Proposal to Improve F-22 Operational Efficiency

at Joint Base Elmendorf-Richardson, Alaska

Final Environmental Impact Statement

February 2018

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Cover Sheet

UNITED STATES AIR FORCE PROPOSAL TO IMPROVE F-22 OPERATIONAL EFFICIENCY AT JOINT BASE ELMENDORF-RICHARDSON (JBER), ALASKA

FINAL ENVIRONMENTAL IMPACT STATEMENT (EIS)

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

b. ***Proposed Action:*** The Air Force proposes to improve the distribution of F-22 Raptor fighter aircraft departures and arrivals on JBER's runways, to use JBER runways in as efficient a manner as possible within operational, airspace, and environmental constraints. This means that the Air Force would choose any JBER runway for departure or arrival based on the airfield and air traffic conditions at the time. Efficiency is defined by the amount of pilot training time in the airspace during a training mission. The purposes of the action are to: (1) maintain all F-22 mission capabilities at JBER and maintain operational capabilities in the Pacific Air Forces (PACAF) region while providing pilots with the highest degree of training possible; (2) address F-22 operational efficiency on JBER runways to reduce the restrictions on flight operations derived from the F-22 Plus-Up EA/FONSI (Air Force 2011); (3) respond to Federal Aviation Administration (FAA) 2014 policy on the use of one runway for opposite direction flight operations (ODO); (4) address public/agency concerns regarding aviation safety in the Anchorage Bowl airspace; and (5) address F-22 runway operations that have the potential to affect noise over residential and other noise-sensitive areas. There is no proposed change in aircraft numbers or to F-22 training in Alaskan airspace. There is no proposed change in the numbers of flights or runway usage of other JBER based or transient aircraft. JBER runways are RW 06 west to east, RW 24 east to west, RW 34 south to north, and RW 16 north to south. The Proposed Action and alternatives (designated A through F, plus the No Action Alternative) addressed in this EIS have different distributions of F-22 departures and arrivals on the JBER runways. The Alternative A is the Proposed Action and the Preferred Alternative is Alternative F. The alternatives permit flexible application of the reasonably highest number of 5,710 F-22 sorties evaluated for environmental consequences in this EIS.

c. ***Inquiries:*** For further information on this EIS, contact JBER Public Affairs, Bldg. 10480 Sijan Ave, Suite 123, JBER, AK 99506; telephone inquiries at: 907-552-8151; and email inquiries to: jber.pa.3@us.af.mil.

d. ***Designation:*** Final EIS

e. ***Abstract:*** This Final EIS was prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, 42 United States Code §§ 4321-4374, as implemented by the Council on Environmental Quality (CEQ) regulations, 40 Code of Federal Regulations (CFR) §§ 1500-1508, and Air Force implementing regulation 32 CFR 989. All alternatives would improve efficiency except Alternative D, with a 2-mile taxi distance for F-22 departures. Alternatives A, B, D, and F address FAA ODO guidance. All of the alternatives except Alternative E reduce military operations in the congested Anchorage Bowl airspace and improve civil aircraft safety. Runway extension alternatives have potential for increased bird/wildlife-aircraft strike hazard (BASH) risk. No Action, or baseline conditions, would result in a calculated 1,424 on-base and no off-base persons exposed to an annual exterior noise level of 65 decibels (dB) day-night average sound level (L_{dn}). The number of persons exposed with the Proposed Action (Alternative A) is calculated to be 824 on-base and 424 off-base. No other alternative would expose off-base persons to noise levels of 65 dB L_{dn} or greater. On-base exposure would be from 775 (Alternative B) to 1,955 (Alternative F) persons. The Proposed Action (Alternative A) would have a disproportionate noise effect on a calculated 353 minority and 140 low-income persons off-base. There would be a calculated 516 on-base and no off-base children exposed to noise levels of 65 dB L_{dn} with the No Action Alternative and 299 on-base and 158 off-base children exposed with the Proposed Action (Alternative A). Mountain View Elementary School noise levels during the school day would increase from 68.3 to 70.2 dB $L_{eq\text{-}8hr}$. Informal consultations with the National Marine Fisheries Service (NMFS) under the Endangered Species Act, Section 7, regarding potential effects of overflight to the Cook Inlet beluga whales, other sensitive species, and critical habitat is completed; NMFS concurred with the Air Force determination of "may affect, not likely to adversely affect." Government-to-Government consultation with Alaska Native tribes and corporations was conducted, and the Air Force did not receive any expression of

concerns with protected tribal resources, tribal rights, or Indian Lands. In compliance with the National Historic Preservation Act, Section 106, the Air Force consulted with the Alaska State Historic Preservation Office and other interested parties who concurred with its finding of “no historic properties affected” for Alternatives A, D, E, and No Action; and “no direct effect or adverse indirect effect to historic properties” for Alternatives B, C, and F. Coordination with the U.S. Army Corps of Engineers (USACE) would be required, consistent with Section 404 permitting (including Section 401 certification), to verify any wetland delineation and determine the jurisdictional status of wetland areas that cannot be avoided during the construction of a runway extension under Alternative B, C, or F. Section 404 permitting and determination of mitigation requirements (e.g., purchase of wetland bank credits or in lieu payments) for unavoidable effects upon the approximately 28 acres of wetlands in the project area would occur prior to project execution and construction.

EXECUTIVE SUMMARY

ES.1. INTRODUCTION

This is a summary of the Final Environmental Impact Statement (EIS), which addresses proposals to improve F-22 operational efficiency at Joint Base Elmendorf-Richardson (JBER), Alaska. The reader is encouraged to review the entire EIS for details on any subject contained in this Executive Summary.

ES.2. PURPOSE AND NEED FOR THE PROPOSED ACTION

The JBER-based combat-ready F-22s of the 3rd Wing (3 WG) are prepared for rapid worldwide deployment to accomplish air superiority and/or precision engagement of surface targets using a wide variety of air-to-air and air-to-surface munitions. The 3 WG's 90th Fighter Squadron (FS) and 525 FS regularly train in the Joint Pacific Alaska Range Complex (JPARC) training airspace.

JBER-based F-22 fighter aircraft have restrictions that affect the pilot's ability to select a runway for departure and/or arrival. These restrictions on runway use affect efficient use of Air Force pilot and aircraft assets. Efficient flight operations are defined in this EIS as time available to a pilot in training airspace. The more time available to F-22 pilots for training in the airspace with the available fuel, the more efficient the F-22 training sortie.

A pilot needs to be able to select a runway for departure based on airfield and air traffic conditions at the time. Currently, a pilot does not have the ability to select the departure runway because there are additional runway use restrictions from the F-22 Plus-Up Environmental Assessment/Finding of No Significant Impact (EA/FONSI), from Federal Aviation Administration (FAA) opposite direction operations (ODO) policy, and from airspace congestion associated with civil aircraft operations. These constraints result in losses of efficiency in training time in the training airspace. See Section 2.2 in the EIS for descriptions of JBER runways and training airspace.

The Proposed Action would remove and/or reduce the magnitude of the constraints and improve F-22 operational efficiency. The Proposed Action would result in a larger number of F-22 departures on runway (RW) 34 with flights directly toward primary training airspace, would remove the runway use constraints identified in the F-22 Plus-Up EA/FONSI, would reduce opposite direction arrival and departure conflicts, and would reduce potential unsafe interactions with other civil and military operations.

ES.2.1 PURPOSE

The purpose of this action is to provide the 3 WG with the flexibility to distribute F-22 departures and arrivals on JBER's runways. Flexibility is defined as the Air Force's ability to use JBER runways in as efficient a manner as possible within operational, airspace, and environmental constraints, and efficiency is measured by the amount of pilot training time in the airspace during a training mission. Improved flexibility would permit JBER to address the existing challenges to flight operations, including efficiency and safety.

ES.2.2 NEED

Five factors have created the need for improved F-22 operational efficiency. The Air Force needs to:

(1) Maintain all F-22 mission capabilities at JBER and efficiently maintain operational capabilities in the Pacific Air Forces (PACAF) region while providing pilots with the highest degree of training possible. Efficiency means using available fuel for pilot training in the airspace;

(2) Address 3 WG operational flexibility on JBER runways to reduce the restrictions on flight operations derived from the F-22 Plus-Up EA/FONSI (Air Force 2011). The F-22 Plus-Up EA/FONSI restricts F-22 departures on RW 34 to not more than 25 percent of total annual departures. The history and basis for this restriction is explained in Section 1.2;

(3) Address the use of JBER runways to respond to 2014 FAA ODO regulations (FAA 2014a; 2014b). ODO requirements restrict the use of one active runway for departure and arrival in both directions. The FAA Joint Order (JO) 7210.3, *Facility Operation and Administration*, restricts ODO traffic when using one runway for two-directional traffic. Application of this restriction limits F-22 use of RW 24 and requires that F-22 departures use the most inefficient runway, RW 06, for approximately 38 percent of annual departures;

(4) Reduce traffic congestion with civil aircraft and improve safety within the Anchorage Bowl airspace segments. This would reduce civil and military departure and arrival delays associated with F-22 flight operations using Anchorage Bowl airspace segments; and

(5) Address F-22 runway operations that have the potential to affect noise over residential and other noise-sensitive areas.

