United States Air Force
F-35A Operational Beddown - Pacific
Final
Environmental Impact Statement

Volume I

February 2016

How to Use This Document

The Air Force's goal is to provide you with a reader-friendly document that presents a thorough, accurate analysis of the proposed action and alternatives and the potential environmental impacts. The organization of this Final Environmental Impact Statement, or Final EIS, is shown below.

ENVIRONMENTAL IMPACT STATEMENT

EXECUTIVE SUMMARY
Synopsis of the Purpose and Need and Proposed Action and Alternatives
Summary Comparison of Impacts by Alternatives

CHAPTER 1
Purpose of and Need for the Proposed Action

CHAPTER 2
Description of the Proposed Action and Alternatives

CHAPTER 3
Affected Environment

CHAPTER 4
Environmental Consequences

CHAPTER 5
Cumulative Effects

CHAPTER 6
Other Considerations Required by the National Environmental Policy Act

CHAPTER 7
List of Preparers

CHAPTER 8
References Cited

APPENDICES can be found in Volume II
- **Appendix A:** Public Notices
- **Appendix B:** Stakeholder Mailing List
- **Appendix C:** Coordination and Consultation Correspondence
- **Appendix D:** Detailed Resource Information
- **Appendix E:** Noise Modeling, Methodology, and Effects
- **Appendix F:** Air Emissions Calculations
- **Appendix G:** Draft EIS Public Comments and Responses

FINAL

United States Air Force
F-35A Operational Beddown – Pacific
Environmental Impact Statement

February 2016

Privacy Advisory for Final Environmental Impact Statement (EIS)

Letters or written comments received on the Draft EIS are published in this Final EIS. As required by law, the Air Force considered those comments and responded to substantive comments herein. Any personal information was used only to identify your desire to make a comment during the public availability period or to fulfill a request for copies of the EIS. Private address information provided with comments were used solely to develop a mailing list for the Final EIS distribution and were not otherwise released.

COVER SHEET

UNITED STATES AIR FORCE F-35A OPERATIONAL BEDDOWN – PACIFIC
FINAL ENVIRONMENTAL IMPACT STATEMENT

a. Responsible Agency: United States (U.S.) Air Force

b. Proposed Action: The Air Force proposes to beddown operational F-35A squadrons (Ops #2) in the Pacific Air Forces Area of Responsibility (PACAF AOR), arriving at this decision through a deliberative process. The Proposed Action would base up to 54 F-35A aircraft (or 48 Primary Assigned Aircraft and 6 Backup Aircraft Inventory) within the PACAF AOR, specifically at Eielson Air Force Base (AFB) in Alaska. The proposal also includes additional military and civilian personnel, and construction and/or modification of facilities for aircraft maintenance and operation. The F-35As would conduct training at the base and primarily in existing northern Joint Pacific Alaska Range Complex (JPARC) airspace: Birch Military Operations Area (MOA), Buffalo MOA, Delta 1/2/3/4 MOAs, Eielson MOA, Fox 1/2/3 MOAs and Air Traffic Control Assigned Airspace (ATCAA), Paxon MOA/ATCAA, and Yukon 1/2/3/4/5 MOAs/ATCAAs, as well as Restricted Areas 2202, 2205, and 2211. No new airspace would be established as part of this Proposed Action.

c. Inquiries: For further information on this Environmental Impact Statement (EIS), contact the 354 Fighter Wing, Public Affairs Office (354 FW/PA), 354 Broadway Avenue, Suite 15A, Eielson AFB, AK 99702. Telephone inquiries can be made to the 354 FW/PA at 907-377-2116. Send email inquiries to: 354fw.pa.publicaffairs@us.af.mil.

d. Designation: Final EIS

Abstract: This EIS was prepared in accordance with the National Environmental Policy Act of 1969, 42 United States Code §§ 4321-4374, as implemented by the Council on Environmental Quality regulations, 40 Code of Federal Regulations (CFR) §§ 1500-1508, and Air Force implementing regulation 32 CFR § 989. As presented in the Draft EIS, analysis established that few significant adverse impacts would result from implementing the Proposed Action Alternative. On base, noise levels would increase noticeably for residential areas, schools, and child development center; there would be a potential for on-base noise impacts. Off base, increased number of residences in Moose Creek would experience noise levels between 65 and 70 decibel A-weighted Day-Night Average Sound Level. The schools and care centers would experience an increase in the number of hourly classroom learning interference events resulting in the potential for adverse noise impacts to children. Subsonic and supersonic operations in northern JPARC airspace would not generate noise levels resulting in adverse impacts to underlying populations. Through adherence to existing flight rules regarding seasonal avoidance areas and altitude restrictions, the change in subsonic and supersonic noise levels in northern JPARC airspace would not result in significant changes in the impacts (compared to current conditions) to people, local, state, or federal special use areas, special status species, wildlife, livestock, or domesticated animals. Air emissions would remain consistent with federal and state standards and no conformity issues would arise from the beddown of two F-35A squadrons at Eielson AFB. No adverse impacts were identified in terms of fire risk and management, aircraft mishaps, and bird/wildlife strike hazards. Construction costs and an increase in personnel and dependents would introduce beneficial economic benefits to the Fairbanks North Star Borough area. It was found that there would be suitable housing units available in the North Pole, Moose Creek, and Salcha areas to support both short-term construction personnel and in the long term, military families and unaccompanied personnel. No adverse effects to traditional, archaeological, and architectural resources would occur if the Proposed Action were implemented. No disproportionate adverse impacts would affect low-income and minority populations. There would be about 21 acres covered with impervious surfaces and approximately 56 acres would be developed within the 100-year floodplain, according to the Federal Emergency Management Administration mapping. All facilities would be constructed to conform to floodplain requirements and, thereby, mitigate adverse impacts. An estimated 17 acres of wetlands would be removed. Eielson AFB would offset these potential adverse wetland impacts by purchasing wetland credits at local mitigation banks or pay in *lieu* of fees. No adverse impacts would result from hazardous material and toxic substance use, hazardous and toxic waste disposal, or from contaminated sites. No adverse impacts would occur to recreational and visual resources resulting from the Proposed Action.

This Page Intentionally Left Blank.

Executive Summary

EXECUTIVE SUMMARY

ES.1 INTRODUCTION

This Final Environmental Impact Statement (EIS) presents the potential consequences of the Operational Beddown of F-35A aircraft in the Pacific Air Forces (PACAF) Area of Responsibility (AOR). The Proposed Action would base two F-35A squadrons at Eielson Air Force Base (AFB), Alaska, as an additive operational mission to the 354th Fighter Wing (354 FW). There would be a total of up to 54 F-35A aircraft based at Eielson AFB, or 48 Primary Assigned Aircraft, comprising 24 aircraft per squadron, and 6 Backup Aircraft Inventory. If undertaken, the first aircraft would be delivered in 2019, with the final aircraft arriving by late 2020, allowing full operational capabilities for both squadrons by 2021. This Final EIS also analyzes the environmental consequences of the No-Action Alternative, where the F-35As would not be based at Eielson AFB or within the PACAF AOR at this time.

ES.2 PURPOSE OF AND NEED FOR THE PROPOSED ACTION

The proposed beddown and operation of the F-35A within the PACAF AOR meets the President and Secretary of Defense's directives to reduce vulnerabilities and provide rapid worldwide deployment. The PACAF F-35A beddown would also provide a stabilizing presence within the region by providing efficient and effective response to threats, and undertake the Combat Air Force core competencies of air and space superiority, global attack, precision engagement, and agile combat support.

ES2.1 Purpose

To maintain capable ready forces required for national defense, the Air Force must integrate the F-35A mission while transitioning from the legacy-fighter aircraft programs. The purpose of the Proposed Action is to maintain efficient and effective combat capability and mission readiness in the PACAF AOR as the Air Force faces deployments across a spectrum of conflicts, while also providing for homeland defense. Beddown and operation of the F-35A at a PACAF AOR base would represent a major step toward this goal. This beddown action assures availability of combat-ready pilots in the PACAF AOR, flying the most advanced fighter aircraft in the world.

ES2.2 Need

The Secretary of the Air Force determined there was a need to locate F-35A aircraft in the PACAF AOR based on the following priorities:

- Support the Pacific rebalance as directed by the President and the Secretary of Defense to counter the threats arising in the Pacific arena;
- Support the location of robust fifth-generation aircraft capability to offset similar threats in the PACAF AOR;
- Support future significant peacekeeping requirements or conflicts that may occur in the Pacific region; and
- Provide adequate war-planning response times in the PACAF AOR.

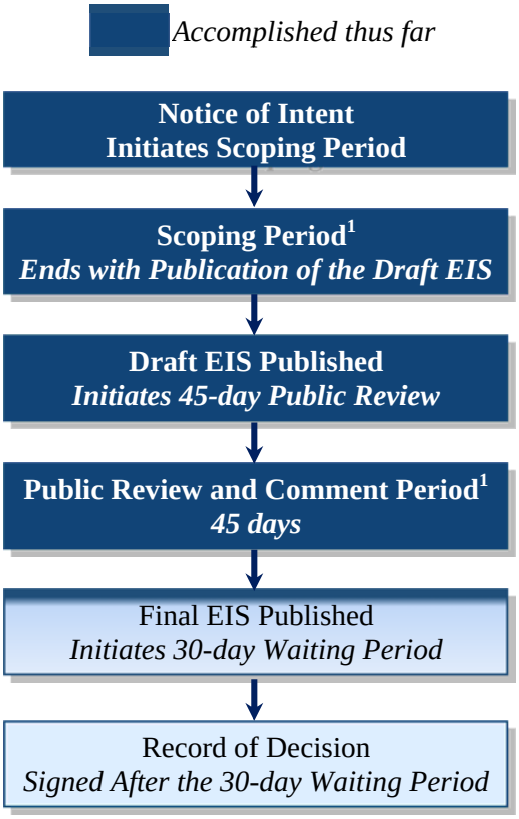
ES.3 THE ENVIRONMENTAL IMPACT ANALYSIS PROCESS

The National Environmental Policy Act (NEPA) requires that a federal agency, when considering undertaking a major federal action, employ a systematic, interdisciplinary approach to: (1) analyze the

potential environmental impacts of a proposed action, (2) consider alternatives to the proposed action, and (3) make an informed decision prior to implementing the action. This act applies to actions occurring in the United States (U.S.) and its territories, Antarctica, and for actions within 12 nautical miles (about 14 miles) from U.S. shorelines.

The Council on Environmental Quality (CEQ) regulations for implementing NEPA (40 Code of Federal Regulations [CFR] §§ 1500-1508), and the Air Force's regulations (32 CFR § 989) implementing NEPA, require the Air Force to consider potential environmental consequences of its proposed action early and concurrent with the initial project planning stages. Adherence to these regulations ensures the Air Force considers environmental impacts of its actions in planning and decision making, and provides an opportunity for public input into the decision-making process.

The Environmental Impact Analysis Process (EIAP), as contained in 32 CFR § 989, is the Air Force procedure for implementing NEPA. Through EIAP reviews, all information pertinent to the proposed action and reasonable alternatives, as well as the no-action alternative, are used to determine the appropriate level of NEPA analysis. For this Proposed Action, the Air Force determined the appropriate level of analysis was an EIS. The flow chart to the right identifies key milestones of the EIAP associated with the F-35A beddown proposal in the PACAF AOR.



[1]Opportunities for public involvement

ES.3.1 Streamlining the NEPA Process

In accordance with CEQ regulations implementing NEPA, and with the intent of reducing the size of this document, this EIS summarizes and incorporates by reference relevant material from other NEPA documents, as applicable.

ES.3.2 Scoping Process

Scoping began with publication of the Notice of Intent (NOI) in the *Federal Register* on March 5, 2015 (Volume II, Appendix A). Advertisements announcing the NOI and scoping meeting locations, dates, and times were placed in the *Fairbanks Daily News-Miner* (daily), *Delta Wind* (weekly), *Alaska Dispatch News* (daily), and the *Juneau Empire* (daily) newspapers at least a week prior to the scoping meetings. In daily newspapers, advertisements ran for three consecutive days and once in the weekly newspaper.

Scoping meetings were held in North Pole, Fairbanks, and Delta Junction on March 24, 25, and 26, 2015, respectively. In total, 195 people attended and 25 written comments were submitted at the scoping meetings. Another 45 comments were received up to publication of the Draft EIS. In general, the comments were supportive of basing the F-35A at Eielson AFB, although one commenter opposed the basing action in its entirety. During scoping issues of concern included: noise generated at the airfield by low-altitude aircraft, and in the airspace by higher-altitude aircraft creating sonic booms; the effects of noise to humans, wildlife, livestock, and quality of life; increased air emissions further deteriorating North Pole air quality;

increased wildland fire danger in the Delta Junction area because of increased ordnance use; the effects of aircraft-generated noise on recreating in the state and national parks; and how increased military air traffic could impact civil aviation in the region.

ES.3.3 Public Review and Comment Period

The public review and comment period began on September 4, 2015, with the Draft EIS Notice of Availability (NOA) published in the *Federal Register*. The Draft EIS was distributed for review and comment to government agencies, local organizations, Alaska Native tribal entities, members of the public who requested a copy, and to libraries in time to coincide with the NOA announcement. The Draft EIS was also available for review or download from the project website at https://www.PACAF-F35Aeis.com on September 1, 2015. The advertisements, as well as the NOA, supplied the dates, times, and locations of the hearing meetings that were held in North Pole, Delta Junction, and Fairbanks on September 21, 22, and 23, 2015, respectively.

The three hearing meetings were held in two concurrent formats: an open house with displays where the public could interact with members of the Air Force NEPA team, and the formal hearing where the public was given the opportunity to provide oral testimony on the Draft EIS. In total, 196 people attended the hearing meetings, 48 oral comments were recorded by a stenographer, and the Air Force received 20 written comments. Additionally, 12 emailed comments were submitted through the project website and nine letters were received over the 45-day comment period. The public review and comment period ended on October 20, 2015.

Copies of all comments recorded and received during the 45-day public comment and review period are presented in Volume II, Appendix G and can be viewed on the project website at https://www.PACAF-F35Aeis.com. They are also found in the hard copy Final EIS and on the CD accompanying the Executive Summary. The following is a summary of comments received at each of the hearings. Written comments received after the hearings, through email and the U.S. Postal Service, echoed the comments received at the hearings.

For North Pole, of the 11 oral comments delivered, all but one was in support of basing the F-35As at Eielson AFB. Most found that the economic benefit of having the increased Air Force personnel and their dependents far out-weighed any noise issues. Commenters asked that we address issues such as noise reduction in schools (see Sections 4.3.3 and 4.9.3), concerns with the effects increased security for areas that are public (see Section 4.5.2.2, *Fire Risk and Management*), and air quality resulting from an increase in the population (see Section 4.4.2.1). There was also a comment that expressed concern for sonic booms and their effect on wildlife (see Section 4.3.2.2 and Appendix E, Section E2.14.2). Another commenter requested discussion that is more detailed on whether there is suitable rental housing in the area. For example, are the units close enough to the base, are there enough affordable housing units in the area to support construction employees in the short term and an increase in military and civilian personnel the in the long term (see Section 4.6.2.1).

At Delta Junction, four individuals provided oral comments and two submitted written comments. One commentor was concerned about the increase in greenhouse gasses (see Section 5.2.1.3) and asked if our analysis included other sources of emissions in addition to those of the F-35A (see Appendix F). That commentor also stated concerns with an increase in sonic booms (see Section 4.3.2.2). Another commentor suggested we establish a 30-mile radius sonic bubble around Delta Junction as a solution for sonic boom noise (see Appendix G, comment response AA-3). The last commentor wanted to know how

the Air Force and civilian aircraft could interact together (see Section 4.2.2.3). The written comments were supportive; however, there was concern regarding safety and that the Automated Surface Observation System office at Fort Greely should continue to be staffed to ensure aircraft safety with increased air traffic in the region (see Appendix G, comment response SA-7). There was one other written comment from the City of Fairbanks Mayor expressing his support of the basing action.

The Fairbanks hearing was the most heavily attended, with 33 oral comments and 15 written comments provided by the attendees. The oral comments were mostly supportive, endorsing the basing of aircraft at Eielson AFB and appreciation for the Air Force's recognition of Alaska's strategic value. The office of economic development asked the Air Force to be forthcoming with the construction schedule so that there would be funding available for the growth associated with the Proposed Action. One commentor was concerned about the Draft EIS not assessing the impact of using Historically Underutilized Business contracting (see Appendix G, comment response SO-3). Another commentor suggested that the Proposed Action would improve water and wastewater utility services (see Appendix G, comment response WR-2). A commentor was concerned that the existing Special Use Airspace Information System would be inadequate to support the airspace expansions and increased use (see Appendix G, comment response AA-5). There were also several oral comments opposing the Proposed Action. All 15 written comments were in support of basing F-35As at Eielson AFB.

Letters, postmarked after the close of the comment period, were received from Governor Bill Walker, State Representative Gabrielle LeDoux, State Representative Jim Colver, State Senator Click Bishop, and the Alaska Congressional Delegation comprising Senators Lisa Murkowski and Dan Sullivan, and Representative Don Young. All stated their support for basing the F-35A at Eielson AFB.

While all comments submitted were considered by the Air Force, only substantive comments are addressed. Substantive comments are those that identify issues and concerns related to the Proposed Action and No-Action Alternatives. Non-substantive comments are those that only express a conclusion, an opinion, or a vote for or against the proposal itself; or that otherwise state a personal preference or opinion.

ES.4 ALTERNATIVE IDENTIFICATION

Based on strategic requirements, site survey results, and application of selection standards, the Secretary of the Air Force identified Eielson AFB, located in the interior of Alaska, as the preferred location and only location for basing two F-35A operational squadrons in the PACAF AOR, and directed that only two alternatives be carried forward for analysis in this EIS:

- *Proposed Action Alternative:* Beddown two squadrons of F-35A aircraft at Eielson AFB as an addition to all existing mission activities.
- *No-Action Alternative*: F-35A squadrons would not be located at Eielson AFB or within the PACAF AOR at this time; existing flight missions at the base would remain unchanged and already planned construction and infrastructure upgrades, not associated with the F-35A, would be undertaken.

The No-Action Alternative is discussed first to provide a context for comparing the changes that would occur under the Proposed Action of basing two F-35A squadrons at Eielson AFB.

ES.5 NO-ACTION ALTERNATIVE

Per CEQ regulations (40 CFR §1502.14(d)) implementing NEPA, analysis of a No-Action Alternative is required. "No action" means that the Proposed Action (i.e., the F-35A beddown) would not take place, and the resulting environmental effects from not taking the action are compared to the effects of implementing the Proposed Action. Under the No-Action Alternative for this EIS, no F-35A beddown would occur at Eielson AFB or within the PACAF AOR at this time, thus no F-35A associated on-base construction or personnel increases would be implemented. Major flying exercises and routine training would continue to be supported at Eielson AFB.

The 354 FW is the host unit at Eielson AFB with the mission to prepare aviation forces for combat, deploy airmen in support of global operations, and enable the staging of forces. To accomplish that mission, the 354 FW implements flying operations, mission support, maintenance, and medical care functions. Located adjacent to the northern portion of the Joint Pacific Alaska Range Complex (JPARC) airspace, the 354 FW's 18th Aggressor Squadron familiarizes combat-ready forces with the tactics used by potential adversaries.

ES.5.1 Personnel

The number of military and civilian personnel fluctuates at the base due to the constant departure and arrival of personnel over a year. However, as of December 2014, there was a total of 4,986 military, civilians, and contractor personnel and dependents working and/or living on Eielson AFB. The 354 FW accounts for the majority of individuals on base, with tenant units accounting for 415 positions.

ES.5.2 Facilities and Infrastructure Construction and Modifications

The airfield is the dominant feature within the base boundaries, with a 14,530-foot long runway and associated ramps and taxiways that occupy the west side of the base. The runway parallels Richardson Highway, which runs through the base. Most of the Eielson AFB operational and industrial areas are immediately adjacent to the airfield on the east side of the flight line. Due to its isolation and extreme climate, Eielson AFB provides its own power generation, steam heat production, potable water provision, wastewater treatment and disposal, as well as clean construction material fill sites. The base also provides a wide range of community facilities including about 900 housing units for families and 450 dormitory rooms for unaccompanied military personnel; educational facilities spanning from kindergarten through high school; a medical center, chapel, commissary, and base exchange; various commercial-services businesses; as well as year-round physical fitness and recreational facilities.

Under the No-Action Alternative, the base has planned and programmed numerous facility and infrastructure improvements up to calendar year 2021. This time period was identified because it represents the conditions that would be present at the time the F-35A proposed beddown would be completed. Examples of these improvements include repairs to the central heat and power plant, consolidation of munitions on Quarry Hill, and construction of Red Flag-Alaska visiting quarters.

ES.5.3 Airfield and Airspace Operations

Airfield Operations. Currently, 21 F-16s, 9 KC-135s, and 2 HH-60s are based at Eielson AFB. Because the base supports Red Flag-Alaska, Northern Edge, and other major flying exercises, more than a dozen types of transient aircraft (i.e., other U.S. major units and allied nation visitors not based at Eielson AFB) temporarily operate from the base during these exercises. In calendar year 2014, 18,963 annual airfield operations were conducted by based and transient aircraft at Eielson AFB and it was assumed that this tempo would continue under the No-Action Alternative. Aircraft operations occur during both "environmental" daytime and nighttime hours. Environmental daytime is defined as 7:00 a.m. to 10:00 p.m. and nighttime is defined as 10:00 p.m. to 7:00 a.m. Environmental night represents a period when the effects of noise on people are accentuated and receives special consideration. Of the total airfield operations, approximately 8 percent (or 1,466) occur during environmental nighttime hours.

Airspace Operations. Aircraft operating out of Eielson AFB primarily use the northern portion of the JPARC Special Use Airspace (SUA) and range assets (the gray area identified in Figure ES-1). On average, aircraft operate in northern JPARC airspace 240 days a year. Of this total, up to a maximum of 60 days, typically from the spring to early fall, support a higher operational tempo due to major flying exercises such as Red Flag-Alaska and Northern Edge. In the other overland JPARC SUA, i.e., Galena, Naknek A/B, Stony A/B, and Susitna Military Operations Areas (MOAs) and their overlying Air Traffic Control Assigned Airspace (ATCAAs), the primary user is Joint Base Elmendorf-Richardson. The overwater warning area 612 (W612) is used by Joint Base Elmendorf-Richardson aircraft chiefly during Northern Edge. Throughout JPARC airspace and ranges authorized for such use, chaff and flares are deployed in air combat exercises as countermeasures to air- or ground-based threats. While most air-to-ground training is simulated, where nothing is released from the aircraft, there is still a need to conduct realistic ordnance delivery. These operations are conducted in authorized JPARC restricted airspace and ranges.

ES.6 PROPOSED ACTION ALTERNATIVE

The primary beddown requirements that drive the analysis of environmental impacts for this Proposed Action are aircraft operations, construction, and personnel. The resources impacts by each of these requirements are identified in Table ES-1.

Table ES-1. Proposed Action Elements Impacting Resources

Resource Category	*Aircraft Operations*	*Construction*	*Personnel*
Airfield and Airspace Operations and Management	✓	✓	-
Acoustic Environment	✓	✓	-
Air Quality	✓	✓	-
Safety	✓	-	✓
Socioeconomics	✓	✓	✓
Land Management	✓	-	✓
Cultural Resources	✓	✓	-
Environmental Justice and Protection of Children	✓	✓	✓
Natural Resources	✓	✓	-
Earth Resources	-	✓	-
Water Resources	-	✓	✓
Hazardous Materials, Hazardous Wastes, Toxic Substances, and Contaminated Sites	✓	✓	✓
Recreational and Visual Resources	✓	✓	✓

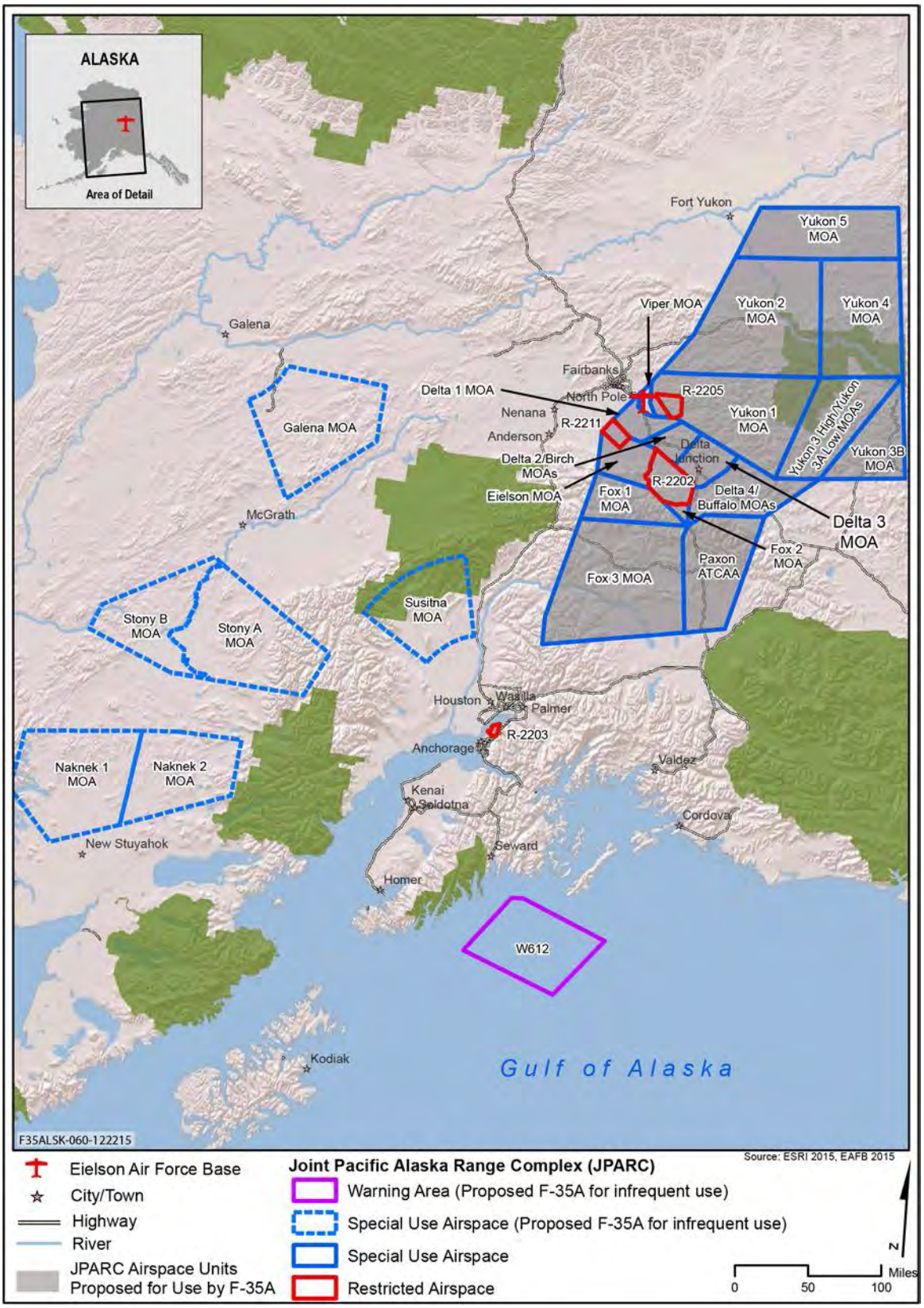


Figure ES-1. Joint Pacific Alaska Range Complex

ES.6.1 Personnel

Basing two F-35A squadrons and associated support and maintenance functions is expected to add 1,563 military and civilian personnel to the base by fiscal year 2020 (FY20), when both squadrons are expected to be fully operational. This would increase the total authorized active-duty military population of the 354 FW to 2,981 (Table ES-2). Civilian and contractor personnel would increase by 487 people, for a total of 1,256 and military dependents would increase by 1,202, for a total of 3,099. The tenant unit population would not change, and remain at 415 authorized personnel. Total base population would increase by an estimated 2,765 individuals to 7,751, or grow by approximately 55 percent when compared to the No-Action Alternative. Personnel increases would be incremental, happening over 2 to 3 years, typically preceding the scheduled delivery of the aircraft by several months.

Table ES-2. Eielson AFB Proposed Action Alternative Personnel and Dependents

Category	*No Action*	*Proposed Action Alternative*	*Total Base*
Military			
Officer	168	95	263
Enlisted	1,737	981	2,718
Subtotal	***1,905***	***1,076***	***2,981***
Civilians			
Appropriated Fund	360	228	588
Non-Appropriated Fund	186	118	304
Contractors	223	141	364
Subtotal	***769***	***487***	***1,256***
Military Dependents			
Spouses	1,063	674	1,737
Children	834	528	1,362
354 FW Subtotal	***1,897***	***1,202***	***3,099***
Tenant Unit Personnel			
Military and Civilian	415	0	415
Eielson Population Total	**4,986**	**2,765**	**7,751**

ES.6.2 Facility and Infrastructure Construction and Modifications

New and modified infrastructure and facilities would be required at Eielson AFB to support the proposed beddown of up to 54 primary and backup F-35A aircraft (Table ES-3). Under the Proposed Action Alternative, the 18th Aggressor Squadron would move to the former A-10 operations area. Several facilities would be renovated or constructed in the central area of the base, and munitions storage facilities would be added in Quarry Hill (Figure ES-2). However, the majority of F-35A operations and maintenance facilities would be located in the southern end of the runway at the South Loop (Figure ES-3). Several construction projects had to be placed within the 100-year floodplain or in wetland areas. No other practicable alternative locations were identified because of the need to place facilities outside explosive safety arcs, and the requirement for adjacency to the flight line. Additionally, the South Gate would be reopened to divert construction traffic from and minimize congestion at the North Gate. With this reopening, the South Gate vehicle inspection area would be expanded to support commercial and construction equipment, as well as new entry and merge lanes established on both sides of Richardson Highway to minimize congestion along the highway.

Table ES-3. Proposed Action Alternative Construction, Additions, Alterations/Renovations, and Demolition

Proposed Start Dates	*Action*	*Site Number*
FY16	Renovate Building 4110 (B-4110): 18 Aggressor Squadron Operations and Aircraft Maintenance Unit	22
FY16	Construct 6-Bay Flight Simulator Facility	12
FY16	Reopen/Expand South Gate (for construction traffic)	26
FY17	Construct 4-Bay Hangar/Propulsion Maintenance/Corrosion Control Personnel Dispatch (Squadron 1)	1
FY17	Construct 4-Bay Hangar/Squadron Operations/Aircraft Maintenance Unit (Squadron 2)	35
FY17	Construct 16-Bay, 16-Aircraft Weather Shelter (South Loop)	5
FY17	Construct 16-Bay, 16-Aircraft Weather Shelter (South Loop)	3
FY17	Construct 6 Munitions Storage Igloos (Quarry Hill)	17
FY17	Construct new Missile Maintenance Facility	20
FY17	Add/Alter B-4280: Field Training Detachment Unit	13
FY17	Demolish B-1303: Missile Maintenance Shop	48
FY17	Renovate B-1326: Munitions Line Delivery	41
FY17	Renovate B-1307/B-1338: F-35 Aircraft Maintenance Unit /Weather Shelter (Squadron 1)	36/42
FY17	Renovate B-1337: F-35 Squadron Operations (Squadron 1)	2
FY17	Renovate B-3426: Base Supply (enlarge classified storage, larger doors)	11
FY17	Renovate B-1341: Egress Maintenance Shop	6
FY17	Renovate B-1335: 4-Bay Weather Shelter (fire suppression, floors, lights)	38
FY18	Add/Alter B-1324: Munitions Inspection Shop	40
FY18	Construct 6-Bay R-11 Refueling Truck Garage	27
FY18	Construct South Loop Aerospace Ground Equipment Facility with Fill Stand	30
FY18	Construct South Heat Plant	10
FY18	Construct New Consolidated Munitions Operations Facility	39
FY18	Construct New Alternate Mission Equipment Facility	24
FY18	Renovate B-1209: Aerospace Ground Equipment Shop/Covered Storage	37
FY18	Construct new Operations Support Squadron Facility; alter B-1215 for Base Operations	23
FY18	Renovate B-1232: Enlarge Wheel & Tire Shop in Nose Dock 7	16
FY18	Renovate B-3462: Munitions Flight (alter to accommodate additional personnel)	25
FY18	Renovate B-1306: Aerospace Ground Equipment Covered Storage (North Bays)	30
FY18	Renovate B-1338: Aircraft Maintenance Hangar	42
FY18	Renovate B-1340: Weapons Load Training (add fire suppression and alter to accommodate additional personnel)	34
FY18	Renovate B-1344: Fuel Cell Maintenance Facility (alter to accommodate additional personnel)	33
FY18	Renovate B-1346: Metals Tech in Jet Engine Intermediate Maintenance Facility (alter to accommodate additional personnel)	7
FY18	Renovate B-1347: Maintenance Group (alter to accommodate additional personnel)	15
FY18	Renovate B-1353: Armament Systems Maintenance Facility for Alternate Mission Equipment and Metals Tech	9
FY18	Add/Alter B-6385: Munitions Inspection Shop	44
FY18	Renovate B-1141: Maintenance Operations Center (alter to accommodate additional personnel)	29
FY18	Add/Alter B-6389: Outdoor Arms Range Add Two Firing Points	45
FY18	Construct Flight Kitchen	32
FY18	Construct School Age Facility	31
FY18	Renovate B-3134: Security Forces Facility	28
FY18	Demolish B-3303: School Age Facility	46
FY18/19	Renovate B-2262 and B-2264: Dormitories	49
FY19	Construct 14-Point Combat Arms Training and Maintenance Range	14
FY19	Construct 200-Person Dormitory	18
FY19	Demolish B-5313: Youth Center	47
FY19	Add/Alter B-3349: Medical Clinic (alter to accommodate additional personnel)	43

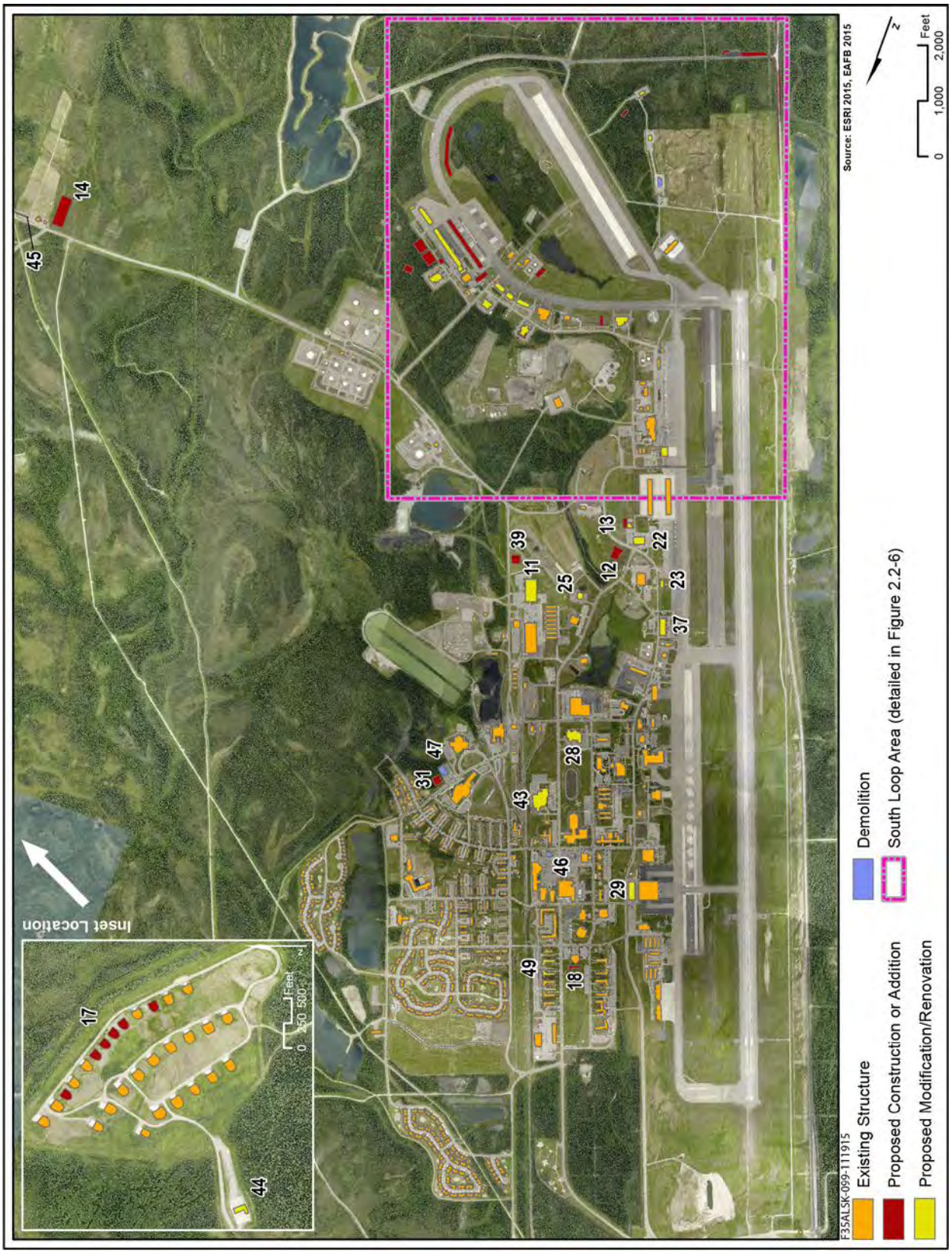


Figure ES-2. Proposed Action Alternative Basewide Facility and Infrastructure Construction and Modification Plan

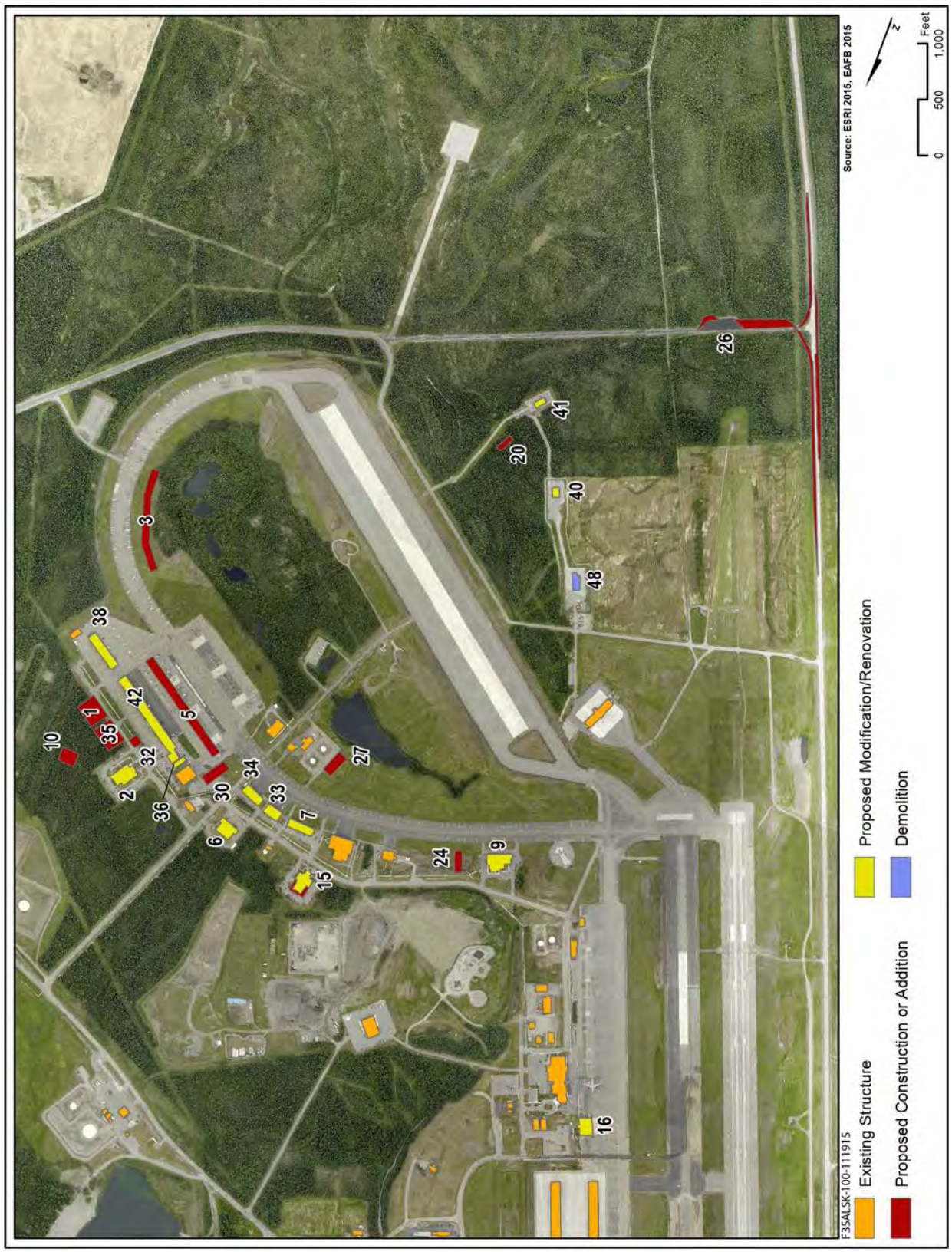


Figure ES-3. Proposed Action Alternative Southern Facility and Infrastructure Construction and Modification Plan

Proposed construction, additions, interior renovations, exterior alterations, and infrastructure improvements would occur between FY16 and FY20. Total acreage disturbed, which includes equipment laydown areas, construction clearing/grading, landscaping, infrastructure improvements, and construction entrances, would be approximately 66 acres, of which approximately 21 acres would be converted to impervious surfaces. Existing utility corridors would be used to the greatest extent possible; any fill needed for facility construction would come from existing on-base resources; clean demolition material (e.g., concrete and asphalt) would be disposed at on-base sites; and the base has disposal sites permitted to accept materials that contain asbestos. All construction material (wood, metal, and concrete) is locally available or can be ordered and delivered.

ES.6.3 Airfield and Airspace Operations

Airfield Operations. Under the Proposed Action Alternative up to 54 aircraft would be based at Eielson AFB, bringing the total number of based aircraft at Eielson AFB to 86. By completion of the beddown process (anticipated by FY21), F-35A aircraft would annually contribute 26,106 additional airfield operations (i.e., takeoffs, landings, low approaches, and other pattern work at the airfield) at Eielson AFB. When added to the baseline of 18,963, airfield operations would more than double to 45,069. Please note that these total airfield operations include based and transient aircraft at Eielson AFB. Transient aircraft are those that visit on a temporary basis, participate in major flying exercises, travel through the area, or land at the airfield for emergency, weather, or other contingencies. The existing runway at Eielson AFB is more than sufficient to meet this increased use without requiring any runway modifications or construction.

Aircraft operations fluctuate over the year, and the busiest months are from April through October when the major flying exercises occur. Operations differ according to the number of aircraft that participate in major flying exercise (every exercise varies), the number of based aircraft that are deployed to different locations for reasons such as combat and/or training, and fiscal constraints that dictate how far aircraft can travel to undertake training. These are just a few reasons why specific operations cannot be identified for each month or for particular seasons. Therefore, annual average operations are used to evaluate potential impacts in this EIS. Table ES-4 provides the annual number of airfield operations projected under the Proposed Action Alternative. Existing standard departure and arrival routes, as well as noise abatement procedures (e.g., quiet hours, engine runup times and locations) would be used by the F-35A. Once the beddown is complete, approximately 96 percent (or 43,450) of the total airfield operations would occur during the environmental daytime hours (i.e., 7:00 a.m. to 10:00 p.m.) and approximately 4 percent (or 1,619) during environmental nighttime hours (10:00 p.m. to 7:00 a.m.). Environmental night represents a period when the effects of noise on people are accentuated and a 10-decibel penalty is applied in the noise modeling. F-35A airfield operations would result in a 138-percent increase (or 25,953) in daytime operations and a 10-percent increase (or 153) in the overall environmental nighttime operations.

Table ES-4. Proposed F-35A Annual Airfield Operations[1] at Full Operational Capability

Details of Airfield Operations	*F-35A Airfield Operations*	*Based Aircraft Operations*	*Total Airfield Operations*
Day (7:00 a.m. to 10:00 p.m.)	25,953	17,497	43,450
Night (10:00 p.m. to 7:00 a.m.)	153	1,466	1,619
Total	**26,106**	**18,963**	**45,069**

Note:
[1]An *airfield operation* represents the individual portion of a flight in the base airfield environment; for instance, one aircraft taking off, doing an approach and departure, and then landing are four airfield operations but these all comprise one sortie performed by a single aircraft.

Airspace Operations. Aircraft operating out of Eielson AFB primarily use the northern portion of the JPARC SUA and range assets. On average, aircraft operate in the JPARC airspace 240 days a year. F-35As from Eielson AFB would primarily operate in the northern portion of JPARC airspace, in the MOAs, ATCAAs, and Restricted Areas in the immediate vicinity of Eielson AFB (Figure ES-4). The F-35As could also fly throughout the entirety of JPARC SUA; however, these operations would be minimal. If operations exceed existing evaluated levels, then the appropriate NEPA documentation will be undertaken and public involvement invited. No changes in training airspace configurations are proposed for this action. Table ES-5 summarizes proposed annual operations that would be conducted at completion of the beddown in early FY21. These numbers are based on the utilization rate for the F-35A (or the number of times one F-35A can operate on a typical day) and the type of training that is required for combat readiness. For F-35A operations (the third column in Table ES-5), within each of the northern JPARC airspace units, 99 percent of operations would occur between 7:00 a.m. and 10:00 p.m. (or environmental daytime hours) and 1 percent would occur between 10:00 p.m. and 7:00 a.m. (or environmental nighttime hours). Total projected annual average operations are provided in column four.

Table ES-5. Proposed F-35A Annual Operations in Northern JPARC Airspace

Airspace Unit	*No Action (calendar year 2021)*	*F-35A Proposed (calendar year 2021)*	*Total*
Birch MOA	4,672	433	5,105
Buffalo MOA	4,672	433	5,105
Delta 1 MOA[1]	2,908	690	3,598
Delta 2 MOA[1]	3,618	690	4,308
Delta 3 MOA[1]	3,618	690	4,308
Delta 4 MOA[1]	3,618	690	4,308
Delta ATCAA	4,808	760	5,568
Eielson MOA/ATCAA	7,034	3,387	10,421
Fox 1 MOA/ATCAA	7,056	3,387	10,443
Fox 2 MOA	6,749	3,387	10,136
Fox 3 MOA[2]/ATCAA	6,507	3,387	9,894
Paxon High MOA/ATCAA[2]	4,701	3,387	8,088
Paxon Low MOA[1, 2]	3,618	920	4,538
Yukon 1 MOA/ATCAA	5,568	2,540	8,108
Yukon 2 MOA/ATCAA	5,568	2,540	8,108
Yukon 3A Low/3 High MOAs/ATCAAs	3,759	2,540	6,299
Yukon 3B MOA[1]	3,417	690	4,107
Yukon 4 MOA/ATCAA	3,447	1,270	4,717
Yukon 5 MOA/ATCAA[1]	3,417	690	4,107
Viper B MOA/ATCAA	5,568	2,540	8,108
R-2202A/B/C/D	10,168	3,387	13,555
R-2205	6,334	2,540	8,874
R-2211	3,031	3,387	6,418
Blair ATCAA	3,898	3,387	7,285

Source: Air Force 2015a.
Notes:
[1]Operations in these airspace units conducted only during major flying exercises.
[2]If the lower floors of these MOAs are not charted by the FAA, then the F-35As would conduct operations within the higher floor configurations of the Fox 3 MOA and Paxon ATCAA. Total operations would not change and would be distributed similarly as presented above. Aircraft would just not fly lower, but maintain operations within the higher constricts of the airspace.

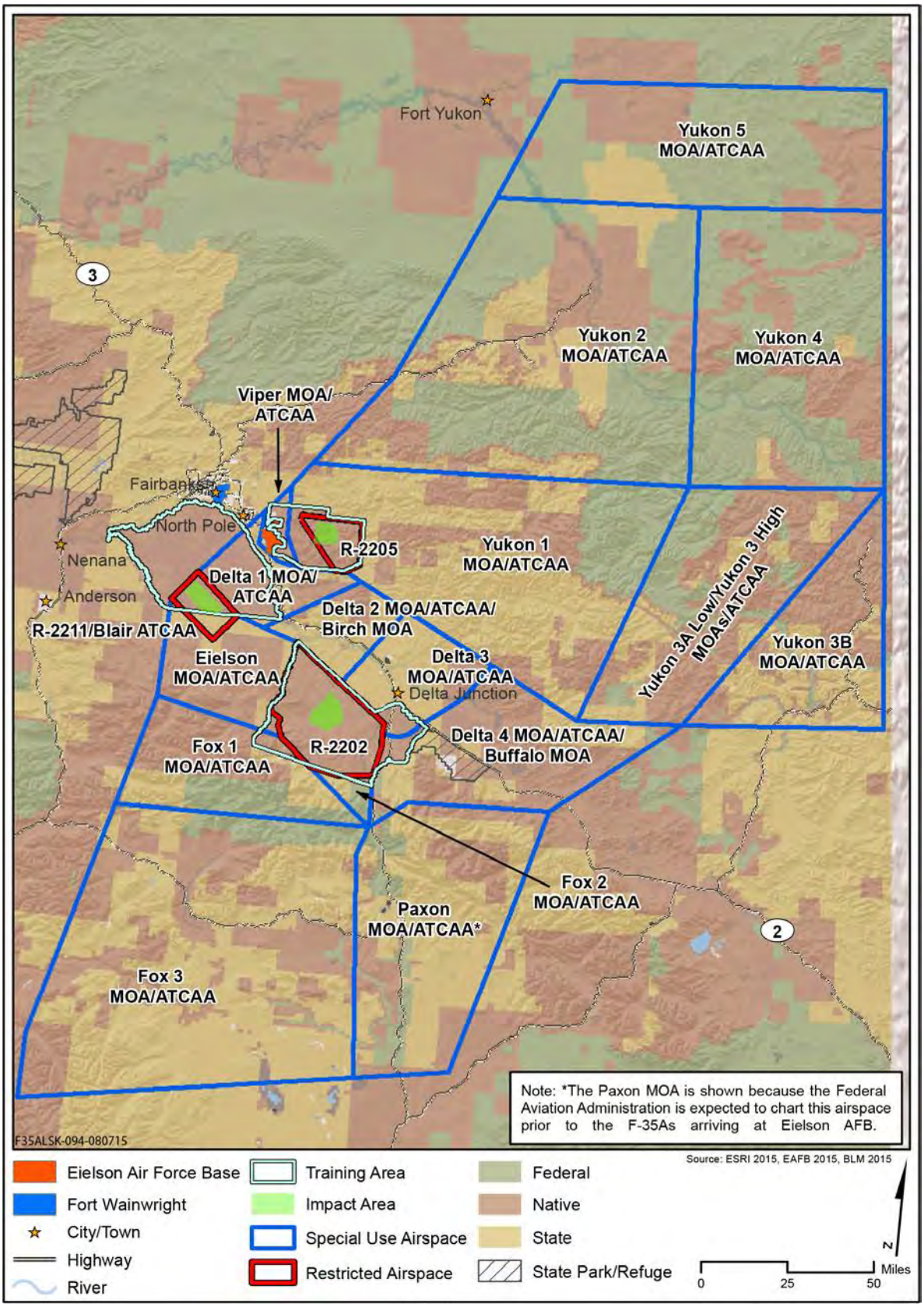


Figure ES-4. Joint Pacific Alaska Range Complex Airspace used by Eielson AFB Aircraft

The F-35As would occasionally use existing Military Training Routes (MTRs). As is done currently for aircraft operating in the MTRs, the F-35As would fly according to the parameters outlined in the 2008 611th Air Operations Center Finding of No Significant Impacts for the final Military Training Routes (Alaska) Environmental Assessment, whereby an average of eight operations per day (by any aircraft) can fly in any of the MTRs. If F-35As use MTRs for transit to other locations, the analyses in this EIS assume that the use would fall within the eight operations currently authorized for use by all aircraft. As F-35A operations would fall within the parameters already analyzed in the 611th Environmental Assessment, there would be no additional environmental impacts from MTR use by F-35As that have not already been analyzed in the 611th Environmental Assessment.

Due to the F-35A mission and the aircraft's capabilities, the Air Force anticipates approximately 10 percent of the time spent in air-to-air combat training, would involve supersonic flight for a maximum of 2 to 3 minutes per sortie. Supersonic flight would normally be conducted above 15,000 feet mean sea level (MSL), with 90 percent occurring above 30,000 feet MSL. On occasion, the F-35A aircraft may conduct supersonic flight below 15,000 feet MSL to accommodate mission and training needs; however, these would only be done in airspace already authorized and approved for supersonic flights at the lower altitudes.

Although the F-35A's stealth features significantly reduce its detectability, pilots must train to employ defensive countermeasures. Flares would be used only in approved JPARC airspace at the altitudes and seasons designated in the 11th Air Force Alaska Airspace Handbook and in accordance with the F-35A combat readiness training requirements. It is estimated that annually, F-35A pilots would deploy up to 27,060 flares; this would double current flare use within northern JPARC airspace.

The F-35A has the requirement and capability to perform air-to-ground missions (i.e., deploying ordnance and munitions from the aircraft to targets on the ground) to maintain combat readiness. For the F-35A, air-to-ground training represents approximately 60 percent of its training program, with the air-to-air mission accounting for the remaining 40 percent. While most air-to-ground training would be electronically simulated, where no ordnance or munitions are released from the aircraft, there is a need to conduct realistic ordnance delivery at approved JPARC ranges. Therefore, F-35A aircraft would primarily operate in northern JPARC restricted airspace (i.e., R-2202, R-2205, and R-2211) and at ranges (i.e., Oklahoma, Stuart Creek, and Blair Lakes Impact Areas) approved for live-fire and inert ordnance delivery.

It is anticipated that under the Proposed Action Alternative, F-35A pilots would annually deploy, in total, 68 to 75 live ordnance, and from 68 to 150 inert ordnance onto existing ranges. This represents an increase of 225 more bombs to the training areas. Because the F-35A also carries an internal 25-millimeter cannon, occasional tactical strafing training would be required. Strafing involves flying toward and firing at a prescribed strafing target for a short burst of time. The F-35A has a capacity of 180 rounds, and the four times per year that live strafing would occur; a total of 34,560 rounds would be expended. As is the case for air-to-air and air-to-ground ordnance training, strafing activities must follow specific safety procedures and be employed only on approved JPARC ranges and targets.

ES.7 ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ACTION ALTERNATIVE

ES.7.1 Airfield and Airspace Operations and Management

***Base*:** In early FY21, with all F-35A aircraft at the base, the added activity would raise total annual airfield operations by approximately 138 percent, or by 26,106 operations. Even though total operations would more than double, this increase would not affect the airfield or surrounding terminal airspace management and use within the local air traffic environment. Eielson AFB was surveyed for the F-35A beddown, and the runway and terminal airspace capacity were found to be adequate for the additional annual airfield operations. No changes to the Eielson AFB terminal airspace or base arrival and departure procedures would be required to accommodate F-35A aircraft performance or operations. The increased operations would not exceed the capabilities of Eielson AFB Approach Control or its control tower for handling air traffic within the local airspace. There are no adverse impacts to the Eielson AFB airfield and adjacent terminal airspace structure or management.

***Airspace*:** Under the Proposed Action Alternative, F-35A operations would not alter management or current or planned structure of northern JPARC restricted areas, MOAs, and overlying ATCAAs. The F-35A would fly mission profiles similar to those flown by F-16s. The F-35A training activities would occur throughout the restricted airspace and ranges for air-to-ground training and the numerous MOAs and ATCAAs would continue to be used for air-to-air combat training and exercises. There would be no adverse impacts to northern JPARC airspace management. Adherence to all Federal Aviation Administration Visual Flight Rules, 11th Air Force (the JPARC managing entity) flight limitations (as prescribed in the 11th Air Force Alaska Airspace Handbook), and established communication procedures would not introduce adverse impacts to civil and commercial aviation activities.

Ongoing interaction between Eielson AFB, the Alaska Civil/Military Aviation Council, and state and federal agencies, as well as continued use of the Special Use Airspace Information Service (SUAIS), ensures continued compatibility of military and commercial/civil aviation in the affected environment of Eielson AFB and JPARC airspace. No adverse impacts to civil and commercial aviation activities are anticipated under the Proposed Action Alternative.

ES.7.2 Acoustic Environment

***Base*:** Under the Proposed Action Alternative, the 65 decibels A-weighted (dB) Day-Night Average Sound Level (DNL) contour would extend past the northern base boundary into the town of Moose Creek by nearly 1 mile and to the west by approximately 1,900 feet. Figure ES-5 presents the noise contours generated by the No-Action Alternative and Figure ES-6 presents those generated under the Proposed Action Alternatives. The 70 dB DNL contour would not extend beyond the base except at the western boundary by approximately 800 feet. When compared to the No-Action Alternative, off base, there would be approximately 865 more acres and 73 more households, to the north and west of the base, which would experience an increase in DNL between 65 and 70 dB. Ten additional acres would newly experience DNL between 70 and 75 dB to the west, but no households were identified in this area.

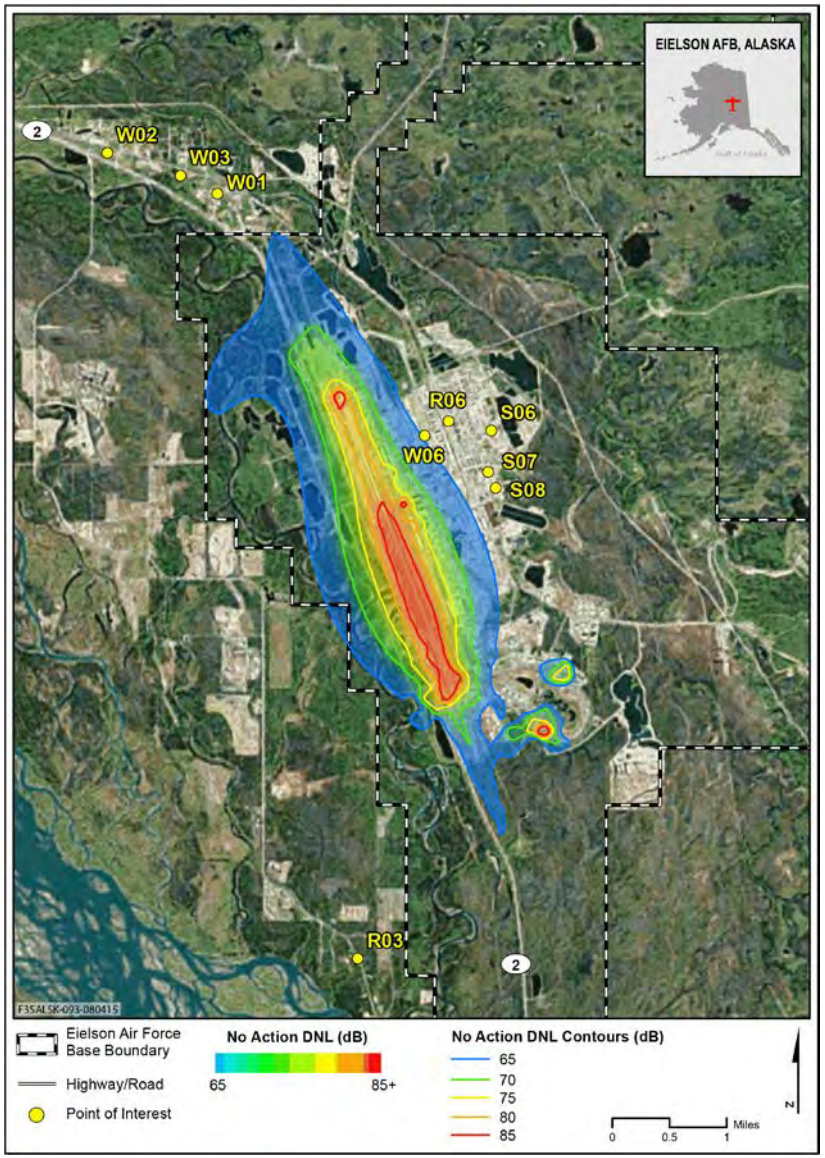


Figure ES-5. No-Action Alternative 65 to 85 dB DNL Contours

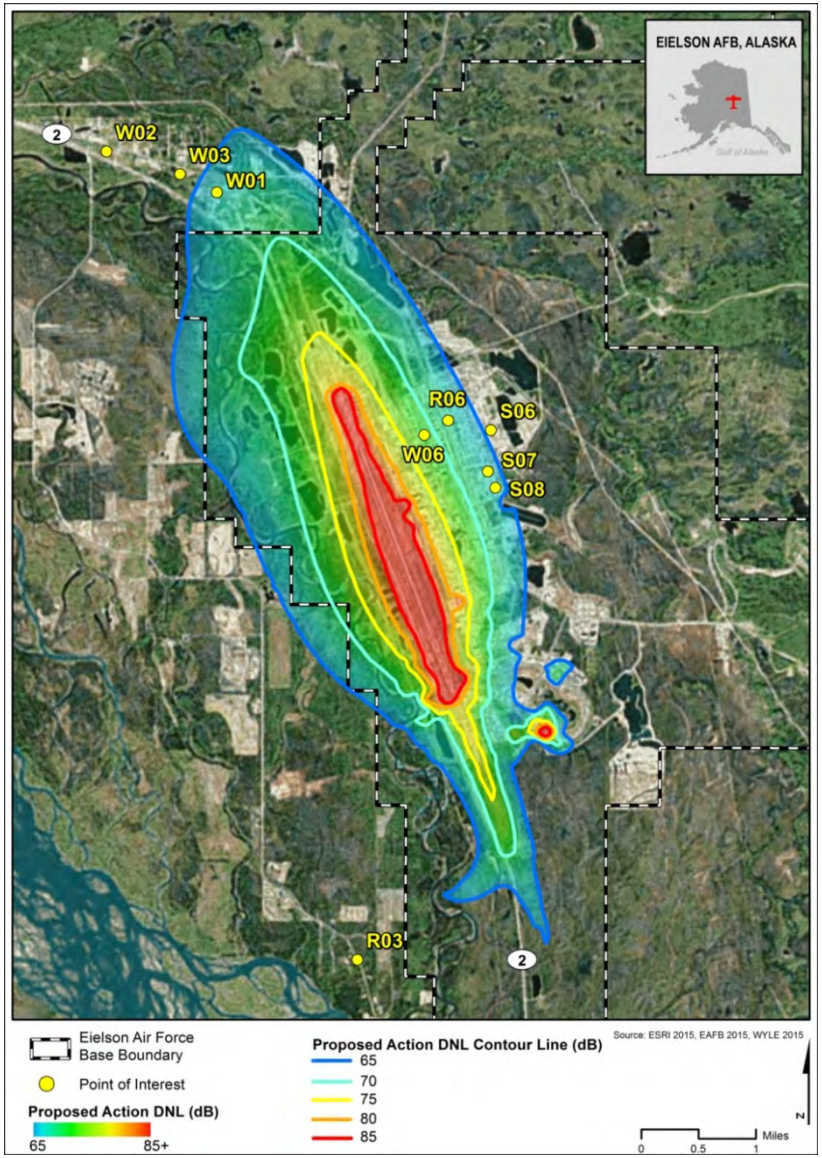


Figure ES-6. Proposed Action Alternative 65 to 85 dB DNL Contours

Population

Under the Proposed Action Alternative, 178 more people in Moose Creek would experience DNL between 65 and 70 dB. On base, approximately 860 more military personnel in dormitories would experience DNL between 70 and 75 dB, identified as Point of Interest (POI) W06 in Figure ES-6. There would be 1,382 military personnel and their dependents, residing in 512 on-base residences, newly exposed to DNL between 65 and 70 dB in the housing area (R06).

Table ES-6 shows DNL for representative POIs under the Proposed Action Alternative; Figure ES-6 identifies the POIs affected by noise levels greater than or equal to 65 dB DNL. Five locations would experience DNL greater than or equal to 65 dB, compared to one under the No-Action Alternative. Under the Proposed Action Alternative, one location would be off base at the Moose Creek Baptist Church (W01), which would experience an increase in DNL of approximately 5 dB. On base, DNL at two schools (S07 and S08) would increase by an estimated 5 dB DNL, to a projected DNL of 66 dB, and the residential housing area (R06) would experience an approximate 7 dB DNL increase. The base chapel and dormitories (W06) would experience a DNL of 71 dB, reflecting an increase of 6 dB DNL.

Table ES-6. Proposed Action Alternative DNL for Representative Points of Interest

Description				***DNL (dB)***	
Type	*ID*	*Points of Interest*	*On Base?*	*Proposed*	*Increase from No Action*
Park (includes recreation and wildlife)	P01	Salcha River State Recreation	No	<45	N/A
	P02	Harding Lake		<45	N/A
	P04	Tanana Valley State Forest		<45	N/A
	P05	Chena Lakes		47	1
Residential	R01	Tare Nike Missile Site		49	2
	R02	6615-6647 Richardson Highway		52	7
	R03	Old Valdez Trail		53	5
	R06	Eielson AFB Housing	Yes	68	6
School/ Day Care	S01	North Pole Elementary School/ Eagle Wings Assisted Living	No	<45	N/A
	S02	North Pole Middle School		<45	N/A
	S03	Association of Village Council Presidents Head Start		<45	N/A
	S04	Loving Learning Day Care		48	2
	S05	Salcha Elementary School		<45	N/A
	S06	Anderson Elementary School/ Child Development Center	Yes	64	5
	S07	Ben Eielson Junior/Senior High School		66	5
	S08	Crawford Elementary School		66	5
Place of Worship/ Residential	W01	Moose Creek Baptist Church	No	66	5
	W02	Pioneer Baptist Church		60	5
	W03	Church of Christ		64	6
	W04	Lord of Life Lutheran Church		<45	N/A
	W05	North Pole Missionary Chapel		<45	N/A
	W06	Base Chapel/Base Dorms	Yes	71	6

Legend: N/A = Not Applicable.

Speech Interference. In terms of indoor speech interference, off-base locations would experience a range of one to three more interference events per hour with windows closed and between one and three more events per hour with windows open when compared to the No-Action Alternative. The percent probability of indoor awakening events for representative residential locations, during environmental nighttime hours (10:00 p.m. to 7:00 a.m.), would be less than 5 percent with windows opened and no

more than 2 percent with windows closed. The percentage probability of awakening would increase by less than 2 percent under the Proposed Action Alternative relative to the No-Action Alternative.

Classroom Learning Interference. None of the off-base schools would experience increases in classroom learning interference events; however, the Loving Learning Day Care Center would experience a one-event per hour increase with windows open compared to zero under the No-Action Alternative. On base, the three schools and the child development center would experience increased numbers of hourly classroom learning interference events with windows closed or open. Relative to the No-Action Alternative, Anderson and Crawford Elementary Schools and Ben Eielson Junior/Senior High School would experience two more classroom disruptions per hour with windows closed and three more per hour with windows open. These interruptions could disturb the teaching continuity within the classroom.

Sleep Disturbance. Under the Proposed Action Alternative, there would be approximately 1,800 nighttime disturbance events at residential areas. This represents a 23-percent increase relative to the No-Action Alternative. The percentage probability of awakening would be less than 6 percent with windows opened and no more than 3 percent with windows closed. When compared to the No-Action Alternative, the percent probability of awakening with windows open or closed would increase by about 2.4 percent.

Potential for Hearing Loss. Under the Proposed Action Alternative, no residential areas on or off base would be exposed to DNL greater than or equal to 80 dB. Therefore, a potential for hearing loss is not anticipated.

Workplace Noise. Air Force occupational noise exposure, prevention procedures such as hearing protection and monitoring would continue to be applied under the Proposed Action Alternative. These procedures would assure compliance with all applicable Occupational Safety and Health Administration and Air Force occupational noise exposure regulations.

Construction Noise. Noise is an unavoidable, short-term by-product of construction activities. The major noise events for this construction would take place on the base with only a negligible increase in traffic noise caused by vehicles entering and exiting the base for construction deliveries and work force arrivals and departures. On base, steps would be taken to minimize the impacts. These include having construction equipment enter at the South Gate and making sure all equipment is in good operating condition with an emphasis on maintenance of mufflers, bearings, and moving machinery parts. Stationary equipment with a potential to emit noise would be placed away from sensitive noise receivers. Stockpiles and haul roads would be planned so that the vehicle paths are away from sensitive noise receivers. Whenever possible, noise events would be scheduled to avoid noise sensitive times (e.g., weekends and holidays).

Non-Auditory Effects. The current state of scientific knowledge cannot yet support inference of a causal or consistent relationship between aircraft noise exposure and non-auditory health consequences for exposed residents. Although some recent studies offer indications, it is not yet possible to establish a quantitative cause and effect based on the currently available scientific evidence.

Land Use Compatibility

Off base, 73 more households would experience DNL between 65 and 70 dB. All the households exposed to DNL between 65 and 70 dB are in Moose Creek, to the north. To the west, areas would be exposed to DNL between 65 and 75 dB; however, no households or people were identified that reside

there. The Fairbanks North Star Borough (FNSB) identifies these lands to the north and west as general use. The majority of the area impacted by DNL greater than 65 dB is on base; the largest increase is in areas that would experience DNL between 65 and 70 dB.

Domesticated Animals and Wildlife

Construction: Noise generated during construction would be confined to the base. Domesticated animals and wildlife inhabiting areas surrounding new building construction and existing structure alteration projects could be subject to short-term increases in noise levels and human activity. Any increases would be temporary and therefore, no adverse impacts to on-base domesticated animals or wildlife.

Aircraft Operations: Wildlife could be startled and temporarily displaced in the presence of increased noise and activity around the flight line, as aircraft operations would more than double once the F-35s arrive. However, these responses are expected to be temporary and wildlife would be expected to move and use adjacent habitat in such instances. Aircraft have been flying at this installation for many decades and wildlife species would likely adapt to the increased noise levels generated by F-35A operations. No adverse impacts are anticipated for domesticated animals or wildlife under the Proposed Action Alternative.

Airspace

Population

Subsonic Flight. Subsonic noise levels under the northern JPARC airspace are represented by the Onset-Rate Adjusted Monthly Day-Night Average Sound Level metric, or L_{dnmr}. This metric accounts for the specific effects of low-altitude and high-speed operations that can occur in airspace such as MOAs or Restricted Areas. The busiest month was used for modeling purposes, or the conditions that would occur during the 6 weeks of major flying exercises. The results include both the F-35As and aircraft operating under the No-Action Alternative (reflective of current conditions). Please note that the modeling assumed that the Paxon Low and expanded Fox 3 MOAs would be charted by the time F-35As operate in northern JPARC airspace. However, if these two MOA changes are not charted, F-35As would operate at higher altitudes within the existing airspace structure and noise levels would be negligibly lower than presented here under the Proposed Action Alternative (Figure ES-7).

All MOAs within northern JPARC airspace were estimated to have L_{dnmr} values less than 65 dB, except R-2205 and R-2211. These two restricted areas would have L_{dnmr} of 71 and 68 dB, respectively, increasing by 5 to 7 dB relative to the No-Action Alternative. Subsonic noise conditions under the Proposed Action Alternative would not differ substantially from those found under the No-Action Alternative.

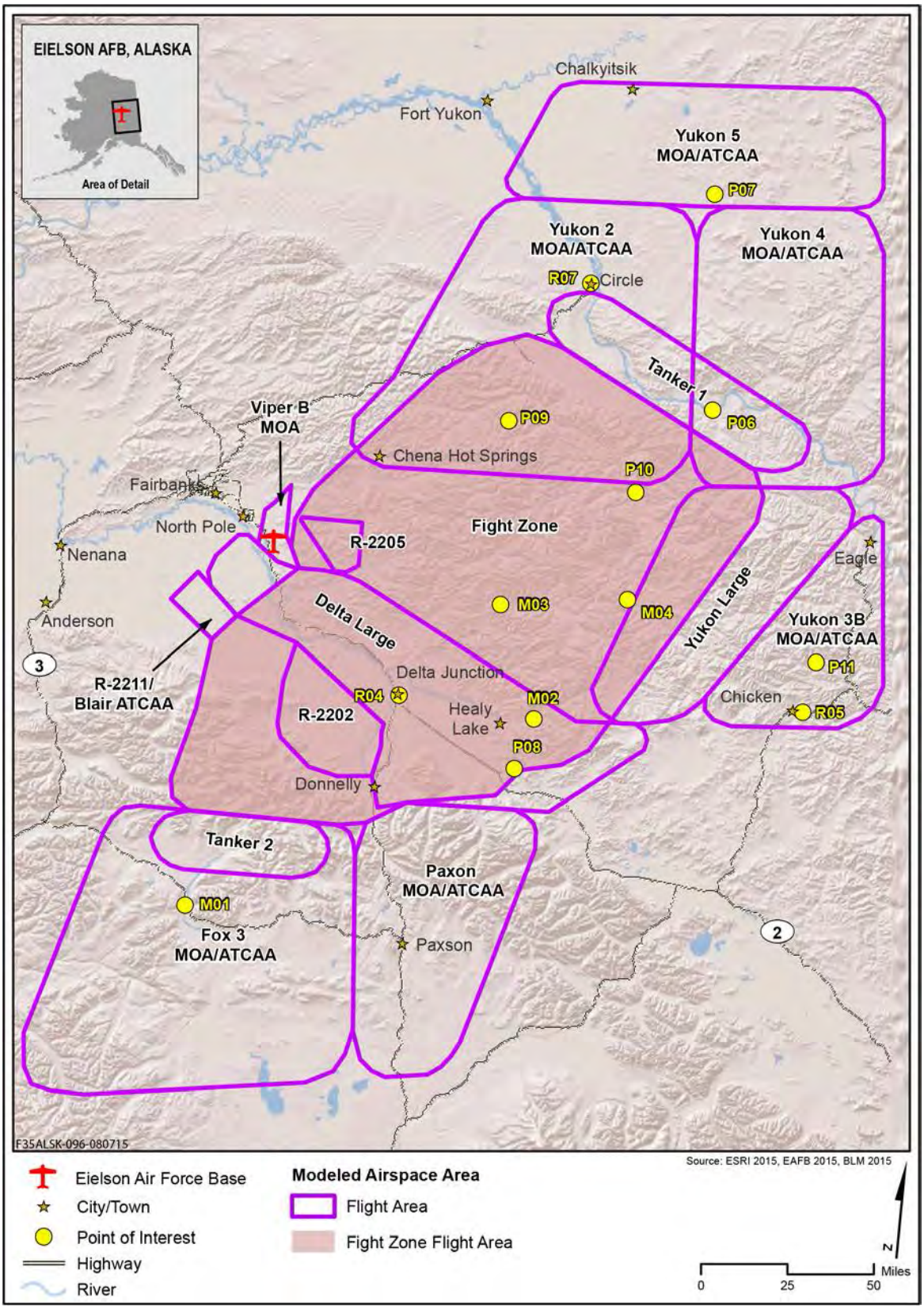


Figure ES-7. Modeled Northern JPARC Airspace and Representative POIs

Supersonic Flight. Under the Proposed Action Alternative, maximum C-weighted Day-Night Average Sound Levels (CDNL) of 56 dB would occur in the center of the Fight Zone area that comprises the Delta ATCAA and Yukon 1 MOA (Figure ES-8 and Table ES-7). Because air combat training would be concentrated near the center of the modeled flight area, the number and intensity of sonic booms would be less in areas that are not directly beneath the center of the modeled flight area. However, sonic booms may propagate horizontally, affecting ground areas beyond the military training airspace boundaries. Compared to the No-Action Alternative, the Proposed Action Alternative would increase the CDNL by no more than 1 dB across the flight areas. The towns of Delta Junction and Circle would be exposed to similar CDNL as found under the No-Action Alternative; Chicken would experience an increase of 1 dBC.

Table ES-7. Proposed Action Alternative Supersonic Noise Exposure and Sonic Booms per Busiest Month in Northern JPARC Airspace

Description		***Point of Interest***	***Location***	***Proposed Action***		***Increase from No Action***	
Type	*ID*			*CDNL (dBC)*	*Booms/ Busiest Month*	*CDNL (dBC)*	*Booms/ Busiest Month*
Multi-Use	M01	Denali Highway where it crosses Susitna River	Fox 3	49	12	0	1
	M02	Healy Lake Airport	Delta 4	50	15	0	1
	M03	Pogo Mine Airstrip	Yukon 1	55	36	0	2
	M04	Joseph Creek	Yukon 1	51	19	0	1
Park (includes recreation and wildlife)	P06	Yukon-Charley Rivers National Preserve	Yukon 4	51	18	0	1
	P07	Yukon Flats National Wildlife Refuge	Yukon 5	49	11	0	1
	P08	Lake George (southeast of Delta Junction)	Delta 4	48	11	0	1
	P09	Steese National Conservation Area/ Birch Creek WSR	Yukon 2	53	28	1	2
	P10	Charley WSR	Yukon 1	53	28	1	2
	P11	Fortymile WSR	Yukon 3B	<42	1	1	0
Residential	R04	Delta Junction	Delta 3	53	27	0	2
	R05	Chicken	Yukon 3B	<42	1	1	0
	R07	Town of Circle	Yukon 2	49	13	0	1

For the number of sonic booms generated during the busiest month, there would be an increase of two per busiest month in the vicinity of Pogo Mine Airstrip (M03), Steese National Conservation Area/Birch Creek Wild and Scenic River (WSR) (P09), Charley WSR (P10), and Delta Junction (R04). With the exception of Chicken (R05) and the Fortymile WSR (P11), where there would be no changes in the number of booms, all other POIs would experience a one boom per busiest month increase under the Proposed Action Alternative (Figure ES-9). Supersonic noise conditions under the Proposed Action Alternative would not differ substantially from those found under the No-Action Alternative. Therefore, the additional sonic booms generated by the F-35s would not produce significant adverse impacts.

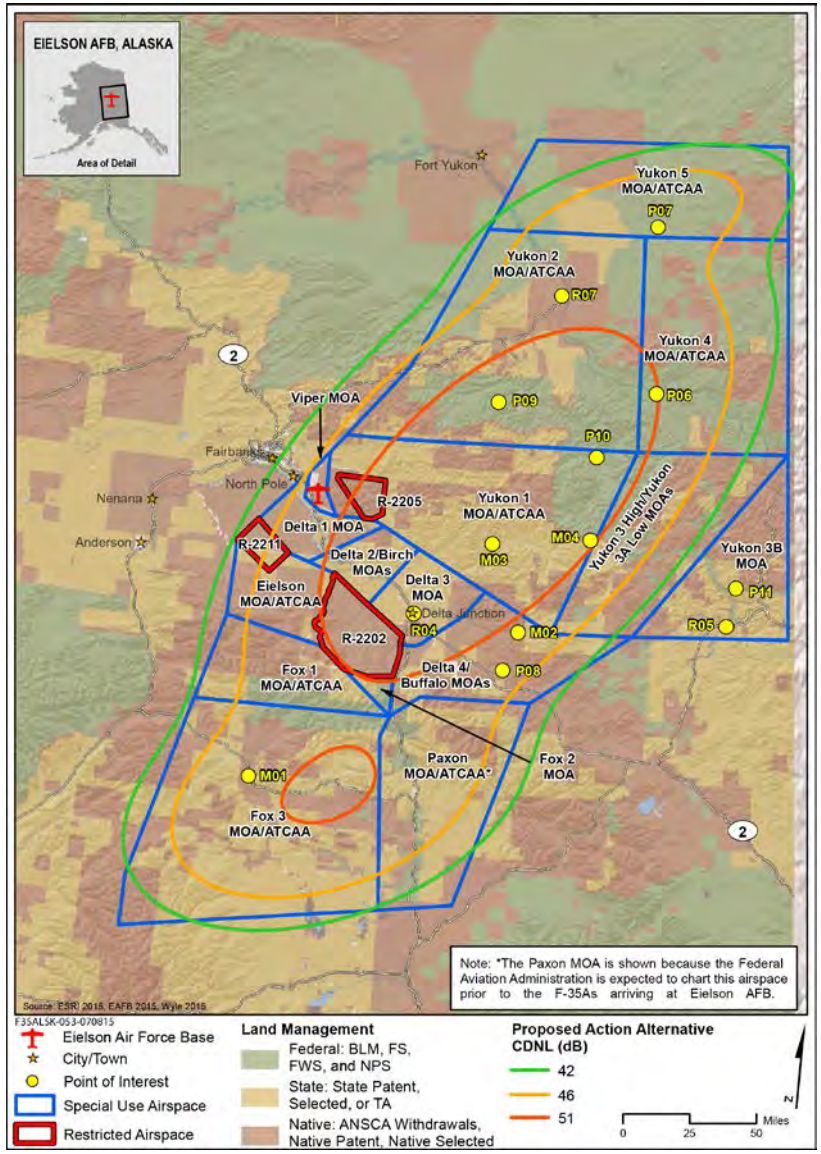


Figure ES-8. Proposed Action Alternative CDNL Contours for Supersonic Operations during the Busiest Month

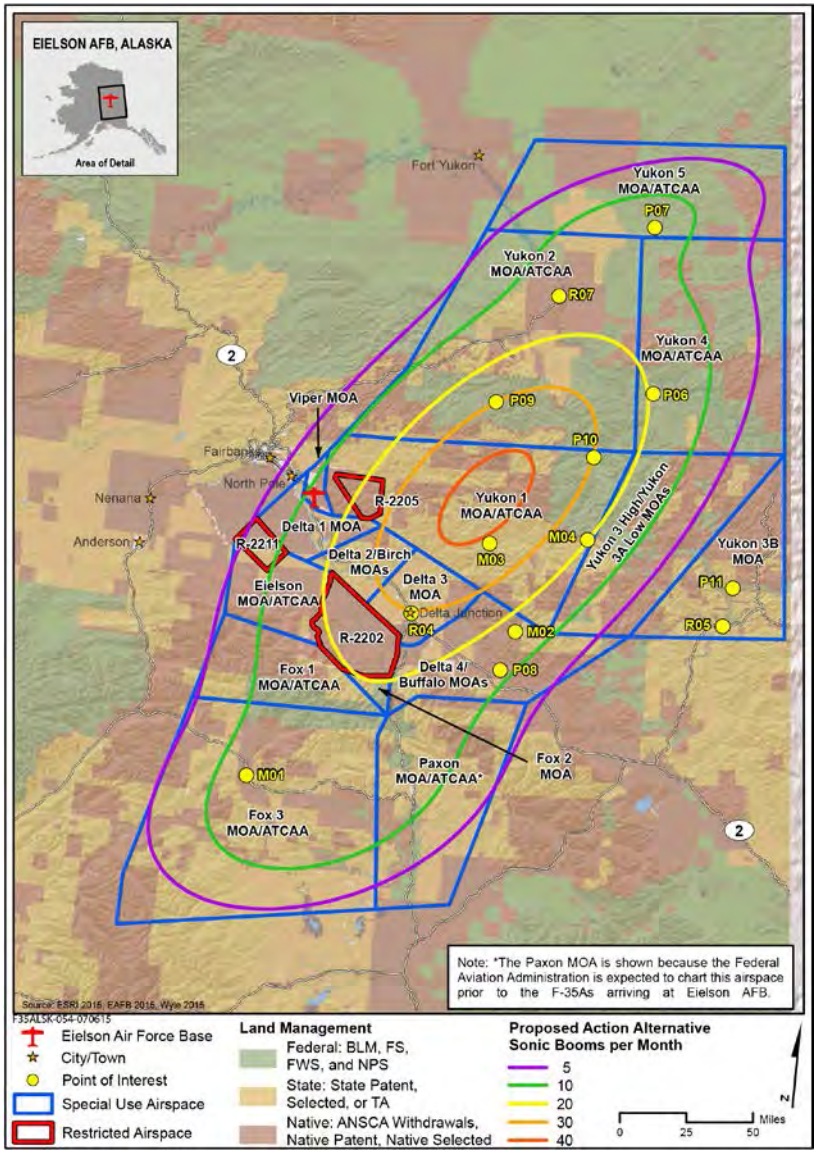


Figure ES-9. Proposed Action Alternative Estimated Number of Sonic Booms during the Busiest Month

Land Use Compatibility

In terms of outdoor speech interference, when compared to the No-Action Alternative, Viper MOA and R-2205 would experience increases in NA65 L_{max} of up to six events during the busiest month of the major flying exercises. For potentially audible outdoor events, all modeled flight areas, except the Yukon MOAs and the Paxon MOA, would have an NA35 L_{max} of at least one event during the busiest month of a major flying exercise. At 122 events during the busiest month, the Viper B MOA would have the greatest NA35 L_{max} of the modeled flight areas. The area under the Blair ATCAA would also have the greatest increase in NA35 L_{max}, at 56 events during the busiest month, relative to the No-Action Alternative. The L_{dnmr} values are shown for the representative POIs in Table ES-8 for the Proposed Action Alternative, compared to the No-Action Alternative. All POIs would have L_{dnmr} less than 65 dB; with the Healy Lake Airport environs (M02) experiencing an L_{dnmr} of 62 dB. Increases in L_{dnmr} would range between 4 and 5 dB when compared to the No-Action Alternative. However, all POIs would experience L_{dnmr} of less than 65 dB under the Proposed Action Alternative.

Table ES-8. Proposed Action Alternative L_{dnmr} for Representative POIs under Northern JPARC Airspace

POI			***No Action***	***Proposed***	
Type	*ID*	*Description*	***L_{dnmr} (dB)***	*L_{dnmr} (dB)*	*Increase from No Action (dB)*
Multi-Use	M01	Denali Highway where it crosses Susitna River	<45	<45	5
	M02	Healy Lake Airport	58	62	4
	M03	Pogo Mine Airstrip	<45	<45	N/A
	M04	Joseph Creek	<45	<45	N/A
Park (includes recreation and wildlife)	P06	Yukon-Charley Rivers National Preserve	<45	<45	>= 3
	P07	Yukon Flats National Wildlife Refuge	<45	<45	>= 2
	P08	Lake George (southeast of Delta Junction)	53	57	4
	P09	Steese National Conservation Area/Birch Creek WSR	49	54	5
	P10	Charley WSR	<45	<45	N/A
	P11	Fortymile WSR	<45	45	4
Residential	R04	Delta Junction	53	57	4
	R05	Chicken	<45	<45	4
	R07	Town of Circle	49	54	5

Domesticated Animals and Wildlife

As detailed in Appendix E, Section E.2.14, animals exhibit a wide variety of responses to noise, ranging from startle to panicked flight. Consequently, some animal species may be more sensitive than other species and/or may exhibit different forms or intensities of behavioral responses. The majority of the literature suggests that domesticated animals (e.g., cows, horses, and chickens), as well as most wildlife exhibit adaptation, acclimation, and habituation after repeated exposure to jet aircraft noise and sonic booms. Noise is expected to increase in northern JPARC airspace; however, extensive avoidance measures are currently in place for areas within the JPARC that overlie critical habitat for nesting and calving, subsistence areas, hatcheries, and other areas supporting wildlife populations such as the Dall sheep, the Delta caribou herd, peregrine falcons, and salmon. These measures, which include seasonal and/or altitude restrictions, are identified in the 11th Air Force Alaska Airspace Handbook and must be followed by all Air Force and Air Force-sponsored military pilots operating in JPARC airspace. Therefore, all F-35A pilots would be required to adhere to these measures when operating in JPARC

airspace. No federally listed species would be affected, and it is anticipated that only minor and short-term responses would be experienced by eagles and migratory birds underlying northern JPARC airspace.

ES.7.3 Air Quality

***Base*:** The total incremental emissions from the Proposed Action Alternative construction, operations, personnel commuting, and heating are shown in Table ES-9. In addition to the criteria pollutants, volatile organic compounds (VOCs) and ammonia (NH_3) are included because VOCs are an important ozone precursor gas and ammonia can cause secondary particulate matter and interfere with visibility. The table shows the expected emissions during each year up to the steady state of 2021.

Table ES-9. Proposed Action Alternative Total Emissions by Year

Pollutant	*Emissions 2016 (ton/year)*	*Emissions 2017 (ton/year)*	*Emissions 2018 (ton/year)*	*Emissions 2019 (ton/year)*	*Emissions 2020 (ton/year)*	*Emissions 2021 (ton/year)**
VOC	0.926	5.423	0.677	11.698	23.398	23.398
NO_x	3.411	14.171	1.539	61.649	123.304	123.304
CO	2.979	13.863	8.871	164.636	329.299	329.299
SO_x	0.006	0.027	0.009	6.202	12.404	12.404
PM_{10}	2.299	4.061	0.085	10.496	20.992	20.992
$PM_{2.5}$	0.185	0.000	0.073	8.829	17.659	17.659
Pb	0	0	0	0	0	0
NH_3	0.006	0.034	0.080	0.465	0.930	0.930

Legend:
VOC = volatile organic compounds; NO_x = nitrogen oxides; CO = carbon monoxide; SO_x = sulfur oxides; $PM_{10/2.5}$= particulate matter 10 and 2.5 micrometers in size; and Pb = lead.

Additionally, because the emissions from aircraft operations are a continuing activity, the mobile source emissions of criteria pollutants predicted for each squadron of the 24 aircraft are shown separately in Table ES-10.

Table ES-10. Proposed Action Alternative F-35A Emissions per Squadron (24 aircraft per squadron)

Calendar Year	*Scenario*	*Emissions (tons/year)*					
		VOC	*SO_x*	*NO_x*	*CO*	*PM_{10}*	*$PM_{2.5}$*
2019	1st Squadron	8.8	6.2	59.1	118.1	10.4	8.8
2020	2nd Squadron	8.8	6.2	59.1	118.1	10.4	8.8
Total Emissions	**Both Combined**	**17.6**	**12.3**	**118.1**	**236.1**	**20.7**	**17.5**

Total emissions, after steady state operations would occur in 2021, were compared to the total emissions of the FNSB. The comparison showed the incremental increase to be 0.096 percent for CO, 1.26 percent for NO_x, 0.030 percent for VOCs, 0.246 percent for SO_x, 0.050 percent for PM_{10}, and 0.064 percent for $PM_{2.5}$. Due to the small incremental increases, the impact to regional air quality is not considered adverse.

A second quantitative analysis was conducted by comparing mobile source emissions of the A-10 and F-16 squadrons stationed at Eielson AFB in calendar year 2004, to the proposed F-35A emissions expected in 2021. The year 2004 represents a conservative estimate when the number of based aircraft was greater than what exists now. Comparing the 2004 emissions with the F-35A, 0.4 more tons per year of VOCs would be generated, 4.3 more tons per year of SO_x, 53.8 more tons per year of NO_x, 32.2 more tons per year of CO, and 12.8 less tons per year of PM_{10}. In 2004, $PM_{2.5}$, a subset of PM_{10}, reporting was not required by the U.S. Environmental Protection Agency (USEPA). When compared to historical emissions, the F-35A beddown would increase criteria emissions with the exception of PM_{10}. The two

most important pollutants to the regional air quality are CO and PM_{10} due to the nearby CO maintenance and the $PM_{2.5}$ nonattainment areas. While CO would increase above the historic levels, the expected emissions are still a small fraction of the FNSB emissions (0.096 per cent). PM_{10} emissions are expected to be less than historic emissions and are estimated to represent 0.050 percent of the FNSB emissions. There are no adverse impacts to regional air quality.

It was also identified that F-35A aircraft would traverse small portions of the $PM_{2.5}$ nonattainment and CO maintenance areas while arriving and departing on particular flight tracks below 3,000 feet above ground level (AGL). It was determined annual emissions would equate to less than 1 ton of $PM_{2.5}$ and about 1.1 tons of CO. The threshold, or *de minimis*, for $PM_{2.5}$ is 100 tons in nonattainment areas and for CO it is 100 tons for areas in maintenance. These emissions would not exceed *de minimis* thresholds for either criteria pollutant. Therefore, no conformity analysis is required and no adverse impacts to these maintenance and nonattainment areas.

***Airspace*:** The F-35A operations would only represent a small portion of the activity currently underway in northern JPARC airspace, an area in attainment for all criteria pollutants. The VOCs and NO_x projected annual emissions would be substantially smaller than those generated by F-35As at the base. This is because F-35As primarily would fly the majority of the time above the 3,000-foot AGL mixing height. Therefore, no adverse effects to regional air quality would be imposed. Additionally, visibility impairment to the only Class I area for Prevention of Significant Deterioration (PSD), Denali National Park, would not be affected. The Park is about 15 miles from the northern JPARC airspace and with the transport distance (i.e., 15 miles) emissions would be dispersed by the time they reach the Park. Other special use areas (e.g., conservation areas and WSRs) would not be exposed to visibility impairment, as the F-35A would spend a predominant amount of its flight time above the 3,000-foot AGL mixing height.

Greenhouse Gases. The computed carbon dioxide equivalent, or CO_2(e), emissions after beddown of both F-35A squadrons is 31,704 metric tons, or 0.937 percent of the existing CO_2(e) emissions for the FNSB region. Accordingly, no adverse impacts from GHG emissions due to the Proposed Action Alternative are anticipated.

ES.7.4 Safety

***Base*:** Operations and maintenance activities conducted on Eielson AFB would continue to be performed in accordance with all applicable safety directives.

Fire Risk and Management. Fire and crash response would continue to be provided by the Eielson AFB fire department. In response to the increased use of advanced composite materials in aircraft, a Hazardous Aerospace Material Mishap Emergency Response (HAMMER) Integrated Process Team was chartered. The HAMMER project identifies and inventories all hazardous aerospace materials on Air Force weapon systems and ensures procedures are in place to protect personnel from safety/health hazards associated with aerospace vehicle mishaps. Although not anticipated, if new response procedures are required for unique materials used in the F-35A, the Air Force will develop them after the F-35A model is finalized and prior to being based at Eielson AFB. Under the Proposed Action Alternative, fire fighters would continue to be fully trained and appropriately equipped for crash and rescue response; the F-35A beddown would not change these abilities. If new information and/or fire-fighting techniques associated with composite materials burned during an accident are identified, then local fire-fighting departments will be informed. No adverse impacts to fire risk and management are anticipated.

Accident Potential Zones. No changes to existing Accident Potential Zones (APZs) or Clear Zones would be required to accommodate F-35A operations. The approximate 72 residences would continue to be located within APZ II in Moose Creek; however, the F-35A would follow all established airfield course rules and flight procedures to ensure that no new or increased safety risks would be introduced to the installation population or adjacent communities. No adverse impacts associated with APZs are anticipated.

Aircraft Mishaps. Because of the emphasis on safety and design of its more powerful engine, the F-35A should have an operational mishap rate similar to other tactical fighter jet aircraft like the F-16 and F-15. Additionally, F-35A pilots would use simulators extensively. Simulator training would include all facets of flight operations and comprehensive emergency procedures. This minimizes risk associated with mishaps due to pilot error. The sophistication and fidelity of current simulators and related computer programs match the advancements made in aircraft technology. Since they were operational to January 2015, F-16s had a Class A mishap rate of 3.49 and F-15s a rate of 2.36 for every 100,000 hours flown. As of January 2016, all three F-35 variants have flown a combined 23,000 hours; the F-35A has flown over 9,000 hours with one Class A mishap (an engine fire).

Bird/Wildlife Strike Hazards (BASH). Over the past 5 years, there has been an annual average of 9.8 bird-aircraft strikes at Eielson AFB. Implementing the Proposed Action Alternative is expected to increase airfield operations by 138 percent, which would increase the number of bird strikes by aircraft to a possible average of 24. Although this is a substantial increase in strikes, the Air Force considers this a minor impact that would have only negligible effects on bird populations on the base. Three factors support this conclusion: 1) the F-35A would operate like all other fighter aircraft that have used Eielson AFB; 2) no aspect of the Proposed Action Alternative would increase concentrations of birds on or near the base; and 3) the base would continue use of the 354 FW BASH Plan and Air Force tools (bird avoidance model and Avian Hazard Advisory System) and cooperation with local U.S. Department of Agriculture Wildlife Services to minimize the BASH potential. Furthermore, when BASH risk increases, limits are placed on low-altitude flights and certain types of training (e.g., multiple approaches). Minor adverse impacts associated with BASH are anticipated.

Airspace: Under the Proposed Action Alternative, operations in northern JPARC airspace would increase when compared to the No-Action Alternative. Such an increase would not affect the abilities of this airspace to accommodate the proposed training activities by the F-35As and would not result in structural changes to JPARC airspace. Total operations within northern JPARC airspace and ranges would remain within the capability and capacity of the airspace and managing entities. If new information and/or fire-fighting techniques associated with composite materials burned during an accident are identified, then local fire-fighting departments will be informed.

Fire Risk and Management. The potential for wildfire ignition by flare use was identified as a public concern with F-35A operations; however, based on the emphasis of flight at higher altitudes, roughly 90 percent of F-35A flares released throughout authorized JPARC airspace would occur above 15,000 feet MSL, further reducing the potential risk for accidental fires. To mitigate the potential for wildland fires in the Delta Junction area, all fire management and response practices currently employed would continue. These include monitoring the fire weather index and modifying planned training activities accordingly, establishing non-training buffers within 0.5 miles of training areas to protect the surrounding areas, and conducting prescribed burns and mechanical thinning in training areas. The following standard measures would continue to be implemented:

- Maintain firefighting materials and equipment by all units on ranges or training areas during high and extreme fire risk index rating periods. These firefighting tools would include but are not limited to Pulaskis, beaters, and portable water extinguishers.
- Limit the use of certain ammunition and pyrotechnics during periods of elevated fire risk indices.

Implementation of the above listed measures would minimize the potential for adverse impacts to lands and the public.

Aircraft Mishaps. No military to civilian midair collisions and few reported near misses have occurred within the northern JPARC airspace. Pilot attentiveness to safe flight practices would continue to avoid impacts to civil and commercial flights in the airspace. Additionally, maintenance of situational awareness, and use of available communications for tracking the scheduled and near real-time status of the JPARC airspace helps maintain a safe flying environment for all concerned. Any changes to those capabilities and the current or future areas in which this service is provided would be appropriately addressed and communicated through the same venues. The majority of flight operations would be conducted over remote areas; however, in the unlikely event that an aircraft accident occurs, existing response, investigation, and follow-on procedures would be enforced to ensure the health and safety of underlying populations and lands. No adverse aircraft mishap impacts are anticipated under the Proposed Action Alternative.

Bird/Wildlife Strike Hazards. Under the Proposed Action Alternative, the F-35A would operate in the same airspace environment as the current aircraft. As such, the overall potential for bird-aircraft strikes is not anticipated to be statistically different following the beddown of the F-35A. It is anticipated that BASH potential would be mitigated by the fact that F-35A aircrews operating in the JPARC would be required to follow applicable procedures outlined in the 354 FW BASH Plan and the fact that the majority of its flight time is spent at higher altitudes. When BASH risk increases, limits are and would continue to be placed on low-altitude flights. Special briefings are provided to military pilots whenever the potential exists for greater bird-strike risks within the airspace; F-35A pilots would also be subject to these procedures. Under the Proposed Action Alternative, BASH risk would not impose adverse impacts when compared to the No-Action Alternative.

ES.7.5 Socioeconomics

Base:

Population, Demographics, and Economics. The FNSB population is projected to be 106,822 by calendar year 2020; the addition of 2,765 would represent an increase of 2.6 percent over this level. A change in population is not considered an impact itself; however, population change has the potential to drive positive or negative impacts to other socioeconomic factors. Under the Proposed Action Alternative, FNSB demographic characteristics would not change in any material way. Some slight variation from the No-Action Alternative conditions may occur, but any changes would not be adverse. Construction activities are anticipated to occur from 2016 to 2019 and would inject an estimated $453 million (direct, indirect, and induced) into the economy. Once the two squadrons become operational in 2020, there would be an estimated direct, indirect, and induced annual economic benefit of approximately $250 million. No adverse impacts to population and demographics, and a beneficial economic impact would be anticipated under the Proposed Action Alternative.

Schools, Housing, Transportation, and Utilities. The Proposed Action Alternative would add about 385 students to the Fairbanks North Star School District enrollment, representing an increase of 2.8 percent

over current enrollment. The school district identified excess capacity at schools that would be used by these additional students. The Proposed Action Alternative, therefore, would not push the Fairbanks North Star School District beyond its current capacity, and because it is anticipated that federal education impact aid payments would increase, in proportion to the additional student population, affects to schools would not be adverse.

Housing during Construction. The short-term housing requirement for workers hired during the construction phase of the Proposed Action Alternative is expected to last several construction seasons, between 2016 and 2019. The EIS estimates that 1,387 jobs would be directly created to support construction efforts over this period, with another 952 indirect and induced jobs being required. For this analysis, it was assumed that 1,387 direct construction jobs would potentially require local housing, as the indirect and induced jobs tend to be service positions, typically coming from the local labor supply. With local hire advocated by local governments, it is assumed that half of the direct jobs would be drawn from the FNSB labor force, leaving 693 jobs to be filled by non-local labor. These individuals would need housing for varying lengths of time, depending on the seasonality of their work. Based on the analysis contained in the FNSB *Housing Needs Assessment*, there are currently an estimated 1,068 vacant housing units within a 30-minute commute of Eielson AFB, which is sufficient to absorb the anticipated non-resident workers. Because all construction needs to be completed prior to the arrival of the first aircraft in August 2019, construction activities would be declining by the time the first influx of military personnel start arriving. Based on this analysis, there would be no adverse impacts to the local housing market caused by F-35A construction requirements.

Housing once Operational. The recently completed *Air Force Housing Requirements and Market Analysis* (HRMA) identified that no new Privatized Housing would be needed on Eielson AFB to support the additional military and civilian personnel and their dependents associated with the F-35A beddown proposal. The HRMA assumed that personnel (military, civilian, and contractor) would either rent or purchase off-base housing during their tour at Eielson AFB. According to the HRMA there would be a rental housing unit shortfall of 1,064 for military families and 579 unaccompanied personnel by 2020. However, the HRMA assumed a commute distance of 20 minutes, which did not include units available throughout North Pole and Salcha. The HRMA also assumed that there would be no growth in the number of available rental units from 2015 to 2020. According to the Fairbanks Economic Development Corporation's *Housing Needs Assessment*, however, there were 3,495 available vacant rental units in 2013. Based on these 2013 figures, this assessment indicated there would be adequate supply in 2020 for the increases in personnel and dependents seeking off-base housing.

Based on 2000 and 2010 Census data for population and housing growth in FNSB, Table ES-11 shows the estimated population and housing-unit availability in 2020. As depicted, the FNSB population would increase by 1.1 percent per year over 10 years, totaling 110,555 (this includes the additional population associated with the Proposed Action Alternative). This results in an increase of 12,974 by 2020 (or 13.3 percent increase from 2010). By averaging the per capita rates from the 2000 and 2010 census data, total housing units projected for 2020 would be 47,182, or an increase of 5,399 units (or 12.92 percent increase) (U.S. Census 2010, 2015). For occupied, owner occupied, and renter occupied housing units census data indicate that there would be an increase of 5,175, 2,149, and 3,025 units, respectively. Based on an average vacancy rate of 11.8 percent, there would be an estimated 2,130 vacant rental units available in 2020. While these numbers are estimates, they provide a reasonable basis for determining

future housing-unit availability. Based on both the census data and the *Housing Needs Assessment*, there would not be a shortfall in available housing units and no adverse impacts are anticipated.

Table ES-11. Population and Housing Growth Projections to 2020

Category	*2000 Census*	*2010 Census*	*2020 Projected*
Population	82,840	97,581	110,555
Total Housing Units	33,291	41,783	47,182
Occupied Housing Units	*29,777*	*36,441*	*41,616*
Owner Occupied Units	16,077	21,410	23,559
Renter Occupied Units	13,711	15,031	18,056
Renter Vacant Units	*1,448*	*1,922*	*2,130*
Rental Vacancy Rate	10.56%	12.79%	11.80%

Source: U.S. Census 2010, 2015.

Transportation and Utilities. Existing transportation and utilities infrastructure on Eielson AFB (e.g., road network, power, potable water, wastewater, and solid waste), along with planned upgrades, would support additional on-base requirements associated with the Proposed Action Alternative. Addition of entry and merge lanes at the South Gate for construction traffic would lessen congestion at the main North Gate, and accommodate entering and exiting vehicles onto Richardson Highway. The Proposed Action Alternative would neither restrict nor close the Richardson Highway. The increase of off-base residential population is not anticipated to strain regional transportation and utilities infrastructure. Therefore, no adverse impacts to transportation and utilities are anticipated.

Airspace: There would be no changes to socioeconomic conditions underlying northern JPARC airspace resulting from the Proposed Action Alternative. Continued compliance with flight avoidance areas and seasonal flight restrictions in identified subsistence areas underlying JPARC airspace would continue. Therefore, no adverse impacts to socioeconomic sectors or to subsistence pursuits are anticipated.

ES.7.6 Land Management

***Base*:** Under the Proposed Action Alternative, there would be no changes to land management when compared to the No-Action Alternative. No installation plans would need to be changed and FNSB land management plans are consistent with the anticipated population growth associated with bringing two F-35A squadrons to Eielson AFB. Implementing the Proposed Action Alternative would not result in adverse impacts to land management.

***Airspace*:** The Proposed Action Alternative would not require acquisition of any lands underlying northern JPARC airspace. The F-35As would operate in existing airspace and in a similar manner to current use, but with an increase in operations. The F-35As, however, would generally fly 90 percent of the time at altitudes above 15,000 feet MSL. When compared to the No-Action Alternative, F-35A operations would not require any changes to land management plans or conflict with existing management objectives of federal, state, tribal, or local management agencies. This conclusion is justified because F-35A operations are a continuation of military aircraft training in the northern JPARC airspace, which have occurred for several decades. The introduction of a new aircraft, in an area already overflown by military aircraft, would not necessitate any changes to land management plans for special use areas underlying northern JPARC airspace.

ES.7.7 Cultural and Traditional Resources

***Base*:**

Traditional/Alaska Native. To date, Alaska Native villages and organizations have not identified any traditional cultural properties on Eielson AFB. Therefore, the Proposed Action Alternative would not introduce any direct or indirect adverse impacts to traditional cultural properties.

Archaeological. No known prehistoric sites have been recorded at Eielson AFB. Therefore, no direct or indirect adverse impacts to prehistoric sites from the Proposed Action Alternative are anticipated. However, if human remains, funerary objects, sacred objects, or objects of cultural patrimony are discovered during land-disturbance activities, work will cease immediately in the vicinity of the artifact discovery and site personnel will notify the Eielson AFB Cultural Resources Manager immediately. In consultation with the Alaska State Historic Preservation Office, the Cultural Resources Manager will follow Section 106 processes to determine the site's National Register eligibility and if necessary, determine a course of action to avoid or mitigate the site. If an archaeological dig is deemed necessary, the person(s) conducting the dig will meet all the requirements specified in 32 CFR 229.8. The Tanana Chiefs Conference will be notified of the discovery in writing.

Architectural. Two buildings, 1306 and 1141, in the Flightline Historic District would undergo interior modifications. These modifications would not affect the exterior visual aspect of the Flightline Historic District. Several other facilities near, but outside the Flightline Historic District would also be modified but would not affect the historic attributes of the district. Six new munitions storage igloos are also scheduled for construction in the Quarry Hill Munitions Storage Historic District to support the increased munitions requirements of the F-35A aircraft. No demolition of existing munitions storage igloos would occur and all new igloos would be constructed in vacant areas. This munitions storage district falls under the Program Comment entitled *Program Comment for World War II and Cold War Era (1939 – 1974) Ammunition Storage Facilities*. As such, proposed construction of six more storage igloos would not alter the district's historic status. No direct or indirect impacts are anticipated within the Engineer Hill Munitions Historic District, as no facility or infrastructure construction, renovations, or modifications are proposed within or adjacent to this district. The Alaska State Historic Preservation Office concurred with the Air Force's finding of no effect to historic resources within the area of potential effect of the base.

***Airspace*:**

Traditional/Alaska Native. To date, no specific traditional cultural properties have been identified by Alaska Native villages and communities under the airspace in the area of potential effect. As discussed earlier, there would be little change in subsonic or supersonic noise levels in northern JPARC airspace under the Proposed Action Alternative. Therefore, no adverse impacts to traditional cultural properties are anticipated. Under the Proposed Action Alternative, subsistence hunting could potentially become more difficult due to the increase in aircraft noise. However, seasonal adjustments, restrictions, and limitations, as identified in the 11th Air Force Alaska Airspace Handbook, have been instituted to minimize impacts to subsistence hunting. Therefore, no adverse impacts to traditional subsistence opportunities would occur.

Archaeological and Architectural. Under the Proposed Action Alternative, the only source of potential impacts to archaeological or architectural resources beneath the northern JPARC airspace is through sound and vibration. There would be little change in subsonic or supersonic noise levels in northern

JPARC airspace. Noise levels in most areas would not exceed 45 dB L_{dnmr}, including at the Eagle Historic District National Historic Landmark. Compared to existing conditions, the Proposed Action Alternative would increase the supersonic noise levels by less than 1 dB. This would occur in areas already subjected to sonic booms and would not be at a level to produce an adverse effect to historic properties. Therefore, no direct or indirect adverse impacts to archaeological or architectural resources would occur under the Proposed Action Alternative. The Air Force identified a finding of no effect on historic properties in the airspace area of potential effect and received concurrence of this finding from the SHPO.

ES.7.8 Environmental Justice and Protection of Children

***Base*:** With the exception of noise, there would be no adverse disproportionate impacts to environmental justice populations, nor would there be adverse impacts to sensitive receptors such as children and the elderly. As presented in Sections 4.4 *Air Quality*, 4.5 *Safety*, 4.12 *Water Resources*, 4.13 *Hazardous Materials, Hazardous Wastes, Toxic Substances, and Contaminated Sites*, and 4.14 *Recreational and Visual Resources* there are no adverse impacts introduced to the general public from F-35A operations under the Proposed Action Alternative. Under the Proposed Action Alternative, aircraft-generated DNL equal to greater than 65 dB would increase for some areas outside of base boundaries; however, noise levels would not exceed 65 dB DNL for any concentrations of the elderly, or low-income and minority populations (Figure ES-10). Noise levels below 65 dB DNL are typically considered compatible with all land uses and sensitive receptors such as children and the elderly. Therefore, the Proposed Action Alternative would not introduce disproportionate adverse impacts generated by aircraft noise to off-base environmental justice communities nor to elderly populations.

Supplemental noise analysis, however, does indicate that classroom learning interference events would increase on base at Ben Eielson Junior/Senior High School, Crawford Elementary School, Anderson Elementary School, and the Child Development Center. At all four locations, classroom learning interference events would increase by three more events per hour with windows opened and two more events per hour with windows closed. Off base, the Loving Learning Day Care center would experience no change in the number of events with windows closed but a one-event per hour increase would occur with windows opened. This represents an increase of one compared to the No-Action and baseline conditions. These classroom learning interference event increases could introduce enough disruptions in teaching continuity that could affect the children's ability to learn when these disruptions occur. These interference events would be considered adverse.

