Final

UNITED STATES AIR FORCE F-35A OPERATIONAL BEDDOWN AIR NATIONAL GUARD ENVIRONMENTAL IMPACT STATEMENT

Volume I

February 2020

ACRONYMS AND ABBREVIATIONS

°F	degree Fahrenheit
115 FW	115th Fighter wing
124 FW	124th Fighter Wing
125 FW	125th Fighter Wing
127 WG	127th Wing
187 FW	187th Fighter Wing
AAD	Annual Average Day
ACAM	Air Conformity Applicability Model
ACC	Air Combat Command
ACM	asbestos-containing material
ADEM	Alabama Department of Environmental Management
AEDT	Aviation Environmental Design Tool
AETC	Air Education and Training Command
AFB	Air Force Base
AFCEC	Air Force Civil Engineer Center
AFGM	Air Force Guidance Memorandum
AFGSC	Air Force Global Strike Command
AFI	Air Force Instruction
AFMC	Air Force Materiel Command
AFOSH	Air Force Occupational Safety and Health
AFRC	Air Force Reserve Command
AFSEC	Air Force Safety Center
AFSOC	Air Force Special Operations Command
AFSPC	Air Force Space Command
AGE	Aerospace Ground Equipment
AGL	above ground level
AGR	Active Guard Reserve
AICUZ	Air Installation Compatible Use Zone
ALANG	Alabama Air National Guard
ALIS	Autonomic Logistics Information System
AMC	Air Mobility Command
ANG	Air National Guard
ANGB	Air National Guard Base
ANSI	American National Standards Institute
AOC	Area of Concern
APE	Area of Potential Effect
APZ	accident potential zone
AQCR	Air Quality Control Region
ARTCC	Air Route Traffic Control Center
ASA	Acoustical Society of America
AST	Aboveground Storage Tank
AT/FP	Anti-terrorism/Force Protection
ATC	Air Traffic Control
ATCAA	Air Traffic Control Assigned Airspace
BAI	Backup Aircraft Inventory
BASH	Bird/Wildlife Aircraft Strike Hazard
BMP	Best Management Practice
CAA	Clean Air Act
CAF	Combat Air Forces
CAP	Central Accumulation Point
CBMPP	Construction Best Management Practices Plan
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
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CO_2e	CO_2 equivalency
CONUS	contiguous United States
CTOL	Conventional Take-Off and Landing
CV	Carrier Variant
CWA	Clean Water Act
CY	Calendar Year
CZ	Clear Zone
dB	Decibel
dBA	A-weighted decibel
dBC	C-weighted decibel
DEP	Department of Environmental Protection
DEQ	Department of Environmental Quality
DNL	Day-Night Average Sound Level
DoD	Department of Defense
DOPAA	Description of Proposed Action and Alternatives
EA	Environmental Assessment
EGLE	Michigan Department of Environment, Great Lakes, and Energy
EIAP	Environmental Impact Analysis Process
EIS	Environmental Impact Statement
EISA	Energy and Independence Security Act
EO	Executive Order
EOTS	Electro-Optical Targeting System
ERP	Environmental Restoration Program
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FICUN	Federal Interagency Committee on Urban Noise
FL	Flight Level
FLANG	Florida Air National Guard
FMS	Full Mission Simulator
FPPA	Farmland Protection Policy Act
FTU	formal training unit
FY	Fiscal Year
GAU	Aircraft Gun Unit
GBU	Guided Bomb Unit
GHG	Greenhouse Gas
GIS	Geographic Information System
GPS	Global Positioning System
GWP	Global Warming Potential
HAP	Hazardous Air Pollutant
HQ/AF3	Headquarters Air Force Operations, Plans and Requirements
HUD	Department of Housing and Urban Development
IAP	International Airport
IBD	Inhabited Building Distance
IDANG	Idaho Air National Guard
IDFG	Idaho Fish and Game
IFR	Instrument Flight Rules
JDAM	Joint Direct Attack Munitions

Cover Sheet
FINAL
UNITED STATES AIR FORCE F-35A OPERATIONAL BEDDOWN AIR NATIONAL GUARD ENVIRONMENTAL IMPACT STATEMENT

a. *Responsible and Cooperating Agencies:* United States Air Force, National Guard Bureau (Responsible Agencies); Federal Aviation Administration is a Cooperating Agency.

b. *Title of Action:* United States Air Force F-35A Operational Beddown Air National Guard Environmental Impact Statement

c. *Comments and Inquiries:* Mr. Ramon Ortiz, NGB/A4AM, 3501 Fetchet Avenue, Joint Base Andrews MD 20762-5157, (240) 612-7042; usaf.jbanafw.ngb-a4.mbx.a4a-nepa-comments@mail.mil.

d. *Designation:* Final Environmental Impact Statement (EIS)

e. *Abstract:* This Final EIS has been prepared in accordance with the National Environmental Policy Act (NEPA). The public and agency scoping process resulted in the analysis of the following environmental resources: noise, airspace, air quality, safety, land use, socioeconomics, environmental justice and the protection of children, infrastructure, earth resources, water resources, biological resources, cultural resources, and hazardous materials and waste. The Secretary of the Air Force proposes to beddown F-35A aircraft at two of five alternative locations. The goal of F-35A basing and fielding is to continue to provide optimum Combatant Commander support and to efficiently meet regional and global receiver demands while replacing the existing F-15, F-16, or A-10 fighter attack aircraft. This action would involve the beddown of one F-35A squadron consisting of 18 Primary Aircraft Authorized (PAA) with 2 Backup Aircraft Inventory (BAI) at each of the two selected locations, thereby establishing two F-35A operational locations. Five alternative ANG locations were selected for this beddown:

- 115th Fighter Wing (115 FW) at Dane County Regional Airport, Madison, Wisconsin
- 124th Fighter Wing (124 FW) at Boise Air Terminal (Boise Airport), Boise, Idaho
- 125th Fighter Wing (125 FW) at Jacksonville International Airport (IAP), Jacksonville, Florida
- 127th Wing (127 WG) at Selfridge Air National Guard Base (ANGB), Michigan
- 187th Fighter Wing (187 FW) at Montgomery Regional Airport, Montgomery, Alabama

The USAF has identified the 115 FW, Madison, Wisconsin as the preferred alternative for the 5th Operational Beddown and the 187 FW, Montgomery, Alabama as the preferred alternative for the 6th Operational Beddown.

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. Private citizen's addresses were not published in the Final EIS to protect their privacy.

How to Use This Document

Our goal is to give you 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, or EIS, is shown below.

OVERALL PROPOSAL

CHAPTER 1
Purpose and Need for the Proposed Action

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

CHAPTER 3
Resource Definition and Methodology

INFORMATION SPECIFIC TO EACH INSTALLATION

CHAPTER 4
Five Installation-Specific Sections

115 FW, Wisconsin	124 FW, Idaho	125 FW, Florida	127 WG, Michigan	187 FW, Alabama
Section WI1.0 Installation Overview	**Section ID1.0** Installation Overview	**Section FL1.0** Installation Overview	**Section MI1.0** Installation Overview	**Section AL1.0** Installation Overview
Section WI2.0 Alternative	**Section ID2.0** Alternative	**Section FL2.0** Alternative	**Section MI2.0** Alternative	**Section AL2.0** Alternative
Section WI3.0 Affected Environment and Environmental Consequences	**Section ID3.0** Affected Environment and Environmental Consequences	**Section FL3.0** Affected Environment and Environmental Consequences	**Section MI3.0** Affected Environment and Environmental Consequences	**Section AL3.0** Affected Environment and Environmental Consequences
Section WI4.0 Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section ID4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section FL4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section MI4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section AL4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources

OVERALL PROPOSAL

CHAPTER 5
References

CHAPTER 6
List of Preparers

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

TABLE OF CONTENTS

FIGURES

TABLES

CHAPTER 1

Purpose and Need

How to Use This Document

Our goal is to give you 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, or EIS, is shown below.

OVERALL PROPOSAL

CHAPTER 1
Purpose and Need for the Proposed Action

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

CHAPTER 3
Resource Definition and Methodology

INFORMATION SPECIFIC TO EACH INSTALLATION

CHAPTER 4
Five Installation-Specific Sections

115 FW, Wisconsin	124 FW, Idaho	125 FW, Florida	127 WG, Michigan	187 FW, Alabama
Section WI1.0 Installation Overview	**Section ID1.0** Installation Overview	**Section FL1.0** Installation Overview	**Section MI1.0** Installation Overview	**Section AL1.0** Installation Overview
Section WI2.0 Alternative	**Section ID2.0** Alternative	**Section FL2.0** Alternative	**Section MI2.0** Alternative	**Section AL2.0** Alternative
Section WI3.0 Affected Environment and Environmental Consequences	**Section ID3.0** Affected Environment and Environmental Consequences	**Section FL3.0** Affected Environment and Environmental Consequences	**Section MI3.0** Affected Environment and Environmental Consequences	**Section AL3.0** Affected Environment and Environmental Consequences
Section WI4.0 Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section ID4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section FL4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section MI4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section AL4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources

OVERALL PROPOSAL

CHAPTER 5
References

CHAPTER 6
List of Preparers

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

1.0 PURPOSE AND NEED FOR THE PROPOSED ACTION

1.1 INTRODUCTION

The United States (U.S.) Air Force (USAF) is proposing to beddown F-35A aircraft at two of five alternative Air National Guard (ANG) locations. The F-35A would replace the existing F-15, F-16, or A-10 fighter attack aircraft at the two selected installations. This action would involve the beddown of one F-35A squadron consisting of 18 Primary Aircraft Authorized (PAA) with 2 Backup Aircraft Inventory (BAI) at each of the two selected locations, thereby establishing two F-35A operational locations[1]. Five alternative ANG locations (Figure 1.1-1) are being considered for this beddown based on criteria identified in Section 2.3.

- 115th Fighter Wing (115 FW) at Dane County Regional Airport, Madison, Wisconsin
- 124th Fighter Wing (124 FW) at Boise Air Terminal (Boise Airport), Boise, Idaho
- 125th Fighter Wing (125 FW) at Jacksonville International Airport (IAP), Jacksonville, Florida
- 127th Wing (127 WG) at Selfridge Air National Guard Base (ANGB), Michigan
- 187th Fighter Wing (187 FW) at Montgomery Regional Airport, Montgomery, Alabama

USAF MAJCOMS
- Air Combat Command (ACC)
- Air Education and Training Command (AETC)
- Air Force Global Strike Command (AFGSC)
- Air Force Materiel Command (AFMC)
- Air Force Reserve Command (AFRC)
- Air Force Space Command (AFSPC)
- Air Force Special Operations Command (AFSOC)
- Air Mobility Command (AMC)
- Pacific Air Forces (PACAF)
- U.S. Air Force in Europe (USAFE)

The ANG has both federal and state missions. These dual missions result in each guardsman holding membership in the National Guard of his or her state as part of the ANG unit acting in the capacity of a Reserve Component of the USAF. The ANG's federal mission is to maintain well-trained, well-equipped units available for prompt mobilization during wartime and to provide assistance during national emergencies (such as natural disasters or civil disturbances). During peacetime, the combat-ready units and their support units are assigned to most USAF major commands (MAJCOMs), to carry out missions compatible with training, mobilization readiness, humanitarian and contingency operations.

---

[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. From this point forward in the document, only PAA will be discussed.

Figure 1.1-1
Alternative Locations for the ANG F-35A Operational Beddown

Each of the five alternative ANG F-35A beddown locations evaluated in this Environmental Impact Statement (EIS) have a fighter mission that is assigned to the USAF Air Combat Command (ACC) MAJCOM for their federal missions, and as such they implement a training syllabus associated with ACC.

ANG units may be activated in a number of ways as prescribed by public law, most of which may be found in Title 10 of the U.S. Code (USC). The ANG provides nearly half of the USAF's tactical airlift support, combat communications functions, aeromedical evacuations, and aerial refueling. In addition, the ANG has total responsibility for air defense of the entire U.S.

When ANG units are not mobilized or under federal control, they report to the governor of their respective state, territory, or the commanding general of the District of Columbia National Guard. The Adjutant General of the state or territory supervises each of the 54 National Guard organizations. Under state law, the ANG provides protection of life and property, and preserves peace, order, and public safety. These missions are accomplished through emergency relief support during natural disasters such as floods, earthquakes, and forest fires; search and rescue operations; support to civil defense authorities; maintenance of vital public services; and counterdrug operations.

In accordance with the National Environmental Policy Act (NEPA) of 1969 (42 USC 4321-4347), Council on Environmental Quality (CEQ) *Regulations for Implementing the Procedural Provisions of NEPA* (40 Code of Federal Regulations [CFR] Parts 1500-1508), and Air Force Instruction (AFI) 32-7061 as promulgated at 32 CFR Part 989 *et seq.*, *Environmental Impact Analysis Process* (EIAP), the National Guard Bureau (NGB) has prepared this Final EIS. The EIS uses a systematic, interdisciplinary approach to consider the potential consequences to the quality of the human environment and important historic, cultural, and natural aspects of our national heritage that may result from implementation of this action.

The USAF is in the midst of the strategic basing process for the F-35A. Pilot training and operational testing for the F-35A has already been established at Eglin Air Force Base (AFB) in Florida; Edwards AFB in California; Nellis AFB in Nevada; and at Luke AFB in Arizona. One location currently supports operational F-35A squadrons at Hill AFB in Utah (the first operational beddown or Operational Beddown #1), where aircraft started arriving in 2015. The second operational F-35A beddown (Operational Beddown #2) is at Burlington ANGB in Vermont, where the aircraft have begun to arrive. The third beddown, at Eielson AFB in Alaska (Operational Beddown #3), is scheduled to receive its first F-35A in 2020. Operational Beddown #4 is scheduled for Lakenheath AFB (Suffolk, England). This EIS analyzes the impacts associated with implementing Operational Beddowns #5 and #6 for the ANG. Operational Beddown #7 is associated with the Air Force Reserve Command (AFRC), which is evaluated under another EIS. Alternative locations for the AFRC beddown include Naval Air Station Joint Reserve Base Fort

Worth, Texas; Davis-Monthan AFB, Arizona; Homestead Air Reserve Base, Florida; and Whiteman AFB, Missouri.

1.2 PURPOSE AND NEED

1.2.1 Purpose of F-35A Beddown

The federal mission of these ANG units is to support the USAF by maintaining well-trained, well-equipped units available for prompt mobilization during wartime and to provide assistance during national emergencies. As such, the ANG must acquire and train with the current USAF aircraft, including the F-35A. To meet these requirements, the ANG must operate combat and support aircraft and train personnel for the job, according to the training requirements established by ACC through its Ready Aircrew Program. The purpose of the Proposed Action is to efficiently and effectively maintain combat capability and mission readiness in the full spectrum of USAF aircraft as the ANG faces deployments for conflicts abroad, while also providing for homeland defense. Beddown and operation of the F-35A at two of the five alternative locations would represent a major step toward this goal. These beddown actions and associated training would ensure availability of combat-ready pilots in the most advanced fighter aircraft in the world.

1.2.2 Need for F-35A Beddown

The F-35A is the latest generation of fighter aircraft supporting the Combat Air Forces (CAF), which includes ACC, ANG, and AFRC. ACC is the primary provider of combat airpower to the U.S.'s warfighting commands. As a component of CAF, the ANG needs to train in the same aircraft as ACC to effectively fulfill these same roles in a reserve capacity. To support global implementation of national security strategy, ACC, ANG, and AFRC operate fighter, bomber, reconnaissance, battle-management, and electronic combat aircraft. As such, ACC, ANG, and AFRC organize, train, equip, and maintain 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.

Three factors drive the need to beddown and operate the F-35A in the USAF. *First*, existing and anticipated enemy air defense systems have reached levels of effectiveness sufficient to pose a significant threat to current fighter 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 attack aircraft are vulnerable. In its role to support the CAF, the ANG needs to identify locations for the F-35A beddown so that their pilots can be trained and combat-ready. Additionally, basing the F-35A at an ANG installation that already supports an Active Duty Associate Unit would allow both active duty and ANG pilots the opportunity to train together. The Active Duty Associate Unit is a squadron of active duty members stationed with an ANG host unit and tasked with flying and maintaining aircraft under the operational control of the host ANG's command (Sjostedt 2010).

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

Third, the ANG F-35A must support CAF core competencies of air and space superiority, global attack, precision engagement, and agile combat support. To do this efficiently and effectively, the aircraft need to be based 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 form a critical priority for the USAF.

1.3 BACKGROUND OF THE F-35

1.3.1 Fighter Modernization

During the 1980s, the USAF assessed its tactical capabilities against projected threats and determined a multi-role aircraft deficiency would emerge in the near future. Such a deficiency could jeopardize the U.S. ability to ensure its forces have the freedom of action to conduct operations against opposing forces. As a result, the USAF developed a strategy to modernize the aging inventory of legacy fighter aircraft with a nearly all-stealth fighter force by 2025. The first phase began in the early 1990s to replace the older F-15 aircraft and augment the air superiority role with the newly developed F-22 Raptor. In 1993, the Joint Advanced Strike Technology Program was established to define and develop a common Joint Strike Fighter airframe that would fill multiple combat roles and meet the growing sophistication of enemy defense systems. In 1994, the U.S. Congress and the Department of Defense (DoD) determined a Joint Strike Fighter (or F-35 Lightning II) would be developed to replace and supplement legacy fighter and attack aircraft. There are three variants of the F-35: F-35A (USAF), Conventional Take-Off and Landing (CTOL); F-35B (Marine Corps), Short Take-Off, Vertical Landing (STOVL); and F-35C (Navy), Carrier Variant (CV). The common F-35 airframe also addresses allied air force's operational needs. Under the current Concept of Operations, the F-35A would replace USAF and ANG fighter aircraft such as the F-16 Fighting Falcon, F-15 Eagle, and A-10 Thunderbolt II. The F-35A would augment the F-22 Raptor, which continues to excel in its air superiority role.

1.3.2 F-35A Aircraft Characteristics

The F-35A is a supersonic, single seat, single engine, all-weather fighter aircraft capable of performing and surviving lethal strike warfare missions. The F-35A is capable of speeds up to Mach 1.5 and can employ air-to-ground, air-to-air, and guided weapons from an internal weapons bay. The USAF F-35A model also possesses a 25-millimeter (mm) cannon for close air support and anti-armor missions. In addition, it employs defensive countermeasures such as chaff and flares, although its stealth characteristics reduce the need for such measures.

The F-35A combines internal weapon bays and expanded fuel capacity to permit low visibility penetration of enemy air defenses.

The F-35A CTOL variant is designed to embody critical combat capabilities to fulfill multiple USAF mission roles, emphasizing air-to-ground missions by providing a unique combination of the following capabilities:

- *Stealth*: Design features and radar-absorbent composite materials make the F-35A harder to detect than conventional aircraft of similar size.
- *Range and Supersonic Speed*: The F-35A offers an equivalent or greater combat radius than legacy fighter aircraft while performing at substantially higher speeds than some legacy aircraft. The higher speeds and lower observability make pilots less vulnerable to enemy aircraft and ground-based threats.
- *Sensor Integration to Support Precision Munitions*: New computer systems, combined with an internal munitions bay, permit F-35A pilots to detect enemy threats and deliver precision munitions at substantially greater distances than legacy aircraft.
- *Comprehensive Combat Information Systems*: Highly sophisticated avionics systems, including a helmet-mounted display, are integrated throughout the F-35A to provide the pilot with 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.

1.3.3 F-35A Training Requirements

Headquarters Air Force Operations, Plans and Requirements (HQ AF/A3) defines the pilot training requirements needed to retain pilot proficiency. Major Air Commands transmit those requirements to their installations by issuing Ready Aircrew Program Tasking messages. The Ready Aircrew Program requirements indicate that to fulfill the multiple roles currently performed by the fighter aircraft it is replacing, F-35A aircraft must be used in training exercises to ensure combat readiness for all major types of missions, including basic fighter maneuvers, surface attack tactics, air combat maneuvers, close air support, and air combat tactics (refer to Table 2.2-3 for further details). Each of these major missions requires the necessary airspace and range assets (e.g., targets and strafing pits) to permit realistic training. Existing training airspace associated with each of the five alternative locations has the requisite airspace and range assets to support F-35A combat readiness training; no new airspace or reconfiguration of existing airspace or ranges is required or proposed. More detail on F-35A Training Requirements can be found in Section 2.2, and base-specific details can be found in Chapter 4.

1.4 LEGACY AIRCRAFT CHARACTERISTICS

1.4.1 A-10 Thunderbolt II

The A-10 Thunderbolt II has excellent maneuverability at low air speeds and altitude, and can loiter near battle areas for extended periods of time, and operate in low ceiling and low visibility conditions. The wide combat radius and short take-off and landing capability permit operations in and out of locations near front lines. Using night vision goggles, A-10 pilots can conduct their missions during darkness. The A-10 is capable of speeds up to Mach 0.75 and can employ a wide variety of conventional munitions, including general purpose bombs, cluster bomb units, laser guided bombs, joint direct attack munitions, wind corrected munitions dispenser, Sidewinder missiles, rockets, illumination flares, and the Aircraft Gun Unit (GAU)-8/A 30-mm cannon. The aircraft can survive direct hits from armor-piercing and high explosive projectiles up to 23 mm. Their self-sealing fuel cells are protected by internal and external foam. Manual systems back up their redundant hydraulic flight control systems.

1.4.2 F-16 Fighting Falcon

The F-16 Fighting Falcon is a compact, multi-role fighter aircraft. In an air combat role, the F-16s maneuverability and combat radius (distance it can fly to enter air combat, stay, fight, and return) exceed that of all potential threat fighter aircraft. With a full load of internal fuel, the F-16 can withstand up to nine Gs (nine times the force of gravity) which exceeds the capability of other current fighter aircraft. The cockpit and its bubble canopy give the pilot unobstructed forward and upward vision, and greatly improved vision over the side and to the rear. All active units and many ANG and USAF Reserve units have converted to the F-16C/D. The F-16C is a single seat model, while the F-16D is a two-seat model. The F-16C/D is capable of speeds up to Mach 2 and contains one M-61A1 20-mm multi-barrel cannon with 500 rounds and external stations can carry up to six air-to-air missiles, conventional air-to-air and air-to-surface munitions, and electronic countermeasure pods.

1.4.3 F-15 Eagle

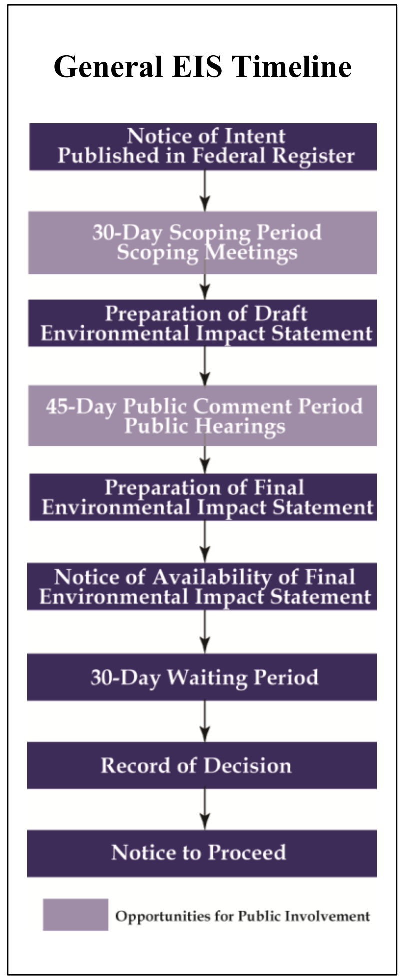
The F-15 Eagle is an all-weather, extremely maneuverable, tactical fighter capable of speeds up to Mach 2. A multi-mission avionics system sets the F-15 apart from other fighter aircraft. It includes a head-up display, advanced radar, inertial navigation system, flight instruments, ultra-high frequency communications, tactical navigation system, and instrument landing system. It also has an internally mounted, tactical electronic warfare system, "identification friend or foe" system, electronic countermeasures set, and a central digital computer. A variety of air-to-air weaponry can be carried by the F-15. The Eagle can be armed with combinations of different air-to-air weapons: AIM-120 advanced medium range air-to-air missiles on its lower fuselage corners, AIM-9L/M Sidewinder, or AIM-120 missiles on two pylons under the wings, and an internal 20-mm Gatling gun in the right wing root.

1.5 ENVIRONMENTAL IMPACT ANALYSIS PROCESS

This EIS has been prepared in compliance with all applicable local, state, and federal environmental regulations. An EIS is prepared as a tool for compiling information for a proposal and provides a full and fair discussion of environmental impacts to the natural and human environment. Reasonable alternatives to the Proposed Action, including the No Action Alternative, are also evaluated in an EIS. The USAF and NGB have evaluated all reasonable alternatives to ensure that an informed decision is made after review and consideration of the potential environmental consequences.

Compliance with NEPA guidance for preparation of an EIS involves several critical steps summarized below.

1. *Announce that an EIS will be prepared*. For this EIS, a Notice of Intent (NOI) was published in the *Federal Register* on February 7, 2018. The NOI formally initiated the public scoping process. The NOI included descriptions of the alternatives; the scoping process; and the dates, times, and locations of the scoping meetings. The NOI also invited participation in scoping of affected federal, state, and local agencies, affected American Indian Tribe(s), and interested persons (e.g., public).
2. *Conduct scoping.* This is the first major step in identifying the relevant issues to be analyzed in detail, and to eliminate issues that are not relevant. Scoping for this EIS began on February 7, 2018 with the request that all comments be provided by April 6, 2018 to ensure consideration in the development of the Draft EIS. Throughout the scoping period, the NGB actively solicited public comments on the proposal. Information related to the proposal has been disseminated to the public through several avenues, including newspaper advertisements, public service announcements, a project website (www.ANGF35EIS.com), and periodic fact sheets that have been distributed to the mailing list as well as all residential and business addresses within the proposed 65 decibel (dB) or greater noise contours.



The NGB has provided potentially interested government agencies with notifications regarding the proposal. Comments received from these agencies have been and will continue to be incorporated into this document throughout the process. Appendix A provides a list of relevant federal, state, and local agencies as well as sample notification letters.

Coordination with federally-recognized Native American Tribes occurred in accordance with the American Indian and Alaska Native Policy (signed October 20, 1998); Executive Order (EO) 13007, *Indian Sacred Sites* (May 24, 1996); EO 13175, *Consultation and Coordination with Indian Tribal Governments* (November 6, 2000); and DoD Instruction 4710.02, *DoD Interactions with Federally-Recognized Tribes* (September 14, 2006). Section 106 consultation and government-to-government consultation for this project has continued throughout the duration of EIS preparation. See Appendix A for example letters and responses received from tribes.

Scoping meetings were held one day each in Clinton Township, Michigan; Boise, Idaho; Montgomery, Alabama; Madison, Wisconsin; and Jacksonville, Florida. From 2 to 4 p.m., a session was held for agencies and Congressional Delegations; from 5 to 8 p.m., a session was held for the general public. During the scoping meetings, the NGB presented details about the Proposed Action and alternatives, outlined the NEPA process, and provided an opportunity for agency and public interaction and comment. In addition to receiving verbal and written comments at the scoping meetings, the NGB has also accepted written comments through the U.S. Postal Service and project website. Relevant scoping comments were used to shape the analysis and focus the issues in this EIS.

3. *Prepare a Draft EIS.* The Draft EIS is a comprehensive document for public and agency review. The Draft EIS describes the purpose and need of the Proposed Action and alternatives; presents the affected environment in the region potentially affected; and provides analysis of the environmental consequences of the Proposed Action and alternatives, including the No Action Alternative. The Draft EIS was distributed to agencies, regional libraries, and members of the public who requested copies, and was/is also accessible for downloading on the website.
4. *Public/Agency Review.* There was a public comment period following the Notice of Availability (NOA) for the Draft EIS, which was published in the *Federal Register* on August 9, 2019. This initiated the public comment period, during which public meetings were held at each alternative location. Per 32 CFR 989.19, the public review period must be a minimum of 45 days, with the public meetings occurring no sooner than 15 days after the NOA, and ending at least 15 days before the end of the comment period. As a result of this, the original comment period for the Draft EIS was August 9, 2019 through September 27, 2019 (50 days). As a result of comments received, the USAF extended the comment period for another 35 days through November 1, 2019, resulting in a comment period of 85 days. During the public meetings, the NGB presented details about the proposal, the NEPA process, and provided attendees an opportunity to provide written and/or oral comments. In addition to receiving verbal and written comments at the meetings, the NGB also accepted written comments from the public and agencies through U.S. mail, the website, and email. All substantive comments received during the public comment period were fully considered and addressed in the Final EIS, as appropriate. 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 NGB; or that offer specific information that may 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 NGB response, are

generally considered to be those comments that are non-specific; 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.

5. *Prepare a Final EIS.* The Final EIS has been prepared following the 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, the proponent's responses, and additional information received from reviewers. The Final EIS will provide the Secretary of the Air Force (the decision-maker) with a comprehensive review of the potential environmental consequences of selecting any of the alternatives. 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.
6. *Issue a Record of Decision.* The Record of Decision (ROD) is a concise public record that will address the USAF decision, identifies the alternatives considered, specifies the environmentally preferable alternative, states 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.

1.6 PUBLIC INVOLVEMENT PROCESS

1.6.1 Public Scoping

In accordance with NEPA, CEQ Regulations, and the USAF EIAP, the USAF and NGB have prepared this Final EIS to assess potential environmental consequences of the beddown and operation of F-35A aircraft for the ANG. As part of the EIAP, public involvement is integral in developing a comprehensive EIS. Specifically, NEPA, CEQ Regulations, and the EIAP require a process called "scoping" to involve the public early in the assessment process, as well as 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.

Scoping for this EIS began with publication of the NOI in the *Federal Register* on February 7, 2018, with the request that scoping comments be provided by April 6, 2018 to ensure consideration in the Draft EIS analysis. During the scoping period, the NGB conducted five public scoping meetings in potentially affected areas of Wisconsin, Idaho, Florida, Michigan, and Alabama.

The NGB initiated interagency coordination with the U.S. Fish and Wildlife Service (USFWS) regional offices and the State Historic Preservation Offices (SHPOs) by expressing their intent to undertake the EIS as well as notifying them of the initiation of formal consultation (Appendix A). Prior to the scoping meetings, the NGB initiated direct contact with potentially interested and affected government agencies, government representatives, elected officials, and parties in the states potentially affected through distribution of coordination letters (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 F-35A Fact Sheet. The NGB published advertisements in local newspapers near the installations and under the airspace prior to each of the scoping meetings; these advertisements included the scoping meeting dates and locations for each alternative. Newspaper advertisements ran in these newspapers on the following dates:

- 115 FW, Madison, Wisconsin – *Milwaukee Journal Sentinel* and the *Wisconsin State Journal* on February 11 and March 4, 2018.
- 124 FW, Boise, Idaho – *Idaho Statesman, Twin Falls Times-News,* and the *Mountain Home News* on February 4 and 25, 2018.
- 125 FW, Florida – *Florida Times Union* and the *Brunswick News* on February 18 and March 11, 2018.
- 127 WG, Michigan – *Macomb Daily, Alpena News,* and the *Huron Daily Tribune* on February 4 and 18, 2018.
- 187 FW, Alabama – *Montgomery Advertiser, Sun Herald,* and the *Mobile-Press Register* on February 4 and 25, 2018.

