.00	0.00	0.00
Approach	18.5	50	118.43	183.80	230.25	0.00	0.00	0.00
Taxi/Idle Out/In	0	18.5	80.49	0.00	0.00	38.43	0.00	0.00
Frequency (% of Time) =			**65%**	**20%**	**5%**	**10%**	**95%**	**5%**

Weighted Times Based on Noise Profiles Weighted by Frequency (seconds)

Mode	% Thrust Range		Arrivals				Departures		Noise LTO
			Overhead Break Arrival - Break at Midfield (F35ACO01)	Straight-in IFR Arrival (F35ACA02)	Straight-in VFR Arrival (F35ACA05)	SFO Break Arrival (F35ACP01)	Mil Departure (F35ACD01)	Afterburner Departure (F35ACD09)	Cycle Contributions
	>	<							
Takeoff Afterburner	105	150	0.00	0.00	0.00	0.00	0.00	0.49	0.49
Takeoff Military	92.5	105	0.00	0.00	0.00	0.00	59.14	2.42	61.56
Climb Out	50	92.5	5.21	0.00	0.00	0.00	0.00	0.00	5.21
Approach	18.5	50	76.98	36.76	11.51	0.00	0.00	0.00	125.25
Taxi/Idle Out/In	0	18.5	52.32	0.00	0.00	3.84	0.00	0.00	56.16

USAF Representative Value (default) for Taxi Out/In = **29.8** minutes

Mode	% Thrust Range		Noise LTO Cycle Contributions (min)	LTO Missing Data (min, use defaults)	Derived LTO Cycle (min)
	>	<			
Takeoff Afterburner	105	150	0.01		**0.01**
Takeoff Military	92.5	105	1.03		**1.03**
Climb Out	50	92.5	0.09		**0.09**
Approach	18.5	50	2.09		**2.09**
Taxi/Idle Out/In	0	18.5	0.94	29.8	**30.74**

Representative Weighted Average LTO Time (min) = 33.94

LTO Cycle TIMs By Altitude Method

Times Based on Noise Profiles Altitude Values (seconds)

Mode	Arrivals				Departures	
	Overhead Break Arrival - Break at Midfield (F35ACO01)	Straight-in IFR Arrival (F35ACA02)	Straight-in VFR Arrival (F35ACA05)	SFO Break Arrival (F35ACP01)	Mil Departure (F35ACD01)	Afterburner Departure (F35ACD09)
Takeoff Afterburner	0	0	0	0	0	30.85
Takeoff Military	0	0	0	0	33.10	0
Climb Out Military	0	0	0	0	29.15	27.23
Approach	207	184	230	38	0	0
Taxi/Idle Out/In	0	0	0	0	0	0
requency (% of Time) =	**65%**	**20%**	**5%**	**10%**	**95%**	**5%**

Weighted Times Based on Noise Profiles Weighted by Frequency (seconds)

Mode	Arrivals				Departures		Noise LTO
	Overhead Break Arrival - Break at Midfield (F35ACO01)	Straight-in IFR Arrival (F35ACA02)	Straight-in VFR Arrival (F35ACA05)	SFO Break Arrival (F35ACP01)	Mil Departure (F35ACD01)	Afterburner Departure (F35ACD09)	Cycle Contributions
Takeoff Afterburner	0.00	0.00	0.00	0.00	0.00	1.54	1.54
Takeoff Military	0.00	0.00	0.00	0.00	31.44	0.00	31.44
Climb Out Military	0.00	0.00	0.00	0.00	27.70	1.36	29.06
Approach	134.51	36.76	11.51	3.84	0.00	0.00	186.62
Taxi/Idle Out/In	0.00	0.00	0.00	0.00	0.00	0.00	0.00

USAF Representative Value (default) for Taxi Out/In = **29.8** minutes

Mode	Noise LTO Cycle Contributions (min)	LTO Missing Data (min, use defaults)	Derived LTO Cycle (min)
Takeoff Afterburner	0.03		**0.03**
Takeoff Military	0.52		**1.01**
Climb Out Military	0.48		
Approach	3.11		**3.11**
Taxi/Idle Out/In	0.00	29.8	**29.80**

Representative Weighted Average LTO Time (min) = 33.94

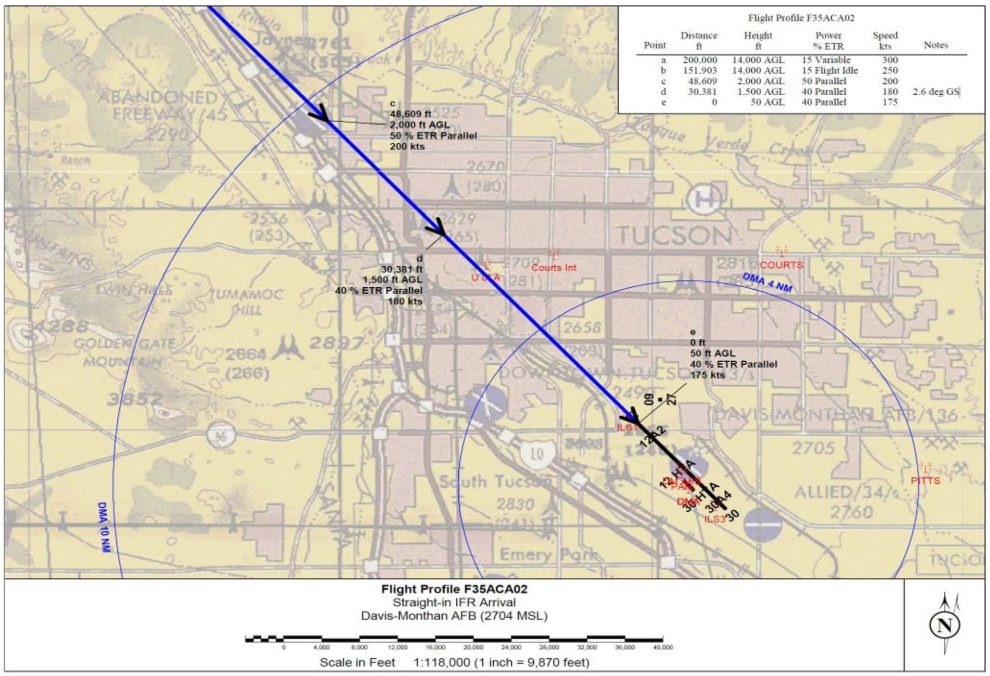
Davis-Monthan AFB

Flight Profile F35ACA02

Point	Distance (ft)	Height (ft)	Power (%ETR)	Speed (kts)	Notes
a	200,000	14000	15	300	
b	151,903	14000	15	250	
	57,217	3000	47	204	
c	48,609	2000	50	200	
d	30,381	1500	40	180	2.6 deg GS
e	0	50	40	175	

True Flight Distance (ft)	Air Speed (fps)	Segment Time (sec)		
8666	341	25.41		
18235	321	56.86	Approach	184
30416	300	101.53		

183.80



Davis-Monthan AFB

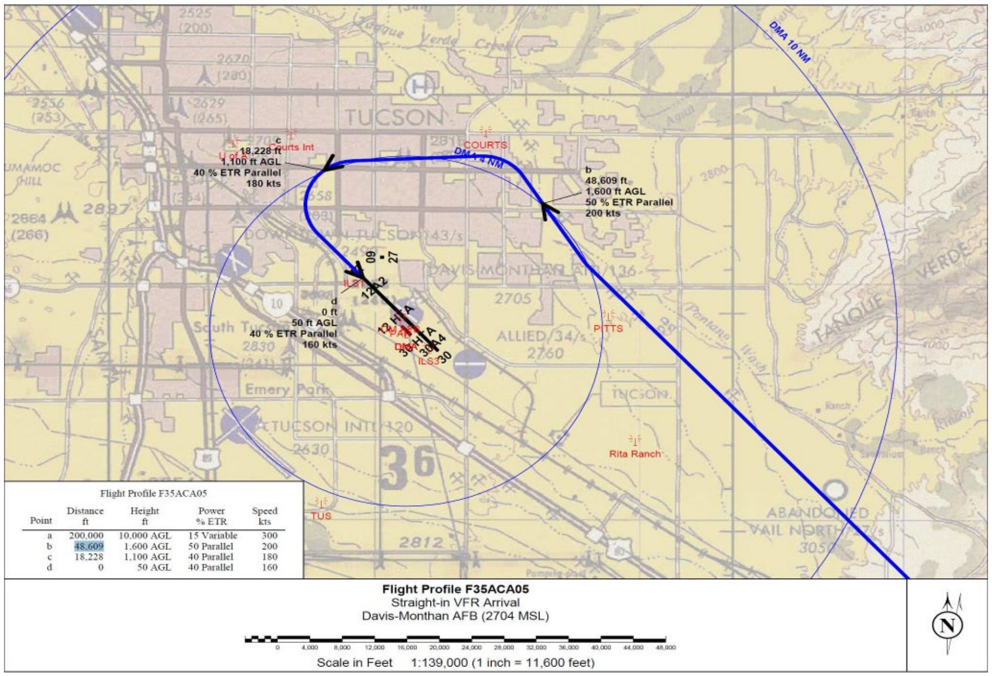
Flight Profile F35ACA05

Notes

Point	Distance (ft)	Height (ft)	Power (%ETR)	Speed (kts)
a	200,000	10000	15	300
	73,841	3000	44	217
b	48,609	1600	50	200
c	18,229	1100	40	180
d	0	50	40	160

True Flight Distance (ft)	Air Speed (fps)	Segment Time (sec)		
25271	352	71.87	Approach	230
30384	321	94.75		
18259	287	63.64		

230.25

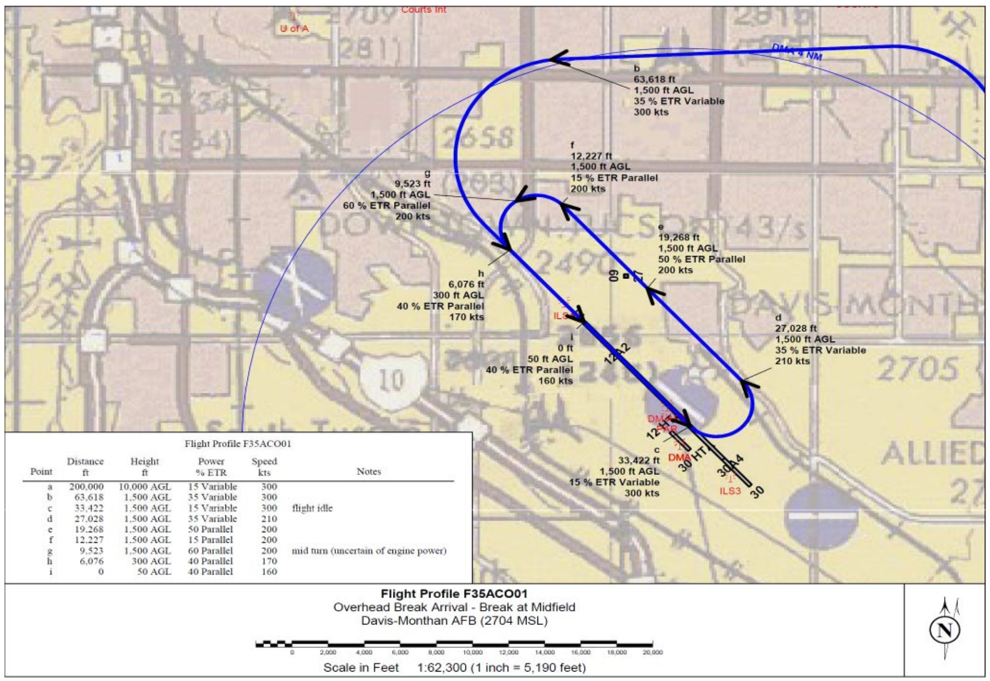


Davis-Monthan AFB

Flight Profile F35ACO01

Point	Distance (ft)	Height (ft)	Power (%ETR)	Speed (kts)	Notes	True Flight Distance (ft)	Air Speed (fps)	Segment Time (sec)		
a	200,000	10000	15	300						
	87,685	3000	31	300						
b	63,618	1500	35	300		24114	506	47.62	Approach	207
c	33,422	1500	15	300	flight idle	30196	506	59.64		
d	27,028	1500	35	210		6394	430	14.86		
e	19,268	1500	50	200		7760	346	22.43		
f	12,227	1500	15	200		7041	338	20.86		
g	9,523	1500	60	200	mid turn (uncertain engine)	2704	338	8.01		
h	6,076	300	40	170		3650	312	11.69		
i	0	50	40	160		6081	278	21.84		

206.94



Davis-Monthan AFB

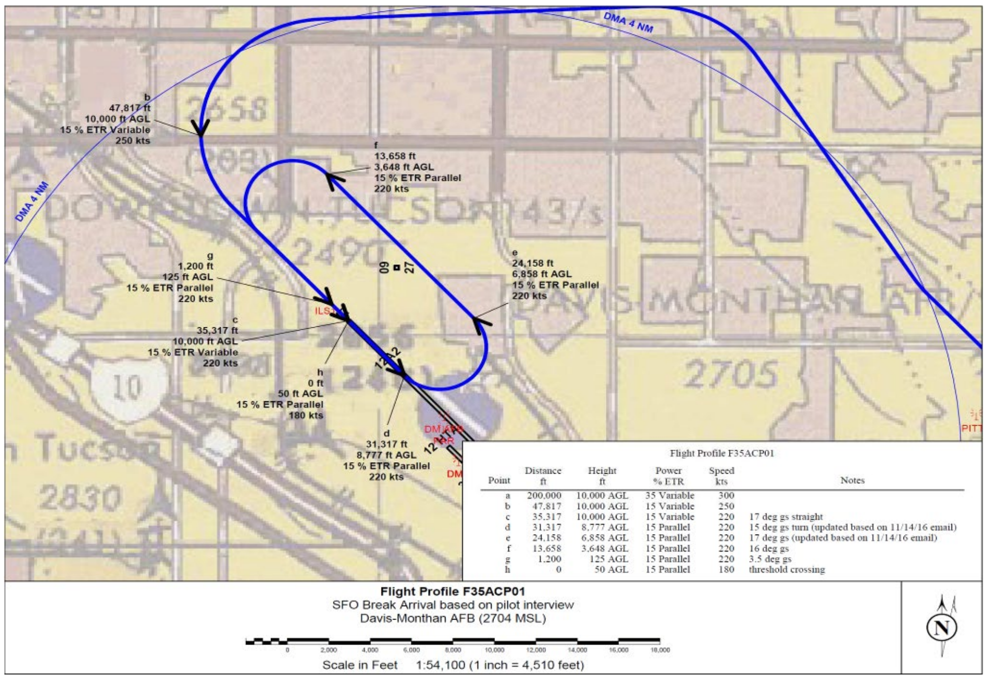
Flight Profile F35ACP01

Notes

Point	Distance (ft)	Height (ft)	Power (%ETR)	Speed (kts)	
a	200,000	10000	35	300	
b	47,817	10000	15	250	
c	35,317	10000	15	220	17 deg gs straight
d	31,317	8777	15	220	15 deg gs turn (updated based on 11/14/16 email)
e	24,158	6858	15	220	17 deg gs (updated based on 11/14/16 email)
f	13,658	3648	15	220	16 deg gs
	11,367	3000	15	220	
g	1,200	125	15	220	3.5 deg gs
h	0	50	15	180	threshold crossing

True Flight Distance (ft)	Air Speed (fps)	Segment Time (sec)		
2381	371	6.41	Approach	38
10565	371	28.45		
1202	338	3.56		

38.43



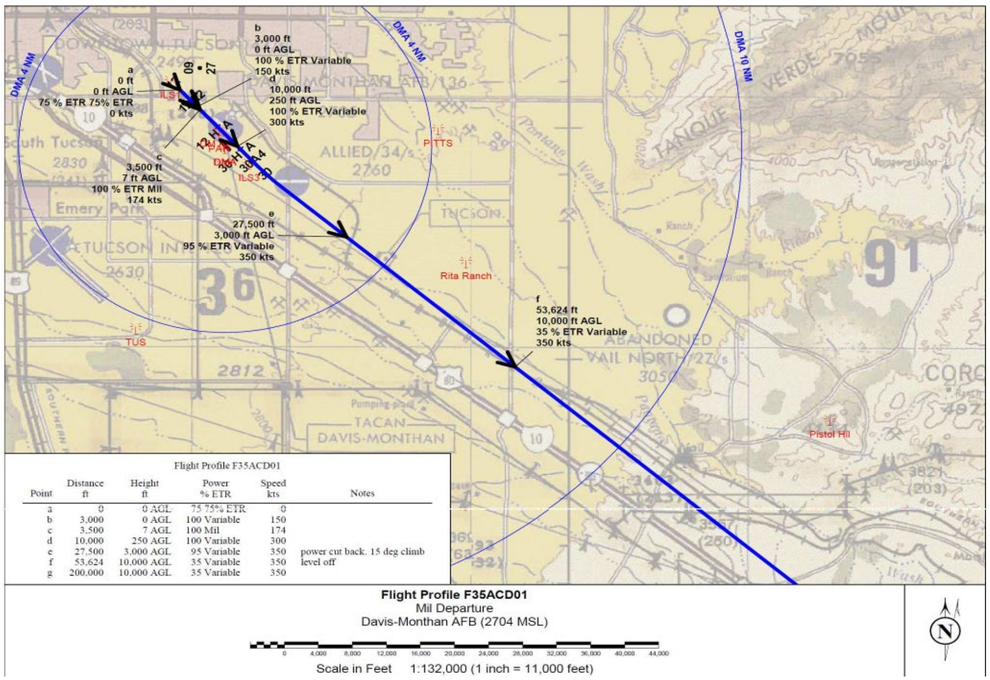
Davis-Monthan AFB

Flight Profile F35ACD01

Point	Distance (ft)	Height (ft)	Power (%ETR)	Speed (kts)	Notes
a	0	0	75	0	
b	3,000	0	100	150	
c	3,500	7	100	174	
d	10,000	250	100	300	
	11,591	500	100	305	
e	27,500	3000	95	350	Power cust back. 15 deg climb
f	53,624	10000	35	350	level off
g	200,000	10000	35	350	

True Flight Distance (ft)	Air Speed (fps)	Segment Time (sec)		
3000	253	11.85	Take off	33.10
500	273	1.83		
6505	400	16.26		
1610	510	3.16		
16104	552	29.15	Climb out	29.15

62.25



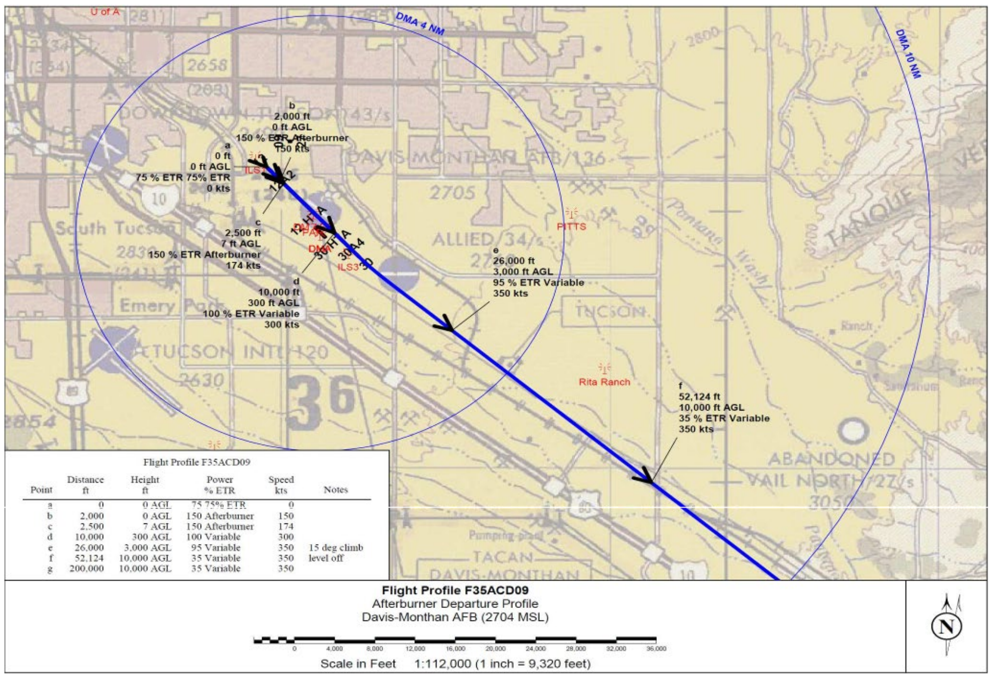
Davis-Monthan AFB

Flight Profile F35ACD09

Point	Distance (ft)	Height (ft)	Power (%ETR)	Speed (kts)	Notes
a	0	0	75	0	
b	2,000	0	150	150	
c	2,500	7	150	174	
d	10,000	300	100	300	
	11,185	500	100	304	
e	26,000	3000	95	350	15 deg climb
f	52,124	10000	35	350	level off
g	200,000	10000	35	350	

True Flight Distance (ft)	Air Speed (fps)	Segment Time (sec)		
2000	253	7.90	Take off	30.85
500	273	1.83		
7506	400	18.76		
1202	509	2.36		
15024	552	27.23	Climb out	27.23

58.09



Flight Profile F35ACD09
Afterburner Departure Profile
Davis-Monthan AFB (2704 MSL)

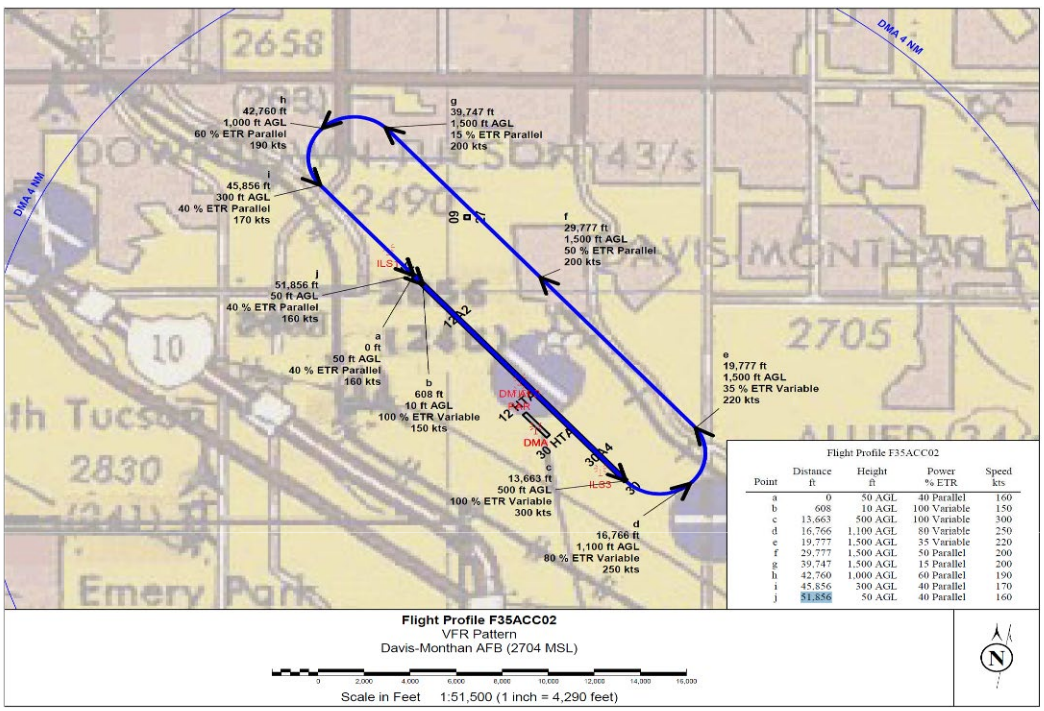
Davis-Monthan AFB

Flight Profile F35ACC02

Notes

Point	Distance (ft)	Height (ft)	Power (%ETR)	Speed (kts)
a	0	50	40	160
b	608	10	100	150
c	13,663	500	100	300
d	16,766	1100	80	250
e	19,777	1500	35	220
f	29,777	1500	50	200
g	39,747	1500	15	200
h	42,760	1000	60	190
i	45856	300	40	170
j	51856	50	40	160

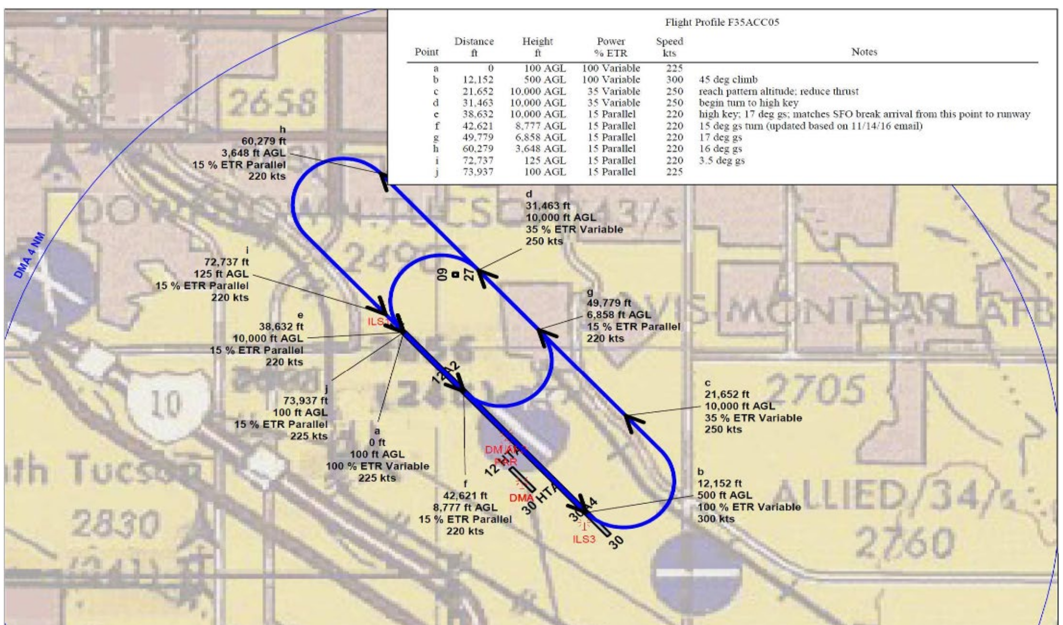
True Flight Distance (ft)	Air Speed (fps)	Segment Time (sec)
609	253	2.41
13064	380	34.40
3160	464	6.81
3037	397	7.66
10000	354	28.21
9970	338	29.54
3054	329	9.28
3174	304	10.45
6005	278	21.56
		150.32



Davis-Monthan AFB

Flight Profile F35ACC05

Point	Distance (ft)	Height (ft)	Power (%ETR)	Speed (kts)	Notes	True Flight Distance (ft)	Air Speed (fps)	Segment Time (sec)
a	0	100	100	225				
b	12,152	500	100	300	45 deg climb	12159	506	24.01
	14,652	3000	83	287		3536	495	7.14
c	21,652	10000	35	250	reach pattern altitude; reduce thrust			
d	31,463	10000	35	250	begin turn to high key			
e	38,632	10000	15	220	high key; turn 17 deg gs; matches SFO break arrival from this point to runway			
f	42,621	8777	15	220	15 deg gs turn (updated based on 11/14/16 email)			
g	49,779	6858	15	220	17 deg gs			
h	60,279	3648	15	220	16 deg gs			
	62,570	3000	15	220		2381	371	6.41
i	72737	125	15	220	3.5 deg gs	10565	371	28.45
j	73937	100	15	225		1200	376	3.20
								69.21



Flight Profile F35ACC05
Multiple SFO Pattern based on pilot interview (check the glide slope angles)
Davis-Monthan AFB (2704 MSL)
Scale in Feet 1:54,200 (1 inch = 4,520 feet)

Davis-Monthan AFB

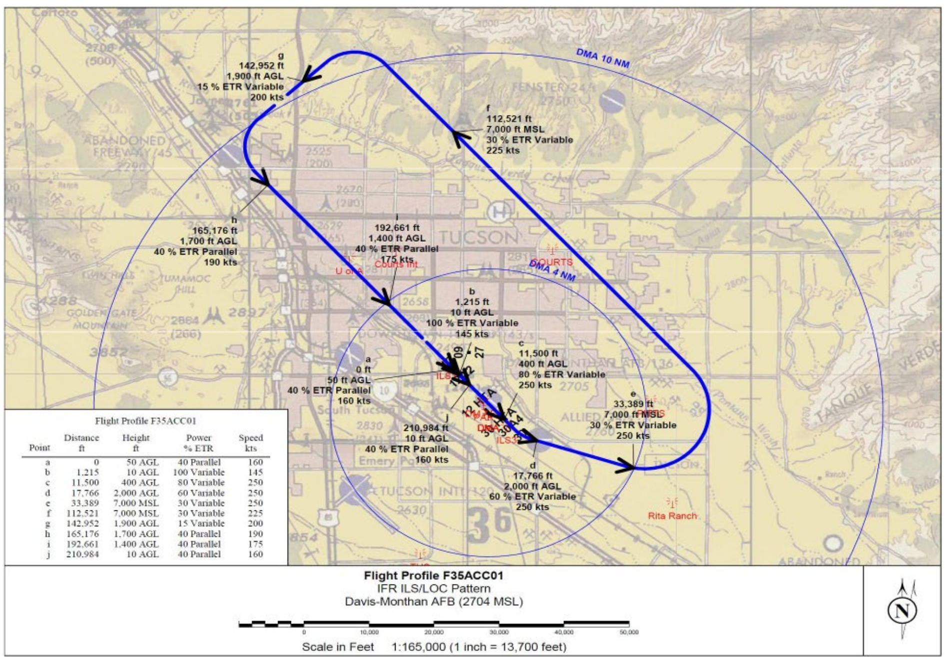
Flight Profile F35ACC01

Notes

Point	Distance (ft)	Height (ft)	Power (%ETR)	Speed (kts)
a	0	50	40	160
b	1,215	10	100	145
c	11,500	400	80	250
d	17,766	2000	60	250
	24,570	3000	47	250
e	33,389	4296	30	250
f	112,521	4296	30	225
	128,981	3000	22	211
g	142,952	1900	15	200
h	165,176	1700	40	190
i	192661	1400	40	175
j	210984	10	40	160

True Flight Distance (ft)	Air Speed (fps)	Segment Time (sec)
1216	245	4.97
10292	333	30.88
6467	422	15.33
6878	422	16.30
14014	347	40.36
22225	329	67.53
27487	308	89.24
18376	283	65.00

329.59



Davis-Monthan AFB

Landing and Takeoff Emissions

Estimated F-35A Emissions Based on LTO Cycle Derived from Site-Specific Noise Data
(Standard Mode Altitude Method)

Mode	Fuel Flow (lb/hr)	Emission Factors (lb/1000lb fuel)						
		NO_X	CO	VOC	HAPs	SO_X	PM_{10}	$PM_{2.5}$
Idle	2128	2.00	22.00	0.05	0.04	1.07	2.14	1.92
Approach	6730	9.00	1.20	0.01	0.01	1.07	1.52	1.37
Intermediate	16068	18.50	0.60	0.00	0.00	1.07	1.32	1.19
Military	19003	22.00	0.40	0.00	0.00	1.07	1.17	1.05
Afterburner	37938	14.43	9.87	0.01	0.01	1.07	1.11	1.00

Mode	TIM (min)	Emissions (lb)						
		NO_X	CO	VOC	HAPs	SO_X	PM_{10}	$PM_{2.5}$
Idle	29.80	2.11	23.25	0.05	0.04	1.13	2.26	2.03
Approach	3.11	3.14	0.42	0.00	0.00	0.37	0.53	0.48
Intermediate	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Military	1.01	7.03	0.13	0.00	0.00	0.34	0.37	0.34
Afterburner	0.03	0.23	0.16	0.00	0.00	0.02	0.02	0.02
Emissions per LTO (lb) =		**12.51**	**23.96**	**0.06**	**0.05**	**1.86**	**3.18**	**2.86**
Emissions per LTO (ton) =		**0.00626**	**0.01198**	**0.00003**	**0.00002**	**0.00093**	**0.00159**	**0.00143**

Davis-Monthan AFB

Landing and Takeoff Emissions

Estimated F-35A Emissions Based on LTO Cycle Derived from Site-Specific Noise Data

(Power setting reported in Noise Data Method)

Mode	% Power	Fuel Flow (lb/hr)	Emission Factors (lb/1000lb fuel)						
			NO_X	CO	VOC	HAPs	SO_X	PM_{10}	$PM_{2.5}$
Idle	0 > 10 ≤ 18.5	2128	2.00	22.00	0.05	0.04	1.07	2.14	1.92
Approach	18.5 > 30 ≤ 50	6730	9.00	1.20	0.01	0.01	1.07	1.52	1.37
Intermediate	50 > 85 ≤ 92.5	16068	18.50	0.60	0.00	0.00	1.07	1.32	1.19
Military	92.5 > 100 ≤ 105	19003	22.00	0.40	0.00	0.00	1.07	1.17	1.05
Afterburner	105 > 130 ≤ 150	37938	14.43	9.87	0.01	0.01	1.07	1.11	1.00

Mode		TIM (min)	Emissions (lb)						
			NO_X	CO	VOC	HAPs	SO_X	PM_{10}	$PM_{2.5}$
Idle	0 > 10 ≤ 18.5	30.74	2.18	23.98	0.05	0.04	1.17	2.33	2.09
Approach	18.5 > 30 ≤ 50	2.09	2.11	0.28	0.00	0.00	0.25	0.36	0.32
Intermediate	50 > 85 ≤ 92.5	0.09	0.43	0.01	0.00	0.00	0.02	0.03	0.03
Military	92.5 > 100 ≤ 105	1.03	7.15	0.13	0.00	0.00	0.35	0.38	0.34
Afterburner	105 > 130 ≤ 150	0.01	0.07	0.05	0.00	0.00	0.01	0.01	0.01

Emissions per LTO (lb) = 11.94 24.46 0.06 0.05 1.79 3.11
2.79

Emissions per LTO (ton) =
0.00597 0.012229 0.00003 0.00002 0.000897 0.001553
0.001394

Davis-Monthan AFB

Touch and Go Emissions

Estimated F-35A Emissions Based on LTO Cycle Derived from Site-Specific Noise Data

(Power Setting Method)

Mode	Fuel Flow (lb/hr)	Emission Factors (lb/1000lb fuel)						
		NO_X	CO	VOC	HAPs	SO_X	PM_{10}	$PM_{2.5}$
Idle	2128	2.00	22.00	0.05	0.04	1.07	2.14	1.92
Approach	6730	9.00	1.20	0.01	0.01	1.07	1.52	1.37
Intermediate	16068	18.50	0.60	0.00	0.00	1.07	1.32	1.19
Military	19003	22.00	0.40	0.00	0.00	1.07	1.17	1.05
Afterburner	37938	14.43	9.87	0.01	0.01	1.07	1.11	1.00

Mode	TIM (min)	Emissions (lb)						
		NO_X	CO	VOC	HAPs	SO_X	PM_{10}	$PM_{2.5}$
Idle	0.51	0.04	0.40	0.00	0.00	0.02	0.04	0.03
Approach	1.10	1.11	0.15	0.00	0.00	0.13	0.19	0.17
Intermediate	0.27	1.33	0.04	0.00	0.00	0.08	0.09	0.09
Military	0.58	4.02	0.07	0.00	0.00	0.20	0.21	0.19
Afterburner	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Emissions per LTO (lb) =		**6.49**	**0.66**	**0.00**	**0.00**	**0.42**	**0.54**	**0.48**
Emissions per LTO (ton) =		**0.003247**	**0.000332**	**0.00000**	**0.00000**	**0.000212**	**0.000268**	**0.000241**

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ATTACHMENT C-2 HOMESTEAD AIR RESERVE BASE - AIR CONFORMITY APPLICABILITY MODEL REPORTS

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AIR CONFORMITY APPLICABILITY MODEL REPORT
RECORD OF AIR ANALYSIS (ROAA)

1. General Information: The Air Force's Air Conformity Applicability Model (ACAM) was used to perform an analysis to assess the potential air quality impact/s associated with the action in accordance with the Air Force Instruction 32-7040, Air Quality Compliance And Resource Management; the Environmental Impact Analysis Process (EIAP, 32 CFR 989); and the General Conformity Rule (GCR, 40 CFR 93 Subpart B). This report provides a summary of the ACAM analysis.

a. Action Location:
Base: HOMESTEAD ARB
State: Florida
County(s): Miami-Dade
Regulatory Area(s): NOT IN A REGULATORY AREA

b. Action Title: AFRC F-35A EIS - Homestead ARB

c. Project Number/s (if applicable): Replace Existing Aircraft with F-35As

d. Projected Action Start Date: 1 / 2021

e. Action Description:

Demolition/Renovation/Construction activities and replacement aircraft operations.

f. Point of Contact:
Name: Chris Crabtree, Leidos, Inc., and Austin N. Naranjo, Solutio
Title:
Organization:
Email:
Phone Number:

2. Air Impact Analysis: Based on the attainment status at the action location, the requirements of the General Conformity Rule are:

_____ applicable
__X__ not applicable

Total combined direct and indirect emissions associated with the action were estimated through ACAM on a calendar-year basis for the "worst-case" and "steady state" (net gain/loss upon action fully implemented) emissions.

"Air Quality Indicators" were used to provide an indication of the significance of potential impacts to air quality. These air quality indicators are EPA General Conformity Rule (GCR) thresholds (de minimis levels) that are applied out of context to their intended use. Therefore, these indicators do not trigger a regulatory requirement; however, they provide a warning that the action is potentially significant. It is important to note that these indicators only provide a clue to the potential impacts to air quality.

Given the GCR de minimis threshold values are the maximum net change an action can acceptably emit in non-attainment and maintenance areas, these threshold values would also conservatively indicate an actions emissions within an attainment would also be acceptable. An air quality indicator value of 100 tons/yr is used based on the GCR de minimis threshold for the least severe non-attainment classification for all criteria pollutants (see 40 CFR 93.153). Therefore, the worst-case year emissions were compared against the GCR Indicator and are summarized below.

AIR CONFORMITY APPLICABILITY MODEL REPORT
RECORD OF AIR ANALYSIS (ROAA)

Analysis Summary:

2021

Pollutant	Action Emissions (ton/yr)	AIR QUALITY INDICATOR	
		Threshold (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.216	100	No
NOx	1.324	100	No
CO	1.480	100	No
SOx	0.003	100	No
PM 10	0.244	100	No
PM 2.5	0.058	100	No
Pb	0.000	25	No
NH3	0.001	100	No
CO2e	313.1		

2022

Pollutant	Action Emissions (ton/yr)	AIR QUALITY INDICATOR	
		Threshold (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.440	100	No
NOx	1.940	100	No
CO	2.271	100	No
SOx	0.005	100	No
PM 10	0.137	100	No
PM 2.5	0.087	100	No
Pb	0.000	25	No
NH3	0.002	100	No
CO2e	465.6		

2023

Pollutant	Action Emissions (ton/yr)	AIR QUALITY INDICATOR	
		Threshold (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.000	100	No
NOx	0.000	100	No
CO	0.000	100	No
SOx	0.000	100	No
PM 10	0.000	100	No
PM 2.5	0.000	100	No
Pb	0.000	25	No
NH3	0.000	100	No
CO2e	0.0		

AIR CONFORMITY APPLICABILITY MODEL REPORT
RECORD OF AIR ANALYSIS (ROAA)

2024

Pollutant	Action Emissions (ton/yr)	AIR QUALITY INDICATOR	
		Threshold (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	-17.988	100	No
NOx	13.554	100	No
CO	0.850	100	No
SOx	2.119	100	No
PM 10	2.896	100	No
PM 2.5	2.781	100	No
Pb	0.000	25	No
NH3	-0.010	100	No
CO2e	6271.8		

2025 - (Steady State)

Pollutant	Action Emissions (ton/yr)	AIR QUALITY INDICATOR	
		Threshold (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	-17.988	100	No
NOx	13.554	100	No
CO	0.850	100	No
SOx	2.119	100	No
PM 10	2.896	100	No
PM 2.5	2.781	100	No
Pb	0.000	25	No
NH3	-0.010	100	No
CO2e	6271.8		

None of estimated emissions associated with this action are above the GCR indicators, indicating no significant impact to air quality; therefore, no further air assessment is needed.

//Chris Crabtree, Austin Naranjo// 7/23/20

Chris Crabtree, Leidos, Inc., and Austin N. Naranjo, Solutio DATE

AIR CONFORMITY APPLICABILITY MODEL REPORT
RECORD OF AIR ANALYSIS (ROAA)

1. General Information: The Air Force's Air Conformity Applicability Model (ACAM) was used to perform an analysis to assess the potential air quality impact/s associated with the action in accordance with the Air Force Instruction 32-7040, Air Quality Compliance And Resource Management; the Environmental Impact Analysis Process (EIAP, 32 CFR 989); and the General Conformity Rule (GCR, 40 CFR 93 Subpart B). This report provides a summary of the ACAM analysis.

a. Action Location:
Base: HOMESTEAD ARB
State: Florida
County(s): Miami-Dade
Regulatory Area(s): NOT IN A REGULATORY AREA

b. Action Title: AFRC F-35A EIS - Homestead ARB - 50% Afterburner Departures

c. Project Number/s (if applicable): Replace Existing Aircraft with F-35As

d. Projected Action Start Date: 1 / 2021

e. Action Description:

Demolition/Renovation/Construction activities and replacement aircraft operations.

f. Point of Contact:
Name: Chris Crabtree, Leidos, Inc., and Austin N. Naranjo, Solutio
Title:
Organization:
Email:
Phone Number:

2. Air Impact Analysis: Based on the attainment status at the action location, the requirements of the General Conformity Rule are:

_____ applicable
__X__ not applicable

Total combined direct and indirect emissions associated with the action were estimated through ACAM on a calendar-year basis for the "worst-case" and "steady state" (net gain/loss upon action fully implemented) emissions.

"Air Quality Indicators" were used to provide an indication of the significance of potential impacts to air quality. These air quality indicators are EPA General Conformity Rule (GCR) thresholds (de minimis levels) that are applied out of context to their intended use. Therefore, these indicators do not trigger a regulatory requirement; however, they provide a warning that the action is potentially significant. It is important to note that these indicators only provide a clue to the potential impacts to air quality.

Given the GCR de minimis threshold values are the maximum net change an action can acceptably emit in non-attainment and maintenance areas, these threshold values would also conservatively indicate an actions emissions within an attainment would also be acceptable. An air quality indicator value of 100 tons/yr is used based on the GCR de minimis threshold for the least severe non-attainment classification for all criteria pollutants (see 40 CFR 93.153). Therefore, the worst-case year emissions were compared against the GCR Indicator and are summarized below.

AIR CONFORMITY APPLICABILITY MODEL REPORT
RECORD OF AIR ANALYSIS (ROAA)

Analysis Summary:

2021

Pollutant	Action Emissions (ton/yr)	AIR QUALITY INDICATOR	
		Threshold (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.216	100	No
NOx	1.324	100	No
CO	1.480	100	No
SOx	0.003	100	No
PM 10	0.244	100	No
PM 2.5	0.058	100	No
Pb	0.000	25	No
NH3	0.001	100	No
CO2e	313.1		

2022

Pollutant	Action Emissions (ton/yr)	AIR QUALITY INDICATOR	
		Threshold (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.440	100	No
NOx	1.940	100	No
CO	2.271	100	No
SOx	0.005	100	No
PM 10	0.137	100	No
PM 2.5	0.087	100	No
Pb	0.000	25	No
NH3	0.002	100	No
CO2e	465.6		

2023

Pollutant	Action Emissions (ton/yr)	AIR QUALITY INDICATOR	
		Threshold (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.000	100	No
NOx	0.000	100	No
CO	0.000	100	No
SOx	0.000	100	No
PM 10	0.000	100	No
PM 2.5	0.000	100	No
Pb	0.000	25	No
NH3	0.000	100	No
CO2e	0.0		

AIR CONFORMITY APPLICABILITY MODEL REPORT RECORD OF AIR ANALYSIS (ROAA)

2024

Pollutant	Action Emissions (ton/yr)	AIR QUALITY INDICATOR	
		Threshold (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	-17.986	100	No
NOx	13.980	100	No
CO	2.968	100	No
SOx	2.219	100	No
PM 10	2.994	100	No
PM 2.5	2.869	100	No
Pb	0.000	25	No
NH3	-0.010	100	No
CO2e	6224.3		

2025 - (Steady State)

Pollutant	Action Emissions (ton/yr)	AIR QUALITY INDICATOR	
		Threshold (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	-17.986	100	No
NOx	13.980	100	No
CO	2.968	100	No
SOx	2.219	100	No
PM 10	2.994	100	No
PM 2.5	2.869	100	No
Pb	0.000	25	No
NH3	-0.010	100	No
CO2e	6224.3		

None of estimated emissions associated with this action are above the GCR indicators, indicating no significant impact to air quality; therefore, no further air assessment is needed.