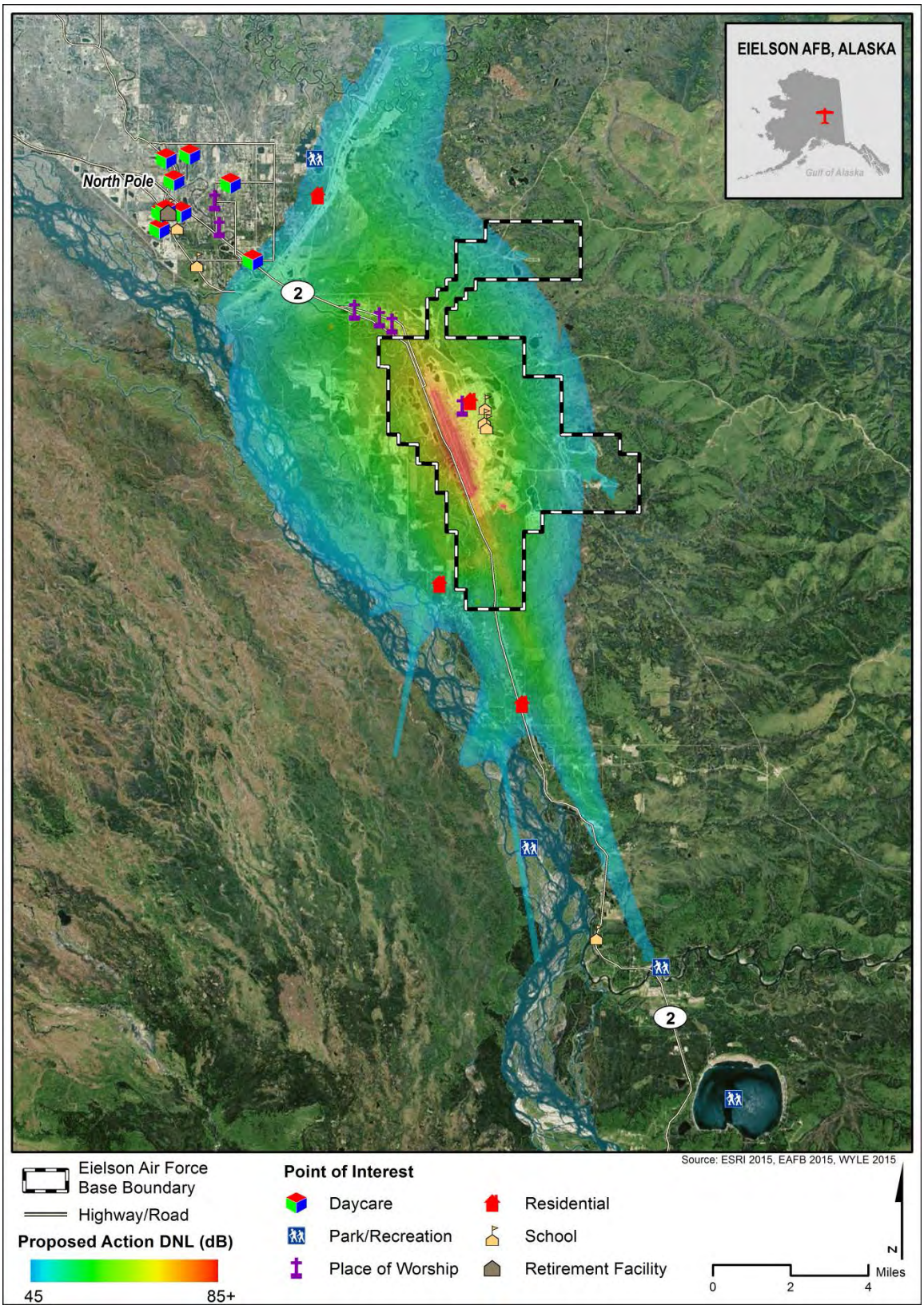


Figure ES-10. Proposed Action Alternative Concentrations of Children and the Elderly Experiencing Noise Levels 45 to 85 dB DNL

***Airspace*:** There would be no air quality, water quality, floodplains, or hazardous materials/toxic wastes impacts introduced that would disproportionately adversely affect the health and safety considerations of any environmental justice populations underlying northern JPARC airspace. The same conclusion applies to concentrations of children and elderly populations. In terms of the acoustic environment, under the Proposed Action Alternative, subsonic noise levels do not increase more than 5 dB DNL; supersonic noise levels increase no more than 1 dBC; and the number of sonic booms generated during the busiest month (i.e., during the major flying exercises) would increase no more than two booms per busiest month. In no instances, would there be adverse impacts to any sensitive populations underlying northern JPARC airspace. Therefore, no disproportionate health effects or environmental concerns would occur to environmental justice populations; nor would there be adverse impacts to children and the elderly.

ES.7.9 Natural Resources

***Base*:** There are no designated critical habitats or threatened and endangered species listed under the Endangered Species Act known to occur on Eielson AFB. About 17 acres of wetlands would be removed because of construction activities in the southern end of the runway (Figure ES-11). There are no practicable alternatives for these wetland impacts because of the need to accommodate the aircraft hangars and shelters adjacent to F-35A operations facilities along the flight line, locate the south heating plant next to existing utility corridors, and place the flight line kitchen near aircraft operations and logistics areas. The missile maintenance facility location was placed to allow for explosive safety distance requirements from other facilities. The South Gate would be reopened with an expanded inspection area and new entry and merge lanes constructed along Richardson Highway. Impacts associated with re-opening the South Gate are unavoidable. Expansion of the gate is needed because of increased Anti-Terrorism/Force Protection directives that require inspection of all commercial and construction vehicles entering the base. There is no practicable alternative to expanding the existing inspection area at the South Gate, it has to be large enough to accommodate the larger construction equipment and commercial trucks and the higher volume of vehicles anticipated during construction. The new entry and merge lanes are needed so that construction vehicle and commercial traffic entering and exiting the base do not impede traffic at the North Gate or along the Richardson Highway. Through the section 404 permitting process, these significant adverse wetland impacts would be mitigated by either purchasing wetland credits from locally available mitigation banks or paying in *lieu* of fees.

Figure ES-11. Proposed Action Alternative Facility and Infrastructure Construction and Modification in Wetland Areas

***Airspace*:** No adverse impacts would occur to vegetation, wildlife, or wetlands underlying northern JPARC airspace because there would be no construction associated with this proposal. Ordnance and munitions use would occur at military ranges authorized for such use under northern JPARC airspace (i.e., Oklahoma, Stuart Creek, and Blair Lakes Impact Areas) and would continue to be managed and protected by the Air Force and Army under existing Integrated Natural Resource Management Plans. Sources of potential impacts to natural resources under the Proposed Action Alternative include increases in aircraft activity, which changes the acoustic environment and the potential for BASH within the northern JPARC airspace. To minimize effects of aircraft flight operations to special use areas underlying JPARC airspace, the 11th Air Force institutes extensive avoidance measures as part of their standard operating procedures, as codified in the 11th Air Force Alaska Airspace Handbook. These include, but are not limited to, seasonal avoidance areas and altitude restrictions over critical habitat for wildlife such as Dall sheep, the Delta caribou herd, peregrine falcons, and areas used for subsistence pursuits, as well as salmon hatcheries. F-35A flight operations would adhere to all published airspace avoidance areas and seasonal restrictions within JPARC. Therefore, no adverse impacts to wildlife populations are expected under the Proposed Action Alternative.

For special status species, only two federally listed threatened or endangered species have the potential to be found under northern JPARC airspace: the short-tailed albatross and Eskimo curlew. These are shore birds and the likelihood of their existence in northern JPARC airspace would be negligible. Additionally, no critical habitat lies underneath northern JPARC airspace. Therefore, no adverse impacts to threatened or endangered species would occur under the Proposed Action Alternative.

A wide variety of migratory bird species listed under the Migratory Bird Treaty Act (e.g., trumpeter swans and peregrine falcons) occur within the northern JPARC airspace, including bald and golden eagles, which are also protected under the Bald and Golden Eagle Protection Act. To minimize the risk of mid-air collisions and disturbance to migrating birds, visual observations of migrating birds are communicated between military pilots and range control personnel. Continued adherence to the BASH plan as well as to the limitations, restrictions, and avoidance measures prescribed in the 11th Air Force Alaska Airspace Handbook, would minimize adverse impacts to eagles and migrating birds.

ES.7.10 Earth Resources

Approximately 66 acres would be disturbed for proposed construction. The area proposed for new construction lies on a flat area of the base; therefore, excess runoff and erosion would not be generated. Most of the construction would occur on areas of the base that have been previously disturbed or are currently occupied by existing buildings or structures. Any needed fill would be taken from on-base resources. As such, no adverse impacts to geology, topography, and soils would occur.

Although Eielson AFB lies in a seismically active area, most earthquakes are low in magnitude with only a few reaching a magnitude of 5.0 on the Richter scale. Construction would not affect seismic activity nor would the proposed construction be exposed to unique seismic risks requiring additional design and construction criteria beyond what is normal for the Fairbanks area. Therefore, no adverse impacts would result from the seismic conditions at Eielson AFB.

ES.7.11 Water Resources

***Base*:**

Quantity. An estimated population increase would introduce additional demand on the water supply from the aquifer located both on and off base. The estimated population increase of 2,765 individuals (assuming 148 gallons/day/capita) would introduce additional demands on potable water supply. This is estimated to be 409,220 gallons per day (0.41 million gallons per day). As this aquifer is part of a vast system, receives constant recharge from the nearby Tanana and Chena Rivers, and has existing excess capacity, an increase in less than 6 percent of the total FNSB population would not adversely affect water quantity within the local aquifer system. Additionally, increases of wastewater due to the growth of on-base personnel and dependents would not exceed the Eielson AFB wastewater permitted level of 2 million gallons per day nor hamper the ability of the FNSB to provide such services to those living off base. In terms of wastewater, there is existing capacity to support this population increase through on- and off-base services and, therefore, no adverse impacts are anticipated to either potable or wastewater resources.

Quality. Impacts to water quality due to construction-related activities, would be minimized or eliminated by the incorporation of proper construction design, erosion control (e.g., silt fencing), and structural engineering techniques (e.g., paving to eliminate sedimentation) into the final project design and construction. Drinking water would continue to be monitored for contaminants. No adverse impacts to water quality are anticipated because of the Proposed Action Alternative.

Stormwater. Approximately 21 of the 66 acres would be converted to impervious surfaces. Localized increases in stormwater runoff could potentially occur in these areas; however, any possible increases would not exceed the current capacities of stormwater systems at Eielson AFB. Garrison Slough is primarily a stormwater drainage ditch and is the only designated impaired water body located on the installation (specifically with polychlorinated biphenyl or other potential contaminants). Garrison Slough is connected to groundwater that is impacted by perfluorinated compounds. It has tested above the USEPA's provisional health advisory level for perfluorooctane sulfonate. However, construction would not occur in areas likely to affect the slough nor would the Proposed Action Alternative introduce increased levels of polychlorinated biphenyl.

No adverse impacts to stormwater systems are anticipated under the Proposed Action Alternative. With adherence to federal regulation (Energy Independence and Security Act of 2007, Section 438), which requires that any construction project, with a footprint greater than 5,000 square feet (or 0.1 acre) or renovations that expand the footprint of existing facilities by 5,000 square feet, must maintain or restore to the maximum extent technically feasible, the predevelopment hydrology of the property with regard to the temperature, rate, volume, and duration of the flow.

Floodplains. For analysis purposes and in line with Executive Orders 11988 and 13690 covering floodplain management, the Air Force examined potential impacts of the Proposed Action Alternative by applying the FNSB-delineated map of the 100-year floodplains and then compared these results using the Federal Emergency Management Agency's (FEMA) 100-year floodplain map data. According to the FNSB map data, up to 5 acres would be developed within the 100-year floodplain (Figure ES-12); however, according to the FEMA mapping, up to 56 acres in the 100-year floodplain would be developed (Figure ES-13). No matter which floodplain map is used, there is no other practicable alternative for

Figure ES-12. Proposed Action Alternative Facility and Infrastructure Construction and Modifications within the FNSB 100-Year Floodplain

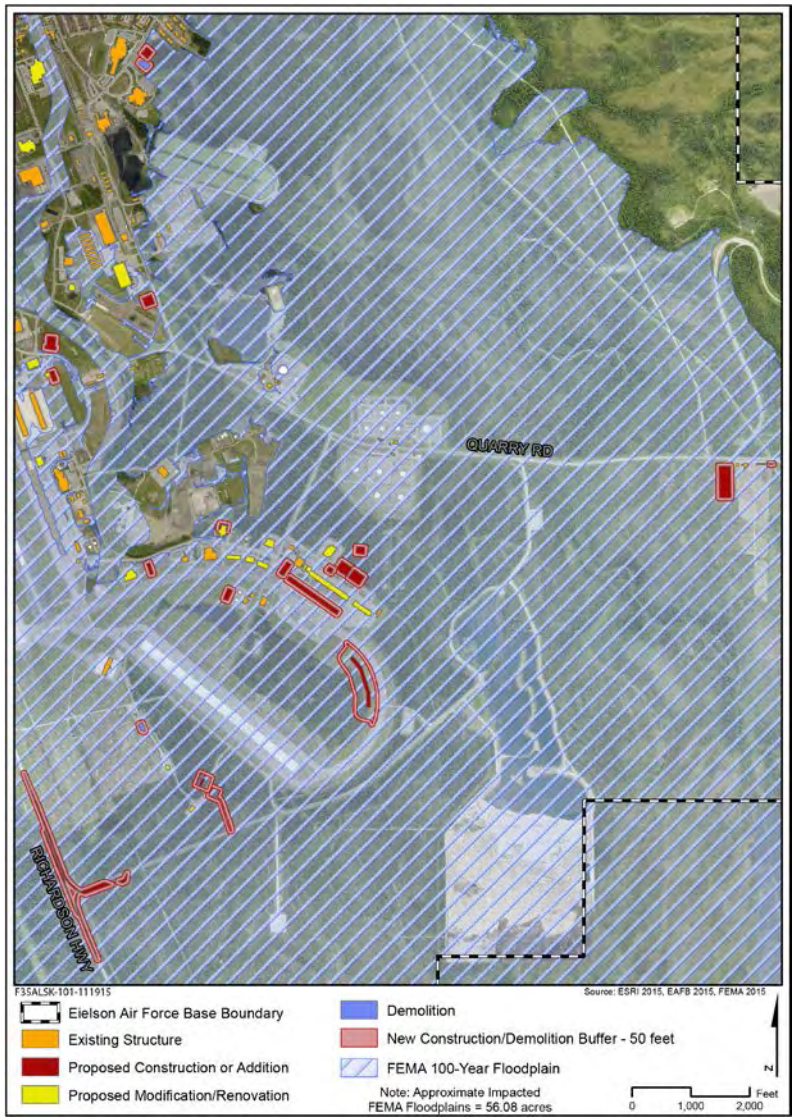


Figure ES-13. Proposed Action Alternative Facility and Infrastructure Construction and Modifications within the FEMA 100-Year Floodplain

locating these facilities along and adjacent to the flight line in the floodplain. To ensure adherence to the Executive Orders, the Air Force used the more conservative FEMA estimate to evaluate the extent of impacts.

In total, all of the facilities proposed in the South Loop (see Figure ES-3) lie within the FEMA 100-year floodplain, as well as the Field Detachment Unit, School Age Facility, Combat Arms and Maintenance Range, and the expansion of the Shooting Points (see Figure ES-2). Placement of proposed F-35A operational and maintenance facilities in the South Loop is restricted because they cannot be sited within explosive safety distance arcs and require being adjacent to the flight line. The South Gate, currently closed, would be reopened to divert construction traffic from and minimize congestion at the North Gate. At the South Gate, the vehicle inspection area would be expanded to support commercial and construction equipment, and entry and merge lanes would be established on both sides of the Richardson Highway to minimize congestion along the highway. The majority of construction would occur at the south end of the base and an entrance here would minimize on-base congestion and allow construction vehicles and equipment closer access to the construction sites. No alternative to alleviate traffic congestion at the North Gate and along Richardson Highway is practicable.

Please note that the Executive Orders do not prohibit development in the 100-year floodplain, nor do they require flood proofing, if there is no practicable alternative. As the proposed facilities need to be constructed at the same elevations as the existing facilities along the South Loop, all existing and new facilities will be 8 to 10 feet below the elevation of the 100-year flood event. Because raising floor elevations above this level is not practicable, and there is no other location on base for the F-35A facilities that meets operational and safety requirements, a Finding of No Practicable Alternative is incorporated into the Final EIS. If the Air Force chooses to implement the Proposed Action Alternative, it is accepting the flood risk for these facilities.

***Airspace*:** Under the Proposed Action Alternative, there would be no ground-disturbing activities or personnel changes associated with training and operations conducted within northern JPARC airspace. Therefore, no adverse impacts to water resources quality or quantity, stormwater systems, or floodplains would result from implementing the Proposed Action Alternative in northern JPARC airspace.

ES.7.12 Hazardous Materials, Hazardous Wastes, Toxic Substances, and Contaminated Sites

Base:

Hazardous Materials. With an increase in the number of aircraft based at Eielson AFB, there would be an overall increase in hazardous materials used. Procedures for hazardous material management established for Eielson AFB would continue during all construction and renovation activities as well as in future aircraft maintenance and operational activities. These existing practices and procedures can accommodate the increase of hazardous materials. The types of materials recycled from F-35A maintenance would be similar to aircraft currently operating at Eielson AFB and no changes to recycling procedures would be required. No adverse impacts would occur to hazardous materials if the Proposed Action Alternative were implemented.

Hazardous Waste. The types of hazardous waste streams generated by F-35A operations are expected to be fewer in comparison to those generated by F-16 aircraft because operations involving hydrazine, cadmium and hexavalent chromium primer, and various heavy metals have been eliminated or greatly reduced in the F-35A. Hazardous waste quantities would increase because there would be more aircraft

operating from what is found under the No-Action Alternative. Eielson AFB would continue to operate within its large quantity generator hazardous waste permit conditions. In addition, established hazardous waste procedures would continue to be followed during future squadron operations and for all construction and renovation that may occur in association with the Proposed Action Alternative. The disposal of low observable coatings and demilitarization activities would be contracted to a vendor permitted to dispose of such materials and not affect the waste streams at Eielson AFB. No adverse impacts would occur to hazardous wastes if the Proposed Action Alternative were implemented.

Toxic Substances. Any structures proposed for upgrade or retrofit would be inspected for asbestos containing material and lead-based paint according to established Eielson AFB procedures prior to any renovation activities. If any issues are discovered during renovation activities, all asbestos containing material would be properly removed and disposed of prior to or during demolition in accordance with 40 CFR 61.40 through 157 and established Eielson AFB procedures. Any lead-based paint would also be managed and disposed of in accordance with Toxic Substance Control Act, Occupational Safety and Health Administration regulations, Alaska requirements (regarding work-site practices for buildings with lead-based paint), and established Eielson AFB procedures. No adverse impacts associated with toxic substances are anticipated under the Proposed Action Alternative.

Installation/Environmental and Compliance Restoration Programs. Proposed construction activities overlap or lie adjacent to Installation Restoration Program sites and several Compliance Restoration Program sites. Although these restoration program sites coincide with proposed renovation and/or construction, close coordination with the Environmental Restoration Program staff would occur to avoid significant adverse impacts. Military Response Area sites also occur near proposed construction areas but none coincides with the areas proposed for facility construction.

Residues from Aqueous Film Forming Foam (fire-fighting foam) containing perfluorooctanesulfonic acid and perfluorooctanoic acid were recently detected in ground water. It appears to have resulted from using this foam for training at the on-base fire stations and in response to actual aircraft fires. Eielson AFB is working closely with USEPA and Alaska Department of Environmental Conservation (ADEC) to determine future course(s) of action(s). It is not expected that response actions would interfere with F-35A construction; however, some additional measures during construction may be required if dewatering is necessary. The F-35A operations would not increase health risks or alter existing conditions of these residues when compared to the No-Action Alternative.

***Airspace*:** The Air Force has specific emergency-response procedures for aircraft mishaps involving composite materials contained in Technical Order 00-105E-9. Air Force Manual 10-2504 (December 2009) provides guidance for responding to major accidents and natural disasters and Air Force Instruction 10-2501 provides response planning guidelines for major accident response, natural disasters, and enemy attack. These procedures would be followed to ensure no adverse impacts to areas underlying northern JPARC airspace from hazardous materials and toxic substances.

ES.7.13 Recreational and Visual Resources

***Base*:** Under the Proposed Action Alternative, the number of total airfield operations would increase, resulting in increased noise levels in areas used for recreational purposes on and off base. Military jet overflights can adversely affect recreational activities for those who value or expect a natural soundscape. However, visitors to recreational sites can distinguish between concepts of annoyance and interference produced by aircraft sound. Annoyance is an emotional reaction, while interference is more of a

subjective judgment. Studies have indicated that if visitors know that they could see or hear aircraft while in a remote area, they are less annoyed by aircraft noise. Inhabitants of the base and surrounding communities have lived with a military presence since the establishment of Eielson AFB in 1943. Therefore, any increase in sound would not adversely affect the setting or experiences that people have on or off base. In terms of the visual landscape, new facilities would be consistent with existing military base facilities. For the entry and merge lanes, proposed along Richardson Highway, adjacent to the South Gate, no recreational areas would be impacted nor would this expansion change the visual aspect of the existing road. Under the Proposed Action Alternative, there would be no adverse impacts to recreational and visual resources at and around the base.

***Airspace*:** There are many recreational and special use areas under the northern JPARC airspace. The Air Force has made an extensive effort to identify these areas, and where possible, to minimize unavoidable noise and visual impacts. As noted earlier, JPARC airspace is managed in accordance with the 11th Air Force Alaska Airspace Handbook, which identifies all the limitations, restrictions, and mitigations such as seasonal flight avoidance areas that military pilots must comply with when operating in these airspace units. Dissemination of this information is accomplished by briefing all Air Force and Air Force-sponsored pilots prior to operating in the airspace, through the 11th Air Force Alaska Airspace Handbook, and access to the 11th Air Force website.

Under the Proposed Action Alternative, there would be an increase in the frequency of airspace operations; however, the noise levels would remain similar as found under the No-Action Alternative. In no instances would the L_{dnmr} exceed 52 dB, and with the exception of the Steese National Conservation Area/Birch Creek WSR, all other special use areas would experience L_{dnmr} of less than 45 dB during the busiest month (i.e., during major flying exercises between April and October). In terms of supersonic operations, C-weighted DNL would remain below 54 dB over special use areas, with only the Steese National Conservation Area/Birch Creek WSR, and the Charley and Fortymile WSRs experiencing a 1-dB increase. Yukon-Charley Rivers National Preserve, Yukon Flats National Wildlife Refuge, and Lake George would experience a one-boom per busiest month increase and the Steese National Conservation Area/Birch Creek WSR and Charley WSR would experience a two-boom per busiest month increase.

Some individuals may perceive this noise increase as interfering with the quality of their recreation; however, the F-35A would be conducting activities similar to those currently conducted by the F-16, but at predominantly higher altitudes, resulting in a negligible increase in noise levels on the ground. Overflights would not change the visual experience of the characteristic landscape as well. Consequently, in combination with the currently identified standard operation procedures in JPARC airspace, any increases in noise levels associated with the Proposed Action Alternative would not result in adverse impacts to recreational or visual resources.

ES.8 SUMMARY COMPARISON OF IMPACTS BY ALTERNATIVE

Table ES-12 provides a summary comparison of impacts for each of the resource categories. The last column provides mitigation measures that are proposed for implementation beyond existing permitting processes, best management practices, and standard operating procedures undertaken by Eielson AFB at the base level, in northern JPARC airspace by the 11th Air Force, and at the impact areas managed by the Air Force and Army.

Table ES-12. Summary Comparison of Impacts by Alternative

Resource Areas		***No Action***	***Proposed Action***	***Mitigation Measures***
Airfield and Airspace Operations and Management				
Base:	Airfield Operations	No impacts to airfield operations and management.	There would be no adverse impacts to Eielson AFB airfield and airspace structure or management.	No mitigation measures proposed on base.
Airspace:	Training and Exercise Operations	No effect to northern JPARC airspace use or management.	No changes to airspace management. The airspace has sufficient ability to absorb the increased aircraft operations. Ongoing interaction between Eielson AFB, the Alaska Civil/Military Aviation Council, and state and federal agencies, as well as continued use of the SUAIS, ensures continued compatibility of military and commercial/civil aviation in the JPARC airspace. No adverse impacts are anticipated to airspace operations and management through continued adherence to JPARC standard operating procedures. *Civil and Commercial Aviation Airspace Use* - The mishap potential between civil and military would be low through continued adherence of JPARC operational procedures.	No mitigation measures proposed.
Acoustic Environment				
Base:	Population, Land Use Compatibility, and Domesticated Animals and Wildlife	Existing noise impacts would continue.	On-base noise exposure would noticeably increase for residential areas, schools, and a child development center; there would be a potential for on-base noise impacts. Off base, an increased number of residences in Moose Creek would experience noise levels between 65 and 70 decibel A-weighted Day-Night Average Sound Level (dB DNL) and a day care center would experience an increase in the number of classroom learning interference events.	Due to the potential for people and households to experience noise levels 65 dB DNL and greater, possible noise-attenuating measures could include re-glazing loose windowpanes, replacing cracked windowpanes, putting in weather stripping, adding insulation, and baffling vents. As the Air Force does not own the housing, either on or off base, noise attenuation measures would be the responsibility of the owners. The Air Force does not own the off-base schools, and on base, the FNSB School District leases the schools from the Air Force. Therefore, the undertaking of noise attenuation measures would be the responsibility of the FNSB School District. Noise-attenuating measures for schools could include, but are not limited to, installing sound absorbing materials in the ceiling and walls, fixing cracked windowpanes, sealing any gaps between the walls, floor, and ceiling, and installing insulation in building cavities. The American National Standard Acoustical Performance Criteria, Design Requirements, and Guidelines for Schools, Parts 1 and 2 from the American National Standards Institute S12.60 provide guidance for noise attenuating design criteria for schools.

Table ES-12. Summary Comparison of Impacts by Alternative

Resource Areas		***No Action***	***Proposed Action***	***Mitigation Measures***
Airspace:		Noise levels would remain consistent with baseline conditions.	Subsonic and supersonic operations would not generate noise levels that would adversely affect underlying populations of the northern JPARC airspace.	No mitigation measures proposed.
Air Quality				
Base:	Criteria Pollutants, Conformity Applicability, Greenhouse Gases, and Hazardous Air Pollutants	Emissions of criteria pollutants and greenhouse gases would not affect regional air quality or attainment status.	Emissions of criteria pollutants and greenhouse gases would not introduce adverse impacts to affect regional air quality or attainment status.	No mitigation measures proposed on base.
Airspace:		Emissions of criteria pollutants and greenhouse gases would not affect regional air quality or Prevention of Significant Deterioration for Denali National Park, as well as to the Yukon-Charley Rivers National Preserve and Steese National Conservation Area. No adverse impacts.	Emissions of criteria pollutants and greenhouse gases would not affect regional air quality or deteriorate air quality in: Denali National Park (Prevention of Significant Deterioration Class 1 Area); Yukon-Charley Rivers National Preserve; Yukon Flats National Wildlife Refuge; the Steese National Conservation Area; or designated wild and scenic rivers. No adverse impacts to regional air quality within the northern JPARC airspace. In terms of Greenhouse Gas (GHG) emissions, the computed carbon dioxide equivalent or CO_2(e) emissions after final beddown for both squadrons are 31,704 metric tons, or 0.937 percent of the existing CO_2(e) emissions for the FNSB region. Accordingly, no adverse impacts from GHG emissions due to the Proposed Action Alternative.	No mitigation measures proposed.

Table ES-12. Summary Comparison of Impacts by Alternative

Resource Areas		***No Action***	***Proposed Action***	***Mitigation Measures***
Safety				
Base:	Accident Potential Zones (base), Mishaps, Bird/Wildlife-Aircraft Strike Hazards	Ground and flight safety considerations associated with current operations would remain in place. No adverse impacts.	*Fire Risk and Management* - No adverse impacts to current fire-fighting abilities and mutual aid agreements. If new information and/or fire-fighting techniques associated with composite materials burned during an accident are identified, then local fire-fighting departments will be informed. *Accident Potential Zones* - No adverse impacts to existing Accident Potential Zones or Clear Zones. *Aircraft Mishaps* - Operational mishap rate would be similar to other tactical fighter jet aircraft like the F-16 and F-15, and therefore, no adverse impacts with continued application of existing operating procedures. *Bird/Wildlife-Aircraft Strike Hazards* - BASH is not anticipated to change markedly and affect this facet of safety at Eielson AFB; no adverse impacts with continued application of existing avoidance procedures.	No mitigation measures proposed on base.
Airspace:		Continuation of plans, procedures, and processes currently used for minimizing flight safety risks for all flight activities within the existing JPARC airspace would incur no adverse impacts.	Total operations within the northern JPARC airspace and ranges would remain within its capability and capacity. No new accident response procedures would be required. If new information and/or fire-fighting techniques associated with composite materials burned during an accident are identified, then local fire-fighting departments will be informed. No adverse impacts. *Fire Risk and Management* - All guidance, regulations, and instructions for ordnance delivery at the three impact areas, and flare use in the airspace would be adhered to; fire response and suppression capabilities would continue to meet all requirements. Mutual aid agreements and coordination between Air Force personnel and wildland fire-fighting personnel regarding fire detection and response would continue. No adverse impacts. *Aircraft Mishaps* - No adverse impacts with continued application of existing JPARC standard operating procedures. *Bird/Wildlife-Aircraft Strike Hazards* - Overall potential for bird-aircraft strikes is not anticipated to be statistically different from the No-Action Alternative. No adverse impacts.	No mitigation measures proposed.

Table ES-12. Summary Comparison of Impacts by Alternative

Resource Areas		*No Action*	*Proposed Action*	*Mitigation Measures*
Socioeconomics				
Base:	Economics, Demographics, Population, Housing, Public Schools, Transportation, Utilities, and Emergency Medical/Police/ Fire Response	*Population, Demographics, and Economics* - Socioeconomic conditions related to population, demographics, and economics would remain consistent with current conditions. *Schools, Housing, Transportation and Utilities* - Socioeconomic conditions related to schools, housing, transportation, and utilities would remain consistent with current conditions. *Health, Fire, and Crime Response* - Socioeconomic conditions related to health, fire, and crime response services would remain consistent with current conditions.	*Population* - Population would increase by 2.7 percent to FNSB. *Demographics* - General demographics of the regional population would not change in any material way. *Economics* - Positive impact to local economy. *Schools* - Increase in student enrollment would be within the current capacity of FNSB School District. *Housing* - It is estimated there would be available housing to support construction personnel in the short term as well as military and civilian families and unaccompanied personnel in the long term. No adverse impacts. *Transportation and Utilities* - Additional on- and off-base residential population is not anticipated to strain the base or regional transportation and utilities infrastructure. *Health, Fire, and Crime Response* - Additional off-base residential population is not anticipated to strain the capacity of current health, fire, and crime response services in the region.	No mitigation measures proposed on base.
Airspace:	Subsistence	No changes to existing conditions in aircraft operations within JPARC airspace. Continued compliance with flight avoidance areas and seasonal flight restrictions in identified subsistence areas would continue. No adverse impacts to subsistence pursuits.	No impacts to the population, demographics, economics, schools, housing, transportation, utilities, or health, fire and crime response. Continued compliance with flight avoidance areas and seasonal flight restrictions over identified subsistence areas would continue to minimize potential adverse impacts.	No mitigation measures proposed.
Land Management				
Base:	Local, state, and federal land management plans	No change from baseline conditions, therefore, no impacts to management.	No changes to land use designations or management objectives on Eielson AFB would occur. Off base, the Proposed Action Alternative would not require purchase of any lands or change how lands are managed. No adverse impacts to on-base land management are anticipated.	No mitigation measures proposed on base.
Airspace:	Local, state, and federal land management plans	No change from baseline conditions, therefore, no impacts to land management.	No lands would be acquired underneath the northern JPARC airspace and aircraft operations would be consistent with current conditions. Agency land management plans and objectives would not be affected by F-35A operations in JPARC airspace where aircraft have been operating for several decades. There would be no adverse impacts to land management under the airspace.	No mitigation measures proposed.

Table ES-12. Summary Comparison of Impacts by Alternative

Resource Areas		***No Action***	***Proposed Action***	***Mitigation Measures***
Cultural Resources				
Base:	Traditional, Prehistoric and Historic Archaeological and Architectural Resources	*Traditional/Alaska Native* - No change when compared to baseline conditions on Eielson AFB, therefore, no impacts to traditional Alaska Native resources. *Archaeological and Architectural* - No change to baseline conditions, therefore, no adverse impacts to archaeological and architectural resources.	*Traditional/Alaska Native* - No direct or indirect adverse impacts to Traditional or Alaska Native resources. *Archaeological and Architectural* - No known prehistoric sites have been recorded at Eielson AFB. Therefore, no direct or indirect adverse impacts to prehistoric archaeological sites are anticipated. While construction would occur in the Quarry Hill Munitions Storage Historic District, all development would be undertaken in accordance with the Program Comment. The Flightline Historic District would continue to experience the indirect effect of aircraft operations on the flight line; however, this would be in keeping with the setting of the district and would not affect the integrity of the district. The Alaska State Historic Preservation Office concurred with the Air Force finding of no effect to historic properties in the area of potential effect.	No mitigation measures proposed on base.
Airspace:	Traditional Resources	*Traditional/Alaska Native* - No change when compared to baseline conditions underlying northern JPARC airspace. No adverse impacts to traditional Alaska Native resources. *Archaeological and Architectural* - No change compared to baseline conditions in archaeological and architectural resources underlying northern JPARC airspace, therefore, no adverse impacts to these resources.	*Traditional/Alaska Native* - Continued adherence by F-35A pilots to seasonal flight adjustments, restrictions, and limitations in the northern JPARC airspace would minimize any adverse impacts to traditional resources or areas supporting subsistence hunting. *Archaeological and Architectural* - No damage to historic structures from supersonic or subsonic operations is anticipated. Therefore, no direct or indirect adverse impacts to archaeological or architectural resources would occur in the area of potential effect.	No mitigation measures proposed.

Table ES-12. Summary Comparison of Impacts by Alternative

Resource Areas		*No Action*	*Proposed Action*	*Mitigation Measures*
Environmental Justice and Protection of Children				
Base:	Low Income, Minority, Children, and the Elderly	The No-Action Alternative would not disproportionately adversely affect low-income or minority populations. No adverse impacts are anticipated to children or the elderly.	The Proposed Action Alternative does not introduce any adverse impacts to air quality; safety; water quality; or hazardous materials/waste, toxic substances, and contaminated sites. Therefore, no disproportionate adverse impacts to low-income or minority populations. No adverse impacts to the elderly were identified. There could be adverse impacts for children attending the on-base schools and child development center, as well as children at an off-base day care center. The increase in the number of aircraft noise intrusions during classroom instruction could result in teaching disruptions and interfere with the children's ability to learn.	The Air Force does not own the off-base schools, and on base, the FNSB School District leases the schools from the Air Force. Therefore, the undertaking of noise attenuation measures would be the responsibility of the FNSB School District. Noise-attenuating measures could include, but are not limited to installing sound absorbing materials in the ceiling and walls, fixing cracked windowpanes, sealing any gaps between the walls, floor, and ceiling, and installing insulation in building cavities. The American National Standard Acoustical Performance Criteria, Design Requirements, and Guidelines for Schools, Parts 1 and 2 from the American National Standards Institute S12.60 provide guidance for noise attenuating design criteria for schools.
Airspace:			The Proposed Action Alternative does not introduce any adverse impacts to noise; air quality; safety; water quality; or hazardous materials/waste, toxic substances, and contaminated sites. Therefore, no disproportionate adverse impacts would be introduced to low-income or minority populations. There would also be no adverse impacts to children or the elderly who live under the northern JPARC airspace.	No mitigation measures proposed.
Natural Resources				
Base:	Wildlife, Vegetation, Wetlands, and Special Status Species	No adverse impacts with continued adherence to federal, state, local, and base rules and regulations and those codified in the Integrated Natural Resource Management Plan.	*Wildlife* - Increased noise and activity due to construction and renovation projects would be short term, and would not present adverse impacts to wildlife populations. *Vegetation* - No critical habitat would be disturbed, no adverse impacts. *Wetlands* - Approximately 17 acres would be removed. No practicable alternative to this adverse impact was identified. *Special Status Species* - No federally listed species are located within the area to be developed and therefore, no impacts. No adverse impacts to eagles or migratory birds.	Through the 404 permitting process, Eielson AFB will either purchase wetland credits from existing mitigation banks or pay in *lieu* of fees to offset the wetlands (type and size) removed.

Table ES-12. Summary Comparison of Impacts by Alternative

Resource Areas		***No Action***	***Proposed Action***	***Mitigation Measures***
Airspace:	Wildlife, Special Status Species	No adverse impacts to underlying special status species with continued adherence to seasonal flight limitations and avoidance areas in JPARC airspace.	*Wildlife* - No adverse impacts to threatened and endangered species. Current mitigations identified in the 11th Air Force Alaska Airspace Handbook and those that the JPARC EIS have identified (which will be fully implemented by 2021), provide protection to "at risk" or special status species that minimizes potential adverse impacts. *Special Status Species* - No adverse impacts to federally listed species, eagles, or migratory birds.	No mitigation measures proposed.
Earth Resources				
Base:	Topography, Geology, Soils, and Seismology	Continued use of erosion control measures to minimize sedimentation.	Approximately 66 acres would be disturbed, of which 21 acres are vegetated. Potential adverse impacts would be minimized by adhering to sedimentation and erosion minimization measures required for all construction projects under the permitting process.	No mitigation measures proposed on base.
Airspace:		No impacts.	Ground disturbance due to increased ordnance and munitions use would not present adverse impacts through continued implementation of land management practices identified in Air Force and Army Integrated Natural Resource Management Plans.	No mitigation measures proposed.
Water Resources				
Base:	Water Quantity/ Quality, Stormwater, Wastewater, and Floodplains	Continued adherence to the Stormwater Pollution Prevention and avoidance of floodplains.	*Quantity* - There is existing on- and off-base capacity to provide potable water and support wastewater treatment; there would be no adverse impacts. *Quality* - Ground water would not be affected or degraded; no adverse impacts to water quality. *Stormwater* - Sufficient stormwater drainage systems exist to support the approximate 21 acres of impervious surfaces introduced. Retention structures would be provided to collect storm water from any newly developed areas. They will be designed to discharge no more than the pre-existing rate into the drainage system in order not to increase flooding or erosion hazards. Therefore, no adverse impacts. *Floodplains* - Facilities within the 100-year floodplain would be established and impact 5 acres according to the FNSB delineation and up to 56 acres according to Federal Emergency Management Agency (FEMA) mapping data. No matter which floodplain map is used, there is no other practicable alternative for locating these facilities along and adjacent to the flight line in the floodplain. There would be adverse impacts.	Using the FEMA, 100-year floodplain data, the Air Force will include strategies to mitigate floodplain impacts in facility design and construction. These can include elevating facilities above the floodplain to reduce water infiltration, anchoring structures to prevent movement, and including impervious surfaces to eliminate sinks and/or swells associated with water levels. However, as the proposed facilities need to be constructed at the same elevations as the existing facilities along the South Loop, all existing and new facilities will be 8 to 10 feet below the elevation of the 100-year flood event. Because raising the floor elevations above the floodplain is not practicable, and there are no other on-base locations that meet F-35A facility operational and safety requirements, a Finding of No Practicable Alternative is incorporated into the Final EIS. If the Air Force chooses to implement the Proposed Action Alternative, it is accepting the potential flood risk for these facilities.

Table ES-12. Summary Comparison of Impacts by Alternative

Resource Areas		No Action	Proposed Action	Mitigation Measures
Airspace:		No impacts.	No adverse impacts.	No mitigation measures proposed.
Hazardous Materials and Wastes, Toxic Substances, and Contaminated Sites				
Base:	Use, Storage Disposal, and Installation/ Environmental/ Compliance Restoration Programs/ Military Response Areas	Established procedures for storing, using, and disposing of hazardous materials and waste would continue to be followed. Toxic substances would be consistent with baseline levels. Contaminated sites would continue to be managed under the Installation, Environmental, and Compliance Restoration Plans.	No new hazardous materials would be introduced; existing disposal systems are in place and have the capacity to support increased total hazardous waste. Toxic substances associated with the F-35A are minor and any construction on or near contaminated sites would adhere to federal, state, local, and base management practices to avoid health and safety risks. No adverse impacts.	No mitigation measures proposed on base.
Airspace:		No impacts.	No adverse impacts.	No mitigation measures proposed.
Recreational and Visual Resources				
Base:	Facilities and Development Compatibility	Noise levels would not change the recreational use of on- or off-base recreational facilities. In terms of visual impacts, new facility design would be consistent with the existing visual landscape found on a military installation. No adverse impacts are anticipated.	No construction would occur on or near parks adjacent to the base or with the expansion of the South Gate. Changes in noise levels would not affect recreational pursuits on base or in locations near the base. The visual aspect would be consistent with the No-Action Alternative conditions found on a military installation. No adverse impacts to recreational or visual resources on or immediately off base.	No mitigation measures proposed on base.
Airspace:	Special Use Areas and Visual Landscape Compatibility	No change to baseline noise and visual aspects in northern JPARC airspace. Continued adherence to existing avoidance areas, seasonal and altitude restrictions, and standard operational procedures identified in the 2015 11th Air Force Alaska Airspace Handbook and those identified in the 2013 JPARC EIS ROD, minimize the potential for adverse impacts recreational or visual resources.	There would be an increase in the frequency of airspace operations and associated noise levels would negligibly increase when compared to the No-Action Alternative. Some individuals may perceive the noise increase as interfering with the quality of their recreation. However, the F-35A would be conducting activities similar to those currently conducted by the F-16 and transient jet aircraft, but at predominantly higher altitudes, resulting in a negligible increase in noise levels on the ground. Overflights also would not change the visual aspect of the landscape where military aircraft have been operating for several decades. Consequently, in combination with the existing avoidance areas, seasonal and altitude restrictions, and standard operating procedures identified in the 2015 11th Air Force Alaska Airspace Handbook, increases in noise associated with the Proposed Action Alternative would minimize the potential for adverse impacts to recreational or visual resources.	No mitigation measures proposed.

This Page Intentionally Left Blank.

Table of Contents

TABLE OF CONTENTS

ACRONYMS AND ABBREVIATIONS i

1.0 PURPOSE OF AND NEED FOR THE PROPOSED ACTION 1-1
1.1 INTRODUCTION 1-1
1.1.1 Fighter Modernization 1-1
1.1.2 F-35 Aircraft Characteristics 1-1
1.2 PURPOSE OF AND NEED FOR THE PROPOSED ACTION 1-2
1.2.1 Purpose 1-2
1.2.2 Need 1-2
1.3 THE ENVIRONMENTAL IMPACT ANALYSIS PROCESS 1-3
1.3.1 Streamlining the NEPA/EIAP Process 1-3
1.3.2 Scoping Process 1-3
1.3.3 Public Review and Comment Period 1-4
1.3.4 Interagency and Intergovernmental Coordination during Scoping 1-5
1.3.5 Agency and Government-to-Government Consultation 1-6
1.3.5.1 State Historic Preservation Office 1-7
1.3.5.2 United States Fish and Wildlife Service 1-8
1.3.5.3 Government-to-Government 1-8
1.3.6 Lead and Cooperating Agencies 1-9
1.4 SCOPE OF RESOURCE ANALYSIS 1-9
1.5 CLARIFICATIONS AND CHANGES TO THE EIS 1-9

2.0 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES 2-1
2.1 ALTERNATIVES SELECTION STANDARDS 2-1
2.1.1 Candidate Bases 2-2
2.1.2 Site Survey Results 2-2
2.1.3 Overview of the Alternatives to be Analyzed 2-3
2.2 ALTERNATIVES CARRIED FORWARD FOR ANALYSIS 2-3
2.2.1 No-Action Alternative 2-3
2.2.1.1 Personnel 2-4
2.2.1.2 Facilities and Infrastructure 2-5
2.2.1.3 Airfield and Airspace Operations 2-7
2.2.2 Proposed Action Alternative: Add Two Squadrons of F-35As to Existing Missions at Eielson AFB 2-15
2.2.2.1 Personnel 2-15
2.2.2.2 Facility and Infrastructure Construction and Modifications 2-16
2.2.2.3 Airfield and Airspace Operations 2-20
2.3 ANALYSIS OF IMPACTS 2-26
2.4 DOCUMENTS INCORPORATED BY REFERENCE 2-27
2.5 SUMMARY OF ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ACTION ALTERNATIVE 2-28

3.0 AFFECTED ENVIRONMENT 3-1
3.1 INTRODUCTION 3-1
3.2 AIRFIELD AND AIRSPACE OPERATIONS AND MANAGEMENT 3-1
3.2.1 Resource Definition 3-1
3.2.1.1 Operations 3-1
3.2.1.2 Management 3-3
3.2.2 Affected Environment 3-5
3.2.2.1 Base 3-6
3.2.2.2 Airspace 3-7
3.3 ACOUSTIC ENVIRONMENT 3-13
3.3.1 Resource Definition 3-13
3.3.1.1 Population Noise Effects 3-13
3.3.1.2 Types of Military Aircraft Noise 3-15
3.3.1.3 Land Use Noise Effects 3-18
3.3.1.4 Domesticated Animals and Wildlife Noise Effects 3-21
3.3.2 Affected Environment 3-21
3.3.2.1 Base 3-21
3.3.2.2 Airspace 3-32
3.4 AIR QUALITY 3-40
3.4.1 Resource Definition 3-40
3.4.1.1 Criteria Pollutants 3-40
3.4.1.2 Conformity Rule 3-41
3.4.1.3 Greenhouse Gas Emissions 3-41
3.4.2 Analysis Methodology 3-42
3.4.3 Affected Environment 3-44
3.4.3.1 Base 3-44
3.4.3.2 Airspace 3-45
3.5 SAFETY 3-45
3.5.1 Resource Definition 3-45
3.5.1.1 Fire Risk and Management 3-45
3.5.1.2 Accident Potential Zones 3-46
3.5.1.3 Aircraft Mishaps 3-46
3.5.1.4 Bird/Wildlife-Aircraft Strike Hazards 3-48
3.5.2 Affected Environment 3-48
3.5.2.1 Base 3-48
3.5.2.2 Airspace 3-52
3.6 SOCIOECONOMICS 3-55
3.6.1 Resource Definition 3-55
3.6.2 Affected Environment 3-56
3.6.2.1 Base 3-56
3.7 LAND MANAGEMENT 3-61
3.7.1 Resource Definition 3-61
3.7.2 Affected Environment 3-61
3.7.2.1 Base 3-61
3.7.2.2 Airspace 3-62

3.8 CULTURAL RESOURCES 3-65
3.8.1 Resource Definition 3-65
3.8.2 Affected Environment 3-66
3.8.2.1 Base 3-66
3.8.2.2 Airspace 3-68
3.9 ENVIRONMENTAL JUSTICE AND PROTECTION OF CHILDREN 3-72
3.9.1 Resource Definition 3-72
3.9.2 Affected Environment 3-73
3.9.2.1 Base 3-73
3.9.2.2 Airspace 3-76
3.10 NATURAL RESOURCES 3-78
3.10.1 Resource Definition 3-78
3.10.2 Affected Environment 3-79
3.10.2.1 Base 3-79
3.10.2.2 Airspace 3-80
3.11 EARTH RESOURCES 3-84
3.11.1 Resource Definition 3-84
3.11.2 Affected Environment 3-85
3.11.2.1 Base 3-85
3.11.2.2 Airspace 3-87
3.12 WATER RESOURCES 3-87
3.12.1 Resource Definition 3-87
3.12.2 Affected Environment 3-87
3.12.2.1 Base 3-88
3.12.2.2 Airspace 3-89
3.13 HAZARDOUS MATERIALS, HAZARDOUS WASTES, TOXIC SUBSTANCES, AND CONTAMINATED SITES 3-92
3.13.1 Resource Definition 3-92
3.13.1.1 Hazardous Materials 3-92
3.13.1.2 Hazardous Waste 3-92
3.13.1.3 Toxic Substances 3-92
3.13.1.4 Contaminated Sites 3-92
3.13.2 Affected Environment 3-93
3.13.2.1 Base 3-93
3.13.2.2 Airspace 3-98
3.14 RECREATIONAL AND VISUAL RESOURCES 3-99
3.14.1 Resource Definition 3-99
3.14.2 Affected Environment 3-99
3.14.2.1 Base 3-99
3.14.2.2 Airspace 3-100

4.0 ENVIRONMENTAL CONSEQUENCES 4-1
4.1 INTRODUCTION 4-1
4.2 AIRFIELD AND AIRSPACE OPERATIONS AND MANAGEMENT 4-2
4.2.1 No-Action Alternative 4-3
4.2.1.1 Base 4-3
4.2.1.2 Airspace 4-3
4.2.2 Proposed Action Alternative 4-3
4.2.2.1 Base 4-3
4.2.2.2 Airspace 4-4
4.2.2.3 Civil and Commercial Aviation Airspace Use 4-5
4.2.3 Mitigation 4-5
4.3 ACOUSTIC ENVIRONMENT 4-6
4.3.1 No-Action Alternative 4-6
4.3.1.1 Base 4-6
4.3.1.2 Airspace 4-13
4.3.2 Proposed Action Alternative 4-18
4.3.2.1 Base 4-18
4.3.2.2 Airspace 4-28
4.3.3 Mitigation 4-35
4.4 AIR QUALITY 4-35
4.4.1 No-Action Alternative 4-37
4.4.1.1 Base 4-37
4.4.1.2 Airspace 4-37
4.4.2 Proposed Action Alternative 4-37
4.4.2.1 Base 4-37
4.4.2.2 Airspace 4-39
4.4.3 Mitigation 4-40
4.5 SAFETY 4-40
4.5.1 No-Action Alternative 4-40
4.5.1.1 Base 4-40
4.5.1.2 Airspace 4-40
4.5.2 Proposed Action Alternative 4-40
4.5.2.1 Base 4-40
4.5.2.2 Airspace 4-42
4.5.3 Mitigation 4-44
4.6 SOCIOECONOMICS 4-44
4.6.1 No-Action Alternative 4-46
4.6.1.1 Population, Demographics, and Economics 4-46
4.6.1.2 Schools, Housing, Transportation, and Utilities 4-46
4.6.1.3 Health, Fire, and Crime Response 4-46
4.6.2 Proposed Action Alternative 4-46
4.6.2.1 Population, Demographics, and Economics 4-46
4.6.2.2 Schools, Housing, Transportation, and Utilities 4-47
4.6.2.3 Health, Fire, and Crime Response 4-49
4.6.3 Mitigation 4-50

4.7 LAND MANAGEMENT 4-50
4.7.1 No-Action Alternative 4-50
4.7.1.1 Base 4-50
4.7.1.2 Airspace 4-50
4.7.2 Proposed Action Alternative 4-50
4.7.2.1 Base 4-50
4.7.2.2 Airspace 4-50
4.7.3 Mitigation 4-51
4.8 CULTURAL RESOURCES 4-51
4.8.1 No-Action Alternative 4-52
4.8.1.1 Base 4-52
4.8.1.2 Airspace 4-52
4.8.2 Proposed Action Alternative 4-52
4.8.2.1 Base 4-52
4.8.2.2 Airspace 4-53
4.8.3 Mitigation 4-54
4.9 ENVIRONMENTAL JUSTICE AND PROTECTION OF CHILDREN 4-54
4.9.1 No-Action Alternative 4-56
4.9.2 Proposed Action Alternative 4-56
4.9.2.1 Base 4-56
4.9.2.2 Airspace 4-59
4.9.3 Mitigation 4-60
4.10 NATURAL RESOURCES 4-61
4.10.1 No-Action Alternative 4-61
4.10.1.1 Base 4-61
4.10.1.2 Airspace 4-61
4.10.2 Proposed Action Alternative 4-61
4.10.2.1 Base 4-61
4.10.2.2 Airspace 4-66
4.10.3 Mitigation 4-68
4.11 EARTH RESOURCES 4-68
4.11.1 No-Action Alternative 4-69
4.11.1.1 Base 4-69
4.11.1.2 Airspace 4-69
4.11.2 Proposed Action Alternative 4-69
4.11.2.1 Base 4-69
4.11.2.2 Airspace 4-69
4.11.3 Mitigation 4-70
4.12 WATER RESOURCES 4-70
4.12.1 No-Action Alternative 4-70
4.12.1.1 Base 4-70
4.12.1.2 Airspace 4-70
4.12.2 Proposed Action Alternative 4-70
4.12.2.1 Base 4-70
4.12.2.2 Airspace 4-75
4.12.3 Mitigation 4-75

4.13 HAZARDOUS MATERIALS, HAZARDOUS WASTES, TOXIC SUBSTANCES, AND CONTAMINATED SITES....4-76
4.13.1 No-Action Alternative....4-76
4.13.1.1 Base....4-76
4.13.1.2 Airspace....4-76
4.13.2 Proposed Action Alternative....4-76
4.13.2.1 Base....4-76
4.13.2.2 Airspace....4-78
4.13.3 Mitigation....4-78
4.14 RECREATIONAL AND VISUAL RESOURCES....4-78
4.14.1 No-Action Alternative....4-79
4.14.1.1 Base....4-79
4.14.1.2 Airspace....4-79
4.14.2 Proposed Action Alternative....4-79
4.14.2.1 Base....4-79
4.14.2.2 Airspace....4-79
4.14.3 Mitigation....4-80

5.0 CUMULATIVE EFFECTS....5-1
5.1 PAST AND PRESENT ACTIONS RELEVANT TO THE PROPOSED ACTION ALTERNATIVE....5-2
5.1.1 Department of Defense Actions....5-2
5.1.2 Non-Department of Defense Actions....5-3
5.2 ANALYSIS OF CUMULATIVE EFFECTS....5-3
5.2.1 Cumulative Impacts with Actions in the Region....5-3
5.2.1.1 Airfield and Airspace Operations and Management....5-3
5.2.1.2 Acoustic Environment....5-4
5.2.1.3 Air Quality....5-4
5.2.1.4 Socioeconomics....5-4
5.2.2 Cumulative Impacts with Actions outside of the Region....5-5

6.0 OTHER CONSIDERATIONS REQUIRED BY THE NATIONAL ENVIRONMENTAL POLICY ACT....6-1
6.1 CONSISTENCY AND COMPLIANCE WITH OTHER FEDERAL, STATE, AND LOCAL PLANS, POLICIES, AND REGULATIONS....6-1
6.2 UNAVOIDABLE ADVERSE ENVIRONMENTAL EFFECTS....6-3
6.3 RELATIONSHIP BETWEEN SHORT-TERM USES AND LONG-TERM PRODUCTIVITY....6-4
6.4 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES....6-4

7.0 LIST OF PREPARERS....7-1

8.0 REFERENCES CITED....8-1

9.0 INDEX....9-1

APPENDICES (can be found in Volume II)

APPENDIX A Public Notices A-1
APPENDIX B Stakeholder Mailing List B-1
APPENDIX C Coordination and Consultation Correspondence C-1
APPENDIX D Detailed Resource Information D-1
APPENDIX E Noise Modeling, Methodology, and Effects E-1
APPENDIX F Air Emissions Calculations F-1
APPENDIX G Draft EIS Public Comments and Responses G-1

LIST OF FIGURES

Figure 2.2-1. Eielson AFB Boundary 2-6
Figure 2.2-2. Joint Pacific Alaska Range Complex 2-10
Figure 2.2-3. Joint Pacific Alaska Range Complex Airspace used by Eielson AFB Aircraft 2-12
Figure 2.2-4. Regional Training Impact Areas underneath Northern JPARC Airspace 2-14
Figure 2.2-5. Proposed Action Alternative Basewide Facility and Infrastructure Construction and Modification Plan 2-18
Figure 2.2-6. Proposed Action Alternative Southern End Facility and Infrastructure Construction and Modification Plan 2-19
Figure 2.2-7. Military Training Routes in the Northern Joint Pacific Alaska Range Complex Airspace 2-23
Figure 3.2-1. Airspace Classification 3-2
Figure 3.2-2. Representative Operational Airspace 3-4
Figure 3.2-3. Terminal Radar Service Area in the Affected Environment 3-7
Figure 3.2-4. Joint Pacific Alaska Range Complex Northern Airspace Restrictions, Limitations, and Seasonal Adjustments 3-8
Figure 3.3-1. Baseline DNL Contours for Annual Average Daily Aircraft Operations 3-23
Figure 3.3-2. Altitude Profiles for Representative Departures from Runway 32 for Based and Transient Aircraft at Eielson AFB 3-24
Figure 3.3-3. L_{max} and SEL for Representative Aircraft Operating at Eielson AFB 3-25
Figure 3.3-4. Baseline Representative POIs On and Off Base 3-27
Figure 3.3-5. Eielson AFB Current Land Use 3-31
Figure 3.3-6. Northern JPARC Airspace and Modeled Airspace 3-33
Figure 3.3-7. Baseline Modeled Northern JPARC Airspace and Representative POIs 3-33
Figure 3.3-8. Baseline CDNL Contours for Supersonic Operations during the Busiest Month 3-37
Figure 3.3-9. Baseline Estimated Number of Sonic Booms for the Busiest Month 3-38
Figure 3.4-1. Fairbanks North Star Borough Air District 3-44
Figure 3.5-1. Accident Potential Zones 3-46
Figure 3.5-2. Fighter Aircraft Mishap Rates 3-47
Figure 3.5-3. Eielson AFB Clear Zones and Accident Potential Zones 3-50
Figure 3.5-4. Fairbanks North Star Borough Land Use Categories within Accident Potential Zone II 3-51
Figure 3.5-5. Oklahoma Range and Recent Wildland Fires 3-54
Figure 3.6-1. Fairbanks North Star Borough Boundaries 3-56
Figure 3.7-1. Special Use Land Management Areas Underlying JPARC Airspace 3-63
Figure 3.8-1. Eielson AFB Area of Potential Effect 3-67
Figure 3.8-2. Northern JPARC Airspace Area of Potential Effect 3-69
Figure 3.9-1. Minority Population Areas in the Community of Comparison 3-74
Figure 3.9-2. Low-income Population Areas in the Community of Comparison 3-75
Figure 3.9-3. Baseline Sensitive Populations (Children and the Elderly) Experiencing 45 dB to 85 dB DNL 3-77
Figure 3.10-1. Wetlands in the Southern Portion of Eielson AFB 3-81
Figure 3.11-1. Soil Units within the Southern Portion of Eielson AFB 3-86
Figure 3.12-1. FNSB 100-Year Floodplains within the Southern Portion of Eielson AFB 3-90
Figure 3.12-2. Federal Emergency Management Agency 100-Year Floodplains within the Southern Portion of Eielson AFB 3-90
Figure 3.12-3. Eielson AFB Vegetation Map 3-91
Figure 3.13-1. Installation Restoration Program Sites in the Southern Portion of Eielson AFB 3-95
Figure 3.13-2. Compliance Restoration Sites in the Southern Portion of Eielson AFB 3-96

Figure 3.13-3. Military Munitions Response Program Sites in the Southern Portion of Eielson AFB 3-97
Figure 3.14-1. National Wild and Scenic Rivers underneath Northern JPARC Airspace 3-101
Figure 4.3-1. No-Action Alternative DNL Contours for Annual Average Daily Aircraft Operations and Representative POIs On and Off Eielson AFB 4-7
Figure 4.3-2. No-Action Alternative DNL Contours for Annual Average Daily Aircraft Operations and Representative POIs On and Off Eielson AFB 4-8
Figure 4.3-3. No-Action Alternative CDNL Contours for Supersonic Operations in the Busiest Month 4-16
Figure 4.3-4. No-Action Alternative Estimated Number of Sonic Booms for the Busiest Month 4-17
Figure 4.3-5. Proposed Action Alternative DNL Contours for Annual Average Daily Aircraft Operations 4-19
Figure 4.3-6. Proposed Action Alternative DNL Contours Compared to the No-Action Alternative 4-20
Figure 4.3-7. Proposed Action Alternative Altitude Profiles on Runway 32 for Representative Aircraft Departures 4-21
Figure 4.3-8. Proposed Action Alternative F-35A L_{max} and SEL 4-22
Figure 4.3-9. Proposed Action Alternative CDNL Contours for Supersonic Operations in the Busiest Month 4-32
Figure 4.3-10. Proposed Action Alternative Estimated Number of Sonic Booms in the Busiest Month 4-33
Figure 4.9-1. Proposed Action Alternative Concentrations of Children and the Elderly and DNL Contours 45 to 85 dB 4-57
Figure 4.9-2. Proposed Action Alternative Minority Population in the Community of Comparison and DNL Contours 65 dB and Greater 4-58
Figure 4.9-3. Proposed Action Alternative Low-Income Population in the Community of Comparison and DNL Contours 65 dB and Greater 4-58
Figure 4.10-1. Proposed Action Alternative Facility and Infrastructure Construction and Modification in Wetland Areas 4-64
Figure 4.12-1. FNSB 100-Year Floodplains within the Southern Portion of Eielson AFB 4-73
Figure 4.12-2. Federal Emergency Management Agency 100-Year Floodplains within the Southern Portion of Eielson AFB 4-73

LIST OF TABLES

Table 1.3-1. Consultation Requirements....1-7
Table 2.2-1. Eielson AFB Personnel and Dependents....2-4
Table 2.2-2. Eielson AFB Infrastructure and Construction Activities under the No-Action Alternative....2-5
Table 2.2-3. Eielson AFB No-Action Alternative Infrastructure and Construction Activities under Northern JPARC Airspace....2-7
Table 2.2-4. Based Aircraft at Eielson AFB under the No-Action Alternative....2-8
Table 2.2-5. Summary of Operations, Airspace Altitudes, and Supersonic Authorization[1] under the No-Action Alternative for Northern JPARC Airspace....2-11
Table 2.2-6. Annual Baseline Air-to-Ground Munitions Used at Training Areas underlying R-2202, R-2205, and R-2211....2-13
Table 2.2-7. F-35A Flow and Based Aircraft....2-15
Table 2.2-8. Eielson AFB Proposed Action Alternative Personnel and Dependents....2-15
Table 2.2-9. Proposed Action Alternative Construction, Additions, Alterations/Renovations, and Demolition....2-17
Table 2.2-10. Projected F-35A Annual Airfield Operations at Full Operational Capability....2-21
Table 2.2-11. Projected F-35A Training Activities....2-21
Table 2.2-12. Proposed F-35A Annual Operations in Northern JPARC Airspace....2-24
Table 2.2-13. F-35A Altitude Distribution....2-25
Table 2.2-14. Average Altitude Profiles for Supersonic Flight....2-25
Table 2.5-1. Summary Comparison of Impacts by Alternative....2-29
Table 3.2-1. Northern JPARC Airspace Units....3-8
Table 3.2-2. Northern Joint Pacific Alaska Range Complex Airspace Restrictions, Limitations, and Seasonal Adjustments Summary....3-9
Table 3.2-3. Northern Joint Pacific Alaska Range Complex Airspace Annual Operations....3-12
Table 3.3-1. Noise Metrics and Their Use....3-14
Table 3.3-2. Air Force Land Use Compatibility with DNL....3-19
Table 3.3-3. Baseline Airfield Annual Operations....3-22
Table 3.3-4. Baseline On- and Off-Base Noise Exposure....3-22
Table 3.3-5. Baseline DNL for Representative POIs On and Off Base....3-26
Table 3.3-6. Baseline Indoor Speech Interference at Representative POIs On and Off Base....3-28
Table 3.3-7. Baseline Classroom Learning Interference for Schools On or Near Eielson AFB....3-29
Table 3.3-8. Baseline Indoor Sleep Disturbance Residential POIs On or Near Eielson AFB....3-29
Table 3.3-9. Baseline Land Use Categories Affected by Noise On and Off Eielson AFB (in acres)....3-32
Table 3.3-10. Baseline Uniform Distributed L_{dnmr} and Number of Events At or Above Selected Thresholds in Northern JPARC....3-34
Table 3.3-11. Baseline L_{dnmr} for Representative POIs below Northern JPARC Airspace....3-35
Table 3.3-12. Maximum Single Event Noise Levels for Aircraft Operating in Northern JPARC Airspace....3-35
Table 3.3-13. Baseline Sonic Boom Peak Overpressures (pounds per square foot) for Typical Supersonic Aircraft....3-36
Table 3.3-14. Baseline Supersonic Noise Exposure and Sonic Booms per Busiest Month in Northern JPARC Airspace....3-39
Table 3.4-1. National Ambient Air Quality Standards....3-40
Table 3.4-2. Baseline Emissions Inventory for Fairbanks North Star Borough....3-44
Table 3.4-3. 2004 Aircraft Criteria Pollutant Emissions....3-44

Table 3.5-1. Aircraft Class Mishaps 3-47
Table 3.6-1. Population in Fairbanks North Star Borough and Alaska from 2000 to 2013.....3-56
Table 3.6-2. Population Projections in FNSB and Alaska for 2017 to 2032 3-57
Table 3.6-3. Military Population in the Region of Influence Associated with Eielson AFB in 2015.....3-57
Table 3.6-4. Race and Ethnicity for FNSB and Alaska in 2013 3-57
Table 3.6-5. Gender and Age for FNSB and Alaska in 2013 3-57
Table 3.6-6. Labor Force and Employment for FNSB and Alaska in 2013.....3-58
Table 3.6-7. Civilian Employment by Industry for FNSB and Alaska in 2013.....3-58
Table 3.6-8. Income and Poverty for FNSB and Alaska in 2013.....3-59
Table 3.6-9. Housing Characteristics for FNSB and Alaska in 2013 3-59
Table 3.6-10. 2014 Use of Transportation Infrastructure in FNSB 3-59
Table 3.7-1. Special Use Areas Underlying Joint Pacific Alaska Range Complex Airspace.....3-64
Table 3.8-1. Federally Recognized Alaska Native Tribes Under JPARC Airspace 3-68
Table 3.8-2. NRHP Listed Resources Under Northern JPARC Airspace.....3-70
Table 3.9-1. Demographic Information for Fairbanks North Star Borough, Moose Creek, and North Pole.....3-73
Table 3.9-2. Census Areas underlying Northern JPARC Airspace 3-76
Table 3.9-3. Demographic Information for Census Areas under Northern JPARC Airspace 3-78
Table 3.10-1. Species Federally Listed as Endangered or Threatened under the Endangered Species Act that May Occur in the northern JPARC Airspace 3-84
Table 4.1-1. Proposed Action Elements Impacting Resources.....4-1
Table 4.2-1. Proposed Action Alternative Annual Operations for Northern JPARC Airspace 4-4
Table 4.3-1. No-Action Alternative DNL for Representative POIs On and Off Eielson AFB.....4-9
Table 4.3-2. No-Action Alternative Indoor Speech Interference Events at Representative On- and Off-Base POIs.....4-10
Table 4.3-3. No-Action Alternative Classroom Learning Interference On and Off Eielson AFB.....4-11
Table 4.3-4. No-Action Alternative Indoor Sleep Disturbance for On- and Off-Base Residential POIs 4-12
Table 4.3-5. No-Action Alternative Uniform Distributed L_{dnmr} and Number of Events At or Above Selected Thresholds in Northern JPARC Airspace.....4-13
Table 4.3-6. No-Action Alternative L_{dnmr} for Northern JPARC Airspace Representative POIs 4-14
Table 4.3-7. Proposed Action Alternative On- and Off-Base Noise Exposure.....4-21
Table 4.3-8. Proposed Action Alternative DNL for Representative POIs.....4-23
Table 4.3-9. Proposed Action Alternative Indoor Speech Interference Locations 4-24
Table 4.3-10. Proposed Action Alternative Classroom Learning Interference On and Off Base.....4-25
Table 4.3-11. Proposed Action Alternative Indoor Sleep Disturbance for On- and Off-Base Residential POIs 4-26
Table 4.3-12. Proposed Action Alternative Change in On-Base Acreage by Land Use Category and DNL Band.....4-27
Table 4.3-13. Proposed Action Alternative Uniform Distributed L_{dnmr} and Number of Events At or Above Selected Thresholds in Northern JPARC Airspace 4-28
Table 4.3-14. Proposed Action Alternative L_{dnmr} for Northern JPARC Airspace Representative POIs 4-29
Table 4.3-15. Proposed Action Alternative Maximum Single-Event Noise Levels for Modeled Aircraft 4-30
Table 4.3-16. Proposed Action Alternative Sonic Boom Peak Overpressures (pounds per square foot) for Typical Supersonic Aircraft in the Northern JPARC Airspace 4-31

Table 4.3-17. Proposed Action Alternative Supersonic Noise Exposure and Sonic Booms during the Busiest Month in Northern JPARC Airspace 4-34
Table 4.4-1. Sources included in the Base Air Quality Analysis 4-38
Table 4.4-2. Total Emissions from Proposed Action Alternative Construction, Demolition, Based Aircraft Operations, Personnel, and Heating by Year at Eielson AFB 4-38
Table 4.4-3. Proposed Action Alternative Aircraft Emissions Based on Each F-35A Squadron (24 aircraft per squadron) 4-39
Table 4.6-1. Economic Impacts from Construction, Totals, FY16 to FY19, 2015 $'s 4-47
Table 4.6-2. Economic Impacts from Construction, Annual Averages, FY16 to FY19, 2015 $'s 4-47
Table 4.6-3. Economic Impacts from F-35A Operations and Maintenance Activities, Annual, 2015 $'s 4-47
Table 4.6-5. Population and Housing Growth Projections to 2020 4-49
Table 4.14-1. Summary of Airspace Limitations over Special Use Areas 4-81
Table 5.1-1. DoD Past, Present, and Reasonably Foreseeable Actions 5-2
Table 5.1-2. Non-DoD Present and Reasonably Foreseeable Actions 5-3
Table 5.2-1. CumulativePollutantEmissions 5-4
Table 6.1-1. Summary of Applicable Environmental Regulations and Regulatory Compliance 6-1

ACRONYMS AND ABBREVIATIONS

354 FW	354th Fighter Wing
ACAM	Air Conformity Applicability Model
ADEC	Alaska Department of Environmental Conservation
ADFG	Alaska Department of Fish and Game
AFB	Air Force Base
AFCEC	Air Force Civil Engineer Center
AFI	Air Force Instruction
AFSC	Air Force Safety Center
AGL	Above Ground Level
ANSCA	Alaska Native Claims Settlement Act
AOR	Area of Responsibility
APDES	Alaska Pollutant Discharge Elimination System
APE	area of potential effect
APZ	Accident Potential Zone
ATCAA	Air Traffic Control Assigned Airspace
BASH	Bird-Wildlife Aircraft Strike Hazard
BGEPA	Bald and Golden Eagle Protection Act
BLM	Bureau of Land Management
CAA	Clean Air Act
CDNL	C-Weighted DNL
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
dB	decibel
dBC	C-Weighted dB
DNL	Day-Night Average Sound Level
DoD	Department of Defense
EA	Environmental Assessment
EIAP	Environmental Impact Analysis Process
EIS	Environmental Impact Statement
EO	Executive Order
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FICUN	Federal Interagency Committee on Urban Noise
FL	Flight Level
FNSB	Fairbanks North Star Borough
FONSI	Finding of No Significant Impact
FY	Fiscal Year
GHG	greenhouse gas
HAP	Hazardous Air Pollutant
HAZMART	Hazardous Materials Pharmacy Program
HRMA	Housing Requirements and Market Analysis
IFR	Instrument Flight Rule
IMPLAN	Impact Analysis for Planning
INRMP	Integrated Natural Resources Management Plan
JPARC	Joint Pacific Alaska Range Complex
L	Threshold Level
L_{dnmr}	Onset-Rate Adjusted Day-Night Average Sound Level
L_{eq}	Equivalent Noise Level
LIDAR	Light Detection and Ranging
L_{max}	Maximum Sound Level
$\mu g/m^3$	micrograms per cubic meter
MOA	Military Operations Area
MSL	Mean Sea Level
MTR	Military Training Route
NA	Number-of-Events Above
NAL	Number-of-Events Above a Threshold Level
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NIOSH	National Institute for Occupational Safety and Health
NM	nautical mile
NO_2	nitrogen dioxide
NOI	Notice of Intent
NO_x	nitrogen oxide
NPS	National Park Service
NRHP	National Register of Historic Places
O_3	ozone
OCONUS	Outside the Contiguous United States
OEIS	Overseas EIS
OSHA	Occupational Safety and Health Administration
PAA	Primary Assigned Aircraft
PACAF	Pacific Air Forces
Pb	lead
$PM_{2.5}$	particulate matter less than or equal to 2.5
PM_{10}	particulate matter less than or equal to 10
POI	point of interest
ppm	parts per million
PSD	Prevention of Significant Deterioration
RAP	Ready Aircrew Program
RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision
SEL	Sound Exposure Level
SHPO	State Historic Preservation Office(r)
SO_2	sulfur dioxide
SO_x	sulfur oxide
SUA	Special Use Airspace
SUAIS	Special Use Airspace Information Service
UAV	Unmanned Aerial Vehicle
U.S.	United States
USC	U.S. Code
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
VFR	Visual Flight Rule
VOC	volatile organic compound
VRM	Visual Resource Management
WSR	Wild and Scenic River

This Page Intentionally Left Blank.

1.0 Purpose of and Need for the Proposed Action

1.0 PURPOSE OF AND NEED FOR THE PROPOSED ACTION

1.1 INTRODUCTION

1.1.1 Fighter Modernization

During the 1980s, the United States (U.S.) Air Force assessed its tactical capabilities against projected threats and determined a multirole 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 Air Force developed a strategy to modernize the aging inventory of legacy aircraft with an almost all-stealth fighter force by 2025. This began with the F-22 Raptor in the early 1990s. 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 the Joint Strike Fighter (or F-35 Lightning II) would be developed to replace and supplement Air Force legacy fighter and attack aircraft such as the F-16 Fighting Falcon and A-10 Thunderbolt II.

1.1.2 F-35 Aircraft Characteristics

The F-35 is a supersonic, single seat, single engine, all weather fighter aircraft capable of performing and surviving lethal strike warfare missions. The F-35 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 Air Force F-35A version also possesses a 25-millimeter cannon for close air support and anti-armor missions. In addition, it employs defensive countermeasures such as flares, although its stealth characteristics may reduce the need for such measures. There are three variations of the F-35: the F-35A Conventional Take-Off and Landing version the Air Force is purchasing; the F-35B Short Take-Off and Vertical Landing version; and the F-35C Carrier Variant.

The F-35A Conventional Take-Off and Landing variant embodies critical combat capabilities to fulfill multiple Air Force mission roles, emphasizing air-to-ground missions by providing a unique combination of the following capabilities:

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

- *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.

The Air Force has begun the strategic basing process and identified installations to receive the first F-35A beddowns. Pilot training and operational testing for the F-35A is already established at Eglin Air Force Base (AFB) in Florida, Edwards AFB in California, Nellis AFB in Nevada, and at Luke AFB in Arizona. Two basing locations have already been identified to support operational squadrons: Hill AFB in Utah (the first operational beddown or Ops #1), where aircraft started arriving in 2015, and the third beddown at Burlington Air National Guard Base in Vermont (Ops #3), which is scheduled to receive its first F-35A in 2020. Under this Proposed Action, the second operational F-35A beddown (Ops #2) is planned in the Pacific Air Forces (PACAF) Area of Responsibility (AOR). This beddown proposal consists of basing two F-35A squadrons, with the first aircraft scheduled for delivery in 2019. This Environmental Impact Statement (EIS) analyzes the impacts associated with implementing Ops #2 within the PACAF AOR.

1.2 PURPOSE OF AND NEED FOR THE PROPOSED ACTION

The proposed beddown and operation of the F-35A within the PACAF AOR meets the President and Secretary of Defense's directives to reduce vulnerabilities and provide rapid worldwide deployment. The PACAF F-35A beddown would also serve as a stabilizing presence within the region by providing efficient and effective response to threats, and undertake the Combat Air Force core competencies of air and space superiority, global attack, precision engagement, and agile combat support.

1.2.1 Purpose

To maintain capable ready forces required for national defense, the Air Force must integrate the F-35A mission while transitioning from the legacy-fighter aircraft programs. The purpose of the Proposed Action is to maintain efficient and effective combat capability and mission readiness in the PACAF AOR as the Air Force faces deployments across a spectrum of conflicts, while also providing for homeland defense. Beddown and operation of the F-35A at a PACAF AOR base would represent a major step toward this goal. This beddown action assures availability of combat-ready pilots in the PACAF AOR, flying the most advanced fighter aircraft in the world.

1.2.2 Need

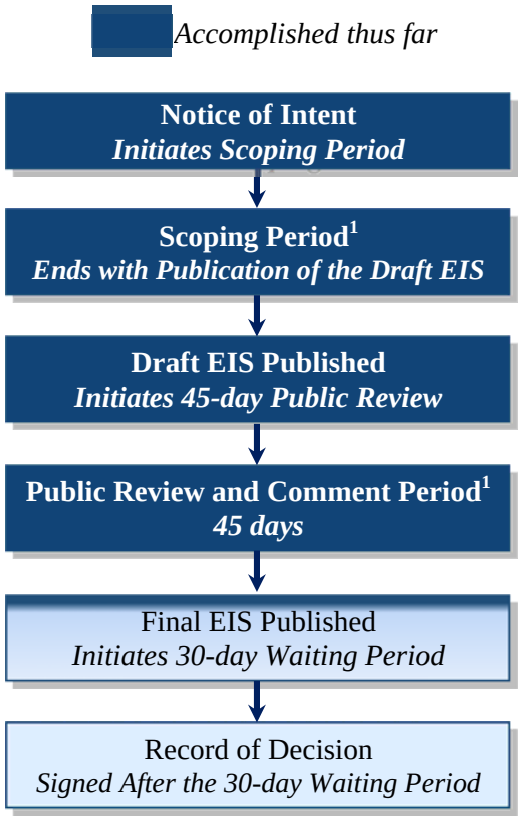
The Secretary of the Air Force determined there was a need to locate F-35A aircraft in the PACAF AOR based on the following priorities:

- Support the Pacific rebalance as directed by the President and the Secretary of Defense to counter the threats arising in the Pacific arena;
- Support the location of robust fifth-generation aircraft capability to offset similar threats in the PACAF AOR;
- Support future significant peacekeeping requirements or conflicts that may occur in the Pacific region; and
- Provide adequate war planning response times in the PACAF AOR.

1.3 THE ENVIRONMENTAL IMPACT ANALYSIS PROCESS

The National Environmental Policy Act (NEPA) requires that a federal agency, when considering undertaking a major federal action, employ a systematic, interdisciplinary approach to: (1) analyze the potential environmental impacts of a proposed action, (2) consider alternatives to the proposed action, and (3) make an informed decision prior to implementing the action. This act applies to actions occurring in the U.S. and its territories, Antarctica, and for actions within 12 nautical miles (NM) (about 14 miles) from U.S. shorelines.

The Council on Environmental Quality (CEQ) regulations for implementing NEPA (40 Code of Federal Regulations [CFR] §§ 1500-1508), and the Air Force's regulations (32 CFR § 989) implementing NEPA, require the Air Force to consider potential environmental consequences of its proposed action early and concurrent with the initial project planning stages. Adherence to these regulations ensures the Air Force considers environmental impacts of its actions in planning and decision making, and provides an opportunity for public input into the decision making process. The Environmental Impact Analysis Process (EIAP), as contained in 32 CFR § 989, is the Air Force procedure for implementing NEPA. Through EIAP reviews, all information pertinent to the proposed action and reasonable alternatives, as well as the no-action alternative, are used to determine the appropriate level of NEPA analysis. For this Proposed Action, the Air Force determined the appropriate level of analysis was an EIS. The flow chart to the right identifies key milestones of the EIAP associated with the F-35A beddown proposal in the PACAF AOR.



[1]Opportunities for public involvement

1.3.1 Streamlining the NEPA/EIAP Process

In accordance with CEQ regulations implementing NEPA, and with the intent of reducing the size of this document, this EIS summarizes and incorporates by reference relevant material from other NEPA documents, as applicable.

1.3.2 Scoping Process

Scoping began with publication of the Notice of Intent (NOI) in the *Federal Register* on March 5, 2015 (Appendix A). Advertisements announcing the NOI and scoping meeting locations, dates, and times were placed in the *Fairbanks Daily News-Miner* (daily), *Delta Wind* (weekly), *Alaska Dispatch News* (daily), and the *Juneau Empire* (daily) newspapers at least a week prior to the scoping meetings. In daily newspapers, advertisements ran for three consecutive days and once in the weekly newspaper.

Scoping meetings were held in North Pole, Fairbanks, and Delta Junction on March 24, 25, and 26, 2015, respectively. In total, 195 people attended and 25 written comments were submitted at the scoping meetings. Another 45 comments were received up to publication of the Draft EIS. In general, the comments were supportive of basing the F-35A at Eielson AFB, although one commenter opposed the basing action in its entirety. During scoping, issues of concern included noise generated at the airfield by low-altitude aircraft, and in the airspace by higher-altitude aircraft creating sonic booms; the effects of

noise to humans, wildlife, livestock, and quality of life; increased air emissions further deteriorating North Pole air quality; increased wildland fire danger in the Delta Junction area because of more ordnance use; the effects of aircraft-generated noise on recreating in the state and national parks; and how increased military air traffic could impact civil aviation in the region.

1.3.3 Public Review and Comment Period

The public review and comment period began on September 4, 2015, with the publication of the Draft EIS Notice of Availability (NOA) in the *Federal Register*. The Draft EIS was distributed for review and comment to government agencies, local organizations, Alaska Native tribal entities, members of the public who requested a copy, and to libraries in time to coincide with the NOA announcement (Volume II, Appendix A). The Draft EIS was also available for review or download from the project website at https://www.PACAF-F35aeis.com on September 1, 2015. The advertisements, as well as the NOA, supplied the dates, times, and locations of the hearing meetings that were held in North Pole, Delta Junction, and Fairbanks on September 21, 22, and 23, 2015, respectively.

The three hearing meetings were held in two concurrent formats: an open house with displays where the public could interact with members of the Air Force NEPA team and the formal hearing where the public was given the opportunity to provide oral testimony on the Draft EIS. In total, 196 people attended the hearing meetings, 48 oral comments were recorded by a stenographer, and the Air Force received 20 written comments. Additionally, 12 emailed comments were submitted through the project website and nine letters were received over the 45-day comment period. The public review and comment period ended on October 20, 2015.

Copies of all comments recorded and received during the 45-day public comment and review period are presented in Volume II, Appendix G and can be viewed on the project website at https://www.PACAF-F35Aeis.com. They are also found in the hard copy Final EIS and on the CD accompanying the stand-alone Executive Summary. The following is a summary of comments received at each of the hearings. Written comments received after the hearings, through email and the U.S. Postal Service, echoed the comments received at the hearings.

For North Pole, of the 11 oral comments delivered, all but one was in support of basing the F-35As at Eielson AFB. Most found that the economic benefit of having the increased Air Force personnel and their dependents far out-weighed any noise issues. Commenters asked that we address issues such as noise reduction in schools (see Sections 4.3.3 and 4.9.3), concerns with the effects increased security for areas that are public (see Section 4.5.2.2, *Fire Risk and Management*), and air quality resulting from an increase in the population (see Section 4.4.2.1). There was also a comment that expressed concern for sonic booms and their effect on wildlife (see Section 4.3.2.2 and Volume II, Appendix E, Section E.2.14.2). Another commenter requested discussion that is more detailed on whether there is suitable rental housing in the area. For example, are the units close enough to the base, are there enough suitable and affordable housing units in the area to support construction employees in the short term and an increase in military and civilian personnel in the long term (see Section 4.6.2.1, *Schools, Housing, Transportation, and Utilities*).

At Delta Junction, four individuals provided oral comments and two submitted written comments. One commentor voiced their concerned about the increase in greenhouse gasses (see Section 5.2.1.3) and asked if our analysis included other sources of emissions in addition to those of the F-35A (see Volume II, Appendix F). That commentor also stated concerns with an increase in sonic booms (see Section

4.3.2.2). Another commentor suggested we establish a 30-mile radius sonic bubble as a solution for sonic boom noise (see Volume II, Appendix G, comment response AA-3). The last commentor wanted to know how the Air Force and civilian aircraft could interact together (see Section 4.2.2.3). The written comments were supportive; however, there was concern regarding safety and that the Automated Surface Observation System office at Fort Greely should continue to be staffed to ensure aircraft safety with increased air traffic in the region (see Volume II, Appendix G, comment response SA-7). The other written comment was from the City of Fairbanks Mayor expressing his support of the basing action.

The Fairbanks hearing was the most heavily attended, with 33 oral comments and 15 written comments provided. The oral comments were mostly supportive, endorsing the basing of aircraft at Eielson AFB and appreciation for the Air Force's recognition of Alaska's strategic value. The Fairbanks Office of Economic Development asked the Air Force to be forthcoming with the construction schedule so that there would be funding available for the growth associated with the Proposed Action. One commentor was concerned about the Draft EIS not assessing the impact of using Historically Underutilized Business contracting (see Volume II, Appendix G, comment response SO-3). Another commentor suggested that the Proposed Action would improve water and wastewater utility services (see Volume II, Appendix G, comment response WR-2). A commentor was concerned that the existing Special Use Airspace Information System would be inadequate to support the airspace expansions and the increased use (see Volume II, Appendix G, comment response AA-5). There were also several oral comments opposing the Proposed Action. All 15 written comments were in support of basing F-35As at Eielson AFB.

Letters, postmarked after the close of the comment period, were received from Governor Bill Walker, State Representative Gabrielle LeDoux, State Representative Jim Colver, State Senator Click Bishop, and the Alaska Congressional Delegation comprising Senators Lisa Murkowski and Dan Sullivan, and Representative Don Young. All stated their support for basing the F-35As at Eielson AFB.

While all comments submitted were considered by the Air Force, only substantive comments are addressed. Substantive comments are those that identify issues and concerns related to the Proposed Action and No-Action Alternatives. Non-substantive comments are those that only express a conclusion, an opinion, or a vote for or against the proposal itself; or that otherwise state a personal preference or opinion.

1.3.4 Interagency and Intergovernmental Coordination during Scoping

According to NEPA, Section 102 (42 U.S. Code [USC] § 4332), CEQ regulations implementing NEPA (40 CFR §§ 1501.7(a)(1)), and Executive Order (EO) 12372, the Air Force notified, coordinated, and/or consulted (where applicable) other federal, state, and governmental agencies with authority over resources or that potentially have an interest in the Proposed Action. During the scoping process and prior to the meetings, the Air Force sent letters to interested and affected government agencies, government representatives, elected officials, and interested parties potentially affected by the Proposed Action. Appendix B (in Volume II) contains the stakeholder mailing list. The letters announced the Air Force's intent to prepare an EIS, summarized the Proposed Action and No-Action Alternatives, outlined and invited participation in the scoping process, listed the scoping meeting dates and locations, and solicited comments. Appendix C (in Volume II) provides a sample letter sent to these recipients and a summary of the consultation and coordination efforts associated with this EIS. Any responses received from these stakeholders are included as well.

Throughout the scoping process, letters of support were received from Governor Walker, the Alaskan Congressional Delegation (Senators Murkowski and Sullivan, and Representative Young), the Alaska State Legislature's Joint Armed Services Committee, and the mayors of Delta Junction, Fairbanks, and Fairbanks North Star Borough (FNSB). Additionally, the mayor of Delta Junction requested that the Air Force examine the potential for increased wildfire and sonic booms due to increased operations in Joint Pacific Alaska Range Complex (JPARC) airspace; and the superintendent of schools for the FNSB School District indicated that there was capacity in the district to meet increased educational needs for incoming Air Force families.

The National Park Service (NPS), Alaska Region, responded with a request to evaluate how aircraft operations would affect the natural soundscape and subsistence pursuits underlying the Special Use Airspace (SUA), as well as to provide detailed information on how the airspace units are now used and what would change (see Section 3.2 *Airfield and Airspace Operations and Management* [affected environment] and 4.2 *Airfield and Airspace Operations and Management* [environmental consequences]). On June 17, 2015, the Air Force met with the NPS, Alaska Region. The NPS indicated that their greatest concern was with aircraft operations over Denali National Park, Wrangell-St. Elias National Park and Preserve, and Yukon-Charley Rivers National Preserve. The Yukon-Charley Rivers National Preserve, which includes the Charley Wild and Scenic River, has been identified as a Point of Interest and is evaluated in this EIS. Denali and Wrangell-St. Elias National Parks do not underlie the primary northern JPARC airspace, where F-35As would operate, so they were not identified as specific Points of Interest in the analysis.

The U.S. Environmental Protection Agency (USEPA), Region 10, provided recommendations for focused analysis on particular resources such as the potential for discovering previously unknown contaminated sites, aquatic resources to include wetlands and riparian areas, air quality, environmental justice, children's health and safety, hazardous materials/waste and solid waste, and cumulative impacts. The resources identified by the USEPA are examined in this EIS.

1.3.5 Agency and Government-to-Government Consultation

Consultation is required with various authorities during the impact analysis process. Table 1.3-1 lists anticipated consultation requirements and the status of the consultations. Appendix C provides copies of all associated correspondence and responses.

Table 1.3-1. Consultation Requirements

Consultation	*Topics*	*Status*
State Historic Preservation Officer (SHPO)	Buildings, sites, districts, structures, or objects eligible or listed in the National Register of Historic Places, including Traditional Cultural Places and Section 106 consultation	A consultation package was sent on July 31, 2015. An initial finding of no effect (direct or indirect) was identified and concurrence with the finding was requested from the SHPO. On September 1, 2015, the SHPO provided partial concurrence on the no effects conclusion to properties underlying the northern JPARC airspace. However, they requested further information about on-base facility construction and modifications. A revised consultation package was sent to the SHPO on December 3, 2015, with additional information and a request for concurrence with findings of "not eligible" for listing on the National Register of Historic Places for specified Cold War and Post-Cold War facilities on Eielson AFB. On December 30, 2015, the SHPO agreed with most but not all of the findings, but requested that Eielson AFB obtain Alaska Heritage Resources Survey numbers for several existing facilities prior to providing concurrence, and that the base provide an historic assessment of the Small Arms Range Complex. A third consultation package providing the requested information was sent to the SHPO on January 20, 2016. The SHPO provided full concurrence with Air Force findings on January 21, 2016, concluding consultation requirements.
U.S. Fish and Wildlife Service (USFWS)	Protected species (threatened/endangered species; migratory birds, bald and golden eagles)	On base and in the airspace, there would be no adverse impacts to federally listed species, migratory birds, or eagles.
Alaska Native	Government-to-government consultation with Alaska Native tribal entities	A formal request for government-to-government consultation was sent in August 2015. To date, no responses were received from this request. Phone calls to tribal representatives indicated that no further coordination was requested.
USEPA, Alaska Department of Environmental Conservation/Division of Air Quality	Federal actions must conform to the appropriate state, tribal or federal implementation plan (SIP, TIP, or FIP) for attaining clean air ("General Conformity")	The emissions generated by the Proposed Action and No-Action Alternatives were analyzed. Emissions would not cause degradation of local air quality. The northern JPARC airspace is not within any non-attainment or maintenance areas and would not affect any Prevention of Significant Deterioration Class I sites.
USEPA, U.S. Army Corps of Engineers, Alaska Department of Environmental Conservation/Division of Water	Provides for protection of waters of the U.S. from degradation; includes analyses of practicable alternatives if jurisdictional wetlands or floodplains would be affected	This EIS identified that there was no practicable alternative for constructing facilities in wetlands and in the 100-year floodplain.

Legend: SHPO=State Historic Preservation Officer; SIP=State Implementation Plan; TIP=Tribal Implementation Plan; FIP=Federal Implementation Plan.

1.3.5.1 *State Historic Preservation Office*

A consultation package was sent on July 31, 2015. An initial finding of no effect (direct or indirect) was identified and concurrence with the finding was requested from the SHPO. On September 1, 2015, the SHPO provided partial concurrence on the no effects conclusion to properties underlying the northern

JPARC airspace. However, they requested further information about on-base facility construction and modifications. A revised consultation package was sent to the SHPO on December 3, 2015, with additional information and a request for concurrence with findings of "not eligible" for listing on the National Register of Historic Places for specified Cold War and Post-Cold War facilities on Eielson AFB. On December 30, 2015, the SHPO agreed with most but not all of the findings, but requested that Eielson AFB obtain Alaska Heritage Resources Survey numbers for several existing facilities prior to providing concurrence, and that the base provide an historic assessment of the Small Arms Range Complex. A third consultation package providing the requested information was sent to the SHPO on January 20, 2016. The SHPO provided full concurrence with Air Force findings on January 21, 2016, concluding consultation requirements. All correspondence is provided in Appendix C, Volume II.

1.3.5.2 *United States Fish and Wildlife Service*

On August 11, 2015, the USFWS was sent a package describing the Proposed Action and preliminary results of the findings of effects on federally listed threatened and endangered species. However, as no listed threatened or endangered species or their critical habitat are present in the area of potential effect for the Proposed Action Alternative, the request for concurrence with a finding of "may effect, but not likely to adversely affect the continued existence" for the two species identified, was made in error. No consultation is required if listed threatened or endangered species or their habitat are not present. The remainder of the letter was correct in requesting a finding of no adverse impacts to migratory bird species or other species of special concern, such as eagles. The USFWS has chosen not to provide comment, thereby providing default concurrence with the findings of no adverse impact on migratory birds and other species of special concern, as documented in this EIS. The letter and its attachments are provided in Appendix C, Volume II.

1.3.5.3 *Government-to-Government*

In an ongoing effort to identify traditional cultural resources, as well as satisfy the requirements of various laws, regulations, Executive Orders (EO), and instructions, the Air Force initiated consultation with Alaska Native entities according to EO 13175: *Memorandum on Government-to-Government Relations with Native American Tribal Governments*; DoD Instruction 4710.02: *DoD Interactions with Federally-Recognized Tribes*; and Air Force Instruction (AFI) 90-2002: *Air Force Interactions with Federally-Recognized Tribes*. After publication of the NOI, the Air Force sent letters to tribal entities potentially impacted by the Proposed Action. The letters announced the Air Force's intent to prepare an EIS, summarized the Proposed Action and No-Action Alternatives, outlined the scoping process, invited their participation, and listed the scoping meeting dates and locations. A sample of the letter is provided in Volume II, Appendix C.

On August 13, 2015, Alaska Native tribes were sent a letter from the Eielson AFB Wing Commander asking whether the tribe, tribal representative, and/or corporation would like to enter into formal government-to-government consultation (see Volume II, Appendix C). If they wished to do so, it was requested that the Wing Commander be contacted so that a meeting could be arranged. In mid-October 2015, phone calls to tribal representatives indicated that no consultation was requested from any of the tribal representatives.

1.3.6 Lead and Cooperating Agencies

The Air Force is the lead agency for the PACAF F-35A beddown EIS, with Headquarters PACAF serving as the Proponent for the action. As defined in 40 CFR § 1508.6, a potential cooperating agency is any other federal agency which has jurisdiction by law or special expertise with respect to any environmental issue. In addition, in certain circumstances, non-Federal entities may seek and be granted cooperating agency status. For this Proposed Action, no cooperating agencies were identified.

1.4 Scope of Resource Analysis

Table 1.4-1 identifies the environmental resources and areas of likely effects that have been identified and are addressed in the EIS. Effects were analyzed for operations at the base (and adjacent regional area) and within the northern JPARC airspace.

Table 1.4-1. Environmental Resources Evaluated

EIS Section/Resource Category		*Subcategories*
3.2/4.2	Airfield and Airspace Operations and Management	Aircraft/Airspace descriptions, operations, restrictions, and mitigations
3.3/4.3	Acoustic Environment	Noise contour bands, points of interest exposure, maximum sound exposure, speech interference, sleep disturbance, and classroom interruptions
3.4/4.4	Air Quality	Criteria pollutants, conformity rule, greenhouse gas emissions, and hazardous air pollutants
3.5/4.5	Safety	Airfield hazards, airspace hazards, and public safety
3.6/4.6	Socioeconomics	Population, demographics and economics; schools, housing, transportation, and utilities; and health, fire, and crime response
3.7/4.7	Land Management	Land ownership and status and land management plans for federal, state, and local special use areas
3.8/4.8	Cultural Resources	Traditional/Alaska Native, prehistoric and historic archeological resources, historic architectural, subsistence, and Section 106
3.9/4.9	Environmental Justice and Protection of Children	Low income, minority, children, and elderly populations
3.10/4.10	Natural Resources	Wildlife, vegetation, wetlands, and special status species
3.11/4.11	Earth Resources	Topography, geology, soils, and seismology
3.12/4.12	Water Resources	Surface and groundwater quantity and quality, stormwater, and floodplains
3.13/4.13	Hazardous Materials and Wastes, Toxic Substances, and Contaminated Sites	Comprehensive Environmental Response, Compensation, and Liability Act; Resource Conservation and Recovery Act; Environmental and Installation Restoration Program; Toxic Substances Control Act, and Compliance Resource Program
3.14/4.14	Recreational and Visual Resources	Activities undertaken away from home and visual resources such as landforms, vegetation, and water surfaces

1.5 Clarifications and Changes to the EIS

Public and agency comments on the Draft EIS revealed the need to clarify or enhance certain information on a few topics in the Final EIS. These clarifications and enhancements improved the accuracy and thoroughness of the analysis presented in the Draft EIS, but did not alter any conclusions regarding the nature or magnitude of impacts on any resources. In addition, changes to military construction projects as well as minor editorial and typographical corrections were made. Changes and clarifications presented in the Final EIS include the following:

- Throughout the EIS, clarified airspace and acoustical discussions, and corrected typos, spelling, as well as grammar where applicable.
- Information on the public comment period, hearing meetings, and comments received were added in Section 1.3.3 and Appendix G created and included Volume II.
- Updates to agency and government-to-government coordination and consultation were made to Section 1.3.5 and Appendix C.
- Further clarification of the alternative selection process was added to Section 2.1. Changes in the buildings being modified, renovated, and demolished and the reopening of the South Gate vice modifying the North gate were added to Section 2.2.2.2. All are within the same area identified in the Draft EIS.
- Clarification was added in Section 3.13.2.1 on the Environmental Restoration Program at Eielson AFB.
- Based on information produced in September 2015 (after the publication of the Draft EIS), the discussion on availability of housing was revised in Section 4.6.2.2.
- Results of consultation with the Alaska SHPO were added in Section 4.8.2.1.
- Further identification of the types of wetlands impacted and the extent of impacts to floodplains were added to Section 4.10.2.1 and 4.12.2.1, respectively.
- Chapter 5, Cumulative Effects, was updated to reflect two projects that were identified during the comment period, which could interact with the Proposed Action Alternative.

2.0 Description of the Proposed Action and Alternatives

2.0 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

This chapter rigorously explores and objectively evaluates all reasonable alternatives. For alternatives eliminated from detailed study, a brief discussion of the reasons for their having been eliminated follows. In accordance with Council on Environmental Quality (CEQ) regulations (40 Code of Federal Regulations [CFR] § 1502.14[d]) and the Air Force Environmental Impact Analysis Process (EIAP) regulation (32 CFR § 989.8), this chapter details the process Pacific Air Forces (PACAF) followed to identify reasonable alternatives that met the purpose of and need for the Proposed Action. This chapter also discusses the No-Action Alternative, as required under CEQ regulations (40 CFR § 1502.14[d]), whereby the No-Action Alternative provides a basis from which to compare the magnitude of impacts potentially created by the Proposed Action Alternative. A final decision identifying the Air Force action will be made and announced in the Record of Decision (ROD) at the end of the National Environmental Policy Act (NEPA) process.

The Air Force proposes to beddown two F-35A operational squadrons (Ops #2) in the PACAF Area of Responsibility (AOR), arriving at this decision through a deliberative process. The Proposed Action would base up to 54 F-35A aircraft (or 48 Primary Assigned Aircraft [PAA], two squadrons each with 24 aircraft, and 6 Backup Aircraft Inventory) within the PACAF AOR. The proposal also includes additional military and civilian personnel, and construction and/or modification of facilities for maintenance and operation of the aircraft. The F-35As would conduct training from the base and in existing airspace. No new airspace would be established as part of the Proposed Action. Pilots flying the F-35As would adhere to all existing rules, regulations, mitigations (e.g., seasonal adjustments), and avoidance measures associated with military aircraft operations in the Joint Pacific Alaska Range Complex airspace. Section 3.2 *Airfield and Airspace Operations and Management*, details these requirements.

2.1 ALTERNATIVES SELECTION STANDARDS

The Air Force plans to buy 1,763 F-35As to replace aging F-16 and A-10 aircraft. With a worldwide mission covering Major Commands and bases in different AORs, the Air Force plans to base some of these aircraft in the Continental United States (CONUS) and some overseas (OCONUS). The initial OCONUS plan calls for three bases in the Pacific Air Forces (PACAF) AOR and two bases in the United States Air Forces – Europe (USAFE) AOR to receive F-35s, with the rest going to bases in CONUS.

After receiving the decision that Ops #2 would take place in the Pacific, PACAF, Air Combat Command, and the Deputy Assistant Secretary of the Air Force (Installations) Strategic Basing Division undertook an Enterprise-Wide Look to identify a suitable location to base the F-35A in the PACAF AOR (Air Force 2014a). All bases considered for the beddown were United States (U.S.) Air Force main operating installations currently supporting the combatant commander for fighter operations. Based on these requirements, eight bases were identified for further evaluation as potential F-35A basing locations, through application of the Air Force Strategic Basing Process:

- Joint Region Marianas (Andersen Air Force Base [AFB]), Guam;
- Eielson AFB, Alaska;
- Joint Base Elmendorf-Richardson (JBER), Alaska;

- Joint Base Pearl Harbor-Hickam, Hawaii; and
- Four overseas installations (classified locations).

The basing process evaluated these eight bases against the following set of standards and applied a point system to measure how well a base met these standards:

- *Mission*: an F-35A training environment tailored to support in-theater missions. Points were awarded for the following: the number of days per year where visibility exceeds 3 miles at 3,000 feet above ground level (AGL); the percentage completion allowed for Ready Aircrew Program (i.e., pilot combat readiness training) requirements; and the number of days provided for fighter-related bi-lateral and multi-lateral, exercise-hosting training opportunities per year.
- *Capacity*: points were awarded based on the candidate location having, completely or partially, the following facilities—squadron operations/Aircraft Maintenance Unit; simulator bays; airfield ramp space for parking; maintenance and logistics facilities (hangars; aircraft shelters; backshop functions; supply capability; petroleum, oils, and lubricant functions; corrosion control capability; and munitions storage); and base operational support facilities (child development centers, fitness centers, dormitories, medical care, and Department of Defense [DoD] schools).
- *Environmental*: points were awarded based on factors that could limit military aircraft beddowns, including flight operations. These factors were air quality; incompatible development within noise and accident potential zones; or for non-U.S. locations with country-specific laws, regulations, or restrictions pertaining to noise that limit U.S. military flying operations.
- *Cost:* a composite score was awarded based on a location's cost factor, cost of living adjustment, and basic housing allowance.

2.1.1 Candidate Bases

After application of the standards identified above, the five highest-ranked bases in the Enterprise-Wide Look were Eielson AFB, JBER, and three other OCONUS locations. Joint Region Marianas (Andersen AFB), Joint Base Pearl Harbor-Hickam, and one OCONUS base were eliminated from further consideration, because their current mission, capacity, and environmental rankings in the Enterprise-Wide Look, were so low they were not reasonable alternatives for the Ops #2 beddown.

Site surveys for each of the five candidate bases were conducted in March and April 2014 to determine their feasibility to support the beddown of two F-35A squadrons. The same four factors (Mission, Capacity, Environmental, and Cost) used during the initial selection process, were used to examine each base during the site surveys.

2.1.2 Site Survey Results

After completion of the detailed site surveys, JBER was eliminated because, although it provided worldwide ability to deploy, it had the largest un-resourced manpower requirement and cost, and previous NEPA analyses identified a limited availability of housing in the Anchorage area for military personnel.

The other OCONUS locations were eliminated from further consideration in the Ops #2 Environmental Impact Statement (EIS) for classified reasons. Although eliminated from consideration for the initial PACAF F-35A basing, all locations will be evaluated at a later date for subsequent beddowns using standards and military judgment factors that are appropriate for that point in time.

2.1.3 Overview of the Alternatives to be Analyzed

Based on strategic requirements, site survey results, and application of the selection standards, the Secretary of the Air Force selected Eielson AFB, located in interior Alaska, as the preferred location and only location for the basing of two F-35 squadrons as part of Ops #2. Strategically, Eielson AFB provides a base from which F-35 aircraft can be deployed throughout PACAF or other AORs, as needed. Because of the elimination of the other candidate bases, two alternatives were carried forward for analysis in this EIS:

- *Proposed Action Alternative:* Beddown two squadrons of F-35A aircraft at Eielson AFB as an addition to all existing mission activities.
- *No-Action Alternative*: F-35A squadrons would not be located at Eielson AFB or within the PACAF AOR at this time, existing flight missions at the base would remain unchanged and already planned construction and infrastructure upgrades would be undertaken.

2.2 ALTERNATIVES CARRIED FORWARD FOR ANALYSIS

The following describes the No-Action and the Proposed Action alternatives being analyzed in this EIS and the order does not relate to their preference for implementation. The No-Action Alternative is discussed first to provide a context for comparing the changes that would occur under the Proposed Action of basing two F-35A squadrons at Eielson AFB.

2.2.1 No-Action Alternative

Per CEQ regulations (40 CFR § 1502.14[d]) implementing NEPA, analysis of a No-Action Alternative is required. "No action" means that the Proposed Action (i.e., the F-35A beddown) would not take place, and the resulting environmental effects from not taking the action are compared to the effects of implementing the Proposed Action. Under the No-Action Alternative for this EIS, no F-35A beddown would occur at Eielson AFB or within the PACAF AOR at this time, thus no F-35A associated on-base construction or personnel increases would be implemented. As described in Chapter 3, *Affected Environment*, major flying exercises and routine training would continue to be supported at Eielson AFB.

The 354th Fighter Wing (354 FW) is the host unit at Eielson AFB with the mission to prepare aviation forces for combat, deploy airmen in support of global operations, and enable the staging of forces. To accomplish that mission, the 354 FW implements flying operations, mission support, maintenance, and medical care functions. Located adjacent to the northern portion of the Joint Pacific Alaska Range Complex (JPARC) airspace, the 345 FW's 18th Aggressor Squadron familiarizes combat-ready forces with the tactics used by potential adversaries.

The job of the F-16 Aggressors is to know, teach, and replicate adversarial threats so the Air Force, U.S. commands, and allied nations are trained in a realistic threat environment. Additionally, Eielson AFB (along with JBER) is home to Red Flag-Alaska. This is a PACAF-sponsored Joint National Training Capability-accredited exercise executing the world's premier tactical joint and coalition air combat employment exercise. Red Flag replicates the stresses warfighters face during their first eight to ten combat encounters. Along with aircrews, these exercises also provide training for unit-level intelligence experts, maintenance crews, and command and control elements from across the U.S. Air Force, Navy, Marine Corps, and Army, and can include allied nations. On average, more than 1,000 people and 60 aircraft are known to deploy to Eielson AFB for each major flying exercise. Typically, there are three 2-week exercises annually, running from April through October.

The base also hosts numerous other tenants. Those units that have aircraft based at Eielson AFB include the Air National Guard's 168th Air Refueling Wing with KC-135 Stratotanker aircraft and the 210th Rescue Squadron Detachment 1 with HH-60 Pave Hawk helicopters. Other tenant units, which do not have associated based aircraft, include the Air Force Technical Applications Center Detachment 460; 66th Training Squadron Detachment 1, Arctic Survival School; 6th Field Investigations Region Detachment 632, Air Force Office of Special Investigations; 372nd Training Squadron Detachment 25; 732nd Air Mobility Squadron Operating Location A passenger terminal; Air Force Civil Engineer Center Field Operating Agency, Operating Location CE49; Air Force Legal Operating Agency Operating Location 0D4N, Area Defense Council; and the Air Combat Command Detachment 2, Operating Location 00PC.

2.2.1.1 *Personnel*

The number of military and civilian personnel fluctuates due to the constant departure and arrival of personnel over a year. Table 2.2-1 provides the numbers for military, civilian, and contractor personnel; associated military dependents; and tenant unit personnel currently authorized at Eielson AFB, as of December 2014. The 354 FW accounts for the majority of individuals on base, with the tenant units accounting for 415 positions. These estimates are based on analyses provided by the Eielson Personnel Office (Eielson AFB 2015a).

Table 2.2-1. Eielson AFB Personnel and Dependents

Category	***Total***
Military	
Officer	168
Enlisted	1,737
Subtotal	***1,905***
Civilians	
Appropriated Fund	360
Non-Appropriated Fund	186
Contractors	223
Subtotal	***769***
Military Dependents	
Spouses	1,063
Children	834
Subtotal	***1,897***
354 FW Subtotal	***4,571***
Tenant Units[1]	
Military and Civilian Personnel	415
Total Eielson Population	**4,986**

Source: Eielson AFB 2015a.
Note: [1]See Section 2.2.1 for tenant units; does not include dependents.

2.2.1.2 *Facilities and Infrastructure*

The airfield is the dominant feature within the base boundaries, with a 14,530-foot long runway and associated ramps and taxiways that occupy the west side of the base (Figure 2.2-1). The runway parallels Richardson Highway, which traverses the base. Most of the Eielson AFB operational and industrial areas are immediately adjacent to the airfield on the east side of the flight line. The 18th Aggressor Squadron support facilities are located on the south end of the flight line (or the South Loop) and the former A-10 operational area is located just north of the loop. These are the two areas of primary focus for proposed facility and infrastructure development supporting the F-35A basing action.

Due to its isolation and extreme climate, Eielson AFB provides its own power generation, steam heat production, potable water provision, wastewater treatment and disposal, as well as solid waste fill sites. The base also provides a wide range of community facilities including about 900 housing units for families and 450 dormitory rooms for unaccompanied military personnel; educational facilities spanning from kindergarten through high school; a medical center, chapel, commissary, and base exchange; as well as various commercial-services businesses. The base also provides year-round physical fitness and recreational opportunities at a fitness center, indoor pool, bowling alley, and several athletic fields. Most of these facilities are located north and east of the flight line. Table 2.2-2 provides a listing of the currently planned facility and infrastructure improvements through calendar year 2020. These projects represent conditions found under the No-Action Alternative in the year 2021 when the Proposed Action would be completed.

Table 2.2-2. Eielson AFB Infrastructure and Construction Activities under the No-Action Alternative

Project Name/Description	*Planned Fiscal Year (FY) of Implementation*
Repair Central Heat and Power Plant Boiler Phase 3	2016
Repair Central Heat and Power Plant Boiler Phase 4	2017
Consolidate Munitions on Quarry Hill	2018
Replace Cryogenics Facility	2018
Install Fire Protection, Quarry Hill Munitions Storage	2018
Construct Loop Fire Station	2018
Repair Central Heat and Power Plant Boiler Phase 5	2018
Install De-aerator System Central Heat and Power Plant (B6203)	2019
Repair Central Heat and Power Plant Turbine Generators	2019
Replace Youth Center	2019
Construct Alternate Entry Gate	2019
Construct Red Flag-Alaska Visiting Quarters	2019
Install Fire Protection, Petroleum, Oil, and Lubricants Storage E-2, E-6, and E-11	2020

Figure 2.2-1. Eielson AFB Boundary

Table 2.2-3 identifies construction activities that would be completed under northern JPARC airspace.

Table 2.2-3. Eielson AFB No-Action Alternative Infrastructure and Construction Activities under Northern JPARC Airspace

Project Name/Description	*Planned FY of Implementation*
Approved actions under the JPARC EIS: enhance access to ground maneuver space; establish access to the Tanana Flats Training Area; construct the joint air-ground integration complex; and establish intermediate staging bases and drop zones	2016
Fuel Storage Tank (Blair Lakes Complex)	2019
Construct Airstrip Target Site at the Yukon Range	2020
Construct Blair Lakes Modern Operations in Urban Terrain Site	2020
Construct Convoy and Scud Target Site at the Yukon Range	2020
Construct Battery Target Site at the Yukon Range	2020

2.2.1.3 *Airfield and Airspace Operations*

This EIS uses three terms to describe aircraft flying activities: sortie, operation, and event. Each has a distinct meaning and commonly applies to a specific set of activities in a particular airfield/airspace environment or unit. These terms also provide a means to quantify activities for analysis purposes.

- A *sortie* consists of a single military aircraft from a takeoff through a landing and includes a flying mission in Special Use Airspace (SUA). For this EIS, the term sortie is commonly used when generally discussing the amount of flight activity from a base.
- The term *operation* applies to both airfield and airspace activities and represents the primary analytical and descriptive quantifier of aircraft flight activities presented in this EIS. At an airfield, a landing or a takeoff is each considered an operation, but a low approach is often counted as two operations. For airspace and ranges, an operation comprises the use of one airspace unit (e.g., a Military Operations Area [MOA] or Air Traffic Control Assigned Airspace [ATCAA] unit) by one aircraft. Each time a single aircraft flies in a different airspace unit, one operation is counted for the unit.
- As a subset of operations, the term *event* is used to define specific training elements (e.g., supersonic flight, close air support, or ordnance delivery). More than one event may be performed during the use of a single airspace unit.

For instance, a sortie at an airfield could involve a takeoff, a practice approach, and go-around (i.e., an airplane does not actually touch pavement but undertakes a low approach and departure to and from the runway, circles back around, and then lands). This would be counted as one sortie, but comprises four distinct airfield operations: (1) takeoff, (2) low approach, (3) departure, and (4) landing. In the airspace, an aircraft could fly in several airspace units, conducting a number of operations and events and be counted as one sortie, but several operations. For these reasons, the number of airfield and airspace *operations* exceeds total sorties.

Please note that aircraft operations at Eielson AFB fluctuate over the year, and the busiest months are from April through October, during the major flying exercises. Operations vary according to the number of aircraft that participate in major flying exercises (every exercise differs), the number of based aircraft that are deployed to different locations for reasons such as combat and/or training, and fiscal constraints dictating how much fuel can be used. These are just a few of the reasons why specific daily operations cannot be identified for each month or for particular seasons, therefore, annual average operations are used to evaluate potential impacts in this EIS.

Airfield Operations

Under the No-Action Alternative, the number and nature of aircraft assigned to Eielson AFB, and the quantity and type of airfield operations, would remain unchanged from existing conditions. The only exceptions are that transient AV-8Bs and F-18C/Ds would be replaced by F-35Bs and the EA-6Bs replaced with EA-18Gs. Table 2.2-4 lists the aircraft based and assigned to Eielson AFB. Because the base supports Red Flag-Alaska, Northern Edge, and other major flying exercises, more than a dozen types of transient aircraft (i.e., other U.S. major units and allied nation visitors not based at Eielson AFB), temporarily operate from the base during these exercises. These transient aircraft range from Air Force B-1B bombers to allied-nation fighters such as the Tornado. Because the aircraft are not based at Eielson AFB, and they are there for only a short time period, they are not listed in Table 2.2-4. However, their operations during the major flying exercises are included in the noise analyses both at the airfield and in the SUA, see Section 3.3 *Acoustic Environment* and Appendix E.