At these open-house style meetings, approximately 535 people attended with 191 written comments submitted. During the scoping period, the NGB received nine agency responses to early coordination, and two Native American Tribes replied to the government-to-government consultation request. A total of 1,954 comments were received from the public through April 6, 2018.

1.6.2 Draft EIS Public Comment Period

The USAF released the Draft EIS on August 9, 2019 for public and agency review and comment. A NOA was published in the *Federal Register*, newspaper advertisements were published in the following newspapers starting approximately 3 weeks in advance of the public meeting:

- 115th Fighter Wing (115 FW), Madison, Wisconsin – *Milwaukee Journal Sentinel* and the *Wisconsin State Journal* on August 25 and September 8, 2019.
- 124th Fighter Wing (124 FW), Boise, Idaho – *Idaho Statesman* and *Twin Falls Times-News* on August 18 and September 1, 2019, and the *Mountain Home News* on August 21 and September 4, 2019.
- 125th Fighter Wing (125 FW), Florida – *Florida Times Union* on August 11 and August 25, 2019, and the *Brunswick News* on August 10 and August 24, 2019.

- 127th Wing (127 WG), Michigan – *Macomb Daily* on August 25 and September 8, 2019, and the *Alpena News* and the *Huron Daily Tribune* on August 24 and September 7, 2019.
- 187th Fighter Wing (187 FW), Alabama – *Montgomery Advertiser, Sun Herald,* and the *Mobile-Press Register* on August 11 and August 25, 2019.

The comment period was then extended for an additional 35 days and newspaper advertisements were again published in the same newspapers announcing the extension of the comment period.

Additionally, press releases were sent to local media outlets, flyers were posted, and letters accompanied the direct mailing of the Draft EIS document. Fact Sheets were mailed to everyone that signed up to be on the mailing list as well as all properties located within the projected 65 dB noise contours. The Draft EIS was also posted on a publicly accessible website at www.ANGF35EIS.com. Copies of the Draft EIS were also sent to local document repositories.

As mentioned in Section 1.5, the USAF responded to all substantive comments received on the Draft EIS in the Final EIS, consistent with 40 CFR § 1503.4.

The schedule, location, and attendance level for the public meetings are provided in Table 1.6-1.

Table 1.6-1. Schedule of Meetings and Attendance

Date/Time	*Meeting Attendees*	*Location*
Public Meeting August 27, 2019 5 – 8 p.m.	3	DoubleTree Hotel, Jacksonville Airport Aviation Ballroom 2101 Dixie Clipper Dr., Jacksonville, Florida
Public Meeting August 29, 2019 5 – 8 p.m.	15	Montgomery Regional Airport First Floor Rotunda and Conference Room 4445 Selma Highway, Montgomery, Alabama
Public Meeting September 5, 2019 5 – 8 p.m.	123	Boise State University Stueckle Sky Center Double R Ranch Club 1910 University Drive MSC 1335, Boise, ID
Public Meeting September 10, 2019 5 – 8 p.m.	12	L'Anse Creuse Public Schools Wheeler Community Center, 24076 Frederick V. Pankow Blvd. Clinton Township, Michigan
Public Meeting September 12, 2019 5 – 8 p.m.	585	Exhibition Hall at the Alliant Energy Center 1919 Alliant Energy Center Way Madison, Wisconsin

The USAF made every attempt to find the best possible venue as close to the impacted area as possible. Because it was apparent that there would be a large turnout at both the Boise and Madison meetings, the USAF looked for fairly large venues that could comfortably accommodate the anticipated crowds. There were no venues closer to the airports that had availability at any time during the public comment period. Venues for both of these meetings were within a 4 to 8 mile drive of the respective airfields. Approximately 738 people attended the Draft EIS public meetings with 204 written comments submitted at the meetings. During the 85-day comment period, the NGB received a total of 6,419 comments from the public through November 1, 2019.

1.6.3 Government-to-Government Consultation

In an ongoing effort to identify traditional cultural resources, as well as satisfy the requirements of various laws, regulations, and EOs, the NGB has consulted with American Indian Tribes according to the Presidential *Memorandum on Government-to-Government Relations with Native American Tribal Governments*, EO 13175, *Consultation and Coordination with Indian Tribal Governments*, and DoD Policy on Native American and Native Alaskan Consultation. The NGB initiated informal government-to-government consultation with American Indian Tribes by notifying them of the intent to undertake the EIS as well as initiating informal consultation (Appendix A). Federally-recognized tribes with potential interest in the Proposed Action at the five locations were sent letters asking if they had any concerns, would like to provide further information for incorporation into the EIS, and/or desire to meet with the NGB. Copies of letters and responses are included in Appendix A. Refer to Chapter 4, base-specific sections for information on the government-to-government consultation.

1.7 LEAD AND COOPERATING AGENCIES

The role of a federal agency in the NEPA process depends on the agency's expertise and relationship to the proposed undertaking. The agency carrying out the Proposed Action is responsible for complying with the requirements of NEPA. In some cases, there may be more than one federal agency involved in an undertaking. In this situation, a lead agency is designated to supervise preparation of the environmental analysis. Federal agencies, together with state, tribal, or local agencies, may act as joint lead agencies. The NGB and USAF are co-lead agencies for preparation of this EIS. As defined in 40 CFR § 1508.5, a cooperating agency is "any Federal agency other than a lead agency that 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. A state or local agency of similar qualifications, or when the effects are on a reservation, an American Indian Tribe may, by agreement with the lead agency, become a cooperating agency."

The Federal Aviation Administration (FAA) is a cooperating agency for this EIS (see Appendix A for cooperating agency letter). The FAA has special expertise and interest relating to the alternative locations for the Proposed Action that are "joint-use," where the DoD shares use of a civil airport. In addition, the FAA provides leadership in planning and developing a safe and efficient national airport system to satisfy the needs of the aviation interests of the U.S., with consideration for economics, environmental issues, local proprietary rights, and safeguarding the public investment. The joint-use alternatives for the Proposed Action include construction or modification of facilities and infrastructure within the airport boundary that are necessary to support the F-35A beddown. Some of the construction and modifications would require prior FAA approval of a change to the airport's Airport Layout Plan. Before providing such approval, the FAA may have to comply with NEPA.

CHAPTER 2

Description of Proposed Action and Alternatives

How to Use This Document

Our goal is to give you 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, or EIS, is shown below.

OVERALL PROPOSAL

CHAPTER 1
Purpose and Need for the Proposed Action

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

CHAPTER 3
Resource Definition and Methodology

INFORMATION SPECIFIC TO EACH INSTALLATION

CHAPTER 4
Five Installation-Specific Sections

115 FW, Wisconsin	124 FW, Idaho	125 FW, Florida	127 WG, Michigan	187 FW, Alabama
Section WI1.0 Installation Overview	**Section ID1.0** Installation Overview	**Section FL1.0** Installation Overview	**Section MI1.0** Installation Overview	**Section AL1.0** Installation Overview
Section WI2.0 Alternative	**Section ID2.0** Alternative	**Section FL2.0** Alternative	**Section MI2.0** Alternative	**Section AL2.0** Alternative
Section WI3.0 Affected Environment and Environmental Consequences	**Section ID3.0** Affected Environment and Environmental Consequences	**Section FL3.0** Affected Environment and Environmental Consequences	**Section MI3.0** Affected Environment and Environmental Consequences	**Section AL3.0** Affected Environment and Environmental Consequences
Section WI4.0 Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section ID4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section FL4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section MI4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section AL4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources

OVERALL PROPOSAL

CHAPTER 5
References

CHAPTER 6
List of Preparers

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

2.0 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

2.1 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

The Air National Guard (ANG) proposes to beddown one squadron of 18 F-35A operational aircraft at two of five ANG installations. Each of these five alternative locations meets the beddown and operational requirements presented later in this chapter. These locations include the following: 115th Fighter Wing (115 FW) at Dane County Regional Airport, Madison, Wisconsin; 124th Fighter Wing (124 FW) at Boise Airport, Boise, Idaho; 125th Fighter Wing (125 FW) at Jacksonville International Airport (IAP), Jacksonville, Florida; 127th Wing (127 WG) at Selfridge Air National Guard Base (ANGB), Michigan; and 187th Fighter Wing (187 FW) at Montgomery Regional Airport, Montgomery, Alabama. The Proposed Action would replace the current fighter aircraft inventory of A-10s, F-16s, or F-15s with 18 Primary Aircraft Authorized (PAA) F-35A aircraft at the ultimate beddown locations. The Proposed Action also includes personnel needed to operate and maintain the F-35A, and construction of new and/or modification of existing facilities on the installations supporting the F-35A beddown. Pilots operating F-35A aircraft would conduct training from the installation and in existing Special Use Airspace (SUA) associated with each proposed location. No new SUA or reconfiguration of existing SUA is proposed, or would be required to support the ANG F-35A beddown at any of the alternative locations.

This chapter presents the elements common to the Proposed Action at the five alternative locations. The specifics of the proposal, relative to each of the five alternative locations, are presented in Chapter 4. The methodology used to identify the Proposed Action and alternatives analyzed in this Draft Environmental Impact Statement (EIS), and the alternatives considered but not carried forward for analysis, are discussed in Section 2.3.3. This chapter also discusses the No Action Alternative, as required under Council on Environmental Quality (CEQ) regulations (40 Code of Federal Regulations [CFR] § 1502.14[d]).

2.2 ELEMENTS OF THE PROPOSED ACTION COMMON TO ALL BEDDOWN ALTERNATIVES

The proposed F-35A beddown would involve implementing several related elements at two of the five alternative locations. The following elements would occur at an installation and in its associated training SUA.

Elements Affecting the Installation

- Beddown of F-35A aircraft and replacement of existing legacy A-10, F-16, or F-15 fighter aircraft
- Conduct local airfield operations for training and deployment

- Construct or modify facilities and infrastructure necessary to support F-35A aircraft/mission
- Establish an Active Duty Associate Unit at the two selected alternative locations, or upgrade Active Duty Associate Unit up to approximately 50 personnel, if one already exists at the location

Elements Affecting Special Use Airspace

- Conduct F-35A training activities in existing Restricted Areas, Military Operations Areas (MOAs), Air Traffic Control Assigned Airspace (ATCAAs), and/or over water Warning Areas, emphasizing fighter aircraft requirements, to include supersonic flight where authorized (Figure 2.2-1)
- Employ defensive countermeasures, such as chaff and flares, in airspace authorized for their use
- Accomplish limited employment of ordnance at ranges approved for such use

2.2.1 Action Elements Affecting the Installation

2.2.1.1 Basing of the F-35A Aircraft

The beddown process would occur in phases associated with manufacture and delivery of F-35A aircraft. Delivery of the first F-35As to an installation could be as early as 2023 and the last is scheduled to be completed by 2024, when the full complement of 18 PAA F-35A aircraft would be based at the two selected locations. Construction activities would precede the arrival of the first aircraft. If an A-10 installation were selected, then the existing A-10s would be kept in the United States (U.S.) Air Force (USAF) inventory to be redistributed as needed at a later date. If an F-16 or F-15 installation were selected, those aircraft would be evaluated for redistribution or removed from the USAF inventory on a case-by-case basis based on aircraft condition. Table 2.2-1 identifies the current type and number of PAA aircraft at each alternative installation, the number of F-35As proposed for beddown, and the net change in aircraft.

Table 2.2-1. Current and Proposed Aircraft Beddown (PAA)

Installation	*Aircraft Drawdown*	*F-35A Beddown*	*Net Change in Aircraft*
115 FW, Wisconsin	18 F-16s	18	0
124 FW, Idaho	18 A-10s	18	0
125 FW, Florida	18 F-15s	18	0
127 WG, Michigan	18 A-10s	18	0
187 FW, Alabama	18 F-16s	18	0

Legend: 115 FW = 115th Fighter Wing; 124 FW = 124th Fighter Wing; 125 FW = 125th Fighter Wing; 127 WG = 127th Wing; 187 FW = 187th Fighter Wing; PAA = Primary Aircraft Authorized.
Source: ANG 2017.

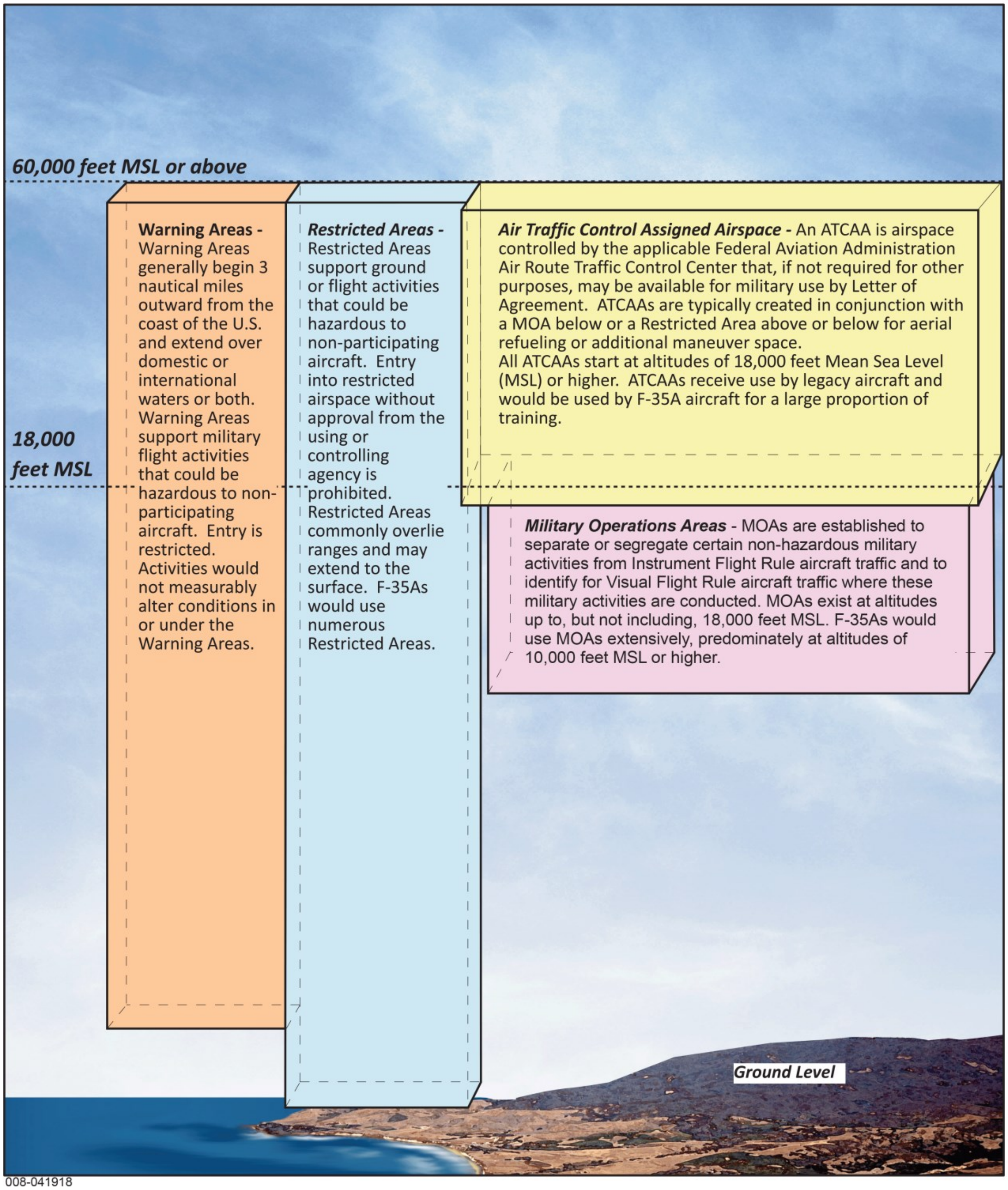


Figure 2.2-1.
Types of Training Airspace

2.2.1.2 Airfield Operations

To provide the training needed to ensure combat readiness, F-35A aircrews would conduct operations in two types of areas: (1) an airfield associated with an installation, and (2) training ranges and SUA. Additionally, pilots flying the F-35A would use simulators extensively. Simulator training includes all facets of flight operations and comprehensive emergency procedures. This EIS uses three terms to describe different components of aircraft flying activities: *sortie, operation,* and *event.* Each 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 a single military aircraft from a take-off through a landing. For this EIS, the term *sortie* is commonly used when summarizing the amount of flight activities from an installation. However, the term receives rare use since it provides limited analytic and descriptive value. A sortie can include more than one *operation.*

The term *operation* can apply to both airfield and airspace activities, and represents the primary analytic and descriptive quantifier of aircraft flight activities presented in this EIS. At an airfield, an operation comprises one action such as a landing or a take-off. For airspace and ranges, an operation comprises the use of one airspace unit (e.g., MOA, Restricted Area, ATCAA) by one aircraft. Each time a single aircraft flies in a different airspace unit, one operation is counted for the unit. Thus, different installations could support the same number of sorties for the same aircraft type, but generate different numbers of operations in the airspace due to the configuration of airspace units.

As a subset of operations, the term *event* is used to define specific training elements (e.g., a defensive countermeasure or ordnance delivery event). More than one event may be performed during the use of an airspace unit. During a single sortie, an aircraft could fly in several airspace units, conducting a number of operations and events. For these reasons, the number of operations and events may exceed total sorties and are not additive to one another.

Based on a 4,500 flying hour program, and an average sortie duration of 1.47 hours, the National Guard Bureau (NGB) anticipates that each ANG F-35A unit would fly no more than an estimated 3,061 sorties annually. Each sortie includes at least one departure and one arrival resulting in a potential 6,122 annual airfield operations. Additional airfield operations would occur as a result of additional practice approaches to the airfield. The EIS assumed that 100 percent of air operations would be at home station to provide a conservative estimate for the initial F-35A qualification training required for ANG pilots. After the ANG pilots are qualified in the F-35A, which is expected to take several years, and begin deployments and off-station training, air operations could be expected to be reduced to a level closer to historical home station operations, with a commensurate reduction in noise impacts.

Current airfield operations differ across installations due to several factors: aircraft type, number of pilots requiring Ready Aircrew Program training currency, and the availability of aircraft/training hours. Each aircraft type, such as the A-10, F-15, and F-16, has differing utilization requirements for daily operations; therefore, current airfield operations differ from those identified for F-35As. The number of pilots requiring currency in their Ready Aircrew Program training also differs across installations and is a function of available training hours and the number of pilots requiring the training.

Total proposed airfield operations numbers, as noted above, would account for 6,122 F-35A arrivals and departures, regardless of the alternative. Closed pattern operations account for the variations among the installations. A closed pattern is a take-off from an airfield, followed by a flight pattern that sets the aircraft up for an immediate landing at the same airfield, without intent to ever leave the local area. However, closed patterns under visual and instrument flight rules (VFR and IFR) would also be conducted and are dependent on the installation. The current number of closed patterns per sortie flown was used to predict the proposed F-35A closed patterns at each base. Therefore, if one installation averaged one closed pattern per sortie and another averaged two closed patterns per sortie, the total of airfield operations would differ.

Each of the alternative locations already supports a considerable number of airfield operations; Table 2.2-2 provides the current legacy aircraft sorties flown at each of the five locations, current as of October 2017 and compares them to the proposed F-35A sorties. Sorties flown by these units in other locations are not reflected in the table. The F-35A sorties are based on a 100 percent manned wing with assigned pilots maintaining combat ready status in accordance with the requirements of the Ready Aircrew Program. Using information from previous noise studies, airfield management logs, recent environmental documentation, and interviews with airfield managers and pilots, the current operations provide a benchmark against which proposed activities can be assessed. For all installations, these data include operations by transient military aircraft and/or civilian aircraft, where applicable. With the exception of Selfridge ANGB, all airfields are joint use, where civilian and commercial air traffic may comprise the bulk of the airfield operations. The F-35A beddown would not change the number or type of other based aircraft, transient military aircraft, or civilian and commercial operations.

Table 2.2-2. Current and Estimated Proposed Annual Home Field Airfield Sorties

ANG Unit and Airfield	*Total Current Annual Legacy Aircraft Sorties*	*Proposed F-35A Sorties*
115 FW, Wisconsin	2,400	3,061
124 FW, Idaho	2,500	3,061
125 FW, Florida	2,400	3,061
127 WG, Michigan	2,388	3,061
187 FW, Alabama	3,076	3,061

Legend: 115 FW = 115th Fighter Wing; 124 FW = 124th Fighter Wing; 125 FW = 125th Fighter Wing; 127 WG = 127th Wing; 187 FW = 187th Fighter Wing.
Source: ANG 2018.

Afterburner is used on some military aircraft to provide the increase in speed needed to safely lift off from a runway, and as needed in the training airspace to achieve high speeds quickly. Use of afterburner consumes large amounts of fuel, so its use is typically limited to those times when it is absolutely necessary for flight safety (additional thrust is needed) or to achieve higher acceleration rates. During aircraft departures, afterburner could be needed if the aircraft is heavily loaded, or when certain weather conditions exist (such as high temperatures or high-density altitude). For this Proposed Action, the USAF has evaluated the requirement for F-35A afterburner use during a departure at each of the five alternative installations based on a basic training configuration, airfield elevation, runway length, and hottest temperature on record. The evaluation resulted in minimal to no requirement for afterburner use at any of the installations under consideration. There is no training requirement for F-35A pilots to utilize afterburner on take-offs. Although heavily-loaded F-35A training flights may drive afterburner use in rare cases, that training scenario would typically occur off-station, and would not be required at any of the five ANG alternative installations. However, to ensure that afterburner use is considered in this analysis, the USAF has recommended that the F-35A should be modeled to conduct 5 percent of take-offs in afterburner mode at the five alternative installations.

All F-35A units have pilot proficiency requirements defined by Headquarters Air Force Operations, Plans and Requirements (HQ AF/A3) and published in the F-35A Ready Aircrew Program (Air Force Instruction [AFI] 11-2F-35A, Volume 1, September 13, 2010). As is the case with current A-10, F-16, and F-15 aircraft operations, F-35A combat missions require flying during daylight and dark conditions, as well as under myriad weather conditions. For flight training purposes, "after dark" is considered to be the time period from 1 hour after sunset to 1 hour before sunrise. The time of day flown in the dark varies between the units because of their geographic location, and also varies seasonally. "After dark" training is different than "environmental night," which is used to predict changes to the noise environment. "Environmental night" is considered to be after 10 p.m. and before 7 a.m., and is used in the noise analysis to account for the added intrusiveness of aircraft operations during this time period. The legacy aircraft being replaced at any of the five installations fly between less than 1 and 4 percent of the time after 10 p.m. and before 7 a.m., with the majority of the late night operations associated with arrivals back to the installation. Typically, "after dark" operations are achieved prior to 10 p.m. Standard procedures do not include F-35A departures during environmental night (10 p.m. to 7 a.m.), although some arrivals may occur during due to contingencies such as weather or special combat mission training. Under the Proposed Action, the F-35A is predicted to have the same pattern of environmental night operations as the aircraft they would be replacing.

2.2.1.3 Construction and Modification of Facilities

To accommodate the F-35A aircraft, the installations selected for implementation would require both new construction and modification of some existing facilities. All construction would be located within the airport or ANG installation boundaries. Examples of some basic F-35A facility and infrastructure requirements include:

- Squadron operations/maintenance facilities
- Hangars
- Simulator facilities
- Installation communications infrastructure
- Electrical system upgrades
- Other installation support facilities, such as an engine repair shop and aircraft parking aprons, which vary from installation to installation

While each of the five alternative installations offer most of the basic necessary facilities for the proposed beddown, none of the five alternative locations has all of the required infrastructure and facilities. Construction of new facilities and/or modification of existing facilities would be necessary at each location, although the nature and magnitude of these efforts would differ slightly among the five locations. As noted earlier, the majority of construction and modifications would occur before the first F-35A arrives at the selected installations but may extend after the first aircraft arrives. The duration of construction is dependent upon the complexity and breadth of development needed to support the F-35A beddown. Construction projects not directly supporting the F-35A are being reviewed under separate National Environmental Policy Act (NEPA) documentation and are analyzed in this EIS under the cumulative impacts sections. Details on construction and modification projects related to the F-35A beddown are presented in each installation-specific Chapter 4.

2.2.1.4 Personnel Changes

It is expected that there would be a minor increase in the overall number of ANG personnel at each installation following conversion to the F-35A. Up to approximately 35 new personnel would be added at each installation to provide security and contract oversite for the Full Mission Simulator (FMS) and the Autonomic Logistics Information System (ALIS) (7 field service, 15 ALIS support, 10 training, and 3 security personnel). ALIS serves as the Information Technology backbone and capabilities to support the F-35A. There would also be some retraining required for existing ANG personnel to support other F-35A operations.

In addition, there would be an Active Duty Associate Unit established at any selected alternative. The Active Duty Associate Unit will be composed of up to 5 pilots, 40 maintenance staff, and approximately 5 other support staff. For those installations that currently have an Active Duty Associate Unit (the 187 FW and the 115 FW), those associate units would be supplemented up to the 50 total personnel, who would serve on a 3-year rotation.

The Active Duty Associate Unit program is designed to satisfy the active duty need for increased fighter pilot training capacity by assigning active duty personnel to ANG fighter units. The concept is not new and has evolved and been refined since the mid-1990s. As a result of the drawdown in the early 1990s, the USAF observed a major drop in fighter pilot retention. In addition to the drawdown, the negative effects of multiple deployments, frequent moves, and quality-of-life issues contributed to even more fighter pilots leaving active duty. To further complicate the fighter pilot shortage, the increasing appeal of commercial aviation, coupled with unprecedented hiring by the airlines, accelerated the problem. Although highly experienced fighter pilots were leaving active duty, they would often join ANG units that flew fighter aircraft.

The active duty force requires 330 to 380 new fighter pilots a year, but it only has the resources available to train 302. A new fighter pilot generally needs an additional 500 flight training hours in a fighter aircraft to be considered fully qualified. By embedding newly trained but inexperienced fighter pilots into ANG fighter units, the newly trained fighter pilots would be able to fly more frequently with highly experienced fighter pilots and be fully qualified within a shorter period of time.

To achieve training objectives, the Associate Fighter Program takes advantage of available ANG training capacity. On a typical flying training day, most ANG fighter installations would have two aircraft launches consisting of up to eight aircraft for each launch, although most launches normally consist of six fighter aircraft. After take-off, the aircraft depart to the training area, complete the planned training scenario, then return and land. The training mission typically lasts approximately 1.3 hours. This routine is repeated for the second launch of the day. The capacity to fly up to eight aircraft for each launch enables new fighter pilots to fly more frequently and achieve fully qualified status over a shorter period of time.

ANG fighter unit staffing, for the most part, is a function of the number of PAA. Likewise, the budget for flight hours is a function of PAA. Additional flight hours are subsequently authorized for the Associate Fighter Program to ensure both active duty and ANG fighter pilots are able to meet their flying training requirements.

2.2.2 Action Elements Affecting Training Airspace and Ranges

2.2.2.1 Training Airspace and Range Operations

The Ready Aircrew Program requirements indicate that to fulfill the multiple roles currently performed by the fighter aircraft it is replacing, the F-35A aircraft must be used to conduct training exercises to ensure combat readiness for five major types of missions. Each of these five major missions requires the necessary airspace and range assets (e.g., targets and strafing pits) to permit realistic training. Existing training airspace associated with each of the five alternative locations has the requisite airspace and range assets to support F-35A combat readiness training; no new airspace or reconfigurations are needed or proposed to support the ANG F-35A beddown. Table 2.2-3 presents each of the major missions (identified in the first column) F-35A pilots must perform in the airspace to maintain combat readiness. How pilots will meet each training mission requirement is described under the training activities column (the second column). The third column identifies the type of airspace where F-35A pilots conduct the training. The final column identifies the general size of the airspace needed to accomplish the training.

Table 2.2-3. Projected F-35A Training Activities

Major Mission	*Training Activities*	*Airspace Type*	*Airspace Dimension (floor to ceiling in feet / size in NM)*
Basic Fighter Maneuvers	G-force awareness, maneuverability, break turns, high angle of attack maneuvering, acceleration maneuvering, gun tracking, offensive and defensive positioning, air refueling, and stall recovery	MOAs and ATCAAs	10,000 to 50,000 / 40 by 60
Surface Attack Tactics	Single to multiple aircraft attacking a wide range of ground targets (i.e., air-to-ground) using different ingress and egress methods, delivery tactics, ordnance types, angles of attack, and combat scenarios	MOAs and Restricted Areas (over training ranges)	Surface to 30,000 / 60 by 100
Air Combat Maneuvers	Multi-aircraft formations and tactics, systems check, G-force awareness, 2 vs. 4 and 4 vs. 6 aircraft intercepts, combat air patrol, defense of airspace sector from composite force attack, intercept and destroy bomber aircraft, avoid adversary fighters, and supersonic engagement (or air-to-air activities)	MOAs, ATCAAs, and Restricted Areas (over weapons delivery ranges)	10,000 to 50,000 / 60 by 80
Close Air Support	Air support for ground-based offensive and defensive operations, work with Joint Terminal Attack Controllers, use Surface Attack Tactics and Basic Surface Attack components	MOAs and Restricted Areas (over weapons delivery ranges)	Surface to 25,000 / 20 by 40
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, and supersonic engagement	MOA	10,000 to 50,000 / 40 by 60

Legend: AGL = above ground level; ATCAA = Air Traffic Control Assigned Airspace; MOA = Military Operations Area; MSL = mean sea level; NM = nautical mile.
Source: USAF 2013.

Due to their higher altitude missions, advanced electronics, and speed, F-35As would not use Military Training Routes; rather, they would primarily operate in MOAs, ATCAAs, Restricted Areas, and/or Warning Areas. Figure 2.2-1 depicts and describes the characteristics of this SUA.

No F-35A-specific changes to ranges would be required to accommodate the F-35A training. Should the NGB decide to make any range modifications specific to F-35A use in the future, these actions would undergo the appropriate level of environmental analysis at that time. In general, NGB F-35A pilots at each alternative installation would operate in Federal Aviation Administration (FAA)-approved MOAs, ATCAAs, Restricted Areas, and Warning Areas above ranges. Air-to-ground training would also include ordnance delivery. Actual ordnance delivery training would occur in existing Restricted Areas over the approved ranges. Proposed ranges at each of the alternative bases include:

- Hardwood Range, Wisconsin (115 FW)
- Saylor Creek and Juniper Butte Ranges, Idaho (124 FW)
- Townsend Bombing Range, Georgia (125 FW)
- Grayling Range, Michigan (127 WG)
- Camp Shelby, Mississippi (187 FW)

Detailed installation-specific information for operations within these different airspace units is provided in Chapter 4. No F-35A-specific changes to airspace structure or size are proposed to support the ANG F-35A beddown; nor are any changes to range target configurations and types needed to accommodate F-35A training and operations. If in the future the NGB chooses to make any F-35A-specific airspace or range modifications, these actions would undergo the appropriate level of environmental analysis prior to implementation.

In accordance with 40 CFR §1502.14(d), this EIS evaluates the Proposed Action in comparison to the No Action Alternative for each alternative location. In this EIS, the affected environment constitutes the No Action Alternative.