To the extent practicable, F-22 flight operation efficiencies from runway use flexibility need to be achieved within the constraints of infrastructure, air traffic, ODO, weather, and noise effects.

ES.3. PROPOSED ACTION AND ALTERNATIVES

The alternatives include variations in runway use for F-22 operations, infrastructure improvements, and other possible actions to respond to the purpose and need to improve 3 WG flexibility and F-22 operational efficiencies.

This section summarizes runway use applicable to the Proposed Action and five alternatives identified and addressed in this EIS along with the No Action Alternative, which represents the baseline or existing conditions. The Proposed Action and alternatives distribute the highest reasonable number of F-22 annual operations on each runway with consideration of mission requirements, runway maintenance, and weather. Actual runway use during any given month, or during any given year, would be expected to vary due to deployments, weather events, ODO requirements, runway availability, and/or other factors. There is no proposed change in aircraft numbers or to F-22 training in Alaskan airspace. There is no proposed change in the numbers of flights or runway usage of the other aircraft, including based and transient, that operate at JBER.

ES.3.1 Application of Purpose and Need Elements

Table ES-1 (Table 2.3-1 in the EIS) identifies the alternatives and applies the elements of the purpose and to the alternatives.

There are multiple ways in which the highest reasonable five-year-high sortie number of 5,710 annual F-22 sorties could be distributed among JBER runways. The Proposed Action and alternatives plus the No Action Alternative are listed in Table ES-2 (Table 2.4-1 in the EIS). The runway use numbers reflect the existing use of runways with established and/or projected F-22 flight profiles. The No Action Alternative, required to be addressed by the National Environmental Policy Act (NEPA), presents flight operations consistent with the constrained operations from the F-22 Plus-Up EA/FONSI (Air Force 2011) and FAA ODO policy restrictions as of summer 2016. Other JBER-based aircraft, as well as transient aircraft, would be expected to continue to use JBER runways as at present.

Table ES-1. Applying Purpose and Need Elements to the Alternatives

Alternatives			Purpose and Need Elements		
	Achieves Mission Requirements Efficiently	Addresses 2011 EA/FONSI Restrictions	Addresses FAA ODO Policy	Addresses Airspace Safety Concerns	Addresses Community Noise Concerns
Alternative A (Proposed Action): RW 34 for Departure; RW 06 Arrival	• Using RW 34 for departure is efficient for both F-22 squadrons • Efficiency increased with 2.5–4.3% more airspace training time than No Action • Using RW 06 for arrivals requires inefficient approach	• 2011 EA/FONSI restriction addressed by the flexibility to use RW 34 for departures	• Using RW 34 for departure and RW 06 for arrival meets FAA ODO policy	• RW 34 departures safely direct departing aircraft away from the busy Anchorage Bowl • Continued safety concern with RW 06 arrival through multiple Anchorage Bowl airspace segments	• RW 34 departures have the potential to increase noise over off-base residential and other noise sensitive areas
Alternative B: RW 34 for Departure; RW 06 Arrival; RW 16/34 Extension	• Using RW 34 for departure is efficient for both F-22 squadrons • Efficiency increased with 2.2–4.0% more airspace training time than No Action • Using RW 06 for arrivals requires inefficient approach	• 2011 EA/FONSI restriction addressed by the flexibility to use RW 34 for departures	• Using RW 34 for departure and RW 06 for arrival meets FAA ODO policy	• RW 34 departures safely direct departing aircraft away from the busy Anchorage Bowl • Continued safety concern with RW 06 arrival through multiple Anchorage Bowl airspace segments	• Departures on the extended RW 16/34 have the potential to reduce noise over off-base residential and other noise-sensitive areas
Alternative C: RW 34 for Departure; RW 16 Arrival; RW 16/34 Extension	• Using RW 34 for departures is efficient for both F-22 squadrons • Efficiency increased with 8.5–10.5% more airspace training time than No Action • Arrival efficiencies achieved with RW 16	• 2011 EA/FONSI restriction addressed by the flexibility to use RW 34 for departures	• Inconsistent with FAA ODO policy; Management of RW 16/34 required to address ODO	• RW 34 departures safely direct departing aircraft away from the busy Anchorage Bowl • RW 16 arrivals address civil safety concerns by reducing arrivals on RW 06 through the	• Departures on the extended RW 16/34 have the potential to reduce noise over off-base residential and other noise sensitive areas

Table ES-1. Applying Purpose and Need Elements to the Alternatives (continued)

Alternatives		Purpose and Need Elements			
	Achieves Mission Requirements Efficiently	Addresses 2011 EA/FONSI Restrictions	Addresses FAA ODO Policy	Addresses Airspace Safety Concerns	Addresses Community Noise Concerns
	• Greater inefficiencies could arise from ODO constraints			Anchorage Bowl • Potential for decreased safety for military aircraft due to ODO • Potential for increased interaction with general aviation at Sixmile Lake and with the Merrill Airspace Segment	
Alternative D: RW 06 for Departure and Arrival	• Increased inefficiencies result from taxiing to RW 06 and hold delay for arriving aircraft • Decrease of efficiency of 4.8–9.0% in airspace training time relative to No Action • Using RW 06 for arrivals requires inefficient approach	• Uses JBER runways to avoid 2011 EA/FONSI restrictions	• Using RW 06 for departure and arrival meets FAA ODO policy	• RW 06 departures safely direct departing aircraft away from the busy Anchorage Bowl • Departure on RW 06 requires avoiding restricted airspace for safety • Continued safety concern with RW 06 arrival through multiple Anchorage Bowl airspace segments	• Noise over off-base residential and other noise sensitive areas is not expected to discernably change
Alternative E: RW 24 for Departure; RW 06 Arrival	• Using RW 24 for departures is efficient for both F-22 squadrons • Efficiency increase of 1.9–3.6% in airspace training time relative to No Action • Using RW 06 for arrivals requires inefficient controlled approach • Greater inefficiencies could arise from FAA ODO policy constraints	• Uses JBER runways to avoid 2011 EA/FONSI restrictions	• Inconsistent with FAA ODO policy; management of RW 06/24 required to address ODO	• RW 24 F-22 departures for training turn north within JBER Class D airspace away from the busy Anchorage Bowl • Potential for decreased safety for military aircraft due to ODO • Continued safety concern with RW 06 arrival through multiple Anchorage Bowl airspace segments	• Noise over off-base residential and other noise sensitive areas is not expected to discernably change

Table ES-1. Applying Purpose and Need Elements to the Alternatives (continued)

Alternatives			Purpose and Need Elements		
	Achieves Mission Requirements Efficiently	Addresses 2011 EA/FONSI Restrictions	Addresses FAA ODO Policy	Addresses Airspace Safety Concerns	Addresses Community Noise Concerns
Alternative F: RW 24 for Departure; RW 16 Arrival; RW 16/34 Extension	• Using RW 24 for departures is efficient for both F-22 squadrons • 7.4–9.3% increase in airspace training time relative to No Action • Efficiencies achieved with RW 16 arrival	• Uses JBER runways to avoid 2011 EA/FONSI restrictions	• Using RW 24 for departure and RW 16 for arrival meets FAA ODO policy	• RW 24 F-22 departures for training turn north within JBER Class D airspace away from the busy Anchorage Bowl • RW 16 arrivals address safety concerns by reducing arrivals on RW 06 through the Anchorage Bowl. • Potential for increased interaction with general aviation at Sixmile Lake and with the Merrill Airspace Segment	• Noise over off-base residential and other noise sensitive areas is not expected to discernably change
No Action Alternative: Departure 25% on RW 34; 37.5% on RW 06; and 37.5% on RW24; Arrival on RW 06	• Does not achieve mission efficiencies • Using RW 06 for arrivals requires inefficient controlled approach	• 2011 EA/FONSI restriction continues	• FAA ODO restrictions as of summer 2016 met with limitations on RW 24 departures.	• Departure on RW 06 requires avoiding restricted airspace for safety • Continued safety concern on RW 06 arrival through the Anchorage Bowl	• No change to noise conditions

Notes:

[1] F-22 operational efficient training in the airspace is defined in Section 1.1.2; efficiency comparisons are based on the No Action Alternative with Plus-Up EA/FONSI and ODO constraints as of summer 2016. See Appendix B for percentage calculations of efficiency.

Key:

2011 EA/FONSI = 2011 Plus-Up Environmental Assessment and the associated Finding of No Significant Impact (Air Force 2011); FAA = Federal Aviation Administration; FS = Fighter Squadron; ODO = Opposite Direction Operations; RW = runway

The F-22 runway use numbers for each alternative in Table ES-2 (Table 2.4-1 in the EIS) represent the F-22 five-year-high sortie count of 5,710. This sortie count represents a reasonable number of flight operations based on both F-22 squadrons operating at full strength at JBER. The runway use numbers are representative annual averages, and actual use during any given month, or during any given year, would be expected to vary due to deployments, mission requirements, construction, maintenance, and/or weather events. F-22 operations represent approximately one-third of all annual JBER operations (compare with Table 2.2-2 in the EIS). The EIS acoustic analysis in the EIS Chapter 4 is a cumulative analysis that includes F-22, other JBER-based aircraft, and transient aircraft operations.