Table 2.2-4. Based Aircraft at Eielson AFB under the No-Action Alternative

Aircraft Type	*Aircraft Type*
354 Fighter Wing[1]	21 F-16s
168th Aerial Refueling Wing[2]	9 KC-135s
210th Rescue Squadron	2 HH-60s

Source: Air Force 2015a.
Note: [1]Eighteen PAA and three Backup Aircraft Inventory.
[2]Eight PAA and one Backup Aircraft Inventory.

The Eielson AFB airfield is surrounded by Class D airspace. It extends from the surface up to and including 3,000 feet Mean Sea Level (MSL), and is controlled by the base's air traffic control tower. There is one runway, oriented in a southeast-northwest direction that supports routine training and major force exercise activities. In calendar year 2014, 18,963 annual airfield operations were conducted by based and transient aircraft at Eielson AFB and it was assumed that this tempo would continue under the No-Action Alternative. Aircraft operations occur during both "environmental" daytime and nighttime hours. Environmental daytime is defined as 7:00 a.m. to 10:00 p.m. and nighttime is defined as 10:00 p.m. to 7:00 a.m. Environmental night represents a period when the effects of noise on people are accentuated and a 10-decibel penalty is applied during noise modeling. Of the total airfield operations, approximately 8 percent (or 1,466) occur during environmental nighttime hours. Section 3.2, *Airfield and Airspace Use and Management*, presents further detail about airfield operations.

Airspace Operations

The SUA—JPARC airspace—is managed in accordance with the 11th Air Force Alaska Airspace Handbook (11th Air Force 2015) and would continue to be so under the No-Action Alternative. The Handbook is a consolidated source of airspace information for Air Force aircrews and any other Air Force-sponsored major flying exercise participants. The Handbook provides geographical descriptions of Alaskan Military Operations Areas (MOAs), MOA groupings, Restricted Areas, Air Traffic Control Assigned Areas, Color Coded/Air Defense Areas, the 11th Air Force Noise/Flight Sensitive Areas List, and Coordination Areas. The Handbook undergoes regular review and update, and is a "living" document. Changes occur frequently and the most current information is available online (11th Air Force 2015).

Additionally, the Resource Protection Council and the Alaska Civil-Military Aviation Council would continue as mandated in the Alaska MOA EIS ROD (Air Force 1997). These councils ensure a continuous balance between natural resource protection and DoD training requirements. The Resource

Protection Council comprises federal, state, and DoD representatives to address issues concerning resource protection/mitigation, public information, research, and monitoring. The Alaska Civil-Military Aviation Council is composed of numerous organizations representing every segment of the Alaskan aviation community and is focused on addressing aviation issues. At the forefront of the interface between the military and civil aviation groups, is the SUA Information Service (SUAIS). The SUAIS provides civil pilots information concerning SUA activation via telephone and radio communications. This service is unique to Alaska and was initiated using existing infrastructure and Eielson Range Control personnel; it would continue under the No-Action Alternative.

In addition, the 1997 ROD formally presented JPARC airspace mitigation measures, defined exercises and MOA use limitations, summarized altitude and seasonal restrictions, as well as identified exclusion/avoidance areas. These limitations and restrictions imposed as a result of the 1997 ROD mitigations were codified in the 11th Air Force Alaska Airspace Handbook. All Air Force and Air Force-sponsored military aircraft operating in the JPARC airspace must adhere to these limitations, restrictions, exclusion/avoidance areas, and standard operating procedures identified in the Handbook. Appendix D.1 summarizes these operating procedures for northern JPARC airspace.

Aircraft operating out of Eielson AFB primarily use the northern portion of the JPARC airspace and range assets (gray area identified in Figure 2.2-2). On average, aircraft operate in northern JPARC airspace 240 flying days a year. Of this total, a maximum of up to 60 days per year, typically from the spring to early fall, support a higher operational tempo due to major flying exercises such as Red Flag-Alaska and Northern Edge. As mentioned earlier, during this time, aircraft and pilots from other U.S. bases and allied nations would visit both Eielson AFB and Joint Base Elmendorf-Richardson to conduct operations and exercises that simulate combat conditions in the entirety of JPARC airspace.

Fighter aircraft operating out of JBER primarily use Stony A/B MOAs and ATCAAs, Fox 1/2/3 MOAs and ATCAAs, and Eielson MOA and ATCAA. The overwater warning area 612 (W612) is used chiefly during Northern Edge exercises. F-35As would spend the majority of their time in northern JPARC airspace, but could also operate in the remainder of the JPARC airspace (including all MOAs and ATCAAs) on an as needed basis.

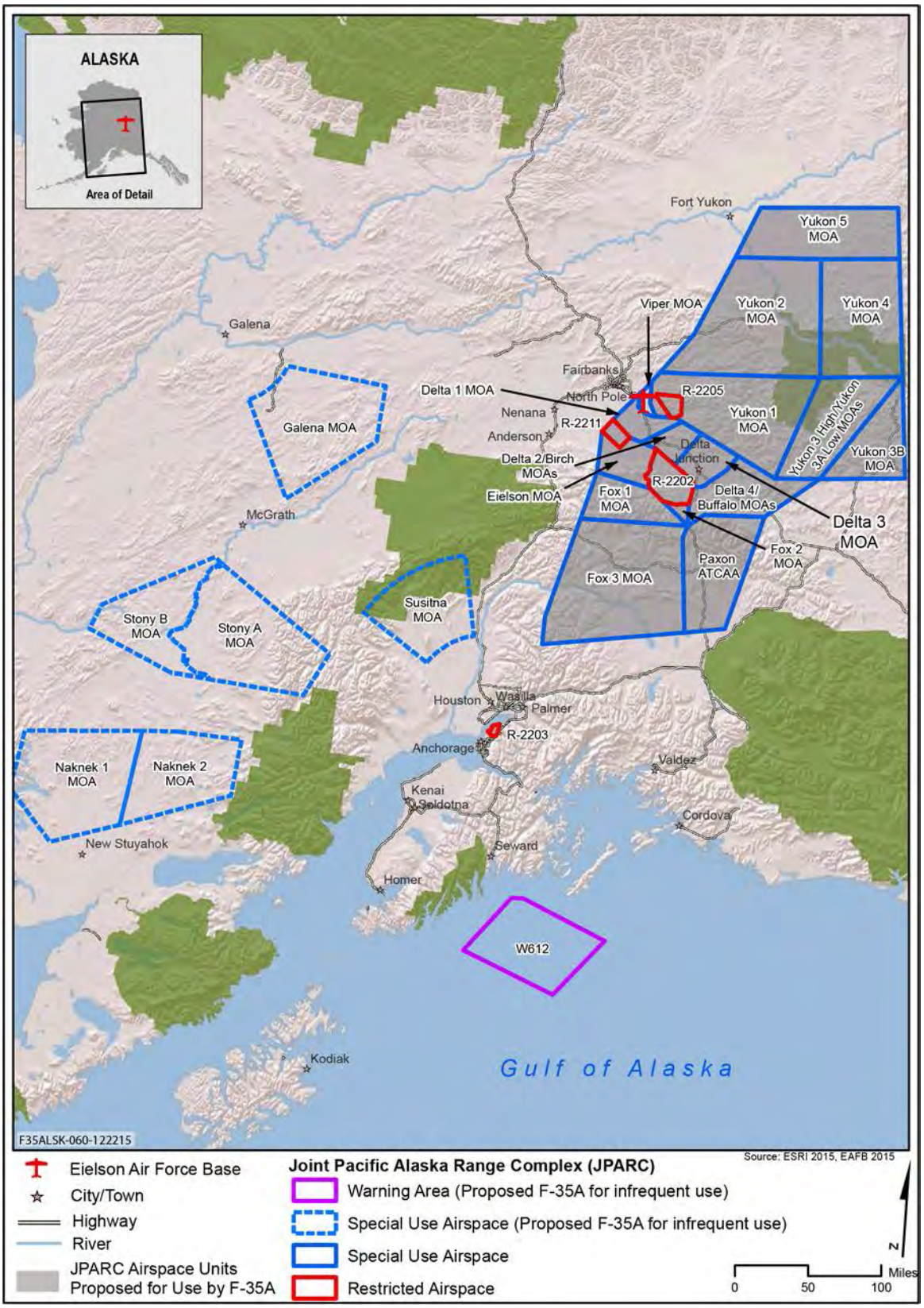


Figure 2.2-2. Joint Pacific Alaska Range Complex

Figure 2.2-3 illustrates this airspace and Table 2.2-5 lists the northern JPARC airspace primarily used by aircraft operating out of Eielson AFB. The also table presents the number of operations that would occur in northern JPARC airspace under the No-Action Alternative based on calendar year 2014 numbers, the SUA floor and ceiling altitudes, as well as where and at what altitude supersonic flight is authorized. Provided the appropriate environmental analyses or waivers have been completed, supersonic operations are allowed in any airspace (it does not need to be a MOA or ATCAA) at altitudes above 30,000 feet MSL[1]. Aircraft operating in northern JPARC airspace are afforded the ability to fly within its entirety to conduct the myriad types of training needed to maintain combat readiness, such as steep dives, climbs, and turns to avoid "enemy" aircraft.

Table 2.2-5. Summary of Operations, Airspace Altitudes, and Supersonic Authorization[1] under the No-Action Alternative for Northern JPARC Airspace

Airspace Unit	*Annual Operations*	*Altitudes in feet (floor – ceiling)*	*Supersonic Authorized[1]*
Birch MOA	4,672	500 AGL – 5,000 MSL	>30,000 feet MSL
Buffalo MOA	4,672	300 AGL – 7,000 MSL	
Delta 1 MOA	2,908	10,000 MSL – 18,000 MSL	
Delta 2 MOA	3,618	5,000 MSL – 18,000 MSL	
Delta 3 MOA	3,618	3,000 AGL – 18,000 MSL	
Delta 4 MOA	3,618	7,000 MSL – 18,000 MSL	
Delta ATCAA	4,808	18,000 MSL – 60,000 MSL (or Flight Level FL 600)	
Eielson MOA[2]	7,034	100 AGL – 18,000 MSL	
Fox 1 MOA[2]	7,056	5,000 MSL – 18,000 MSL	>12,000 feet MSL or 5,000 feet AGL (whichever is higher)
Fox 2 MOA[2]	6,749	7,000 MSL – 18,000 MSL	
Fox 3 MOA[2]	6,507	5,000 AGL – 18,000 MSL	
Paxon ATCAA	4,071	18,000 MSL – 60,000 MSL (or FL 600)	>30,000 feet MSL
Yukon 1 MOA[2]	5,568	100 AGL – 18,000 MSL	>12,000 feet MSL or 5,000 feet AGL (whichever is higher)
Yukon 2 MOA[2]	5,568	100 AGL – 18,000 MSL	
Yukon 3A Low MOA	3,759	100 AGL – 10,000 MSL	
Yukon 3 High MOA [2]	3,759	10,000 MSL – 18,000 MSL	
Yukon 3B MOA[2]	3,417	2,000 AGL – 18,000 MSL	
Yukon 4 MOA[2]	3,447	100 AGL – 18,000 MSL	
Yukon 5 MOA[2]	3,417	5,000 AGL – 18,000 MSL	
Viper A MOA	-	500 AGL – 10,000 MSL	>30,000 feet MSL
Viper B MOA[2]	5,568	10,000 MSL – 18,000 MSL	
R-2202A/B	10,168	Surface – 10,000 MSL	>12,000 feet MSL
R-2202C		10,000 MSL – 31,000 MSL	>12,000 feet MSL
R-2202D		31,000 MSL – Unlimited	>31,000 feet MSL
R-2205[2]	6,334	Surface – 20,000 MSL	>12,000 feet MSL or >5,000 feet AGL (whichever is higher)
R-2211	3,031	Surface – 31,000 MSL	>30,000 feet MSL
Blair ATCAA	3,898	31,000 MSL – 60,000 MSL (or FL 600)	>30,000 feet MSL

Source: 11th Air Force 2015.
Note: [1]Supersonic is allowed in any airspace if the appropriate waivers and/or environmental analyses have been completed.
[2]ATCAA airspace is activated over these airspace units when needed for training.

[1]MSL is the elevation (on the ground) or altitude (in the air) of an object, relative to sea level, corrected for non-standard barometric pressure. Because aircraft fly across vast landscapes, where points above the ground can and do vary, MSL is used to denote the "plain" on which the floors and ceilings of SUA are established and the altitude at which aircraft must operate within that special use airspace.

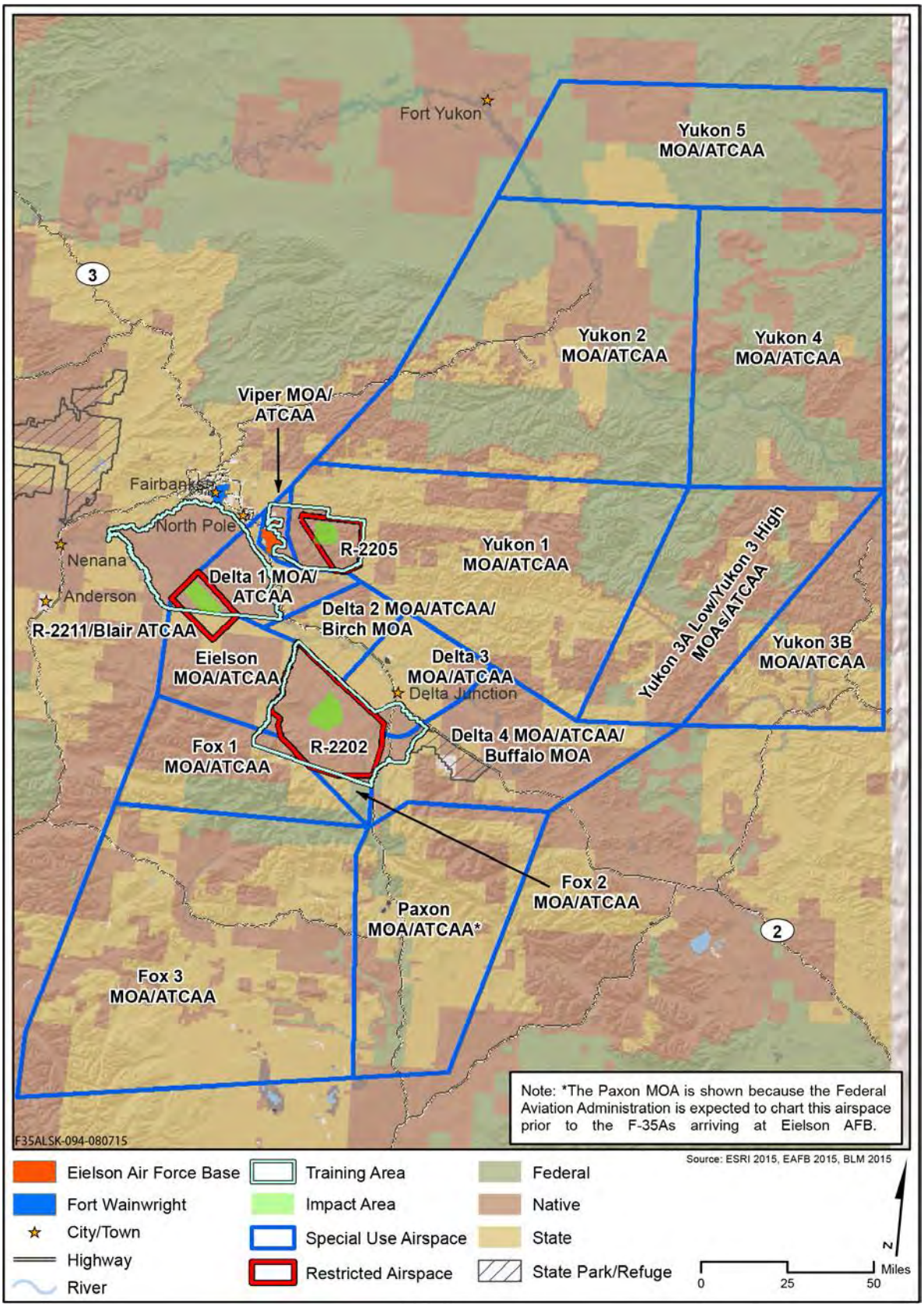


Figure 2.2-3. Joint Pacific Alaska Range Complex Airspace used by Eielson AFB Aircraft

Defensive Countermeasures

Throughout JPARC airspace, chaff and flares are used in air combat exercises as countermeasures to air- or ground-based threats. Chaff and defensive flares are authorized for use by the 11th Air Force in existing MOAs and ATCAAs. Use is governed by detailed operating procedures to ensure safety. Air Force altitude restrictions for flare use in JPARC airspace (including the northern portion) are above 5,000 feet AGL from June through September and above 2,000 feet AGL for the rest of the year. These altitude restrictions substantially reduce any risk of a fire from training with defensive flares. Chaff, which is ejected from an aircraft to reflect radar signals, consists of fibers of aluminum-coated silica thinner than human hair packed into approximately 4-ounce bundles. When ejected, chaff forms a brief electronic "cloud" that temporarily masks the aircraft from radar detection. Although the chaff may be ejected from the aircraft using a small pyrotechnic charge, the chaff itself is not explosive. Depending on the chaff used, plastic or nylon pieces, a felt piece, and 2-inch by 3-inch squares of parchment paper can fall to the ground with each released chaff bundle. In an average year, aircraft operating out of Eielson AFB deploy close to 33,000 chaff bundles.

Flares are the principal defensive countermeasure dispensed by military aircraft to evade attack by enemy air defense systems. Defensive flares are made of magnesium that, when ignited, burn for a short period (less than 5 seconds) at approximately 2,000 degrees Fahrenheit. The burn temperature is hotter than the aircraft 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. Currently, aircraft operating out of Eielson AFB are estimated to deploy about 22,320 flares in northern JPARC airspace.

Ordnance Use

While most air-to-ground training is simulated, where nothing is released from the aircraft, there is still a need to conduct realistic ordnance delivery. These operations are conducted in authorized JPARC restricted airspace and ranges that include R-2202 over the Oklahoma Impact Area within the Donnelly Training Area, R-2205 over the Stuart Creek Impact Area within the Yukon Training Area, and R-2211 over the Blair Lakes Impact Area within the Tanana Flats Training Area (Figure 2.2-4). In 2014, the average number of ordnance used by Eielson AFB is presented in Table 2.2-6. All ordnance is employed as specified in the JPARC EIS, in Section 3.2 (Air Force 2013a).

Table 2.2-6. Annual Baseline Air-to-Ground Munitions Used at Training Areas underlying R-2202, R-2205, and R-2211

Munitions Type	*Oklahoma Impact Area/ R-2202*	*Stuart Creek Impact Area/ R-2205*	*Blair Lakes Impact Area/ R-2211*
20 mm (inert)	3,388	9,144	-
20 mm (high-explosive incendiary)	9,788	23,113	-
25 mm (high-explosive incendiary)	4,788	750	-
30 mm (high-explosive incendiary)	22,063	75	-
30 mm (inert)	-	28,950	25,090
Inert bombs	1,184	1,349	451
250-pound class bombs (live) (e.g., Small Diameter Bomb)	200	-	-
500-pound class bombs (live) (e.g., GBU-12, GBU-38, MK-82)	357	564	-

Table 2.2-6. Annual Baseline Air-to-Ground Munitions Used at Training Areas underlying R-2202, R-2205, and R-2211

Munitions Type	*Oklahoma Impact Area/ R-2202*	*Stuart Creek Impact Area/ R-2205*	*Blair Lakes Impact Area/ R-2211*
1,000 pound class bombs (live) (e.g., GBU-32, MK-83)	400	20	-
2,000-pound class bombs (live) (e.g., GBU-31, MK-84)	65	45	-
2.75-inch rocket (high-explosive)	244	118	-
2.75-inch rocket (inert)	99	1,540	248
AGM-65 missile (high-explosive)	60	-	-
AGM-65 missile (inert)	26	-	-
.50 caliber	-	-	26,050
7.62 mm	-	-	176,800

Legend: AGM=air-to-ground missile; GBU=Guided Bomb Unit; MK=mark; mm=millimeter.

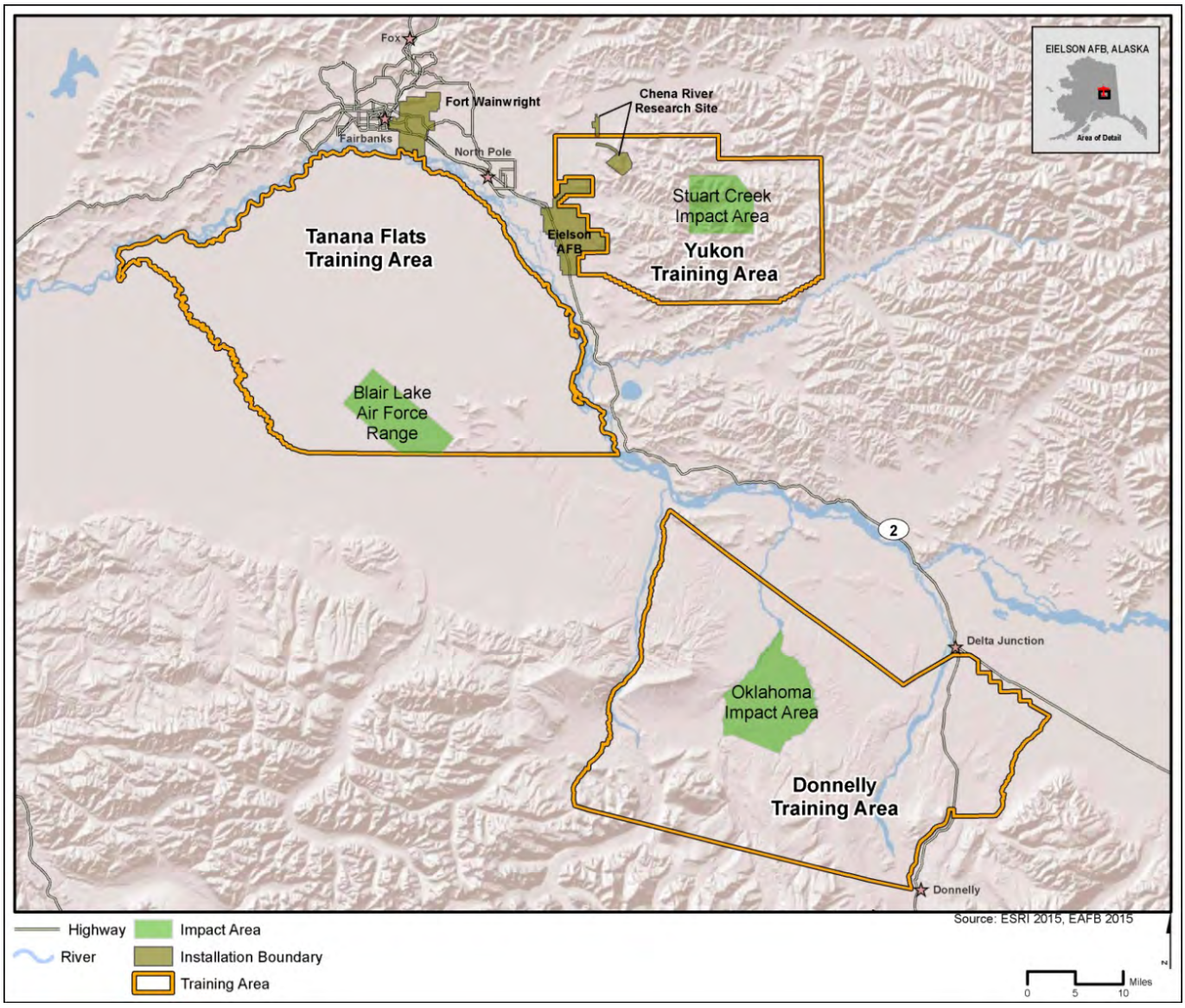


Figure 2.2-4. Regional Training Impact Areas underneath Northern JPARC Airspace

2.2.2 Proposed Action Alternative: Add Two Squadrons of F-35As to Existing Missions at Eielson AFB

This alternative would add two squadrons of F-35As, consisting of 48 PAA, and 6 Backup Aircraft Inventory (i.e., replacement aircraft when a PAA is not in operation) to the existing missions of the 354 FW at Eielson AFB. If undertaken, the first aircraft would be delivered in 2019, with the final aircraft arriving by late 2020, allowing full operational capabilities for both squadrons by early 2021. Table 2.2-7 provides the flow of F-35As arriving at Eielson AFB along with the based aircraft. The final F-35A flow rate, however, is dependent on congressional funding approval and the production schedule. The Proposed Action Alternative includes additional military and civilian personnel; increases in airfield and airspace aircraft operations; modifications and additions to existing facilities and infrastructure; and construction of new facilities to operate and maintain two F-35A squadrons.

Table 2.2-7. F-35A Flow and Based Aircraft

Aircraft	*FY16*	*FY17*	*FY18*	*FY19*	*FY20*	*FY21*
Proposed Action Alternative						
F-35A	0	0	0	5	50	54
Based Aircraft						
F-16	21	21	21	21	21	21
KC-135	9	9	9	9	9	9
HH-60	2	2	2	2	2	2
Total	**32**	**32**	**32**	**37**	**82**	**86**

2.2.2.1 *Personnel*

Basing two F-35A squadrons and associated support and maintenance functions are expected to add 1,563 military and civilian personnel to the base by FY20 (Table 2.2-8). This date reflects when both squadrons are expected be fully operational. This would increase the total active duty military population of the 354 FW to 2,981 (Table 2.2-8). Civilian and contractor personnel would increase by 487 people, for a total of 1,256 and military dependents would increase by 1,202, for a total of 3,099. The tenant unit population would not change and remain at 415 authorized personnel; however, Lockheed Martin has indicated that there would need to be 141-contractor personnel to support F-35A operations. Therefore, with the addition of projected military dependents, the total base population would increase by an estimated 2,765 individuals to 7,751, or grow by approximately 55 percent when compared to the No-Action Alternative. Personnel increases would be incremental, happening over 2 to 3 years, typically preceding the scheduled delivery of the aircraft by several months. It is anticipated that this increase in population would be accommodated by existing on base and off-base housing.

Table 2.2-8. Eielson AFB Proposed Action Alternative Personnel and Dependents

Category	*Baseline*	*Proposed Action Alternative*	*Total Base*
Military			
Officer	168	95	263
Enlisted	1,737	981	2,718
Subtotal	***1,905***	***1,076***	***2,981***
Civilians			
Appropriated Fund	360	228	588
Non-Appropriated Fund	186	118	304
Contractors	223	141	364
Subtotal	***769***	***487***	***1,256***

Table 2.2-8. Eielson AFB Proposed Action Alternative Personnel and Dependents

Category	*Baseline*	*Proposed Action Alternative*	*Total Base*
Military Dependents			
Spouses	1,063	674	1,737
Children	834	528	1,362
354 FW Subtotal	***1,897***	***1,202***	***3,099***
Tenant Unit Personnel[1]			
Military and Civilian[1]	415	0	415
Eielson AFB Population Total	**4,986**	**2,765**	**7,751**

Source: Eielson AFB 2015a.
Note: [1]See Section 2.2.1 for tenant units; does not include dependents.

Aircraft are anticipated to arrive in two phases, with the first squadron starting to arrive in FY19, and the second squadron arriving in FY20. Current projections call for about a third of the F-35A personnel and dependents (or about 900) arriving early in FY19 for the first squadron beddown, with the remaining (or 1,865) arriving in FY20 (or early calendar year 2021), in time for the second squadron basing. New personnel and their dependents would reside either on base or in adjacent communities. The timing of the actual aircraft delivery, and the personnel accompanying them, depends on congressional funding and production schedules at the manufacturing locations.

2.2.2.2 *Facility and Infrastructure Construction and Modifications*

New and modified infrastructure and facilities would be required at Eielson AFB to support the proposed beddown of up to 54 primary and backup F-35A aircraft (Table 2.2-9). Under the Proposed Action Alternative, the 18th Aggressor Squadron would move to the former A-10 operations area (see Figure 2.2-1). Several facilities would be renovated or constructed in the central area of the base and munitions storage facilities would be added in Quarry Hill (Figure 2.2-5). However, the majority of F-35A operations and maintenance facilities would be located in the southern end of the runway at the South Loop (Figure 2.2-6). Several construction projects had to be placed within the 100-year floodplain or in wetland areas. No other practicable alternative locations were identified because of the need to place facilities outside explosive safety arcs, and the requirement for adjacency to the flightline. Additionally, the South Gate would be reopened to divert construction traffic from and minimize congestion at the North Gate. With this reopening, the vehicle inspection area would be expanded to support commercial and construction equipment, as well as new entry and merge lanes established on both sides of Richardson Highway to minimize congestion along the highway. Please refer to Sections 4.10.2.1 and 4.12.2.1 for further discussions of wetlands and floodplains impacts, respectively.

Proposed construction, additions, interior renovations, exterior alterations, and infrastructure improvements would occur between FY16 and FY20. Total acreage disturbed, which includes equipment laydown areas, construction clearing/grading, landscaping, infrastructure improvements, and construction entrance, would be approximately 66 acres, of which approximately 21 acres would be converted to impervious surfaces. Existing underground utility corridors would be used to the greatest extent possible; any fill needed for facility construction would come from existing on-base resources; clean demolition material (e.g., concrete and asphalt) would be disposed at on-base sites; and the base has disposal sites permitted to accept materials that contain asbestos. All construction material (wood, metal, and concrete) is locally available or can be ordered and delivered.

Table 2.2-9. Proposed Action Alternative Construction, Additions, Alterations/Renovations, and Demolition

Proposed Start Dates	*Action*	*Site Number*
FY16	Renovate Building 4110 (B-4110): 18 Aggressor Squadron Operations and Aircraft Maintenance Unit	22
FY16	Construct 6-Bay Flight Simulator Facility	12
FY16	Reopen/Expand South Gate (for construction traffic)	2
FY17	Construct 4-Bay Hangar/Propulsion Maintenance/Corrosion Control Personnel Dispatch (Squadron 1)	1
FY17	Construct 4-Bay Hangar/Squadron Operations/Aircraft Maintenance Unit (Squadron 2)	35
FY17	Construct 16-Bay, 16-Aircraft Weather Shelter (South Loop)	5
FY17	Construct 16-Bay, 16-Aircraft Weather Shelter (South Loop)	3
FY17	Construct 6 Munitions Storage Igloos (Quarry Hill)	17
FY17	Construct new Missile Maintenance Facility	20
FY17	Add/Alter B-4280: Field Training Detachment Unit	13
FY17	Demolish B-1303: Missile Maintenance Shop	48
FY17	Renovate B-1326: Munitions Line Delivery	4
FY17	Renovate B-1307/B-1338: F-35 Aircraft Maintenance Unit /Weather Shelter (Squadron 1)	36/42
FY17	Renovate B-1337: F-35 Squadron Operations (Squadron 1)	2
FY17	Renovate B-3426: Base Supply (enlarge classified storage, larger doors)	11
FY17	Renovate B-1341: Egress Maintenance Shop	6
FY17	Renovate B-1335: 4-Bay Weather Shelter (fire suppression, floors, lights)	38
FY18	Add/Alter B-1324: Munitions Inspection Shop	40
FY18	Construct 6-Bay R-11 Refueling Truck Garage	2
FY18	Construct South Loop Aerospace Ground Equipment and Fill Stand	30
FY18	Construct South Heat Plant	10
FY18	Construct New Consolidated Munitions Operations Facility	39
FY18	Construct New Alternate Mission Equipment Facility	24
FY18	Renovate B-1209: Aerospace Ground Equipment Shop/Covered Storage	37
FY18	Construct new Operations Support Squadron Facility; alter B-1215 for Base Operations	23
FY18	Renovate B-1232: Enlarge Wheel & Tire Shop in Nose Dock 7	16
FY18	Renovate B-3462: Munitions Flight (alter space to accommodate additional personnel)	2
FY18	Renovate B-1306: Aerospace Ground Equipment Covered Storage (North Bays)	30
FY18	Renovate B-1340: Weapons Load Training (add fire suppression and alter to accommodate additional personnel)	34
FY18	Renovate B-1344: Fuel Cell Maintenance Facility (alter to accommodate additional personnel)	3
FY18	Renovate B-1346: Metals Tech in Jet Engine Intermediate Maintenance Facility (alter to accommodate additional personnel)	7
FY18	Renovate B-1347: Maintenance Group (alter to accommodate additional personnel)	15
FY18	Renovate B-1353: Armament Systems Maintenance Facility for Alternate Mission Equipment and Metals Tech	9
FY18	Add/Alter B-6385: Munitions Inspection Shop	44
FY18	Renovate B-1141: Maintenance Operations Center (alter to accommodate additional personnel)	29
FY18	Add/Alter B-6389: Outdoor Arms Range Add Two Firing Points	45
FY18	Construct Flight Kitchen	32
FY18	Construct School Age Facility	31
FY18	Renovate B-3134: Security Forces Facility	28
FY18	Demolish B-3303: School Age Facility	46
FY18/19	Renovate B-2262 and B-2264: Dormitories	49
FY19	Construct 14-Point Combat Arms Training and Maintenance Range	14
FY19	Construct 200-Person Dormitory	18
FY19	Demolish B-5313: Youth Center	47
FY19	Add/Alter B-3349: Medical Clinic (alter to accommodate additional personnel)	43

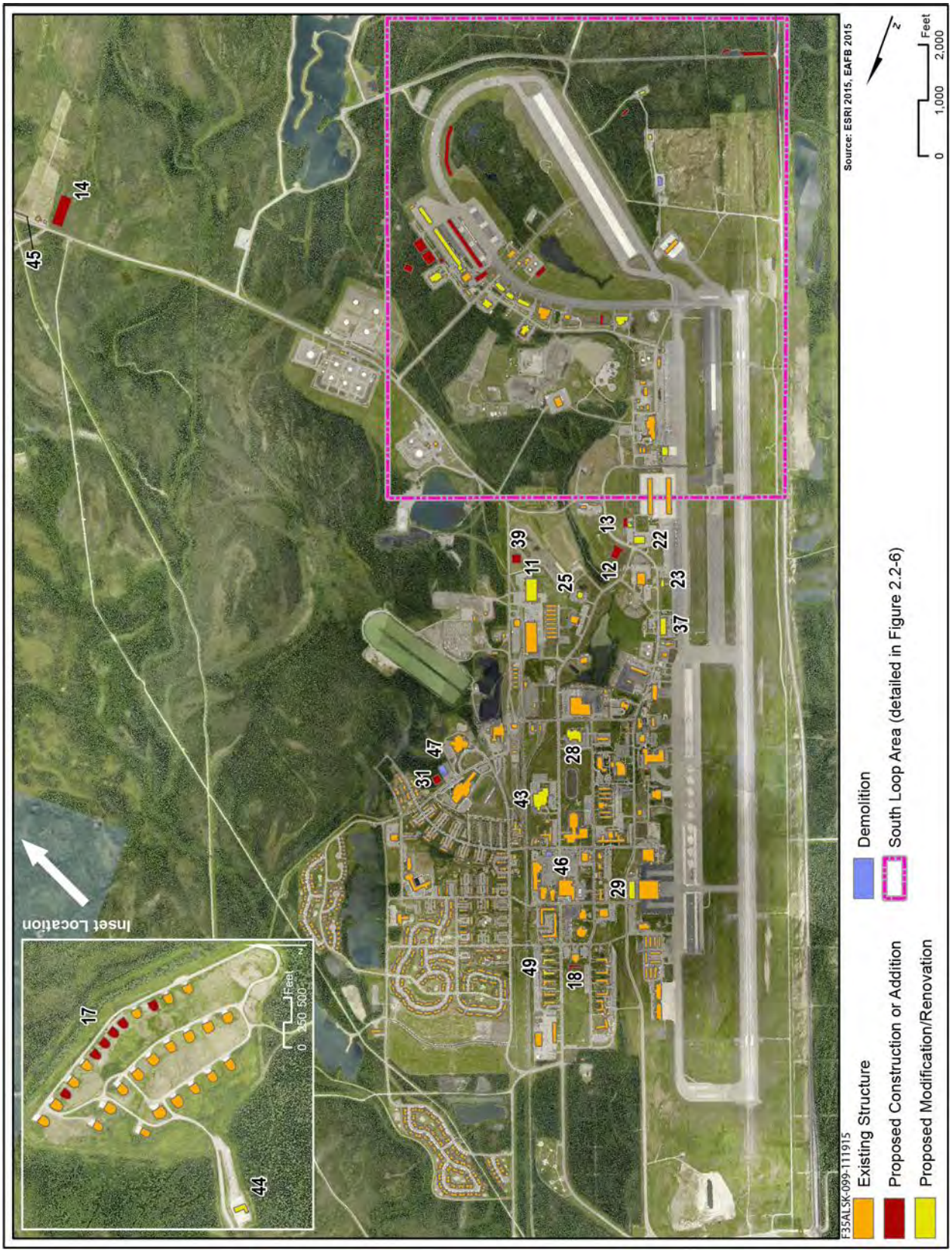


Figure 2.2-5. Proposed Action Alternative Basewide Facility and Infrastructure Construction and Modification Plan

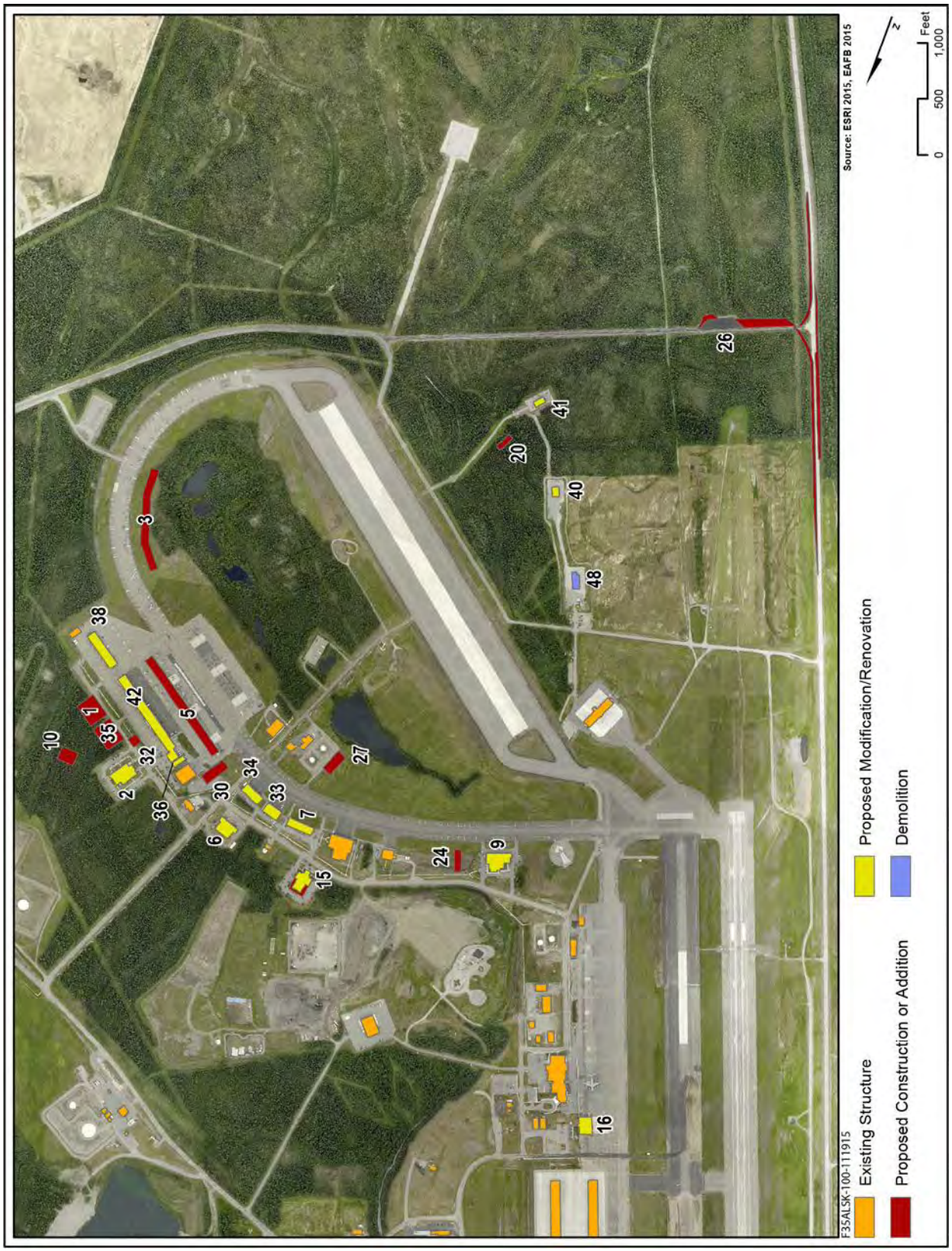


Figure 2.2-6. Proposed Action Alternative Southern End Facility and Infrastructure Construction and Modification Plan

2.2.2.3 *Airfield and Airspace Operations*

Based on previous analyses of F-35A operations (Air Force 2014a), the Proposed Action Alternative would result in the addition of approximately 8,640 sorties per year (or 26,106 airfield operations [i.e., takeoffs, landings, and pattern work]) to existing base flight activities (see Section 2.2.1.3 *Airfield and Airspace Operations* for definitions of the operational terms used). To provide the training needed to ensure combat readiness and aircrew training requirements, F-35A aircrews would conduct operations in two types of environments. The first is the base airfield that includes the runway, taxi areas, and overlying/adjacent airspace. The second is the northern JPARC airspace. The following discussion provides details on the number and type of airfield and airspace operations proposed to ensure combat readiness and meet aircrew training requirements.

Airfield Operations

Under the Proposed Action Alternative, up to 54 aircraft would be based at Eielson AFB, bringing the total number of based aircraft at Eielson AFB to 86. All aircraft refueling as well as for ground equipment would be done by existing mobile tankers (R-11s) and fuel lines. Currently, JP-8 comes directly via a pipeline from the North Pole refinery. Diesel, vehicle gas, JP-4 (for helos), and other types of fuel are delivered by trucks from outside sources. At this time, no fuel capacity issues have been identified; however, there are available storage tanks on base to accommodate any increased needs. No new infrastructure would be required to accommodate refueling.

By completion of the beddown process (anticipated by early FY21), F-35A aircraft would generate 8,640 sorties per year at Eielson AFB; a sortie is a single military aircraft conducting its mission and includes its takeoff, training mission, and then a landing. This translates to 26,106 airfield operations, or each takeoff, landing, low approach, and other pattern work that would be conducted by the F-35As. When added to the baseline of 18,963, airfield operations would more than double to 45,069. Please note that these total airfield operations include based and transient aircraft at Eielson AFB. Transient aircraft are those that visit on a temporary basis, participating in major flying exercises, traveling through the area, or are landing at the airfield for emergency, weather, or other contingencies. Eielson AFB is more than sufficient to meet this increased use without requiring any runway modifications or construction.

Aircraft operations fluctuate over the year, and the busiest months are from April through October when major flying exercises occur. Operations differ according to the number of aircraft that participate in major flying exercise (every exercise varies), the number of based aircraft that are deployed to different locations for reasons such as combat and/or training, and fiscal constraints dictating how far aircraft can travel to undertake training. These are just a few reasons why specific operations cannot be identified for each month or for particular seasons. Therefore, annual average operations are used to evaluate potential impacts in this EIS; these represent the average of all operations conducted over 240 flying days in a year. Table 2.2-10 provides the annual number of airfield operations projected under the Proposed Action Alternative.

Existing standard departure and arrival routes, as well as noise abatement procedures (e.g., quiet hours, engine runup times and locations) would be used by the F-35A. Once the beddown is complete, approximately 96 percent (or 43,450) of the total airfield operations would occur during the environmental daytime hours (i.e., 7:00 a.m. to 10:00 p.m.) and approximately 4 percent (or 1,619) during environmental nighttime hours (10:00 p.m. to 7:00 a.m.). Environmental night represents a period when the effects of noise on people are accentuated and receives special consideration. F-35A airfield

operations would result in a 138-percent increase (or 25,953) in daytime operations and a 10-percent increase (or 153) in the overall environmental nighttime operations.

Table 2.2-10. Projected F-35A Annual Airfield Operations at Full Operational Capability

Details of Airfield Operations	*F-35A Airfield Operations*[1]	*No Action Aircraft Operations*	*Total Airfield Operations*
Day (7:00 a.m. to 10:00 p.m.)	25,953	17,497	43,450
Night (10:00 p.m. to 7:00 a.m.)	153	1,466	1,619
Total	**26,106**	**18,963**	**45,069**

Note:
[1]An *airfield operation* represents the individual portion of a flight in the base airfield environment; for instance, one aircraft taking off, doing an approach and departure, and then landing are four airfield operations but these all comprise one sortie done by a single aircraft.

Airspace Operations

The aircrew training requirements indicate that to fulfill its multiple roles currently done by the F-16 and A-10 aircraft, the F-35A must conduct training 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. The northern portion of the JPARC airspace has the requisite airspace and range assets that more than adequately supports F-35A combat readiness training, no new airspace configurations are needed or proposed. Table 2.2-11 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 then 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. The northern portion of JPARC airspace provides sufficient MOAs, ATCAAs, and Restricted Areas needed to meet all five of these major mission-training activities without any changes or reconfigurations in northern JPARC airspace units.

Table 2.2-11. Projected F-35A Training Activities

Major Mission	*Training Activities*	*Airspace Type*	*Airspace Dimension in (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 and ATCAAs	10,000 to 50,000 / 40 by 60

Due to their predominantly higher altitude missions, advanced electronics, and speed, the F-35As would primarily use the MOAs, ATCAAs, and Restricted Areas within the northern portion of JPARC, no new airspace is required. The F-35As would occasionally use existing Military Training Routes (MTRs); they are illustrated in Figure 2.2-7. As is done currently for aircraft operating in the MTRs, the F-35As would fly according to the parameters outlined in the Finding of No Significant Impacts for the final MTR (Alaska) Environmental Assessment (EA), whereby an average of eight operations per day (by any aircraft) can fly in any of the MTRs (611th Air Operations Group 2008). If F-35As use MTRs for transit to other locations, the analyses in this EIS assume that the use would fall within the eight operations currently authorized for use by all aircraft, as analyzed in Section 4.4 of the MTR EA (611th Air Operations Group 2007). Therefore, no significant impacts from MTR use by F-35As would occur.

F-35As from Eielson AFB would primarily operate in the northern portion of JPARC airspace, in the MOAs, ATCAAs, and Restricted Areas in the immediate vicinity of Eielson AFB. The F-35As could also fly throughout the entirety of JPARC airspace (see Figure 2.2-3); however, these operations would be minimal. If it is found that operations could exceed existing evaluated levels, then the appropriate level of NEPA documentation will be undertaken and public involvement invited.

F-35A operations would take place in existing and already-approved northern JPARC airspace; no changes are proposed for this action. Table 2.2-12 summarizes proposed annual operations that would be conducted at completion of the beddown in early FY21. These numbers are based on the F-35A utilization rate (i.e., the number of times one F-35A can operate in a typical day), the type of training that is required to maintain combat readiness, information from pilots flying F-35As, and interviews with pilots who currently fly in the northern JPARC airspace. For F-35A operations (the third column in Table 2.2-12), within each of the northern JPARC airspace units, 99 percent of operations would occur between 7:00 a.m. and 10:00 p.m. (or environmental daytime hours) and 1 percent would occur between 10:00 p.m. and 7:00 a.m. (or environmental nighttime hours).

Please note that as part of the JPARC ROD (Air Force 2013c), the Paxon High/Low MOA and expanded/lowered Fox 3 MOA are expected to be charted by the Federal Aviation Administration (FAA) before FY21, prior to the F-35A arrival. Therefore, F-35A operations were assumed in both these airspace units. If the MOAs were not charted, F-35A operations would be the same as those in Table 2.2-12; the aircraft would maintain their operations at the higher altitudes and not fly down to the lower MOA floors. Not charting these two airspace actions would in no way preclude F-35As from operating in existing northern JPARC airspace (see Figure 2.2-3).

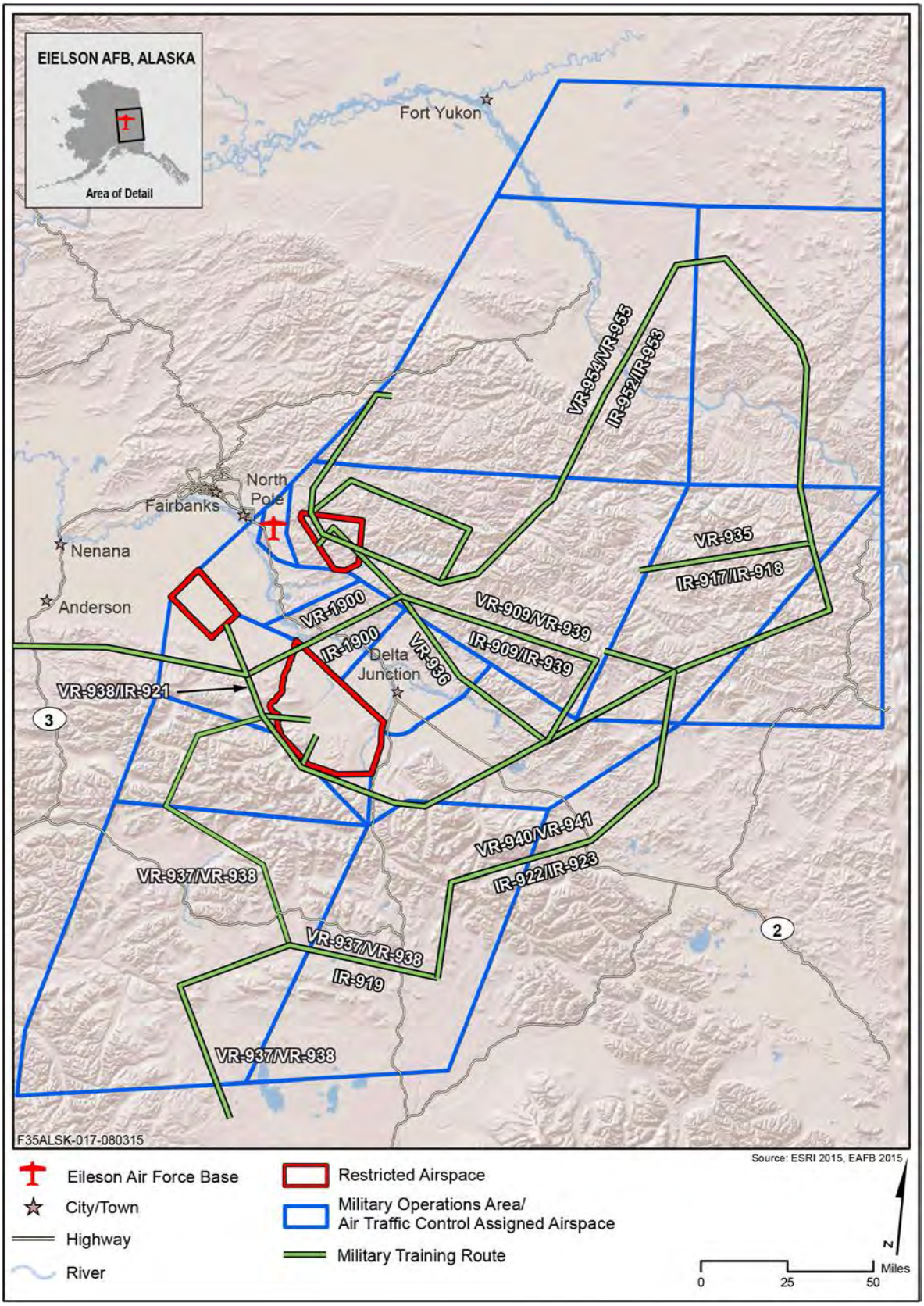


Figure 2.2-7. Military Training Routes in the Northern Joint Pacific Alaska Range Complex Airspace

Table 2.2-12. Proposed F-35A Annual Operations in Northern JPARC Airspace

Airspace Unit	*No Action (calendar year 2021)*	*F-35A Proposed (calendar year 2021)*	*Total*
Birch MOA	4,672	433	5,105
Buffalo MOA	4,672	433	5,105
Delta 1 MOA[1]	2,908	690	3,598
Delta 2 MOA[1]	3,618	690	4,308
Delta 3 MOA[1]	3,618	690	4,308
Delta 4 MOA[1]	3,618	690	4,308
Delta ATCAA	4,808	760	5,568
Eielson MOA/ATCAA	7,034	3,387	10,421
Fox 1 MOA/ATCAA	7,056	3,387	10,443
Fox 2 MOA	6,749	3,387	10,136
Fox 3 MOA[2]/ATCAA	6,507	3,387	9,894
Paxon High MOA/ATCAA[2]	4,701	3,387	8,088
Paxon Low MOA[1, 2]	3,618	920	4,538
Yukon 1 MOA/ATCAA	5,568	2,540	8,108
Yukon 2 MOA/ATCAA	5,568	2,540	8,108
Yukon 3A Low/3 High MOAs/ATCAAs	3,759	2,540	6,299
Yukon 3B MOA[1]	3,417	690	4,107
Yukon 4 MOA/ATCAA	3,447	1,270	4,717
Yukon 5 MOA/ATCAA[1]	3,417	690	4,107
Viper B MOA/ATCAA	5,568	2,540	8,108
R-2202A/B/C/D	10,168	3,387	13,555
R-2205	6,334	2,540	8,874
R-2211	3,031	3,387	6,418
Blair ATCAA	3,898	3,387	7,285

Source: Air Force 2015a.
Notes:
[1]Operations in these airspace units conducted only during major flying exercises.
[2]If the lower floors of these MOAs are not charted by the FAA, then the F-35As would conduct operations within the higher floor configurations of the Fox 3 MOA and Paxon ATCAA. Total operations would not change and would still be distributed similarly as presented above.

The following highlights some of the expected differences in the F-35A operational capabilities compared to the fighter attack aircraft they are eventually replacing:

- More effective in air-to-air engagements;
- More effective in prosecuting 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 defenses missions;
- Self-sufficient or part of multisystem and multiservice combat operations;
- Able to rapidly transition between air-to-ground and air-to-air missions while still airborne; and
- Reduced detection with low-observable technologies and tactics.

Due to these capabilities and the breadth of the F-35A mission accomplishments, several operational differences (when compared to the F-16s and A-10s) would occur with the F-35A. These changes are detailed below.

Use of Higher Altitudes

The F-35A would use the full, authorized capabilities of northern JPARC airspace units available for training and operating from 500 feet AGL up to 60,000 feet MSL. See Table 2.2-5 for the floors and

ceilings of the northern JPARC airspace units F-35As primarily would use. Generally, the F-35A would fly at higher altitudes, operating at 10,000 feet MSL or higher about 86 percent of its time in northern JPARC airspace (Table 2.2-13).

Table 2.2-13. F-35A Altitude Distribution

Altitude (feet)	*Percent Use*
500 – 1,000 AGL	4
1,000 – 3,000 AGL	2
3,000 – 5,000 AGL	3
5,000 – 10,000 MSL	5
10,000 – 18,000 MSL	26
>18,000 MSL	60

Due to its capabilities and expected tactics, the F-35A would occasionally (9 percent or less) fly below 5,000 feet AGL, and would consistently operate (60 percent) from 23,000 feet MSL to above 30,000 feet MSL. Actual flight altitudes would depend upon the lower and upper limits of specific JPARC airspace units (see Table 2.2-5). When operating, F-35A pilots would continue to adhere to all FAA charted floors and ceilings of northern JPARC airspace (see Table 2.2-5) and FAA avoidance regulations (14 CFR § 91.119). Additionally, all F-35A pilots would comply with any Eielson- or JPARC-specific restrictions, limitations, seasonal adjustments, and avoidance areas that currently exist and are codified as standard operating procedures in the 11th Air Force Alaska Airspace Handbook (Air Force 2014). Specific information regarding airspace operations and management is detailed in Section 3.2 *Airfield and Airspace Operations and Management* and Appendix D.1.

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 authorized (i.e., approved by the FAA) for such activities (see Table 2.2-5 for northern JPARC airspace authorized for supersonic activity). Due to the F-35A mission and the aircraft's capabilities, the Air Force anticipates approximately 10 percent of the 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 2.2-14). On occasion, the F-35A aircraft may conduct supersonic flight below 15,000 feet MSL to accommodate mission and training needs but as stated earlier, only in airspace authorized and approved for supersonic flights. For any of the occasional overwater supersonic activities, they must be conducted above 10,000 feet MSL, at least 15 NM (about 17 miles) from shore.

Table 2.2-14. 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%

Mission Duration

Like the fighter attack F-16s, the F-35As would fly, on average, approximately 30 to 90 minute-long missions, including takeoff, transit to and from the training airspace, training operations/events in the airspace, and landing. Depending upon the distance and type of training activity, the F-35A (like legacy fighter aircraft) would spend between 20 to 60 minutes in the training airspace.

Defensive Countermeasures

Although the F-35A's stealth features significantly reduce its detectability, pilots must train to employ defensive countermeasures. Flares would be used only in approved JPARC airspace at the altitudes and seasons designated in the 11th Air Force Alaska Airspace Handbook and in accordance with the F-35A combat-readiness training requirements. It is estimated that F-35A pilots would annually deploy up to 26,600 flares. Based on the emphasis of flight at higher altitudes for the F-35A, roughly 90 percent (or 24,354) of F-35A flares released throughout authorized JPARC airspace would occur above 15,000 feet MSL.

Ordnance Use

The F-35A has the requirement and capability to perform air-to-ground missions. For the F-35A, air-to-ground training represents about 60 percent of their combat readiness training program, with the air-to-air superiority mission accounting for the remaining 40 percent. 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 Alaska ranges. Therefore, F-35A aircraft would primarily operate in northern JPARC restricted airspace and on ranges approved for live-fire and inert ordnance delivery. These airspace and ranges are R-2202/Oklahoma Impact Area, R-2205/Stuart Creek Impact Area, and R-2211/ Blair Lakes Impact Area (see Table 2.2-6).

It is anticipated that under the Proposed Action Alternative, F-35A pilots would need to deploy 68 to 75 live ordnance and 68 to 150 inert ordnance annually onto existing ranges. This represents an increase of up to 225 more bombs to ranges that are more than capable of handling this increase. Because the F-35A also carries an internal 25-millimeter cannon, occasional tactical strafing training would be needed. Strafing involves flying toward and firing at a prescribed strafing target for a short burst of time. With a capacity of 180 rounds, and the four times per year that live strafing would occur, the F-35As would deploy a total of 34,560 rounds (see Table 2.2-6). As is the case for air-to-air and air-to-ground ordnance training, strafing activities must follow specific safety procedures and be employed only on approved JPARC ranges and targets.

2.3 ANALYSIS OF IMPACTS

All of the No-Action and Proposed Action Alternatives' elements (i.e., personnel increases, facility and infrastructure construction, and aircraft operations) are evaluated for their impacts on the various components of the human and natural environment. Chapter 3 presents baseline conditions in the *Affected Environment* and Chapter 4, evaluates the *Environmental Consequences* of the No-Action and Proposed Action Alternatives and compares the impacts.

2.4 DOCUMENTS INCORPORATED BY REFERENCE

In accordance with CEQ regulations implementing NEPA, and with the intent of reducing the size of this document, the following material relevant to the Proposed Action is incorporated by reference. These documents are part of the administrative record and are available upon request from the Air Force or via the internet at the project website at www.PACAF-F35Aeis.com.

Alaska Military Operations Area Final EIS was published in August 1995 and the ROD signed in April 1997. This documentation created the JPARC airspace in Alaska. The Air Force ROD changed several temporary MOAs to permanent; modified some existing MOAs; created new MOAs and identified the number of operations and type of aircraft using the airspace; added supersonic, routine, and major flying exercises aircraft operations; and authorized use of chaff and flares in particular MOAs (Air Force 1995, 1997). The 11th Air Force Alaska Airspace Handbook codifies the airspace dimensions, supersonic authorizations, limitations, avoidance areas, and seasonal restrictions in JPARC airspace. Relevant sections of these authorizations, limitations, avoidance areas, and seasonal restrictions, which all F-35A pilots would need to comply with, are summarized in Appendix D.1.

Military Training Routes Alaska Final EA and Finding of No Significant Impact (FONSI) were published in 2006 and 2008 respectively (611th Air Operations Group 2007, 2008). The proposed action modified eight existing MTRs, removed two MTRs from service, and two remained unchanged but different operational use was evaluated. The MTRs and operational parameters evaluated in the EA, and resulting FONSI, represent how current and any proposed aircraft would operate therein.

Delta Military Operations Areas Final EA and FONSI, published in January 2010, evaluated the impacts of creating and expanding the Delta MOAs and accommodating major flying exercises and routine training (including the F-35, see Table 2.2-1 in the EA). The EA evaluated operations of aircraft during major flying exercises as well as the impacts of using chaff and flares in the airspace (11th Air Force 2010). The conclusion reached was a signed FONSI.

F-22 Plus-Up Final EA and FONSI (11th Air Force 2011) evaluated the impacts of additional F-22 aircraft operating in all JPARC airspace. Section 2.2.1 of the EA, presents both baseline and proposed operations (flight activities, chaff and flare, as well as ordnance use) to include the F-22, F-15, F-16, and transient aircraft. The EA also analyzed F-22 and other aircraft employing defensive countermeasures and ordnance in the northern JPARC airspace, and included operations in Galena, Naknek 1/2, Stony A/B, and Susitna MOAs. Potential impacts of F-22 and other aircraft operations were evaluated with the result being a FONSI.

Gulf of Alaska Navy Training Activities Final EIS/Overseas EIS (OEIS) was published in March 2011 and the ROD signed in May 2011. The U.S. Navy decision improved the availability and quality of training opportunities in Alaska, including portions of JPARC airspace (U.S. Navy 2011a, 2011b). The EIS/OEIS included Air Force operations in overwater training airspace (Warning Area W-612) under current conditions and that could be used by F-35A aircraft. A draft Supplemental EIS/OEIS was published in August 2014 (U.S. Navy 2014). The supplemental document updates the 2011 Final EIS/OEIS with new information and analytical methods that emerged since it was published. To date, no final Supplemental EIS/OEIS or ROD has been published.

Joint Pacific Alaska Range Complex in Alaska Modernization and Enhancement Final EIS (or JPARC EIS) was published in June 2013 and the ROD signed in August 2013 (Air Force 2013a, 2013b). The Air Force decision included expanding restricted airspace R-2202, expanding Fox 3 MOA, creating the Paxon

MOA, and increasing nighttime joint training operations. Included in Section 3.2.2.1 of the EIS, were the types and numbers of ordnance use at R-2202/Donnelly Training Area and R-2211/Blair Lakes Impact Area aircraft use at these ranges. Extensive evaluation of the potential impacts of aircraft operations and use of defensive countermeasures was presented and significant impacts were identified for noise effects to people, wildlife, recreation, and subsistence activities, as well as the potential to conflict with civil aircraft operations. The JPARC ROD prescribed numerous commitments to various mitigation measures, for example, flight restrictions over hunting, fishing, and recreational areas during certain times of the year; avoidance of caribou calving areas; and limitations of flare use during high fire risk), which all Air Force and Air Force-sponsored military pilots must comply with and would continue with F-35A pilots. These restrictions were codified in the 11th Air Force Alaska Airspace Handbook (11th Air Force 2015) and all military pilots operating in JPARC airspace are briefed on the flight restrictions and required to adhere to them accordingly. In February 2015, the FAA disseminated their airspace study for the JPARC airspace modifications and requested public comments through April 10, 2015 (FAA 2015). It is expected that the expanded Fox 3 MOA and R-2202, as well as the Paxon MOA will be charted by the FAA by the time the F-35A would arrive at Eielson AFB in early FY21. If these airspace changes were not charted, the F-35A would still be able to operate in the existing configuration of JPARC airspace.

F-35A Operational Beddown Final EIS was published in September 2013 (Air Force 2013c) and two RODs were signed in January 2014 (Air Force 2014b). The EIS evaluated six potential basing locations and several basing scenarios (i.e., aircraft numbers) and established a basis on how F-35As would operate in training airspace. Active-duty and Reserve/National Guard bases were identified for potential basing locations. Three basing scenarios of 24, 48, and 72 F-35As were evaluated for the active-duty bases (Ops #1). At the three Reserve/National Guard bases, two basing scenarios of 18 and 24 aircraft were evaluated (Ops #3). The Air Force published two RODs; the first announced the decision to base up to 72 aircraft at Hill AFB in Utah. The second ROD identified that up to 18 aircraft would be based at Burlington Air National Guard Base in Vermont. This document sets the stage for how the F-35A operates in training airspace.

2.5 SUMMARY OF ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ACTION ALTERNATIVE

Table 2.5-1 provides a summary comparison of impacts for each of the resource categories. The last column provides mitigation measures that are proposed for implementation above and beyond existing permitting processes, best management practices, and standard operating procedures undertaken by Eielson AFB at the base level, in northern JPARC airspace by the 11th Air Force, and at the impact areas managed by the Air Force and Army.

Table 2.5-1. Summary Comparison of Impacts by Alternative

Resource Areas		No Action	Proposed Action	Mitigation Measures
Airfield and Airspace Operations and Management				
Base:	Airfield Operations	No impacts to airfield operations and management.	There would be no adverse impacts to Eielson AFB airfield and airspace structure or management.	No mitigation measures proposed on base.
Airspace:	Training and Exercise Operations	No effect to northern JPARC airspace use or management.	No changes to airspace management. The airspace has sufficient ability to absorb the increased aircraft operations. Ongoing interaction between Eielson AFB, the Alaska Civil/Military Aviation Council, and state and federal agencies, as well as continued use of the SUAIS, ensures continued compatibility of military and commercial/civil aviation in the JPARC airspace. No adverse impacts are anticipated to airspace operations and management through continued adherence to JPARC standard operating procedures. *Civil and Commercial Aviation Airspace Use* - The mishap potential between civil and military would be low through continued adherence of JPARC operational procedures.	No mitigation measures proposed.
Acoustic Environment				
Base:	Population, Land Use Compatibility, and Domesticated Animals and Wildlife	Existing noise impacts would continue.	On base noise exposure would increase noticeably for residential areas, schools, and child development center; there would be a potential for on-base noise impacts. Off base, an increased number of residences in Moose Creek would experience noise levels between 65 and 70 decibel A-weighted Day-Night Average Sound Level (dB DNL) and a day care center would experience an increase in the number of classroom learning interference events.	Due to the potential for people and households to experience noise levels 65 dB DNL and greater, possible noise-attenuating measures could include re-glazing loose windowpanes, replacing cracked windowpanes, putting in weather stripping, adding insulation, and baffling vents. As the Air Force does not own the housing, either on or off base, noise attenuation measures would be the responsibility of the owners. The Air Force does not own the off-base schools, and on base, the FNSB School District leases the schools from the Air Force. Therefore, the undertaking of noise attenuation measures would be the responsibility of the FNSB School District. Noise-attenuating measures for schools could include, but are not limited to, installing sound absorbing materials in the ceiling and walls, fixing cracked windowpanes, sealing any gaps between the walls, floor, and ceiling, and installing insulation in building cavities. The American National Standard Acoustical Performance Criteria, Design Requirements, and Guidelines for Schools, Parts 1 and 2 from the American National Standards Institute S12.60 provide guidance for noise attenuating design criteria for schools.

Table 2.5-1. Summary Comparison of Impacts by Alternative

Resource Areas		***No Action***	***Proposed Action***	***Mitigation Measures***
Airspace:		Noise levels would remain consistent with baseline conditions.	Subsonic and supersonic operations would not generate noise levels that would adversely affect underlying populations of the northern JPARC airspace.	No mitigation measures proposed.
Air Quality				
Base:	Criteria Pollutants, Conformity Applicability, Greenhouse Gases, and Hazardous Air Pollutants	Emissions of criteria pollutants and greenhouse gases would not affect regional air quality or attainment status.	Emissions of criteria pollutants and greenhouse gases would not introduce adverse impacts to affect regional air quality or attainment status.	No mitigation measures proposed on base.
Airspace:		Emissions of criteria pollutants and greenhouse gases would not affect regional air quality or Prevention of Significant Deterioration for Denali National Park, as well as to the Yukon-Charley Rivers National Preserve and Steese National Conservation Area. No adverse impacts.	Emissions of criteria pollutants and greenhouse gases would not affect regional air quality or deteriorate air quality in: Denali National Park (Prevention of Significant Deterioration Class 1 Area); Yukon-Charley Rivers National Preserve; Yukon Flats National Wildlife Refuge; the Steese National Conservation Area; or designated wild and scenic rivers. No adverse impacts to regional air quality within the northern JPARC airspace. In terms of Greenhouse Gas (GHG) emissions, the computed carbon dioxide equivalent or CO_2(e) emissions after final beddown for both squadrons are 31,704 metric tons, or 0.937 percent of the existing CO_2(e) emissions for the FNSB region. Accordingly, no adverse impacts from GHG emissions due to the Proposed Action Alternative.	No mitigation measures proposed.

Table 2.5-1. Summary Comparison of Impacts by Alternative

Resource Areas		***No Action***	***Proposed Action***	***Mitigation Measures***
Safety				
Base:	Accident Potential Zones (base), Mishaps, Bird/Wildlife-Aircraft Strike Hazards	Ground and flight safety considerations associated with current operations would remain in place. No adverse impacts.	*Fire Risk and Management* - No adverse impacts to current fire-fighting abilities and mutual aid agreements. If new information and/or fire-fighting techniques associated with composite materials burned during an accident are identified, then local fire-fighting departments will be informed. *Accident Potential Zones* - No adverse impact to existing Accident Potential Zones or Clear Zones. *Aircraft Mishaps* - Operational mishap rate would be similar to other tactical fighter jet aircraft like the F-16 and F-15, and therefore, no adverse impacts with continued application of existing operating procedures. *Bird/Wildlife-Aircraft Strike Hazards* - BASH is not anticipated to change markedly and affect this facet of safety at Eielson AFB; no adverse impacts with continued application of existing avoidance procedures.	No mitigation measures proposed on base.
Airspace:		Continuation of plans, procedures, and processes currently used for minimizing flight safety risks for all flight activities within the existing JPARC airspace would incur no adverse impacts.	Total operations within the northern JPARC airspace and ranges would remain within its capability and capacity. No new accident response procedures would be required. If new information and/or fire-fighting techniques associated with composite materials burned during an accident is identified, then local fire-fighting departments will be informed. No adverse impacts. *Fire Risk and Management* - All guidance, regulations, and instructions for ordnance delivery at the three impact areas, and flare use in the airspace would be adhered to; fire response and suppression capabilities would continue to meet all requirements. Mutual aid agreements and coordination between Air Force personnel and wildland fire-fighting personnel regarding fire detection and response would continue. No adverse impacts. *Aircraft Mishaps* - No adverse impacts with continued application of existing JPARC standard operating procedures. *Bird/Wildlife-Aircraft Strike Hazards* - Overall potential for bird-aircraft strikes is not anticipated to be statistically different from the No-Action Alternative. No adverse impacts.	No mitigation measures proposed.

Table 2.5-1. Summary Comparison of Impacts by Alternative

Resource Areas		***No Action***	***Proposed Action***	***Mitigation Measures***
Socioeconomics				
Base:	Economics, Demographics, Population, Housing, Public Schools, Transportation, Utilities, and Emergency Medical/Police/ Fire Response	*Population, Demographics, and Economics* - Socioeconomic conditions related to population, demographics, and economics would remain consistent with current conditions. *Schools, Housing, Transportation and Utilities* - Socioeconomic conditions related to schools, housing, transportation, and utilities would remain consistent with current conditions. *Health, Fire, and Crime Response* - Socioeconomic conditions related to health, fire, and crime response services would remain consistent with current conditions.	*Population* - Population would increase by 2.7 percent to FNSB. *Demographics* - General demographics of the regional population would not change in any material way. *Economics* - Positive impact to local economy. *Schools* - Increase in student enrollment would be within the current capacity of FNSB School District. *Housing* - It is estimated there would be available housing to support construction personnel in the short term as well as military and civilian families and unaccompanied personnel in the long term. No adverse impacts. *Transportation and Utilities* - Additional on- and off-base residential population is not anticipated to strain the base or regional transportation and utilities infrastructure. *Health, Fire, and Crime Response* - Additional off-base residential population is not anticipated to strain the capacity of current health, fire, and crime response services in the region.	No mitigation measures proposed on base.
Airspace:	Subsistence	No changes to existing conditions in aircraft operations within JPARC airspace. Continued compliance with flight avoidance areas and seasonal flight restrictions in identified subsistence areas would continue. No adverse impacts to subsistence pursuits.	No impacts to the population, demographics, economics, schools, housing, transportation, utilities, or health, fire and crime response. Continued compliance with flight avoidance areas and seasonal flight restrictions over identified subsistence areas would continue to minimize any potential for adverse impacts.	No mitigation measures proposed.
Land Management				
Base:	Local, state, and federal land management plans	No change from baseline conditions, therefore, no impacts to management.	No changes to land use designations or management objectives on Eielson AFB would occur. Off base, the Proposed Action Alternative would not require purchase of any lands or change how lands are managed. No adverse impacts to on-base land management are anticipated.	No mitigation measures proposed on base.
Airspace:	Local, state, and federal land management plans	No change from baseline conditions, therefore, no impacts to land management.	No lands would be acquired underneath the northern JPARC airspace and aircraft operations would be consistent with current conditions. Agency land management plans and objectives would not be affected by F-35A operations in JPARC airspace where aircraft have been operating for several decades. There would be no adverse impacts to land management under the airspace.	No mitigation measures proposed.

Table 2.5-1. Summary Comparison of Impacts by Alternative

Resource Areas		***No Action***	***Proposed Action***	***Mitigation Measures***
Cultural Resources				
Base:	Traditional, Prehistoric and Historic Archaeological and Architectural Resources	*Traditional/Alaska Native* - No change when compared to baseline conditions on Eielson AFB, therefore, no impacts to traditional Alaska Native resources. *Archaeological and Architectural* - No change to baseline conditions, therefore, no adverse impacts to archaeological and architectural resources.	*Traditional/Alaska Native* - No direct or indirect adverse impacts to Traditional or Alaska Native resources. *Archaeological and Architectural* - No known prehistoric sites have been recorded at Eielson AFB. Therefore, no direct or indirect adverse impacts to prehistoric archaeological sites are anticipated. While construction would occur in the Quarry Hill Munitions Storage Historic District, all development would be undertaken in accordance with the Program Comment. The Flightline Historic District would continue to experience the indirect effect of aircraft operations on the flightline; however, this is in keeping with the setting of the district and would not affect the integrity of the district. The Alaska State Historic Preservation Office concurred with the Air Force finding of no effect to historic properties in the area of potential effect.	No mitigation measures proposed on base.
Airspace:	Traditional Resources	*Traditional/Alaska Native* - No change when compared to baseline conditions underlying northern JPARC airspace. No adverse impacts to traditional Alaska Native resources. *Archaeological and Architectural* - No change compared to baseline conditions in archaeological and architectural resources underlying northern JPARC airspace, therefore, no adverse impacts to these resources.	*Traditional/Alaska Native* - Continued adherence by F-35A pilots to seasonal flight adjustments, restrictions, and limitations in the northern JPARC airspace would minimize any adverse impacts to traditional resources or areas supporting subsistence hunting. *Archaeological and Architectural* - No damage to historic structures from supersonic or subsonic operations is anticipated. Therefore, no direct or indirect adverse impacts to archaeological or architectural resources would occur in the area of potential effect.	No mitigation measures proposed.

Table 2.5-1. Summary Comparison of Impacts by Alternative

Resource Areas		***No Action***	***Proposed Action***	***Mitigation Measures***
Environmental Justice and Protection of Children				
Base:	Low Income, Minority, Children, and the Elderly	The No-Action Alternative would not disproportionately adversely affect low-income or minority populations. No adverse impacts are anticipated to children or the elderly.	The Proposed Action Alternative does not introduce any adverse impacts to air quality; safety; water quality; or hazardous materials/waste, toxic substances, and contaminated sites. Therefore, no disproportionate adverse impacts to low-income or minority populations. No adverse impacts to the elderly were identified. There could be adverse impacts for children attending the on-base schools and child development center, as well as children at an off-base day care center. The increase in the number of aircraft noise intrusions during classroom instruction could result in teaching disruptions and interfere with the children's ability to learn.	The Air Force does not own the off-base schools, and on base, the FNSB School District leases the schools from the Air Force. Therefore, the undertaking of noise attenuation measures would be the responsibility of the FNSB School District. Noise-attenuating measures could include, but are not limited to installing sound absorbing materials in the ceiling and walls, fixing cracked windowpanes, sealing any gaps between the walls, floor, and ceiling, and installing insulation in building cavities. The American National Standard Acoustical Performance Criteria, Design Requirements, and Guidelines for Schools, Parts 1 and 2 from the American National Standards Institute S12.60 provide guidance for noise attenuating design criteria for schools.
Airspace:			The Proposed Action Alternative does not introduce any adverse impacts to noise; air quality; safety; water quality; or hazardous materials/waste, toxic substances, and contaminated sites. Therefore, no disproportionate adverse impacts would be introduced to low-income or minority populations. There also would be no adverse impacts to children or the elderly who live under the northern JPARC airspace.	No mitigation measures proposed.
Natural Resources				
Base:	Wildlife, Vegetation, Wetlands, and Special Status Species	No adverse impacts with continued adherence to federal, state, local, and base rules and regulations and those codified in the Integrated Natural Resource Management Plan.	*Wildlife* - Increased noise and activity due to construction and renovation projects would be short term, and would not present adverse impacts to wildlife populations. *Vegetation* - No critical habitat would be disturbed, no adverse impacts. *Wetlands* - Approximately 17 acres would be removed. No practicable alternative to this adverse impact was identified. *Special Status Species* - No federally listed species are located within the on-base areas to be developed and therefore, no impacts. No adverse impacts to eagles or migratory birds.	Through the 404 permitting process, Eielson AFB will either purchase wetland credits from existing mitigation banks or pay in *lieu* of fees to offset the wetlands (type and size) removed.

Table 2.5-1. Summary Comparison of Impacts by Alternative

Resource Areas		No Action	Proposed Action	Mitigation Measures
Airspace:	Wildlife, Special Status Species	No adverse impacts to underlying special status species with continued adherence to seasonal flight limitations and avoidance areas in JPARC airspace.	*Wildlife* - No adverse impacts to threatened and endangered species. Current mitigations identified in the 11th Air Force Alaska Airspace Handbook and those that the JPARC EIS have identified (which will be fully implemented by 2021), provide protection to "at risk" or special status species that minimizes potential adverse impacts. *Special Status Species* - No adverse impacts to federally listed species, eagles, or migratory birds.	No mitigation measures proposed.
Earth Resources				
Base:	Topography, Geology, Soils, and Seismology	Continued use of erosion control measures to minimize sedimentation.	Approximately 66 acres would be disturbed, of which 21 acres are vegetated. Potential adverse impacts would be minimized by adhering to sedimentation and erosion minimization measures required for all construction projects under the permitting process.	No mitigation measures proposed on base.
Airspace:		No impacts.	Ground disturbance due to increased ordnance and munitions use would not present adverse impacts through continued implementation of land management practices identified in Air Force and Army Integrated Natural Resource Management Plans.	No mitigation measures proposed.
Water Resources				
Base:	Water Quantity/ Quality, Stormwater, Wastewater, and Floodplains	Continued adherence to the Stormwater Pollution Prevention and avoidance of floodplains.	*Quantity* - There is existing on- and off-base capacity to provide potable water and support wastewater treatment; no there would be no adverse impacts. *Quality* - Ground water would not be affected or degraded. No adverse impacts to water quality. *Stormwater* - Sufficient stormwater drainage systems exist to support the approximate 21 acres of impervious surfaces introduced. Retention structures would be provided to collect storm water from any newly developed areas. They will be designed to discharge no more than the pre-existing rate into the drainage system in order not to increase flooding or erosion hazards. No adverse impacts. *Floodplains* - Facilities within the 100-year floodplain would be established and impact 5 acres according to the FNSB delineation and up to 56 acres according to Federal Emergency Management Agency (FEMA) mapping data. No matter which floodplain map is used, there is no other practicable alternative for locating these facilities along and adjacent to the flight line in the floodplain. There would be adverse impacts.	Using the FEMA, 100-year floodplain data, the Air Force will include strategies to mitigate floodplain impacts in facility design and construction. These can include elevating facilities above the floodplain to reduce water infiltration, anchoring structures to prevent movement, and including impervious surfaces to eliminate sinks and/or swells associated with water levels. However, as the proposed facilities need to be constructed at the same elevations as the existing facilities along the South Loop, all existing and new facilities will be 8 to 10 feet below the elevation of the 100-year flood event. Because raising the floor elevations above the floodplain is not practicable, and there is no other location on base for the F-35 facilities that meets operational and safety requirements, a Finding of No Practicable Alternative is incorporated into the Final EIS. If the Air Force chooses to implement the Proposed Action Alternative, it is accepting the flood risk for these facilities.

Table 2.5-1. Summary Comparison of Impacts by Alternative

Resource Areas		***No Action***	***Proposed Action***	***Mitigation Measures***
Airspace:		No adverse impacts.	No adverse impacts.	No mitigation measures proposed.
Hazardous Materials and Wastes, Toxic Substances, and Contaminated Sites				
Base:	Use, Storage Disposal, and Installation/ Environmental/ Compliance Restoration Programs/ Military Response Areas	Established procedures for storing, using, and disposing of hazardous materials and waste would continue to be followed. Toxic substances would be consistent with baseline levels. Contaminated sites would continue to be managed under the Installation, Environmental, and Compliance Restoration Plans.	No new hazardous materials would be introduced; existing disposal systems are in place and have the capacity to support increased total hazardous waste. Toxic substances associated with the F-35A are minor and any construction on or near contaminated sites would adhere to federal, state, local, and base management practices to avoid health and safety risks. No adverse impacts.	No mitigation measures proposed on base.
Airspace:		No adverse impacts.	No adverse impacts.	No mitigation measures proposed.
Recreational and Visual Resources				
Base:	Facilities and Development Compatibility	Noise levels would not change the recreational use of on- or off-base recreational facilities. In terms of visual impacts, new facility design would be consistent with the existing visual landscape found on a military installation. No adverse impacts are anticipated.	No construction would occur on or near parks adjacent to the base or with the expansion of the South Gate. Changes in noise levels would not affect recreational pursuits on base or in locations near the base. The visual aspect would be consistent with the No-Action Alternative conditions found on a military installation. No adverse impacts to recreational or visual resources on or immediately off base with continued adherence to existing operational procedures.	No mitigation measures proposed on base.
Airspace:	Special Use Areas and Visual Landscape Compatibility	No change to baseline noise and visual aspects in northern JPARC airspace. Continued adherence to existing avoidance areas, seasonal and altitude restrictions, and standard operational procedures identified in the 2015 11th Air Force Alaska Airspace Handbook and those identified in the 2013 JPARC EIS ROD, minimize the potential for adverse impacts recreational or visual resources.	There would be an increase in the frequency of airspace operations and associated noise levels would negligibly increase when compared to the No-Action Alternative. Some individuals may perceive the noise increase as interfering with the quality of their recreation. However, the F-35A would be conducting activities similar to those currently conducted by the F-16 and transient jet aircraft, but at predominantly higher altitudes, resulting in a negligible increase in noise levels on the ground. Overflights also would not change the visual experience of the landscape where military aircraft have been operating for several decades. Consequently, in combination with the existing avoidance areas, seasonal and altitude restrictions, and standard operating procedures identified in the 2015 11th Air Force Alaska Airspace Handbook, increases in noise associated with the Proposed Action Alternative would not result in adverse impacts to recreational or visual resources.	No mitigation measures proposed.

3.0 Affected Environment

3.0 AFFECTED ENVIRONMENT

3.1 INTRODUCTION

According to the National Environmental Policy Act (NEPA) (40 Code of Federal Regulations [CFR] § 1502.15) "the Environmental Impact Statement shall succinctly describe the environment of the area(s) to be affected or created by the alternatives under consideration." Potential impacts cannot be determined without first understanding the existing conditions in the affected environment. For this reason, the impact analysis process involves two steps—identifying the affected environment and detailing the potential environmental consequences resulting from the alternatives. The geographic extent of the affected environment is determined by the potential for impacts to affect components of the human, natural, and cultural environment. From this point forward, these human, natural, and cultural components are referred to collectively as resource categories. Depending on the resource category, the extent of the affected environment/region of influence may differ. For instance, the proposed action may have impacts on soils within Eielson Air Force Base (AFB); however, air pollutants generated by the proposed action would include areas downwind of the proposed action and could possibly influence the regional air quality. Following the affected environment discussion, Chapter 4 details the magnitude of potential impacts or "environmental consequences" of the Proposed Action and No-Action Alternatives on the resource categories. Please note that reference documents that are cited, but cannot be found over the internet, are available for review on the project website at https://www.PACAF-F35Aeis.com and upon request from the 354th Fighter Wing (354 FW) Public Affairs Office at Eielson AFB.

3.2 AIRFIELD AND AIRSPACE OPERATIONS AND MANAGEMENT

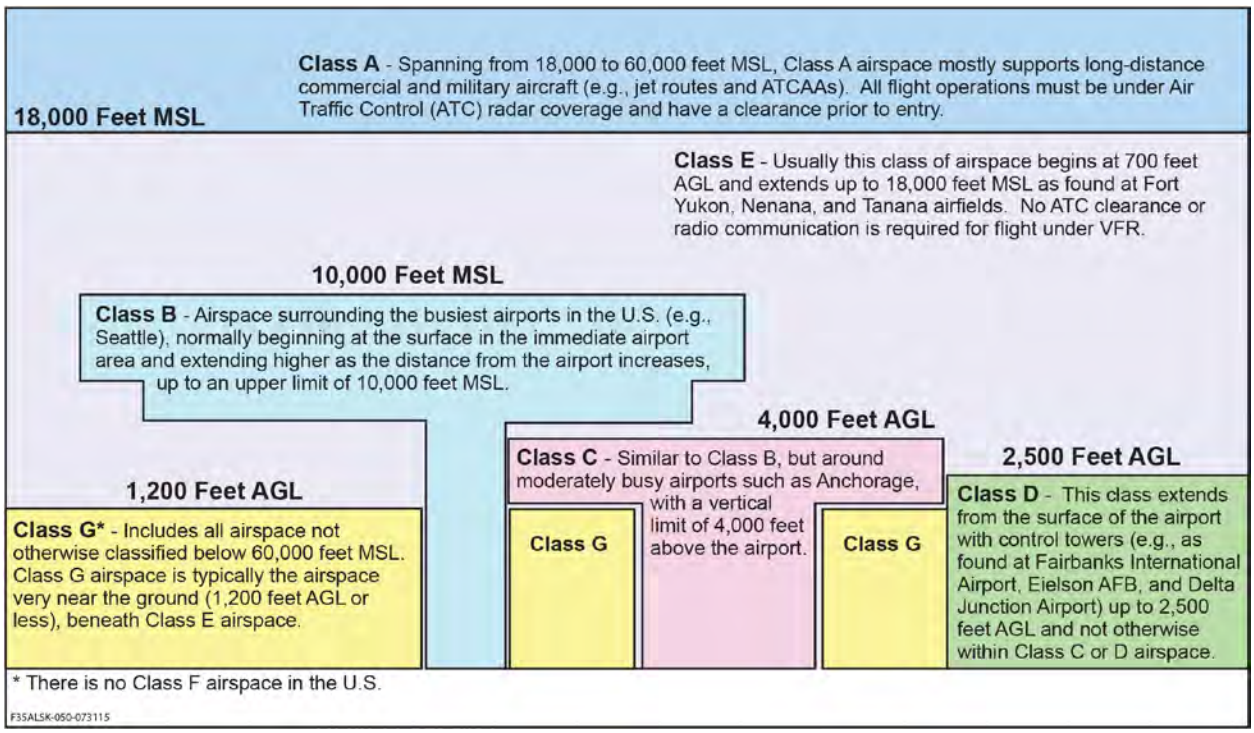
3.2.1 Resource Definition

3.2.1.1 *Operations*

There are two categories of airspace, regulatory and non-regulatory. Within these two categories, the Federal Aviation Administration (FAA) has categorized United States (U.S.) airspace as Controlled, Special Use, Other, or Uncontrolled airspace. *Controlled airspace* is of defined dimensions within which air traffic control service is provided to Instrument Flight Rule (IFR) and Visual Flight Rule (VFR) flights in accordance with the airspace classification (FAA 2013). Controlled airspace is categorized into six separate classes: Classes A through E, and G (there is no Class F category) (Figure 3.2-1).

These classes identify airspace that is controlled, airspace supporting airport operations, and designated airways affording *en route* transit from place-to-place. The classes also dictate pilot qualification requirements, rules of flight that must be followed, and the type of equipment necessary to operate within that airspace. *Uncontrolled airspace* is designated Class G airspace. The following descriptions are from the FAA Airspace Classification Guidance, Chapter 14 (FAA 2008).

Class A airspace, generally, is that airspace from 18,000 feet Mean Sea Level (MSL) up to and including 60,000 feet or Flight Level 600 (FL 600), within which civilian Jet Routes are established. This airspace also includes Air Traffic Control Assigned Airspace (ATCAA), which is normally established over a Military Operations Area (MOA) for higher-altitude training. The northern Joint Pacific Alaska Range Complex (JPARC) ATCAAs are Class A airspace.



Source: FAA 2008.

Figure 3.2-1. Airspace Classification

Class B is generally airspace from the surface to 10,000 feet MSL surrounding the nation's busiest airports in terms of airport operations or passenger numbers. The configuration of each Class B airspace area is individually tailored, consists of a surface area and two or more layers (some Class B airspace areas resemble upside-down wedding cakes), and is designed to contain all published instrument procedures once an aircraft enters the airspace. An air traffic control clearance is required for all aircraft to operate in the area, and all aircraft that are so cleared receive separation services within the airspace. This type of airspace is found at Seattle-Tacoma International Airport.

Class C airspace, generally, is that airspace from the surface to 4,000 feet above the airport elevation surrounding those airports that have an operational control tower, are serviced by a radar approach control, and that have a certain number of IFR operations or passenger numbers. This type of airspace is found at Ted Stevens Anchorage International Airport. Although the actual configuration of Class C airspace is individually tailored, it usually consists of a surface area within a 5-nautical mile radius from the surface to 1,000 feet above the airport elevation and an outer circle within a 10-nautical mile radius from 1,200 feet to 4,000 feet above the airport elevation. The primary purpose of Class C airspace is to improve aviation safety by reducing the risk of midair collisions in the terminal area and enhancing the management of air traffic operations therein.

Class D airspace, generally, is that airspace from the surface to 2,500 feet above the airport elevation surrounding those airports that have an operational control tower. However, the ceiling may be different depending on the airfield. This type of airspace is found at Eielson AFB, Fairbanks International Airport, and Delta Junction Airport. The configuration of each Class D airspace area is individually tailored and, when instrument procedures are published, the airspace is normally designed to contain those procedures.

Class E airspace typically begins at 700 feet above ground level (AGL) and extends up to 18,000 feet MSL as found at Fort Yukon Airport, Nenana Municipal Airport, and Ralph M. Calhoun Memorial Airport in Tanana. No air traffic control clearance or radio communication is required for flight under VFR.

Class G airspace is designated as uncontrolled and extends from the surface to the floor of the overlying Class E airspace. Air traffic control has no authority or responsibility to control air traffic and pilots operate under VFR.

When flying, pilots must comply with FAA avoidance regulations (Section 91.119). 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. Outside congested areas, aircraft must avoid persons, vessels, vehicles, or structures by 500 feet.

3.2.1.2 *Management*

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

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 the airspace needed to ensure the safety of aircraft taking off and landing (49 USC 40102). This navigable airspace is a limited natural resource that congress has charged the FAA to administer in the public interest (FAA Order 7400.2J 2013) (FAA 2013).

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 and other special needs to determine how the National Airspace System can best be structured to address all user requirements. While public and private land ownership does not include control of the overlying airspace, management of the navigable airspace also considers, as appropriate, those conditions where flight restrictions or other measures may be needed to avoid obstacles and other sensitive land use areas.

Special Use Airspace (SUA) is airspace of defined dimensions wherein activities must be confined because of their nature, or wherein limitations may be imposed upon aircraft operations that are not a part of those activities. Types of SUA are Prohibited Areas, Restricted Areas, MOAs, Warning Areas, Alert Areas, National Security Areas, and Controlled Firing Areas. Other types of airspace include advisory areas, temporary flight restrictions, areas designated for parachute jump operations, Military Training Routes, Aerial Refueling Tracks, and ATCAAs. When not required for other needs, an ATCAA can extend the vertical boundary of training airspace (e.g., a MOA) as authorized for military use by the controlling Air Route Traffic Control Center.

Three types of airspace addressed in this Environmental Impact Statement (EIS) include Restricted Areas, MOAs, and ATCAAs (Figure 3.2-2). The Warning Area is depicted but would only be used infrequently by the F-35As, on an as-needed basis. Most Restricted Areas are designated joint use, where VFR and

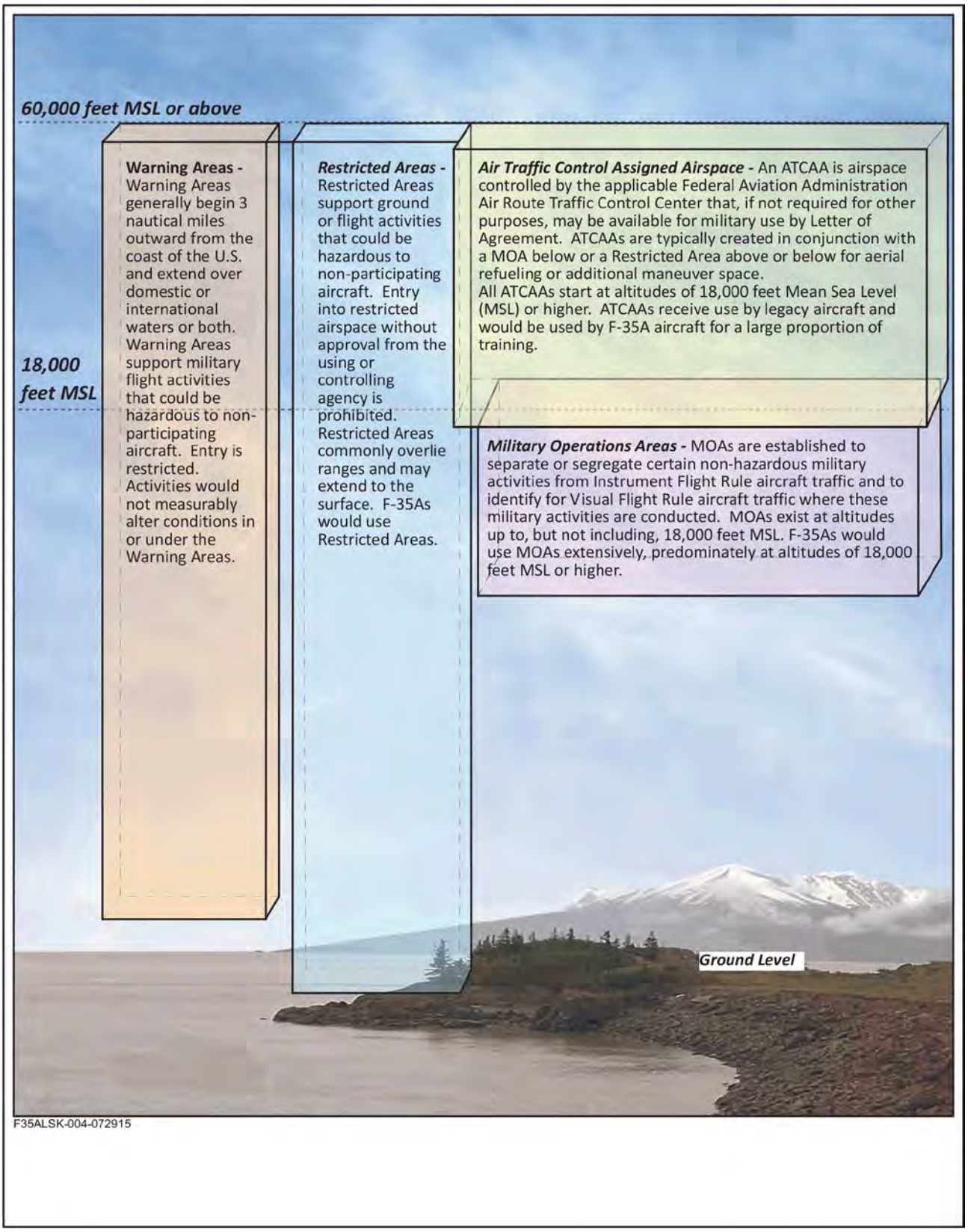


Figure 3.2-2. Representative Operational Airspace

IFR operations may be authorized by the controlling Air Traffic Control facility when it is not being used for military operations. The MOAs are also considered joint use airspace, where non-participating aircraft operating under VFR are permitted to enter, even when the MOA is active for military use. Aircraft operating under IFR must remain clear of an active MOA unless approved by the responsible Air Traffic Control agency. Flight by both participating and VFR non-participating aircraft is conducted under the "see-and-avoid" concept, which stipulates that when weather conditions permit, pilots operating under VFR are required to observe and maneuver to avoid other aircraft.

The Air Force manages airspace in accordance with processes and procedures detailed in Air Force Instruction (AFI) 13-201, Air Combat Command Supplement, *Airspace Management* (Air Force 2013d). This instruction implements Air Force Policy Directive 13-2, *Air Traffic, Airspace, Airfield, and Range Management* (Air Force 2007a), and DoD Directive 5030.19, *DoD Responsibilities on Federal Aviation* (DoD 2013). The AFI addresses the development and processing of SUA, and covers aeronautical matters governing the efficient planning, acquisition, use, and management of airspace required to support Air Force flight operations.

Air Force management of training ranges involves the development and implementation of those processes and procedures required by AFI 13-212, *Range Planning and Operations* (Air Force 2015b). These procedures ensure that Air Force ranges are planned, operated, and managed in a safe manner, that all required equipment and facilities are available to support range use, and that proper security for range assets is present. The overall purpose of range management is to balance the military need to accomplish realistic testing and training with the need to minimize potential impacts of such activities on the environment and surrounding communities.

3.2.2 Affected Environment

The local airspace surrounding Eielson AFB comprises the affected environment for airfield operations. The Eielson AFB control tower is responsible for airfield operations within Class D airspace surrounding its airfield. Air Traffic Control services within the Eielson AFB region are provided by FAA facilities in Fairbanks. The Fairbanks Terminal Radar Approach Control provides air traffic control approach and departure services to the Fairbanks International Airport, as well as military aircraft operating out of Eielson AFB and Ladd Army Air Field (Fort Wainwright). The affected environment for airspace operations is northern JPARC airspace as depicted in Figure 2.2-3.

The processes for managing, coordinating, and scheduling use of the individual JPARC airspace units are the responsibility of the different service organizations designated as the scheduling agency for each. Procedures and guidance for Air Force scheduling of JPARC airspace is contained in AFI 13-212, *Range Planning and Operations*, 11th Air Force Supplement 1, and the 11th Air Force Alaska Airspace Handbook (11th Air Force 2015).

In most cases, MOAs and ATCAAs are used primarily for Air Force aircrew training and exercise where there are minimal multiservice competing needs for this airspace. For those ranges and associated Restricted Areas having competing multiservice requirements, procedures have been established for coordinating use of this airspace in a Memorandum of Agreement (AK-MOA-040) (supersedes AK-MOA-153) between 11th Air Force, U.S. Army Alaska, and the Cold Regions Test Center (Air Force/Army 2014).

This Agreement identifies the responsible scheduling/using agency for each range/Restricted Area and delineates range scheduling protocols, scheduling priorities, range activation/deactivation and clearance authorities, authorized ordnance, and ground operations responsibilities to be adhered to by all user agencies. Range/Restricted Area use scheduling normally requires a minimum of 28 days prior to the requested training date; is based on priorities, regardless of the service branch; and is offered on a first-come, first-served basis. Shared use of these assets by multiple components is accommodated to the extent possible. Any conflicts are resolved through coordination among the responsible range controlling agencies, such as the monthly scheduling meetings, to help ensure that the Alaska ranges and associated Restricted Areas are managed in a manner that strives to meet all airspace user requirements.

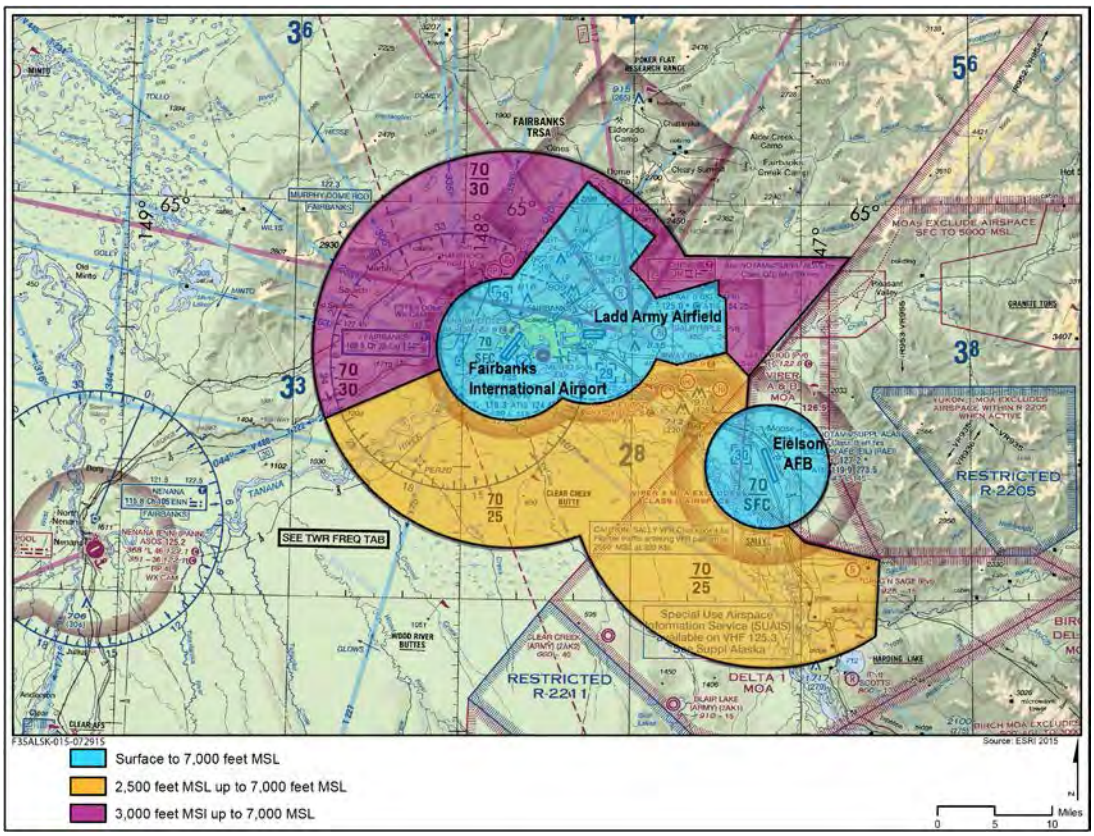
Historically, commercial, military, and general aviation operations within this region have been reasonably compatible. The compatibility of the aforementioned is due to an effective air traffic control system, close coordination between military airspace scheduling agencies and the FAA, availability of the SUA Information Service (SUAIS), and notices to airmen (notices providing daily active status of Alaska's SUA).

3.2.2.1 *Base*

As mentioned above, the local airspace surrounding Eielson AFB comprises the affected environment for airfield operations. Departure and arrival flight routes at Eielson AFB segregate base flight operations from civil air traffic at local airports and standardize the flow of military flights between the base and JPARC airspace. Factors such as local wind and weather conditions, noise abatement, mission requirements, and emergency conditions are considered for runway selection. Runway 14/32 is oriented in a southeast-northwest direction, and the vast majority (nearly 90 percent) of both day and night departures and arrivals is to the northwest on Runway 32. On average, there are 18,963 airfield operations (takeoffs and landings) conducted annually by the Eielson AFB based F-16s, KC-135s, and HH-60s, as well as transient aircraft.

For noise abatement and safety reasons, all aircraft avoid flying below 3,500 feet MSL over base housing and populated areas. Quiet hours are in effect for all aircraft operations from 10:00 p.m. until 6:00 a.m. local time (354 Fighter Wing [FW] 2013). No closed pattern work occurs during this time, and all arrivals use a straight-in approach for landing. Runway 32 is the preferred runway for arrivals during quiet hours.

A Terminal Radar Service Area surrounds Eielson AFB, Fairbanks International Airport, and Ladd Army Airfield (Figure 3.2-3). Eielson Air Traffic Control provides radar vectoring, sequencing, and separation on a full-time basis for all IFR and participating VFR aircraft within Eielson AFB Class D Airspace, from the surface up to and including 7,000 feet MSL (354 FW 2013).



Source: 354 FW 2013.

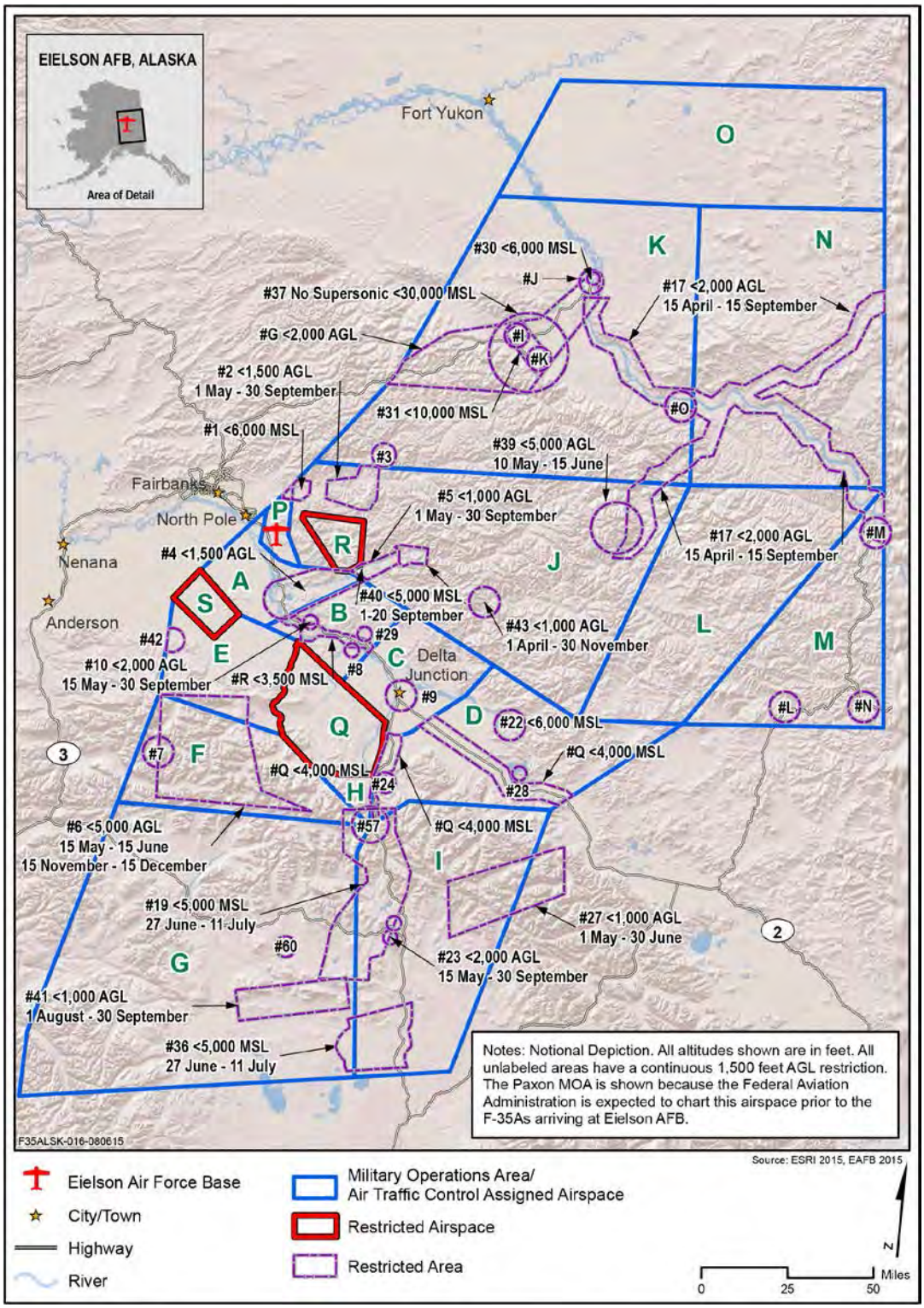
Figure 3.2-3. Terminal Radar Service Area in the Affected Environment

3.2.2.2 *Airspace*

Military Operations Areas

The affected environment for airspace is the northern portion of JPARC, which includes MOAs, ATCAAs, and Restricted Areas (see Figure 2.2-3). This SUA allows military flight operations to occur and minimizes exposure to civil aviation users, non-participating military aircrews, and the general public to hazards associated with military training and operations. This section describes the existing operational procedures within the airspace units. As noted in Section 2.2.1.3, JPARC airspace is managed in accordance with the 11th Air Force Alaska Airspace Handbook, which codified all the limitations, restrictions, and mitigations such as seasonal flight avoidance areas identified in the 1997 Alaska MOA EIS Record of Decision (ROD). The Handbook is a consolidated source of airspace information for Air Force aircrews and any other Air Force-sponsored major flying exercise participants. The Handbook provides geographical descriptions of Alaskan MOAs, MOA groupings, Restricted Areas, ATCAAs, Color Coded/Air Defense Areas, the 11th Air Force Noise/Flight Sensitive Areas List, and Coordination Areas. The Handbook undergoes regular review and update, and is a "living" document. Changes occur frequently and the most current information is available online (11th Air Force 2015).

Pilots operating in this airspace must comply with all rules and restrictions prescribed by the 11th Air Force. If there are observations of military aircraft not following these procedures, then please inform the 11th Air Force at: 1-800-538-6647. Figure 3.2-4 identifies the altitude and seasonal restrictions applied throughout the northern JPARC airspace and the table to the right of the figure, Table 3.2-1, lists the airspace units.



Source: 11th Air Force 2015.

Figure 3.2-4. Joint Pacific Alaska Range Complex Northern Airspace Restrictions, Limitations, and Seasonal Adjustments

Table 3.2-1. Northern JPARC Airspace Units

Airspace Unit	*Map Key*
Delta 1 MOA	A
Delta 2/ Birch MOAs	B
Delta 3 MOA	C
Delta 4/ Buffalo MOAs	D
Eielson MOA	E
Fox 1 MOA	F
Fox 2 MOA	H
Fox 3 MOA	G
Paxon ATCAA	I
Yukon 1 MOA	J
Yukon 2 MOA	K
Yukon 3 High/ Yukon 3A Low MOAs	L
Yukon 3B MOA	M
Yukon 4 MOA	N
Yukon 5 MOA	O
Viper A/B MOAs	P
R-2202	Q
R-2205	R
R-2211	S

Table 3.2-2 provides general descriptions of the airspace restrictions. Please see Appendix D.1 where the applicable northern JPARC airspace exclusions and adjustments (Table D-1), flight sensitive areas (Table D-2), and noise avoidance areas (page D-9) are summarized.