Table 2.2-4 identifies airspace units associated with each alternative location where F-35A aircraft would operate. To simplify discussion of the numerous airspace subunits, many are subsumed under a single unofficial designation. This approach is taken because these units are typically scheduled at the same time due to their proximity to each other. For example, Jarbidge MOA/ATCAA North and Restricted Area (R-) 3202 (R-3202) is part of the Mountain Home Range Complex (MHRC), which includes several MOAs, ATCAAs, and two Restricted Areas. This EIS, therefore, uses the combined designations both analytically and descriptively instead of presenting the constituent airspace units. Individual units are only identified in those instances where greater specificity enhances description or analysis. Further details on airspace units associated with each alternative location are presented in Chapter 4 for each installation.

Table 2.2-4. Summary of Existing Airspace Units Proposed for Use by F-35A Aircraft

Airspace Unit	
115 FW, Wisconsin	
• Volk East MOA/ATCAA	• R-6904 B
• Volk West MOA/ATCAA	• Black River ATCAA
• Volk South MOA	• Oshkosh ATCAA
• Volk Falls MOA	• Sheboygan East ATCAA
• R-6904 A	• Sheboygan West ATCAA
124 FW, Idaho	
• Jarbidge MOA North	• Owyhee North MOA
• Jarbidge MOA South	• Owyhee South MOA
• Jarbidge ATCAA	• Owyhee ATCAA
• R-3202 Low	• Saddle A MOA
• R-3202 High	• Saddle B MOA
• R-3202 ATCAA	• Saddle ATCAA
• R-3204 A	• Saddle Corridor ATCAA
• R-3204 B	• Paradise North MOA
• R-3204 C	• Paradise South MOA
• R-3204 ATCAA	• Paradise ATCAA
125 FW, Florida	
• Coastal 1/2 MOA	• R-2901E
• Coastal 4 MOA	• W-136 B/C/E/F W-137 A/B/C/D/E/F/L
• Coastal 5 MOA	• W-137 G
• Coastal 6/7 MOA	• W-138 A/B/C/D/E/L
• Coastal 8 MOA	• W-139 C/D/E
• R-3007 A	• W-139 F
• R-3007 B	• W-140 C/D/E
• R-3007 C	• W-140 F
• R-3007 D	• W-141
• R-2901A	• W-470 D/E/F
• R-2901B	• Palatka 1/2 MOA
• R-2901C	
• R-2901D	
127 WG, Michigan	
• Pike East MOA	• R-4207
• Pike West MOA	• Firebird ATCAA
• Steelhead MOA	• Garland ATCAA
• Steelhead ATCAA	• Grayling ATCAA
• R-4201 A	• Lumberjack ATCAA
• R-4201 B	• Molson ATCAA
187 FW, Alabama	
• Birmingham MOA	• Grove Hill North ATCAA
• Birmingham 2 MOA	• Grove Hill West ATCAA
• Birmingham ATCAA	• Grove Hill Shelf ATCAA
• Camden Ridge MOA	• Montgomery West ATCAA
• Pinehill East/West MOA	• R-4401 A/B/C/D/E
• Grove Hill ATCAA	• DeSoto 1/2 MOA
• Grove Hill Bridge ATCAA	• Bullseye 1/2/3 MOA

Legend: 115 FW = 115th Fighter Wing; 124 FW = 124th Fighter Wing; 125 FW = 125th Fighter Wing; 127 WG = 127th Wing; 187 FW = 187th Fighter Wing; ATCAA = Air Traffic Control Assigned Airspace; MOA = Military Operations Area; R- = Restricted Area; W- = Warning Area.

Sources: 115 FW 2019; 124 FW 2019; 125 FW 2019; 127 WG 2019; 187 FW 2019.

Variation in the number of operations among the five locations would result from differences in the number, size, arrangement, and proximity of the airspace units to the installation. These differences also reflect adaptation of training activities to existing airspace. Detailed operations data are provided in individual location discussions in Chapter 4.

The F-35A would share training airspace with many other users. Representative types of other aircraft using the airspace include the USAF F-15, A-10, F-16, E-3, C-12, Navy F-18, and E-3; Marine Corps F-35B; and helicopters. These other users would continue operations after the beddown of the F-35As. Other aircraft would account for varying amounts of total activity in the airspace, depending upon the installation.

The A-10, F-16, and F-15 fighter aircraft conduct needed training in the airspace types identified in Figure 2.2-1; the F-35A would also use these types of airspace. Although F-35A aircraft would perform missions similar to the aircraft they are replacing, they have distinctive capabilities and would fly somewhat differently. The following highlights some of the expected differences in the F-35A operational capabilities relative to fighter attack aircraft they are replacing.

- 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, and suppression of enemy air defenses and destruction of enemy air defense missions
- Self-sufficient or part of multi-system and multi-service combat operations
- Able to rapidly transition between air-to-ground and air-to-air missions while still airborne
- Reduced detection with low-observable technologies and tactics

Due to these capabilities and the breadth of the F-35A mission requirements, operational use of existing airspace and ranges would change under any of the alternatives. No changes to airspace size or structure are proposed; rather, how the F-35A aircraft flies within the existing airspace configuration would change from the legacy aircraft. Changes with regard to operations in the airspace are detailed in Sections 2.2.2.2 through 2.2.2.6 while changes with regard to the use of ranges are detailed in Section 2.2.2.7.

2.2.2.2 Use of Higher Altitudes

Subsonic Flight

The F-35A would use the full, authorized capabilities of the airspace units available for training and operating from 500 feet above ground level (AGL) up to 60,000 feet mean sea level (MSL). Generally, the F-35A would fly at higher altitudes than the legacy aircraft, operating at 10,000 feet MSL or higher about 93 percent of the time. Table 2.2-5 provides the percent of time the F-35A is projected to operate within the altitude groupings. Comparisons of existing A-10, F-15, and F-16 altitude distributions with the F-35A are provided in the installation-specific Chapter 4, *Training Airspace and Ranges* section.

Table 2.2-5. F-35A Projected Altitude Distribution

Altitude (feet)	*Percent Use*
500-2,000 AGL	1
2,000-5,000 AGL	1
5,000-10,000 AGL	5
10,000-18,000 MSL	24
18,000-30,000 MSL	58
>30,000 MSL	11

Legend: AGL = above ground level; MSL = mean sea level.
Source: USAF 2013.

Due to its capabilities and expected tactics, the F-35A would occasionally (2 percent or less) fly below 5,000 feet AGL, and would consistently operate (93 percent) above 10,000 feet MSL. Actual flight altitudes would depend upon the lower and upper limits of specific airspace units. For example, if a MOA has a charted floor of 7,000 feet AGL, then F-35A aircraft would remain at or above that level. F-35A pilots would continue to comply with FAA avoidance regulations (14 CFR Part 91.119) and any installation-specific avoidance procedures that current fighter pilots employ when flying. 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 and outside of congested areas, persons, vessels, vehicles, or structures must be avoided by 500 feet. Additionally, all F-35A pilots are required to comply with any airspace-specific restrictions, limitations, seasonal adjustments, and avoidance areas that currently exist and are either codified or published as standard operating procedures. Specific information regarding subsonic (flying slower than the speed of sound) operations is detailed in Chapter 4 (*Training Airspace and Ranges* section) for each installation and associated training airspace.

Supersonic Flight

To train with the full capabilities of the aircraft, F-35A pilots would employ supersonic flight (i.e., flying at or greater than the speed of sound). All supersonic flight would occur within airspace and at altitudes previously approved for such activities. Section 3.1.2.1 of each installation Chapter 4 includes details on the location and frequency of supersonic flights. NGB anticipates that time spent in air-to-air combat training would involve supersonic flight for a maximum of 2 to 3 minutes per sortie. Supersonic speeds enable the F-35A to employ weapons at greater distances than an adversary aircraft with less supersonic capability. After simulated weapon employment, the F-35A uses its speed to evade adversary missiles and aircraft. Supersonic flight would be conducted above 15,000 feet MSL, with 90 percent of these supersonic events occurring above 30,000 feet MSL (Table 2.2-6), again within airspace already approved for supersonic activities.

Table 2.2-6. Average Altitude Profiles for Supersonic Flight

Altitude (feet)	*General Legacy Fighter Aircraft*	*Projected 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%

Legend: AGL = above ground level; MSL = mean sea level.
Source: USAF 2013.

In comparison to the F-35A, the A-10, F-16, and F-15 aircraft generally operate at lower altitudes a greater proportion of the time (the A-10 does not fly supersonic). Altitude distribution varies according to mission type with the F-35, F-15, and F-16 having both an air-to-air and air-to-ground mission and the A-10 having an air-to-ground mission. For air-to-ground missions, current fighter aircraft emphasize operations below 23,000 feet MSL (60 to 90 percent) with 10 to 40 percent conducted from 5,000 feet AGL to 10,000 feet AGL. The A-10's ground attack and Close Air Support mission requires them to spend more time in the lower altitudes where approximately 50 percent are below 5,000 feet AGL. In an air-to-air role, the F-15 and F-16 aircraft operate more between 5,000 feet AGL and 23,000 feet MSL than the F-35A. While these data represent generalized altitude distributions for current aircraft (not specific to a single airspace unit), they clearly illustrate the differences in altitude use between the F-35As and current fighter aircraft. Specific information regarding supersonic operations is detailed in Chapter 4 for each installation and associated training airspace.

2.2.2.3 Combined Use of Existing Airspace

Due to their capabilities and based on individual mission scenarios, current aircraft typically activate multiple contiguous SUA units rather than individual components, such as a single MOA. For example, pilots may schedule and use two or more MOAs and their overlying ATCAAs for one training activity. No new airspace or reconfiguration of existing airspace is proposed, or would be required to support the ANG F-35A beddown at any of the alternative locations. To conduct its training missions, the F-35A would also use airspace units in combination rather than singly, but F-35A capabilities could drive a need for more consistent use and incorporation of more existing airspace when compared to legacy aircraft. Details on such changes and the combined use of airspace units are presented in the descriptions of the individual alternative locations in Chapter 4.

2.2.2.4 Night Operations

As noted for airfield operations, F-35A pilots would need to train after dark since combat can occur 24 hours a day. Under most circumstances, these after dark operations are and can be completed before environmental night (10 p.m. to 7 a.m.). The fighter aircraft being replaced fly between 0 and 3 percent of the time during environmental night. Typical ANG flight schedules would not require F-35A departures during environmental night, although some arrivals may occur during environmental night. Nighttime arrivals would be consistent with existing legacy aircraft nighttime operations but would not exceed 3 percent. Contingencies such as weather or special combat mission training may result in rare, unplanned operations during this period.

2.2.2.5 Mission Duration

Like the A-10, F-16, and F-15 aircraft, the F-35A would fly, on average, approximately 90-minute-long missions, including take-off, transit to and from the training airspace, training activities, and landing. Depending upon the distance, speed, and type of training activity, the F-35A (like A-10, F-16, and F-15 fighter aircraft) would spend approximately 30-60 minutes in the training airspace. On occasion during an exercise, the F-35A may spend up to 90 minutes in one or more airspace units.

2.2.2.6 Defensive Countermeasures

Chaff and flares are the principal defensive countermeasures dispensed by military aircraft to evade attack by enemy air defense systems. Although the F-35A's stealth features substantially reduce its detectability, pilots must train to employ defensive countermeasures.

A bundle of chaff consists of approximately 5 to 5.6 million fibers that are cut to reflect radar signals, and when dispensed from aircraft, form an electronic "cloud" that breaks the radar signal and temporarily hides the maneuvering aircraft from radar detection. RR-180 and RR-188 chaff is approved by the FAA for military training in SUA and ATCAAs. The ARM-210 chaff proposed for use by the F-35A is currently unavailable and undergoing operational testing. It is expected to be available for use in 2020. ARM-210 chaff is similar to the RR-180 and RR-188 chaff currently in use by the F-16, F-15, and A-10 aircraft proposed for replacement. The majority of flares dispensed from aircraft provide high-temperature heat sources that mislead heat-sensitive or heat-seeking targeting systems, where other flares, such as the LLU are used by the A-10 and other aircraft to provide illumination for ground targets. The MJU-61 flares used by the F-35 provide an infrared countermeasure to counter homing, heat-seeking surface-to-air and air-to-air missiles. Flares are used only in approved airspace and at times and altitudes specifically designated for each airspace unit. Flares typically burn out in approximately 500 feet after release, and in SUA over non-government-owned or -controlled property, release of flares is not permitted below 2,000 feet AGL, to ensure flare burnout before it can reach the ground or water (AFI 11-214). Defensive flares such as the M-206, MJU-61, and MJU-7 are made of magnesium that, when ignited, burn 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 train regularly with defensive flares under simulated threat conditions to ensure flare deployment in extremely high-stress combat conditions. Historic use of defensive countermeasures varies in the airspace for the five alternative locations. Although F-35A missions and training would retain similarities with those of the fighter aircraft it is replacing, tactics and training events continue to be developed. Flare use by the F-35A 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 F-35A flares released throughout the authorized airspace units would occur above 15,000 feet MSL, further reducing the potential risk for accidental fires.

Chaff and flare deployment in authorized airspace associated with the five alternative locations is governed by AFI 11-214, Change 1 and local supplements based on safety and environmental considerations and limitations. This regulation establishes procedures governing the use of chaff and flares over ranges, other federally-controlled lands, and nongovernment-owned or -controlled areas. The USAF has set standard minimum-release altitudes (AFI 11-214, Change 1, 2016) for flares over government-owned and -controlled lands. These standards, which vary from 300 to 900 feet AGL depending on the flare type, are designed to allow the flares to burn out completely at least 100 feet above the ground. Over nongovernment-controlled lands, flare release is restricted to a minimum of 2,000 feet AGL and above for all aircraft (and would be the same for F-35As). More restrictive altitude limits are followed for specific airspace units in response to local considerations, including wildfire threat levels. Flares can be dispensed in the offshore Warning Areas without altitude restrictions. The use of chaff requires approval from the FAA to ensure that it does not interfere with radar or communications used to direct air traffic. Use and limitations within SUA are defined in each unit's letter of agreement with the Air Route Traffic Control Center (ARTCC) responsible for controlling the airspace.

2.2.2.7 Ordnance Use

The F-35A has the requirement and capability to perform air-to-ground missions. For the F-35A operational aircraft, air-to-ground training would represent about 60 percent of the training sorties flown, with the air superiority mission accounting for the remaining 40 percent of the sorties flown. While most air-to-ground training would be simulated, where nothing is released from the aircraft, there is a need to conduct realistic ordnance delivery at approved ranges. The F-35A is capable of carrying and employing several types of ordnance. Internally, it can carry 5,700 pounds of ordnance and up to 22,000 pounds when carried internally and externally. The standard internal payload for F-35A aircraft includes two AIM-120C air-to-air missiles and two 2,000-pound Guided Bomb Unit (GBU)-31 Joint Direct Attack Munitions (JDAM) for air-to-ground ordnance delivery (Lockheed Martin 2018). In addition, the F-35A carries an internal, 25-millimeter (mm) Aircraft Gun Unit (GAU)-22/A cannon, which requires occasional tactical strafing training. Strafing involves flying towards and firing at a prescribed strafing target for a short burst of time; however, with a capacity of 182 rounds, strafing by the F-35A would be limited. Altitude and flight profiles while strafing vary with mission, weather, threat, tactics, and other considerations. As is the case for air-to-air and other air-to-ground ordnance training, strafing activities must follow specific rules and procedures identified in AFI 11-214, *Air Operations Rules and Procedures*, and be employed only on approved ranges. Under the Proposed Action, the ANG F-35A aircraft would primarily employ air-to-ground ordnance and conduct strafing at the following approved ranges: the 115 FW at the Hardwood Range; the 124 FW at the Saylor Creek and Juniper Butte Ranges; the 125 FW at Townsend Bombing Range; the 127 WG at Grayling Range; and the 187 FW at Camp Shelby.

The F-35A Block 3F aircraft is not "nuclear-capable"; therefore, the F-35A aircraft that would be based at any of these five alternative locations would not have the hardware necessary for a nuclear mission. There are no plans to add the hardware necessary to make these F-35A aircraft nuclear-capable at this time. Only units with a nuclear mission are provided the hardware necessary to carry nuclear weapons; therefore, because none of these five alternatives have a nuclear mission, should any of the aircraft associated with this F-35A beddown ever be fitted with Block 4 upgrades, they still would not be nuclear-capable.

2.3 ALTERNATIVE IDENTIFICATION PROCESS

2.3.1 Alternative Identification Process Methodology

Identification and analysis of alternatives is one of the core elements of the Environmental Impact Analysis Process (EIAP) under NEPA and the USAF's implementing regulations. The Secretary of the Air Force may expressly eliminate alternatives from detailed analysis based on reasonable selection standards (32 CFR 989.8(c)). Based on extensive analysis by the NGB and USAF operations communities, a study was conducted to determine the specific requirements for beddown of the F-35A aircraft and to identify potential military installations where this beddown could occur. Following this study, the Secretary of the Air Force and the Chief of Staff of the Air Force approved selection criteria for the F-35A beddown.

In general, the USAF uses the strategic basing process outlined in AFI 10-503 (2017) to identify potential locations to beddown missions. The process begins by determining an enterprise definition from which potential installations could be identified. This enterprise of installations is then evaluated using objective criteria to screen the top alternative installations. Site surveys are then conducted at each alternative location to determine if the installation could reasonably support the mission in question. The Strategic Basing Executive Steering Group oversees the process and reports findings directly to the Secretary of the Air Force and Chief of Staff of the Air Force. This process was mandated by the Secretary of the Air Force to ensure basing decisions were made using a standardized, repeatable, transparent process. This F-35A basing decision followed this general basing process. The following planning conventions were followed:

1. Identify the number of F-35A aircraft scheduled to be delivered between 2023 and 2024. This time period corresponded to the Department of Defense (DoD) 2020-2024 Future Years Defense Program, which is the program and financial plan approved by the Secretary of Defense, and provides a basis for USAF planning. Planning beyond this time period is speculative due to the uncertainty of funding availability.
2. Identify the number of F-35A aircraft to be allocated to operations based on then-current national strategic considerations.
3. Determine the enterprise definition, from which the number of potential locations capable of supporting one squadron of up to 18 PAA can be identified. The PAA are those assigned to meet the primary aircraft authorization and reflect the number of aircraft flown by a unit in performance of its mission.
4. Recognize additional factors of Plans and Guidance and Global Positioning, which include strategic considerations but do not provide meaningful distinction among installations for ANG training within the U.S. and its territories.

Consideration of the planning conventions above led to an initial screening of all ANG installations against the following standards:

1. a unit that currently supports a fourth generation fighter aircraft mission,
2. a runway of at least 8,000 feet in length,
3. units that are not formal training units (FTUs), and
4. the installation had to be located in the contiguous U.S. (CONUS).

The initial screening yielded a defined enterprise of 18 alternative installations to be evaluated for the 5th and 6th Operational Beddowns. NGB presented objective screening criteria to the Strategic Basing Executive Steering Group to be used in the identification of installations for the beddown of the F-35A. The approved criteria were used to screen the enterprise of 18 alternative installations to identify those installations' capacity to successfully support the F-35A mission. The objective criteria included mission, capacity, environmental considerations, and cost, and are described in more detail below:

Ability to meet the mission requirements. Under this criterion, the alternative location should be within reasonable proximity and access to operational training ranges and airspace. For the purpose of this analysis, a distance of 243 nautical miles (NM) was assumed and coincides with optimal training distance for the F-35A Ready Aircrew Program Training.

Capacity. The alternative location should have hangar capacity; runway length and weight-bearing capacity; ramp space; installation operation support capacity; squadron operations facilities with aircraft maintenance units; aircrew, maintenance, and fuselage training capabilities; and the necessary communications infrastructure.

Environmental Constraints. The alternative location should be able to demonstrate conformity with the respective State Implementation Plan (SIP); meet the local community's zoning or other land use controls adopted to limit encroachment and protect the public's health, safety, and welfare; have an absence of incompatible development such as tall structures in the airport's Runway Protection Zones (RPZs)/installation's Clear Zone (CZ), and/or Accident Potential Zone (APZ) that create flight safety hazards; and have an absence or limited amount of noise-sensitive development located in areas near the airport/installation that are exposed to Day-Night Average Sound Levels (DNL) at and above 65 decibels (dB) and considered by the FAA and DoD as incompatible land uses (USAF 1999; 14 CFR Part 150).

Cost. Given budgetary constraints, it was important for the USAF to select alternative installations that have a favorable area cost factor based on Unified Facilities Criteria (UFC) 3-701-01, Change 13, *DoD Facilities Pricing Guide\2\/2/* (DoD 2017).

The Secretary of the Air Force considered the objective screening results as well as qualitative operational factors in determining the alternative installations for the 5th and 6th F-35A Operational Beddowns. These factors included:

- Plans and Guidance
- Global and Regional Coverage
- Combatant Commander Support
- Total Force
- Beddown Timing
- Force Structure
- Training Requirements and Efficiencies
- Logistic Supportability
- Resources/Budgeting

2.3.2 Results of Alternative Identification Process

The NGB and USAF scored each of the 18 installations based on the planning conventions described above to identify alternatives that best met the selection criteria for the ANG F-35A squadrons in CONUS (Overseas beddowns comprise separate and distinct actions from the proposed beddown assessed in this EIS). There was a distinct separation in overall score between the top five candidates and the remaining candidates (i.e., #6 through #18); and therefore, those five installations were carried forward for detailed analysis in the EIS. Installations identified as alternatives for the 5th and 6th F-35A Operational Beddown include:

- 115 FW at Dane County Regional Airport, Wisconsin
- 124 FW at Boise Airport, Idaho
- 125 FW at Jacksonville IAP, Florida
- 127 WG at Selfridge ANGB, Michigan
- 187 FW at Montgomery Regional Airport, Alabama

Based on an evaluation of operational parameters, on December 21, 2017, the Secretary of the Air Force announced two preferred alternatives for the 5th and 6th F-35A Operational Beddown as the 115 FW at Dane County Regional Airport, Madison, Wisconsin; and the 187 FW at Montgomery Regional Airport, Montgomery, Alabama. The Secretary of the Air Force makes the final basing decisions after the requisite environmental analysis (this EIS) is complete, and then signs the Record of Decision (ROD).

2.3.3 Alternatives Considered But Not Carried Forward

As a result of the strategic basing process carried out for identification of alternative installations for the 5th and 6th F-35A Operational Beddown, 13 installations[1], in addition to the 5 listed above, were identified as potential alternatives. As the process continued beyond the strategic basing process, and additional narrowing criteria described above were applied to each, it became apparent that the five alternatives carried forward for detailed analysis most clearly met the objectives and constraints described above. The remaining 13 installations were not carried forward as viable alternatives for the 5th and 6th Operational Beddowns.

2.3.4 Proposed Action and Alternatives Carried Forward for Detailed Analysis

Five alternative F-35A beddown locations are carried forward for detailed analysis. To provide a context for the Preferred Alternatives and beddown alternatives, the following presents a brief

[1] The 13 installations include Atlantic City, New Jersey; Barnes, Massachusetts; Buckley AFB, Colorado; Duluth, Minnesota; Fresno, California; Fort Wayne, Indiana; Joe Foss Field, South Dakota; Joint Base Andrews-Naval Air Facility, Maryland; McEntire Joint National Guard Base, South Carolina; Naval Air Station Joint Reserve Base New Orleans, Louisiana; Portland, Oregon; Toledo, Ohio; and Tulsa, Oklahoma.

description of each installation and its mission. More detailed information is provided in Sections 2.0 of each installation-specific Chapter 4.

2.3.4.1 115th Fighter Wing, Dane County Regional Airport, Wisconsin

The 115 FW, located at Dane County Regional Airport in Madison, flies 18 PAA F-16C/D aircraft and 1 RC-26B aircraft. The ANG unit shares the airfield with the Dane County Regional Airport, which has three runways (9,006 feet, 7,200 feet, and 5,846 feet). The unit's primary training airspace includes the nearby Volk Field Combat Readiness Training Center and airspace complex, with the primary training range being Hardwood Range located in Juneau County, Wisconsin.

2.3.4.2 124th Fighter Wing, Boise Airport, Idaho

The 124 FW flies 18 PAA A-10 aircraft. It is co-located with the Boise Airport, supports a 10,000-foot runway, and lies within the boundaries of Boise Airport. A-10 aircraft flying out of Boise Airport primarily train in the MHRC ranges and airspace located in south Idaho.

2.3.4.3 125th Fighter Wing, Jacksonville International Airport, Florida

The 125 FW, located near the Atlantic coast of Florida, flies 18 PAA F-15C aircraft. The installation is co-located with the Jacksonville IAP that offers a 10,000-foot runway and a 7,700-foot secondary runway. Primary training airspace consists of numerous Warning Areas, with the primary training range being Townsend Bombing Range located in southeast Georgia.

2.3.4.4 127th Wing, Selfridge Air National Guard Base, Michigan

The 127 WG supports two separate Major Commands (MAJCOMs): Air Combat Command (ACC) and Air Mobility Command (AMC), which require two distinctly different missions. The A-10 Thunderbolt II is a close air support aircraft and KC-135 Stratotanker is an aerial refueler with global reach. Selfridge ANGB has a 9,000-foot-long runway. Primary training airspace includes several MOAs and Restricted Areas and air-to-ground training is predominantly undertaken at Grayling Range, located in Grayling, Michigan.

2.3.4.5 187th Fighter Wing, Montgomery Regional Airport, Alabama

The 187 FW, located at Montgomery Regional Airport in Montgomery, flies 18 PAA F-16C/D aircraft. The ANG unit is co-located with Montgomery Regional Airport and has two runways, one of which is 9,020-feet long. Training is primarily undertaken in MOAs and Restricted Areas, with air-to-ground training provided at Camp Shelby, located in Mississippi.

2.3.5 No Action Alternative

Analysis of the No Action Alternative provides the benchmark, enabling decision-makers to compare the magnitude of the environmental effects of the Proposed Action or alternatives. Section 1502.14(d) of CEQ regulations implementing NEPA requires an EIS to analyze the No Action Alternative. No action means that an action would not take place, and the resulting environmental effects from taking no action are compared with the effects of allowing the proposed activity to go forward. Under the No Action Alternative, no F-35A operational aircraft would be based, no F-35A personnel changes or construction would be performed, no Active Duty Associate Unit would be created, and no training activities by F-35A operational aircraft would be conducted in the airspace. Under the No Action Alternative, the NGB would continue to conduct their current mission using existing, legacy aircraft with multiple configurations.

2.4 Comparison of Environmental Consequences Among Alternatives

Comparing and differentiating among alternatives comprises a fundamental premise of NEPA. For the basing alternatives and scenarios identified for this Proposed Action, summaries and comparisons of consequences are presented below in Table 2.4-1.

Table 2.4-1. Summary of Impacts
(Page 1 of 19)

115 FW	*124 FW*	*125 FW*	*127 WG*	*187 FW*	*No Action Alternative*
Noise					
Installation: Based on context and intensity, the change in the noise environment associated with the Proposed Action would be considered significant in the area surrounding the airfield. Changes in DNL results in an additional 1,320 acres within the 65 dB noise contour where compatible land use recommendations are triggered. As a result, the number of households located within the 65 dB DNL contour would increase by 1,019 and the number of people exposed would increase by 2,215. One hundred thirty-two of the households and 292 persons would be located in the 70-75 DNL contour where housing is incompatible absent an exception. Interference with classroom speech would remain the same or	Installation: Based on context and intensity, the change in the noise environment associated with the Proposed Action would be considered significant in the area surrounding the airfield. Changes in DNL results in an additional 446 acres within the 65 dB noise contour where compatible land use recommendations are triggered. As a result, the number of households located within the 65 dB DNL contour would increase by 272 and the number of people exposed would increase by 665. Eighty-three of the households and 199 persons would be located in the 70-75 DNL contour where housing is incompatible absent an exception. Three of the school POIs located within the ROI would experience an increase in the number of events causing speech	Installation: Based on context and intensity, the change in the noise environment associated with the Proposed Action would not be considered significant in the area surrounding the airfield. Changes in DNL results in a reduction of 688 acres within the 65 dB noise contour where compatible land use recommendations are triggered. As a result, the number of households located within the 65 dB DNL contour would decrease by 4 and the number of people exposed would decrease by 15. Interference with classroom speech would increase at one school by one event per hour. Speech interference in residential areas would remain the same or increase by one event per hour. The	Base: Based on context and intensity, the change in the noise environment associated with the Proposed Action would be considered significant in the area surrounding the airfield. Changes in DNL results in an additional 1,073 acres within the 65 dB noise contour where compatible land use recommendations are triggered. As a result, the number of households located within the 65 dB DNL contour would increase by 1,034 and the number of people exposed would increase by 2,902. Forty-five of the households and 130 persons would be located in the 70-75 DNL contour where housing is incompatible absent an exception. Interference with classroom speech	Installation: Based on context and intensity, the change in the noise environment associated with the Proposed Action would be considered significant in the area surrounding the airfield. Changes in DNL results in an additional 1,219 acres within the 65 dB noise contour where compatible land use recommendations are triggered. As a result, the number of households located within the 65 dB DNL contour would increase by 46 and the number of people exposed would increase by 113. Sixteen of the households and 35 persons would be located in the 70-75 DNL contour where housing is incompatible absent an exception. Interference with classroom speech is predicted not to change. Speech interference in residential areas would remain the same or	The noise environment at each of the five alternative airfields would continue to be managed through their existing AICUZ or Federal Aviation Regulations Part 150 airfield compatibility programs. There would be no additional Noise impacts at any of the alternative installations under the No Action Alternative.