//Chris Crabtree, Austin Naranjo// 7/23/20

Chris Crabtree, Leidos, Inc., and Austin N. Naranjo, Solutio DATE

AIR CONFORMITY APPLICABILITY MODEL REPORT
RECORD OF AIR ANALYSIS (ROAA)

1. General Information: The Air Force's Air Conformity Applicability Model (ACAM) was used to perform an analysis to assess the potential air quality impact/s associated with the action in accordance with the Air Force Instruction 32-7040, Air Quality Compliance And Resource Management; the Environmental Impact Analysis Process (EIAP, 32 CFR 989); and the General Conformity Rule (GCR, 40 CFR 93 Subpart B). This report provides a summary of the ACAM analysis.

a. Action Location:
Base: HOMESTEAD ARB
State: Florida
County(s): Miami-Dade
Regulatory Area(s): NOT IN A REGULATORY AREA

b. Action Title: AFRC F-35A EIS - Homestead ARB - 95% Afterburner Departures

c. Project Number/s (if applicable): Replace Existing Aircraft with F-35As

d. Projected Action Start Date: 1 / 2021

e. Action Description:

Demolition/Renovation/Construction activities and replacement aircraft operations.

f. Point of Contact:
Name: Chris Crabtree, Leidos, Inc., and Austin N. Naranjo, Solutio
Title:
Organization:
Email:
Phone Number:

2. Air Impact Analysis: Based on the attainment status at the action location, the requirements of the General Conformity Rule are:

_____ applicable
__X__ not applicable

Total combined direct and indirect emissions associated with the action were estimated through ACAM on a calendar-year basis for the "worst-case" and "steady state" (net gain/loss upon action fully implemented) emissions.

"Air Quality Indicators" were used to provide an indication of the significance of potential impacts to air quality. These air quality indicators are EPA General Conformity Rule (GCR) thresholds (de minimis levels) that are applied out of context to their intended use. Therefore, these indicators do not trigger a regulatory requirement; however, they provide a warning that the action is potentially significant. It is important to note that these indicators only provide a clue to the potential impacts to air quality.

Given the GCR de minimis threshold values are the maximum net change an action can acceptably emit in non-attainment and maintenance areas, these threshold values would also conservatively indicate an actions emissions within an attainment would also be acceptable. An air quality indicator value of 100 tons/yr is used based on the GCR de minimis threshold for the least severe non-attainment classification for all criteria pollutants (see 40 CFR 93.153). Therefore, the worst-case year emissions were compared against the GCR Indicator and are summarized below.

AIR CONFORMITY APPLICABILITY MODEL REPORT
RECORD OF AIR ANALYSIS (ROAA)

Analysis Summary:

2021

Pollutant	Action Emissions (ton/yr)	AIR QUALITY INDICATOR	
		Threshold (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.216	100	No
NOx	1.324	100	No
CO	1.480	100	No
SOx	0.003	100	No
PM 10	0.244	100	No
PM 2.5	0.058	100	No
Pb	0.000	25	No
NH3	0.001	100	No
CO2e	313.1		

2022

Pollutant	Action Emissions (ton/yr)	AIR QUALITY INDICATOR	
		Threshold (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.440	100	No
NOx	1.940	100	No
CO	2.271	100	No
SOx	0.005	100	No
PM 10	0.137	100	No
PM 2.5	0.087	100	No
Pb	0.000	25	No
NH3	0.002	100	No
CO2e	465.6		

2023

Pollutant	Action Emissions (ton/yr)	AIR QUALITY INDICATOR	
		Threshold (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.000	100	No
NOx	0.000	100	No
CO	0.000	100	No
SOx	0.000	100	No
PM 10	0.000	100	No
PM 2.5	0.000	100	No
Pb	0.000	25	No
NH3	0.000	100	No
CO2e	0.0		

AIR CONFORMITY APPLICABILITY MODEL REPORT
RECORD OF AIR ANALYSIS (ROAA)

2024

Pollutant	Action Emissions (ton/yr)	AIR QUALITY INDICATOR	
		Threshold (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	-17.983	100	No
NOx	14.131	100	No
CO	5.080	100	No
SOx	2.306	100	No
PM 10	3.075	100	No
PM 2.5	2.943	100	No
Pb	0.000	25	No
NH3	-0.010	100	No
CO2e	6133.1		

2025 - (Steady State)

Pollutant	Action Emissions (ton/yr)	AIR QUALITY INDICATOR	
		Threshold (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	-17.983	100	No
NOx	14.131	100	No
CO	5.080	100	No
SOx	2.306	100	No
PM 10	3.075	100	No
PM 2.5	2.943	100	No
Pb	0.000	25	No
NH3	-0.010	100	No
CO2e	6133.1		

None of estimated emissions associated with this action are above the GCR indicators, indicating no significant impact to air quality; therefore, no further air assessment is needed.

//Chris Crabtree, Austin Naranjo// 7/23/20

Chris Crabtree, Leidos, Inc., and Austin N. Naranjo, Solutio DATE

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

1. General Information

- Action Location
Base: HOMESTEAD ARB
State: Florida
County(s): Miami-Dade
Regulatory Area(s): NOT IN A REGULATORY AREA

- Action Title: AFRC F-35A EIS - Homestead ARB

- Project Number/s (if applicable): Replace Existing Aircraft with F-35As

- Projected Action Start Date: 1 / 2021

- Action Purpose and Need:

- Action Description:
Demolition/Renovation/Construction activities and replacement aircraft operations.

- Point of Contact
Name: Chris Crabtree, Leidos, Inc., and Austin N. Naranjo, Solutio
Title:
Organization:
Email:
Phone Number:

- Activity List:

Activity Type		Activity Title
2.	Construction / Demolition	AFRC F-35A Beddown EIS - Homestead ARB
3.	Aircraft	Remove 24 F-16Cs
4.	Aircraft	Beddown 24 F-35As - Weighted Average LTO
5.	Aircraft	Beddown 24 F-35As - Weighted Average TGO
6.	Personnel	Removal of 91 Personnel

Emission factors and air emission estimating methods come from the United States Air Force's Air Emissions Guide for Air Force Stationary Sources, Air Emissions Guide for Air Force Mobile Sources, and Air Emissions Guide for Air Force Transitory Sources.

2. Construction / Demolition

2.1 General Information & Timeline Assumptions

- Activity Location
County: Miami-Dade
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: AFRC F-35A Beddown EIS - Homestead ARB

- Activity Description:
Demolition, Site Grading, Trenching/Excavating, Building Construction, Architectural Coatings, and Paving Activities

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Activity Start Date
Start Month: 1
Start Month: 2021

- Activity End Date
Indefinite: False
End Month: 11
End Month: 2022

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.656015
SO_x	0.008058
NO_x	3.264466
CO	3.751373
PM 10	0.381378

Pollutant	Total Emissions (TONs)
PM 2.5	0.145246
Pb	0.000000
NH_3	0.002661
CO_2e	778.7

2.1 Demolition Phase

2.1.1 Demolition Phase Timeline Assumptions

- Phase Start Date
Start Month: 4
Start Quarter: 1
Start Year: 2021

- Phase Duration
Number of Month: 1
Number of Days: 0

2.1.2 Demolition Phase Assumptions

- General Demolition Information
Area of Building to be demolished (ft^2): 8786
Height of Building to be demolished (ft): 20

- Default Settings Used: Yes

- Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Concrete/Industrial Saws Composite	1	8
Rubber Tired Dozers Composite	1	1
Tractors/Loaders/Backhoes Composite	2	6

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

2.1.3 Demolition Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Concrete/Industrial Saws Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0443	0.0006	0.3176	0.3761	0.0170	0.0170	0.0040	58.563
Rubber Tired Dozers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.2015	0.0024	1.4660	0.7661	0.0581	0.0581	0.0181	239.53
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0407	0.0007	0.2505	0.3606	0.0112	0.0112	0.0036	66.890

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.282	000.002	000.207	003.392	000.006	000.005		000.023	00341.791
LDGT	000.376	000.003	000.373	004.889	000.007	000.006		000.024	00439.705
HDGV	000.832	000.005	000.964	016.217	000.016	000.014		000.046	00814.851
LDDV	000.084	000.003	000.127	002.822	000.004	000.004		000.008	00334.379
LDDT	000.227	000.004	000.365	004.850	000.007	000.006		000.008	00473.628
HDDV	000.423	000.014	004.175	001.653	000.176	000.162		000.028	01559.331
MC	003.040	000.003	000.626	013.017	000.026	000.023		000.052	00392.775

2.1.4 Demolition Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD} = (0.00042 * BA * BH) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
0.00042: Emission Factor (lb/ft^3)
BA: Area of Building to be demolished (ft^2)
BH: Height of Building to be demolished (ft)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

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- Vehicle Exhaust Emissions per Phase
$VMT_{VE} = BA * BH * (1 / 27) * 0.25 * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building being demolish (ft^2)
BH: Height of Building being demolish (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd^3 / 27 ft^3)
0.25: Volume reduction factor (material reduced by 75% to account for air space)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

2.2 Site Grading Phase

2.2.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 6
Start Quarter: 1
Start Year: 2021

- Phase Duration
Number of Month: 1
Number of Days: 0

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2.2.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 15000
Amount of Material to be Hauled On-Site (yd^3): 100
Amount of Material to be Hauled Off-Site (yd^3): 100

- Site Grading Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Graders Composite	1	6
Other Construction Equipment Composite	1	8
Rubber Tired Dozers Composite	1	6
Tractors/Loaders/Backhoes Composite	1	7

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

2.2.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Graders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0860	0.0014	0.5212	0.5747	0.0247	0.0247	0.0077	132.93
Other Construction Equipment Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0533	0.0012	0.3119	0.3497	0.0121	0.0121	0.0048	122.61
Rubber Tired Dozers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.2015	0.0024	1.4660	0.7661	0.0581	0.0581	0.0181	239.53
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0407	0.0007	0.2505	0.3606	0.0112	0.0112	0.0036	66.890

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- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.282	000.002	000.207	003.392	000.006	000.005		000.023	00341.791
LDGT	000.376	000.003	000.373	004.889	000.007	000.006		000.024	00439.705
HDGV	000.832	000.005	000.964	016.217	000.016	000.014		000.046	00814.851
LDDV	000.084	000.003	000.127	002.822	000.004	000.004		000.008	00334.379
LDDT	000.227	000.004	000.365	004.850	000.007	000.006		000.008	00473.628
HDDV	000.423	000.014	004.175	001.653	000.176	000.162		000.028	01559.331
MC	003.040	000.003	000.626	013.017	000.026	000.023		000.052	00392.775

2.2.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD} = (20 * ACRE * WD) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

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- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

2.3 Trenching/Excavating Phase

2.3.1 Trenching / Excavating Phase Timeline Assumptions

- Phase Start Date
Start Month: 5
Start Quarter: 1
Start Year: 2022

- Phase Duration
Number of Month: 1
Number of Days: 0

2.3.2 Trenching / Excavating Phase Assumptions

- General Trenching/Excavating Information
Area of Site to be Trenched/Excavated (ft^2): 5000
Amount of Material to be Hauled On-Site (yd^3): 25
Amount of Material to be Hauled Off-Site (yd^3): 25

- Trenching Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Excavators Composite	2	8
Other General Industrial Equipmen Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

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- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

2.3.3 Trenching / Excavating Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Graders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0860	0.0014	0.5212	0.5747	0.0247	0.0247	0.0077	132.93
Other Construction Equipment Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0533	0.0012	0.3119	0.3497	0.0121	0.0121	0.0048	122.61
Rubber Tired Dozers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.2015	0.0024	1.4660	0.7661	0.0581	0.0581	0.0181	239.53
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0407	0.0007	0.2505	0.3606	0.0112	0.0112	0.0036	66.890

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.282	000.002	000.207	003.392	000.006	000.005		000.023	00341.791
LDGT	000.376	000.003	000.373	004.889	000.007	000.006		000.024	00439.705
HDGV	000.832	000.005	000.964	016.217	000.016	000.014		000.046	00814.851
LDDV	000.084	000.003	000.127	002.822	000.004	000.004		000.008	00334.379
LDDT	000.227	000.004	000.365	004.850	000.007	000.006		000.008	00473.628
HDDV	000.423	000.014	004.175	001.653	000.176	000.162		000.028	01559.331
MC	003.040	000.003	000.626	013.017	000.026	000.023		000.052	00392.775

2.3.4 Trenching / Excavating Phase Formula(s)

- Fugitive Dust Emissions per Phase
$PM10_{FD}$ = (20 * ACRE * WD) / 2000

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

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- Construction Exhaust Emissions per Phase
$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase
$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

2.4 Building Construction Phase

2.4.1 Building Construction Phase Timeline Assumptions

- Phase Start Date
Start Month: 6
Start Quarter: 1
Start Year: 2021

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- Phase Duration
Number of Month: 18
Number of Days: 0

2.4.2 Building Construction Phase Assumptions

- General Building Construction Information
Building Category: Office or Industrial
Area of Building (ft^2): 29121
Height of Building (ft): 20
Number of Units: N/A

- Building Construction Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Cranes Composite	1	6
Forklifts Composite	2	6
Generator Sets Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8
Welders Composite	3	8

- Vehicle Exhaust
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

- Vendor Trips
Average Vendor Round Trip Commute (mile): 40 (default)

- Vendor Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

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2.4.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Cranes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0845	0.0013	0.6033	0.3865	0.0228	0.0228	0.0076	128.82
Forklifts Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0293	0.0006	0.1458	0.2148	0.0056	0.0056	0.0026	54.462
Generator Sets Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0362	0.0006	0.2977	0.2707	0.0130	0.0130	0.0032	61.074
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0407	0.0007	0.2505	0.3606	0.0112	0.0112	0.0036	66.890
Welders Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0280	0.0003	0.1634	0.1787	0.0088	0.0088	0.0025	25.665

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**Pb**	**NH_3**	**CO_2e**
LDGV	000.282	000.002	000.207	003.392	000.006	000.005		000.023	00341.791
LDGT	000.376	000.003	000.373	004.889	000.007	000.006		000.024	00439.705
HDGV	000.832	000.005	000.964	016.217	000.016	000.014		000.046	00814.851
LDDV	000.084	000.003	000.127	002.822	000.004	000.004		000.008	00334.379
LDDT	000.227	000.004	000.365	004.850	000.007	000.006		000.008	00473.628
HDDV	000.423	000.014	004.175	001.653	000.176	000.162		000.028	01559.331
MC	003.040	000.003	000.626	013.017	000.026	000.023		000.052	00392.775

2.4.4 Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = BA * BH * (0.42 / 1000) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.42 / 1000): Conversion Factor ft^3 to trips (0.42 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

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$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Vender Trips Emissions per Phase
$VMT_{VT} = BA * BH * (0.38 / 1000) * HT$

VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.38 / 1000): Conversion Factor ft^3 to trips (0.38 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

2.5 Architectural Coatings Phase

2.5.1 Architectural Coatings Phase Timeline Assumptions

- Phase Start Date
Start Month: 8
Start Quarter: 1
Start Year: 2022

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- Phase Duration
Number of Month: 2
Number of Days: 0

2.5.2 Architectural Coatings Phase Assumptions

- General Architectural Coatings Information
Building Category:
Total Square Footage (ft^2): 10000
Number of Units: N/A

- Architectural Coatings Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

2.5.3 Architectural Coatings Phase Emission Factor(s)

- Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.282	000.002	000.207	003.392	000.006	000.005		000.023	00341.791
LDGT	000.376	000.003	000.373	004.889	000.007	000.006		000.024	00439.705
HDGV	000.832	000.005	000.964	016.217	000.016	000.014		000.046	00814.851
LDDV	000.084	000.003	000.127	002.822	000.004	000.004		000.008	00334.379
LDDT	000.227	000.004	000.365	004.850	000.007	000.006		000.008	00473.628
HDDV	000.423	000.014	004.175	001.653	000.176	000.162		000.028	01559.331
MC	003.040	000.003	000.626	013.017	000.026	000.023		000.052	00392.775

2.5.4 Architectural Coatings Phase Formula(s)

- Worker Trips Emissions per Phase
$VMT_{WT} = (1 * WT * PA) / 800$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
1: Conversion Factor man days to trips (1 trip / 1 man * day)
WT: Average Worker Round Trip Commute (mile)
PA: Paint Area (ft^2)
800: Conversion Factor square feet to man days (1 ft^2 / 1 man * day)

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

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- Off-Gassing Emissions per Phase
$VOC_{AC} = (AB * 2.0 * 0.0116) / 2000.0$

VOC_{AC}: Architectural Coating VOC Emissions (TONs)
BA: Area of Building (ft^2)
2.0: Conversion Factor total area to coated area (2.0 ft^2 coated area / total area)
0.0116: Emission Factor (lb/ft^2)
2000: Conversion Factor pounds to tons

2.6 Paving Phase

2.6.1 Paving Phase Timeline Assumptions

- Phase Start Date
Start Month: 5
Start Quarter: 1
Start Year: 2022

- Phase Duration
Number of Month: 1
Number of Days: 0

2.6.2 Paving Phase Assumptions

- General Paving Information
Paving Area (ft^2): 1000

- Paving Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Cement and Mortar Mixers Composite	4	6
Pavers Composite	1	7
Paving Equipment Composite	2	6
Rollers Composite	1	7
Tractors/Loaders/Backhoes Composite	1	7

- Vehicle Exhaust
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

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2.6.3 Paving Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Graders Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0860	0.0014	0.5212	0.5747	0.0247	0.0247	0.0077	132.93
Other Construction Equipment Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0533	0.0012	0.3119	0.3497	0.0121	0.0121	0.0048	122.61
Rubber Tired Dozers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.2015	0.0024	1.4660	0.7661	0.0581	0.0581	0.0181	239.53
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0407	0.0007	0.2505	0.3606	0.0112	0.0112	0.0036	66.890

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.282	000.002	000.207	003.392	000.006	000.005		000.023	00341.791
LDGT	000.376	000.003	000.373	004.889	000.007	000.006		000.024	00439.705
HDGV	000.832	000.005	000.964	016.217	000.016	000.014		000.046	00814.851
LDDV	000.084	000.003	000.127	002.822	000.004	000.004		000.008	00334.379
LDDT	000.227	000.004	000.365	004.850	000.007	000.006		000.008	00473.628
HDDV	000.423	000.014	004.175	001.653	000.176	000.162		000.028	01559.331
MC	003.040	000.003	000.626	013.017	000.026	000.023		000.052	00392.775

2.6.4 Paving Phase Formula(s)

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = PA * 0.25 * (1 / 27) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
PA: Paving Area (ft^2)
0.25: Thickness of Paving Area (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd^3 / 27 ft^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

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$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase
$VOC_P = (2.62 * PA) / 43560$

VOC_P: Paving VOC Emissions (TONs)
2.62: Emission Factor (lb/acre)
PA: Paving Area (ft^2)
43560: Conversion Factor square feet to acre (43560 ft2 / acre)^2 / acre)

3. Aircraft

3.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location
County: Miami-Dade
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: Remove 24 F-16Cs

- Activity Description:
Remove 24 F-16Cs and associated operations

- Activity Start Date
Start Month: 1
Start Year: 2024

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- Activity End Date
Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-26.167054
SO_x	-5.542464
NO_x	-65.026291
CO	-72.497660
PM 10	-9.078076

Pollutant	Emissions Per Year (TONs)
PM 2.5	-8.151623
Pb	0.000000
NH_3	0.000000
CO_2e	-13092.2

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-17.547725
SO_x	-3.771035
NO_x	-39.652657
CO	-57.314996
PM 10	-6.455224

Pollutant	Emissions Per Year (TONs)
PM 2.5	-5.616357
Pb	0.000000
NH_3	0.000000
CO_2e	-11574.4

- Activity Emissions [Test Cell part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.226207
SO_x	-0.080707
NO_x	-1.222120
CO	-0.455394
PM 10	-0.133180

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.120049
Pb	0.000000
NH_3	0.000000
CO_2e	-246.2

- Activity Emissions [Aerospace Ground Equipment (AGE) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-8.393121
SO_x	-1.690721
NO_x	-24.151514
CO	-14.727270
PM 10	-2.489673

Pollutant	Emissions Per Year (TONs)
PM 2.5	-2.415217
Pb	0.000000
NH_3	0.000000
CO_2e	-1271.6

3.2 Aircraft & Engines

3.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine
Aircraft Designation: F-16C
Engine Model: F100-PW-220
Primary Function: Combat
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate
Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

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3.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e
Idle	1084.00	7.94	1.06	4.61	35.30	2.06	1.85	3234
Approach	3837.00	5.12	1.06	12.53	1.92	2.63	2.37	3234
Intermediate	5770.00	2.89	1.06	22.18	0.86	2.06	1.85	3234
Military	9679.00	1.79	1.06	29.32	0.86	1.33	1.20	3234
After Burn	41682.00	1.53	1.06	8.37	11.99	1.15	1.04	3234

3.3 Flight Operations

3.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 24
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 4740
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 474
Number of Annual Trim Test(s) per Aircraft: 12

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 18.5
Takeoff [Military] (mins): 0.4
Takeoff [After Burn] (mins): 0
Climb Out [Intermediate] (mins): 0.8
Approach [Approach] (mins): 3.5
Taxi/Idle In [Idle] (mins): 11.3

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 12
Approach (mins): 27
Intermediate (mins): 9
Military (mins): 12
AfterBurn (mins): 0

3.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

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- Aircraft Emissions for LTOs per Year

$AE_{LTO} = AEM_{IDLE\_IN} + AEM_{IDLE\_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{LTO}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{TGO}: Aircraft Emissions (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$

AE_{TRIM}: Aircraft Emissions (TONs)
$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

3.4 Auxiliary Power Unit (APU)

3.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: Yes

- Auxiliary Power Unit (APU) (default)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
1	1	No	T-62T-40-8	

3.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e
T-62T-40-8	272.6	0.493	0.289	1.216	3.759	0.131	0.037	910.8

3.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year

$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
APU: Number of Auxiliary Power Units
OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

3.5 Aircraft Engine Test Cell

3.5.1 Aircraft Engine Test Cell Assumptions

- Engine Test Cell
Total Number of Aircraft Engines Tested Annually: 24

- Default Settings Used: Yes

- Annual Run-ups / Test Durations
Annual Run-ups (Per Aircraft Engine): 1 (default)
Idle Duration (mins): 12 (default)
Approach Duration (mins): 27 (default)
Intermediate Duration (mins): 9 (default)
Military Duration (mins): 9 (default)
After Burner Duration (mins): 3 (default)

3.5.2 Aircraft Engine Test Cell Emission Factor(s)

- See Aircraft & Engines Emission Factor(s)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

3.5.3 Aircraft Engine Test Cell Formula(s)

- Aircraft Engine Test Cell Emissions per Pollutant & Power Setting (TONs)
$TestCellPS_{POL}$ = (TD / 60) * (FC / 1000) * EF * NE * ARU / 2000

$TestCellPS_{POL}$: Aircraft Engine Test Cell Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Total Number of Engines (For All Aircraft)
ARU: Annual Run-ups (Per Aircraft Engine)
2000: Conversion Factor pounds to TONs

- Aircraft Engine Test Cell Emissions per Year
TestCell = $TestCellPS_{IDLE}$ + $TestCellPS_{APPROACH}$ + $TestCellPS_{INTERMEDIATE}$ + $TestCellPS_{MILITARY}$ + $TestCellPS_{AFTERBURN}$

TestCell: Aircraft Engine Test Cell Emissions (TONs)
$TestCellPS_{IDLE}$: Aircraft Engine Test Cell Emissions for Idle Power Setting (TONs)
$TestCellPS_{APPROACH}$: Aircraft Engine Test Cell Emissions for Approach Power Setting (TONs)
$TestCellPS_{INTERMEDIATE}$: Aircraft Engine Test Cell Emissions for Intermediate Power Setting (TONs)
$TestCellPS_{MILITARY}$: Aircraft Engine Test Cell Emissions for Military Power Setting (TONs)
$TestCellPS_{AFTERBURN}$: Aircraft Engine Test Cell Emissions for After Burner Power Setting (TONs)

3.6 Aerospace Ground Equipment (AGE)

3.6.1 Aerospace Ground Equipment (AGE) Assumptions

- Default Settings Used: Yes

- AGE Usage
Number of Annual LTO (Landing and Take-off) cycles for AGE: 4740

- Aerospace Ground Equipment (AGE) (default)

Total Number of AGE	Operation Hours for Each LTO	Exempt Source?	AGE Type	Designation
1	0.33	No	Air Compressor	MC-1A - 18.4hp
1	1	No	Bomb Lift	MJ-1B
1	0.33	No	Generator Set	A/M32A-86D
1	0.5	No	Heater	H1
1	0.5	No	Hydraulic Test Stand	MJ-2/TTU-228 - 130hp
1	8	No	Light Cart	NF-2
1	0.33	No	Start Cart	A/M32A-60A

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3.6.2 Aerospace Ground Equipment (AGE) Emission Factor(s)

- Aerospace Ground Equipment (AGE) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e
MC-1A - 18.4hp	1.1	0.267	0.008	0.419	0.267	0.071	0.068	24.8
MJ-1B	0.0	3.040	0.219	4.780	3.040	0.800	0.776	141.2
A/M32A-86D	6.5	0.294	0.046	6.102	0.457	0.091	0.089	147.0
H1	0.4	0.100	0.011	0.160	0.180	0.006	0.006	8.9
MJ-2/TTU-228 - 130hp	7.4	0.195	0.053	3.396	0.794	0.089	0.086	168.8
NF-2	0.0	0.010	0.043	0.110	0.080	0.010	0.010	22.1
A/M32A-60A	0.0	0.270	0.306	1.820	5.480	0.211	0.205	221.1

3.6.3 Aerospace Ground Equipment (AGE) Formula(s)

- Aerospace Ground Equipment (AGE) Emissions per Year

$AGE_{POL} = AGE * OH * LTO * EF_{POL} / 2000$

AGE_{POL}: Aerospace Ground Equipment (AGE) Emissions per Pollutant (TONs)
AGE: Total Number of Aerospace Ground Equipment
OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

4. Aircraft

4.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Miami-Dade
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: Beddown 24 F-35As - Weighted Average LTO

- Activity Description:
Beddown 24 F-35As and associated operations

- Activity Start Date
Start Month: 1
Start Year: 2024

- Activity End Date
Indefinite: Yes
End Month: N/A
End Year: N/A

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- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	8.341209
SO_x	7.439267
NO_x	75.483855
CO	74.905514
PM 10	11.688638

Pollutant	Emissions Per Year (TONs)
PM 2.5	10.675742
Pb	0.000000
NH_3	0.000000
CO_2e	18851.4

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.138477
SO_x	5.652088
NO_x	49.929286
CO	60.102129
PM 10	9.086058

Pollutant	Emissions Per Year (TONs)
PM 2.5	8.162865
Pb	0.000000
NH_3	0.000000
CO_2e	17196.9

- Activity Emissions [Test Cell part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000846
SO_x	0.134980
NO_x	1.953343
CO	0.411673
PM 10	0.169634

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.152690
Pb	0.000000
NH_3	0.000000
CO_2e	411.8

- Activity Emissions [Aerospace Ground Equipment (AGE) part]:

Pollutant	Emissions Per Year (TONs)
VOC	8.201885
SO_x	1.652199
NO_x	23.601227
CO	14.391712
PM 10	2.432946

Pollutant	Emissions Per Year (TONs)
PM 2.5	2.360187
Pb	0.000000
NH_3	0.000000
CO_2e	1242.6

4.2 Aircraft & Engines

4.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: F-35A
Engine Model: F135-PW-100
Primary Function: Combat
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

4.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

4.3 Flight Operations

4.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	24
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft:	4632
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft:	0
Number of Annual Trim Test(s) per Aircraft:	12

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins):	18.5
Takeoff [Military] (mins):	0.77
Takeoff [After Burn] (mins):	0.02
Climb Out [Intermediate] (mins):	0.32
Approach [Approach] (mins):	2.17
Taxi/Idle In [Idle] (mins):	11.3

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

4.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$AE_{LTO} = AEM_{IDLE\_IN} + AEM_{IDLE\_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{LTO}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Aircraft Emissions per Mode for TGOs per Year
AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year
$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{TGO}: Aircraft Emissions (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year
$AEPS_{POL}$ = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year
$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$

AE_{TRIM}: Aircraft Emissions (TONs)
$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

4.4 Auxiliary Power Unit (APU)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

4.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: Yes

- Auxiliary Power Unit (APU) (default)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer

4.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e

4.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year

$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
APU: Number of Auxiliary Power Units
OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

4.5 Aircraft Engine Test Cell

4.5.1 Aircraft Engine Test Cell Assumptions

- Engine Test Cell
Total Number of Aircraft Engines Tested Annually: 24

- Default Settings Used: Yes

- Annual Run-ups / Test Durations
Annual Run-ups (Per Aircraft Engine): 1 (default)
Idle Duration (mins): 12 (default)
Approach Duration (mins): 27 (default)
Intermediate Duration (mins): 9 (default)
Military Duration (mins): 9 (default)
After Burner Duration (mins): 3 (default)

4.5.2 Aircraft Engine Test Cell Emission Factor(s)

- See Aircraft & Engines Emission Factor(s)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

4.5.3 Aircraft Engine Test Cell Formula(s)

- Aircraft Engine Test Cell Emissions per Pollutant & Power Setting (TONs)
$TestCellPS_{POL}$ = (TD / 60) * (FC / 1000) * EF * NE * ARU / 2000

$TestCellPS_{POL}$: Aircraft Engine Test Cell Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Total Number of Engines (For All Aircraft)
ARU: Annual Run-ups (Per Aircraft Engine)
2000: Conversion Factor pounds to TONs

- Aircraft Engine Test Cell Emissions per Year
TestCell = $TestCellPS_{IDLE}$ + $TestCellPS_{APPROACH}$ + $TestCellPS_{INTERMEDIATE}$ + $TestCellPS_{MILITARY}$ + $TestCellPS_{AFTERBURN}$

TestCell: Aircraft Engine Test Cell Emissions (TONs)
$TestCellPS_{IDLE}$: Aircraft Engine Test Cell Emissions for Idle Power Setting (TONs)
$TestCellPS_{APPROACH}$: Aircraft Engine Test Cell Emissions for Approach Power Setting (TONs)
$TestCellPS_{INTERMEDIATE}$: Aircraft Engine Test Cell Emissions for Intermediate Power Setting (TONs)
$TestCellPS_{MILITARY}$: Aircraft Engine Test Cell Emissions for Military Power Setting (TONs)
$TestCellPS_{AFTERBURN}$: Aircraft Engine Test Cell Emissions for After Burner Power Setting (TONs)

4.6 Aerospace Ground Equipment (AGE)

4.6.1 Aerospace Ground Equipment (AGE) Assumptions

- Default Settings Used: Yes

- AGE Usage
Number of Annual LTO (Landing and Take-off) cycles for AGE: 4632

- Aerospace Ground Equipment (AGE) (default)

Total Number of AGE	Operation Hours for Each LTO	Exempt Source?	AGE Type	Designation
1	0.33	No	Air Compressor	MC-1A - 18.4hp
1	1	No	Bomb Lift	MJ-1B
1	0.33	No	Generator Set	A/M32A-86D
1	0.5	No	Heater	H1
1	0.5	No	Hydraulic Test Stand	MJ-2/TTU-228 - 130hp
1	8	No	Light Cart	NF-2
1	0.33	No	Start Cart	A/M32A-60A

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

4.6.2 Aerospace Ground Equipment (AGE) Emission Factor(s)

- Aerospace Ground Equipment (AGE) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e
MC-1A - 18.4hp	1.1	0.267	0.008	0.419	0.267	0.071	0.068	24.8
MJ-1B	0.0	3.040	0.219	4.780	3.040	0.800	0.776	141.2
A/M32A-86D	6.5	0.294	0.046	6.102	0.457	0.091	0.089	147.0
H1	0.4	0.100	0.011	0.160	0.180	0.006	0.006	8.9
MJ-2/TTU-228 - 130hp	7.4	0.195	0.053	3.396	0.794	0.089	0.086	168.8
NF-2	0.0	0.010	0.043	0.110	0.080	0.010	0.010	22.1
A/M32A-60A	0.0	0.270	0.306	1.820	5.480	0.211	0.205	221.1

4.6.3 Aerospace Ground Equipment (AGE) Formula(s)

- Aerospace Ground Equipment (AGE) Emissions per Year
$AGE_{POL} = AGE * OH * LTO * EF_{POL} / 2000$

AGE_{POL}: Aerospace Ground Equipment (AGE) Emissions per Pollutant (TONs)
AGE: Total Number of Aerospace Ground Equipment
OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

5. Aircraft

5.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Miami-Dade
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: Beddown 24 F-35As - Weighted Average TGO

- Activity Description:

- Activity Start Date
Start Month: 1
Start Year: 2024

- Activity End Date
Indefinite: Yes
End Month: N/A
End Year: N/A

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	0.001265
SO_x	0.223025
NO_x	3.228188
CO	0.312260
PM 10	0.288015

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.259120
Pb	0.000000
NH_3	0.000000
CO_2e	680.4

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.001265
SO_x	0.223025
NO_x	3.228188
CO	0.312260
PM 10	0.288015

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.259120
Pb	0.000000
NH_3	0.000000
CO_2e	680.4

5.2 Aircraft & Engines

5.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine
Aircraft Designation: F-35A
Engine Model: F135-PW-100
Primary Function: Combat
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate
Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

5.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)
Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

5.3 Flight Operations

5.3.1 Flight Operations Assumptions

- Flight Operations
Number of Aircraft: 24
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 1158
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	0.5
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	0.13
Approach [Approach] (mins):	1.41
Taxi/Idle In [Idle] (mins):	0.34

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

5.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$AE_{LTO} = AEM_{IDLE\_IN} + AEM_{IDLE\_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{LTO}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Aircraft Emissions for TGOs per Year
$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{TGO}: Aircraft Emissions (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year
$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year
$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$

AE_{TRIM}: Aircraft Emissions (TONs)
$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

5.4 Auxiliary Power Unit (APU)

5.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: Yes

- Auxiliary Power Unit (APU) (default)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer

5.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

5.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year
$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
APU: Number of Auxiliary Power Units
OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

6. Personnel

6.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location
County: Miami-Dade
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: Removal of 91 Personnel

- Activity Description:

- Activity Start Date
Start Month: 1
Start Year: 2024

- Activity End Date
Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-0.163161
SO_x	-0.001096
NO_x	-0.131630
CO	-1.870038
PM 10	-0.002915

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.002482
Pb	0.000000
NH_3	-0.010067
CO_2e	-167.8

6.2 Personnel Assumptions

- Number of Personnel
Active Duty Personnel: 0
Civilian Personnel: 0
Support Contractor Personnel: 0
Air National Guard (ANG) Personnel: 91
Reserve Personnel: 0

- Default Settings Used: Yes

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Average Personnel Round Trip Commute (mile): 20 (default)

- Personnel Work Schedule
Active Duty Personnel: 5 Days Per Week (default)
Civilian Personnel: 5 Days Per Week (default)
Support Contractor Personnel: 5 Days Per Week (default)
Air National Guard (ANG) Personnel: 4 Days Per Week (default)
Reserve Personnel: 4 Days Per Month (default)

6.3 Personnel On Road Vehicle Mixture

- On Road Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	37.55	60.32	0	0.03	0.2	0	1.9
GOVs	54.49	37.73	4.67	0	0	3.11	0

6.4 Personnel Emission Factor(s)

- On Road Vehicle Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.282	000.002	000.207	003.392	000.006	000.005		000.023	00341.791
LDGT	000.376	000.003	000.373	004.889	000.007	000.006		000.024	00439.705
HDGV	000.832	000.005	000.964	016.217	000.016	000.014		000.046	00814.851
LDDV	000.084	000.003	000.127	002.822	000.004	000.004		000.008	00334.379
LDDT	000.227	000.004	000.365	004.850	000.007	000.006		000.008	00473.628
HDDV	000.423	000.014	004.175	001.653	000.176	000.162		000.028	01559.331
MC	003.040	000.003	000.626	013.017	000.026	000.023		000.052	00392.775

6.5 Personnel Formula(s)

- Personnel Vehicle Miles Travel for Work Days per Year
$VMT_P = NP * WD * AC$

VMT_P: Personnel Vehicle Miles Travel (miles/year)
NP: Number of Personnel
WD: Work Days per Year
AC: Average Commute (miles)

- Total Vehicle Miles Travel per Year
$VMT_{Total} = VMT_{AD} + VMT_C + VMT_{SC} + VMT_{ANG} + VMT_{AFRC}$

VMT_{Total}: Total Vehicle Miles Travel (miles)
VMT_{AD}: Active Duty Personnel Vehicle Miles Travel (miles)
VMT_C: Civilian Personnel Vehicle Miles Travel (miles)
VMT_{SC}: Support Contractor Personnel Vehicle Miles Travel (miles)
VMT_{ANG}: Air National Guard Personnel Vehicle Miles Travel (miles)
VMT_{AFRC}: Reserve Personnel Vehicle Miles Travel (miles)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Vehicle Emissions per Year

$V_{POL} = (VMT_{Total} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{Total}: Total Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Personnel On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

AIR CONFORMITY APPLICABILITY MODEL REPORT
RECORD OF AIR ANALYSIS (ROAA)

1. General Information: The Air Force's Air Conformity Applicability Model (ACAM) was used to perform an analysis to assess the potential air quality impact/s associated with the action in accordance with the Air Force Instruction 32-7040, Air Quality Compliance And Resource Management; the Environmental Impact Analysis Process (EIAP, 32 CFR 989); and the General Conformity Rule (GCR, 40 CFR 93 Subpart B). This report provides a summary of the ACAM analysis.

a. Action Location:
Base: HOMESTEAD ARB
State: Florida
County(s): Miami-Dade
Regulatory Area(s): NOT IN A REGULATORY AREA

b. Action Title: AFRC F-35A EIS

c. Project Number/s (if applicable):

d. Projected Action Start Date: 1 / 2024

e. Action Description:

At Homestead ARB, remove 24 F-16Cs and add 24 F-35As. This analysis is only for net changes in airspace operations.

f. Point of Contact:
Name: Chris Crabtree, Leidos, Inc., and Austin N. Naranjo, Solutio
Title:
Organization:
Email:
Phone Number:

2. Air Impact Analysis: Based on the attainment status at the action location, the requirements of the General Conformity Rule are:

_____ applicable
__X__ not applicable

Total combined direct and indirect emissions associated with the action were estimated through ACAM on a calendar-year basis for the "worst-case" and "steady state" (net gain/loss upon action fully implemented) emissions.

"Air Quality Indicators" were used to provide an indication of the significance of potential impacts to air quality. These air quality indicators are EPA General Conformity Rule (GCR) thresholds (de minimis levels) that are applied out of context to their intended use. Therefore, these indicators do not trigger a regulatory requirement; however, they provide a warning that the action is potentially significant. It is important to note that these indicators only provide a clue to the potential impacts to air quality.

Given the GCR de minimis threshold values are the maximum net change an action can acceptably emit in non-attainment and maintenance areas, these threshold values would also conservatively indicate an actions emissions within an attainment would also be acceptable. An air quality indicator value of 100 tons/yr is used based on the GCR de minimis threshold for the least severe non-attainment classification for all criteria pollutants (see 40 CFR 93.153). Therefore, the worst-case year emissions were compared against the GCR Indicator and are summarized below.

AIR CONFORMITY APPLICABILITY MODEL REPORT
RECORD OF AIR ANALYSIS (ROAA)

Analysis Summary:

2024

Pollutant	Action Emissions (ton/yr)	AIR QUALITY INDICATOR	
		Threshold (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	-1.476	100	No
NOx	-12.284	100	No
CO	-0.495	100	No
SOx	-0.304	100	No
PM 10	-0.464	100	No
PM 2.5	-0.422	100	No
Pb	0.000	25	No
NH3	0.000	100	No
CO2e	-919.0		

2025 - (Steady State)

Pollutant	Action Emissions (ton/yr)	AIR QUALITY INDICATOR	
		Threshold (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	-1.476	100	No
NOx	-12.284	100	No
CO	-0.495	100	No
SOx	-0.304	100	No
PM 10	-0.464	100	No
PM 2.5	-0.422	100	No
Pb	0.000	25	No
NH3	0.000	100	No
CO2e	-919.0		

None of estimated emissions associated with this action are above the GCR indicators, indicating no significant impact to air quality; therefore, no further air assessment is needed.

//Chris Crabtree, Austin Naranjo// 7/23/20

Chris Crabtree, Leidos, Inc., and Austin N. Naranjo, Solutio DATE

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

1. General Information

- Action Location
Base: HOMESTEAD ARB
State: Florida
County(s): Miami-Dade
Regulatory Area(s): NOT IN A REGULATORY AREA

- Action Title: AFRC F-35A EIS

- Project Number/s (if applicable):

- Projected Action Start Date: 1 / 2024

- Action Purpose and Need:
...

- Action Description:
At Homestead ARB, remove 24 F-16Cs and add 24 F-35As. This analysis is only for net changes in airspace operations.

- Point of Contact
Name: Chris Crabtree, Leidos, Inc., and Austin N. Naranjo, Solutio
Title:
Organization:
Email:
Phone Number:

- Activity List:

Activity Type		Activity Title
2.	Aircraft	Airspace operations - F-35As
3.	Aircraft	Airspace operations - F-16Cs

Emission factors and air emission estimating methods come from the United States Air Force's Air Emissions Guide for Air Force Stationary Sources, Air Emissions Guide for Air Force Mobile Sources, and Air Emissions Guide for Air Force Transitory Sources.