Table 3.2-2. Northern Joint Pacific Alaska Range Complex Airspace Restrictions, Limitations, and Seasonal Adjustments Summary

Airspace Unit (Map Key)	*Limitations/Restrictions*
Birch (B)	• No MOA floor below 3,500 feet MSL over Richardson and Alaska Highways • At Shaw Creek Youth Camp, floor of MOA at 1,500 feet AGL within a 1.0-nautical mile (1.2-mile) radius • Seasonal altitude restrictions at Clear Creek Cabins and Birch Lake State Recreation Site, from May 15 to September 30 • Chaff authorized at any time, flares authorized seasonally • Supersonic not authorized
Buffalo (D)	• No MOA floor below 4,000 feet MSL over Richardson and Alaska Highways • Over Black Rapids Airport, MOA floor no lower than 1,500 feet AGL within a 3.0-nautical mile (3.5-mile) radius • Avoid VFR corridors • Chaff authorized at any time, flares authorized seasonally • Supersonic not authorized
Delta 1 (A)	• MOA floor at 1,500 feet AGL over Salcha River • Chaff authorized at any time, flares authorized seasonally • Supersonic not authorized
Delta 2 (B)	• Seasonal altitude restrictions at Birch Lake State Recreation Site (May 15 to September 30) • Continuous avoidance areas over Clear Creek Cabins, Shaw Creek Youth Camp, and Richardson Highway • Chaff authorized at any time, flares authorized seasonally • Supersonic not authorized
Delta 3 (C)	• Avoid Delta Junction within a 3.0-nautical mile (3.5-mile) radius • Chaff authorized at any time, flares authorized seasonally • Supersonic not authorized
Delta 4 (D)	• Seasonal altitude restrictions at Delta National Wild and Scenic River (WSR) (June 27 to July 11) and Donnelly Creek State Recreation Site (May 15 to September 30) • Continuous avoidance areas over Healy Lake/Village, Lake George, and Black Rapids Airport, as well as Richardson and Alaska Highways • Chaff authorized at any time, flares authorized seasonally • Supersonic not authorized
Eielson (E)	• Over Gold King Creek Airport, MOA floor no lower than 1,500 feet AGL within a 3.0-nautical mile (3.5-mile) radius • Seasonal altitude restrictions at Sheep Lambing Area and Newman Creek Airstrip, May 15 to June 15 and November 15 to December 15 • Chaff authorized at any time, flares authorized seasonally • Supersonic not authorized
Fox 1 (F)	• Over Wood River Lodge and Black Rapids Airport, MOA floor no lower than 1,500 feet AGL in a 3.0-nautical mile (3.5-mile) radius • Seasonal altitude restrictions at Sheep Lambing Area and Newman Creek Airstrip (May 15 to June 15 and November 15 to December 15), as well as the Delta National WSR (June 27 to July 11) • Chaff authorized at any time, flares authorized seasonally • Supersonic authorized at or above 5,000 feet AGL or 12,000 feet MSL, whichever is higher

Table 3.2-2. Northern Joint Pacific Alaska Range Complex Airspace Restrictions, Limitations, and Seasonal Adjustments Summary

Airspace Unit (Map Key)	***Limitations/Restrictions***
Fox 2 (H)	• Over Black Rapids Airport, MOA floor no lower than 1,500 feet AGL in a 3.0-nautical mile (3.5-mile) radius • Seasonal altitude restrictions at Delta National WSR (June 27 to July 11) • Chaff authorized at any time, flares authorized seasonally • Supersonic authorized at or above 5,000 feet AGL or 12,000 feet MSL, whichever is higher
Fox 3 (G)	• Over Black Rapids Airport, MOA floor no lower than 1,500 feet AGL in a 3.0-nautical mile (3.5-mile) radius • Over Maclaren Lodge and Airstrip, MOA floor no lower than 1,500 feet AGL in a 2.0-nautical mile (2.3-mile) radius • Seasonal altitude restrictions at Delta National WSR (June 27 to July 11) and Caribou Calving Area (August 1 to September 30) • Chaff authorized at any time, flares authorized seasonally • Supersonic authorized at or above 5,000 feet AGL or 12,000 feet MSL, whichever is higher
Yukon 1 (J)	• Floor above Pleasant Valley Subdivision is no lower than 6,000 feet MSL from April 15 to September 15 • Floor of MOA is raised to 2,000 feet AGL above Charley River for the Peregrine Falcon Area from April 15 to September 15 • From May 1 to September 30, MOA floor no lower than 1,500 feet AGL above the Chena Recreation Area • Salcha River Area Two, from May 1 to August 31, MOA floor no lower than 1,000 feet AGL; from September 1 to 20, MOA floor no lower than 5,000 feet MSL • Seasonal altitude restrictions at Cirque Lakes Dall Sheep Lambing Area (May 10 to June 15), Salcha River Area Three (September 1 to 20), as well as the Pogo airstrip and Goodpaster River Valley (April 1 to November 30) • Seasonal altitude restrictions at Yukon and Charley National WSRs (April 15 to September 15) • Chaff authorized only during certain weather conditions, flares authorized seasonally • Supersonic authorized at or above 5,000 feet AGL or 12,000 feet MSL, whichever is higher
Yukon 2 (K)	• Over Steese Highway Area, MOA floor no lower than 2,000 feet AGL • Over Circle City Airport, Circle Hot Springs Airport, Central Airport, Coal Creek Airport, and Chena Hot Springs Resort, MOA floor no lower than 1,500 feet AGL within a 3.0-nautical mile (3.5-mile) radius • Over the towns of Circle City, Central, and Circle Hot Springs, MOA floor no lower than 10,000 feet MSL • Seasonal altitude restrictions at Yukon and Charley National WSRs (April 15 to September 15) • No supersonic operations within 10.0-nautical mile (11.5-mile) radius around the towns of Central and Circle Hot Springs, below 30,000 feet MSL • Chaff authorized only during certain weather conditions, flares authorized seasonally • Supersonic authorized at or above 5,000 feet AGL or 12,000 feet MSL, whichever is higher
Yukon 3A Low (L)	• Over Peregrine Falcon Area Upper Yukon River, MOA floor is no lower 2,000 feet AGL from April 15 to September 15 • Seasonal altitude restrictions at Yukon and Charley National WSRs (April 15 to September 15) • Chaff authorized at any time, flares authorized seasonally • Supersonic authorized at or above 5,000 feet AGL or 12,000 feet MSL, whichever is higher
Yukon 3 High (L)	• Seasonal altitude restrictions at Yukon and Charley National WSRs (April 15 to September 15) • Chaff authorized at any time, flares authorized seasonally • Supersonic authorized at or above 5,000 feet AGL or 12,000 feet MSL, whichever is higher

Table 3.2-2. Northern Joint Pacific Alaska Range Complex Airspace Restrictions, Limitations, and Seasonal Adjustments Summary

Airspace Unit (Map Key)	*Limitations/Restrictions*
Yukon 3B (M)	• Above Chicken, Eagle, and Boundary Airports, MOA floor is no lower than 1,500 feet AGL in a 3.0-nautical mile (3.5-mile) radius • Over Peregrine Falcon Area Upper Yukon River, MOA floor is no lower than 2,000 feet AGL, 2.0-nautical miles (2.3 miles) either side of the river, from April 15 to September 15 • Seasonal altitude restrictions at Yukon and Charley National WSRs (April 15 to September 15) • Chaff authorized at any time, flares authorized seasonally • Supersonic authorized at or above 5,000 feet AGL or 12,000 feet MSL, whichever is higher
Yukon 4 (N)	• Over Peregrine Falcon Area Upper Yukon and Kandik Rivers, MOA floor is no lower than 2,000 feet AGL, 2.0 nautical miles (2.3 miles) either side of the river, from April 15 to September 15 • Seasonal altitude restrictions at Yukon and Charley National WSRs (April 15 to September 15) • Chaff authorized at any time, flares authorized seasonally • Supersonic authorized at or above 5,000 feet AGL or 12,000 feet MSL, whichever is higher
Yukon 5 (O)	• Chaff authorized at any time, flares authorized seasonally • Supersonic authorized at or above 5,000 feet AGL or 12,000 feet MSL, whichever is higher

Source: 11th Air Force 2015.

All MOAs have an overlying ATCAA with lateral boundaries that normally coincide with the underlying MOA (refer to Figure 2.2-3). The ATCAAs extend from 18,000 feet MSL up to 60,000 feet MSL (designated FL 600) or as stipulated in a Letter of Agreement with the FAA. The combined MOA and ATCAA airspace provide a greater range of altitudes in which military aircraft can conduct the mission activities requiring use of the higher altitudes. Anchorage Air Traffic Control maintains control over this ATCAA airspace and segregates/separates civil and commercial aircraft routed through this airspace from military aircraft. The Restricted Areas support ground or flight activities that could be hazardous to non-participating aircraft such as air-to-ground weapons delivery on range target areas. By definition, a Restricted Area is considered airspace within which the flight of non-participating aircraft, while not wholly prohibited, is subject to restriction. Most Restricted Areas are designated “joint-use” where civilian aircraft may be authorized by the controlling air traffic control facility to operate within this airspace when it is not being used by the military.

The Air Force is proactive in publicizing MOA and Restricted Area times of use through informational pamphlets as well as radio and telephone service known as the SUAIS, to promote public awareness when military operations are in progress. A SUAIS pamphlet, along with the Eielson AFB Midair Collision Avoidance pamphlet, describes the airspace and routings used by military aircraft while operating within both the airfield and JPARC airspace environs. The information provided in these pamphlets, along with radio service and military interactions with the civil aviation community, enhances flight safety for all aviation interests sharing use of the JPARC airspace.

Table 3.2-3 presents historic baseline operations in the northern JPARC airspace. The information is presented in terms of annual operations and the number of daily operations that occur in the busiest month, as of calendar year 2014. These data were used to determine noise levels within the airspace units.

Table 3.2-3. Northern Joint Pacific Alaska Range Complex Airspace Annual Operations

Airspace Unit	*Annual Operations*	*Busiest Month*
Birch MOA	4,672	1,792
Buffalo MOA	4,672	1,722
Delta 1 MOA[1]	2,908	1,146
Delta 2 MOA[1]	3,618	1,146
Delta 3 MOA[1]	3,618	1,146
Delta 4 MOA[1]	3,618	1,146
Delta ATCAA	4,808	1,713
Eielson MOA/ATCAA	7,034	1,862
Fox 1 MOA/ATCAA	7,056	1,860
Fox 2 MOA	6,749	1,860
Fox 3 MOA/ATCAA	6,507	1,822
Paxon ATCAA	4,071	1,721
Yukon 1 MOA/ATCAA	5,568	1,753
Yukon 2 MOA/ATCAA	5,563	1,753
Yukon 3A Low/3 High MOAs/ATCAAs	3,759	1,175
Yukon 3B MOA[1]	3,417	1,169
Yukon 4 MOA/ATCAA	3,447	1,175
Yukon 5 MOA/ATCAA[1]	3,417	1,169
Viper B MOA/ATCAA	5,568	1,870
R-2202A/B/C/D	10,168	1,431
R-2205	6,334	904
R-2211	3,031	454
Blair ATCAA	3,898	1,235

Source: Air Force 2015a.
Note: [1]Operations only during major flying exercises.

Military Training Routes

As mentioned in Section 2.2.2.3, Eielson AFB aircraft occasionally use existing Military Training Routes (MTRs) (see Figure 2.2-7). In the northern portion of JPARC airspace, MTRs were modified to their present configurations in 2008, with the completion of an Environmental Assessment (EA) (611th Air Operations Group 2007), resulting in a Finding of No Significant Impact (FONSI) (611th Air Operations Group 2008). The modifications addressed a number of inefficiencies of the pre-2008 MTRs, including inadequate connectivity to ranges; radio dead spots; routes longer than necessary; areas of frequently poor weather; extensive localized mitigation requirements; and limitations on joint training exercises. There are ten MTRs and each one could be flown up to eight times per day in accordance with the FONSI; however, actual use is considerably less. Aircraft participating in major flying exercises normally use the JPARC MOAs; however, MTRs are used occasionally if no MOA airspace is available. All MTRs are limited to flying at subsonic speeds. Low altitude operations, as low as 100 feet AGL, are permitted both in the day and night as well as under any weather conditions. Most routes are 10 nautical miles wide, capable of supporting both IFR and VFR operations, and can be flown in either direction. The MTR ceilings vary from 1,500 feet AGL to 17,000 feet MSL.

Warning Area

Aircraft based or visiting Eielson AFB occasionally use Warning Area 612 (W612) in the Gulf of Alaska during Northern Edge exercises. The F-35A would use this airspace only on an as needed basis. Other Air Force activities within W-612 were included in the Navy's Gulf of Alaska EIS/Overseas Final EIS on page 2-36, Table 2-5, and in the ROD (U.S. Navy 2011a, b). These documents are incorporated by

reference because the environmental effects of aircraft operations in W-612 were addressed (40 CFR § 1502.21). Further effects analysis of Air Force training activities in W-612 is not required because F-35A operations would be infrequent and within the operational tempo analyzed in the referenced environmental documentation.

Civil Aviation Airspace Use

The 11th Air Force operates the SUAIS to assist civilian, commercial, and bush pilots with flight planning and situational awareness while operating in or near certain JPARC airspace in interior Alaska. The SUAIS provides a means for civil and Air Force pilots to obtain near real-time flight information regarding military training flight activity and ensure safe use while traveling through the airspace. The SUAIS primarily covers the area east of Fairbanks and near Delta Junction in Yukon 1, 2, and 3 MOAs, and in the Birch, Buffalo, and Eielson MOAs. The Air Force also provides service to anyone within current radio range operating near or within R-2202, R-2205, R-2211, and the MTRs in this geographic area.

The SUAIS is available 24 hours a day via direct communication with Eielson Range Control during normal duty hours (typically 9:00 a.m. to 7:00 p.m.) or after hours via recorded broadcast on radio frequency 125.3 or by recorded telephonic message at 1-800-759-8723. Information regarding daily activation times is available in advance by contacting Eielson Range Control at 907-377-3125. The SUAIS information is available from the Joint Base Elmendorf-Richardson at www.jber.af.mil under Alaska Airspace Information.

3.3 ACOUSTIC ENVIRONMENT

3.3.1 Resource Definition

3.3.1.1 *Population Noise Effects*

Sound is a physical phenomenon consisting of minute vibrations that 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. Appendix E presents further detail on noise effects, metrics, modeling, and related information; the following are highlights of the detailed information provided in the appendix.

Noise and sound levels are expressed in logarithmic units of decibels (dB). A sound level of 0 dB is approximately the threshold of human hearing and is barely audible under extremely quiet listening conditions. Normal speech has a sound level of approximately 60 dB; sound levels above 120 dB begin to be felt inside the human ear as discomfort. Sound levels between 130 to 140 dB are felt as pain (Berglund and Lindvall 1995). The minimum change in the sound level of individual events that an average human ear can detect is about 3 dB. 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 sounds have a spectral content, which means their 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 that filters out very low and very high frequencies to replicate human sensitivity. It is common to add the "A" to the measurement unit to identify that the measurement was made with this filtering process, for instance dBA. In this document, the dB unit refers to A-weighted sound levels. "C-weighting" is typically applied to impulsive sounds such as a sonic boom or ordnance detonation and is denoted by the units "dBC."

In accordance with DoD guidelines and standard practice for environmental impact analysis documents, the noise analysis herein applies the A-weighted (and in dB unless specified) noise descriptors or metrics listed in Table 3.3-1.

Table 3.3-1. Noise Metrics and Their Use

Type of Metric	***Metric***			***Analysis***		
	Symbol or Abbreviation	*Description*	*Units**	*Airfield and Vicinity*	*Subsonic Airspace*	*Supersonic Airspace*
Single-Event	L_{max}	Maximum Sound Level	dB	Yes	Yes	-
	N/A	Peak Sound Pressure	Pounds per square foot	-	-	Yes
	SEL	Sound Exposure Level	dB	Yes	-	-
	SEL_r	Sound Exposure Level, rise-time corrected	dB	-	Yes	
	CSEL or L_{CE}	C-weighted SEL	dBC	-	-	Yes
Cumulative - 24 hour	$L_{eq(24)}$	24-hour Equivalent Sound Level	dB	Yes	-	-
	DNL	Day-Night Average Sound Level	dB	Yes	-	-
	CDNL	C-weighted DNL	dBC	-	-	Yes
	L_{dnmr}	Onset-Rate Adjusted Monthly Day-Night Average Sound Level	dB	-	Yes	-
	NA L_{max}	Number of Events At or Above a Specified L_{max} Threshold	Events and dB	-	Yes	-
Cumulative - other	PA (DNL nighttime)	Probability of Awakening	Percent	Yes	-	-
	NA (DNL daytime)	Number of Events At or Above a Specified L_{max} Threshold	Events and dB	Yes	-	-
	NA (8-hour school day)	Number of Events At or Above a Specified L_{max} Threshold	Events and dB	Yes	-	-
	$L_{eq(8)}$	Equivalent Sound Level, 8-hour school day	dB	Yes	-	-
	N/A	Booms per busiest month	Events	No	No	Yes

Legend: N/A = Not Applicable.
Note: All dB are A-weighted unless otherwise specified.

Although the cumulative 24-hour metrics of Day-Night Average Sound Level (DNL) and C-weighted DNL (CDNL) provide a useful indication of overall aircraft noise levels tied to compatibility of land use and are predictors of annoyance, they do not correlate to aircraft noise heard at any given time and are therefore, not intuitively understood. Therefore, along with DNL, the airfield noise analysis evaluates supplemental metrics in accordance with DoD guidelines. These include:

- Speech interference analysis for the DNL daytime period for representative Points of Interest (POIs),
- School-day classroom learning interference analysis for representative school POIs,
- Sleep disturbance analysis for the DNL nighttime period for representative residential POIs,

- Potential for Hearing Loss for on- and off-base receptors, and
- Color-shaded, gradient maps of DNL from 65 dB to 85 dB.

For noise evaluation of subsonic aircraft operations in northern JPARC airspace, both Onset-Rate Adjusted Day-Night Average Sound Level (L_{dnmr}) and supplemental metrics are presented. For supersonic aircraft operations, CDNL and the number of booms per busiest month are evaluated.

For the acoustical evaluation, representative Points of Interest (POIs) were identified around the installation and include both on- and off-base schools, day care locations, places of worship, and residential areas. These POIs were chosen to represent locations that could potentially be exposed to incompatible noise levels generated by aircraft operations at the base. For the airspace acoustical evaluation, POIs including airports/airstrips, national wildlife refuges, conservation areas, Wild and Scenic Rivers (WSRs), and towns were identified to assess cumulative noise exposure within the vicinity of the POI. All points were derived from Google Earth satellite imagery and verified by base personnel. Parks (including recreational and wildlife areas) are indicated with a "P", schools and day care centers with "S"; residential areas with an "R"; and places of worship with "W".

3.3.1.2 *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.

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.

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 pounds per square foot. 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 pounds per square foot, 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 (see Appendix E). They can be; however, annoying and cause startle reaction in humans and animals. On occasion, sonic booms can cause physical damage (e.g., to a window) if the overpressure is of sufficient magnitude. The condition of the structure is a major factor when damage occurs, the probability of which tends to be low. For example, the probability of a 1 pound per square foot boom (average pressure in airspace) cracking plaster or breaking a window falls in the range of 1 in 10 thousand 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. As shown in Table 3.3-1, cumulative exposure to impulsive sound events such as sonic booms is measured in terms of CDNL for annual average daily supersonic operations. CDNL of 62 dB, 65 dB, and 69 dB can be expected to result in about 12, 22, and 37 percent of the population affected, potentially causing high annoyance (Committee on Hearing, Bioacoustics, and Biomechanics 1981).

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 and include evaluation of speech interference, classroom learning interference, recreational interference, sleep disturbance, potential for hearing loss, and workplace noise. Appendix E.2 provides further detail on these supplemental analyses for noise effects.

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 (L) during a specified period of time. Combined with the selected threshold, the metric is denoted NAL. The threshold can be either Sound Exposure Level (SEL) or Maximum Sound Level (L_{max}), and it is important that this selection is shown in the nomenclature. When labeling a contour line or POI, (NA) a Threshold Level (NAL) is followed by the number of events in parentheses. For example, where 10 events exceed an SEL of 90 dB over a given period of time, the nomenclature would be NA90SEL(10). Similarly, for L_{max} it would be written as NA90L_{max}(10). 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.

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 (7:00 a.m. to 10:00 p.m.) with open and closed windows. This measure also accounts for 17 dB or 27 dB noise attenuation that is provided by buildings such as houses and schools in cold climates, with windows open (17 dB attenuation) or closed (27 dB attenuation) (Federal Interagency Committee on Noise 1992). Since modeling accounts for outdoor noise levels only, these data are represented as NA77L_{max} (windows closed) and NA67L_{max} (windows open). NA means "number of events above", so this analysis examines the number of annual average daily overflight events where L_{max} would be greater than or equal to 67 dB and 77 dB.

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 8-hour Equivalent Noise Level ($L_{eq(8)}$) of 35 to 40 dB and a limit on single events of 50 dB L_{max}. The 35 dB $L_{eq(8)}$ equates to an outdoor L_{eq} of 62 dB with windows closed. The 50 dB L_{max} for single events, equates to an outdoor L_{max} of 67 dB and 77 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 67 dB and 77 dB, serves as the measure of potential classroom effects and are presented as NA67 L_{max} and NA77 L_{max} for windows open and closed, respectively, on a per-hour basis. Because classrooms are in use during the day predominantly, these criteria are applied for annual average daily aircraft operations occurring over an 8-hour period between 8:00 a.m. and 4:00 p.m., rather than for a 15-hour period between 7:00 a.m. and 10:00 p.m. for standard speech interference.

Recreational Interference Events. For recreational areas, 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).

Sleep Disturbance. Sleep disturbance is a concern for communities exposed to nighttime noise. Sleep, or the lack of quality sleep, has the potential to affect health and concentration, although the relationship between noise levels and sleep disturbance is complex and not fully understood. To assess the potential for sleep disturbance, the analysis uses SEL as the metric and calculates the probability of being awakened at least once from annual average daily overflights occurring between 10:00 p.m. and 7:00 a.m., when most people sleep. The SEL from each overflight is based on the particular type of aircraft, flight track, power setting, speed, and altitude relative to the residential receptor. The analysis also accounts for standard building attenuation of 17 dB with windows open and 27 dB with windows closed. When summed, the probability of being awakened for a given location is determined.

Potential for Hearing Loss. As 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 (Undersecretary of Defense for Acquisition Technology and Logistics 2009). The U.S. Environmental Protection Agency's (USEPA's) Guidelines for Noise Impact Analysis quantifies hearing loss risk in terms of Noise-Induced Permanent Threshold Shift, a quantity that defines the permanent change in the threshold level below which a sound cannot be heard. Noise-Induced Permanent Threshold Shift 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.

Workplace Noise. In 1972, the National Institute for Occupational Safety and Health (NIOSH) published a criteria document with a recommended exposure limit of 85 dB as an 8-hour time-weighted average. This exposure limit was reevaluated in 1998 when NIOSH made recommendations that went beyond conserving hearing by focusing on the prevention of occupational hearing loss (NIOSH 1998). Following the reevaluation using a new risk assessment technique, NIOSH published another criteria document in 1998, which reaffirmed the 85 dB recommended exposure limit (NIOSH 1998). Active-duty and reserve components of the Air Force, as well as civilian employees and contracted personnel working on Air Force 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*; Air Force Occupational Safety and Health Standard 48-20 (June 2006); and *Occupational Noise and Hearing Conservation Program* (including material derived from the International Standards Organization 1999.2 *Acoustics-Determination of Occupational Noise Exposure and Estimation of Noise Induced Impairment*).

3.3.1.3 *Land Use Noise Effects*

At and around the base, land use categories include residential; commercial; manufacturing; transportation, communication, and utilities; recreation; institutional; mining and extraction; and agriculture and forestry. For the areas under the airspace, land use categories also include special use areas. Special use areas are identified by agencies as being worthy of more rigorous management. These areas can include Wilderness Areas, WSRs, National or State Parks, and National Wildlife Refuges.

In June 1980, an *ad hoc* Federal Interagency Committee on Urban Noise (FICUN) published guidelines (FICUN 1980) relating DNL to compatible land uses. This committee was composed of representatives from DoD; Departments of Transportation and Housing and Urban Development; the USEPA; and the Veterans Administration. Generally, federal agencies have adopted these guidelines for noise analyses. Following the lead of the FICUN, the DoD and FAA adopted the concept of land use compatibility as the accepted measure of aircraft noise effect.

Air Force compatibility guidelines are found in Table 3.3-2, along with the explanatory footnotes. These guidelines are not mandatory rather they are recommendations to provide the best means for determining land use impacts for communities adjacent to bases. These land use compatibility guidelines provide a gauge for assessing impacts around busy airfields. In general, residential land uses, schools, hospitals, and places of worship normally are not compatible with outdoor DNL values of 65 dB or greater. Therefore, the extent of exposure of these sensitive-type receptors to DNL of 65 dB and higher provides the best means for assessing the noise impacts of the proposed action to land uses.

Table 3.3-2. Air Force Land Use Compatibility with DNL

Land Use Categories		*Suggested Land Use Compatibility (dB DNL)*				
SLUCM NO.	*Land Use Name*	*65-69*	*70-74*	*75-79*	*80-84*	*>85*
10	**Residential**					
11	Household units	N[1]	N[1]	N	N	N
11.11	Single units: detached	N[1]	N[1]	N	N	N
11.12	Single units: semidetached	N[1]	N[1]	N	N	N
11.13	Single units: attached row	N[1]	N[1]	N	N	N
11.21	Two units: side-by-side	N[1]	N[1]	N	N	N
11.22	Two units: one above the other	N[1]	N[1]	N	N	N
11.31	Apartments: walk-up	N[1]	N[1]	N	N	N
11.32	Apartment: elevator	N[1]	N[1]	N	N	N
12	Group quarters	N[1]	N[1]	N	N	N
13	Residential hotels	N[1]	N[1]	N	N	N
14	Mobile home parks or courts	N	N	N	N	N
15	Transient lodgings	N[1]	N[1]	N[1]	N	N
16	Other residential	N[1]	N[1]	N	N	N
20	**Manufacturing**					
21	Food and kindred products; manufacturing	Y	Y[2]	Y[3]	Y[4]	N
22	Textile mill products; manufacturing	Y	Y[2]	Y[3]	Y[4]	N
23	Apparel and other finished products; products made from fabrics, leather, and similar materials; manufacturing	Y	Y[2]	Y[3]	Y[4]	N
24	Lumber and wood products (except furniture); manufacturing	Y	Y[2]	Y[3]	Y[4]	N
25	Furniture and fixtures; manufacturing	Y	Y[2]	Y[3]	Y[4]	N
26	Paper and allied products; manufacturing	Y	Y[2]	Y[3]	Y[4]	N
27	Printing, publishing, and allied industries	Y	Y[2]	Y[3]	Y[4]	N
28	Chemicals and allied products; manufacturing	Y	Y[2]	Y[3]	Y[4]	N
29	Petroleum refining and related industries	Y	Y[2]	Y[3]	Y[4]	N
30	**Manufacturing**					
31	Rubber and misc. plastic products; manufacturing	Y	Y[2]	Y[3]	Y[4]	N
32	Stone, clay and glass products; manufacturing	Y	Y[2]	Y[3]	Y[4]	N
33	Primary metal products; manufacturing	Y	Y[2]	Y[3]	Y[4]	N
34	Fabricated metal products; manufacturing	Y	Y[2]	Y[3]	Y[4]	N
35	Professional scientific, and controlling instruments; photographic and optical goods; watches and clocks	Y	25	30	N	N
39	Miscellaneous manufacturing	Y	Y[2]	Y[3]	Y[4]	N
40	**Transportation, Communication, and Utilities**					
41	Railroad, rapid rail transit, and street railway transportation	Y	Y[2]	Y[3]	Y[4]	N
42	Motor vehicle transportation	Y	Y[2]	Y [3]	Y[4]	N
43	Aircraft transportation	Y	Y[2]	Y[3]	Y[4]	N
44	Marine craft transportation	Y	Y[2]	Y[3]	Y[4]	N
45	Highway and street right-of-way	Y	Y	Y	Y	N
46	Automobile parking	Y	Y	Y	Y	N
47	Communication	Y	25[5]	30[5]	N	N
48	Utilities	Y	Y[2]	Y[3]	Y[4]	N
49	Other transportation, communication and utilities	Y	25[5]	30[5]	N	N
50	**Trade**					
51	Wholesale trade	Y	Y[2]	Y[3]	Y[4]	N
52	Retail trade – building materials, hardware and farm equipment	Y	25	30	Y[4]	N
53	Retail trade – including shopping centers, discount clubs, home improvement stores, electronics superstores, etc.	Y	25	30	N	N
54	Retail trade – food	Y	25	30	N	N
55	Retail trade – automotive, marine craft, aircraft and accessories	Y	25	30	N	N
56	Retail trade – apparel and accessories	Y	25	30	N	N
57	Retail trade – furniture, home, furnishings and equipment	Y	25	30	N	N
58	Retail trade – eating and drinking establishments	Y	25	30	N	N
59	Other retail trade	Y	25	30	N	N
60	**Services**					
61	Finance, insurance and real estate services	Y	25	30	N	N
62	Personal services	Y	25	30	N	N
62.4	Cemeteries	Y	Y[2]	Y[3]	Y[4,11]	Y[6,11]
63	Business services	Y	25	30	N	N
63.7	Warehousing and storage	Y	Y[2]	Y[3]	Y[4]	N
64	Repair services	Y	Y[2]	Y[3]	Y[4]	N
65	Professional services	Y	25	30	N	N
65.1	Hospitals, other medical facilities	25	30	N	N	N

Table 3.3-2. Air Force Land Use Compatibility with DNL

Land Use Categories		***Suggested Land Use Compatibility (dB DNL)***				
SLUCM NO.	*Land Use Name*	*65-69*	*70-74*	*75-79*	*80-84*	*>85*
65.16	Nursing homes	N[1]	N[1]	N	N	N
66	Contract construction services	Y	25	30	N	N
67	Government services	Y[1]	25	30	N	N
68	Educational services	25	30	N	N	N
68.1	Child care services, child development centers, and nurseries	25	30	N	N	N
69	Miscellaneous Services	Y	25	30	N	N
69.1	Religious activities (including places of worship)	Y	25	30	N	N
70	**Cultural, Entertainment, and Recreational**					
71	Cultural activities	25	30	N	N	N
71.2	Nature exhibits	Y[1]	N	N	N	N
72	Public assembly	Y	N	N	N	N
72.1	Auditoriums, concert halls	25	30	N	N	N
72.11	Outdoor music shells, amphitheaters	N	N	N	N	N
72.2	Outdoor sports arenas, spectator sports	Y[7]	Y[7]	N	N	N
73	Amusements	Y	Y	N	N	N
74	Recreational activities (including golf courses, riding stables, water recreation)	Y	25	30	N	N
75	Resorts and group camps	Y	25	N	N	N
76	Parks	Y	25	N	N	N
79	Other cultural, entertainment and recreation	Y	25	N	N	N
80	**Resource Production and Extraction**					
81	Agriculture (except live- stock)	Y[8]	Y[9]	Y[10]	Y[10,11]	Y[10,11]
81.5-81.7	Agriculture-Livestock farming including grazing and feedlots	Y[8]	Y[9]	N	N	N
82	Agriculture related activities	Y[8]	Y[9]	Y[10]	Y[10,11]	Y[10,11]
83	Forestry activities	Y[8]	Y[9]	Y[10]	Y[10,11]	Y[10,11]
84	Fishing activities	Y	Y	Y	Y	Y
85	Mining activities	Y	Y	Y	Y	Y
89	Other resource production or extraction	Y	Y	Y	Y	Y

Legend:

SLUCM – Standard Land Use Coding Manual, U.S. Department of Transportation.
Y (Yes) – Land use and related structures compatible without restrictions.
N (No) – Land use and related structures are not compatible and should be prohibited.
Y^x – Yes with restrictions. The land use and related structures generally are compatible. However, see note(s) indicated by the superscript.
N^x – No with exceptions. The land use and related structures are generally incompatible. However, see note(s) indicated by the superscript.
25, 30, or 35 – The numbers refer to noise level reduction (NLR) levels. NLR (outdoor to indoor) is achieved through the incorporation of noise attenuation into the design and construction of a structure. Land use and related structures are generally compatible; however, measures to achieve NLR of 25, 30, or 35 must be incorporated into design and construction of structures. However, measures to achieve an overall noise reduction do not necessarily solve noise difficulties outside the structure and additional evaluation is warranted. Also, see notes indicated by superscripts where they appear with one of these numbers.
Ldn – Mathematical symbol for DNL.

Notes:

1. General
   a. Although local conditions regarding the need for housing may require residential use in these zones, residential use is discouraged in DNL 65-69 and strongly discouraged in DNL 70-74. The absence of viable alternative development options should be determined and an evaluation should be conducted locally prior to local approvals indicating that a demonstrated community need for the residential use would not be met if development were prohibited in these zones. Existing residential development is considered as pre-existing, non-conforming land uses.
   b. Where the community determines that these uses must be allowed, measures to achieve outdoor to indoor NLR of at least 25 dB in DNL 65-69 and 30 dB in DNL 70-74 should be incorporated into building codes and be considered in individual approvals; for transient housing, an NLR of at least 35 dB should be incorporated in DNL 75-79.
   c. Normal permanent construction can be expected to provide an NLR of 20 dB, thus the reduction requirements are often stated as 5, 10, or 15 dB over standard construction and normally assume mechanical ventilation, upgraded sound transmission class ratings in windows and doors, and closed windows year round. Additional consideration should be given to modifying NLR levels based on peak noise levels or vibrations.
   d. NLR criteria will not eliminate outdoor noise problems. However, building location, site planning, design, and use of berms and barriers can help mitigate outdoor noise exposure particularly from ground level sources. Measures that reduce noise at a site should be used wherever practical in preference to measures that only protect interior spaces.
2. Measures to achieve NLR of 25 must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas, or where the normal noise level is low.
3. Measures to achieve NLR of 30 must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas, or where the normal noise level is low.
4. Measures to achieve NLR of 35 must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas, or where the normal noise level is low.
5. If project or proposed development is noise sensitive, use indicated NLR; if not, land use is compatible without NLR.
6. Buildings are not permitted.
7. Land use is compatible provided special sound reinforcement systems are installed.
8. Residential buildings require an NLR of 25
9. Residential buildings require an NLR of 30.
10. Residential buildings are not permitted.
11. Land use that involves outdoor activities is not recommended, but if the community allows such activities, hearing protection devices should be worn when noise sources are present. Long-term exposure (multiple hours per day over many years) to high noise levels can cause hearing loss in some unprotected individuals.

3.3.1.4 *Domesticated Animals and Wildlife Noise Effects*

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

Domesticated animal species differ greatly in their responses to noise. Noise effects on domestic animals and wildlife are classified as primary, secondary, and tertiary. Primary effects are direct, physiological changes to the auditory system, and most likely include the masking of auditory signals. Masking is defined as the inability of an individual to hear important environmental signals that may arise from mates, predators, or prey. 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.

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 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. See Appendix E, Section E.2.14 for more detail on noise effects to domesticated animals and wildlife.

3.3.2 Affected Environment

The affected environment is the area exposed to aircraft-generated noise both on and off base. Many components of the Proposed Action may generate noise and warrant analysis. The predominant noise sources consist of aircraft operations, both at and around the base, as well as in northern JPARC airspace. Other components such as construction, aerospace ground equipment, and vehicle traffic would produce noise, but such noise would be transitory and contribute negligibly to the overall noise environment. For airspace operations, the affected environment is inclusive of northern JPARC airspace. As mentioned earlier, aircraft from Eielson AFB operate in other JPARC airspace on an as needed, infrequent basis and have been evaluated in existing NEPA documentation: the F-22 Plus-Up EA Joint Base Elmendorf-Richardson (11th Air Force 2011).

3.3.2.1 *Base*

At Eielson AFB, quiet hours are in effect for all aircraft operations between 10:00 p.m. and 6:00 a.m. local time (354 FW 2013). No closed pattern work (e.g., low approaches) occurs during quiet hours, and all arrivals must use a straight-in approach for landing. For noise abatement and safety reasons, all aircraft taking off and landing at Eielson AFB avoid overflying base housing and populated areas of Moose Creek, Fort Wainwright, and Fairbanks below 3,500 feet AGL. Please note that noise analysis applies a 10-dB penalty for aircraft operations that occur between the hours of 10:00 p.m. and 7:00 a.m., or what is called environmental nighttime. Runway 32 is the preferred runway for arrivals during quiet hours. Noise complaints may be lodged by calling 1-800-JETNOIS, the 354 Fighter Wing Public Affairs Office at 907-377-2116, the 11th Air Force Public Affairs Office at 1-800-538-6647, or the 3rd Wing Public Affairs Office at 907-552-5756. When complaints are received, they are logged, and information

is collected concerning the date, time, and location of the complaint. The complaint is then analyzed by reviewing the information with Air Traffic Control and Range Control to determine if there is a correlation between operations out of Eielson AFB (or Joint Base Elmendorf-Richardson) and the geographic area. During Fiscal Year 2014 (FY14), the 354 FW Public Affairs Office received over 70 noise complaints. The majority of complaints coincided with major flying exercises and was primarily from residents underlying the Delta MOAs.

The sound environment near Eielson AFB is dominated by military aircraft noise including based F-16C/D, KC-135R, and HH-60s as well as many types of transient aircraft. Table 3.3-3 presents annual operations, based on calendar year 2014 data, broken down into environmental day and night hours. Noise exposure reflecting annual average daily aircraft operations is shown in Figure 3.3-1. Representative POIs on or near Eielson AFB were chosen to identify locations that could potentially be exposed to aircraft-generated noise.

Table 3.3-3. Baseline Airfield Annual Operations

Aircraft	*Environmental Day (7:00 a.m. – 10:00 p.m.)*	*Environmental Night (10:00 p.m. – 7:00 a.m.)*	*Total*
Based	16,029	1,400	17,429
Transient	1,468	66	1,534
Total	**17,497**	**1,466**	**18,963**

As identified in Table 3.3-4, DNL greater than or equal to 65 dB occurs primarily (or about 99 percent), on DoD-owned land affecting 3,367 acres, about 660 military personnel living in dormitories on the east side of the runway, and no households. Off base, there are nearly 19 acres of land exposed to DNL between 65 and 70 dB, to the west; one household to the north; and based on census data and a household multiplier, an estimated three people. Because of the operations numbers, the period of day in which they occur, and their single-event sound level, departures of based F-16 aircraft and the arrival portion of based KC-135R pattern operations contribute the most to the DNL, north of the base. Transient heavy cargo (e.g., C-5) aircraft arrivals contribute the most to the DNL south of the base.

Table 3.3-4. Baseline On- and Off-Base Noise Exposure

Band of DNL (dB)	*Acreage*	*Estimated Population*	*Households*
On Base			
65 – 70	1,796	660[1]	0
70 – 75	745	0	0
75 – 80	369	0	0
80 – 85	260	0	0
85+	197	0	0
Total	**3,367**	**660[1]**	**0**
Off Base			
65 – 70	18.7	3	1
70 – 75	0	0	0
75 – 80	0	0	0
80 – 85	0	0	0
85+	0	0	0
Total	**18.7**	**3**	**1**

Note: [1]Population residing in the base dormitories.

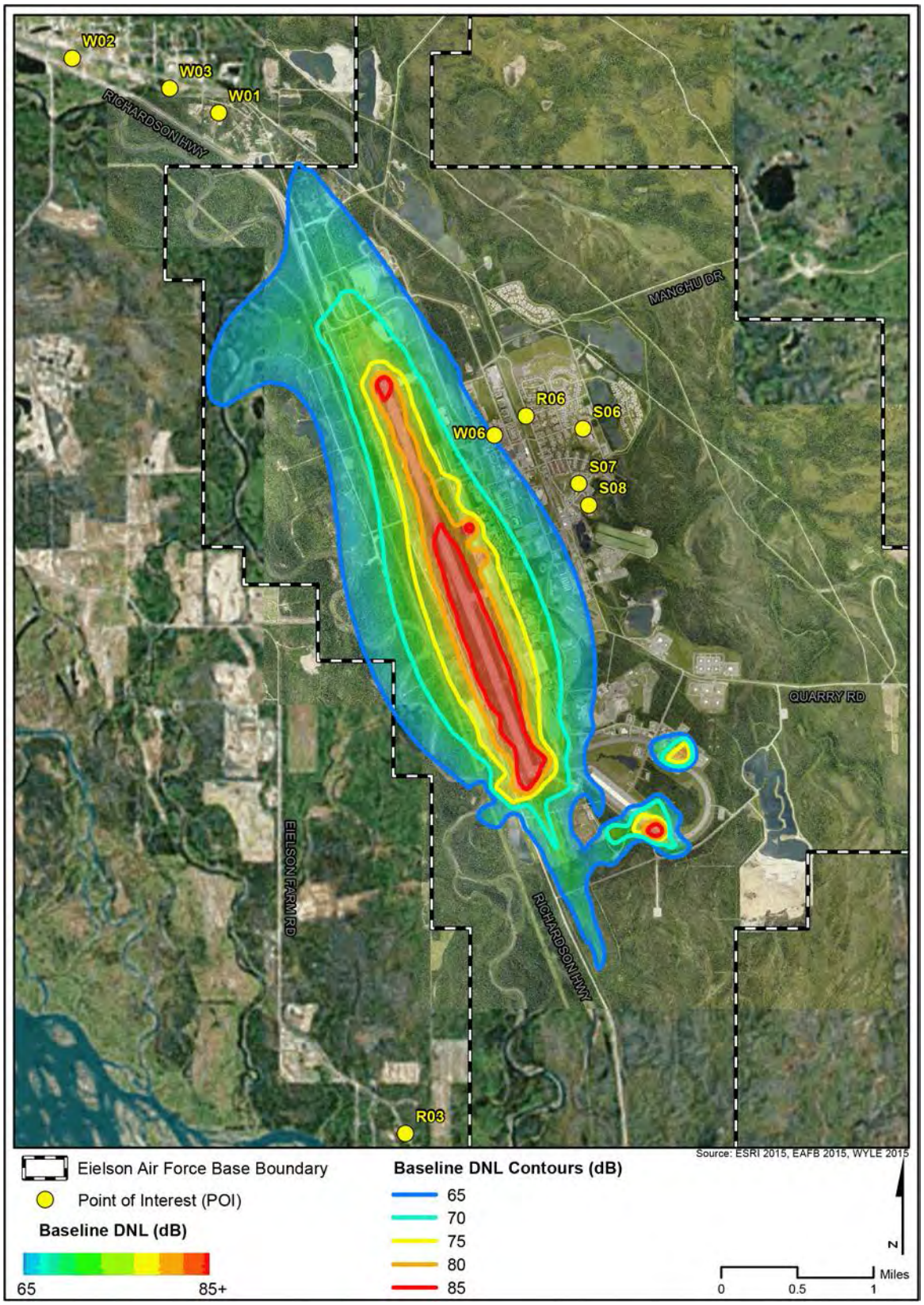


Figure 3.3-1. Baseline DNL Contours for Annual Average Daily Aircraft Operations

Figure 3.3-2 illustrates the altitude of selected aircraft as they pass over the northern base boundary. Figure 3.3-3 provides an estimation of the SEL and L_{max} values for based and visiting aircraft that predominate the noise generated from the base. Departing to the north, the F-16C, at approximately 2,000 feet AGL when crossing the northern boundary of the base, exhibits the greatest SEL and L_{max} values of the aircraft shown. Arriving from the south and descending through 1,000 feet AGL, the heavy cargo-type aircraft (represented by the C-5A) exhibits the greatest SEL and L_{max} values of the aircraft shown.

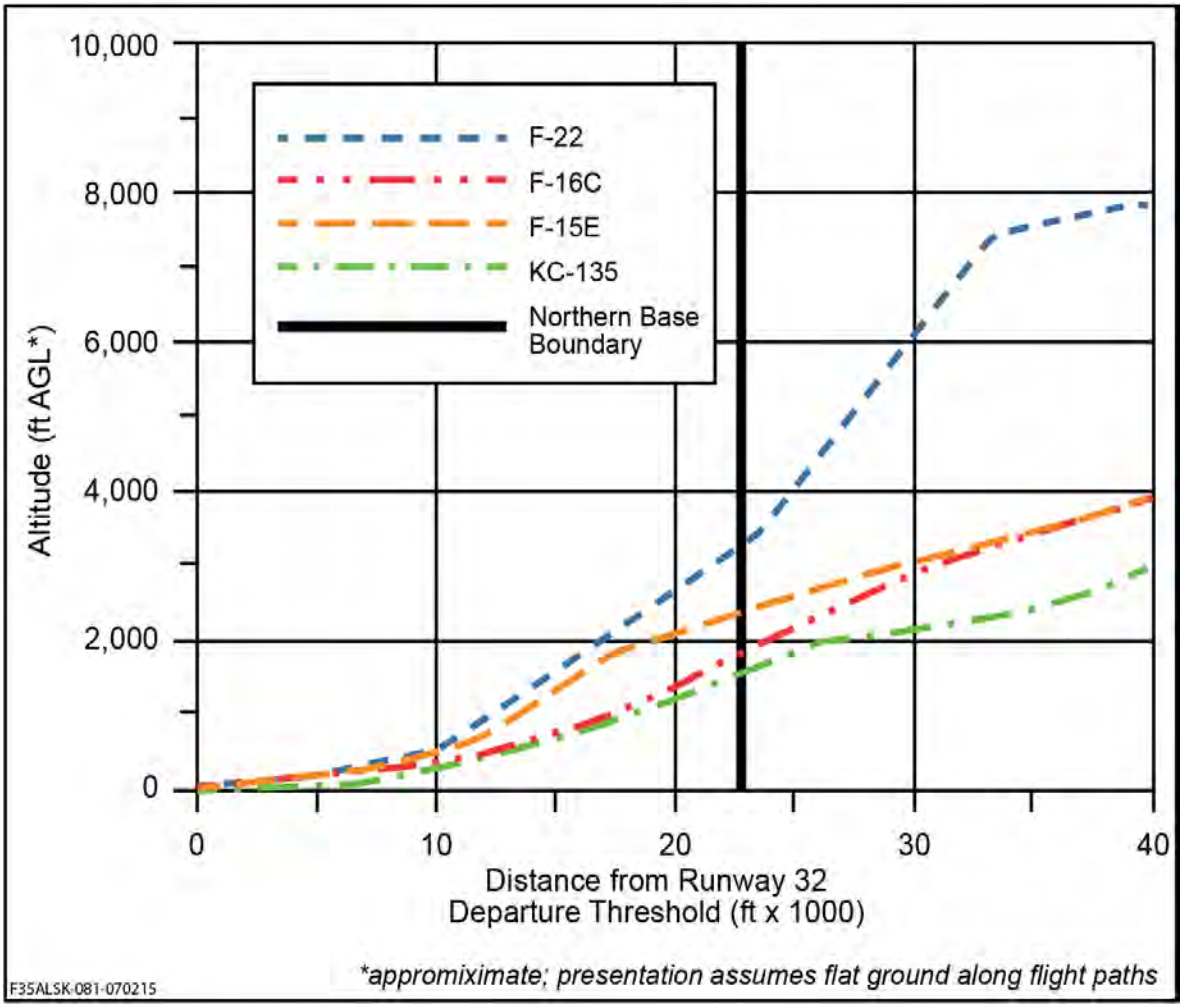


Figure 3.3-2. Altitude Profiles for Representative Departures from Runway 32 for Based and Transient Aircraft at Eielson AFB

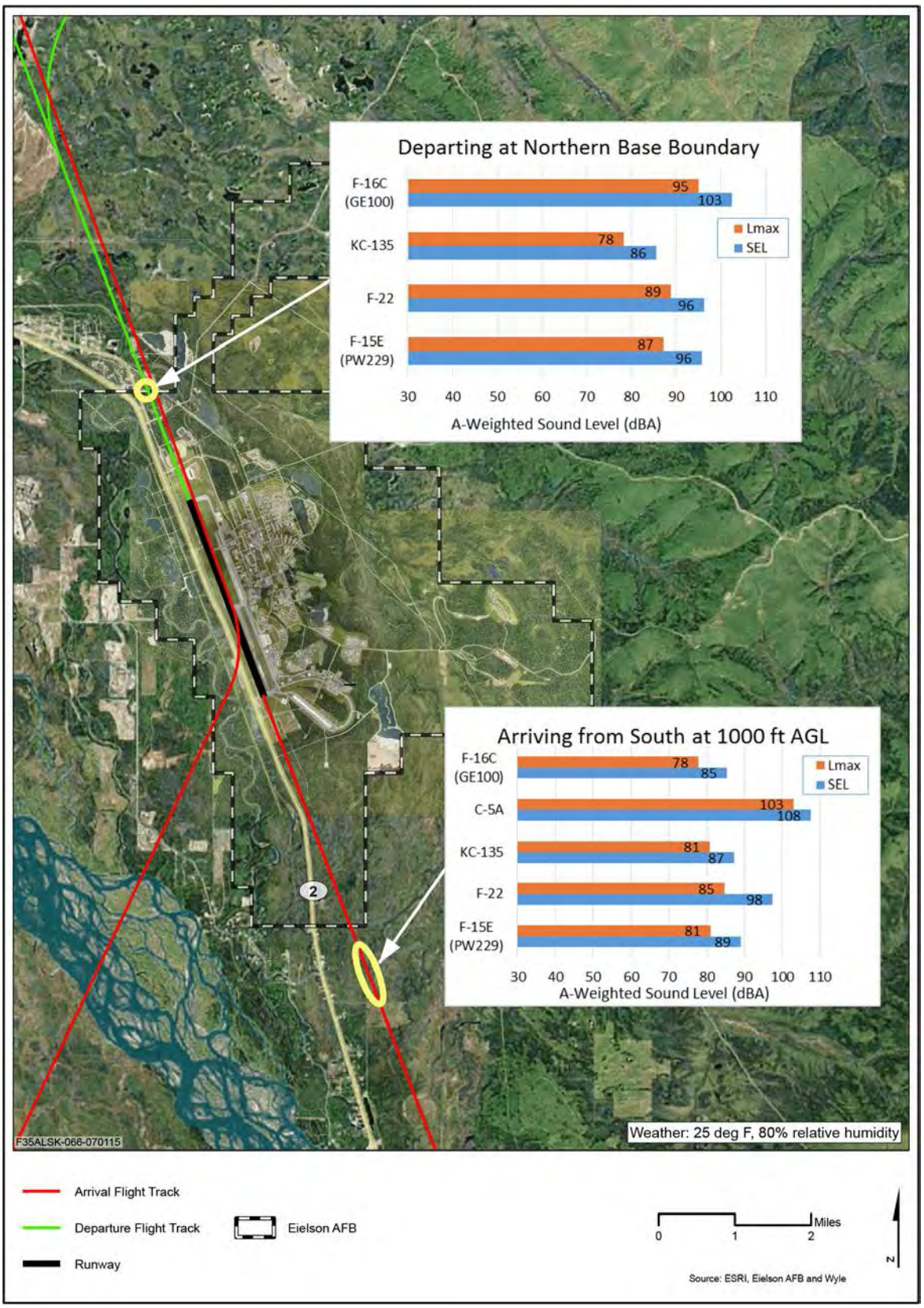


Figure 3.3-3. L_{max} and SEL for Representative Aircraft Operating at Eielson AFB

Population

Baseline aircraft DNLs for representative POIs on or near Eielson AFB are identified in Figure 3.3-4 and listed in Table 3.3-5. With the exception of the Eielson AFB Chapel and the on-base dormitories, no other POI is exposed to DNL greater than or equal to 65 dB.

Table 3.3-5. Baseline DNL for Representative POIs On and Off Base

Type	*ID*	*Point of Interest*	*On Base?*	*DNL (dB)*
Park (includes recreation and wildlife)	P01	Salcha River State Recreation	No	<45
	P02	Harding Lake		<45
	P04	Tanana Valley State Forest		<45
	P05	Chena Lakes		46
Residential	R01	Tare Nike Missile Site		47
	R02	6615-6647 Richardson Highway		46
	R03	Old Valdez Trail		48
	R06	Eielson AFB Housing Area	Yes	62
School/ Day Care	S01	North Pole Elementary School/Eagle Wings Assisted Living	No	<45
	S02	North Pole Middle School		<45
	S03	Association of Village Council Presidents Head Start		<45
	S04	Loving Learning Day Care		46
	S05	Salcha Elementary		<45
	S06	Anderson Elementary School/Child Development Center	Yes	59
	S07	Ben Eielson Junior/Senior High School		61
	S08	Crawford Elementary School		61
Place of Worship/ Residential	W01	Moose Creek Baptist Church	No	61
	W02	Pioneer Baptist Church		55
	W03	Church of Christ		59
	W04	Lord of Life Lutheran Church		<45
	W05	North Pole Missionary Chapel		<45
	W06	Base Chapel/Base Dorms	Yes	65

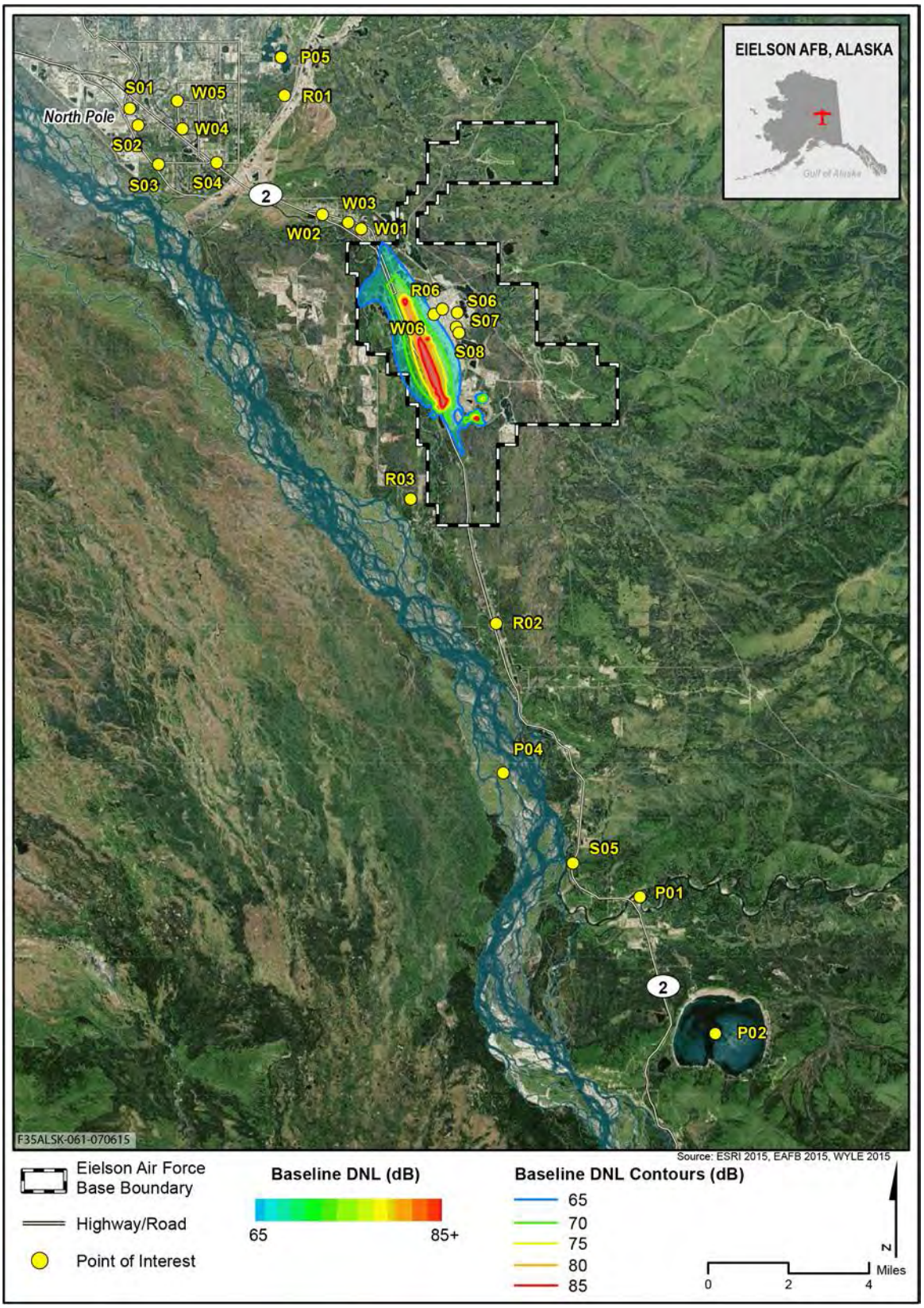


Figure 3.3-4. Baseline Representative POIs On and Off Base

Speech Interference. Daytime speech interference for normal conversation comprises another indicator of noise effects. Table 3.3-6 presents the indoor speech interference under baseline conditions. Across the POIs, data reveal that speech interference events average about one per hour for windows closed. With windows open, events range from one to two per hour.

Table 3.3-6. Baseline Indoor Speech Interference at Representative POIs On and Off Base

Description				***Average Daily Indoor Daytime (7:00 a.m. to 10:00 p.m.) Events per Hour[1]***	
Type	*ID*	*Point of Interest*	*On Base?*	*Windows Closed*	*Windows Open*
Residential	R01	Tare Nike Missile Site	No	-	-
	R02	6615-6647 Richardson Highway		-	-
	R03	Old Valdez Trail		1	1
	R06	Eielson AFB Housing Area	Yes	1	1
School/ Day Care	S01	North Pole Elementary School/Eagle Wings Assisted Living	No	-	-
	S02	North Pole Middle School		-	-
	S03	Association of Village Council Presidents Head Start		-	-
	S04	Loving Learning Day Care		1	-
	S05	Salcha Elementary		-	-
	S06	Anderson Elementary School/Child Development Center	Yes	1	1
	S07	Ben Eielson Junior/Senior High School		1	1
	S08	Crawford Elementary School		1	1
Place of Worship/ Residential	W01	Moose Creek Baptist Church	No	1	1
	W02	Pioneer Baptist Church		1	1
	W03	Church of Christ		1	1
	W04	Lord of Life Lutheran Church		-	-
	W05	North Pole Missionary Chapel		-	-
	W06	Base Chapel/Base Dorms	Yes	1	2

Note: [1]With an indoor maximum sound level of at least 50 dB, assumes 17 dB and 27 dB of noise level reduction for windows open and closed, respectively.

Classroom Learning Interference. For schools, aircraft noise events can disrupt classroom learning. Table 3.3-7 presents baseline conditions of classroom learning interference for schools on and off base. None of the off-base schools experience noise that exceeds an outdoor equivalent sound level of 62 dB L_{eq} over an 8-hour period [$L_{eq(8h)}$]. The three on-base schools are exposed to $L_{eq(8h)}$ greater than 62 dB and likely have up to one disruption per hour, on average, with windows open or closed.

Table 3.3-7. Baseline Classroom Learning Interference for Schools On or Near Eielson AFB

Description			***Outdoor $L_{eq(8h)}$ (dB)***	***Indoor***			
				Windows Open		*Windows Closed*	
ID	*Point of Interest*	*On Base?*		$L_{eq(8h)}$ (dB)	Events per Hour[1,2]	$L_{eq(8h)}$ (dB)	Events per Hour[1,2]
S01	North Pole Elementary School/Eagle Wings Assisted Living	No	36	19	-	9	-
S02	North Pole Middle School		38	21	-	11	-
S03	Association of Village Council Presidents Head Start		42	25	-	15	-
S04	Loving Learning Day Care		49	32	-	22	-
S05	Salcha Elementary		37	20	-	10	-
S06	Anderson Elementary School/Child Development Center	Yes	63	46	1	36	1
S07	Ben Eielson Junior/Senior High School		65	48	1	38	1
S08	Crawford Elementary School		65	48	1	38	1
Number of sites exceed 1 intrusive event per hour					0		0
Minimum Number intrusive events per hour if exceeding 1					0		0
Maximum Number intrusive events per hour if exceeding 1					0		0

Notes: [1]Number of annual average daily events per hour during 8-hour school day (8:00 a.m. to 4:00 p.m.), at or above an indoor maximum (single event) sound level (L_{max}) of 50 dB; noise level reductions of 17 dB and 27 dB for windows open and closed, respectively.
[2]Does not account for differences between weekday and weekend activity.

Sleep Disturbance. Nighttime sleep disturbance is a concern for communities exposed to nighttime noise. Table 3.3-8 lists the probabilities of indoor awakening from average daily nighttime (10:00 p.m. to 7:00 a.m.) events for residential POI locations. Under baseline conditions, POIs experience over 1,300 annual potential sleep disturbance events. With windows open, there is a 1 to 3 percent probability of awakening. With windows closed, there is a 0.1 to 1.3 percent probability of awakening.

Table 3.3-8. Baseline Indoor Sleep Disturbance Residential POIs On or Near Eielson AFB

Representative Residential Receptor		***Average Nightly (2200-0700) Probability of Awakening (%)****	
ID	*Point of Interest*	*Windows Open*	*Windows Closed*
R01	Tare Nike Missile Site	1.1%	0.1%
R02	6615-6647 Richardson Highway	1.9%	0.1%
R03	Old Valdez Trail	1.4%	0.4%
R06	Eielson AFB Housing Area	2.9%	1.3%

Note: *Assumes 17 dB and 27 dB of noise level reductions for windows open and closed, respectively.

Potential for Hearing Loss. Under baseline conditions, the potential risk for hearing loss is negligible because there are no military or civilian residential areas on or adjacent to Eielson AFB exposed to DNL greater than or equal to 80 dB (see Figure 3.3-1).

Workplace Noise. Per Air Force Occupational Safety and Health Standard 48-20, the Hearing Conservation Program is designed to protect workers from the harmful effects of hazardous noise by

identifying all areas where workers are exposed to hazardous noise. The following are main components of the program and are followed by Eielson AFB:

- Identify noise hazardous areas or sources and ensure these areas are clearly marked.
- Use engineering controls as the primary means of eliminating personnel exposure to potentially hazardous noise. All practical design approaches to reduce noise levels to below hazardous levels by engineering principles shall be explored. Priorities for noise control resources shall be assigned based on the applicable risk assessment code. Where engineering controls are undertaken, the design objective shall be to reduce steady-state levels to below 85 dBA, regardless of personnel exposure time, and to reduce impulse noise levels to below 140 dB peak sound pressure level.
- Ensure workers with an occupational exposure to hazardous noise complete an initial/reference audiogram within 30 days from the date of the workers' initial exposure to hazardous noise.
- Ensure new equipment being considered for purchase has the lowest sound emission levels that are technologically and economically possible and compatible with performance and environmental requirements; 42 USC § 4914, *Public Health and Welfare, Noise Control, Development of Low-Noise Emission Products,* applies.
- Educate and train personnel regarding potentially noise hazardous areas and sources, use and care of hearing protective devices, the effects of noise on hearing, and the Hearing Conservation Program.

Other Noise Sources. Other generators of noise, such as general vehicle traffic, construction, and other maintenance and landscaping activities, are a common occurrence at Eielson AFB. While these sources may contribute to the overall noise environment, the noise they generate does not present any effects to POIs on base nor are they perceptible to off-base POIs.

Non-Auditory Effects. As summarized in Appendix E.2.6, the current state of scientific knowledge cannot yet support inference of a causal or consistent relationship between aircraft noise exposure and non-auditory health consequences for exposed residents. Although some recent studies offer indications, it is not yet possible to establish a quantitative cause and effect based on the currently available scientific evidence.

Land Use Compatibility

Land uses most sensitive to noise typically include residential and commercial areas, public services, and areas associated with cultural and recreational uses. The Fairbanks North Star Borough (FNSB) prepared a Joint Land Use Study in partnership with the Air Force and U.S. Department of the Army to guide land use controls around Eielson AFB and Fort Wainwright to achieve maximum compatibility between military operations and important economic and social growth of the surrounding area. The study identified off-base land use conflicts with military aircraft noise (FNSB 2006). As listed in Table 3.3-9 and depicted in Figure 3.3-5, the majority of the area affected by DNL greater than 65 dB is contained on base; however, 0.4 acres to the north and 18.3 acres to the west (both areas identified by FNSB as general use), experience DNL noise levels between 65 and 70 dB.

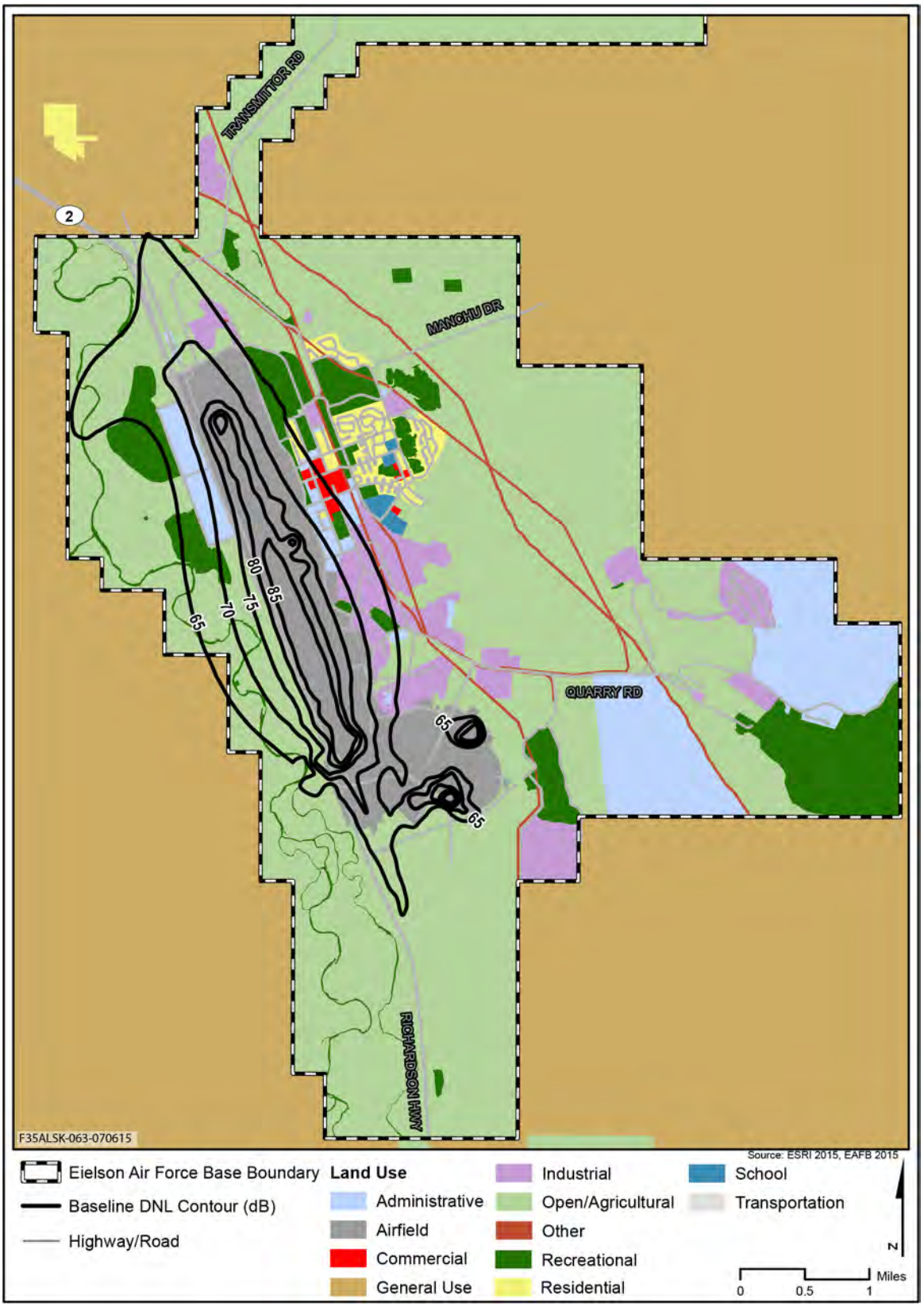


Figure 3.3-5. Eielson AFB Current Land Use

Table 3.3-9. Baseline Land Use Categories Affected by Noise On and Off Eielson AFB (in acres)

Category	*65-70 dB DNL*	*70-75 dB DNL*	*75-80 dB DNL*	*80-85 dB DNL*	*+85 dB DNL*
On Base					
Administrative	167.7	56.6	0	0	0
Airfield	300.3	406.7	259.9	233.0	196.2
Commercial	25.3	0	0	0	0
Industrial	185.9	19.8	0	0	0
Open/Agriculture	796.7	201.5	92.6	7.5	0.1
Other	11.2	20.5	13.3	12.4	0
Recreational	255.4	23.5	0	0	0
Residential	11.8	0	0	0	0
School	0	0	0	0	0
Transportation	42.1	16.7	3.1	6.7	0.3
Off Base					
General Use	18.7	0	0	0	0
Total	**1,815.1**	**745.3**	**368.9**	**259.6**	**196.6**

Domesticated Animals and Wildlife

Domesticated animals at and around the base potentially affected by aircraft-generated noise include dogs, cats, and livestock. The Eielson Integrated Natural Resources Management Plan (INRMP) identifies a wide variety of wildlife species, which may be found on the installation (see Section 3.10.2.1). The Tanana Valley (including the base and adjacent communities) provides habitat for year-round resident bird species, as well as, summer breeding habitat for a variety of migratory bird species. Animals exhibit a wide variety of responses to noise and, consequently, some species may be more sensitive than other species and/or may exhibit different forms or intensities of behavioral responses (Appendix E.2.14). The majority of the literature suggests that domesticated animal species (cows, horses, chickens) and wildlife species exhibit adaptation, acclimation, and habituation after repeated exposure to jet aircraft noise. Based on the variety of birds struck by military aircraft and the number of moose and other mammals that have to be removed from around the flight line (Section 3.5.2.1), birds and other wildlife appear to have habituated to the current noise levels on Eielson.

3.3.2.2 *Airspace*

In analyzing noise impacts under the northern JPARC airspace, the focus was on identifying noise associated with an average day of the busiest month of aircraft activity. The busiest month occurs during major flying exercises such as Red Flag-Alaska and Northern Edge. These major flying exercises occur 3 to 4 times per year, on average, each lasting around 2 weeks. For the other 44 to 46 weeks of the year, aircraft operations in northern JPARC airspace would be considerably less.

During pilot interviews, the 354 FW F-16 Aggressor pilots stated that during these major flying exercises they primarily fly in what is referred to as the Fight Zone, to a lesser degree in the area named Yukon Large, and aerial refueling in areas named Tanker 1 and Tanker 2 (Figures 3.3-6 and 3.3-7). These flight areas cover most of the northern JPARC airspace. The noise modeled in this section includes both the flight areas identified by the 354 FW and other more frequently used northern JPARC airspace. The modeled JPARC airspace units and derivation of airspace operations are addressed in Appendix E.3. Please note that this approach differs from the methodology used to model noise in the JPARC EIS (Air Force 2013a) and better represents how aircraft actually fly in the airspace during major flying exercises.

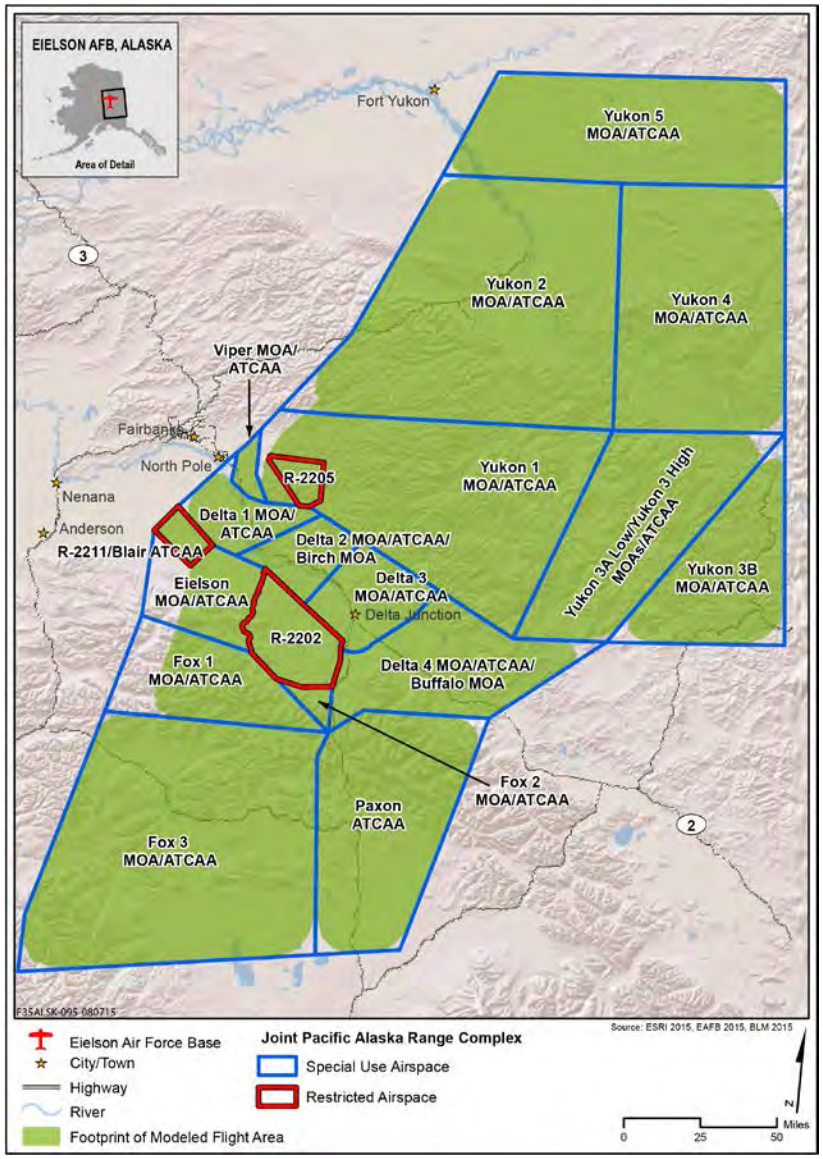


Figure 3.3-6. Northern JPARC Airspace and Modeled Airspace

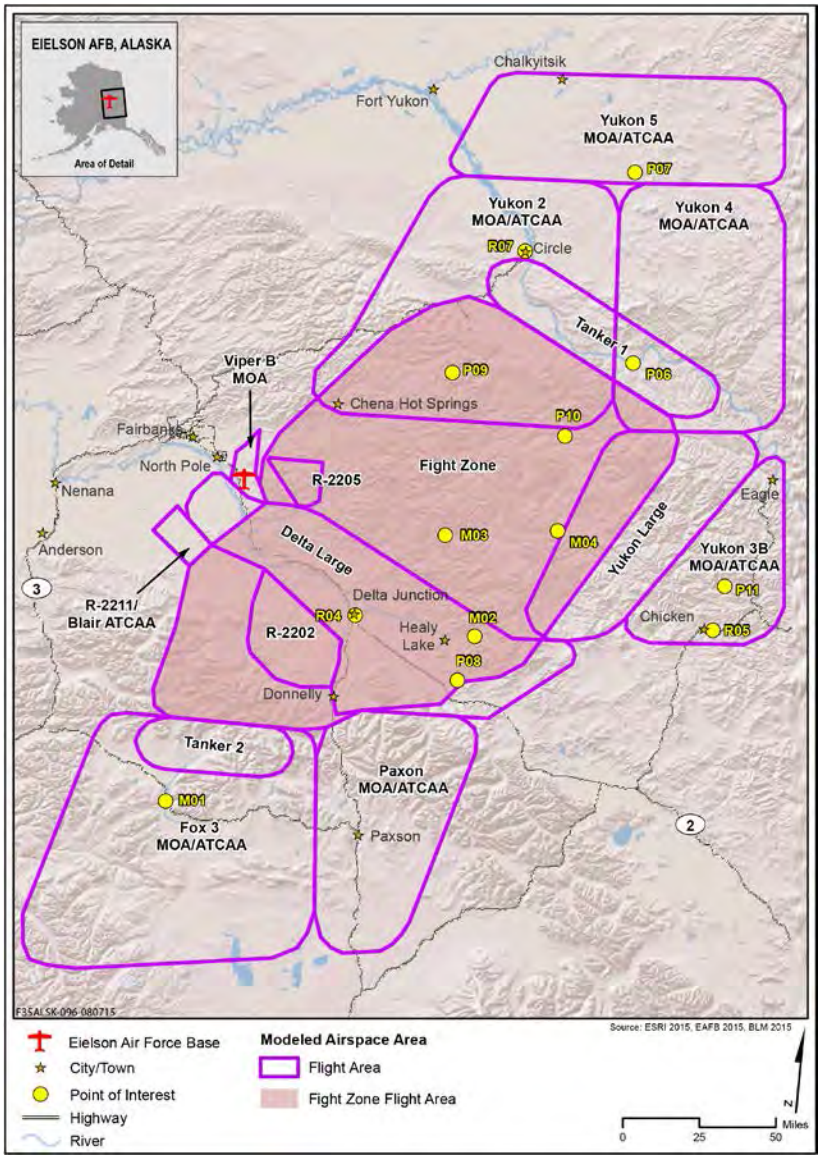


Figure 3.3-7. Baseline Modeled Northern JPARC Airspace and Representative POIs

Population

Subsonic Flight. Subsonic aircraft operations are dispersed and distributed throughout the aforementioned northern JPARC MOAs and ATCAAs. Per the methodology presented in Appendix E, L_{dnmr} and NA were calculated using the DoD's Military Operating Area and Range Noise Model (MR_NMAP) software based on operations counts, time of day of operation, typical aircraft configuration, and typical altitude distribution for each aircraft type. Again, the busiest month was modeled; therefore, the information provided represents conditions that are found during major flying exercises.

The L_{dnmr} and NA of selected values are shown in Table 3.3-10 for northern JPARC airspace. Airspace units where operations occur only on an incidental basis are not listed. Where DNL or L_{dnmr} is less than 45 dB, the noise levels are stated as "<45". All of the modeled airspace has L_{dnmr} less than 65 dB except R-2205 (at 65 dB). Viper B MOA, R-2205, and R-2211 have $NA65L_{max}$ (corresponding to recreational speech interference) of six, one, and one events, respectively. All modeled airspace, except the Yukon MOAs/ATCAAs and Fox 3 MOA/ATCAA, has a $NA35L_{max}$ (corresponding to recreational audibility) of at least one event per busiest month. At 73 events during the busiest month, Viper B MOA has the greatest $NA35L_{max}$ of the modeled flight areas.

Table 3.3-10. Baseline Uniform Distributed L_{dnmr} and Number of Events At or Above Selected Thresholds in Northern JPARC

Airspace Unit	*L_{dnmr} (dB)*	*NA $65L_{max}$ (Busiest Month Events)*	*NA $35L_{max}$ (Busiest Month Events)*
Fight Zone	<45	<1	3
Tanker 1	<45	<1	1
Tanker 2	<45	<1	1
Blair	<45	<1	60
Delta Large	56	<1	2
Viper	52	6	73
Yukon 2	49	<1	<1
Yukon 3B	<45	<1	<1
Yukon 4	46	<1	<1
Yukon 5	<45	<1	<1
Yukon Large	50	<1	<1
Fox 3	<45	<1	<1
Paxon	50	<1	1
R-2202	60	<1	4
R-2205	65	1	9
R-2211	60	1	5

The L_{dnmr} values for representative POIs under the northern JPARC airspace are listed in Table 3.3-11. All POIs experience an L_{dnmr} less than 60 dB. Although not shown in the table, one of the 13 POIs has L_{dnmr} less than 35 dB but this level is at the computational limit of MR_NMAP and thus not depicted.

Table 3.3-11. Baseline L_{dnmr} for Representative POIs below Northern JPARC Airspace

Description		*Point of Interest*	*L_{dnmr} (dB)*
Type	*ID*		
Multi-Use	M01	Denali Highway where it crosses Susitna River	<45
	M02	Healy Lake Airport	58
	M03	Pogo Mine Airstrip	<45
	M04	Joseph Creek	<45
Park (includes recreation and wildlife)	P06	Yukon-Charley Rivers National Preserve	<45
	P07	Yukon Flats National Wildlife Refuge	<45
	P08	Lake George (southeast of Delta Junction)	53
	P09	Steese National Conservation Area/Birch Creek WSR	49
	P10	Charley WSR	<45
	P11	Fortymile WSR	<45
Residential	R04	Delta Junction	53
	R05	Chicken	<45
	R07	Town of Circle	49

Maximum single-event noise levels associated with direct aircraft overflight, which use the northern JPARC airspace the most frequently, are listed in Table 3.3-12. Note the aircraft in the airspace noise analysis are not necessarily identical to the set of aircraft in the airfield noise analysis. At an overflight altitude of 10,000 feet AGL, F-15s have the highest L_{max} (73 dB), with the F-16 and EA-18G aircraft ranked second with an L_{max} of 65 dB. Please note that the light gray in the table indicates the altitude(s) in which the particular aircraft typically operates; some aircraft fly above 25,000 feet AGL.

Table 3.3-12. Maximum Single Event Noise Levels for Aircraft Operating in Northern JPARC Airspace

Data		*Maximum Instantaneous A-weighted Sound Level (L_{max}) for Aircraft Type*							
		A-10[1]	*F-15C/J*[2]	*F-16*[3]	*F-22*	*EA-18G*[4]	*KC-135R*[5], *E-3, and E-767*	*C-130*[6]	*HH-60*
Speed in Knots:		**325**	**520**	**450**	**350**	**400**	**300**	**170**	**140**
Power Setting:		**5333 NF**	**81% NC**	**87% NC**	**30% ETR**	**84.50% NC**	**89.6% NF**	**970 CTIT**	**N/A**
Overflight Altitude (feet AGL)	500[7]	93	113	107	98	105	94	90	85
	1,000	85	106	100	90	98	87	83	79
	2,000	76	97	91	82	89	79	76	71
	2,500	73	94	88	79	86	77	73	69
	4,000	67	88	82	73	79	72	68	64
	5,000	64	85	78	70	76	69	65	61
	10,000	55	73	65	60	65	60	56	52
	12,500	51	68	61	56	61	56	53	48
	16,000	48	63	55	52	58	52	50	45
	20,000	45	57	50	49	53	49	47	41
	25,000	41	51	44	44	49	44	44	37

Legend: NF=Maximum Fan Speed; NC=Maximum Engine Core Revolution; ETR=Engine Thrust Request; CTIT=Turbine Intake Temperature in Celsius.
Notes: [1]A-10 modeled as A-10A.
[2]F-15C and F-15J modeled as F-15A.
[3]F-16 modeled as F-16A.
[4]EA-18G modeled as F-18E/F.
[5]E-3 and E767 modeled as KC-135R.
[6]HC-130 modeled as C-130.
[7]Typical altitudes for each aircraft are shaded in gray; some may fly higher than 25,000 feet AGL.

Supersonic Flight. The majority of supersonic flight in northern JPARC airspace is conducted by F-22s based at Joint Base Elmendorf-Richardson, F-16s based at Eielson AFB, and transient F-15 and F-16 aircraft participating in Red Flag-Alaska and other major flying exercises. Supersonic flight is typically conducted as part of air combat training under specific altitude restrictions, but is not authorized below 5,000 feet AGL in any MOA (see Appendix E.1). As listed in Table 3.3-13, at 30,000 feet MSL, the F-15 and F-22 have the greatest sonic boom overpressures of the three aircraft shown, generating 1.9 pounds per square foot.

Table 3.3-13. Baseline Sonic Boom Peak Overpressures (pounds per square foot) for Typical Supersonic Aircraft

Aircraft	***Altitude (feet MSL)***		
	10,000	*20,000*	*30,000*
F-15E	5.4	2.9	1.9
F-22	5.3	2.8	1.9
F-16C	4.4	2.3	1.5

Note: Calculated using CABOOMj for level flight at Mach 1.2; focusing can result in overpressures increased by 2 to 5 times the steady state boom levels; and levels diminish toward 0.1 pounds per square foot as the lateral distance increases.

The analysis for this EIS is based on 1,047 supersonic operations per year. Figure 3.3-8 presents the resulting baseline CDNL. A maximum CDNL of 55 dB occurs in the center of the Fight Zone area, which is within the Delta 1 ATCAA and the Yukon 1 MOA. Because air combat training is typically concentrated near the center of a modeled flight area, the number and intensity of sonic booms is greatest in the center versus areas not directly beneath the center. However, sonic booms may propagate (or spread) horizontally, affecting ground areas beyond the training airspace boundaries.

Contours of the number of sonic booms heard per busiest month are presented in Figure 3.3-9. A maximum of nearly 40 booms per month occur in the center of the Fight Zone area during major flying exercises.

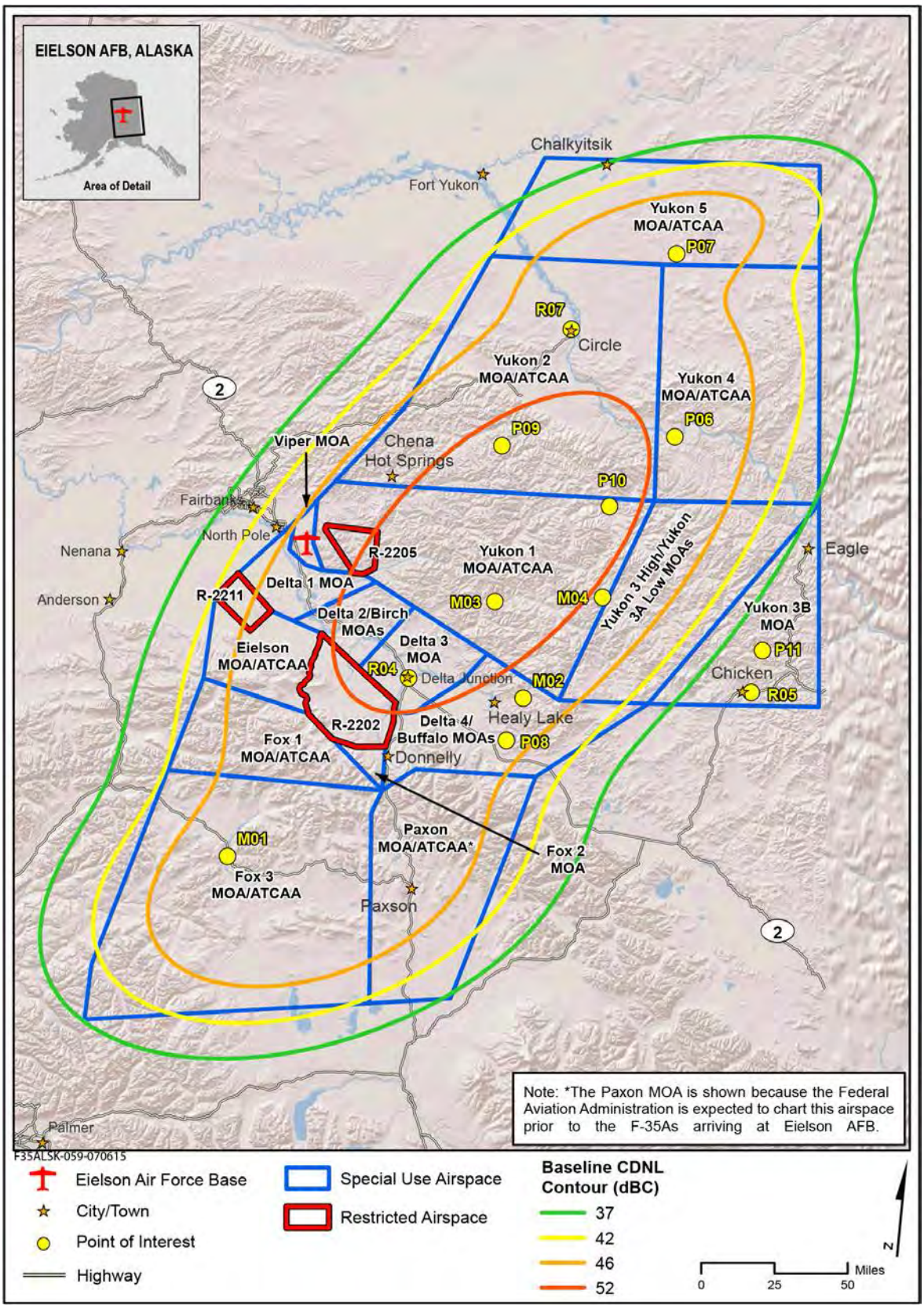


Figure 3.3-8. Baseline CDNL Contours for Supersonic Operations during the Busiest Month

Note: CDNL of 62 dBC is not anticipated.

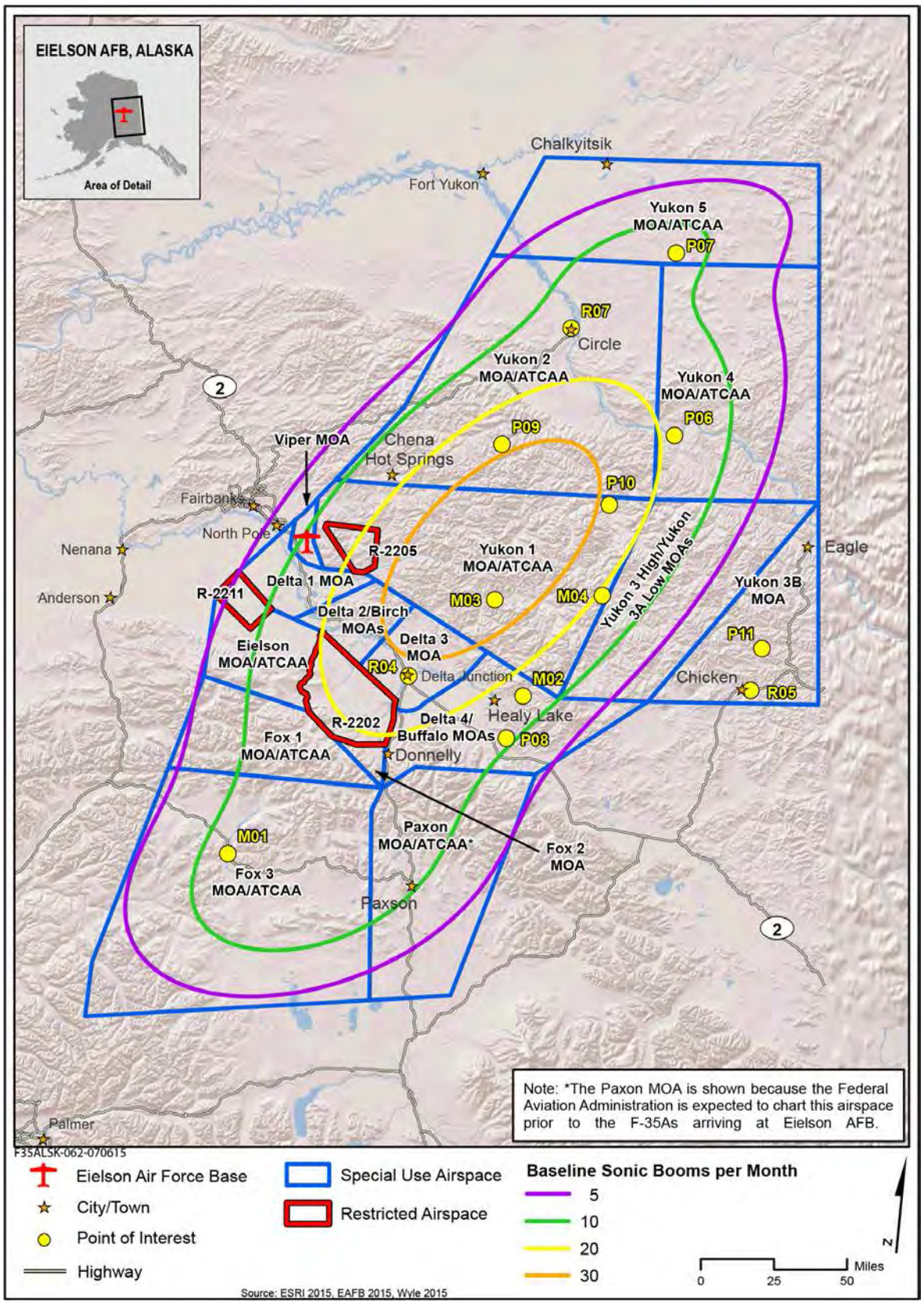


Figure 3.3-9. Baseline Estimated Number of Sonic Booms for the Busiest Month

Land Use Compatibility

Table 3.3-14 presents annual average daily baseline CDNL and estimated number of booms per busiest month in northern JPARC airspace authorized for supersonic operations. Modeling used the busiest month or what can be anticipated during major flying exercises. Under baseline conditions, none of the POIs has CDNL greater than 62 dBC. At 55 dBC, M03 (Pogo Mine Airstrip) has the greatest CDNL and the most sonic booms per busiest month (36).

Table 3.3-14. Baseline Supersonic Noise Exposure and Sonic Booms per Busiest Month in Northern JPARC Airspace

Description		*Point of Interest*	*Location*	*CDNL (dBC)*	*Booms/ Busiest Month*
Type	*ID*				
Multi-Use	M01	Denali Highway where it crosses Susitna River	Fox 3	49	12
	M02	Healy Lake Airport	Delta 4	50	15
	M03	Pogo Mine Airstrip	Yukon 1	55	36
	M04	Joseph Creek	Yukon 1	51	19
Park (includes recreation and wildlife)	P06	Yukon-Charley Rivers National Preserve	Yukon 4	51	18
	P07	Yukon Flats National Wildlife Refuge	Yukon 5	49	11
	P08	Lake George (southeast of Delta Junction)	Delta 4	48	11
	P09	Steese National Conservation Area/ Birch Creek WSR	Yukon 2	53	28
	P10	Charley WSR	Yukon 1	53	28
	P11	Fortymile WSR	Yukon 3B	<42	1
Residential	R04	Delta Junction	Delta 3	53	27
	R05	Chicken	Yukon 3B	<42	1
	R07	Town of Circle	Yukon 2	49	13

Subsonic and Supersonic Flight. As mentioned above, subsonic aircraft operations are dispersed and distributed throughout the northern JPARC MOAs and ATCAAs. Under baseline conditions, during a month of major flying exercises, L_{dnmr} is less than 45 dB at all of the non-park POIs, except the Town of Circle, which has an L_{dnmr} of 47 dB (see Table 3.3-11). None of the non-park POIs has CDNL greater than 62 dBC from supersonic operations. None of the non-park POIs has more than 36 sonic booms per busiest month (Table 3.3-14).

People recreating in special use areas, designated as park POIs, experience L_{dnmr} of 47 dB at Steese National Conservation Area and less than 45 dB L_{dnmr} in other park POIs (see Table 3.3-11). From supersonic flight, the highest CDNL over a park POI is 53 dBC for Steese National Conservation Area and Charley WSR. Booms per busiest month at park POIs range between 1 at Fortymile WSR, to 28 at Steese National Conservation Area and Charley WSR (see Table 3.3-14).

Domesticated Animals and Wildlife

The same types of domesticated animals found in the vicinity of Eielson can also be found underlying northern JPARC airspace. Livestock becomes a larger portion of the total, due to the rural farming nature of portions of the airspace, particularly around Delta Junction. Wildlife species are found in greater variety and abundance under the JPARC airspace than around Eielson AFB, though some are the same (see Section 3.10.2.2). A majority of the literature suggests that domesticated animal species (cows, horses, chickens) and wildlife species exhibit adaptation, acclimation, and habituation after repeated exposure to jet aircraft noise and sonic booms. Aircraft have been flying in JPARC airspace for many decades and both domesticated animals and wildlife species have likely habituated to noise generated by aircraft.

3.4 AIR QUALITY

3.4.1 Resource Definition

3.4.1.1 *Criteria Pollutants*

Air quality is defined by ambient air concentrations of specific pollutants determined by the USEPA to be of concern with respect to the health and welfare of the public. Six major pollutants of concern, called "criteria pollutants," are carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), ozone (O_3), total suspended particulate matter less than or equal to 10 (PM_{10}) and 2.5 ($PM_{2.5}$) micrometers in aerodynamic diameter, and lead (Pb). The USEPA has established National Ambient Air Quality Standards (NAAQS) for these pollutants as shown in Table 3.4-1. Other toxic pollutants include Hazardous Air Pollutants (HAPs).

Table 3.4-1. National Ambient Air Quality Standards

Pollutant		*Primary/Secondary[1, 2]*	*Averaging Time*	*Level[3]*
Carbon Monoxide (CO)		Primary	8-hour	9 ppm (10 mg/m^3)
			1-hour	35 ppm (40 mg/m^3)
Nitrogen Dioxide (NO_2)		Primary	1-hour	100 ppb (188 µg/m^3)
		Primary and Secondary	Annual	53 ppb (100 µg/m^3)
Ozone (O_3)		Primary and Secondary	8-hour	0.075 ppm (147 µg/m^3)
Particulate Pollution	$PM_{2.5}$	Primary	Annual	12 µg/m^3
		Secondary	Annual	15 µg/m^3
		Primary and Secondary	24-hour	35 µg/m^3
	PM_{10}	Primary and Secondary	24-hour	150 µg/m^3
Sulfur Dioxide (SO_2)		Primary	1-hour	75 ppb (105 µg/m^3)
		Secondary	1-hour	0.5 ppm (1,300 µg/m^3)
Lead (Pb)		Primary and Secondary	Rolling 3-month average	0.15 µg/m^3

Source: USEPA 2015.
Legend: mg/m^3=milligrams per cubic meter; µg/m^3=micrograms per cubic meter; and ppm(b)=parts per million (billion).
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.

Ambient air quality refers to the atmospheric concentration of a specific compound pollutant that occurs at a particular geographic location. Ambient air quality concentrations are generally reported as a mass per unit volume (e.g., micrograms per cubic meter [µg/m^3] of air) or as a volume fraction of the air (e.g., parts per million [ppm] by volume). The ambient air quality concentrations at a particular location are determined by the interactions of emissions, meteorology, and chemistry. Emission considerations include the types, amounts, and locations of pollutants emitted into the atmosphere. 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.

Pollutant emissions typically refer to the amount of pollutants or pollutant precursors introduced into the atmosphere by a source or group of sources. Pollutant emissions contribute to the ambient air concentrations of criteria pollutants, either by directly emitting the pollutant in the ambient air (primary pollutants) or by direct emissions interacting in the atmosphere to form criteria pollutants (secondary pollutants).

Secondary pollutants, such as O_3, NO_2, and some particulates, are formed through atmospheric chemical reactions that are influenced by meteorology, ultraviolet light, and other atmospheric processes. PM_{10} and $PM_{2.5}$ are generated as primary pollutants by various mechanical processes (for example, abrasion, erosion, mixing, or atomization) or combustion processes. However, PM_{10} and $PM_{2.5}$ can also be formed as secondary pollutants through chemical reactions or by gaseous pollutants condensing into fine aerosols. In general, for secondary pollutants, the emissions of the compounds that are considered "precursors" to secondary pollutants in the atmosphere are the pollutants for which emissions can be evaluated to control their level in the ambient air. These include reactive organic gases and nitrogen oxides (NO_x), which are precursors to O_3.

3.4.1.2 *Conformity Rule*

The USEPA designates an area as in attainment when it complies with the NAAQS. Areas that violate these ambient air quality standards are designated as nonattainment areas. Areas that have improved air quality from nonattainment to attainment are designated as attainment/maintenance areas. Areas that lack monitoring data to demonstrate attainment or nonattainment status are designated as unclassified and are treated as attainment areas for regulatory purposes. When an area is designated in nonattainment and/or in maintenance, the Clean Air Act (CAA) Section 176(c), General Conformity Rule, is applied. The intent of this rule is to ensure that federal actions do not adversely affect the timely attainment of air quality standards in areas of nonattainment or maintenance. Eielson AFB is in attainment for all criteria pollutants and as such, the conformity rule does not apply to emissions generated at the base. However, some of the flight tracks to and from the base travel through a portion of the nonattainment and maintenance areas below 3,000 feet, and are evaluated herein.

3.4.1.3 *Greenhouse Gas Emissions*

Greenhouse gases (GHGs) are gases that trap heat in the atmosphere. Both natural processes and human activities generate these emissions. The accumulation of GHGs in the atmosphere regulates the earth's temperature. Observations show that warming of the climate is unequivocal. The global warming observed over the past 50 years is thought to be due primarily to human-induced emissions of heat-trapping gases. These emissions come mainly from the burning of fossil fuels (coal, oil, and gas), with important contributions from forest clearing, agricultural practices, and other activities.

To minimize GHG impacts, federal agencies and installations are required to comply with federal climate change policies. Eielson AFB stationary sources operate under 40 CFR § 98, *Mandatory Greenhouse Gas Reporting*. For purposes of this analysis; however, both stationary (e.g., boilers, generators) and mobile (e.g., aircraft and vehicles) sources were evaluated. Greenhouse gas in the form of carbon dioxide equivalent (CO_2(e)) are evaluated in section 3.4.3.1.

3.4.2 Analysis Methodology

Local emissions such as the criteria pollutants have also been quantified. To determine the affected environment for local air quality requires knowledge of: (1) the type of emissions, (2) location(s) of the sources of emissions (for stationary sources) and the horizontal and vertical extent of emissions from mobile sources such as aircraft or automobiles, (3) emission rates of the pollutant sources, (4) the proximity of existing emission sources to those sources associated with the proposed action, and (5) local and regional climate conditions. The affected environment for emissions of inert pollutants (pollutants other than O_3, its precursors, or NO_2) is generally limited to a few miles downwind of the source, while O_3 and NO_2 generally extend much farther downwind.

The Proposed Action Alternative would include new F-35A operations and facility construction and/or modification activities. The assessment of both aircraft and construction-related emissions were mainly conducted through use of the Air Force Air Conformity Applicability Model (ACAM), Version 5 (AFCEC 2014a). Activity data (e.g., aircraft operations, construction projects) were obtained from the Air Force.

Potential effects to air quality also have a vertical dimension because the emissions occur in a volume of air. The vertical dimension depends upon climatic conditions, and is defined from ground level to a certain "mixing height". The mixing height used for calculating emissions, varies by region based on daily temperature changes, amount of sunlight, winds, and other climatic factors. Below the mixing height, in poor dispersion conditions, there can be less mixing of the atmosphere with the airflow stagnating and emissions not as easily dispersed resulting in greater pollution concentrations. Pollutants emitted above the mixing height become diluted in the large volume of air before they are slowly transported to ground level. Emissions released above the mixing height become so widely dispersed before reaching ground level that any potential ground-level effects would be negligible and would not impact ambient air quality. Emissions generated above the mixing height, therefore, are excluded from further analysis.

The quality of air between ground level and 3,000 feet AGL is often used as the mixing height based on historic climatic data and is of most concern to human health per USEPA guidance (USEPA 420-R-92-009 1992), unless otherwise stipulated within a state's implementation plan. A mixing height of 3,000 feet AGL was assumed for this analysis.

The methodology for estimating aircraft emissions involves evaluating the type of activity, the number of hours of operation, the type of engine, and the mode of operation for each type of aircraft. Mobile source emissions include aircraft operations (takeoffs, landings, and low approaches) aerospace ground equipment, maintenance aircraft operations performed with the engines still mounted on the aircraft (engine run-ups and trim checks), as well as other flight operations at the bases, were considered and included. This applied to both based and transient aircraft. Aircraft emissions were calculated based on the following inputs:

- Aircraft emissions were modeled using the Air Force ACAM emission factors.
- Times-in-mode were assessed applying flight profiles used for the noise analysis.
- Flight operations data were the same as those used for the noise analysis.
- Default taxi/idle times from the ACAM model were applied.
- Emissions from aerospace ground equipment, Auxiliary Power Units, and personnel vehicles were assessed using ACAM.

Total emissions under baseline conditions are quantified and compared to the regional emissions.

Hazardous Air Pollutants

In addition to the ambient air quality standards for criteria pollutants, national standards exist for HAPs, which are regulated under Section 112(b) of the 1990 CAA Amendments. The National Emission Standards for Hazardous Air Pollutants regulate 188 HAPs based on available control technologies (USEPA 2010). Some HAPs are associated with diesel and gasoline exhaust. Because these HAPs are emitted from mobile sources, they are called Mobile Source Air Toxics, and include benzene, aldehydes, 1, 3-butadiene, and a class of compounds known as polycyclic aromatic hydrocarbons.

During past environmental documentation, concerns were expressed regarding HAPs generated by military aircraft. In particular, concerns were raised about benzene, which is a major component of gasoline. Increased levels are primarily found at fueling stations and in air emissions from manufacturing plants and hazardous waste sites. Benzene may also be released to the environment by both natural and industrial sources. Emissions of benzene to the atmosphere result from gasoline vapors, auto exhaust, industrial discharges, landfill leachate, underground storage tanks, chemical production and user facilities, tobacco smoke, as well as vapors from products such as glues, paints, furniture wax, and detergents.

According to conclusions drawn from Select Source Materials and Annotated Bibliography on the Topic of HAPs Associated with Aircraft, Airports, and Aviation (FAA 2003), the FAA concluded that:

- Neither aircraft nor airports meet the definitions of the source types that are regulated under Section 112 (*Hazardous Air Pollutants*) of the CAA.
- Emissions from aircraft engines are currently regulated under Section 231 (*Aircraft Emission Standards*) of the federal CAA. Although HAPs are not directly regulated, they are indirectly controlled as elements of total unburned hydrocarbons and particulate matter.
- Airports are characterized under the USEPA National Air Toxics Program as an example of complex facilities that produce aggregates of emissions, including HAPs, from multiple sources.

In addition, the FAA report noted that the most remarkable observations recorded during the testing of aircraft exhaust were:

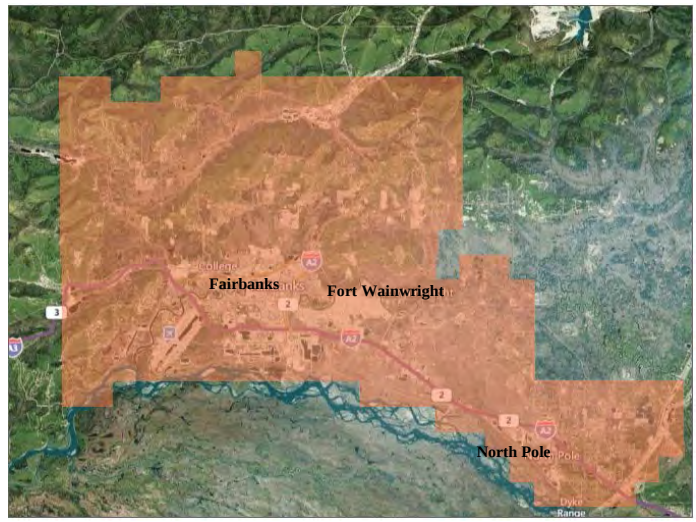
1) the extremely low concentration of HAPs found in aircraft exhaust considering the amounts of fuel burned, the amounts of energy (or thrust) generated, and the amounts of other products of combustion produced;
2) the type and amount of HAP emissions are strongly influenced by the engine load, varying by an order-of-magnitude (or more) from taxi/idle to full takeoff thrust; and
3) that averaging HAP emission factors from different aircraft and for different operating conditions is not considered appropriate, as there is potential for great variation.

For these reasons, available aircraft engine emission factors for HAPs may also not be representative of untested aircraft or the aircraft fleet as a whole (FAA 2003).

For this EIS, HAPs were not evaluated further in the document. This is justified because aircraft emissions of HAPs are unlikely to reach levels considered adverse below the mixing height and would not create health risks to humans living adjacent to airfields or underneath airspace in which these aircraft operate. Further, USEPA HAPs regulations protect drinking water and OSHA standards address employee exposure within the workplace. Existing Air Force regulations and permits require them to follow these USEPA and OSHA standards.

3.4.3 Affected Environment

The affected environment is the area surrounding the base and the adjacent FNSB air district. The district's boundary includes the urbanized areas of Fairbanks, Chena, Ester, Fox, and North Pole but ends northwest of Moose Creek (Figure 3.4-1). This district is in nonattainment for $PM_{2.5}$ and in maintenance for CO. The affected environment for emissions in the airspace, generated by aircraft operating 3,000 feet and below, includes the area underlying northern JPARC airspace.



Source: © Harris Corp, Earthstar Geographics LLC, Earthstar Geographics SIO, © 2015 Microsoft Corporation, © 2015 HERE .

Figure 3.4-1. Fairbanks North Star Borough Air District

3.4.3.1 *Base*

Eielson AFB is located outside of the FNSB nonattainment and maintenance areas. It operates under air quality operating permit number AQ0264TVP02. To provide a basis of comparison and context for the regional air quality found at Eielson AFB, the FNSB and GHG emissions are presented in Table 3.4-2. A second basis for analysis is to compare emissions of the formerly based A-10 aircraft squadrons that were at Eielson AFB and the F-16s. This represents a time when the operational tempo at the base was roughly equivalent to what is proposed. These historic mobile emissions were measured in 2004 and are shown in Table 3.4-3.

Table 3.4-2. Baseline Emissions Inventory for Fairbanks North Star Borough

Criteria Pollutants in Tons per Year					
CO	*NO_x*	*VOCs*	*SO_2*	*PM_{10}*	*$PM_{2.5}$*
341,835	9,821	77,608	5,045	42,076	27,529
Greenhouse Gasses in Metric Tons per Year					
CO_2	*CH_4*	*N_2O*	*CO_2e*		
3,348,627	14,928	28	3,384,024		

Legend: VOC=volatile organic compound; CH_4=methane; N_2O=nitrous oxide; CO_2e=carbon dioxide equivalent.
Source: USEPA 2011.

Table 3.4-3. 2004 Aircraft Criteria Pollutant Emissions

Aircraft	***CO***	***NO_x***	***VOCs***	***SO_2***	***PM_{10}*** [1]
A-10	84.1	14.9	16.0	4.9	20.8
F-16C	119.8	49.4	1.2	3.1	12.7
Total	**203.9**	**64.3**	**17.2**	**8.0**	**33.5**

Note: [1]In 2004, $PM_{2.5}$ measurement was not required by the USEPA.
Source: Air Force Institute for Operational Health 2006.

3.4.3.2 *Airspace*

Aircraft operations generated out of Eielson AFB primarily occur within the northern JPARC airspace, in the interior of Alaska in areas of attainment for all criteria pollutants (see Figure 2.2-3). This airspace is outside the CO maintenance and $PM_{2.5}$ nonattainment areas of the FNSB.

As part of the Prevention of Significant Deterioration (PSD) Regulation, the CAA provides special protection for air quality and air-quality-related values (including visibility and pollutant deposition) in selected areas of the U.S.—national parks greater than 6,000 acres or national wilderness areas greater than 5,000 acres. These Class I areas are areas where any appreciable deterioration of air quality is considered significant. In 1999, the USEPA promulgated a regional haze regulation that requires states to establish goals and emission reduction strategies to make initial improvements in visibility within their respective Class I areas (USEPA 1999). Visibility impairment is defined as: (1) a reduction in the regional visual range and (2) atmospheric discoloration or plume blight. The closest PSD Class I area to the northern JPARC airspace is Denali National Park, which is approximately 15 miles from the Fox 3 MOA. Due to the proximity of the proposed action to a PSD Class I area, this EIS provides an analysis of the potential for proposed activities to affect visibility within this area.

3.5 SAFETY

3.5.1 Resource Definition

The Air Force practices Operational Risk Management as outlined in AFI 90-901 *Operational Risk Management* (Air Force 2011). Requirements outlined in this document provide for a process to maintain readiness in peacetime and achieve success in combat while safeguarding people and resources. The safety analysis contained in the following sections addresses issues related to the health and well-being of both military personnel and civilians living on or near Eielson AFB and under the 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]).

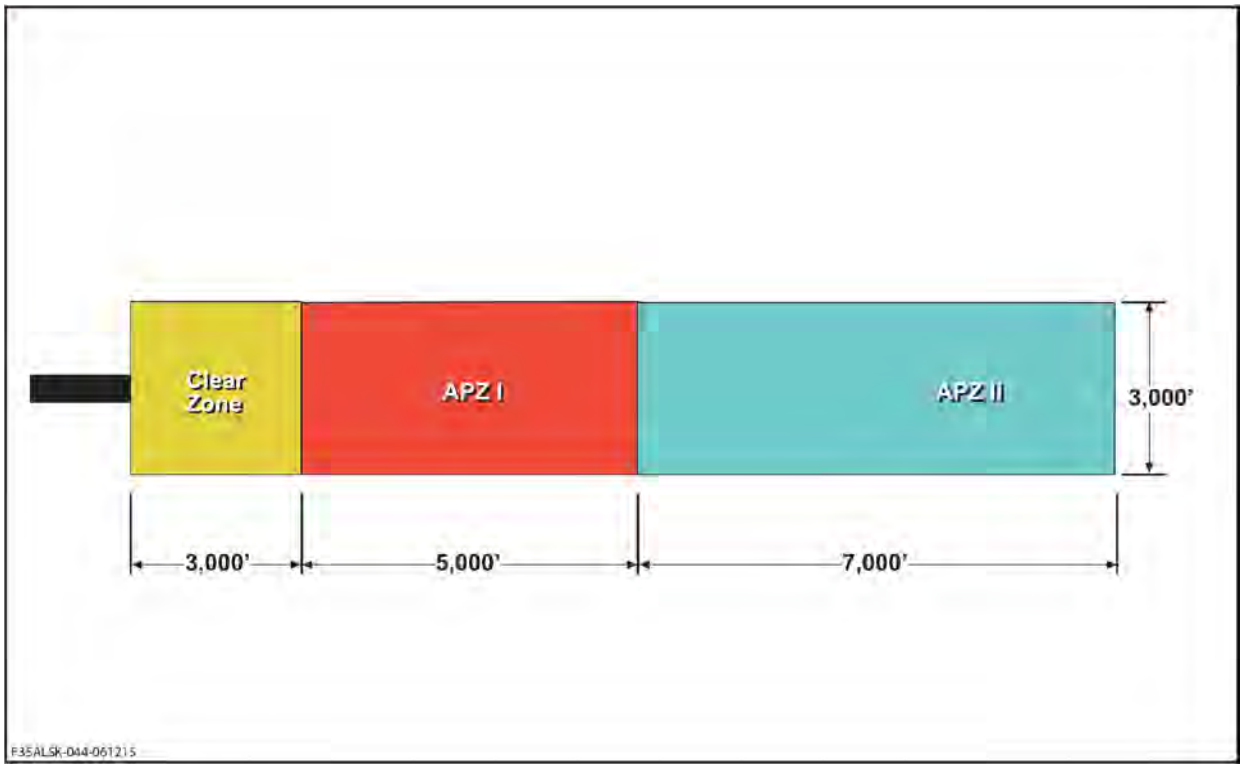
The FAA is responsible for ensuring safe and efficient use of U.S. airspace by military and civilian aircraft and for supporting national defense requirements. To fulfill these requirements, the FAA has established safety regulations, airspace management guidelines, a civil-military common system, and 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 *Fire Risk and Management*

Day-to-day operations and maintenance activities conducted at the base are performed in accordance with applicable Air Force safety regulations, published Air Force Technical Orders, and standards prescribed by Air Force Occupational Safety and Health requirements (Air Force 2006a). Aircraft Rescue Fire Fighting services are available on a 24-hour basis. Upon notification of an in-flight or ground emergency, the crash and rescue services personnel would coordinate emergency services.