Table 2.4-1. Summary of Impacts
(Page 2 of 19)

115 FW	*124 FW*	*125 FW*	*127 WG*	*187 FW*	*No Action Alternative*
increase by one event per hour. Speech interference in residential areas would remain the same or increase by one event per hour. The probability of awakening would remain low at between 2% and 4% of the population with windows open and 1% or less with windows closed. The potential for hearing loss to off-installation personnel is not anticipated.	interference but only Owyhee-Harbor Elementary School would exceed L_{eq} of 65 dB. Speech interference in residential areas would remain the same or increase by one event per hour. The probability of awakening would either remain the same or increase by 1%. The potential for hearing loss to off-installation personnel is negligible.	probability of awakening would remain low at less than 1% of the population with windows open and with windows closed. The potential for hearing loss to off-installation personnel is negligible.	would remain the same or increase by one event per hour. Speech interference in residential areas would remain the same or increase by one event per hour. The probability of awakening would change between 0 and 1% in eight areas, remaining at between <1% and 5% of the population with windows open and 1% or less with windows closed. The potential for hearing loss to off-installation personnel is negligible.	increase by one event per hour. There is no change in the probability of awakenings. The potential for hearing loss to off-installation personnel is negligible.	
Airspace: Impacts to the acoustic environment beneath the SUA would not be significant. The increase in L_{dnmr} as a result of subsonic operations would be between 1 and 4 dB, with the greatest change (4 dB) beneath the Volk East MOA, and highest L_{dnmr} of 57dB beneath the Volk South MOA. Increases in CDNL as a result of	Airspace: Impacts to the acoustic environment beneath the SUA would not be significant. The increase in L_{dnmr} as a result of subsonic operations would be between 1 and 8 dB. While the greatest change is 8 dB, the L_{dnmr} is predicted to remain below 45 dB. Increases in CDNL as a result of supersonic flight operations would be	Airspace: Impacts to the acoustic environment beneath the SUA would not be significant. The increase in L_{dnmr} as a result of subsonic operations would be between 1 and 2 dB, with the greatest change (2 dBA) beneath the Palatka 1 and Palatka 2 MOAs, and highest L_{dnmr} of 49 dBA beneath the	Airspace: Impacts to the acoustic environment beneath the SUA would not be significant. The increase in L_{dnmr} as a result of subsonic operations would be between 4 and 9 dB, with the greatest change (9 dB) beneath the Pike East MOA and the highest L_{dnmr} of 58 dB beneath R-4201A. Increases in	Airspace: Impacts to the acoustic environment beneath the SUA would not be significant. The increase in L_{dnmr} as a result of subsonic operations would be between 0 and 15 dB, with the greatest change (15 dB) beneath the Birmingham, Birmingham 2, and Camden Ridge MOAs. The highest L_{dnmr} of 50 dB would be beneath the	

Table 2.4-1. Summary of Impacts (Page 3 of 19)

115 FW	*124 FW*	*125 FW*	*127 WG*	*187 FW*	*No Action Alternative*
supersonic flight operations would be between 1 and 2 dBC, with overall CDNL remaining below 50 dBC. Overall, the Proposed Action would be anticipated to result in significant impacts to the airport noise environment, but have no significant impacts in the SUA. The USAF does not have authority to expend appropriated funds on facilities that are not under the direct control of the USAF. However, the FAA has a program that addresses noise and compatible land use near airports. Title 14, 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	between 0 and 5 dBC, with overall CDNL remaining below 50 dBC. Overall, the Proposed Action would be anticipated to result in significant impacts to the airport noise environment, but have no significant impacts in the SUA. The USAF does not have authority to expend appropriated funds on facilities that are not under the direct control of the USAF. However, the FAA has a program that addresses noise and compatible land use near airports. Title 14, 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	Coastal 1 East and West MOAs. Supersonic flight operations would only occur over water in the Warning Areas. Overall, the Proposed Action would not result in significant impacts to the airport noise environment, or in the SUA.	CDNL as a result of supersonic flight operations would be between 1 and 2 dBC, with overall CDNL remaining below 50 dBC. Overall, the Proposed Action would be anticipated to result in significant impacts to the airport noise environment, but have no significant in the SUA. The USAF does not have authority to expend appropriated funds on facilities that are not under the control of the USAF. Procedures implemented through the AICUZ program at Selfridge ANGB would be similar to the Part 150 program at the civilian installations, but does not provide the ability to conduct off-base mitigation to structures within the community.	Birmingham, Birmingham 2, and Camden Ridge MOAs. Increases in CDNL as a result of supersonic flight operations would be 6 dBC, with overall CDNL remaining below 45 dBC. Overall, the Proposed Action would be anticipated to result in significant impacts to the airport noise environment, but have no significant in the SUA. The USAF does not have authority to expend appropriated funds on facilities that are not under the direct control of the USAF. However, the FAA has a program that addresses noise and compatible land use near airports. Title 14, 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	

Table 2.4-1. Summary of Impacts
(Page 4 of 19)

115 FW	*124 FW*	*125 FW*	*127 WG*	*187 FW*	*No Action Alternative*
process an airport sponsor can use to mitigate significant noise impacts from airport users. It is important to note that the Part 150 program is not a guarantee that sound mitigation or abatement will take place. Eligibility for sound insulation in noise-sensitive land uses through the FAA's Airport Improvement Program requires that the impacted property is located within a DNL 65 dB or higher noise contour and meet various other criteria in FAA guide documents used for sound mitigation.	mitigate significant noise impacts from airport users. It is important to note that the Part 150 program is not a guarantee that sound mitigation or abatement will take place. Eligibility for sound insulation in noise-sensitive land uses through the FAA's Airport Improvement Program requires that the impacted property is located within a DNL 65 dB or higher noise contour and meet various other criteria in FAA guide documents used for sound mitigation.			airport sponsor can use to mitigate significant noise impacts from airport users. It is important to note that the Part 150 program is not a guarantee that sound mitigation or abatement will take place. Eligibility for sound insulation in noise-sensitive land uses through the FAA's Airport Improvement Program requires that the impacted property is located within a DNL 65 dB or higher noise contour and meet various other criteria in FAA guide documents used for sound mitigation.	

Table 2.4-1. Summary of Impacts
(Page 5 of 19)

115 FW	*124 FW*	*125 FW*	*127 WG*	*187 FW*	*No Action Alternative*
Airspace					
Installation: There would be a 47% increase in military operations at the airfield (this would drop to 27% once the F-35A adopts the alert mission), 3% increase in total airfield operations. There would be no significant impacts to airspace management and use within the local air traffic environment.	Installation: There would be an 18% increase in military operations at the airfield, 1% increase in total airfield operations. There would be no significant impacts to airspace management and use within the local air traffic environment.	Installation: There would be a 28% increase in military operations at the airfield, 1% increase in total airfield operations. There would be no significant impacts to airspace management and use within the local air traffic environment.	Base: There would be a 32% increase in 127 WG operations; 8% increase in total airfield operations. There would be no significant impacts to airspace management and use within the local air traffic environment.	Installation: There would be a 1% increase in military operations at the airfield, less than 1% increase in total airfield operations. There would be no significant impacts to airspace management and use within the local air traffic environment.	No changes to the number of operations or frequency of use of training would occur. Operations would remain as current. There would be no significant impacts to Airspace at each alternative installation under the No Action Alternative.
Airspace: No change to the current configuration of SUA (MOAs, Restricted Areas or Ranges). Impacts on SUA use and management would not be significant. There would be an approximate 28% increase in time spent within the airspace. The existing agreements in place between the scheduling agencies, and 115 FW would be sufficient to support F-35A flight operations. A new LOA with the	Airspace: No change to the current configuration of airspace. Impacts on airspace use and management would not be significant. There would be up to an approximate 47% increase in time spent within the airspace. Use of existing procedures and continued close coordination for scheduling use of the MOAs, ATCAAs, and Restricted Areas would continue to ensure safe air traffic operations	Airspace: No change to the current configuration of airspace. Impacts on airspace use and management would not be significant. There would be an approximate 28% increase in time spent within the airspace. Close coordination of scheduling and use of the SUA by the 125 FW with the scheduling agencies would continue to ensure safe air traffic operations throughout the region. Impacts to	Airspace: No change to the current configuration of airspace. Impacts on airspace use and management would not be significant. There would be up to an approximate 54% increase in time spent within the airspace. Close coordination of scheduling and use of the SUA by the 127 WG with the scheduling agencies would continue to ensure safe air traffic operations throughout the region.	Airspace: No change to the current configuration of airspace. Impacts on airspace use and management would not be significant. There would be up to an approximate 17% decrease in time spent within the airspace. Close coordination of scheduling and use of the SUA by the 187 FW with the scheduling agencies would continue to ensure safe air traffic operations throughout the region. Impacts to civil and commercial aviation traffic in 187 FW training	

Table 2.4-1. Summary of Impacts
(Page 6 of 19)

115 FW	*124 FW*	*125 FW*	*127 WG*	*187 FW*	*No Action Alternative*
FAA would be required to support the need for increased ATCAA altitudes. The FAA retains control of ATCAA leading to negligible effects to air traffic. Impacts to civil and commercial aviation traffic in 115 FW training airspace would be negligible.	throughout this region. In accordance with previous agreements, supersonic activity would occur only in the airspace and at altitudes and times currently approved for supersonic flight. Seasonal restrictions for supersonic flight below 15,000 feet AGL along the Owyhee River system would not change. Flight restrictions over the boundaries of the Duck Valley Reservation would remain in place. The addition of F-35A supersonic events occurring above 10,000 feet AGL and below 30,000 feet MSL in the Owyhee North and Jarbidge North MOAs/ATCAAs could result in an exceedance of the number of supersonic operations (730 events) approved in the 2016 supersonic waiver (366th Operations Support Squadron/OSO 2016). Impacts to civil and commercial aviation	civil and commercial aviation traffic in 125 FW training airspace would be negligible.	Impacts to civil and commercial aviation traffic in 127 WG training airspace would be negligible.	airspace would be negligible.	

Table 2.4-1. Summary of Impacts (Page 7 of 19)

115 FW	*124 FW*	*125 FW*	*127 WG*	*187 FW*	*No Action Alternative*
	traffic in 124 FW training airspace would be negligible.				
Air Quality					
Installation: Area is in attainment for all criteria pollutants; no conformity determination required. Impacts to air quality would not be significant. Emissions would not exceed threshold levels.	Installation: Area is in maintenance for CO and PM_{10}. Impacts to air quality would not be significant. Emissions for both construction and aircraft operations would not be anticipated to exceed *de minimis.*	Installation: Area is in attainment for all criteria pollutants; no conformity determination required. Impacts to air quality would not be significant. Emissions would not exceed threshold levels.	Base: Area is in non-attainment for ozone and maintenance area for CO and $PM_{2.5}$. Impacts to air quality would not be significant. Emissions for both construction and aircraft operations would not be anticipated to exceed *de minimis.*	Installation: Area is in attainment for all criteria pollutants; no conformity determination required. Impacts to air quality would not be significant. Emissions would not exceed threshold levels.	Air Quality at each alternative airfield would remain as it currently is. Emissions at each of the alternative installations would continue to be in compliance with their respective SIPs. There would be no significant impacts to Air Quality at each alternative installation under the No Action Alternative.
Airspace: Emissions within the training airspace would not be significant because over 99% of the operations would occur well above the mixing height.	Airspace: Emissions within the training airspace would be not be significant because over 99% of the operations would occur well above the mixing height.	Airspace: Emissions within the training airspace would not be significant because over 99% of the operations would occur well above the mixing height.	Airspace: Emissions within the training airspace would not be significant because over 99% of the operations would occur well above the mixing height.	Airspace: Emissions within the training airspace would not be significant because over 99% of the operations would occur well above the mixing height.	
Safety					
Installation: Impacts to safety would not be significant. Existing facilities for fire response and crash recovery meet F-35A beddown requirements. New building construction is not	Installation: Impacts to safety would not be significant. Existing facilities for fire response and crash recovery meet F-35A beddown requirements. New building construction is not	Installation: Impacts to safety would not be significant. Existing facilities for fire response and crash recovery meet F-35A beddown requirements. New building	Base: Impacts to safety would continue to be significant due to residential encroachment in the CZ. No other impacts related to safety would be significant. Existing	Installation: Impacts to safety would not be significant. Existing facilities for fire response and crash recovery meet F-35A beddown requirements. New building construction is not	Both ground and flight safety at each alternative airfield would remain as they currently are. There would be no significant impacts to Safety under the No Action Alternative.

Table 2.4-1. Summary of Impacts
(Page 8 of 19)

115 FW	*124 FW*	*125 FW*	*127 WG*	*187 FW*	*No Action Alternative*
proposed within RPZs or APZs. None of the planned construction would be in conflict with the proposed QD arcs. No explosives would be handled during construction or demolition activities.	proposed within RPZs or APZs. None of the planned construction would be in conflict with the proposed QD arcs. No explosives would be handled during construction or demolition activities.	construction is not proposed within RPZs or APZs. None of the planned construction would be in conflict with the proposed QD arcs. No explosives would be handled during construction or demolition activities.	facilities for fire response and crash recovery meet F-35A beddown requirements. New building construction is not proposed within RPZs or APZs, with exception of the BAK 12/14 arresting system, which is not considered a safety hazard. None of the planned construction would be in conflict with the proposed QD arcs. No explosives would be handled during construction or demolition activities.	proposed within RPZs or APZs. None of the planned construction would be in conflict with the proposed QD arcs. No explosives would be handled during construction or demolition activities.	
Airspace: Impacts to safety would not be significant. All current fire risk management procedures would remain unaffected due to the F-35A basing. Increase of approximately 3% in total Dane County Regional Airport airfield operations. The use of ordnance and chaff and flares would	Airspace: Impacts to safety would not be significant. All current fire risk management procedures would remain unaffected due to the F-35A basing. Increase of approximately 1% in total Boise Airport airfield operations. The use of ordnance and chaff and flares would be approximately the same or decrease from those	Airspace: Impacts to safety would not be significant. All current fire risk management procedures would remain unaffected due to the F-35A basing. Increase of approximately 1% in total Jacksonville IAP airfield operations compared to the affected environment.	Airspace: Impacts to safety would not be significant. All current fire risk management procedures would remain unaffected due to the F-35A basing. Increase of approximately 8% in total airfield operations compared to the affected environment. The use of ordnance and chaff and flares	Airspace: Impacts to safety would not be significant. All current fire risk management procedures would remain unaffected due to the F-35A basing. Less than 1% increase in total Montgomery Regional Airport airfield operations compared to the affected environment. The use of ordnance and chaff and flares would be approximately the same	

Table 2.4-1. Summary of Impacts
(Page 9 of 19)

115 FW	*124 FW*	*125 FW*	*127 WG*	*187 FW*	*No Action Alternative*
be approximately the same or decrease from those currently employed by legacy aircraft. No increase of BASH and aircraft mishaps beyond current levels.	currently employed by legacy aircraft. No increase of BASH and aircraft mishaps beyond current levels.	The use of ordnance and chaff and flares would be approximately the same or decrease from those currently employed by legacy aircraft. No increase of BASH and aircraft mishaps beyond current levels.	would be approximately the same or decrease from those currently employed by legacy aircraft. No increase of BASH and aircraft mishaps beyond current levels.	or decrease from those currently employed by legacy aircraft. No increase of BASH and aircraft mishaps beyond current levels.	
Land Use					
Installation: No change to the existing airfield-related RPZs and CZs. Off-airport area affected by noise levels equal to or greater than 65 dB DNL increases 1,320 acres overall. Approximately 199 additional acres of residential land use would be included in the 65-75 dB DNL noise contour, rendering this acreage potentially incompatible for residential land use, which would be considered a significant impact.	Installation: No change to the existing airfield-related RPZs and CZs. Off-airport area affected by noise levels equal to or greater than 65 dB DNL increases approximately 446 acres overall. Approximately 74 additional acres of residential land use would be included in the 65-80 dB DNL noise contour, rendering this acreage potentially incompatible for residential land use, which would be considered a significant impact.	Installation: No change to the existing airfield-related RPZs and CZs. Off-airport area affected by noise greater than 65 dB DNL would decrease by approximately 688 acres; no residential land use would fall under areas affected by noise greater than 65 dB DNL. Therefore, there would be no significant impacts.	Base: There would be no change to the existing airfield-related APZs and CZs. Off-airport area affected by noise greater than 65 dB DNL would increase by approximately 1,073 acres overall. Approximately 475 acres of residential land use would be included in the 65-75 dB DNL noise contour, rendering this acreage potentially incompatible for residential land use, which would be considered a significant impact.	Installation: There would be no change to the existing airfield-related RPZs and CZs. Off-airport area affected by noise greater than 65 dB DNL would increase by approximately 1,219 acres overall. Approximately 37 additional acres of residential land use would be included in the 65-75 dB DNL noise contour, rendering this acreage potentially incompatible for residential land use, which would be considered a significant impact.	Land Use at each alternative airfield would remain as it currently is. There would be no significant impacts to Land Use under the No Action Alternative at any of the alternative locations.

Table 2.4-1. Summary of Impacts (Page 10 of 19)

115 FW	*124 FW*	*125 FW*	*127 WG*	*187 FW*	*No Action Alternative*
Airspace: Impacts to land use under the airspace would not be significant. There would be no changes to the status or use of underlying lands, nor would the Proposed Action affect existing plans or policies implemented for land management. The beddown action would not require changes in SUA attributes, volume, or proximity. Changes in noise levels from the Proposed Action would not affect general land use patterns, land ownership, or affect management of lands or special use land areas.	Airspace: Impacts to land use under the airspace would not be significant. There would be no changes to the status or use of underlying lands, nor would the Proposed Action affect existing plans or policies implemented for land management. The beddown action would not require changes in SUA attributes, volume, or proximity. Changes in noise levels from the Proposed Action would not affect general land use patterns, land ownership, or affect management of lands or special use land areas.	Airspace: Impacts to land use under the airspace would not be significant. There would be no changes to the status or use of underlying lands, nor would the Proposed Action affect existing plans or policies implemented for land management. The beddown action would not require changes in SUA attributes, volume, or proximity. Changes in noise levels from the Proposed Action would not affect general land use patterns, land ownership, or affect management of lands or special use land areas.	Airspace: Impacts to land use under the airspace would not be significant. There would be no changes to the status or use of underlying lands, nor would the Proposed Action affect existing plans or policies implemented for land management. The beddown action would not require changes in SUA attributes, volume, or proximity. Changes in noise levels from the Proposed Action would not affect general land use patterns, land ownership, or affect management of lands or special use land areas.	Airspace: Impacts to land use under the airspace would not be significant. There would be no changes to the status or use of underlying lands, nor would the Proposed Action affect existing plans or policies implemented for land management. The beddown action would not require changes in SUA attributes, volume, or proximity. Changes in noise levels from the Proposed Action would not affect general land use patterns, land ownership, or affect management of lands or special use land areas.	
Socioeconomics					
Installation: There would be no significant impacts to socioeconomics. Up to 64 additional military personnel. Less than 0.1% increase in population of Dane	Installation: There would be no significant impacts to socioeconomics. Up to 85 additional military personnel. Less than 0.1% increase in the population of Ada	Installation: There would be no significant impacts to socioeconomics. Up to 85 additional military personnel. Less than 0.1% increase in the	Base: There would be no significant impacts to socioeconomics. Up to 85 additional military personnel. 0.9% increase in the population of Harrison	Installation: There would be no significant impacts to socioeconomics. Up to 27 additional military personnel. Less than 0.1% increase in population of	Socioeconomics at each alternative installation would remain as described in the affected environment section for each alternative. The minor economic benefit of additional based personnel and construction activity would not occur at any of the alternative

Table 2.4-1. Summary of Impacts
(Page 11 of 19)

115 FW	*124 FW*	*125 FW*	*127 WG*	*187 FW*	*No Action Alternative*
County, which would be a negligible impact. Construction spending would have short-term benefits for the local economy. Negligible impact on the housing market in the city of Madison. Overall, the potential lost property value would represent between 0.03 and 0.27 percent of the tax base of Dane County.	County, which would be a negligible impact. Construction spending would have short-term benefits for the local economy. Negligible impact on the housing market in the city of Boise. Overall, the potential lost property value would represent between 0.01 and 0.13 percent of the tax base of Ada County.	population of Duval County, which would be a negligible impact. Construction spending would have short-term benefits for the local economy. Negligible impact on the housing market in the city of Jacksonville or Duval County. Overall, the potential lost property value would represent between less than 0.01 and 0.01 percent of the tax base of Duval County.	Township and less than 0.1% of the population of Macomb County, which would be a negligible impact. Construction spending would have short-term benefits for the local economy. Negligible impact on the housing market in Harrison Township and in Macomb County. Overall, the potential lost property value would represent between 0.04 and 0.38 percent of the tax base of Macomb County.	Montgomery County, which would be a negligible impact. Construction spending would have short-term benefits for the local economy. Negligible impact on the housing market city of Montgomery or Montgomery County. Overall, the potential lost property value would represent between 0.01 and 0.14 percent of the tax base of Montgomery County.	installations. There would be no significant impacts to Socioeconomics under the No Action Alternative.
Environmental Justice and the Protection of Children					
<u>Installation:</u> There would be significant disproportionate impacts to low-income and minority populations as well as children. The increase in noise exposure to the south of the airport would disproportionately impact low-income	<u>Installation:</u> Census blocks associated with the expected changes in off-base noise contours associated with the proposed F-35A beddown are not considered to be disproportionately low-income or minority areas. Further, none of these census blocks indicate that there is a	<u>Installation:</u> Census blocks associated with the expected changes in off-base noise contours associated with the proposed F-35A beddown are not considered to be disproportionately low-income or minority areas. Further, none of these census blocks	<u>Base:</u> There would be no significant disproportionate impacts to low-income or minority populations. Census blocks associated with the expected changes in off-base noise contours associated with the proposed F-35A beddown are	<u>Installation:</u> There would be significant disproportionate impacts to low-income and minority populations as well as children. Since all of the block groups surrounding the airport and under the noise contours are considered environmental justice communities and there	Environmental Justice and the Protection of Children at each alternative installation would remain as described in the affected environment section for each alternative. There were no disproportionate impacts to low-income populations, minorities, or children identified under any of the action alternatives. There would be no significant impacts

Table 2.4-1. Summary of Impacts
(Page 12 of 19)

115 FW	*124 FW*	*125 FW*	*127 WG*	*187 FW*	*No Action Alternative*
areas and the increase in noise exposure to the east of the airport would disproportionately impact a low-income minority population. In addition, the Proposed Action could disproportionately impact children.	higher population of children within them. Therefore, impacts to environmental justice associated with the Proposed Action are not considered to be significant.	indicate that there is a higher population of children within them. Therefore, impacts to environmental justice associated with the Proposed Action are not considered to be significant.	not considered to be disproportionately low-income or minority areas. Some schools would be affected by increased noise levels, with associated adverse impacts of interrupted speech and hindrance of learning. In addition, there are six impacted block groups that have higher proportions of children than the surrounding area and there are four impacted block groups that have lower proportions of children than the surrounding area. Therefore, the Proposed Action would significantly disproportionately impact children.	would be increased impacts, there would be disproportionate impacts on low-income and minority populations under the Proposed Action. Three of the five block groups with noise levels above 65 dB DNL under the Proposed Action have a higher proportion of children than Montgomery County as a whole. Together with the increased impacts at Martin Luther King Elementary School, there could be an adverse and disproportionate impact to children, to include low-income and minority children under the Proposed Action.	as a result of the No Action Alternative.
Infrastructure					
Installation: Impacts to infrastructure resulting from construction and operations would not be significant since any interruption of utility services or increased demand on infrastructure would be	Installation: Impacts to infrastructure resulting from construction and operations would not be significant since any interruption of utility services or increased demand on infrastructure would be minor,	Installation: Impacts to infrastructure resulting from construction and operations would not be significant since any interruption of utility services or increased demand on infrastructure would be	Base: Impacts to infrastructure resulting from construction and operations would not be significant since any interruption of utility services or increased demand on infrastructure would be	Installation: Impacts to infrastructure resulting from construction and operations would not be significant since any interruption of utility services or increased demand on infrastructure would be minor,	Infrastructure at each alternative installation would remain as they currently are. There would be no change to the based personnel at any of the alternative locations. There would be no increase in use of various utilities or roadway systems under this alternative. There would be no significant

Table 2.4-1. Summary of Impacts
(Page 13 of 19)

115 FW	*124 FW*	*125 FW*	*127 WG*	*187 FW*	*No Action Alternative*
minor, temporary or infrequent. Existing roadway networks, potable water supply, and installation sanitary sewer, stormwater drainage, and electrical and natural gas systems are adequate to support any temporary or minor changes as a result of the Proposed Action.	temporary or infrequent. Existing roadway networks, potable water supply, and installation sanitary sewer, stormwater drainage, and electrical and natural gas systems are adequate to support any temporary or minor changes as a result of the Proposed Action.	minor, temporary or infrequent. Existing roadway networks, potable water supply, and installation sanitary sewer, stormwater drainage, and electrical and natural gas systems are adequate to support any temporary or minor changes as a result of the Proposed Action.	minor, temporary or infrequent. Existing roadway networks, potable water supply, and installation sanitary sewer, stormwater drainage, and electrical and natural gas systems are adequate to support any temporary or minor changes as a result of the Proposed Action.	temporary or infrequent. Existing roadway networks, potable water supply, and installation sanitary sewer, stormwater drainage, and electrical and natural gas systems are adequate to support any temporary or minor changes as a result of the Proposed Action.	impacts under the No Action Alternative.
Earth Resources					
Installation: New construction footprint of up to 4.9 acres and 1.7 acres of new impervious surface. To minimize potential impacts associated with erosion, runoff, and sedimentation, standard construction practices would be implemented. In addition, as the construction is for national defense purposes and the surrounding land is already in urban development, the FPPA does not apply to this alternative. Therefore,	Installation: New construction footprint of up to 5.7 acres and 0.6 acre of new impervious surface. To minimize potential impacts associated with erosion, runoff, and sedimentation, standard construction practices would be implemented. In addition, as the construction is for national defense purposes and the surrounding land is already in urban development, the FPPA does not apply to this alternative. Therefore,	Installation: New construction footprint of up to 10.8 acres and 1.9 acres of new impervious surface. To minimize potential impacts associated with erosion, runoff, and sedimentation, standard construction practices would be implemented. In addition, as the construction is for national defense purposes and the surrounding land is already in urban development, the FPPA does not apply to this alternative. Therefore,	Base: New construction footprint of up to 2.4 acres and 1.4 acres of new impervious surface. To minimize potential impacts associated with erosion, runoff, and sedimentation, standard construction practices would be implemented. In addition, as the construction is for national defense purposes and the surrounding land is already in urban development, the FPPA does not apply	Installation: New construction footprint of up to 4.8 acres and 2.9 acres of new impervious surface. To minimize potential impacts associated with erosion, runoff, and sedimentation, standard construction practices would be implemented. In addition, as the construction is for national defense purposes and the surrounding land is already in urban development, the FPPA does not apply to this alternative. Therefore, impacts to soils would not be significant.	Soils at each alternative airfield would remain as they currently are. There would be no significant impacts to Soils as a result of the No Action Alternative.

Table 2.4-1. Summary of Impacts
(Page 14 of 19)

115 FW	*124 FW*	*125 FW*	*127 WG*	*187 FW*	*No Action Alternative*
impacts to soils would not be significant.	impacts to soils would not be significant.	impacts to soils would not be significant.	to this alternative. Therefore, impacts to soils would not be significant.		
Water Resources					
Installation: Construction would be limited to the area of ground disturbance. A site-specific SWPPP would include measures to minimize potential impacts associated with stormwater runoff during construction, including BMPs and standard erosion control measures. No significant impacts to surface water, groundwater, and floodplains. Construction activities would have no impact on wetlands.	Installation: Construction would be limited to the area of ground disturbance. A site-specific SWPPP would include measures to minimize potential impacts associated with stormwater runoff during construction, including BMPs and standard erosion control measures. No significant impacts to surface water, groundwater, and floodplains. Construction activities would have no impact on wetlands.	Installation: Construction would be limited to the area of ground disturbance. A site-specific SWPPP would include measures to minimize potential impacts associated with stormwater runoff during construction, including BMPs and standard erosion control measures. No significant impacts to surface water, groundwater, and floodplains. Wetland impacts as a result of the construction of the MSA Administration building would result in a permanent fill of the wetlands. Federal permitting under Section 404 of the CWA would be necessary. State of Florida permitting under Chapter 62-330,	Base: Construction would be limited to the area of ground disturbance. A site-specific SWPPP would include measures to minimize potential impacts associated with stormwater runoff during construction, including BMPs and standard erosion control measures. No significant impacts to surface water, groundwater, and floodplains. Construction activities would have no impact on wetlands.	Installation: Construction would be limited to the area of ground disturbance. A site-specific SWPPP would include measures to minimize potential impacts associated with stormwater runoff during construction, including BMPs and standard erosion control measures. No significant impacts to surface water, groundwater, and floodplains. Construction activities would have no impact on wetlands.	Water Resources at each alternative airfield would remain as they currently are. There would be no additional impacts to Water Resources as a result of the No Action Alternative.

Table 2.4-1. Summary of Impacts
(Page 15 of 19)

115 FW	*124 FW*	*125 FW*	*127 WG*	*187 FW*	*No Action Alternative*
		Florida Administrative Code, would also be necessary. A Finding of No Practicable Alternative would be required.			
Biological Resources					
Installation: Impacts to biological resources would not be significant. Impacts to the vegetation at the installation would not be significant due to the lack of sensitive vegetation in the project area. No impacts to federally- or state-listed species. Changes in operational noise are not expected to impact terrestrial species in the area because species on and near the installation are likely accustomed to elevated noise levels associated with aircraft and military operations. Indirect impacts from construction noise would not be significant.	Installation: Impacts to biological resources would not be significant. Impacts to the vegetation at the installation would not be significant due to the lack of sensitive vegetation in the project area. No impacts to federally- or state-listed species. Changes in operational noise are not expected to impact terrestrial species in the area because species on and near the installation are likely accustomed to elevated noise levels associated with aircraft and military operations. Indirect impacts from construction noise would not be significant. No increase of BASH and aircraft mishaps beyond current levels.	Installation: Impacts to biological resources would not be significant. Approximately 6.8 acres of forested wetland vegetation would be removed (see water resources section). Impacts to other vegetation would not be significant. Changes in operational noise are not expected to impact terrestrial species in the area because species on and near the installation are likely accustomed to elevated noise levels associated with aircraft and military operations. No increase of BASH and aircraft mishaps beyond current levels. No impacts to federally- or state-listed species.	Base: Impacts to biological resources would not be significant. Impacts to the vegetation at the installation would not be significant due to the lack of sensitive vegetation in the project area. Changes in operational noise are not expected to impact terrestrial species in the area because species on and near the installation are likely accustomed to elevated noise levels associated with aircraft and military operations. Indirect impacts from construction noise would not be significant.	Installation: Impacts to biological resources would not be significant. Impacts to the vegetation at the installation would not be significant due to the lack of sensitive vegetation in the project area. Changes in operational noise are not expected to impact terrestrial species in the area because species on and near the installation are likely accustomed to elevated noise levels associated with aircraft and military operations. Indirect impacts from construction noise would not be significant. No increase of BASH and aircraft mishaps beyond current levels. No impacts to federally- or state-listed species.	There would be no change to Biological Resources under this alternative. There would be no significant impacts to Biological Resources as a result of the No Action Alternative.

Table 2.4-1. Summary of Impacts
(Page 16 of 19)

115 FW	*124 FW*	*125 FW*	*127 WG*	*187 FW*	*No Action Alternative*
No increase of BASH and aircraft mishaps beyond current levels.		Two state-listed plant species occur near proposed construction areas. However, if these projects were implemented, the 125 FW would avoid disturbance to these plant populations.	No increase of BASH and aircraft mishaps beyond current levels. No impacts to federally- or state-listed species. Noise from proposed construction and operations is not expected to affect special status species since they are likely accustomed to elevated noise levels associated with current aircraft and military operations.		
Airspace: Ordnance delivery and chaff and flare use would not exceed current levels and would occur in locations already used and authorized for those purposes. Impacts to migratory birds protected under the MBTA would not be significant. No significant impacts to the federal- and state-listed species from the proposed change in	Airspace: Ordnance delivery and chaff and flare use would not exceed current levels and would occur in locations already used and authorized for those purposes. Impacts to migratory birds protected under the MBTA would not be significant. No significant impacts to the federal- and state-listed species from the proposed change in subsonic and supersonic operations.	Airspace: Ordnance delivery and chaff and flare use would not exceed current levels and would occur in locations already used and authorized for those purposes. Impacts to migratory birds protected under the MBTA would not be significant. No significant impacts to the federal- and state-listed species from the proposed change in	Airspace: Ordnance delivery and chaff and flare use would not exceed current levels and would occur in locations already used and authorized for those purposes. Impacts to migratory birds protected under the MBTA would not be significant. No significant impacts to the federal- and state-listed species from the proposed change in	Airspace: Ordnance delivery and chaff and flare use would not exceed current levels and would occur in locations already used and authorized for those purposes. Impacts to migratory birds protected under the MBTA would not be significant. No significant impacts to the federal- and state-listed species from the proposed change in subsonic and supersonic operations.	