2. Aircraft

2.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Miami-Dade
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: Airspace operations - F-35As

- Activity Description:
Add annual airspace operations for 24 F-35As

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Activity Start Date
Start Month: 1
Start Year: 2024

- Activity End Date
Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO_x	0.578310
NO_x	11.890494
CO	0.216191
PM 10	0.632358

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.567501
Pb	0.000000
NH_3	0.000000
CO_2e	1747.9

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO_x	0.578310
NO_x	11.890494
CO	0.216191
PM 10	0.632358

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.567501
Pb	0.000000
NH_3	0.000000
CO_2e	1747.9

2.2 Aircraft & Engines

2.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine
Aircraft Designation: F-35A
Engine Model: F135-PW-100
Primary Function: Combat
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate
Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

2.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)
Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

2.3 Flight Operations

2.3.1 Flight Operations Assumptions

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Flight Operations

Number of Aircraft:	24
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft:	1
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft:	0
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	3413
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	0
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

2.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$AE_{LTO} = AEM_{IDLE\_IN} + AEM_{IDLE\_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{LTO}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Aircraft Emissions per Mode for TGOs per Year
AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year
$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{TGO}: Aircraft Emissions (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year
$AEPS_{POL}$ = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year
$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$

AE_{TRIM}: Aircraft Emissions (TONs)
$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

2.4 Auxiliary Power Unit (APU)

2.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: Yes

- Auxiliary Power Unit (APU) (default)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

2.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e

2.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year

$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
APU: Number of Auxiliary Power Units
OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

3. Aircraft

3.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location
County: Miami-Dade
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: Airspace operations - F-16Cs

- Activity Description:
Remove annual airspace operations for 24 F-16Cs

- Activity Start Date
Start Month: 1
Start Year: 2024

- Activity End Date
Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-1.476083
SO_x	-0.882348
NO_x	-24.174640
CO	-0.710941
PM 10	-1.096636

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.989406
Pb	0.000000
NH_3	0.000000
CO_2e	-2666.9

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-1.476083
SO_x	-0.882348
NO_x	-24.174640
CO	-0.710941
PM 10	-1.096636

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.989406
Pb	0.000000
NH_3	0.000000
CO_2e	-2666.9

3.2 Aircraft & Engines

3.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: F-16C
Engine Model: F100-PW-220
Primary Function: Combat
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

3.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e
Idle	1084.00	7.94	1.07	4.61	35.30	2.06	1.85	3234
Approach	3837.00	5.12	1.07	12.53	1.92	2.63	2.37	3234
Intermediate	5770.00	2.89	1.07	22.18	0.86	2.06	1.85	3234
Military	9679.00	1.79	1.07	29.32	0.86	1.33	1.20	3234
After Burn	41682.00	1.53	1.07	8.37	11.99	1.15	1.04	3234

3.3 Flight Operations

3.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 24
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 1
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
Takeoff [Military] (mins): 10222
Takeoff [After Burn] (mins): 0
Climb Out [Intermediate] (mins): 0
Approach [Approach] (mins): 0
Taxi/Idle In [Idle] (mins): 0

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

3.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$AE_{LTO} = AEM_{IDLE\_IN} + AEM_{IDLE\_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{LTO}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{TGO}: Aircraft Emissions (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Aircraft Emissions per Mode for Trim per Year
$AEPS_{POL}$ = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year
$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$

AE_{TRIM}: Aircraft Emissions (TONs)
$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

3.4 Auxiliary Power Unit (APU)

3.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: Yes

- Auxiliary Power Unit (APU) (default)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
1	1	No	T-62T-40-8	

3.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e
T-62T-40-8	272.6	0.493	0.289	1.216	3.759	0.131	0.037	910.8

3.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year
APU_{POL} = APU * OH * LTO * EF_{POL} / 2000

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
APU: Number of Auxiliary Power Units
OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

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Homestead ARB

F-35A Operations

Sorties	4632	**Total**

Patterns	0.25	**per Sortie**
	1158	**Total**

AFRC Operations Type Distribution

Operation	Stated Type	Frequency (% of Time)	Count	Assumed Type
Arrivals	Overhead Break Arrival	15%	694.8	Overhead Break Arrival (F35AO02)
	Straight in Arrival IFR	20%	926.4	Straight in Arrival IFR (F35AO02)
	Straight in Arrival VFR	5%	231.6	Straight in Arrival VFR (F35AA02)
	Overhead Break Arrival - Wingman	50%	2316	Overhead Break Arrival - Wingman (F35O08)
	SFO Break Arrival	10%	463.2	SFO Break Arrival (F35AS01)
		good		
Departures	Military	95%	4400.4	Military Departure (F35AD02)
	Afterburner	5%	231.6	Afterburner Departure (F35AD08)
Patterns	VFR (Visual) Pattern	88%	1019.04	VFR (Visual) Pattern (F35AC01)
	VFR Outside Downwind Pattern		0	
	PFO Pattern	10%	115.8	PFO Pattern (F35AC03)
	Re-entry Pattern		0	
	ILS Pattern	1%	11.58	ILS Pattern (F35AC05)
	TACAN Pattern	1%	11.58	TACAN Pattern (F35AC05)
		good		

Homestead ARB

Representative Weighted Average T&G Cycle TIMS By Power Setting Method

Times Based on Power Setting Method Only (seconds)

Mode	% Thrust Range		T & G's VFR (Visual) Pattern (F35AC01)	T & G's PFO Pattern (F35AC03)	T & G's ILS Pattern (F35AC05)
	>	<			
Takeoff Afterburner	105	150	0.00	0.00	0.00
Takeoff Military	92.5	105	31.13	27.44	4.72
Climb Out	50	92.5	6.85	7.14	46.20
Approach	18.5	50	84.94	0.00	498.44
Taxi/Idle Out/In	0	18.5	18.00	31.65	63.32
Frequency (% of Time) =			88%	10%	2%

Weighted Times Based on Noise Profiles Power Setting Times Weighted by Frequency (seconds)

Mode	% Thrust Range		T & G's VFR (Visual) Pattern (F35AC01)	T & G's PFO Pattern (F35AC03)	T & G's ILS Pattern (F35AC05)	Noise LTO Cycle Contributions
	>	<				
Takeoff Afterburner	105	150	0.00	0.00	0.00	0.00
Takeoff Military	92.5	105	27.40	2.74	0.09	30.23
Climb Out	50	92.5	6.03	0.71	0.92	7.67
Approach	18.5	50	74.75	0.00	9.97	84.71
Taxi/Idle Out/In	0	18.5	15.84	3.16	1.27	20.27

Mode	% Thrust Range		Noise T&G Contributions (min)	Representative T&G Cycle (min)
	>	<		
Takeoff Afterburner	105	150	0.00	**0.00**
Takeoff Military	92.5	105	0.50	**0.50**
Climb Out	50	92.5	0.13	**0.13**
Approach	18.5	50	1.41	**1.41**
Taxi/Idle Out/In	0	18.5	0.34	**0.34**
Representative Weighted Average T&G Time (min) =				**2.38**

Homestead ARB

Representative Weighted Average TO Cycle TIMs By Power Setting & Altitude Method

Times Based on Power Setting & Altitude Method (seconds)

Mode	% Thrust Range		Arrivals				Departures	
			Overhead Break Arrival (F35AO02)	Straight in Arrival VFR (F35AA02)	Overhead Break Arrival - Wingman (F35O08)	SFO Break Arrival (F35AS01)	Military Departure (F35AD02)	Afterburner Departure (F35AD08)
	>	<						
Takeoff Afterburner	105	150	0.00	0.00	0.00	0.00	0.00	20.29
Takeoff Military	92.5	105	0.00	0.00	0.00	0.00	47.67	24.18
Climb Out	50	92.5	5.66	0.00	5.66	0.00	14.58	13.62
Approach	18.5	50	105.57	230.25	160.18	16.01	0.00	0.00
Taxi/Idle Out/In	0	18.5	27.60	0.00	26.93	16.01	0.00	0.00
Frequency (% of Time) =			35%	5%	50%	10%	95%	5%

Weighted Times Based on Noise Profiles Average Times Weighted by Frequency (seconds)

Mode	% Thrust Range		Arrivals				Departures		Noise LTO
			Overhead Break Arrival (F35AO02)	Straight in Arrival VFR (F35AA02)	Overhead Break Arrival - Wingman (F35O08)	SFO Break Arrival (F35AS01)	Military Departure (F35AD02)	Afterburner Departure (F35AD08)	Cycle Contributions
	>	<							
Takeoff Afterburner	105	150	0.00	0.00	0.00	0.00	0.00	1.01	1.01
Takeoff Military	92.5	105	0.00	0.00	0.00	0.00	45.29	1.21	46.50
Climb Out	50	92.5	1.98	0.00	2.83	0.00	13.85	0.68	19.34
Approach	18.5	50	36.95	11.51	80.09	1.60	0.00	0.00	130.15
Taxi/Idle Out/In	0	18.5	9.66	0.00	13.47	1.60	0.00	0.00	24.73

USAF Representative Value (default) for Taxi Out/In = 29.8 minutes

Mode	% Thrust Range		Noise LTO Cycle Contributions (min)	LTO Missing Data (min, use defaults)	Representative LTO Cycle (min)
	>	<			
Takeoff Afterburner	105	150	0.02		**0.02**
Takeoff Military	92.5	105	0.77		**0.77**
Climb Out	50	92.5	0.32		**0.32**
Approach	18.5	50	2.17		**2.17**
Taxi/Idle Out/In	0	18.5	0.41	29.8	**30.21**

Representative Weighted Average LTO Time (min) = 33.50

Homestead ARB

LTO Cycle TIMs By Power Setting Method

Times Based on Noise Profiles Power Settings (seconds)

Mode	% Thrust Range		Arrivals				Departures	
			Overhead Break Arrival (F35AO02)	Straight in Arrival VFR (F35AA02)	Overhead Break Arrival - Wingman (F35O08)	SFO Break Arrival (F35AS01)	Military Departure (F35AD02)	Afterburner Departure (F35AD08)
	>	<						
Takeoff Afterburner	105	150	0.00	0.00	0.00	0.00	0.00	9.73
Takeoff Military	92.5	105	0.00	0.00	0.00	0.00	62.25	48.36
Climb Out	50	92.5	11.31	0.00	11.31	0.00	0.00	0.00
Approach	18.5	50	72.31	230.25	127.60	0.00	0.00	0.00
Taxi/Idle Out/In	0	18.5	55.20	0.00	53.87	32.02	0.00	0.00
Frequency (% of Time) =			35%	5%	50%	10%	95%	5%

Weighted Times Based on Noise Profiles Weighted by Frequency (seconds)

Mode	% Thrust Range		Arrivals				Departures		Noise LTO
			Overhead Break Arrival (F35AO02)	Straight in Arrival VFR (F35AA02)	Overhead Break Arrival - Wingman (F35O08)	SFO Break Arrival (F35AS01)	Military Departure (F35AD02)	Afterburner Departure (F35AD08)	Cycle Contributions
	>	<							
Takeoff Afterburner	105	150	0.00	0.00	0.00	0.00	0.00	0.49	0.49
Takeoff Military	92.5	105	0.00	0.00	0.00	0.00	59.14	2.42	61.56
Climb Out	50	92.5	3.96	0.00	5.66	0.00	0.00	0.00	9.61
Approach	18.5	50	25.31	11.51	63.80	0.00	0.00	0.00	100.62
Taxi/Idle Out/In	0	18.5	19.32	0.00	26.93	3.20	0.00	0.00	49.45

USAF Representative Value (default) for Taxi Out/In = **29.8** minutes

Mode	% Thrust Range		Noise LTO Cycle Contributions (min)	LTO Missing Data (min, use defaults)	Derived LTO Cycle (min)
	>	<			
Takeoff Afterburner	105	150	0.01		**0.01**
Takeoff Military	92.5	105	1.03		**1.03**
Climb Out	50	92.5	0.16		**0.16**
Approach	18.5	50	1.68		**1.68**
Taxi/Idle Out/In	0	18.5	0.82	29.8	**30.62**

Representative Weighted Average LTO Time (min) = 33.50

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LTO Cycle TIMs By Altitude Method

Times Based on Noise Profiles Altitude Values (seconds)

Mode	Arrivals				Departures	
	Overhead Break Arrival (F35AO02)	Straight in Arrival IFR (F35AO02)	Overhead Break Arrival - Wingman (F35O08)	SFO Break Arrival (F35AS01)	Military Departure (F35AD02)	Afterburner Departure (F35AD08)
Takeoff Afterburner	0.00	0.00	0.00	0.00	0.00	30.85
Takeoff Military	0.00	0.00	0.00	0.00	33.10	0.00
Climb Out Military	0.00	0.00	0.00	0.00	29.15	27.23
Approach	138.82	230.25	192.77	32.02	0.00	0.00
Taxi/Idle Out/In	0.00	0.00	0.00	0.00	0.00	0.00
requency (% of Time) =	**35%**	**5%**	**50%**	**10%**	**95%**	**5%**

Weighted Times Based on Noise Profiles Weighted by Frequency (seconds)

Mode	Arrivals				Departures		Noise LTO
	Overhead Break Arrival (F35AO02)	Straight in Arrival IFR (F35AO02)	Overhead Break Arrival - Wingman (F35O08)	SFO Break Arrival (F35AS01)	Military Departure (F35AD02)	Afterburner Departure (F35AD08)	Cycle Contributions
Takeoff Afterburner	0.00	0.00	0.00	0.00	0.00	1.54	1.54
Takeoff Military	0.00	0.00	0.00	0.00	31.44	0.00	31.44
Climb Out Military	0.00	0.00	0.00	0.00	27.70	1.36	29.06
Approach	48.59	11.51	96.39	3.20	0.00	0.00	159.69
Taxi/Idle Out/In	0.00	0.00	0.00	0.00	0.00	0.00	0.00

USAF Representative Value (default) for Taxi Out/In = **29.8** minutes

Mode	Noise LTO Cycle Contributions (min)	LTO Missing Data (min, use defaults)	Derived LTO Cycle (min)
Takeoff Afterburner	0.03		**0.03**
Takeoff Military	0.52		**1.01**
Climb Out Military	0.48		
Approach	2.66		**2.66**
Taxi/Idle Out/In	0.00	29.8	**29.80**

Representative Weighted Average LTO Time (min) = **33.50**

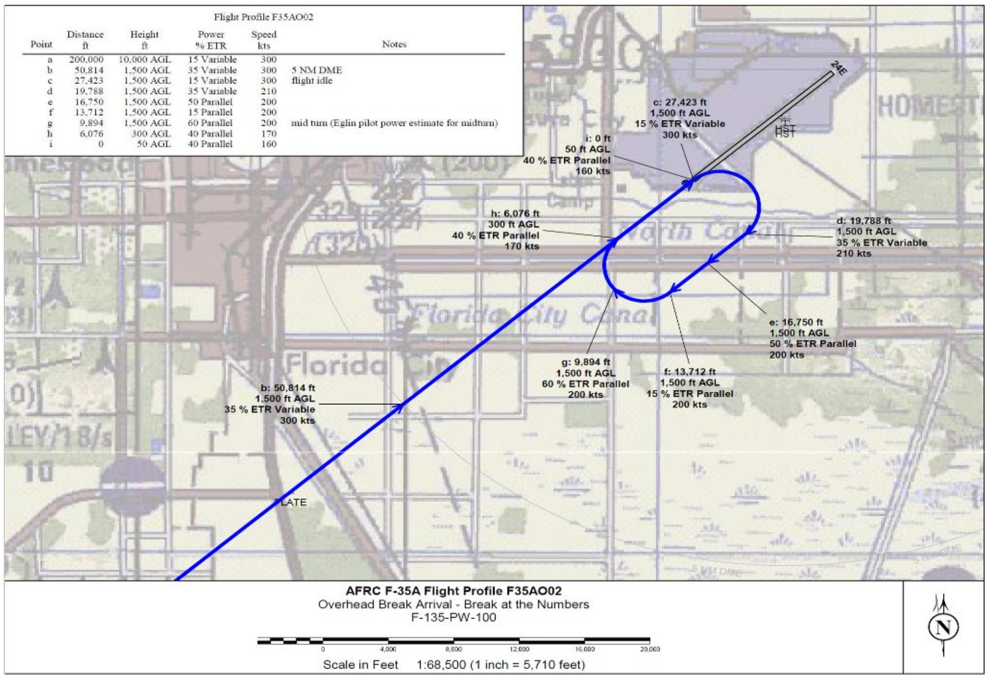
Homestead ARB

Flight Profile F35AO0

Point	Distance (ft)	Height (ft)	Power (%ETR)	Speed (kts)	Notes
a	20,000	10000	15	300	
	45,376	3000	31	300	
b	50,814	1500	35	300	5 NM DME
c	27,423	1500	15	300	flight idle
d	19,788	1500	35	210	
e	16,750	1500	50	200	
f	13,712	1500	15	200	
g	9,894	1500	60	200	mid turn (Eglin pilot power estimate for midturn)
h	6,076	300	40	170	
i	0	50	40	160	

True Flight Distance (ft)	Air Speed (fps)	Segment Time (sec)		
5641	506	11.14	Approach	139
23391	506	46.20		
7635	430	17.74		
3038	346	8.78		
3038	338	9.00		
3818	338	11.31		
4002	312	12.82		
6081	278	21.84		

138.82



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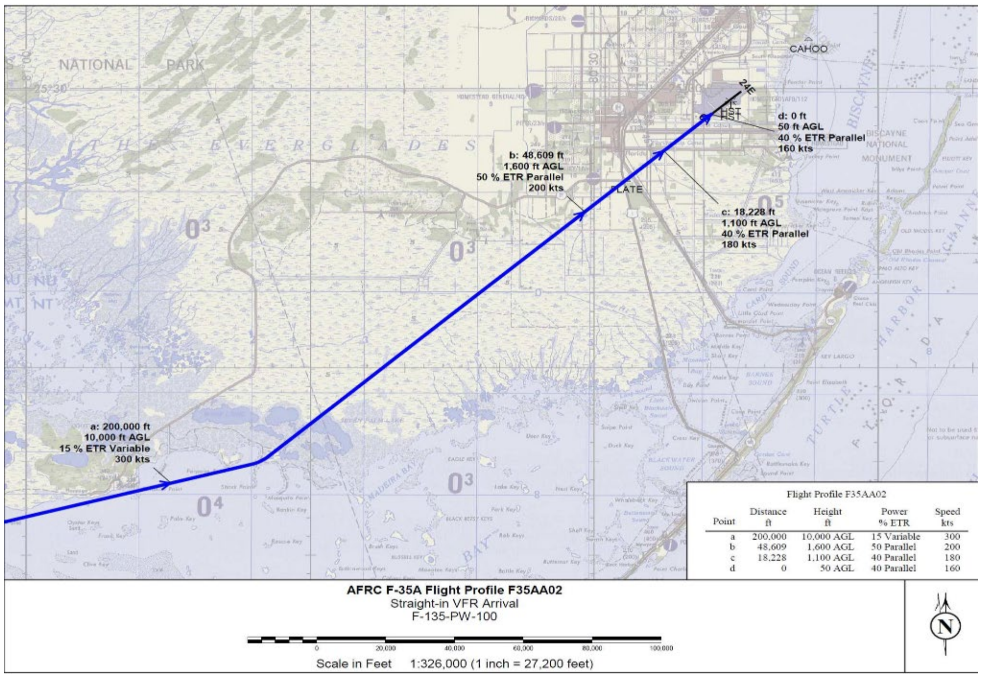
Flight Profile F35AA02

Point	Distance (ft)	Height (ft)	Power (%ETR)	Speed (kts)
a	200,000	10000	15	300
	73,841	3000	44	217
b	48,609	1600	50	200
c	18,228	1100	40	180
d	0	50	40	160

Notes

True Flight Distance (ft)	Air Speed (fps)	Segment Time (sec)		
25271	352	71.87		
30385	321	94.75	Approach	230
18258	287	63.63		

230.25

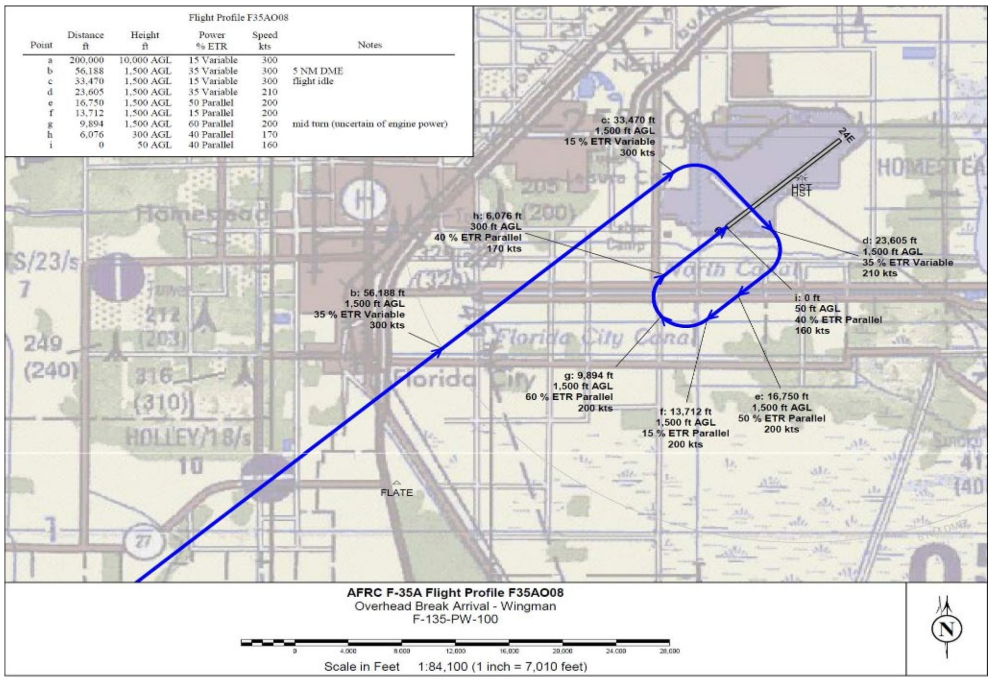


Homestead ARB
Flight Profile F35AO08

Point	Distance (ft)	Height (ft)	Power (%ETR)	Speed (kts)	Notes
a	200,000	10000	15	300	
	81,567	3000	31	300	
b	56,188	1500	35	300	5 NM DME
c	33,470	1500	15	300	flight idle
d	23,605	1500	35	210	
e	16,750	1500	50	200	
f	13,712	1500	15	200	
g	9,894	1500	60	200	mid turn (uncertain of engine power)
h	6,076	300	40	170	
i	0	50	40	160	

True Flight Distance (ft)	Air Speed (fps)	Segment Time (sec)		
25423	506	50.21	Approach	193
22718	506	44.87		
9865	430	22.92		
6855	346	19.81		
3038	338	9.00		
3818	338	11.31		
4002	312	12.82		
6081	278	21.84		

192.77

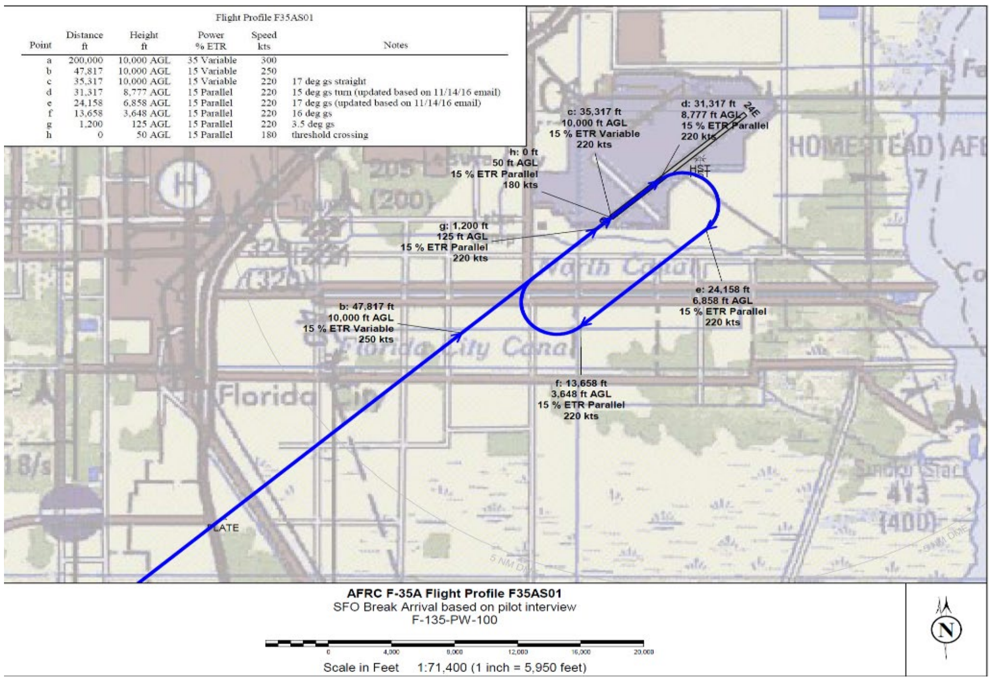


Homestead ARB

Flight Profile F35AS01

Point	Distance (ft)	Height (ft)	Power (%ETR)	Speed (kts)	Notes
a	200,000	10000	35	300	
b	47,817	10000	15	250	
c	35,317	10000	15	220	17 deg gs straight
d	31,317	8777	15	220	15 deg gs turn (updated based on 11/14/16 email)
e	24,158	6858	15	220	17 deg gs (updated based on 11/14/16 email)
f	13,658	3648	15	220	16 deg gs
	11,367	3000	15	220	
g	1,200	125	15	220	3.5 deg gs
h	0	50	15	180	threshold crossing

True Flight Distance (ft)	Air Speed (fps)	Segment Time (sec)		
10565	371	28.45	Approach	32
1202	338	3.56		
		32.02		



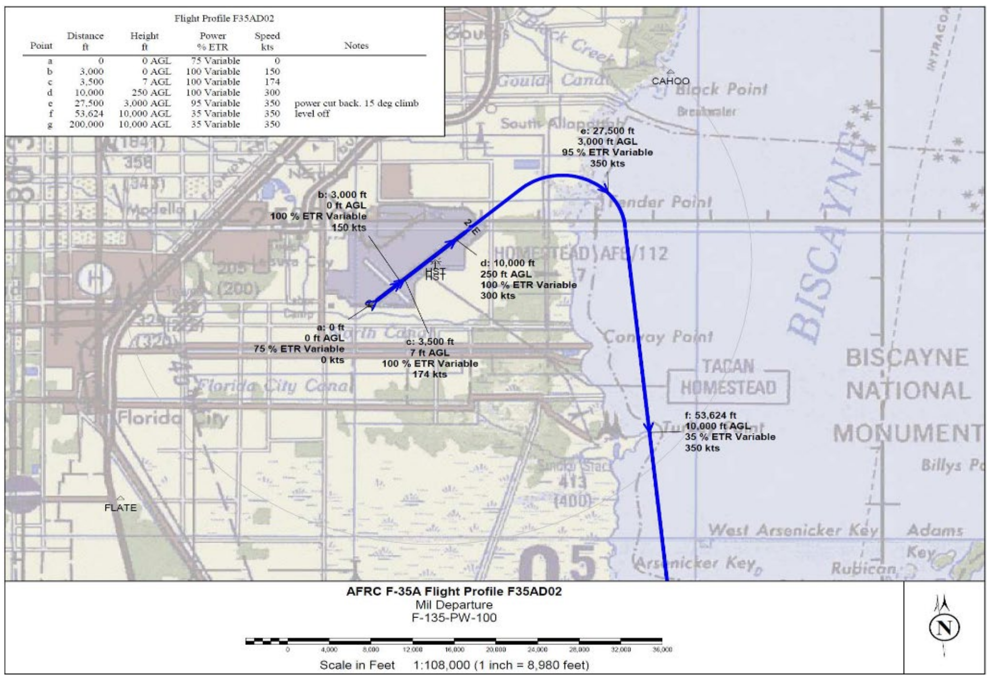
Homestead ARB

Flight Profile F35AD02

Point	Distance (ft)	Height (ft)	Power (%ETR)	Speed (kts)	Notes
a	0	0	75	0	
b	3,000	0	100	150	
c	3,500	7	100	174	
d	10,000	250	100	300	
	11,591	500	100	305	
e	27,500	3000	95	350	power cut back. 15 deg climb
f	53,624	10000	35	350	level off
g	200,000	10000	35	350	

True Flight Distance (ft)	Air Speed (fps)	Segment Time (sec)		
3000	253	11.85	Takeoff	33.10
500	273	1.83		
6505	400	16.26		
1610	510	3.16		
16104	552	29.15	Climb out	29.15

62.25

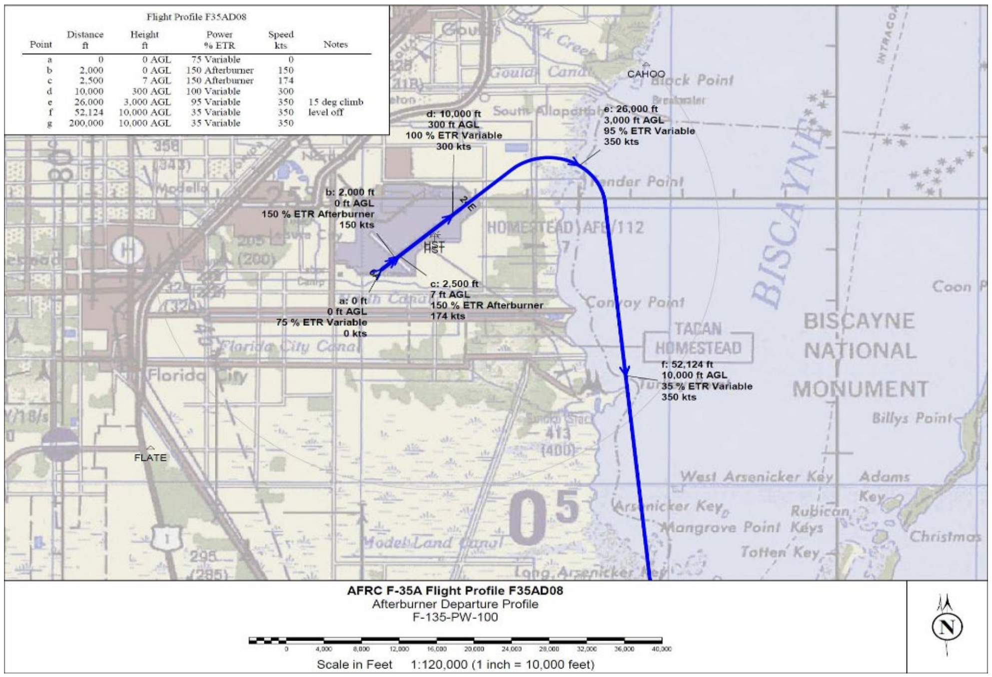


Homestead ARB
Flight Profile F35AD08

Point	Distance (ft)	Height (ft)	Power (%ETR)	Speed (kts)	Notes
a	0	0	75	0	
b	2,000	0	150	150	
c	2,500	7	150	174	
d	10,000	300	100	300	
	11,185	500	100	304	
e	26,000	3000	95	350	power cut back. 15 deg climb
f	52,124	10000	35	350	level off
g	200,000	10000	35	350	

True Flight Distance (ft)	Air Speed (fps)	Segment Time (sec)		
2000	253	7.90	Take off	30.85
500	273	1.83		
7506	400	18.76		
1202	509	2.36		
15024	552	27.23	Climb out	27.23

58.09

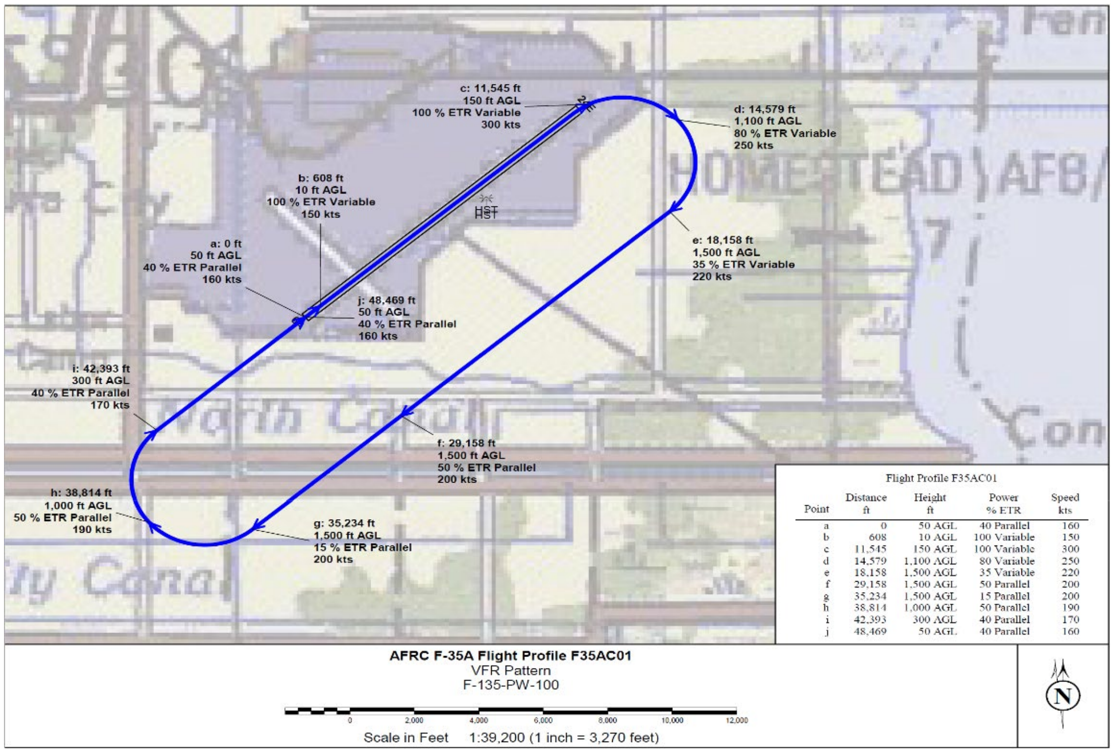


AFRC F-35A Flight Profile F35AD08
Afterburner Departure Profile
F-135-PW-100
Scale in Feet 1:120,000 (1 inch = 10,000 feet)

<u>Homestead ARB</u>
Flight Profile F35AC01

Point	Distance (ft)	Height (ft)	Power (%ETR)	Speed (kts)	Notes
a	0	50	40	160	
b	608	10	100	150	
c	11,545	150	100	300	
d	14,579	1100	80	250	
e	18,158	1500	35	220	
f	29,158	1500	50	200	
g	35,234	1500	15	200	
h	38,814	1000	50	190	
i	42,393	300	40	170	
j	48,469	50	40	160	

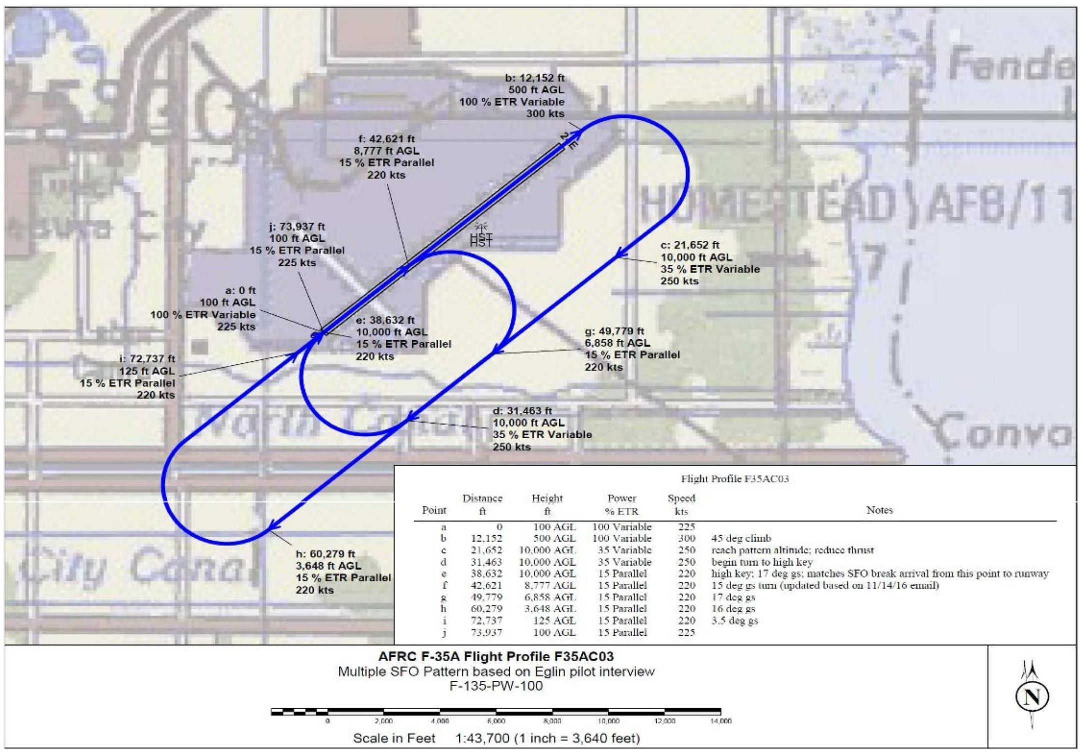
True Flight Distance (ft)	Air Speed (fps)	Segment Time (sec)
609	262	2.33
10938	380	28.80
3179	464	6.85
3601	397	9.08
11000	354	31.04
6076	338	18.00
3615	329	10.98
3647	304	12.00
6081	278	21.84
		140.92



<u>Homestead ARB</u>

Flight Profile F35AC03

Point	Distance (ft)	Height (ft)	Power (%ETR)	Speed (kts)	Notes	True Flight Distance (ft)	Air Speed (fps)	Segment Time (sec)
a	0	100	100	225				
b	12,152	500	100	300	45 deg climb	12159	443	27.44
	14,652	3000	83	287		3536	495	7.14
c	21,652	10000	35	250	reach pattern altitude; reduce thrust			
d	31,463	10000	35	250	begin turn to high key			
e	38,632	10000	15	220	high key; 17 deg gs; matches SFO break arrival from this point to runway			
f	42,621	8777	15	220	15 deg gs turn (updated based on 11/14/16 email)			
g	49,779	6858	15	220	17 deg gs			
h	60,279	3648	15	220	16 deg gs			
	62,570	3000	15	220				
i	72,737	125	15	220	3.5 deg gs	10565	371	28.45
j	73,937	100	15	225		1200	376	3.20
								66.23

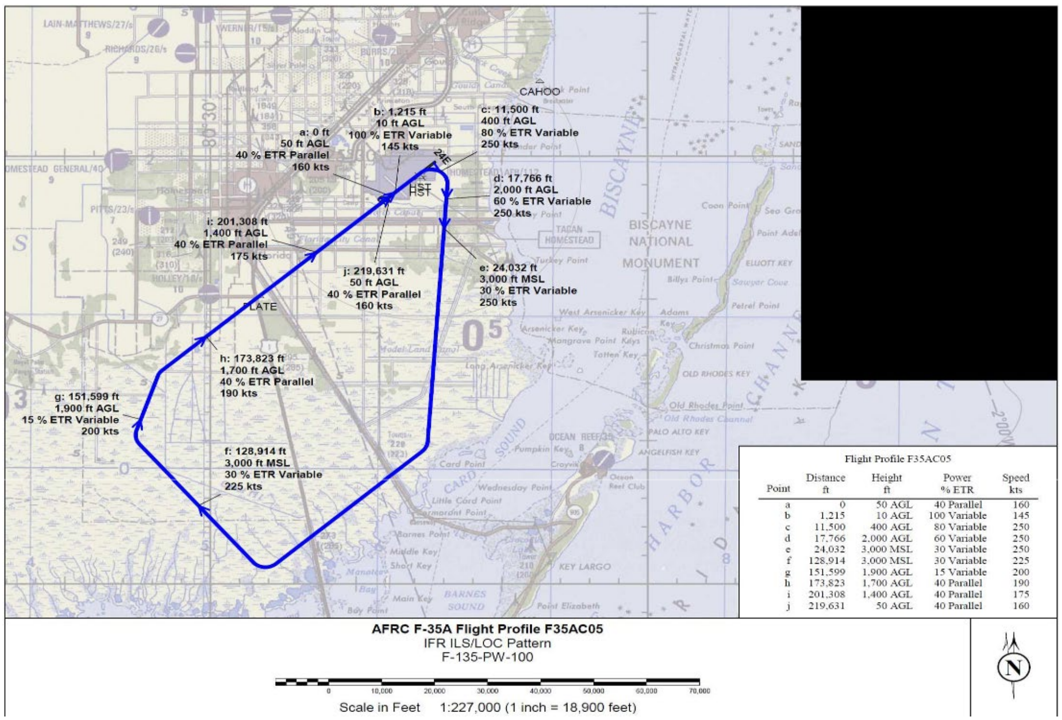


Homestead ARB
Flight Profile F35AC05

Notes

Point	Distance (ft)	Height (ft)	Power (%ETR)	Speed (kts)
a	0	50	40	160
b	1,215	10	100	145
c	11,500	400	80	250
d	17,766	2000	60	250
e	24,032	2994.4	30	250
f	128,914	2994.4	30	225
g	151,599	1900	15	200
h	173,823	1700	40	190
i	201,308	1400	40	175
j	219,631	50	40	160

True Flight Distance (ft)	Air Speed (fps)	Segment Time (sec)
1216	257	4.72
10292	333	30.88
6467	422	15.33
6344	422	15.04
104882	401	261.65
22711	359	63.32
22225	329	67.53
27487	308	89.24
18373	283	64.99
		612.68



Homestead ARB

Landing and Takeoff Emissions

Estimated F-35A Emissions Based on LTO Cycle Derived from Site-Specific Noise Data
(Standard Mode Altitude Method)

Mode	Fuel Flow (lb/hr)	Emission Factors (lb/1000lb fuel)						
		NO_X	CO	VOC	HAPs	SO_X	PM_{10}	$PM_{2.5}$
Idle	2128	2.00	22.00	0.05	0.04	1.07	2.14	1.92
Approach	6730	9.00	1.20	0.01	0.01	1.07	1.52	1.37
Intermediate	16068	18.50	0.60	0.00	0.00	1.07	1.32	1.19
Military	19003	22.00	0.40	0.00	0.00	1.07	1.17	1.05
Afterburner	37938	14.43	9.87	0.01	0.01	1.07	1.11	1.00

Mode	TIM (min)	Emissions (lb)						
		NO_X	CO	VOC	HAPs	SO_X	PM_{10}	$PM_{2.5}$
Idle	29.80	2.11	23.25	0.05	0.04	1.13	2.26	2.03
Approach	2.66	2.69	0.36	0.00	0.00	0.32	0.45	0.41
Intermediate	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Military	1.01	7.03	0.13	0.00	0.00	0.34	0.37	0.34
Afterburner	0.03	0.23	0.16	0.00	0.00	0.02	0.02	0.02
Emissions per LTO (lb) =		**12.06**	**23.90**	**0.06**	**0.05**	**1.81**	**3.11**	**2.79**
Emissions per LTO (ton) =		**0.00603**	**0.01195**	**0.00003**	**0.00002**	**0.00090**	**0.00155**	**0.00139**

Homestead ARB

Landing and Takeoff Emissions

Estimated F-35A Emissions Based on LTO Cycle Derived from Site-Specific Noise Data
(Power setting reported in Noise Data Method)

Mode	% Power	Fuel Flow (lb/hr)	Emission Factors (lb/1000lb fuel)						
			NO_X	CO	VOC	HAPs	SO_X	PM_{10}	$PM_{2.5}$
Idle	0 > 10 ≤ 18.5	2128	2.00	22.00	0.05	0.04	1.07	2.14	1.92
Approach	18.5 > 30 ≤ 50	6730	9.00	1.20	0.01	0.01	1.07	1.52	1.37
Intermediate	50 > 85 ≤ 92.5	16068	18.50	0.60	0.00	0.00	1.07	1.32	1.19
Military	92.5 > 100 ≤ 105	19003	22.00	0.40	0.00	0.00	1.07	1.17	1.05
Afterburner	105 > 130 ≤ 150	37938	14.43	9.87	0.01	0.01	1.07	1.11	1.00

Mode		TIM (min)	Emissions (lb)						
			NO_X	CO	VOC	HAPs	SO_X	PM_{10}	$PM_{2.5}$
Idle	0 > 10 ≤ 18.5	30.62	2.17	23.90	0.05	0.04	1.16	2.32	2.09
Approach	18.5 > 30 ≤ 50	1.68	1.69	0.23	0.00	0.00	0.20	0.29	0.26
Intermediate	50 > 85 ≤ 92.5	0.16	0.79	0.03	0.00	0.00	0.05	0.06	0.05
Military	92.5 > 100 ≤ 105	1.03	7.15	0.13	0.00	0.00	0.35	0.38	0.34
Afterburner	105 > 130 ≤ 150	0.01	0.07	0.05	0.00	0.00	0.01	0.01	0.01
Emissions per LTO (lb) =			**11.88**	**24.33**	**0.06**	**0.05**	**1.76**	**3.05**	**2.74**
Emissions per LTO (ton) =			**0.005941**	**0.012164**	**0.00003**	**0.00002**	**0.000881**	**0.001526**	**0.00137**

Homestead ARB

Touch and Go Emissions

Estimated F-35A Emissions Based on LTO Cycle Derived from Site-Specific Noise Data

(Power Setting Method)

Mode	Fuel Flow (lb/hr)	Emission Factors (lb/1000lb fuel)						
		NO_X	CO	VOC	HAPs	SO_X	PM_{10}	$PM_{2.5}$
Idle	2128	2.00	22.00	0.05	0.04	1.07	2.14	1.92
Approach	6730	9.00	1.20	0.01	0.01	1.07	1.52	1.37
Intermediate	16068	18.50	0.60	0.00	0.00	1.07	1.32	1.19
Military	19003	22.00	0.40	0.00	0.00	1.07	1.17	1.05
Afterburner	37938	14.43	9.87	0.01	0.01	1.07	1.11	1.00

Mode	TIM (min)	Emissions (lb)						
		NO_X	CO	VOC	HAPs	SO_X	PM_{10}	$PM_{2.5}$
Idle	0.34	0.02	0.26	0.00	0.00	0.01	0.03	0.02
Approach	1.41	1.43	0.19	0.00	0.00	0.17	0.24	0.22
Intermediate	0.13	0.63	0.02	0.00	0.00	0.04	0.05	0.04
Military	0.50	3.51	0.06	0.00	0.00	0.17	0.19	0.17
Afterburner	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Emissions per LTO (lb) =	**5.59**	**0.54**	**0.00**	**0.00**	**0.39**	**0.50**	**0.45**
Emissions per LTO (ton) =	**0.002797**	**0.000269**	**0.00000**	**0.00000**	**0.000195**	**0.000249**	**0.000224**

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ATTACHMENT C-3 NAVAL AIR STATION JOINT RESERVE BASE FORT WORTH - AIR CONFORMITY APPLICABILITY MODEL REPORTS

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AIR CONFORMITY APPLICABILITY MODEL REPORT
RECORD OF CONFORMITY ANALYSIS (ROCA)

1. General Information: The Air Force's Air Conformity Applicability Model (ACAM) was used to perform an analysis to assess the potential air quality impact/s associated with the action in accordance with the Air Force Instruction 32-7040, Air Quality Compliance And Resource Management; the Environmental Impact Analysis Process (EIAP, 32 CFR 989); and the General Conformity Rule (GCR, 40 CFR 93 Subpart B). This report provides a summary of the ACAM analysis.

a. Action Location:
Base: NAS JRB FORT WORTH
State: Texas
County(s): Tarrant
Regulatory Area(s): Dallas-Fort Worth, TX

b. Action Title: AFRC F-35A EIS – NAS JRB Fort Worth

c. Project Number/s (if applicable): Replace Existing Aircraft with F-35As

d. Projected Action Start Date: 4 / 2021

e. Action Description:

Demolition/Renovation/Construction activities and replacement aircraft operations.

f. Point of Contact:
Name: Chris Crabtree, Leidos, Inc., and Austin N. Naranjo, Solutio
Title:
Organization:
Email:
Phone Number:

2. Analysis: Total combined direct and indirect emissions associated with the action were estimated through ACAM on a calendar-year basis for the "worst-case" and "steady state" (net gain/loss upon action fully implemented) emissions. General Conformity under the Clean Air Act, Section 1.76 has been evaluated for the action described above according to the requirements of 40 CFR 93, Subpart B.