Under all alternatives, there would be no change to 3 WG F-22s conducting the required percentage (30 percent) of sorties after dark (i.e., about one hour after sunset) to fulfill the annual after-dark flying requirement under the Air Force's initiative to increase readiness. Aircrews operating from JBER-Elmendorf can normally fulfill the annual night flying requirements during winter months without flying after 10:00 PM or before 7:00 AM to be consistent with the JBER-Elmendorf noise abatement program. After 10:00 PM or before 7:00 AM is defined as environmental night for the purpose of assessing acoustical effects.

Table ES-2. F-22 Total Sorties and Flight Operations by Runway for the Proposed Action and Alternatives

Unit	Sorties / Year[1]	Departure Operations				Arrival Operations			
		RW 34	RW 06[2]	RW 24[3]	RW 16	RW 34	RW 06	RW 24	RW 16
Proposed Action: Alternative A (RW 34 Focus)									
3 WG F-22	5,710	4,335	900	470	5	444	5,231	7	28
Alternative B (RW 34 Focus with RW 16 Extension)									
3 WG F-22	5,710	4,235	900	570	5	444	5,231	7	28
Alternative C (RW 34 Focus with RW 16 Extension/Arrivals)									
3 WG F-22	5,710	4,235	900	570	5	144	800	7	4759[4]
Alternative D (RW 06 Focus)									
3 WG F-22	5,710	470	4,765	470	5	444	5,231	7	28
Alternative E (RW 24 Focus)									
3 WG F-22	5,710	470	900	4335	5	444	5,231	7	28
Alternative F (RW 24 Focus with RW 16 Extension/Arrivals)									
3 WG F-22	5,710	470	900	4335	5	144	800	7	4759[4]
No Action Alternative[5]									
3 WG F-22	5,710	1,422	2,140	2,143	5	444	5,231	7	28

F-22s depart from, and arrive on, JBER runways (RW) 06 west to east, RW 24 east to west, RW 34 south to north, and RW 16 north to south. Figure ES-1 (Figure 2.2-1 in the EIS) presents the JBER runways and the location of the two F-22 squadrons, 90 FS and 525 FS.

The primary arrival runway for all JBER-based aircraft is RW 06 (see Figure ES-1). The approach to RW 06 passes through the complex Anchorage Airspace, which is used by multiple commercial, general aviation, and military aircraft. The Anchorage Airspace is managed by FAA through the Anchorage Terminal Area, which is subdivided into the six segments illustrated on Figure ES-2. The Anchorage International Segment supports commercial air carriers at Ted Stevens Anchorage International Airport (ANC). The Merrill Segment and Lake Hood Segment, as well as the Seward Highway Segment and Sixmile Lake primarily support general aviation, including float planes. The Elmendorf and Bryant Segments are primarily for JBER military flight operations (see Figure ES-2). An F-22 landing on RW 06 must transition, at constrained altitudes, through portions of the Anchorage International Segment, the Lake Hood Segment, and the Merrill Segment before entering the Elmendorf Segment to land on RW 06. Military aircraft seeking to depart from JBER and civilian aircraft seeking to depart from ANC may face ground holds as a result of Anchorage Bowl aircraft traffic.

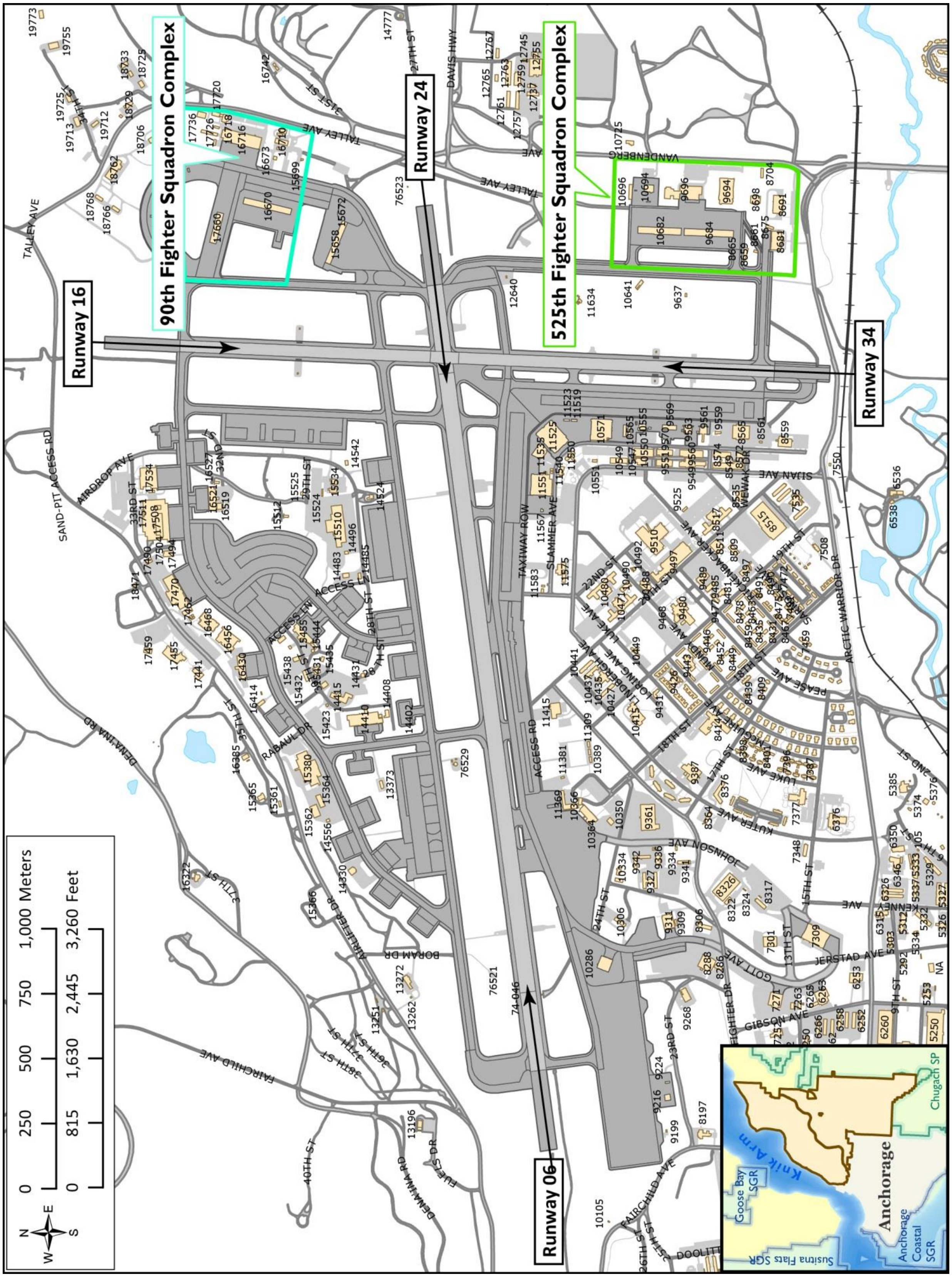

Figure ES-1. JBER Primary Airfield with Runway 06/24 (East-West), Runway 16/34 (North-South), and the F-22 Squadron Facility Complexes