Table 2.4-1. Summary of Impacts
(Page 17 of 19)

115 FW	*124 FW*	*125 FW*	*127 WG*	*187 FW*	*No Action Alternative*
subsonic and supersonic operations.		subsonic and supersonic operations.	subsonic and supersonic operations.		
Cultural Resources					
Installation: No significant impacts to archaeological, architectural, or traditional historic properties.	Installation: No significant impacts to archaeological or traditional historic properties. Building 1524 is an eligible storage magazine built in 1958. The proposed exterior renovations to Building 1524 include the installation of a canopy over the Munitions Assembly Conveyor pad, grounding, and lights. proposed undertaking would have an adverse effect on this resource; however, mitigation of the adverse effect of the renovation of ammunition storage magazines is covered under the Program Comment.	Installation: No significant impacts to archaeological, architectural, or traditional historic properties.	Base: No significant impacts to archaeological, architectural, or traditional historic properties.	Installation: No significant impacts to archaeological, architectural, or traditional historic properties.	Cultural Resources at each alternative installation would remain as they currently are. None of the proposed facility construction/ renovations would occur at any of the installations, and thus there would be no potential impacts to facilities that are eligible for listing on the NRHP. There would be no surface disturbance from construction activities, and thus no potential to impact unknown archaeological resources. There would be no significant impacts to Cultural Resources as a result of the No Action Alternative.
Airspace: No adverse effects to NRHP-eligible or listed archaeological resources, architectural resources, or traditional cultural properties. All agreements currently in	Airspace: No adverse effects to NRHP-eligible or listed archaeological resources, architectural resources, or traditional cultural properties. All agreements currently in	Airspace: No adverse effects to NRHP-eligible or listed archaeological resources, architectural resources, or traditional cultural properties. All agreements currently in	Airspace: No adverse effects to NRHP-eligible or listed archaeological resources, architectural resources, or traditional cultural properties. All agreements currently	Airspace: No adverse effects to NRHP-eligible or listed archaeological resources, architectural resources, or traditional cultural properties. All agreements currently in	

Table 2.4-1. Summary of Impacts
(Page 18 of 19)

115 FW	*124 FW*	*125 FW*	*127 WG*	*187 FW*	*No Action Alternative*
place would remain in effect.	place would remain in effect.	place would remain in effect.	in place would remain in effect.	place would remain in effect.	
Hazardous Materials and Wastes, and Other Contaminants					
Installation: Impacts relative to hazardous materials, wastes, and other contaminants would not be significant. There would not be an increased risk of hazardous waste releases or exposure from this alternative. Omission of hydrazine, cadmium fasteners, chrome plating, copper-beryllium bushings, and the use of a non-chromium primer. Increase in airfield operations would increase the throughput of petroleum substances (e.g., fuels, oils) used during F-35A operations. Six ERP sites (Site 1, Site 4, Site 5, Site 7, Site 8 Area 1, and Site 8 Area 2) overlap with the	Installation: Impacts relative to hazardous materials, wastes, and other contaminants would not be significant. There would not be an increased risk of hazardous waste releases or exposure from this alternative. Omission of cadmium fasteners, chrome plating, copper-beryllium bushings, and the use of a non-chromium primer. Increase in airfield operations would increase the throughput of petroleum substances (e.g., fuels, oils) used during F-35A operations. There is a potential of impact from PFOS/PFOA potential release sites Hangar 148, Hangar 1529, Hangar 1530, and Hangar 155 due to potential PFOS/PFOA contamination in soil and groundwater. A	Installation: Impacts relative to hazardous materials, wastes, and other contaminants would not be significant. There would not be an increased risk of hazardous waste releases or exposure from this alternative. Omission of cadmium fasteners, chrome plating, copper-beryllium bushings, and the use of a non-chromium primer. The increase in airfield operations would increase the throughput of petroleum substances (e.g., fuels, oils) used during F-35A operations. One ERP site, Site 4 OWS at Hush House, overlaps with the proposed construction under this alternative.	Base: Impacts relative to hazardous materials, wastes, and other contaminants would not be significant. There would not be an increased risk of hazardous waste releases or exposure from this alternative. Omission of cadmium fasteners, chrome plating, copper-beryllium bushings, and the use of a non-chromium primer. The increase in airfield operations would increase the throughput of petroleum substances (e.g., fuels, oils) used during F-35A operations. Three ERP/AOC sites (Site 7, Site 21, and TU051) and two PFOS/PFOA sites (#4, and #15) overlap with	Installation: Impacts relative to hazardous materials, wastes, and other contaminants would not be significant. There would not be an increased risk of hazardous waste releases or exposure from this alternative. Omission of cadmium fasteners, chrome plating, copper-beryllium bushings, and the use of a non-chromium primer. Minimal change in airfield operations, therefore no noticeable change in throughput of petroleum substances (e.g., fuels, oils) used during F-35A operations. Two ERP sites and three PFOS/PFOA sites overlap with the proposed construction under this alternative. As applicable, the 187 FW	Hazardous materials, wastes, and other contaminants at each alternative installation would remain as described in the affected environment section for each alternative location. The throughput and management of hazardous materials, wastes, and other contaminants would not be expected to change. There would be no significant impacts to hazardous materials, wastes, and other contaminants under the No Action Alternative.

Table 2.4-1. Summary of Impacts
(Page 19 of 19)

115 FW	*124 FW*	*125 FW*	*127 WG*	*187 FW*	*No Action Alternative*
proposed construction under this alternative. All six ERP sites are closed. Three perfluorinated compound PRLs including Hangar 400, Hangar 406, and Hangar 414 overlap with the proposed construction. As applicable, the 115 FW would coordinate with the WDNR regarding proposed construction near ERP sites. The 115 FW will comply with Air Force Guidance Memorandum (AFGM2019-32-01) *AFFF-Related Waste Management Guidance* to manage waste streams containing PFOS/PFOA.	construction plan would be created for the proposed renovations at Hangars 148, 1529, 1530, and 155 to minimize direct contact with soil and groundwater. No other ERP sites overlap with the proposed construction under this alternative. One ERP site (Site 9) overlaps with proposed construction under this alternative. This site has been recommended for NFA with site closure. The 124 FW will comply with Air Force Guidance Memorandum (AFGM2019-32-01) *AFFF-Related Waste Management Guidance* to manage waste streams containing PFOS/PFOA.	There is a potential of impact from PFOS/PFOA potential release sites Hangar 1001, Hangar 1029, Old Fire Station #1, Old Fire Station #2, and Current Fire Station. The 125 FW will comply with Air Force Guidance Memorandum (AFGM2019-32-01) *AFFF-Related Waste Management Guidance* to manage waste streams containing PFOS/PFOA.	the proposed construction under this alternative. As applicable, the 127 WG would coordinate with the EGLE[1] regarding proposed construction near ERP sites, on Selfridge ANGB. The 127 WG will comply with Air Force Guidance Memorandum (AFGM2019-32-01) *AFFF-Related Waste Management Guidance* to manage waste streams containing PFOS/PFOA.	would coordinate with the ADEM, regarding proposed construction near ERP. The 187 FW will comply with Air Force Guidance Memorandum (AFGM2019-32-01) *AFFF-Related Waste Management Guidance* to manage waste streams containing PFOS/PFOA.	

Note: [1]Agency name changed from Michigan Department of Environmental Quality by Executive Order 2019-02 effective 7 April 2019.

Legend: 115 FW = 115th Fighter Wing; 124 FW = 124th Fighter Wing; 125 FW = 125th Fighter Wing; 127 WG = 127th Wing; 187 FW = 187th Fighter Wing; ADEM = Alabama Department of Environmental Management; AFGM = Air Force Guidance Memorandum; AGL = above ground level; AICUZ = Air Installation Compatible Use Zone; ANGB = Air National Guard Base; AOC = Area of Concern; APZ = Accident Potential Zone; ATCAA = Air Traffic Control Assigned Airspace; BASH = Bird/Wildlife Aircraft Strike Hazard; BMP = Best Management Practice; CDNL = C-weighted Day-Night Average Sound Level; CFR = Code of Federal Regulations; CO = carbon monoxide; CWA = Clean Water Act; CZ = Clear Zone; dB = decibel; dBA = A-weighted decibel; dBC = C-weighted decibel; DNL = Day-Night Average Sound Level; EGLE = Michigan Department of Environment, Great Lakes, and Energy; ERP = Environmental Restoration Program; FAA = Federal Aviation Administration; FPPA = Farmland Protection Policy Act; IAP = International Airport; L_{dnmr} = Onset-Rate Adjusted Day-Night Average Sound Level; L_{eq} = Equivalent Sound Level; LOA = Letter of Agreement: MBTA = Migratory Bird Treaty Act; MOA = Military Operations Area; MSA = Munitions Storage Area; MSL = mean sea level; NFA = No Further Action; NRHP = National Register of Historic Places; OWS = Oil/Water Separator; PFAS = polyfluoroalkyl substances; $PM_{2.5}$ = particulate matter less than or equal to 2.5 microns in diameter; PM_{10} = particulate matter less than or equal to 10 microns in diameter; PFOA = perfluorooctanoic acid; PFOS = perfluorooctane sulfonate; POI = Point of Interest; PRL = Potential Release Location; QD = quantity-distance; ROI = Region of Influence; RPZ = Runway Protection Zone; SIP = State Implementation Plan; SUA = Special Use Airspace; SWPPP = Stormwater Pollution Prevention Plan; USAF = United States Air Force; WDNR = Wisconsin Department of Natural Resources.

2.5 DOCUMENTS INCORPORATED BY REFERENCE

In accordance with CEQ regulations for implementing NEPA and with the intent of reducing the size of this document, materials relevant to the Proposed Action at the alternative locations are incorporated by reference, where appropriate. These documents include detailed noise reports and biological and cultural surveys conducted for this EIS and are available on the project website (http://www.angf35eis.com/) and are also part of the administrative record.

2.6 MITIGATION MEASURES

Mitigations avoid, minimize, remediate, or compensate for environmental impact. The CEQ regulations (40 CFR 1508.20) define mitigation to include:

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 lifetime of the action; or
5. **Compensating** for the impact by replacing or providing substitute resources or environments.

Avoiding, minimizing, or reducing potential impacts has guided the development of F-35A basing alternatives and aircraft number scenarios. Mitigation measures are built or designed into the Proposed Action and alternatives; applied to construction, operation, or maintenance involved in the action; or implemented as compensatory measures.

The USAF does not have authority to expend appropriated funds on facilities that are not under the direct control of the USAF. However, the FAA has a program that addresses noise and compatible land use near airports. Title 14, 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. It is important to note that the Part 150 program is not a guarantee that sound mitigation or abatement will take place. Eligibility for sound insulation in noise-sensitive land uses through the FAA's Airport Improvement Program requires that the impacted property is located within a DNL 65 dB or higher noise contour and meet various other criteria in FAA guide documents used for sound mitigation.

Noise Exposure Maps (NEMs) can and do change over time. NEMs include an existing year and a future year (5 years forward in time). These NEMs have to be updated every 5 years or certified to the FAA that they are current. Non-compatible land uses (i.e., residences) can become compatible if the DNL 65 dB noise contour changes shape or becomes smaller due to changes in operational procedures, fleet mix, or nighttime operations.

Specific mitigation measures (where applicable) are presented in each of the installation-specific discussions. Following publication of the ROD, a mitigation plan will be prepared in accordance with 32 CFR 989.22(d). The mitigation plan will address specific mitigations identified and agreed to during the environmental process, and will include metrics to track and monitor those activities that are identified to minimize the impacts. These could include afterburner usage, flight tracks, number of operations, etc. The Mitigation and Monitoring Plan will identify who is responsible for implementing specific mitigation procedures, who is responsible for funding them, and who is responsible for tracking these measures to ensure compliance.

2.6.1 Best Management Practices to Reduce the Potential for Environmental Impacts

The following describes general mitigation and management measures incorporated into the overall design of the F-35A operations beddown proposal regardless of the location alternative. These measures include best management practices (BMPs) for construction practices and continuation of ongoing operational restrictions and avoidance measures. They are summarized below, and listed according to specific resources.

- Continue close coordination with the FAA ARTCC, Air Traffic Control (ATC), and other FAA entities to minimize conflicts with civil and commercial aviation.
- Avoid, using standard procedures, airports and airfields underlying military airspace as prescribed in Chapters 3 (Airspace), 4 (Air Traffic Control), 5 (Air Traffic Procedures), 6 (Emergency Procedures), and 7 (Safety of Flight) of the FAA Aeronautical Information Manual (available at: http://www.faa.gov/atpubs).
- Continue to adhere to all existing FAA (14 CFR Part 91.119) and local avoidance procedures (available through Notice to Airmen [https://pilotweb.nas.faa.gov/PilotWeb/], Flight Information Program Charts [https://www.aviation.dla.mil/rmf/programs_flip.htm], and for each airport via the internet at: http://www.airnav.com/airport), flight restrictions, scheduling adjustments, and other practices designed for flight safety, and in some instances, minimize exposure to aircraft noise.
- Utilize advanced simulators for training to the extent practicable.
- Avoid, to the extent practicable:
    - identified seasonally sensitive American Indian ceremonies or other seasonal activities;
    - low-altitude (below 5,000 feet AGL) overflights of identified seasonally sensitive ranching and recreation activities; and
    - low-altitude overflights (below 5,000 feet AGL) on holidays.

  - Similar to the Part 150 program, and in accordance with AFI 32-7073, *Air Installation Compatible Use Zones (AICUZ)*, NGB would prepare an update to the noise study at Selfridge ANGB once the aircraft become operational. Of the five alternative locations evaluated in this EIS, the AICUZ applies to Selfridge ANGB only, as it is the only one not co-located at a civilian airfield. As a military installation, compatible land use recommendations are provided 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. The AICUZ program does not provide the ability 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 impacts associated with noise.
- Sequence construction activities to limit the soil exposure for long periods of time.
- Employ fugitive dust control and soil retention practices including:
  - Use water trucks or sprinkler systems to keep all areas of vehicle movement damp enough to prevent dust from leaving the construction area.
  - Minimize traffic speeds on all unpaved roads.
  - Install gravel pads at construction area access points to prevent tracking of soil onto paved roads.
  - Provide temporary wind fencing around sites being graded or cleared.
  - Suspend all soil disturbance activities when winds exceed 25 miles per hour or when visible dust plumes emanate from the site.
  - Cover truck loads that haul dirt, sand, or gravel.
  - After completion of clearing, grading, earthmoving, or excavation, treat the disturbed areas by watering, re-vegetation, or by spreading non-toxic soil binders until they are paved or otherwise developed to prevent dust generation.
  - Designate personnel to monitor the dust control program and to order increased watering, as necessary, to prevent the transport of dust off-site.
  - Store chemicals, cements, solvents, paints, or other potential water pollutants in locations where they cannot cause runoff pollution.
- Employ, where feasible, construction equipment emission control measures, including:
  - Maintain equipment according to manufacturer specifications.
  - Restrict idling of equipment and trucks to a maximum of five minutes at any location.
  - Employ diesel oxidation catalysts and/or catalyzed diesel particulate traps.
  - Use electricity from power poles rather than temporary diesel- or gasoline-powered generators.
  - Provide temporary traffic control, such as a flag person, during all phases of construction to maintain smooth traffic flow.
  - Keep construction equipment and equipment staging areas away from sensitive receptor areas (such as day care centers).

  - Re-route construction trucks away from congested streets or sensitive receptor areas.
  - Use construction equipment with engines that meet U.S. Environmental Protection Agency (USEPA) Tier 3 and 4 non-road standards.
  - Use alternatively-fueled construction equipment, such as compressed natural gas, liquefied natural gas, or electric.
- Incorporate Leadership in Energy and Environmental Design and sustainable development into construction projects to achieve optimum resource efficiency, sustainability, and energy conservation.
- Manage stormwater on-site during operations to prevent discharges into nearby surface waters through site planning with low-impact design principles and engineered storm water retention ponds (or swales).
- Update, as needed, Stormwater Pollution Prevention Plans (SWPPPs).
- Avoid spreading invasive non-native species; preclude vehicles from driving in areas with known invasive non-native species problems.
- Perform any repairs, maintenance, and use of construction equipment (i.e., cement mixers) in designated "staging areas" designed to contain any chemicals, solvents, or toxins from entering surface waters.
- Incorporate into the design and construction of paved surface areas a slope sufficient enough to direct potential runoff away from wetland areas.
- Continue and enhance recycling and reuse programs to accommodate waste generated by the F-35A beddown.
- Continue to follow established procedures for managing hazardous materials and wastes (See Chapter 3, Section 3.14, *Hazardous Materials and Waste*).

2.6.2 Unavoidable Impacts

Certain F-35A beddown activities are projected to result in disturbance and/or noise within areas not previously or recently subjected to these effects. Some of these noise effects could be considered adverse or annoying to potentially affected individuals.

This page intentionally left blank.

CHAPTER 3

Resource Definition and Methodology

How to Use This Document

Our goal is to give you 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, or EIS, is shown below.

OVERALL PROPOSAL

CHAPTER 1
Purpose and Need for the Proposed Action

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

CHAPTER 3
Resource Definition and Methodology

INFORMATION SPECIFIC TO EACH INSTALLATION

CHAPTER 4
Five Installation-Specific Sections

115 FW, Wisconsin	124 FW, Idaho	125 FW, Florida	127 WG, Michigan	187 FW, Alabama
Section WI1.0 Installation Overview	**Section ID1.0** Installation Overview	**Section FL1.0** Installation Overview	**Section MI1.0** Installation Overview	**Section AL1.0** Installation Overview
Section WI2.0 Alternative	**Section ID2.0** Alternative	**Section FL2.0** Alternative	**Section MI2.0** Alternative	**Section AL2.0** Alternative
Section WI3.0 Affected Environment and Environmental Consequences	**Section ID3.0** Affected Environment and Environmental Consequences	**Section FL3.0** Affected Environment and Environmental Consequences	**Section MI3.0** Affected Environment and Environmental Consequences	**Section AL3.0** Affected Environment and Environmental Consequences
Section WI4.0 Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section ID4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section FL4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section MI4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section AL4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources

OVERALL PROPOSAL

CHAPTER 5
References

CHAPTER 6
List of Preparers

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

3.0 RESOURCE DEFINITION AND METHODOLOGY

3.1 INTRODUCTION

3.1.1 Analytical Approach

An Environmental Impact Statement (EIS) under the National Environmental Policy Act (NEPA) requires focused analysis of the areas and resources potentially affected by an action or alternative to that action. It also provides that an EIS should consider, but not analyze in detail, those areas or resources within the area of potential impact, *not* potentially affected by the proposal. Therefore, a NEPA document should not be encyclopedic; rather, it should be succinct and to the point. Both description and analysis in an EIS should provide sufficient detail and depth to ensure that the agency (i.e., the United States [U.S.] Air Force [USAF], and the National Guard Bureau [NGB]) took an objective and critical look at all resources potentially impacted by an action. An EIS also requires a comparative analysis that allows decision-makers and the public to differentiate among the alternatives.

Council on Environmental Quality (CEQ) regulations (40 Code of Federal Regulations [CFR] §§ 1500-1508) require an EIS to discuss impacts in proportion to their potential magnitude and to present only enough discussion of peripheral issues as necessary to demonstrate why more study is not warranted. The analysis in this EIS considers the affected environment and compares those to conditions that might occur should the USAF implement the Proposed Action or any of the action alternatives. The Proposed Action includes components potentially affecting the 115th Fighter Wing (115 FW) at Dane County Regional Airport, Madison, Wisconsin; 124th Fighter Wing (124 FW) at Boise Airport, Boise, Idaho; 125th Fighter Wing (125 FW) at Jacksonville International Airport (IAP), Jacksonville, Florida; 127th Wing (127 WG) at Selfridge Air National Guard Base (ANGB), Michigan; and 187th Fighter Wing (187 FW) at Montgomery Regional Airport, Montgomery, Alabama, as well as their surrounding environs. Existing training airspace and ranges for each of the five alternative locations that the F-35A aircraft would also form part of the affected environment. Only certain components of the Proposed Action have the potential to affect resources in the airspace or at the ranges. For example, the aircraft transition and personnel changes would not generate any impacts in the airspace. While this EIS considers all resource topics for each discrete geographic area and its relationship to each component of the Proposed Action, it emphasizes those resources affected by the Proposed Action and only briefly mentions those not affected.

The following sections for each resource topic begin with an introduction that defines the resources addressed in the section, summarizes applicable laws and regulations that apply to all installations, defines key terms as necessary, and describes the general region of influence (ROI) within which the effects from implementation of the various alternatives are anticipated to occur. A specific

ROI for each installation/resource is described within Chapter 3, as are any local/regional regulations.

The methodology used in Chapter 4 to analyze potential impacts for each resource follows the definition of the resource sections in this chapter. The analysis of significance considers both context and intensity as well as both direct and indirect effects. Quantitative thresholds are applied, where appropriate, to determine the level of significance. Other issues are assessed qualitatively based on context and intensity.

3.1.2 Organization of this Chapter

Since the affected area consists of five distinct locations – the 115 FW at Dane County Regional Airport, Wisconsin; the 124 FW at Boise Airport, Idaho; the 125 FW at Jacksonville IAP, Florida; the 127 WG at Selfridge ANGB, Michigan; and the 187 FW at Montgomery Regional Airport, Alabama, and their associated airspace and ranges – this EIS presents descriptions of affected environment and potential impacts for the alternative locations in each of the installation-specific subsections: WI3, ID3, FL3, MI3, and AL3. However, the definition of the resource and analysis methodology for each resource would remain the same regardless of the location. Therefore, to prevent redundancy, the EIS captures all of that information in this chapter. Resources discussed in this chapter include:

- Noise
- Infrastructure
- Airspace
- Earth Resources
- Air Quality
- Water Resources
- Safety
- Biological Resources
- Land Use
- Socioeconomics
- Environmental Justice
- Cultural Resources
- Hazardous Materials and Waste

3.2 NOISE

This EIS evaluates noise effects to people, land uses, and historic structures, as well as wildlife and domesticated animals. Noise effects on populations are evaluated in the noise, socioeconomics, environmental justice, and cultural resources sections; noise effects to land uses and historic structures are evaluated in the land use and cultural resources sections, respectively; and the potential noise effects to wildlife and domesticated animals is addressed in the biological resources section. More details regarding noise modeling methodology and results specific to this EIS can be found in the noise analysis reports cited in Section 2.5, *Documents Incorporated by Reference*. Additional analysis for noise impacts can be found in Appendix B, *Noise Modeling, Methodology, and Effects*. Specific topics discussed in Appendix B include, among other things, land use compatibility, noise-induced hearing impairment, non-auditory health effects, and noise effects on children. The following provides a definition of the resource applicable to any of the five alternative locations, as well as the noise metrics, supplemental noise analyses, types of military aircraft noise, and the analysis methodology.

3.2.1 Definition of Resource

3.2.1.1 Population Noise Effects

Sound is a physical phenomenon consisting of minute vibrations exhibited as waves, measured in frequency and amplitude, which travel through a medium, such as air or water, and are sensed by the human ear. Sound is all around us. Noise is generally described as unwanted sound. Unwanted sound can be based on objective effects (such as hearing loss or damage to structures) or subjective judgments (community annoyance). Noise analysis thus requires assessing a combination of physical measurement of sound, physical and physiological effects, plus psycho- and socio-acoustic effects. The response of different individuals to similar noise events is diverse and influenced by the type of noise, the perceived importance of the noise, its appropriateness in the setting, the time of day, the type of activity during which the noise occurs, and the sensitivity of the individual. Noise may also affect wildlife through disruption of nesting, foraging, migration, and other life-cycle activities.

3.2.1.2 Land Use Noise Effects

At and around each of the installations and for areas under the airspace, land use categories may include residential; manufacturing; transportation, communication and utilities; commercial (trade); services; cultural, entertainment, and recreational; institutional; and resources production and extraction. Special use areas are an additional land use category under airspace, and are identified by government agencies as being worthy of more rigorous management. These areas can include Wilderness Areas, Wilderness Study Areas, National and State Parks, and National Wildlife Refuges.

In June 1980, an *ad hoc* Federal Interagency Committee on Urban Noise (FICUN) published guidelines (FICUN 1980) relating to noise and compatible land uses. This committee was composed of representatives from Department of Defense (DoD); Department of Transportation and the Department of Housing and Urban Development (HUD); the U.S. Environmental Protection Agency (USEPA); and the Veterans Administration. Generally, federal agencies have adopted these guidelines for noise analyses.

3.2.1.3 Wildlife and Domesticated Animals Noise Effects

Hearing is critical to an animal's ability to react, compete, reproduce, hunt, forage, and survive in its environment. The ability to hear sounds and noise and to communicate, assist wildlife in maintaining group cohesiveness and survivorship. Social species communicate for calls of warning, territorial defense, during courtship, and other reasons that are subsequently related to an individual's or group's cohesiveness and responsiveness.

Domesticated animal species differ 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. 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 (Smith 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. Wildlife responses to aircraft are influenced by many variables, including size, speed, proximity (both height above the ground and distance), engine noise, color, flight profile, and radiated noise. The type of aircraft (e.g., fixed wing [jet] versus rotor-wing [helicopter]) and type of flight mission may also produce different levels of disturbance, with varying animal responses (Smith et al. 1988). It is difficult, therefore, to generalize wildlife responses to noise disturbances across species. Appendix B, *Noise Modeling, Methodology, and Effects*, provides more detail on noise effects to domesticated animals and wildlife.

3.2.2 Noise Metrics

Noise and sound levels are expressed in logarithmic units measured by decibel (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. On average, a person perceives a doubling (or halving) of a sound's loudness when there is a 10 dB change in sound level.

All sound has a spectral content, which means its magnitude or level changes with frequency, where frequency is measured in cycles per second, or hertz. 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, denoted as dBA, that de-emphasizes very low and very high frequencies to better replicate human sensitivity. "C-weighting" is typically applied to impulsive sounds such as a sonic boom or ordnance detonation. As is done in many environmental documents, the "A" in dBA is dropped for brevity to refer to A-weighted sound levels. The only sound levels that do not use A-weighting are supersonic boom levels, which utilize C-weighting denoted as dBC.

In accordance with DoD guidelines and standard practice for environmental impact analysis documents, the noise analysis herein uses the following (A-weighted) noise metrics: Maximum Sound Level (L_{max}), Sound Exposure Level (SEL), Day-Night Average Sound Level (DNL), Onset-Rate Adjusted Day-Night Average Sound Level (L_{dnmr}), and C-weighted DNL (CDNL).

3.2.2.1 Maximum Sound Level

The maximum sound level or L_{max} is the highest integrated sound level measured during a single event in which the sound level changes value with time (e.g., an aircraft overflight). During an aircraft overflight, the noise level begins at the ambient or background noise level, rises to the maximum level as the aircraft passes close to the observer, and returns to the background level as the aircraft recedes into the distance. L_{max} defines the maximum sound level occurring for a fraction of a second, which is defined as 1/8 second, and is denoted as "fast" response (American National Standards Institute 1988). In this EIS, L_{max} is one metric used in the analysis of speech interference, and each installation-specific section includes a comparison of L_{max} for F-16, F-15, A-10, and F-35A aircraft.

3.2.2.2 Sound Exposure Level

The SEL composite metric represents both the intensity of a sound and its duration. Individual time-varying noise events (e.g., aircraft overflights) have two main characteristics: a sound level that changes throughout the event and a period of time during over which the event occurs. During an aircraft flyover, SEL captures the total sound energy during the entire acoustic event, but does not directly represent the sound level heard at any given time. The total sound energy of an event is condensed into a 1-second period of time the equivalent sound level (L_{eq}) containing an equal amount of energy is reported. For sound from aircraft overflights, which typically lasts more than 1 second, the SEL is usually greater than the L_{max} because an individual overflight lasts more than a few seconds. SEL represents the best metric to compare noise levels from disparate aircraft overflights because it accounts for both the magnitude and duration of the event. Each installation-specific section (Chapter 4) includes a comparison of SELs for applicable legacy aircraft (F-16, F-15, A-10) and F-35A aircraft. Analysis of sleep disturbance employs the SEL metric.

3.2.2.3 Equivalent Sound Level

The L_{eq} is a “cumulative” metric that combines a series of noise events over a period of time by averaging the sound energy. The time period specified for L_{eq} is typically provided along with the value and relates to a type of activity and presented in parenthesis (e.g., $L_{eq[24]}$ for 24 hours). An 8-hour equivalent sound level ($L_{eq[8]}$) is used in this study to represent a typical school day occurring from 7 a.m. to 3 p.m. and is used for school screening for potential classroom impacts from noise.

3.2.2.4 Day-Night Average Sound Level

The DNL noise metric is the energy-averaged sound level measured over a 24-hour period, with a 10 dB penalty assigned to noise events occurring between 10 p.m. and 7 a.m. (environmental night). DNL values are obtained by averaging the SEL values for a given 24-hour period, with louder values receiving emphasis. DNL is the preferred noise metric of HUD, Federal Aviation Administration (FAA), USEPA, and DoD. Studies of community annoyance in response to numerous types of environmental noise show that DNL correlates well with impact assessments; there is a consistent relationship between DNL and the level of annoyance (USAF 2016).

Most people are exposed to sound levels of 50 to 65 dB DNL or higher on a daily basis. Research has indicated that about 87 percent of the population is not highly annoyed by outdoor sound levels below 65 dB DNL (FICUN 1980). Therefore, the 65 dB DNL noise level is typically used to help determine compatibility of military aircraft operations with local land use, particularly for land use associated with airfields.

3.2.2.5 Onset-Rate Adjusted Day-Night Average Sound Level

Subsonic noise levels associated with the types of military airspace proposed for use by the F-35A are characterized by the L_{dnmr}, based upon DNL. Military aircraft operating in Military Operations Areas (MOAs) or Restricted Areas includes low-altitude and high-speed operations that do not occur at airfields. Because military jet aircraft can exhibit a high rate of increase in sound level (onset rate) of up to 150 dB per second in such areas, the L_{dnmr} metric applies an adjustment of up to +11 dB to account for the startle effect.

Unlike the use of DNL around airfields, the FICUN compatibility standards do not readily apply to land use under military airspace. Rather, the analysis considers both the L_{dnmr} generated by the proposed operations and the degree of change in L_{dnmr} from current to proposed noise conditions. Note that an L_{dnmr} of 45 dB or less is low and considered indistinguishable from ambient outdoor noise levels. The implications of higher L_{dnmr} depend upon the underlying land uses and the degree of change in noise levels.

3.2.2.6 C-Weighted Day-Night Average Sound Level

Supersonic noise is described using C-weighted DNL, or CDNL. This metric captures the impulsive characteristics of supersonic noise in a day-night average. In addition, the analysis considers changes in the number of sonic booms per month as a measure of effects.

3.2.3 Supplemental Noise Analyses

To characterize the potential effects of noise from aircraft operations, this EIS includes supplemental noise analyses. All of these supplemental analyses apply to the airfield environs due to their proximity and include evaluation of speech interference, classroom learning interference, recreational interference, sleep disturbance, potential for hearing loss, and workplace noise. The detailed noise analysis developed for this project and maintained in the administrative record provides more detail on noise effects, metrics, and noise modeling results.

3.2.3.1 Number of Events Above a Threshold Level

The Number of Events Above (NA) metric gives the total number of events that exceed a noise level threshold during a specified period of time. The threshold can be either SEL or L_{max}, and it is important that this selection is shown in the nomenclature. For example, where determining the number of events that would exceed an SEL of 90 dB over a given period of time, the nomenclature would be NA90SEL. Similarly, for L_{max} it would be written as NA90L_{max}. The time period 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 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. It provides additional information about the acoustic environment and is valuable in helping to describe noise exposure 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.