Based on the analysis, the requirements of this rule are: _____ applicable
__X__ not applicable

Conformity Analysis Summary:

2021

Pollutant	Action Emissions (ton/yr)	GENERAL CONFORMITY	
		Threshold (ton/yr)	Exceedance (Yes or No)
Dallas-Fort Worth, TX			
VOC	0.202	50	No
NOx	1.256	50	No
CO	1.424		
SOx	0.003		
PM 10	0.104		
PM 2.5	0.055		
Pb	0.000		
NH3	0.001		
CO2e	298.4		

AIR CONFORMITY APPLICABILITY MODEL REPORT
RECORD OF CONFORMITY ANALYSIS (ROCA)

2022

Pollutant	Action Emissions (ton/yr)	GENERAL CONFORMITY	
		Threshold (ton/yr)	Exceedance (Yes or No)
Dallas-Fort Worth, TX			
VOC	0.405	50	No
NOx	1.716	50	No
CO	1.928		
SOx	0.004		
PM 10	0.076		
PM 2.5	0.075		
Pb	0.000		
NH3	0.002		
CO2e	409.2		

2023

Pollutant	Action Emissions (ton/yr)	GENERAL CONFORMITY	
		Threshold (ton/yr)	Exceedance (Yes or No)
Dallas-Fort Worth, TX			
VOC	0.000	50	No
NOx	0.000	50	No
CO	0.000		
SOx	0.000		
PM 10	0.000		
PM 2.5	0.000		
Pb	0.000		
NH3	0.000		
CO2e	0.0		

2024

Pollutant	Action Emissions (ton/yr)	GENERAL CONFORMITY	
		Threshold (ton/yr)	Exceedance (Yes or No)
Dallas-Fort Worth, TX			
VOC	-12.987	50	No
NOx	25.227	50	No
CO	16.932		
SOx	3.286		
PM 10	4.739		
PM 2.5	4.435		
Pb	0.000		
NH3	-0.011		
CO2e	8989.4		

AIR CONFORMITY APPLICABILITY MODEL REPORT
RECORD OF CONFORMITY ANALYSIS (ROCA)

2025 - (Steady State)

Pollutant	Action Emissions (ton/yr)	GENERAL CONFORMITY	
		Threshold (ton/yr)	Exceedance (Yes or No)
Dallas-Fort Worth, TX			
VOC	-12.987	50	No
NOx	25.227	50	No
CO	16.932		
SOx	3.286		
PM 10	4.739		
PM 2.5	4.435		
Pb	0.000		
NH3	-0.011		
CO2e	8989.4		

None of estimated emissions associated with this action are above the conformity threshold values established at 40 CFR 93.153 (b); Therefore, the requirements of the General Conformity Rule are not applicable.

//Chris Crabtree, Austin Naranjo// 7/23/20

Chris Crabtree, Leidos, Inc., and Austin N. Naranjo, Solutio DATE

AIR CONFORMITY APPLICABILITY MODEL REPORT
RECORD OF CONFORMITY ANALYSIS (ROCA)

1. General Information: The Air Force's Air Conformity Applicability Model (ACAM) was used to perform an analysis to assess the potential air quality impact/s associated with the action in accordance with the Air Force Instruction 32-7040, Air Quality Compliance And Resource Management; the Environmental Impact Analysis Process (EIAP, 32 CFR 989); and the General Conformity Rule (GCR, 40 CFR 93 Subpart B). This report provides a summary of the ACAM analysis.

a. Action Location:
Base: NAS JRB FORT WORTH
State: Texas
County(s): Tarrant
Regulatory Area(s): Dallas-Fort Worth, TX

b. Action Title: AFRC F-35A EIS - NAS JRB Fort Worth - 50% AB

c. Project Number/s (if applicable): Replace Existing Aircraft with F-35As

d. Projected Action Start Date: 4 / 2021

e. Action Description:

Demolition/Renovation/Construction activities and replacement aircraft operations.

f. Point of Contact:
Name: Chris Crabtree, Leidos, Inc., and Austin N. Naranjo, Solutio
Title:
Organization:
Email:
Phone Number:

2. Analysis: Total combined direct and indirect emissions associated with the action were estimated through ACAM on a calendar-year basis for the "worst-case" and "steady state" (net gain/loss upon action fully implemented) emissions. General Conformity under the Clean Air Act, Section 1.76 has been evaluated for the action described above according to the requirements of 40 CFR 93, Subpart B.

Based on the analysis, the requirements of this rule are: _____ applicable
__X__ not applicable

Conformity Analysis Summary:

2021

Pollutant	Action Emissions (ton/yr)	GENERAL CONFORMITY	
		Threshold (ton/yr)	Exceedance (Yes or No)
Dallas-Fort Worth, TX			
VOC	0.202	50	No
NOx	1.256	50	No
CO	1.424		
SOx	0.003		
PM 10	0.104		
PM 2.5	0.055		
Pb	0.000		
NH3	0.001		
CO2e	298.4		

AIR CONFORMITY APPLICABILITY MODEL REPORT
RECORD OF CONFORMITY ANALYSIS (ROCA)

2022

Pollutant	Action Emissions (ton/yr)	GENERAL CONFORMITY	
		Threshold (ton/yr)	Exceedance (Yes or No)
Dallas-Fort Worth, TX			
VOC	0.405	50	No
NOx	1.716	50	No
CO	1.928		
SOx	0.004		
PM 10	0.076		
PM 2.5	0.075		
Pb	0.000		
NH3	0.002		
CO2e	409.2		

2023

Pollutant	Action Emissions (ton/yr)	GENERAL CONFORMITY	
		Threshold (ton/yr)	Exceedance (Yes or No)
Dallas-Fort Worth, TX			
VOC	0.000	50	No
NOx	0.000	50	No
CO	0.000		
SOx	0.000		
PM 10	0.000		
PM 2.5	0.000		
Pb	0.000		
NH3	0.000		
CO2e	0.0		

2024

Pollutant	Action Emissions (ton/yr)	GENERAL CONFORMITY	
		Threshold (ton/yr)	Exceedance (Yes or No)
Dallas-Fort Worth, TX			
VOC	-12.985	50	No
NOx	25.538	50	No
CO	19.047		
SOx	3.380		
PM 10	4.829		
PM 2.5	4.517		
Pb	0.000		
NH3	-0.011		
CO2e	8921.9		

AIR CONFORMITY APPLICABILITY MODEL REPORT RECORD OF CONFORMITY ANALYSIS (ROCA)

2025 - (Steady State)

Pollutant	Action Emissions (ton/yr)	GENERAL CONFORMITY	
		Threshold (ton/yr)	Exceedance (Yes or No)
Dallas-Fort Worth, TX			
VOC	-12.985	50	No
NOx	25.538	50	No
CO	19.047		
SOx	3.380		
PM 10	4.829		
PM 2.5	4.517		
Pb	0.000		
NH3	-0.011		
CO2e	8921.9		

None of estimated emissions associated with this action are above the conformity threshold values established at 40 CFR 93.153 (b); Therefore, the requirements of the General Conformity Rule are not applicable.

//Chris Crabtree, Austin Naranjo// — 7/23/20

Chris Crabtree, Leidos, Inc., and Austin N. Naranjo, Solutio — DATE

AIR CONFORMITY APPLICABILITY MODEL REPORT
RECORD OF CONFORMITY ANALYSIS (ROCA)

1. General Information: The Air Force's Air Conformity Applicability Model (ACAM) was used to perform an analysis to assess the potential air quality impact/s associated with the action in accordance with the Air Force Instruction 32-7040, Air Quality Compliance And Resource Management; the Environmental Impact Analysis Process (EIAP, 32 CFR 989); and the General Conformity Rule (GCR, 40 CFR 93 Subpart B). This report provides a summary of the ACAM analysis.

a. Action Location:
Base: NAS JRB FORT WORTH
State: Texas
County(s): Tarrant
Regulatory Area(s): Dallas-Fort Worth, TX

b. Action Title: AFRC F-35A EIS - NAS JRB Fort Worth - 95% Afterburner Departures

c. Project Number/s (if applicable): Replace Existing Aircraft with F-35As

d. Projected Action Start Date: 4 / 2021

e. Action Description:

Demolition/Renovation/Construction activities and replacement aircraft operations.

f. Point of Contact:
Name: Chris Crabtree, Leidos, Inc., and Austin N. Naranjo, Solutio
Title:
Organization:
Email:
Phone Number:

2. Analysis: Total combined direct and indirect emissions associated with the action were estimated through ACAM on a calendar-year basis for the "worst-case" and "steady state" (net gain/loss upon action fully implemented) emissions. General Conformity under the Clean Air Act, Section 1.76 has been evaluated for the action described above according to the requirements of 40 CFR 93, Subpart B.

Based on the analysis, the requirements of this rule are: _____ applicable
__X__ not applicable

Conformity Analysis Summary:

2021

Pollutant	Action Emissions (ton/yr)	GENERAL CONFORMITY	
		Threshold (ton/yr)	Exceedance (Yes or No)
Dallas-Fort Worth, TX			
VOC	0.202	50	No
NOx	1.256	50	No
CO	1.424		
SOx	0.003		
PM 10	0.104		
PM 2.5	0.055		
Pb	0.000		
NH3	0.001		
CO2e	298.4		

AIR CONFORMITY APPLICABILITY MODEL REPORT
RECORD OF CONFORMITY ANALYSIS (ROCA)

2022

Pollutant	Action Emissions (ton/yr)	GENERAL CONFORMITY	
		Threshold (ton/yr)	Exceedance (Yes or No)
Dallas-Fort Worth, TX			
VOC	0.405	50	No
NOx	1.716	50	No
CO	1.928		
SOx	0.004		
PM 10	0.076		
PM 2.5	0.075		
Pb	0.000		
NH3	0.002		
CO2e	409.2		

2023

Pollutant	Action Emissions (ton/yr)	GENERAL CONFORMITY	
		Threshold (ton/yr)	Exceedance (Yes or No)
Dallas-Fort Worth, TX			
VOC	0.000	50	No
NOx	0.000	50	No
CO	0.000		
SOx	0.000		
PM 10	0.000		
PM 2.5	0.000		
Pb	0.000		
NH3	0.000		
CO2e	0.0		

2024

Pollutant	Action Emissions (ton/yr)	GENERAL CONFORMITY	
		Threshold (ton/yr)	Exceedance (Yes or No)
Dallas-Fort Worth, TX			
VOC	-12.982	50	No
NOx	25.689	50	No
CO	21.158		
SOx	3.467		
PM 10	4.910		
PM 2.5	4.590		
Pb	0.000		
NH3	-0.011		
CO2e	8830.6		

AIR CONFORMITY APPLICABILITY MODEL REPORT RECORD OF CONFORMITY ANALYSIS (ROCA)

2025 - (Steady State)

Pollutant	Action Emissions (ton/yr)	GENERAL CONFORMITY	
		Threshold (ton/yr)	Exceedance (Yes or No)
Dallas-Fort Worth, TX			
VOC	-12.982	50	No
NOx	25.689	50	No
CO	21.158		
SOx	3.467		
PM 10	4.910		
PM 2.5	4.590		
Pb	0.000		
NH3	-0.011		
CO2e	8830.6		

None of estimated emissions associated with this action are above the conformity threshold values established at 40 CFR 93.153 (b); Therefore, the requirements of the General Conformity Rule are not applicable.

//Chris Crabtree, Austin Naranjo//
Chris Crabtree, Leidos, Inc., and Austin N. Naranjo, Solutio

7/23/20
DATE

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

1. General Information

- Action Location
Base: NAS JRB FORT WORTH
State: Texas
County(s): Tarrant
Regulatory Area(s): Dallas-Fort Worth, TX

- Action Title: AFRC F-35A EIS - NAS JRB Fort Worth

- Project Number/s (if applicable): Replace Existing Aircraft with F-35As

- Projected Action Start Date: 4 / 2021

- Action Purpose and Need:

- Action Description:
Demolition/Renovation/Construction activities and replacement aircraft operations.

- Point of Contact
Name: Chris Crabtree, Leidos, Inc., and Austin N. Naranjo, Solutio
Title:
Organization:
Email:
Phone Number:

- Activity List:

Activity Type		Activity Title
2.	Construction / Demolition	Demolition/Construction Activities
3.	Aircraft	Remove 24 F-16Cs
4.	Aircraft	Beddown 24 F-35As Weighted Average LTO
5.	Aircraft	Beddown 24 F-35As TGO Weighted Average
6.	Personnel	Removal of 102 Personnel

Emission factors and air emission estimating methods come from the United States Air Force's Air Emissions Guide for Air Force Stationary Sources, Air Emissions Guide for Air Force Mobile Sources, and Air Emissions Guide for Air Force Transitory Sources.

2. Construction / Demolition

2.1 General Information & Timeline Assumptions

- Activity Location
County: Tarrant
Regulatory Area(s): Dallas-Fort Worth, TX

- Activity Title: Demolition/Construction Activities

- Activity Description:
Demolition, Site Grading, Trenching/Excavating, Building Construction, Architectural Coatings, and Paving Activities

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Activity Start Date
Start Month: 4
Start Month: 2021

- Activity End Date
Indefinite: False
End Month: 11
End Month: 2022

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.607106
SO_x	0.007292
NO_x	2.971156
CO	3.352305
PM 10	0.179696

Pollutant	Total Emissions (TONs)
PM 2.5	0.130692
Pb	0.000000
NH_3	0.002938
CO_2e	707.6

2.1 Demolition Phase

2.1.1 Demolition Phase Timeline Assumptions

- Phase Start Date
Start Month: 4
Start Quarter: 1
Start Year: 2021

- Phase Duration
Number of Month: 2
Number of Days: 0

2.1.2 Demolition Phase Assumptions

- General Demolition Information
Area of Building to be demolished (ft^2): 11558
Height of Building to be demolished (ft): 20

- Default Settings Used: Yes

- Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Concrete/Industrial Saws Composite	1	8
Rubber Tired Dozers Composite	1	1
Tractors/Loaders/Backhoes Composite	2	6

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

2.1.3 Demolition Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Concrete/Industrial Saws Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0443	0.0006	0.3176	0.3761	0.0170	0.0170	0.0040	58.563
Rubber Tired Dozers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.2015	0.0024	1.4660	0.7661	0.0581	0.0581	0.0181	239.53
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0407	0.0007	0.2505	0.3606	0.0112	0.0112	0.0036	66.890

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.265	000.002	000.200	003.208	000.006	000.005		000.023	00325.859
LDGT	000.340	000.003	000.357	004.561	000.008	000.007		000.024	00421.180
HDGV	000.737	000.005	000.984	015.455	000.018	000.016		000.045	00783.227
LDDV	000.095	000.003	000.134	002.768	000.004	000.004		000.008	00318.007
LDDT	000.236	000.004	000.383	004.740	000.007	000.006		000.008	00451.951
HDDV	000.440	000.013	004.473	001.638	000.165	000.152		000.028	01512.371
MC	002.730	000.003	000.697	012.599	000.026	000.023		000.054	00395.818

2.1.4 Demolition Phase Formula(s)

- Fugitive Dust Emissions per Phase
$PM10_{FD} = (0.00042 * BA * BH) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
0.00042: Emission Factor (lb/ft^3)
BA: Area of Building to be demolished (ft^2)
BH: Height of Building to be demolished (ft)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase
$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Vehicle Exhaust Emissions per Phase
$VMT_{VE} = BA * BH * (1 / 27) * 0.25 * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building being demolish (ft^2)
BH: Height of Building being demolish (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd^3 / 27 ft^3)
0.25: Volume reduction factor (material reduced by 75% to account for air space)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

2.2 Building Construction Phase

2.2.1 Building Construction Phase Timeline Assumptions

- Phase Start Date
Start Month: 6
Start Quarter: 1
Start Year: 2021

- Phase Duration
Number of Month: 18
Number of Days: 0

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

2.2.2 Building Construction Phase Assumptions

- General Building Construction Information

Building Category: Office or Industrial
Area of Building (ft^2): 73708
Height of Building (ft): 20
Number of Units: N/A

- Building Construction Default Settings

Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Cranes Composite	1	6
Forklifts Composite	2	6
Generator Sets Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8
Welders Composite	3	8

- Vehicle Exhaust

Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

- Vendor Trips

Average Vendor Round Trip Commute (mile): 40 (default)

- Vendor Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

2.2.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Cranes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0845	0.0013	0.6033	0.3865	0.0228	0.0228	0.0076	128.82
Forklifts Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0293	0.0006	0.1458	0.2148	0.0056	0.0056	0.0026	54.462
Generator Sets Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0362	0.0006	0.2977	0.2707	0.0130	0.0130	0.0032	61.074
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0407	0.0007	0.2505	0.3606	0.0112	0.0112	0.0036	66.890
Welders Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0280	0.0003	0.1634	0.1787	0.0088	0.0088	0.0025	25.665

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**Pb**	**NH_3**	**CO_2e**
LDGV	000.265	000.002	000.200	003.208	000.006	000.005		000.023	00325.859
LDGT	000.340	000.003	000.357	004.561	000.008	000.007		000.024	00421.180
HDGV	000.737	000.005	000.984	015.455	000.018	000.016		000.045	00783.227
LDDV	000.095	000.003	000.134	002.768	000.004	000.004		000.008	00318.007
LDDT	000.236	000.004	000.383	004.740	000.007	000.006		000.008	00451.951
HDDV	000.440	000.013	004.473	001.638	000.165	000.152		000.028	01512.371
MC	002.730	000.003	000.697	012.599	000.026	000.023		000.054	00395.818

2.2.4 Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = BA * BH * (0.42 / 1000) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.42 / 1000): Conversion Factor ft^3 to trips (0.42 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
VMT_{WT} = WD * WT * 1.25 * NE

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Vender Trips Emissions per Phase
VMT_{VT} = BA * BH * (0.38 / 1000) * HT

VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.38 / 1000): Conversion Factor ft^3 to trips (0.38 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

2.3 Architectural Coatings Phase

2.3.1 Architectural Coatings Phase Timeline Assumptions

- Phase Start Date
Start Month: 5
Start Quarter: 1
Start Year: 2022

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Phase Duration
Number of Month: 1
Number of Days: 0

2.3.2 Architectural Coatings Phase Assumptions

- General Architectural Coatings Information
Building Category:
Total Square Footage (ft^2): 10860
Number of Units: N/A

- Architectural Coatings Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

2.3.3 Architectural Coatings Phase Emission Factor(s)

- Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.265	000.002	000.200	003.208	000.006	000.005		000.023	00325.859
LDGT	000.340	000.003	000.357	004.561	000.008	000.007		000.024	00421.180
HDGV	000.737	000.005	000.984	015.455	000.018	000.016		000.045	00783.227
LDDV	000.095	000.003	000.134	002.768	000.004	000.004		000.008	00318.007
LDDT	000.236	000.004	000.383	004.740	000.007	000.006		000.008	00451.951
HDDV	000.440	000.013	004.473	001.638	000.165	000.152		000.028	01512.371
MC	002.730	000.003	000.697	012.599	000.026	000.023		000.054	00395.818

2.3.4 Architectural Coatings Phase Formula(s)

- Worker Trips Emissions per Phase
$VMT_{WT} = (1 * WT * PA) / 800$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
1: Conversion Factor man days to trips (1 trip / 1 man * day)
WT: Average Worker Round Trip Commute (mile)
PA: Paint Area (ft^2)
800: Conversion Factor square feet to man days (1 ft^2 / 1 man * day)

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Off-Gassing Emissions per Phase
VOC_{AC} = (AB * 2.0 * 0.0116) / 2000.0

VOC_{AC}: Architectural Coating VOC Emissions (TONs)
BA: Area of Building (ft^2)
2.0: Conversion Factor total area to coated area (2.0 ft^2 coated area / total area)
0.0116: Emission Factor (lb/ft^2)
2000: Conversion Factor pounds to tons

3. Aircraft

3.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location
County: Tarrant
Regulatory Area(s): Dallas-Fort Worth, TX

- Activity Title: Remove 24 F-16Cs

- Activity Description:
Remove 24 F-16Cs and associated operations

- Activity Start Date
Start Month: 1
Start Year: 2024

- Activity End Date
Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-21.164974
SO_x	-4.544899
NO_x	-54.798307
CO	-57.253443
PM 10	-7.497580

Pollutant	Emissions Per Year (TONs)
PM 2.5	-6.733545
Pb	0.000000
NH_3	0.000000
CO_2e	-10881.5

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-14.376550
SO_x	-3.142290
NO_x	-34.693168
CO	-45.283436
PM 10	-5.417834

Pollutant	Emissions Per Year (TONs)
PM 2.5	-4.725143
Pb	0.000000
NH_3	0.000000
CO_2e	-9641.0

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- Activity Emissions [Test Cell part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.226207
SO_x	-0.080707
NO_x	-1.222120
CO	-0.455394
PM 10	-0.133180

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.120049
Pb	0.000000
NH_3	0.000000
CO_2e	-246.2

- Activity Emissions [Aerospace Ground Equipment (AGE) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-6.562217
SO_x	-1.321902
NO_x	-18.883019
CO	-11.514612
PM 10	-1.946567

Pollutant	Emissions Per Year (TONs)
PM 2.5	-1.888353
Pb	0.000000
NH_3	0.000000
CO_2e	-994.2

3.2 Aircraft & Engines

3.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine
Aircraft Designation: F-16C
Engine Model: F100-PW-220
Primary Function: Combat
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate
Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

3.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e
Idle	1084.00	7.94	1.06	4.61	35.30	2.06	1.85	3234
Approach	3837.00	5.12	1.06	12.53	1.92	2.63	2.37	3234
Intermediate	5770.00	2.89	1.06	22.18	0.86	2.06	1.85	3234
Military	9679.00	1.79	1.06	29.32	0.86	1.33	1.20	3234
After Burn	41682.00	1.53	1.06	8.37	11.99	1.15	1.04	3234

3.3 Flight Operations

3.3.1 Flight Operations Assumptions

- Flight Operations
Number of Aircraft: 24
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 3706
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 556
Number of Annual Trim Test(s) per Aircraft: 12

- Default Settings Used: No

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins):	18.5
Takeoff [Military] (mins):	0.4
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	0.8
Approach [Approach] (mins):	3.5
Taxi/Idle In [Idle] (mins):	11.3

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	12
AfterBurn (mins):	0

3.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$AE_{LTO} = AEM_{IDLE\_IN} + AEM_{IDLE\_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{LTO}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Aircraft Emissions for TGOs per Year
$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{TGO}: Aircraft Emissions (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year
$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year
$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$

AE_{TRIM}: Aircraft Emissions (TONs)
$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

3.4 Auxiliary Power Unit (APU)

3.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: Yes

- Auxiliary Power Unit (APU) (default)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
1	1	No	T-62T-40-8	

3.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e
T-62T-40-8	272.6	0.493	0.289	1.216	3.759	0.131	0.037	910.8

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

3.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year
$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
APU: Number of Auxiliary Power Units
OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

3.5 Aircraft Engine Test Cell

3.5.1 Aircraft Engine Test Cell Assumptions

- Engine Test Cell
Total Number of Aircraft Engines Tested Annually: 24

- Default Settings Used: Yes

- Annual Run-ups / Test Durations

Annual Run-ups (Per Aircraft Engine):	1 (default)
Idle Duration (mins):	12 (default)
Approach Duration (mins):	27 (default)
Intermediate Duration (mins):	9 (default)
Military Duration (mins):	9 (default)
After Burner Duration (mins):	3 (default)

3.5.2 Aircraft Engine Test Cell Emission Factor(s)

- See Aircraft & Engines Emission Factor(s)

3.5.3 Aircraft Engine Test Cell Formula(s)

- Aircraft Engine Test Cell Emissions per Pollutant & Power Setting (TONs)
$TestCellPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * ARU / 2000$

$TestCellPS_{POL}$: Aircraft Engine Test Cell Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Total Number of Engines (For All Aircraft)
ARU: Annual Run-ups (Per Aircraft Engine)
2000: Conversion Factor pounds to TONs

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Aircraft Engine Test Cell Emissions per Year
$TestCell = TestCellPS_{IDLE} + TestCellPS_{APPROACH} + TestCellPS_{INTERMEDIATE} + TestCellPS_{MILITARY} + TestCellPS_{AFTERBURN}$

TestCell: Aircraft Engine Test Cell Emissions (TONs)
$TestCellPS_{IDLE}$: Aircraft Engine Test Cell Emissions for Idle Power Setting (TONs)
$TestCellPS_{APPROACH}$: Aircraft Engine Test Cell Emissions for Approach Power Setting (TONs)
$TestCellPS_{INTERMEDIATE}$: Aircraft Engine Test Cell Emissions for Intermediate Power Setting (TONs)
$TestCellPS_{MILITARY}$: Aircraft Engine Test Cell Emissions for Military Power Setting (TONs)
$TestCellPS_{AFTERBURN}$: Aircraft Engine Test Cell Emissions for After Burner Power Setting (TONs)

3.6 Aerospace Ground Equipment (AGE)

3.6.1 Aerospace Ground Equipment (AGE) Assumptions

- Default Settings Used: Yes

- AGE Usage
Number of Annual LTO (Landing and Take-off) cycles for AGE: 3706

- Aerospace Ground Equipment (AGE) (default)

Total Number of AGE	Operation Hours for Each LTO	Exempt Source?	AGE Type	Designation
1	0.33	No	Air Compressor	MC-1A - 18.4hp
1	1	No	Bomb Lift	MJ-1B
1	0.33	No	Generator Set	A/M32A-86D
1	0.5	No	Heater	H1
1	0.5	No	Hydraulic Test Stand	MJ-2/TTU-228 - 130hp
1	8	No	Light Cart	NF-2
1	0.33	No	Start Cart	A/M32A-60A

3.6.2 Aerospace Ground Equipment (AGE) Emission Factor(s)

- Aerospace Ground Equipment (AGE) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e
MC-1A - 18.4hp	1.1	0.267	0.008	0.419	0.267	0.071	0.068	24.8
MJ-1B	0.0	3.040	0.219	4.780	3.040	0.800	0.776	141.2
A/M32A-86D	6.5	0.294	0.046	6.102	0.457	0.091	0.089	147.0
H1	0.4	0.100	0.011	0.160	0.180	0.006	0.006	8.9
MJ-2/TTU-228 - 130hp	7.4	0.195	0.053	3.396	0.794	0.089	0.086	168.8
NF-2	0.0	0.010	0.043	0.110	0.080	0.010	0.010	22.1
A/M32A-60A	0.0	0.270	0.306	1.820	5.480	0.211	0.205	221.1

3.6.3 Aerospace Ground Equipment (AGE) Formula(s)

- Aerospace Ground Equipment (AGE) Emissions per Year
$AGE_{POL} = AGE * OH * LTO * EF_{POL} / 2000$

AGE_{POL}: Aerospace Ground Equipment (AGE) Emissions per Pollutant (TONs)
AGE: Total Number of Aerospace Ground Equipment
OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

4. Aircraft

4.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Tarrant
Regulatory Area(s): Dallas-Fort Worth, TX

- Activity Title: Beddown 24 F-35As Weighted Average LTO

- Activity Description:
Beddown 24 F-35As and associated operations

- Activity Start Date
Start Month: 1
Start Year: 2024

- Activity End Date
Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	8.344077
SO_x	7.610146
NO_x	76.811058
CO	75.809101
PM 10	11.952579

Pollutant	Emissions Per Year (TONs)
PM 2.5	10.913336
Pb	0.000000
NH_3	0.000000
CO_2e	19372.7

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.141345
SO_x	5.822967
NO_x	51.256488
CO	61.005716
PM 10	9.350000

Pollutant	Emissions Per Year (TONs)
PM 2.5	8.400459
Pb	0.000000
NH_3	0.000000
CO_2e	17718.3

- Activity Emissions [Test Cell part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000846
SO_x	0.134980
NO_x	1.953343
CO	0.411673
PM 10	0.169634

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.152690
Pb	0.000000
NH_3	0.000000
CO_2e	411.8

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Activity Emissions [Aerospace Ground Equipment (AGE) part]:

Pollutant	Emissions Per Year (TONs)	Pollutant	Emissions Per Year (TONs)
VOC	8.201885	PM 2.5	2.360187
SO_x	1.652199	Pb	0.000000
NO_x	23.601227	NH_3	0.000000
CO	14.391712	CO_2e	1242.6
PM 10	2.432946		

4.2 Aircraft & Engines

4.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine
- **Aircraft Designation:** F-35A
- **Engine Model:** F135-PW-100
- **Primary Function:** Combat
- **Aircraft has After burn:** Yes
- **Number of Engines:** 1

- Aircraft & Engine Surrogate
- **Is Aircraft & Engine a Surrogate?** No
- **Original Aircraft Name:**
- **Original Engine Name:**

4.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

4.3 Flight Operations

4.3.1 Flight Operations Assumptions

- Flight Operations
- **Number of Aircraft:** 24
- **Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft:** 4632
- **Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft:** 0
- **Number of Annual Trim Test(s) per Aircraft:** 12

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)
- **Taxi/Idle Out [Idle] (mins):** 18.5
- **Takeoff [Military] (mins):** 0.77
- **Takeoff [After Burn] (mins):** 0.02
- **Climb Out [Intermediate] (mins):** 0.34
- **Approach [Approach] (mins):** 2.61
- **Taxi/Idle In [Idle] (mins):** 11.72

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Trim Test

Idle (mins): 12
Approach (mins): 27
Intermediate (mins): 9
Military (mins): 9
AfterBurn (mins): 3

4.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$AE_{LTO} = AEM_{IDLE\_IN} + AEM_{IDLE\_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{LTO}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{TGO}: Aircraft Emissions (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Aircraft Emissions per Mode for Trim per Year
$AEPS_{POL}$ = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year
$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$

AE_{TRIM}: Aircraft Emissions (TONs)
$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

4.4 Auxiliary Power Unit (APU)

4.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: Yes

- Auxiliary Power Unit (APU) (default)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer

4.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e

4.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year
APU_{POL} = APU * OH * LTO * EF_{POL} / 2000

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
APU: Number of Auxiliary Power Units
OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

4.5 Aircraft Engine Test Cell

4.5.1 Aircraft Engine Test Cell Assumptions

- Engine Test Cell
Total Number of Aircraft Engines Tested Annually: 24

- Default Settings Used: Yes

- Annual Run-ups / Test Durations
Annual Run-ups (Per Aircraft Engine): 1 (default)
Idle Duration (mins): 12 (default)
Approach Duration (mins): 27 (default)
Intermediate Duration (mins): 9 (default)
Military Duration (mins): 9 (default)
After Burner Duration (mins): 3 (default)

4.5.2 Aircraft Engine Test Cell Emission Factor(s)

- See Aircraft & Engines Emission Factor(s)

4.5.3 Aircraft Engine Test Cell Formula(s)

- Aircraft Engine Test Cell Emissions per Pollutant & Power Setting (TONs)
$TestCellPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * ARU / 2000$

$TestCellPS_{POL}$: Aircraft Engine Test Cell Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Total Number of Engines (For All Aircraft)
ARU: Annual Run-ups (Per Aircraft Engine)
2000: Conversion Factor pounds to TONs

- Aircraft Engine Test Cell Emissions per Year
$TestCell = TestCellPS_{IDLE} + TestCellPS_{APPROACH} + TestCellPS_{INTERMEDIATE} + TestCellPS_{MILITARY} + TestCellPS_{AFTERBURN}$

TestCell: Aircraft Engine Test Cell Emissions (TONs)
$TestCellPS_{IDLE}$: Aircraft Engine Test Cell Emissions for Idle Power Setting (TONs)
$TestCellPS_{APPROACH}$: Aircraft Engine Test Cell Emissions for Approach Power Setting (TONs)
$TestCellPS_{INTERMEDIATE}$: Aircraft Engine Test Cell Emissions for Intermediate Power Setting (TONs)
$TestCellPS_{MILITARY}$: Aircraft Engine Test Cell Emissions for Military Power Setting (TONs)
$TestCellPS_{AFTERBURN}$: Aircraft Engine Test Cell Emissions for After Burner Power Setting (TONs)

4.6 Aerospace Ground Equipment (AGE)

4.6.1 Aerospace Ground Equipment (AGE) Assumptions

- Default Settings Used: Yes

- AGE Usage
Number of Annual LTO (Landing and Take-off) cycles for AGE: 4632

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Aerospace Ground Equipment (AGE) (default)

Total Number of AGE	Operation Hours for Each LTO	Exempt Source?	AGE Type	Designation
1	0.33	No	Air Compressor	MC-1A - 18.4hp
1	1	No	Bomb Lift	MJ-1B
1	0.33	No	Generator Set	A/M32A-86D
1	0.5	No	Heater	H1
1	0.5	No	Hydraulic Test Stand	MJ-2/TTU-228 - 130hp
1	8	No	Light Cart	NF-2
1	0.33	No	Start Cart	A/M32A-60A

4.6.2 Aerospace Ground Equipment (AGE) Emission Factor(s)

- Aerospace Ground Equipment (AGE) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e
MC-1A - 18.4hp	1.1	0.267	0.008	0.419	0.267	0.071	0.068	24.8
MJ-1B	0.0	3.040	0.219	4.780	3.040	0.800	0.776	141.2
A/M32A-86D	6.5	0.294	0.046	6.102	0.457	0.091	0.089	147.0
H1	0.4	0.100	0.011	0.160	0.180	0.006	0.006	8.9
MJ-2/TTU-228 - 130hp	7.4	0.195	0.053	3.396	0.794	0.089	0.086	168.8
NF-2	0.0	0.010	0.043	0.110	0.080	0.010	0.010	22.1
A/M32A-60A	0.0	0.270	0.306	1.820	5.480	0.211	0.205	221.1

4.6.3 Aerospace Ground Equipment (AGE) Formula(s)

- Aerospace Ground Equipment (AGE) Emissions per Year
$AGE_{POL} = AGE * OH * LTO * EF_{POL} / 2000$

AGE_{POL}: Aerospace Ground Equipment (AGE) Emissions per Pollutant (TONs)
AGE: Total Number of Aerospace Ground Equipment
OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

5. Aircraft

5.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Tarrant
Regulatory Area(s): Dallas-Fort Worth, TX

- Activity Title: Beddown 24 F-35As TGO Weighted Average

- Activity Description:

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- Activity Start Date
Start Month: 1
Start Year: 2024

- Activity End Date
Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	0.001075
SO_x	0.222291
NO_x	3.356450
CO	0.344123
PM 10	0.287341

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.258643
Pb	0.000000
NH_3	0.000000
CO_2e	678.2

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.001075
SO_x	0.222291
NO_x	3.356450
CO	0.344123
PM 10	0.287341

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.258643
Pb	0.000000
NH_3	0.000000
CO_2e	678.2

5.2 Aircraft & Engines

5.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine
Aircraft Designation: F-35A
Engine Model: F135-PW-100
Primary Function: Combat
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate
Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

5.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)
Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

5.3 Flight Operations

5.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	24
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft:	1158
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft:	0
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	0.34
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	0.49
Approach [Approach] (mins):	0.96
Taxi/Idle In [Idle] (mins):	0.44

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

5.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$AE_{LTO} = AEM_{IDLE\_IN} + AEM_{IDLE\_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{LTO}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Aircraft Emissions per Mode for TGOs per Year

AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{TGO}: Aircraft Emissions (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$AEPS_{POL}$ = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$

AE_{TRIM}: Aircraft Emissions (TONs)
$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

5.4 Auxiliary Power Unit (APU)

5.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: Yes

- Auxiliary Power Unit (APU) (default)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer

5.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e

5.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year

$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
APU: Number of Auxiliary Power Units
OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

6. Personnel

6.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location
County: Tarrant
Regulatory Area(s): Dallas-Fort Worth, TX

- Activity Title: Removal of 102 Personnel

- Activity Description:

- Activity Start Date
Start Month: 1
Start Year: 2024

- Activity End Date
Indefinite: Yes
End Month: N/A
End Year: N/A

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- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-0.166993
SO_x	-0.001229
NO_x	-0.142445
CO	-1.967382
PM 10	-0.003550

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.003064
Pb	0.000000
NH_3	-0.011301
CO_2e	-180.1

6.2 Personnel Assumptions

- Number of Personnel

Active Duty Personnel: 0
Civilian Personnel: 0
Support Contractor Personnel: 0
Air National Guard (ANG) Personnel: 102
Reserve Personnel: 0

- Default Settings Used: Yes

- Average Personnel Round Trip Commute (mile): 20 (default)

- Personnel Work Schedule

Active Duty Personnel: 5 Days Per Week (default)
Civilian Personnel: 5 Days Per Week (default)
Support Contractor Personnel: 5 Days Per Week (default)
Air National Guard (ANG) Personnel: 4 Days Per Week (default)
Reserve Personnel: 4 Days Per Month (default)

6.3 Personnel On Road Vehicle Mixture

- On Road Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	37.55	60.32	0	0.03	0.2	0	1.9
GOVs	54.49	37.73	4.67	0	0	3.11	0

6.4 Personnel Emission Factor(s)

- On Road Vehicle Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.265	000.002	000.200	003.208	000.006	000.005		000.023	00325.859
LDGT	000.340	000.003	000.357	004.561	000.008	000.007		000.024	00421.180
HDGV	000.737	000.005	000.984	015.455	000.018	000.016		000.045	00783.227
LDDV	000.095	000.003	000.134	002.768	000.004	000.004		000.008	00318.007
LDDT	000.236	000.004	000.383	004.740	000.007	000.006		000.008	00451.951
HDDV	000.440	000.013	004.473	001.638	000.165	000.152		000.028	01512.371
MC	002.730	000.003	000.697	012.599	000.026	000.023		000.054	00395.818

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

6.5 Personnel Formula(s)

- Personnel Vehicle Miles Travel for Work Days per Year
$VMT_P = NP * WD * AC$

VMT_P: Personnel Vehicle Miles Travel (miles/year)
NP: Number of Personnel
WD: Work Days per Year
AC: Average Commute (miles)

- Total Vehicle Miles Travel per Year
$VMT_{Total} = VMT_{AD} + VMT_C + VMT_{SC} + VMT_{ANG} + VMT_{AFRC}$

VMT_{Total}: Total Vehicle Miles Travel (miles)
VMT_{AD}: Active Duty Personnel Vehicle Miles Travel (miles)
VMT_C: Civilian Personnel Vehicle Miles Travel (miles)
VMT_{SC}: Support Contractor Personnel Vehicle Miles Travel (miles)
VMT_{ANG}: Air National Guard Personnel Vehicle Miles Travel (miles)
VMT_{AFRC}: Reserve Personnel Vehicle Miles Travel (miles)

- Vehicle Emissions per Year
$V_{POL} = (VMT_{Total} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{Total}: Total Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Personnel On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

AIR CONFORMITY APPLICABILITY MODEL REPORT
RECORD OF CONFORMITY ANALYSIS (ROCA)

1. General Information: The Air Force's Air Conformity Applicability Model (ACAM) was used to perform an analysis to assess the potential air quality impact/s associated with the action in accordance with the Air Force Instruction 32-7040, Air Quality Compliance And Resource Management; the Environmental Impact Analysis Process (EIAP, 32 CFR 989); and the General Conformity Rule (GCR, 40 CFR 93 Subpart B). This report provides a summary of the ACAM analysis.

a. Action Location:
Base: NAS JRB FORT WORTH
State: Texas
County(s): Tarrant
Regulatory Area(s): Dallas-Fort Worth, TX

b. Action Title: AFRC F-35A EIS

c. Project Number/s (if applicable):

d. Projected Action Start Date: 1 / 2024

e. Action Description:

At NAS JRB Fort Worth, remove 24 F-16Cs and add 24 F-35As. This analysis is only for net changes in airspace operations.

f. Point of Contact:
Name: Chris Crabtree, Leidos, Inc., and Austin N. Naranjo, Solutio
Title:
Organization:
Email:
Phone Number:

2. Analysis: Total combined direct and indirect emissions associated with the action were estimated through ACAM on a calendar-year basis for the "worst-case" and "steady state" (net gain/loss upon action fully implemented) emissions. General Conformity under the Clean Air Act, Section 1.76 has been evaluated for the action described above according to the requirements of 40 CFR 93, Subpart B.

Based on the analysis, the requirements of this rule are: _____ applicable
__X__ not applicable

Conformity Analysis Summary:

2024

Pollutant	Action Emissions (ton/yr)	GENERAL CONFORMITY	
		Threshold (ton/yr)	Exceedance (Yes or No)
Dallas-Fort Worth, TX			
VOC	-11.084	50	No
NOx	-169.664	50	No
CO	-5.111		
SOx	-6.047		
PM 10	-7.603		
PM 2.5	-6.863		
Pb	0.000		
NH3	0.000		
CO2e	-18277.9		

AIR CONFORMITY APPLICABILITY MODEL REPORT
RECORD OF CONFORMITY ANALYSIS (ROCA)

2025 - (Steady State)

Pollutant	Action Emissions (ton/yr)	GENERAL CONFORMITY	
		Threshold (ton/yr)	Exceedance (Yes or No)
Dallas-Fort Worth, TX			
VOC	-11.084	50	No
NOx	-169.664	50	No
CO	-5.111		
SOx	-6.047		
PM 10	-7.603		
PM 2.5	-6.863		
Pb	0.000		
NH3	0.000		
CO2e	-18277.9		

None of estimated emissions associated with this action are above the conformity threshold values established at 40 CFR 93.153 (b); Therefore, the requirements of the General Conformity Rule are not applicable.

//Chris Crabtree, Austin Naranjo// 7/23/20

Chris Crabtree, Leidos, Inc., and Austin N. Naranjo, Solutio DATE

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

1. General Information

- Action Location
Base: NAS JRB FORT WORTH
State: Texas
County(s): Tarrant
Regulatory Area(s): Dallas-Fort Worth, TX

- Action Title: AFRC F-35A EIS

- Project Number/s (if applicable):

- Projected Action Start Date: 1 / 2024

- Action Purpose and Need:
...

- Action Description:
At NAS JRB Fort Worth, remove 24 F-16Cs and add 24 F-35As. This analysis is only for net changes in airspace operations.

- Point of Contact
Name: Chris Crabtree, Leidos, Inc., and Austin N. Naranjo, Solutio
Title:
Organization:
Email:
Phone Number:

- Activity List:

	Activity Type	Activity Title
2.	Aircraft	Airspace operations - F-35As
3.	Aircraft	Airspace operations - F-16Cs

Emission factors and air emission estimating methods come from the United States Air Force's Air Emissions Guide for Air Force Stationary Sources, Air Emissions Guide for Air Force Mobile Sources, and Air Emissions Guide for Air Force Transitory Sources.