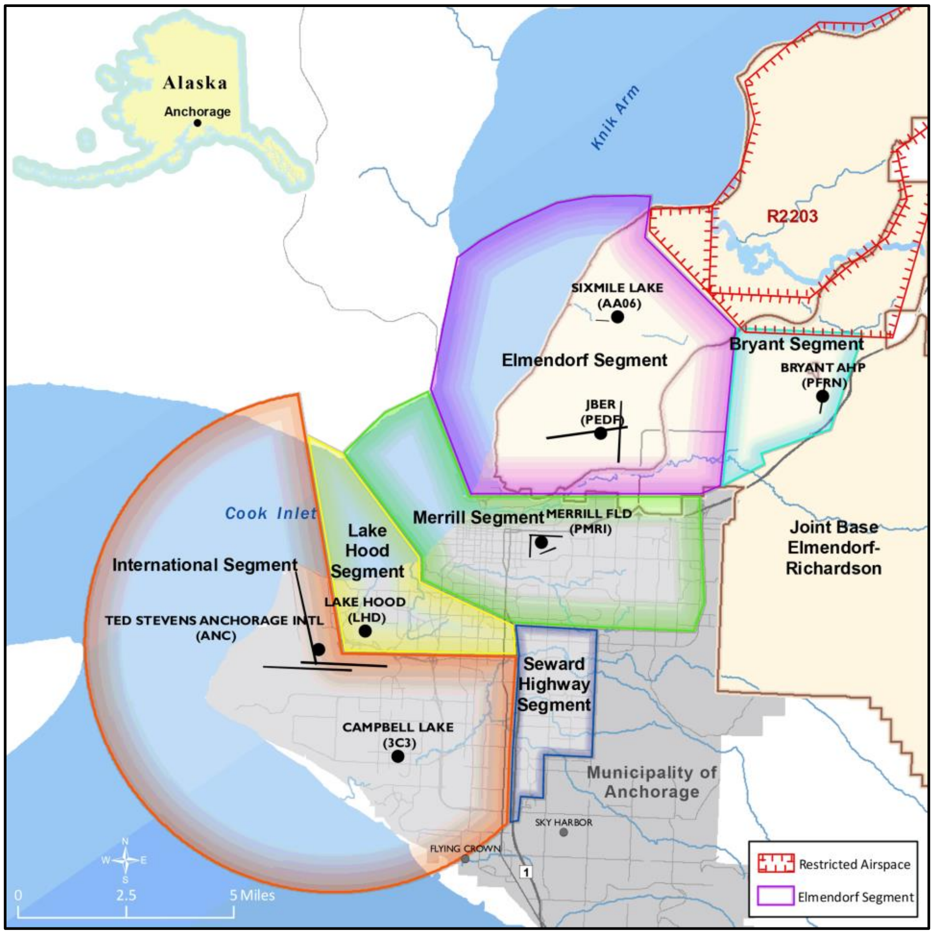

Figure ES-2. JBER Location and Anchorage Bowl Airspace Segments

After consideration of relevant mission, operational, environmental, efficiency, and technical factors, as well as environmental consequences explained in the EIS, inputs from the public and regulatory agencies during scoping, and other relevant factors, the Air Force has identified Alternative A as the Proposed Action.

The Proposed Action would accomplish the purpose and need by removing the F-22 Plus-Up EA/FONSI RW 34 use constraints to flight operations and permitting flexible use of JBER runways based on airfield, weather, and air traffic conditions at the time. The Proposed Action would result in improved efficiency for the 5,710 annual F-22 sorties at JBER, allow flexible F-22 runway departure choices, provide for efficient access to training airspace, achieve ODO policy requirements, and provide for F-22 departures that would reduce congestion in the Anchorage Bowl airspace.

The Proposed Action would increase off-base noise and have disproportionate effects on minority and low income populations in the community of Mountain View.

The Air Force has identified Alternative F as the preferred alternative. Alternative F includes the 2,500-foot extension of RW 16/34 to the north to achieve a 10,000-foot runway. The F-22 sorties would have departures primarily on RW 24 and arrivals primarily on an extended RW 16. Alternative F with an extended runway would substantially improve operational efficiency. Alternative F runway operations meet FAA ODO guidance with no change in departure safety due to the F-22's ability to depart from RW 24 and vector toward regular training airspace prior to exiting the Elmendorf airspace. Alternative F addresses F-22 Plus-Up EA/FONSI RW 34 restrictions and does not increase off-base noise (see Section ES.2.2 and EIS Section 2.2.3.2 for F-22 Plus-Up EA/FONSI RW 34 restrictions). In addition to the Air Force's identification of Alternative F as the preferred alternative, some public and agency input on the Draft EIS expressed preference for a runway extension alternative (see Appendix A).

ES.3.2 Description of the Proposed Action and Alternatives

The Proposed Action and each alternative are described below.

ES.3.2.1 Alternative A: RW 34 for Departure; RW 06 Arrival (Proposed Action)

Alternative A would primarily have F-22 departures on RW 34 and arrivals on RW 06 (see Figure ES-3). Alternative A would allow F-22 operations to depart directly toward the most commonly used training airspaces. Alternative A cross runway operations would improve efficiency, meet FAA ODO guidance, reduce congestion in the Anchorage Bowl airspace, and addresses the F-22 Plus-Up EA/FONSI restrictions. Safety issues would continue for arrivals on RW 06 through multiple Anchorage Bowl airspaces.

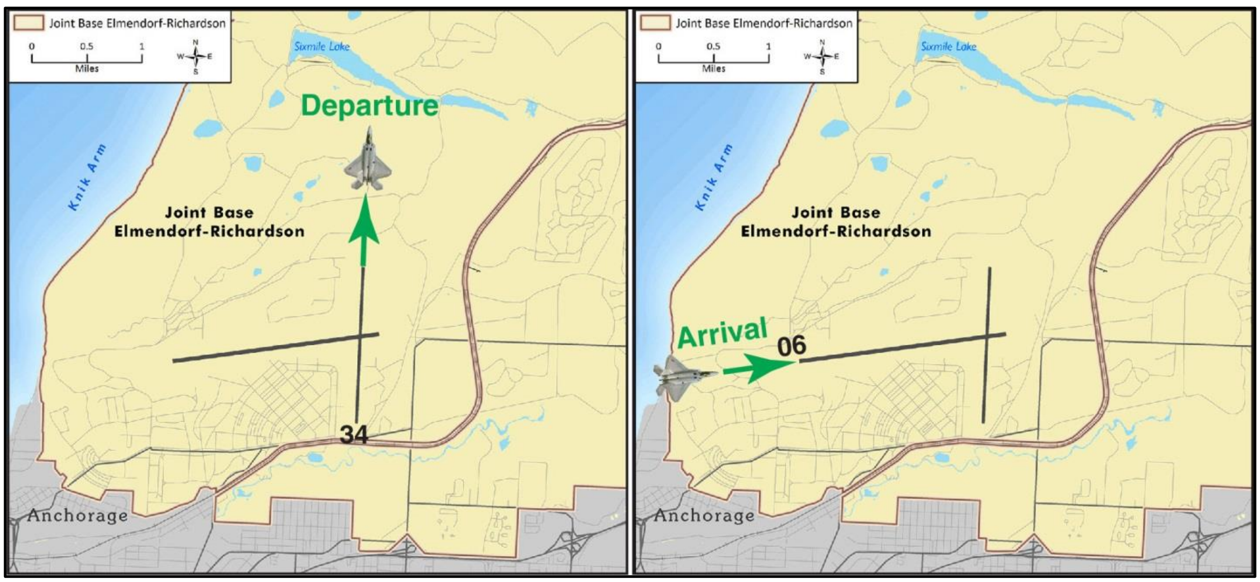

Figure ES-3. Alternative A Representation: RW 34 for Departure, RW 06 Arrival

Alternative A Environmental Effects

Alternative A would have no construction and no new effects on air quality, soils, water, waste materials, transportation, cultural, biological, or socioeconomic resources. Alternative A increased departures on RW 34 would improve airspace safety and have the potential for increased bird/wildlife-aircraft strike hazard (BASH) issues with lower overflight over water areas north of RW 16/34. Section ES.8 presents the environmental effects for all potentially affected environmental resources for all the alternatives.

The primary environmental effects with the Proposed Action (Alternative A) would be associated with aircraft generated noise. The acoustic analysis in this EIS takes into consideration all JBER-based aircraft, transient use of JBER by the F-35A, and other aircraft that could participate in Alaska training exercises.

Under baseline conditions, no off-base residents and 1,424 on-base residents experience outside noise levels of 65 decibel (dB) day-night average noise levels (L_{dn}) or greater. Of the on-base residents experiencing noise levels of 65 dB L_{dn} or greater, 523 are identified by census data as minority and 78 as low-income. Alternative A would result in a calculated 424 off-base residents in the community of Mountain View and 824 on-base residents experiencing outside noise levels of 65 dB L_{dn} or greater. Based on the Air Force method for calculating disproportionate effects, Alternative A would result in disproportionate noise effects to 353 off-base minority persons who would experience 65 dB L_{dn} or greater annual average outdoors noise levels. Some of the minority persons would also be among the disproportionately affected 140 low-income persons who live off-base. There would be no disproportionate effect to the 303 minority or 45 low-income on-base persons exposed to outside noise levels of 65 dB L_{dn} or greater. Under Alternative A, the calculated number of children (under 18) exposed to 65 dB L_{dn} would be 158 off-base and 299 on-base. Older persons (65 or older) would change from a baseline of four on-base and no off-base elderly persons to two on-base and eight off-base elderly persons being exposed to outside noise levels of 65 dB L_{dn} or greater.

Off-base, the Mountain View Elementary School calculated existing school-day noise level of 68.3 dB $L_{eq\text{-}8hr}$ would increase to 70.2 dB $L_{eq\text{-}8hr}$ with Alternative A. On-base, the Mount Spurr Elementary School existing noise level of 74.2 dB $L_{eq\text{-}8hr}$ would decrease to 71.8 dB $L_{eq\text{-}8hr}$. Noise level changes of less than 1 dB are not detectable to the human ear. Changes in noise levels in the 3 dB range can be discerned as a noise change. Renovations at Mountain View Elementary School have been funded by 2014 and 2015 school bonds to improve sound insulation and help attenuate indoor noise levels at the school. Davis Park acreage within the noise contour of 65 dB L_{dn} or greater would increase from approximately 3.3 to 11.2 acres. Davis Park is adjacent to the minority community of Mountain View. Noise levels over Matanuska-Susitna Valley would not discernably change.