3.2.3.2 Speech Interference

Speech interference comprises another supplemental indicator of noise effects. Such interference is measured by the number of events per hour, on an average daily basis, when the aircraft noise is greater than or equal to 50 dB L_{max} inside the building during the DNL daytime hours (7 a.m. to 10 p.m.) with open and closed windows. The software model predicts outdoor sound levels that must be converted to interior levels by applying typical building attenuation values of 15 dB or 25 dB for windows open and windows closed conditions, respectively (Department of Defense Noise Working Group 2009a).

3.2.3.3 Classroom Learning Interference

When considering intermittent noise caused by aircraft overflights, guidelines for classroom interference indicate that an appropriate criterion is a limit on indoor background $L_{eq(8)}$ of 45 dB and a limit on single events of 50 dB L_{max}. The 45 dB $L_{eq(8)}$ equates to an outdoor L_{eq} of 60 dB with windows open. The 50 dB L_{max} for single events equates to an outdoor L_{max} of 65 dB and 75 dB for windows open and closed, respectively. Thus, the number of annual average daily events where L_{max} would be greater than or equal to outdoor 65 dB and 75 dB, serves as the measure of potential classroom effects and are presented on a per-hour basis. Because classrooms are in use during the day predominantly, these criteria are applied for annual average daily aircraft operations occurring over an 8-hour period between 7 a.m. and 3 p.m., rather than for a 15-hour period between 7 a.m. and 10 p.m. for standard speech interference.

3.2.3.4 Recreational Interference Events

For recreational areas, which are typically underlying Special Use Airspace (SUA), NA65L_{max} for speech interference and NA35L_{max} for audibility were chosen as measures for gauging aircraft-generated noise impacts, consistent with previous environmental assessments (Air Force Civil Engineer Center [AFCEC] 2015).

3.2.3.5 Sleep Disturbance

Sleep disturbance can be caused by excessive noise, which can hinder people's ability to fall asleep or to cause people to wake from sleep. A method for calculation of the probability of awakening from at least one event per night is described in American National Standards Institute (ANSI)/Acoustical Society of America (ASA) S12.9-2008/Part 6. The standard utilizes the estimated interior SEL caused by aircraft events along with the number of occurrences per night to calculate the probability of awakening from that event. Multiple events can be combined to determine the probability of awakening for all events during a single night. ANSI recommended that only nighttime events occurring during the DNL nighttime with SELs between 50 and 100 dB should be used for this probability of awakening calculation. Data suggested that events below 50 dB do not contribute significantly to probability of awakening and the formula underpredicts probability of awakening for events over 100 dB. The Defense Noise Working Group for environmental impact analysis has endorsed this ANSI/ASA 2008 methodology (Department of Defense Noise Working Group 2009b).

As of July 2018, the ANSI and ASA have withdrawn the 2008 standard, which formed the basis of much of the Department of Defense Noise Working Group 2009b guidance:

> *The decision of Working Group S12/WG 15 to withdraw ANSI/ASA S12.9-2008/Part 6 implies that the method for calculating "at least one behavioral awakening per night" contained in the former Standard should no longer be relied upon for environmental impact assessment purposes. The Working Group believes that continued reliance on the 2008 Standard would lead to unreliable and difficult-to-interpret predictions of transportation-noise-induced sleep disturbance (ANSI/ASA 2018).*

The 2008 standard relied on the assumption that the calculation for probability of awakening from a single event is independent of the subsequent events, so multiple events in the same night can simply be combined using the same formula. Additionally, the studies that supported the 2008 standard assumed varying sensitivity to awakening of individual study participants and employed "sensitivity coefficients" to improve the prediction correlation. However, the sensitivity coefficients for residents of airport neighborhoods were not generalizable from one airport to another making accurate prediction at airfields without such studies and sensitivity coefficients difficult and less reliable.

The explanations given by ANSI and ASA for the withdrawal of the 2008 standard include the following criticism:

- When applied to large populations, a fractional increase in noise level produces an unrealistic increase in number of awakenings.

- Lacks advice concerning situational limits of its applicability allowing misapplication in very large study areas resulting in implausibly large total numbers of awakenings, even at imperceptibly low sound levels.
- Lacks guidance about the reliability of its predictions, which encourages practitioners to apply the predictive equations with the assumption of unlimited accuracy.
- Due to the awakening studies' setup, predictions of sleep awakening in settings with greater than 20 nighttime events are dubious.

Additionally, ANSI/ASA 2018 described the relatively small number of field observations of behavioral awakenings attributable to transportation sleep disruption, which lack sufficient representation of the reactions of diverse populations necessary for the typical application of the 2008 standard.

The discussion in ANSI/ASA 2018 included consideration of SEL's value in computing probability of awakening and concluded that reliance solely on SEL may not be reliable because awakenings depend only slightly on SEL, particularly at lower levels. A study by Fidell et al. (2013) re-analyzed the same database published in the 2008 ANSI but concluded that probability of awakening more closely related to relative SEL rather than absolute, *"Minor differences in prediction of small awakening rates should not be interpreted as evidence of meaningfully different environmental impacts of one project alternative with respect to another."*

Without a reliable and standardized method to compute probability of awakening, or updated guidance from the Department of Defense Noise Working Group, this study presents the sleep impact analysis utilizing the previous standard (ANSI/ASA 2008; Department of Defense Noise Working Group 2009b) for environmental impact disclosure purposes. The reader is cautioned that the probability of awakening metric provides only a crude estimate because it cannot truly account for all variables that could affect a person's sleep. A comparison of the affected environment and Proposed Action awakening percentages showing large changes to probability of awakening could provide some insight on whether a particular action would be likely to increase or decrease sleep impacts. However, any additional conclusions may not be supportable.

3.2.3.6 Potential for Hearing Loss

Per the 2009 DoD policy memorandum, populations exposed to noise greater than 80 dB DNL are at the greatest risk of potential for hearing loss (PHL) (Undersecretary of Defense for Acquisition Technology and Logistics 2009). The USEPA's Guidelines for Noise Impact Analysis quantifies hearing loss risk in terms of Noise Induced Permanent Threshold Shift (NIPTS), a quantity that defines the permanent change in the threshold level below which a sound cannot be heard. NIPTS is stated in terms of the average threshold shift at several frequencies that can be expected from daily exposure to noise over a normal working lifetime of 40 years, with exposure lasting 8 hours per day for 5 days per week. The DoD recommends screening for PHL risk by determining if any residences would be exposed to 80 dB DNL or greater (Department of Defense Noise Working Group 2012). If any residences are identified in that risk area then additional analysis shall be performed utilizing L_{eq} in 1 dB bands.

3.2.3.7 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, which reaffirmed the 85 dB recommended exposure limit (NIOSH 1998). Active duty and reserve components of the USAF, as well as civilian employees and contracted personnel working on USAF bases, must comply with Occupational Safety and Health Administration (OSHA) regulations (29 CFR § 1910.95, *Occupational Noise Exposure*); DoD Instruction 6055.12, *Hearing Conservation Program;* and Air Force Instruction (AFI) 48-127, *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*).

3.2.4 Types of Military Aircraft Noise

Sound from military aircraft can be categorized into two types, named after the type of flight from which they originate—subsonic and supersonic. As described in the following two subsections, these two types of noise differ in their characteristics.

3.2.4.1 Subsonic Aircraft Noise

Subsonic noise from an individual aircraft traveling at less than the speed of sound is a time-varying continuous sound, typically lasting 20 to 30 seconds. It is first audible as the aircraft approaches, increases to a maximum when the aircraft is near its closest point, and then decreases as it departs. The noise depends on the speed and power setting of the aircraft and its flight track. Noise levels from flight operations exceeding ambient noise typically occur beneath main approach and departure corridors, in local air traffic patterns around the airfield, and in areas immediately adjacent to aircraft parking ramps and staging areas. As aircraft in flight gain altitude, their noise contribution drops to lower dB levels, often becoming indistinguishable from ambient noise.

3.2.4.2 Supersonic Aircraft Noise (Sonic Boom)

Aircraft in supersonic flight (i.e., exceeding the speed of sound [Mach 1]) generate an air pressure wave. The air pressure wave is sometimes reflected upward resulting from changing air temperatures at different altitudes such that it never reaches the ground (Plotkin et al. 1989). When the pressure wave does reach the ground, it is heard as a sonic boom. 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 psf. The amplitude depends on the aircraft’s size, weight, geometry, Mach number, maneuver (e.g., turn, dive), and flight altitude.

As mentioned above, not all supersonic flights cause sonic booms that are heard on the ground. As altitude increases, air temperature and sound speed decrease. The change in the speed of sound with altitude typically results in pressure waves, which create sonic booms, to be turned upward as they move toward the ground. Depending on the altitude of the aircraft and the Mach number, many pressure waves can be bent upward such that they never reach the ground. This phenomenon, referred to as “cutoff,” also acts to limit the width (or area covered) of the sonic booms that do reach the ground.

The biggest single condition affecting overpressure is altitude, but maneuvers can also affect boom psf, increasing or decreasing overpressures from those for steady level flight. The overpressures of booms that reach the ground are well below those that would begin to cause physical injury to humans or animals (USAF 2016). They can be, however, annoying and cause startle reactions 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 psf boom (average pressure in airspace) cracking plaster or breaking a window falls in the range of 1 in 10,000 to 1 in 10 million.

Sonic booms from air combat training activities tend to be concentrated within elliptical boundaries fitting within the airspace. Aircraft set up at positions at opposite ends of the airspace before proceeding toward each other for an engagement. Supersonic events can occur as the aircraft accelerate toward each other, during dives in the engagement itself, and during disengagement. When booms occur relatively frequently, it is useful to estimate the overall 24-hour exposure of the booms to relate it to land use compatibility and annoyance.

3.2.5 Analysis Methodology

This analysis uses the DoD NOISEMAP suite of computer programs and refers to BASEOPS as the input module for military aircraft and NOISEMAP as the noise model for predicting noise exposure resulting from military operations in the installation environment. The Aviation Environmental Design Tool (AEDT) refers to the computer model used to predict noise exposure from civilian aircraft operating in the airport environment; this would apply to all installations under consideration, except the 127 WG. The NMPLOT tool is used to combine the noise contours produced by NOISEMAP and AEDT into a single noise exposure map for all installations save the 127 WG. Noise exposure is presented in terms of contours, i.e., lines of equal value, of DNL, and for this analysis, the grid spacing used for calculating noise exposure was 500 feet. DNL contours of 65 to 85 dB, presented in 5 dB increments, graphically depict the aircraft noise environment. This modeling process, using the NOISEMAP software suite and AEDT, is the DoD- and FAA-accepted method for representing the overall community noise exposure over time. Noise exposure is also presented in terms of DNL at representative points of interest (POIs) and on- and off-airport acreages within each noise contour.

The USAF has no definitive significant threshold for noise impacts in the vicinity of military airfields or beneath SUA, and therefore rely on the context of the local environment and the intensity of the change on that environment. Context refers to the need to consider impacts within the setting in which they occur (e.g., changes in a rural area may elicit more of a response than one in an urban area). Intensity refers to the severity of the noise impact based on a change in the acoustic environment as a result of both single events (SEL, L_{max}) and the combination of all noise events (DNL, CDNL, $L_{eq,}$, and L_{dnmr}). To determine the level of significance in the airfield environment, we analyzed many factors including: 1) changes to land use compatibility in relation to the number and type of structures, and population within the affected area; 2) the potential for increases in events that could result in sleep disturbance, speech interference and interference with classroom learning; and 3) the PHL to occur to off-installation populations. Changes in the SUA were based on predicted changes in human annoyance and interference with daily activities.

The FAA has designated significance thresholds for changes in the acoustic environment at civilian airports where proposed actions are subject to NEPA compliance. An action that would result in a DNL change of 1.5 dB or more in a noise sensitive area that is exposed to noise at or above a DNL of 65 dB or that would be exposed to a DNL of 65 dB when compared to the No Action Alternative would be considered a significant impact. This threshold does not directly apply or adequately address impacts to areas where other noise is very low and a quiet setting is the generally recognized purpose and attribute, such as national parks and wildlife refuges often located beneath SUA (FAA Order 1050.1F).

The ROI for noise associated with the five alternative installations includes the counties, townships, and towns/cities that each installation lies within, as well as those that are and will be affected by noise generated at the airfields. The ROI also includes areas under the airspace that would be used by each of the units.

3.2.5.1 Airfield Noise Modeling

Noise modeling using DNL is based on annual average day (AAD) aircraft operations, which are determined by dividing the total yearly airfield/airport operations by 365 days per year. DNL has two time periods of interest: daytime and nighttime. As identified above, daytime hours are from 7 a.m. to 10 p.m. local time. Nighttime hours are from 10 p.m. to 7 a.m. local time. DNL adds an adjustment to operations occurring during the nighttime period by adding 10 dB to their single-event sound level. Note that "daytime" and "nighttime" in DNL calculations are sometimes referred to as "acoustic day" and "acoustic night." This is often different from the "day" and "night" used commonly in military aviation, which are directly related to the times of sunrise and sunset, and are important for military training in dark conditions. These times vary throughout the year, latitudinally, and with seasonal changes.

Military Aircraft Operations

Noise modeling was conducted by determining and building each aircraft's flight tracks (paths over the ground) and profiles (which include data such as altitude, airspeed, power settings, and other flight conditions). This information was developed iteratively with a team primarily made up of representatives from the installation's flying squadrons, air traffic controllers, and the NGB. These data were combined with information about the numbers of each type of operation by aircraft/track/profile, local climate, ground surrounding the airfield, and similar data related to aircraft engine runs that occur at specific, static locations on the ground (e.g., pre- and post-flight and maintenance activities).

Civilian Aircraft Operations

Civilian aircraft noise modeling was accomplished using the AEDT software program. The data (numbers and types of aircraft, time of day, runway assignments, type of operation) used were developed through coordination with representatives from the FAA, air traffic controllers, and the NGB. Aircraft types were incorporated into the model directly for aircraft that constituted 1 percent or more of the total operations. Aircraft operating less than that were grouped by type and size and represented by the aircraft most common in the group. Actual times were used to assign operations to acoustic day and night, and, where applicable, using daylight savings time conversion. Standardized flight profile data (power settings, airspeeds, etc.) available with AEDT were used for civilian aircraft operations.

3.2.5.2 Special Use Airspace Noise Modeling

In the airspace environment, L_{dnmr} is the relevant noise metric used. L_{dnmr} is based on the month with the most aircraft activity in each airspace unit to account for the sporadic nature of operations. L_{dnmr} is similar to the DNL except that an additional penalty is applied to account for the startle effect of aircraft operating at low altitudes and at high rates of speed (over 400 knots), as described in Section 3.2.2.5. Noise modeling in the airspace was accomplished by determining the use of each airspace unit and building each aircraft's flight profiles based on the aircraft's configuration (airspeed and power setting) and the amount of time spent at various altitudes throughout the airspace.

3.3 AIRSPACE

3.3.1 Definition of Resource

This resource includes evaluation of both airspace management and use and addresses the use of airspace needed to support airfields and their surrounding airspace, as well as the airspace used for military training, and other components of the National Airspace System. Issues associated with the Proposed Action focus on the management and use of that system.

Airspace management is defined as the direction, control, and handling of flight operations in the "navigable airspace" that overlies the geopolitical borders of the U.S. and its territories. "Navigable airspace" is airspace above the minimum altitudes of flight prescribed by regulations under U.S. Code (USC) Title 49, Subtitle VII, Part A, and includes airspace needed to ensure safety in the take-off and landing of aircraft (49 USC § 40102). Congress has charged the FAA with responsibility for managing airspace, as well as developing plans and policy for the use of the navigable airspace and assigning by regulation or order the use of the airspace necessary to ensure the safety of aircraft and its efficient use (49 USC § 40103[b]; FAA Order JO 7400.2L, Chg 3). Management of this resource considers how airspace is designated, used, and administered to best accommodate the individual and common needs of military, commercial, and general aviation. The FAA considers multiple and sometimes competing demands for aviation airspace in relation to airport operations, Federal Airways, Jet Routes, military flight training activities, and other special needs to determine how the National Airspace System can best be structured to address all user requirements. There are two categories of airspace or airspace areas, regulatory and non-regulatory. Within these two categories, there are four types of airspace—Controlled, Uncontrolled, Special Use, and Other.

Controlled airspace is airspace of defined dimensions within which air traffic control service is provided to Instrument Flight Rule flights (IFR) and to Visual Flight Rule (VFR) flights in accordance with the airspace classification (FAA 2018a). Controlled airspace is categorized into five separate classes: Classes A through E (Figure 3.3-1). These classes identify airspace that is under the control of an air traffic controller, airspace supporting airport operations, and designated airways supporting en route transit from place-to-place. The classes also dictate pilot qualification requirements, flight rules that must be followed, and the type of equipment necessary to operate within that airspace. In controlled airspace, Air Traffic Service routes are used by air traffic controllers to direct the flow of air traffic throughout the U.S. based on Navigational Aids (NAVAIDS) and/or Area Navigation (RNAV) using Global Positioning System (GPS) waypoints. Victor (V) and Tango (T) routes are the low-altitude airways in airspace below 18,000 feet mean sea level (MSL) used by air traffic control (ATC) to route air traffic between fixed locations. Jet (J-) and Q-Routes are published airways designated at altitudes between 18,000 feet MSL and 45,000 feet MSL.

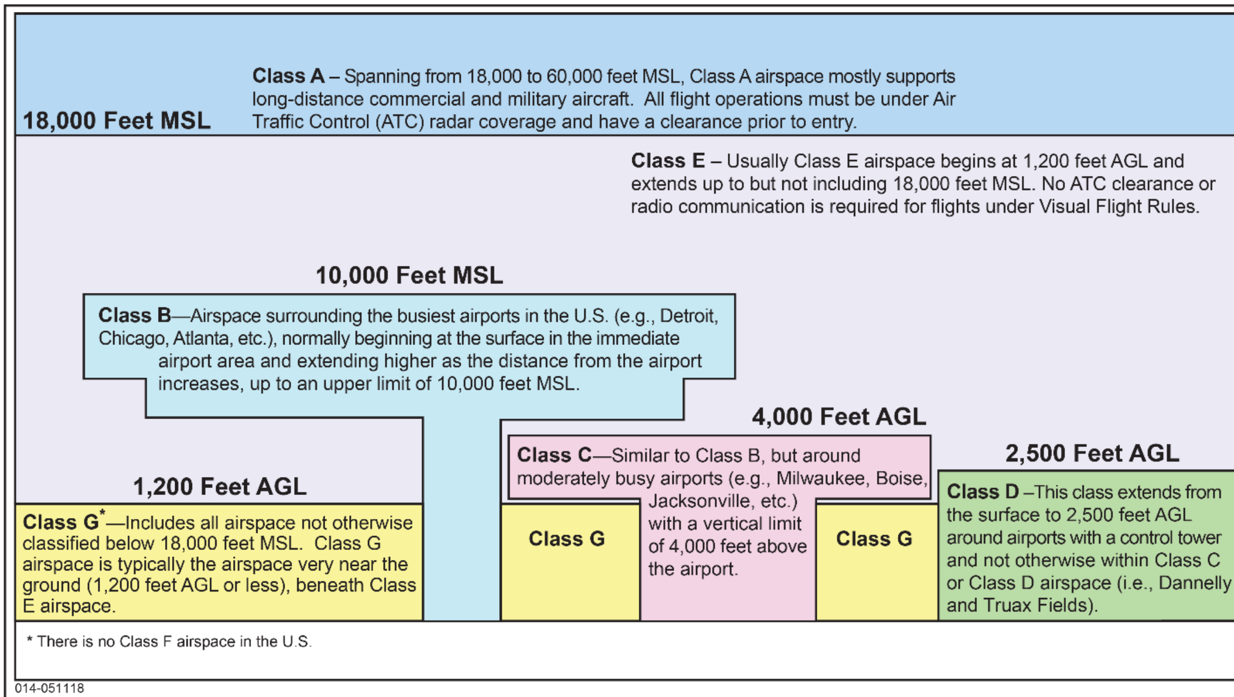


Figure 3-3-1. Cross Section of Airspace Classes and their Relationships

Uncontrolled airspace is designated as Class G airspace. Within the Continental U.S. and out to 12 NM off shore, Class G airspace includes all airspace up to 14,500 feet MSL that has not been designated as Class B, C, D or E.

Special Use Airspace has defined dimensions identified by an area on the surface of the earth wherein activities must be confined because of their nature, or where limitations are imposed upon aircraft operations that are not a part of those activities or both. The types of SUA are Prohibited Areas, Restricted Areas, MOAs, Warning Areas, Alert Areas, Controlled Firing Areas, and National Security Areas. The vertical limits of SUA are described by designating floors (the lowest altitude within the SUA) and ceilings (the highest altitude within the SUA). Depending on the terrain or operational considerations, floors of SUA are designated as feet above ground level (AGL), MSL, or both (e.g., 5,000 feet MSL or 3,000 feet AGL, whichever is higher). Ceilings are expressed as a flight level (FL) or as feet MSL. A FL denotes thousands of feet MSL when an aircraft's altimeter is set to a standard atmospheric pressure, thereby ensuring that all aircraft are flying at their designated altitudes (i.e., FL500 would be 50,000 feet MSL). For this EIS, flight levels are omitted and discussed as feet MSL for ease of reading. SUA designated for military and other governmental activities is charted and published by the National Aeronautical Charting Office in accordance with FAA Order JO 7400.2L, Chg. 2, *Procedures for Handling Airspace Matters*, and other applicable regulations and orders. Specific rules and regulations concerning designation and management of SUA are listed in FAA Order JO 7400.10, *Special Use Airspace* (FAA 2018b).

Other airspace includes advisory areas, temporary flight restrictions, areas designated for parachute jump operations, Military Training Routes, Aerial Refueling Tracks, and Air Traffic Control Assigned Airspace (ATCAA). ATCAAs are not charted, it is airspace that can be requested from and authorized by the controlling Air Route Traffic Control Center (ARTCC) when needed for military training. ATCAAs are often used to expand the airspace vertically over a MOA, but can also be independent of other SUA.

Pilots comply with the minimum safe altitudes when flying, identified by the FAA and codified in 14 CFR § 91.119. At a minimum, aircraft operators 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. Outside congested areas, aircraft must avoid persons, vessels, vehicles, or structures by 500 feet except over open water or sparsely populated areas.

3.3.2 Analysis of Methodology

Management of the ranges and airspace used for military training focuses on ensuring safe, effective, and efficient operations, while balancing the military's need to accomplish realistic training and testing with the need to minimize potential impacts of such activities on the environment and surrounding communities. Analysis in this EIS considered these competing factors as a means to assess the nature and magnitude of the potential impacts that could occur from replacing existing A-10, F-15, and F-16 aircraft with F-35A aircraft.

This EIS describes the existing operations at the 115 FW, 124 FW, 125 FW, 127 WG, and 187 FW installations, and in associated SUA that the F-35A would use to support operational training. Further, the EIS evaluates changes that could occur in the use and management of the training airspace should the F-35A replace the existing aircraft. The most up-to-date data were used for this analysis.

The assessment of airfield and airspace use and management discusses how the No Action and Proposed Action would affect civil, commercial, and military air traffic within the airspace of each alternative airfield, and in SUA that the F-35A would use. Because no modifications or additions are proposed for the current airspace structure, the impact analysis focuses on changes in use that would result from the predicted addition or reduction in annual airfield and airspace operations. It is important to note that when discussing operations in the training airspace (e.g., MOAs, ATCAAs), a single aircraft creates one operation each time it flies through an individual airspace unit. For example, an individual aircraft flying through MOA A to MOA B and back again to MOA A in the same training mission would account for three airspace operations.

Impacts on air traffic were assessed with respect to the potential for disruption of existing air traffic patterns and systems, and changes in existing levels of air traffic. Factors used to assess the impacts of the proposed beddown on air traffic include consideration of an alternative's potential to result in an increased number of flights such that they could not be accommodated within established operational procedures and flight patterns at the airfield; a requirement for an airspace modification to SUA; or an increase in air traffic that might increase collision potential between military and civilian operations. In addition, the analysis evaluated the potential for conflicts with civil aviation and underlying airfields.

ROI for airspace associated with the five alternative installations includes the airspace associated with operations at each of the airfields, as well as the SUA that would be used by each of the units.

3.4 AIR QUALITY

3.4.1 Definition of Resource

Ambient air quality refers to the atmospheric concentration of a specific compound (amount of pollutants in a specified volume of air) that occurs at a particular geographic location. The ambient air quality levels measured at a particular location are determined by the interaction of emissions, meteorology, and chemistry. Meteorological considerations include wind and precipitation patterns affecting the distribution, dilution, and removal of pollutant emissions. Chemical reactions can transform pollutant emissions into other chemical substances.

Air pollution is a threat to human health and damages trees, crops, other plants, lakes, and animals. It creates haze or smog that reduces visibility in national parks and cities and interferes with aviation. To improve air quality and reduce air pollution, Congress passed the Clean Air Act (CAA) and its amendments in 1970 and 1990, which set regulatory limits on air pollutants and help to ensure basic health and environmental protection from air pollution.

3.4.1.1 Criteria Pollutants

Air quality is defined by ambient concentrations of specific air pollutants – pollutants the USEPA determined may affect the health or welfare of the public (USEPA 2018a). The major pollutants of concern are called "criteria pollutants": carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), ozone (O_3), particulate matter (PM) (dust particles less than or equal to 10 microns in diameter [PM_{10}] and fine particulate matter less than or equal to 2.5 microns in diameter [$PM_{2.5}$]), and lead. The CAA required that the USEPA establish National Ambient Air Quality Standards (NAAQS) for these criteria pollutants, shown in Table 3.4-1. These standards set specific concentration limits for criteria pollutants in the outdoor air.

Table 3.4-1. National Ambient Air Quality Standards

Pollutant		*Primary/Secondary[1, 2]*	*Averaging Time*	*Level[3]*
Carbon Monoxide (CO)		Primary	8 hours	9 ppm (10 mg/m^3)
Carbon Monoxide (CO)		Primary	1 hour	35 ppm (40 mg/m^3)
Nitrogen Dioxide (NO_2)		Primary	1 hour	100 ppb (188 $\mu g/m^3$)
Nitrogen Dioxide (NO_2)		Primary and Secondary	Annual	53 ppb (100 $\mu g/m^3$)
Ozone (O_3)		Primary and Secondary	8 hours	0.070 ppm (147 $\mu g/m^3$)
Particulate Matter	$PM_{2.5}$	Primary	Annual	12 $\mu g/m^3$
Particulate Matter	$PM_{2.5}$	Secondary	Annual	15 $\mu g/m^3$
Particulate Matter	$PM_{2.5}$	Primary and Secondary	24 hours	35 $\mu g/m^3$
Particulate Matter	PM_{10}	Primary and Secondary	24 hour	150 $\mu g/m^3$
Sulfur Dioxide (SO_2)		Primary	1 hour	75 ppb (105 $\mu g/m^3$)
Sulfur Dioxide (SO_2)		Secondary	3 hours	0.5 ppm (1,300 $\mu g/m^3$)
Lead (Pb)		Primary and Secondary	Rolling 3-month average	0.15 $\mu g/m^3$

Notes: [1]Primary Standards: the levels of air quality necessary, with an adequate margin of safety to protect the public health. Each state must attain the primary standards no later than 3 years after that state's implementation plan is approved by the USEPA.
[2]Secondary Standards: the levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.
[3]Concentrations are expressed first in units in which they were promulgated; equivalent units are given in parenthesis.
Legend: mg/m^3 = milligrams per cubic meter; $\mu g/m^3$ = micrograms per cubic meter; ppm = parts per million; ppb = parts per billion.
Source: USEPA 2018a.

The concentration limits were developed because the criteria pollutants are common in outdoor air, considered harmful to public health and the environment, and come from numerous and diverse sources. The concentration limits are designed to aid in protecting public health and the environment. Areas with air pollution problems typically have one or more criteria pollutants consistently present at levels that exceed the NAAQS. These areas are designated as nonattainment for the standards. Criteria air pollutants are classified as either primary or secondary pollutants based on how they are formed in the atmosphere.

Primary air pollutants are emitted directly into the atmosphere from the source of the pollutant and retain their chemical form. Examples of primary pollutants are the smoke produced by burning wood and volatile organic compounds (VOCs) emitted by industrial solvents. Secondary air pollutants are those formed through atmospheric chemical reactions that usually involve primary air pollutants (or pollutant precursors) and normal constituents of the atmosphere. O_3, a major component of photochemical smog, is a secondary air pollutant and its precursors fall into two broad groups of chemicals: nitrogen oxides (NO_x) and VOCs.

Some criteria air pollutants are a combination of primary and secondary pollutants. PM_{10} and $PM_{2.5}$ are generated as primary pollutants by various mechanical processes (e.g., abrasion, erosion, mixing, or atomization) or combustion processes. They are generated as secondary pollutants through chemical reactions or by the condensation of gaseous pollutants into fine aerosols.

3.4.1.2 Hazardous Air Pollutants

In addition to the criteria pollutants, the USEPA currently designates 187 substances as hazardous air pollutants (HAPs) under the federal CAA. HAPs are air pollutants known or suspected to cause cancer or other serious health effects, or adverse environmental and ecological effects (USEPA 2016). NAAQS are not established for these pollutants; however, the USEPA developed rules that limit emissions of HAPs from specific industrial sources. HAP emissions are typically one or more orders of magnitude smaller than concurrent emissions of criteria air pollutants, and only become a concern when large amounts of fuel, explosives, or other materials are consumed during a single activity or in one location. Mobile sources, such as aircraft operations, would be functioning intermittently over a large area and would produce negligible ambient HAP emissions. Therefore, HAPs would not create significant or adverse health risks to humans living adjacent to airfields or underneath airspace in which aircraft operate, and are not further evaluated in the analysis.

3.4.1.3 General Conformity Rule

Federal actions are required to conform with the approved State Implementation Plan (SIP) for those areas of the U.S. designated as nonattainment or maintenance areas for any criteria air pollutant under the CAA (40 CFR §§ 51 and 93). The purpose of the General Conformity Rule is to ensure that applicable federal actions, such as the Proposed Action, would not cause or contribute to a violation of an air quality standard and that the Proposed Action would not adversely affect the attainment and maintenance of any NAAQS. A conformity evaluation must be completed for every applicable USAF action that generates emissions to determine and document whether a proposed action complies with the General Conformity Rule.

If a federal action: is not an emergency response action, conforms under the Rule, does not meet the approved facility emissions budget, is not a listed exempt activity, or is not covered by the Transportation Conformity Rule, then a conformity demonstration evaluating total direct and indirect emissions must be made. In determining the total direct and indirect emissions caused by the action, agencies must project the future emissions in the area along with the Proposed Action emissions. Total direct and indirect emissions must consider all emission increases and decreases, be reasonably foreseeable at the time that the conformity evaluation is conducted, and are possibly controllable through an agency's continuing program responsibility to affect emissions.