3.5.1.2 *Accident Potential 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 mishap were to occur. Air Installations Compatible Use Zone guidelines identify three types of APZs for airfields based on aircraft mishap patterns: the Clear Zone, APZ I, and APZ II (Figure 3.5-1). The standard Air Force Clear Zone, for Class B runways such as Eielson AFB, is a rectangle area that extends 3,000 feet from the end of a runway, is 3,000 feet wide, and identifies the area with the highest probability for mishaps. APZ I, which typically extends 5,000 feet from the end of the Clear Zone, has a lower mishap probability, and APZ II, which typically extends 7,000 feet from the end of APZ I, has the lowest mishap probability of the three zones. If needed, to reflect different departure and arrival patterns, both the shape and size of APZs can be modified.



Source: DoD 2011a.

Figure 3.5-1. Accident Potential Zones

3.5.1.3 *Aircraft Mishaps*

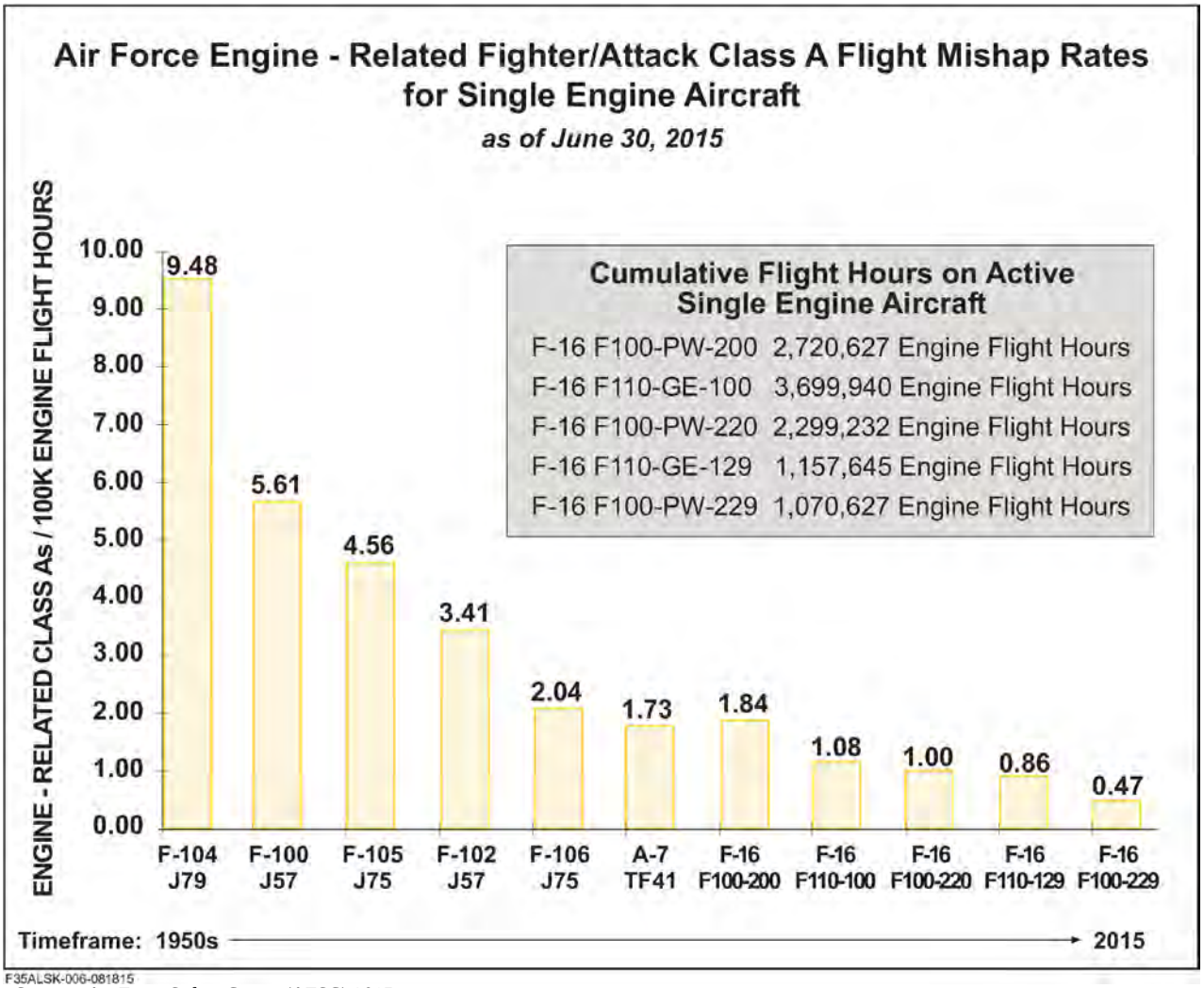
Mishaps are defined as any damage that occurs on the ground or in flight. As shown in Table 3.5-1, mishaps are broken down into four categories, based on the severity of the mishap in relation to property damage or personnel injury. Class A mishaps are the most severe with total property damage of $2 million or more or a fatality and/or permanent total disability. Comparison of Class A mishap rates for various engine types, as calculated per 100,000 flying hours provide the basis for evaluating risks among different aircraft and levels of operations. The safety sections analyze existing and projected Class A mishap potentials based on flying hours and aircraft types. Figure 3.5-2 provides historic mishap rate for

fighter aircraft, including various engine types of the F-16 (the predominant aircraft operating at Eielson AFB). As depicted, the longer the aircraft flies, the lower the mishap rate becomes.

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.



Source: Air Force Safety Center (AFSC) 2015a.

Note: "Engine-related" excludes mishaps caused by Foreign Object Damage, BASH, or failure of support systems external to the engine (e.g., fuel starvation).

Figure 3.5-2. Fighter Aircraft Mishap Rates

3.5.1.4 *Bird/Wildlife-Aircraft Strike Hazards*

BASH and the hazards they present form another safety concern for aircraft operations. Bird/wildlife-aircraft strikes constitute a safety concern because of the potential for damage to aircraft or injury to aircrews or local populations if an aircraft crash should occur in a populated area. 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 at Eielson AFB include moose and bear; however, birds in particular pose the most significant threat to aircraft operations and are the focus of this analysis.

According to the Air Force Safety Center (AFSC) BASH statistics, more than 50 percent of strikes occur from birds flying below 400 feet, and 90 percent occur at less than 2,000 feet AGL (AFSC 2014a). Waterfowl present the greatest BASH potential due to their flocking flight patterns and because, when migrating, they can be encountered at altitudes up to 20,000 feet AGL. Raptors also present a substantial hazard due to their size and soaring flight patterns. In general, the threat of bird-aircraft strikes increases during March and April and from August through November due to migratory activities. The Air Force BASH Team maintains a database that documents all reported bird/wildlife-aircraft strikes. Historic information across the Air Force for the past 20 years indicates that 16 Air Force aircraft have been destroyed and 14 fatalities have occurred from bird/wildlife-aircraft strikes, with the last Class A mishap occurring in 2014 (AFSC 2014b).

The Air Force BASH program was established to minimize the risk for collisions of birds and aircraft and the subsequent loss of life and property. In accordance with AFI 91-202, *U.S. Air Force Mishap Prevention Program* (Air Force 2011), requires each flying unit in the Air Force to develop a BASH plan to reduce hazardous bird/animal activity relative to airport flight operations. The intent of each plan is to reduce BASH issues at the airfield by creating an integrated hazard abatement program through awareness, avoidance, monitoring, and actively controlling bird and animal population movements. Some of the procedures outlined in the plan include monitoring the airfield for bird activity, issuing bird hazard warnings, initiating bird avoidance procedures when potentially hazardous bird activities are reported, and submitting BASH reports for all incidents.

3.5.2 Affected Environment

Flight safety in the affected environment includes activities and operations conducted on the base itself, as well as operations conducted in northern JPARC airspace. Flight safety considers aircraft flight risks (or mishaps), including the potential for BASH.

3.5.2.1 *Base*

Fire Risk and Management

Eielson AFB has two fire stations. Station 1 is at the northern end of the flight line and currently underwent renovation. Because Station 1 fire trucks cannot meet the 7-minute response time to the south loop, where the 18th Aggressor Squadron operations area is located, a second “station” was created. As a temporary solution, emergency response equipment is located in the Tactical Alert Cell.

Eielson AFB maintains mutual aid agreements for additional fire protection and crash response services with numerous communities in the FNSB. These include the City of Fairbanks, City of North Pole, U.S. Army-Fort Wainwright, Fairbanks International Airport, FNSB, Chena-Goldstream Fire and Rescue, Ester Volunteer Fire Department, North Star Volunteer Fire Department, Salcha Fire and Rescue, Steese

Volunteer Fire Department, and the University of Alaska Fairbanks Fire Department (Eielson AFB No Date).

In response to the increased use of advanced composite materials in recent aircraft, a Hazardous Aerospace Material Mishap Emergency Response Integrated Process Team was chartered in 2000 by the Deputy Assistant Secretary of the Air Force for Environmental, Safety and Occupational Health. The goals of the Hazardous Aerospace Material Mishap Emergency Response project were to identify and inventory all hazardous aerospace materials on Air Force weapon systems and ensure procedures were in place to protect personnel from safety/health hazards associated with aerospace vehicle mishaps. The program included full-scale fire testing of composite materials for toxicology and expected exposure to response personnel.

Some general conclusions included (Wright *et al*. 2003):

- Burn data suggest that the combustion characteristics of composite materials are roughly equivalent to other combustible materials. Combustion products released by burning composite materials are similar to those released from other solid combustibles.
- Burning of composite materials can release fibers that are respirable.
- Respirable fibers released from burning composite materials can penetrate into the lungs, causing respiratory irritation. Factors known to affect the toxicity of these inhaled fibers include dosage, physical dimensions, retention time in the lung, location of deposition in the lung, and solubility of the fibers in the lung.
- Exposed fibers along the edges of fragmented composite debris present a dermal puncture hazard. The skin can be irritated and sensitized if punctured by exposed fibers.
- The toxicity of combustion products from burning aircraft composite materials currently used does not appear to be exceptional. Types and quantities of combustion products from burning composite materials fall within the same spectrum as other burning combustibles at an aircraft mishap site.
- No additional smoke toxicity hazards created by burning composite materials were identified.
- Personal protective equipment recommendations for firefighters responding to composite aircraft mishaps include a self-contained breathing apparatus, standard firefighter protective clothing and/or proximity suits, and steel-tipped/-shanked boots.

The Air Force has specific emergency-response procedures for aircraft mishaps involving composite materials contained in Technical Order 00-105E-9 (Air Force 2001).

Accident Potential Zones

As described above, these zones are established to delineate recommended surrounding land uses for the protection of people and property on the ground. On base, neither the Clear Zone nor the APZs include housing or other incompatible land uses. However, off base to the north, portions of the APZs overlay lands outside of the base. APZ I falls on lands identified as general use (which could be considered a compatible land use), and almost the entirety of APZ II overlays land uses identified as either residential or general use in Moose Creek (Figure 3.5-3). Approximately 72 residences are located within APZ II in Moose Creek. Land uses such as high-density housing, industry (which uses hazardous or flammable chemicals), and public use facilities are not recommended within APZ II-designated areas and conflict with Air Force land use recommendations (Figure 3.5-4).

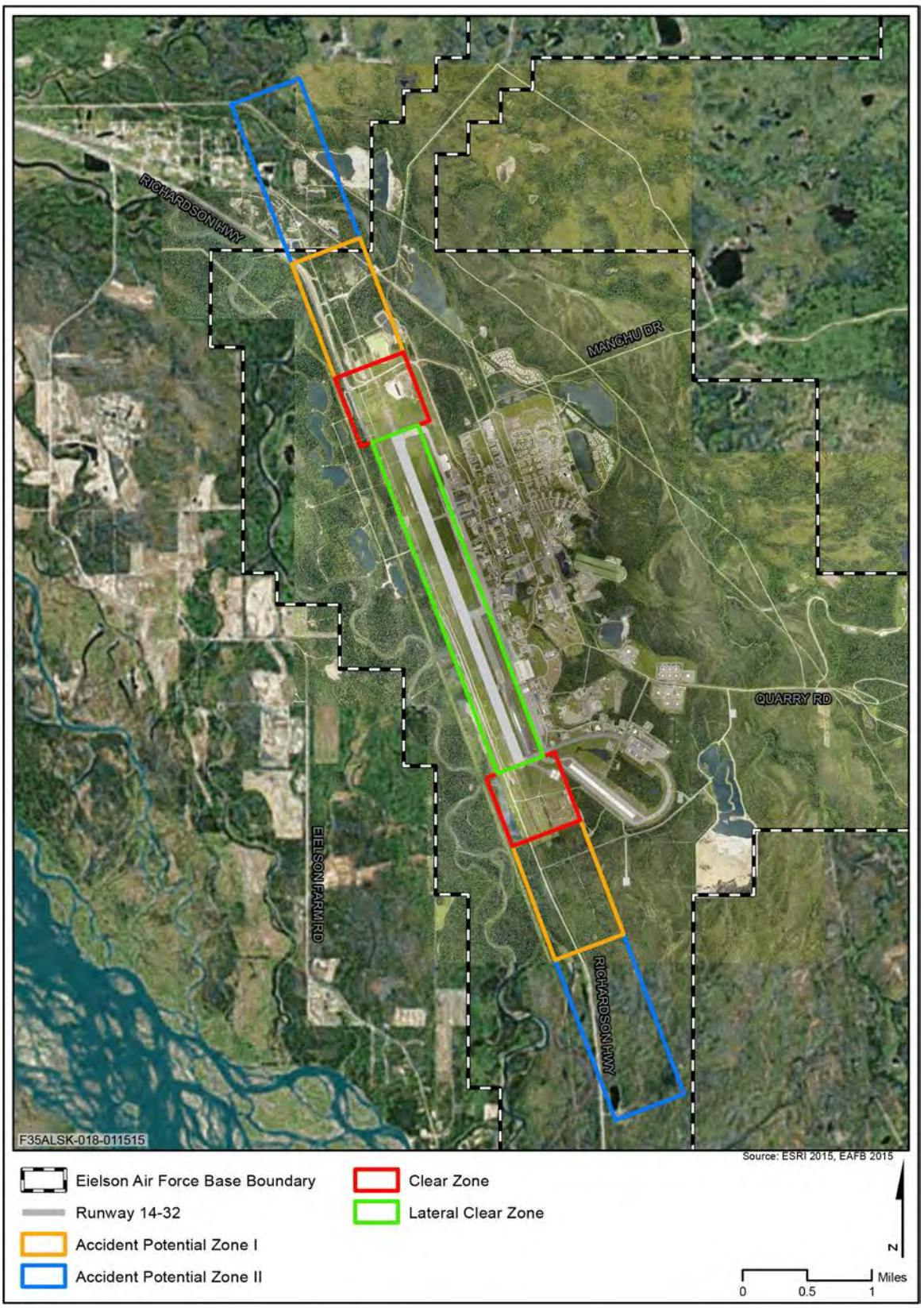


Figure 3.5-3. Eielson AFB Clear Zones and Accident Potential Zones

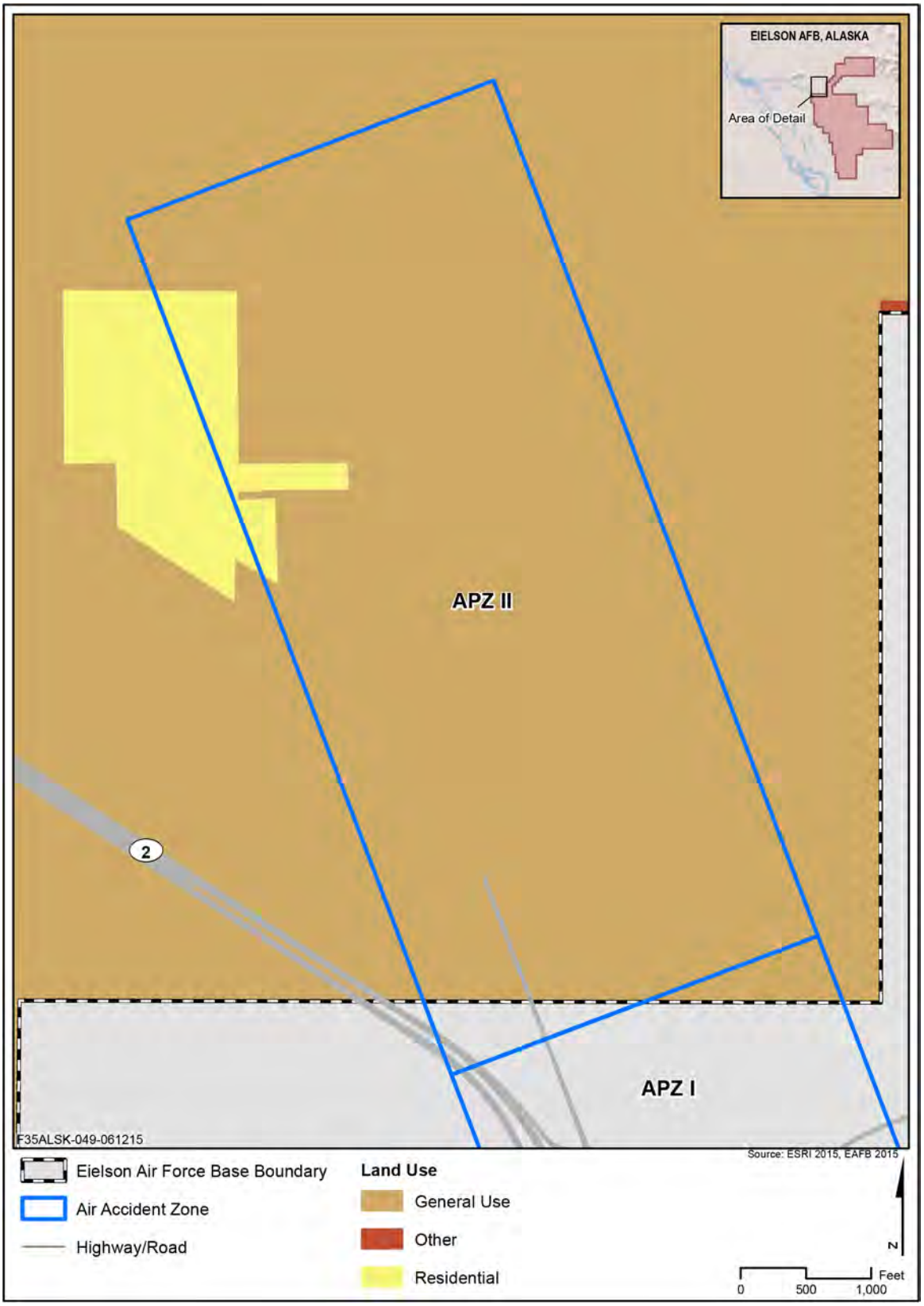


Figure 3.5-4. Fairbanks North Star Borough Land Use Categories within Accident Potential Zone II

Aircraft Mishaps

The DoD defines four categories of aircraft mishaps: Classes A, B, C, and D (DoD 2011b). Class A mishaps result in a loss of life, permanent total disability, a total cost in excess of $2 million, destruction of an aircraft, or damage to an aircraft beyond economical repair. Class A mishaps are of primary concern because of their potentially catastrophic results. Refer to Figure 3.5-2, which illustrates historic mishap rates (including the F-16) for various fighter attack aircraft. Since 2010, there has been one Class B mishap, five Class C mishaps, and two Class D mishaps at Eielson AFB. Over the last 5 years, there have not been any Class A mishaps recorded (Eielson AFB 2015b).

Bird/Wildlife-Aircraft Strike Hazard

The 354 FW BASH Plan prescribes procedures to assist aircrews in avoiding bird hazards. Bird hazards are considered during mission planning with aircrews referencing the Avian Hazard Advisory System and Bird Avoidance Model and checking the base Bird Watch Condition status before flight. Within JPARC airspace, aircrews use the BASH Plan Bird Hazard Warning System to report significant bird activity noted away from the base and report sightings to the supervisor of flying or the Safety Office to advise aircrews on hazardous conditions.

Over the past 5 years, aircraft operating to and from the Eielson airfield have experienced an average of 9.8 bird strikes per year (Bird Strike Summary 2010-2014). Nine bird strikes on or near the Eielson AFB flight line were reported in 2014, down from 12 reported strikes in 2013. Eight resulted in no damage, but one strike resulted in minor ($500) damage (U.S. Department of Agriculture 2014). The three previous years (2010, 2011, and 2012) saw 7, 10, and 8 BASH strikes respectively, with no aircraft damage reported on any strike (354 FW 2015). The overall wildlife numbers that were controlled in the airfield environment in 2014 was the lowest since 2009, and could be attributed to a variety of factors, including the closure of the flight line perimeter gates, control efforts, reproductive success, and weather (USDA 2014).

The primary threat to aircraft in the vicinity of Eielson AFB is migratory birds, although moose, coyotes, and foxes occasionally wander onto the flight line (354 FW 2011). The 354 FW at Eielson AFB has an effective, on-going BASH program through which information and assistance is freely shared between airfield users, the Fairbanks International Airport staff, local air traffic controllers, tenant units, and transient aircrews. Additionally, each year since 2009, the U.S. Department of Agriculture, Wildlife Services conducts a year-round Wildlife Hazard Management Program in cooperation with the 354 FW. The intent of the collaborative agreement is to reduce wildlife strikes and damage to aviation assets at Eielson AFB.

3.5.2.2 *Airspace*

Fire Risk and Management

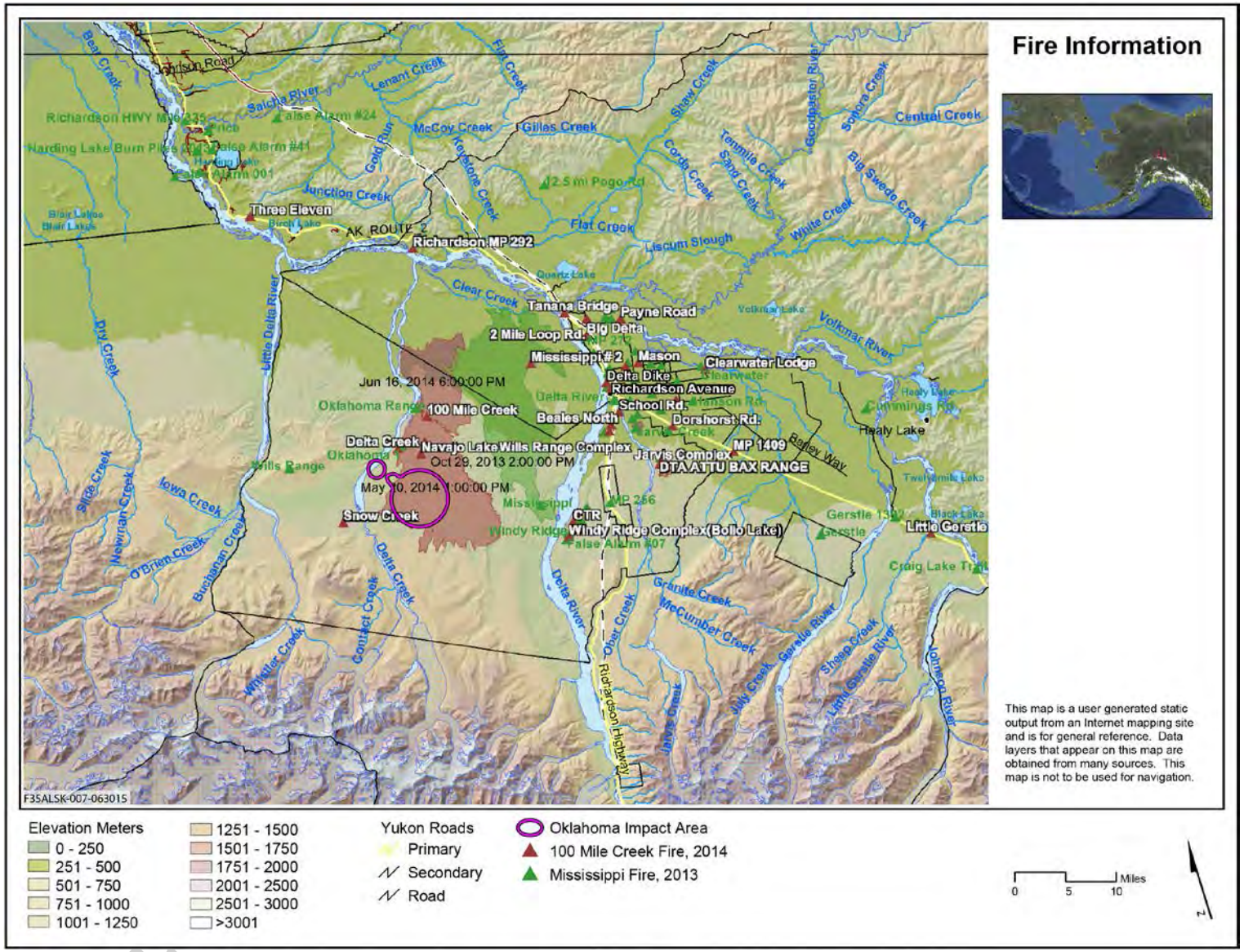
The Bureau of Land Management's (BLM's) Alaska Fire Service, based out of Fort Wainwright, provides fire protection and suppression for the majority of lands under the northern portion of JPARC airspace, working closely with U.S. Army Alaska on the Donnelly Training Area (underlying restricted airspace R-2202). Aircraft from Eielson AFB use the Oklahoma Range Impact Area (within Donnelly Training Area boundaries, see Figure 2.2-4) to conduct live ordnance delivery training. In the last 2 years, two large wildland fires started in this training area (Mississippi Fire in 2013 and the 100-Mile Creek Fire in

2014). The Mississippi Fire originated on military lands from an undetermined cause and consumed over 67,000 acres of forest on military and state lands (Figure 3.5-5).

The 100-Mile Creek Fire was caused by a "spot fire" from a prescribed fire on the Oklahoma Range being conducted by the Alaska Fire Service to reduce fire danger. The prescribed fire burned 55,000 acres, while the wildfire portion consumed an additional 23,000 acres of forest on military and state lands. Both fires heightened concerns in the Delta Junction community as the fires were driven by winds from the south, which predominate during summer months. These winds pushed fires originating on the east side of the Delta River and on Fort Greely towards Delta Junction. During the scoping meeting in Delta Junction, wildfire and noise were the primary concerns identified by the public and local government officials that they wished to be evaluated in this EIS.

Lightning-caused fires burn the most forested acreage in Alaska. Between 1950 and 1999, there were 13,244 fires attributed to human causes, burning an estimated 5,059,610 acres (382 acres per fire), while 8,179 fires were ignited by lightning, burning an estimated 31,879,997 acres (3,897 acres per fire) (Todd and Jewkes 2006). The large acreage of lightning-caused fires is a result of the fact that they often occur in less populated areas, where they are not fought with the same level of response. Fire suppression in these areas is usually directed toward protection of cabins, lodges, and other remote properties. The total number of human-caused wildland fires per decade from 1950 to 1999 has more than doubled from 1,838 to 4,157, in response to the increase in population during that time, while the acreage burned has decreased by 75 percent from 2,183,060 acres to 520,559. This reflects the fact that most human-caused fires occur in developed areas of Alaska, where they are more quickly brought under control than fires burning in remote areas. This is reflected in Figure 3.5-5 where the red and green triangles mark the locations of small fires in the Delta Junction area over the past 2 years that were put out quickly.

Another source of potential fire risk is flares. Each defensive flare consists of small pellets of highly flammable material that burn rapidly at extremely high temperature. Flares provide a heat source other than the aircraft's engine exhaust to mislead heat-sensitive or heat-seeking targeting systems and decoy them away from the aircraft. The flare ignites upon ejection from the aircraft and burns completely within approximately 3.5 to 5 seconds, or approximately 400 to 500 feet from its release point. Flare use is governed by detailed operating procedures prescribed by the 11th Air Force to ensure safety. Air Force altitude restrictions for flare use in northern JPARC airspace are above 5,000 feet AGL from June through September and above 2,000 feet AGL for the rest of the year. Additionally, if there is a high wildfire risk, then flare use is prohibited. These altitude and use restrictions substantially reduce risk of a fire from training with defensive flares.



Source: Alaska Interagency Coordination Center.

Figure 3.5-5. Oklahoma Range and Recent Wildland Fires

DELIBERATIVE PROCESS - PRE-DECISIONAL - NOT RELEASABLE UNDER FOIA

Aircraft Mishaps

Aircraft flight operations from Eielson AFB are governed by standard flight rules. Specific safety requirements are contained in standard operating procedures that must be followed by all aircrews operating from the airfield (354 FW Instruction 11-250, *Flying Operations and Local Flying Procedures*, February 2012) to ensure flight safety. In addition, since the introduction of the single-engine jet fighter or attack aircraft in the 1950s, technological advances have continually driven down the engine failure rate and associated aircraft mishaps (AFSC 2014a).

Extensive coordination between the military and civil aviation groups is necessary to mitigate potential conflicts between Alaska airspace users. A primary tool in this effort is the SUAIS. The SUAIS provides civil pilots information concerning SUA activation via telephone and radio communications. This service is unique to Alaska and was initiated using existing infrastructure and Eielson Range Control personnel. The SUAIS is crucial to the delicate interface with the general aviation community. When SUA is active for participating aircraft, the Air Force provides SUAIS to pilots requesting this service. Air traffic information is provided to aircraft requesting the service.

To assist military aircrews in complying with the many documents that protect all aviators in and near the JPARC airspace, 11th Air Force publishes the Alaska Airspace Handbook (11th Air Force 2015) as a consolidated source of airspace information for all Air Force and Air Force-sponsored pilots using the JPARC airspace. Information in the handbook includes, but is not limited to, geographical descriptions of Alaskan MOAs, MOA groupings, Restricted Areas, ATCAAs, Air Defense Areas, and the 11th Air Force Noise/Flight Sensitive Areas List. Appendix D.1 contains detailed information from the 11th Air Force Alaska Airspace Handbook associated with northern JPARC airspace.

Bird/Wildlife-Aircraft Strike Hazard

The primary threat to military aircraft operating in the northern JPARC airspace is migratory birds, where large areas of boreal forest, marshes, and open water habitats exist for these species. Though the exact number of birds struck in the airspace units is difficult to assess, as they tend to be small birds that are not detected until post-flight maintenance checks. Pilots do not always detect a small bird impact during flight so it is difficult to pinpoint the location where the BASH incident occurred. An increased BASH threat is experience during the spring and fall migrations periods, as this is when waterfowl concentrate in large numbers and fly at higher altitudes that can put them into the same airspace as military aircraft. Although no waterfowl have been struck in northern JPARC airspace, the risk is present.

3.6 SOCIOECONOMICS

3.6.1 Resource Definition

The Council on Environmental Quality (CEQ) regulations implementing NEPA state that when economic or social effects and natural or physical environmental effects are interrelated, these effects on the human environment should be discussed (40 CFR § 1508.14). The CEQ regulations further state that the "human environment shall be interpreted comprehensively to include the natural and physical environment and the relationship of people with that environment." In addition, 40 CFR § 1508.8 states that agencies need to assess not only direct effects, but also "aesthetic, historic, cultural, economic, social, or health" effects. Following from these regulations, the socioeconomic analysis evaluates how elements of the human environment might be affected.

3.6.2 Affected Environment

For purposes of analysis, the affected environment encompasses a Region of Influence for socioeconomics. The Region of Influence for this EIS is the FNSB (Figure 3.6-1). Additional information on the State of Alaska is provided for context.

Source: FNSB Community Planning Website 2015

Figure 3.6-1. Fairbanks North Star Borough Boundaries

3.6.2.1 *Base*

Population, Demographics, and Economics

Population. Table 3.6-1 shows population for the FNSB and Alaska for 2000, 2010, and 2013. Between 2000 and 2013, population in the FNSB increased from 82,840 to 98,656, a 19.1 percent increase. Population growth over the 2000 to 2013 period exceeded that of Alaska overall, which experienced population growth of 14.9 percent.

Table 3.6-1. Population in Fairbanks North Star Borough and Alaska from 2000 to 2013

	2000	*2010*	*2013*	*2000-2013 Change*
Fairbanks North Star Borough	82,840	97,581	98,656	19.1%
Alaska	626,932	710,231	720,316	14.9%

Source: U.S. Census Bureau 2000, 2010, 2013.

Table 3.6-2 shows population projections for the FNSB and Alaska for 2017 to 2032. Projected population growth in the FNSB exceeds that of Alaska overall over the 2017 to 2032 period, 15.2 percent in the FNSB, compared to 12.8 percent for the state.

Table 3.6-2. Population Projections in FNSB and Alaska for 2017 to 2032

	2017	*2022*	*2027*	*2032*	*2017-2032 Change*
Fairbanks North Star Borough	106,822	112,843	118,191	123,018	15.2%
Alaska	770,417	806,479	839,191	868,902	12.8%

Source: Alaska Department of Labor and Workforce Development 2012.

Table 3.6-3 shows the estimated 2015 Air Force military population in the FNSB. As of 2015, military population was 3,867. Most of the military population (2,639) was living on base, including 1,280 uniformed military personnel and 1,359 military dependents. Additional military population lived off base (668 uniformed military and 560 military dependents).

Table 3.6-3. Military Population in the Region of Influence Associated with Eielson AFB in 2015

	Military	*Military Dependents*	*Total*
Living On base	1,280	1,359	**2,639**
Living Off base	668	560	**1,228**
Total	**1,948**	**1,919**	**3,867**

Source: Air Force 2015b.

Demographics. Table 3.6-4 shows race and ethnicity for the FNSB and Alaska. As of 2013, the population of the FNSB was majority White (77.7 percent) and 6.6 percent of the population was Alaska Native. Compared to Alaska overall, the FNSB had a greater proportion of White residents and a lower proportion of Alaska Natives.

Table 3.6-4. Race and Ethnicity for FNSB and Alaska in 2013

	Fairbanks North Star Borough	*Alaska*
White Alone	77.7%	66.9%
Two or more races	7.2%	7.9%
American Indian and Alaska Native alone	6.6%	14.1%
Black or African American alone	4.6%	3.5%
Asian alone	2.5%	5.4%
Some other race alone	0.9%	1.2%
Native Hawaiian and Other Pacific Islander alone	0.4%	1.1%

Source: U.S. Census Bureau 2013.

Table 3.6-5 shows gender and age for the FNSB and Alaska for 2013. As of 2013, the FNSB was slightly more male and less female than Alaska overall. The FNSB, as of 2013, was younger than Alaska overall, with 48.8 percent of the population under 30 years of age (compared to Alaska's 44.8 percent).

Table 3.6-5. Gender and Age for FNSB and Alaska in 2013

	Fairbanks North Star Borough	*Alaska*
Male	53.0%	52.2%
Female	47.0%	47.8%
Under 5 years	8.1%	7.5%
5 to 9 years	7.4%	7.0%
10 to 14 years	6.1%	7.2%
15 to 19 years	6.8%	7.2%
20 to 29 years	20.4%	15.9%
30 to 39 years	13.8%	13.2%
40 to 49 years	12.6%	13.7%
50 to 59 years	13.1%	14.9%

Table 3.6-5. Gender and Age for FNSB and Alaska in 2013

	Fairbanks North Star Borough	*Alaska*
60 to 69 years	7.3%	8.4%
70 to 79 years	3.0%	3.5%
80 years and over	1.3%	1.6%

Source: U.S. Census Bureau 2013.

Economics. Table 3.6-6 shows labor force and employment statistics for the FNSB and Alaska for 2013. In 2013, the FNSB had a stronger labor market than Alaska overall with a higher labor force participation rate (73 percent compared to 71 percent) and a lower unemployment rate (7.9 percent compared to 8.8 percent).

Table 3.6-6. Labor Force and Employment for FNSB and Alaska in 2013

	Fairbanks North Star Borough	*Alaska*
Population 16 years and over	76,010	553,214
In labor force	55,496	393,037
Civilian	*49,876*	*376,305*
Armed Forces	*5,620*	*16,732*
Labor Force Participation Rate	73%	71%
Civilian Employment	45,920	343,366
Civilian Unemployment	3,956	32,939
Civilian Unemployment Rate	7.9%	8.8%

Source: U.S. Census Bureau 2013.

Table 3.6-7 shows employment by industry for the FNSB and Alaska for 2013. In 2013, the educational services and health care and social assistance industry were the largest employer in both the FNSB and Alaska. Other major employing industries included retail trade and public administration.

Table 3.6-7. Civilian Employment by Industry for FNSB and Alaska in 2013

	Fairbanks North Star Borough	*Alaska*
Educational services, and health care and social assistance	25.1%	23.4%
Retail trade	12.2%	10.9%
Public administration	11.4%	11.5%
Arts, entertainment, and recreation, and accommodation and food services	9.5%	8.9%
Construction	9.3%	7.6%
Professional, scientific, and management, and administrative and waste management services	8.3%	8.5%
Transportation and warehousing, and utilities	7.1%	7.7%
Finance and insurance, and real estate and rental and leasing	4.0%	4.1%
Other services, except public administration	3.9%	4.2%
Agriculture, forestry, fishing and hunting, and mining	3.7%	5.5%
Manufacturing	2.2%	3.8%
Information	1.6%	1.9%
Wholesale trade	1.5%	1.9%

Source: U.S. Census Bureau 2013.

Table 3.6-8 shows 2013 income and poverty statistics for the FNSB and Alaska. In 2013, the FNSB had a lower median household income than Alaska overall ($69,223 per year compared to $70,760) but had a lower percentage of families with incomes below the poverty line (6.2 percent compared to 6.8 percent).

Table 3.6-8. Income and Poverty for FNSB and Alaska in 2013

	Fairbanks North Star Borough	*Alaska*
Median household income	$69,223	$70,760
Family's income below poverty line	6.2%	6.8%

Source: U.S. Census Bureau 2013.

Schools, Housing, Transportation, and Utilities

Schools. As of October 2014, there were 40 schools in the FNSB School District, with total enrollment of 13,716 students. There were 21 public elementary schools (7,387 students), 7 middle schools (1,976 students), 8 high schools (3,654 students), and 4 charter schools (699 students) (FNSB School District 2014). As of February 2015, there were 770 school-aged children (5 to 18 years old) in the school district, which were family members of military personnel working at Eielson AFB (Air Force 2015b).

Housing. Table 3.6-9 provides 2013 housing characteristics for the FNSB and Alaska. In 2013, housing units in the FNSB were slightly smaller (4.6 rooms per unit compared to 4.7) and less expensive ($212,500 median value compared to $241,800) when compared to the state. In 2013, 6,022 housing units were vacant in the FNSB, a greater portion than in Alaska overall (8.4 percent of total rental units compared to 5.8 percent). Of the vacant housing units in the FNSB, 102 were in the city of North Pole. As of February 2015, there were 368 military households living off base in the FNSB (Air Force 2015b).

Table 3.6-9. Housing Characteristics for FNSB and Alaska in 2013

Housing Type	*Fairbanks North Star Borough*	*Alaska*
Total housing units	41,610	306,662
Occupied housing units	35,588	251,899
Vacant housing units	6,022	54,763
Homeowner vacancy rate	1.3%	1.5%
Rental vacancy rate	8.4%	5.8%
Median rooms	4.6	4.7
Median value (owner occupied units)	$212,500	$241,800
Gross monthly rent	$1,179	$1,098

Source: U.S. Census Bureau 2013.

Transportation. Table 3.6-10 provides information on utilization of transportation infrastructure in the FNSB in 2014. The table shows that use of transportation infrastructure tends to be seasonally dependent, with more activity during the warmer months. Passengers entering and leaving the FNSB tend to do so primarily through air travel, rather than by using the highway system.

Table 3.6-10. 2014 Use of Transportation Infrastructure in FNSB

	January-March	*April-June*	*July-September*	*October-December*	*2014 Total*
Fairbanks International Airport					
Incoming freight (000's of pounds)	1,440	1,770	2,315	1,763	**7,288**
Outgoing freight (000's of pounds)	7,344	9,105	9,455	6,685	**32,589**
Transit freight (000's of pounds)	683	290	332	154	**1,459**
Revenue landings	5,291	6,079	7,412	5,193	**23,975**
Incoming passengers	110,144	130,356	162,771	99,229	**502,500**
Outgoing passengers	106,982	125,122	163,803	106,819	**502,726**
Alaska Highway (Statewide)					
Entering passengers	7,248	33,961	41,721	7,022	**89,952**
Exiting passengers	5,329	20,731	47,532	8,461	**82,053**

Source: FNSB Community Research Center 2014.

Eielson AFB is serviced by a roadway network composed of approximately 45 miles of paved road, which is principally used by uniformed military and civilian military employees. An entrance gate and visitor's center is located on the north end of the base and leads vehicular traffic along the Old Richardson Highway to Flight Line and Central Avenues, which are the main north-south traffic routes within the base. Main base roads are generally in fair-to-good condition. Eielson AFB is also accessed by 9.9 miles of railroad track from the Alaska Railroad. The main function of the rail system is to carry coal and deliver munitions (Air Force 2013b).

Utilities. Utilities on Eielson AFB are currently adequate to accommodate the base's mission. Water and wastewater treatment, including pumped waste from individual septic systems is done at a treatment plant on base. Stormwater collection systems on base are minimal. Storm drainage is an integral part of all new projects and the base has begun phased efforts to remove storm runoff from the main base streets and intersections and limit the use of underground injection wells. The installation receives power from a coal-fired power plant owned and operated by the Air Force, which has electricity production capacity of up to 25 megawatts; however, a small amount of power is purchased from Golden Valley Electric Association (Air Force 2013b).

Solid waste (industrial and domestic) is collected by a contractor. Scrap metal is collected for recycling. Eielson AFB owns and operates three permitted active disposal areas: Quarry Hill Inert Waste Monofill (Permit No. SWZA021-20) for disposing of coal ash and limited amounts of clean construction/ demolition debris; Eielson AFB Asbestos Landfill (Solid Waste Permit No. SWZA019-17) for disposal of asbestos containing materials; and permitted areas near the runway for sewage sludge. Generally, there are no capacity issues, with Eielson AFB operating at their permitted levels (Eielson AFB 2015c). Construction contractors are allowed to dispose of clean concrete and asbestos on base—this reduces construction costs of requiring them to dispose of these materials at other locations within the FNSB.

Health and Fire and Crime Response

Health. Major public health facilities in the FNSB include Fairbanks Memorial Hospital, which has 152 beds, and the Denali Center, which has 90 beds. The 354 Medical Group provides outpatient primary healthcare under the TRICARE program for all eligible beneficiaries living in the Eielson AFB area. In addition, a collocated dental clinic provides general dental care for all active-duty military members. Pharmacy, laboratory, X-ray, and immunizations services are located in the clinic. Bassett Army Community Hospital on Fort Wainwright serves as Eielson AFB clinic's primary referral source for specialty and inpatient care (Air Force 2015c).

Fire Response. Fire response services are provided by various city governments in the FNSB. The Fairbanks Fire Department, North Pole Fire Department, Moose Creek Fire Department, and the Salcha Fire Department each provide fire response services in the FNSB. At Eielson AFB, the 354 Civil Engineer Squadron fire department provides fire response services (Air Force 2015d).

Crime Response. Crime response services are provided by various city governments in the FNSB and the State government. The Fairbanks Police Department, North Pole Fire Department, and the Division of Alaska State Troopers provide crime response services in the FNSB. At Eielson AFB, the 354 Security Forces Squadron provides on-base crime response services (Air Force 2015e).

3.7 LAND MANAGEMENT

3.7.1 Resource Definition

The attributes of land management examined in this EIS include land ownership and status as well as consistency with land management plans. For the base and adjacent communities, 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. Land use categories can include residential; commercial; manufacturing; transportation, communication, and utilities; recreation; institutional; mining and extraction; and agriculture and forestry. On military installations, land use tends generally to be divided into operational and support functions.

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. In Alaska, other federal and state agencies, as well as Alaska Native Corporations have management responsibilities for lands under many of the MOAs/ATCAAs. 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.

3.7.2 Affected Environment

3.7.2.1 *Base*

The affected environment for land management is Eielson AFB and surrounding areas potentially affected by activities at the base, including the towns of Moose Creek, North Pole, Fairbanks, and Salcha. Eielson AFB is located in the FNSB, about 22 miles southeast of Fairbanks and 10 miles southeast of North Pole. Moose Creek and Salcha are immediately adjacent to the northern and southern base boundaries, respectively.

The main base is approximately 19,790 acres. Land management on the base is guided by the Installation Development Plan. The airfield encompasses the largest portion of the base, with a notably long 14,530-foot runway and associated ramps and taxiways occupying the west and south sides of the base. The runway is parallel to Richardson Highway, which runs through the base. Most of the aircraft operational and industrial areas are immediately adjacent to the airfield on the east side. The airfield is located on the south end of the base. Land to the west of the airfield and highway is predominantly undeveloped open space with wetlands, lakes, and forests (Air Force 2013a).

Due to the high cost of off-base housing and the extreme climate in Alaska, the base provides a wide range of community facilities. These facilities include heating, power, water, and close to 900 family housing units and approximately 450 rooms for unaccompanied military personnel. The layout of the functional areas of the base provides some separation between the housing areas and the airfield, decreasing the noise exposure in the housing areas (see Figure 3.3-4) (Air Force 2013a).

The housing areas on the east side of the base are close to several lakes (see Figure 2.2-1). Most of the community services are situated in the center of the base, bounded by Wabash Avenue to the west, Arctic Avenue to the east, north by North Street, and south by Broadway Avenue. The base has school facilities

from kindergarten through high school, a medical clinic, chapel, commissary, base exchange, and several commercial businesses.

Outside of the base, land use in the FNSB is guided by the FNSB Regional Comprehensive Plan. The plan focuses on protecting private property rights and enhancing development opportunities, while minimizing land use conflicts. The small community of Moose Creek is located a few miles to the north of the base. Moose Creek is a census-designated place with an estimated population of approximately 650 (U.S. Census Bureau 2013). Salcha, a census designated place with an estimated population of 136, is located south of Eielson AFB. The city of North Pole, located approximately 10 miles northwest of Eielson AFB, has an estimated population of approximately 2,200 people. Fairbanks, the second largest city in the state of Alaska with an estimated population of 32,000, is located approximately 22 miles northwest of Eielson AFB.

On the west side of Richardson Highway, land outside the base is a mixture of undeveloped natural forest and some cultivated agricultural land with associated rural facilities and a small number of homes. Land to the south/southeast of the base is mostly uninhabited. A small airstrip and rural roads provide some access to the area for recreation (predominantly hunting and fishing) and some commercial and subsistence use of resources in the surrounding area (Air Force 2013a).

3.7.2.2 *Airspace*

The lands underlying northern JPARC airspace comprise the affected environment, where a vast majority of the underlying lands is composed of sparsely populated or uninhabited areas (see Figure 2.2-3). Any aircraft that operate out of Eielson AFB primarily use the northern JPARC airspace. This airspace includes (but is not limited to) the ranges, training areas, Restricted Areas, and MOAs associated with Fort Greely, Fort Wainwright, Eielson AFB, and the Donnelly, Tanana Flats, Yukon, Gerstle River, and Black Rapids Training Areas. The town of Delta Junction, population 947, is located under a portion of northern JPARC airspace. Delta Junction supports a small airstrip used for charter flights and the economy is largely based around the construction and maintenance of military facilities. Moose Creek and Salcha are both under the JPARC airspace, while Fairbanks and North Pole lie just outside of the JPARC airspace. Several other communities are scattered underneath northern JPARC airspace and are shown in Figure 2.2-3.

Federal and State Lands

Land under the entirety of JPARC airspace is owned and managed by state and federal agencies. Figure 3.7-1 identifies land ownership and generated with data from the BLM's Alaska Case Retrieval Enterprise System. Subsections were combined to illustrate general land management under the airspace and some of the data sets overlap: *State*: State Selected, State Patent, or Tentative Approval; *Parks and Refuges*: State; *Federal*: BLM, Forest Service, U.S. Fish and Wildlife Service (USFWS), National Park Service (NPS); and *Native*: Alaska Native Claims Settlement Act (ANSCA) Withdrawals, Native Selected, and Native Patent.

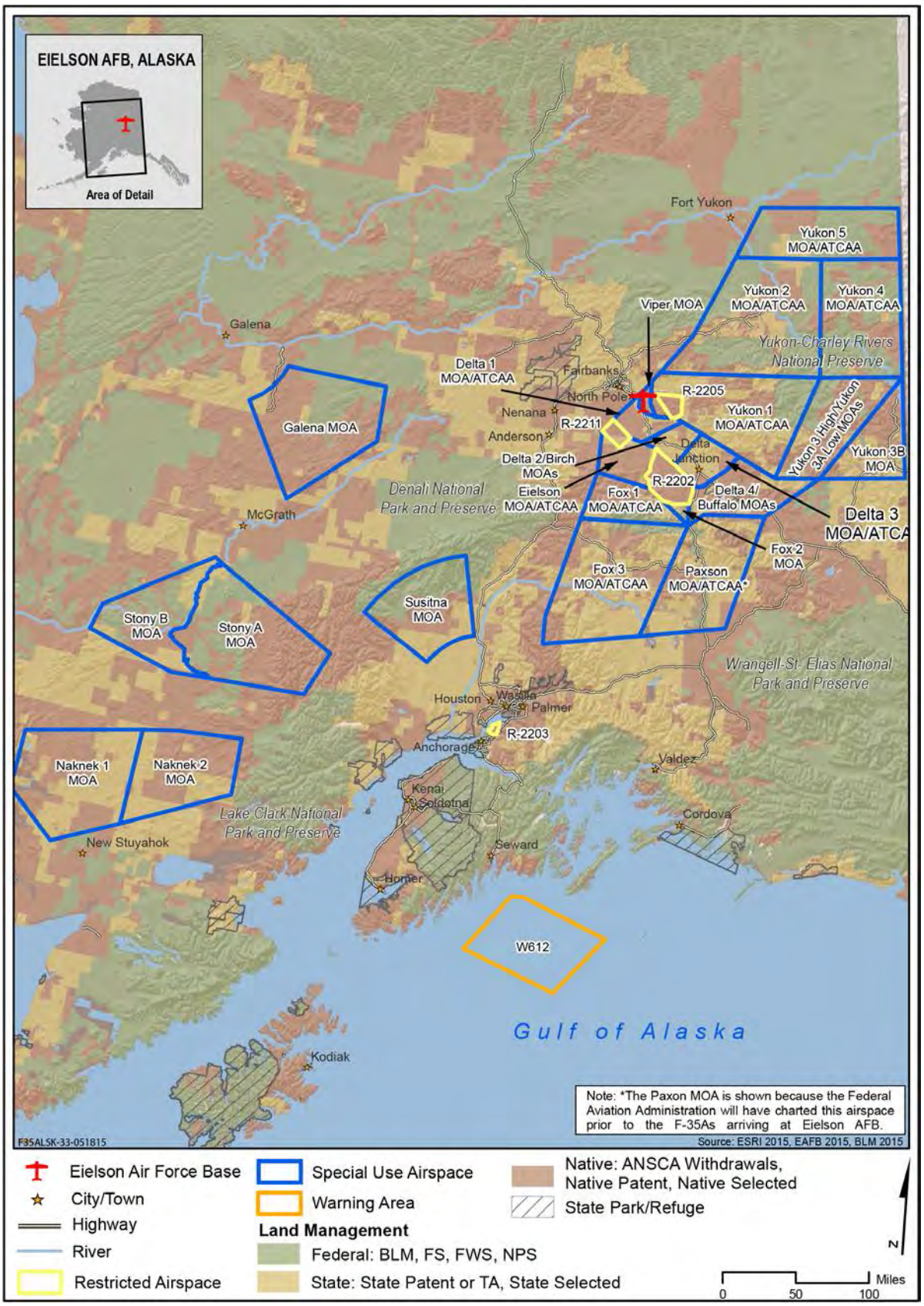


Figure 3.7-1. Special Use Land Management Areas Underlying JPARC Airspace

Federal special use areas are legislatively designated by the federal government rather than the state of Alaska. State special use areas are those that are legislatively designated by the state of Alaska. These areas may include refuges, sanctuaries, critical habitat areas, ranges, special management areas, forests, parks, recreation areas, preserves, public use areas, and recreational rivers (Air Force 2013a). A relatively small proportion of land under the JPARC is privately held. Table 3.7-1 identifies the federal and state special use areas underlying northern JPARC airspace. The following is a list of federal and state management plans that identify the management objectives envisioned by the management agency. Refer to the JPARC EIS, Appendix I.1 that outlines all associated federal and state land management plans and studies under northern JPARC airspace (Air Force 2013a).

- State:
  - Upper Yukon Area Plan, Alaska Department of Natural Resources 2003
  - Yukon Tanana Area Plan, Alaska Department of Natural Resources 2014
  - Chena River State Recreation Management Plan, Alaska Department of Natural Resources 2006
  - Delta Bison Interim Management Plan, Alaska Department of Fish and Game, 2012
  - Matanuska Valley Moose Range, Alaska Department of Fish and Game, 1986
  - Delta River Special Recreation Management Area Plan and East Alaska Resource Management Plan Amendment, BLM, 2011
  - Tanana Valley State Forest Management Plan, Alaska Department of Natural Resources 2001
  - Alaska's Statewide Comprehensive Outdoor Recreation Plan, 2009-2014, Alaska Department of Natural Resources 2009
- Federal
  - Yukon-Charley Rivers National Preserve General Management Plan, National Park Service 1985
  - Fortymile WSR Management Plan, BLM 1983a
  - Delta WSR Management Plan, BLM 1983b
  - Gulkana WSR Management Plan, BLM2006
  - Eastern Interior Resource Management Plan, BLM 2012

Table 3.7-1. Special Use Areas Underlying Joint Pacific Alaska Range Complex Airspace

Type	*Airspace*	*Area Name*	*Management Agency*	*WSR Classification*
Federal Special Use Area	Yukon 1 MOA	• Yukon-Charley Rivers National Preserve • Charley WSR	NPS	- Wild
	Yukon 2 MOA	• Yukon Flats National Wildlife Refuge • Birch Creek National WSR • Steese National Conservation Area	USFWS BLM BLM	- Wild -
	Yukon 1 and 2 MOAs	Fortymile National WSR	BLM	Wild, Scenic, and Recreational
	Delta 4 MOA	• Delta WSR • Delta River Special Recreation Management Area	BLM	Wild, Scenic, and Recreational -
	Fox 3MOA	• Gulkana National Wild River • Gulkana River Special Recreation Management Area (Including Middle	BLM	Wild -

Table 3.7-1. Special Use Areas Underlying Joint Pacific Alaska Range Complex Airspace

Type	*Airspace*	*Area Name*	*Management Agency*	*WSR Classification*
		Fork and West Fork)		
State Special Use Area	Yukon 1 MOA	Chena River State Recreation Area	ADNR	-
	Yukon 1 MOA, Delta 1, 2, 3, MOAs, Fox 1 and 2 MOAs, Eielson MOA, R-2205, R-2202	Tanana Valley State Forest	ADNR	-
	Delta 1 MOA	Donnelly Creek State Recreational Site	ADNR	-
	Delta 4 MOA	• Big Delta State Historical Park, Quartz Lake State Recreation Area, Salcha River State Recreation Area, and Clearwater State Recreation Site • Delta Junction Bison Range Area	ADNR ADFG	- -
	Fox 3 MOA	• Lake Louise State Recreation Area, and Nelchina Public Use Area • Matanuska Valley Moose Range	ADNR ADFG	- -
	R-2202	Birch Lake and Harding Lake State Recreational Sites	ADNR	-
	Yukon 1 MOA, Delta 1, 2, 3 MOAs, Fox 1 and 2 MOAs, Eielson MOA, R-2205, R-2202	Tanana Valley State Forest	ADNR	-

Legend: ADFG=Alaska Department of Fish and Game; ADNR=Alaska Department of Natural Resources; BLM=Bureau of Land Management; NPS=National Park Service; and USFWS=U.S. Fish and Wildlife Service.

As presented in the JPARC EIS, Section 3.1.10, *Land Use* (Air Force 2013a), there are numerous communities and Alaska Native villages that depend on fishing, hunting, ranching, foraging, farming, and other resource extraction as their primary means of subsistence. Currently, northern JPARC airspace has limitations, restrictions, and seasonal adjustments to mitigate, where possible, the use of JPARC airspace during hunting seasons to avoid impacts to rural inhabitants' and Alaska Native subsistence hunting activities. Subsistence impacts of aircraft operations were identified in the JPARC EIS, Appendix I.3 of that EIS provided a summary of game management units and hunting restrictions and limitations, and the associated ROD identified mitigation measures to minimize adverse impacts (Air Force 2013a, 2013c). The 11th Air Force Alaska Airspace Handbook codified the mitigations identified in the JPARC ROD and presents the standard operating procedures required of all Air Force and Air Force-sponsored pilots operating in JPARC airspace (11th Air Force 2015). Appendix D.1 of this EIS provides further detail on flight restrictions, operational limitations, and seasonal adjustments in northern JPARC Airspace.

3.8 CULTURAL RESOURCES

3.8.1 Resource Definition

Cultural resources are defined as any district, site, building, structure, or object considered to be important to a culture, subculture, or community for scientific, traditional, religious, or any other reason. Cultural resources include prehistoric (before European contact) and historic archaeological resources, architectural resources, and traditional cultural properties. The cultural resources discussed in this chapter include those that meet the specific criteria of the National Historic Preservation Act (NHPA) and its associated regulations. However, other cultural resources such as plants, animals, or geological materials may be important to a culture, but are not eligible under the NHPA. Additionally, cultural resources are

protected under the Archaeological Resource Protection Act (16 USC 470aa-470mm; Public Law 96-95 and amendments), the Native American Graves Protection and Repatriation Act (Public Law 101-601; 25 USC 3001-3013), and the American Indian Religious Freedom Act (Public Law 95-341; 42 USC 1996 and 1996a). Compliance with Section 106 of the NHPA, which directs federal agencies to take into account the effect of a federal undertaking on a historic property, is outlined in the Advisory Council on Historic Preservation's regulations, "Protection of Historic Properties" (36 CFR § 800). The NHPA and associated Section 106 compliance also include guidance for American Indian consultation regarding cultural significance of potential religious and sacred sites (16 USC 470a).

Historic properties are eligible for listing on the National Register of Historic Places (NRHP) if they are deemed important in American history, architecture, archaeology, engineering, and culture. A traditional cultural property is defined as one that is eligible for inclusion in the NRHP because of its association with cultural practices or beliefs of a living community, which are rooted in that community's history, and are important in maintaining the continuing cultural identity of the community.

3.8.2 Affected Environment

The base area of potential effect (APE) comprises the area where construction and aircraft operations could affect cultural resources. Figure 3.8-1 depicts the base and associated historic districts. No historic districts outside base boundaries are affected by Eielson AFB operations. The APE for airspace is the lands underlying northern JPARC airspace (see Figure 2.2-3) where the predominant amount of Eielson AFB aircraft operations occurs.

3.8.2.1 *Base*

Traditional/Alaska Native

At this time, Alaska Natives have not identified any traditional cultural properties on Eielson AFB (Eielson AFB 2014a).

Archeological and Architectural

A Section 110 survey for prehistoric and historic archaeological resources has been completed for Eielson AFB (Eielson AFB 2014a). The identification study consisted of an intensive program of pedestrian survey and a subsurface testing program directed by a probability model. Three survey areas were identified as high probability and 2,192 soil probes and 465 shovel tests were excavated. No evidence for prehistoric or non-military land use by Athabaskans or Euroamericans was found in the course of these investigations.

A building evaluation was completed on base as part of the 2013 Eielson AFB Integrated Cultural Resources Management Plan update. There are two historic districts identified in the main base (Figure 3.8-1). The first is the Eielson AFB Flightline Historic District, which consists of 19 buildings and 1 structure along the flight line. This historic district is eligible for listing on the NRHP and the SHPO has concurred with its status. The Eielson AFB Flightline Historic District played a central role in bomber deployment and arctic observation missions during the Cold War, i.e., the period between 1947 and 1960. These missions were central to U.S. decision making about worldwide atomic proliferation, national defense, and possible retaliation (Eielson AFB 2014a).

Figure 3.8-1. Eielson AFB Area of Potential Effect

A second historic district is known as the Eielson AFB Munitions Historic District with structures dating between 1947 and 1960. This district includes Engineer Hill (seven munitions igloos and one munitions inspection igloo) and Quarry Hill (21 munitions igloos) (see Figure 3.8-1). These munitions storage facilities enhanced the fast response mission of the airbase by ensuring that weapons were stored properly and functionally ready on short notice. The collection of gabled, bermed munitions igloos represents Eielson AFB's role in arctic bomber defense during the Cold War, and the critical demand for secure storage of high explosives munitions at the Quarry Hill site. The combined munitions storage facilities are contributing members of the historic district. Both of the sites are managed under the Program Comment for World War II and Cold War Era (1939 to 1974) Ammunition Storage Facilities between DoD and the Advisory Council on Historic Preservation (2006). The Program Comment provides DoD with an alternative way to comply with their responsibilities under Section 106 of the NHRP with regard to the effect of management actions on World War II and Cold War Era ammunitions facilities. Appendix D.2 provides a copy of the Program Comment.

No other buildings older than 50 years have been identified as eligible for listing on the NRHP (Eielson AFB 2014a). Of the remaining buildings at Eielson AFB dating to the Cold War era that are younger than 50 years, none have the exceptional significance necessary to achieve NRHP eligibility (36 CFR § 60.4).

3.8.2.2 *Airspace*

The APE associated with northern JPARC airspace is identified in Figure 3.8-2.

Traditional/Alaska Native

Seven federally recognized Alaska Native villages or communities are found under the northern JPARC airspace, the training area most frequently used by aircraft from Eielson AFB. These villages are presented in Table 3.8-1. An expanded discussion of these villages follows the tables.

Table 3.8-1. Federally Recognized Alaska Native Tribes Under JPARC Airspace

Airspace	*Federally Recognized Alaska Native Tribe*
Buffalo MOA, Delta 4 MOA	Village of Dot Lake
Buffalo MOA, Delta 4 MOA	Healy Lake Village
Yukon 2 MOA	Circle Native Community
Yukon 3 and 4 MOAs	Native Village of Eagle
Yukon 5 MOA	Chalkyitsik Village
Paxon MOA	Cheesh-Na Tribe (formerly the Native Village of Chistochina)
Paxon MOA	Native Village of Gakona

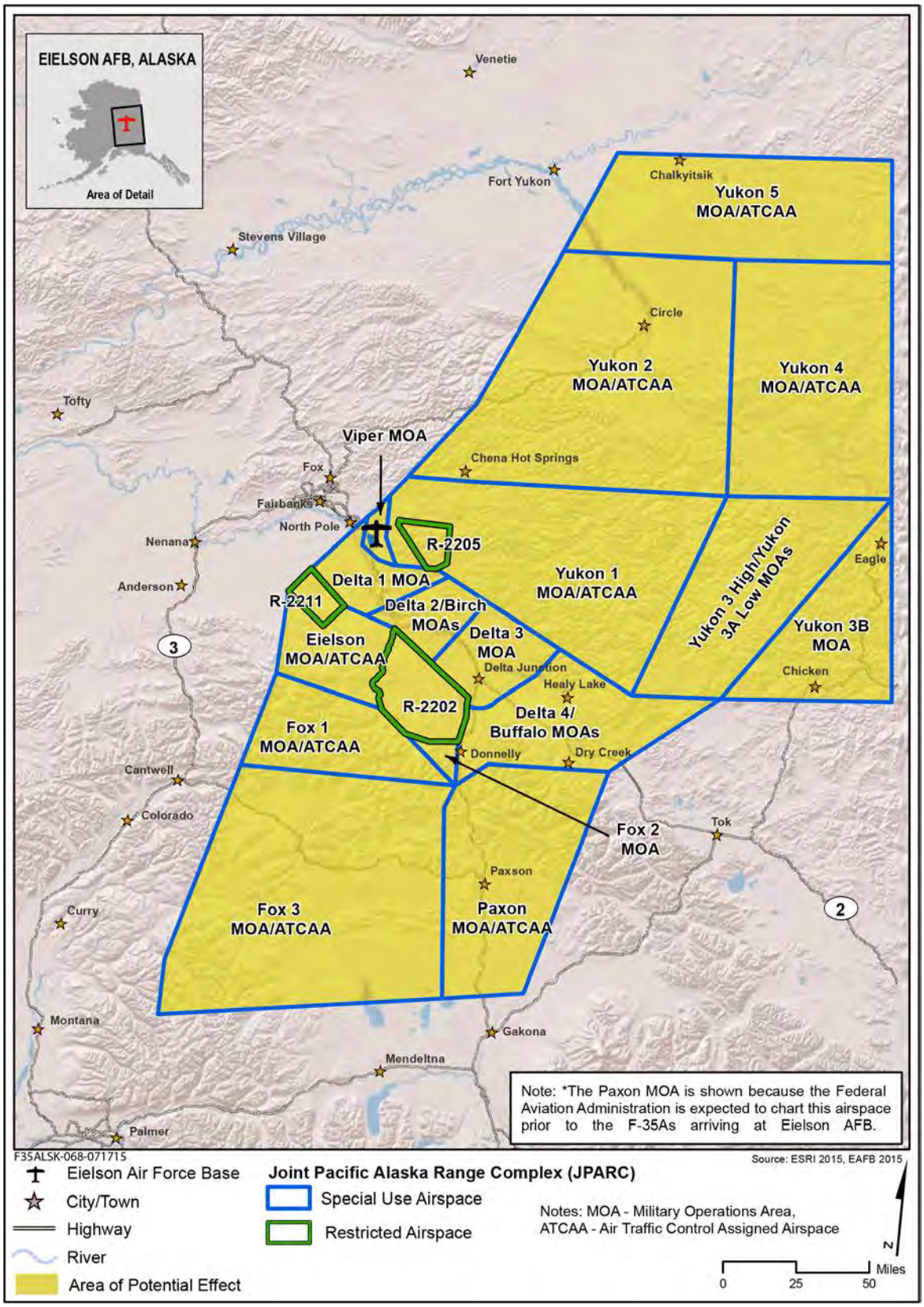


Figure 3.8-2. Northern JPARC Airspace Area of Potential Effect

Archeological and Architectural

Through a search of the National Register database, 19 historic properties were identified as representative properties within the airspace APE (Table 3.8-2). Though there are numerous historic properties under the airspace, the properties identified in the table were selected as the most representative based upon their location and character. These properties are listed in the NRHP, and there is sufficient information to determine impacts. It was assumed that other properties, similarly situated and with the same characteristics, would experience similar impacts from activities in the overlying northern JPARC airspace.

Table 3.8-2. NRHP Listed Resources Under Northern JPARC Airspace

Airspace	*Property*	*Location*
Delta 1 MOA	Chugwater Site	Address/location restricted
Delta 3 MOA	Sullivan Roadhouse	Mile 226, Richardson Highway
	Big Delta Historic District	Richardson Highway, Mile 274.5 at junction of Tanana and Delta Rivers
	Rika's Landing Roadhouse	Mile 252, Richardson Highway
	Swan Point Archaeological Site	Address/location restricted
Buffalo and Delta 4 MOAs	Rapid Roadhouse	Mile 227, Richardson Highway
	Alaska-Canada Military Highway	West of Alaska Hwy. approximately 37 miles southeast of Delta Junction
Fox 3 MOA	Tangle Lakes Archaeological District	Address/location restricted
Yukon 2 MOA	Coal Creek Historic Mining District	Along the Yukon River, Southeast of Circle, in Yukon-Charley Rivers National Preserve
	Frank Slaven Roadhouse	Left bank of the Yukon River, 0.25 mile from the mouth of Coal Creek
	Woodchopper Roadhouse	Left bank of the Yukon River, 1 mile up from Woodchopper Creek
	George McGregor Cabin	Left bank of the Yukon River, 2 miles down from Coal Creek
	Ed Biederman Fish Camp	Left bank of the Yukon River, 0.25 mile down across from the Kandick River
	Central House	Mile 128, Steese Highway
Yukon 3 B MOA	The Kink	East of Fairbanks, part of North Fork of Fortymile River
	Chicken Historic District	Mile 66.5, Taylor Highway
	Eagle Historic District/National Historic Landmark	Mile 0, Taylor Highway
	F.E. Company Dredge No. 4	Mile 66.4, Taylor Highway
	Steele Creek Roadhouse	Fortymile River

Archaeological sites under northern JPARC airspace include Native burial grounds, village and settlement sites, and historic mining sites (Air Force 2006b). Archaeological resources listed in the NRHP include the Tangle Lakes Archaeological District, the Chugwater site, and the Swan Point archaeological site. Architectural resources under the northern JPARC MOAs include structures relating to gold mining, lodging, trapping, fishing, or the railroad (Air Force 2006b). In addition to NRHP-listed sites, there are likely to be additional cultural resources that are either eligible or potentially eligible for National Register listing under the airspace. Traditional Cultural Properties may also be present under airspace and may be identified through continued consultation with Alaska Native tribes.

Fox MOAs. Although there are no federally recognized Alaska Native tribes within this area, there are scattered remote residences and BLM-managed recreation areas. The area is frequently used for subsistence and recreational hunting (Eielson AFB 2014a). Additionally, the National Register-listed Tangle Lakes Archaeological District is located on lands underlying the Fox MOAs. The district contains more than 400-recorded archaeological sites spanning 10,000 years of human presence in the region (Air Force 2013a).

Delta MOAs. There are seven National Register-listed properties under the Delta MOAs, five of which are architectural resources and two of which are archaeological resources. Architectural resources include the Big Delta Historic District (also known as Big Delta State Historical Park), Delta Junction; Rika's Landing Roadhouse (also known as Rika's Landing Site), Big Delta; Alaska-Canada Military Highway, 37 miles southeast of Delta Junction; and Sullivan Roadhouse in Delta Junction (Air Force 2013a). Rapids Roadhouse, also known as Black Rapids Roadhouse, in the Delta vicinity, underlies Buffalo/Delta 4 MOA (Air Force 2013a). Also under the Delta MOA are the Swan Point and Chugwater archaeological sites. Two Alaska Native villages or communities occur under Delta 4 MOA. The small village of Healy Lake, home to the federally recognized Alaska Native tribe of Healy Lake Village, is located 29 miles east of Delta Junction. Predominant activity in the area is the recreational use of Healy Lake during summer months. The Village of Dot Lake is located on the Alaska Highway, 155 road miles southeast of Fairbanks.

Yukon MOAs. The Yukon MOAs overlie a large area to the north and east of Fairbanks. Three Alaska Native villages or communities occur in this area, as well as 11 National Register-listed resources (see Table 3.8-2). The 11 historic properties are the Coal Creek Historic Mining District, the Central House, the Eagle Historic District (which is also a National Historic Landmark), Woodchopper Roadhouse, Frank Slaven Roadhouse, Steele Creek Roadhouse, George McGregor Cabin, Ed Biederman Fish Camp, the Chicken Historic District, F.E. Company Dredge #4, and the Kink, a National Register-listed artificial river channel located near Fairbanks.

The village of Circle, home to the federally recognized Alaska Native tribe of Circle Native Community, which underlies the Yukon 2 MOA, is situated on the south bank of the Yukon River at the edge of the Yukon Flats National Wildlife Refuge (about 160 miles northeast of Fairbanks). The federally recognized Circle Native Community is predominantly Athabascan. Established in 1893, Circle, or Circle City, was a supply point for goods shipped up the Yukon River and then distributed to the gold mining camps. By 1896, Circle was the largest mining town on the Yukon, with a population of 700. Residents, some of whom are part time, now number approximately 100.

The Native Village of Eagle is a federally recognized Alaska Native tribe and underlies the Yukon 3 MOA; it is 6 miles west of the Alaska-Canada border. It is located on the Taylor Highway, on the left bank of the Yukon River, at the mouth of Mission Creek. The area has been the historical home to Han Kutchin Indians, and was once known by non-Alaska Natives as "Johnny's," after a leader named John.

The Chalkyitsik Village, a federally recognized Alaska Native tribe, underlies the Yukon 5 MOA. Archaeological excavations indicate this region may have been first used as early as 12,000 years ago. This village on the Black River has traditionally been an important seasonal fishing site for the Gwich'in. Village elders remember a highly nomadic way of life: the people lived at the headwaters of the Black River from autumn into spring, and fished downriver in the summer. Contact with early explorers was limited, and the Black River Gwich'in received scant mention in early records. The location of the

village at its present site is due in part to low water in the Black River in the 1930s. A boat carrying materials intended for a school to be built in Salmon Village had to be unloaded at the Chalkyitsik seasonal fishing camp that then consisted of four cabins. Rather than reload the construction materials, the school was built at Chalkyitsik, and the Black River people began to settle around the school.

Paxon MOA. There are two federally recognized Alaskan Native communities under the Paxon MOA. The Cheesh-Na Tribe (formerly the Native Village of Chistochina) is located 42 miles northeast of Glennallen on the Glenn highway. It began as a fish camp and stopover for traders, and expanded during the 1897 gold rush; the current population is approximately 100 people. The Native Village of Gakona is located at the confluence of the Copper and Gakona Rivers just east of the Richardson Highway. Gakona is a traditional village of the Ahtna Athabascan people with over 200 inhabitants. There are no National Register-listed properties under the Paxon MOA.

3.9 ENVIRONMENTAL JUSTICE AND PROTECTION OF CHILDREN

3.9.1 Resource Definition

The 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 2012). 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." The USEPA guidance states that "each federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the U.S. and its territories, the District of Columbia, the Commonwealth of Puerto Rico, and the Commonwealth of Northern Marianas Islands."

Two Executive Orders (EOs) deal directly with concerns of potentially affected communities. EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* requires federal agencies to assess whether their actions could have disproportionately high and adverse environmental and health impacts on minority or low-income populations. EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks* requires a similar analysis for children. According to the 2014 Air Force Civil Engineer Center *Guide for Environmental Justice Analysis under the Environmental Impact Analysis Process*, another sensitive population needing evaluation for potential adverse health effects generated by a proposed Air Force action is the elderly (AFCEC 2014b).

Minority populations are "identified where either: (a) the minority population of the affected area 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" (EO 12989). Minority populations include populations that report their ethnicity as something other than non-Hispanic White alone, including Alaska Native, Native Hawaiian or other Pacific Islander, Asian, Black or African American, Hispanic or Latin, or American Indian (U.S. Census Bureau 2010); specifically. Low-income populations "should be identified with the annual statistical poverty thresholds from the Bureau of the Census' Current Population Reports, Series P-60 on Income and Poverty" (EO 12989).

Children and the elderly are identified in the U.S. Air Force *Guide for Environmental Justice Analysis under the Environmental Impact Analysis Process* as sensitive receptors (AFCEC 2014b). 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.

3.9.2 Affected Environment

The affected environment, or Region of Influence, for this analysis are the census blocks affected by the noise contours generated from the base; the community of comparison is the FNSB.

3.9.2.1 *Base*

Demographic Information

Table 3.9-1 provides demographic information for FNSB, Moose Creek, North Pole, and Alaska as of the 2013 U.S. Census Bureau QuickFacts (U.S. Census 2015). The percent of population living below the poverty level (i.e., low income) in FNSB was 1.5 percent lower than that found at the state level. In Moose Creek, it was 0.6 percent lower than found at the state level but 0.9 percent higher when compared to FNSB. The North Pole population living below poverty level was 1.3 percent lower than found across the state but 0.2 percent higher when compared to FNSB. In terms of minority populations, 33.1 percent of Alaska's total population was minority. In FNSB, minority populations comprised about 22.3 percent of the total Borough population. For North Pole, about 15.8 percent was minority and 22 percent was identified in Moose Creek.

Table 3.9-1. Demographic Information for Fairbanks North Star Borough, Moose Creek, and North Pole

Type	FNSB	Moose Creek	North Pole	Alaska
Population	98,656	648	2,224	720,316
Percent Population Below Poverty Level	8.5%	9.4%	8.7%	10.0%
Race				
White	77.7%	78.0%	84.2%	66.9%
Black	4.6%	5.1%	4.8%	3.5%
Alaska Native or Native American	6.6%	5.1%	1.3%	14.1%
Asian	2.5%	2.9%	2.6%	5.4%
Pacific Islander	0.4%	0.7%	-	1.1%
Other Races	0.9%	1.3%	-	1.2%
Two or More Races	7.2%	6.8%	7.1%	7.9%

Minority Population Areas

Minority population areas are defined as census block groups where the proportion of minority residents equals or exceeds the proportion of minority residents in the FNSB overall. Figure 3.9-1 shows the 2010 census block groups that have a higher percentage of minority residents than the overall FNSB average of 22.3 percent. According to 2010 data, 30 out of 62 census block groups exceeded the FNSB overall minority percentage and are considered a minority population area as a baseline condition (see blue area in Figure 3.9-1). None of the census blocks that exceed the FNSB average of 22.3 percent are exposed to aircraft-generated noise from Eielson AFB.

Low-Income Population Areas

Low-income population areas are defined as census block groups where the proportion of low-income residents equals or exceeds the proportion of low-income residents in the FNSB overall. Figure 3.9-2

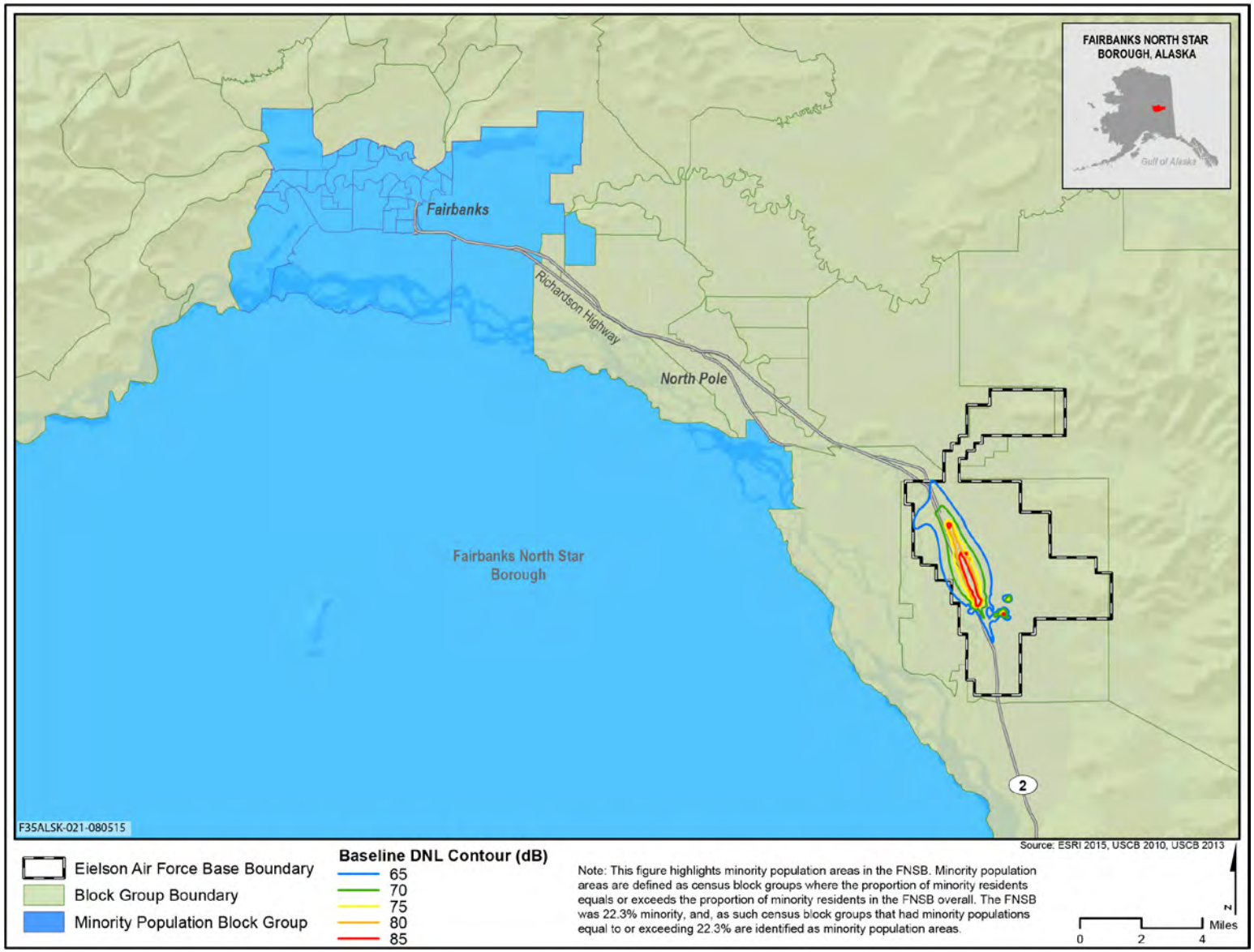


Figure 3.9-1. Minority Population Areas in the Community of Comparison

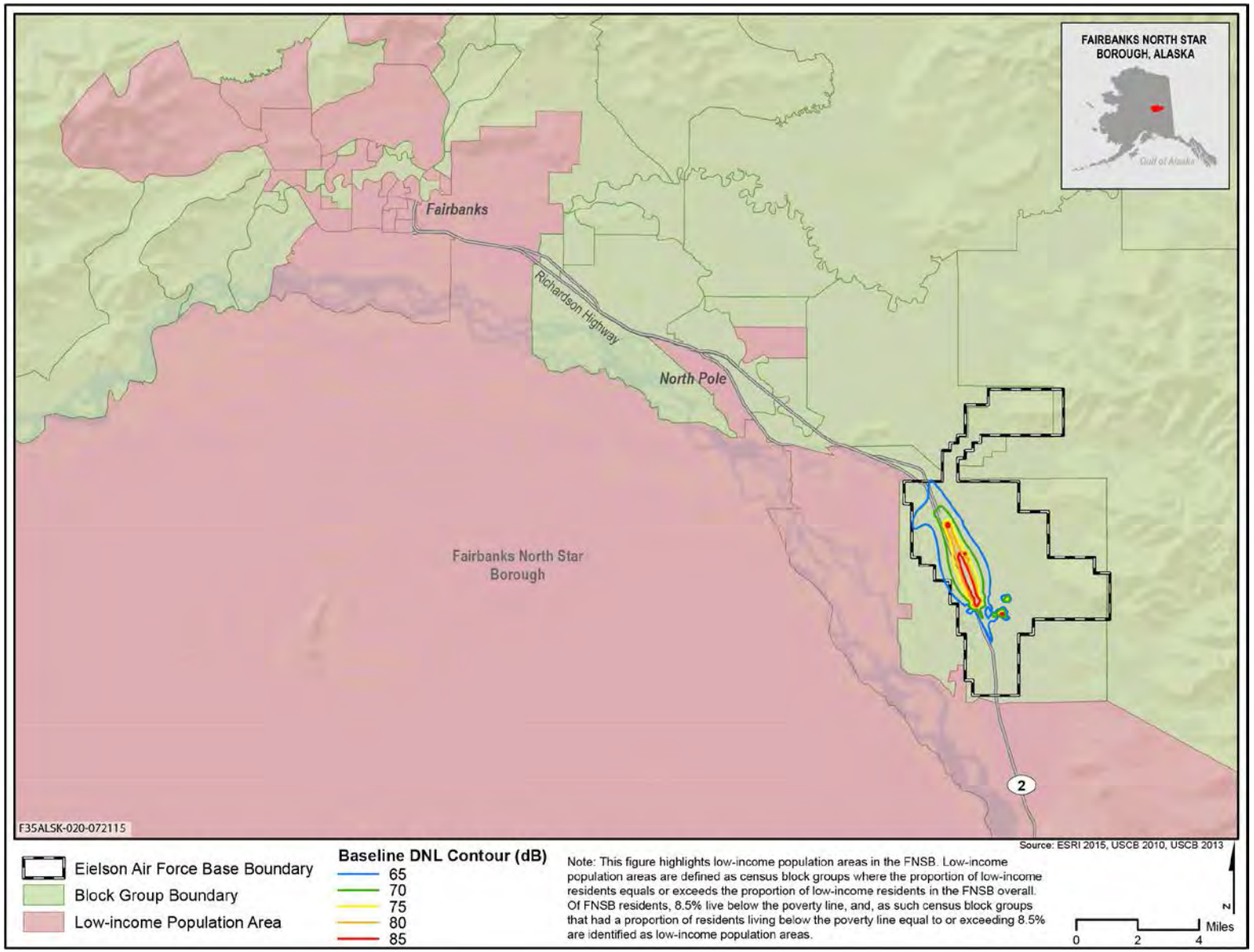


Figure 3.9-2. Low-income Population Areas in the Community of Comparison

shows 2010 census block groups in the FNSB that have a higher percentage of low-income households with incomes below the poverty line than the FNSB average of 8.5 percent. According to 2010 data, 26 out of 62 census block groups exceeded the overall FNSB low-income percentage and are considered low-income population areas as a baseline condition.

Concentrations of children are typically found at schools, day care centers, and parks. Concentrations of the elderly can be found at assisted living facilities or nursing homes.

Acoustic Environment (Section 3.3.2.1). Under baseline conditions, no off-base minority or low-income populations and no concentrations of children or the elderly experience noise levels exceeding 45 dB DNL, a level that is considered consistent with ambient noise conditions (see Table 3.3-5 and Figures 3.9-1, 3.9-2, and 3.9-3). On base, three schools and a day care center are exposed to noise levels less than 65 dB DNL (see Table 3.3-5 and Figure 3.9-3). These schools currently experience one indoor speech interference event per hour with either the windows closed or open. Classroom learning interference events are also one event per hour with windows closed or open.

Air Quality (Section 3.4.2.1). Eielson AFB is located in an attainment area for all criteria pollutants with no existing health issues associated with their emissions to affect environmental justice communities, children, and the elderly. However, in the adjacent FNSB region, PM_{10} is in nonattainment and CO is in maintenance.

Safety (Section 3.5.2.1). There is no existing health or other issues related to fire risk and management, accident potential zones, aircraft mishaps, and BASH to affect environmental justice communities, children, and the elderly.

Water Quality (Section 3.12.2.1). There is no existing health or other issues related to water quality to affect environmental justice communities, children, and the elderly.

Hazardous Materials, Hazardous Wastes, Toxic Substances, and Contaminated Sites (Section 3.13.2.1). There is no existing health or other issues related to these hazardous/toxic materials and wastes or contaminated sites to affect environmental justice communities, children, and the elderly.

3.9.2.2 *Airspace*

Under northern JPARC airspace there are several census areas potentially exposed to noise generated by aircraft operations. Table 3.9-2 lists the census areas and identifies the overlying northern JPARC airspace units.

Table 3.9-2. Census Areas underlying Northern JPARC Airspace

Census Area	*Airspace Unit*
Eastern portion of Yukon-Koyukuk Census Area	Yukon 2, 3 High/3A Low, 4, and 5 MOAs/ATCAAs
Southeast Fairbanks Census Area	Yukon 3B MOA/ATCAA, Delta 3 MOA ATCAA, and Delta 4/Buffalo MOAs
FNSB Census Area	Delta 1 MOA/ATCAA, Delta 2/Birch MOAs/ATCAA, Eielson MOA/ATCAA, and Fox 1 and 2 MOAs/ATCAA
Northeast Portion of Valdez-Cordova Census Area	Paxon MOA/ATCAA
Northeast Corner of Matanuska-Susitna Borough	Fox 3 MOA/ATCAA
Northeast Portion of Denali Borough	Fox 3 MOA/ATCAA

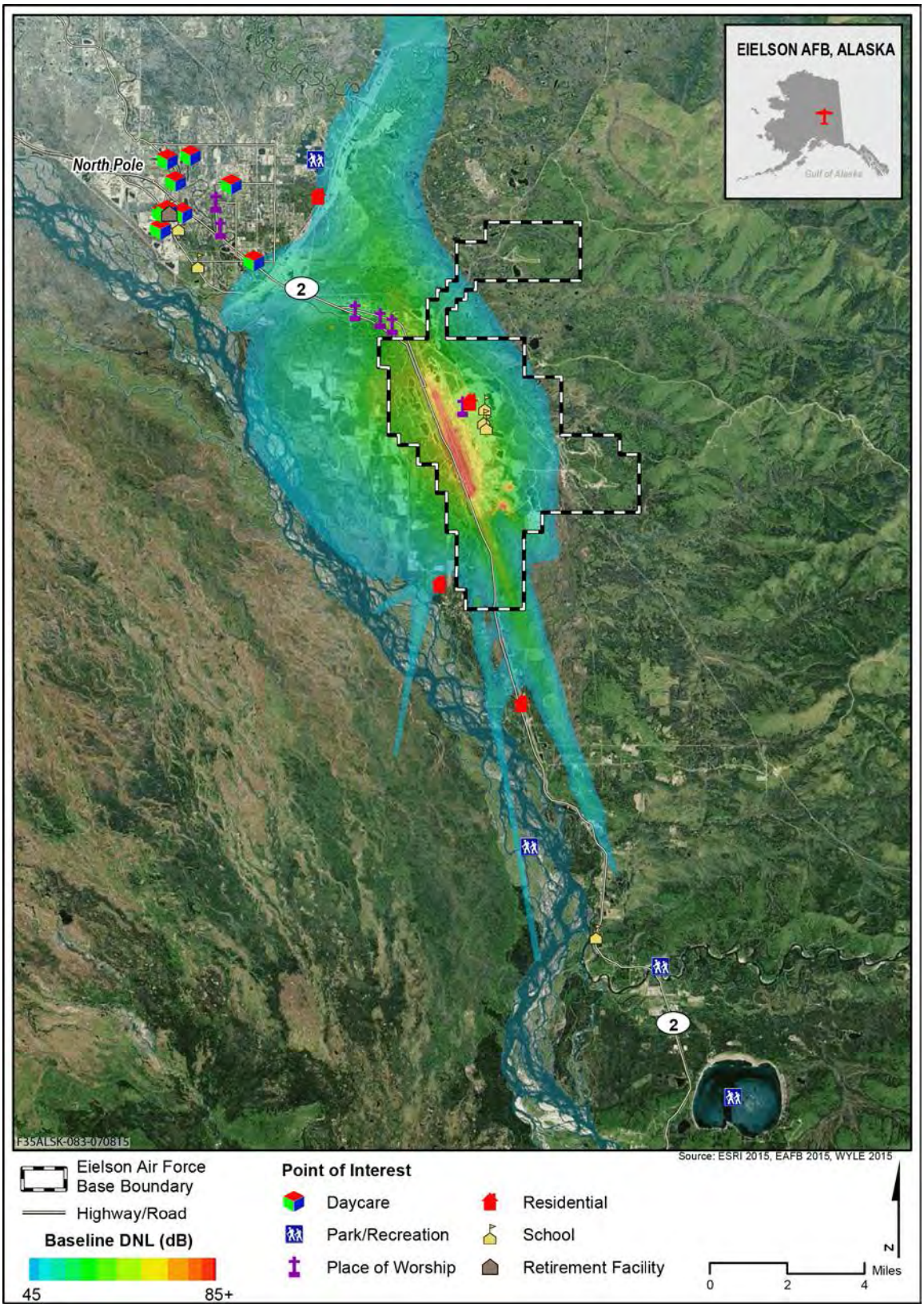


Figure 3.9-3. Baseline Sensitive Populations (Children and the Elderly) Experiencing 45 dB to 85 dB DNL

Demographic information, income status, percent minority populations, as well as the percent of persons under the age of 18 and older than the age of 65 is presented in Table 3.9-3 (U.S. Census 2015).

Table 3.9-3. Demographic Information for Census Areas under Northern JPARC Airspace

Type	*FNSB*	*Southeast Fairbanks Census Area*	*Yukon-Koyukuk Census Area*	*Valdez-Cordova Census Area*	*Matanuska-Susitna Borough*	*Denali Borough*	*Alaska*
Population	98,656	6,969	5,654	9,770	95,892	1,933	710,231
Percent Persons Below Poverty Level	8.5%	13.3%	24.2%	8.3%	9.9%	11.4%	9.9%
Race							
White	77%	80.2%	22.9%	73.8%	84.5%	89.0%	67.3%
Minority	23%	19.8%	77.1%	26.2%	15.5%	11%	3.9%
Percent Population <18 years old	25.4%	25.5%	27.8%	25.0%	27.7%	20.7%	25.6%
Percent Population >65 years old	6.5%	11.4%	12.8%	9.6%	9.9%	8.6%	9.9%

Possible impacts to environmental justice communities, children, and the elderly include the acoustic environment, air quality, safety, water quality, as well as hazardous/toxic materials/wastes and contaminated sites. With the exception of the acoustic environment, none of the resources has existing health or safety issues due to aircraft operating in the northern JPARC airspace. Therefore, these resources are not examined further.

Acoustic Environment (Section 3.3.2.2). Under baseline conditions, no minority or low-income populations or concentrations of children and that elderly experience noise levels exceeding 51 dB L_{dnmr}, a level that is considered consistent with ambient noise conditions (see Table 3.3-10). In terms of noise exposure to supersonic operations (see Table 3.3-14), areas underlying northern JPARC airspace experience a range from a high of 55 dBC in the Yukon 1 MOA to a low of less than 42 dBC. Residential areas such as Delta Junction, Chicken, and the Town of Circle where schools may be present, experience 53, less than 42, and 49 dBC, respectively. Sonic booms during the busiest months (i.e., during major flying exercises) range from 27 per month in Delta Junction, 1 per month in Chicken, and 13 per month in the Town of Circle. Again, these were estimated for the busiest month and represent conditions that occur during the 6 to 8 weeks of major flying exercises. Refer to Figures 3.3-8 and 3.3-9 illustrating other locations and supersonic noise exposure. No environmental justice communities, children, or the elderly are exposed to adverse health or safety impacts from aircraft-generated noise in northern JPARC airspace.

3.10 NATURAL RESOURCES

3.10.1 Resource Definition

Natural resources include living, native, and naturalized plant and animal species, both terrestrial and aquatic, and the habitats within which they occur. For purposes of this EIS, natural resources are divided into four major categories: wildlife, vegetation, wetlands, and special status species. Plant communities and associations are referred to as *vegetation*, while animal species are generally referred to as *wildlife*. Habitat can be defined as the resources and conditions present in an area that produce occupancy, including survival and reproduction, by a given organism (Hall *et al.* 1997). Wetlands generally include swamps, marshes, bogs, and similar areas. Wetlands serve as the transition between terrestrial habitats and aquatic habitats. They are defined by the U.S. Army Corps of Engineers as 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). Special Status Species are defined as: (1) federally listed plant and animal species and their habitats that are protected under the Endangered Species Act; and (2) other special status species, including state listed species that are not federally listed, and other species of special concern identified by state and federal agencies.

The existence and preservation of natural resources are intrinsically valuable; however, these resources also provide recreational, aesthetic, and socioeconomic values to society. The analyses in this EIS focus 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.

3.10.2 Affected Environment

The affected environment for on-base natural resources includes areas located in the Tanana Valley, on and around Eielson AFB, that would be impacted by construction and noise associated with aircraft activities (see Figure 2.2-5). These natural resources are described in detail in the Eielson AFB INRMP and summarized below (Eielson AFB 2012).

3.10.2.1 *Base*

Wildlife

A variety of bird, mammal, and fish species inhabit areas within the affected environment (Eielson AFB 2012). The Tanana Valley provides habitat for year-round resident bird species; as well as, summer-breeding habitat for various migratory bird species. Bird species occurring on Eielson AFB include the great horned owl (*Bubo virginianus*), northern goshawk (*Accipiter gentilis*), Canada goose (*Branta canadensis*), ruffed grouse (*Bonasa umbellus*), willow ptarmigan (*Lagopus lagopus*), and common loon (*Gavia immer*). More than 30 mammal species have been identified at Eielson AFB including moose (*Alces alces*), black bear (*Ursus americanus*), marten (*Martes americana*), red squirrel (*Tamiasciurus hudsonicus*), snowshoe hare (*Lepus americanus*), and beaver (*Castor canadensis*). Lakes, ponds, rivers, and streams are abundant in the Tanana Valley and provide aquatic habitat for multiple fish species. Commonly observed fish species include king salmon (*Oncorhynchus tshawytscha*), rainbow trout (*Oncorhynchus mykiss*), arctic grayling (*Thymallus arcticus*), and northern pike (*Esox Lucius*).

Vegetation

Eielson AFB is located within the Yukon-Tanana Uplands ecoregion that is characterized by rounded mountains and hills of boreal forest or taiga habitats. These boreal forests are dominated by woodland evergreen species of black spruce (*Picea mariana*) and white spruce (*Picea glauca*). Large stands of deciduous forests that include balsam poplar (*Populus balsamifera*), paper birch (*Betula papyrifera*), and quaking aspen (*Populus tremuloides*) are found in boreal forests on and surrounding Eielson AFB. The on-base airfield and developed areas consist of a variety of native and introduced plant species. These developed areas surrounding the airfield are landscaped and maintained by Eielson AFB, which focuses on maintaining vegetation in early stages of succession to discourage use by wildlife inhabiting surrounding areas (Eielson AFB 2012).

Wetlands

Permafrost, or permanently frozen ground is ground/water that has been frozen for at least 2 years, results in poor drainage leading to heavily saturated and wet surface soil conditions. Additionally, many standing water bodies and depressions in the topography fill/flood after precipitation and snowmelt, making conditions favorable for wetland areas to occur. Approximately 52 percent of Eielson AFB is wetlands, composed of 9,453 acres of vegetated wetlands and 792 acres of lakes, ponds, and streams (Eielson AFB 2012). The most commonly observed vegetated wetlands are dominated by black spruce. Brush and groundcover vegetation in black spruce wetlands often comprise bog rosemary (*Andromeda polifolia*), low bush cranberry (*Vaccinium vitis-idaea*), and thick layers of moss. Figure 3.10-1 illustrates wetlands within the affected environment.

Special Status Species

As of April 2015, there are 33 listed or candidate animal species and one listed plant species that are covered by the Endangered Species Act (ESA) that are believed or known to occur in Alaska (USFWS 2014). The Alaska Department of Fish and Game (ADFG) also maintains a State Endangered Species List that as of April 2015 lists five animal species, all of which are also listed and covered by the ESA. There are no plants or animal species listed or covered by the ESA that are known or expected to occur at Eielson AFB. Additionally, there are no areas designated as Critical Habitat on Eielson AFB.

Eielson AFB is located along the migratory bird Pacific Flyway and many species of migratory birds are known to occur at Eielson AFB; many of these are waterfowl that use the abundant wetlands, ponds, and lakes on and surrounding Eielson AFB. Species listed under the Migratory Bird Treaty Act that are known to occur at Eielson AFB include western sandpiper (*Calidris mauri*), osprey (*Pandion haliaetus*), Pacific loon (*Gavia pacifica*), American kestrel (*Falco sparverius*), and black-bellied plover (*Pluvialis squatarola*). Both the bald eagle (*Haliaeetus leucocephalus*) and golden eagle (*Aquila chrysaetos*) are known to occur at Eielson AFB, though no nesting has been recorded. Both are receive protection under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act.

3.10.2.2 *Airspace*

Wildlife

Terrestrial ecoregions underlying the northern portions of JPARC airspace vary from temperate boreal forests to subarctic alpine tundra, and provide habitat for a wide range of wildlife in Alaska. Wildlife species occurring under the northern JPARC airspace are similar to species found around Eielson AFB. Additional major species found in the affected area include: Dall sheep (*Ovis dalli dalli*); caribou (*Rangifer tarandus*); brown bear (*Ursus arctos*); bison (*Bison bison*); gray wolf (*Canis lupus*); and trumpeter swan *(Cygnus buccinators)*

Detailed analyses of the major wildlife species, their ranges, and critical life cycle stages are contained in the 1995 Alaska MOA EIS (Air Force 1995, Sections 3.5.3, 3.5.4, and 3.5.5), as well as the JPARC EIS (Air Force 2013a, Section 3.1.8), and are incorporated in this EIS by reference. These documents are available for review on the F-35A Pacific Operational Beddown EIS web site. The existing information is periodically updated by the ADFG and the USFWS. Temporal and spatial protection measures for “at-risk” species (e.g., moose, caribou, and Dall sheep) are identified in the 11th Air Force Alaska Airspace Handbook as standard operation procedures for Air Force and Air Force-sponsored pilots flying in JPARC airspace (Air Force 2015).

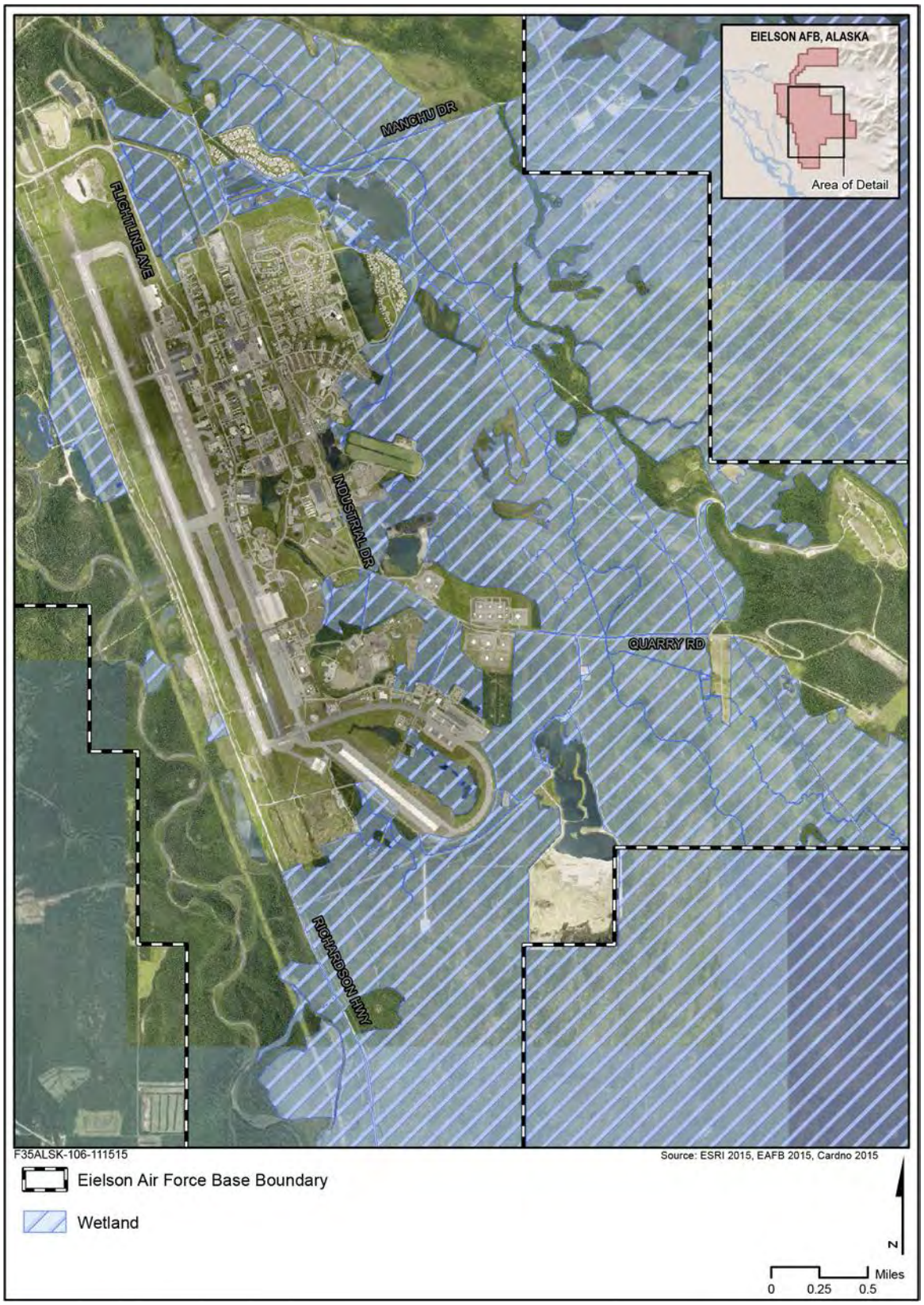


Figure 3.10-1. Wetlands in the Southern Portion of Eielson AFB

Natural resources within the training areas supporting live and inert ordnance and munitions employment (see Table 2.2-6) are managed by the U.S. Army Garrison Fort Wainwright Alaska under their 2013 INRMP and the Eielson AFB 2012 INRMP.

Moose (Alces alces)

In Alaska, moose live in a large area ranging from the Stikine River in southeast Alaska all the way to the Colville River on the Arctic Slope and at present, under all MOAs in the northern JPARC. They are especially abundant on timberline plateaus; along the major rivers of southcentral and interior Alaska; and in recently burned areas that have generated dense stands of willow, aspen, and birch shrubs. About 175,000 to 200,000 moose are widely distributed throughout Alaska. The ADFG intensively manages and monitors moose populations under the northern JPARC airspace through habitat manipulation and harvest limits. Overall populations are considered to be in good condition, with most Game Management Units showing increases.

Due to the accessibility of lands under the northern JPARC by road, boat, or airplane, some of the highest harvest levels take place there. It is estimated that about 30 percent of the entire Alaska moose harvest takes place around Fairbanks in three subunits of Game Management Unit 20, 20A, and 20B, as well as the Central Tanana Valley near Delta Junction in Game Management Unit 20D.

Most moose make seasonal movements to calving, rutting, and wintering areas, traveling anywhere from only a few miles to as many as 60 miles during these transitions. Moose tend to be loners, rarely forming small herds. Any herding that takes place usually occurs during the fall mating season, when males and female congregate in small groups. Because of the dispersed nature of calving and mating, no avoidance areas for moose were identified in either the Alaska MOA EIS (Air Force 1997) or the JPARC EIS (Air Force 2013a).

Caribou (Rangifer tarandus)

There are approximately 750,000 wild caribou in Alaska (including some herds that are shared by Alaska and Canada's Yukon Territory). There are four caribou herds that live under the northern JPARC airspace: Delta, Macomb, Fortymile, and Nelchina, with the Fortymile and Nelchina herds being the largest at 52,000 and 46,500, respectively. Caribou herd populations are somewhat cyclic with the timing of declines and increases, and the size to which herds grow not being very predictable. Although overhunting caused some herds to remain low in the past, today, varying weather patterns (climate), population density, predation by wolves and grizzly bears, and disease outbreaks determine whether most herds increase or decrease.

In Alaska, caribou prefer treeless tundra and mountains during all seasons, but many herds winter in the boreal forest (taiga). Calving areas are usually located in mountains or on open, coastal tundra. Caribou tend to calve in the same general areas year after year, but migration routes used for many years may suddenly be abandoned in favor of movements to new areas with more food. Calving occurs in mid-late May in the interior of Alaska and in early June in northern and southwestern Alaska. If females are in very good condition they can breed when they are 16 months old, but in most herds, they do not breed until they are 28 months old. Most adult cows are pregnant every year and give birth to one calf; twins are very rare. In some areas, wolves, grizzly bears, and golden eagles kill large numbers of newborn calves. The caribou “swamp” the predators, whereby the cows give birth to many calves in a very short

period of time, essentially overwhelming predators in the area with an overabundance of food. Predators and scavengers are also quick to target stillborn or unhealthy calves.

The shedding of velvet (the fur covering on antlers) in late August and early September by large bulls marks the approach of the rutting (breeding) season and the start of fall migration. Fighting begins in early September and becomes more frequent as the rut approaches at the end of the month.

Several avoidance areas are identified in the 11th Air Force Alaska Airspace Handbook to minimize military aircraft operational impacts during calving and rutting periods and include:

- Protecting the Delta caribou herd by establishing a minimum overflight altitude of 3,000 feet AGL over calving areas under Birch and Eielson MOAs, normally May 15 through June 5.
- Avoiding the Nelchina Caribou Hunting Area, under Fox 3 MOA, below 1,000 feet AGL, August 1 through September 30.

Dall Sheep (Ovis dalli dalli)

Dall sheep inhabit the mountain ranges of Alaska, preferring relatively dry country and frequenting a special combination of open alpine ridges, meadows, and steep slopes near to areas with extremely rugged "escape terrain." They use ridges, meadows, and steep slopes for feeding and resting. When danger approaches, they flee to the rocks and crags to elude pursuers. They are generally high country animals but sometimes occur in Alaska in rocky gorges below timberline. These white creatures are most notable for the male's massive curled horns. Females (known as ewes) also carry horns, but theirs are shorter and more slender, and only slightly curved. Until rams reach the age of 3 years, they tend to resemble the ewes quite a bit. After that, continued horn growth makes the males easily recognizable. Horns grow steadily during spring, summer, and early fall. In late fall or winter, horn growth slows and eventually ceases.

Lambs are born to ewes in late May or early June. As lambing time approaches, ewes seek solitude and protection from predators in the most rugged cliffs available on their spring ranges. The first weeks of a lamb's life are precarious. The bulk of the mortality is in first 30 to 45 days of life, when the lambs are most vulnerable. Lambs begin feeding on vegetation within a week after birth and usually are weaned by October. Ewes typically have their first lamb at age three or four and produce a lamb annually.

The diets of Dall sheep vary from range to range. During summer, food is abundant, and wide varieties of plants are consumed. Winter diet is much more limited and consists primarily of dry, frozen grass and sedge stems available when snow is blown off the winter ranges. Some populations consume significant amounts of lichen and moss during winter. Many Dall sheep populations visit mineral licks during the spring and often travel many miles to eat the soil at these unusual geological formations. As several different bands of sheep meet at mineral licks, ram and ewe groups may mingle and young rams join the ram band, which happens to be present at the time. This random contribution of young rams to different ram bands may benefit sheep by maintaining genetic diversity. Sheep are very loyal to their home ranges. Mineral licks are good spots to observe sheep because the animals are so intent on eating the dirt they pay little attention to humans. However, major disturbances such as low-flying aircraft or operating machinery can drive sheep from the mineral licks.

Dall sheep are found under the following northern JPARC MOAs: Buffalo, Eielson, Fox 1, and Yukon 1. The following avoidance/flight restrictions (identified in the 11th Air Force Alaska Airspace Handbook) are followed by Air Force and Air Force sponsored pilots during critical life cycle periods:

- Cirque Lakes Dall Sheep Lambing Area Adjustment, 7-nautical mile (NM) radius around 64°48'00"N, 143°45'00"W, below 5,000 feet AGL, May 10 to June 15 under the Yukon 1 MOA.
- Establishing a minimum overflight altitude of 5,000 feet AGL over lambing areas and spring mineral licks, nominally from May 15 to June 15, and over rutting areas, nominally from November 15 to December 15 under the Buffalo, Eielson, Fox 1, and Yukon 1 MOAs.

Special Status Species

Of the 33 listed animal and plant species that could occur in Alaska, only two are known to occur or may occur in areas underneath the northern JPARC airspace (Table 3.10-1). The short-tailed albatross is seen in the Gulf of Alaska a marine environment and unlikely to occur in interior Alaska. The Eskimo curlew has not been sighted since the 1960s and is not expected to inhabit areas in Alaska (USFWS 2012).

Table 3.10-1. Species Federally Listed as Endangered or Threatened under the Endangered Species Act that May Occur in the northern JPARC Airspace

Common Name	*Scientific Name*	*Status*	*Critical Habitat In Alaska*
Birds			
Short-tailed albatross	*Phoebastria albatrus*	FE, MBTA	No
Eskimo curlew	*Numenius borealis*	FE, MBTA	No

Legend: FE=Federally Endangered, MBTA= Migratory Bird Treaty Act.
Note: *These species spawn on the West Coast of the Lower 48, but may occur in Alaska waters during marine phase of their life cycles.
Source: USFWS 2014.

Migratory Birds

Large numbers of migratory birds are known to occupy a wide variety of habitats under the northern JPARC airspace. These habitats vary from boreal forests of spruce and hardwoods for perching birds to open-water marshes for waterfowl. Due to the large percentage of the trumpeter swan *(Cygnus buccinators)* population that is known to breed in Alaska (80 percent), this species was used as a representative for all waterfowl in the Alaska MOA EIS (Air Force 1997). The population was identified as increasing over the years prior to the EIS, and has continued to increase for the past 20 years (ADFG Species Note). Trumpeter swans are known to be sensitive to disturbances during nesting season, as are other species.

An avoidance area 2,000 feet AGL and 2 NM either side of the river centerline on the Charley, Kandik, and Yukon rivers is identified under Yukon 1-4 MOAs to protect the peregrine falcon area from April 15 to September 15.

3.11 EARTH RESOURCES

3.11.1 Resource Definition

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

- *Topography* – is the natural and fabricated features of a place or region, which show relative positions and elevations at the earth's surface.
- *Geology* – is defined by the distinctive, dominant, easily mapped and recognizable physical characteristics, and features of a volume of rock.
- *Soils* – are unconsolidated earthen materials overlying rock.
- *Geologic Hazards* – are one of several types of adverse geologic conditions capable of causing damage or loss of property and life; for purposes of this analysis it includes seismic activity from earthquakes or fault ruptures.

3.11.2 Affected Environment

3.11.2.1 *Base*

Eielson AFB lies east of the Tanana River on the floodplain of the river with elevations ranging from 525 to 550 feet above MSL. Generally level, the topography of Eielson AFB slopes gently downward to the northwest at a gradient of approximately 6 feet per mile.