Acoustic energy over critical habitat would not produce significant impacts on any federally listed, candidate, or proposed species and/or designated or proposed critical habitat, including the Cook Inlet beluga whale (CIBW). Informal consultations with the National Marine Fisheries Service (NMFS) regarding overflights of critical CIBW habitat resulted in a “may affect, not likely to adversely affect” determination.

Government-to-Government consultation with Alaska Native tribes and corporations was conducted, and the Air Force did not receive any expression of concerns regarding protected tribal resources, tribal rights, or Indian Lands. The Air Force completed National Historic Preservation Act (NHPA) Section 106 consultation, with receipt of Alaska State Historic Preservation Officer (SHPO) concurrence on the finding of “no historic properties affected” for Alternative A.

Section ES.8 presents the environmental effects for all potentially affected environmental resources for all the alternatives. For an expanded discussion of environmental effects by resource, please refer to Chapter 4 of the EIS.

ES.3.2.2 Alternative B: RW 34 for Departure; RW 06 Arrival; RW 16/34 Extension

Alternative B includes a 2,500-foot extension of RW 16/34 north of its present terminus to permit F-22 departures on RW 34 directly toward the training airspace while potentially limiting noise impacts south of the base (see Figure ES-4). Alternative B has approximately the same representative F-22 operations as Alternative A with the number of RW 34 operations adjusted to reflect additional time for runway maintenance for a longer RW 16/34 (see Table ES-2).

Construction would include the extension of RW 16/34 and two supporting taxiways, and provides appropriate shoulders, grading, drainage, arm and disarm pad, and airfield visual navigation aids required to accommodate the existing mission at JBER. The project will require substantial earth movement, both cutting and filling to extend the runway and comply with Unified Facilities Criteria (UFC) 3-260-01 imaginary surfaces criteria. In addition, the extension involves rerouting Airlifter Drive to the north and constructing a new airfield lighting vault (ALSF-1). A start date of FY2019 with a 3-year construction period was assumed for cost estimating purposes only (Jacobs 2016), but the actual start date is uncertain and could be further in the future. See the EIS Chapter 2 for a detailed presentation of runway construction elements and requirements.

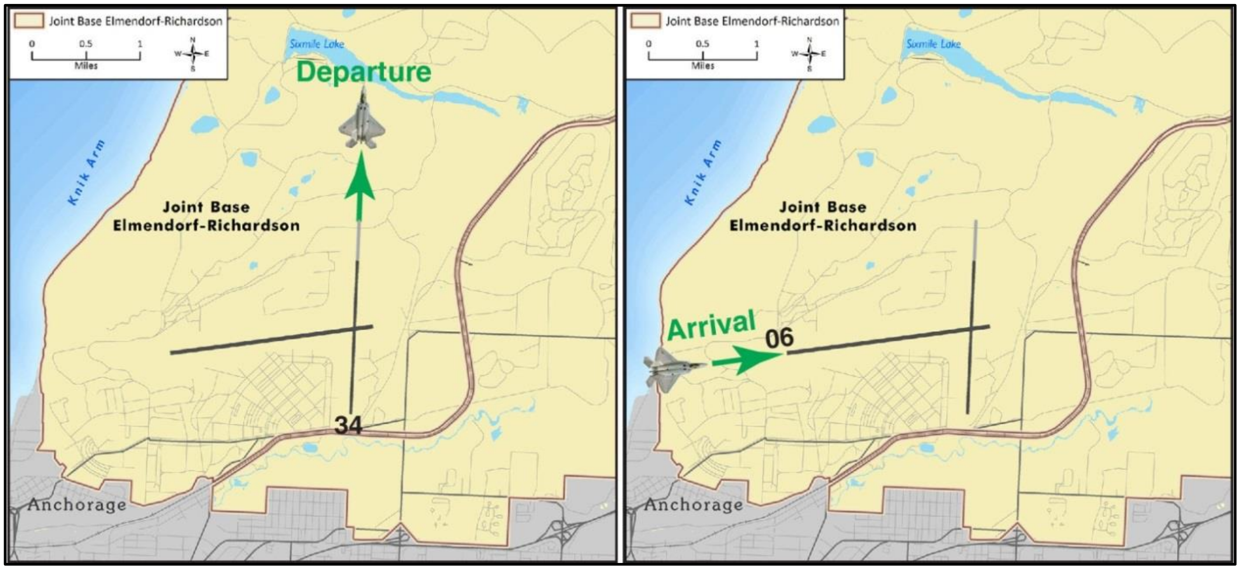

Figure ES-4. Alternative B Departure and Arrival Directions Representation: RW 34 for Departure; RW 06 Arrival; RW 16/34 Extension

Alternative B Environmental Effects

There would be no off-base residences or schools experiencing noise levels of 65 dB L_{dn} with a runway extension and F-22s initiating takeoff roll approximately 2,000 feet north on the extended RW 34. Acoustic energy over critical habitat would not produce significant impacts on any federally listed, candidate, or proposed species and/or designated or proposed critical habitat, including the CIBW. Informal consultations with the NMFS regarding overflights of critical CIBW habitat resulted in a “may affect, not likely to adversely affect” determination.

The primary environmental effects of Alternative B construction would be related to the excavation and disposal of 15.3 million cubic yards of material required to establish the required glideslope for the extended runway. The excavated material would be deposited in three existing borrow pits on JBER within 3 to 8 miles round trip from the excavation site. Truck traffic would increase daily traffic by 7 to 8 percent at the Post Road gate during construction. Other gates would experience a temporary increase of 1 to 2 percent in daily traffic. Construction vehicle traffic would not contribute to exceedance of any air quality standard. The Anchorage labor force is adequate to supply construction and other personnel during the runway construction period.

Ground disturbing construction would directly disturb 557 acres in areas of low sensitivity for the presence of archaeological resources. Government-to-Government consultation with Alaska Native tribes and corporations was conducted, and the Air Force did not receive any expression of concerns regarding protected tribal resources, tribal rights, or Indian Lands. The Air Force completed NHPA Section 106 consultation, with receipt of Alaska SHPO concurrence on the finding of “no direct effect or adverse indirect effect to historic properties” for Alternative B.

Runway construction ground disturbance would affect approximately 28 acres of wetlands. Coordination with the U.S. Army Corps of Engineers (USACE) would be required to verify any wetland delineation and determine the jurisdictional status of wetland areas that cannot be avoided during the construction of a runway extension under Alternatives B, C, and F. Section 404 permitting (including Section 401 certification) and determination of mitigation requirements (e.g., purchase of wetland bank credits or in lieu payments) for unavoidable effects upon wetlands would occur prior to project execution and construction.

Alternative B increased departures on RW 34 would improve airspace safety and have the potential for increased BASH issues with lower overflight over water areas north of an extended RW 16/34. Section ES.8 presents the environmental effects for all potentially affected environmental resources for all the alternatives. For an expanded discussion of environmental effects by resource, please refer to Chapter 4 of the EIS.

ES.3.2.3 Alternative C: RW 34 for Departure; RW 16 Arrival; RW 16/34 Extension

Alternative C would extend RW 16/34 by 2,500 feet to achieve a 10,000-foot runway as described for Alternative B (see Figure ES-5). Construction would be as described for Alternative B. RW 34 would become the primary F-22 departure runway, and RW 16 would become the primary F-22 arrival runway. RWs 06 and 24 would continue to be available for F-22 departure and arrival for certain required operations and during temporary closure of RW 16/34 for maintenance during the summer months. Table ES-2 presents the representative distribution of F-22 operations for each runway.

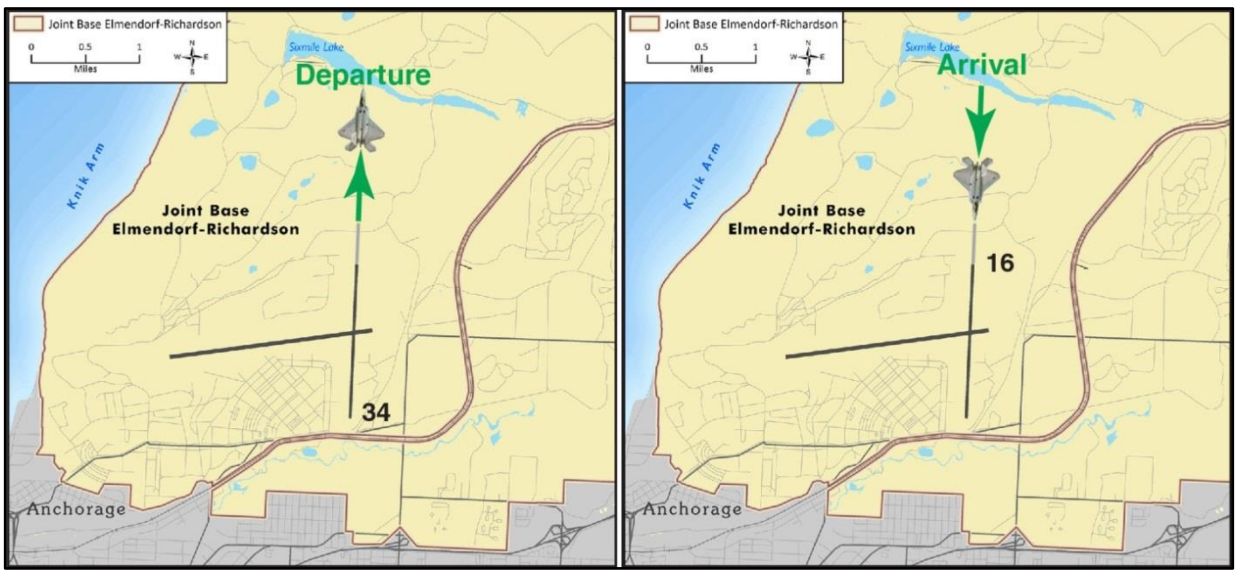

Figure ES-5. Alternative C Representation: RW 34 for Departure; RW 16 Arrival; RW 16/34 Extension

Alternative C Environmental Effects

The primary environmental effects for Alternative C are those associated with construction as described for Alternative B.