The first step in the demonstration is a Conformity Applicability Analysis and involves calculating the non-exempt direct and indirect emissions associated with the action. If the action is a change from a current level of emissions, then the current level is compared to future emissions. The net change is the difference between the emissions associated with the action and the current emissions. The net change may be positive, negative, or zero. In the Conformity Applicability Analysis, the emissions thresholds that trigger the conformity requirements are called *de minimis* thresholds. The net change emissions calculated for the direct and indirect emissions are compared to these thresholds. If the emissions are below *de minimis* thresholds, then a General Conformity Determination is not required. If the net change in emissions equal or exceed the *de minimis* conformity applicability threshold values, then a formal Conformity Determination must be prepared to demonstrate conformity with the approved SIP. *De minimis* levels are shown in Table 3.4-2. Compliance is presumed if the net change in emissions resulting from a proposed federal action is less than the relevant *de minimis* threshold.

Table 3.4-2. *De Minimis* Thresholds for Conformity Determinations

Pollutant	*Nonattainment or Maintenance Area Type*	*De Minimis Threshold (TPY)*
Ozone (VOC or NO_x)	Serious nonattainment	50
Ozone (VOC or NO_x)	Severe nonattainment	25
Ozone (VOC or NO_x)	Extreme nonattainment	10
Ozone (VOC or NO_x)	Other areas outside an ozone transport region	100
Ozone (NO_x)	Marginal and moderate nonattainment inside an ozone transport region	100
Ozone (NO_x)	Maintenance	100
Ozone (VOC)	Marginal and moderate nonattainment inside an ozone transport region	50
Ozone (VOC)	Maintenance within an ozone transport region	50
Ozone (VOC)	Maintenance outside an ozone transport region	100
CO, SO_2 and NO_2	All nonattainment and maintenance	100
PM_{10}	Serious nonattainment	70
PM_{10}	Moderate nonattainment and maintenance	100
$PM_{2.5}$	All nonattainment and maintenance	100
Lead	All nonattainment and maintenance	25

Notes: CO = Carbon Monoxide; NO_2 = Nitrogen Dioxide; NO_x = Nitrogen Oxides; $PM_{2.5}$ = Particulate Matter Less Than or Equal to 2.5 Microns in Diameter; PM_{10} = Particulate Matter Less Than or Equal to 10 Microns in Diameter; SO_2 = Sulfur Dioxide; TPY = tons per year; VOC = Volatile Organic Compound.

Source: USEPA 2010.

3.4.1.4 Greenhouse Gas Emissions

Greenhouse gases (GHGs) are compounds that contribute to the greenhouse effect—a natural phenomenon in which gases trap heat within the lowest portion of the Earth's atmosphere, causing heating at the surface of the earth. The USEPA has specifically identified carbon dioxide (CO_2), methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride as GHGs (USEPA 2009). CO_2, methane, and nitrous oxide occur naturally in the atmosphere. These gases influence the global climate by trapping heat in the atmosphere that would otherwise escape to space. The heating effect from these gases is considered the primary cause of the global warming observed over the last 50 years (USEPA 2009). Global warming and climate change affect many aspects of the environment.

To estimate global warming potential (GWP), which is the heat trapping capacity of a gas, the U.S. quantifies GHG emissions using the 100-year timeframe values established in the Intergovernmental Panel on Climate Change Fourth Assessment Report (Intergovernmental Panel on Climate Change 2007). This was done in accordance with United Nations Framework Convention on Climate Change (United Nations Framework Convention on Climate Change 2014) reporting procedures. All GWPs are expressed relative to a reference gas, CO_2, which is assigned a GWP equal to 1. Six other primary GHGs have GWPs: 25 for methane, 298 for nitrous oxide, 124 to 14,800 for hydrofluorocarbons, 7,390 to greater than 17,340 for perfluorocarbons, 17,200 for nitrogen trifluoride, and up to 22,800 for sulfur hexafluoride. The dominant GHG emitted is CO_2, mostly from fossil fuel combustion (81.6 percent) (USEPA 2018b). Weighted by its GWP, methane is the second largest component of emissions, followed by nitrous oxide. To estimate the CO_2 equivalency, or CO_2e, of a non-CO_2 GHG, the appropriate GWP of that gas is multiplied by the amount of the gas emitted. Emissions of a GHG are multiplied by the GWP to calculate the total equivalent emissions of CO_2. GWP-weighted emissions are presented in terms of CO_2e, using units of metric tons. The Proposed Action is anticipated to release GHGs to the atmosphere. These emissions are quantified primarily using methods elaborated in the Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2016 (USEPA 2018b).

At this time, climate change presents a global problem caused by increasing concentrations of GHG emissions and the current state of the science surrounding it 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 in this EIS is for disclosing the local net effects (increase or decrease) of the Proposed Action and alternatives and for its potential usefulness in making reasoned choices among alternatives. The cumulative impacts section discusses the net change in GHG emissions from the Proposed Action and the alternatives as well as the potential impacts of climate change upon mission activities and installation infrastructure.

3.4.2 Analysis Methodology

Emissions sources and the approach used to estimate emissions under each alternative for the air quality analysis were based on information from USAF subject matter experts, established aircraft operations, and standard construction practices. .

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 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 (PSD) 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 PSD permitting threshold. The PSD 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 will be insignificant for that pollutant.

Where applicable, the analysis includes CAA General Conformity Rule Applicability Analyses to support a determination pursuant to the General Conformity Rule (40 CFR § 93B). 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). These analyses focus on construction and airfield operation activities that could impact nonattainment or maintenance areas within the affected environment. To determine whether the requirements of the General Conformity Rule apply, the net air pollutant emissions from the proposed USAF action in a nonattainment or maintenance area were calculated and compared to the rule's applicable *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 is required before any emissions from the actions may occur.

The ROI for the air quality impacts analysis for criteria pollutants and their precursors is the applicable attainment, nonattainment, or maintenance area surrounding the proposed demolition, construction, and operational activities. As discussed in Section 3.4.1.4, GHG emissions are global by nature, and addressed accordingly.

Mixing height is another factor used in defining the ROI for various pollutants. The mixing height is the upper vertical limit of the volume of air in which emissions may affect air quality. Emissions released above the mixing height are typically restricted from affecting ground level ambient air quality in the region, while emissions of pollutants released *below* the mixing height may affect ground level concentrations. The portion of the atmosphere that is completely mixed begins at ground level and may extend up to heights of thousands of feet. Mixing height varies from region to region based on daily temperature changes, amount of sunlight, and other climatic factors. The General Conformity Rule requires determining the mixing height, if any, used in the applicable SIP (40 CFR §93.153(c)(2)(xxii)). If the SIP does not specify any particular mixing height, the rule provides that the default mixing height of 3,000 feet may be used. For attainment area criteria pollutants, the default mixing height of 3,000 feet was used, unless a nonattainment or maintenance SIP for the same region specified a different mixing height.

Criteria pollutant air quality impacts will not be addressed in detail for the SUA since F-35A aircraft would operate with 98 percent of all emissions occurring above the mixing height, as compared to up to 30 percent for the legacy aircraft. As a result, emissions below the mixing height would decrease with implementation of the Proposed Action.

3.5 SAFETY

3.5.1 Definition of Resource

The USAF (including the Air National Guard [ANG]) practices risk management as prescribed in AFI 90-802, *Risk Management* (USAF 2013a). Requirements in the AFI provide for a process to maintain readiness in peacetime and achieve success in combat while safeguarding people and resources. The safety analysis herein addresses issues related to the health and well-being of both military personnel and civilians living on or near the Proposed Action locations and under military training airspace. Specifically, this section provides information on 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.

3.5.1.1 Base

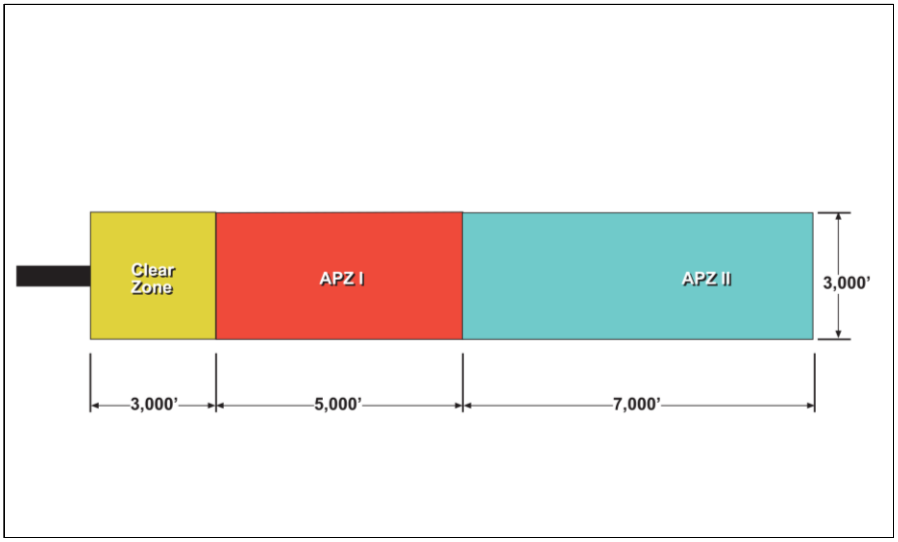
Fire and Crash Risk and Management

Day-to-day operations and maintenance activities, conducted at all the installations identified for potential F-35A beddown, are performed in accordance with applicable USAF safety regulations, published Air Force Technical Orders, and identified guidelines in the Air Force Occupational Safety and Health program (see AFI 91-202, *The USAF Mishap Prevention Program* [USAF 2013b]). In their entirety, these regulations, orders, and guidelines provide for the safety, fire protection, and health for USAF military and civilian employees.

The F-35A aircraft has a 42 percent composite material by weight, which is more than the A-10, F-15, and F-16 aircraft. One disadvantage of composite materials is that they have the potential to degrade under extreme temperatures, resulting in the production of toxic fumes and airborne respirable fibers. Laboratory studies have identified respirable fiber products and toxic gases (including high levels of CO, NO_x, and hydrogen cyanide) from burning composite materials. Because of these characteristics, composite aerospace materials present unique hazards to mishap responders. 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 (Naval Air Warfare Center 2003). However, research on aircraft composite materials similar to that used on F-35A aircraft demonstrate that combustion characteristics of composite materials are similar to other combustible materials and rapid flame spread or excessive heat releases are not a concern. Additionally, data and experience from several crash responses indicate that single fiber concentrations are typically very low, and a very specific and rare set of conditions is needed to produce airborne carbon fires. Due to the rarity of mishaps involving composite aerospace materials, no epidemiological data are available on personnel exposure to burning composites, and no studies have assessed the toxicology of carbon fibers generated in fire scenario with extended post-exposure duration.

Accident Potential Zones and Runway Protection Zones

In accordance with DoD Instruction 4165.57, *Air Installations Compatible Use Zones* (DoD 2011a), 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 flight mishap were to occur. Air Installation Compatible Use Zone (AICUZ) guidelines identify three types of APZs for airfields based on aircraft mishap patterns: the Clear Zone (CZ), APZ I, and APZ II (Figure 3.5-1). The standard USAF CZ, for Class B runways such as at 127 WG, 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. Both the shape and size of APZs can be modified (e.g., a curving APZ), if needed, to reflect different departure and arrival patterns.



Source: DoD 2011a.

Figure 3.5-1. Accident Potential Zones

For FAA joint use airfields like Boise Airport, Dane County Regional Airport, Montgomery Regional Airport, and Jacksonville IAP, Runway Protection Zones (RPZs) are used. The RPZs are trapezoidal zones extending outward from the ends of active runways at commercial airports and delineate those areas recognized as having the greatest risk of aircraft mishaps, most of which occur during take-off or landing (Figure 3.5-2). Development restrictions within RPZs are intended to discourage incompatible land use activities from being established in these areas. The RPZ dimension for a particular runway end is a function of the type of aircraft and minimum approach visibility associated with that runway end, and therefore, differs for each airport.

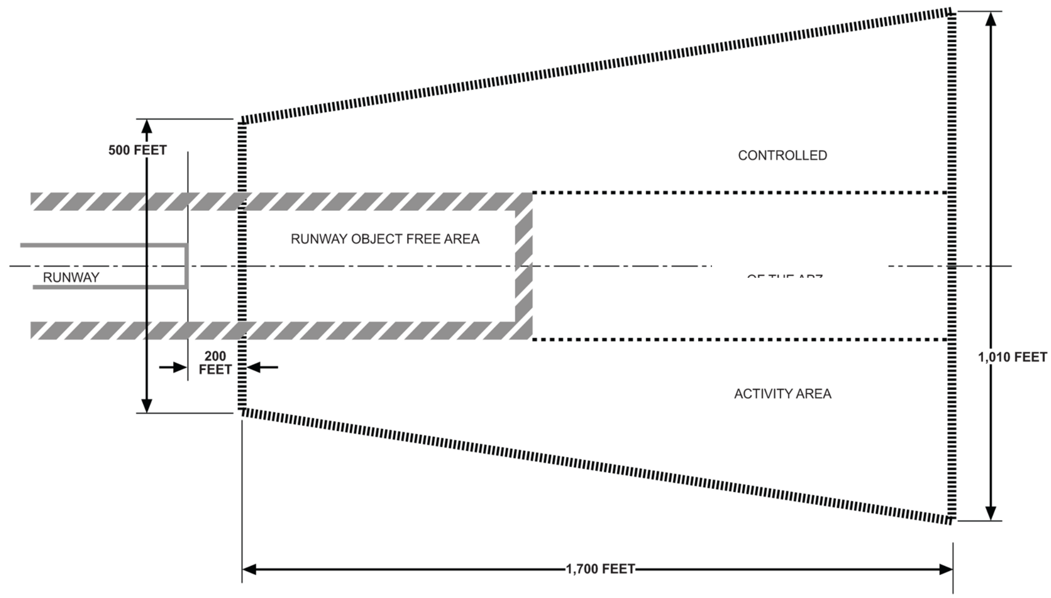


Figure 3.5-2. Runway Protection Zones

Aircraft Mishaps

Aircraft mishaps are classified as A, B, C, or D (Table 3.5-1). 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 aircraft types, as calculated per 100,000 flying hours, provide the basis for evaluating risks among different aircraft and levels of operations. Each installation-specific safety section analyzes existing and projected Class A mishap potentials based on flying hours and aircraft types. Worldwide historic mishap data for A-10s, F-16s, and F-15s are maintained by the Air Force Safety Center (AFSEC). There have not been enough flight hours to accurately depict the specific safety record for the F-35.

Table 3.5-1. 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

Source: DoD 2011b.

Worldwide historic mishap data for A-10s, F-16s, and F-15s are presented in Table 3-5-2. Data from Fiscal Year (FY) 72 to 2019 represent these aircrafts' full incorporation into the fleet. Since 1972, the average historical Class A mishap rate for every 100,000 flying hours is 1.88 for the A-10s, 3.35 for the F-16s, 2.31 for the F-15s, and 7.32 for the F-22s. In the past 5 years, Class A mishap rates for all these aircraft, except the F-22, have decreased; 0.25 for the A-10s, 1.90 for the F-16s, 1.72 for the F-15s, and 8.59 for the F-22s (AFSEC 2019a, 2019b, 2019c, 2019d).

Explosive Safety

Quantity-distance (QD) arcs define levels of risk considered acceptable for potential explosive sites. Separation distances are buffers that provide relative protective or safe distances. QD standards were developed over many years and are based on explosives mishaps and tests. All ordnance is handled and stored in accordance with USAF explosive safety directives (Air Force Manual 91-201), and all munitions maintenance is carried out by trained, qualified personnel using USAF-approved technical data.

Anti-terrorism/Force Protection

Anti-terrorism/Force Protection (AT/FP) standards seek effective ways to minimize the likelihood of mass casualties from terrorist attacks against DoD personnel in the buildings in which they work and live. These standards provide minimum levels of protection against terrorist attacks for the occupants of all DoD inhabited buildings. They are intended to be used by security and anti-terrorism personnel and design teams to identify the minimum requirements that must be incorporated into the design of all new construction and major renovations of inhabited DoD buildings. They also include recommendations that should be, but are not required to be, incorporated into all such buildings.

3.5.1.2 Airspace

Flight Safety Procedures

AFSEC recently initiated several facets for proactive flight safety. While investigations after an accident have yielded causality of mishaps, proactive safety entails searching for and measuring precursors that can lead to accidents before they occur. In mission planning, pre-flight, and during flight, safety is at the forefront of all USAF operations. By AFI, each unit conducting or supporting flight operations must have a flight safety program to support its mission and foster a culture of mishap prevention (USAF 2013a).

Table 3.5-2. Historic Class A Flight Mishaps for Relevant DoD Aircraft (Page 1 of 2)

Year	A-10 Class A Mishaps	A-10 Flight Hours	A-10 Mishap Rate	F-15 Class A Mishaps	F-15 Flight Hours	F-15 Mishap Rate	F-16 Class A Mishaps	F-16 Flight Hours	F-16 Mishap Rate	F-22 Class A Mishaps	F-22 Flight Hours	F-22 Mishap Rate	F-35 Class A Mishaps	F-35 Flight Hours	F-35 Mishap Rate
CY72	0	32	0.00	0	25	0.00									
CY73	0	124	0.00	0	826	0.00									
CY74	0	403	0.00	0	2,110	0.00									
CY75	0	936	0.00	1	4,541	22.02	1	161	621.12						
CY76	0	3,678	0.00	0	17,803	0.00	1	226	442.48						
CY77	2	16,722	11.96	6	42,369	14.16	0	856	0.00						
CY78	7	44,538	15.72	8	69,023	11.59	0	1,402	0.00						
CY79	8	86,544	9.24	5	96,959	5.16	2	6,527	30.64						
CY80	5	130,159	3.84	5	109,309	4.57	5	26,803	18.65						
CY81	5	174,924	2.86	5	132,291	3.78	5	56,423	8.86						
CY82	4	219,349	1.82	3	153,369	1.96	17	107,389	15.83						
CY83	7	226,129	3.10	4	169,438	2.36	11	150,728	7.30						
CY84	6	224,058	2.68	3	175,515	1.71	10	199,761	5.01						
CY85	4	224,133	1.78	5	185,324	2.70	10	219,647	4.55						
CY86	3	219,334	1.37	7	198,095	3.53	11	254,491	4.32						
FY87	5	171,089	2.92	3	154,821	1.94	8	233,560	3.43						
FY88	3	218,289	1.37	1	201,099	0.50	23	338,039	6.80						
FY89	7	230,655	3.03	5	214,592	2.33	14	385,179	3.63						
FY90	3	222,399	1.35	7	227,617	3.08	13	408,078	3.19						
FY91	2	228,273	0.88	3	276,393	1.09	21	461,451	4.55						
FY92	3	167,648	1.79	5	220,866	2.26	18	445,201	4.04						
FY93	2	115,059	1.74	3	217,539	1.38	19	433,949	4.38						
FY94	4	119,330	3.35	4	210,231	1.90	16	400,474	4.00						
FY95	2	118,600	1.69	4	206,640	1.94	10	386,429	2.59						
FY96	2	122,952	1.63	5	200,758	2.49	9	374,517	2.40						
FY97	3	125,095	2.40	3	192,073	1.56	11	367,038	3.00						
FY98	1	124,119	0.81	3	188,205	1.59	14	360,245	3.89						
FY99	2	122,629	1.63	8	189,109	4.23	18	352,275	5.11						
FY00	2	111,111	1.80	4	179,372	2.23	9	342,959	2.62	0	0	0.00	0	0	0.00
FY01	2	112,662	1.78	2	183,706	1.09	13	337,315	3.85	0	0	0.00	0	0	0.00
FY02	2	114,791	1.74	5	194,847	2.57	7	368,707	1.90	1	0	0.00	0	0	0.00
FY03	1	123,181	0.81	4	193,611	2.07	11	355,557	3.09	0	132	0.00	0	0	0.00

Table 3.5-2. Historic Class A Flight Mishaps for Relevant DoD Aircraft (Page 2 of 2)

Year	*A-10 Class A Mishaps*	*A-10 Flight Hours*	*A-10 Mishap Rate*	*F-15 Class A Mishaps*	*F-15 Flight Hours*	*F-15 Mishap Rate*	*F-16 Class A Mishaps*	*F-16 Flight Hours*	*F-16 Mishap Rate*	*F-22 Class A Mishaps*	*F-22 Flight Hours*	*F-22 Mishap Rate*	*F-35 Class A Mishaps*	*F-35 Flight Hours*	*F-35 Mishap Rate*
FY04	3	118,642	2.53	3	189,596	1.58	2	343,198	0.58	1	3,113	32.12	0	0	0.00
FY05	0	112,710	0.00	3	169,158	1.77	5	324,238	1.54	1	4,017	24.89	0	0	0.00
FY06	0	113,550	0.00	1	168,854	0.59	9	327,979	2.74	1	9,012	11.10	0	0	0.00
FY07	0	108,329	0.00	6	159,582	3.76	11	304,030	3.62	0	14,488	0.00	0	0	0.00
FY08	1	99,990	1.00	4	143,964	2.78	3	285,503	1.05	1	17,978	5.56	0	0	0.00
FY09	1	92,717	1.08	2	143,806	1.39	3	257,209	1.17	1	20,988	4.76	0	0	0.00
FY10	1	97,444	1.03	1	124,357	0.80	3	245,029	1.22	0	24,675	0.00	0	0	0.00
FY11	2	103,611	1.93	1	100,848	0.99	5	225,079	2.22	1	15,289	6.54	0	0	0.00
FY12	0	101,310	0.00	3	95,445	3.14	4	207,159	1.93	3	26,507	11.32	0	215	0.00
FY13	0	94,353	0.00	1	79,100	1.26	7	190,148	3.68	1	26,183	3.82	0	1,283	0.00
FY14	0	83,523	0.00	2	91,550	2.18	0	195,623	0.00	1	29,940	3.34	1	2,664	37.54
FY15	0	87,241	0.00	3	107,441	2.79	6	211,170	2.84	1	31,991	3.13	0	7,467	0.00
FY16	0	80,227	0.00	2	103,553	1.93	5	207,709	2.41	1	30,888	3.24	0	11,343	0.00
FY17	1	83,149	1.20	1	105,778	0.95	4	189,999	2.11	1	33,833	2.96	0	22,714	0.00
FY18	0	78,006	0.00	1	100,878	0.99	2	197,459	1.01	5	38,424	13.01	2	30,514	11.90
FY19	0	78,551	0.00	2	106,315	1.88	2	191,552	1.04	6	27,932	21.48	0	20,113	0
Total	**106.00**	**5,652,298**	**1.88**	**157.00**	**6,798,701**	**2.31**	**378.00**	**11,278,471**	**3.35**	**26.00**	**355,390**	**7.32**	**3.00**	**96,313**	**3.11**

Sources: AFSEC 2019a, 2019b, 2019c, 2019d, 2019e.

Bird/Wildlife Aircraft Strike Hazards

BASH and the hazards they present form another safety concern for aircraft operations. BASH constitutes a safety concern because of the potential for injury to aircrews or local populations and/or damage to aircraft. The USAF BASH program was established to minimize the risk for collisions of birds/wildlife and aircraft and the subsequent loss of life and property. Aircraft can encounter birds at nearly all altitudes up to 30,000 feet MSL; however, most birds fly close to the ground. Other wildlife that could impose BASH risks includes deer and coyote; however, birds in particular pose the most significant threat to aircraft operations and are the focus of this analysis.

According to AFSEC, BASH statistics from FY 1995 through FY 2016, known locational data indicate that 24 percent of bird/wildlife strikes occur at ground level, close to 69 percent occur below 2,500 feet; therefore, about 93 percent of BASH occurs at altitudes below 2,500 feet AGL (AFSEC 2018). Waterfowl present the greatest BASH potential due to their congregational 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/wildlife aircraft strikes increases during March and April and from August through November due to migratory activities.

AFI 91-202, *U.S. Air Force Mishap Prevention Program* (USAF 2013b), requires each flying unit in the USAF (including the ANG) to develop a BASH plan to reduce hazardous bird/wildlife activity relative to airport flight operations. The intent of each plan is to reduce BASH issues at airfields 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 and other wildlife activity, issuing bird hazard warnings, initiating bird/wildlife avoidance procedures when potentially hazardous bird/wildlife activities are reported, and submitting BASH reports for all incidents.

3.5.2 Analysis Methodology

The assessment of safety examines how the No Action Alternative and Proposed Action would affect safety at each alternative airfield location and within the associated training airspace. Since no modifications or additions are proposed for the current airspace structure, the impact analysis focuses on changes in airspace use that would result from the addition or loss of annual airfield and airspace operations with the arrival of the F-35A and departure of A-10, F-16, or F-15 aircraft.

Impacts on air traffic safety were assessed with respect to the potential for disruption of air traffic pattern and systems, and changes in existing levels of air traffic safety. Factors used to assess the impacts on air traffic included an alternative's potential to result in: increased numbers of flights such that they could not be accommodated within established operational procedures and flight patterns; need for an airspace modification; or increased air traffic that might increase collision potential between military and non-participating civilian operations.

At publication of this EIS, there have not been enough flight hours to accurately depict the specific safety record for the F-35. Though with 96,313 flying hours accumulated through FY 2019, the Class A mishap rate is 3.11, which is better than the F-22 lifetime rate. However, because the F-35A has not accumulated 100,000 flying hours yet, this analysis used similar fighter aircraft safety records. Mishap analysis was based on that fighter aircraft to draw operational history. For APZs/RPZs and BASH, a comparative safety analysis was performed using the existing conditions and describing the expected changes as a result of implementing the Proposed Action.

The F-35A is a new aircraft and historical trends show that mishaps of all types decrease the longer an aircraft is operational as flight crews and maintenance personnel learn more about the aircraft's capabilities and limitations. As the F-35A becomes more operationally mature, the aircraft mishap rate is expected to become comparable with a similarly sized aircraft with a similar mission. F-35A's improved electronics and maintenance are expected to result in long-term Class A accident rate comparable to that of the similarly sized F-16 aircraft (3.35 lifetime) (AFSEC 2019e).

In order to provide a broader perspective on the potential mishap rate for a new technology like the F-35A, the discussion refers to the mishap rates for the introduction of the F-22A (Raptor), the most recent jet fighter in the DoD inventory prior to the F-35A. The F-22A was introduced in 2002, and provided the USAF with the most current engine and stealth capabilities. This new technology is akin to the F-35A in that it is a new airframe with similar flight capabilities. With that in mind, it is possible that proposed mishap rates for the F-35A may be comparable to the historical rates of the F-22A. The Class A mishap rates for the F-22A from squadron operational status through FY 2019 is 7.32.

The ROI for safety includes the airfield at each of the alternative installations and their immediate vicinity. In addition, the ROI includes the SUA that would be used by each unit, and the land beneath it.

3.6 LAND USE

3.6.1 Definition of Resource

Land use describes how land is developed and used, typically in terms of the types of activities allowed. The attributes of land use examined in this EIS include land ownership and status, general land use patterns, land management plans, and special use areas. Land use comprises the natural conditions and/or human-modified activities occurring at a particular location. Human-modified land use categories generally include residential, commercial, industrial, agricultural, and other public uses. For the installations and environs, management plans and zoning regulations determine the type and extent of allowable land use in specific areas to limit conflicting land uses and protect specially designated or environmentally sensitive areas. On military installations, land use tends to be generally divided into various operational and support functions.

Several siting criteria have been established specifically for land development and use at and around commercial and military airfields. For example, APZs and RPZs address height restrictions, development density, and land use in and around airports, and are enforced to reduce the potential for aircraft-related hazards.

FICUN, DoD, and FAA have established guidelines to help assess land use compatibility with aircraft noise exposure. As shown in Table 3.6-1, a range of noise exposure levels are associated with a given land use. These guidelines are intended as a planning tool and as such provide general indications as to whether particular land uses are appropriate for certain measured noise exposure levels. The designations in the table do not constitute a federal determination that any land use is acceptable or unacceptable under federal, state, or local law, nor are they used to determine if a structure is habitable or uninhabitable. Combined with the land use tables, DNL provides one mechanism for local communities to use in controlling new development in a manner that limits interference to day-to-day activities from outside noise sources, such as aircraft overflights and other transportation noise. However, these recommendations must be adapted based on the economic and technological feasibility and the needs and desires of each particular community.

For the areas under the airspace, analysis of land management considers the same basic topics as noted above. However, the land use categories also include special use areas, parks and recreation areas, and communities. Less emphasis is placed on ordinances, with broader land management being the focus. Areas under the airspace include federal, state, and local government lands as well as private lands. For the ordnance ranges, most lands have been withdrawn for military purposes with public use either prohibited or restricted. How the land is managed is typically regulated by management plans, policies, and ordinances that determine the types of uses that are allowable or protect specially designated or environmentally sensitive uses.

Table 3.6-1. Land Use Compatibility with Yearly Day-Night Average Sound Levels

Land Use	*<65 dB DNL*	*65-70 dB DNL*	*70-75 dB DNL*	*75-80 dB DNL*	*80-85 dB DNL*	*>85 dB DNL*
Residential						
Residential, other than mobile homes and transient lodgings	Y	N(1)	N(1)	N	N	N
Mobile home parks	Y	N	N	N	N	N
Transient lodgings	Y	N(1)	N(1)	N(1)	N	N
Public Use						
Schools	Y	N(1)	N(1)	N	N	N
Hospitals and nursing homes	Y	25	30	N	N	N
Churches, auditoriums, and concert halls	Y	25	30	N	N	N
Governmental services	Y	Y	25	30	N	N
Transportation	Y	Y	Y(2)	Y(3)	Y(4)	Y(4)
Parking	Y	Y	Y(2)	Y(3)	Y(4)	N
Commercial Use						
Offices, business and professional	Y	Y	25	30	N	N
Wholesale and retail - building materials, hardware and farm equipment	Y	Y	Y(2)	Y(3)	Y(4)	N
Retail trade - general	Y	Y	25	30	N	N
Utilities	Y	Y	Y(2)	Y(3)	Y(4)	N
Communication	Y	Y	25	30	N	N
Manufacturing and Production						
Manufacturing, general	Y	Y	Y(2)	Y(3)	Y(4)	N
Photographic and optical	Y	Y	25	30	N	N
Agriculture (except livestock) and forestry	Y	Y(6)	Y(7)	Y(8)	Y(8)	Y(8)
Livestock farming and breeding	Y	Y(6)	Y(7)	N	N	N
Mining and fishing, resource production and extraction	Y	Y	Y	Y	Y	Y
Recreational						
Outdoor sports arenas and spectator sports	Y	Y(5)	Y(5)	N	N	N
Outdoor music shells, amphitheaters	Y	N	N	N	N	N
Nature exhibits and zoos	Y	Y	N	N	N	N
Amusements, parks, resorts and camps	Y	Y	Y	N	N	N
Golf courses, riding stables and water recreation	Y	Y	25	30	N	N

Note: *The designations contained in this table 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. FAA determinations under part 150 are not intended to substitute federally determined land uses for those determined to be appropriate by local authorities in response to locally determined needs and values in achieving noise compatible land uses.

Numbers in parentheses refer to notes:

(1) Where the community determines that residential or school uses must be allowed, measures to achieve outdoor to indoor Noise Level Reduction (NLR) of at least 25 dB and 30 dB should be incorporated into building codes and be considered in individual approvals. Normal residential construction can be expected to provide a 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 and closed windows year round. However, the use of NLR criteria will not eliminate outdoor noise problems.
(2) Measures to achieve NLR 25 dB 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.
(3) Measures to achieve NLR of 30 dB 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.
(4) Measures to achieve NLR 35 dB 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 level is low.
(5) Land use compatible provided special sound reinforcement systems are installed.
(6) Residential buildings require an NLR of 25.
(7) Residential buildings require an NLR of 30.
(8) Residential buildings not permitted.