2. Aircraft

2.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Tarrant
Regulatory Area(s): Dallas-Fort Worth, TX

- Activity Title: Airspace operations - F-35As

- Activity Description:
Add annual airspace operations for 24 F-35As

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Activity Start Date
Start Month: 1
Start Year: 2024

- Activity End Date
Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO_x	0.578310
NO_x	11.890494
CO	0.216191
PM 10	0.632358

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.567501
Pb	0.000000
NH_3	0.000000
CO_2e	1747.9

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO_x	0.578310
NO_x	11.890494
CO	0.216191
PM 10	0.632358

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.567501
Pb	0.000000
NH_3	0.000000
CO_2e	1747.9

2.2 Aircraft & Engines

2.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine
Aircraft Designation: F-35A
Engine Model: F135-PW-100
Primary Function: Combat
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate
Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

2.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)
Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

2.3 Flight Operations

2.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	24
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft:	1
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft:	0
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	3413
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	0
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

2.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$AE_{LTO} = AEM_{IDLE\_IN} + AEM_{IDLE\_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{LTO}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Aircraft Emissions per Mode for TGOs per Year

AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{TGO}: Aircraft Emissions (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$AEPS_{POL}$ = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$

AE_{TRIM}: Aircraft Emissions (TONs)
$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

2.4 Auxiliary Power Unit (APU)

2.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: Yes

- Auxiliary Power Unit (APU) (default)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer

2.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e

2.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year
$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
APU: Number of Auxiliary Power Units
OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

3. Aircraft

3.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location
County: Tarrant
Regulatory Area(s): Dallas-Fort Worth, TX

- Activity Title: Airspace operations - F-16Cs

- Activity Description:
Remove annual airspace operations for 24 F-16Cs

- Activity Start Date
Start Month: 1
Start Year: 2024

- Activity End Date
Indefinite: Yes
End Month: N/A
End Year: N/A

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-11.084177
SO_x	-6.625735
NO_x	-181.554160
CO	-5.327120
PM 10	-8.235612

Pollutant	Emissions Per Year (TONs)
PM 2.5	-7.430587
Pb	0.000000
NH_3	0.000000
CO_2e	-20025.8

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-11.084177
SO_x	-6.625735
NO_x	-181.554160
CO	-5.327120
PM 10	-8.235612

Pollutant	Emissions Per Year (TONs)
PM 2.5	-7.430587
Pb	0.000000
NH_3	0.000000
CO_2e	-20025.8

3.2 Aircraft & Engines

3.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine
Aircraft Designation: F-16C
Engine Model: F100-PW-220
Primary Function: Combat
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate
Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

3.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e
Idle	1084.00	7.94	1.07	4.61	35.30	2.06	1.85	3234
Approach	3837.00	5.12	1.07	12.53	1.92	2.63	2.37	3234
Intermediate	5770.00	2.89	1.07	22.18	0.86	2.06	1.85	3234
Military	9679.00	1.79	1.07	29.32	0.86	1.33	1.20	3234
After Burn	41682.00	1.53	1.07	8.37	11.99	1.15	1.04	3234

3.3 Flight Operations

3.3.1 Flight Operations Assumptions

- Flight Operations
Number of Aircraft: 24
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 1
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	76770
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	0
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

3.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$AE_{LTO} = AEM_{IDLE\_IN} + AEM_{IDLE\_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{LTO}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Aircraft Emissions for TGOs per Year
$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{TGO}: Aircraft Emissions (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year
$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year
$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$

AE_{TRIM}: Aircraft Emissions (TONs)
$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

3.4 Auxiliary Power Unit (APU)

3.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: Yes

- Auxiliary Power Unit (APU) (default)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
1	1	No	T-62T-40-8	

3.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e
T-62T-40-8	272.6	0.493	0.289	1.216	3.759	0.131	0.037	910.8

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

3.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year
$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
APU: Number of Auxiliary Power Units
OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

NAS JRB Fort Worth

F-35A Operations

AFRC

Sorties	4632	**Total**
Patterns	0.25	**per Sortie**
	1158	**Total**

Lockheed Martin

288	**Total**
2.5	**per Sortie**
720	**Total**

AFRC Operations Type Distribution

Operation	Stated Type	Frequency (% of Time)	Count	Assumed Type
Arrivals	Overhead Break Arrival	15%	694.8	Overhead Break Arrival Lead (F35AO03)
	Tactical Overhead Break Arrival	50%	2316	Overhead Break Arrival - Wingman (F35AO04)
	Tactical Straight-in (VFR)			
	Straight-in Arrival (ILS)	10%	463.2	Straight-in IFR Arrival (F35AA01)
	Straight-in Arrival (TACAN)	10%	463.2	Straight-in IFR Arrival (F35AA01)
	Straight-in Arrival (VFR)	5%	231.6	Straight-in VFR Arrival (F35AA06)
	PFO Arrival	10%	463.2	PFO Arrival (F35AS01)
		good		
Departures	Military	95%	4400.4	Mil Departure (F35ADM01)
	Afterburner	5%	231.6	Afterburner Departure Profile (F35ADA01)
Patterns	VFR (Visual) Pattern	88%	1019.04	VFR Pattern (F35AC01)
	VFR Outside Downwind Pattern			
	PFO Pattern	10%	115.8	Multiple PFO Pattern (F35AC05)
	Re-entry Pattern		0	
	ILS Pattern	1%	11.58	IFR ILS/LOC Pattern (F35AC07)
	TACAN Pattern	1%	11.58	IFR ILS/LOC Pattern (F35AC07)
		good		

Lockheed Martin Operations Type Distribution

Operation	Stated Type	Frequency (% of Time)	Count
Arrivals	Straight-in Arrival	100%	288
	Overhead Break Arrival		0
	Carrier Break Arrival		0
	SFO Arrival		0
	Straight-in to Slow Landing		0
	Tactical Overhead Break		0
	Instrument Approach		0
			0
		good	
Departures	Military	60%	172.8
	Afterburner Takeoff to Mil Climb	40%	115.2
	Short Takeoff to Mil Climb		0
		good	
Patterns	VFR Touch and Go Pattern (or Low Approach Pattern)	50%	360
	SFO Pattern	17%	122.4
	IFR Pattern or GCA Box	33%	237.6
	Touch and Go to Slow Landing		0
		good	

NAS JRB Fort Worth

Representative Weighted T&G Cycle TIMs By Power Setting Method

Times Based on PowerSettingMethodOnly (seconds)

Mode	% Thrust Range		T & G's VFR Pattern (F35AC01)	T & G's Multiple PFO Pattern (F35AC05)	T & G's IFR ILS/LOC Pattern (F35AC07)
	>	<			
Takeoff Afterburner	105	150	0.00	0.00	0.00
Takeoff Military	92.5	105	20.17	27.44	4.72
Climb Out	50	92.5	32.02	7.14	30.88
Approach	18.5	50	60.17	0.00	224.65
Taxi/Idle Out/In	0	18.5	14.85	31.65	522.92
Frequency (% of Time) =			**88%**	**10%**	**2%**

Weighted Times Based on Noise Profiles Power Setting Times Weighted by Frequency (seconds)

Mode	% Thrust Range		T & G's VFR Pattern (F35AC01)	T & G's Multiple PFO Pattern (F35AC05)	T & G's IFR ILS/LOC Pattern (F35AC07)	Noise LTO Cycle Contributions
	>	<				
Takeoff Afterburner	105	150	0.00	0.00	0.00	0.00
Takeoff Military	92.5	105	17.75	2.74	0.09	20.59
Climb Out	50	92.5	28.18	0.71	0.62	29.51
Approach	18.5	50	52.95	0.00	4.49	57.45
Taxi/Idle Out/In	0	18.5	13.07	3.16	10.46	26.69

Mode	% Thrust Range		Noise T&G Contributions (min)	Representative T&G Cycle (min)
	>	<		
Takeoff Afterburner	105	150	0.00	**0.00**
Takeoff Military	92.5	105	0.34	**0.34**
Climb Out	50	92.5	0.49	**0.49**
Approach	18.5	50	0.96	**0.96**
Taxi/Idle Out/In	0	18.5	0.44	**0.44**
Representative Weighted Average T&G Time (min) =				**2.24**

NAS JRB Fort Worth

Representative Weighted Average LTO Cycle TIMs By Power Setting & Altitude Method

Times Based on Power Setting & Altitude Method (seconds)

Mode	% Thrust Range		Arrivals					Departures	
			Overhead Break Arrival Lead (F35AO03)	Overhead Break Arrival Wingman (F35AO04)	Straight-in IFR Arrival (F35AA01)	Straight-in VFR Arrival (F35AA06)	PFO Arrival (F35AS01)	Mil Departure (F35ADM01)	Afterburner Departure Profile (F35ADA01)
	>	<							
Takeoff Afterburner	105	150	0.00	0.00	0.00	0.00	0.00	0.00	20.29
Takeoff Military	92.5	105	0.00	0.00	0.00	0.00	0.00	47.67	24.18
Climb Out	50	92.5	8.84	8.84	0.00	0.00	0.00	14.58	13.62
Approach	18.5	50	172.54	187.54	119.68	230.25	16.95	0.00	0.00
Taxi/Idle Out/In	0	18.5	35.74	35.74	0.00	0.00	16.95	0.00	0.00
Frequency (% of Time) =			**15%**	**50%**	**20%**	**5%**	**10%**	**95%**	**5%**

Weighted Times Based on Noise Profiles Average Times Weighted by Frequency (seconds)

Mode	% Thrust Range		Arrivals					Departures		Noise LTO
			Overhead Break Arrival Lead (F35AO03)	Overhead Break Arrival Wingman (F35AO04)	Straight-in IFR Arrival (F35AA01)	Straight-in VFR Arrival (F35AA06)	PFO Arrival (F35AS01)	Mil Departure (F35ADM01)	Afterburner Departure Profile (F35ADA01)	Cycle Contributions
	>	<								
Takeoff Afterburner	105	150	0.00	0.00	0.00	0.00	0.00	0.00	1.01	1.01
Takeoff Military	92.5	105	0.00	0.00	0.00	0.00	0.00	45.29	1.21	46.50
Climb Out	50	92.5	1.33	4.42	0.00	0.00	0.00	13.85	0.68	20.27
Approach	18.5	50	25.88	93.77	23.94	11.51	1.69	0.00	0.00	156.79
Taxi/Idle Out/In	0	18.5	5.36	17.87	0.00	0.00	1.69	0.00	0.00	24.93

USAF Representative Value (default) for Taxi Out/In = **29.8** minutes

Mode	% Thrust Range		Noise LTO Cycle Contributions (min)	LTO Missing Data (min, use defaults)	Representative LTO Cycle (min)
	>	<			
Takeoff Afterburner	105	150	0.02		**0.02**
Takeoff Military	92.5	105	0.77		**0.77**
Climb Out	50	92.5	0.34		**0.34**
Approach	18.5	50	2.61		**2.61**
Taxi/Idle Out/In	0	18.5	0.42	29.8	**30.22**

Representative Weighted Average LTO Time (min) = 33.96

NAS JRB Fort Worth

LTO Cycle TIMs By Power Setting Method

Times Based on Noise Profiles Power Settings (seconds)

Mode	% Thrust Range		Arrivals					Departures	
			Overhead Break Arrival Lead (F35AO03)	Overhead Break Arrival Wingman (F35AO04)	Straight-in IFR Arrival (F35AA01)	Straight-in VFR Arrival (F35AA06)	PFO Arrival (F35AS01)	Mil Departure (F35ADM01)	Afterburner Departure Profile (F35ADA01)
	>	<							
Takeoff Afterburner	105	150	0.00	0.00	0.00	0.00	0.00	0.00	9.73
Takeoff Military	92.5	105	0.00	0.00	0.00	0.00	0.00	62.25	48.36
Climb Out	50	92.5	17.67	17.67	0.00	0.00	0.00	0.00	0.00
Approach	18.5	50	127.96	142.96	119.68	230.25	0.00	0.00	0.00
Taxi/Idle Out/In	0	18.5	71.49	71.49	0.00	0.00	33.89	0.00	0.00
Frequency (% of Time) =			**15%**	**50%**	**20%**	**5%**	**10%**	**95%**	**5%**

Weighted Times Based on Noise Profiles Weighted by Frequency (seconds)

Mode	% Thrust Range		Arrivals					Departures		Noise LTO
			Overhead Break Arrival Lead (F35AO03)	Overhead Break Arrival Wingman (F35AO04)	Straight-in IFR Arrival (F35AA01)	Straight-in VFR Arrival (F35AA06)	PFO Arrival (F35AS01)	Mil Departure (F35ADM01)	Afterburner Departure Profile (F35ADA01)	Cycle Contributions
	>	<								
Takeoff Afterburner	105	150	0.00	0.00	0.00	0.00	0.00	0.00	0.49	0.49
Takeoff Military	92.5	105	0.00	0.00	0.00	0.00	0.00	59.14	2.42	61.56
Climb Out	50	92.5	2.65	8.84	0.00	0.00	0.00	0.00	0.00	11.49
Approach	18.5	50	19.19	71.48	23.94	11.51	0.00	0.00	0.00	126.12
Taxi/Idle Out/In	0	18.5	10.72	35.74	0.00	0.00	3.39	0.00	0.00	49.85

USAF Representative Value (default) for Taxi Out/In = **29.8** minutes

Mode	% Thrust Range		Noise LTO Cycle Contributions (min)	LTO Missing Data (min, use defaults)	Derived LTO Cycle (min)
	>	<			
Takeoff Afterburner	105	150	0.01		**0.01**
Takeoff Military	92.5	105	1.03		**1.03**
Climb Out	50	92.5	0.19		**0.19**
Approach	18.5	50	2.10		**2.10**
Taxi/Idle Out/In	0	18.5	0.83	29.8	**30.63**

Representative Weighted Average LTO Time (min) = 33.96

NAS JRB Fort Worth

LTO Cycle TIMs By Altitude Method

Times Based on Noise Profiles Altitude Values (seconds)

Mode	Arrivals					Departures	
	Overhead Break Arrival Lead (F35AO03)	Overhead Break Arrival - Wingman (F35AO04)	Straight-in IFR Arrival (F35AA01)	Straight-in VFR Arrival (F35AA06)	PFO Arrival (F35AS01)	Mil Departure (F35ADM01)	Afterburner Departure Profile (F35ADA01)
Takeoff Afterburner	0.00	0.00	0.00	0.00	0.00	0.00	30.85
Takeoff Military	0.00	0.00	0.00	0.00	0.00	33.10	0.00
Climb Out Military	0.00	0.00	0.00	0.00	0.00	29.15	27.23
Approach	217.12	232.12	119.68	230.25	33.89	0.00	0.00
Taxi/Idle Out/In	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Frequency (% of Time) =	**15%**	**50%**	**20%**	**5%**	**10%**	**95%**	**5%**

Weighted Times Based on Noise Profiles Weighted by Frequency (seconds)

Mode	Arrivals					Departures		Noise LTO
	Overhead Break Arrival Lead (F35AO03)	Overhead Break Arrival - Wingman (F35AO04)	Straight-in IFR Arrival (F35AA01)	Straight-in VFR Arrival (F35AA06)	PFO Arrival (F35AS01)	Mil Departure (F35ADM01)	Afterburner Departure Profile (F35ADA01)	Cycle Contributions
Takeoff Afterburner	0.00	0.00	0.00	0.00	0.00	0.00	1.54	1.54
Takeoff Military	0.00	0.00	0.00	0.00	0.00	31.44	0.00	31.44
Climb Out Military	0.00	0.00	0.00	0.00	0.00	27.70	1.36	29.06
Approach	32.57	116.06	23.94	11.51	3.39	0.00	0.00	187.47
Taxi/Idle Out/In	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

USAF Representative Value (default) for Taxi Out/In = **29.8** minutes

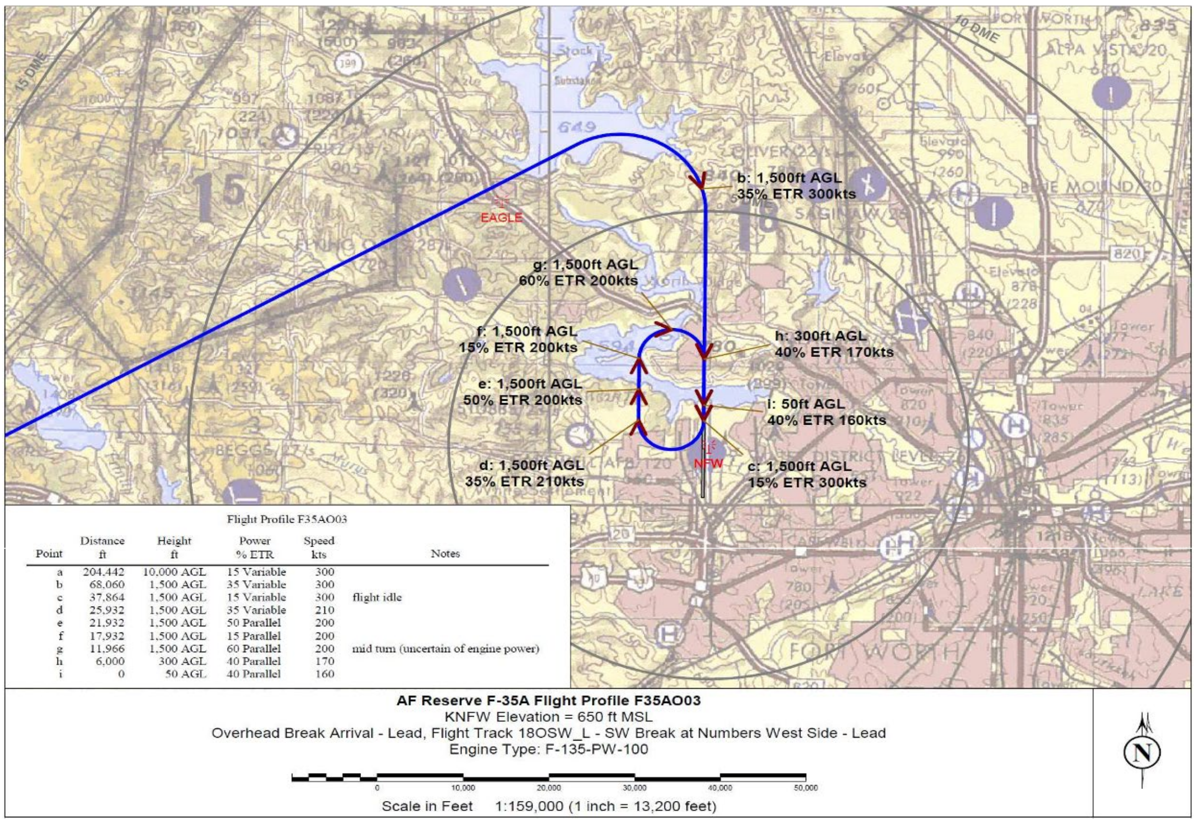
Mode	Noise LTO Cycle Contributions (min)	LTO Missing Data (min, use defaults)	Derived LTO Cycle (min)
Takeoff Afterburner	0.03		**0.03**
Takeoff Military	0.52		**0.52**
Climb Out Military	0.48		**0.48**
Approach	3.12		**3.12**
Taxi/Idle Out/In	0.00	29.8	**29.80**

Representative Weighted Average LTO Time (min) = 33.96

NAS JRB Fort Worth
Flight Profile F35AO03

Point	Distance (ft)	Height (ft)	Power (%ETR)	Speed (kts)	Notes
a	204,442	10000	15	300	
	92,127	3000	31	300	
b	68,060	1500	35	300	
c	37,864	1500	15	300	flight idle
d	25,932	1500	35	210	
e	21,932	1500	50	200	
f	17,932	1500	15	200	
g	11,966	1500	60	200	mid turn (uncertain of engine power)
h	6,000	300	40	170	
i	0	50	40	160	

True Flight Distance (ft)	Air Speed (fps)	Segment Time (sec)		
24114	506	47.62	Approach	217
30196	506	59.64		
11932	430	27.72		
4000	346	11.56		
4000	338	11.85		
5966	338	17.67		
6085	312	19.49		
6005	278	21.56		
		217.12		

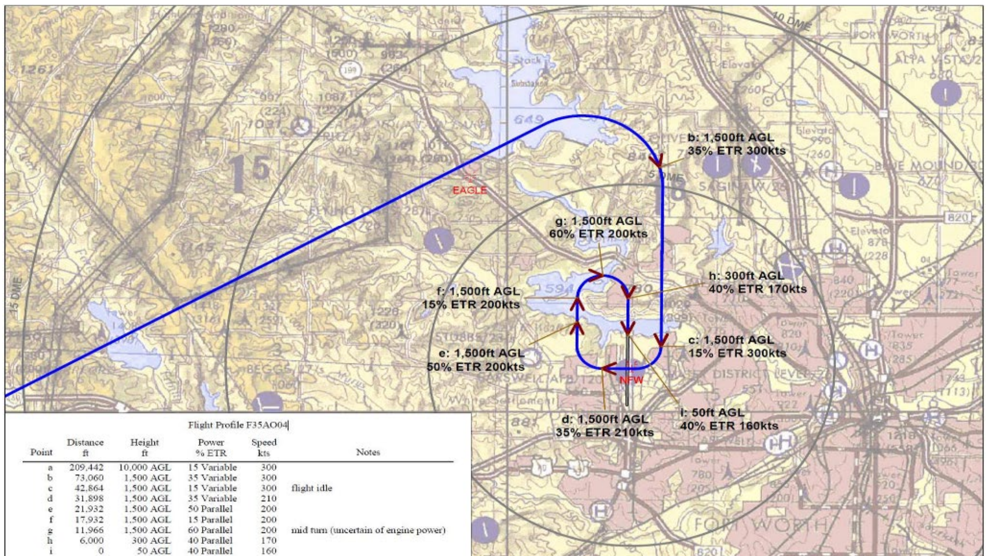


NAS JRB Fort Worth

Flight Profile F35AO0

Point	Distance (ft)	Height (ft)	Power (%ETR)	Speed (kts)	Notes
a	209,442	10000	15	300	
	97,127	3000	31	300	
b	73,060	1500	35	300	
c	42,864	1500	15	300	flight idle
d	31,898	1500	35	210	
e	21932	1500	50	200	
f	17932	1500	15	200	
g	11966	1500	60	200	mid turn (uncertain of engine power)
h	6000	300	40	170	
i	0	50	40	160	

True Flight Distance (ft)	Air Speed (fps)	Segment Time (sec)		
24114	506	47.62	Approach	232
30196	506	59.64		
10966	430	25.48		
9966	346	28.80		
4000	338	11.85		
5966	338	17.67		
6085	312	19.49		
6005	278	21.56		
		232.12		



Point	Distance ft	Height ft	Power % ETR	Speed kts	Notes
a	209,442	10,000 AGL	15 Variable	300	
b	73,060	1,500 AGL	35 Variable	300	
c	42,864	1,500 AGL	15 Variable	300	flight idle
d	31,898	1,500 AGL	35 Variable	210	
e	21,932	1,500 AGL	50 Parallel	200	
f	17,932	1,500 AGL	15 Parallel	200	
g	11,966	1,500 AGL	60 Parallel	200	mid turn (uncertain of engine power)
h	6,000	300 AGL	40 Parallel	170	
i	0	50 AGL	40 Parallel	160	

AF Reserve F-35A Flight Profile F35AO04
KNFW Elevation = 650 ft MSL
Overhead Break Arrival - Wingman, Flight Track 18OSW_W - Northwest Break at Numbers West Side - Wingman
Engine Type: F-135-PW-100

0 10,000 20,000 30,000 40,000 50,000
Scale in Feet 1:167,000 (1 inch = 14,000 feet)

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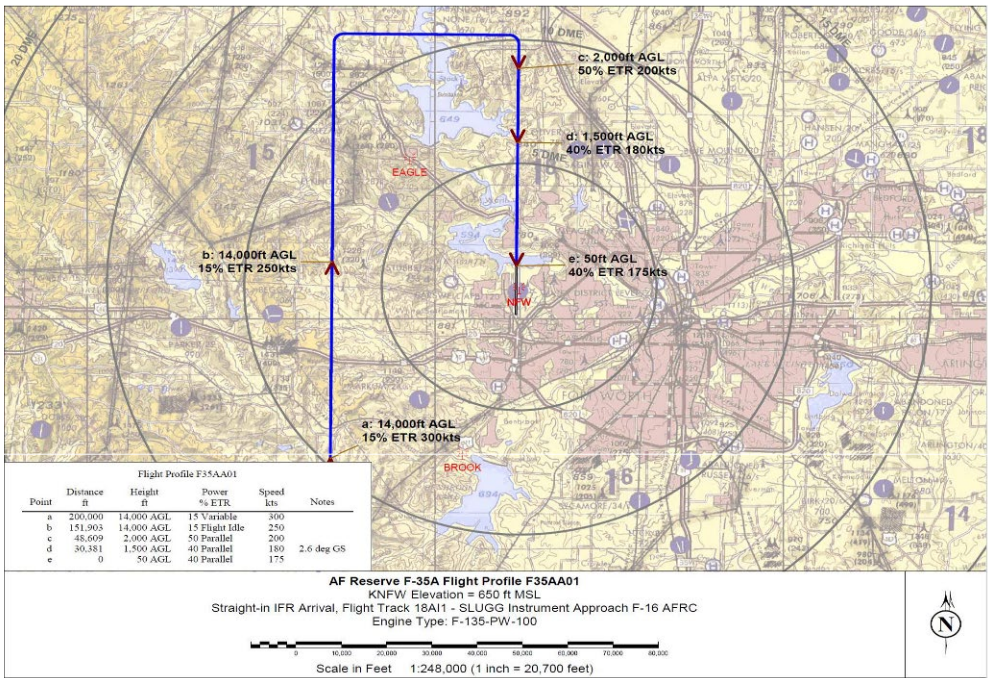
NAS JRB Fort Worth

Flight Profile F35AA01

Point	Distance (ft)	Height (ft)	Power (%ETR)	Speed (kts)	Notes	True Flight Distance (ft)	Air Speed (fps)	Segment Time (sec)		
a	200,000	14000	15	300						
b	151,903	14000	15	250						
	57,217	3000	47	204						
c	48,609	2000	50	200		8666	341	25.41	Approach	120
d	30,381	1500	40	180	2.6 deg GS	18235	321	56.86		
e	19,268	50	40	175		11207	300	37.41		
								119.68		



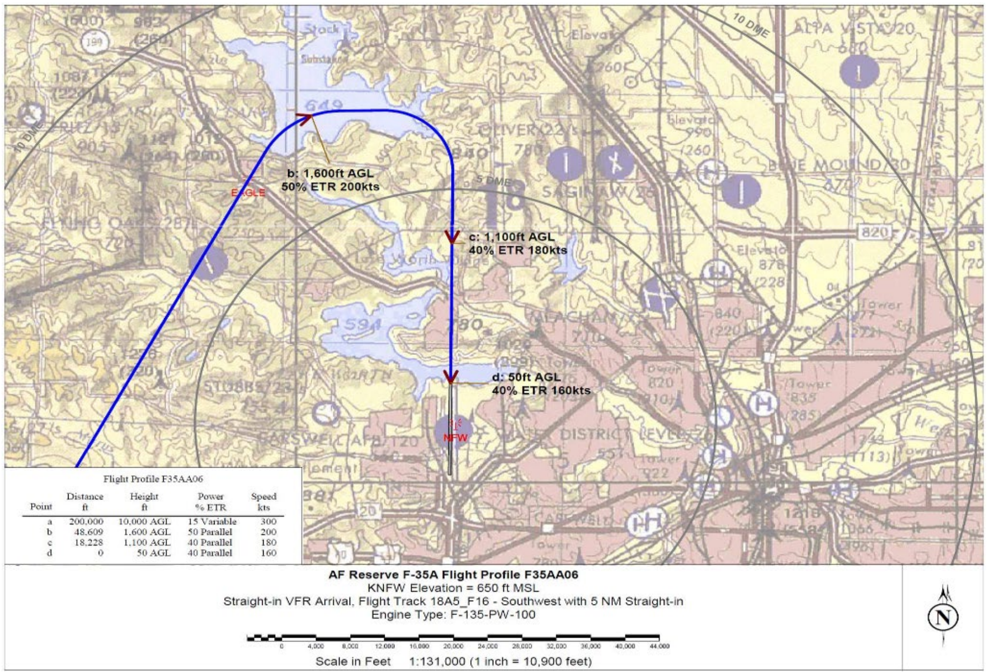
NAS JRB Fort Worth

Flight Profile F35AA06

Point	Distance (ft)	Height (ft)	Power (%ETR)	Speed (kts)
a	200,000	10000	15	300
	73,841	3000	44	217
b	48,609	1600	50	200
c	18,228	1100	40	180
d	0	50	40	160

Notes

True Flight Distance (ft)	Air Speed (fps)	Segment Time (sec)		
25271	352	71.87	Approach	230
30385	321	94.75		
18258	287	63.63		
		230.25		

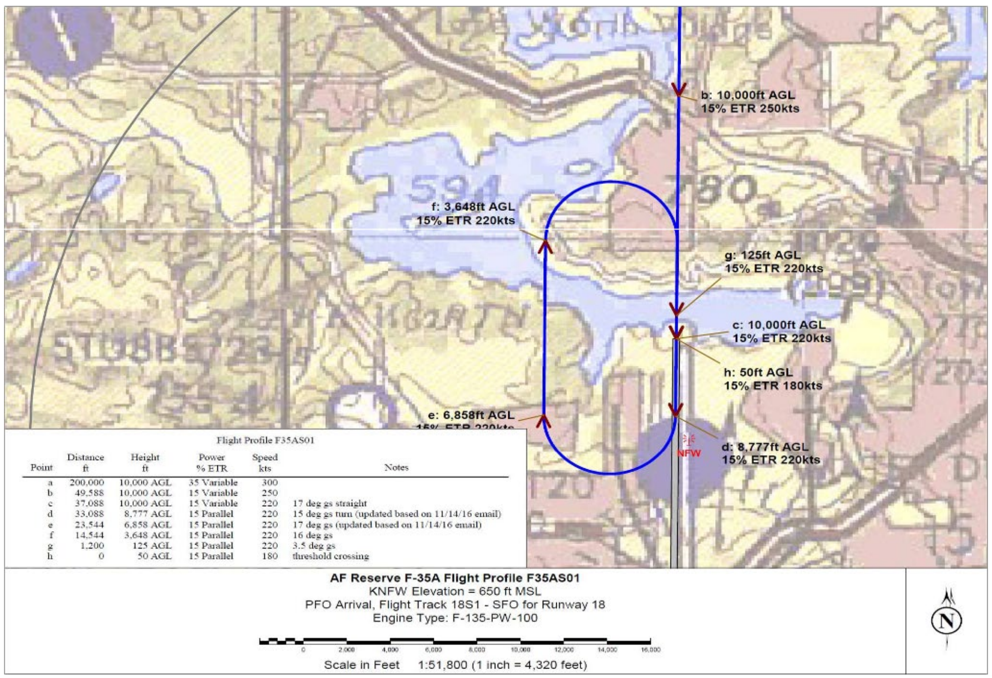


NAS JRB Fort Worth

Flight Profile F35AS01

Point	Distance (ft)	Height (ft)	Power (%ETR)	Speed (kts)	Notes
a	200,000	10000	35	300	
b	49,588	10000	15	250	
c	37,088	10000	15	220	17 deg gs straight
d	33,088	8777	15	220	15 deg gs turn (updated based on 11/14/16 email)
e	23,544	6858	15	220	17 deg gs (updated based on 11/14/16 email)
f	14,544	3648	15	220	16 deg gs
	12,090	3000	15	220	
g	1,200	125	15	220	3.5 deg gs
h	0	50	15	180	threshold crossing

True Flight Distance (ft)	Air Speed (fps)	Segment Time (sec)		
11263	371	30.33	Approach	34
1202	338	3.56		
		33.89		

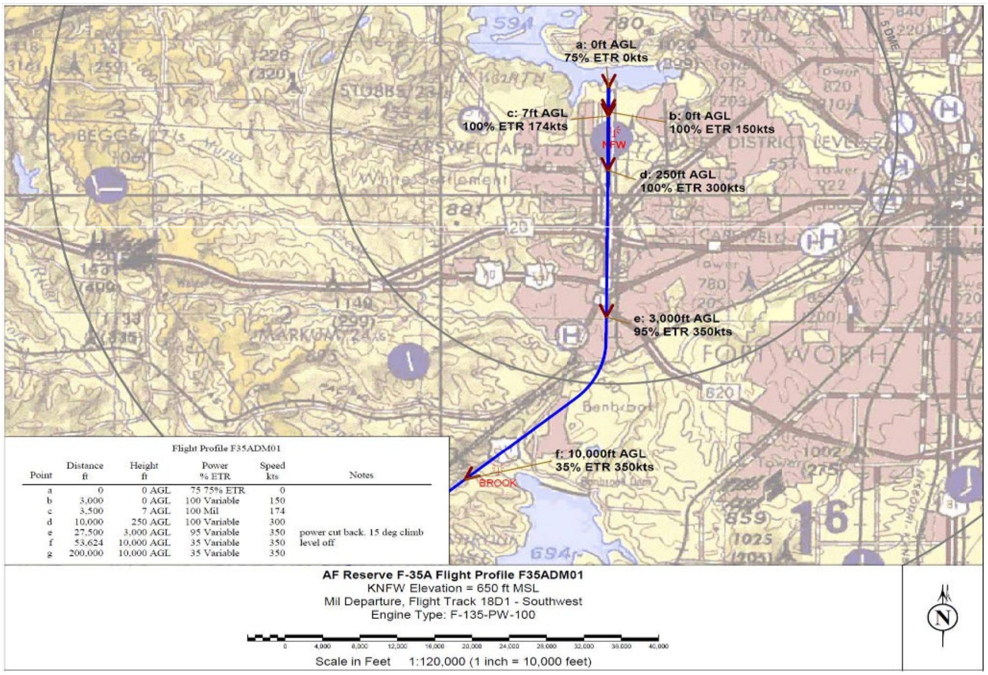


NAS JRB Fort Worth

Flight Profile F35ADM01

Point	Distance (ft)	Height (ft)	Power (%ETR)	Speed (kts)	Notes
a	0	0	75	0	
b	3,000	0	100	150	
c	3,500	7	100	174	
d	10,000	250	100	300	
	11,591	500	100	305	
e	27,500	3000	95	350	power cut back. 15 deg climb
f	53,624	10000	35	350	level off
g	200,000	10000	35	350	

True Flight Distance (ft)	Air Speed (fps)	Segment Time (sec)		
3000	253	11.85	Take off	33.10
500	273	1.83		
6505	400	16.26		
1610	510	3.16		
16104	552	29.15	Climb out	29.15
		62.25		

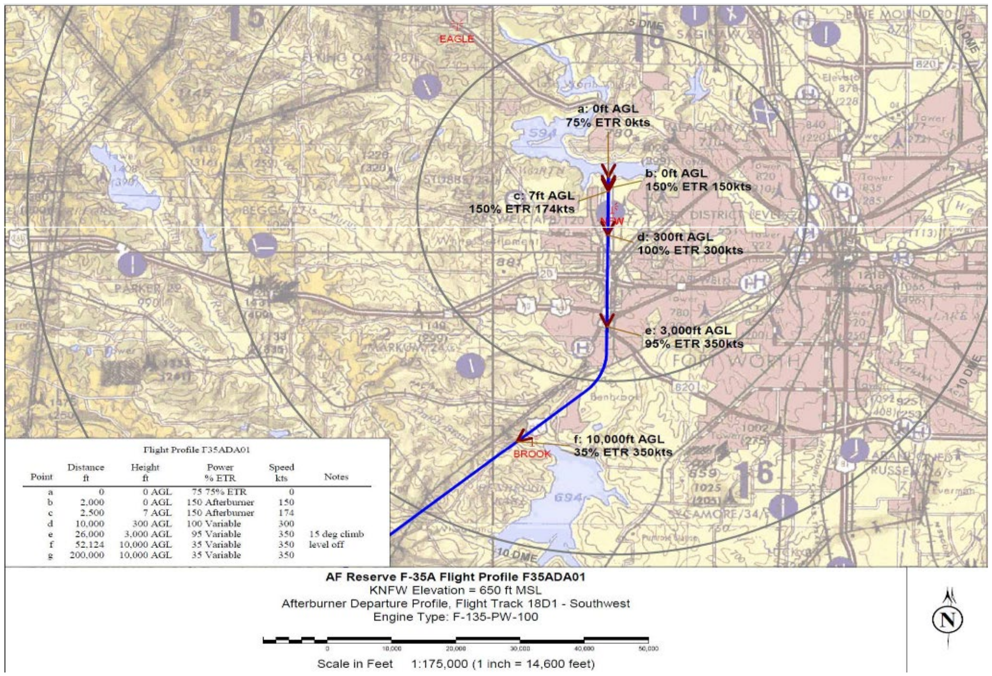


NAS JRB Fort Worth

Flight Profile F35ADA01

Point	Distance (ft)	Height (ft)	Power (%ETR)	Speed (kts)	Notes
a	0	0	75	0	
b	2,000	0	150	150	
c	2,500	7	150	174	
d	10,000	300	100	300	
	11,185	500	100	304	
e	26,000	3000	95	350	15 deg climb
f	52,124	10000	35	350	level off
g	200,000	10000	35	350	

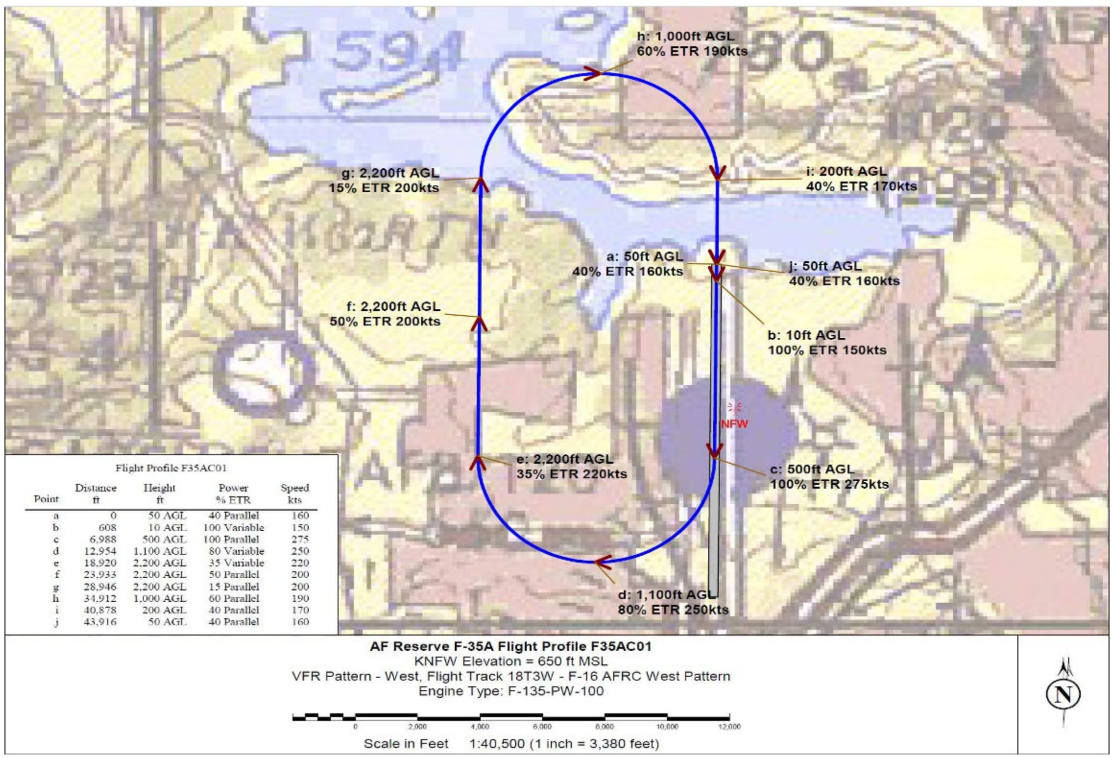
True Flight Distance (ft)	Air Speed (fps)	Segment Time (sec)		
2000	253	7.90	Take off	30.85
500	273	1.83		
7506	400	18.76		
1202	509	2.36		
15024	552	27.23	Climb out	27.23
		58.09		



NAS JRB Fort Worth

Flight Profile F35AC01

Point	Distance (ft)	Height (ft)	Power (%ETR)	Speed (kts)	Notes	True Flight Distance (ft)	Air Speed (fps)	Segment Time (sec)
a	0	50	40	160				
b	608	10	100	150		609	262	2.33
c	6,988	500	100	275		6399	359	17.84
d	12,954	1100	80	250		5996	443	13.53
e	18,920	2200	35	220		6067	397	15.30
f	23,933	2200	50	200		5013	354	14.14
g	28,946	2200	15	200		5013	338	14.85
h	34,912	1000	60	190		6085	329	18.49
i	40,878	200	40	170		6019	304	19.81
j	43,916	50	40	160		3042	278	10.92
								127.22

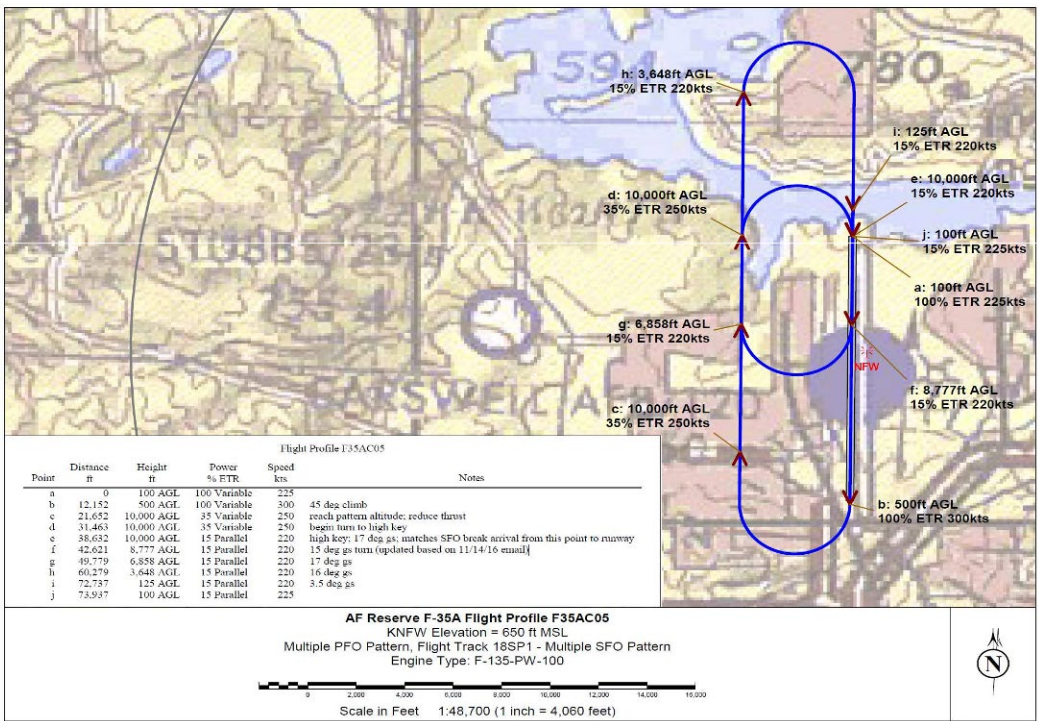


Point	Distance ft	Height ft	Power % ETR	Speed kts
a	0	50 AGL	40 Parallel	160
b	608	10 AGL	100 Variable	150
c	6,988	500 AGL	100 Parallel	275
d	12,954	1,100 AGL	80 Variable	250
e	18,920	2,200 AGL	35 Variable	220
f	23,933	2,200 AGL	50 Parallel	200
g	28,946	2,200 AGL	15 Parallel	200
h	34,912	1,000 AGL	60 Parallel	190
i	40,878	200 AGL	40 Parallel	170
j	43,916	50 AGL	40 Parallel	160