Acoustic energy over critical habitat would not produce significant impacts on any federally listed, candidate, or proposed species and/or designated or proposed critical habitat, including the CIBW. Informal consultations with the NMFS regarding overflights of critical CIBW habitat resulted in a “may affect, not likely to adversely affect” determination.

Government-to-Government consultation with Alaska Native tribes and corporations was conducted, and the Air Force did not receive any expression of concerns regarding protected tribal resources, tribal rights, or Indian Lands. The Air Force completed NHPA Section 106 consultation, with receipt of Alaska SHPO concurrence on the finding of "no direct effect or adverse indirect effect to historic properties" for Alternative C.

The environmental effects include ODO restrictions associated with flight operations on RW 16 and RW 34. Use of RW 34 for departure and RW 16 for arrival is the most efficient alternative for flight training in the primary training airspace. FAA ODO policy would not support the use of RW 16/34 for normal or regular arrival/departures operations. The Air Force and FAA would need to concur on management of the runways for Alternative C.

Alternative C, with increased departures and arrivals on an extended RW 16/34, would move a portion of military operations out of the congested area of the Anchorage Bowl and improve airspace safety for civil aircraft operations. Alternative C has the potential for increased BASH issues with lower overflight over water areas north of an extended RW 16/34. Section ES.8 presents the environmental effects for all potentially affected environmental resources for all the alternatives. For an expanded discussion of environmental effects by resource, please refer to Chapter 4 of the EIS.

ES.3.2.4 Alternative D: RW 06 for Departure and Arrival

Alternative D would have F-22s use RW 06 for departure and arrival, except: (1) when RW 06/24 is closed for maintenance or (2) when either RW 34 or RW 24 is needed for operationally necessary conditions or during high winds. The representative runway use for Alternative D is presented in Table ES-2 and depicted in Figure ES-6.

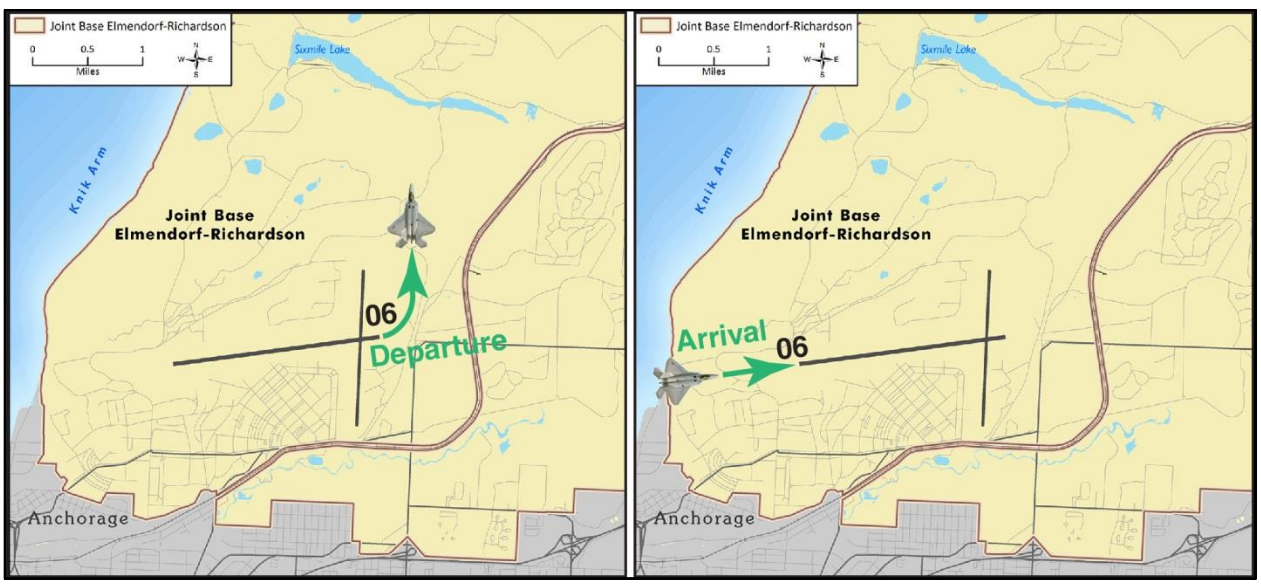

Figure ES-6. Alternative D Representation: RW 06 for Departure and Arrival

Alternative D Environmental Effects

Alternative D would result in no off-base persons, including no off-base children or elderly, being exposed to an annual average noise level of 65 dB L_{dn} or greater. Acoustic energy over critical habitat would not produce significant impacts on any federally listed, candidate, or proposed species and/or designated or proposed critical habitat, including the CIBW. Informal consultations with the NMFS regarding overflights of critical CIBW habitat resulted in a “may affect, not likely to adversely affect” determination.

Government-to-Government consultation with Alaska Native tribes and corporations was conducted, and the Air Force did not receive any expression of concerns regarding protected tribal resources, tribal rights, or Indian Lands. The Air Force completed NHPA Section 106 consultation, with receipt of Alaska SHPO concurrence on the finding of “no historic properties affected” for Alternative D.

Alternative D would increase F-22 departures on RW 06 with some improvement in airspace safety. The primary impact of Alternative D would be to efficiency of F-22 flight operations. Alternative D would have approximately 83 percent of F-22 departures on RW 06. This requires the F-22 pilot to taxi for over two miles and hold for any arriving aircraft. Under severe weather conditions, a second de-icing could be required for safety. Primarily using RW 06 for departure with Alternative D would be the most inefficient of any alternative, including No Action.

Section ES.8 presents the environmental effects for all potentially affected environmental resources for all the alternatives. For an expanded discussion of environmental effects by resource, please refer to Chapter 4 of the EIS.

ES.3.2.5 Alternative E: RW 24 for Departure; RW 06 Arrival

Alternative E increases RW 24 departures by focusing departures for both the 90 FS and the 525 FS on RW 24 to the extent practicable. Table ES-2 presents the Alternative E projected departure and arrival operations by runway, which are also depicted in Figure ES-7. There would continue to be summer maintenance closure of RW 06/24, which would require shifting operations to RW 16/34 for approximately 30 days per year. Alternative E departures would generally be efficient for F-22 flight operations.

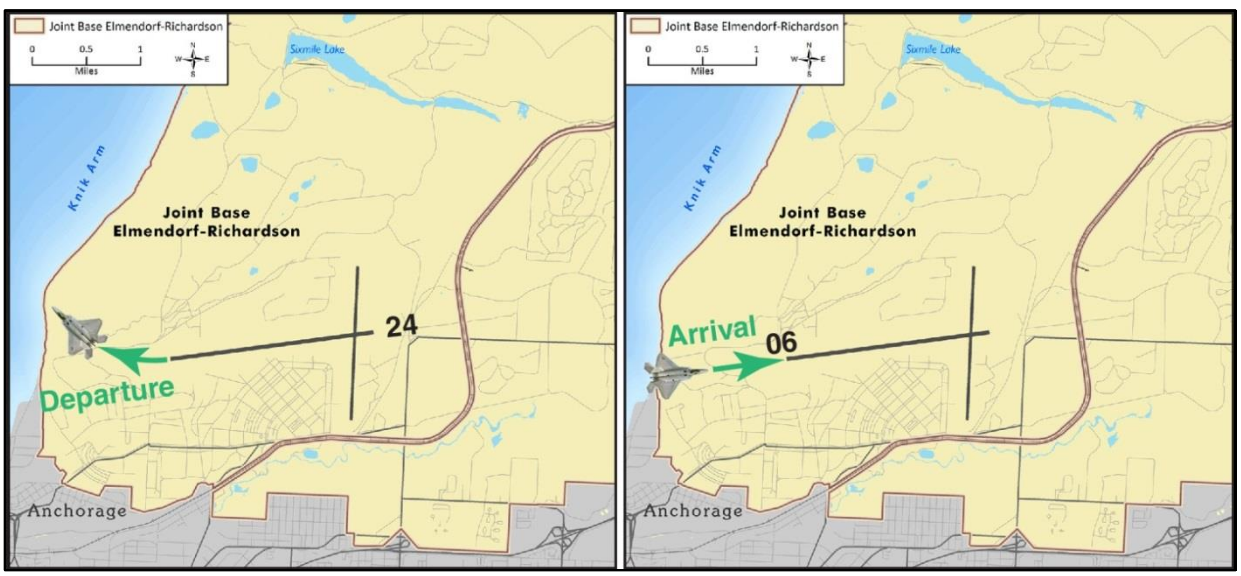

Figure ES-7. Alternative E Representation: RW 24 for Departure; RW 06 Arrival

Alternative E Environmental Effects

Alternative E has no construction and no new effects on air quality, soils, water, waste materials, transportation, land use, cultural, biological, or socioeconomic resources. No off-base populations, including children or the elderly, would experience outside noise levels of 65 dB L_{dn}. Noise levels over Matanuska-Susitna Valley would not discernably change. Acoustic energy over critical habitat would not produce significant impacts on any federally listed, candidate, or proposed species and/or designated or proposed critical habitat, including the CIBW. Informal consultations with the NMFS regarding overflights of critical CIBW habitat resulted in a “may affect, not likely to adversely affect” determination.