Geologic subsurface formations of the central plateau of Alaska formed during the Permian and Devonian periods of the Paleozoic era, roughly 230 to 410 million years ago. Dating back to the Precambrian Period, Yukon-Tanana Terrain comprises most of the Tanana River Valley from just west of Fairbanks east to the Yukon Territory of Canada and is the oldest rock known to occur in interior Alaska. Rock types consist of metamorphic rocks including muscovite-quartz schist, micaceous quartzite, and graphitic schist. These rocks are believed to have formed through metamorphism of shale, mudstone, and sandstone originally deposited along the western margin of North America (Eielson AFB 2012).

Soils in the Tanana River Valley consist of unconsolidated silty sands and gravels, organic silts, sandy silts, and clays. Floodplain soils nearest the active river channel are sandy, with a thin silt loam layer on the surface. On higher terraces, the soils are predominately silt belonging to the Salchaket series. Silt loam soils containing significant organic components, are generally underlain by permafrost, and tend to be cold and wet. Soils containing discontinuous permafrost cover approximately two-thirds of Eielson AFB. Permafrost soils contribute to the large percentage of vegetated wetlands occurring on undeveloped base lands. The developed portion of Eielson AFB is composed of fill material deposited atop reclaimed wetlands (Figure 3.11-1). Much of this area is over 40 years old. Quarried Tanana floodplain gravels, cobble, and soil material built up as poorly sorted material to a thickness of between 3 and 8 feet, comprise the substrate of the developed portion of the base. This substrate also provides a firm platform for base construction that is devoid of wetlands, above the 100-year floodplain, and insulated from the permafrost layer.

In terms of geologic hazards, Alaska rates as one of the most seismically active in the U.S. (Alaska Earthquake Information Center 2014). Eielson AFB is located north of the Denali Fault (Haeussler and Plafker 2004) and numerous smaller faults are mapped in the Tanana River basin (Eielson AFB 2012). According to Earthquake Tracker (2014), over 500 small earthquakes have occurred in the past year in the region encompassing the FNSB and Eielson AFB. In the summer and fall of 2014, several earthquakes of around magnitude 5.0 were felt in the region. Historically, a magnitude 7.3 earthquake occurred in 1937, with the epicenter at Salcha Bluff, about 13 miles southeast of Eielson AFB.

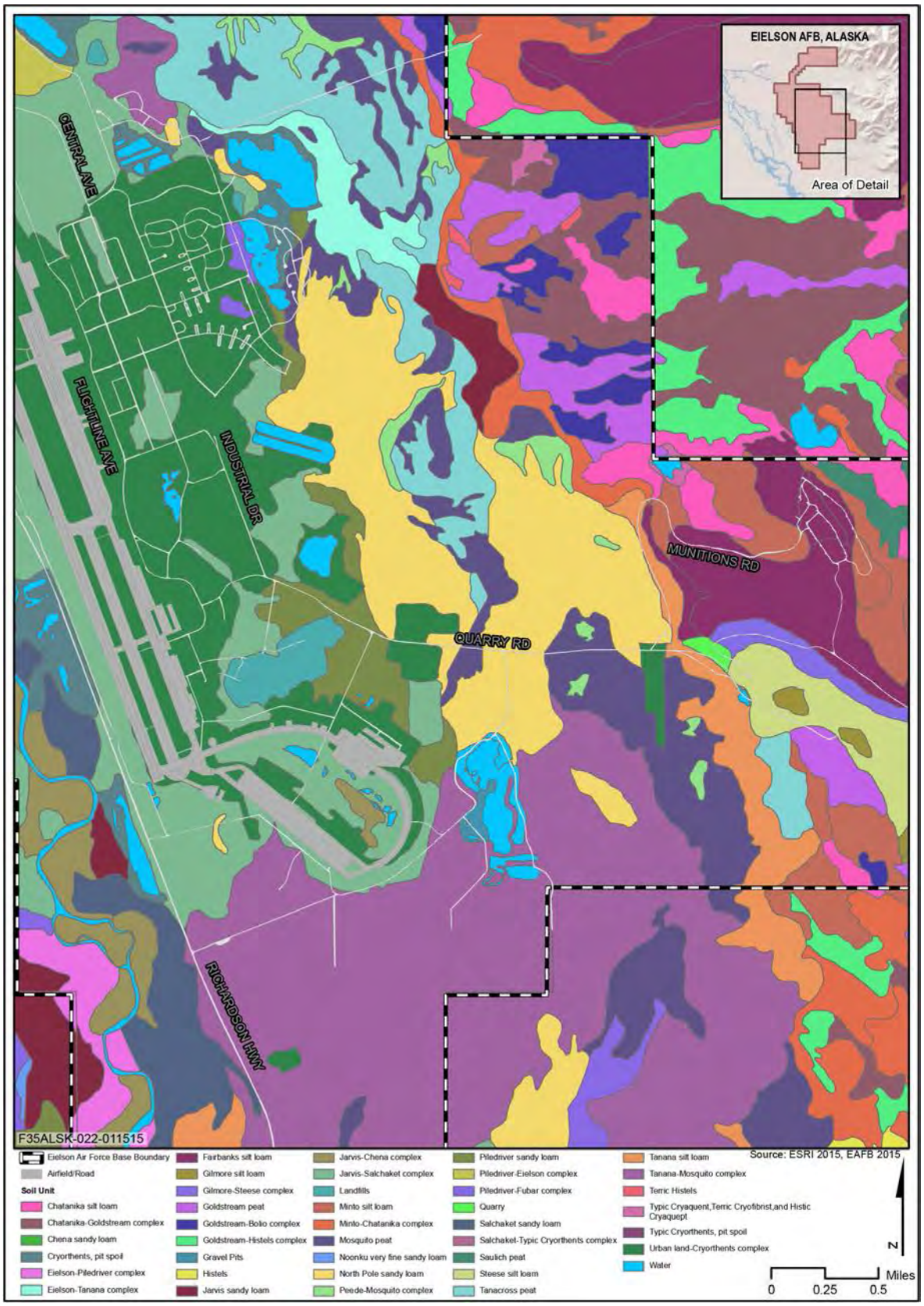


Figure 3.11-1. Soil Units within the Southern Portion of Eielson AFB

3.11.2.2 *Airspace*

Aircraft operations would not affect topography, geology, soils, or geologic hazards; therefore, this aspect of earth resources is not evaluated further.

3.12 WATER RESOURCES

3.12.1 Resource Definition

Water resources include the quantity and quality of groundwater and surface water bodies, wastewater, stormwater, and floodplains (wetlands are addressed in Section 3.10, *Natural 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, the goal of which is "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters."

The Clean Water Act 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. The state of Alaska, Department of Environmental Conservation (ADEC) assumed full authority to administer the wastewater and discharge permitting programs from USEPA on October 31, 2012. These permits fall under the Alaska Pollution Discharge Elimination System (APDES), within ADEC. Wastewater is any water that has been adversely affected, through anthropogenic means, and has decreased quality. Sources of wastewater include industrial processes, stormwater runoff, sanitary processes, and equipment washing. Stormwater is excess surface water that occurs or collects during periods of frequent precipitation and is typically diverted into a facility's wastewater system.

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 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.

3.12.2 Affected Environment

The affected environment for water resources includes Eielson AFB, as well as groundwater and surface water bodies on base and adjacent to the base.

3.12.2.1 *Base*

Quantity and Quality

Quantity. Eielson AFB is located in the FNSB, within the Tanana River Valley, which contains an extensive aquifer system. The Tanana Valley Alluvial Aquifer is approximately 45 to 50 miles wide and 8 to 10 feet below ground surface at the base. Due to the presence of snow pack and heavy rainfall periods in the area, water depths fluctuate seasonally in the aquifer. The Tanana River is the primary water source for the aquifer, with secondary contributions from the Chena River. The Chena River typically only contributes water when its stage is high and the Tanana is low. The Tanana River gets approximately 85 percent of its water from snowmelt of the Alaska Range and 15 percent from the Yukon-Tanana uplands (Alaska Community Action on Toxics 2003). All potable water comes from on-base wells. The wells, with the exception of the wells for the central heat and power plant, have the ability to pump 6,500 gallons per minute and the base currently uses 550,000 to 650,000 gallons per day.

Quality. Eielson AFB's Public Water System is permitted through a community water system that consists of six sources located on base. Groundwater is extracted from the aquifer and is delivered to the water treatment plant located on Eielson AFB where it is treated, disinfected, and then distributed (Eielson AFB 2014b). Potable (drinking) water quality monitoring is conducted annually by the installation, and a summary report is made available to the public through ADEC. In the spring of 2015, the base detected perfluorinated chemicals in some of their wells; the base is working with state regulators to address this issue (see Section 3.13.2.1 for further detail of this topic).

Stormwater and Floodplains

Stormwater. The majority of on-base stormwater flow is overland or sheet flow directed towards Garrison Slough and French Creek. Garrison Slough passes directly through the developed portion of the base and is primarily an engineered drainage channel that drains to Moose Creek. Portions of the slough are enclosed in culverts. Garrison Slough is the only impaired water body located on Eielson AFB. French Creek is located along the eastern boundary of the base. To identify and manage areas where stormwater contamination could occur due to industrial processes, sectors have been established and categorized by the types of industrial operations that occur there. These sectors are managed and maintained in accordance with the base Stormwater Pollution Prevention Plan.

The current Stormwater Pollution Prevention Plan was completed in July 2015, and details Standard Operating Procedures, Best Management Practices, and assessment of contamination potentials. All potential stormwater leaving regulated industrial sectors on the installation is contained on site by structural Best Management Practices or flows into Garrison Slough (Eielson AFB 2014c). Eielson AFB received coverage under the ADEC 2015 APDES, Multi-Sector General Permit for stormwater discharges associated with industrial activities (APDES permit: AKR060000) on September 15, 2015 (APDES tracking number: AKR06AD14). This permit expires on March 31, 2020, unless administratively extended. ADEC has also issued coverage to Eielson AFB, under APDES Construction General Permit number AKR100000, for discharges from large and small construction activities effective February 1, 2016. This permit will expire at midnight, January 31, 2021, unless administratively extended. When new permits are needed, Eielson AFB applies for coverage.

Floodplains. Floodplains are managed in accordance with EO 11988, *Floodplain Management* (May 1977) and as amended in EO 13690, *Establishing a Federal Flood Risk Management Standard and*

Process for Further Soliciting and Considering Stakeholder Input (January 2015). Floodplains managed under this program are defined as those areas having a 1 percent chance of flooding in any given year, or the 100-year floodplain. The Draft EIS used the old Flood Insurance Rate Maps prepared by the U.S. Department of Housing and Urban Development for FNSB, as identified in the current Eielson AFB Integrated Natural Resources Management Plan. The FNSB considers the older version of the flood insurance map to be more realistic, because it takes into account the diking effect that the Richardson Highway provides the base. The Draft EIS identified that approximately 33 percent of Eielson AFB (6,480 acres) lies within the 100-year floodplain (Figure 3.12-1). However, with issuance of the Final Implementing Guidelines for EO 11988 (October 2015), the more conservative Federal Emergency Management Agency (FEMA) map for Eielson AFB is used to evaluate impacts to floodplains in the Final EIS. This map identifies that approximately 52 percent of the base (10,318 acres) lies within the 100-year floodplain of the Tanana River, including a majority of the southern portion of the Eielson flight line (Figure 3.12-2).

Outside of the developed portions of the base, the FEMA 100-year floodplain is dominated by a mixture of vegetation types, ranging from white spruce-hardwood forests on the west side of the Richardson Highway, to black spruce brushfields and wetlands on the east side (Figure 3.12-3). In the event of a 100-year flood event, these vegetation types would serve to slow the force of floodwaters by trapping or filtering out woody material and silt.

Since its establishment in 1943, the Eielson AFB flight line has never been flooded. The 2008 flooding of the Salcha and Tanana Rivers, which caused substantial flooding of the Salcha community to the south (upstream) of Eielson AFB. A flood level of 26.53 feet was recorded on the Tanana River, 2.03 feet above the flood stage of 24.5 feet at Fairbanks. Although Fairbanks is downstream of the base, it is the official flood-elevation monitoring site for the Tanana River. The August 1967 Flood of Record for the Tanana River was measured at 27.8 feet. Neither of these flood events, resulting from unusually heavy summer rains, caused flooding on Eielson AFB.

3.12.2.2 *Airspace*

Aircraft operations would not affect water quantity or quality, stormwater, or floodplains; therefore, this aspect of water resources is not evaluated further.

Figure 3.12-1. FNSB 100-Year Floodplains within the Southern Portion of Eielson AFB

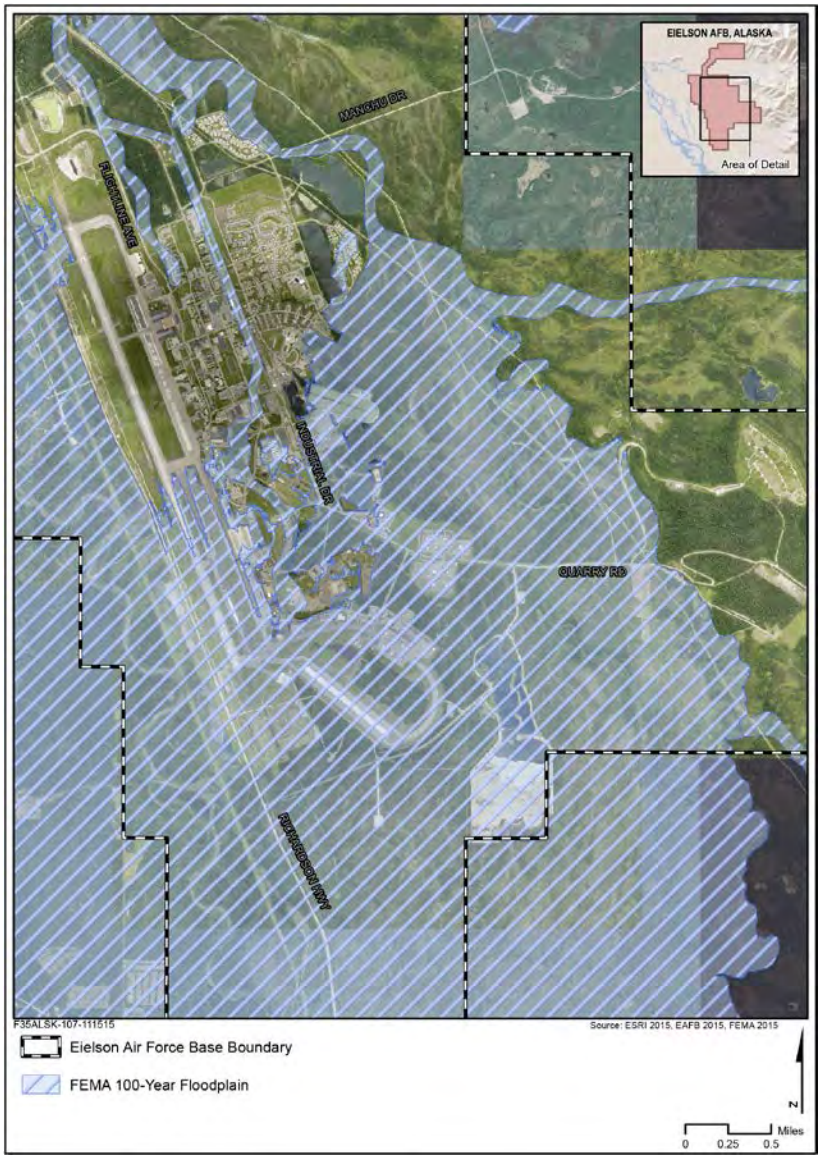


Figure 3.12-2. Federal Emergency Management Agency 100-Year Floodplains within the Southern Portion of Eielson AFB

Figure 3.12-3. Eielson AFB Vegetation Map

3.13 HAZARDOUS MATERIALS, HAZARDOUS WASTES, TOXIC SUBSTANCES, AND CONTAMINATED SITES

3.13.1 Resource Definition

"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 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.

3.13.1.1 *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.

3.13.1.2 *Hazardous Waste*

Hazardous wastes are defined and regulated under the federal Resource Conservation and Recovery Act (USEPA 2014). Before a material can be classified as a hazardous waste, it must first be defined as a solid waste. 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).

3.13.1.3 *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, lead-based paint, polychlorinated biphenyls, and radon.

3.13.1.4 *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 Installation Restoration Program, Formerly Used Defense Sites, Military Munitions Response Program, and Base Realignment and Closure. Appendix D.3 provides further detail on these program categories.

3.13.2 Affected Environment

3.13.2.1 *Base*

Hazardous Materials

Hazardous materials are used at Eielson AFB in support of aircraft operations and maintenance missions including petroleum, oil, and lubricants management and distribution. Types of hazardous materials used for aircraft maintenance include solvents, solder (lead and silver), batteries, liquid cooling oil, lubricating oils, sludge oil, hydraulic fluid, paint, jet propellant-8 (or JP-8) fuel, diesel fuel, motor gasoline, antifreeze, scrap metal, bead blast metals (lead and cadmium), and contaminated solids. In addition, an on-base hydrazine facility is operated to service F-16 hydrazine systems.

Hazardous materials on Eielson AFB used by tenants and contractor personnel are controlled through the Hazardous Materials Pharmacy Program (HAZMART)/Installation HAZMART Management Program pollution prevention process (AFI 32-7086, February 2015). This process provides centralized points of contact and management of the acquisition, tracking, use, handling, and disposition of hazardous materials and offers support for the turn-in, recovery, reuse, recycling, or disposal of hazardous wastes. The HAZMART process includes review and approval by Eielson AFB personnel to ensure users are aware of exposure and safety risks (Eielson AFB 2010). The Defense Logistics Agency determines the ultimate off-site disposition of recycled materials including metals and other recyclable materials.

The Eielson AFB Oil and Hazardous Substances Discharge Prevention and Contingency Plan (Eielson AFB 2010) addresses spill prevention, contingency planning, and emergency response. This integrated plan satisfies the applicable federal and state regulatory requirements for a Spill Prevention, Control, and Countermeasure Plan, Facility Response Plan, and Resource Conservation and Recovery Act Contingency Plan and Emergency Procedures. In addition, State of Alaska requires an Oil and Hazardous Substance Discharge Prevention and Contingency Plan and a Facility Response Plan for the Flint Hills Resources to Eielson AFB Pipeline. Each generation point has a site-specific contingency plan, which addresses spill prevention and emergency actions specific to materials and activities associated with the site (Eielson AFB 2010).

Hazardous Waste

Eielson AFB is regulated as a large quantity hazardous waste generator under the Resource Conservation and Recovery Act. The Eielson AFB Hazardous Waste Management Plan (2014d) governs the Eielson AFB Hazardous Waste Management Program. Building 4388 houses the Hazardous Waste Facility that serves as the 90-day central accumulation site. In addition to the 90-day accumulation site, there are 27 satellite accumulation points near work locations and 3 other accumulation sites. The Civil Engineer Environmental Element oversees the Hazardous Waste Program and the Infrastructure Systems oversees the operations and management of the Hazardous Waste Facility (Eielson AFB 2014d). Typical hazardous waste streams for aircraft maintenance include: abrasive blast media; aerosol cans; alodine; asbestos brakes; batteries; filters for oil and fuel; paint booth filters; parts washer filters; glycol; hydrazine

(F-16 aircraft); oil/water separator sludge; paints and primer wastes; solvent contaminated patches and Q-tips; contaminated rags; rinse water; sealing kits and compounds; used oil and fuels; parts washer and solvent tank sludge; and weapons cleaning solution (Eielson AFB 2014d).

Toxic Substances

The Asbestos Management Plan provides guidance for identifying asbestos containing material and managing asbestos wastes, disposed of at an on-base permitted landfill (Eielson AFB 2010d). The Asbestos Material Program is coordinated by the Civil Engineer Environmental Element, but generally implemented by the Base Civil Engineer who maintains building survey records, project reviews, and material removals.

Older facilities on Eielson AFB may have been painted with lead-based paint. Alterations of structures suspected of containing lead-based paint are conducted in accordance with applicable regulations and according to the Eielson AFB Lead-Based Paint Management Plan (Eielson AFB 2015e). Samples of potential lead-based paint are screened using a Toxicity Characteristic Leachate Procedure to determine if the lead-based paint meets/exceeds Resource Conservation and Recovery Act levels, to determine the proper disposal process (Air Force 2013a). Proper disposal of any resulting lead-containing wastes is conducted in accordance with federal regulations, including the Toxic Substances Control Act and the Occupational Safety and Health Act.

Environmental Restoration Program

The DoD developed the Environmental Restoration Program to facilitate cleanup of sites contaminated by past military activities regulated under Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The USEPA and State of Alaska jointly regulate the sites with CERCLA contaminants. Petroleum-contaminated sites are designated as Compliance Restoration Sites and are addressed under State of Alaska regulations. Figure 3.13-1 shows the Installation Restoration Program sites located on the main base and Figure 3.13-2 identifies the Compliance Restoration Sites. There are currently 119 Environmental Restoration Program and Compliance Restoration Sites in various phases of remedial action. On the main base, all remedial actions are in place for areas with potential to affect human populations. Clusters of sites are bundled into Operable Units, and Operable Units 1, 2, 3, 4, 5, and 6 have RODs and Remedial Actions in place. In addition to the Operable Units sites, there are individual sites such as disposal pits, spill sites, etc.

Following the 2013 Five Year Review, required by CERCLA, most of the remedies in place were found not to be protective. Eielson AFB reopened the remedial investigations for many of these sites. An Addendum to the 2013 Five Year Review was completed and agreed to by regulators, which identifies the protectiveness status for all sites and provides time frames for conduct of further remedial investigations (Eielson AFB 2015).

The Air Force implements a Military Munitions Response Program that identifies past munitions use and identifies the appropriate response. The Air Force uses a Comprehensive Site Evaluation concept modeled after the Preliminary Assessment/Site Assessment process used for Comprehensive Environmental Response, Compensation, and Liability Act sites. Eielson AFB has 45 Munitions Response Area sites in their Military Munitions Response Program and are shown in Figure 3.13-3.

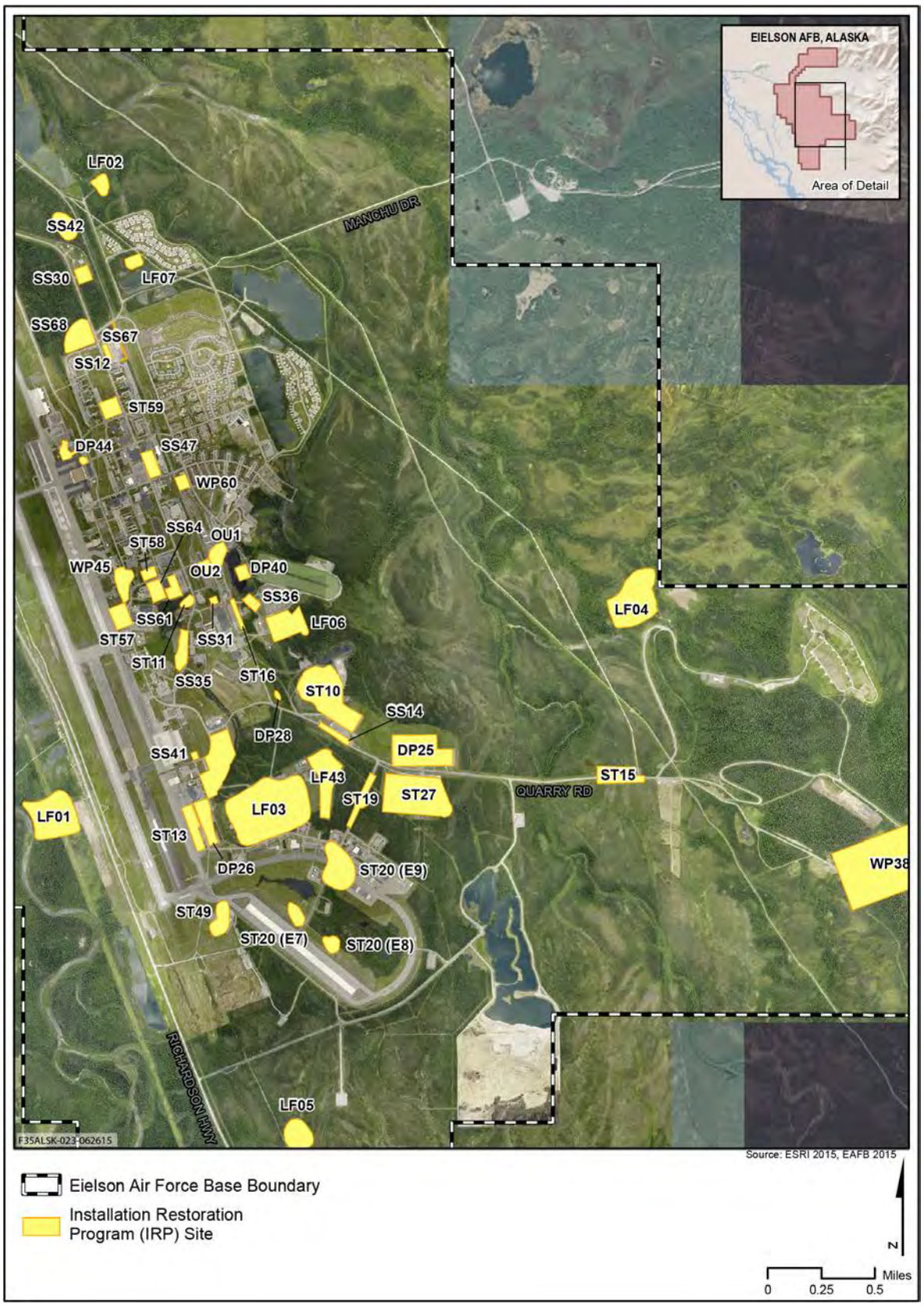


Figure 3.13-1. Installation Restoration Program Sites in the Southern Portion of Eielson AFB

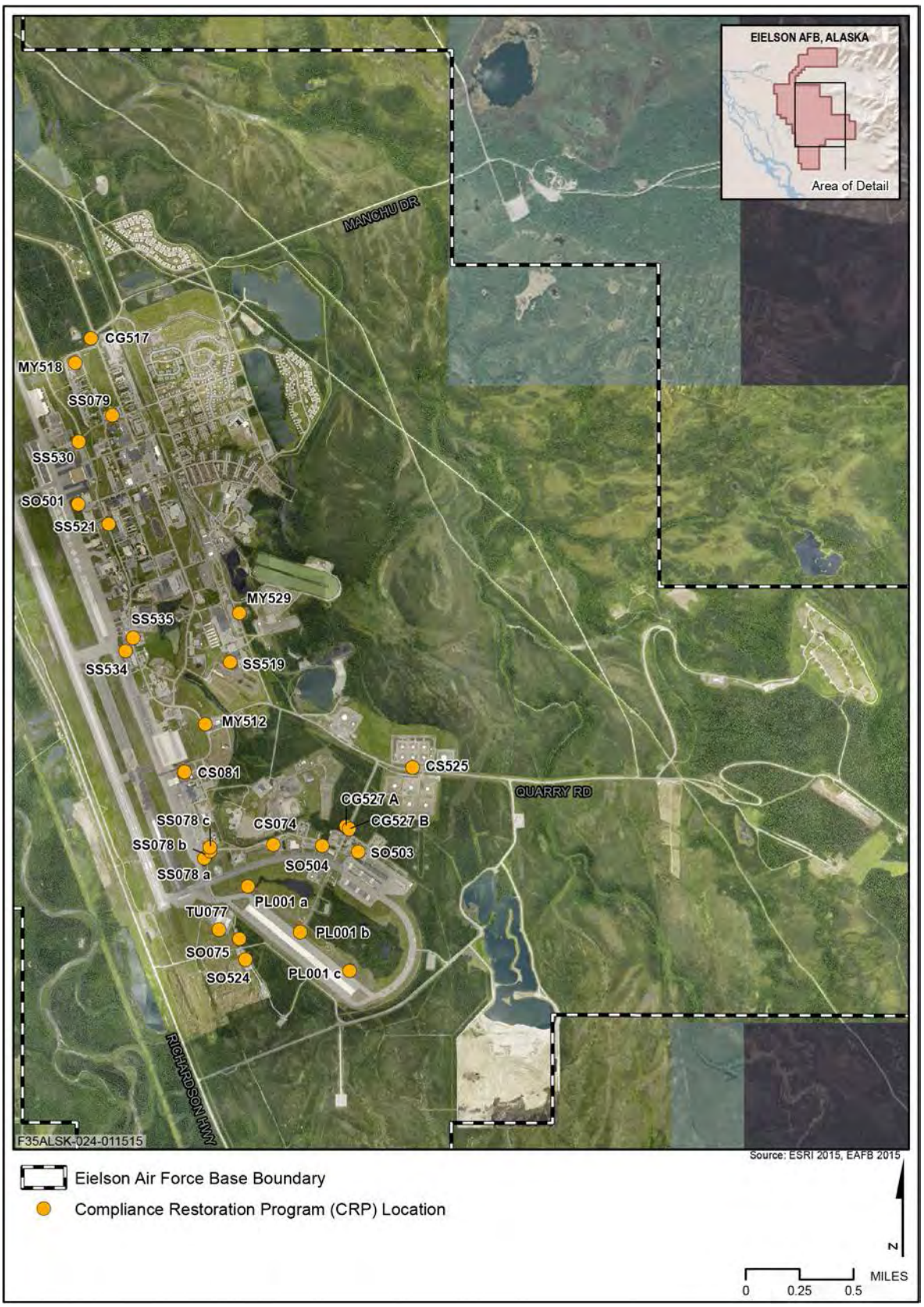


Figure 3.13-2. Compliance Restoration Sites in the Southern Portion of Eielson AFB

Figure 3.13-3. Military Munitions Response Program Sites in the Southern Portion of Eielson AFB

The Military Munitions Response Program addresses issues related to munitions and explosives of concern and munitions constituents associated with Munitions Response Areas, as well as related hazardous substances, pollutants, and contaminants of potential concern. Eielson AFB completed Phase I of a Comprehensive Site Evaluation, with Phase II currently being developed. Further investigation and remediation activities are still in early planning stages. Eielson AFB recently discovered issues with Aqueous Film Forming Foam containing perfluorooctane-sulfonic acid and perfluorooctanoic acid affecting groundwater. The base is working with the USEPA and ADEC to determine the appropriate course or courses of action to resolve the issue.

3.13.2.2 *Airspace*

Hazardous materials used by aircraft operating in northern JPARC airspace consist of various components and fluids from the aircraft itself. The plastic and other residual parts of chaff and flares after deployment are inert and non-hazardous. As presented in Section 3.5.2.1, a Hazardous Aerospace Material Mishap Emergency Response Integrated Process Team was chartered in 2000 by the Deputy Assistant Secretary of the Air Force for Environmental, Safety and Occupational Health. The goals of the Hazardous Aerospace Material Mishap Emergency Response project were to identify and inventory all hazardous aerospace materials on Air Force weapon systems and ensure procedures were in place to protect personnel from safety/health hazards associated with aerospace vehicle mishaps. The test program included full-scale fire testing of composite materials for toxicology and expected exposure to response personnel.

Some general conclusions included (Wright *et al*. 2003):

- Burn data suggest that the combustion characteristics of composite materials are roughly equivalent to other combustible materials. Combustion products released by burning composite materials are similar to those released from other solid combustibles.
- Burning of composite materials can release fibers that are respirable.
- Respirable fibers released from burning composite materials can penetrate into the lungs, causing respiratory irritation. Factors known to affect the toxicity of these inhaled fibers include dosage, physical dimensions, retention time in the lung, location of deposition in the lung, and solubility of the fibers in the lung.
- Exposed fibers along the edges of fragmented composite debris present a dermal puncture hazard. The skin can be irritated and sensitized if punctured by exposed fibers.
- The toxicity of combustion products from burning aircraft composite materials currently used does not appear to be exceptional. Types and quantities of combustion products from burning composite materials fall within the same spectrum as other burning combustibles at an aircraft mishap site.
- No additional smoke toxicity hazards created by burning composite materials were identified.
- Personal protective equipment recommendations for firefighters responding to composite aircraft mishaps include a self-contained breathing apparatus, standard firefighter protective clothing and/or proximity suits, and steel-tipped/-shanked boots.

The Air Force has specific emergency-response procedures for aircraft mishaps involving composite materials contained in Technical Order 00-105E-9 (Air Force 2001).

3.14 RECREATIONAL AND VISUAL RESOURCES

3.14.1 Resource Definition

Recreational resources are outdoor recreational activities that take place away from the residences of participants. Resources may include public facilities in suburban and urban areas, such as parks, playing fields, amphitheaters, and outdoor sports facilities. Other resources are located in remote natural areas managed for recreation by state and federal agencies. Such areas may include wilderness areas, rivers, picnic sites, campgrounds, historical and educational locations, and trails designated for public outdoor recreational use (Air Force 2013a).

Visual resources include the features of an area, such as landforms, vegetation, water surfaces, and cultural modifications that define the overall impression of a landscape. Such features may be considered to be visual resources without demonstrable aesthetic appeal. This impression is referred to as visual character. Visual character is used as a point of reference to assess whether the proposed action would appear compatible with landscape features or would contrast noticeably or unfavorably with them.

Visual resources also are defined by viewer expectations, values, goals, awareness, and concern regarding visual quality. Visual sensitivity refers to the relative degree of public interest in visual resources and concern over changes in the quality of these resources. Sensitivity refers to public attitudes about specific views, or interrelated views, and viewsheds, and is used to identify the importance of visual resources. Laws, regulations, plans, and policies may protect certain views, indicating high sensitivity.

3.14.2 Affected Environment

The affected environment for recreational and visual resources comprises facilities on and around Eielson AFB and areas beneath the northern JPARC airspace potentially impacted by aircraft activities (see Figure 3.7-1).

3.14.2.1 *Base*

Recreation

Recreational opportunities and facilities are an integral part of planning and development at all Air Force bases. Eielson AFB provides a variety of indoor and outdoor recreation opportunities. Outdoor recreational areas on base include athletic fields, trails, campgrounds, lakes, an outdoor track, as well as indoor athletic facilities (Air Force 2013a). In the summer months, Bear Lake Family Camp is open May 15 through Labor Day and includes 41 camper pads and 8 tent sites. Amenities include showers, restrooms, and a pavilion equipped with a kitchenette, picnic tables, and volleyball and horseshoe areas. Eielson AFB Iceman Falls Ski Area and Sled Hill are open for winter use. The Iceman Falls Lodge provides winter equipment rentals. The Eielson Skeet & Trap Range is located near the lodge on Quarry Road.

On the western side of Richardson Highway, the land outside of the base is undeveloped natural forest and some cultivated agricultural land with associated rural facilities. Land to the south/southeast of the base is mostly uninhabited; rural roads and a small airstrip provide some access for recreational use (predominantly hunting and fishing) (Air Force 2013a). The Birch Lake Military Recreation Area, located about 45 miles south of Eielson AFB, includes rental cabins and opportunities for fishing and camping, boating, and parties.

Visual

Eielson AFB buildings generally do not exceed three stories in keeping with the base and surrounding environment. The base maintains Architectural Compatibility Standards for continuity among the buildings. Landscape development has been limited. The short growing season and harsh winters create a challenge for landscaping. Lawns, trees, and some native plantings have been established throughout the base (Air Force 2007).

3.14.2.2 *Airspace*

Recreation

The extensive area underlying JPARC airspace is largely undeveloped and supports diverse recreational opportunities in parks, forests, and open lands that are ideal for hunting, fishing, and/or solitude or wilderness experiences. Hunting and fishing in Alaska is closely tied to subsistence and livelihoods, with special provisions under ANSCA.

Proportionately, most of the land is publicly owned (either state or federal) or is owned by Alaska Native Corporations, with only a very small portion held privately. There are a number of small towns and villages throughout the area that occur along roads and highways, as well as in remote areas accessible only by waterways or small planes (Air Force 2013a). Appendix D.4 provides further detail of special use areas under the northern JPARC airspace. Designated land and special use areas include large public land such as state or national parks, trails, monuments, WSRs, conservation areas, forests, refuges, and reserves. Some of these may have individual campgrounds, trail systems, and visitor centers (Air Force 2013a).

Several nationally designated WSR corridors partially underlie the airspace (Figure 3.14-1). The Birch Creek WSR underlies Yukon 2 MOA. Charley National WSR underlies Yukon 1, 2, 4, and 3A Low MOAs. The Fortymile WSR underlies a portion of Yukon 3A Low and Yukon 3B MOAs. The Gulkana WSR underlies Fox 3 and Paxon MOAs, and Delta WSR underlies Delta 4/Buffalo and Paxon MOAs, as well as a small portion of Fox 3 MOA. These WSRs support varying levels of visitation and use for recreation, hunting, subsistence harvesting, and other diverse outdoor public uses (Air Force 2013a). The Charley WSR is managed by the NPS and the BLM oversees Birch Creek, Fortymile, Delta, and Gulkana WSRs (see Appendix D.5, Figure D-2, which illustrates Alaska's system of WSRs). The JPARC Final EIS, Appendix I.2 provides a lengthy description of federal and state special use areas underlying northern JPARC airspace (Air Force 2013a).

As presented in Section 3.3.2.2, people recreating in Steese National Conservation Area experience L_{dnmr} of 47 dB and less than 45 dB in all the other special use areas (see Table 3.3-11). From supersonic flight, the highest CDNL is 53 dBC for Steese National Conservation Area and Charley WSR (see Table 3.3-14). Booms per busiest month at special use areas range between 1 at Fortymile WSR to 28 at the Steese National Conservation Area and Charley WSR (see Table 3.3-14). The busiest month occurs during the major flying exercises that take place between April and October.

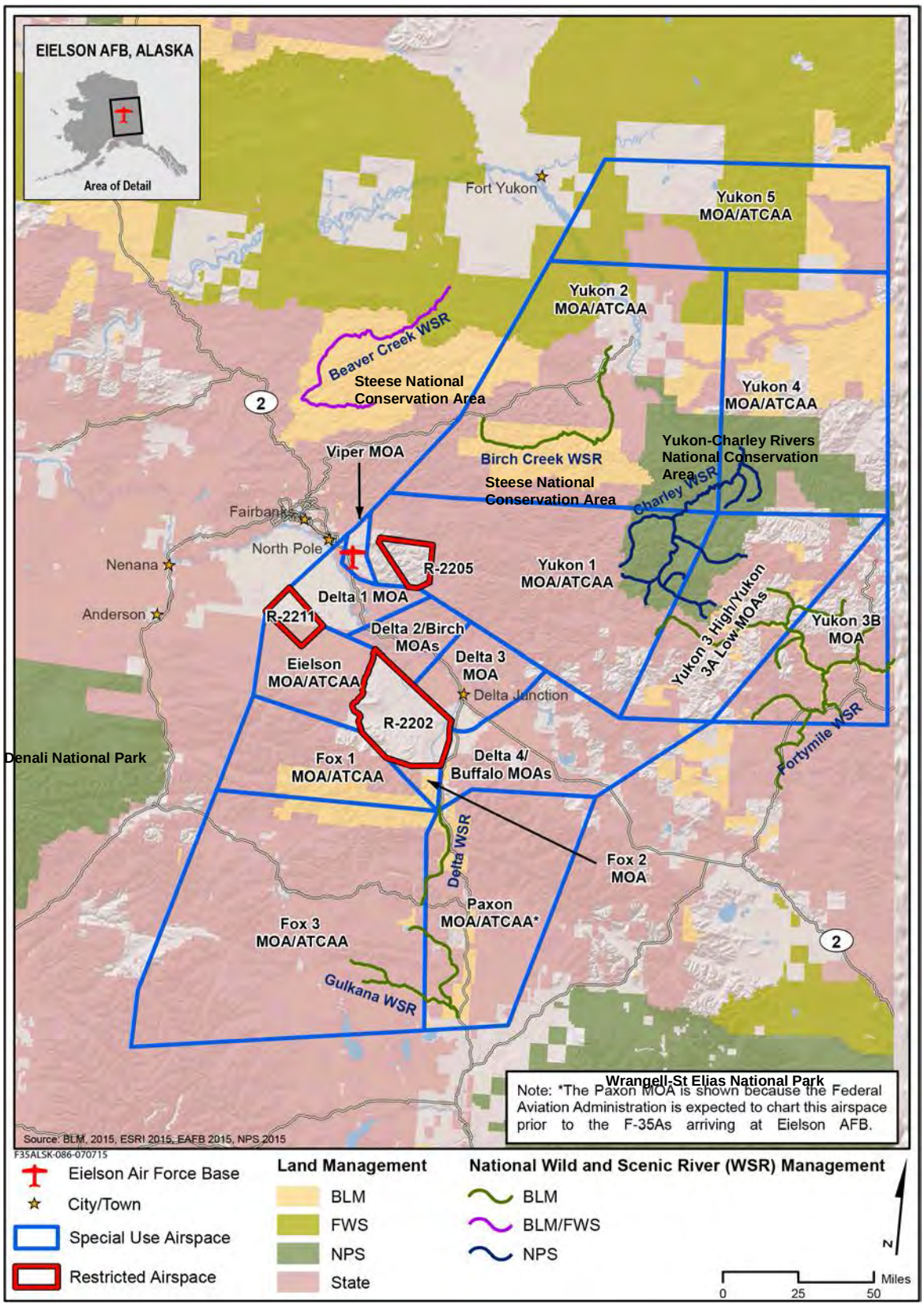


Figure 3.14-1. National Wild and Scenic Rivers underneath Northern JPARC Airspace

All individuals (including military personnel) who hunt or recreate in areas underlying northern JPARC airspace must follow state and local fish and game regulations. Military personnel are briefed upon arrival at Eielson AFB of these regulations. If a violation is observed, as is the case for any fish and game violations, the Alaska Wildlife Trooper office (in charge of enforcement) is contacted through their local offices in Fairbanks, Delta Junction, and Tok or violations reported via the Fish and Wildlife Safeguard organization at 1-800-478-3377.

Visual

The current management of visual resources under the airspace is guided by decisions made in the existing land use plans (BLM 1980) and river management plans (BLM 1983), and NPS general management plans including the Consolidated General Management Plan for Denali National Park and Preserve. These resource and river management plans establish general Visual Resource Management (VRM) goals, which are to:

1) maintain scenic quality by adhering to visual resource management objectives while implementing a program of visual assessment of all surface-disturbing activities, such as, new access trails, mining activities, off highway vehicle use, support structures and developments, and recreational facilities;
2) manage National WSR corridors to maintain the natural landscape; and
3) manage viewsheds to maintain the natural landscape.

The BLM has identified visual resources according to VRM classes for the Fortymile National WSR, Gulkana National WSR corridor, and Delta National Wild, Scenic, and Recreational River. The NPS incorporates the VRM classes into plans as appropriate. These VRM classes are based on conditions such as scenic quality, viewing distance zones, and viewer sensitivity levels. The VRM class objectives and their descriptions are:

VRM Class I: The objective of Class I is to preserve the existing character of the landscape. This class provides for natural ecological changes; however, it does not preclude very limited management activities. The level of change to the characteristic landscape should be very low and should not attract attention.

VRM Class II: The objective of this class is to retain the existing character of the landscape. The level of change to the landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer. Any changes to the landscape must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.

VRM Class III: The Class III objective is to partially retain the existing character of the landscape. The level of change to the landscape should be moderate. Management activities may attract the attention of the casual observer, but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape

VRM Class IV: The objective of Class IV is to provide for management activities that require major modifications to the existing character of the landscape. The level of change to the landscape can be high. The management activities may dominate the view and may be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repetition of the basic visual elements of form, line, color, and texture (BLM 2012).

Areas identified as sensitive include known travel routes, especially state scenic byways, areas of human habitation, and areas of traditional use. Several locations under northern JPARC airspace have potentially high visual sensitivity because area residents and visitors view the natural landscape as very important and have a high level of interest and sensitivity to changes to the natural landscape. Management activities that could adversely affect visual resources in this remote setting include construction of recreational or other facilities, electrical transmission lines or pipelines, personal use harvest of timber for firewood or house logs, off highway vehicle trails, and wildland or prescribed fire. The BLM has identified trending impacts to visual resources as recreational use and development and mineral exploration and development within their planning areas (BLM 2012). Aircraft overflight is not mentioned as an activity of concern.

Delta National Wild, Scenic, and Recreational River and Gulkana National Wild River corridors were specified as Class I VRM viewsheds by the BLM, with the primary objective of retaining the existing character of the landscape. Class I VRM objectives state "The level of change to the characteristic landscape should be low, and management activities may be seen, but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color and texture that are found in the predominant natural features of the characteristic landscape." While several sensitive river corridor areas are protected by restricted overflight areas, it should be noted that the Wilderness Act (16 USC 410aaa-82), or other land management laws generally applicable to the National Park or Wilderness Preservation Systems designated by the Act, do not restrict or preclude military overflight including:

a. low-level overflights of military aircraft over the area designated as wilderness under this section, including military overflights that can be seen or heard within any wilderness area;
b. flight testing and evaluation; or
c. the designation or creation of new units of SUA, or the establishment of military flight training routes over the wilderness area.

This Page Intentionally Left Blank.

4.0 Environmental Consequences

4.0 ENVIRONMENTAL CONSEQUENCES

4.1 INTRODUCTION

Chapter 4 presents the environmental consequences of the proposed beddown of two F-35A squadrons at Eielson Air Force Base (AFB). It addresses impacts for each of the resources presented in Chapter 3. To identify the potential environmental consequences, this section (Chapter 4) overlays the components of the alternatives (Section 2.2) onto the affected environment (Chapter 3). Refer to Table 2.5-1 for a comprehensive matrix comparing the potential impacts of the Proposed Action and No-Action Alternatives as well as any necessary mitigation measures. Cumulative effects of the F-35A beddown proposal with other past, present, and reasonably foreseeable future actions are presented in Chapter 5.

The Air Force performed the impact analysis according to the nature of the proposed activity (construction, demolition, and/or aircraft operations) and the potential impact these activities would have upon the resource. The year 2021 was chosen to evaluate aircraft operations at the airfield and in the airspace. That year represents the peak when all 48 Primary Assigned Aircraft (PAA) and 6 Backup Aircraft Inventory would be operating at Eielson AFB and would be the most conservative (i.e., the greatest) number of aircraft operations that would occur at the base and in Joint Pacific Alaska Range Complex (JPARC) airspace. Table 4.1-1 identifies the elements of the Proposed Action that would likely affect the resource category.

Table 4.1-1. Proposed Action Elements Impacting Resources

Resource Category	*Construction*	*Aircraft Operations*
Airfield and Airspace Operations and Management	✓	✓
Acoustic Environment	✓	✓
Air Quality	✓	✓
Safety	-	✓
Socioeconomics	✓	✓
Land Management	-	✓
Cultural Resources	✓	✓
Environmental Justice and Protection of Children	✓	✓
Natural Resources	✓	✓
Earth Resources	✓	-
Water Resources	✓	-
Hazardous Materials, Hazardous Wastes, Toxic Substances, and Contaminated Sites	✓	✓
Recreation and Visual Resources	✓	✓

In the following sections, environmental consequences are evaluated as either a direct or an indirect impact. The National Environmental Policy Act (NEPA) (40 Code of Federal Regulations [CFR] § 1508.8) defines “direct impacts” as those specifically caused by the action and that occur at the same time and place. “Indirect impacts” are caused by the action and are later in time or farther removed in distance but are reasonably foreseeable. A determination was made as to whether the impacts would be adverse. If the impact was found to be significantly adverse, then a determination was made as to whether it could be mitigated.

For purposes of this analysis, F-35A operations would adhere to the mitigations, best management practices, and standard operating procedures presented in the Final JPARC Environmental Impact Statement (EIS) in Chapter 3 and Appendix K, *Mitigations, Best Management Practices, and Standard*

Operating Procedures as well as those presented in the Record of Decision (ROD) (Air Force 2013a, 2013c). Adherence to these measures when operating in northern JPARC airspace would reduce the potential for adverse impacts to most resources. However, where existing practices cannot mitigate the adverse impacts sufficiently, additional proposed mitigations are provided at the end of the impact discussions for the applicable resource category.

The proposed mitigations in the Final EIS represent the measures identified by the Air Force to avoid, reduce, or implement management actions to minimize potential adverse impacts. They are included herein to provide the public, government agencies and officials, and other interested organizations with the necessary information on the selected mitigations and to request input on these mitigations during the Final EIS stage. The decision document (i.e., the ROD) for this EIS will identify mitigations adopted by the Air Force as part of implementing the Proposed Action Alternative. The Air Force gave serious consideration to adopting mitigations that protect the environment to the degree deemed reasonable and practicable but allow for implementation of the Proposed Action without compromising its purpose and need.

The No-Action Alternative serves as a benchmark for decision makers to evaluate the environmental consequences of the action alternatives. As presented in Section 2.2.1, no action means that no F-35A beddown would occur at this time either at Eielson AFB or in the Pacific Air Forces Area of Responsibility, and that no associated construction or personnel increases would be implemented to support the beddown. However, planned and programmed infrastructure improvements would still occur and routine training and major flying exercises would continue. Aging legacy aircraft such as the F-18 and EA-6B would be replaced. The No-Action Alternative reflects the conditions that would be found at the base and in the northern JPARC airspace in calendar year 2021, in the absence of the F-35A.

The following is an analysis of the Proposed Action Alternative where two F-35A squadrons would be based at Eielson AFB and operate in northern JPARC airspace. Impacts of the Proposed Action Alternative are compared to the No-Action Alternative. To support the Proposed Action, additional personnel and dependents would move to the base, facility and infrastructure construction would occur, and infrastructure upgrades and modifications would be undertaken (see Section 2.2.2). Additional aircraft operations at the airfield and within JPARC airspace are anticipated as well.

4.2 AIRFIELD AND AIRSPACE OPERATIONS AND MANAGEMENT

The assessment of airfield and airspace use and management discusses how the No-Action and Proposed Action Alternatives would affect air traffic within the airspace of the Eielson AFB airfield (or its airfield environment) and northern JPARC airspace. This resource impact analysis focuses on changes in use that would result from the addition of annual airfield and airspace operations with the F-35A beddown. No modifications or additions are proposed for the JPARC airspace structure. Impacts on air traffic were assessed with respect to the potential for disrupting air traffic patterns and systems and changing existing levels of air traffic safety.

Impacts would be considered adverse if the increased number of flight operations could not be accommodated within established operational procedures and flight patterns; if there were a requirement to modify airspace; or if air traffic might increase collision potential between military and non-participating civilian operations. In addition, the analysis evaluated the potential for conflicts with civil aviation.

4.2.1 No-Action Alternative

4.2.1.1 *Base*

Under this alternative, airspace use in the Eielson AFB terminal airspace, and arrival and departure routes would remain similar to that described in Section 3.2.2.1. The total number of operations (takeoffs and landings) at Eielson AFB would remain at 18,963 as presented in Table 2.2-4. The No-Action Alternative would not change the configuration or management of Class D airspace around Eielson AFB. No impacts would occur from the No-Action Alternative to use and management of the Eielson AFB airfield environment.

4.2.1.2 *Airspace*

Management and use of the northern JPARC restricted areas, Military Operations Areas (MOAs), and Air Traffic Control Assigned Airspace (ATCAAs) would continue as presented in Table 2.2-5 to support training and major force exercises. No changes to any of the JPARC airspace, save those already approved (i.e., the Paxon and Fox MOAs expansions, which are anticipated to be published by the Federal Aviation Administration [FAA] prior to calendar year 2021), are anticipated under the No-Action Alternative. The No-Action Alternative would have no effect on the airspace and altitudes authorized for supersonic flight within JPARC (see Table 2.2-5), and continued adherence to all flight restrictions, limitations, and seasonal adjustments codified in the 11th Air Force Alaska Airspace Handbook would occur. Appendix D, Section D.1 summarizes the applicable standard operating procedures that all Air Force and Air Force-sponsored pilots must follow when flying in JPARC airspace. No impacts would occur, resulting from implementing the No-Action Alternative, in northern JPARC airspace operations and management.

4.2.2 Proposed Action Alternative

4.2.2.1 *Base*

The proposed F-35A beddown would not adversely affect the use and management of Class D airspace surrounding Eielson AFB. The proposed F-35A annual airfield operations are projected to be approximately 26,106 once all F-35As arrive at the base. By early 2021, this activity would raise total airfield operations by approximately 138 percent. Even though the total operations would increase, it would not affect airfield or surrounding terminal airspace management and use within the local air traffic environment.

Eielson AFB was surveyed for the F-35A beddown by Headquarters Air Force staff, and the runway and terminal airspace capacity were found to be adequate for two squadrons of F-35A aircraft and their additional annual airfield operations (Air Force 2014a). No changes to the Eielson AFB terminal airspace or base arrival and departure procedures would be required to accommodate F-35A aircraft performance or operations. These routes were established due to terrain and obstacle clearance, civil air traffic routes, available airspace, navigational aid coverage, noise abatement, and operational characteristics of aircraft based at Eielson AFB. The increased operations would not exceed the capabilities of Eielson AFB approach control or its control tower for handling air traffic within the local airspace. There would be no short- or long-term adverse impacts to Eielson AFB airfield and airspace structure.

4.2.2.2 *Airspace*

Under the Proposed Action Alternative, F-35A activities would not alter the structure or management of JPARC restricted areas, MOAs, and overlying ATCAAs. Additionally, the existing Memoranda of Agreement, MOA-029, between the Army and the City of Delta Junction, would remain in effect as presented in the 2006 ROD for Construction and Operation of Battle Area Complex and a Combined Arms Collective Training Facility (United States [U.S.] Army 2006). Table 4.2-1 presents the operational numbers projected under the No-Action Alternative in calendar year 2021 and the proposed F-35A operations. This increase would not tax the capability of northern JPARC airspace, requiring no changes to airspace dimensions or management other than scheduling use of particular airspace units. The F-35A training activities would occur throughout the restricted areas (R-2202, R-2205, and R-2211) for air-to-ground training and the numerous MOAs and ATCAAs would continue to be used for air-to-air combat training and exercises.

F-35A operations would not require any changes to the airspace approved for supersonic operations. Current forecasts estimate the F-35A would fly supersonic approximately 3.5 percent of the time during training, increasing overall JPARC supersonic activity by approximately 11 percent. There would be no short- or long-term impacts to northern JPARC airspace structure.

Table 4.2-1. Proposed Action Alternative Annual Operations for Northern JPARC Airspace

Airspace Unit	*No Action (calendar year 2021)*	*F-35A Proposed (calendar year 2021)*	*Total*
Birch MOA	4,672	433	5,105
Buffalo MOA	4,672	433	5,105
Delta 1 MOA[1]	2,908	690	3,598
Delta 2 MOA[1]	3,618	690	4,308
Delta 3 MOA[1]	3,618	690	4,308
Delta 4 MOA[1]	3,618	690	4,308
Delta ATCAA	4,808	760	5,568
Eielson MOA/ATCAA	7,034	3,387	10,421
Fox 1 MOA/ATCAA	7,056	3,387	10,443
Fox 2 MOA	6,749	3,387	10,136
Fox 3 MOA[2]/ATCAA	6,507	3,387	9,894
Paxon High MOA/ATCAA[2]	4,071	3,387	8,088
Paxon Low MOA[1, 2]	3,618	920	4,538
Yukon 1 MOA/ATCAA	5,568	2,540	8,108
Yukon 2 MOA/ATCAA	5,568	2,540	8,108
Yukon 3A Low/3 High MOAs/ATCAAs	3,759	2,540	6,299
Yukon 3B MOA[1]	3,417	690	4,107
Yukon 4 MOA/ATCAA	3,447	1,270	4,717
Yukon 5 MOA/ATCAA[1]	3,417	690	4,107
Viper B MOA/ATCAA	5,568	2,540	8,108
R-2202A/B/C/D	10,168	3,387	13,555
R-2205	6,334	2,540	8,874
R-2211	3,031	3,387	6,418
Blair ATCAA	3,898	3,387	7,285

Source: Air Force 2015a.
Note: [1]Operations only during major flying exercises.
[2]If the lower floors of these MOAs are not charted by the FAA, then the F-35As would conduct operations within the higher floor configurations of the Fox 3 MOA and Paxon ATCAA. Total operations would not change and would be distributed similarly as presented above; aircraft would maintain their operations in the higher altitudes.

The FAA is currently evaluating the airspace configurations identified in the JPARC ROD (Air Force 2013c), which would lower the Fox 3 MOA and create the Paxon Low MOA, both with floors of 500 feet Above Ground Level (AGL) (refer to Figure 2.2-4 and Table 4.2-1). The FAA comment period closed at the end of May 2015 and a final decision on the proposal is expected within the following 12 to 18 months. If approved, both MOAs would be used by the F-35A. If not approved, F-35 would operate in the currently charted Fox 3 MOA/ATCAA and Paxon ATCAA. As this would increase the altitude of aircraft in these two airspaces, the noise impacts would be slightly less than calculated in this EIS (see Section 4.3.2.2).

4.2.2.3 *Civil and Commercial Aviation Airspace Use*

Information regarding the scheduled and real-time use of the airspace would be available through the Special Use Airspace Information Service (SUAIS), Eielson Range Control, Notice to Airmen, Air Traffic Control, and Flight Service Stations to increase pilot awareness of the daily military flight activities. All civil and commercial pilots are encouraged to make maximum use of these resources to help increase flight safety and minimize flight risks for all concerned. Visual Flight Rule (VFR) pilots are also encouraged to file flight plans to increase general awareness of their activities. It is contingent upon all military, civil, and commercial pilots during airspace operations to exercise greater situational awareness using see and avoid practices. Military pilots use both visual observation and onboard radar systems that "see" transponder-equipped aircraft well beyond visual range to take necessary actions to avoid any non-participating aircraft within this airspace. Because aircraft without transponders cannot always be observed by onboard radar systems, FAA and other aviation safety concerns encourage VFR pilots to equip their aircraft with transponders.

While VFR aircraft can operate through an active MOA, informal indicators suggest that an increasing segment of this aviation community may elect to avoid active airspace. This may create impacts if these pilots were to cancel or delay their flights, or otherwise fly increased travel distances around active airspace to avoid conflicts. Taking such actions may particularly affect those business and other aviation interests having a timely need to provide subsistence or other support to areas affected by military activities in northern JPARC airspace.

Such impacts resulting from a VFR pilot's decision to avoid active airspace are difficult to quantify. However, several standing procedures and practices have been implemented in accordance with the 11th Air Force Alaska Airspace Handbook (11th Air Force 2015:86-94) (see Table 3.2-2 and Appendix D.1 for a general outline of procedures and practices prescribed for northern JPARC airspace). Mitigations and other initiatives to better accommodate VFR air traffic in this region are identified and include designated corridors, no-fly zones, and avoidance areas for the common VFR routes, airfields, and other flight sensitive locations used by VFR air traffic (see Appendix D.1). Ongoing interaction between Eielson AFB, the Alaska Civil/Military Aviation Council, and state and federal agencies, as well as continued use of the SUAIS, ensures continued compatibility of military and commercial/civil aviation in the affected environment of Eielson AFB and JPARC airspace. No significant adverse impacts to civil and commercial aviation activities are anticipated to airspace management and use under the Proposed Action Alternative.

4.2.3 Mitigation

As there are no significant adverse impacts either on base or in the airspace, no mitigation measures are identified under the No-Action Alternative. For the Proposed Action Alternative, no mitigation measures

are identified for the on-base airfield or airspace operations and management because no significant adverse impacts are anticipated.

4.3 ACOUSTIC ENVIRONMENT

4.3.1 No-Action Alternative

4.3.1.1 *Base*

Under the No-Action Alternative, based aircraft operations would remain identical to baseline at 18,963 annual operations. Transient operations would remain identical to baseline except for the transition of older airframes, such as the AV-8B Harrier II, F/A-18 Hornet, and EA-6B Prowler, to newer airframes such as the F-35B (the replacement for AV-8Bs and F/A-18s) and the EA-18G Growler (the EA-6B replacement). See Table 3.3-3 for the operations used to analyze noise under the No-Action Alternative.

As found under baseline conditions, 99 percent of the acreage exposed to Day-Night Average Sound Level (DNL) greater than or equal to 65 decibels (dB) occur on Department of Defense (DoD)-owned land. However, 19 acres of off-base land (18.3 acres to the north and 0.4 acres to the south), one household to the north, and based on census data and multiplier, an estimated three people (see Table 3.3-4) would be exposed to noise levels between 65 and 70 dB DNL. Departures of based F-16 aircraft and the arrival portion of based KC-135R pattern operations would continue to be the largest contributors to the DNL levels north of the base. Transient heavy cargo (e.g., C-5) aircraft arrivals would contribute the most DNL to the south of the base. Figure 4.3-1 illustrates DNL contour bands and representative points of interest (POIs) immediately adjacent to the base; Figure 4.3-2 illustrates all POIs evaluated in this EIS.

Identical to baseline, the F-16C, at approximately 2,000 feet AGL when crossing the northern boundary of Eielson AFB, would continue to exhibit the greatest Sound Exposure Level (SEL) and Maximum Sound Level (L_{max}) values of the aircraft shown due to departures to the north. Arriving from the south and descending through 1,000 feet AGL, the heavy cargo-type aircraft (represented by the C-5A) would continue to exhibit the greatest SEL and L_{max} values of the aircraft shown in Figure 3.3-3.

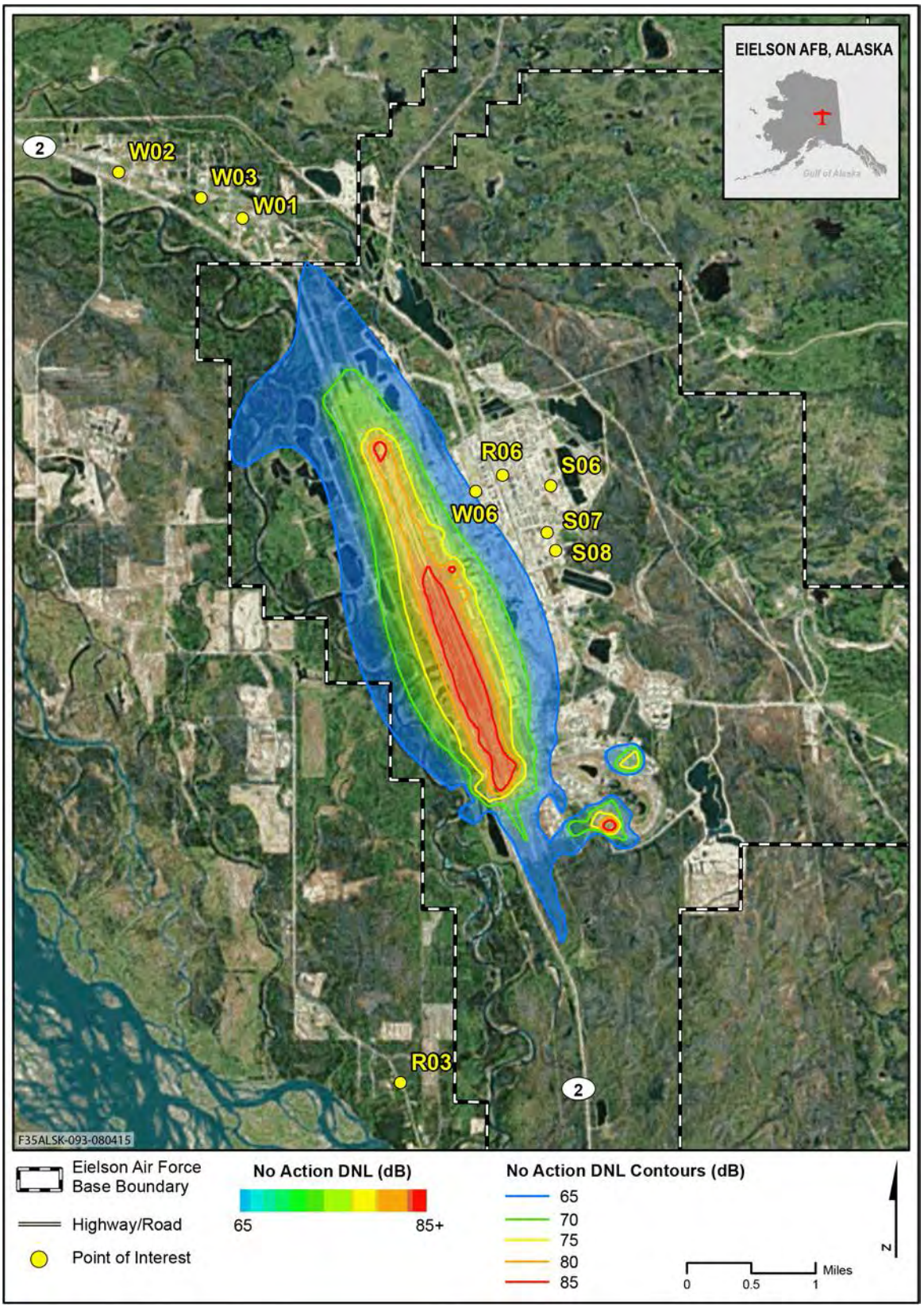


Figure 4.3-1. No-Action Alternative DNL Contours for Annual Average Daily Aircraft Operations and Representative POIs On and Off Eielson AFB

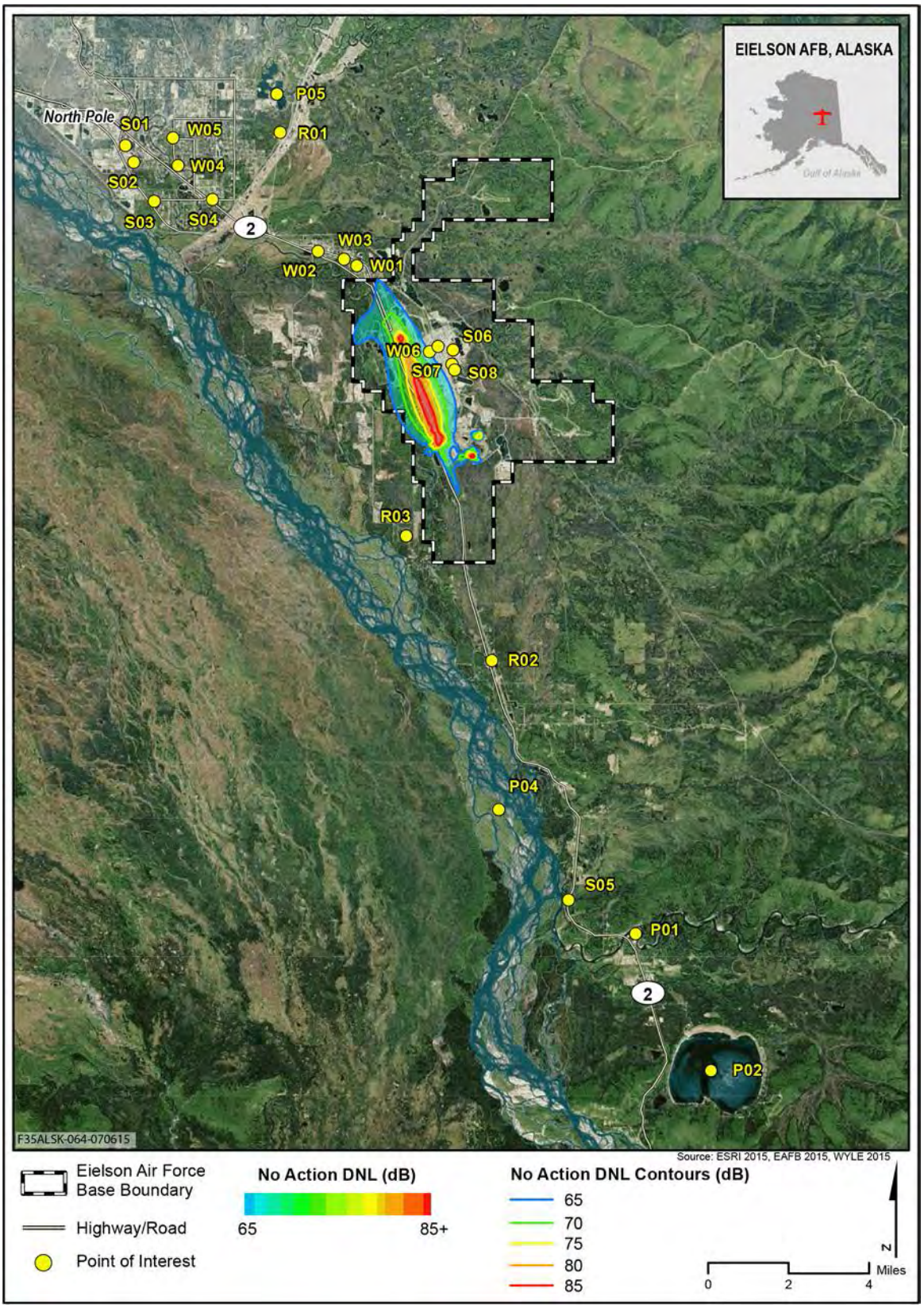


Figure 4.3-2. No-Action Alternative DNL Contours for Annual Average Daily Aircraft Operations and Representative POIs On and Off Eielson AFB

Population

Table 4.3-1 presents aircraft DNLs for representative POIs potentially affected by noise generated at Eielson AFB under the No-Action Alternative (see Figure 4.3-2). With the exception of the Eielson AFB Chapel and base dormitories, no other POI, on or off base, experiences DNL greater than or equal to 65 dB. This difference is because the AV-8Bs and F/A-18s would be replaced by F-35Bs, and the EA-6Bs replaced with EA-18Gs. There would be no impacts when compared to baseline conditions. In two instances, at POI R02 and W03, there would be a DNL of 1-dB decrease in the noise level. However, the minimum change in sound level that an average human ear can detect is about 3 dB, so this 1-dB decrease would not be noticeable.

Table 4.3-1. No-Action Alternative DNL for Representative POIs On and Off Eielson AFB

Type	*ID*	*POI*	*On Base?*	*Baseline DNL (dB)*	*No-Action DNL (dB)*	*Change from Baseline*
Park (includes recreation and wildlife)	P01	Salcha River State Recreation	No	<45	<45	N/A
	P02	Harding Lake		<45	<45	N/A
	P04	Tanana Valley State Forest		<45	<45	N/A
	P05	Chena Lakes		46	46	0
Residential	R01	Tare Nike Missile Site	No	47	47	0
	R02	6615-6647 Richardson Highway		46	45	-1
	R03	Old Valdez Trail		48	48	0
	R06	Eielson AFB Housing Area	Yes	62	62	0
School/ Day Care	S01	North Pole Elementary School/ Eagle Wings Assisted Living	No	<45	<45	N/A
	S02	North Pole Middle School		<45	<45	N/A
	S03	Association of Village Council Presidents Head Start		<45	<45	N/A
	S04	Loving Learning Day Care		46	46	0
	S05	Salcha Elementary School		<45	<45	N/A
	S06	Anderson Elementary School/ Child Development Center	Yes	59	59	0
	S07	Ben Eielson Junior/Senior High School		61	61	0
	S08	Crawford Elementary School		61	61	0
Place of Worship/ Residential	W01	Moose Creek Baptist Church	No	61	61	0
	W02	Pioneer Baptist Church		55	55	0
	W03	Church of Christ		59	58	-1
	W04	Lord of Life Lutheran Church		<45	<45	N/A
	W05	North Pole Missionary Chapel		<45	<45	N/A
	W06	Base Chapel/Base Dorms	Yes	65	65	0

Legend: N/A=Not Applicable.

Speech Interference. Table 4.3-2 presents the indoor speech interference condition under the No-Action Alternative. Across the POIs, data reveal that interference events would average about one per hour for windows closed. With windows open, events would range from one to two per hour. For the No-Action Alternative, there would be no changes in impacts when compared to baseline conditions.

Table 4.3-2. No-Action Alternative Indoor Speech Interference Events at Representative On- and Off-Base POIs

Type	***ID***	***POI***	***On Base?***	***No-Action Daily Indoor Daytime[1] (7:00 a.m. to 10:00 p.m.) Events per Hour***		***Change from Baseline***	
				Windows Closed	*Windows Open*	*Windows Closed*	*Windows Open*
Residential	R01	Tare Nike Missile Site	No	-	-	0	0
	R02	6615-6647 Richardson Highway		-	-	0	0
	R03	Old Valdez Trail		-	1	0	0
	R06	Eielson AFB Housing Area	Yes	1	1	0	0
School/ Day Care	S01	North Pole Elementary School/ Eagle Wings Assisted Living	No	-	-	0	0
	S02	North Pole Middle School		-	-	0	0
	S03	Association of Village Council Presidents Head Start		-	-	0	0
	S04	Loving Learning Day Care		-	-	0	0
	S05	Salcha Elementary School		-	-	0	0
	S06	Anderson Elementary School/ Child Development Center	Yes	1	1	0	0
	S07	Ben Eielson Junior/Senior High School		1	1	0	0
	S08	Crawford Elementary School		1	1	0	0
Place of Worship/ Residential	W01	Moose Creek Baptist Church	No	1	1	0	0
	W02	Pioneer Baptist Church		1	1	0	0
	W03	Church of Christ		1	1	0	0
	W04	Lord of Life Lutheran Church		-	-	0	0
	W05	North Pole Missionary Chapel		-	-	0	0
	W06	Base Chapel/Base Dorms	Yes	1	2	0	0

Note: [1]With an indoor maximum sound level of at least 50 dB, assumes 17 dB and 27 dB of noise level reduction for windows open and closed, respectively.

Classroom Learning Interference. Table 4.3-3 presents the potential for classroom learning interference for No-Action Alternative conditions on and off base. With windows open or closed none of the schools or day care centers, over an 8-hour period, would experience noise levels that exceed 62 dB Equivalent Noise Level ($L_{eq(8)}$). For the No-Action Alternative, there would be no changes in impacts when compared to baseline conditions except a 1-dB decrease at Salcha Elementary School. Again, the minimum change in the sound level that an average human ear can detect is about 3 dB; therefore, this reduction in sound level would not be noticeable. There would be no change in the number of learning interference events under the No-Action Alternative when compared to baseline.

Table 4.3-3. No-Action Alternative Classroom Learning Interference On and Off Eielson AFB

Description			***No Action***					***Change from Baseline***				
			Outdoor $L_{eq(8h)}$ *(dB)*	*Indoor*				*Outdoor* $L_{eq(8h)}$ *(dB)*	*Indoor*			
				Windows Open		Windows Closed			Windows Open		Windows Closed	
ID	*POI*	*On Base ?*		$L_{eq(8h)}$ (dB)	Events per Hour[1]	$L_{eq(8h)}$ (dB)	Events per Hour[1]		$L_{eq(8h)}$ (dB)	Events per Hour[1]	$L_{eq(8h)}$ (dB)	Events per Hour[1]
S01	North Pole Elementary School/Eagle Wings Assisted Living	No	36	19	-	9	-	0	0	0	0	0
S02	North Pole Middle School		38	21	-	11	-	0	0	0	0	0
S03	Association of Village Council Presidents Head Start		42	25	-	15	-	0	0	0	0	0
S04	Loving Learning Day Care		49	32	-	22	-	0	0	0	0	0
S05	Salcha Elementary School		36	19	-	9	-	-1	-1	0	-1	0
S06	Anderson Elementary School/Child Development Center	Yes	63	46	1	36	1	0	0	0	0	0
S07	Ben Eielson Jr./Sr. High School		65	48	1	38	1	0	0	0	0	0
S08	Crawford Elementary School		65	48	1	38	1	0	0	0	0	0
Number of sites exceed 1 intrusive event per hour							0		0			0
Minimum Number intrusive events per hour if exceeding 1							0		0			0
Maximum Number intrusive events per hour if exceeding 1							0		0			0

Notes: [1]Number of annual average daily events per hour during 8-hour school day (8:00 a.m. to 4:00 p.m.), at or above an indoor maximum (single event) sound level (L_{max}) of 50 dB; noise level reductions of 17 dB and 27 dB for windows open and closed, respectively. Does not account for differences between weekday and weekend activity.

Sleep Disturbance. Table 4.3-4 lists the probabilities of indoor awakening from average daily nighttime (10:00 p.m. to 7:00 a.m.) disturbance events for residential POI locations under the No-Action Alternative. With windows open, there would be a 1 to 3 percent probability of awakening; with windows closed there would be a less than 1 to 1.4-percent probability of awakening. For the No-Action Alternative, there would be no changes in impacts when compared to baseline conditions.

Table 4.3-4. No-Action Alternative Indoor Sleep Disturbance for On- and Off-Base Residential POIs

Representative Residential Receptor		***Average Nightly (10:00 p.m. – 7:00 a.m.) Probability of Awakening (%)[1]***			
		No Action		*Change from Baseline*	
ID	*POI*	Windows Open	Windows Closed	Windows Open	Windows Closed
R01	Tare Nike Missile Site	1.1	0.1	0	0
R02	6615-6647 Richardson Highway	1.9	0.1	0	0
R03	Old Valdez Trail	1.4	0.4	0	0
R06	Eielson AFB Housing Area	2.9	1.3	0	0

Note: [1]Assumes 17 dB and 27 dB of noise level reductions for windows open and closed, respectively.

Potential for Hearing Loss. Under the No-Action Alternative, potential for hearing loss would be negligible because there would be no residential areas on or adjacent to Eielson AFB exposed to DNL greater than or equal to 80 dB (see Figure 4.3-1). For the No-Action Alternative, there would be no changes in impacts when compared to baseline conditions.

Workplace Noise. Current Air Force occupational noise exposure prevention procedures such as hearing protection and monitoring are currently used and comply with all applicable Occupational Health and Safety Act and Air Force occupational noise exposure regulations. For the No-Action Alternative, there would be no changes in impacts when compared to baseline conditions.

Other Noise Sources. Other generators of noise, such as general vehicle traffic, and other maintenance and landscaping activities, are a common occurrence at Eielson AFB. While these sources may contribute to the overall noise environment, the noise they generate does not present any impacts to POIs on base nor are they perceptible to off-base POIs. There would be no changes in impacts when compared to baseline conditions.

Construction Noise. Construction (see Table 2.2-2) would occur under the No-Action Alternative; however, it would be at discreet locations within the developed area of the base. The distance from any neighboring residential areas on or off base is too far for construction noise to travel. For the No-Action Alternative, there would be no significant adverse impacts when compared to baseline conditions.

Non-Auditory Effects. As summarized in Appendix E, the current state of scientific knowledge cannot yet support inference of a causal or consistent relationship between aircraft noise exposure and non-auditory health consequences for exposed residents. Although some recent studies offer indications, it is not yet possible to establish a quantitative cause and effect based on the currently available scientific evidence. For the No-Action Alternative, there would be no change in impacts when compared to baseline conditions.

Land Use Compatibility

Activities most sensitive to noise typically include residential and commercial areas, public services, and areas associated with cultural and recreational uses. As listed in Table 3.3-9 and depicted in Figure 3.3-5,

the majority of the area impacted by DNL greater than 65 dB is contained on base; however, nearly 19 acres experience noise levels of DNL between 65 and 70 dB. For the No-Action Alternative, there would be no change in impacts when compared to baseline conditions.

Domesticated Animals and Wildlife

No impacts to domestic and wildlife species on Eielson AFB would take place under this alternative. Noise levels would remain the same as currently experienced. Aircraft have been flying in this airfield environment for many decades and domesticated animals and wildlife species have likely adapted and become habituated to noise generated by aircraft.

4.3.1.2 *Airspace*

Noise modeling assumed that aircraft operating in the Fox 3 MOA, Fox 3 ATCAA, and Paxon ATCAA would operate within the parameters for these charted airspace units: above 5,000 feet AGL, above 18,000 feet MSL, and above 18,000 feet MSL, respectively. As presented in Section 3.3.2.2, noise modeling was done in consultation with pilots currently flying in northern JPARC airspace. They wished to have the noise modeled in the same way they fly exercises in the airspace. In consequence, pilots stated that during the major flying exercises they primarily fly in what is referred to as the Fight Zone, to a lesser degree in the area named Yukon Large, and aerial refueling in areas named Tanker 1 and Tanker 2 (see Figures 3.3-6 and 3.3-7). Please note that this approach differs from what was done for the JPARC EIS (Air Force 2013a) where aircraft operations were concentrated in each of the separate MOAs. The approach in this EIS analyzes operations as they actually are flown across the northern JPARC airspace during the busiest month.

Population

Subsonic Flight. The Onset-Rate Adjusted Day-Night Average Sound Level (L_{dnmr}) and NA (number of events above) values under the No-Action Alternative are shown in Table 4.3-5 for the modeled areas within northern JPARC airspace (see Figure 3.3-2 for modeled airspace). The flight areas where operations frequency would not change or where operations would occur only on an incidental basis are not listed. Where L_{dnmr} would be less than 45 dB, the noise levels are stated as "<45". Under the No-Action Alternative, 1 percent of aircraft operations would be during environmental nighttime hours (10:00 p.m. to 7:00 a.m.), so there would an increase of the overall noise levels. Paxon, R-2205, R-2211, and Blair ATCAA would increase by 1 dB; however, noise levels would remain unchanged in all other northern JPARC airspace units. This 1-dB increase would not be noticeable.

Table 4.3-5. No-Action Alternative Uniform Distributed L_{dnmr} and Number of Events At or Above Selected Thresholds in Northern JPARC Airspace

JPARC Airspace Unit	***Baseline***			***No-Action Alternative***					
				L_{dnmr} (dB)[1]		*$NA65L_{max}$*[2] *(busiest month events)*		*$NA35L_{max}$*[2] *(busiest month events)*	
	L_{dnmr} (dB)[1]	$NA65L_{max}$ (busiest month events)	$NA35\ L_{max}$ (busiest month events)	No Action	Change from Baseline (dB)	No Action	Change from Baseline (events)	No Action	Increase from Baseline (events)
Fight Zone	<45	<1	3	<45	0	<1	0	3	0
Tanker 1	<45	<1	1	<45	0	<1	0	1	0
Tanker 2	<45	<1	1	<45	0	<1	0	1	0

Table 4.3-5. No-Action Alternative Uniform Distributed L_{dnmr} and Number of Events At or Above Selected Thresholds in Northern JPARC Airspace

JPARC Airspace Unit	***Baseline***			***No-Action Alternative***					
				L_{dnmr} (dB)[1]		*$NA65L_{max}$*[2] *(busiest month events)*		*$NA35L_{max}$*[2] *(busiest month events)*	
	L_{dnmr} (dB)[1]	$NA65L_{max}$ (busiest month events)	NA35 L_{max} (busiest month events)	No Action	Change from Baseline (dB)	No Action	Change from Baseline (events)	No Action	Increase from Baseline (events)
Blair	<45	<1	60	<45	1	<1	0	60	0
Delta 1	56	<1	2	56	0	<1	0	2	0
Viper	52	6	73	52	0	6	0	73	0
Yukon 2	49	<1	<1	49	0	<1	0	<1	0
Yukon 3B	<45	<1	<1	<45	0	<1	0	<1	0
Yukon 4	46	<1	<1	46	0	<1	0	<1	0
Yukon 5	<45	<1	<1	<45	0	<1	0	<1	0
Yukon Large	50	<1	<1	50	0	<1	0	<1	0
Fox 3	<45	<1	<1	<45	0	<1	0	<1	0
Paxon	50	<1	1	51	1	<1	0	1	0
R-2202	60	<1	4	60	0	<1	0	4	0
R-2205	65	1	9	66	1	1	0	9	0
R-2211	60	1	5	61	1	1	0	5	0

Notes: [1]Uniform distributed sound level.
[2]Number of events above an L_{max} of 65 dB and 35 dB.

The L_{dnmr} values are shown for the POIs in Table 4.3-6. Even with the increase in environmental nighttime operations, POIs would have L_{dnmr} identical to baseline conditions. No significant adverse impacts are anticipated under the No-Action Alternative.

Table 4.3-6. No-Action Alternative L_{dnmr} for Northern JPARC Airspace Representative POIs

POI			***Baseline***	***No Action***	***Change from Baseline***
Type	*ID*	*Description*	*L_{dnmr} (dB)*	*L_{dnmr} (dB)*	
Multi-Use	M01	Denali Highway where it crosses Susitna River	<45	<45	0
	M02	Healy Lake Airport	58	58	0
	M03	Pogo Mine Airstrip	<45	<45	0
	M04	Joseph Creek	<45	<45	0
Park (includes recreation and wildlife)	P06	Yukon-Charley Rivers National Preserve	<45	<45	0
	P07	Yukon Flats National Wildlife Refuge	<45	<45	0
	P08	Lake George (southeast of Delta Junction)	53	53	0
	P09	Steese National Conservation Area/ Birch Creek Wild and Scenic River (WSR)	49	49	0
	P10	Charley WSR	<45	<45	0
	P11	Fortymile WSR	<45	<45	0
Residential	R04	Delta Junction	53	53	0
	R05	Chicken	<45	<45	0
	R07	Town of Circle	49	49	0

Maximum single-event noise levels associated with direct overflight of aircraft, which use the training airspace frequently, were listed in Table 3.3-10. No significant changes are anticipated in the types of aircraft using the airspace under the No-Action Alternative. The F-15 aircraft would continue to have the highest L_{max} (73 dB), with the F-16 and EA-18G aircraft ranked second with an L_{max} of 65 dB.

Supersonic Flight. Table 3.3-13 presented sonic boom overpressures for the F-22, F-16C, and F-15E aircraft in level flight at various altitudes, and this would not change under the No-Action Alternative. As found under baseline conditions, the majority of supersonic flight in northern JPARC airspace would continue to be conducted by F-22 aircraft based at Joint Base Elmendorf-Richardson, F-16s based at Eielson AFB, and transient F-15 and F-16 aircraft.

As presented in Figure 4.3-3, C-Weighted DNL (CDNL) in modeled JPARC airspace would range between 48 and 51 during the 6 weeks of major flying exercises. Booms during these weeks of exercises would range from a low of 13 per month in the Delta MOAs/ATCAAs to a high of 83 booms in the Fox 3 MOA/ATCAA (Figure 4.3-4). The No-Action Alternative would introduce imperceptible differences when compared to baseline conditions.

Land Use Compatibility

Subsonic and Supersonic Flight. Under the No-Action Alternative conditions would be identical to baseline; POIs would continue to experience L_{dnmr} less than 50 dB (see Table 3.3-11). The same as found under baseline, none of the POIs would experience CDNL greater than 62 dB and none of the POIs would experience more than 36 sonic booms per busiest month (see Table 3.3-14). No significant changes in impacts are anticipated to land uses underlying northern JPARC airspace due to aircraft operations.

Domesticated Animals and Wildlife

No changes from the current impacts to domestic and wildlife species under the northern JPARC airspaces would take place under this alternative. Noise levels would remain the same as currently experienced. Aircraft have been flying in this airspace for many decades, domesticated animals and wildlife species have likely become adapted and habituated to noise generated by aircraft.

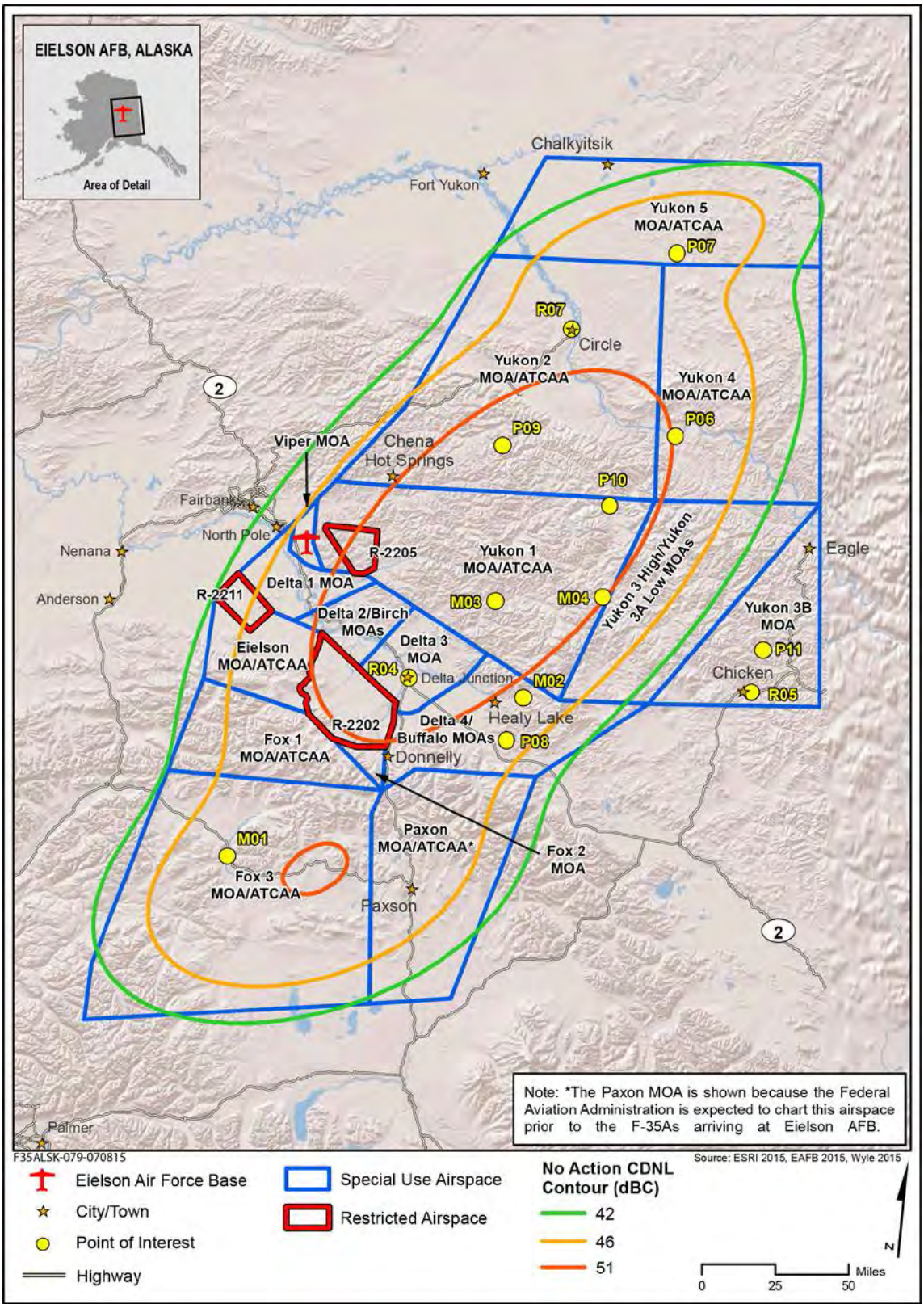


Figure 4.3-3. No-Action Alternative CDNL Contours for Supersonic Operations in the Busiest Month

Note: CDNL of 62 dBC is not anticipated.

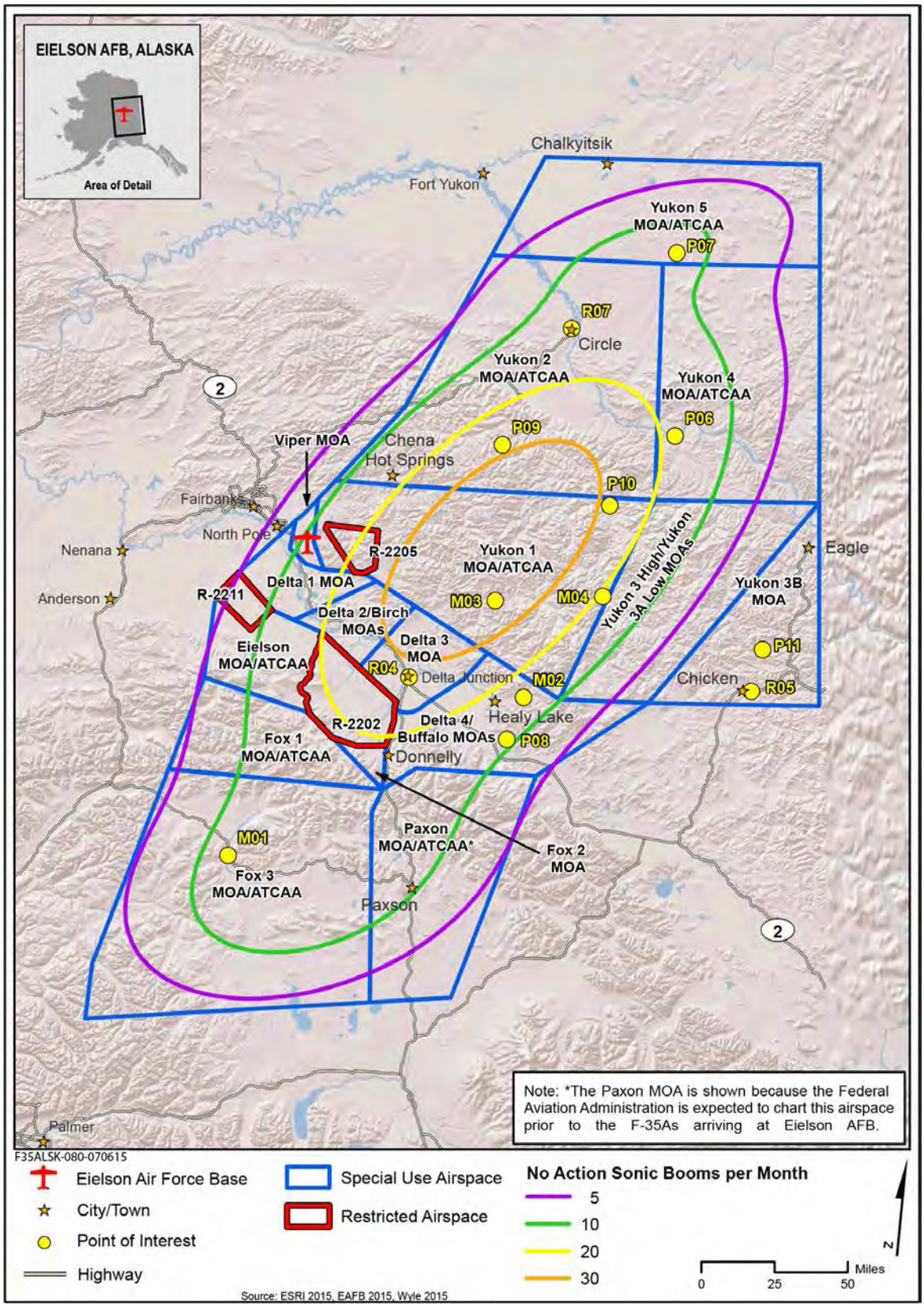


Figure 4.3-4. No-Action Alternative Estimated Number of Sonic Booms for the Busiest Month

4.3.2 Proposed Action Alternative

4.3.2.1 *Base*

The Proposed Action Alternative would involve the beddown of 48 Primary and 6 Backup F-35A aircraft at Eielson AFB. Proposed F-35A flight operations would total 26,106 annually (see Table 2.2-10). Approximately two-thirds of these proposed operations would consist of departures and arrivals; the remaining one-third would involve pattern work (e.g., low approaches) in the airfield environment. Other based and transient aircraft operations would total 18,963, as found under the No-Action Alternative. Under the Proposed Action Alternative, total annual flight operations would be 45,069, a 138-percent increase from the No-Action Alternative. See Appendix E.3 for further details about the modeled operations.

Figure 4.3-5 shows the DNL contours from 65 to 85 dB, in 5-dB increments, for the Proposed Action Alternative at and around Eielson AFB and compares the 65 dB to 85 dB DNL contours to the No-Action Alternative (Figure 4.3-6). Under the Proposed Action Alternative, the 65 dB DNL contour would extend past the northern base boundary, into the town of Moose Creek by nearly 1 mile and to the west by approximately 1,900 feet. The 70 dB DNL contour would not extend beyond the base boundary except for the western boundary by approximately 800 feet. Because of the numbers of operations, the period of day in which they occur, and the single-event sound level, departures of proposed F-35A and F-16 aircraft from Runway 32 would contribute the most to the DNL north of the base. Arrivals of proposed F-35A and transient heavy cargo (e.g., C-5) aircraft to Runway 14 would contribute the most DNL south of the base. The DNL contours under the Proposed Action Alternative would increase noticeably when compared to the No-Action Alternative.

Table 4.3-7 presents the estimated on- and off-base acreage, population, housing units, and on- and off-base representative receptors within each 5-dB DNL contour band. Figure 4.3-6 illustrates the contour bands for the No-Action and Proposed Action Alternatives. When compared to the No-Action Alternative, off base, there would be 865 more acres, 178 more people, and 73 more households experiencing DNL between 65 and 70 dB to the north and west of base boundaries. Ten additional acres would experience DNL between 70 and 75 dB to the west of base boundaries, however, no people or households are found in this area. On base, about 860 military personnel would experience DNL between 70 and 75 dB in the dormitories (see POI W06). There would be 1,382 military personnel and their dependents, residing in 512 on-base residences, newly experiencing DNL between 65 and 70 dB in the housing area (see POI R06). This on-base population would be exposed to noise levels the Air Force has identified as incompatible.

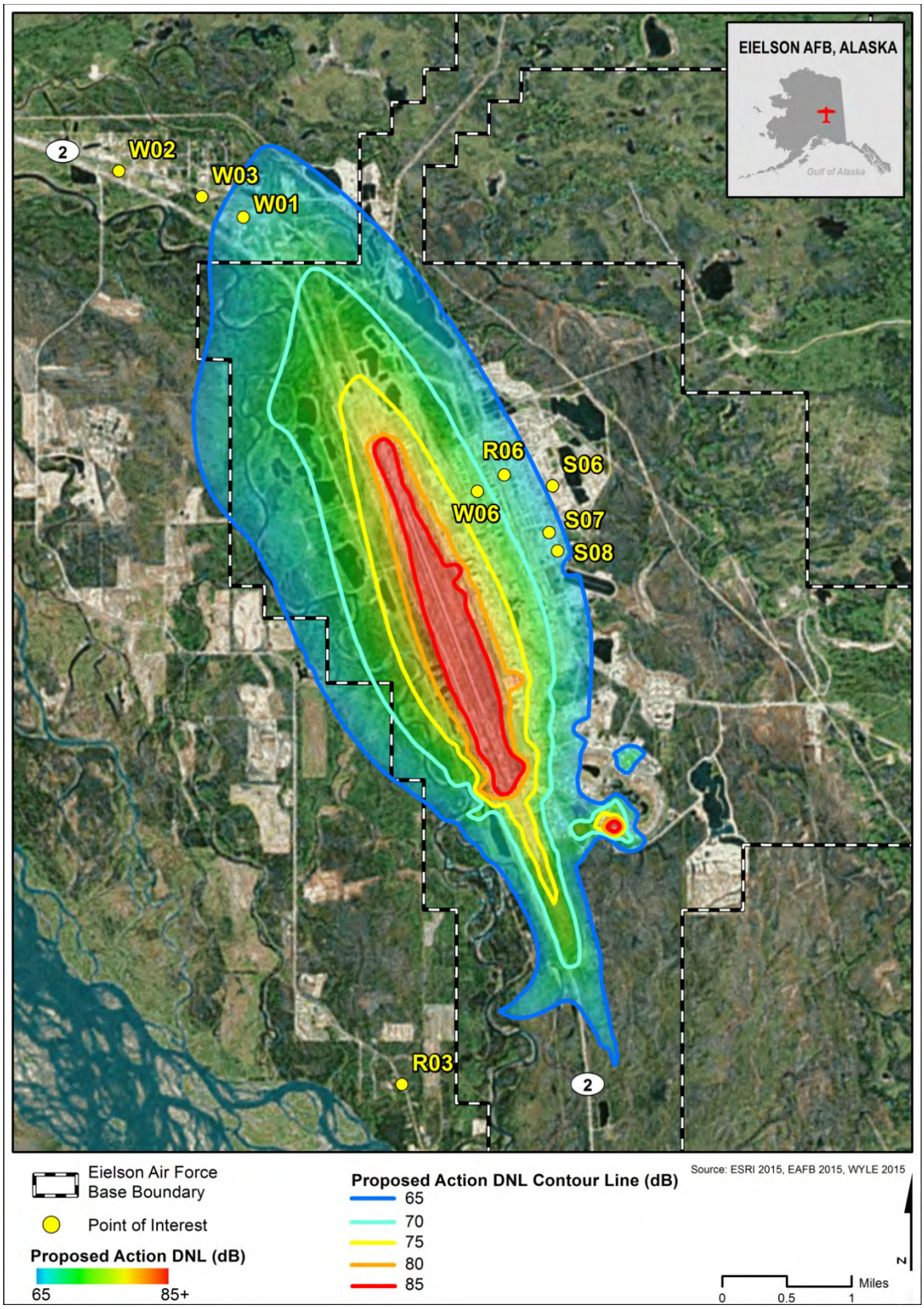


Figure 4.3-5. Proposed Action Alternative DNL Contours for Annual Average Daily Aircraft Operations

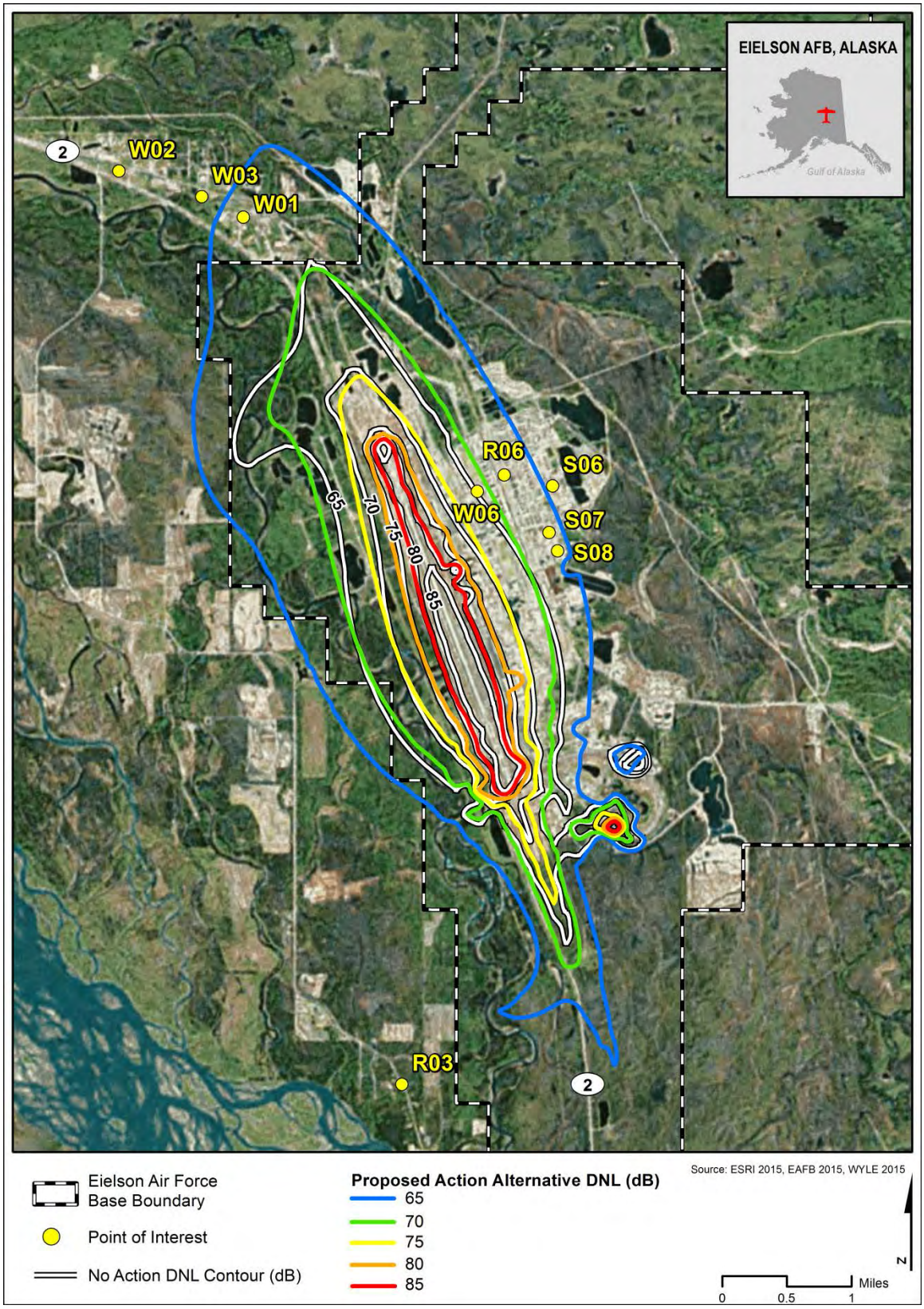


Figure 4.3-6. Proposed Action Alternative DNL Contours Compared to the No-Action Alternative

Table 4.3-7. Proposed Action Alternative On- and Off-Base Noise Exposure

Band of DNL (dB)	*Proposed Action*			*Change from No Action*		
	Acreage	*Estimated Population*	*Households*	*Acreage*	*Estimated Population*	*Households*
On Base						
65 – 70	2,831	2,242[1]	512	1,035	1,582[1]	512
70 – 75	1,761	-	-	1,016	-	-
75 – 80	772	-	-	403	-	-
80 – 85	370	-	-	110	-	-
85+	440	-	-	243	-	-
Total	**6,174**	**2,242**	**512**	**2,807**	**1,582**	**512**
Off Base						
65 – 70	884	181	74	865	178	73
70 – 75	10	-	-	10	-	-
75 – 80	-	-	-		-	-
80 – 85	-	-	-		-	-
85+	-	-	-		-	-
Total	**894**	**181**	**74**	**875**	**178**	**73**

Note: [1]Represents 200 more military personnel resident in the new dormitory and 1,382 newly exposed household members.

As outlined in Table 3.3-2, residential use is discouraged in DNL 65 to 69 dB contour bands and strongly discouraged in DNL 70 to 74 dB contour bands; however, local conditions regarding the need for housing may require residential use in these areas. Existing residential development is considered as pre-existing, non-conforming land uses. Where the community determines that residential land uses must be allowed in these noise level areas, measures to achieve outdoor to indoor noise level reductions of at least 25 dB in DNL 65 to 69, and 30 dB in DNL 70 to74 should be incorporated into building codes (see Notes 1a and 1b, Table 3.3-2). Normal permanent construction can be expected to provide a noise level reduction of 20 dB, thus the reduction requirements are often stated as 5, 10, or 15 dB over standard construction and normally assume mechanical ventilation, upgraded sound transmission class ratings in windows and doors, and closed windows year round.

Figure 4.3-7 shows the altitude profiles of select aircraft departing Runway 32 to the north. Figure 4.3-8 presents SEL and L_{max} values for typical based and visiting aircraft under the Proposed Action Alternative. These figures are identical to Figures 3.3-2 and 3.3-3, except the F-35A is added. As found under baseline and the No-Action Alternative, the F-16C would be at an altitude of about 2,000 feet AGL when crossing the northern boundary of Eielson AFB and would continue to exhibit the greatest SEL and L_{max} values of the aircraft shown departing to the north (Figure 4.3-7). The F-35A was modeled to climb steeper than the F-16, similar to the F-22 profile. As depicted in Figure 4.3-8, arriving from the south and descending through 1,000 feet AGL, the heavy cargo-type aircraft (represented by the C-5A) would continue to exhibit the greatest SEL and L_{max} values of the aircraft shown; the F-35A would have the second greatest SEL and L_{max} values arriving from the south.

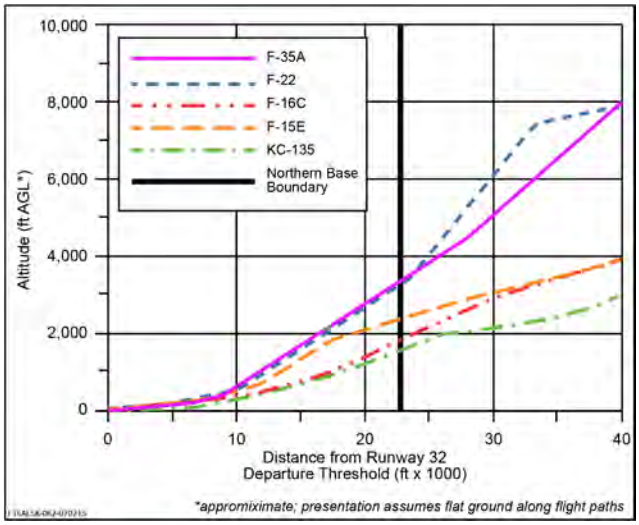


Figure 4.3-7. Proposed Action Alternative Altitude Profiles on Runway 32 for Representative Aircraft Departures

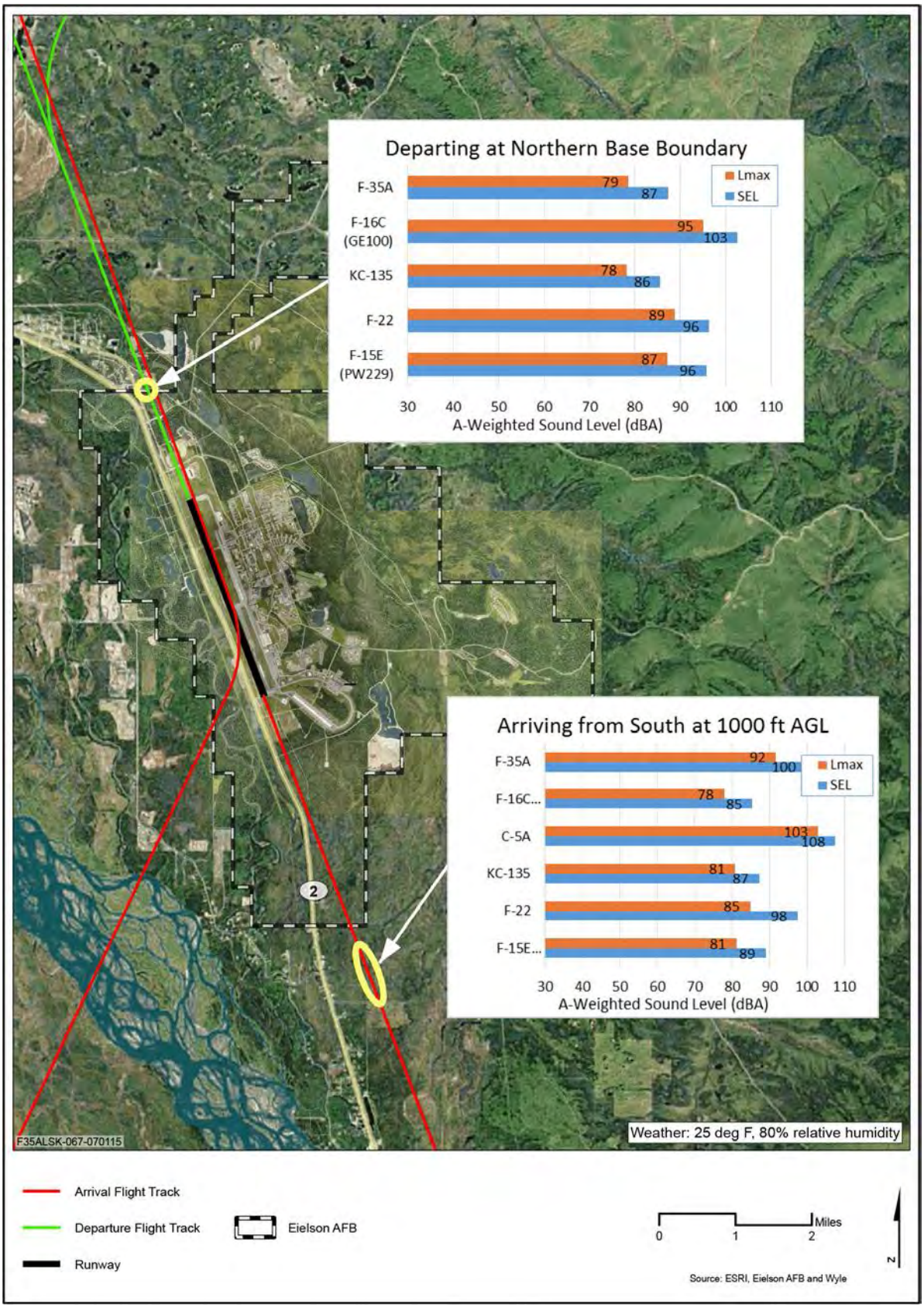


Figure 4.3-8. Proposed Action Alternative F-35A L_{max} and SEL

Population

Table 4.3-8 shows proposed DNL for representative POIs. Under the Proposed Action Alternative, five locations would experience DNL greater than or equal to 65 dB, compared to one under the No-Action Alternative. One of these locations would be off base, the Moose Creek Baptist Church (W01), which would experience an increase in DNL of about 5 dB. On base, DNL at two schools (S07 and S08) would increase by about 5 dB DNL to a projected DNL of 66 dB, and the residential housing area (R06) would experience an approximate 7-dB DNL increase. The base chapel and dorms (W06) would be exposed to a DNL of 71 dB reflecting an increase of 6 dB DNL.