NAS JRB Fort Worth

Flight Profile F35AC05

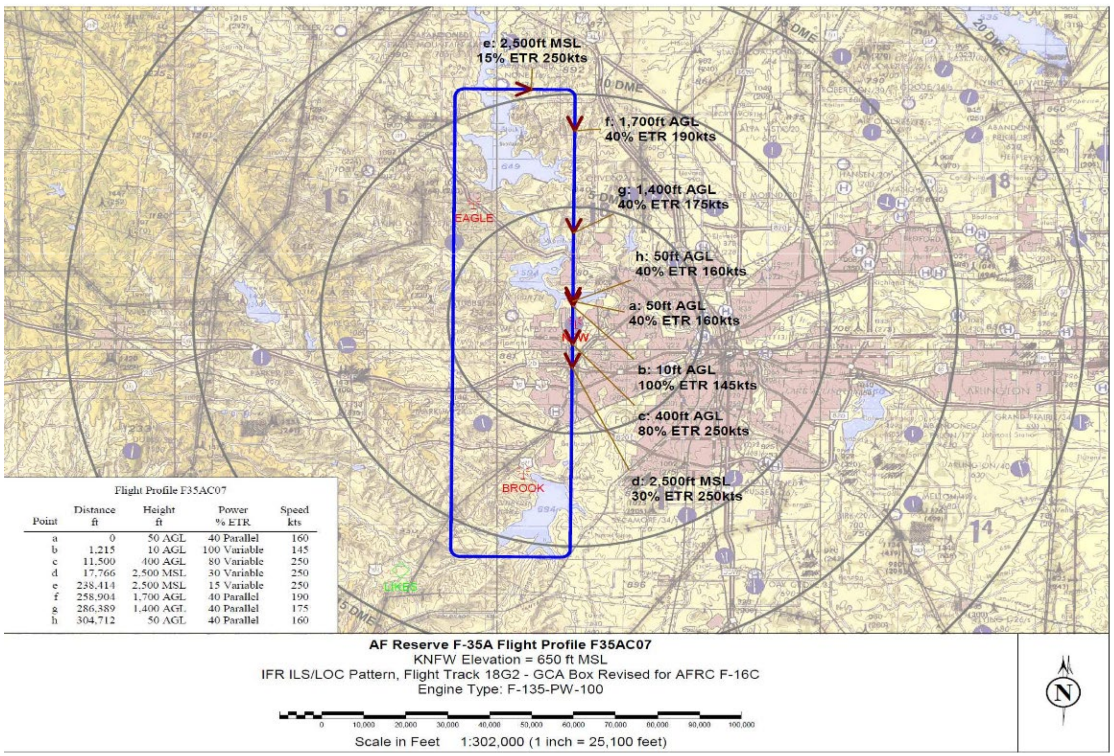
Point	Distance (ft)	Height (ft)	Power (%ETR)	Speed (kts)	Notes	True Flight Distance (ft)	Air Speed (fps)	Segment Time (sec)
a	0	100	100	225				
b	12,152	500	100	300	45 deg climb	12159	443	27.44
	14,652	3000	83	287		3536	495	7.14
c	21,652	10000	35	250	reach pattern altitude; reduce thrust			
d	31,463	10000	35	250	begin turn to high key			
e	38,632	10000	15	220	high key; 17 deg gs; matches SFO break arrival from this point to runway			
f	42,621	8777	15	220	15 deg gs turn (updated based on 11/14/16 email)			
g	49,779	6858	15	220	17 deg gs			
h	60,279	3648	15	220	16 deg gs			
	62,570	3000	15	220				
i	72,737	125	15	220	3.5 deg gs	10565	371	28.45
j	73,937	100	15	225		1200	376	3.20
								66.23



NAS JRB Fort Worth

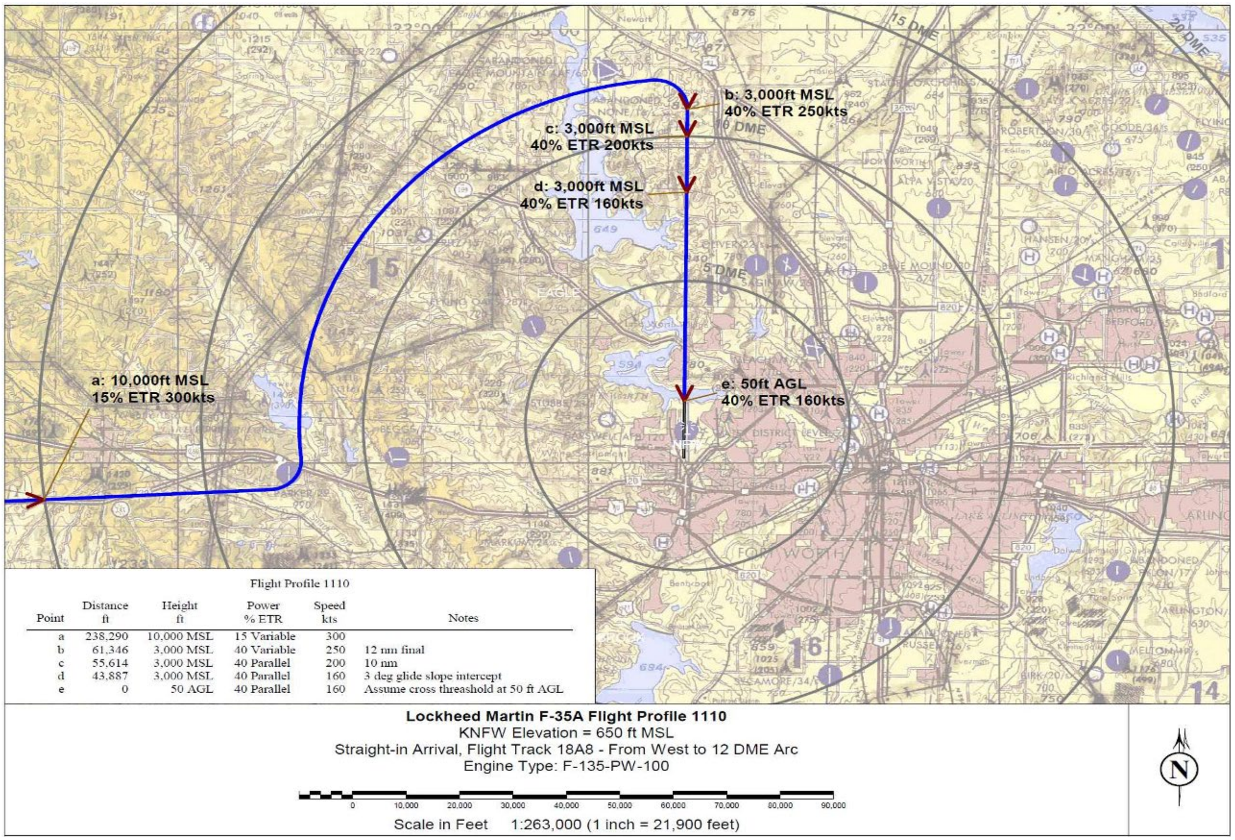
Flight Profile F35AC07

Point	Distance (ft)	Height (ft)	Power (%ETR)	Speed (kts)	Notes	True Flight Distance (ft)	Air Speed (fps)	Segment Time (sec)
a	0	50	40	160				
b	1,215	10	100	145		1216	257	4.72
c	11,500	400	80	250		10292	333	30.88
d	17,766	1850	30	250		6432	422	15.24
e	238,414	1850	15	250		220648	422	522.92
f	258,904	1700	40	190		20491	371	55.18
g	286,389	1400	40	175		27487	308	89.24
h	304,712	50	40	160		18373	283	64.99
								783.17



NAS JRB Fort Worth
Flight Profile 1110

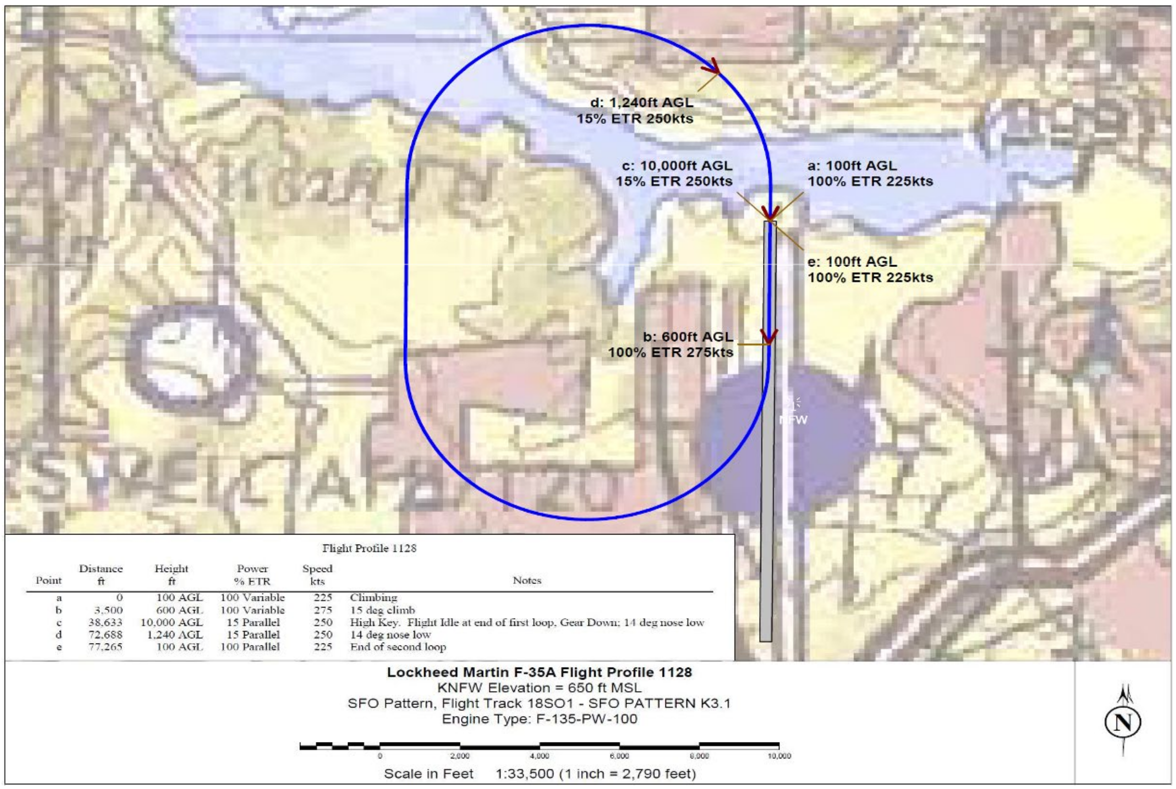
Point	Distance	Height	Power (%ETR)	Speed (kts)	Notes
a	238,29	1000	15	300	
b	61,34	300	40	250	12 nm final
c	55,61	300	40	200	10 nm
d	43,88	300	40	160	3 deg glide slope intercept
e	0	50	40	160	Assume cross threshold at 50 ft AGL



NAS JRB Fort Worth

Flight Profile 1128

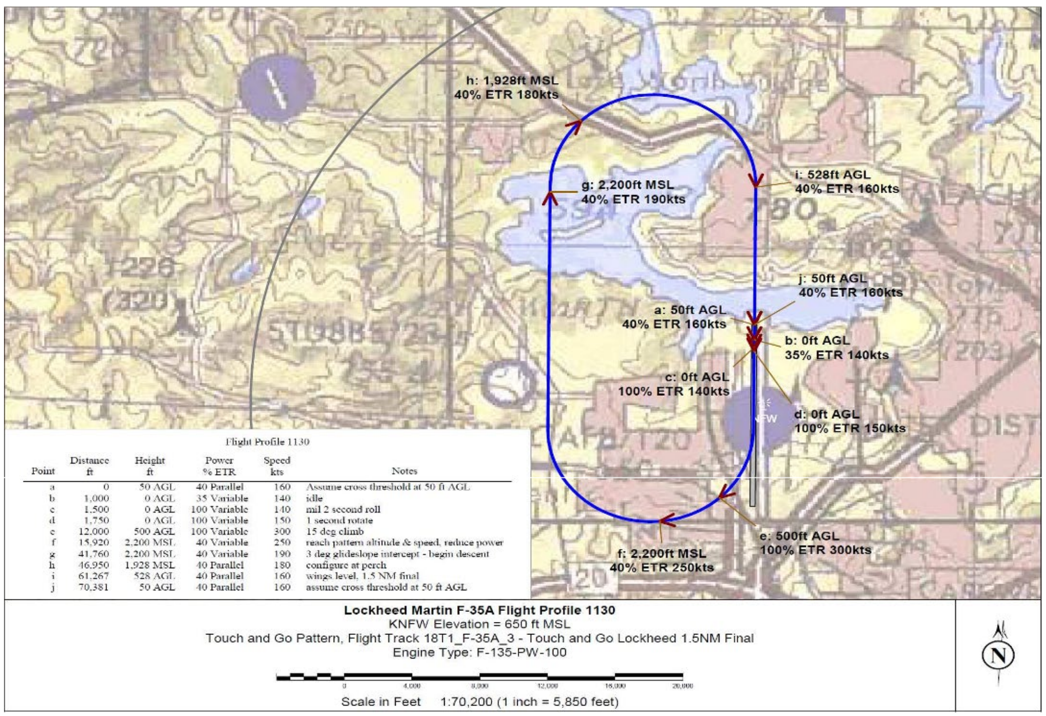
Point	Distance (ft)	Height (ft)	Power (%ETR)	Speed (kts)	Notes
a	0	100	100	225	Climbing
b	3,500	600	100	275	15 deg climb
	12,470	3000	78	269	
c	38,633	10000	15	250	High Key. Flight Idle at end of first loop, Gear Down; 14 deg nose low
	65,846	3000	15	250	
d	72,688	1240	15	250	14 def nose low
e	77,265	100	100	225	End of second loop



NAS JRB Fort Worth

Flight Profile 1130

Point	Distance (ft)	Height (ft)	Power (%ETR)	Speed (kts)	Notes
a	0	50	40	160	Assume cross threshold at 50 ft AGL
b	1,000	0	35	140	idle
c	1,500	0	100	140	mil 2 second roll
d	1,750	0	100	150	1 second rotate
e	12,000	500	100	300	15 deg climb
f	15,920	2200	40	250	reach pattern altitude & speed, reduce power
g	41,760	2200	40	190	3 deg glideslope intercept - begin descent
h	46,950	1928	40	180	configure at perch
i	61,267	528	40	160	wings level, 1.5 NM final
j	70,381	50	40	160	assume cross threshold at 50 ft AGL



Flight Profile 1130

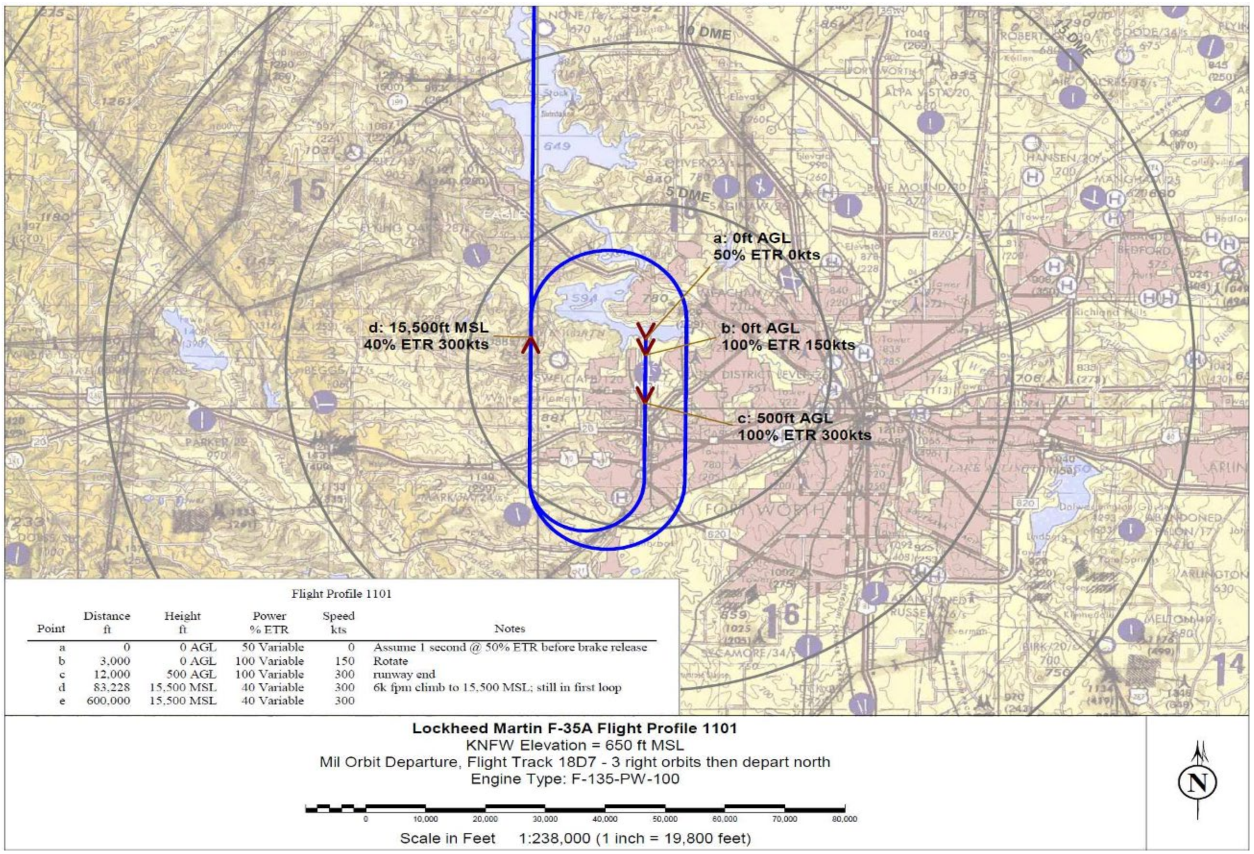
Point	Distance ft	Height ft	Power % ETR	Speed kts	Notes
a	0	50 AGL	40 Parallel	160	Assume cross threshold at 50 ft AGL
b	1,000	0 AGL	35 Variable	140	idle
c	1,500	0 AGL	100 Variable	140	mil 2 second roll
d	1,750	0 AGL	100 Variable	150	1 second rotate
e	12,000	500 AGL	100 Variable	300	15 deg climb
f	15,920	2,200 MSL	40 Variable	250	reach pattern altitude & speed, reduce power
g	41,760	2,200 MSL	40 Variable	190	3 deg glideslope intercept - begin descent
h	46,950	1,928 MSL	40 Parallel	180	configure at perch
i	61,267	528 AGL	40 Parallel	160	wings level, 1.5 NM final
j	70,381	50 AGL	40 Parallel	160	assume cross threshold at 50 ft AGL

Lockheed Martin F-35A Flight Profile 1130
KNFW Elevation = 650 ft MSL
Touch and Go Pattern, Flight Track 18T1_F-35A_3 - Touch and Go Lockheed 1.5NM Final
Engine Type: F-135-PW-100

NAS JRB Fort Worth

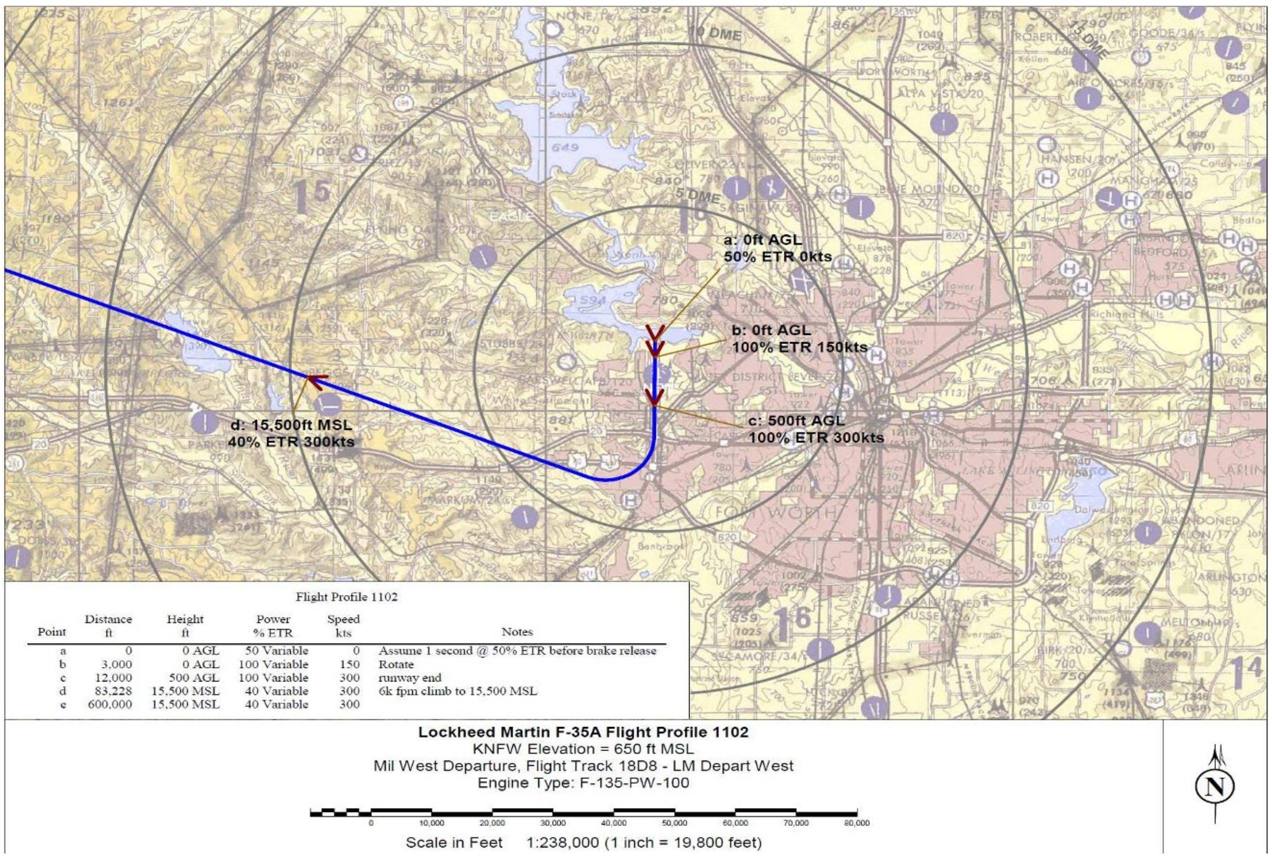
Flight Profile 1101

Point	Distance	Height	Power (%ETR)	Speed (kts)	Notes
a	0	0	50	0	Assume 1 second @ 50% ETR before
b	3,00	0	100	150	Rotate
c	12,00	500	100	300	runway end
d	83,22	1550	40	300	6k fpm climb to 15,500 MSL; still in first
e	600,00	1550	40	300	



NAS JRB Fort Worth
Flight Profile 1102

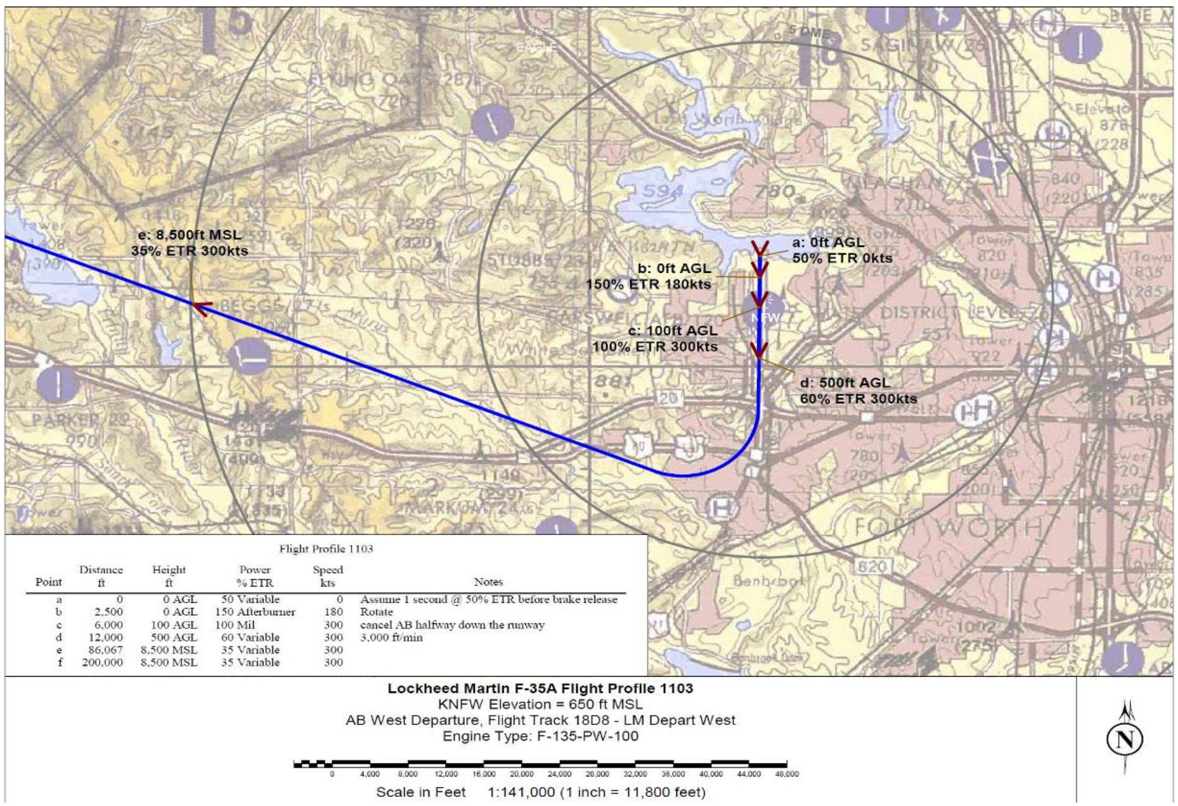
Point	Distance	Height	Power (%ETR)	Speed (kts)	Notes
a	0	0	50	0	Assume 1 second @ 50% ETR before
b	3,00	0	100	150	Rotate
c	12,00	500	100	300	runway end
d	83,22	1550	40	300	6k fpm climb to 15,500 MSL
e	600,00	1500	40	300	



NAS JRB Fort Worth

Flight Profile 1103

Point	Distance (ft)	Height (ft)	Power (%ETR)	Speed (kts)	Notes
a	0	0	50	0	Assume 1 second @ 50% ETR before brake release
b	2,500	0	150	180	Rotate
c	6,000	100	100	300	cancel AB halfway down the runway
d	12,000	500	60	300	3,000 ft/min
e	86,067	8500	35	300	
f	200,000	8500	35	300	



Landing and Takeoff Emissions

Estimated F-35A Emissions Based on LTO Cycle Derived from Site-Specific Noise Data
(Standard Mode Altitude Method)

Mode	Fuel Flow (lb/hr)	Emission Factors (lb/1000lb fuel)						
		NO_X	CO	VOC	HAPs	SO_X	PM_{10}	$PM_{2.5}$
Idle	2128	2.00	22.00	0.05	0.04	1.07	2.14	1.92
Approach	6730	9.00	1.20	0.01	0.01	1.07	1.52	1.37
Intermediate	16068	18.50	0.60	0.00	0.00	1.07	1.32	1.19
Military	19003	22.00	0.40	0.00	0.00	1.07	1.17	1.05
Afterburner	37938	14.43	9.87	0.01	0.01	1.07	1.11	1.00

Mode	TIM (min)	Emissions (lb)						
		NO_X	CO	VOC	HAPs	SO_X	PM_{10}	$PM_{2.5}$
Idle	29.80	2.11	23.25	0.05	0.04	1.13	2.26	2.03
Approach	3.12	3.15	0.42	0.00	0.00	0.37	0.53	0.48
Intermediate	0.48	2.40	0.08	0.00	0.00	0.14	0.17	0.15
Military	0.52	3.65	0.07	0.00	0.00	0.18	0.19	0.17
Afterburner	0.03	0.23	0.16	0.00	0.00	0.02	0.02	0.02
Emissions per LTO (lb) =		**11.55**	**23.98**	**0.06**	**0.05**	**1.84**	**3.18**	**2.85**
Emissions per LTO (ton) =		**0.00578**	**0.01199**	**0.00003**	**0.00002**	**0.00092**	**0.00159**	**0.00143**

NAS JRB Fort Worth

Landing and Takeoff Emissions

Estimated F-35A Emissions Based on LTO Cycle Derived from Site-Specific Noise Data

(Power setting reported in Noise Data Method)

Mode	% Power	Fuel Flow (lb/hr)	Emission Factors (lb/1000lb fuel)						
			NO_X	CO	VOC	HAPs	SO_X	PM_{10}	$PM_{2.5}$
Idle	0 > 10 ≤ 18.5	2128	2.00	22.00	0.05	0.04	1.07	2.14	1.92
Approach	18.5 > 30 ≤ 50	6730	9.00	1.20	0.01	0.01	1.07	1.52	1.37
Intermediate	50 > 85 ≤ 92.5	16068	18.50	0.60	0.00	0.00	1.07	1.32	1.19
Military	92.5 > 100 ≤ 105	19003	22.00	0.40	0.00	0.00	1.07	1.17	1.05
Afterburner	105 > 130 ≤ 150	37938	14.43	9.87	0.01	0.01	1.07	1.11	1.00

Mode		TIM (min)	Emissions (lb)						
			NO_X	CO	VOC	HAPs	SO_X	PM_{10}	$PM_{2.5}$
Idle	0 > 10 ≤ 18.5	30.63	2.17	23.90	0.05	0.04	1.16	2.32	2.09
Approach	18.5 > 30 ≤ 50	2.10	2.12	0.28	0.00	0.00	0.25	0.36	0.32
Intermediate	50 > 85 ≤ 92.5	0.19	0.95	0.03	0.00	0.00	0.05	0.07	0.06
Military	92.5 > 100 ≤ 105	1.03	7.15	0.13	0.00	0.00	0.35	0.38	0.34
Afterburner	105 > 130 ≤ 150	0.01	0.07	0.05	0.00	0.00	0.01	0.01	0.01

Emissions per LTO (lb) = **12.47** **24.39** **0.06** **0.05** **1.82** **3.14**
2.82

Emissions per LTO (ton) =
0.006233 **0.012197** **0.00003** **0.00002** **0.000911** **0.001568**
0.001408

NAS JRB Fort Worth

Touch and Go Emissions

Estimated F-35A Emissions Based on LTO Cycle Derived from Site-Specific Noise Data

(Power Setting Method)

Mode	Fuel Flow (lb/hr)	Emission Factors (lb/1000lb fuel)						
		NO_X	CO	VOC	HAPs	SO_X	PM_{10}	$PM_{2.5}$
Idle	2128	2.00	22.00	0.05	0.04	1.07	2.14	1.92
Approach	6730	9.00	1.20	0.01	0.01	1.07	1.52	1.37
Intermediate	16068	18.50	0.60	0.00	0.00	1.07	1.32	1.19
Military	19003	22.00	0.40	0.00	0.00	1.07	1.17	1.05
Afterburner	37938	14.43	9.87	0.01	0.01	1.07	1.11	1.00

Mode	TIM (min)	Emissions (lb)						
		NO_X	CO	VOC	HAPs	SO_X	PM_{10}	$PM_{2.5}$
Idle	0.44	0.03	0.35	0.00	0.00	0.02	0.03	0.03
Approach	0.96	0.97	0.13	0.00	0.00	0.11	0.16	0.15
Intermediate	0.49	2.44	0.08	0.00	0.00	0.14	0.17	0.16
Military	0.34	2.39	0.04	0.00	0.00	0.12	0.13	0.11
Afterburner	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Emissions per LTO (lb) = 5.83 0.60 0.00 0.00 0.39 0.50 0.45

Emissions per LTO (ton) = 0.002913 0.000299 0.00000 0.00000 0.000195 0.000249 0.000224

ATTACHMENT C-4 WHITEMAN AIR FORCE BASE - AIR CONFORMITY APPLICABILITY MODEL REPORTS

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AIR CONFORMITY APPLICABILITY MODEL REPORT
RECORD OF AIR ANALYSIS (ROAA)

1. General Information: The Air Force's Air Conformity Applicability Model (ACAM) was used to perform an analysis to assess the potential air quality impact/s associated with the action in accordance with the Air Force Instruction 32-7040, Air Quality Compliance And Resource Management; the Environmental Impact Analysis Process (EIAP, 32 CFR 989); and the General Conformity Rule (GCR, 40 CFR 93 Subpart B). This report provides a summary of the ACAM analysis.

a. Action Location:
Base: WHITEMAN AFB
State: Missouri
County(s): Johnson
Regulatory Area(s): NOT IN A REGULATORY AREA

b. Action Title: AFRC F-35A EIS - Whiteman AFB

c. Project Number/s (if applicable): Replace 24 A-10Cs with 24 F-35As

d. Projected Action Start Date: 5 / 2021

e. Action Description:

Demolition/Renovation/Construction activities and replacement aircraft operations.

f. Point of Contact:
Name: Chris Crabtree, Leidos, Inc., and Austin N. Naranjo, Solutio
Title:
Organization:
Email:
Phone Number:

2. Air Impact Analysis: Based on the attainment status at the action location, the requirements of the General Conformity Rule are:

_____ applicable
__X__ not applicable

Total combined direct and indirect emissions associated with the action were estimated through ACAM on a calendar-year basis for the "worst-case" and "steady state" (net gain/loss upon action fully implemented) emissions.

"Air Quality Indicators" were used to provide an indication of the significance of potential impacts to air quality. These air quality indicators are EPA General Conformity Rule (GCR) thresholds (de minimis levels) that are applied out of context to their intended use. Therefore, these indicators do not trigger a regulatory requirement; however, they provide a warning that the action is potentially significant. It is important to note that these indicators only provide a clue to the potential impacts to air quality.

Given the GCR de minimis threshold values are the maximum net change an action can acceptably emit in non-attainment and maintenance areas, these threshold values would also conservatively indicate an actions emissions within an attainment would also be acceptable. An air quality indicator value of 100 tons/yr is used based on the GCR de minimis threshold for the least severe non-attainment classification for all criteria pollutants (see 40 CFR 93.153). Therefore, the worst-case year emissions were compared against the GCR Indicator and are summarized below.

AIR CONFORMITY APPLICABILITY MODEL REPORT RECORD OF AIR ANALYSIS (ROAA)

Analysis Summary:

2021

Pollutant	Action Emissions (ton/yr)	AIR QUALITY INDICATOR	
		Threshold (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.144	100	No
NOx	0.896	100	No
CO	0.992	100	No
SOx	0.002	100	No
PM 10	0.323	100	No
PM 2.5	0.038	100	No
Pb	0.000	25	No
NH3	0.001	100	No
CO2e	223.4		

2022

Pollutant	Action Emissions (ton/yr)	AIR QUALITY INDICATOR	
		Threshold (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.408	100	No
NOx	1.753	100	No
CO	1.905	100	No
SOx	0.004	100	No
PM 10	2.067	100	No
PM 2.5	0.077	100	No
Pb	0.000	25	No
NH3	0.002	100	No
CO2e	416.2		

2023

Pollutant	Action Emissions (ton/yr)	AIR QUALITY INDICATOR	
		Threshold (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.000	100	No
NOx	0.000	100	No
CO	0.000	100	No
SOx	0.000	100	No
PM 10	0.000	100	No
PM 2.5	0.000	100	No
Pb	0.000	25	No
NH3	0.000	100	No
CO2e	0.0		

AIR CONFORMITY APPLICABILITY MODEL REPORT
RECORD OF AIR ANALYSIS (ROAA)

2024

Pollutant	Action Emissions (ton/yr)	AIR QUALITY INDICATOR	
		Threshold (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	-20.500	100	No
NOx	19.661	100	No
CO	-6.383	100	No
SOx	3.917	100	No
PM 10	-2.539	100	No
PM 2.5	0.522	100	No
Pb	0.000	25	No
NH3	0.001	100	No
CO2e	14717.5		

2025 - (Steady State)

Pollutant	Action Emissions (ton/yr)	AIR QUALITY INDICATOR	
		Threshold (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	-20.500	100	No
NOx	19.661	100	No
CO	-6.383	100	No
SOx	3.917	100	No
PM 10	-2.539	100	No
PM 2.5	0.522	100	No
Pb	0.000	25	No
NH3	0.001	100	No
CO2e	14717.5		

None of estimated emissions associated with this action are above the GCR indicators, indicating no significant impact to air quality; therefore, no further air assessment is needed.

//Chris Crabtree, Austin Naranjo// 7/23/20

Chris Crabtree, Leidos, Inc., and Austin N. Naranjo, Solutio DATE

AIR CONFORMITY APPLICABILITY MODEL REPORT
RECORD OF AIR ANALYSIS (ROAA)

1. General Information: The Air Force's Air Conformity Applicability Model (ACAM) was used to perform an analysis to assess the potential air quality impact/s associated with the action in accordance with the Air Force Instruction 32-7040, Air Quality Compliance And Resource Management; the Environmental Impact Analysis Process (EIAP, 32 CFR 989); and the General Conformity Rule (GCR, 40 CFR 93 Subpart B). This report provides a summary of the ACAM analysis.

a. Action Location:
Base: WHITEMAN AFB
State: Missouri
County(s): Johnson
Regulatory Area(s): NOT IN A REGULATORY AREA

b. Action Title: AFRC F-35A EIS - Whiteman AFB - 50% Afterburner Departures

c. Project Number/s (if applicable): Replace 24 A-10Cs with 24 F-35As

d. Projected Action Start Date: 5 / 2021

e. Action Description:

Demolition/Renovation/Construction activities and replacement aircraft operations.

f. Point of Contact:
Name: Chris Crabtree, Leidos, Inc., and Austin N. Naranjo, Solutio
Title:
Organization:
Email:
Phone Number:

2. Air Impact Analysis: Based on the attainment status at the action location, the requirements of the General Conformity Rule are:

_____ applicable
__X__ not applicable

Total combined direct and indirect emissions associated with the action were estimated through ACAM on a calendar-year basis for the "worst-case" and "steady state" (net gain/loss upon action fully implemented) emissions.

"Air Quality Indicators" were used to provide an indication of the significance of potential impacts to air quality. These air quality indicators are EPA General Conformity Rule (GCR) thresholds (de minimis levels) that are applied out of context to their intended use. Therefore, these indicators do not trigger a regulatory requirement; however, they provide a warning that the action is potentially significant. It is important to note that these indicators only provide a clue to the potential impacts to air quality.

Given the GCR de minimis threshold values are the maximum net change an action can acceptably emit in non-attainment and maintenance areas, these threshold values would also conservatively indicate an actions emissions within an attainment would also be acceptable. An air quality indicator value of 100 tons/yr is used based on the GCR de minimis threshold for the least severe non-attainment classification for all criteria pollutants (see 40 CFR 93.153). Therefore, the worst-case year emissions were compared against the GCR Indicator and are summarized below.

AIR CONFORMITY APPLICABILITY MODEL REPORT
RECORD OF AIR ANALYSIS (ROAA)

Analysis Summary:

2021

Pollutant	Action Emissions (ton/yr)	AIR QUALITY INDICATOR	
		Threshold (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.144	100	No
NOx	0.896	100	No
CO	0.992	100	No
SOx	0.002	100	No
PM 10	0.323	100	No
PM 2.5	0.038	100	No
Pb	0.000	25	No
NH3	0.001	100	No
CO2e	223.4		

2022

Pollutant	Action Emissions (ton/yr)	AIR QUALITY INDICATOR	
		Threshold (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.408	100	No
NOx	1.753	100	No
CO	1.905	100	No
SOx	0.004	100	No
PM 10	2.067	100	No
PM 2.5	0.077	100	No
Pb	0.000	25	No
NH3	0.002	100	No
CO2e	416.2		

2023

Pollutant	Action Emissions (ton/yr)	AIR QUALITY INDICATOR	
		Threshold (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.000	100	No
NOx	0.000	100	No
CO	0.000	100	No
SOx	0.000	100	No
PM 10	0.000	100	No
PM 2.5	0.000	100	No
Pb	0.000	25	No
NH3	0.000	100	No
CO2e	0.0		

AIR CONFORMITY APPLICABILITY MODEL REPORT
RECORD OF AIR ANALYSIS (ROAA)

2024

Pollutant	Action Emissions (ton/yr)	AIR QUALITY INDICATOR	
		Threshold (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	-20.497	100	No
NOx	19.973	100	No
CO	-4.269	100	No
SOx	4.011	100	No
PM 10	-2.449	100	No
PM 2.5	0.604	100	No
Pb	0.000	25	No
NH3	0.001	100	No
CO2e	14650.0		

2025 - (Steady State)

Pollutant	Action Emissions (ton/yr)	AIR QUALITY INDICATOR	
		Threshold (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	-20.497	100	No
NOx	19.973	100	No
CO	-4.269	100	No
SOx	4.011	100	No
PM 10	-2.449	100	No
PM 2.5	0.604	100	No
Pb	0.000	25	No
NH3	0.001	100	No
CO2e	14650.0		

None of estimated emissions associated with this action are above the GCR indicators, indicating no significant impact to air quality; therefore, no further air assessment is needed.

//Chris Crabtree, Austin Naranjo// 7/23/20

Chris Crabtree, Leidos, Inc., and Austin N. Naranjo, Solutio DATE

AIR CONFORMITY APPLICABILITY MODEL REPORT
RECORD OF AIR ANALYSIS (ROAA)

1. General Information: The Air Force's Air Conformity Applicability Model (ACAM) was used to perform an analysis to assess the potential air quality impact/s associated with the action in accordance with the Air Force Instruction 32-7040, Air Quality Compliance And Resource Management; the Environmental Impact Analysis Process (EIAP, 32 CFR 989); and the General Conformity Rule (GCR, 40 CFR 93 Subpart B). This report provides a summary of the ACAM analysis.

a. Action Location:
Base: WHITEMAN AFB
State: Missouri
County(s): Johnson
Regulatory Area(s): NOT IN A REGULATORY AREA

b. Action Title: AFRC F-35A EIS - Whiteman AFB - 95% Afterburner Departures

c. Project Number/s (if applicable): Replace 24 A-10Cs with 24 F-35As

d. Projected Action Start Date: 5 / 2021

e. Action Description:

Demolition/Renovation/Construction activities and replacement aircraft operations.

f. Point of Contact:
Name: Chris Crabtree, Leidos, Inc., and Austin N. Naranjo, Solutio
Title:
Organization:
Email:
Phone Number:

2. Air Impact Analysis: Based on the attainment status at the action location, the requirements of the General Conformity Rule are:

_____ applicable
__X__ not applicable

Total combined direct and indirect emissions associated with the action were estimated through ACAM on a calendar-year basis for the "worst-case" and "steady state" (net gain/loss upon action fully implemented) emissions.

"Air Quality Indicators" were used to provide an indication of the significance of potential impacts to air quality. These air quality indicators are EPA General Conformity Rule (GCR) thresholds (de minimis levels) that are applied out of context to their intended use. Therefore, these indicators do not trigger a regulatory requirement; however, they provide a warning that the action is potentially significant. It is important to note that these indicators only provide a clue to the potential impacts to air quality.

Given the GCR de minimis threshold values are the maximum net change an action can acceptably emit in non-attainment and maintenance areas, these threshold values would also conservatively indicate an actions emissions within an attainment would also be acceptable. An air quality indicator value of 100 tons/yr is used based on the GCR de minimis threshold for the least severe non-attainment classification for all criteria pollutants (see 40 CFR 93.153). Therefore, the worst-case year emissions were compared against the GCR Indicator and are summarized below.