Key: SLUCM = Standard Land Use Coding Manual; Y (Yes) = Land Use and related structures compatible without restrictions; N (No) = Land Use and related structures are not compatible and should be prohibited; NLR = Noise Level Reduction (outdoor to indoor) to be achieved through incorporation of noise attenuation into the design and construction of the structure; 25, 30, or 35 = Land use and related structures generally compatible; measures to achieve NLR of 25, 30, or 35 dB must be incorporated into design and construction of structure.

Source: 14 CFR Part 150, Appendix A.

3.6.2 Analysis Methodology

Impacts to land use are evaluated by identifying whether an action is incompatible with an existing land use due to noise, safety, or other issues. The significance of potential land use impacts is based on the level of land use sensitivity in areas affected by a proposed action. In general, land use impacts would be significant if the action would: (1) be inconsistent or noncompliant with applicable land use plans or policies, including the county or city plans; (2) preclude the viability of an existing land use activity within the affected environment; (3) preclude continued use or occupation of an area; or (4) be incompatible with adjacent nearby land use to the extent that public health or safety is threatened. Compatibility standards such as those identified in Table 3.6-1 provide the means to evaluate impacts.

The ROI for land use includes the airfield at each of the alternative installations and their immediate vicinity. In addition, the ROI includes the SUA that would be used by each unit, and the land beneath it. Underlying training airspace, changes to ownership or status commonly represent the types of impacts evaluated for land use. Because no portion of the Proposed Action would alter the structure, size, or operation of DoD ranges, and there would be no new acquisition of non-DoD lands, alteration of ownership would not pose an issue. Similarly, the Proposed Action would not generate changes to the status or use of underlying lands, or plans and policies implemented for their management. Therefore, the only source of potential effects to land use would result from changes to noise from overflights that could be perceived as incompatible with current uses, particularly recreation and wilderness aesthetics. Lacking a quantitative or regulatory standard for such impacts, this analysis considers the degree of change and overall noise levels in defining potential impacts to underlying uses and activities. Assessment of land use compatibility underlying SUA considered the overall level of subsonic and supersonic noise, as well as the degree of change. Noise is reported as the amount of perceptible change in noise levels; the frequency of overflights, especially those at lower altitudes; perceived sensitivities of land uses; and where appropriate, the change in numbers of sonic booms.

3.7 SOCIOECONOMICS

3.7.1 Definition of Resource

Socioeconomics comprises the basic attributes and resources associated with the human environment, particularly population and economic activity. A socioeconomic analysis evaluates how elements of the human environment such as population, housing, employment, economic growth, and public services might be affected by the Proposed Action and alternatives. Economic activity also typically encompasses employment, personal income, and economic growth. Impacts to these fundamental socioeconomic components also influence other issues such as housing availability and the provision of public services.

3.7.2 Analysis Methodology

Socioeconomic impacts are assessed in terms of direct effects to the local economy and population and related indirect effects on other socioeconomic resources within the ROI. Although economic or social effects are not intended by themselves to require preparation of an EIS (Section 1508.14 CEQ Regulations), socioeconomic impacts would be considered significant if the Proposed Action resulted in a substantial shift in population trends or notably affected regional employment, earnings, or community resources such as schools.

The ROI for socioeconomics associated with the five alternative installations includes the counties, townships, and towns/cities that each installation lies within, as well as those that are and will be affected by noise generated at the airfields. The socioeconomic aspect of potential impacts to lands underlying SUA was not evaluated because no construction or other ground disturbance would occur to generate economic activity.

3.8 ENVIRONMENTAL JUSTICE AND THE PROTECTION OF CHILDREN

3.8.1 Definition of Resource

Executive Order (EO) 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations* (1994), addresses potential disproportionate human health and environmental impacts that a project may have on minority or low-income communities. USEPA defines environmental justice as, "the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies" (USEPA 2018c). It goes on to clarify that "no group of people should bear a disproportionate share of the negative environmental consequences resulting from industrial, governmental, and commercial operations or policies."

CEQ guidance states that "minority populations should be identified where either: (a) the minority population of the affected areas exceeds 50 percent, or (b) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis" (CEQ 1997). Minority populations include those that report their ethnicity as something other than non-Hispanic White alone; minority populations include Black or African American, Hispanic or Latin, American Indian, Native Hawaiian or other Pacific Islander, Asian, or Alaska Native (U.S. Census Bureau 2011). According to 15 USC § 689(3), HUD defines a low-income community as a census block or tract having greater than 20 percent of its population living below the federal poverty line, among other possible indicators.

EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks* (1997), requires federal agencies to, "identify and assess environmental health risks and safety risks that may disproportionately affect children," and, "ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks." Additionally, children and the elderly are identified in the USAF *Guide for Environmental Justice Analysis under the Environmental Impact Analysis Process* as sensitive receptors (AFCEC 2014). Children are defined as those individuals under the age of 18 years and the elderly are defined as those who are aged 65 years and older.

3.8.2 Analysis Methodology

To evaluate potential effects to low-income and minority populations, children, and the elderly, areas containing relatively high percentages of these populations were identified and determinations made as to whether adverse human health or environmental effects would occur in those areas.

Ethnicity and poverty status in census block groups in the vicinity of the proposed alternative locations were examined. Any census block with 50 percent or more of the population identifying as a minority is classified as a minority population area. Census block groups where the incomes of 20 percent or more of the population were below the poverty level are classified as low-income population areas. Further methodology behind the environmental justice analysis are described in Section 3.8. Geographic Information System (GIS) data obtained from the U.S. Census Bureau were used to obtain information on these populations located within the vicinity of the proposed alternative locations. Additional POIs, such as schools, were considered with respect to other environmental justice populations.

The ROI for environmental justice and the potential effects to children includes the counties, townships, and towns/cities that each installation lies within, as well as those that are and will be affected by noise generated at the airfields. Environmental justice and potential effects to children in communities under the SUA were not evaluated because the only anticipated impacts would be due to aircraft noise, but any changes in noise levels in these areas are anticipated to be minor.

3.9 INFRASTRUCTURE

3.9.1 Definition of Resource

Infrastructure refers to the system of public works, such as utilities and transportation, which provide the underlying framework for a community. Utilities include such amenities as water, power supply, and waste management. Transportation refers to roadway and street systems, the movement of vehicles on roadway networks, pedestrian and bicycle traffic, and mass transit.

All DoD installations are required to proactively plan for and assess all specific infrastructure and utility requirements and other essential services to ensure that proposed increases in personnel and their dependents can be accommodated. The installations routinely evaluate community facilities and services to account for fluctuations associated with new units assigned to the installation and the deployment of existing units. In addition, the installations identify infrastructure or utility needs within the scope of each corresponding project. If particular projects require additional infrastructure or utilities, they are incorporated as a part of that project. This process ensures that any infrastructure or utility deficiencies are identified in the initial planning stages.

3.9.2 Analysis Methodology

The infrastructure components evaluated include the electrical, natural gas, and potable water systems; wastewater; stormwater; solid waste management; and transportation network. Potential impacts to infrastructure elements at the five alternative installations are assessed in terms of effects of the Proposed Action on existing service levels. Impacts to public services/utilities and transportation networks are assessed with respect to the potential for disruption or improvement of current utility systems and traffic circulation patterns and deterioration or improvement of existing levels of service on local roads. Impacts may arise from physical changes to circulation or utility corridors, construction activity, and introduction of construction-related traffic and utility use.

Utility system effects may include disruption, degradation, or improvement of existing levels of service or potential change in demand for energy or water resources. Adverse impacts to 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 an action. Transportation effects may arise from changes in traffic circulation, delays due to construction activity, or changes in traffic volumes.

For the range of public services discussed below, the installation is required to proactively plan for and assess all specific infrastructure and utility requirements and other essential services to ensure that the proposed increase in personnel and their dependents would be accommodated under the Proposed Action. The installation routinely evaluates community facilities and services to account for fluctuations associated with new units assigned to the installation and the deployment of existing units. In addition, the installation identifies infrastructure or utility needs within the scope of each corresponding project. If particular projects require additional infrastructure or utilities, they are incorporated as a part of that project. This process ensures that any infrastructure or utility deficiencies are identified in the initial planning stages.

The ROI for infrastructure primarily consists of each of the alternative installations, with additional information presented for the surrounding vicinity, where relevant. The ROI does not include land beneath the SUA since no ground disturbance, construction, or changes in infrastructure would occur.

3.10 EARTH RESOURCES

3.10.1 Definition of Resource

Earth resources include the geology, topography, and soils of the installations. The discussion of this resource includes an overall description of the regional geological setting, as well as a description of the topography and soils associated with the affected environment. These terms are defined below.

- *Geology* – is defined by the distinctive, dominant, easily mapped and recognizable physical characteristics, and features of a volume of rock.
- *Topography* – is the natural and fabricated features of a place or region, which show relative positions and elevations at the Earth's surface.
- *Soils* – are unconsolidated earthen materials overlying rock.

The Farmland Protection Policy Act (FPPA), part of the Agriculture and Food Act of 1981 (Public Law 97-98), was passed in an effort to protect farmland and combat urban sprawl. Additionally, the FPPA is intended to minimize the impact federal programs have on the unnecessary and irreversible conversion of farmland to nonagricultural uses. It assures that, to the extent possible, federal programs are administered to be compatible with state, local, and private programs and policies to protect farmland. However, construction for national defense purposes as well as construction on land already in urban development is not subject to FPPA. Therefore, the FPPA does not apply to this Proposed Action.

3.10.2 Analysis Methodology

Reports, studies, and best available data sets prepared by, or for, the federal government, the state governments, and independent researchers that address geology, topography and soils were reviewed for information related to the affected environment of geological and soil resources at each of the proposed alternative locations. Additionally, federal and state regulations were reviewed for regulations that serve to protect, conserve, and manage geological and soil resources. No construction or ground disturbance would occur below the airspace proposed for use under any of the alternatives. The ROI for earth resources primarily consists of each of the alternative installations, with additional information presented for the surrounding vicinity, where relevant. The ROI does not include land beneath the SUA since no ground disturbance would occur.

3.11 WATER RESOURCES

3.11.1 Definition of Resource

Water resources include the quantity and quality of groundwater and surface water bodies, stormwater, and floodplains (wetlands are addressed in Section 3.12, *Biological Resources*). Groundwater includes subsurface hydrologic resources and is typically a reliable and safe fresh water source. Groundwater is an important component of the overall hydrologic cycle of the earth. Surface water includes all rivers, streams, lakes, and ponds that are used for various applications including recreation, sustenance, irrigation, flood control, and human health. Surface waters in the U.S. are protected under the Clean Water Act (CWA), the goal of which is "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters."

The CWA requires that any point source facility that discharges polluted wastewater into a body of water must first obtain a National Pollutant Discharge Elimination System (NPDES) permit that is issued at a national level through the USEPA, or an approved State agency. Stormwater is excess surface water that occurs or collects during periods of frequent precipitation and is typically diverted into a facility's stormwater sewer system. Stormwater runoff management addresses measures to reduce flow energy and pollutants in stormwater and to control discharge from point and non-point sources. Point source pollution is produced by a single, identifiable source. Non-point source pollution affects surface water and groundwater resources as a result of pollution from diffuse sources.

Floodplains are defined by EO 11988 as "the lowland and relatively flat areas adjoining inland and coastal waters including flood prone areas of offshore islands, including at a minimum, that area subject to a 1 percent or greater chance of flooding in any given year." Areas subject to a 1 percent or greater chance of annual flooding are also referred to as 100-year floodplains and areas subject to a 0.2 percent or greater chance of annual flooding are referred to as 500-year floodplains. On January 30, 2015, EO 13690, *Establishing a Federal Flood Risk Management Standard and Process for Further Soliciting and Considering Stakeholder Input*, was announced and amended EO 11988. Per both orders, federal agencies are required to avoid, to the extent practicable, the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct or indirect support of floodplain development whenever there is a practicable alternative. If impacts cannot be avoided, the appropriate flood risk management strategies need to be applied to the design and construction of the building.

Wetlands are considered sensitive habitats and are subject to federal regulatory authority under Sections 401 and 404 of the CWA and EO 11990, *Protection of Wetlands*. Wetlands are defined by the U.S. Army Corps of Engineers (USACE) as those areas that are inundated or saturated by surface or groundwater 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 (Environmental Laboratory 1987). Wetlands generally include swamps, marshes, bogs, and similar areas.

3.11.2 Analysis Methodology

The protection of surface and groundwater sources during ground disturbing activities, changes to stormwater control systems, and disturbance of areas located within the 100-year floodplains were considered when evaluating potential impacts to water resources. Water resources would be adversely impacted if there were significant unmitigated impacts to wetlands, significant modification of the floodplain, uncontrolled erosion and sedimentation due to stormwater runoff, or pollution discharged into impaired water bodies to exceed Total Maximum Daily Loads. The ROI for water resources primarily consists of each of the alternative installations, with additional information presented for the surrounding vicinity, where relevant. The ROI does not include land beneath the SUA since no ground disturbance or construction would occur.

3.12 BIOLOGICAL RESOURCES

3.12.1 Definition of Resource

Biological resources include living, native, or naturalized plant and animal species and the habitats within which they occur. Plant associations are generally referred to as *vegetation* and animal species are referred to as *wildlife*. Habitat can be defined as the resources and conditions present in an area that produces occupancy of a plant or animal (Hall et al. 1997). Although the existence and preservation of biological resources are intrinsically valuable, these resources also provide aesthetic, recreational, and socioeconomic values to society. This analysis focuses on species or vegetation types that are important to the function of the ecosystem, of special societal importance, or are protected under federal or state law or statute. For purposes of this EIS, these resources are divided into four major categories: vegetation, wildlife, special status species, and wetlands.

Vegetation includes all existing terrestrial plant communities as well as their individual component species. The affected environment for vegetation includes only those areas potentially subject to ground disturbance.

Wildlife includes all fish, amphibian, reptile, bird, and mammal species with the exception of those identified as special status species (special status wildlife species are addressed separately due to their protected status).

Special Status Species are defined as those plant and animal species listed as endangered, threatened, and species proposed for listing by the U.S. Fish and Wildlife Service (USFWS) under the Endangered Species Act (ESA), and by State agencies. Special status species also include birds protected under the federal Migratory Bird Treaty Act (MBTA), the Bald and Golden Eagle Protection Act, and other species-specific conservation legal authorities.

The ESA protects federally-listed endangered and threatened plant and animal species. Critical habitat is a term defined and used in the ESA. It is a specific geographic area(s) that contains features essential for the conservation of a threatened or endangered species and that may require special management and protection. Federally identified candidate species (species proposed for listing) are not protected under law; however, these species could become listed, and therefore, protected at any time. Their consideration early in the planning process may avoid future conflicts that could otherwise occur. Additionally, the corresponding State regulatory agencies (Wisconsin Department of Natural Resources [WDNR], Idaho Fish and Game [IDFG], Florida Fish and Wildlife Conservation Commission, Michigan Department of Natural Resources, and Alabama Department of Conservation and Natural Resources) protect state-listed plant and animal species through State fish and wildlife and administrative codes. Assessment of a project's effect on migratory birds places an emphasis on "species of concern" as defined by EO 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds*.

3.12.2 Analysis Methodology

Analysis of impacts to biological resources focused on whether and how components of the Proposed Action could affect biological resources. Additional analysis for noise impacts can be found in Appendix B, *Noise Modeling, Methodology, and Effects*,. The affected environment for biological resources consists of lands within the vicinity of the airfield at the five alternative locations and the areas under the airspace used by the units. Determination of the significance of potential impacts to biological resources is based on:

- the importance (i.e., legal, commercial, recreational, ecological, or scientific) of the resource,
- the proportion of the resource that would be affected relative to its occurrence in the region,
- the sensitivity of the resource to proposed activities, and
- the duration of ecological ramifications.

Impacts to biological resources would be considered significant if species or habitats of concern were significantly adversely affected over relatively large areas or disturbances resulted in reductions in the population size or distribution of a special status species, or if laws, codes, or ordinances protecting special status species were violated.

The ROI for biological resources primarily consists of each of the alternative installations, with additional information presented for the surrounding vicinity, where relevant. The ROI also includes areas under the airspace used by the units. Due to the nature of the actions proposed within the airspace, plant species were excluded from extensive review and analysis because the proposed activities would not result in new ground disturbance, and ordnance delivery and flare use would not exceed current levels and would occur in locations already used and authorized for those purposes. In addition, marine mammals, invertebrates, and fish were excluded from review and analysis as they, too, would not likely be impacted by the Proposed Action and alternatives.

3.13 CULTURAL RESOURCES

3.13.1 Definition of Resource

Cultural resources consist of prehistoric and historic districts, sites, structures, artifacts, or any other physical evidence of human activity considered important to a culture, subculture, or community for scientific, traditional, religious, or other reasons. Cultural resources can be divided into three major categories: archaeological resources (prehistoric and historic), architectural resources, and traditional cultural resources.

Archaeological resources are locations where human activity measurably altered the earth or left deposits of physical remains (e.g., tools, arrowheads, or bottles). "Prehistoric" refers to resources that predate the advent of written records in a region. These resources can range from a scatter composed of a few artifacts to village sites and rock art. "Historic" refers to resources that postdate the advent of written records in a region. Archaeological resources can include campsites, roads, fences, trails, dumps, battlegrounds, mines, and a variety of other features.

Architectural resources include standing buildings, dams, canals, bridges, and other structures of historic or aesthetic significance. Architectural resources generally must be more than 50 years old to be considered for protection under existing cultural resource laws. However, more recent structures, such as Cold War-era military buildings, may warrant protection if they have exceptional characteristics and the potential to be historically significant structures.

Architectural resources must also retain integrity according to the Secretary of the Interior's seven aspects of integrity (location, design, setting, materials, workmanship, feeling, and association). A property will retain several, and usually most, of the aspects to possess historic integrity.

Traditional cultural resources can include archaeological resources, buildings, neighborhoods, prominent topographic features, habitats, plants, animals, and minerals that Native Americans or other groups consider essential for the continuance of traditional cultures.

Only cultural resources considered to be significant, known or unknown, warrant consideration with regard to adverse impacts resulting from a proposed action. To be considered significant, archaeological or architectural resources must meet one or more criteria as defined in 36 CFR 60.4 for inclusion in the National Register of Historic Places (NRHP). The quality of significance in

American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and:

(a) are associated with events that have made a significant contribution to the broad patterns of our history; or
(b) are associated with the lives of persons significant in our past; or
(c) embody the distinctive characteristics of a type, period, or method of construction; or
(d) 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; or
(e) have yielded, or may be likely to yield, information important in prehistory or history.

Several federal laws and regulations have been established to manage cultural resources, including the National Historic Preservation Act (NHPA) (1966), the Archaeological and Historic Preservation Act (1974), American Indian Religious Freedom Act (1978), the Archaeological Resources Protection Act (1979), and Native American Graves Protection and Repatriation Act (1990). In addition, coordination with federally-recognized Native American Tribes must occur in accordance with EO 13175, *Consultation and Coordination with Indian Tribal Governments*.

On November 27, 1999, the DoD promulgated 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 in recognition of their sovereignty as a nation. 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 services (DoD American Indian/Alaska Native Policy), as does DoD Instruction 4710.02, *Interaction with Federally Recognized Tribes* (September 14, 2006).

3.13.2 Analysis Methodology

Cultural resources are subject to review under both federal and state laws and regulations. Section 106 of the NHPA of 1966 empowers the Advisory Council on Historic Preservation to comment on federally initiated, licensed, or permitted projects affecting cultural sites listed or eligible for inclusion on the NRHP. Once cultural resources have been identified, significance evaluation is the process by which resources are assessed relative to significance criteria for scientific or historic research, for the general public, and for traditional cultural groups. Only cultural resources determined to be significant (i.e., eligible for the NRHP) are protected under the NHPA.

Analysis of potential impacts on cultural resources considers both direct and indirect impacts. Direct impacts may occur by physically altering, damaging, or destroying all or part of a resource; altering characteristics of the surrounding environment that contribute to the resource's significance; introducing visual or audible elements that are out of character with the property or alter its setting; or neglect of a resource to the extent that it deteriorates or is destroyed. Direct impacts are assessed by identifying the types and locations of proposed activity and determining the location of cultural resources that could be affected. Indirect impacts result primarily from project-induced population increases on-installation and the need for construction to accommodate this population growth. Construction activities and the subsequent use of the facilities could affect cultural resources. The area of potential effect (APE) for historic, cultural, and traditional resources encompasses areas where ground disturbing activities and alterations/modifications to buildings would occur, as well as areas affected by noise generated at the airfields and in the airspace.

Cultural resources that would reasonably be affected by noise impacts under the airspace were also included in the analysis. These include architectural resources, archaeological resources with standing structures, and traditional cultural properties. Prehistoric and historic archaeological sites lacking standing structures are not included as they are generally ground surface or even subsurface deposits that would not be affected by the Proposed Action. Some prehistoric archaeological sites could contain natural structures such as rock shelters or caves. These structures often house petroglyphs or pictographs, which are etched or painted onto the rock surfaces. However, studies have found that these types of natural formations are not affected by noise vibrations, such as sonic booms, any more than by natural erosion, wind, or seismic activity (Battis 1983).

Overpressure values are used to provide a general picture of psf resulting from supersonic flight. Actual overpressure varies based on maneuvers (climb/descent, turns, acceleration/deceleration) and specific weather conditions (winds, vertical temperature/pressure profile). Aircraft maneuvers result in concentration of sonic boom energy ("focus booms") that may exceed overpressure or defocusing that may result in lower overpressures. At 1 psf, the probability of a window breaking ranges from one in a billion (Sutherland 1990) to one in a million (Hershey and Higgins 1976). At 10 psf, the probability of breakage is between one in a hundred and one in a thousand (Haber and Nakaki 1989). Damage to plaster is in a comparable range but depends on the condition of the plaster. Adobe faces risks similar to plaster, but assessment is complicated by adobe structures being exposed to weather, where they can deteriorate in the absence of any specific loads (Sutherland 1990). Typical outdoor structures such as buildings, windmills, radio towers, etc., are resilient and routinely subject to wind loads far in excess of sonic boom pressures. Foundations and retaining walls, which are intended to support substantive earth loads, are not typically at risk from sonic booms below 4 psf.

For traditional cultural resources, consultation with federally-recognized American Indian Tribes was conducted. The list of Tribes consulted was primarily compiled using three federal on-line tools: 1) HUD Tribal Directory Assessment Tool Version 3.0, which is designed to help users identify Tribes by county and state and to provide appropriate tribal contact information to assist in consultation (HUD 2018); 2) the National Park Service's Native American Consultation Database (National Park Service 2018); and 3) the Bureau of Indian Affairs, Tribal Leaders Directory database (2018). The *Indian Tribal Entities Within the Contiguous 48 States Recognized and Eligible to Receive Services from the United States Bureau of Indian Affairs* (77 Federal Register 47868, August 6, 2012) was used as another level of verification in identifying federally-recognized Tribes.

The ROI for cultural resources includes only those locations on the specific installation where facility renovation or construction and its staging would occur and potential ground disturbance would result. The ROI also includes areas under the airspace used by the units.

3.14 HAZARDOUS MATERIALS AND WASTE, AND OTHER CONTAMINANTS

3.14.1 Definition of Resource

"Hazardous materials," "toxic substances," and "hazardous waste," broadly defined, can all be classified as "hazardous substances" as defined by the federal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 because they may present a threat to human health and/or the environment. The phrase "hazardous substance" is used in this document to describe any item or agent (i.e., biological, chemical, or physical) that has the potential to cause harm to humans, animals, or the environment. Definitions of these terms are summarized below.

3.14.1.1 Hazardous Materials

The term "hazardous materials" is defined under Section 1802 of the Hazardous Materials Transportation Act as "a substance or material in a quantity and form which may pose an unreasonable risk to health and safety or property when transported in commerce" (49 USC §§ 5101-5127). When discussed in this document, hazardous materials include petroleum, oils, and lubricants; cleaning agents; adhesives; paints; pesticides; and other products necessary to perform essential functions. Hazardous materials are frequently stored in bulk quantities (e.g., fuels, petroleum, oils, lubricants) in aboveground and underground storage tanks and distributed with pumps and pipelines. Fueling operations to support aircraft, watercraft, vehicle operations, and power generation require the storage of bulk quantities of these petroleum, oils, and lubricants. The storage areas for petroleum, oils, and lubricants represent potential sources of leaks, releases, or spills. Other types of hazardous materials (e.g., paints, pesticides, adhesives, cleaning agents) are frequently stored and distributed in smaller quantities such as drums, buckets, and bottles.

3.14.1.2 Hazardous Waste

Hazardous wastes are defined and regulated under the federal Resource Conservation and Recovery Act (RCRA) (USEPA 2014). Hazardous wastes may take the form of a solid, liquid, contained gas, or semi-solid. In general, any combination of wastes that poses a substantial present or potential hazard to human health or the environment that has been discarded or abandoned may be a hazardous waste. The USEPA defines several hazardous waste types: (1) listed wastes (wastes that the agency has determined are hazardous); (2) characteristic wastes (e.g., corrosive, ignitable, reactive, toxic wastes); (3) universal wastes (e.g., lamps, batteries, pesticides, mercury-containing equipment); and (4) mixed wastes (contains both radioactive and hazardous wastes) (USEPA 2014).

3.14.1.3 Toxic Substances

Toxic substances are specific substances whose manufacture, processing, distribution, use, or disposal are restricted by the Toxic Substances Control Act (40 CFR §§ 700-766) because they may present unreasonable risk of personal injury or health of the environment. They include asbestos-containing materials (ACMs), lead-based paint (LBP), polychlorinated biphenyls (PCBs), and radon.

3.14.1.4 Contaminated Sites

In 1986, Congress created the Defense Environmental Restoration Program. The Defense Environmental Restoration Program addresses the identification and cleanup of hazardous substances and military munitions remaining from past activities at U.S. military installations and formerly used at defense sites. Within the Defense Environmental Restoration Program of the DoD there are several program categories: the Environmental Restoration Program (ERP), Formerly Used Defense Sites, Military Munitions Response Program, and Base Realignment and Closure.

3.14.2 Analysis Methodology

A comparative analysis of existing and proposed hazardous materials and waste management practices was performed to evaluate impacts. For each of the alternative locations, the analyses included impacts due to proposed construction activities as well as the proposed operational activities for the F-35A. The analysis considered the magnitude of anticipated increases in hazardous waste generation considering historic levels, existing management practices, and storage capacity. For ERP sites, the methodology compares the proximity of the proposed construction actions to ERP sites and considers construction activities and operational uses of the facilities to determine the impacts to the ERP sites.

The ROI for hazardous materials and wastes consists of each of the alternative installations. The ROI does not include land beneath the SUA since no ground disturbance or construction would occur. In addition, ordnance delivery and flare use would not exceed current levels and would occur in locations already used and authorized for those purposes.

CHAPTER 4

Introduction to Installation-Specific Sections

How to Use This Document

Our goal is to give you 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, or EIS, is shown below.

OVERALL PROPOSAL

CHAPTER 1
Purpose and Need for the Proposed Action

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

CHAPTER 3
Resource Definition and Methodology

INFORMATION SPECIFIC TO EACH INSTALLATION

CHAPTER 4
Five Installation-Specific Sections

115 FW, Wisconsin	124 FW, Idaho	125 FW, Florida	127 WG, Michigan	187 FW, Alabama
Section WI1.0 Installation Overview	**Section ID1.0** Installation Overview	**Section FL1.0** Installation Overview	**Section MI1.0** Installation Overview	**Section AL1.0** Installation Overview
Section WI2.0 Alternative	**Section ID2.0** Alternative	**Section FL2.0** Alternative	**Section MI2.0** Alternative	**Section AL2.0** Alternative
Section WI3.0 Affected Environment and Environmental Consequences	**Section ID3.0** Affected Environment and Environmental Consequences	**Section FL3.0** Affected Environment and Environmental Consequences	**Section MI3.0** Affected Environment and Environmental Consequences	**Section AL3.0** Affected Environment and Environmental Consequences
Section WI4.0 Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section ID4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section FL4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section MI4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources	**Section AL4.0** Cumulative Effects, Irreversible and Irretrievable Commitment of Resources

OVERALL PROPOSAL

CHAPTER 5
References

CHAPTER 6
List of Preparers

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

4.0 INTRODUCTION TO INSTALLATION-SPECIFIC SECTIONS

The goal in producing this Environmental Impact Statement (EIS) has been to prepare as concise a document as possible that addresses the installation-specific concerns of individuals and agencies, while meeting the comparative needs of the United States (U.S.) Air Force (USAF) decision-makers. 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 F-35A aircraft would be located. During scoping, it became apparent that the public and agencies were interested not so much in comparing the potential environmental consequences among bases as in determining what a basing decision would mean for their specific location. Individuals participating in scoping at each location expressed different interests and concerns, and concerns at one location were not necessarily relevant to another location. Therefore, this EIS analyzes impacts at the five alternative basing locations.

Each of the sections in Chapter 4 essentially comprises a sub-chapter dedicated to an individual alternative location. For the reader's ease, all portions of these sub-chapters are labeled with a unique identifier: 115th Fighter Wing (115 FW) installation = WI; 124th Fighter Wing (124 FW) installation = ID; 125th Fighter Wing (125 FW) installation = FL; 127th Wing (127 WG) installation = MI; and 187th Fighter Wing (187 FW) installation = AL. In each installation-specific section, there is a detailed description of the particular facilities required for an F-35A beddown decision at that installation. The description in Section XX2 for each installation includes the number of aircraft involved, buildings needed, amount of area disturbed, personnel changes, flight operations, and airspace use specific to each location. Within Section XX3 for each installation, the affected environment discussion is immediately followed by potential environmental consequences. This compares the potential consequences with the affected environment, or no action conditions. Lastly, cumulative effects of the proposed action at each location are examined.

Parallel environmental resource sections for each installation permit rapid comparisons among the installations. For example, WI3.10, which addresses land use for the 115 FW installation and its environs, can be compared with land use at the 125 FW installation by turning to FL3.10.

The Proposed Action includes four elements affecting the installation and three elements affecting the airspace. Table 4-1 defines the resources associated with each affected area, installation, or airspace. As this table reveals, not all resources affected by the proposed action at the installation would be affected under the airspace. In accordance with the National Environmental Policy Act (NEPA) and Council on Environmental Quality (CEQ) Regulations, this EIS emphasizes those resources affected by the Proposed Action and excludes discussion of resources not affected. This approach also applies to differentiating between the installation and the airspace. For example, construction and personnel changes would affect socioeconomics at the installation and in its environs, but no elements of the action would result in socioeconomic effects on lands under the airspace.

Table 4-1. Resources Analyzed in the EIS

Resource	*Installation*	*Airspace*
Noise	Yes	Yes
Airspace	Yes	Yes
Air Quality	Yes	Yes
Safety	Yes	Yes
Land Use	Yes	Yes
Socioeconomics	Yes	No
Environmental Justice/Protection of Children	Yes	No
Infrastructure	Yes	No
Earth Resources	Yes	No
Water Resources	Yes	No
Biological Resources	Yes	Yes
Cultural Resources	Yes	Yes
Hazardous Materials and Waste	Yes	No