Government-to-Government consultation with Alaska Native tribes and corporations was conducted, and the Air Force did not receive any expression of concerns regarding protected tribal resources, tribal rights, or Indian Lands. The Air Force completed NHPA Section 106 consultation, with receipt of Alaska SHPO concurrence on the finding of “no historic properties affected” for Alternative E.

Alternative E, with increased F-22 departures on RW 24 and continued arrivals on RW 06, would not improve airspace safety in the Anchorage Bowl. The environmental effects include ODO restrictions associated with flight operations on RW 06 and RW 24. Use of RW 24 for departure and RW 06 for arrival expands military use of the congested Anchorage Bowl airspace segments used primarily by civil aviation. FAA ODO policy would not support the use of RW 06/24 for normal or regular arrival/departures operations. The Air Force and FAA would need to concur on management of the runways for Alternative D.

Section ES.8 presents the environmental effects for all potentially affected environmental resources for all the alternatives. For an expanded discussion of environmental effects by resource, please refer to Chapter 4 of the EIS.

ES.3.2.6 Alternative F: RW 24 for Departure; RW 16 Arrival; RW 16/34 Extension

Alternative F would extend RW 16/34 to the north to establish a 10,000-foot runway as described for Alternative B (see Figure ES-5). Construction would be as described for Alternative B. Alternative F increases RW 24 departures by focusing departures from both the 90 FS and the 525 FS on RW 24 to the extent practicable. RW 16 would become the primary F-22 arrival runway, as described for Alternative C. Table ES-2 presents the Alternative F projected departure and arrival operations by runway as depicted in Figure ES-8.

Alternative F with an extended runway would substantially improve operational efficiency. Alternative F runway operations meet FAA ODO guidance with no change in departure safety due to the F-22’s ability to depart from RW 24 and vector toward regular training airspace prior to exiting the Elmendorf airspace. Alternative F addresses F-22 Plus-Up EA/FONSI RW 34 restrictions.

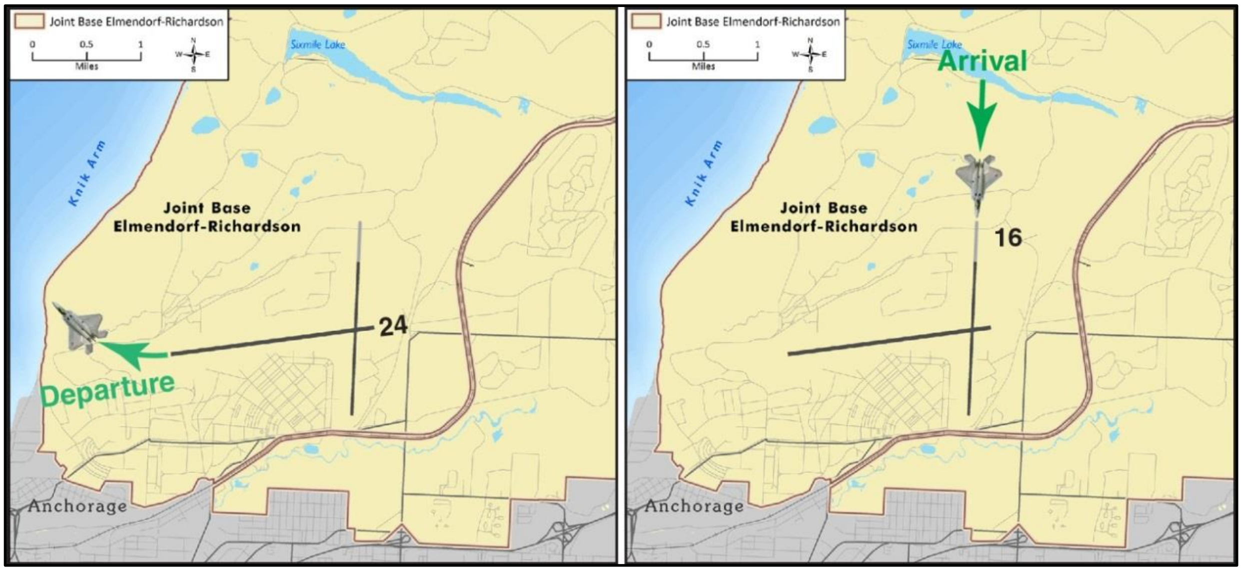

Figure ES-8. Alternative F Representation: RW 24 for Departure; RW 16 Arrival; RW 16/34 Extension

Alternative F Environmental Effects

The primary environmental effects for Alternative F are those associated with construction as described for Alternative B.

Alternative F would decrease noise over off-base residential areas and increase noise over on-base residential areas. Alternative F-generated acoustic energy over critical habitat would not produce significant impacts on any federally listed, candidate, or proposed species and/or designated or proposed critical habitat, including the CIBW. Informal consultations with the NMFS regarding overflights of critical CIBW habitat resulted in a “may affect, not likely to adversely affect” determination.

Government-to-Government consultation with Alaska Native tribes and corporations was conducted, and the Air Force did not receive any expression of concerns regarding protected tribal resources, tribal rights, or Indian Lands. The Air Force completed NHPA Section 106 consultation, with receipt of Alaska SHPO concurrence on the finding of “no direct effect or adverse indirect effect to historic properties” for Alternative F.

Alternative F arrivals on an extended RW 16 would improve airspace safety and have the potential for increased BASH issues with lower overflight over water areas north of an extended RW 16/34. Section ES.8 presents the environmental effects for all potentially affected environmental resources for all the alternatives. For an expanded discussion of environmental effects by resource, please refer to Chapter 4 of the EIS.

ES.3.3 No Action Alternative: Departure 25 Percent on RW 34; 75 Percent on RW 06/24; Arrival on RW 06

The No Action Alternative is the baseline or existing condition for this EIS. The No Action Alternative has approximately 37.5 percent of the projected annual F-22 departure operations on RW 06, 37.5 percent on RW 24, and not more than 25 percent on RW 34 to reflect the runway usage from FAA ODO and the F-22 Plus-Up EA (Air Force 2011). The No Action Alternative would continue constrained F-22 flight operations. No action would not contribute to efficiency; would not change safety for departures; would continue safety issues for arrivals; would not address F-22 Plus-Up EA/FONSI restrictions; and would not change noise conditions over noise sensitive areas.

No Action Alternative Environmental Effects

The No Action Alternative would continue baseline conditions where no off-base residents, including children and elderly, experience outside noise levels of 65 dB L_{dn} or greater. Acoustic energy over critical habitat would continue to not produce significant impacts on any federally listed, candidate, or proposed species and/or designated or proposed critical habitat, including the CIBW.

Section ES.8 presents the environmental effects for all potentially affected environmental resources for all the alternatives. For an expanded discussion of environmental effects by resource, please refer to Chapter 4 of the EIS.

ES.4. CUMULATIVE EFFECTS

Cumulative effects analysis considers the potential environmental consequences resulting from "the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or nonfederal) or person undertakes such other actions" (40 CFR 1508.7). The EIS Chapter 5 identifies multiple past, present, and reasonably foreseeable federal, state, and private projects in the greater Anchorage area.

This EIS has no proposed change in personnel, number of JBER flight operations, or use of training airspace. Alternatives B, C, and F would include a RW 16/34 extension construction project and have the potential to have cumulative effects in conjunction with other on-base past, present, and future projects as well as with other large projects planned for the region.

Cumulative Effects of Noise

The noise analysis in this EIS is a cumulative analysis. F-22 flight operations are combined with all JBER flight operations to identify on- and off-base acoustic effects. The aircraft in the acoustic model represent JBER's experience with flight profiles and noise signatures for all aircraft in the Air Force, Army, Navy, and Marine Corps, inventory as well as foreign aircraft that participate in training exercises with American aircraft. As a result, the noise effects calculated in the EIS represent the cumulative effects of JBER flight operations.