AIR CONFORMITY APPLICABILITY MODEL REPORT
RECORD OF AIR ANALYSIS (ROAA)

Analysis Summary:

2021

Pollutant	Action Emissions (ton/yr)	AIR QUALITY INDICATOR	
		Threshold (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.144	100	No
NOx	0.896	100	No
CO	0.992	100	No
SOx	0.002	100	No
PM 10	0.323	100	No
PM 2.5	0.038	100	No
Pb	0.000	25	No
NH3	0.001	100	No
CO2e	223.4		

2022

Pollutant	Action Emissions (ton/yr)	AIR QUALITY INDICATOR	
		Threshold (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.408	100	No
NOx	1.753	100	No
CO	1.905	100	No
SOx	0.004	100	No
PM 10	2.067	100	No
PM 2.5	0.077	100	No
Pb	0.000	25	No
NH3	0.002	100	No
CO2e	416.2		

2023

Pollutant	Action Emissions (ton/yr)	AIR QUALITY INDICATOR	
		Threshold (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	0.000	100	No
NOx	0.000	100	No
CO	0.000	100	No
SOx	0.000	100	No
PM 10	0.000	100	No
PM 2.5	0.000	100	No
Pb	0.000	25	No
NH3	0.000	100	No
CO2e	0.0		

AIR CONFORMITY APPLICABILITY MODEL REPORT
RECORD OF AIR ANALYSIS (ROAA)

2024

Pollutant	Action Emissions (ton/yr)	AIR QUALITY INDICATOR	
		Threshold (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	-20.495	100	No
NOx	20.352	100	No
CO	-2.150	100	No
SOx	4.111	100	No
PM 10	-2.352	100	No
PM 2.5	0.692	100	No
Pb	0.000	25	No
NH3	0.001	100	No
CO2e	14598.9		

2025 - (Steady State)

Pollutant	Action Emissions (ton/yr)	AIR QUALITY INDICATOR	
		Threshold (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	-20.495	100	No
NOx	20.352	100	No
CO	-2.150	100	No
SOx	4.111	100	No
PM 10	-2.352	100	No
PM 2.5	0.692	100	No
Pb	0.000	25	No
NH3	0.001	100	No
CO2e	14598.9		

None of estimated emissions associated with this action are above the GCR indicators, indicating no significant impact to air quality; therefore, no further air assessment is needed.

//Chris Crabtree, Austin Naranjo// 7/23/20

Chris Crabtree, Leidos, Inc., and Austin N. Naranjo, Solutio DATE

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

1. General Information

- Action Location
Base: WHITEMAN AFB
State: Missouri
County(s): Johnson
Regulatory Area(s): NOT IN A REGULATORY AREA

- Action Title: AFRC F-35A EIS - Whiteman AFB

- Project Number/s (if applicable): Replace 24 A-10Cs with 24 F-35As

- Projected Action Start Date: 5 / 2021

- Action Purpose and Need:

- Action Description:
Demolition/Renovation/Construction activities and replacement aircraft operations.

- Point of Contact
Name: Chris Crabtree, Leidos, Inc., and Austin N. Naranjo, Solutio
Title:
Organization:
Email:
Phone Number:

- Activity List:

Activity Type		Activity Title
2.	Construction / Demolition	Proposed Construction Activities AFRC F-35A EIS
3.	Aircraft	Remove 24 A-10Cs
4.	Aircraft	Add 24 F-35As Weighted Average LTOs - AFRC EIS
5.	Aircraft	Add 24 F-35As Weighted Average TGO - AFRC EIS
6.	Personnel	Increase of 11 Personnel

Emission factors and air emission estimating methods come from the United States Air Force's Air Emissions Guide for Air Force Stationary Sources, Air Emissions Guide for Air Force Mobile Sources, and Air Emissions Guide for Air Force Transitory Sources.

2. Construction / Demolition

2.1 General Information & Timeline Assumptions

- Activity Location
County: Johnson
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: Proposed Construction Activities AFRC F-35A EIS

- Activity Description:

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Activity Start Date
Start Month: 5
Start Month: 2021

- Activity End Date
Indefinite: False
End Month: 8
End Month: 2022

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.551819
SO_x	0.006562
NO_x	2.649735
CO	2.896643
PM 10	2.390273

Pollutant	Total Emissions (TONs)
PM 2.5	0.115487
Pb	0.000000
NH_3	0.002684
CO_2e	639.6

2.1 Demolition Phase

2.1.1 Demolition Phase Timeline Assumptions

- Phase Start Date
Start Month: 5
Start Quarter: 1
Start Year: 2021

- Phase Duration
Number of Month: 1
Number of Days: 0

2.1.2 Demolition Phase Assumptions

- General Demolition Information
Area of Building to be demolished (ft^2): 29400
Height of Building to be demolished (ft): 30

- Default Settings Used: Yes

- Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Concrete/Industrial Saws Composite	1	8
Rubber Tired Dozers Composite	1	1
Tractors/Loaders/Backhoes Composite	2	6

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

2.1.3 Demolition Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Concrete/Industrial Saws Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0443	0.0006	0.3176	0.3761	0.0170	0.0170	0.0040	58.563
Rubber Tired Dozers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.2015	0.0024	1.4660	0.7661	0.0581	0.0581	0.0181	239.53
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0407	0.0007	0.2505	0.3606	0.0112	0.0112	0.0036	66.890

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.293	000.002	000.227	003.465	000.007	000.007		000.023	00314.657
LDGT	000.365	000.003	000.398	004.790	000.010	000.009		000.024	00407.594
HDGV	000.677	000.005	001.014	015.190	000.023	000.020		000.044	00755.070
LDDV	000.117	000.003	000.136	002.565	000.004	000.004		000.008	00304.789
LDDT	000.254	000.004	000.387	004.370	000.007	000.006		000.008	00434.328
HDDV	000.487	000.013	004.900	001.707	000.162	000.149		000.028	01477.065
MC	002.342	000.003	000.774	013.048	000.027	000.024		000.055	00398.920

2.1.4 Demolition Phase Formula(s)

- Fugitive Dust Emissions per Phase
$PM10_{FD} = (0.00042 * BA * BH) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
0.00042: Emission Factor (lb/ft^3)
BA: Area of Building to be demolished (ft^2)
BH: Height of Building to be demolished (ft)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase
$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

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- Vehicle Exhaust Emissions per Phase
$VMT_{VE} = BA * BH * (1 / 27) * 0.25 * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building being demolish (ft^2)
BH: Height of Building being demolish (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd^3 / 27 ft^3)
0.25: Volume reduction factor (material reduced by 75% to account for air space)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

2.2 Site Grading Phase

2.2.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 5
Start Quarter: 1
Start Year: 2022

- Phase Duration
Number of Month: 2
Number of Days: 0

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2.2.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 100000
Amount of Material to be Hauled On-Site (yd^3): 100
Amount of Material to be Hauled Off-Site (yd^3): 1000

- Site Grading Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Graders Composite	1	6
Other Construction Equipment Composite	1	8
Rubber Tired Dozers Composite	1	6
Tractors/Loaders/Backhoes Composite	1	7

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

2.2.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Graders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0806	0.0014	0.4657	0.5731	0.0217	0.0217	0.0072	132.92
Other Construction Equipment Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0507	0.0012	0.2785	0.3488	0.0105	0.0105	0.0045	122.61
Rubber Tired Dozers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.1919	0.0024	1.3611	0.7352	0.0536	0.0536	0.0173	239.51
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0383	0.0007	0.2301	0.3598	0.0095	0.0095	0.0034	66.884

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- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.293	000.002	000.227	003.465	000.007	000.007		000.023	00314.657
LDGT	000.365	000.003	000.398	004.790	000.010	000.009		000.024	00407.594
HDGV	000.677	000.005	001.014	015.190	000.023	000.020		000.044	00755.070
LDDV	000.117	000.003	000.136	002.565	000.004	000.004		000.008	00304.789
LDDT	000.254	000.004	000.387	004.370	000.007	000.006		000.008	00434.328
HDDV	000.487	000.013	004.900	001.707	000.162	000.149		000.028	01477.065
MC	002.342	000.003	000.774	013.048	000.027	000.024		000.055	00398.920

2.2.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD}$ = (20 * ACRE * WD) / 2000

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

VMT_{VE} = (HA_{OnSite} + $HA_{OffSite}$) * (1 / HC) * HT

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

2.3 Trenching/Excavating Phase

2.3.1 Trenching / Excavating Phase Timeline Assumptions

- Phase Start Date
Start Month: 8
Start Quarter: 1
Start Year: 2021

- Phase Duration
Number of Month: 1
Number of Days: 0

2.3.2 Trenching / Excavating Phase Assumptions

- General Trenching/Excavating Information
Area of Site to be Trenched/Excavated (ft^2): 10000
Amount of Material to be Hauled On-Site (yd^3): 100
Amount of Material to be Hauled Off-Site (yd^3): 100

- Trenching Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Excavators Composite	2	8
Other General Industrial Equipmen Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

2.3.3 Trenching / Excavating Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Graders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0806	0.0014	0.4657	0.5731	0.0217	0.0217	0.0072	132.92
Other Construction Equipment Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0507	0.0012	0.2785	0.3488	0.0105	0.0105	0.0045	122.61
Rubber Tired Dozers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.1919	0.0024	1.3611	0.7352	0.0536	0.0536	0.0173	239.51
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0383	0.0007	0.2301	0.3598	0.0095	0.0095	0.0034	66.884

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.293	000.002	000.227	003.465	000.007	000.007		000.023	00314.657
LDGT	000.365	000.003	000.398	004.790	000.010	000.009		000.024	00407.594
HDGV	000.677	000.005	001.014	015.190	000.023	000.020		000.044	00755.070
LDDV	000.117	000.003	000.136	002.565	000.004	000.004		000.008	00304.789
LDDT	000.254	000.004	000.387	004.370	000.007	000.006		000.008	00434.328
HDDV	000.487	000.013	004.900	001.707	000.162	000.149		000.028	01477.065
MC	002.342	000.003	000.774	013.048	000.027	000.024		000.055	00398.920

2.3.4 Trenching / Excavating Phase Formula(s)

- Fugitive Dust Emissions per Phase
$PM10_{FD}$ = (20 * ACRE * WD) / 2000

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

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- Construction Exhaust Emissions per Phase
$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase
$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

2.4 Building Construction Phase

2.4.1 Building Construction Phase Timeline Assumptions

- Phase Start Date
Start Month: 9
Start Quarter: 1
Start Year: 2021

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- Phase Duration
Number of Month: 12
Number of Days: 0

2.4.2 Building Construction Phase Assumptions

- General Building Construction Information
Building Category: Office or Industrial
Area of Building (ft^2): 70047
Height of Building (ft): 20
Number of Units: N/A

- Building Construction Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Cranes Composite	1	6
Forklifts Composite	2	6
Generator Sets Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8
Welders Composite	3	8

- Vehicle Exhaust
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

- Vendor Trips
Average Vendor Round Trip Commute (mile): 40 (default)

- Vendor Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

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2.4.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Cranes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0845	0.0013	0.6033	0.3865	0.0228	0.0228	0.0076	128.82
Forklifts Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0293	0.0006	0.1458	0.2148	0.0056	0.0056	0.0026	54.462
Generator Sets Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0362	0.0006	0.2977	0.2707	0.0130	0.0130	0.0032	61.074
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0407	0.0007	0.2505	0.3606	0.0112	0.0112	0.0036	66.890
Welders Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0280	0.0003	0.1634	0.1787	0.0088	0.0088	0.0025	25.665

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**Pb**	**NH_3**	**CO_2e**
LDGV	000.293	000.002	000.227	003.465	000.007	000.007		000.023	00314.657
LDGT	000.365	000.003	000.398	004.790	000.010	000.009		000.024	00407.594
HDGV	000.677	000.005	001.014	015.190	000.023	000.020		000.044	00755.070
LDDV	000.117	000.003	000.136	002.565	000.004	000.004		000.008	00304.789
LDDT	000.254	000.004	000.387	004.370	000.007	000.006		000.008	00434.328
HDDV	000.487	000.013	004.900	001.707	000.162	000.149		000.028	01477.065
MC	002.342	000.003	000.774	013.048	000.027	000.024		000.055	00398.920

2.4.4 Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = BA * BH * (0.42 / 1000) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.42 / 1000): Conversion Factor ft^3 to trips (0.42 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

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$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Vender Trips Emissions per Phase
$VMT_{VT} = BA * BH * (0.38 / 1000) * HT$

VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.38 / 1000): Conversion Factor ft^3 to trips (0.38 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

2.5 Architectural Coatings Phase

2.5.1 Architectural Coatings Phase Timeline Assumptions

- Phase Start Date
Start Month: 5
Start Quarter: 1
Start Year: 2022

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- Phase Duration
Number of Month: 1
Number of Days: 0

2.5.2 Architectural Coatings Phase Assumptions

- General Architectural Coatings Information
Building Category:
Total Square Footage (ft^2): 10600
Number of Units: N/A

- Architectural Coatings Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

2.5.3 Architectural Coatings Phase Emission Factor(s)

- Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.293	000.002	000.227	003.465	000.007	000.007		000.023	00314.657
LDGT	000.365	000.003	000.398	004.790	000.010	000.009		000.024	00407.594
HDGV	000.677	000.005	001.014	015.190	000.023	000.020		000.044	00755.070
LDDV	000.117	000.003	000.136	002.565	000.004	000.004		000.008	00304.789
LDDT	000.254	000.004	000.387	004.370	000.007	000.006		000.008	00434.328
HDDV	000.487	000.013	004.900	001.707	000.162	000.149		000.028	01477.065
MC	002.342	000.003	000.774	013.048	000.027	000.024		000.055	00398.920

2.5.4 Architectural Coatings Phase Formula(s)

- Worker Trips Emissions per Phase
$VMT_{WT} = (1 * WT * PA) / 800$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
1: Conversion Factor man days to trips (1 trip / 1 man * day)
WT: Average Worker Round Trip Commute (mile)
PA: Paint Area (ft^2)
800: Conversion Factor square feet to man days (1 ft^2 / 1 man * day)

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

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- Off-Gassing Emissions per Phase
VOC_{AC} = (AB * 2.0 * 0.0116) / 2000.0

VOC_{AC}: Architectural Coating VOC Emissions (TONs)
BA: Area of Building (ft^2)
2.0: Conversion Factor total area to coated area (2.0 ft^2 coated area / total area)
0.0116: Emission Factor (lb/ft^2)
2000: Conversion Factor pounds to tons

2.6 Paving Phase

2.6.1 Paving Phase Timeline Assumptions

- Phase Start Date
Start Month: 7
Start Quarter: 1
Start Year: 2022

- Phase Duration
Number of Month: 1
Number of Days: 0

2.6.2 Paving Phase Assumptions

- General Paving Information
Paving Area (ft^2): 5000

- Paving Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Cement and Mortar Mixers Composite	4	6
Pavers Composite	1	7
Paving Equipment Composite	2	6
Rollers Composite	1	7
Tractors/Loaders/Backhoes Composite	1	7

- Vehicle Exhaust
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

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2.6.3 Paving Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Graders Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0806	0.0014	0.4657	0.5731	0.0217	0.0217	0.0072	132.92
Other Construction Equipment Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0507	0.0012	0.2785	0.3488	0.0105	0.0105	0.0045	122.61
Rubber Tired Dozers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.1919	0.0024	1.3611	0.7352	0.0536	0.0536	0.0173	239.51
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0383	0.0007	0.2301	0.3598	0.0095	0.0095	0.0034	66.884

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.293	000.002	000.227	003.465	000.007	000.007		000.023	00314.657
LDGT	000.365	000.003	000.398	004.790	000.010	000.009		000.024	00407.594
HDGV	000.677	000.005	001.014	015.190	000.023	000.020		000.044	00755.070
LDDV	000.117	000.003	000.136	002.565	000.004	000.004		000.008	00304.789
LDDT	000.254	000.004	000.387	004.370	000.007	000.006		000.008	00434.328
HDDV	000.487	000.013	004.900	001.707	000.162	000.149		000.028	01477.065
MC	002.342	000.003	000.774	013.048	000.027	000.024		000.055	00398.920

2.6.4 Paving Phase Formula(s)

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = PA * 0.25 * (1 / 27) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
PA: Paving Area (ft^2)
0.25: Thickness of Paving Area (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd^3 / 27 ft^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

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$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase
$VOC_P = (2.62 * PA) / 43560$

VOC_P: Paving VOC Emissions (TONs)
2.62: Emission Factor (lb/acre)
PA: Paving Area (ft^2)
43560: Conversion Factor square feet to acre (43560 ft2 / acre)^2 / acre)

3. Aircraft

3.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location
County: Johnson
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: Remove 24 A-10Cs

- Activity Description:
Remove 24 A-10Cs

- Activity Start Date
Start Month: 1
Start Year: 2024

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- Activity End Date
Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	-28.864285
SO_x	-4.005989
NO_x	-61.258571
CO	-82.627609
PM 10	-14.904608

Pollutant	Emissions Per Year (TONs)
PM 2.5	-10.763333
Pb	0.000000
NH_3	0.000000
CO_2e	-5629.2

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-1.590255
SO_x	-1.142076
NO_x	-3.217711
CO	-44.140637
PM 10	-7.364499

Pollutant	Emissions Per Year (TONs)
PM 2.5	-3.528841
Pb	0.000000
NH_3	0.000000
CO_2e	-3484.4

- Activity Emissions [Test Cell part]:

Pollutant	Emissions Per Year (TONs)
VOC	-0.021553
SO_x	-0.032356
NO_x	-0.177355
CO	-0.536227
PM 10	-0.164110

Pollutant	Emissions Per Year (TONs)
PM 2.5	-0.088917
Pb	0.000000
NH_3	0.000000
CO_2e	-98.7

- Activity Emissions [Aerospace Ground Equipment (AGE) part]:

Pollutant	Emissions Per Year (TONs)
VOC	-27.252477
SO_x	-2.831557
NO_x	-57.863506
CO	-37.950745
PM 10	-7.376000

Pollutant	Emissions Per Year (TONs)
PM 2.5	-7.145575
Pb	0.000000
NH_3	0.000000
CO_2e	-2046.1

3.2 Aircraft & Engines

3.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine
Aircraft Designation: A-10
Engine Model: TF34-GE-100A
Primary Function: Combat
Aircraft has After burn: No
Number of Engines: 2

- Aircraft & Engine Surrogate
Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

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3.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e
Idle	498.00	2.24	1.06	0.32	65.62	8.13	3.60	3234
Approach	933.00	1.44	1.06	3.09	27.92	6.21	2.12	3234
Intermediate	1512.00	0.13	1.06	5.61	8.88	8.93	6.95	3234
Military	2628.00	0.07	1.06	9.11	3.94	2.66	1.68	3234
After Burn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3234

3.3 Flight Operations

3.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 24
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 2095
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
Number of Annual Trim Test(s) per Aircraft: 12

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 18.5
Takeoff [Military] (mins): 0.4
Takeoff [After Burn] (mins): 0
Climb Out [Intermediate] (mins): 0.8
Approach [Approach] (mins): 3.5
Taxi/Idle In [Idle] (mins): 11.3

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 12
Approach (mins): 27
Intermediate (mins): 9
Military (mins): 12
AfterBurn (mins): 0

3.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Aircraft Emissions for LTOs per Year
$AE_{LTO} = AEM_{IDLE\_IN} + AEM_{IDLE\_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{LTO}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year
AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year
$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{TGO}: Aircraft Emissions (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year
$AEPS_{POL}$ = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year
$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$

AE_{TRIM}: Aircraft Emissions (TONs)
$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

3.4 Auxiliary Power Unit (APU)

3.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: Yes

- Auxiliary Power Unit (APU) (default)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer

3.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e

3.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year

$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
APU: Number of Auxiliary Power Units
OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

3.5 Aircraft Engine Test Cell

3.5.1 Aircraft Engine Test Cell Assumptions

- Engine Test Cell
Total Number of Aircraft Engines Tested Annually: 48

- Default Settings Used: Yes

- Annual Run-ups / Test Durations
Annual Run-ups (Per Aircraft Engine): 1 (default)
Idle Duration (mins): 12 (default)
Approach Duration (mins): 27 (default)
Intermediate Duration (mins): 9 (default)
Military Duration (mins): 12 (default)
After Burner Duration (mins): 0 (default)

3.5.2 Aircraft Engine Test Cell Emission Factor(s)

- See Aircraft & Engines Emission Factor(s)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

3.5.3 Aircraft Engine Test Cell Formula(s)

- Aircraft Engine Test Cell Emissions per Pollutant & Power Setting (TONs)
$TestCellPS_{POL}$ = (TD / 60) * (FC / 1000) * EF * NE * ARU / 2000

$TestCellPS_{POL}$: Aircraft Engine Test Cell Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Total Number of Engines (For All Aircraft)
ARU: Annual Run-ups (Per Aircraft Engine)
2000: Conversion Factor pounds to TONs

- Aircraft Engine Test Cell Emissions per Year
TestCell = $TestCellPS_{IDLE}$ + $TestCellPS_{APPROACH}$ + $TestCellPS_{INTERMEDIATE}$ + $TestCellPS_{MILITARY}$ + $TestCellPS_{AFTERBURN}$

TestCell: Aircraft Engine Test Cell Emissions (TONs)
$TestCellPS_{IDLE}$: Aircraft Engine Test Cell Emissions for Idle Power Setting (TONs)
$TestCellPS_{APPROACH}$: Aircraft Engine Test Cell Emissions for Approach Power Setting (TONs)
$TestCellPS_{INTERMEDIATE}$: Aircraft Engine Test Cell Emissions for Intermediate Power Setting (TONs)
$TestCellPS_{MILITARY}$: Aircraft Engine Test Cell Emissions for Military Power Setting (TONs)
$TestCellPS_{AFTERBURN}$: Aircraft Engine Test Cell Emissions for After Burner Power Setting (TONs)

3.6 Aerospace Ground Equipment (AGE)

3.6.1 Aerospace Ground Equipment (AGE) Assumptions

- Default Settings Used: Yes

- AGE Usage
Number of Annual LTO (Landing and Take-off) cycles for AGE: 2095

- Aerospace Ground Equipment (AGE) (default)

Total Number of AGE	Operation Hours for Each LTO	Exempt Source?	AGE Type	Designation
1	2	No	Air Compressor	MC-1A - 18.4hp
1	8	No	Bomb Lift	MJ-1B
1	1	No	Generator Set	A/M32A-86D
1	2	No	Heater	H1
1	2	No	Hydraulic Test Stand	MJ-2A
1	2	No	Light Cart	NF-2
1	1	No	Start Cart	A/M32A-60A

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3.6.2 Aerospace Ground Equipment (AGE) Emission Factor(s)

- Aerospace Ground Equipment (AGE) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e
MC-1A - 18.4hp	1.1	0.267	0.008	0.419	0.267	0.071	0.068	24.8
MJ-1B	0.0	3.040	0.219	4.780	3.040	0.800	0.776	141.2
A/M32A-86D	6.5	0.294	0.046	6.102	0.457	0.091	0.089	147.0
H1	0.4	0.100	0.011	0.160	0.180	0.006	0.006	8.9
MJ-2A	0.0	0.190	0.238	3.850	2.460	0.083	0.076	172.0
NF-2	0.0	0.010	0.043	0.110	0.080	0.010	0.010	22.1
A/M32A-60A	0.0	0.270	0.306	1.820	5.480	0.211	0.205	221.1

3.6.3 Aerospace Ground Equipment (AGE) Formula(s)

- Aerospace Ground Equipment (AGE) Emissions per Year
$AGE_{POL} = AGE * OH * LTO * EF_{POL} / 2000$

AGE_{POL}: Aerospace Ground Equipment (AGE) Emissions per Pollutant (TONs)
AGE: Total Number of Aerospace Ground Equipment
OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

4. Aircraft

4.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Johnson
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: Add 24-F-35As Weighted Average LTOs - AFRC EIS

- Activity Description:
Add 24 F-35As

- Activity Start Date
Start Month: 1
Start Year: 2024

- Activity End Date
Indefinite: Yes
End Month: N/A
End Year: N/A

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- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	8.344612
SO_x	7.692058
NO_x	77.451944
CO	75.721336
PM 10	12.066917

Pollutant	Emissions Per Year (TONs)
PM 2.5	11.016467
Pb	0.000000
NH_3	0.000000
CO_2e	19622.6

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.141880
SO_x	5.904879
NO_x	51.897375
CO	60.917951
PM 10	9.464338

Pollutant	Emissions Per Year (TONs)
PM 2.5	8.503590
Pb	0.000000
NH_3	0.000000
CO_2e	17968.2

- Activity Emissions [Test Cell part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000846
SO_x	0.134980
NO_x	1.953343
CO	0.411673
PM 10	0.169634

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.152690
Pb	0.000000
NH_3	0.000000
CO_2e	411.8

- Activity Emissions [Aerospace Ground Equipment (AGE) part]:

Pollutant	Emissions Per Year (TONs)
VOC	8.201885
SO_x	1.652199
NO_x	23.601227
CO	14.391712
PM 10	2.432946

Pollutant	Emissions Per Year (TONs)
PM 2.5	2.360187
Pb	0.000000
NH_3	0.000000
CO_2e	1242.6

4.2 Aircraft & Engines

4.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine
Aircraft Designation: F-35A
Engine Model: F135-PW-100
Primary Function: Combat
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate
Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

4.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)
Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

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4.3 Flight Operations

4.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	24
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft:	4632
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft:	0
Number of Annual Trim Test(s) per Aircraft:	12

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	0.77
Takeoff [After Burn] (mins):	0.02
Climb Out [Intermediate] (mins):	0.32
Approach [Approach] (mins):	2.99
Taxi/Idle In [Idle] (mins):	30.11

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

4.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$AE_{LTO} = AEM_{IDLE\_IN} + AEM_{IDLE\_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{LTO}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

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- Aircraft Emissions per Mode for TGOs per Year
AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year
AE_{TGO} = $AEM_{APPROACH}$ + $AEM_{CLIMBOUT}$ + $AEM_{TAKEOFF}$

AE_{TGO}: Aircraft Emissions (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year
$AEPS_{POL}$ = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year
AE_{TRIM} = $AEPS_{IDLE}$ + $AEPS_{APPROACH}$ + $AEPS_{INTERMEDIATE}$ + $AEPS_{MILITARY}$ + $AEPS_{AFTERBURN}$

AE_{TRIM}: Aircraft Emissions (TONs)
$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

4.4 Auxiliary Power Unit (APU)

4.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: Yes

- Auxiliary Power Unit (APU) (default)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer

4.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e

4.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year

$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
APU: Number of Auxiliary Power Units
OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

4.5 Aircraft Engine Test Cell

4.5.1 Aircraft Engine Test Cell Assumptions

- Engine Test Cell
Total Number of Aircraft Engines Tested Annually: 24

- Default Settings Used: Yes

- Annual Run-ups / Test Durations
Annual Run-ups (Per Aircraft Engine): 1 (default)
Idle Duration (mins): 12 (default)
Approach Duration (mins): 27 (default)
Intermediate Duration (mins): 9 (default)
Military Duration (mins): 9 (default)
After Burner Duration (mins): 3 (default)

4.5.2 Aircraft Engine Test Cell Emission Factor(s)

- See Aircraft & Engines Emission Factor(s)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

4.5.3 Aircraft Engine Test Cell Formula(s)

- Aircraft Engine Test Cell Emissions per Pollutant & Power Setting (TONs)
$TestCellPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * ARU / 2000$

$TestCellPS_{POL}$: Aircraft Engine Test Cell Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Total Number of Engines (For All Aircraft)
ARU: Annual Run-ups (Per Aircraft Engine)
2000: Conversion Factor pounds to TONs

- Aircraft Engine Test Cell Emissions per Year
$TestCell = TestCellPS_{IDLE} + TestCellPS_{APPROACH} + TestCellPS_{INTERMEDIATE} + TestCellPS_{MILITARY} + TestCellPS_{AFTERBURN}$

TestCell: Aircraft Engine Test Cell Emissions (TONs)
$TestCellPS_{IDLE}$: Aircraft Engine Test Cell Emissions for Idle Power Setting (TONs)
$TestCellPS_{APPROACH}$: Aircraft Engine Test Cell Emissions for Approach Power Setting (TONs)
$TestCellPS_{INTERMEDIATE}$: Aircraft Engine Test Cell Emissions for Intermediate Power Setting (TONs)
$TestCellPS_{MILITARY}$: Aircraft Engine Test Cell Emissions for Military Power Setting (TONs)
$TestCellPS_{AFTERBURN}$: Aircraft Engine Test Cell Emissions for After Burner Power Setting (TONs)

4.6 Aerospace Ground Equipment (AGE)

4.6.1 Aerospace Ground Equipment (AGE) Assumptions

- Default Settings Used: Yes

- AGE Usage
Number of Annual LTO (Landing and Take-off) cycles for AGE: 4632

- Aerospace Ground Equipment (AGE) (default)

Total Number of AGE	Operation Hours for Each LTO	Exempt Source?	AGE Type	Designation
1	0.33	No	Air Compressor	MC-1A - 18.4hp
1	1	No	Bomb Lift	MJ-1B
1	0.33	No	Generator Set	A/M32A-86D
1	0.5	No	Heater	H1
1	0.5	No	Hydraulic Test Stand	MJ-2/TTU-228 - 130hp
1	8	No	Light Cart	NF-2
1	0.33	No	Start Cart	A/M32A-60A

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

4.6.2 Aerospace Ground Equipment (AGE) Emission Factor(s)

- Aerospace Ground Equipment (AGE) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e
MC-1A - 18.4hp	1.1	0.267	0.008	0.419	0.267	0.071	0.068	24.8
MJ-1B	0.0	3.040	0.219	4.780	3.040	0.800	0.776	141.2
A/M32A-86D	6.5	0.294	0.046	6.102	0.457	0.091	0.089	147.0
H1	0.4	0.100	0.011	0.160	0.180	0.006	0.006	8.9
MJ-2/TTU-228 - 130hp	7.4	0.195	0.053	3.396	0.794	0.089	0.086	168.8
NF-2	0.0	0.010	0.043	0.110	0.080	0.010	0.010	22.1
A/M32A-60A	0.0	0.270	0.306	1.820	5.480	0.211	0.205	221.1

4.6.3 Aerospace Ground Equipment (AGE) Formula(s)

- Aerospace Ground Equipment (AGE) Emissions per Year

$AGE_{POL} = AGE * OH * LTO * EF_{POL} / 2000$

AGE_{POL}: Aerospace Ground Equipment (AGE) Emissions per Pollutant (TONs)
AGE: Total Number of Aerospace Ground Equipment
OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

5. Aircraft

5.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Johnson
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: Add 24 F-35As Weighted Average TGO - AFRC EIS

- Activity Description:

- Activity Start Date
Start Month: 1
Start Year: 2024

- Activity End Date
Indefinite: Yes
End Month: N/A
End Year: N/A

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	0.001052
SO_x	0.231164
NO_x	3.450476
CO	0.298641
PM 10	0.298410

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.268643
Pb	0.000000
NH_3	0.000000
CO_2e	705.3

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.001052
SO_x	0.231164
NO_x	3.450476
CO	0.298641
PM 10	0.298410

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.268643
Pb	0.000000
NH_3	0.000000
CO_2e	705.3

5.2 Aircraft & Engines

5.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: F-35A
Engine Model: F135-PW-100
Primary Function: Combat
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

5.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

5.3 Flight Operations

5.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 24
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 1158
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	0.34
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	0.49
Approach [Approach] (mins):	1.13
Taxi/Idle In [Idle] (mins):	0.31

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

5.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$AE_{LTO} = AEM_{IDLE\_IN} + AEM_{IDLE\_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{LTO}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Aircraft Emissions for TGOs per Year
$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{TGO}: Aircraft Emissions (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year
$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year
$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$

AE_{TRIM}: Aircraft Emissions (TONs)
$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

5.4 Auxiliary Power Unit (APU)

5.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: Yes

- Auxiliary Power Unit (APU) (default)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer

5.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

5.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year
$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
APU: Number of Auxiliary Power Units
OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

6. Personnel

6.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Johnson
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: Increase of 11 Personnel

- Activity Description:

- Activity Start Date
Start Month: 1
Start Year: 2024

- Activity End Date
Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	0.018931
SO_x	0.000133
NO_x	0.017195
CO	0.224396
PM 10	0.000464

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.000430
Pb	0.000000
NH_3	0.001220
CO_2e	18.8

6.2 Personnel Assumptions

- Number of Personnel
Active Duty Personnel: 0
Civilian Personnel: 0
Support Contractor Personnel: 0
Air National Guard (ANG) Personnel: 11
Reserve Personnel: 0

- Default Settings Used: Yes

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Average Personnel Round Trip Commute (mile): 20 (default)

- Personnel Work Schedule
Active Duty Personnel: 5 Days Per Week (default)
Civilian Personnel: 5 Days Per Week (default)
Support Contractor Personnel: 5 Days Per Week (default)
Air National Guard (ANG) Personnel: 4 Days Per Week (default)
Reserve Personnel: 4 Days Per Month (default)

6.3 Personnel On Road Vehicle Mixture

- On Road Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	37.55	60.32	0	0.03	0.2	0	1.9
GOVs	54.49	37.73	4.67	0	0	3.11	0

6.4 Personnel Emission Factor(s)

- On Road Vehicle Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.293	000.002	000.227	003.465	000.007	000.007		000.023	00314.657
LDGT	000.365	000.003	000.398	004.790	000.010	000.009		000.024	00407.594
HDGV	000.677	000.005	001.014	015.190	000.023	000.020		000.044	00755.070
LDDV	000.117	000.003	000.136	002.565	000.004	000.004		000.008	00304.789
LDDT	000.254	000.004	000.387	004.370	000.007	000.006		000.008	00434.328
HDDV	000.487	000.013	004.900	001.707	000.162	000.149		000.028	01477.065
MC	002.342	000.003	000.774	013.048	000.027	000.024		000.055	00398.920

6.5 Personnel Formula(s)

- Personnel Vehicle Miles Travel for Work Days per Year
$VMT_P = NP * WD * AC$

VMT_P: Personnel Vehicle Miles Travel (miles/year)
NP: Number of Personnel
WD: Work Days per Year
AC: Average Commute (miles)

- Total Vehicle Miles Travel per Year
$VMT_{Total} = VMT_{AD} + VMT_C + VMT_{SC} + VMT_{ANG} + VMT_{AFRC}$

VMT_{Total}: Total Vehicle Miles Travel (miles)
VMT_{AD}: Active Duty Personnel Vehicle Miles Travel (miles)
VMT_C: Civilian Personnel Vehicle Miles Travel (miles)
VMT_{SC}: Support Contractor Personnel Vehicle Miles Travel (miles)
VMT_{ANG}: Air National Guard Personnel Vehicle Miles Travel (miles)
VMT_{AFRC}: Reserve Personnel Vehicle Miles Travel (miles)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Vehicle Emissions per Year

$V_{POL} = (VMT_{Total} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{Total}: Total Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Personnel On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

AIR CONFORMITY APPLICABILITY MODEL REPORT
RECORD OF AIR ANALYSIS (ROAA)

1. General Information: The Air Force's Air Conformity Applicability Model (ACAM) was used to perform an analysis to assess the potential air quality impact/s associated with the action in accordance with the Air Force Instruction 32-7040, Air Quality Compliance And Resource Management; the Environmental Impact Analysis Process (EIAP, 32 CFR 989); and the General Conformity Rule (GCR, 40 CFR 93 Subpart B). This report provides a summary of the ACAM analysis.

a. Action Location:
Base: WHITEMAN AFB
State: Missouri
County(s): Johnson
Regulatory Area(s): NOT IN A REGULATORY AREA

b. Action Title: AFRC F-35A EIS

c. Project Number/s (if applicable):

d. Projected Action Start Date: 1 / 2024

e. Action Description:

At Whiteman AFB, remove 24 A-10Cs and add 24 F-35As. This analysis is only for net changes in airspace operations.

f. Point of Contact:
Name: Chris Crabtree, Leidos, Inc., and Austin N. Naranjo, Solutio
Title:
Organization:
Email:
Phone Number:

2. Air Impact Analysis: Based on the attainment status at the action location, the requirements of the General Conformity Rule are:

_____ applicable
__X__ not applicable

Total combined direct and indirect emissions associated with the action were estimated through ACAM on a calendar-year basis for the "worst-case" and "steady state" (net gain/loss upon action fully implemented) emissions.

"Air Quality Indicators" were used to provide an indication of the significance of potential impacts to air quality. These air quality indicators are EPA General Conformity Rule (GCR) thresholds (de minimis levels) that are applied out of context to their intended use. Therefore, these indicators do not trigger a regulatory requirement; however, they provide a warning that the action is potentially significant. It is important to note that these indicators only provide a clue to the potential impacts to air quality.

Given the GCR de minimis threshold values are the maximum net change an action can acceptably emit in non-attainment and maintenance areas, these threshold values would also conservatively indicate an actions emissions within an attainment would also be acceptable. An air quality indicator value of 100 tons/yr is used based on the GCR de minimis threshold for the least severe non-attainment classification for all criteria pollutants (see 40 CFR 93.153). Therefore, the worst-case year emissions were compared against the GCR Indicator and are summarized below.

AIR CONFORMITY APPLICABILITY MODEL REPORT RECORD OF AIR ANALYSIS (ROAA)

Analysis Summary:

2024

Pollutant	Action Emissions (ton/yr)	AIR QUALITY INDICATOR	
		Threshold (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	-0.898	100	No
NOx	-71.704	100	No
CO	-16.972	100	No
SOx	-7.781	100	No
PM 10	-20.149	100	No
PM 2.5	-12.558	100	No
Pb	0.000	25	No
NH3	0.000	100	No
CO2e	-23518.1		

2025 - (Steady State)

Pollutant	Action Emissions (ton/yr)	AIR QUALITY INDICATOR	
		Threshold (ton/yr)	Exceedance (Yes or No)
NOT IN A REGULATORY AREA			
VOC	-0.898	100	No
NOx	-71.704	100	No
CO	-16.972	100	No
SOx	-7.781	100	No
PM 10	-20.149	100	No
PM 2.5	-12.558	100	No
Pb	0.000	25	No
NH3	0.000	100	No
CO2e	-23518.1		

None of estimated emissions associated with this action are above the GCR indicators, indicating no significant impact to air quality; therefore, no further air assessment is needed.

//Chris Crabtree, Austin Naranjo// 7/23/20

Chris Crabtree, Leidos, Inc., and Austin N. Naranjo, Solutio DATE

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

1. General Information

- Action Location
Base: WHITEMAN AFB
State: Missouri
County(s): Johnson
Regulatory Area(s): NOT IN A REGULATORY AREA

- Action Title: AFRC F-35A EIS

- Project Number/s (if applicable):

- Projected Action Start Date: 1 / 2024

- Action Purpose and Need:
...

- Action Description:
At Whiteman AFB, remove 24 A-10Cs and add 24 F-35As. This analysis is only for net changes in airspace operations.

- Point of Contact
Name: Chris Crabtree, Leidos, Inc., and Austin N. Naranjo, Solutio
Title:
Organization:
Email:
Phone Number:

- Activity List:

Activity Type		Activity Title
2.	Aircraft	Airspace operations - A-10Cs
3.	Aircraft	Airspace operations - F-35As

Emission factors and air emission estimating methods come from the United States Air Force's Air Emissions Guide for Air Force Stationary Sources, Air Emissions Guide for Air Force Mobile Sources, and Air Emissions Guide for Air Force Transitory Sources.

2. Aircraft

2.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Remove

- Activity Location
County: Johnson
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: Airspace operations - A-10Cs

- Activity Description:
Remove annual airspace operations for 24 A-10Cs.