Table 4.3-8. Proposed Action Alternative DNL for Representative POIs

Description				***DNL (dB)***	
Type	*ID*	*POI*	*On Base?*	*Proposed*	*Increase from No Action*
Park (includes recreation and wildlife)	P01	Salcha River State Recreation	No	<45	N/A
	P02	Harding Lake		<45	N/A
	P04	Tanana Valley State Forest		<45	N/A
	P05	Chena Lakes		47	1
Residential	R01	Tare Nike Missile Site		49	2
	R02	6615-6647 Richardson Highway		52	7
	R03	Old Valdez Trail		53	5
	R06	Eielson AFB Housing	Yes	68	6
School/ Day Care	S01	North Pole Elementary School/ Eagle Wings Assisted Living	No	<45	N/A
	S02	North Pole Middle School		<45	N/A
	S03	Association of Village Council Presidents Head Start		<45	N/A
	S04	Loving Learning Day Care		48	2
	S05	Salcha Elementary School		<45	N/A
	S06	Anderson Elementary School/ Child Development Center	Yes	64	5
	S07	Ben Eielson Junior/ Senior High School		66	5
	S08	Crawford Elementary School		66	5
Place of Worship/ Residential	W01	Moose Creek Baptist Church	No	66	5
	W02	Pioneer Baptist Church		60	5
	W03	Church of Christ		64	6
	W04	Lord of Life Lutheran Church		<45	N/A
	W05	North Pole Missionary Chapel		<45	N/A
	W06	Base Chapel/Base Dorms	Yes	71	6

Legend: N/A=Not Applicable.

Speech Interference

In terms of speech interference, Table 4.3-9 presents the average daily indoor daytime (7:00 a.m. to 10:00 p.m.) interference events per hour for the representative POIs that generally would experience indoor maximum sound levels of at least 50 dB with windows closed and open. Under the Proposed Action Alternative, off-base POIs would experience a range of one to three more speech interference events per hour when compared to the No-Action Alternative.

Table 4.3-9. Proposed Action Alternative Indoor Speech Interference Locations

Type	***ID***	***POI***	***On Base?***	***Average Daily Indoor Daytime (7:00 a.m. – 10:00 p.m.) Events per Hour[1]***			
				Proposed Action		*Change from No Action*	
				Windows Closed	Windows Open	Windows Closed	Windows Open
Residential	R01	Tare Nike Missile Site	No	-	2	0	+2
	R02	6615-6647 Richardson Highway		-	2	0	+2
	R03	Old Valdez Trail		-	4	0	+3
	R06	Eielson AFB Housing	Yes	-	4	-1	+3
School	S01	North Pole Elementary School/Eagle Wings Assisted Living	No	-	-	0	0
	S02	North Pole Middle School		-	-	0	0
	S03	Association of Village Council Presidents Head Start		-	-	0	0
	S04	Loving Learning Day Care		3	1	+3	+1
	S05	Salcha Elementary		-	-	0	0
	S06	Anderson Elementary School/Child Development Center	Yes	-	4	-1	+3
	S07	Ben Eielson Junior/Senior High School		-	4	-1	+3
	S08	Crawford Elementary School		-	4	-1	+3
Place of Worship/ Residential	W01	Moose Creek Baptist Church	No	-	3	-1	+2
	W02	Pioneer Baptist Church		3	2	+2	+1
	W03	Church of Christ		3	3	+2	+2
	W04	Lord of Life Lutheran Church		3	-	+3	0
	W05	North Pole Missionary Chapel		2	-	+2	0
	W06	Base Chapel/Base Dorms	Yes	2	4	+1	+2

Note: [1]With an indoor maximum sound level of at least 50 dB; assumes 17 dB and 27 dB of noise level reductions for windows open and closed, respectively.

Classroom Learning Interference

Table 4.3-10 presents the potential classroom learning interference under the Proposed Action Alternative. Over an 8-hour period, none of the off-base schools or day care centers would experience outdoor $L_{eq(8h)}$ greater than of 62 dB. The three on-base schools would experience outdoor $L_{eq(8h)}$ greater than 62 dB and would likely have three disruptions per hour with windows closed, and four disruptions per hour with windows open.

Table 4.3-10. Proposed Action Alternative Classroom Learning Interference On and Off Base

Description			***Proposed***					***Change from No Action***				
				Indoor					*Indoor*			
ID	*POI*	*On Base?*	*Outdoor $L_{eq(8h)}$ (dB)*	Windows Open		Windows Closed		*Outdoor $L_{eq(8h)}$ (dB)*	Windows Open		Windows Closed	
				$L_{eq(8h)}$ (dB)	Events per Hour[1]	$L_{eq(8h)}$ (dB)	Events per Hour[1]		$L_{eq(8h)}$ (dB)	Events per Hour1	$L_{eq(8h)}$ (dB)	Events per Hour[1]
S01	North Pole Elementary School/Eagle Wings Assisted Living	No	40	23	-	13	-	+4	+4	0	+4	0
S02	North Pole Middle School		41	24	-	14	-	+3	+3	0	+3	0
S03	Association of Village Council Presidents Head Start		45	28	-	18	-	+3	+3	0	+3	0
S04	Loving Learning Day Care		51	34	1	24	-	+2	+2	+1	+2	0
S05	Salcha Elementary School		39	22	-	12	-	+3	+3	0	+3	0
S06	Anderson Elementary School/Child Development Center	Yes	68	51	4	41	3	+5	+5	+3	+5	+2
S07	Ben Eielson Jr./Sr. High School		70	53	4	43	3	+5	+5	+3	+5	+2
S08	Crawford Elementary School		70	53	4	43	3	+5	+5	+3	+5	+2
Number of sites exceed 1 intrusive event per hour					3		3			3		3
Minimum Number intrusive events per hour if exceeding 1					-		-			0		0
Maximum Number intrusive events per hour if exceeding 1					4		3			4		3

Notes: [1]Number of annual average daily events per hour during 8-hour school day (8:00 a.m.to 4:00 p.m.), at or above an indoor maximum (single event) sound level (L_{max}) of 50 dB; noise level reductions of 17 dB and 27 dB for windows open and closed, respectively. Does not account for differences between weekday and weekend activity.

Relative to the No-Action Alternative, the number of classroom learning interference events with windows closed, would increase by up to two events per hour for Anderson and Crawford Elementary Schools and Ben Eielson Junior/Senior High School—tripling the events per hour. Off base, the Loving Learning Day Care Center would experience a one-event per hour increase with windows open, while there was none under the No-Action Alternative. The remaining schools would experience no change when compared to the No-Action Alternative.

Sleep Disturbance

Under the Proposed Action Alternative, there would be approximately 1,800 nighttime disturbance events at residential areas. This represents a 23-percent increase relative to the No-Action Alternative. Table 4.3-11 lists the probabilities of indoor awakening events for representative residential POIs during environmental nighttime hours (10:00 p.m. to 7:00 a.m.), with windows closed and open. The percentage probability of awakening would be less than 6 percent with windows opened and no more than 3 percent with windows closed. The percentage probability of awakening with windows open or closed would increase by no more than 2.4 percent under the Proposed Action Alternative relative to the No-Action Alternative.

Table 4.3-11. Proposed Action Alternative Indoor Sleep Disturbance for On- and Off-Base Residential POIs

Representative Residential Receptor		***Average Nightly (10:00 p.m. – 7:00 a.m.) Probability of Awakening (%)[1]***			
		Proposed		*Increase from No Action*	
ID	*POI*	Windows Open	Windows Closed	Windows Open	Windows Closed
R01	Tare Nike Missile Site	1.8	0.5	+0.7	+0.4
R02	6615-6647 Richardson Highway	3.4	0.7	+1.5	+0.6
R03	Old Valdez Trail	2.8	0.9	+1.4	+0.5
R06	Eielson AFB Housing	5.3	2.6	+2.4	+1.3

Note: [1]Assumes 17 dB and 27 dB of noise level reductions for windows open and closed, respectively.

Potential for Hearing Loss. Under the Proposed Action Alternative, no residential areas on or adjacent to Eielson AFB would be exposed to DNL greater than or equal to 80 dB. Therefore, a potential for hearing loss is not anticipated. This conclusion is justified because no one would be exposed on a daily basis, over a lifetime of 40 years, lasting 8 hours per day for 5 days per week, by DNL greater than or equal to 80 dB.

Workplace Noise. Air Force occupational noise exposure prevention procedures, such as hearing protection and monitoring would continue to be applied under the Proposed Action Alternative. These procedures would comply with all applicable Occupational Safety and Health Administration (OSHA) and Air Force occupational noise exposure regulations and assure no significant adverse impacts under the Proposed Action Alternative.

Construction Noise. Noise is an unavoidable, short-term byproduct of construction activities. The major noise events for this construction would take place on the base with only a negligible increase in traffic noise caused by vehicles entering and exiting the base for construction deliveries and work force arrivals and departures. On base, steps would be taken to minimize the impacts. These include making sure all equipment is in good operating condition with an emphasis on maintenance of mufflers, bearings, and moving machinery parts. Stationary equipment with a potential to emit noise would be placed away from sensitive noise receivers. Stockpiles and haul roads would be planned so that the vehicle paths are away

from sensitive noise receivers. Whenever possible, noise events would be scheduled to avoid noise sensitive times. Construction workers would comply with OSHA exposure regulations to ensure no significant adverse effects from noise exposure.

Non-Auditory Effects. As summarized in Appendix E, the current state of scientific knowledge cannot yet support inference of a causal or consistent relationship between aircraft noise exposure and non-auditory health consequences for exposed residents. Although some recent studies offer indications, it is not yet possible to establish a quantitative cause and effect based on the currently available scientific evidence.

Land Use Compatibility

Off base to the north, 73 more households in Moose Creek would experience DNL between 65 and 70 dB. To the west, 894 acres, but no households, would newly experience DNL between 65 and 75 dB. The Fairbanks North Star Borough (FNSB) identifies these lands as general use (see Figure 3.3-5). As listed in Table 4.3-12, the majority of the area impacted by DNL greater than 65 dB is on base; the largest increase is to areas in the 65 to 70 dB DNL contour band.

Table 4.3-12. Proposed Action Alternative Change in On-Base Acreage by Land Use Category and DNL Band

Type	***65-70 dB DNL***			***70-75 dB DNL***			***75-80 dB DNL***		
	No Action	Proposed	Change	No Action	Proposed	Change	No Action	Proposed	Change
Administrative	167.7	24.9	-142.8	56.6	129.4	72.8	0.0	98.7	98.7
Airfield	300.3	183.6	-116.7	406.7	213.7	-193.0	259.9	413.1	153.2
Commercial	25.3	10.8	-14.5	0.0	41.3	41.3	0.0	0.0	0.0
Industrial	185.9	186.6	0.7	19.8	185.8	166.0	0.0	16.8	16.8
Open/Agriculture	796.7	1,829.9	1,033.2	201.5	762.3	560.8	92.6	184.6	92.0
Other	11.2	121.6	110.4	20.5	19.9	-0.6	13.3	14.4	1.1
Recreational	255.4	309.5	54.1	23.5	340.2	316.7	0.0	30.0	30.0
Residential	11.8	96.2	84.4	0.0	20.0	20.0	0.0	0.0	0.0
School	0.0	33.1	33.1	0.0	0.0	0.0	0.0	0.0	0.0
Transportation	42.1	34.4	-7.7	16.7	48.6	31.9	3.1	13.9	10.8
Total	**1,796.3**	**2,830.6**	**1,034.2**	**745.3**	**1,761.2**	**1,015.9**	**368.9**	**771.5**	**402.6**
Type	***80-85 dB DNL***			***DNL >85 dB***					
	No Action	Proposed	Change	No Action	Proposed	Change			
Administrative	0.0	0.2	0.2	0.0	0.0	0.0			
Airfield	233.0	260.9	27.9	196.2	421.2	225.0			
Commercial	0.0	0.0	0.0	0.0	0.0	0.0			
Industrial	0.0	0.0	0.0	0.0	0.0	0.0			
Open/Agriculture	7.5	85.9	78.4	0.1	3.7	3.6			
Other	12.4	19.4	7.0	0.0	8.3	8.3			
Recreational	0.0	0.0	0.0	0.0	0.0	0.0			
Residential	0.0	0.0	0.0	0.0	0.0	0.0			
School	0.0	0.0	0.0	0.0	0.0	0.0			
Transportation	6.7	3.2	-3.5	0.3	6.8	6.5			
Total	**259.6**	**369.6**	**110.0**	**196.6**	**440.0**	**243.4**			

Domesticated Animals and Wildlife

Construction. Noise generated during construction would be confined to the base and would not affect domesticated animals. Wildlife species inhabiting areas surrounding construction projects could be subject to increases in noise level and human activity. Any such increases would be temporary and therefore, have no significant adverse impacts to wildlife.

Aircraft Noise. Wildlife could be startled and temporarily displaced in the presence of increased noise and activity around the flight line, as aircraft operations would more than double once the F-35As arrive. However, these responses are expected to be temporary and wildlife would be expected to use adjacent habitat in such instances. Aircraft have been flying at this installation for many decades and wildlife species would likely adapt to the increased noise levels generated by F-35A operations. No significant adverse impacts are anticipated for domesticated animals and wildlife under the Proposed Action Alternative.

4.3.2.2 *Airspace*

Noise modeling assumed that the Paxon Low and expanded Fox 3 MOAs would be charted. However, if these two MOA changes were not charted, aircraft would operate at higher altitudes within the existing airspace structure. For the Fox 3 MOA that would be above 5,000 feet AGL, in the Fox 3 ATCAA that would be above 18,000 feet MSL, and in the Paxon ATCAA operations would occur above 18,000 feet MSL. The resulting noise levels would be negligibly lower than presented here under the Proposed Action Alternative. Please note that the number of F-35A operations that were modeled and the most up-to-date F-35 Edwards 2013 noise data were used in this EIS and differ from the information applied in the JPARC EIS noise modeling (Air Force 2013a). These variances result in different noise levels in this EIS compared to those presented in the JPARC EIS.

Population

Subsonic Flight. The L_{dnmr} and NA values are shown in Table 4.3-13 for the modeled areas within northern JPARC airspace (see Figure 3.3-7 for modeled airspace). Airspace units are not listed where the operational frequency would not change or where operations would occur only on an incidental basis. Where L_{dnmr} would be less than 45 dB, the noise levels are stated as "<45." All of the modeled flight areas would have L_{dnmr} less than 65 dB except R-2205 and R-2211. These two restricted areas would have L_{dnmr} of 71 and 68 dB, respectively, increasing by 5 to 7 dB relative to the No-Action Alternative.

Table 4.3-13. Proposed Action Alternative Uniform Distributed L_{dnmr} and Number of Events At or Above Selected Thresholds in Northern JPARC Airspace

JPARC Airspace Unit	***No Action***			***Proposed***					
				L_{dnmr} (dB)[1]		***$NA65L_{max}$[2] (busiest month events)***		***$NA35L_{max}$[2] (busiest month events)***	
	L_{dnmr} (dB)[1]	*$NA65L_{mzx}$ (busiest month events)*	*$NA35L_{max}$ (busiest month events)*	*Proposed*	*Increase from No Action (dB)*	*Proposed*	*Increase from No Action (events)*	*Proposed*	*Increase from No Action (events)*
Fight Zone	<45	-	3	<45	6	<1	-	4	1
Tanker 1	<45	-	1	<45	0	<1	-	1	-
Tanker 2	<45	-	1	<45	0	<1	-	1	-
Blair	<45	-	60	<45	4	<1	-	116	56
Delta 1	56	0	2	60	4	<1	-	4	2
Viper	52	6	73	58	6	12	6	122	49
Yukon 2	49	0	0	54	5	<1	-	<1	-
Yukon 3B	<45	0	0	45	4	<1	-	<1	-
Yukon 4	45	0	0	50	5	<1	-	<1	-
Yukon 5	<45	0	0	<45	4	<1	-	<1	-
Yukon Large	50	0	0	55	5	<1	-	1	1

Table 4.3-13. Proposed Action Alternative Uniform Distributed L_{dnmr} and Number of Events At or Above Selected Thresholds in Northern JPARC Airspace

JPARC Airspace Unit	No Action			Proposed					
				L_{dnmr} (dB)[1]		$NA65L_{max}$[2] (busiest month events)		$NA35L_{max}$[2] (busiest month events)	
	L_{dnmr} (dB)[1]	$NA65L_{mzx}$ (busiest month events)	$NA35L_{max}$ (busiest month events)	Proposed	Increase from No Action (dB)	Proposed	Increase from No Action (events)	Proposed	Increase from No Action (events)
Fox 3	<45	0	0	<45	5	<1	-	1	1
Paxon	51	0	1	55	4	<1	-	1	-
R-2202	60	0	4	65	5	1	1	6	2
R-2205	66	1	9	71	5	3	2	18	9
R-2211	61	1	5	68	7	1	-	9	4

Notes: [1]Uniform distributed sound level.
[2]Number of events above an L_{max} of 65 dB and 35 dB.

In terms of outdoor speech interference for recreational users, when compared to the No-Action Alternative, Viper MOA and R-2205 would experience increases in $NA65L_{max}$ of up to six events during the busiest month of major flying exercises. For $NA35L_{max}$, all modeled flight areas, except the Yukon MOAs and the Paxon MOA, would have at least one speech interference event during the busiest month of major flying exercises. At 122 events during the busiest month, the Viper B MOA would have the greatest number of NA35 L_{max} interference events of the modeled flight areas. However, the area under the Blair ATCAA would experience the greatest increase in $NA35L_{max}$, at 56 events during the busiest month, relative to the No-Action Alternative (see Table 4.3-13).

The L_{dnmr} values are shown for representative POIs in Table 4.3-14 under the Proposed Action Alternative compared to the No-Action Alternative. All POIs would have L_{dnmr} less than 65 dB, the closest would be Healy Lake Airport environs (M02), which would have an L_{dnmr} of 62 dB. Increases in L_{dnmr} would range between 4 and 5 when compared to the No-Action Alternative. However, all POIs would experience L_{dnmr} of less than 65 dB under the Proposed Action Alternative.

Table 4.3-14. Proposed Action Alternative L_{dnmr} for Northern JPARC Airspace Representative POIs

POI			No Action L_{dnmr} (dB)	Proposed	
Type	ID	Description		L_{dnmr} (dB)	Increase from No Action (dB)
Multi-Use	M01	Denali Highway where it crosses Susitna River	<45	<45	5
	M02	Healy Lake Airport	58	62	4
	M03	Pogo Mine Airstrip	<45	<45	N/A
	M04	Joseph Creek	<45	<45	N/A
Park (includes recreation and wildlife)	P06	Yukon-Charley Rivers National Preserve	<45	<45	>= 3
	P07	Yukon Flats National Wildlife Refuge	<45	<45	>= 2
	P08	Lake George (southeast of Delta Junction)	53	57	4
	P09	Steese National Conservation Area/Birch Creek WSR	49	54	5
	P10	Charley WSR	<45	<45	N/A
	P11	Fortymile WSR	<45	45	4
Residential	R04	Delta Junction	53	57	4
	R05	Chicken	<45	<45	4
	R07	Town of Circle	49	54	5

Maximum single-event noise levels associated with direct aircraft overflight, which use the training airspace frequently, are listed in Table 4.3-15. This is the same Table 3.3-12, except with the addition of the F-35A. At all altitudes, the F-35As would have L_{max} levels that exceed all of the other aircraft that fly in northern JPARC airspace. Please note that the light gray in the table indicates the altitude(s) in which the particular aircraft typically operates; some aircraft fly above 25,000 feet AGL.

Table 4.3-15. Proposed Action Alternative Maximum Single-Event Noise Levels for Modeled Aircraft

Data		***Maximum Instantaneous A-weighted Sound Level (L_{max}) for Aircraft Type***								
		A-10[1]	*F-15C/J*[2]	*F-16*[3]	*F-35A*[4]	*F-22*	*EA-18G*[5]	*KC-135R*[6], *E-3, E-767*	*C-130*[7]	*HH-60*[8]
Speed in knots:		***325***	***520***	***450***	***400***	***350***	***400***	***300***	***170***	***140***
Power Setting:		***5333 NF***	***81% NC***	***87% NC***	***75% ETR***	***30% ETR***	***84.50% NC***	***89.6% NF***	***970 CTIT***	***N/A***
Overflight Altitude (ft AGL)[9]	500	93	113	107	115	98	105	94	90	85
	1,000	85	106	100	108	90	98	87	83	79
	2,000	76	97	91	100	82	89	79	76	71
	2,500	73	94	88	97	79	86	77	73	69
	4,000	67	88	82	91	73	79	72	68	64
	5,000	64	85	78	88	70	76	69	65	61
	10,000	55	73	65	78	60	65	60	56	52
	12,500	51	68	61	74	56	61	56	53	48
	16,000	48	63	55	69	52	58	52	50	45
	20,000	45	57	50	65	49	53	49	47	41
	25,000	41	51	44	60	44	49	44	44	37

Legend: NF=Maximum Fan Speed; NC=Maximum Engine Core Revolution; ETR=Engine Thrust Request; CTIT=Turbine Intake Temperature in Celsius.

Notes: [1]A-10 modeled as A-10A.
[2]F-15C and F-15J modeled as F-15A.
[3]F-16 modeled as F-16A.
[4]F-35A modeled with Edwards 2013 data, corrected for high speed via Plotkin and Czech 2010.
[5]EA-18G modeled as F-18E/F.
[6]E-3 and E-767 modeled as KC-135R.
[7]HC-130 modeled as C-130.
[8]HH-60 modeled as UH-60A.
[9]Typical altitudes for each aircraft are shaded in gray; some may fly higher than 25,000 feet AGL.

Military Training Route Operations. Noise impacts for aircraft operations in the Military Training Routes (MTRs) were evaluated in the MTR (Alaska) Environmental Assessment (EA) (611th Air Operations Group 2008). Noise was evaluated for the F-15, as this was considered at that time, to be the loudest aircraft that would routinely use these routes. It was determined that there would be no significant impacts associated with these aircraft operations. This is because the pilots must comply with the restrictions placed on the MTRs regarding the numbers of sorties and authorized altitudes.

In analyzing the impacts of the occasional use of MTRs by the F-35A, it was assumed that they would not increase the number of sorties authorized (8 per day) and that they would fly within the authorized altitude restrictions for each MTR. A comparison was made between the overflight maximum instantaneous A-weighted sound levels (L_{max}) of the F-15C/J and the F-35A (Table 4.3-15) at altitudes of 500, 1,000, and 2,000 feet AGL, which encompass the 1,500 feet AGL ceiling for low-altitude flight. This comparison revealed that the F-35A sound levels were 2-dB greater than the F-15C/J at 500 feet AGL, 1-dB greater at 1,000 feet AGL, and 2-dB greater at 2,000 feet AGL. As the minimum change in the sound level that an average human ear can detect is about 3 dB (see Section 3.3.1.1, *Acoustic Environment*), none of the sound level changes between the F-15 and F-35 would be noticeable. When

combined with the fact that the F-35As are expected to use MTRs only on an occasional basis, and within the parameters analyzed in the MTR EA, the determination of no significant impact to the human and natural environment contained in the MTR EA remains valid for this EIS.

Supersonic Flight. Under the Proposed Action Alternative, the majority of supersonic flight in northern JPARC airspace would continue to be conducted by F-22s based at Joint Base Elmendorf-Richardson, F-16s based at Eielson AFB, and transient F-15 and F16 aircraft. The Proposed Action Alternative would create an estimated 118 supersonic F-35A operations per year that would account for approximately 10 percent of 1,165 total annual supersonic operations. As depicted in Table 4.3-16, the F-15 would continue to have the greatest sonic boom overpressures of the four aircraft shown, generating nearly 2 pounds per square foot for straight-and-level supersonic (Mach 1.2) flight at an altitude of 30,000 feet Mean Sea Level (MSL). The F-35 would generate an estimated 1.7 pounds per square foot at the same speed and altitude.

Table 4.3-16. Proposed Action Alternative Sonic Boom Peak Overpressures (pounds per square foot) for Typical Supersonic Aircraft in the Northern JPARC Airspace

Aircraft	***Altitude (feet MSL)***		
	10,000	*20,000*	*30,000*
F-15E	5.4	2.9	1.9
F-22	5.3	2.8	1.9
F-35A	4.8	2.6	1.7
F-16C	4.4	2.3	1.5

Note: Calculated using CABOOMj for level flight at Mach 1.2; focusing can result in overpressures increased by 2 to 5 times than steady state boom levels; and levels diminish toward 0.1 pounds per square foot as the lateral distance increases.

Figure 4.3-9 presents the CDNL contours for the busiest month that would occur during a major flying exercise. The maximum CDNL of 56 dB would occur in the center of the Fight Zone that is within the Delta 1 ATCAA and Yukon 1 MOA. Due to differences in modeling assumptions and the use of more recent flight operations information, the CDNL noise levels and numbers of sonic boom calculation for this EIS differ from those presented in the JPARC EIS. Because air combat training would be concentrated near the center of the modeled flight area, the number and intensity of sonic booms would be greater in this area compared to areas that are not directly beneath the center. However, sonic booms may propagate horizontally affecting ground areas beyond the modeled flight area boundaries. Compared to the No-Action Alternative, the Proposed Action Alternative would increase the CDNL by less than 1 dB.

The towns of Delta Junction, Chicken, and Circle would be exposed to similar CDNL as found under the No-Action Alternative; Chicken would experience an increase of 1 dBC compared to no changes in Delta Junction and Circle. For the number of sonic booms generated during the busiest month, there would be an increase of two per busiest month in the vicinity of Pogo Mine Airstrip (M03), Steese National Conservation Area/Birch Creek Wild and Scenic River (WSR) (P09), Charley WSR (P10), and Delta Junction (R04). With the exception of Chicken (R05) and the Fortymile WSR (P11), where there would be no changes in the number of booms, all other POIs would experience a one boom per busiest month increase under the Proposed Action Alternative (Figure 4.3-10). Supersonic noise conditions under the Proposed Action Alternative would not differ substantially from those found under the No-Action Alternative. This is because, when compared to similar jet aircraft, the F-35As would conduct 90 percent of their supersonic events above 30,000 feet MSL.

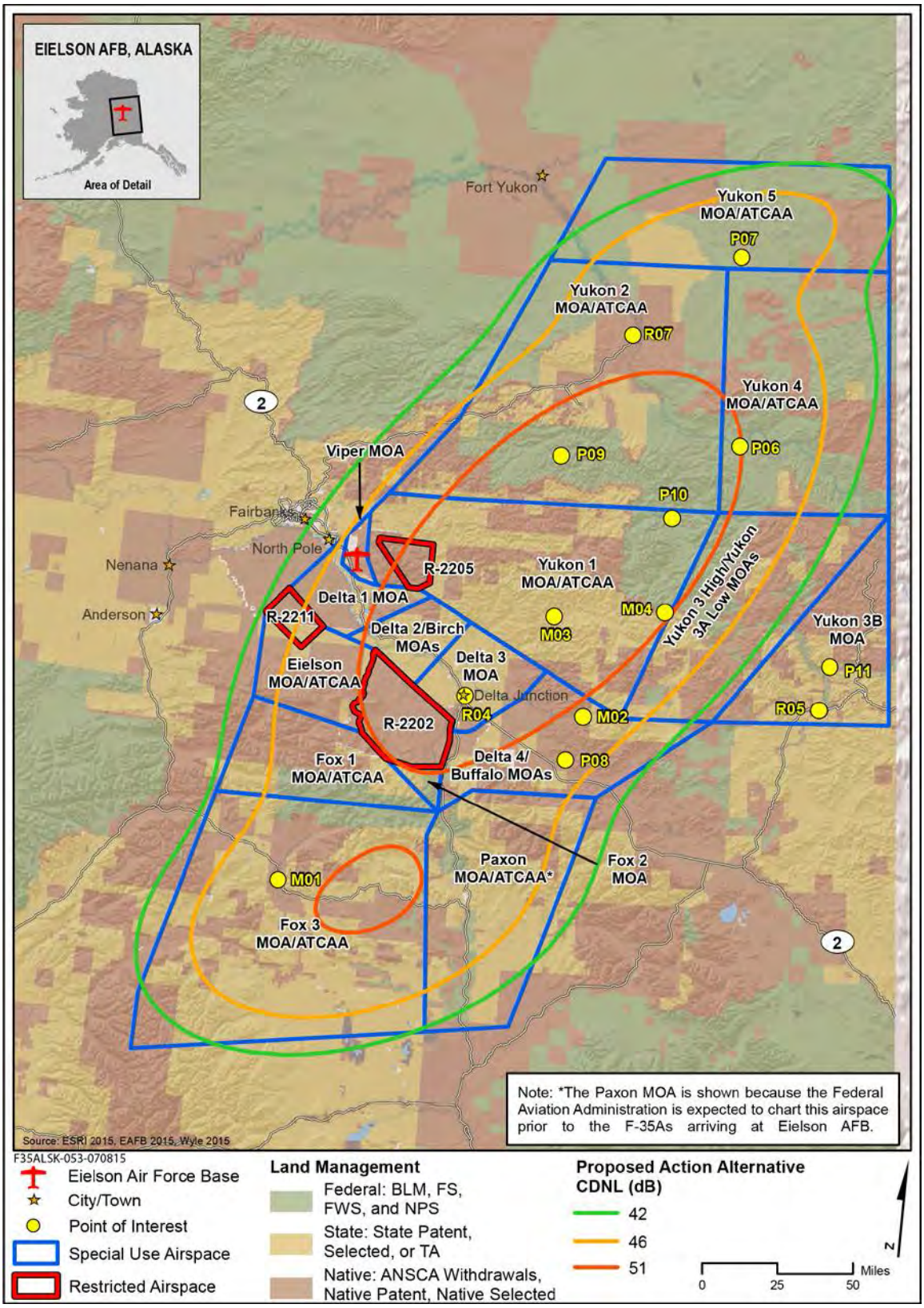


Figure 4.3-9. Proposed Action Alternative CDNL Contours for Supersonic Operations in the Busiest Month

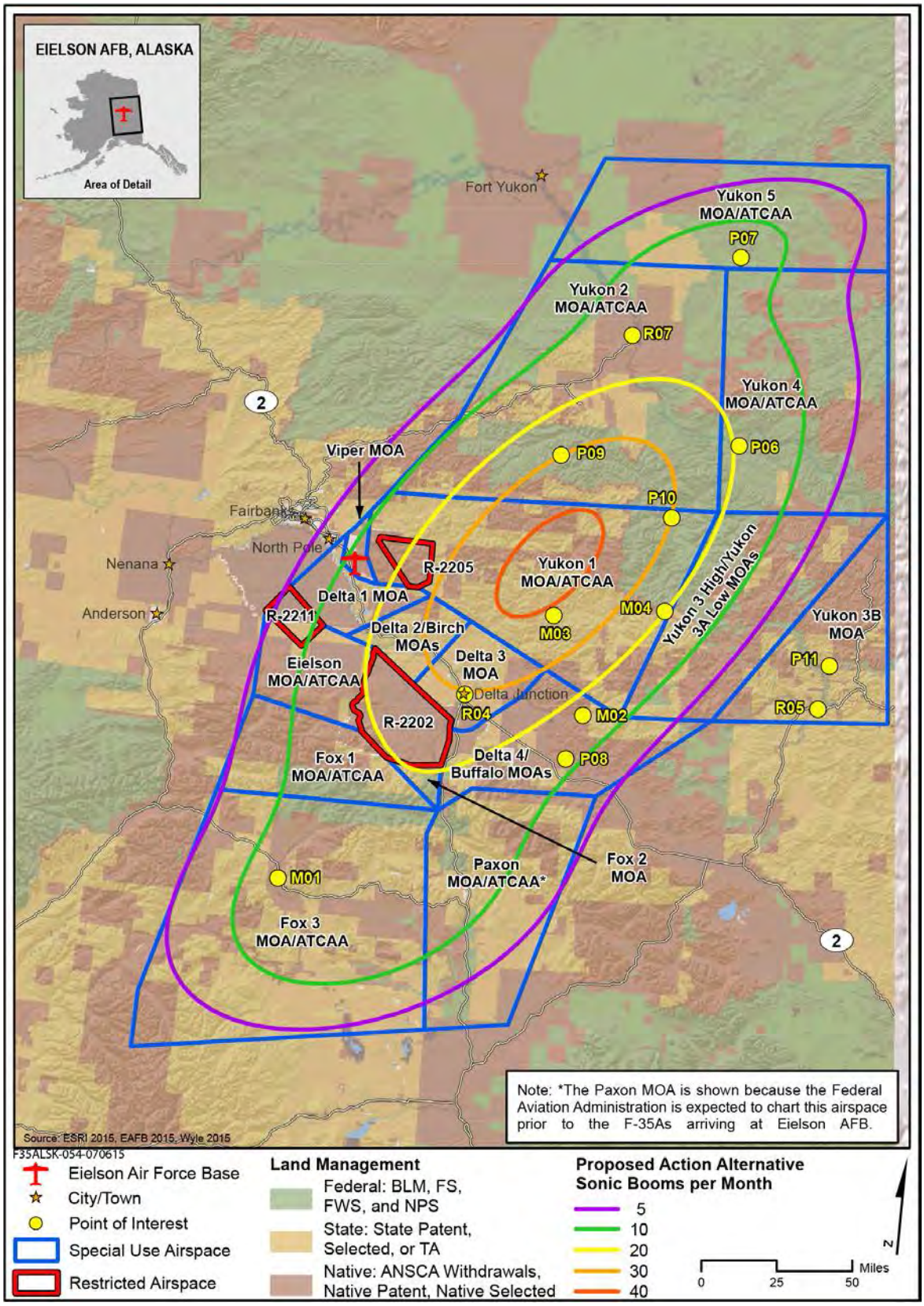


Figure 4.3-10. Proposed Action Alternative Estimated Number of Sonic Booms in the Busiest Month

Land Use Compatibility

Subsonic and Supersonic Flight. Under the Proposed Action Alternative, during the busiest month, L_{dnmr} would be less than 45 dB at all of the non-park POIs, except the Town of Circle, which would have an L_{dnmr} of 49 dB (see Table 4.3-14). None of the non-park POIs would have a CDNL greater than 62 dBC, and none would have an increase of more than 1 dBC relative to the No-Action Alternative. None of the non-park POIs would have more than 36 sonic booms per busiest month, and none would have more than an increase of two booms per busiest month relative to the No-Action Alternative (Table 4.3-17).

Table 4.3-17. Proposed Action Alternative Supersonic Noise Exposure and Sonic Booms during the Busiest Month in Northern JPARC Airspace

Description		***POI***	***Location***	***Proposed Action***		***Increase from No Action***	
Type	*ID*			*CDNL (dBC)*	*Booms/ Busiest Month*	*CDNL (dBC)*	*Booms/ Busiest Month*
Multi-Use	M01	Denali Highway where it crosses Susitna River	Fox 3	49	12	0	1
	M02	Healy Lake Airport	Delta 4	50	15	0	1
	M03	Pogo Mine Airstrip	Yukon 1	55	36	0	2
	M04	Joseph Creek	Yukon 1	51	19	0	1
Park (includes recreation and wildlife)	P06	Yukon-Charley Rivers National Preserve	Yukon 4	51	18	0	1
	P07	Yukon Flats National Wildlife Refuge	Yukon 5	49	11	0	1
	P08	Lake George (southeast of Delta Junction)	Delta 4	48	11	0	1
	P09	Steese National Conservation Area/ Birch Creek WSR	Yukon 2	53	28	1	2
	P10	Charley WSR	Yukon 1	53	28	1	2
	P11	Fortymile WSR	Yukon 3B	<42	1	1	0
Residential	R04	Delta Junction	Delta 3	53	27	0	2
	R05	Chicken	Yukon 3B	<42	1	1	0
	R07	Town of Circle	Yukon 2	49	13	0	1

Domesticated Animals and Wildlife

As detailed in Appendix E.14.2, animals exhibit a wide variety of responses to noise, ranging from startled to panicked flight. Consequently, some animal species may be more sensitive than other species and/or may exhibit different forms or intensities of behavioral responses. The majority of the literature suggests that domesticated animal species (cows, horses, chickens), as well as most wildlife species exhibit adaptation, acclimation, and habituation after repeated exposure to jet aircraft noise and sonic booms. Noise is expected to increase, however, extensive mitigation measures to minimize potential impacts are currently in place for areas within the JPARC that overlie crucial habitat or hatchery areas for "at-risk" wildlife populations including Dall sheep, the Delta caribou herd, peregrine falcons, salmon, and subsistence species (11th Air Force Alaska Airspace Handbook 2015:86-104). These mitigations include seasonal and/or altitude restrictions. All F-35A pilots would adhere to these airspace restrictions. No critical habitat for threatened or endangered species lies underneath northern JPARC airspace. Minor and short-term responses by migratory birds to aircraft flights in the northern JPARC are likely to occur. However, adverse impacts to these species' populations are unlikely under the Proposed Action Alternative. Existing impacts to wildlife populations are expected to continue under the Proposed Action Alternative.

4.3.3 Mitigation

As there are no significant adverse impacts in the acoustic environment, either on base or under the airspace, no acoustic environment mitigation measures are proposed under the No-Action Alternative.

For the Proposed Action Alternative, there are significant adverse impacts to people and households experiencing noise levels 65 dB DNL and greater, noise-attenuating measures for on-base housing areas may be required. Possible noise-attenuating measures could include re-glazing loose windowpanes, replacing cracked windowpanes, putting in weather stripping, adding insulation, and baffling vents. As the Air Force does not own the homes on or off the base, the undertaking of noise attenuation measures would be the responsibility of the owner.

To reduce classroom learning interference in the four on-base and one off-base learning institutions, noise-attenuating measures could include, but are not limited to installing sound absorbing materials in the ceiling and walls, fixing cracked windowpanes, sealing any gaps between the walls, floor, and ceiling, and installing insulation in building cavities. American National Standard Acoustical Performance Criteria, Design Requirements, and Guidelines for Schools, Parts 1 and 2 from the American National Standards Institute S12.60 provide guidance for noise attenuating design criteria.

For the acoustic environment underlying the airspace, no mitigation measures are proposed because there are no significant adverse impacts.

4.4 AIR QUALITY

The air quality analysis evaluated the changes in operational emissions that would occur from the proposed beddown of two F-35A squadrons when compared to the No-Action Alternative (or baseline conditions). Emissions from the No-Action Alternative were assumed to remain at the baseline rate and, therefore, no calculations were performed, refer to Section 3.4.2.1.

The Proposed Action Alternative would include additional flight operations, facility and infrastructure construction and/or modification, and associated personnel increases. Increased aircraft operations would also occur in northern JPARC airspace. The assessment of both aircraft operations below 3,000 feet (i.e., the mixing height) and construction-related emissions were mainly conducted through use of the Air Force Air Conformity Applicability Model (ACAM), Version 5 (Air Force Civil Engineer Center [AFCEC] 2014a). This is in accordance with Air Force Instruction (AFI) 32-7040, Air Quality Compliance and Resource Management; the Environmental Impact Analysis Process (32 CFR § 989); and the General Conformity Rule (40 CFR § 93 Subpart B). Activity data (e.g., aircraft operations, construction projects) were obtained from Air Combat Command. The ACAM uses a variety of informational sources to compute emission rates including U.S. Environmental Protection Agency (USEPA) promulgated models and state-specific models as needed.

As described in Section 3.4, the entire base is within attainment for all criteria pollutants and the Conformity Rule does not apply to Eielson AFB. However, operations of F-35A aircraft on particular flight tracks would have the potential to affect small portions of the particulate matter less than or equal to 2.5 (or $PM_{2.5,}$ micrometer in aerodynamic diameter) nonattainment and the carbon monoxide (CO) maintenance areas. As such, a conformity determination was conducted for the portion of operations that would occur in these nonattainment and maintenance areas. The increased emissions above the No-Action Alternative were calculated to allow a quantitative evaluation of possible impacts. Emissions at the base and up to 3,000 feet AGL were included in the analysis. The reason the emissions were not

calculated above 3,000 feet is due to the mixing height. The mixing height, or the area where emissions may affect the overall concentrations of pollutants and most concern to human health at the surface, are often defined between ground level and 3,000 feet AGL based on historic data. Per USEPA guidance (USEPA 420-R-92-009 1992), unless otherwise stipulated within a state's implementation plan, a mixing height of 3,000 feet AGL shall be assumed. The height can often be less, but 3,000 feet allows a conservative estimate. Below 3,000 feet AGL, mixing of the atmosphere is very dependent on the local topography and meteorology. In worst case scenarios, low winds and other meteorological conditions (e.g., inversions) may cause stagnation in this layer and emissions are not as easily dispersed resulting in higher concentrations.

The affected environment for emissions varies from less than a mile to over 30 miles, depending on the pollutant, local topography, and local meteorology. The affected area for emissions, with relatively conservative pollutants (pollutants that have long half-lives in the atmosphere such as CO), is generally limited to a few miles downwind of the source due to dispersion effects. Secondary pollutants such as ozone (O_3), are created in the atmosphere from precursor gases, such as hydrocarbons and nitrogen dioxide (NO_2) and extend much farther downwind. Emissions from base operations and construction would have negligible impacts at Denali National Park, which is approximately 100 miles to the southeast. However, as described in Chapter 3, during training exercises nearby flights could approach the park. Due to the possible proximity of the Proposed Action Alternative to a pristine Prevention of Significant Deterioration (PSD) Class I area, a qualitative analysis of the potential for impacts on visibility was also conducted.

Criteria Pollutants

The methodology for estimating emissions from the criteria pollutants included evaluating aircraft activity below 3,000 feet, the number of hours of operation, the type of engine with its associated emission parameters, and the mode of operation for each aircraft. Aircraft are anticipated to arrive in two phases, with the first squadron starting to arrive in Fiscal Year 2019 (FY19), and the second squadron arriving in 2020. The modes of the aircraft include idle/taxi, takeoff, climb out, and approach. Low approaches, where operations do not include taxi and idle, were also considered. Additionally aerospace ground equipment and aircraft operations performed with the engines still mounted on the aircraft (engine run-ups and trim checks) were also evaluated. Complete equations of each operational calculation, including emissions factors and operational assumptions used are shown in Appendix F.

To calculate emissions from construction, a wide range of activities were considered including trenching, excavating, grading, paving, worker trips, and architectural coatings. This included the evaluation of multiple large pieces of machinery, especially exhaust emissions, such as graders, dozers, tractors, loaders, backhoes, cranes, forklifts, generators, welders, trucks, worker vehicles, and other construction equipment as a composite. Times for each equipment use, numbers of equipment, emission factors, and load factors were needed to perform these calculations. Building sizes were used to calculate such parameters as earthwork, paving, and architectural coatings. Moreover, additional heating requirements would occur and these emissions have been included for the cold month. The exact methodology used for construction emissions, including equations, emission factors, equipment parameters, and building sizes are presented in Appendix F.

Emissions from personnel increases would include additional motor vehicle activity and total vehicle miles driven. These were calculated based on an incremental approach, happening over 2 to 3 years,

typically preceding (starting in FY19) the scheduled delivery of the aircraft by several months. Current projections call for about a third of the F-35A personnel arriving early in FY19 (359 military/year and 216 civilians/year), with the remaining arriving in FY20 (717 military/year and 434 civilians/year). Again, the methodology calculating emissions associated with increases in personnel, including equations used, emissions factors applied, and vehicle parameters assumed are shown in Appendix F.

Greenhouse Gas Emissions

The potential effects of greenhouse gas (GHG) emissions from the Proposed Action Alternative are by nature global and as such are presented in Chapter 5, *Cumulative Effects*.

4.4.1 No-Action Alternative

4.4.1.1 *Base*

Under the No-Action Alternative, numerous projects would be built inside Eielson AFB boundaries and are listed in Table 2.2-2. No additional aircraft operations at the base are anticipated when compared to baseline conditions. While the exact size of the facilities and infrastructure is not identified, it is unlikely that emissions would be such to change the attainment status. The fact that the construction and infrastructure improvements would be undertaken over numerous years and would be done according to all federal, state, and local construction permits, as well as within Title V permit allowances, supports a conclusion of no significant adverse impacts.

4.4.1.2 *Airspace*

Under the No-Action Alternative, numerous projects would be built outside Eielson AFB boundaries and are listed in Table 2.2-3. No additional aircraft operations in the airspace are anticipated when compared to baseline conditions. While the exact size of the facilities is not identified, it is unlikely that emissions would be such to change the attainment status of this large, undeveloped area. The fact that the construction would be undertaken over numerous years and would be done according to all construction permit regulations, supports a conclusion of no significant adverse impacts.

4.4.2 Proposed Action Alternative

4.4.2.1 *Base*

Based on the previous discussion the major sources categories shown in Table 4.4-1 were included in the base analysis. The outdoor construction period was considered to occur between May and September of each year in a phased construction process with indoor construction occurring over the other months, but emissions would be released at a much slower rate than actual construction activities. The construction process is relatively short term and is assumed to begin in the summer of 2016 and end by the year 2020. In 2021 and beyond, steady-state emissions from aircraft operations were assumed. In Table 4.4-1, the elements of the Proposed Action Alternative—personnel, construction/demolition, heating, and aircraft operations—are presented and the activity associated with the element identified.

Table 4.4-1. Sources included in the Base Air Quality Analysis

Proposed Action Element	*Activity*
Personnel	Personnel Increase for FY18
Personnel	Personnel Increase for FY20
Aircraft	F-35A Aircraft Operations for 1st Squadron (FY19)
Aircraft	F-35A Aircraft Operations for 2nd Squadron (FY20)
Construction/Demolition	Construct 6-Bay Flight Simulator Facility
Construction/Demolition	Construct 4-Bay Hangar/Propulsion Maintenance/Corrosion Control Personnel Dispatch
Construction/Demolition	Construct 4-Bay Hangar/Squadron Operations/Aircraft Maintenance Unit
Construction/Demolition	Construct 8-Bay, 16-Aircraft Weather Shelters (1 of 2)
Construction/Demolition	Construct 8-Bay, 16-Aircraft Weather Shelters (2 of 2)
Construction/Demolition	Missile Maintenance Facility
Construction/Demolition	Munitions Storage Igloos (Quarry Hill)
Construction/Demolition	Construct South Heat Plant
Construction/Demolition	Construct 200-Person Dormitory
Construction/Demolition	Construct Covered Parking for R-11 Aircraft Refueling Vehicles
Heating	Heating Requirements for New Construction
Aircraft	Low Approaches (FY19 - indefinite)
Aircraft	Low Approaches (FY20 - indefinite)

Criteria Pollutants

Total incremental emissions from the Proposed Action Alternative are shown in Table 4.4-2. In addition to the criteria pollutants, volatile organic compounds (VOCs) and ammonia (NH_3) are included because VOCs are an important ozone precursor gas and ammonia can cause secondary particulate matter and interfere with visibility. Emissions tables from each source (e.g., construction equipment, aircraft, aerospace ground equipment, and personally owned vehicles) are quite extensive and included in Appendix F and substantiate the totals presented below. The table shows the expected emissions during each year up to the steady state of 2021 at Eielson AFB. Additionally, because aircraft operations are a continuing activity, the emissions for each squadron of 24 F-35A aircraft are shown in Table 4.4-3. These emissions include those generated by F-35A operations at the airfield, up to 3,000 feet AGL.

Table 4.4-2. Total Emissions from Proposed Action Alternative Construction, Demolition, Based Aircraft Operations, Personnel, and Heating by Year at Eielson AFB

Pollutant	*Emissions 2016 (ton/year)*	*Emissions 2017 (ton/year)*	*Emissions 2018 (ton/year)*	*Emissions 2019 (ton/year)*	*Emissions 2020 (ton/year)*	*Emissions 2021 (ton/year)*
VOC	0.926	5.423	0.677	11.698	23.398	23.398
NO_x	3.411	14.171	1.539	61.649	123.304	123.304
CO	2.979	13.863	8.871	164.636	329.299	329.299
SO_x	0.006	0.027	0.009	6.202	12.404	12.404
PM_{10}	2.299	4.061	0.085	10.496	20.992	20.992
$PM_{2.5}$	0.185	0.000	0.073	8.829	17.659	17.659
Pb	0	0	0.000	0.000	0.000	0.000
NH_3	0.006	0.034	0.080	0.465	0.930	0.930

Legend: VOC=volatile organic compounds; NO_x=nitrogen oxides; CO=carbon monoxide; SO_x=sulfur oxides; $PM_{10/2.5}$=particulate matter; Pb= lead; NH_3=ammonia.

Table 4.4-3. Proposed Action Alternative Aircraft Emissions Based on Each F-35A Squadron (24 aircraft per squadron)

Calendar Year	*Scenario*	*Emissions (tons/year)*					
		VOC	*SO_x*	*NO_x*	*CO*	*PM_{10}*	*$PM_{2.5}$*
2019	1st Squadron	8.8	6.2	59.1	118.1	10.4	8.8
2020	2nd Squadron	8.8	6.2	59.1	118.1	10.4	8.8
Total Emissions	**Both Combined**	**17.6**	**12.4**	**118.2**	**236.2**	**20.8**	**17.6**

To determine the magnitude of impacts, total emissions at steady state (i.e., the point at which the greatest emissions occur) were compared to the total emissions for the FNSB (see Table 3.4-2). The comparison shows the incremental increase to be 0.096 percent for CO, 1.26 percent for nitrogen oxide (NO_x), 0.030 percent for VOCs, 0.246 percent for sulfur oxides (SO_x), 0.050 percent for PM_{10}, and 0.064 percent for $PM_{2.5}$. Due to the small incremental increases, the regional impact is not considered adverse.

A second quantitative analysis was also conducted by comparing F-35A 2021 emissions to the A-10 and F-16 squadrons stationed at Eielson AFB in calendar year 2004 (see Table 3.4-5). Comparing these 2004 emissions to those depicted in Table 4.4-3, the F-35A would generate 0.4 more tons per year of VOCs, 4.3 more tons per year of SO_x, 53.8 more tons per year of NO_x, 32.2 more tons per year of CO, and 12.8 less tons per year of PM_{10}. In 2004, $PM_{2.5}$, a subset of PM_{10}, reporting was not required by USEPA. When compared to historical emissions, F-35A emissions would be greater, with the exception of PM_{10}. The two most important pollutants to the area are CO and PM_{10} due to the nearby CO maintenance area and the $PM_{2.5}$ nonattainment area. While CO would increase above the historic levels, the expected emissions are still a small fraction of the Borough emissions (0.096 per cent). PM_{10} emissions are expected to be less than historic emissions and are estimated to represent 0.050 percent of the Borough emissions.

Additionally, it was identified that F-35A aircraft would traverse small portions of the $PM_{2.5}$ nonattainment and CO maintenance areas while arriving and departing on particular flight tracks below 3,000 feet AGL. It was determined that annually, emissions would equate to less than 1 ton of $PM_{2.5}$ and about 1.1 tons of CO. *De minimis* for $PM_{2.5}$ is 100 tons in nonattainment areas and for CO it is 100 tons for areas in maintenance. These anticipated emissions would not exceed any *de minimis* levels for the two criteria pollutants. Therefore, no further conformity analysis is required and no significant adverse impacts would be introduced.

4.4.2.2 *Airspace*

Proposed training activities could occur as close as 15 miles of Denali National Park in the Fox 3 MOA. Denali National Park is a pristine PSD Class I area, and visibility impacts would be of the greatest concern. No construction activities would occur in airspace near Denali National Park, only emissions generated by F-35A operations could potentially affect this PSD Class I area. The pollutants of greatest concern that would degrade visibility in Denali National Park are NO_x (as a precursor to ammonium nitrate) and VOCs. The F-35A operations would only represent a small portion of the activity currently underway. The VOCs and NO_x projected annual emissions would be substantially smaller than those generated by F-35As at the base (see Table 4.4-3). This is because F-35As primarily would fly above the 3,000-feet mixing height and with a transport distance of at least 15 miles, emissions would be dispersed by the time they reach the Park. As a result, the Proposed Action Alternative would not represent an adverse amount of emissions, as defined in section 40 CFR § 52.21(b)(23)(iii) of the PSD regulation, and not substantially contribute to an increase in visibility impairment within Denali National Park.

Additionally, emissions would not substantially contribute to increased visibility impairment to any special use areas not identified as PSD Class I areas underlying northern JPARC airspace, such as national conservation areas, national refuges, and designated WSRs.

4.4.3 Mitigation

There are no significant adverse air quality impacts on base or in the airspace; therefore, no mitigation measures are proposed under the No-Action Alternative.

For the Proposed Action Alternative, no significant adverse air quality impacts are identified at the base or surrounding areas; therefore, no mitigation measures are proposed. No mitigation measures are proposed for areas underlying the airspace because no significant adverse air quality impacts are identified.

4.5 SAFETY

This section evaluates the potential for the Proposed Action Alternative to introduce safety risks to military personnel, the public, and property. Fire and ground safety are assessed for the potential to increase risk, as well as the Air Force's ability to manage that risk by limiting exposure, responding to emergencies, and suppressing fires. Analysis of aircraft flight risks correlates projected Class A mishaps and Bird/Wildlife-Aircraft Strike Hazard (BASH) with current airspace use to consider the magnitude of the change in risk associated with the proposal. If a unique situation is anticipated to develop because of the Proposed Action Alternative, the ability to manage that situation is assessed. Finally, when the changes in risk arising from the Proposed Action Alternative are considered individually and collectively, assessments can be made about the adequacy of emergency response planning and the need for new or modified procedures and requirements that may become necessary.

4.5.1 No-Action Alternative

4.5.1.1 *Base*

Under the No-Action Alternative, operations on the base would continue; however, without the F-35A. Ground and flight safety considerations associated with current operations, as discussed in Section 3.5, would remain in place to ensure the continued safety of the public, military personnel, and property. The approximate 72 residences would continue to be located within Accident Potential Zone (APZ) II in Moose Creek. Land uses such as high-density housing, industry (which includes hazardous or flammable chemicals), and public use facilities are not recommended within this APZ and conflict with Air Force recommended land uses (see Figure 3.5-3).

4.5.1.2 *Airspace*

The No-Action Alternative would involve continuation of the plans, procedures, and processes currently used for minimizing flight safety risks for all flight activities within the existing JPARC airspace (see Appendix D.1). There would be no change from current environmental conditions identified in Section 3.5.2 *Safety*.

4.5.2 Proposed Action Alternative

4.5.2.1 *Base*

Operations and maintenance activities conducted on Eielson AFB would continue to be performed in accordance with all applicable safety directives. There are no specific aspects of F-35A operations or

maintenance that create any unique or extraordinary safety issues. For a discussion of the types of defensive countermeasures and ordnance the F-35A would use, refer to Appendix D.1, Section D.1.6. The F-35A would employ only those weapons systems approved for use on the impact training ranges and adhere to all flare and live-fire use restrictions already enforced by the 11th Air Force and identified as standard operating procedures in the Alaska Airspace Handbook.

As part of the F-35A beddown, new facilities would be constructed, and other, older facilities would be demolished. New facilities would include buildings on the flight line to support F-35A operations and maintenance, a new simulator facility, upgraded fuel cell and phase fire suppression systems, and a petroleum, oil, and lubricant warm storage facility. No unique construction practices or materials would be required that would change existing safety procedures. During construction, standard OSHA industrial safety standards would be followed. No unusual ground safety risks would be expected to arise from these activities.

Fire Risk and Management

Fire and crash response would continue to be provided by the Eielson AFB fire department. In response to the increased use of advanced composite materials in recent aircraft, a Hazardous Aerospace Material Mishap Emergency Response Integrated Process Team was chartered in 2000 by the Deputy Assistant Secretary of the Air Force for Environmental, Safety and Occupational Health. The goals of the Hazardous Aerospace Material Mishap Emergency Response project were to identify and inventory all hazardous aerospace materials on Air Force weapon systems and ensure procedures were in place to protect personnel from safety/health hazards associated with aerospace vehicle mishaps, see Section 3.5.1.1 for further discussion of Hazardous Aerospace Material Mishap Emergency Response goals. Although not anticipated, if new response procedures are required for unique materials used in the construction of the F-35A, the Air Force will develop them after the F-35A model is finalized. Under the Proposed Action Alternative, fire fighters would continue to be fully trained and appropriately equipped for crash and rescue response, the beddown of the F-35A would not change these abilities. Additionally, the Air Force will keep local firefighting departments informed about any new information or fire-fighting techniques associated with composite materials burned during a crash.

Accident Potential Zones

No changes to existing APZs or Clear Zones would be required to accommodate F-35A operations. The approximate 72 residences would continue to be located within APZ II in Moose Creek; however, the F-35A would follow all established airfield course rules and flight procedures to ensure that no new or increased safety risks would be introduced to the installation population or adjacent communities. Land uses such as high-density housing, industry (which includes hazardous or flammable chemicals), and public use facilities are not recommended within this APZ and conflict with Air Force recommended land uses (see Figure 3.5-3). No significant adverse impacts associated with accident potential zones are anticipated.

Aircraft Mishaps

The F-35A is a new type of 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 fighter attack mission. The more

technologically advanced electronics and engine safety program of this fifth-generation aircraft also improve safety. Although the F-35A is a new aircraft, the single engine that powers it is a composite product of 30 years of engineering, lessons learned from previous single aircraft engines with a similar core, and tens of thousands of hours during operational use of other aircraft. Throughout the design and testing process, safety initiatives for the F-35 took the previous best practices for single engine safety and built upon them to promote flight safety progress. Examples of design characteristics that are damage tolerant and enhance safety include a dual wall engine liner, a fan blade containment shell, and a shaft monitor for vibration, torque, and alignment. Additionally, F-35A pilots would use simulators extensively. Simulator training includes all facets of flight operations and comprehensive emergency procedures. This minimizes risk associated with mishaps due to pilot error. The sophistication and fidelity of current simulators and related computer programs match the advancements made in aircraft technology.

Because of the emphasis on safety and design of its more powerful engine, the F-35A should have an operational mishap rate similar to other tactical fighter jet aircraft like the F-16 and F-15. Since they were operational to January 2015, F-16s had a Class A mishap rate of 3.49 and F-15s a rate of 2.36 for every 100,000 hours flown (Air Force Safety Center [AFSC] 2015b, c). As of January 2016, all three F-35 variants have flown a combined 23,000 hours (Lockheed Martin 2016); the F-35A has flown over 9,000 hours with one Class A mishap (an engine fire) (Air Force 2015a).

Bird/Wildlife-Aircraft Strike Hazards

As discussed in Section 3.5.2.1, there has been an annual average of 9.8 bird-aircraft strikes at Eielson AFB over the past 5 years. Implementing the Proposed Action Alternative is expected to increase airfield operations by 138 percent, which would increase the number of bird strikes by aircraft to a possible average of 24. Although this is a substantial increase in strikes, the Air Force considers this to be a minor impact that would have only negligible effects on bird populations on the base. Three factors support this conclusion: (1) the F-35A would operate like all other fighter aircraft that have used Eielson AFB; (2) no aspect of the Proposed Action Alternative would increase concentrations of birds on or near the base; and (3) the base would continue use of the 354th Fighter Wing (354 FW) BASH Plan and Air Force tools (bird avoidance model and Avian Hazard Advisory System) and cooperation with local U.S. Department of Agriculture Wildlife Services to limit BASH potential. Furthermore, when BASH risk increases, limits are placed on low altitude flights and certain types of training (e.g., multiple approaches). Minor, but not adverse, increased BASH risk to wildlife, pilots, and aircraft under the Proposed Action Alternative is anticipated.

4.5.2.2 *Airspace*

The addition of F-35A aircraft to the JPARC airspace would not require changes to the management or structure of the JPARC training airspace. The F-35A would fly mission profiles similar to those flown by current Eielson AFB F-16 aircraft, only at higher average altitudes, including air-to-ground ordnance delivery, air combat training operations, and supersonic events. Under the Proposed Action Alternative, operations in the JPARC airspace would increase over the No-Action Alternative conditions. Such increases would not affect the capabilities of this airspace to accommodate the proposed training activities by the F-35As and would not result in a need for structural changes to the airspace. Total operations would remain within the capability and capacity of the JPARC airspace and ranges.

Fire Risk and Management

Flare and ordnance deployment in authorized ranges and airspace is governed by a series of regulations based on safety and environmental considerations and limitations. These regulations establish procedures governing the use of flares over ranges, other government-owned and -controlled lands, and nongovernment-owned or -controlled areas. Appendix D.1.6 details the flares and ordnance proposed for use by F-35As.

It is estimated that F-35A pilots would annually deploy up to 27,060 flares; this would double current flare use within JPARC airspace. When flares are used by the F-35A, they would conform to existing JPARC airspace altitude and seasonal restrictions to ensure fire safety. Based on the emphasis of flight at higher altitudes, roughly 86 percent of F-35A flares released throughout authorized JPARC airspace would occur above 15,000 feet MSL, further reducing the potential risk for accidental fires. Lands surrounding the air-to-ground training impact areas underlying JPARC airspace ensure public protection by restricting access to areas associated with laser use, emitters, and ordnance delivery. All guidance, regulations, and instructions for ordnance delivery at the three impact areas (see Figure 2.2-4) would be adhered to by F-35A pilots. Mutual fire response and suppression agreements would continue.

During scoping and at the hearing, citizens of Delta Junction expressed concern over wildland fires due to the Proposed Action Alternative. Three primary management actions are used to prevent wildfires. First, a fire danger rating system is used to reduce the likelihood of a fire by limiting military activities. Certain military activities (e.g., flare and live-fire employment) are restricted when thresholds of wildfire risk are reached. Second, wildfire danger is reduced through the removal of accumulated fuels (e.g., by prescribed burning and/or construction and maintenance of fire or fuel breaks). Third, when military operations are occurring and high and extreme fire danger conditions exist, an Initial Attack Response Team remains on alert to provide a rapid initial response to wildfires in the area. Additionally, coordination between Air Force personnel and wildland fire-fighting personnel regarding fire detection and response would continue under the Proposed Action Alternative.

The Oklahoma Range is located to the southwest of Delta Junction and only strong southerly winds would threaten Delta Junction. Additionally, due to both prescribed burns and the 2013 and 2014 wildfires, there is little flammable material available in the Oklahoma Range area. Delta Junction, and other surrounding communities near the Oklahoma Range, should not be directly impacted by F-35A ordnance training.

To minimize the potential for wildland fires in the Delta Junction area, all fire management and response practices currently employed would continue. These include monitoring the fire weather index and modifying planned training activities accordingly, establishing non-training buffers within 0.5 miles of training areas to protect the surrounding areas, and conducting prescribed burns and mechanical thinning in training areas. The following standard measures would continue to be implemented:

- Continue use of firefighting materials and equipment by all units on ranges or training areas during high and extreme fire risk index rating periods. These firefighting tools would include but are not limited to Pulaskis, beaters, and portable water extinguishers.
- Limit the use of certain ammunition and pyrotechnics during periods of elevated fire risk indices.

Additionally, the Air Force will keep local firefighting departments informed about any new information or fire-fighting techniques associated with composite materials burned during a crash. Implementation of the above listed measures would minimize the potential for adverse impacts to lands and the public.

Aircraft Mishaps

No military to civilian midair collisions and few reported near misses have occurred within the existing JPARC airspace. Continued maintenance of situational awareness, and use of available communications for tracking the scheduled and near real-time status of the Special Use Airspaces (SUAs) would help maintain a safe flying environment for all concerned. Any changes to those capabilities and the current or future areas in which this service is provided would be appropriately addressed and communicated through those same venues. The majority of flight operations would be conducted over remote areas; however, in the unlikely event that an aircraft accident occurs, existing response, investigation, and follow-on procedures would be enforced to ensure the health and safety of underlying populations and lands. No significant adverse aircraft mishap impacts are anticipated under the Proposed Action Alternative.

Bird/Wildlife-Aircraft Strike Hazards

Under the Proposed Action Alternative, the F-35A would operate in the same airspace environment as the current aircraft. As such, the overall potential for bird-aircraft strikes is not anticipated to be statistically different following the beddown of the F-35A. It is anticipated that BASH potential would be mitigated by the fact that F-35A aircrews operating in the JPARC would be required to follow applicable procedures outlined in the 354 FW BASH Plan and the fact that the majority of its flight time is spent at higher altitudes. When BASH risk increases, limits are and would continue to be placed on low-altitude flights. Special briefings are provided to pilots whenever the potential exists for greater bird-strike risks within the airspace; F-35A pilots would also be subject to these procedures. Under the Proposed Action Alternative, BASH risk would not impose adverse impacts when compared to the No-Action Alternative.

4.5.3 Mitigation

As there are no significant adverse impacts to safety, either on base or in the airspace, no mitigation measures are proposed under the No-Action Alternative.

For the Proposed Action Alternative, no significant adverse safety impacts are identified, and therefore no mitigation measures are proposed at the base or surrounding areas. No mitigation measures are proposed for areas underlying the JPARC airspace because no significant adverse safety impacts are identified.

4.6 SOCIOECONOMICS

Socioeconomic impacts and determinations of significance are assessed for the No-Action and Proposed Action Alternatives. In general, socioeconomic impacts are assessed and compared to the No-Action Alternative (or baseline conditions) to gauge the magnitude of impacts. Given the varied nature of the different socioeconomic topics, differing thresholds and considerations are applied in making determinations of whether impacts are adverse or beneficial.

While a change in population is not considered an impact itself, population change has the potential to drive positive or negative impacts to other socioeconomic factors. Because population change is not considered an impact, significance is not determined in this EIS. DoD-specific legislation (Public Law 110-17 10 USC 2391: Military base reuse studies and community planning assistance) and Directives

(DoD 3030.01 and 5410.12) address the issue of what is a significant impact on communities due to changes in population related to DoD programs, such as a base realignment, closure, or expansion. Collectively, these documents establish "thresholds" that allow the DoD's Office of Economic Adjustment to provide communities with technical and financial assistance for organizing and planning for DoD program impacts. The Office of Economic Adjustment must make a finding that the affected community would experience a "direct and significantly adverse consequence" based on the DoD impacts in light of community-specific needs and resources.

Impacts related to housing and public services (i.e., education, transportation and utilities, emergency services, and health) were assessed primarily in relation to changes in population. Increases in population tend to drive up the demand for housing as well as the level of services required from public service agencies. Additional demands, generated by additional population, were evaluated and compared to the ability of existing facilities and services to meet these demands. Impacts to public services and housing were considered adverse if they would lead to a condition where demand would exceed existing capacity of public services agencies to provide services or the housing market to provide adequate housing units.

Economic impacts related to jobs and dollars, when calculated as positive values, were considered "beneficial" impacts. These impacts were calculated using the Impact Analysis for Planning (IMPLAN) economic model using data provided by the Air Force related to the Proposed Action Alternative. Economic variables that are presented as results of IMPLAN modeling include Jobs, Labor Income, and Economic Output. Each of these variables consists of a direct, indirect, and induced element. See Appendix D.2 for more information on the economic concepts used in the analysis.

Construction activities are anticipated to occur from FY16 to FY20 and would cost an estimated $303 million over that period (see Section 2.2.2.2). These planned construction expenditures were inputs into the IMPLAN model (sector number 58), which was then fitted with data for the FNSB. IMPLAN sector 58, titled Construction of Other New Nonresidential Structures, includes data for activities such as "military construction."

Full operations associated with the Proposed Action Alternative are expected to begin in FY20. Based on information in Table 2.2-8, military and civilian employment associated with the Proposed Action Alternative is anticipated to equal 1,563 jobs (1,076 military and 487 civilian and contractor). These jobs were input into the IMPLAN model, into IMPLAN sector 536 - Employment and Payroll of Federal Government, Military.

Non-payroll operations expenditures associated with the Proposed Action Alternative were estimated based on data provided by the Air Force related to current base operations expenditures and planned increases in operations activities associated with the Proposed Action Alternative. Some examples of increases in operations expenditures include increases in facilities support and maintenance, increases in general equipment and supplies, and increased expenditures by the commissary and on-base retail stores. An annual total increase in expenditures of $26.7 million is anticipated. See Appendix D.2 for more information on the input data used in the economic analysis.

4.6.1 No-Action Alternative

4.6.1.1 *Population, Demographics, and Economics*

No significant adverse impacts, socioeconomic conditions related to population, demographics, and economics, under the No-Action Alternative, would remain consistent with conditions as described in Section 3.6.2.1.

4.6.1.2 *Schools, Housing, Transportation, and Utilities*

No significant adverse impacts, socioeconomic conditions related to schools, housing, transportation, and utilities, under the No-Action Alternative, would remain consistent with conditions as described in Section 3.6.2.1.

4.6.1.3 *Health, Fire, and Crime Response*

No significant adverse impacts, socioeconomic conditions related to health, fire, and crime response, under the No-Action Alternative, would remain consistent with conditions as described in Section 3.6.2.1.

4.6.2 Proposed Action Alternative

4.6.2.1 *Population, Demographics, and Economics*

Population

Basing two F-35A Squadrons and associated support and maintenances functions are expected to add 1,563 military and civilian personnel to the base by FY20. Including dependents, the total base population would increase by an estimated 2,765. Personnel increases would be incremental, happening over 2 to 3 years. The FNSB population is projected to be 106,822 (see Table 3.6-2) around the time that the Proposed Action Alternative would occur, the increase of 2,765 would represent an increase of 2.6 percent over this level. A change in population is not considered an impact itself; however, population change has the potential to drive positive or negative impacts to other socioeconomic factors discussed in the remainder of this section.

Demographics

Under the Proposed Action Alternative, there would be a relatively small increase in population (2.6 percent) in the region of influence. Demographic characteristics shown in Table 3.6-4 would not change in a material way in FNSB. Some slight variation from the No-Action Alternative conditions may occur, but any changes would not be adverse.

Economics

Construction. Table 4.6-1 shows estimated total economic impacts from construction associated with the Proposed Action Alternative. From FY16 to FY19, a total of 2,340 jobs, $193 million in labor income, and $453 million in construction activities would be generated. Most of the economic impacts would be direct effects and make up 59 percent of total jobs, 77 percent of total labor income, and 67 percent of total economic output.

Table 4.6-1. Economic Impacts from Construction, Totals, FY16 to FY19, 2015 $'s

Impact	*Jobs*	*Labor Income*	*Economic Output*
Direct	1,387	$147,977,920	$303,000,011
Indirect	396	$19,185,599	$70,603,400
Induced	556	$25,830,653	$79,769,713
Total	**2,339**	**$192,994,172**	**$453,373,124**

Table 4.6-2 shows annual averages for estimated economic impacts from FY16 to FY19. An annual average of 585 jobs, $48 million in labor income, and $113 million in economic output would be generated through construction activities.

Table 4.6-2. Economic Impacts from Construction, Annual Averages, FY16 to FY19, 2015 $'s

Impact	*Jobs*	*Labor Income*	*Economic Output*
Direct	347	$36,994,480	$75,750,003
Indirect	99	$4,796,400	$17,650,850
Induced	139	$6,457,663	$19,942,428
Total	**585**	**$48,248,543**	**$113,343,281**

Operations. Full-time operations associated with the Proposed Action Alternative are expected to begin in FY20. At that time, an estimated 2,321 jobs, $176.7 million in labor income, and $275.4 million in economic output would be generated by F-35A operations and maintenance activities. Most of the economic impacts would be direct effects and comprise 78 percent of total jobs, 86 percent of total labor income, and 73 percent of total economic output.

Table 4.6-3. Economic Impacts from F-35A Operations and Maintenance Activities, Annual, 2015 $'s

Impact	*Jobs*	*Labor Income*	*Economic Output*
Direct	1,802	$152,529,213	$200,729,557
Indirect	20	$974,885	$2,964,771
Induced	500	$23,222,365	$71,714,253
Total	**2,321**	**$176,726,463**	**$275,408,581**

In summary, the Proposed Action Alternative would introduce beneficial economic impacts to the region.

4.6.2.2 *Schools, Housing, Transportation, and Utilities*

Schools

The Proposed Action Alternative would add 528 children to the FNSB population (see Table 2.2-8). Based on data from the 2010 U.S. Census, about 73 percent of these children would be school aged (U.S. Census Bureau 2010), indicating that about 385 students would be added to the enrollment of the Fairbanks North Star School District. The 385 students would represent an increase of 2.8 percent over baseline enrollment of 13,716 students (see Section 3.6) and total enrollment with the Proposed Action Alternative would equal approximately 14,101.

Information from the Fairbanks North Star School District indicates that the school district, as of November of 2014, operated at 79.3 percent of capacity and can accommodate an additional 3,318 students. Available capacity was identified at schools that would be used by DoD dependents, including excess capacity of 136 students at Anderson Elementary, 287 students at Crawford Elementary, and 264 students at Ben Eielson Junior and Senior High School (Fairbanks North Star School District 2014).

Additionally, the School Board has stated its commitment to meet the educational needs of Eielson AFB students both now and in the future.

Because the Proposed Action Alternative would not lead to an increase in student enrollment that would push the Fairbanks North Star School District beyond its current capacity, and because it is anticipated that federal education impact aid payments would increase in proportion to the additional student population, impacts to schools would not be adverse under the Proposed Action Alternative.

Housing

Based on concerns expressed by local mayors during the public comment period, the potential impacts to the local housing market resulting from the proposed F-35A beddown were re-examined. The concerns focused on both the long-term impact resulting from having more military families looking for off-base housing, as well as the short-term impact of construction workers looking for housing in the local area. Since publication of the Draft EIS, additional information has been obtained from the Fairbanks Economic Development Corporation's recently published *Fairbanks North Star Borough Housing Needs Assessment* (September 2015) and the *Air Force Housing Requirements and Market Analysis* (HRMA) (Air Force 2015e), both of which have shed more light on factors affecting local housing markets.

Construction. The short-term housing requirement for workers hired during the construction phase of the Proposed Action Alternative is expected to last four construction seasons, between 2016 and 2019. The EIS estimates that 1,387 jobs would be directly created to support construction efforts over this period, with another 952 indirect and induced jobs being required. For this analysis, it was assumed that 1,387 direct construction jobs would potentially require local housing, as the indirect and induced jobs tend to be service positions, typically coming from the local labor supply. With local hire advocated by local governments, it is assumed that half of the direct jobs would be drawn from the local labor force, leaving 693 jobs to be filled by non-local labor. These individuals would need housing for varying lengths of time, depending on the seasonality of their work. Based on the analysis contained in the FNSB *Housing Needs Assessment* (Fairbanks Economic Development Corporation 2015), there are currently an estimated 1,068 vacant housing units within a 30-minute commute of Eielson AFB, which is more than sufficient to absorb the anticipated non-resident workers. Because all construction needs to be completed prior to the arrival of the first aircraft in August 2019, construction activities would be declining by the time the first influx of military personnel start arriving. Based on this analysis, there would be no significant adverse impact to the local housing market caused by F-35A construction requirements.

Operations. The HRMA identified that no new Privatized Housing would be needed on Eielson AFB to support the additional military and civilian personnel and their dependents associated with the F-35A beddown proposal. The HRMA assumed that personnel (military, civilian, and contractor) would either rent or purchase off-base housing during their tour at Eielson AFB. According to the HRMA there would be a rental housing unit shortfall of 1,190 for military families and 633 unaccompanied personnel by 2020. However, the HRMA assumed a commute distance of 20 minutes, which did not include units available throughout North Pole and Salcha. The HRMA also assumed that there would be no growth in the number of available rental units from 2015 to 2020.

According to the *Housing Needs Assessment* (Fairbanks Economic Development Corporation 2015), in 2013 there were 3,495 available vacant rental units. Based on these 2013 figures, the assessment indicated there would be adequate supply in 2020 for the increases in personnel and dependents seeking off-base housing.

Taking another approach, based on 2000 and 2010 Census data for population and housing growth in FNSB, Table 4.6-4 shows the estimated population and housing-unit availability in 2020. As depicted, the FNSB population would increase by 1.1 percent per year over the 10 years for 110,555 (this includes the additional population associated with the Proposed Action Alternative). This results in an increase of 12,974 by 2020 (or 13.3 percent increase from 2010). By averaging the per capita rates from the 2000 and 2010 census data, total housing units projected for 2020 would be 47,182 or an increase of 5,399 units (or 12.92 percent increase) (U.S. Census 2010, 2015). For occupied, owner occupied, and renter occupied housing units, census data indicate that there would be an increase of 5,175, 2,149, and 3,025 units, respectively. Based on an average vacancy rate of 11.8 percent, there would be an estimated 2,130 vacant rental units available in 2020. While these numbers are estimates, they provide a reasonable basis for determining future housing-unit availability. Based on both the census data and the *Housing Needs Assessment*, there would not be a shortfall in available housing units and no significant adverse impacts are anticipated.

Table 4.6-5. Population and Housing Growth Projections to 2020

Category	***2000 Census***	***2010 Census***	***2020 Projected***
Population	82,840	97,581	110,555
Total Housing Units	33,291	41,783	47,182
Occupied Housing Units	*29,777*	*36,441*	*41,616*
Owner Occupied Units	16,077	21,410	23,559
Renter Occupied Units	13,711	15,031	18,056
Renter Vacant Units	*1,448*	*1,922*	*2,130*
Rental Vacancy Rate	10.56%	12.79%	11.80%

Source: U.S. Census 2010, 2015.

Transportation and Utilities

Existing transportation and utilities infrastructure on Eielson AFB (e.g., power, potable water, wastewater, and solid waste), along with planned upgrades, would support additional on-base requirements associated with the Proposed Action Alternative. Addition of entry and merge lanes at the South Gate for construction traffic would lessen congestion at the main North Gate, and accommodate entering and exiting vehicles onto Richardson Highway. The Proposed Action Alternative would neither restrict nor close the Richardson Highway. The increase of off-base residential population is not anticipated to strain regional transportation or utilities (e.g., solid waste, potable water, energy, and communications) infrastructure. Therefore, no significant adverse impacts to transportation and utilities are anticipated under the Proposed Action Alternative.

4.6.2.3 *Health, Fire, and Crime Response*

Existing health, fire, and crimes response services provided on Eielson AFB, along with planned improvements, would support additional demand for on-base services associated with the Proposed Action Alternative. This requirement has been accounted for in the increases in firefighting and security forces personnel being added under this proposal. Discussions with FNSB representatives indicate that the additional off-base residential population made up of military personnel and dependents is not anticipated to strain the capacity of current health, fire, and crime response services in the region; additional tax revenues generated in the FNSB through normal growth would be used to increase health,

fire, and crime response personnel if needed. Therefore, no significant adverse impacts to health, fire, and crime response services are anticipated under the Proposed Action Alternative.

4.6.3 Mitigation

As there are no significant adverse impacts to the socioeconomic environment in the region, either on base or under the airspace, no mitigation measures are proposed under the No-Action Alternative.

For the Proposed Action Alternative, no significant adverse impacts are identified in the socioeconomic region of influence, therefore, no mitigation measures are proposed. Underlying the airspace, no mitigation measures are proposed because no significant adverse socioeconomic impacts are identified.

4.7 LAND MANAGEMENT

Impact analysis for land management considers whether the Proposed Action Alternative would change the status of land ownership or is inconsistent with land management plans. Noise effects to land use compatibility is evaluated in Sections 4.3.2.1 and 4.3.2.2, *Acoustic Environment*, and in Section 4.14.2.1 and 4.14.2.2, *Recreational and Visual Resources* evaluates potential noise impacts to those resources.

4.7.1 No-Action Alternative

4.7.1.1 *Base*

Under the No-Action Alternative, there would be no change from the baseline conditions to land management. No installation plans would need to be changed and land management plans in FNSB are consistent with Eielson AFB mission and aircraft operations. Therefore, implementing the No-Action Alternative would result in no significant adverse impacts to land management.

4.7.1.2 *Airspace*

Under the No-Action Alternative, there would be no change from baseline conditions to land management by aircraft operating in northern JPARC airspace. Therefore, implementing the No-Action Alternative would not result in adverse impacts to land management.

4.7.2 Proposed Action Alternative

4.7.2.1 *Base*

Under the Proposed Action Alternative, there would be no changes to land management when compared to the No-Action Alternative. No installation plans would need to be changed and FNSB land management plans are consistent with the anticipated population growth associated with bringing two F-35A squadrons to Eielson AFB. Implementing the Proposed Action Alternative would result in no significant adverse impacts to land management.

4.7.2.2 *Airspace*

The Proposed Action Alternative would not require acquisition of any lands underlying northern JPARC airspace and, therefore, would not alter any existing land management plans and objectives. The F-35As would operate in existing airspace and in a similar manner, but increase operations. The F-35As, however, would fly 86 percent of the time at altitudes above 15,000 feet MSL (see Table 2.2-12). These proposed operations would not require any changes to land management plans or conflict with existing management objectives of federal, state, tribal, or local management agencies. This conclusion is justified because F-35A operations are a continuation of military aircraft training in the northern JPARC

airspace, operations that have been continuous for several decades. The introduction of a new aircraft, in an area already overflown by military aircraft, would not necessitate any changes to land management plans or adversely affect land management objectives for special use areas underlying northern JPARC airspace.

4.7.3 Mitigation

As there are no significant adverse impacts to land management, either on base or in the airspace, no mitigation measures are proposed under the No-Action Alternative.

For the Proposed Action Alternative, no significant adverse land management impacts are identified at or around the base; therefore, no mitigation measures are proposed. No land management mitigation measures are proposed for areas underlying the airspace because no significant adverse impacts are identified.

4.8 CULTURAL RESOURCES

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 base 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. The on-base APE is the same for the Proposed Action and the No-Action Alternatives.

Impacts on traditional resources under airspace include the noise and visual effects of aircraft overflights on rituals and ceremonies and on wildlife resources. Aircraft overflights can also increase the level of effort required to harvest subsistence resources and increase the likelihood of reduced harvest levels during the critical subsistence season. The APE for airspace activities, where noise (subsonic and supersonic) is generated by aircraft overflights, is the land that underlies northern JPARC airspace.

Scientific studies of the effects of noise and vibration on historic properties have considered potential impacts on historic buildings, prehistoric structures, archaeological cave/shelter sites, and rock art (see Appendix E.2.13). These studies concluded that overpressures generated by supersonic overflight were well below established damage thresholds and that subsonic operations would be even less likely to cause damage. Archaeological and historic architectural resources under airspace were characterized using the records of the National Register and National Historic Landmark Program.

The potential for traditional resources on Eielson AFB and its vicinity was identified through consultation with Alaska Native villages and communities. The potential for traditional resources under the northern JPARC airspace was identified using documentation on Alaska Native tribes compiled by the Alaska Department of Community and Economic Development and maps. Most importantly, Alaska Native tribes and organizations within the project areas associated with the Proposed Action were contacted requesting whether they have any concerns about the Proposed Action Alternative (see Appendix C for

the recipient list and letters). Information from previous government-to-government consultation with Alaska Native tribes and organizations from the JPARC EIS (Air Force 2013a) was also incorporated into the analysis.

4.8.1 No-Action Alternative

4.8.1.1 *Base*

Traditional/Alaska Native

Under the No-Action Alternative, there would be no change to baseline conditions on Eielson AFB. Therefore, implementing the No-Action Alternative would not have an adverse impact to traditional Alaska Native resources.

Archaeological and Architectural

Under the No-Action Alternative, there would be no change to baseline conditions. Therefore, implementation of the No-Action Alternative would not have an adverse impact to archaeological and architectural resources.

4.8.1.2 *Airspace*

Traditional/Alaska Native

Under the No-Action Alternative, there would be no change to baseline conditions found underlying northern JPARC airspace. Therefore, implementing the No-Action Alternative would not have an adverse impact to traditional Alaska Native resources.

Archaeological and Architectural

Under the No-Action Alternative, there would be no change to baseline conditions of archaeological and architectural resources underlying northern JPARC airspace. Therefore, implementing the No-Action Alternative would not have an adverse impact to these resources.

4.8.2 Proposed Action Alternative

4.8.2.1 *Base*

Traditional/Alaska Native

Phone calls were made to Alaska Native village representatives as follow-on to the letters sent enquiring whether there were any issues or concerns with the Proposed Action and if formal consultation was requested. Discussions with the representatives indicated that there were no concerns or wishes to engage in further consultation. Under the Proposed Action Alternative, no direct or indirect adverse impacts to traditional cultural properties are anticipated.

Archaeological and Architectural

No known prehistoric sites have been recorded at Eielson AFB. However, if human remains, funerary objects, sacred objects, or objects of cultural patrimony are discovered during land-disturbance activities, work will cease immediately in the vicinity of the artifact discovery and site personnel will notify the Eielson AFB Cultural Resources Manager (or Manager) immediately. In consultation with the Alaska State Historic Preservation Office (SHPO), the Manager will follow Section 106 processes to determine the site's National Register eligibility and if necessary, determine a course of action to avoid or mitigate

the site. If an archaeological dig is deemed necessary, the person(s) conducting the dig will meet all the requirements specified in 32 CFR § 229.8. The Tanana Chiefs Conference will be notified of the discovery in writing (U.S. Air Force 2014a). In summary, no direct or indirect effects to archaeological resources from the Proposed Action Alternative are anticipated.

Two buildings in the Flightline Historic District would be impacted: 1306 and 1141 (see Figure 3.8-1). At 1306, an addition to the exterior and interior renovations would be undertaken. At 1141, only interior modifications would be made. Several other facilities in the vicinity of the Flightline Historic District would also be modified, but this would not affect the historic attributes of the district. See Appendix C for the consultation packages and correspondence between Eielson AFB and the SHPO.

Six new munitions storage igloos are also scheduled for construction in the Quarry Hill Munitions Storage Historic District to support the increased munitions requirements of the F-35A aircraft. No demolition of existing munitions storage igloos would occur and all new igloos would be constructed in vacant areas. This munitions storage district falls under the Program Comment entitled: *Program Comment for World War II and Cold War Era (1939 – 1974) Ammunition Storage Facilities*. As such, proposed construction of six more storage igloos would not alter the district's historic status. See Appendix C for the consultation packages and correspondence between Eielson AFB and the Alaska SHPO.

In summary, on September 1, 2015, the SHPO provided partial concurrence on the no effects conclusion to properties underlying the northern JPARC airspace. However, they requested further information about on-base facility construction and modifications. A revised consultation package was sent to the SHPO on December 3, 2015, with additional information and a request for concurrence with findings of "not eligible" for listing on the National Register of Historic Places for specified Cold War and Post-Cold War facilities on Eielson AFB. On December 30, 2015, the SHPO agreed with most but not all of the findings, but requested that Eielson AFB obtain Alaska Heritage Resources Survey numbers for several existing facilities prior to providing concurrence, and that the base provide a historic assessment of the Small Arms Range Complex. A third consultation package, providing the requested information was sent to the SHPO on January 20, 2016. The SHPO provided full concurrence with Air Force findings on January 21, 2016, concluding consultation requirements.

4.8.2.2 *Airspace*

Traditional/Alaska Native

To date, no specific traditional cultural properties have been identified by Alaska Native villages and communities under the airspace in the APE (see Figure 3.8-2). As discussed in Section 4.3.2.2, there would be little change in subsonic or supersonic noise levels in northern JPARC airspace under the Proposed Action Alternative. Therefore, no direct or adverse impacts to traditional cultural properties above and beyond what exist under baseline conditions are anticipated.

Under the Proposed Action Alternative, subsistence hunting could potentially become more difficult due to the increase in aircraft presence. However, seasonal adjustments, restrictions, and limitations (see Appendix D.1) have been instituted in the northern JPARC airspace to minimize impacts to subsistence hunting. Therefore, no direct or adverse impacts to traditional cultural properties above and beyond what exist under baseline conditions are anticipated.

Archaeological and Architectural

Under the Proposed Action Alternative, the only source of impacts to archaeological or architectural resources beneath the effected airspace is through sound and vibration. There would be little change in subsonic or supersonic noise levels for the airspace units under the Proposed Action. Noise levels in most areas would not exceed 45 dB L_{dnmr}, including the Eagle Historic District National Historic Landmark. Compared to existing conditions, the Proposed Action Alternative would increase the supersonic noise levels by less than 1 dBC. This would occur in areas already subject to sonic booms and would not be an adverse effect to historic properties. Therefore, no direct or indirect adverse impacts to archaeological or architectural resources would occur under the Proposed Action Alternative. See Appendix C for the finding of no effects on historic properties underlying northern JPARC airspace and concurrence by the Alaska SHPO.

4.8.3 Mitigation

As there are no significant adverse cultural resources impacts, either on base or under the airspace, no mitigation measures are proposed under the No-Action Alternative.

For the Proposed Action Alternative, no significant adverse cultural resources impacts are identified at the base; therefore, no mitigation measures are proposed. No mitigation measures are proposed for areas underlying the airspace because no significant adverse cultural resources impacts are identified.

4.9 ENVIRONMENTAL JUSTICE AND PROTECTION OF CHILDREN

In 1994, Executive Order (EO) 12898, *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations (Environmental Justice)*, was issued to focus the attention of federal agencies on human health and environmental conditions in minority and low-income populations. This EO was also established to ensure that, if there were a disproportionately high and adverse human health or environmental effects of federal actions on these populations, those effects would be identified and addressed. Environmental justice is achieved if minority and low-income communities are not subjected to disproportionately high or adverse environmental effects.

The Council on Environmental Quality suggests several principles in its *Environmental Justice Guidance Under the National Environmental Policy Act* (1997), to guide agencies in identifying environmental justice issues. These guidelines and the following steps were used to assess potential environmental justice impacts. First, minority and/or low-income populations affected by the Proposed Action Alternative within the region of influence were identified. Second, if these population groups were present, they were specifically identified as to where they were located. Third, it was determined whether these populations were exposed to health or environmental impacts caused by the Proposed Action Alternative. If so, then these impacts were evaluated to determine whether the effects were disproportionally high and adverse to human health or to the natural and physical environment of low-income and/or minority populations. The guidance further states that when determining whether environmental effects are disproportionately high and adverse agencies consider the following three factors to the extent practicable:

a. Whether there is or will be an impact on the natural or physical environment that significantly (as employed by NEPA) and adversely affects a minority population, low-income population, or Indian tribe;

b. Whether environmental effects are significant (as employed by NEPA) and are or may have an adverse impact on minority populations, low-income population, or Indian tribe that appreciably exceeds or is likely to appreciably exceed those on the general population or other appropriate comparison group; and
c. Whether the environmental effects occur or would occur in a minority population, low-income population, or Indian tribe affected by cumulative or multiple adverse exposures from environmental hazards.

In 1997, EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks (Protection of Children)* was issued to identify and address issues that affect the protection of children. Children may suffer disproportionately more environmental health and safety risks than adults because of various factors. These include: children's neurological, digestive, immunological, and other bodily systems are still developing; children eat more food, drink more fluids, and breathe more air in proportion to their body weight than adults; children's behavior patterns may make them more susceptible to pollution and accidents because they are less able to protect themselves; and children's size and weight may diminish their protection from standard safety features.

Health and safety impacts to children were identified by consulting USEPA's memorandum *Addressing Children's Health through Reviews Conducted Pursuant to the National Environmental Policy Act and Section 309 of the Clean Air Act* (USEPA 2012). The memorandum suggests that proposed activities that impact air quality, water quality, floodplains, noise, and traffic and/or produce hazardous/poisonous materials, introduce toxic chemicals, or use radiation have the potential to adversely affect the health and safety of children. The AFCEC, *Guide for Environmental Justice Analysis under the Environmental Impact Analysis Process*, was also consulted for organizing the evaluation of environmental justice communities as well as children and the elderly (AFCEC 2014b). Therefore, the analysis herein considered where there are concentrations of children (e.g., homes, schools, and playgrounds/parks) as well as where the elderly would be found (e.g., nursing homes). The analysis then determined whether these sensitive populations would be affected by proposed construction and operational activities. Analysis then identified if any adverse health or safety risks would be introduced. If children or the elderly were exposed to adverse health and safety risks, then impacts would be considered adverse. Children are defined as those individuals under the age of 18 years old and the elderly are defined as those who are aged 65 years or older.

The impact methodology includes the following evaluation to determine whether there would be adverse impacts to environmental justice communities, children, and the elderly.

Review impacts by alternative for specified resources. This step includes reviewing project-level and cumulative impact conclusions to identify adverse unavoidable impacts. Only those impacts that are classified as adverse and unavoidable have the potential to create environmental justice effects. The following resources are evaluated because they have the potential to create impacts: acoustic environment, air quality, safety, and water resources, as well as hazardous materials, hazardous waste, toxic substances, and contaminated sites.

Identify adverse unavoidable impacts that would affect human populations. Adverse unavoidable impacts that *would not* affect human populations are not analyzed further because they do not have the potential to create environmental justice effects.

4.9.1 No-Action Alternative

Under the No-Action Alternative, there would be no changes to conditions found at the base and under the airspace, when compared to baseline, which could affect environmental justice populations disproportionately or adversely impact the health and safety of children and the elderly (see Section 3.9.2.1).

4.9.2 Proposed Action Alternative

4.9.2.1 *Base*

Construction

Acoustic Environment (Section 4.3.2.1). No impacts were identified to off-base communities due to construction noise because the noise would not extend outside Eielson AFB boundaries. Some on-base residential areas, schools, and a place of worship may be affected by construction noise; however, decibel levels would not reach levels that would introduce health risks. Therefore, no disproportionate adverse impacts to environmental justice populations, nor are there any adverse impacts to children or the elderly resulting from construction-generated noise.

Air Quality (Section 4.4.2.1). There would be a less than 1.5 percent, temporary increase in criteria pollutant emissions during the construction period. Air pollutant emissions from construction would not degrade the regional air quality nor harm nearby sensitive receptors such as children and the elderly resulting from construction. No disproportionate adverse impacts from Proposed Action Alternative construction emissions are anticipated to environmental justice communities.

Safety (Section 4.5.2.1). To ensure their safety, the public would be prohibited from entering construction zones. No significant adverse safety impacts are identified under the Proposed Action Alternative; therefore, no disproportionate impacts to environmental justice communities, to children, or to the elderly.

Water Resources (Section 4.12.2.1). No significant adverse impacts were identified for water quality resulting from construction activities and while 56 acres of on-base floodplains would be developed, no environmental justice, children, or elderly populations would be adversely affected.

Hazardous Materials and Waste, Toxic Substances, and Contaminated Sites (Section 4.13.2.1). No significant adverse impacts were identified for these materials, substances, and sites. Hazardous materials or toxic substances used or waste generated would be stored and/or disposed of according to federal, state, and local requirements and, therefore, would not interact with any of these sensitive populations. No residential or educational institution renovations would be undertaken, so no opportunity for children and the elderly to be exposed to lead-based paint or asbestos containing materials. The proposed enlisted dormitory construction site would be near, but not coincide with an Installation Restoration Program Site. Close coordination with Environmental Restoration Program leadership would avoid adverse impacts. Military Response Area sites would not be affected. In summary, no significant adverse impacts from contaminated sites would occur resulting from construction activities. Therefore, no disproportionate adverse impacts to environmental justice, children, or elderly populations would occur.

Operations

Acoustic Environment (Section 4.3.2). Under the Proposed Action Alternative aircraft-generated DNL equal to or greater than 65 dB would increase for some areas outside of base boundaries but would not exceed 65 dB for any of the concentrations of children or the elderly (Figure 4.9-1), minority population areas (Figure 4.9-2), or low-income (Figure 4.9-3). Noise levels less than 65 dB DNL are typically

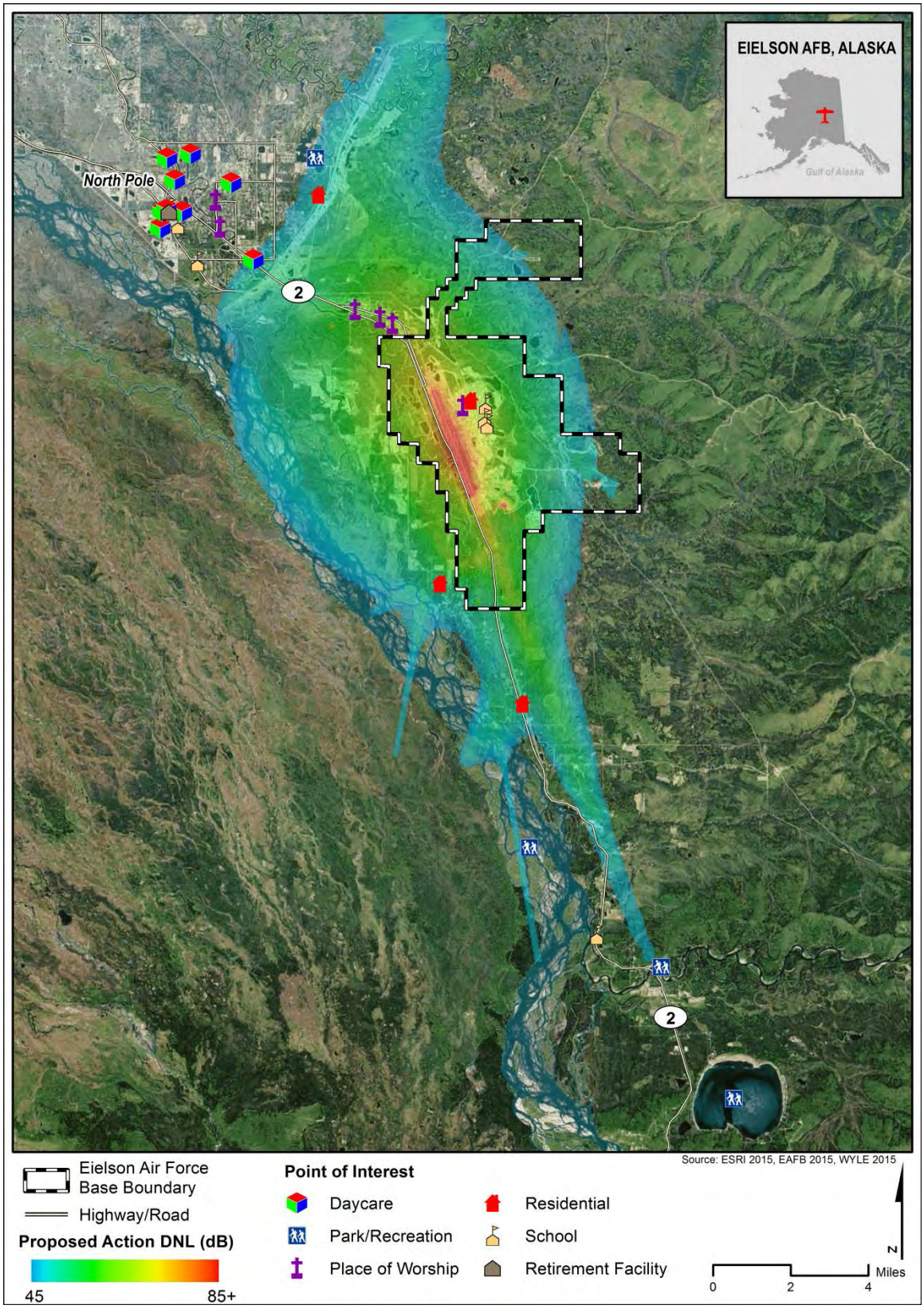


Figure 4.9-1. Proposed Action Alternative Concentrations of Children and the Elderly and DNL Contours 45 to 85 dB

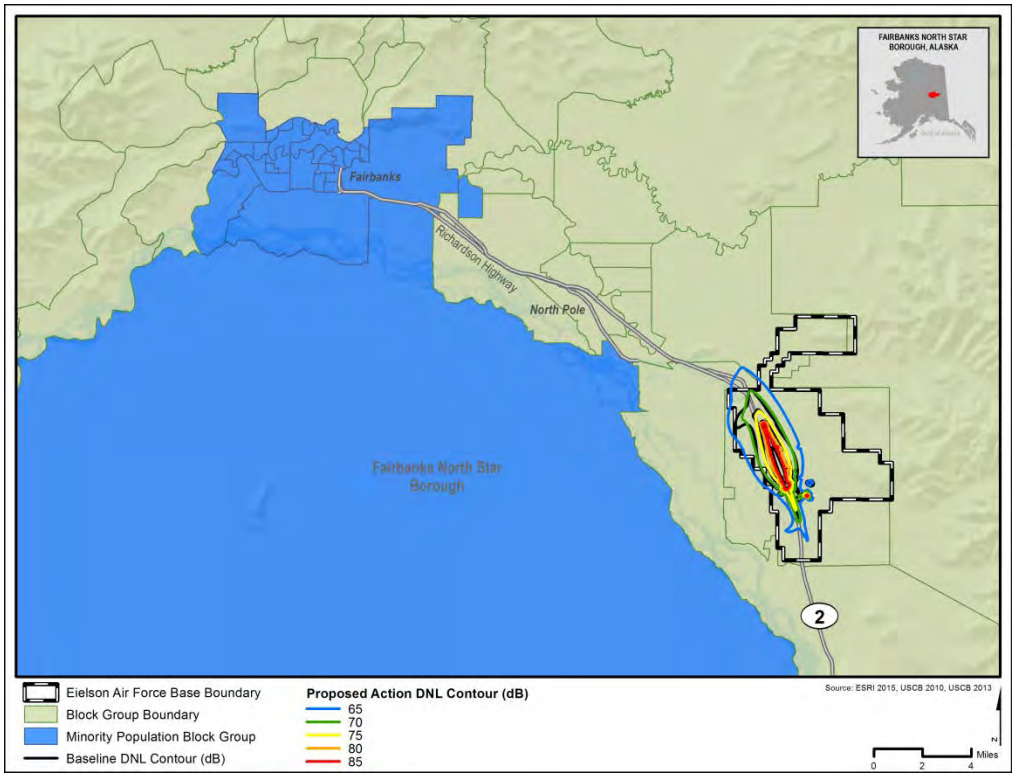


Figure 4.9-2. Proposed Action Alternative Minority Population in the Community of Comparison and DNL Contours 65 dB and Greater

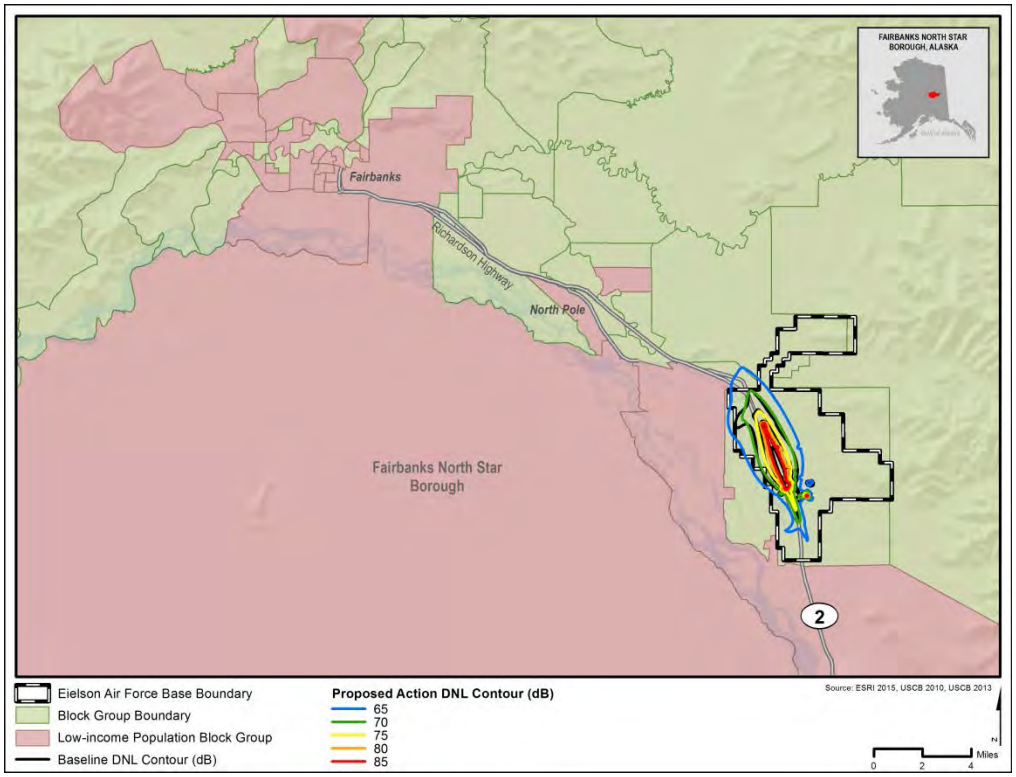


Figure 4.9-3. Proposed Action Alternative Low-Income Population in the Community of Comparison and DNL Contours 65 dB and Greater

considered compatible with all land uses and sensitive receptors such as children and the elderly, see Table 3.3-2 for a listing of Air Force compatibility guidance. Therefore, the Proposed Action Alternative would not introduce disproportionate impacts generated by aircraft noise to environmental justice populations, or adversely affect children or the elderly on or off base.

Supplemental noise analysis, however, does indicate that classroom learning interference would increase at all three on-base schools and a child development center because of increased aircraft operations (see Table 4.3-10). Ben Eielson Junior/Senior High School, Crawford Elementary School, Anderson Elementary School, and the Child Development Center would experience increases in classroom learning interference events of three per hour with windows open and two more events per hour with windows closed (see Table 4.3-10). Off base, the Loving Learning Day Care center would experience a one-event per hour increase with windows open, an increase of one compared to the No-Action and baseline conditions. These event increases could introduce enough disruptions in teaching continuity that could affect the children's ability to learn; therefore, these effects would be considered adverse impacts.

No residential areas or concentrations of children and the elderly outside of Eielson AFB would be exposed to DNL greater than or equal to 80 dB. Therefore, neither a potential for hearing loss nor non-auditory health effects are anticipated to impact environmental justice populations, children, and the elderly.

Safety (Section 4.5.2). Operations and maintenance activities conducted on Eielson AFB would continue to be performed in accordance with all applicable safety directives. There are no specific aspects of F-35A operations or maintenance that create any unique or extraordinary safety issues. No disproportionate adverse impacts are anticipated to environmental justice populations, nor are any adverse impacts being introduced to affect children or the elderly.

Water Quality (Section 4.12.2). Under the Proposed Action Alternative, an estimated 56 acres would be developed within the 100-year floodplain (see Figure 4.12-1). This development would occur within the area identified to support aircraft shelters in the South Loop. Locating the shelter in the floodplains would not adversely affect environmental justice populations disproportionally, or any concentrations of children or the elderly.

Hazardous Materials and Waste, Toxic Substances, and Contaminated Sites (Section 4.13.2). Procedures for hazardous material and toxic substances management established for Eielson AFB would continue for aircraft operations and maintenance activities. Established hazardous waste procedures would continue to be followed in F-35A aircraft operations and maintenance activities. For contaminated sites, no F-35A operations or maintenance activities would incur impacts. Therefore, no disproportionate adverse impacts would occur to environmental justice populations, nor would concentrations of children or the elderly be adversely affected.

4.9.2.2 *Airspace*

Acoustic Environment (Section 4.3.2). Under the Proposed Action Alternative subsonic noise levels do not increase more than 5 dB DNL; supersonic noise levels increase no more than 1 dBC; and the number of sonic booms generated during the busiest month (i.e., 6 weeks out of the year) would increase no more than two booms per busiest month. These changes in the airspace acoustic environment would not be considered adverse impacts to the general public if the Proposed Action Alternative were implemented.

Therefore, no significant adverse impacts would be imposed on any environmental justice populations, or to children and the elderly.

Air Quality (Section 4.4.2). The F-35A operations would represent a small portion of the activity currently underway in northern JPARC airspace. The VOCs and NO_x projected F-35A annual emissions in the airspace would be substantially smaller compared to those generated at the base. This is because F-35As primarily would fly the majority of their time above the 3,000-feet mixing height and not adversely impact regional air quality. Additionally, with a transport distance of at least 15 miles, emissions would be dispersed by the time they reach Denali National Park and Preserve, a PSD Class I area and would not adversely impact visibility. Therefore, no disproportionate health effects or environmental concerns would occur to environmental justice populations, nor would any adverse air quality impacts be introduced to affect children or the elderly.

Safety (Section 4.5.2). Under the Proposed Action Alternative, implementing existing response and avoidance measures and procedures would minimize the potential for adverse impacts from fires to lands and the public. No military and civilian midair collisions and few reported near misses have occurred within the existing northern JPARC airspace. Pilot attentiveness to safe flight practices would continue to avoid impacts to recreational flights in the airspace. Additionally, maintenance of situational awareness, and use of available communications for tracking the scheduled and near real-time status of the SUAs would help maintain a safe flying environment for all concerned. Therefore, no disproportionate health effects or environmental concerns would occur to environmental justice populations, nor would any adverse safety impacts be introduced to affect children or the elderly.

Water Resources (Section 4.12.2). Under the Proposed Action Alternative, there would be no ground-disturbing activities or personnel changes associated with training and operations conducted within JPARC airspace. Therefore, no impacts to water resources quality and quantity, stormwater systems, or floodplains would result from implementing the Proposed Action Alternative. Therefore, no disproportionate health effects or environmental concerns would occur to environmental justice populations, nor would any adverse water resources impacts be introduced to affect children or the elderly.

Hazardous Materials and Waste, Toxic Substances, and Contaminated Sites (Section 4.13.2). The Air Force has specific emergency-response procedures for aircraft mishaps involving composite materials contained in Technical Order 00-105E-9. Air Force Manual 10-2504 (December 2009) provides guidance for responding to major accidents and natural disasters and AFI 10-2501 provides response planning guidelines for major accident response, natural disasters, and enemy attack. These procedures would continue to be followed to minimize impacts to areas underlying northern JPARC airspace from hazardous materials and toxic substances. Therefore, no disproportionate health effects or environmental concerns would occur to environmental justice populations, nor would any adverse impacts be introduced to affect children or the elderly.

4.9.3 Mitigation

As there are no significant adverse impacts to environmental justice populations, either on base or under the airspace, no mitigation measures are proposed under the No-Action Alternative.

For the Proposed Action Alternative, as the Air Force does not own the schools on or off the base, the undertaking of noise attenuation measures would be the responsibility of the FNSB School District. To

reduce classroom learning interference in the four on-base and one off-base learning institutions, noise-attenuating measures could include, but are not limited to installing sound absorbing materials in the ceiling and walls, fixing cracked windowpanes, sealing any gaps between the walls, floor, and ceiling, and installing insulation in building cavities. American National Standard Acoustical Performance Criteria, Design Requirements, and Guidelines for Schools, Parts 1 and 2 from the American National Standards Institute S12.60 provide guidance for noise attenuating design criteria.

4.10 NATURAL RESOURCES

The existence and preservation of natural resources are intrinsically valuable; however, these resources also provide subsistence, recreational, aesthetic, and socioeconomic values to society and should be protected to the best means possible, and as required by law. Impact analysis was conducted using knowledge of wildlife, vegetation, wetlands, and special status species occurrence data, where available, based on where construction-related ground disturbance, airfield operations, and airspace activities would likely occur. Contributing factors considered when assessing the significance of direct and indirect impacts on natural resources are based upon determinations of the importance, rarity, and sensitivity of the resource; as well as the duration and frequency of the impact source.

4.10.1 No-Action Alternative

4.10.1.1 *Base*

Under the No-Action Alternative, limited construction activities within already developed areas would occur and no changes in aircraft operational numbers when compared to baseline conditions. This would result in only negligible changes to the baseline noise environment and no habitat would be disturbed. Therefore, no significant adverse impacts to on-base natural resources are anticipated because of the No-Action Alternative.

4.10.1.2 *Airspace*

Under the No-Action Alternative, no changes to the existing aircraft operations would occur within northern JPARC airspace. Noise levels due to overflights would thus remain unchanged over baseline levels. Therefore, no significant adverse impacts to natural resources would result by implementing the No-Action Alternative.

4.10.2 Proposed Action Alternative

4.10.2.1 *Base*

Sources of potential impacts to natural resources under the Proposed Action Alternative include increases in human and aircraft activity, changes in the current noise environment, and bird/wildlife-aircraft strikes. New construction projects associated with the Proposed Action Alternative would occur on lands where no existing structures are present (see Figure 2.2-6). A 50-foot buffer area around proposed new building footprints was included in impact analyses to estimate conservatively vegetated areas impacted by construction related disturbance. Airfield operations would increase annually by 26,106, resulting in more than twice the number of operations over the No-Action Alternative conditions at Eielson AFB. Upon completion of the beddown, 99 percent of all airfield operations would occur during the environmental daytime hours (7:00 a.m. to 10:00 p.m.). On- and off-base areas exposed to DNL noise levels of 65 dB and greater would increase by approximately 3,529 acres, from 3,331 to 6,860. Wildlife

strike and BASH related impacts are discussed in Section 4.5 *Safety*, and are excluded from further analysis in this section.

Wildlife

Studies on the effects of noise on wildlife have been predominantly conducted on mammals and birds (see Appendix E.2.14). Studies of subsonic aircraft disturbances on ungulates (e.g., pronghorn, bighorn sheep, elk, and mule deer), in both laboratory and field conditions, have shown that effects are transient and of short duration, and suggest that the animals habituate to the sounds (Workman *et al.* 1992; Bowles 1995; Weisenberger *et al.* 1996). In a study performed on bighorn sheep, elevated heart rates occurred during low-altitude overflights by F-16 jets, but this response rarely lasted more than 30 seconds and the sheep seemed to be less responsive after the first flyover (Workman *et al.* 1992). Sheep also responded behaviorally in various studies including no response, minor behavior changes, and running (National Park Service [NPS] 1994). One study that measured the response of radio-collared moose to large-scale ground and aerial military training exercises, found temporal increases in heart rate that returned to normal within 10 to 20 minutes of exposure (Andersen *et al*. 1996).

Similarly, impacts to raptors and other birds from aircraft low-altitude flights were found to be brief, and not detrimental to reproductive success (Smith *et al.* 1988; Lamp 1989; Ellis *et al.* 1991; Grubb and Bowerman 1997). Noises that are close, loud, and sudden and that are combined with a visual stimulus produce the most intense reactions. Rotary-wing aircraft (e.g., helicopters) generally induce the startle affect more frequently than fixed-wing aircraft (Gladwin *et al*. 1988; Workman *et al.* 1992). Some species habituate to repetitive noises, especially noise associated with overflight of fixed-wing aircraft, better than other species (Krausman *et al*. 1993).