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Activity Start Date
Start Month: 1
Start Year: 2024

- Activity End Date
Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)	Pollutant	Emissions Per Year (TONs)
VOC	-0.898451	PM 2.5	-13.125191
SO_x	-8.359497	Pb	0.000000
NO_x	-83.594968	NH_3	0.000000
CO	-17.187750	CO_2e	-25266.0
PM 10	-20.781553		

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)	Pollutant	Emissions Per Year (TONs)
VOC	-0.898451	PM 2.5	-13.125191
SO_x	-8.359497	Pb	0.000000
NO_x	-83.594968	NH_3	0.000000
CO	-17.187750	CO_2e	-25266.0
PM 10	-20.781553		

2.2 Aircraft & Engines

2.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine
Aircraft Designation: A-10C
Engine Model: TF34-GE-100
Primary Function: Combat
Aircraft has After burn: No
Number of Engines: 2

- Aircraft & Engine Surrogate
Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

2.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e
Idle	390.00	39.45	1.07	2.10	106.70	8.13	3.60	3234
Approach	920.00	2.19	1.07	5.70	16.30	6.21	2.12	3234
Intermediate	460.00	23.35	1.07	2.60	78.00	8.93	6.95	3234
Military	2710.00	0.12	1.07	10.70	2.20	2.66	1.68	3234
After Burn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3234

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

2.3 Flight Operations

2.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	24
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft:	1
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft:	0
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	172973
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	0
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

2.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$AE_{LTO} = AEM_{IDLE\_IN} + AEM_{IDLE\_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{LTO}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Aircraft Emissions per Mode for TGOs per Year
AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year
$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{TGO}: Aircraft Emissions (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year
$AEPS_{POL}$ = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year
$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$

AE_{TRIM}: Aircraft Emissions (TONs)
$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

2.4 Auxiliary Power Unit (APU)

2.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: Yes

- Auxiliary Power Unit (APU) (default)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer

2.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e

2.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year

$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
APU: Number of Auxiliary Power Units
OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

3. Aircraft

3.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Johnson
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: Airspace operations - F-35As

- Activity Description:
Add annual airspace operations for 24 F-35As

- Activity Start Date
Start Month: 1
Start Year: 2024

- Activity End Date
Indefinite: Yes
End Month: N/A
End Year: N/A

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Activity Emissions:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO_x	0.578310
NO_x	11.890494
CO	0.216191
PM 10	0.632358

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.567501
Pb	0.000000
NH_3	0.000000
CO_2e	1747.9

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)
VOC	0.000000
SO_x	0.578310
NO_x	11.890494
CO	0.216191
PM 10	0.632358

Pollutant	Emissions Per Year (TONs)
PM 2.5	0.567501
Pb	0.000000
NH_3	0.000000
CO_2e	1747.9

3.2 Aircraft & Engines

3.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine
Aircraft Designation: F-35A
Engine Model: F135-PW-100
Primary Function: Combat
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate
Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

3.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)
Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

3.3 Flight Operations

3.3.1 Flight Operations Assumptions

- Flight Operations
Number of Aircraft: 24
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 1
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	3413
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	0
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

3.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$AE_{LTO} = AEM_{IDLE\_IN} + AEM_{IDLE\_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{LTO}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Aircraft Emissions for TGOs per Year
$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{TGO}: Aircraft Emissions (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year
$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year
$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$

AE_{TRIM}: Aircraft Emissions (TONs)
$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

3.4 Auxiliary Power Unit (APU)

3.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: Yes

- Auxiliary Power Unit (APU) (default)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer

3.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

3.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year
$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
APU: Number of Auxiliary Power Units
OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

Whiteman AFB
F-35A Operations

Sorties	4632	**Total**

Patterns	0.25	**per Sortie**
	1158	**Total**

AFRC Operations Type Distribution

Operation	Stated Type	Frequency (% of Time)	Count	Assumed Type
Arrivals	Overhead Break Arrival (1st Ship)	40%	1852.8	Overhead Break Arrival (1st Ship) (F35-O2)
	Tactical Overhead Break Arrival (2nd Ship)	25%	1158	Tactical Overhead Break Arrival (2nd Ship) (F35-O2W)
	Tactical Straight in Arrival VFR		0	
	Straight in Arrival (ILS)	10%	463.2	Straight in IFR (F35-A7)
	Straight in Arrival (TACAN)	10%	463.2	Straight in IFR (F35-A7)
	Straight in Arrival (VFR)	5%	231.6	Straight in VFR Arrival (F35-A11)
	PFO Arrival	10%	463.2	PFO Arrival (F35-P3)
		good		
Departures	Military	95%	4400.4	Military Departure (F35-D6)
	Afterburner	5%	231.6	Afterburner Departure (F35-D12)
Patterns	VFR (Visual) Pattern	88%	1019.04	VFR (Visual) Pattern (F35-C4)
	VFR Outside Downwind Pattern		0	
	PFO Pattern	10%	115.8	PFO Pattern (F35-C6)
	Re-entry Pattern		0	
	ILS Pattern	1%	11.58	ILS Pattern (F35-C10)
	TACAN Pattern	1%	11.58	TACAN Pattern (F35-C10)
		good		

Whiteman AFB

Representative Weighted Average T&G Cycle TIMs By Power Setting Method

Times Based on PowerSettingMethodOnly (seconds)

Mode	% Thrust Range		T & G's: VFR Pattern West (F35-C4)	T & G's: Multiple PFO Pattern (F35-C6)	T & G's: IFR ILS/LOC Pattern (F35-C10)
	>	<			
Takeoff Afterburner	105	150	0.00	0.00	0.00
Takeoff Military	92.5	105	20.17	27.44	4.72
Climb Out	50	92.5	31.72	7.14	30.88
Approach	18.5	50	59.95	0.00	738.60
Taxi/Idle Out/In	0	18.5	14.85	31.65	117.05
Frequency (% of Time) =			88%	10%	2%

Weighted Times Based on Noise Profiles Power Setting Times Weighted by Frequency (seconds)

Mode	% Thrust Range		T & G's: VFR Pattern West (F35-C4)	T & G's: Multiple PFO Pattern (F35-C6)	T & G's: IFR ILS/LOC Pattern (F35-C10)	Noise LTO Cycle Contributions
	>	<				
Takeoff Afterburner	105	150	0.00	0.00	0.00	0.00
Takeoff Military	92.5	105	17.75	2.74	0.09	20.59
Climb Out	50	92.5	27.92	0.71	0.62	29.25
Approach	18.5	50	52.76	0.00	14.77	67.53
Taxi/Idle Out/In	0	18.5	13.07	3.16	2.34	18.57

Mode	% Thrust Range		Noise T&G Contributions (min)	Representative T&G Cycle (min)
	>	<		
Takeoff Afterburner	105	150	0.00	**0.00**
Takeoff Military	92.5	105	0.34	**0.34**
Climb Out	50	92.5	0.49	**0.49**
Approach	18.5	50	1.13	**1.13**
Taxi/Idle Out/In	0	18.5	0.31	**0.31**
Representative Weighted Average T&G Time (min) =				2.27

Whiteman AFB

Representative Weighted Average LTO Cycle TIMs By Power Setting & Altitude Method

Times Based on Power Setting & Altitude Method (seconds)

Mode	% Thrust Range		Arrivals					Departures	
			Overhead Break Arrival - Lead (F35-O2)	Overhead Break Arrival Wingman (F35-O2W)	Straight in IFR (F35-A7)	Straight in VFR (F35-A11)	PFO Arrival (F35-P3)	Military Departure (F35-D6)	Afterburner Departure (F35-D12)
	>	<							
Takeoff Afterburner	105	150	0.00	0.00	0.00	0.00	0.00	0.00	20.29
Takeoff Military	92.5	105	0.00	0.00	0.00	0.00	0.00	47.67	24.18
Climb Out	50	92.5	6.98	6.98	0.00	0.00	0.00	14.58	13.62
Approach	18.5	50	154.00	167.88	305.69	260.40	16.95	0.00	0.00
Taxi/Idle Out/In	0	18.5	26.52	25.89	0.00	0.00	16.95	0.00	0.00
Frequency (% of Time) =			40%	25%	20%	5%	10%	95%	5%

Weighted Times Based on Noise Profiles Average Times Weighted by Frequency (seconds)

Mode	% Thrust Range		Arrivals					Departures		Noise LTO
			Overhead Break Arrival - Lead (F35-O2)	Overhead Break Arrival Wingman (F35-O2W)	Straight in IFR (F35-A7)	Straight in VFR (F35-A11)	PFO Arrival (F35-P3)	Military Departure (F35-D6)	Afterburner Departure (F35-D12)	Cycle Contributions
	>	<								
Takeoff Afterburner	105	150	0.00	0.00	0.00	0.00	0.00	0.00	1.01	1.01
Takeoff Military	92.5	105	0.00	0.00	0.00	0.00	0.00	45.29	1.21	46.50
Climb Out	50	92.5	2.79	1.74	0.00	0.00	0.00	13.85	0.68	19.07
Approach	18.5	50	61.60	41.97	61.14	13.02	1.69	0.00	0.00	179.42
Taxi/Idle Out/In	0	18.5	10.61	6.47	0.00	0.00	1.69	0.00	0.00	18.77

USAF Representative Value (default) for Taxi Out/In = **29.8** minutes

Mode	% Thrust Range		Noise LTO Cycle Contributions (min)	LTO Missing Data (min, use defaults)	Representative LTO Cycle (min)
	>	<			
Takeoff Afterburner	105	150	0.02		**0.02**
Takeoff Military	92.5	105	0.77		**0.77**
Climb Out	50	92.5	0.32		**0.32**
Approach	18.5	50	2.99		**2.99**
Taxi/Idle Out/In	0	18.5	0.31	29.8	**30.11**

Representative Weighted Average LTO Time (min) = 34.21

Whiteman AFB

LTO Cycle TIMs By Power Setting Method

Times Based on Noise Profiles Power Settings (seconds)

Mode	% Thrust Range		Arrivals					Departures	
			Overhead Break Arrival - Lead (F35-O2)	Overhead Break Arrival Wingman (F35-O2W)	Straight in IFR (F35-A7)	Straight in VFR (F35-A11)	PFO Arrival (F35-P3)	Military Departure (F35-D6)	Afterburner Departure (F35-D12)
	>	<							
Takeoff Afterburner	105	150	0.00	0.00	0.00	0.00	0.00	0.00	9.73
Takeoff Military	92.5	105	0.00	0.00	0.00	0.00	0.00	62.25	48.36
Climb Out	50	92.5	13.96	13.96	0.00	0.00	0.00	0.00	0.00
Approach	18.5	50	120.50	135.01	305.69	260.40	0.00	0.00	0.00
Taxi/Idle Out/In	0	18.5	53.04	51.77	0.00	0.00	33.89	0.00	0.00
Frequency (% of Time) =			40%	25%	20%	5%	10%	95%	5%

Weighted Times Based on Noise Profiles Weighted by Frequency (seconds)

Mode	% Thrust Range		Arrivals					Departures		Noise LTO
			Overhead Break Arrival - Lead (F35-O2)	Overhead Break Arrival Wingman (F35-O2W)	Straight in IFR (F35-A7)	Straight in VFR (F35-A11)	PFO Arrival (F35-P3)	Military Departure (F35-D6)	Afterburner Departure (F35-D12)	Cycle Contributions
	>	<								
Takeoff Afterburner	105	150	0.00	0.00	0.00	0.00	0.00	0.00	0.49	0.49
Takeoff Military	92.5	105	0.00	0.00	0.00	0.00	0.00	59.14	2.42	61.56
Climb Out	50	92.5	5.58	3.49	0.00	0.00	0.00	0.00	0.00	9.07
Approach	18.5	50	48.20	33.75	61.14	13.02	0.00	0.00	0.00	156.11
Taxi/Idle Out/In	0	18.5	21.21	12.94	0.00	0.00	3.39	0.00	0.00	37.55

USAF Representative Value (default) for Taxi Out/In = **29.8** minutes

Mode	% Thrust Range		Noise LTO Cycle Contributions (min)	LTO Missing Data (min, use defaults)	Derived LTO Cycle (min)
	>	<			
Takeoff Afterburner	105	150	0.01		**0.01**
Takeoff Military	92.5	105	1.03		**1.03**
Climb Out	50	92.5	0.15		**0.15**
Approach	18.5	50	2.60		**2.60**
Taxi/Idle Out/In	0	18.5	0.63	29.8	**30.43**

Representative Weighted Average LTO Time (min) = 34.21

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LTO Cycle TIMs By Altitude Method

Times Based on Noise Profiles Altitude Values (seconds)

Mode	Arrivals					Departures	
	Overhead Break Arrival - Lead (F35-O2)	Overhead Break Arrival - Wingman (F35-O2W)	Straight in IFR (F35-A7)	Straight in VFR (F35-A11)	PFO Arrival (F35-P3)	Military Departure (F35-D6)	Afterburner Departure (F35-D12)
Takeoff Afterburner	0.00	0.00	0.00	0.00	0.00	0.00	30.85
Takeoff Military	0.00	0.00	0.00	0.00	0.00	33.10	0.00
Climb Out Military	0.00	0.00	0.00	0.00	0.00	29.15	27.23
Approach	187.50	200.74	305.69	260.40	33.89	0.00	0.00
Taxi/Idle Out/In	0.00	0.00	0.00	0.00	0.00	0.00	0.00
equency (% of Time) =	**40%**	**25%**	**20%**	**5%**	**10%**	**95%**	**5%**

Weighted Times Based on Noise Profiles Weighted by Frequency (seconds)

Mode	Arrivals					Departures		Noise LTO
	Overhead Break Arrival - Lead (F35-O2)	Overhead Break Arrival - Wingman (F35-O2W)	Straight in IFR (F35-A7)	Straight in VFR (F35-A11)	PFO Arrival (F35-P3)	Military Departure (F35-D6)	Afterburner Departure (F35-D12)	Cycle Contributions
Takeoff Afterburner	0.00	0.00	0.00	0.00	0.00	0.00	1.54	1.54
Takeoff Military	0.00	0.00	0.00	0.00	0.00	31.44	0.00	31.44
Climb Out Military	0.00	0.00	0.00	0.00	0.00	27.70	1.36	29.06
Approach	75.00	50.19	61.14	13.02	3.39	0.00	0.00	202.73
Taxi/Idle Out/In	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

USAF Representative Value (default) for Taxi Out/In = **29.8** minutes

Mode	Noise LTO Cycle Contributions (min)	LTO Missing Data (min, use defaults)	Derived LTO Cycle (min)
Takeoff Afterburner	0.03		**0.03**
Takeoff Military	0.52		**1.01**
Climb Out Military	0.48		
Approach	3.38		**3.38**
Taxi/Idle Out/In	0.00	29.8	**29.80**

Representative Weighted Average LTO Time (min) = 34.21

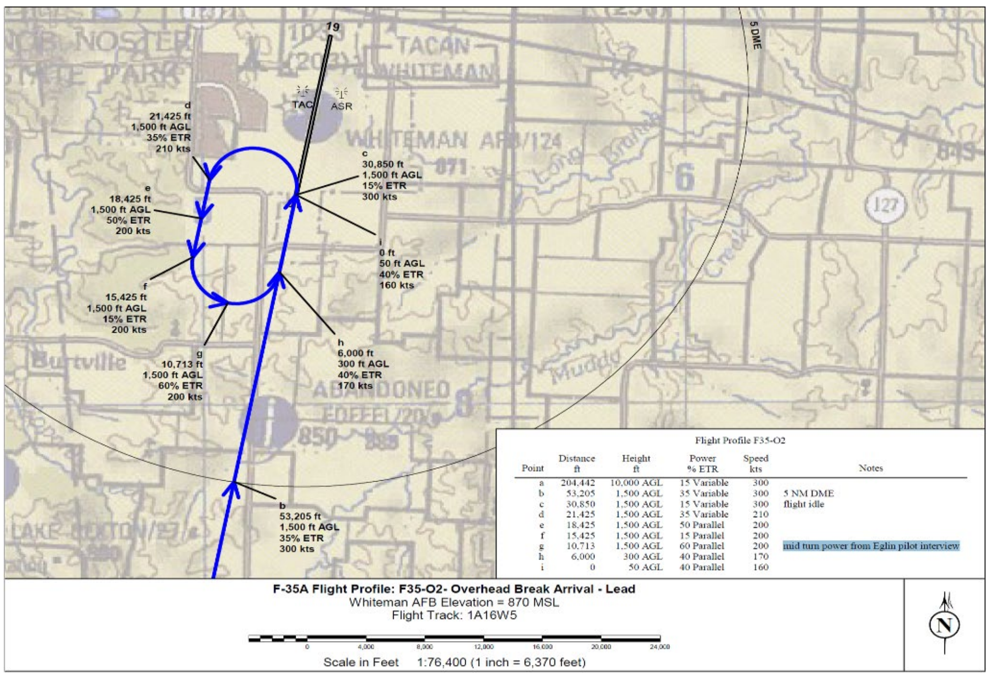
Whiteman AFB

Flight Profile F35-O2

Point	Distance (ft)	Height (ft)	Power (%	Speed (kts)	Notes
a	204,442	10000	15	300	
	79,894	3000	31	300	
b	53,205	1500	35	300	5 NM DME
c	30,850	1500	15	300	flight idle
d	21,425	1500	35	210	
e	18,425	1500	50	200	
f	15,425	1500	15	200	
g	10,713	1500	60	200	mid turn power from Eglin pilot interview
h	6,000	300	40	170	
i	0	50	40	160	

True Flight Distance (ft)	Air Speed (fps)	Segment Time (sec)		
26731	506	52.79	Approach	187
22355	506	44.15		
9425	430	21.90		
3000	346	8.67		
3000	338	8.89		
4712	338	13.96		
4863	312	15.58		
6005	278	21.56		

187.50



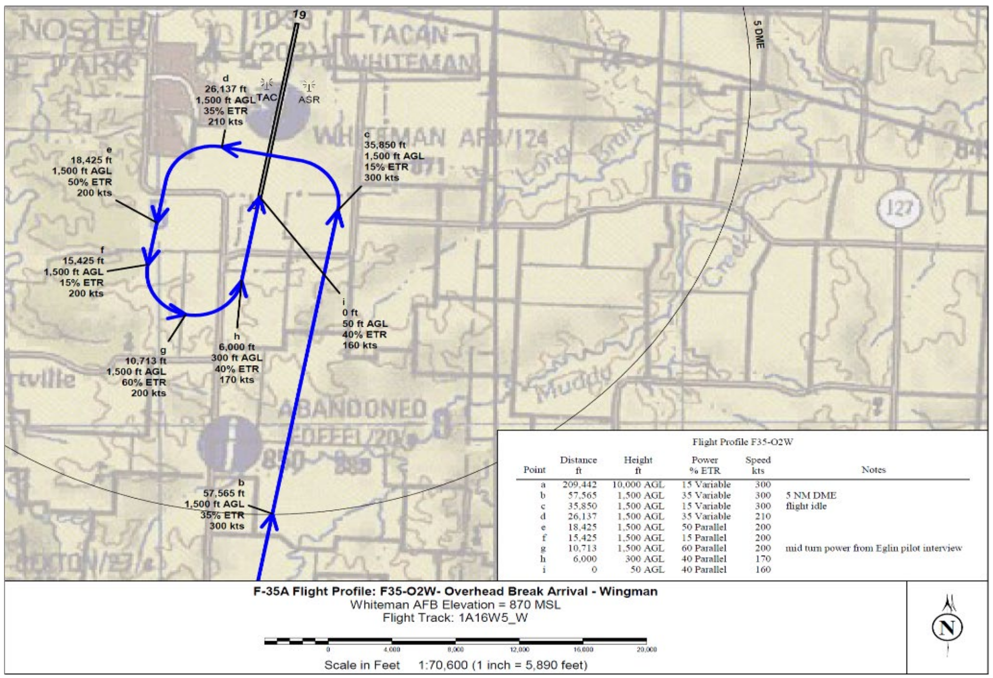
Whiteman AFB

Flight Profile F35-O2W

Point	Distance (ft)	Height (ft)	Power (%ETR)	Speed (kts)	Notes
a	209,442	10000	15	300	
	84,367	3000	31	300	
b	57,565	1500	35	300	5 NM DME
c	35,850	1500	15	300	flight idle
d	26,137	1500	35	210	
e	18,425	1500	50	200	
f	15,425	1500	15	200	
g	10,713	1500	60	200	mid turn power from Eglin pilot interview
h	6,000	300	40	170	
i	0	50	40	160	

True Flight Distance (ft)	Air Speed (fps)	Segment Time (sec)		
26844	506	53.02	Approach	201
21715	506	42.89		
9713	430	22.57		
7712	346	22.29		
3000	338	8.89		
4712	338	13.96		
4863	312	15.58		
6005	278	21.56		

200.74



F-35A Flight Profile: F35-O2W- Overhead Break Arrival - Wingman
Whiteman AFB Elevation = 870 MSL
Flight Track: 1A16W5_W

Whiteman AFB

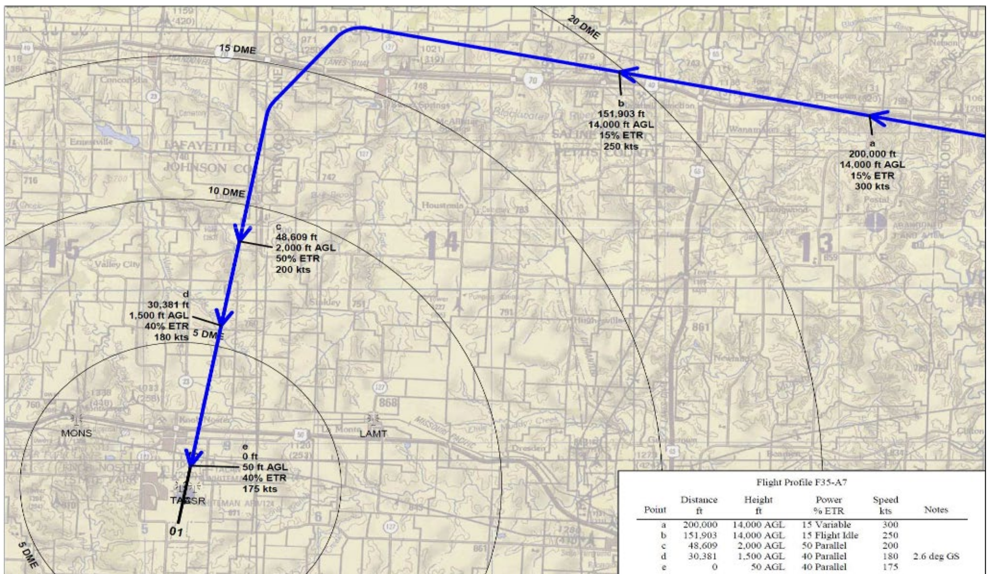
Flight Profile F35-A7

Point	Distance (ft)	Height (ft)	Power (%ETR)	Speed (kts)	
a	200,000	10000	15	300	
b	151,903	1500	15	250	
c	48,609	1500	50	200	
d	30,381	1500	40	180	2.6 deg GS
	61,810	3000	40	185	
e	0	50	40	175	

Notes

True Flight Distance (ft)	Air Speed (fps)	Segment Time (sec)		
31464	308	102.10	Approach	306
61880	304	203.59		

305.69



F-35A Flight Profile: F35-A7- Straight-in IFR Arrival
Whiteman AFB Elevation = 870 MSL
Flight Track: 19A3

Scale in Feet 1:212,000 (1 inch = 17,700 feet)

Whiteman AFB

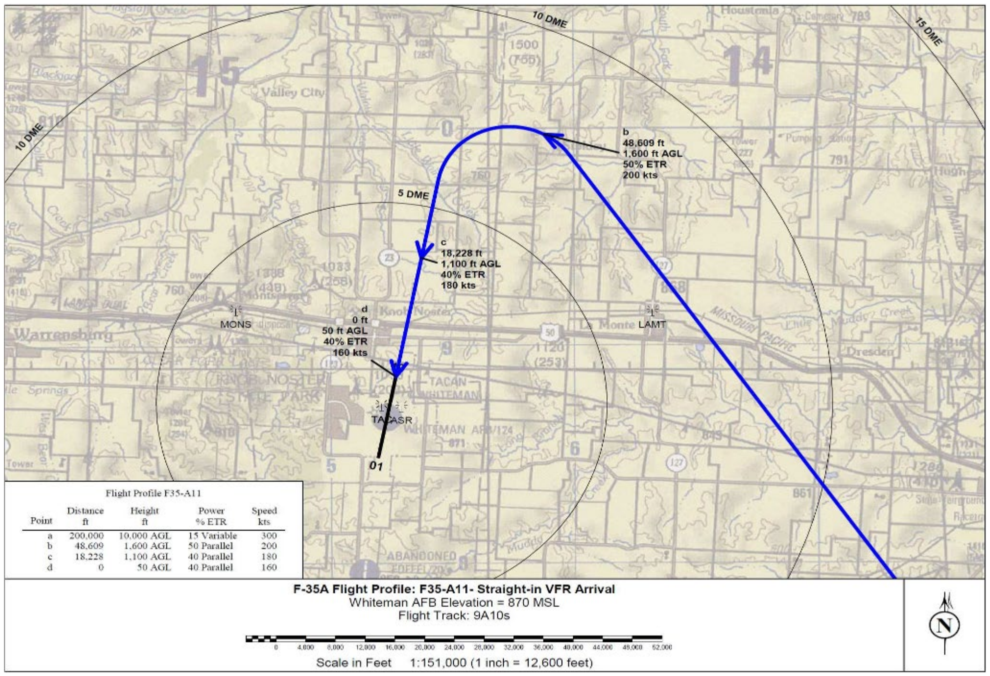
Flight Profile F35-A11

Point	Distance (ft)	Height (ft)	Power (%ETR)	Speed (kts)
a	200,000	10000	15	300
b	48,609	1600	50	200
c	18,228	1100	40	180
	51,212	3000	40	216
d	0	50	40	160

Notes

True Flight Distance (ft)	Air Speed (fps)	Segment Time (sec)		
33039	334	98.82	Approach	260
51297	317	161.58		

260.40

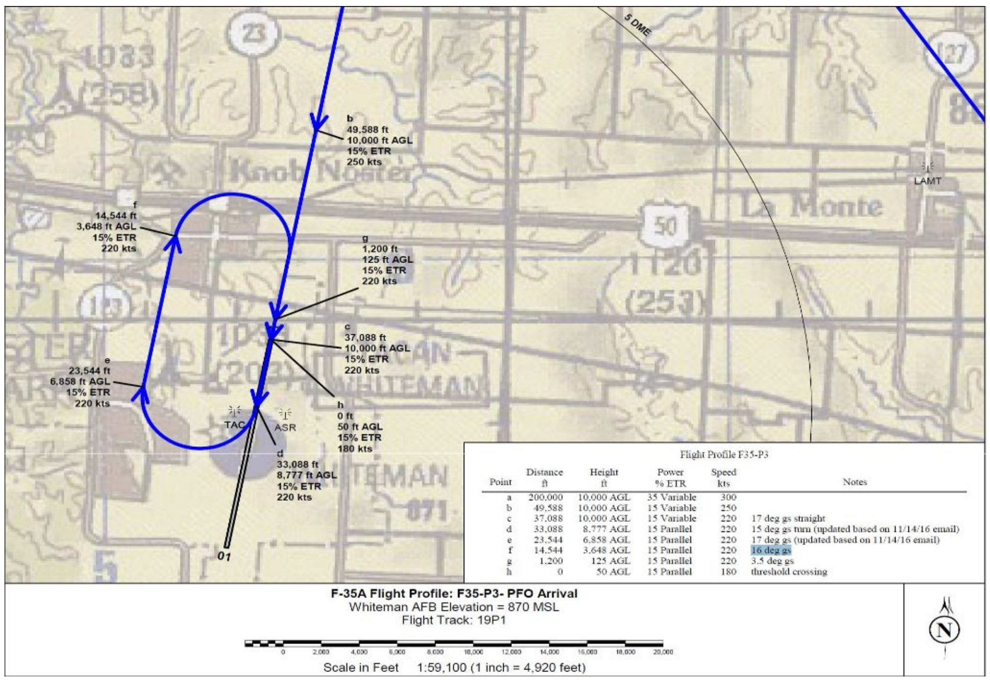


Whiteman AFB

Flight Profile F35-P3

Point	Distance (ft)	Height (ft)	Power (%ETR)	Speed (kts)	Notes
a	200,000	10000	35	300	
b	49,588	10000	15	250	
c	37,088	10000	15	220	17 deg gs straight
d	33,088	8777	15	220	15 deg gs turn (updated based on 11/14/16 email)
e	23,544	6858	15	220	17 deg gs (updated based on 11/14/16 email)
f	14,544	3648	15	220	16 deg gs
	12,090	3000	15	220	
g	1,200	125	15	220	3.5 deg gs
	0	50	15	180	threshold crossing

True Flight Distance (ft)	Air Speed (fps)	Segment Time (sec)		
11263	371	30.33	Approach	33.89
1202	338	3.56		
		33.89		

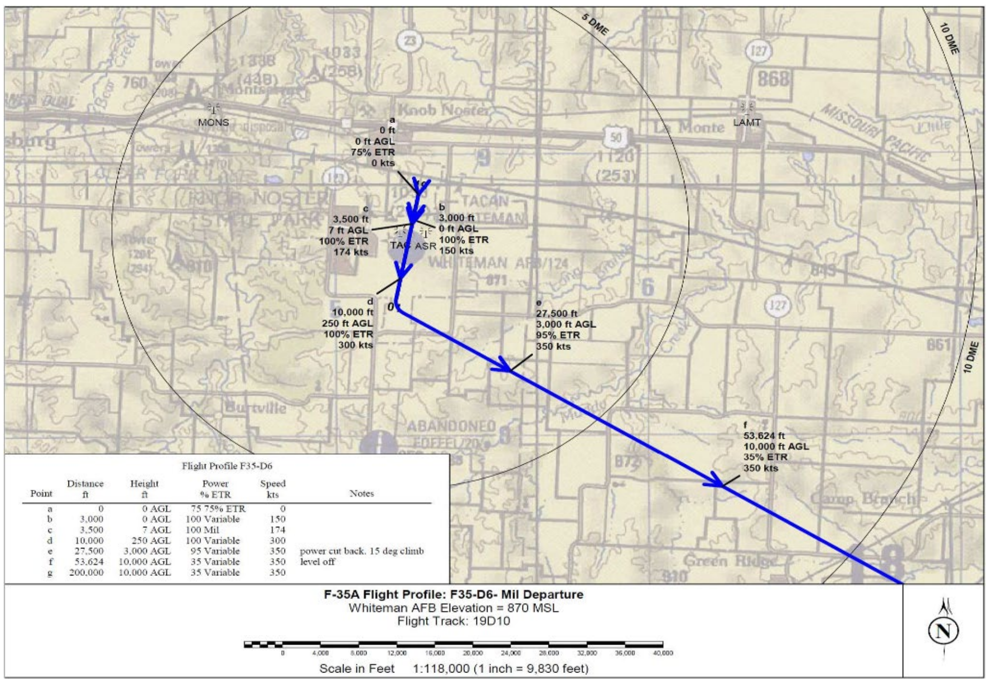


Whiteman AFB

Flight Profile F35-D6

Point	Distance (ft)	Height (ft)	Power (%ETR)	Speed (kts)	Notes
a	0	0	75	0	
b	3,000	0	100	150	
c	3,500	7	100	174	
d	10,000	250	100	300	
	11,591	500	100	305	
e	27,500	3000	95	350	power cut back. 15 deg climb
f	53,624	10000	35	350	level off
g	200,000	10000	35	350	

True Flight Distance (ft)	Air Speed (fps)	Segment Time (sec)		
3000	253	11.85	Take off	33.10
500	273	1.83		
6505	400	16.26		
1610	510	3.16		
16104	552	29.15	Climb out	29.15
		62.25		



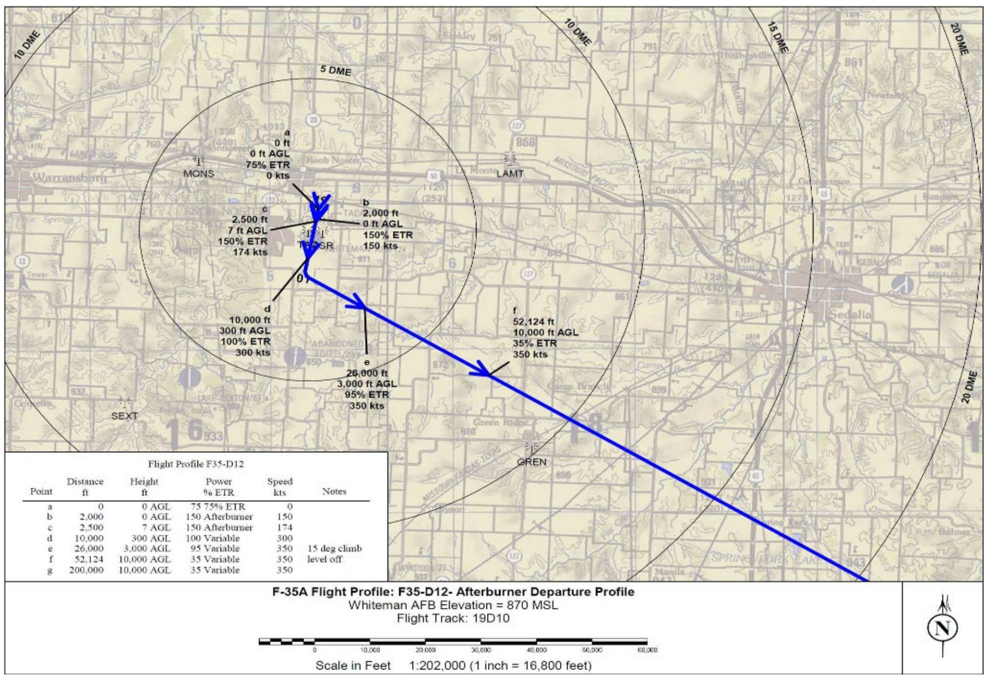
Whiteman AFB

Flight Profile F35-D12

Notes

Point	Distance (ft)	Height (ft)	Power (%ETR)	Speed (kts)	
a	0	0	75	0	
b	2,000	0	150	150	
c	2,500	7	150	174	
d	10,000	300	100	300	
	11,185	500	100	304	
e	26,000	3000	95	350	15 deg climb
f	52,124	10000	35	350	level off
g	200,000	10000	35	350	

True Flight Distance (ft)	Air Speed (fps)	Segment Time (sec)		
2000	253	7.90	Approach	30.85
500	273	1.83		
7506	400	18.76		
1202	509	2.36		
15024	552	27.23	Climb out	27.23
		58.09		



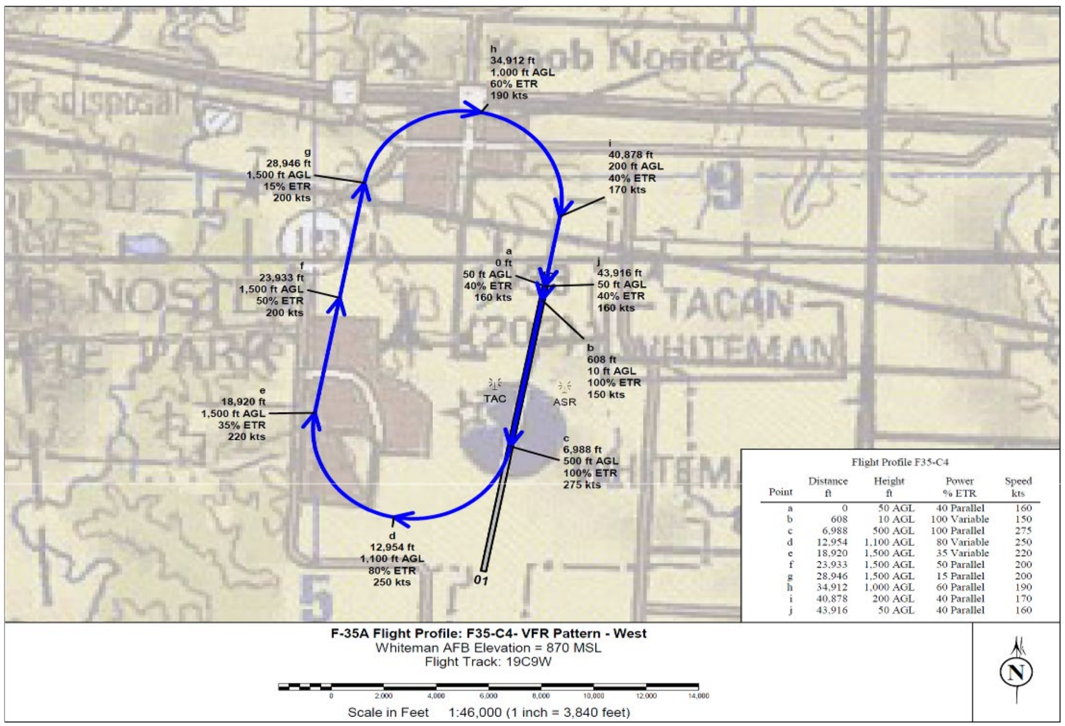
Whiteman AFB

Flight Profile F35-C4

Notes

Point	Distance (ft)	Height (ft)	Power (%ETR)	Speed (kts)
a	0	50	40	160
b	608	10	100	150
c	6,988	500	100	275
d	12,954	1100	80	250
e	18,920	1500	35	220
f	23,933	1500	50	200
g	28,946	1500	15	200
h	34,912	1000	60	190
i	40,878	200	40	170
j	43,916	50	40	160

True Flight Distance (ft)	Air Speed (fps)	Segment Time (sec)
609	262	2.33
6399	359	17.84
5996	443	13.53
5979	397	15.08
5013	354	14.14
5013	338	14.85
5987	329	18.19
6019	304	19.81
3042	278	10.92
		126.70



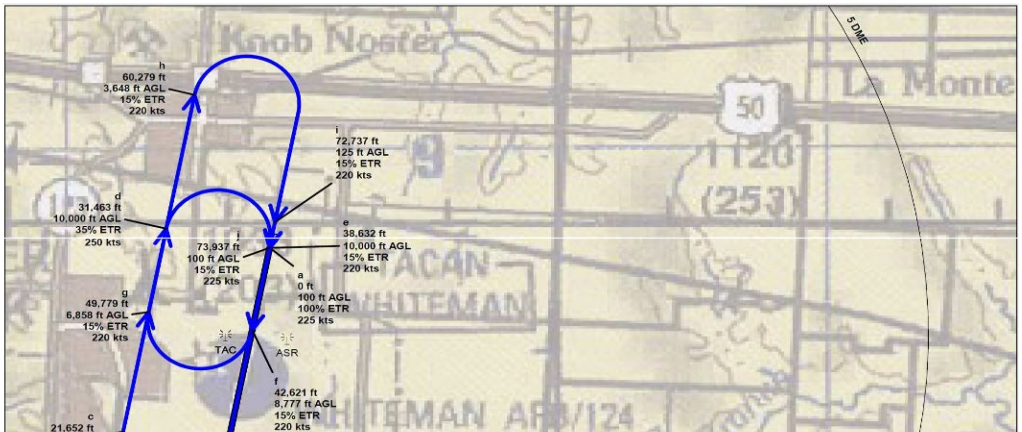
F-35A Flight Profile: F35-C4- VFR Pattern - West
Whiteman AFB Elevation = 870 MSL
Flight Track: 19C9W

Whiteman AFB

Flight Profile F35-C6

Point	Distance (ft)	Height (ft)	Power (%ETR)	Speed (kts)	Notes
a	0	100	100	225	
b	12,152	500	100	300	
	14,652	3000	83	287	
c	21,652	10000	35	250	
d	31,462	10000	35	250	
e	38,632	10000	15	220	
f	42,621	8777	15	220	
g	49,779	6858	15	220	
h	60,279	3648	15	220	
	62,570	3000	15	220	
i	72,737	125	15	220	
j	73,937	100	15	225	

True Flight Distance (ft)	Air Speed (fps)	Segment Time (sec)
12159	443	27.44
3536	495	7.14
10565	371	28.45
1200	376	3.20
		66.23



Flight Profile F35-C6

Point	Distance ft	Height ft	Power % ETR	Speed kts	Notes
a	0	100 AGL	100 Variable	225	
b	12,152	500 AGL	100 Variable	300	45 deg climb
c	21,652	10,000 AGL	35 Variable	250	reach pattern altitude; reduce thrust
d	31,463	10,000 AGL	35 Variable	250	begin turn to high key
e	38,632	10,000 AGL	15 Parallel	220	high key; 17 deg gs; matches SFO break arrival from this point to runway
f	42,621	8,777 AGL	15 Parallel	220	15 deg gs turn (updated based on 11/14/16 email)
g	49,779	6,858 AGL	15 Parallel	220	17 deg gs
h	60,279	3,648 AGL	15 Parallel	220	16 deg gs
i	72,737	125 AGL	15 Parallel	220	3.5 deg gs
j	73,937	100 AGL	15 Parallel	225	

F-35A Flight Profile: F35-C6- Multiple PFO Pattern
Whiteman AFB Elevation = 870 MSL
Flight Track: 19SP1

Scale in Feet 1:50,100 (1 inch = 4,170 feet)

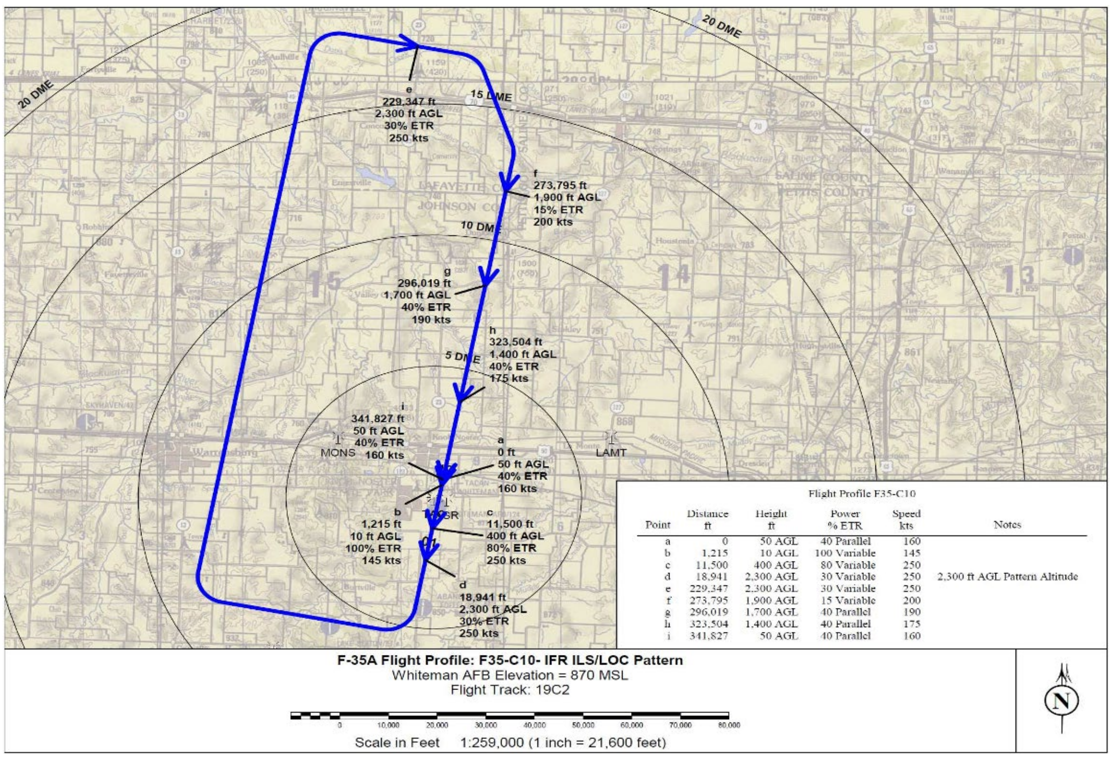
Whiteman AFB

Flight Profile F35-C10

Point	Distance (ft)	Height (ft)	Power (%ETR)	Speed (kts)	Notes
a	0	50	40	160	
b	1,215	10	100	145	
c	11,500	400	80	250	
d	18,941	2300	30	250	2,300 ft AGL Pattern Altitude
e	229,347	2300	30	250	
f	273,795	1900	15	200	
g	296,019	1700	40	190	
h	323,504	1400	40	175	
i	341,827	50	40	160	

True Flight Distance (ft)	Air Speed (fps)	Segment Time (sec)
1216	257	4.72
10292	333	30.88
7680	422	18.20
210406	422	498.65
44450	380	117.05
22225	329	67.53
27487	308	89.24
18373	283	64.99

891.25



Whiteman AFB

Landing and Takeoff Emissions

Estimated F-35A Emissions Based on LTO Cycle Derived from Site-Specific Noise Data

(Standard Mode Altitude Method)

Mode	Fuel Flow (lb/hr)	Emission Factors (lb/1000lb fuel)						
		NO_X	CO	VOC	HAPs	SO_X	PM_{10}	$PM_{2.5}$
Idle	2128	2.00	22.00	0.05	0.04	1.07	2.14	1.92
Approach	6730	9.00	1.20	0.01	0.01	1.07	1.52	1.37
Intermediate	16068	18.50	0.60	0.00	0.00	1.07	1.32	1.19
Military	19003	22.00	0.40	0.00	0.00	1.07	1.17	1.05
Afterburner	37938	14.43	9.87	0.01	0.01	1.07	1.11	1.00

Mode	TIM (min)	Emissions (lb)						
		NO_X	CO	VOC	HAPs	SO_X	PM_{10}	$PM_{2.5}$
Idle	29.80	2.11	23.25	0.05	0.04	1.13	2.26	2.03
Approach	3.38	3.41	0.45	0.00	0.00	0.41	0.58	0.52
Intermediate	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Military	1.01	7.03	0.13	0.00	0.00	0.34	0.37	0.34
Afterburner	0.03	0.23	0.16	0.00	0.00	0.02	0.02	0.02
Emissions per LTO (lb) =		**12.79**	**23.99**	**0.06**	**0.05**	**1.90**	**3.23**	**2.90**
Emissions per LTO (ton) =		**0.00639**	**0.01200**	**0.00003**	**0.00002**	**0.00095**	**0.00161**	**0.00145**

Whiteman AFB

Landing and Takeoff Emissions

Estimated F-35A Emissions Based on LTO Cycle Derived from Site-Specific Noise Data
(Power setting reported in Noise Data Method)

Mode	% Power	Fuel Flow (lb/hr)	Emission Factors (lb/1000lb fuel)						
			NO_X	CO	VOC	HAPs	SO_X	PM_{10}	$PM_{2.5}$
Idle	0 > 10 ≤ 18.5	2128	2.00	22.00	0.05	0.04	1.07	2.14	1.92
Approach	18.5 > 30 ≤ 50	6730	9.00	1.20	0.01	0.01	1.07	1.52	1.37
Intermediate	50 > 85 ≤ 92.5	16068	18.50	0.60	0.00	0.00	1.07	1.32	1.19
Military	92.5 > 100 ≤ 105	19003	22.00	0.40	0.00	0.00	1.07	1.17	1.05
Afterburner	105 > 130 ≤ 150	37938	14.43	9.87	0.01	0.01	1.07	1.11	1.00

Mode		TIM (min)	Emissions (lb)						
			NO_X	CO	VOC	HAPs	SO_X	PM_{10}	$PM_{2.5}$
Idle	0 > 10 ≤ 18.5	30.43	2.16	23.74	0.05	0.04	1.15	2.31	2.07
Approach	18.5 > 30 ≤ 50	2.60	2.63	0.35	0.00	0.00	0.31	0.44	0.40
Intermediate	50 > 85 ≤ 92.5	0.15	0.75	0.02	0.00	0.00	0.04	0.05	0.05
Military	92.5 > 100 ≤ 105	1.03	7.15	0.13	0.00	0.00	0.35	0.38	0.34
Afterburner	105 > 130 ≤ 150	0.01	0.07	0.05	0.00	0.00	0.01	0.01	0.01
		Emissions per LTO (lb) =	**12.76**	**24.30**	**0.06**	**0.05**	**1.86**	**3.19**	**2.87**
		Emissions per LTO (ton) =	**0.006378**	**0.012148**	**0.00003**	**0.00002**	**0.000932**	**0.001596**	**0.001433**

Whiteman AFB

Touch and Go Emissions

Estimated F-35A Emissions Based on LTO Cycle Derived from Site-Specific Noise Data

(Power Setting Method)

Mode	Fuel Flow (lb/hr)	Emission Factors (lb/1000lb fuel)						
		NO_X	CO	VOC	HAPs	SO_X	PM_{10}	$PM_{2.5}$
Idle	2128	2.00	22.00	0.05	0.04	1.07	2.14	1.92
Approach	6730	9.00	1.20	0.01	0.01	1.07	1.52	1.37
Intermediate	16068	18.50	0.60	0.00	0.00	1.07	1.32	1.19
Military	19003	22.00	0.40	0.00	0.00	1.07	1.17	1.05
Afterburner	37938	14.43	9.87	0.01	0.01	1.07	1.11	1.00

Mode	TIM (min)	Emissions (lb)						
		NO_X	CO	VOC	HAPs	SO_X	PM_{10}	$PM_{2.5}$
Idle	0.31	0.02	0.24	0.00	0.00	0.01	0.02	0.02
Approach	1.13	1.14	0.15	0.00	0.00	0.14	0.19	0.17
Intermediate	0.49	2.42	0.08	0.00	0.00	0.14	0.17	0.16
Military	0.34	2.39	0.04	0.00	0.00	0.12	0.13	0.11
Afterburner	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Emissions per LTO (lb) =		**5.96**	**0.51**	**0.00**	**0.00**	**0.40**	**0.51**	**0.46**
Emissions per LTO (ton) =		**0.002982**	**0.000257**	**0.00000**	**0.00000**	**0.000201**	**0.000257**	**0.000232**