Increases in operations, overflights, and DNL noise levels could result in altered behavior or metabolic effects to wildlife species in areas surrounding the airfield. Behavioral and physiological reactions to aircraft overflights are indications of temporary stress upon wildlife; however, the long-term implications to individuals have not been studied extensively. Wildlife species in areas surrounding and adjacent to airfields have historically been, and are currently, exposed to frequent human and aircraft activity, and have likely habituated to these environmental conditions. Some animals could be displaced because of increased DNL noise levels and aircraft activity surrounding the airfield; however, there is an abundance of similar, suitable habitat surrounding and adjacent to Eielson AFB where wildlife could move.

Displacement of wildlife to adjacent habitat would not represent an adverse impact to wildlife populations inhabiting areas with increased noise levels. Wildlife species inhabiting areas surrounding building construction projects could be subject to increases in noise level and human activity. Any such increases would be temporary and therefore, would have minor impacts to wildlife in the area. Wildlife could be startled and temporarily displaced in the presence of increased noise and activity, and would be expected to use adjacent habitat in such instances. These impacts would be short term and would not present adverse impacts to wildlife species.

Vegetation

Twenty-one acres of vegetated areas would be affected by construction, half of which consists of landscaped grasses and the other half comprising black spruce, balsam fir, and shrub species. Impacted grass areas around the airfield have been improved, or landscaped, and are currently maintained on a regular basis to reduce the amount of preferred wildlife habitat and BASH potential. This discourages use

by wildlife that could pose safety concerns for aircraft operations. The 10 remaining unimproved acres represent an insignificant amount of habitat loss when compared to the entire unimproved areas on the installation (<0.001 percent). Additionally, these areas are located directly adjacent to the airfield, where historically they have experienced high levels of human and aircraft activity, and noise. Therefore, no significant adverse impacts to vegetation would occur on base under the Proposed Action Alternative.

Wetlands

Wetlands areas are abundant on and around Eielson AFB, and account for approximately half of all areas on base. Potential impacts to wetlands would be limited to the south end of the airfield where new construction related activities would occur (Figure 4.10-1). A 50-foot buffer around proposed new building footprints was included in the impact analyses to estimate conservatively areas impacted by construction-related disturbance. Reopening the South Gate from the Richardson Highway requires construction in adjacent wetlands to provide an adequately sized vehicle inspection area for commercial and construction traffic entering the base and entry and merge lanes along the highway.

Based on current wetland data from Eielson AFB, an estimated 17 acres of potential wetlands would be removed due to construction related activities (about 10 acres in the south loop area and 7 acres adjacent to the South Gate). Wetland surveys were undertaken for all proposed facilities within the South Loop area with the exception of the South Heat Plant and the South Gate extension. These construction projects were not identified until after the ground had frozen and thus were unsuitable to be surveyed. However, based on the functional assessment outputs for the areas that were surveyed, the affected potential wetlands were categorized as follows:

Category I – High functioning wetlands – Uncommon wetlands that: (1) provide a life support function for threatened or endangered species that has been documented; (2) represent a high quality example of a rare wetland type; (3) are rare within a given region; or (4) are undisturbed and contain ecological attributes that are impossible or difficult to replace within a generation, if at all. Examples include certain bogs and fens.

Category II – High to moderate functioning wetlands – Wetlands that: (1) provide habitat for very sensitive or important wildlife or plants; (2) are either difficult to replace (such as bogs); or (3) provide very high functions, particularly for wildlife habitat. These wetlands may occur more commonly than Category I wetlands, but still need a high level of protection.

Category III – Moderate to low functioning wetlands – Wetlands that are important for a variety of wildlife species and can provide watershed protection functions depending on where they are located. Generally, these wetlands are smaller and/or less diverse in the landscape than Category II wetlands. These wetlands may have experienced some form of degradation, but to a lesser degree than Category IV wetlands.

Category IV – Degraded and low functioning wetlands – The smallest, most isolated, and least diverse wetlands that have likely been degraded by human activities. These wetlands may be readily restored and/or enhanced. Category IV wetlands can provide important functions and values, and should to some degree be protected depending on their position in the watershed and watershed condition.

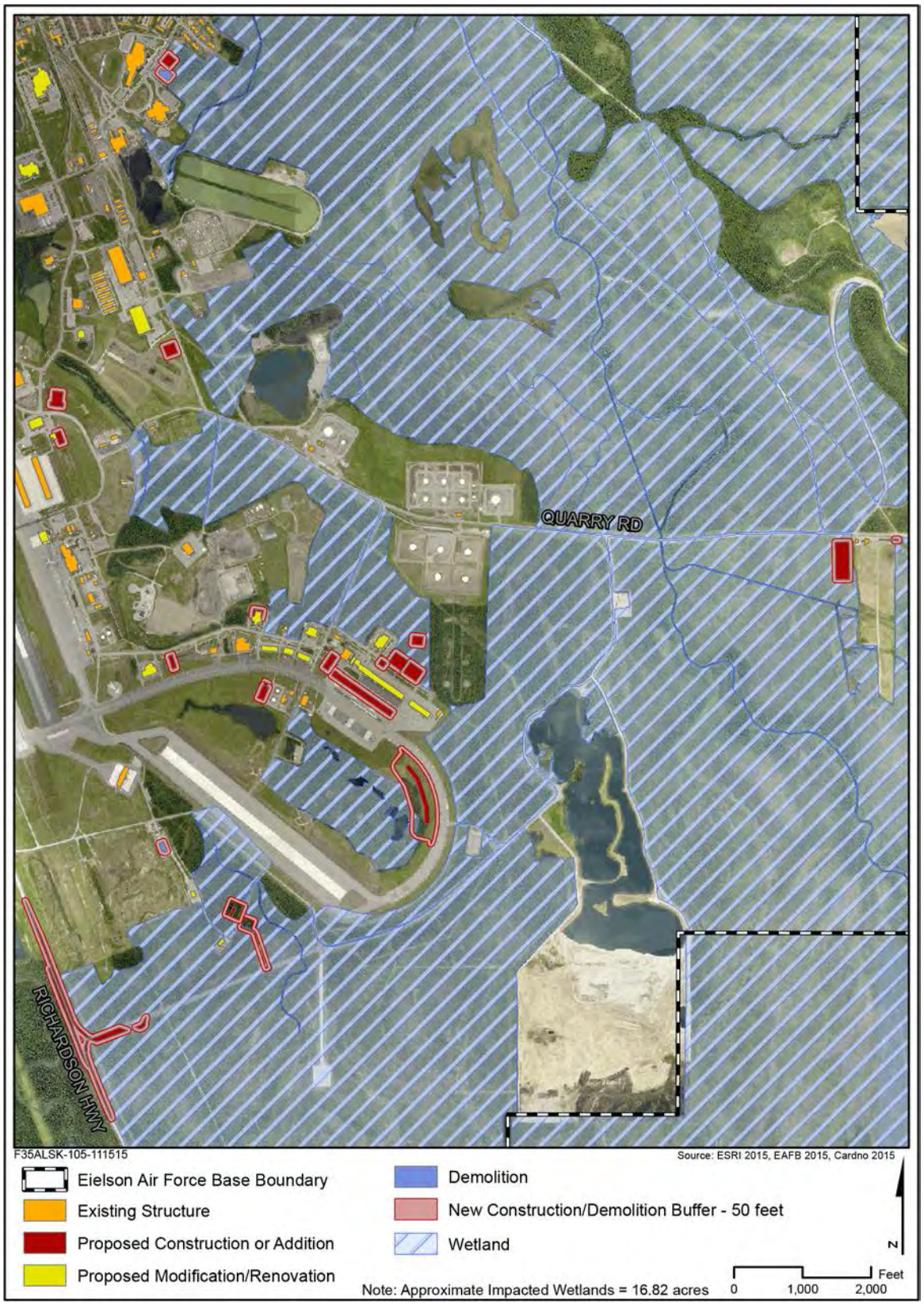


Figure 4.10-1. Proposed Action Alternative Facility and Infrastructure Construction and Modification in Wetland Areas

The survey results indicated that no proposed facility construction falls within Category I; less than half an acre falls within Category II (a portion of the Missile Maintenance Facility, site 20 in Figure 2.2-6); about 1.8 acres fall within Category III (most of the 16-Bay Aircraft Maintenance Shelter (site 3 in Figure 2.2-6); and a little over 1 acre falls within Category IV (a portion of site 3, the 16-Bay Aircraft Maintenance Shelter). The entirety of the 4-Bay Hangar/Propulsion Maintenance/Corrosion Control Personnel Dispatch (site 1 in Figure 2.2-6) and the 4-Bay Hangar/Squadron Operations/Aircraft Maintenance Unit facilities (site 35 in Figure 2.2-6) lie within disturbed areas of upland or upland human modified barrens. In summary, of the 10 acres surveyed, no more than 4 acres of delineated wetlands would be impacted.

Based on the information provided above, without the luxury of specific survey results, it can be estimated that the proposed South Heat Plant and Flight Line Kitchen construction would not likely affect functioning wetlands. This conclusion is justified based on the findings for adjacent sites 1 and 35, where no wetlands were identified. For the South Gate and entry/merge expansions, survey results would most likely find that, similar to the habitat surrounding the Missile Maintenance Facility (site 20), uplands and human modified upland barrens will predominate the proposed location of the gate expansion and entry/merge lanes. Prior to any ground disturbing activities; however, Eielson AFB will undertake wetland surveys of the South Heat Plan and South Gate facilities, delineate the wetlands, and complete Section 404 consultation with the U.S. Army Corps of Engineers.

There are no practicable alternatives for these wetland impacts because of the need to accommodate the aircraft hangars and shelters adjacent to F-35A operations facilities along the flight line, locate the south heating plant next to existing utility corridors, and place the flight line kitchen near aircraft operations and logistics areas. The missile maintenance facility location was placed to allow for explosive safety distance requirements. Additionally, the South Gate would be reopened with an expanded inspection area and new entry and merge lanes constructed along Richardson Highway. Impacts associated with re-opening the South Gate are unavoidable. Expansion of the gate is needed because of increased Anti-Terrorism/Force Protection directives that require inspection of all commercial and construction vehicles entering the base. There is no practicable alternative to expanding the existing inspection area at the South Gate, it has to large enough to accommodate the higher volume of vehicles anticipated during construction. The new entry and merge lanes are needed so that commercial and construction vehicle traffic entering and exiting the base would not impede traffic along the Richardson Highway.

Special Status Species

As of April 2015, there are 33 listed or candidate animal species and one listed plant species that are covered by the Endangered Species Act that are believed or known to occur in Alaska (U.S. Fish and Wildlife Service [USFWS] 2014). The State of Alaska, Department of Fish and Game (ADFG) also maintains a State Endangered Species List that as of April 2015 lists five animal species, all of which are also listed and covered by the Endangered Species Act. No plant or animal species are listed and covered by the Endangered Species Act that are known or expected to occur at Eielson AFB. Additionally, there are no areas designated as Critical Habitat on Eielson AFB. No significant adverse effects to special status species, resulting from the Proposed Action Alternative, are anticipated.

The Migratory Bird Treaty Act provides listed species protection from take. Eielson AFB is located along the Pacific Flyway and many species of migratory birds are known to occur at Eielson AFB; many of these are waterfowl that use the abundant wetlands, ponds, and lakes on and surrounding Eielson AFB.

Both the bald eagle (*Haliaeetus leucocephalus*) and golden eagle (*Aquila chrysaetos*) are known to occur at Eielson AFB, and are both listed and receive protection under the Migratory Bird Treaty Act; as well as, the Bald and Golden Eagle Protection Act (BGEPA). To minimize potential adverse effects, the base would continue implementing the 354 FW BASH Plan, using Air Force tools (e.g., bird avoidance model and Avian Hazard Advisory System), and cooperating with local U.S. Department of Agriculture Wildlife Services.

In terms of consultation, on August 11, 2015, the USFWS was sent a package describing the Proposed Action and preliminary results of the findings of effects on federally listed threatened and endangered species. However, as no listed threatened or endangered species or their critical habitat are present in the area of potential effect for the Proposed Action Alternative, the request for concurrence with a finding of "may effect, but not likely to adversely affect the continued existence" for the two species identified, was made in error. No consultation is required if listed threatened or endangered species or their habitat are not present. The remainder of the letter was correct in requesting a finding of no adverse impacts to migratory bird species or other species of special concern, such as eagles. The USFWS chose not to provide comment, thereby providing default concurrence with the findings of no adverse impact on migratory birds and other species of special concern, as documented in this EIS. The letter and its attachments are provided in Appendix C.

4.10.2.2 *Airspace*

Sources of potential impacts to natural resources under the Proposed Action Alternative include increases in aircraft activity, changes in the noise environment, and bird aircraft strikes within the northern JPARC airspace. Under the Proposed Action Alternative, operations occurring in northern JPARC airspace would increase over the No-Action Alternative (see Table 4.2-1). The F-35A would rarely fly below 5,000 feet AGL and 60 percent of all operations would occur above 23,000 feet MSL. It was assumed that applicable flight restrictions, operations limitations, and seasonal adjustments prescribed in the 11th Air Force Alaska Airspace Handbook (2015:86-94) would continue under the Proposed Action Alternative. See Table 3.2-2 and Appendix D.1 for descriptions of these limitations.

General noise levels within airspace used by F-35As would negligibly increase. Current forecasts estimate the F-35A would fly supersonic (above the speed of sound) approximately 3.5 percent of the time, increasing overall JPARC supersonic activity by approximately 10 percent, with 90 percent of F-35A supersonic flights occurring at altitudes greater than 30,000 feet MSL. The number of sonic booms is expected to increase marginally (projected increase of no more than three sonic booms during the busiest month across the airspace) above the No-Action Alternative.

An increase in airspace operations could result in direct mortality of birds involved in an aircraft collision. BASH related impacts are discussed in Section 4.5.2.2, and are not considered as adverse impacts to Migratory Bird Treaty Act species populations. Again, to minimize potential effects, F-35As operating in in northern JPARC airspace would adhere to the standard operating procedures found in the 11th Air Force Alaska Airspace Handbook.

Wildlife

General behavioral and physiological responses by terrestrial wildlife to aircraft overflights and general noise levels of the F-35A would be similar to those previously outlined in the on-base wildlife impact discussion in Section 4.10.1.1. A sonic boom occurrence during supersonic flight activity in the JPARC

airspace could result in startle effects such as posturing, walking, and running by terrestrial wildlife; however, wildlife inhabiting areas under the JPARC are currently exposed to supersonic flight activity and at lower levels (>15,000 feet MSL) than would be produced by F-35As.

A study conducted on Dall sheep populations inhabiting areas underneath Yukon 1 and 2 MOAs (Lawler *et al.* 2005) reported no difference in behavior, survival rates, productivity, or population trends between areas mitigated and not mitigated for low-altitude military aircraft by the Alaska MOA EIS (Air Force 1997). Lawler *et al.* (2005) similarly concluded aircraft overflights to the Fortymile Caribou Herd, the most prominent herd in interior Alaska whose range extends under various JPARC MOAs, did not cause deaths of caribou calves during calving periods. Short-term effects to caribou due to overflights were described as, "generally mild when compared to that of perceived predators;" however, long-term effects to individuals have not been studied extensively. Studies conducted on the effects of sonic booms on trout and salmon fish species found no evidence of increased mortality of exposed eggs due to sonic booms produced by military aircraft (Rucker 1973).

Extensive mitigation measures (as codified in the 11th Air Force Alaska Airspace Handbook) are currently in place for areas within the JPARC that overfly critical habitat or hatchery areas to minimize potential impacts to "at-risk" wildlife populations including Dall sheep, the Delta caribou herd, peregrine falcons, salmon, and subsistence species. These mitigations, which provide protections for all wildlife species in these avoidance areas, include seasonal and/or altitude restrictions and are detailed in Table 3.2-2 and Appendix D.1. F-35A flight operations would adhere to all published airspace restrictions within JPARC. Additionally, an increase in overall operations conducted in the JPARC airspace could produce mild and short-term responses to aircraft flights; therefore, no significant adverse impacts to wildlife populations are expected by implementing the Proposed Action Alternative.

The one aspect of the proposed action that may cause the injury or death of wildlife is the use of live munitions on the three impact areas designated for this training requirement (see Table 2.2-6 identifying the Tanana, Yukon, and Donnelly Training Areas). Due to the mobility of wildlife, it is likely that moose and caribou may be within the target zones of the impact areas, at the beginning of daily live-fire activity. This could result in the death of any wildlife present on the ranges. The Air Force anticipates that this number would be small. The loss of a small number of animals would not be adverse through continued adherence to wildlife management actions identified in the U.S. Army Garrison Integrated Natural Resource Management Plan in Sections 4.3.6, *Tanana Flats Training Area Management Prescriptions*, 4.4.6, *Yukon Training Area Management Prescriptions*, and 4.5.6, *Donnelly Training Area Management Prescriptions* (U.S. Army 2013).

Special Status Species

As presented in Section 3.2.2.2, only two threatened or endangered species have the potential to be found underneath the northern JPARC airspace (see Table 3.10-1). The two listed species are the short-tailed albatross and Eskimo curlew, and the likelihood of their existence in the northern JPARC airspace would be negligible. No critical habitat lies underneath northern JPARC airspace. Therefore, no significant adverse impacts to threatened or endangered species would occur under the Proposed Action Alternative.

A wide variety of migratory bird species listed under the Migratory Bird Treaty Act occur within the northern JPARC airspace, including trumpeter swans and peregrine falcons, as well as bald and golden eagles, which are also protected under the Bald and Golden Eagle Protection Act (BGEPA). The F-35A operations, should the Proposed Action Alternative be implemented, are not expected to adversely affect

these migratory species, due to the continued implementation of mitigations identified in the 11th Air Force Alaska Airspace Handbook. These include:

- *Peregrine Falcon Avoidance.* The existing peregrine falcon Flight Avoidance Areas have been increased (2,000 feet AGL and 2 nautical miles (NM) either side of the river centerline on the Charley, Kandik, and Yukon Rivers) from April 15 to June 15 (Alaska MOA EIS 1997a), and
- *Eagle and Migratory Bird Avoidance.* The minimum altitude has been limited to 1,000 feet AGL in the new Fox 3 and Paxon MOAs from March 15 to September 30 (i.e., nesting season) to comply with the BGEPA (Air Force 2013a).

Additionally, if needed to accommodate mission requirements and subject to funding, the Air Force may also coordinate with the USFWS to establish habitat use models and/or conduct bald and golden eagle nest surveys to establish low flying (500 feet AGL) areas outside of eagle habitat during the nesting season (March 15 to September 30) to comply with the BGEPA (Air Force 2013a).

Other actions that would avoid adverse impacts is the continued communication of visual observations of migrating birds between pilots and range control personnel to reduce the risk of mid-air collisions and disturbance to migrating birds. Such protocols and adherence to the current BASH plan would continue under the Proposed Action Alternative and would help reduce any adverse impacts to migrating birds.

It is concluded that implementing the Proposed Action Alternative would not adversely affect bald and golden eagles and other migratory birds with ranges that could extend under the northern JPARC airspace, where the majority of the F-35A operations would be conducted.

Vegetation and Wetlands

Due to the absence of ground-disturbing construction activities associated with the Proposed Action Alternative, F-35A operations would have no impact on vegetation or wetlands under the airspaces of the northern JPARC.

4.10.3 Mitigation

Under the No-Action Alternative, no significant adverse impacts to natural resources were identified, either on base or in the airspace, through implementation of existing restrictions, limitations, and avoidance measures contained in the 11th Air Force Alaska Airspace Handbook. Therefore, no mitigation measures are proposed.

For the Proposed Action Alternative, approximately 17 acres of wetlands would be removed, due to on-base facility and road construction. During the 404 permitting process, Eielson AFB will either purchase wetland credits from local mitigation banks or pay in *lieu* of fees for the type and size of wetlands removed to mitigate these unavoidable adverse effects.

No significant adverse natural resources impacts are identified. Therefore, no mitigation measures, above those already practiced in JPARC airspace, are proposed for the airspace.

4.11 EARTH RESOURCES

Earth resources analysis involved examining the potential impacts on geology, topography, soils, and seismology of the Proposed Action. The protection of unique geological features, minimization of soil erosion, and siting of facilities away from potential geological hazards (i.e., faults) are considered when evaluating the potential impacts of an action. Generally, impacts can be avoided or minimized if proper

construction techniques, erosion control measures, and structural engineering components are incorporated into project design. The severity of an impact would be related to the effectiveness and practicality of these techniques, measures, and components to minimize impacts to earth resources. While the F-35A would deliver ordnance and employ chaff and flares, it would operate within existing limitations and regulations and would not change no-action conditions. Therefore, airspace operational impacts to earth resources are not carried forward for further analysis.

4.11.1 No-Action Alternative

4.11.1.1 *Base*

Under the No-Action Alternative, construction would occur and there would be a negligible increase of impervious surfaces. However, there would be no marked changes to topography, geology, or soils, and no seismic impacts are anticipated. No significant adverse impacts to geology, topography, soils, and seismology would result from implementing the No-Action Alternative.

4.11.1.2 *Airspace*

No changes to training and operations within northern JPARC airspace would occur under the No-Action Alternative. Therefore, no impacts to the baseline conditions of earth resources would result from implementing the No-Action Alternative in northern JPARC airspace.

4.11.2 Proposed Action Alternative

4.11.2.1 *Base*

Proposed construction would occur on the developed portion of the base composed of fill material deposited atop reclaimed wetlands. The layer consisting of cobble, gravel, and soil, formed over 40 years ago, provides a firm, stable platform for construction activities. Approximately 66 acres would be disturbed for proposed construction. The proposed construction sites lie on a flat area of the base and would not generate excess runoff and erosion. Most of the construction would occur on areas of the base that have been previously disturbed or are currently occupied by existing buildings or structures. Any needed fill would be taken from on-base resources. As such, no significant adverse impacts to geology, topography, and soils would result from implementing the Proposed Action Alternative.

Although Eielson AFB lies in a seismically active area, most earthquakes are low in magnitude with only the highest few reaching a magnitude of 5.0 on the Richter scale. Construction would not affect seismic activity nor would the proposed construction be exposed to unique seismic risks requiring additional design and construction criteria beyond what is normal for the Fairbanks area. Therefore, no significant adverse seismic impacts would from implementing the Proposed Action Alternative at Eielson AFB.

4.11.2.2 *Airspace*

No construction would occur under the Proposed Action Alternative to areas underlying northern JPARC airspace. Therefore, no significant adverse impacts would occur to earth resources from construction. Operationally, F-35As would use ordnance and munitions that could cause ground disturbance. However, these operations would only occur at ranges already authorized and managed for such use. Existing management activities would preclude adverse impacts to earth resources.

4.11.3 Mitigation

As there are no significant adverse impacts under the No-Action Alternative to earth resources, either on base or in the airspace, no mitigation measures are proposed.

For the Proposed Action Alternative, impacts on base would be minimized to less than significant by adhering to existing sedimentation and erosion minimization measures required for all construction projects under the permitting process. No mitigation measures are proposed for areas underlying the airspace, because no significant adverse earth resources impacts are identified.

4.12 WATER RESOURCES

This section evaluates impacts to surface and groundwater systems that could occur because of the Proposed Action and No-Action Alternatives. The protection of surface and groundwater sources during ground-disturbing activities, changes to potable and wastewater 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 is significant modification of the floodplain, uncontrolled erosion and sedimentation due to stormwater runoff, exceedances in potable water systems capacities, or pollution discharged into impaired water bodies to exceed Total Maximum Daily Loads. Impact analyses relating to hazardous waste creation and spills due to operations and training are included in Section 4.13 *Hazardous Materials, Hazardous Waste, Toxic Substance, and Contaminated Sites*, and are not analyzed in this resource section.

4.12.1 No-Action Alternative

4.12.1.1 *Base*

Under the No-Action Alternative minor construction-related activities (see Table 2.2-2) would occur; however, there would be no increase in impervious surfaces and no changes in personnel numbers at Eielson AFB. Therefore, no additional impacts to existing water resource conditions on Eielson AFB would result from the No-Action Alternative.

4.12.1.2 *Airspace*

No changes to training and operations within northern JPARC airspace would occur under the No-Action Alternative. Therefore, no additional impacts to the baseline conditions of water resources would result from implementing the No-Action Alternative in northern JPARC airspace.

4.12.2 Proposed Action Alternative

Under the Proposed Action Alternative, construction of new F-35A training, operations, and support facilities primarily would occur in the South Loop. Additional facilities would be altered and/or constructed in previously disturbed areas with existing structures. The approximate footprint of impervious surfaces introduced (of the total 66 acres disturbed) would be close to 21 acres. It is expected that 2,765 new personnel and dependents associated with the F-35A basing would be stationed at Eielson AFB, which represents an increase of approximately 55 percent over the current population.

4.12.2.1 *Base*

Quantity

The arrival of personnel and dependents to Eielson AFB would occur incrementally over 2 to 3 years. According to a 2010 water use report by the U.S. Geological Survey, the average total per capita use of

public water was 148 gallons per day for FNSB, including Eielson AFB (U.S. Geological Survey 2010). The estimated population increase of 2,765 individuals (assuming 148 gallons/day/capita) would introduce additional demands on water supply from the aquifer located within the FNSB. This is estimated to be 409,220 gallons per day (0.41 million gallons per day). As this aquifer is part of a vast system, receives constant recharge from the nearby Tanana and Chena Rivers, and has existing excess capacity, an increase in less than 6 percent of the total FNSB population would not adversely affect water quantity within the local aquifer system. Additionally, increases of wastewater due to the growth of on-base personnel and dependents would not exceed the wastewater permitted level of 2 million gallons per day nor hamper the ability of the FNSB to provide such services to those living off base. In terms of wastewater, there is existing capacity to support this population increase through on-base and off-base services and, therefore, no significant adverse impacts are anticipated to either potable or wastewater resources.

Quality

Impacts to water quality due to construction-related activities would be minimized or eliminated by the incorporation of proper construction, erosion control, and structural engineering techniques into the final project design and construction. Drinking water will continue to be monitored for contaminants using USEPA-approved methods (see Section 4.13.2.1 for further discussion). No significant adverse impacts to water quality are anticipated under the Proposed Action Alternative.

Stormwater

New construction would be conducted in compliance with the 2011 (or the most recent) Alaska Pollutant Discharge Elimination System (APDES) Construction General Permit for discharges from large and small construction activities (permit number: AK100000). Federal agencies also have to consider additional stormwater requirements. For example, as the chief stormwater drainage design regulation for all Air Force property, all new construction must meet the requirements identified in the Engineering Technical Letter 08-06 (adopted from the FAA Advisory Circular 150/5320-5D, *Airport Drainage Design*). Also, new drainage systems must adhere to USEPA's 841-B-09-01, *Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects under Section 438 of the Energy Independence and Security Act (EISA)*. Under these requirements, federal agencies must reduce stormwater runoff from federal development and redevelopment projects to protect water resources. This generally applies to projects where new construction has a footprint greater than 5,000 gross square feet (or 0.1 acre), or adding more than 5,000 gross square feet to existing building.

About 21 acres of impervious surfaces would be introduced. Localized increases in stormwater run-off could potentially occur in these areas; however, any possible increases would not exceed the current capacities of stormwater systems at Eielson AFB. Construction practices to reduce soil erosion and runoff (e.g., silt fences) and minimize pollution of stormwater (e.g., spill plans) would be adhered to and incorporated into final planning and construction. Stormwater Best Management Practices and Standard Operating Procedures are detailed in the Eielson AFB Stormwater Pollution Prevention Plan. Additionally, a variety of stormwater management practices, often referred to as "green infrastructure" or "low impact development," would be used to minimize stormwater effects. These practices could include reducing impervious surfaces, using porous pavements, and installing cisterns.

Garrison Slough is primarily a stormwater drainage ditch, and is the only designated impaired water body located on the installation (specifically with polychlorinated biphenyl or other contaminants) (Eielson

AFB 2014c). This slough is connected to groundwater impacted by perfluorinated compounds and tested above the USEPA's provisional health advisory level for perfluorooctane sulfonate. However, construction would not occur in areas likely to affect the slough nor would the Proposed Action Alternative introduce increased levels of polychlorinated biphenyl.

With adherence to federal regulations, no significant adverse impacts to stormwater systems are anticipated under the Proposed Action Alternative. Existing regulations require that any construction project with a footprint greater than 5,000 square feet or renovations that expand the footprint of existing facilities by 5,000 square feet, must maintain or restore to the maximum extent technically feasible, the predevelopment hydrology of the property with regard to the water temperature, rate, volume, and duration of the flow.

Floodplains

Executive Order 11988, *Floodplain Management*, as amended by EO 13690, *Establishing a Federal Flood Risk Management Standard and Process for Further Soliciting and Considering Stakeholder Input*, requires federal agencies to avoid to the extent practicable any possible long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative. Due to the specific requirements of operation and maintenance facilities necessary to beddown F-35A aircraft at Eielson AFB, these facilities must be located within proximity of the airfield ramps and runways, and thus it is necessary to locate them within the 100-year floodplain of the Tanana River. During facility planning, floodplains were identified and avoided where possible. However, due to the extent of the 100-year floodplain found on the installation, particularly around the southern end of the airfield, there are no practicable alternatives to locating the facilities in the 100-year floodplain. Placement of F-35A operational and maintenance facilities is restricted by several factors:

- Operational efficiencies dictate that the two F-35 squadrons be located adjacent to one another along the flight line. Due to the extent of the Federal Emergency Management Agency (FEMA) 100-year floodplain, there are no other locations that meet this requirement.
- Facilities cannot be sited within explosive safety distance arcs.
- Due to weapons loading safety requirements, aircraft shelters used for this purpose, must be oriented so that aircraft are pointed away from developed areas during loading.
- Access between facilities and the ramps/taxiways cannot exceed a 1-percent slope.

Facility planners took all of these factors into consideration and found that there were no other practicable alternatives for locating these facilities along and adjacent to the flight line in the South Loop area of the base.

Under the Proposed Action Alternative, an estimated 5 acres would be developed within the 100-year floodplain according to the FNSB Flood Insurance Rate Maps prepared by the U.S. Department of Housing and Urban Development (Figure 4.12-1). According to FEMA mapping, 56 acres within the southern end of the base would be developed in the 100-year floodplain (Figure 4.12-2). No matter which floodplain map is used, however, there is no other practicable alternative for locating these facilities in the 100-year floodplain, along and adjacent to the flight line. To ensure adherence to the EOs, the Air Force used the more conservative FEMA estimate for incorporation into the planning and construction of new F-35A facilities.

Figure 4.12-1. FNSB 100-Year Floodplains within the Southern Portion of Eielson AFB

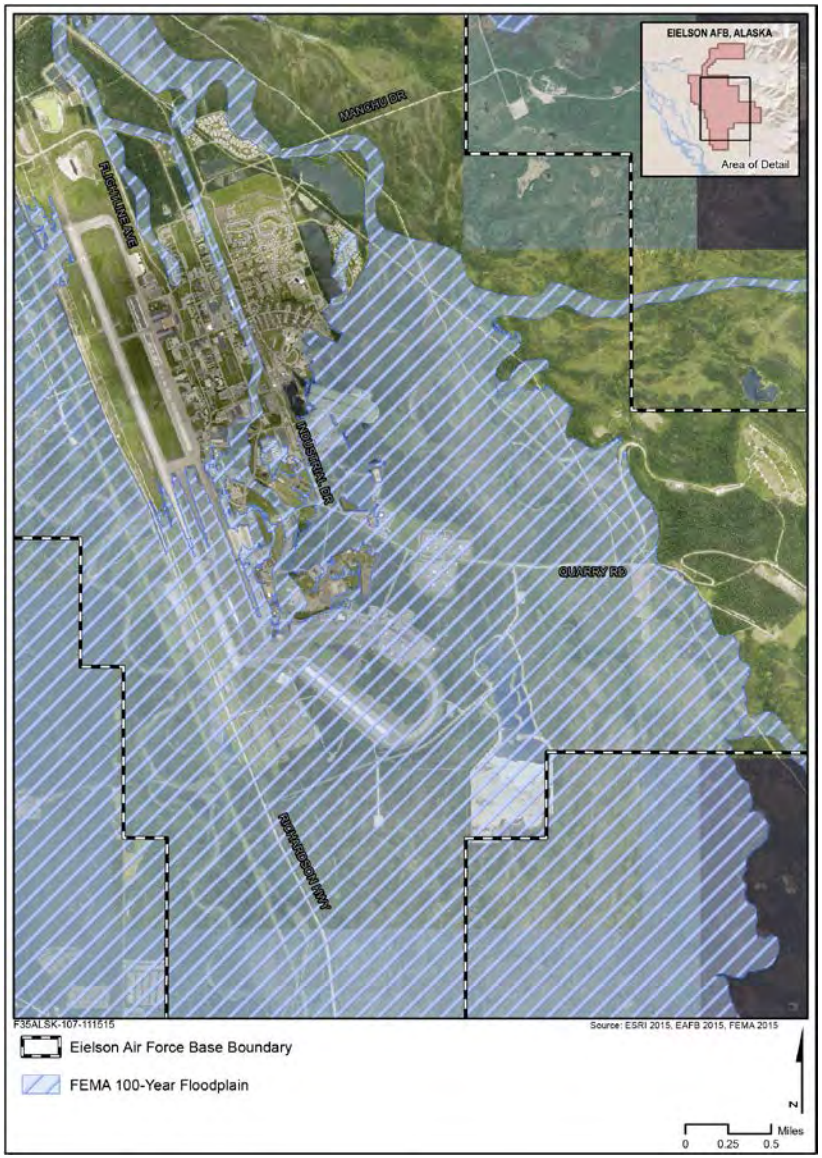


Figure 4.12-2. Federal Emergency Management Agency 100-Year Floodplains within the Southern Portion of Eielson AFB

Based on ground elevation information provided by the 354 Civil Engineer GeoBase Office from Light Detection and Ranging (LIDAR) remote-sensing data, the current ground elevations of existing facilities, ramps, and taxiways in the South Loop area range from 552 to 556 feet. These elevations are approximately 8 to 10 feet below the 100-year flood levels in the locations identified for construction of F-35A facilities. Flood proofing through raising facility floor elevations to 2 feet above the 100-year floodplain level would not be feasible due to the 1-percent slope restriction on the taxiway to the hangar.

Fill requirements necessary to raise new F-35A facilities to the elevations necessary (between 552 and 556 feet) to provide aircraft and vehicle access to the existing flight line would displace a flood volume of approximately 53 acre-feet during a 100-year flood event (see Appendix D.6). This displaced flood volume would be expected to spread over the rest of the floodplain on base, raising flood levels by less than 0.1 inch. This increase in flood level would not increase the risk of flooding in areas on and off base that are currently located outside of the 100-year floodplain.

The South Gate, currently closed, would be reopened to divert construction traffic from and minimize congestion at the North Gate. At the South Gate, the vehicle inspection area would be expanded to support commercial and construction equipment, and entry and merge lanes would be established on both sides of the Richardson Highway to minimize congestion along the highway (see Figure 2.2-6). As identified in Figure 4.12-2, the entire South Gate area falls within the FEMA 100-year floodplain. No other alternative to alleviate traffic congestion at the North Gate and along Richardson Highway during construction of F-35A facilities is practicable. This gate reopening was identified as a temporary measure, so if a 100-year flood event were to occur while it was in use, it would be closed until the end of the flood event.

The following is an assessment of flood hazards as prescribed in the EO.

The Role of Past and Probable Floods in Determining Flood Hazards: Eielson AFB was originally constructed in 1943 as a satellite field, called Mile 26 for Ladd Field, now Fort Wainwright. Since its establishment, the Eielson AFB flight line has never been flooded, even though the southern third of the flight line is identified as being in the 100-year floodplain of the Tanana River. The 2008 flooding of the Salcha and Tanana Rivers, which caused substantial flooding of the Salcha Community to the south of Eielson AFB, reached a Tanana River flood level of 26.53 feet, 2.03 feet above the flood stage of 24.5 feet at Fairbanks. Although Fairbanks is downstream of the base, it is the official flood elevation-monitoring site for the Tanana River. The Flood of Record for the Tanana River (August 1967) was measured at 27.8 feet. Neither of these flood events, resulting from unusually heavy summer rains, caused flooding on Eielson AFB.

High-Hazard Areas: The Tanana River is approximately 1 mile from the Eielson AFB flight line. The river flows from the south-southeast to the north-northwest adjacent to the base boundary. Due to the diking effect of the Richardson Highway, identified in the Figure 4.12-1, the FNSB does not identify any high-hazard areas subject to maximum water pressures during potential flood events. Should floodwaters spread to the east side of the highway (i.e., onto Eielson AFB), forest and wetland vegetation on the south end of the base and adjacent lands would serve to buffer and slow down floodwaters. This would reduce the potential for erosion and facility movement. However, due to the normally high silt load of the Tanana River, areas where water flow is slowed would be subject to silt deposition.

Natural Moderation of Floods: The floodplain on Eielson AFB covers a large area, with an extensive portion lying east of the Richardson Highway, forming a pocket of floodplain between the higher elevations on the developed portion of the base and the hills to the east. During the 100-year flood event, movement of water in this area would be slow, due to its distance from the main channel of the Tanana River, lack of a high-flow volume outlet to the north, and the amount of vegetation between the base and the main channel of the river. As most of the area adjacent to the flight line is heavily vegetated with forest, brush, and wetlands, floodwater flow would be slowed or impeded and woody debris and silt would be trapped or filtered before reaching the flight line facilities. The small amount of floodwater displacement associated with the proposed F-35A construction projects (about 53 acre-feet), would not adversely affect the ability of the floodplain to moderate floodwater impacts. Locating new facilities in the floodplain is not expected to adversely impact any other floodplain values such as water-quality maintenance, groundwater recharge, climate regulation resources, living resources (plants and animals), or forest resources.

Per EO 11988, public review and comment needs to be solicited for any project that proposes development within a 100-year floodplain. Floodplain impacts were evaluated in the Draft EIS and then presented during the public hearings. Although the extent of floodplains impacted by the Proposed Action Alternative, using the FEMA Floodplain Map, has increased from what was indicated in the Draft EIS, there still remains no practicable alternative to locating new facilities in the 100-year floodplain of the Tanana River.

Increases in personnel and dependents associated with Proposed Action Alternative would not exceed the base's potable water and wastewater capacities. Management practices and standard operating procedures as detailed in the base Stormwater Pollution Prevention Plan ensures that adverse impacts would be avoided. New construction within the 100-year floodplain would also adhere to established floodplain management objectives and structure construction to avoid adverse effects to floodplains. Therefore, no significant adverse impacts to water resources would occur under the Proposed Action Alternative.

4.12.2.2 *Airspace*

Under the Proposed Action Alternative, there would be no ground-disturbing construction activities or personnel changes associated with training and operations conducted within northern JPARC airspace. Therefore, no significant adverse impacts to water resources quality and quantity, stormwater systems, or floodplains would result from implementing the Proposed Action Alternative in JPARC airspace.

4.12.3 Mitigation

Under the No-Action Alternative, no significant adverse impacts to water resources, either on base or in the airspace, were identified; therefore, no mitigation measures are proposed.

For the Proposed Action Alternative, adverse impacts to floodplains would be minimized to less than significant through adherence to flood risk management standards detailed in EO 13690, and policies and procedures outlined in the Eielson AFB Integrated Natural Resources Management Plan. No mitigation measures are proposed for areas underlying the airspace, because no significant adverse water resources impacts are identified.

4.13 HAZARDOUS MATERIALS, HAZARDOUS WASTES, TOXIC SUBSTANCES, AND CONTAMINATED SITES

A comparative analysis of existing and proposed hazardous materials and waste management practices was performed to evaluate impacts. For the two alternatives, the analysis includes impacts from construction activities as well as the proposed F-35A operational activities. The analysis considers the magnitude of anticipated increases in hazardous waste generation when compared to historic levels, existing management practices, and storage capacity. For Installation Restoration Program, Compliance Restoration Program, and Military Munitions Response Program sites, the impact methodology compares the proximity of the proposed construction to the sites and considers operational uses of the facilities to determine the impacts to contaminated sites.

4.13.1 No-Action Alternative

4.13.1.1 *Base*

Under the No-Action Alternative, existing military flight training would continue to originate from Eielson AFB. Already planned and proposed construction and modifications, not related to the F-35A, would occur. However, hazardous materials and waste, toxic substances, and contaminated sites would continue to be managed in compliance with state and federal laws and regulations, as well as Air Force directives and instructions; no significant adverse impacts under the No-Action Alternative.

4.13.1.2 *Airspace*

All use of hazardous materials and waste and toxic substances would be confined on base and do not apply to operations within northern JPARC airspace; therefore, no impacts.

4.13.2 Proposed Action Alternative

4.13.2.1 *Base*

Hazardous Materials

The F-35A was designed to reduce the quantities and types of hazardous materials needed for maintenance purposes, and would be less than the materials generated for maintaining the F-16s. The major differences between the F-35A and F-16 is the omission of hydrazine, cadmium fasteners, chrome plating, copper-beryllium bushings, and the use of a non-chromium primer, instead of primers containing cadmium and hexavalent chromium currently used for F-16 aircraft (Joint Program Office 2009, 2008). The F-35A replaces the hydrazine canister (currently used by the F-16s) with an integrated power package. It is a small jet engine used for emergency engine restart situations, thus eliminating the potential for hydrazine leaks.

The elimination of the hazardous substances discussed above reduces the amount of hazardous materials used per aircraft, thus reducing the potential for adverse impacts to the environment. However, because there would be an increase of aircraft based at Eielson AFB, there also would be an overall increase in hazardous materials use. Procedures for hazardous material management established for Eielson AFB (see Section 3.13.2.1) would continue during all construction and renovation activities as well as in future aircraft maintenance and operational activities. These existing practices and procedures can accommodate the increase of hazardous materials. The types of materials recycled from F-35A maintenance would be similar to aircraft currently operating at Eielson AFB and no changes to recycling

procedures would be required. No significant adverse impacts would occur to hazardous materials if the Proposed Action Alternative were implemented.

Hazardous Waste

The types of hazardous waste streams generated by F-35A operations are expected to be less than those generate by F-16 aircraft because operations involving hydrazine, cadmium and hexavalent chromium primer, and various heavy metals have been eliminated or greatly reduced for the F-35A (Joint Program Office 2010, 2008). Hazardous waste quantities would increase because there would be more operating aircraft than under the No-Action Alternative. Eielson AFB would continue to operate within its large quantity generator hazardous waste permit conditions. In addition, established hazardous waste procedures would continue to be followed during future squadron operations and for all construction and renovation that may occur in association with the Proposed Action Alternative. The disposal of low observable coatings and demilitarization activities would be contracted to a vendor permitted to dispose of such materials, and would not affect the waste streams at Eielson AFB. No significant adverse impacts would occur to hazardous wastes if the Proposed Action Alternative were implemented.

Toxic Substances

Any structures proposed for upgrade or retrofit would be inspected for asbestos containing material and lead-based paint according to established Eielson AFB procedures prior to any renovation activities. If any issues are discovered during renovation activities, all asbestos containing material would be properly removed and disposed of prior to or during demolition in accordance with 40 CFR §§ 61.40 through 157 and established Eielson AFB procedures. Any lead-based paint would also be managed and disposed of in accordance with Toxic Substance Control Act, OSHA regulations, Alaska requirements (regarding site work practices for buildings with lead-based paint), and established Eielson AFB procedures. No significant adverse impacts associated with toxic substances are anticipated under the Proposed Action Alternative.

Installation/Environmental and Compliance Restoration Programs

The majority of proposed construction activities would be located in the South Loop and overlap or lie adjacent to Installation Restoration Program site Operable Unit 1 and Compliance Restoration Program sites PL001, S503 and SO504 (see Figures 3.13-1 and 3.13-2). The proposed dormitory construction site would be near Installation Restoration Program Site ST59. Although these restoration program sites coincide with proposed renovation and/or construction sites, close coordination between the base's Environmental Restoration Program leadership, the USEPA, and ADEC would occur to avoid adverse impacts.

Military Response Area sites also occur near proposed construction areas but none coincides with the areas of proposed construction. The Munitions Response Area sites include a disused Ammunition Dump, Small Arms Range, and an area called Gun Butt. These sites were investigated, no munition hazards were detected, and no further action was recommended.

Residues from Aqueous Film Forming Foam (fire-fighting foam) containing perfluorooctanesulfonic acid and perfluorooctanoic acid were recently detected in ground water. It appears to have resulted from using this foam for training at the fire stations and in response to actual aircraft fires. Eielson AFB is working closely with USEPA and ADEC to determine future course(s) of action(s). It is not expected that F-35A construction would interfere with response actions; however, some additional measures during

construction may be required if dewatering is necessary. The F-35A operations would not increase adverse health risks or alter existing conditions of these residues when compared to the No-Action Alternative.

The Proposed Action Alternative would involve a slight increase of hazardous materials and waste that fall well within the base's capability to manage. Management practices for toxic substances such as lead-based paint and asbestos would continue. Proposed construction would have no effect on Installation Restoration Program, Compliance Restoration Program, or Munitions Response Area restoration sites. Therefore, no significant adverse impacts to hazardous materials and waste, toxic substances, or contaminated sites would occur under the Proposed Action Alternative.

4.13.2.2 *Airspace*

The Air Force has specific emergency-response procedures for aircraft mishaps involving composite materials contained in Technical Order 00-105E-9 (Air Force 2001). Air Force Manual 10-2504 provides guidance for responding to major accidents and natural disasters and AFI 10-2501 provides response-planning guidelines for major accident response, natural disasters, and enemy attack. These procedures would be followed to ensure that no significant adverse impacts would be introduced to areas underlying northern JPARC airspace from hazardous materials and toxic substances.

4.13.3 Mitigation

Under the No-Action Alternative, no significant or adverse impacts to hazardous materials, hazardous wastes, toxic substances, and contaminated sites are identified either on base or under the airspace. Therefore, no mitigation measures are proposed under the No-Action Alternative.

For the Proposed Action Alternative, no significant adverse impacts are identified at the base. This is because there would be continued adherence to existing standard operating procedures for storage, use, and disposal of these materials. Therefore, no mitigation measures are proposed. For areas underlying the airspace, no mitigation measures are proposed because no significant adverse impacts to this resource are identified.

4.14 RECREATIONAL AND VISUAL RESOURCES

Impacts to recreational resources were determined by assessing change to the opportunities for and access to recreational activities (e.g., camping, hiking, fishing, canoeing) and predicting user response to those changes. Potential effects to recreation would result from changes to noise from overflights that could be perceived as incompatible with current uses, particularly wilderness aesthetics.

Lacking a quantitative or regulatory standard for recreation and visual impacts from aircraft overflight, this analysis considers the degree of change to overall noise levels and visual quality in defining potential impacts to underlying uses and activities. While human perception of, and reaction to, noise can vary, in general, most people can detect a 3-dB change, while few can discern a 1- or 2-dB change. Even below 65 dB DNL, a 3-dB change can be perceived as a degradation of the noise environment (Air Force 2013a). Visual impacts are characterized by the level of change to the characteristic landscape resulting from the Proposed Action Alternative.

Quiet and naturalness is an intrinsic part of some recreational experiences. The BLM, USFWS, NPS, U.S. Forest Service, and the Alaska Departments of Natural Resources and Fish and Game are mandated to manage wilderness areas, recreational areas, and other specially managed lands areas for their intrinsic

qualities. This includes maintaining the natural setting and allowing minimal human disturbance and development. Management goals for these special use areas could be negatively affected by increased noise and disturbance associated with military overflights. The quality of recreational experiences in these areas could also be affected, depending upon the type of recreation and remoteness of the area.

The visual impact of the Proposed Action Alternative was determined by assessing the change and predicting the viewer response. The change could be in the visual character and/or visual quality of the landscape. The first step in determining visual resource change was to assess the compatibility of the Proposed Action with the existing visual character of the landscape. The second step compared the visual quality of the existing landscape with the projected visual quality. Viewer response to the changes is the sum of viewer exposure and viewer sensitivity to the proposal. The resulting level of visual impact was determined by combining the severity of change with the degree to which people are likely to oppose the change.

4.14.1 No-Action Alternative

4.14.1.1 *Base*

Under the No-Action Alternative, there would be no change from baseline conditions. Therefore, implementing the No-Action Alternative would not introduce adverse impacts to recreational or visual resources.

4.14.1.2 *Airspace*

Under the No-Action Alternative, there would be no change from baseline conditions. Therefore, implementing the No-Action Alternative would not introduce adverse impacts to recreational or visual resources.

4.14.2 Proposed Action Alternative

4.14.2.1 *Base*

Under the Proposed Action Alternative, the number of total airfield operations would increase, resulting in increased noise levels in areas used for recreational purposes on and off base. Inhabitants of the base and surrounding communities have lived with a military presence since the establishment of Eielson AFB in 1943. Therefore, any increase in sound would not significantly affect the setting or experiences that people have on or off base. In terms of the visual landscape, new facilities would be consistent with existing military base facilities. For the entry and merge lanes proposed along Richardson Highway, adjacent to the South Gate, no recreational areas would be impacted nor would this expansion change the visual aspect of the existing road. Under the Proposed Action Alternative, there are no significant adverse impacts to recreational and visual resources at and around the base.

4.14.2.2 *Airspace*

Military jet overflights can adversely affect recreation activities for those who value or expect a natural soundscape. However, visitors can distinguish between concepts of annoyance and interference produced by aircraft sound. Annoyance is an emotional reaction, while interference is more of a subjective judgment. Studies have indicated that if visitors know that they could see or hear aircraft while in a remote area, they are less annoyed by aircraft noise (Miller 1999).

As identified in Section 3.14, there are many recreational and special use areas under the northern JPARC airspace (see Figure 3.14-1). The Air Force has made an extensive effort to identify these areas, and where possible, to minimize unavoidable noise and visual impacts. As noted in Section 2.2.1.3, JPARC airspace is managed in accordance with the 11th Air Force Alaska Airspace Handbook, which identifies all the limitations, restrictions, and mitigations such as seasonal flight avoidance areas Air Force and Air Force-sponsored pilots must comply with when operating in these airspace units. Table 4.14-1 summarizes restrictions in applicable airspace units. Dissemination of this information is accomplished by briefing all military pilots prior to operating in the JPARC airspace, through the 11th Air Force Alaska Airspace Handbook, and access to the 11th Air Force website.

Under the Proposed Action Alternative, an increase in the frequency of airspace operations would occur; however, the noise levels (see Section 4.3.2.2) would remain similar as found under the No-Action Alternative (see Tables 4.3-13 and 4.3-14, and as illustrated in Figures 4.3-9 and 4.3-10). In no instances would the L_{dnmr} exceed 52 dB, and with the exception of the Steese National Conservation Area/Birch Creek WSR, all other special use areas would experience L_{dnmr} of less than 45 dB during the busiest month (i.e., for 6 non-consecutive weeks between April and October). In terms of supersonic operations, CDNL would remain below 54 dB (see Table 4.3-17) over special use areas, with only the Steese National Conservation Area/Birch Creek WSR, and the Charley and Fortymile WSRs area experiencing a 1-dB increase. Yukon-Charley Rivers National Preserve, Yukon Flats National Wildlife Refuge, and Lake George would experience a one-boom per busiest month increase and the Steese National Conservation Area/Birch Creek WSR and Charley WSR would experience a two-boom per busiest month increase.

Some individuals may perceive this noise increase as interfering with the quality of their recreation; however, the F-35A would be conducting activities similar to those currently conducted by the F-16, but at predominantly higher altitudes, resulting in a negligible increase in noise levels on the ground. Likewise, overflights would not change the visual experience of the characteristic landscape where military aircraft training has occurred for decades. Consequently, no significant adverse impacts would be introduced to affect recreational or visual resources.

4.14.3 Mitigation

As there are no significant or adverse impacts under the No-Action Alternative to recreational or visual resources, either on base or in the airspace. No mitigation measures are proposed, therefore, under the No-Action Alternative.

For the Proposed Action Alternative, no significant adverse or significant recreational or visual impacts are identified at the base or for areas underlying the airspace; therefore, no mitigation measures are proposed.

Table 4.14-1. Summary of Airspace Limitations over Special Use Areas

MOA	*Special Use Area*	*Airspace Unit in feet (floor – ceiling)*	*Avoidance Distance (feet)/ Altitude floor (feet) / Dates*
Birch	Birch Lake State Recreation Area	500 AGL – 5,000 MSL	1 nautical mile (NM) radius / 2,000 AGL / May 15 to September 30
Buffalo/ Delta 4	a. Delta WSR b. Healy Lake c. Donnelly Creek State Recreation Area d. Lake George	300 AGL – 18,000 MSL	a. 5 NM either side of the river / 5,000 MSL / June 27 to July 11 b. 3 NM around / 6,000 MSL / All Year c. 1 NM around / 2,000 AGL / May 15 to September 30 d. 2 NM around / 1,500 AGL / All Year
Delta 2	Birch Lake State Recreation Area	5,000 AGL – 17,999 MSL	1 NM radius / 2,000 AGL / May 15 to September 30
Fox 1	Delta WSR	5,000 AGL – 18,000 MSL	5 NM either side of the river / 5,000 MSL / June 27 to July 11
Fox 2	Delta WSR	7,000 MSL – 18,000 MSL	5 NM either side of the river / 5,000 MSL / June 27 to July 11
Fox 3	Delta WSR	5,000 AGL – 18,000 MSL	5 NM either side of the river / 5,000 MSL / June 27 to July 11
Yukon 1	a. Charley WSR/Yukon-Charley Rivers National Conservation Area b. Chena State Recreation Area	100 AGL – 18,000 MSL	a. 2 NM either side of Yukon and Charley Rivers / 2,000 AGL / April 15 to September 15 b. Identified area / 1,500 AGL / May 1 to September 30
Yukon 2	a. Steese National Conservation Area/ Birch Creek WSR b. Charley WSR/Yukon-Charley Rivers National Conservation Area c. Yukon Flats National Wildlife Refuge	100 AGL – 18,000 MSL	a. Identified Area / 3,000 AGL / All Year b. 2 NM either side of Charley River / 2,000 AGL / April 15 to September 15 c. No specific avoidance areas identified
Yukon 3A Low/3 High	Yukon-Charley Rivers National Conservation Area	100 AGL – 18,000 MSL	2 NM either side of Yukon River / 2,000 AGL / April 15 to September 15
Yukon 3B	Fortymile Wild and Scenic Area	2,000 AGL – 18,000 MSL	No specific avoidance areas identified, however, the floor of the MOA is already 2,000 feet AGL
Yukon 4	a. Charley WSR/Yukon-Charley Rivers National Conservation Area b. Yukon Flats National Wildlife Refuge	100 AGL – 18,000 MSL	a. 2 NM either side of Yukon and Charley Rivers / 2,000 AGL / April 15 to September 15 b. No specific avoidance areas identified
Yukon 5	Yukon Flats National Wildlife Refuge	5,000 AGL – 18,000 MSL	No specific avoidance areas identified, however, the floor of the MOA is already 5,000 AGL

Source: 11th Air Force 2015.

This Page Intentionally Left Blank.

5.0 Cumulative Effects

5.0 CUMULATIVE EFFECTS

Council on Environmental Quality (CEQ) regulations implementing the National Environmental Policy Act (NEPA) require that the cumulative impacts of a proposed action be assessed. A cumulative impact is defined as the following:

> *"…the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time." (40 Code of Federal Regulations [CFR] § 1508.7)*

CEQ's guidance for considering cumulative effects states that NEPA documents "should compare the cumulative effects of multiple actions with appropriate national, regional, state, or community goals to determine whether the total effect is significant" (CEQ 1997). The first step in assessing cumulative effects therefore, involves identifying and defining the scope of other actions and determining their interrelationship with the proposed action. The scope must consider whether other projects coincide with the location and timetable of the proposed action and other actions. Past, present, and reasonably foreseeable future actions are examined, including both military actions in the region as well as other federal and non-federal actions to determine if they interact with the Proposed Action Alternative. After examining these actions, the analysis determined the nature of the interaction. An analysis of how the impacts of the defined actions might affect or be affected by those resulting from the action are discussed in this Environmental Impact Study (EIS).

To ensure a rigorous assessment of potential cumulative impacts, this analysis sought information on military actions, other federal actions, and non-federal actions in the Fairbanks North Star Borough (FNSB). Public documents prepared by federal, state, and local governments formed the primary source for defining actions. Scoping also provided an opportunity to gain insight into such actions. Documents used to define these other actions included notices of intent, EISs, and environmental assessments, management and land use plans, ordinances, other NEPA studies, and economic and demographic projections.

At Eielson Air Force Base (AFB), information was gathered from base planners, environmental managers, and operations staff. Community representatives and state and federal land managers provided information on actions outside the base in the surrounding areas. For the ranges and airspace, primary sources of information consisted of the managing and scheduling entities, as well as federal and state agencies with lands underlying the Joint Pacific Alaska Range Complex (JPARC) airspace.

Eielson AFB is an active military installation that undergoes changes in missions and training requirements in response to defense policies, current threats, and tactical and technological advances. The base, like any other major institution (e.g., university, industrial complex), requires new construction, facility improvements, infrastructure upgrades, and maintenance and repairs. In addition, tenant organizations may occupy portions of the base, conduct aircraft operations, and maintain facilities. All of these actions (i.e., mission changes, facility improvements, and tenant use) would continue to occur before, during, and after the Proposed Action Alternative is implemented. For purposes of this analysis, the timeframe bounding the cumulative analysis spans from 2016 (when facility construction supporting

the F-35A beddown would begin) and ends in 2021, when both F-35A squadrons would be fully operational.

5.1 Past and Present Actions Relevant to the Proposed Action Alternative

This EIS provides decision makers with the cumulative effects of the Proposed Action Alternative; as well as, the incremental contribution of past, present, and reasonably foreseeable actions. Recent past and ongoing military action in the region were considered as part of the baseline or existing conditions in Chapter 3. As they impacted the F-35 Beddown at Eielson AFB, these actions were analyzed in Chapter 4.

5.1.1 Department of Defense Actions

Several military actions that could affect the F-35 beddown analysis are listed in Table 5.1-1. A past action included adding the 50th Engineer Battalion to the 1st Stryker Brigade Team, 25th Infantry Division at Fort Wainwright in late 2014 (Fairbanks News Miner 2014). This brought an estimated 550 more personnel to the Fort. Future actions include the Infrastructure and Operational Support for the 25th Aviation Regiment Company D Unmanned Aircraft System (or Gray Eagle), Army Force Structure Realignment at Fort Wainwright, establishment of the Long Range Discrimination Radar at Clear Air Force Station (Department of Defense [DoD] 2015), and the addition of six interceptor missiles at Fort Greely (Defense Industry Daily 2015).

Table 5.1-1. DoD Past, Present, and Reasonably Foreseeable Actions

Project Name/Description	*Planned Year of Implementation*	*Resources Potentially Affected*	*Magnitude of Impact*
50th Engineer Battalion	2014	Socioeconomics	Not Significant
Long Range Discrimination Radar at Clear Air Force Station	2015-2020	Air Quality, Socioeconomics	Not Significant
Six Interceptor Missiles Added at Fort Greely	2015-2020	Air Quality, Socioeconomics	Not Significant
Army Force Structure Realignment at Fort Wainwright	2016-2018	Air Quality, Socioeconomics	Not Significant
Infrastructure and Operational Support for the 25th Aviation Division	2017-2019	Airfield and Airspace Operations and Management, Acoustic Environment, Air Quality	Not Significant

The Army evaluated two alternatives for operating the Gray Eagle Unmanned Aerial Vehicles (UAVs): operate them permanently out of Fort Wainwright or out of Eielson AFB. The proposed action would bring about 130 military personnel to the area and operate UAVs in the local special use airspace. Construction activities would take place between Fiscal Year 2017 (FY17) and FY19 (United States [U.S.] Army 2015). The Finding of No Significant Impact (FONSI) announced that Fort Wainwright was the preferred alternative (U.S. Army 2015).

In early July 2015, the Army announced troop reductions at Fort Wainwright, which were substantially less than estimates of 5,800 military personnel reduction made in 2014. The July announcement identified only 73 military positions would be eliminated (Army Times 2015).

To date, no environmental documentation is associated with the Long Range Discrimination Radar at Clear Air Force Station and expansion of the Missile Defense System at Fort Greely. According to articles, the Long Range Discrimination Radar would be constructed at Clear Air Force Station, about

100 miles to the southwest of Eielson AFB, and be operational by 2020 (mostlymissiledefense.com 2015). The missile expansion involves construction at Fort Greely, about 80 miles east of Eielson AFB, roughly during the same time as construction for the Proposed Action Alternative.

5.1.2 Non-Department of Defense Actions

The cities of Fairbanks and North Pole have three reasonably foreseeable infrastructure projects that are planned or underway in the local area, with impacts that would only cumulatively affect air quality (Table 5.1-2). Please note that the Alaska Department of Transportation indicated that they would widen the road at the South Gate during the Richardson Highway improvements noted below. The entry and merge lanes into the South Gate are anticipated to be done by June 2017. However, none of these actions would change the analysis of impacts for the F-35 Beddown, or lead to significant cumulative impacts.

Table 5.1-2. Non-DoD Present and Reasonably Foreseeable Actions

Project Name/Description	*Planned Year of Implementation*	*Resources Potentially Affected*	*Magnitude of Impact*
Richardson Highway: MP 353-357, Safety/Access Improvements	2015-2020	Air Quality	Not Significant
Richardson Highway MP 359 Railroad Overpass	2015-2020	Air Quality	Not Significant
Plack Road Bike/Pedestrian Facility: North Pole	2015-2020	Air Quality	Not Significant

5.2 Analysis of Cumulative Effects

The following analysis first considered whether the actions could affect, or be affected by those resulting from the Proposed Action Alternative. Second, an evaluation was made to determine whether such a relationship would result in potentially additive impacts not identified when the Proposed Action Alternative is considered alone (i.e., Chapter 4, *Environmental Consequences).*

The additive or interactive cumulative effects of the Proposed Action Alternative, when considered together with the effects of other past, present, and reasonably foreseeable future actions in the greater FNSB region, are presented below by resource category. Please note that only those resources that were identified in Tables 5.1-1 and 5.1-2 were carried forward for cumulative analysis. Other resource categories, analyzed for the Proposed Action Alternative, would not be cumulatively affected by these past, present, or reasonably foreseeable actions.

5.2.1 Cumulative Impacts with Actions in the Region

5.2.1.1 *Airfield and Airspace Operations and Management*

Base

In its FONSI, the Army chose to permanently base and operate UAVs from Fort Wainwright (U.S. Army 2015). No adverse impacts would occur to the airfield environment at Eielson AFB when considered cumulatively. No other projects would cumulatively impact airfield operations and management when considered cumulatively.

Airspace

The Army UAV beddown at Fort Wainwright would increase the use of restricted airspace over Army training areas. Transit through civilian airspace would follow protocols set by FAA to maintain safety for

all pilots, both military and civilian. Sharing airfield operations could increase operations in the airspace, however, scheduling and adherence to local airspace rules and regulation would not introduce adverse impacts when considered cumulatively with this Proposed Action Alternative.

5.2.1.2 *Acoustic Environment*

Base

There would be no significant impacts at the base when all projects are considered cumulatively.

Airspace

Noise generated during operations of the UAVs should not appreciably change in northern JPARC airspace when this action is considered with other foreseeable actions. Fighter jet-generated noise would continue to dominate sound levels in the training airspace. No adverse cumulative impacts are anticipated when considered with the Proposed Action Alternative.

5.2.1.3 *Air Quality*

Base

It is not anticipated that any of the projects would generate emissions during construction to cumulatively effect FNSB due to their distance (i.e., the DoD actions) and/or short duration (i.e., non-DoD actions). Operationally, emissions generated by other foreseeable actions would not adversely impact FNSB regional air quality cumulatively, again because of their distance from the particulate matter up to 2.5 micrometers in size ($PM_{2.5}$) nonattainment and carbon monoxide (CO) maintenance areas around Fairbanks and North Pole.

Airspace

Under the Proposed Action Alternative, criteria pollutants cumulatively would not be adversely affected, as presented in Table 5.2-1. Criteria pollutants generated by UAV and F-35A operations would not exceed levels to deteriorate regional air quality in northern JPARC airspace.

Table 5.2-1. Cumulative Pollutant Emissions

Pollutant of Concern	*UAV Emissions[1]*	*F-35 Emissions*	*Total*
Carbon Monoxide (CO)	13.61	236.1	**249.71**
Sulfur Dioxide (SO_2)	0.26	12.3	**12.56**
Nitrogen Oxide (NO_x)	5.65	118.1	**123.75**
Particulate Matter 2.5 ($PM_{2.5}$)	0.26	17.5	**17.76**

Note: [1]From Table 3-2 of the Gray Eagle EA (U.S. Army 2015).

5.2.1.4 *Socioeconomics*

For socioeconomics, the majority of impacts would occur in the FNSB regional area. In terms of population, there would be a short-term significant increase in the population due to the construction at Fort Wainwright and on area highways occurring within the same timeframe as the Proposed Action Alternative. Economically, the FNSB region, particularly Moose Creek and North Pole, would benefit from construction income in the short term and in the long term by increases in military personnel. For foreseeable actions at Fort Wainwright, socioeconomic impacts (e.g., economics, housing, education) primarily would affect Fairbanks and should not introduce cumulative adverse socioeconomic impacts when considered with this proposal. The same would be said of actions at Clear Air Force Station and

Fort Greely, their distance from Fairbanks and Eielson AFB would minimize the potential for adverse socioeconomic impacts (e.g., housing availability) when considered cumulatively with the Proposed Action Alternative.

In terms of transportation, the reopening of the South Gate and expanding the Richardson Highway for entry and merging purposes would actually benefit local traffic conditions. Allowing equipment and vehicles to use these new lanes would lessen the potential for traffic congestion at the gate during F-35A construction activities.

5.2.2 Cumulative Impacts with Actions outside of the Region

The only resource with potential for cumulative impacts outside the FNSB affected environment is air quality. The potential effects of proposed greenhouse gas (GHG) emissions are by nature global and cumulative. Individual sources of GHG emissions are not large enough to have an appreciable effect on climate change. Therefore, an appreciable impact on global climate change would only occur when the Proposed Action Alternative GHG emissions combine with GHG emissions from other man-made activities on a global (i.e., extra-regional) scale.

Currently, there are no formally adopted or published NEPA thresholds of significance for GHG emissions. The computed carbon dioxide equivalent or CO_2(e) emissions after beddown of both F-35A squadrons are 31,704 metric tons, or 0.937 percent of the existing CO_2(e) emissions for the FNSB region. When considered cumulatively with the 1,562 metric tons per year of CO_2(e) generated by the UAV emissions (U.S. Army 2015), GHGs would be significantly lower than regional and global GHG emissions; thus, there would be no adverse impacts from increased cumulative GHG emissions from the Proposed Action Alternative and the UAV beddown.

Additionally, the high latitudes of the earth may experience an increase of 5 to 8 degrees Fahrenheit over the next century, with the projected climate change impact of an increase in aridity, as documented in Global Climate Change Impacts in the U.S. from the U.S. Global Climate Change Research Program (U.S. Global Change Research Program 2014). This report predicts that permafrost temperatures in Alaska are rising, producing a thawing trend that is expected to continue, causing multiple vulnerabilities through drier landscapes, more wildfire, altered wildlife habitat, increased cost of maintaining infrastructure, and the release of heat-trapping gases that increase climate warming. While operations at Eielson AFB have already adapted to higher temperatures and an increase in smoke from wildfires, exacerbation of climate conditions in the future may increase the cost of proposed operations and could impede operations during extreme events. Additional measures could be needed to mitigate such impacts over the operational life expectancy of the F-35A.

This Page Intentionally Left Blank.

6.0 Other Considerations Required by the National Environmental Policy Act

6.0 OTHER CONSIDERATIONS REQUIRED BY THE NATIONAL ENVIRONMENTAL POLICY ACT

6.1 CONSISTENCY AND COMPLIANCE WITH OTHER FEDERAL, STATE, AND LOCAL PLANS, POLICIES, AND REGULATIONS

The F-35A Pacific Operational Beddown Environmental Impact Statement (EIS) Proposed Action was assessed to determine its consistency and compliance with applicable environmental regulations and other plans, policies, and controls. The United States (U.S.) Air Force (Air Force) has sought input from the various federal, state, and local agencies, as well as Alaska Native tribes and organizations with management responsibilities in the affected environment. The EIS findings indicate that the Proposed Action and No-Action Alternatives would not conflict with the objectives of applicable plans, policies, and regulations. The alternatives were evaluated adequately and accurately in the EIS based on the most current information available. The EIS process provided federal, state, and local agencies, as well as Alaska Native tribes and organizations, the opportunities to review and comment on this proposal, and requisite coordination and consultation have been undertaken. Table 6.1-1 provides a summary of environmental compliance requirements, and how they were achieved for this proposal.

Table 6.1-1. Summary of Applicable Environmental Regulations and Regulatory Compliance

Plans, Policies, and Controls	*Regulatory Agency Authority*	*Status of Compliance*	*Section of EIS*
The National Environmental Policy Act (NEPA) (Public Law 91-190, 42 U.S. Code (USC) 4341 *et seq*. as amended) 1969, and Air Force 32 Code of Federal Regulations (CFR) 989 procedures for NEPA implementation	Air Force	This EIS was prepared in accordance with the Council on Environmental Quality regulations implementing NEPA and Air Force NEPA procedures. Section 2.4 provides a full list of NEPA documents and decisions incorporated by reference. Public participation and review were conducted in compliance with NEPA.	All of document
Alaska Native Claims Settlement Act of 1971 (43 USC 1601-1624)	Air Force	Alaska Native tribes and organizations indicated that they did not wish to conduct further government-to-government coordination with Eielson Air Force Base (AFB). Construction on the base would not affect any land of interest and the F-35As would operate within the rules, regulations, limitations, seasonal adjustments prescribed by the 11th Air Force Alaska Airspace Handbook for operating in the northern Joint Pacific Alaska Range Complex (JPARC) airspace.	Sections 4.2 and 4.8
Noise Control Act of 1972 and Quiet Communities Act of 1978	Air Force	Due consideration to noise impacts consistent with these Acts was undertaken.	Section 4.3

Table 6.1-1. Summary of Applicable Environmental Regulations and Regulatory Compliance

Plans, Policies, and Controls	***Regulatory Agency Authority***	***Status of Compliance***	***Section of EIS***
Clean Air Act, 42 USC *et al.*	U.S. Environmental Protection Agency (USEPA) Division of Air Quality, Alaska Department of Environmental Conservation (ADEC)	The EIS air quality analysis concludes that proposed emissions under any of the alternatives: (1) would not affect the current attainment status at Eielson AFB; (2) would comply with all applicable state and regional air agency permits, rules, and regulations; (3) would not appreciably increase greenhouse gases or Hazardous Air Pollutants; and (4) would not affect the visibility of Prevention of Significant Deterioration sites in interior Alaska. Title V permits will be updated to include applicable new stationary source emissions such as back-up power diesel generators.	Section 4.4
Executive Order (EO) 13514, Federal Leadership in Environmental, Energy, and Economic Performance	Air Force	The Proposed Action Alternative would increase energy and water consumption; however, the base and Fairbanks North Star Borough have the capacity to provide both energy and water without appreciable changes from baseline conditions.	Sections 4.3 and 4.6
National Historic Preservation Act of 1966, as amended in 1980, 54 USC 100101 *et al.*	Alaska State Historic Preservation Office (SHPO)	Section 106 consultation was conducted with the Alaska SHPO; concurrence was received that there would be no adverse effects at Eielson AFB or to areas underlying northern JPARC airspace. Alaska Native tribes and organizations indicated that they did not wish to conduct further government-to-government consultation.	Section 4.8
Archaeological Resources Protection Act (ARPA) of 1979, 16 USC 470 *et al.;* ARPA) of 1979, Final Uniform Regulations, 32 CFR Part 229 (1997).	Alaska SHPO	The Proposed Action Alternative would not adversely affect archeological resources.	Section 4.8
EO 12898, Federal Actions to Address Environmental Justice in Minority and Low-Income Populations	Air Force	The Proposed Action Alternative would not result in disproportionately high and adverse human health or environmental effects on minority or low-income populations.	Section 4.9
EO 13045, Protection of Children from Environmental Health Risks and Safety Risks	Air Force	The Proposed Action Alternative could result in adverse learning capabilities to children from classroom interference events.	Section 4.9
Endangered Species Act of 1973, 16 USC 1531 *et seq.*	U.S. Fish and Wildlife Service (USFWS)	The Proposed Action Alternative would not affect federally listed species at Eielson AFB. No adverse impacts would occur to the two listed species under JPARC airspace or at any of the impact areas on the ranges.	Section 4.10
The Sikes Act of 1960 (16 USC 670a-670o), as amended	Air Force	Eielson AFB would continue to manage its lands with the goals of maintaining public access and use to the extent possible compatible with the military mission. No adverse impacts.	Section 4.10

Table 6.1-1. Summary of Applicable Environmental Regulations and Regulatory Compliance

Plans, Policies, and Controls	*Regulatory Agency Authority*	*Status of Compliance*	*Section of EIS*
Migratory Bird Treaty Act of 1918, 16 USC 703 *et al.*	USFWS	The Proposed Action Alternative would not adversely affect migratory birds at the base or within JPARC airspace.	Section 4.10
Bald and Golden Eagle Protection Act,16 USC 668-668d	USFWS	The higher altitudes at which F-35As operate would not introduce any new or adverse effects to eagles.	Section 4.10
Clean Water Act, 33 USC Sections 1251 to 1387 (1986 and Supplement 1997) Safe Drinking Water Act of 1974, 42 USC Sections 300f to 300j-26 (1991 and Supplement 1997)	USEPA United States Army Corps of Engineers/Alaska Division of Water, ADEC	A Clean Water Act Section 404 permit is required for potential wetland impacts and will be conducted prior to any ground-disturbing activities. Stormwater runoff during construction and operational phases of the project will be regulated (prior to off-base discharge) under the Alaska Pollution Discharge Elimination System permit and associated Stormwater Pollution Prevention Plan. Following construction completion, adherence to applicable federal and state stormwater and erosion practices would be applied to new operational activities.	Sections 4.10 and 4.12
EO 11988, Floodplain Management, as amended by EO 13690, Establishing a Federal Flood Risk Management Standard and Process for Further Soliciting and Considering Stakeholder Input	Federal Emergency Management Agency	Fifty-six acres of Eielson AFB would be developed in the 100-year floodplain. There are no other practicable alternatives for locating these facilities in the 100-year floodplain, along and adjacent to the flight line. New construction within the 100-year floodplain would adhere to established floodplain management objectives and structure construction to avoid adverse effects to floodplains.	Section 4.12

6.2 UNAVOIDABLE ADVERSE ENVIRONMENTAL EFFECTS

Avoidance, minimization, or mitigation of adverse effects to natural, cultural, and other environmental resources were integrated into the Proposed Action Alternative to the greatest extent possible and practicable; however, all impacts may not be completely avoided and/or mitigated. Specifically, there would be a loss of approximately 21 acres of undeveloped land, of which about 17 acres are wetlands and 56 acres would be developed in the 100-year floodplain. Additionally, there would be an increase in the number of people exposed to noise levels between 65 and 70 decibels (dB) day-night average sound level (dB DNL).

6.3 RELATIONSHIP BETWEEN SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

Analysis of the relationship between a project's short-term impacts on the environment and the effects those impacts may have on the maintenance and enhancement of the long-term productivity of the affected environment is required under NEPA. Impacts that narrow the range of beneficial uses of the environment are of particular concern. This means that choosing one option may reduce future flexibility in pursuing other options, or that committing a resource to a certain use may eliminate the possibility for other uses of that resource.

The Proposed Action Alternative and No-Action Alternative would result in both short- and long-term environmental effects to air quality, soils, wetlands, and floodplains. However, neither of the alternatives is expected to result in impacts that would reduce overall environmental productivity, permanently narrow the range of beneficial uses of the environment, or pose long-term risks to health, safety, or the general welfare of the public.

6.4 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Primary irreversible effects result from permanent use of a nonrenewable resource (e.g., minerals or energy). Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored as a result of the alternatives (e.g., archaeological findings) or consumption of renewable resources that are not permanently lost (e.g., wetlands). Secondary impacts could result from environmental accidents, such as fires or flooding. Natural resources include minerals, energy, land, water, forestry, and biota. Nonrenewable resources are those resources that cannot be replenished by natural means, including oil, natural gas, and iron ore. Renewable natural resources are those resources that can be replenished by natural means, including water, lumber, and soil.

Both alternatives would involve irretrievable commitments of nonrenewable and renewable resources and could involve: (1) general industrial resources such as capital, labor, fuels, and construction materials and (2) project-specific resources such as forests and other land uses within the construction footprint. Under the Proposed Action Alternative, ground disturbance may potentially affect previously unknown cultural resources. However, if unknown cultural resources are discovered during construction or site grading activities, work would be stopped immediately and procedures for inadvertent discovery implemented. This would minimize any irreversible or irretrievable effects to cultural resources.

The resources necessary to implement improvements to existing military lands would not be retrievable if any of the alternatives were implemented. However, the total amount of construction materials under the Proposed Action Alternative (e.g., concrete, insulation, wiring) required is relatively small when compared to the resources available in the region. All new construction, moreover, would comply with EO 13423, *Strengthening Federal Environmental, Energy, and Transportation* Management, and EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance*. EO 13423 set goals for federal agencies in areas such as energy efficiency, renewable energy, toxic chemical reduction, recycling, sustainable buildings, electronics stewardship, and water conservation. EO 13514 expands on the requirements set forth in EO 13423 and mandates that federal agencies meet numerical and non-numerical targets. For example, EO 13514 requires that 95 percent of all new contracts require the use of water-efficient fixtures, low-flow fixtures, non-toxic or less toxic products, and energy-efficient products. EO 13514 also requires that all new construction comply with the *Guiding Principles for*

Federal Leadership in High Performance and Sustainable Buildings. This includes employing design and construction strategies that increase energy efficiency, eliminate solid waste, and reduce stormwater runoff. One strategy for reducing stormwater runoff is the implementation of low impact development technologies. The goal of low impact development technologies is to maintain or restore the natural hydrologic functions of a site and reduce the run-off rate, filter out pollutants, and facilitate the infiltration of water into the ground.

Following construction, military training and office operations would consume nonrenewable resources such as jet fuel and various office supplies. These materials and the energy required for operations are not in short supply; their use would not have an adverse impact on the continued availability of these resources, and the energy resource commitment is not anticipated to be excessive in terms of region-wide usage. Furthermore, compliance with the requirements set forth in EOs 13423 and 13514 would further minimize any irreversible or irretrievable effects to multiple non-renewable and renewable resources.

This Page Intentionally Left Blank.

7.0 List of Preparers

7.0 LIST OF PREPARERS AND CONTRIBUTORS

Government Contributors

Dale Clark, Air Force Civil Engineer Center (AFCEC), NEPA Division, *Chief*
Mike Hancock, Pacific Air Forces, Civil Engineering Squadron, *Planning*
Jerry Kohns, U.S. Air Force, Associate General Counsel
Deb Lipyanic, Eielson AFB, Environmental Impact Analysis Process, *Base EIAP Lead*
Julene May, Eielson AFB, Civil Engineering Squadron, *Chief, Installation Management*
Mark Peterson, Pacific Air Forces, *NEPA Representative*
Toni Ristau, AFCEC, NEPA Division, *Project Manager*
Floyd Russell, Air Force Legal Operations Agency
Chief Master Sergeant Jeffrey Rud, 354 Fighter Wing, F-35 Program Integration Superintendent
Lieutenant Colonel Mark (Tyson) Sletten, Chief, 354 Fighter Wing, Planning and F-35 Program Office
Major Gabriel Young, Air Force Legal Operations Agency

Wyle Laboratories, Inc. – EIS Lead

Joe Czech, *Noise Analysis*
B.S., Aerospace Engineering, California State Polytechnic University, 1988
Professional Engineer, State of California
Years of Experience: 26

Joe Demers, *Noise Analysis*
B.S., Structural Engineering, California State Polytechnic University, 2003
Professional Engineer, State of California
Years of Experience: 5

Patrick H. Kester, *Noise Analysis*
B.S., Mechanical Engineering, California State Polytechnic University, 2006
Years of Experience: 9

Brian Kim, *Air Emissions Analysis*
B.S., Mechanical Engineering, University of California-Irvine, 1990
M.S., Environmental Engineering, California State Polytechnic University, 1997
Ph.D., Environmental Engineering, University of Central Florida, 2004
Years of Experience: 15

Allen Richmond, *EIS Project Manager*
B.S., Forestry and Wildlife Management, Virginia Polytechnic Institute and State University, 1972
M.S., Natural Resource Management, University of Alaska-Fairbanks, 1983
Years of Experience: 34

Eric Smith, *GIS*
B.S., Environmental Science, McNeese State University, 1998
M.A., Geography, University of New Orleans, 2000
Years of Experience: 15

Roger Wayson, *Air Emissions Analysis*
B.E.S., Environmental Engineering, University of Texas at Austin, 1980
M.S., Civil Engineering, University of Texas at Austin, 1985
Ph.D., Civil Engineering, Vanderbilt University, 1989
Years of Experience: 41

Cardno Government Services – EIS Subcontractor

Jim Campe, *Earth Resources and Hazardous Materials/Waste, Toxic Substances, and Contaminated Sites*
B.S., Naval Architecture and Offshore Engineering, University of California, 1986
Years of Experience: 23

Christina Cummings, *Project Administrator*
A.A.S., Administrative Office Technology, Boise State University, 1999
Years of Experience: 17

Cathy Doan, *Airfield and Airspace Management and Operations and Safety*
B.S., English, Central Michigan University, 1980
M.A., Human Resources Development, Webster University, 1985
Years of Experience: 18

Jessica Dougherty, *Cultural Resources and Recreational/Visual Resources*
B.A., Anthropology, Boise State University, 2009
M.A., Anthropology, Utah State University, 2014
Years of Experience: 6

Travis P. Gahm, *Natural Resources, Water Resources, and GIS*
B.S. Biology, James Madison University, 2009
Years of Experience: 4

David Kiernan, *Socioeconomics and Environmental Justice/Protection of Children*
B.S., Economics, Florida State University, 2000
M.A., Urban and Regional Planning, University of Hawaii, 2010
Years of Experience: 14

Edie Mertz, *Graphics*
A.A. General Education, Cerro Coso College, CA, 1994
Years of Experience: 25

Isla Nelson, *Cumulative Impacts*
B.A., Anthropology, Boise State University, 2001
Years of Experience: 13

Kevin J. Peter, *Program Manager*
B.A., Anthropology, Pomona College, 1975
M.A., Anthropology, Washington State University, 1986
Years of Experience: 33

Kathy L. Rose, *EIS Project Manager*
B.A., Political Science/German, University of Massachusetts/Amherst, 1980
M.A., International Relations, George Washington University, 1983
M.S., Forest Resource Management, University of Idaho, 1996
Years of Experience: 25

Teresa Rudolph, *Cultural and Traditional Resources Lead*
B.A., Anthropology, Florida State University, 1975
M.A., Anthropology, Southern Illinois University, 1981
Years of Experience: 34

Tamara Shapiro, *Land Use Management and Plans and Recreational/Visual Resources Lead*
B.A., English, Boise State University, 1989
M.L.A., Landscape Architecture, Cornell University, 2003
Years of Experience: 15

Lisa Woeber, *Technical Review*
B.B.A., Business Administration, University of San Diego, 1998
Years of Experience: 19

This Page Intentionally Left Blank.

8.0 References Cited

8.0 REFERENCES CITED

11th Air Force. 2015. Alaska Airspace Handbook. Pacific Air Forces. 28 July.

_____. 2011. F-22 Plus-Up Environmental Assessment Joint Base Elmendorf-Richardson, Alaska. June.

_____. 2010. Establish the Delta Military Operations Area Final Environmental Assessment, Eielson Air Force Base, Alaska. January.

354th Fighter Wing (354 FW). 2015. Flight Safety Office. Aircraft Mishap Data. Electronic Mail between Allen Richmond of Wyle, and Major Kendall Spencer, 354 FW Flight Safety Officer. 7 April.

_____. 2013. 354th Fighter Wing Instruction 13-204, Airfield Operations Instruction. 19 June.

_____. 2011. Bird/Wildlife Aircraft Strike Hazard (BASH) Plan 91-212. February.

611th Air Operations Group. 2008. Finding of No Significant Impact and Final Environmental Assessment of Improvements to Military Training Routes in Alaska. March.

_____. 2007. Environmental Assessment of Improvements to Military Training Route in Alaska. June.

Advisory Council on Historic Preservation. 2006. Program Comment for World War II and Cold War Era (1939-1974) Ammunition Storage Facilities. August.

Air Force Civil Engineer Center (AFCEC). 2015. Final Environmental Assessment and Finding of No Significant Impact for the Replacement of QF-4 Full-Scale Aerial Targets (FSATs) with QF-16 FSATs at Holloman AFB, New Mexico. April.

_____. 2014a. Air Force Air Conformity Applicability Model, Version 5. Lackland AFB, TX.

_____. 2014b. Environmental Justice under the Environmental Impact Analysis Process. Lackland AFB, TX.

Air Force Institute for Operational Health. 2006. Calendar Year 2004 Mobile Source Air Emissions Inventory for Eielson AFB, AK, Environmental Consulting Division. August.

Air Force Materiel Command. 2015. Air Force Instruction 32-7086 Civil Engineering Hazardous Material Management. February.

Air Force Safety Center (AFSC). 2014a. Engine-Related Fighter/Attack Class A Flight Mishap Rates for Single Engine Aircraft. Accessed at: http://www.afsec.af.mil/shared/media/document/AFD-150129-038.pdf on 24 March 2015.

_____. 2014b. Air Force Wildlife Strikes by Altitude, FY1995-2014. Accessed at: http://www.afsec.af.mil/shared/media/document/AFD-141209-034.pdf on 24 March 2015.

_____. 2014c. Class A Mishaps by Fiscal Year. Accessed at: http://www.afsec.af.mil/shared/media/document/AFD-141209-026.pdf on 24 March 2015.

Alaska Community Action on Toxics. 2003. Eielson Air Force Base Environmental Justice and Superfund Sites Fact Sheet. Accessed at: http://www.akaction.org/wp-content/uploads/2013/06/Eielson_Air_Force_Base_EJ_AK_Military_Superfund_Sites_2003.pdf. Accessed on 15 May 2015.

Alaska Department of Labor and Workforce Development. 2012. Alaska Population by Area: 2012 to 2042. Accessed at: http://laborstats.alaska.gov/pop/projected/pub/popproj.pdf.

Alaska Earthquake Information Center. 2014. Overview Information Derived from Website. Accessed at: http://www.aeic.alaska.edu.

Andersen, R., J.D.C. Linnell, and R. Langvatn. 1996. Short Term Behavioral and Physiological Response of Moose (Alces alces) to Military Disturbance in Norway. *Biological Conservation.* Volume 77, Pages 169-176.

ArmyTimes. 2015. *Army lays out plan to cut 40,000 soldiers*. Army Times. Accessed at: http://www.armytimes.com/story/military/pentagon/2015/07/09/army-outlines-40000-cuts/29923339/. Accessed on 22 May.

Berglund, B. and T. Lindvall. 1995. Community Noise. Center for Sensory Research, Stockholm, Sweden.

Bowles, A.E. 1995. *Responses of Wildlife to Noise*. Pages 109-156 *in* R.L. Knight, and K.J. Gutzwiller, Eds. Wildlife and Recreationists: Coexistence through Management and Research. Island Press. Covelo, California.

Bureau of Land Management. 2012. Eastern Interior Draft Resource Management Plan and Environmental Impact Statement. Accessed at: https://www.blm.gov/epl-front-office/projects/lup/1100/33652/35152/default.jsp?projectName=Eastern+Interior+Resource+Management+Plan+and+Environmental+Impact+Statement&projectDisplayName=Eastern+Interior+Resource+Management+Plan+and+Environmental+Impact+Statement.

_____. 1983. River Management Plan for the Birch Creek National Wild River, Alaska.

_____. 1980. Fortymile Management Framework Plan. Fairbanks, Alaska.

Committee on Hearing, Bioacoustics, and Biomechanics. 1981. *Assessment of Community Noise Response to High-Energy Impulsive Sounds*. Report of Working Group 84, Committee on Hearing, Bioacoustics and Biomechanics, Assembly of Behavioral and Social Sciences. National Research Council, National Academy of Sciences. Washington, D.C.

Council on Environmental Quality (CEQ). 1997. CEQ's Guidance for Considering Cumulative Effects.

Department of Defense (DoD). 2015. *Department of Defense Identifies Planned Site of Future Long Range Discrimination Radar (LRDR).* Release No: NR-193-15. Accessed at: http://www.defense.gov/News/News-Releases/News-Release-View/Article/605521. Accessed on 22 May.

_____. 2013. DoD Directive 5030.19, DoD Responsibilities on Federal Aviation. 13 September.

_____. 2011a. DoD Instruction 4165.57 Air Installations Compatible Use Zones (AICUZ). 2 May.

_____. 2011b. DoD Instruction, 6055.07 Mishap Notification, Investigation, Reporting, and Record Keeping. Under Secretary of Defense for Acquisition, Technology, and Logistics. 6 June.

Dockrell, J.E. 2006. *Acoustical Barriers in Classrooms: The Impact of Noise on Performance in the Classroom*. British Educational Research Journal. Volume 32, pages 509-525.

Earthquake Tracker. 2014. Recent Earthquakes near Fairbanks. Accessed at: http://earthquaketrack.com. Accessed April 2014.

Eielson Air Force Base (AFB). 2015a. Projected F-35A Personnel Numbers. 354th Fighter Wing. Eielson Air Force Base, Alaska. February.

_____. 2015b. Eielson AFB 2010-2015 Aircraft Mishap Data. 354th Fighter Wing. Eielson Air Force Base, Alaska. June.

_____. 2015c. F-35A Site Survey 354 FW Eielson AFB Outbrief. Headquarters Air Force. A8B Basing. Washington, D.C. 20 March.

_____. 2015d. 354th Fighter Wing, Civil Engineer. Personal Communication. Eielson Air Force Base, Alaska. November.

_____. 2015e. Lead-Based Paint Management Plan. Eielson Air Force Base, Alaska. September.

_____. 2014a. Integrated Cultural Resources Management Plan, 2013 to 2018. Eielson Air Force Base, Alaska. January.

_____. 2014b. 2014 Drinking Water Quality Annual Consumer Report. Eielson Air Force Base, Alaska.

_____. 2014c. Stormwater Pollution Prevention Plan (SWPPP). Eielson Air Force Base, Alaska. February.

_____. 2014d. Hazardous Waste Management Plan. Eielson Air Force Base, Alaska. February.

_____. 2012. Integrated Natural Resources Management Plan - Second Revision September 2011 to August 2016. Eielson Air Force Base, Alaska. 4 July.

_____. 2010. Oil and Hazardous Substances Discharge Prevention and Contingency Plan. 354th Fighter Wing. Eielson Air Force Base, Alaska. April.

_____. No Date. Mutual Aid Agreement for Fire Protection Services. Eielson Air Force Base, Alaska.

Ellis, D.H., C.H. Ellis, and D.P. Mindell. 1991. Raptor Responses to Low-level Jet Aircraft and Sonic Booms. *Environmental Pollution.* Volume 74, pages 53-83.

Environmental Laboratory. 1987. Corps of Engineers Wetlands Delineation Manual. Prepared by Environmental Laboratory, Vicksburg, Mississippi. January.

Fairbanks News Miner. 2014. *Army releases plan to add 367 soldiers to Fort Wainwright*. Fairbanks News Miner. Accessed at: http://www.newsminer.com/news/local_news/. 9 January.

Fairbanks North Star (FNSB) Community Research Center. 2014. Quarterly Socioeconomic Reviews. Available Online at: http://co.fairbanks.ak.us/communityplanning/crc/. Fairbanks, Alaska.

_____. 2006. Joint Land Use Study. Fairbanks, Alaska. July.

Fairbanks Economic Development Corporation. 2015. Fairbanks North Star Borough Housing Needs Assessment. Fairbanks, Alaska. September.

FNSB School District. 2014. Number of Students Enrolled at Each School. Accessed at: http://www.k12northstar.org/cms/lib010/AK01901510/Centricity/Domain/1125//Public%20Records/2014-2015%20Records/enrollment-ethnicity-report_oct1-2014.pdf.

Federal Aviation Administration (FAA). 2015. Notice of Proposal to Modify, Expand and Establish Special Use Airspace Joint Pacific Alaska Range Complex Joint Base Elmendorf-Richardson, Alaska Study #14-AAL-22NR. 24 February.

_____. 2013. FAA Order 7400.2J 2013. Procedures for Handling Airspace Matters. 22 August.

_____. 2008. Pilot Handbook, Chapter 14, Airspace. Accessed at: https://www.faa.gov/regulations_policies/handbooks_manuals/aviation/pilot_handbook/media/PHAK%20-%20Chapter%2014.pdf. May.

_____. 2003. Select Resource Materials and Annotated Bibliography on the Topic of Hazardous Air Pollutants (HAPs) Associated with Aircraft, Airports, and Aviation. 1 July.

Federal Emergency Management Administration. 2015. Revised Guidelines for Implementing Executive Order 11933, Floodplain Management. January.

Federal Interagency Committee on Noise. 1992. Federal Agency Review of Selected Airport Noise Analysis Issues. August.

Federal Interagency Committee on Urban Noise (FICUN). 1980. Guidelines for Considering Noise in Land-Use Planning and Control. June.

Frampton, K.D., M.J. Lucas, and K.J. Plotkin. 1993. Measurements of Sonic Booms due to ACM Training in the Elgin MOA Subsection of the Nellis Range Complex. Wyle Research Report WR 93-5.

Gladwin, D.N., D.A. Asherin, and K.M. Manci. 1988. Effects of Aircraft Noise and Sonic Booms on Domesticated Animals and Wildlife: Bibliographic Abstracts. NERC-88/32. U.S. Fish and Wildlife Service, National Ecology Research Center, Fort Collins, Colorado.

Grubb, T.G. and W.W. Bowerman. 1997. *Variations in Breeding Bald Eagle Responses to Jets, Light Planes and Helicopters*. Journal of Raptor Research. Volume 31, pages 213-222.

Haeussler, P.J. and G. Plafker. 2004. Earthquakes in Alaska: U. S. Geological Survey Open-File Report 95-624. Accessed at: http://pubs.usgs.gov/of/1995/0624/.

Hall, L.S., P.R. Krausman, and M.L. Morrison. 1997. *The Habitat Concept and a Plea for Standard Terminology*. Wildlife Society Bulletin. Volume 25, pages 173-182.

Joint Program Office. 2009. Personal Communication between Joint Program Office (Stacy Luker) and Cardno (Kathy Rose). October.

_____. 2008. F-35 Pollution Prevention Activities. ESTCP/SERDP Surface Finishing and Repair Workshop. Tempe, Arizona. 26 February.

Krausman, P.R., M.C. Wallace, D.W. DeYoung, M.E. Weisenberger, and C.L. Hayes. 1993. *The Effects of Low-Altitude Jet Aircraft on Desert Ungulates*. International Congress: Noise as a Public Health Problem. Volume 6, pages 471-478.

Lamp, R.E. 1989. Monitoring the Effect of Military Air Operations at Naval Air Station Fallon on the Biota of Nevada. Nevada Department of Wildlife. Reno, Nevada.

Lawler, J.P., A.J. Magoun, C.T. Seaton, C.L. Gardner, R.D. Boertje, J.M. Ver Hoef, P.A. Del Vecchio. 2005. Short-Term Impacts of Military Overflights on Caribou during Calving Season. *Journal of Wildlife Management*. Volume 69, Number 3, pages 1133-1146. July.

Lockheed Martin. 2016. JSF Lighting II Flight Hours. Accessed at: http://www.lockheedmartin.com/us/products/f35.html. 12 January.

Miller, Nicholas P. 1999. The Effects of Aircraft Overflights on Visitors to U.S. National Parks. Burlington, Massachusetts.

Mostlymissiledefense.com. 2015. *The Long Range Discrimination Radar at S-Band?* Accessed at: http://mostlymissiledefense.com/2015/04/20/the-long-range-discrimination-radar-at-s-band-april-20-2015/. 20 April.

National Institute for Occupational Safety and Health (NIOSH). 1998. Criteria for a Recommended Standard: Occupational Noise Exposure, Chapter 1. Accessed at: http://www.cdc.gov/niosh/docs/98-126/.

National Marine Fisheries Service. 2014. Alaska Regional Office Protected Resources Division. Accessed at: www.alaskafisheries.noaa.gov/protectedresources/default.htm. Accessed on 7 April 2015.

National Oceanic and Atmospheric Administration. 2014. Marine Mammal Protection Act (MMPA). Accessed at: www.nmfs.noaa.gov/pr/laws/mmpa/. Accessed on 1 April 2015.

National Park Service. 2002. How to Apply the National Register Criteria for Evaluation.

_____. 1994. Report of Effects of Aircraft Overflights on the National Park System. Report to Congress.

Page, J., B. Schantz, R. Brown, K.J. Plotkin, and C.L. Moulton. 1994. Measurements of Sonic Booms due to ACM Training in R-2301W of the U.S. Barry Goldwater Air Force Range. Wyle Research Report WR 94-11. May.

Plotkin, K.J., K.D. Frampton, M.J. Lucas, V.R. Desai, B. Moring, and B. Cook. 1992. Measurements of Sonic Booms due to ACM Training in R2301E of the Barry Goldwater Air Force Range. Wyle Research Report WR 92-4.

Plotkin, K.J., V.R. Desai, C.L. Moulton, M.J. Lucas, and R. Brown. 1989. Measurements of Sonic Booms due to Air Combat Maneuver Training at White Sands Missile Range. Wyle Research Report WR 89-18.

Rucker, R.R. 1973. *Effect of Sonic Boom on Fish*. Western Fish Disease Laboratory, Bureau of Sport Fisheries and Wildlife, Fish and Wildlife Service. Prepared for Federal Aviation Administration. February.

Shield, B.M. and J.E. Dockrell. 2003. *The Effects of Noise on Children at School: A Review*. Journal of Building Acoustics. Volume 10, Number 2, pages 97-106.

Smith, D.G., D.H. Ellis, and T.H. Johnson. 1988. Raptors and Aircraft. *In* R.L. Glinski, B. Giron-Pendleton, M.B. Moss, M.N. LeFranc, Jr., B.A. Millsap, and S.W. Hoffman, eds. *Proceedings of the Southwest Raptor Management Symposium*. National Wildlife Federation. Pages. 360-367. Washington, D.C.

Todd, S.K. and H.A. Jewkes. 2006. Wildland Fire in Alaska: A History of Organized Fire Suppression and Management in the Last Frontier. Agricultural and Forestry Experiment Station Bulletin No. 114, University of Alaska Fairbanks. March.

Undersecretary of Defense for Acquisition Technology and Logistics. 2009. Memorandum on Methodology for Assessing Hearing Loss Risk and Impacts in DoD Environmental Impact Analysis.

United States (U.S.) Air Force. 2015a. Air Force Instruction 13-212, *Range Planning and Operations*. 23 April.

_____. 2015b. Based Aircraft and Operations. Eielson AFB, Alaska. February.

_____. 2015c. Eielson Air Force Base Official Website, About the 354th Medical Group. Accessed at: http://www.eielson.af.mil/354thmedicalgroup/.

_____. 2015d. Eielson Air Force Base Official Website, About the 354th Civil Engineer Squadron. Accessed at: http://www.eielson.af.mil/library/factsheets/factsheet.asp?id=5261.

_____. 2015e. Eielson Air Force Base official website, About the 354th Security Forces Squadron. Accessed at: http://www.eielson.af.mil/library/factsheets/factsheet.asp?id=5266.

_____. 2015f. Housing Requirements and Market Analysis. Eielson AFB, Alaska. September.

_____. 2014a. F-35A Enterprise-Wide Basing Look. Washington, D.C. May.

_____. 2014b. F-35A Operational Basing Records of Decision. Air Combat Command. Langley AFB, Virginia. January.

_____. 2013a. Joint Pacific Alaska Range Complex Final Environmental Impact Statement for the Modernization and Enhancement of Ranges, Airspace, and Training Areas in the Joint Pacific Alaska Range Complex in Alaska. Air Force Civil Engineer Center, Environmental Division. San Antonio, Texas. June.

_____. 2013b. Proposal to Relocate the 18th Aggressor Squadron from Eielson Air Force Base (EAFB), Alaska to Joint base Elmendorf, Alaska and to Right-Size the Remaining Wing Overhead/Base Operating Support and EAFB, Alaska. Draft Environmental Impact Statement, May 2013. Accessed at: http://www.investfairbanks.com/sites/default/files/documents/F-16_JBER_DEIS_2013-05-24.pdf.

_____. 2013c. Record of Decision for the Modernization and Enhancement of Ranges, Airspace, and Training Areas in the Joint Pacific Alaska Range Complex (JPARC) in Alaska. Air Force Civil Engineer Center, Environmental Division. San Antonio, Texas.

_____. 2013d. Air Force Instruction (AFI) 13-201, Air Combat Command Supplement, Airspace Management. October.

_____. 2011. Air Force Instruction 90-901, Operational Risk Management. Certified Current as of 1 April 2000.

_____. 2007. Air Force Policy Directive 13-2. Space, Missile, Command, and Control Air Traffic, Airfield, Airspace and Range Management. 7 August.

_____. 2006a. Air Force Occupational Safety and Health Standard 48-20. June.

_____. 2006b. F-22 Beddown Environmental Assessment. Elmendorf Air Force Base, Alaska.

_____. 2001. Technical Order 00-105E-9 and STANAG 3896, Aerospace Emergency Rescue and Mishap Response Information.

_____. 1997. Alaska Military Operations Areas Final Environmental Impact Statement Record of Decision. Department of the Air Force, 11th Air Force, Elmendorf AFB, Alaska. April.

_____. 1995. Final Environmental Impact Statement Alaska Military Operations Areas. August.

U.S. Air Force/U.S. Army Alaska (Air Force/Army). 2014. 11th Air Force Alaska Airspace Handbook, Joint Base Elmendorf-Richardson, Alaska. February.

U.S. Army. 2015. Infrastructure and Operational Support for the 25th Aviation Regiment Company D Unmanned Aircraft System Final Environmental Assessment and Draft Finding of No Significant Impact. Fort Wainwright, Alaska. August.

_____. 2014. Supplemental Programmatic Environmental Assessment and Finding of No Significant Impact for Army 2020 Force Structure Realignment. June.

U.S. Census Bureau. 2015. 2010 Census Alaska QuickFacts. Accessed at: http://www.census.gov/quickfacts/table/PST045214/02170,02261,02290,02240,02,00.

_____. 2013. American Community Survey, 5-Year Estimates. Available online through the American Fact Finder. Accessed at: http://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml.

_____. 2010. Decennial Census. SF 1, 100% Data. Available online through the American Fact Finder. Accessed at: http://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml.

_____. 2000. Decennial Census. SF 1, 100% Data. Available online through the American Fact Finder. Accessed at: http://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml.

U.S. Department of Agriculture (USDA). 2014. Wildlife Hazard Management Program at Eielson Air Force Base, 2014 Report. U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services. Palmer, Alaska. Undated.

U.S. Department of the Navy (U.S. Navy). 2014. Gulf of Alaska Training Activities Draft Supplemental Environmental Impact Statement/Overseas Environmental Impact Statement. U.S. Pacific Fleet. Honolulu, Hawaii. Accessed at: http://goaeis.com/Documents/SupplementalEISOEISDocumentsandReferences.aspx. Accessed August 2015.

_____. 2011a. Gulf of Alaska Navy Training Activities Final Environmental Impact Statement/Overseas Environmental Impact Statement. U.S. Pacific Fleet. Honolulu, Hawaii. August. Accessed at: http://goaeis.com/Documents/SupplementalEISOEISDocumentsandReferences.aspx. Accessed March 2015.

_____. 2011b. Gulf of Alaska Navy Training Activities Record of Decision. U.S. Pacific Fleet. Honolulu, Hawaii. Accessed at: http://goaeis.com/Documents/SupplementalEISOEISDocumentsandReferences.aspx. Accessed May 2015.

U.S. Environmental Protection Agency (USEPA). 2015. National Ambient Air Quality Standards. Accessed at: http://www.epa.gov/air/criteria.html. Accessed July 2015.

_____. 2014. What is RCRA Hazardous Waste? Accessed at: http://waste.supportportal.com/link/portal/23002/23023/Article/22091/What-is-a-RCRA-hazardous-waste. Accessed April 2015.

_____. 2012. Environmental Justice. Accessed at: http://www.epa.gov/compliance/environmentaljustice/index.html.

_____. 2011. The 2011 National Emissions Inventory. EPA Technology Transfer Network, Clearinghouse for Inventories and Emissions Factors. Accessed at: http://www.epa.gov/ttn/chief/net/2011inventory.html.

_____. 2010. Air and Radiation. National Ambient Air Quality Standards. Accessed at: http://www3.epa.gov/ttn/naaqs/criteria.html.

_____. 1999. Regional Haze Regulations; Final Rule. *Federal Register*. Volume 64, Number 126. 1 July.

U.S. Fish and Wildlife Service (USFWS). 2014. Alaska Region USFWS Listed and Candidate Species, Species under Review, or Previously Reviewed. Accessed at: www.fws.gov/alaska/fisheries/endangered/species.htm. Accessed on 17 April 2015.

_____. 2012. Alaska Region Species Profile – Eskimo Curlew. Accessed at: www.fws.gov/alaska/fisheries/endangered/species/eskimo%20curlew.htm. Accessed on 25 April 2015.

U.S. Geological Survey. 2010. Water Use Data for Alaska. Accessed at: nwis.waterdata.usgs.gov/ak/nwis/. Accessed on 15 May 2015.

U.S. Global Change Research Program. 2014. Regional Highlights from the Third National Climate Assessment: Climate Change Impacts in Alaska.

Weisenberger, M.E., P.R. Krausman, M.C. Wallace, D.W. DeYoung, and O.E. Maughan. 1996. *Effects of Simulated Jet Aircraft Noise on Heart Rate and Behavior of Desert Ungulates*. Journal of Wildlife Management. Volume 60, pages 52-61.

Workman, G.W., T.D. Bunch, J.W. Call, R.C. Evans, L.S. Neilson, and E.M. Rawlings. 1992. Sonic Boom/Animal Disturbance Studies on Pronghorn Antelope, Rocky Mountain Elk, and Bighorn Sheep.

Wright, M., A. Luers, R. Darwin, J. Scheffey, H. Bowman, R. Davidson, and E. Gogley. 2003. Composite Materials in Aircraft Mishaps Involving Fire: A Literature Review. June.

9.0 Index

9.0 INDEX

Accident Potential Zone(s) (APZ): 2-2, 2-31, 3-45, 3-46, 3-49, 3-50, 3-51, 3-76, 4-40, 4-41

Alaska Native: 1-4, 1-7, 1-8, 1-9, 2-33, 3-57, 3-61, 3-62, 3-65, 3-66, 3-68, 3-70, 3-71, 3-72, 3-73, 3-100, 4-51, 4-52, 4-53, 6-1, 6-2

Annoyance: 3-13, 3-14, 3-16, 4-79

Bird/Wildlife Aircraft Strike Hazard (BASH): 2-31, 3-45, 3-47, 3-48, 3-52, 3-55, 3-61, 3-76, 4-40, 4-42, 4-44, 4-62, 4-66, 4-68, 8-1

Children: Cover Sheet, 1-6, 1-9, 2-4, 2-16, 2-34, 3-59, 3-72, 3-73, 3-76, 3-77, 3-78, 4-1, 4-47, 4-54, 4-55, 4-56, 4-57, 4-59, 4-60, 6-2, 7-2, 8-5

Classroom Learning Interference: Cover Sheet, 2-29, 3-14, 3-16, 3-17, 3-29, 3-76, 4-11, 4-25, 4-26, 4-35, 4-59, 4-61

Consultation: 1-5, 1-6, 1-7, 1-8, 1-10, 3-66, 3-70, 4-13, 4-51, 4-52, 4-53, 4-65, 4-66, 6-1, 6-2

Elderly: 1-9, 2-34, 3-72, 3-73, 3-76, 3-77, 3-78, 4-55, 4-56, 4-57, 4-59, 4-60

Environmental Justice: 1-6, 1-9, 2-34, 3-72, 3-73, 3-76, 3-78, 4-1, 4-54, 4-55, 4-56, 4-59, 4-60, 6-2, 7-2, 8-1, 8-7

Fire Risk: Cover Sheet, 1-4, 2-28, 2-31, 3-45, 3-48, 3-52, 3-53, 3-76, 4-41, 4-43

Floodplains: 1-7, 1-9, 1-10, 2-16, 2-35, 3-87, 3-88, 3-89, 3-90, 4-55, 4-56, 4-59, 4-60, 4-70, 4-72, 4-73, 4-75, 6-3, 6-4

Greenhouse Gas(es) (GHGs): 1-4, 1-9, 2-30, 3-41, 3-44, 4-37, 5-5, 6-2

Hazardous Air Pollutant(s) (HAPs): 1-9, 2-30, 3-40, 3-43, 3-44, 6-2, 8-4

Low-Income: Cover Sheet, 2-34, 3-72, 3-73, 3-75, 3-76, 3-78, 4-54, 4-55, 4-56, 4-58, 6-2

Minority: Cover Sheet, 1-9, 2-34, 3-72, 3-73, 3-74, 3-76, 3-78, 4-54, 4-55, 4-56, 4-58, 6-2

Mishap(s): Cover Sheet, 2-31, 3-45, 3-46, 3-47, 3-48, 3-49, 3-52, 3-55, 3-76, 3-98, 4-40, 4-41, 4-42, 4-44, 4-60, 4-78, 8-1, 8-2, 8-3, 8-6, 8-8

Ordnance: 1-4, 2-7, 2-13, 2-21, 2-26, 2-27, 2-28, 2-31, 2-35, 3-6, 3-14, 3-52, 3-61, 3-82, 4-41, 4-42, 4-43, 4-69

Potential for Hearing Loss: 3-15, 3-16, 3-17, 3-29, 4-12, 4-26, 4-59

Recreational: Cover Sheet, 1-9, 2-5, 2-28, 2-36, 3-15, 3-16, 3-17, 3-20, 3-30, 3-32, 3-34, 3-64, 3-65, 3-71, 3-79, 3-99, 3-100, 3-102, 3-103, 4-12, 4-27, 4-29, 4-50, 4-60, 4-61, 4-78, 4-79, 4-80, 7-2, 7-3

Sleep Disturbance: 1-9, 3-14, 3-16, 3-17, 3-29, 4-12, 4-26

Sonic Boom(s): 1-3, 1-4, 1-5, 1-6, 3-14, 3-15, 3-16, 3-36, 3-38, 3-39, 3-78, 4-15, 4-17, 4-31, 4-33, 4-34, 4-54, 4-59, 4-66, 4-67, 8-3, 8-4, 8-5, 8-8

Speech Interference: 1-9, 3-14, 3-16, 3-17, 3-28, 3-34, 3-76, 4-10, 4-24, 4-29

Special Status Species: Cover Sheet, 1-9, 2-34, 2-35, 3-78, 3-79, 3-80, 3-84, 4-61, 4-65, 4-67

Special Use Airspace (SUA): 1-5, 1-6, 2-7, 2-8, 2-9, 2-11, 3-3, 3-5, 3-6, 3-7, 3-55, 3-103, 4-5, 4-44, 4-60, 5-2, 8-3

Special Use Airspace Information Service (SUAIS): 2-9, 2-29, 3-6, 3-11, 3-13, 3-55, 4-5

Wetland(s): Cover Sheet, 1-6, 1-7, 1-9, 1-10, 2-16, 2-34, 3-61, 3-78, 3-80, 3-81, 3-85, 3-87, 3-89, 4-61, 4-63, 4-64, 4-65, 4-68, 4-69, 4-74, 4-75, 6-3, 6-4, 8-3

Wild and Scenic River(s) (WSRs): 1-6, 2-30, 3-9, 3-10, 3-11, 3-15, 3-18, 3-35, 3-39, 3-64, 3-65, 3-100, 3-101, 3-102, 4-14, 4-29, 4-31, 4-34, 4-40, 4-80, 4-81

Wildlife: Cover Sheet, 1-4, 1-7, 1-8, 1-9, 2-28, 2-29, 2-30, 2-31, 2-34, 2-35, 3-13, 3-15, 3-18, 3-21, 3-26, 3-32, 3-35, 3-39, 3-45, 3-48, 3-52, 3-55, 3-62, 3-64, 3-65, 3-71, 3-78, 3-79, 3-80, 3-102, 4-9, 4-13, 4-14, 4-15, 4-23, 4-27, 4-28, 4-29, 4-34, 4-40, 4-42, 4-44, 4-51, 4-61, 4-62, 4-63, 4-65, 4-66, 4-67, 4-80, 4-81, 5-5, 6-2, 7-1, 8-1, 8-2, 8-4, 8-5, 8-7, 8-8

Workplace Noise: 3-16, 3-18, 3-29, 4-12, 4-26