There would be no cumulative noise effects in conjunction with other past, present, and reasonably foreseeable future actions other than the F-22 Plus-Up, which is included in the baseline for this analysis, and the beddown of F-35A aircraft at Eielson Air Force Base, which are included as JBER transients in the acoustic analysis in this EIS. Consequently, there would be no additional cumulative disproportionate noise impacts to disadvantaged populations, children, older individuals, schools, or other noise-sensitive points of interest other than the impacts described for alternatives in this EIS.

Past, present, and reasonably foreseeable projects could, in combination with F-22 flight operations, contribute to overwater cumulative effects in the Knik Arm and have the potential to impact sensitive habitat and, specifically, the CIBW. The primary projects include:

- Knik Arm Crossing connecting the Municipality of Anchorage with the Matanuska-Susitna Borough. An 8,000- to 14,000-foot-long bridge would be immediately west of RW 06.
- Resumption of year-round firing opportunities at JBER. The restoration of year-round live-fire training at the Eagle River Flats Impact Area would permit Army units to be certified in a variety of weapon systems before deployment.

Construction of the Knik Arm Crossing Bridge would include extensive cross-channel traffic and pile driving, which has been identified as having an acoustic impact upon CIBW in the area. Vibration and noise associated with year-round live weapons firing on Eagle River Flats has the potential to affect CIBW behavior at the confluence of the Knik Arm and Eagle River. The project-specific effects and the cumulative effects are being addressed in environmental documentation for the respective projects.

JBER aircraft overflight of the Knik Arm has been occurring for decades. The alternative runway profiles have been used by F-22s and the overflights have been determined by the NMFS as “may affect, not likely to adversely affect” the CIBW or other species in the sensitive Knik Arm. The overflight of the Eagle River area would be at higher altitude than current overflight of other portions of the Knik Arm. F-22 overflights have acoustic and visual effects consistent with, and, depending upon the alternative, potentially less than the effects of F-22 existing Knik Arm overflights. Other actions under consideration for the Knik Arm have the potential to cumulatively impact the CIBW.

Cumulative Effects of On-Base Excavation Projects

Projects with potential cumulative on-land effects in combination with the RW 16/34 extension alternatives are, primarily:

- The North End Runway Material Extraction and Transport Project. The removal of vegetation, excavation of fill, and transport of fill material to the Port of Anchorage included construction of haul roads and a wetlands remediation agreement.
- Elmendorf Flight Line Safety Project. These REDHORSE exercises removed vegetation, excavated soils materials, disposed of materials, and performed wetlands delineation in portions of the project area affected by runway construction alternatives.

The Port of Anchorage North End Runway Material Extraction and Transport was an independent project to obtain fill material for Port of Anchorage expansion. The fill material for Port of Anchorage and the associated haul road are in the area where an extended RW 16/34 could be constructed.

The Elmendorf Flight Line Safety Project is an independent action to permit safe flight operations on RW 16/34. During Alaska major flying training exercises, maintenance and resurfacing of RW 06/24, and certain weather conditions, JBER aircraft must arrive and depart on RW 16/34. A series of REDHORSE exercises are reducing the risk to aircraft using RW 16 for arrival over the woody, hilly area north of RW 16/34.

Cumulative effects would be associated with an extension of RW 16/34, the (completed) North End Runway Material Extraction and Transport EA for the Port of Anchorage, and the (ongoing in 2016) Elmendorf Flight Line Safety Project associated with REDHORSE exercises. Both of these projects are in the area where extensive earth removal could occur, and the wetlands delineation and remediation for both projects are in areas potentially affected by excavation associated with a RW 16/34 extension.

The Materials Extraction and Flight Line Safety project has resulted in vegetation clearing, cut, fill, and roadway improvements in the area where RW 16/34 could be extended. The cumulative effect with a RW 16/34 extension would be that a portion of the soils and woody area have been removed and potential effects on some species using that woody area have already occurred as a result of the independent Materials Extraction and Flight Line Safety project. On-base recreation use of the area is somewhat reduced as a result of other projects. Extension of RW 16/34 would further reduce woody habitat and outdoor recreation areas. An additional cumulative effect is that wetland impacts and remediation have been experienced in both projects. The experiences help establish procedures for additional potential wetlands impacts, which could be associated with a RW 16/34 extension.

Cumulative Effects on Regional Construction Resources

Energy and other non-military construction projects could have schedules with the potential to overlap a RW 16/34 extension project. Oil prices have reduced exploration and delayed plans for additional oil or gas transportation projects. If oil industry conditions continue and a decision is made within the next few years to proceed with a RW 16/34 extension project, the Air Force action could have beneficial cumulative effects on the regional economy. Overlapping or delayed schedules for major projects could result in cumulative requirements or reductions in demand for regional construction labor, equipment, and/or supplies.

ES.5. MITIGATION MEASURES

Mitigation measures are identified for potential adoption where management actions are unable to avoid or otherwise reduce an impact that would have a regulatory basis, such as impacts upon USACE-regulated wetland areas.

Mitigation measures can include: (1) avoiding an impact by not taking a certain action or parts of an action; (2) minimizing an impact by limiting the degree or magnitude of the action and its implementation; (3) rectifying an impact by repairing, rehabilitating, or restoring the affected environment; (4) reducing or eliminating an impact over time by preservation and maintenance operations during the life of the action; and/or (5) compensating for an impact by replacing or providing substitute resources or environments (40 CFR Section 1508.20).

This section identifies resource-specific mitigations to address potential impacts or identified significant impacts associated with each runway use alternative. Where an alternative would have an unavoidable impact that the Air Force cannot mitigate, such unavoidable impacts are identified in this EIS for decisionmakers.

Airspace Management and Use (Section 4.1)

Impacts to airspace management and use would be minimal under any of the alternatives, including No Action. The Air Force would continue to closely coordinate with FAA and civil aircraft operators to mitigate for potential impacts of the increased frequency of lower overflights of the Knik Arm and Sixmile Lake under Alternative B, C, or F.

Acoustic Environment (Section 4.2)

There is no off-base increase in acoustic effects for Alternative B, Alternative C, Alternative D, Alternative E, or Alternative F. No noise impact mitigation measures are proposed for any of these alternatives.

Alternative A would result in increased noise impact to a calculated 424 persons in the community of Mountain View. Provision of funds for additional structural noise attenuation off-base is not currently an action that the Air Force is authorized to carry out. There are no mitigations to address this unavoidable impact.

JBER would continue to undertake the following actions to address concerns for noise issues associated with flight operations.

- JBER will continue to adhere to reduced operations during late night hours except as required for missions to minimize acoustic effects. The seasonal variation in daylight permits F-22 pilots to achieve most of their annual after dark training in wintertime without late-night flights.
- JBER will continue to provide public information when seasonal runway maintenance requires increased flight operations that contribute to off-base acoustic impacts. This information does not reduce noise levels but it has the potential to reduce complaints of annoyance.
- JBER will continue to provide public information when exercises, such as Red Flag Alaska, change flight patterns and include the duration of such exercises in the public information.
- JBER flight operations will adhere to established and/or adjusted flight profiles to maintain altitudes over sensitive habitat and minimize any potential acoustic or visual impact to species such as the CIBW.
- The Air Force will continue to work with the affected communities, per the AICUZ guidelines, to help communities avoid acoustic impacts.

Safety (Section 4.3)

The following mitigations would be undertaken at JBER to avoid and/or minimize, to the extent practicable, any environmental impacts to safety associated with the improvement of F-22 operational efficiency.

- Expansion of the JBER BASH program to include newly affected areas for Alternative B, Alternative C, and Alternative F would reduce impacts to safety. Areas where vegetation is removed would be restored or revegetated with upland species, to minimize the bird-aircraft strike hazard within the safety area of military aircraft takeoff and landing.
- For Alternative C and Alternative F, the Air Force would work with the FAA to address F-22 arrival flight patterns and missed approach procedures associated with arrivals on an extended RW 16 to minimize potential interaction between military and civil aircraft in the Anchorage Bowl. If acceptable FAA and Air Force missed approach procedures cannot be established, JBER would use the existing TACAN procedures for arrival on RW 16 and/or the established RW 06 procedures for instrument approach. As explained in Section 5.2.1, the FAA is conducting

an independent study to assess military and civil aircraft operations in the Anchorage Bowl, including an Instrument Landing System (ILS) approach to RW 16/34.

Air Quality (Section 4.4)

For Alternative A, Alternative D, Alternative E, and No Action, there would be no air quality impacts; therefore, no mitigation is proposed for these alternatives.

The following mitigation measures would be undertaken at JBER to minimize emissions and avoid, to the extent practicable, potential environmental impacts to air quality associated with the runway extension under Alternative B, Alternative C, or Alternative F.

- Identify and implement best management practice (BMP) construction measures to control/reduce wind erosion, including:
  - Site watering;
  - Installations and regular inspection of all emission control devices on construction equipment;
  - Reduce/eliminate excess equipment and machine idling; and
  - Place gravel at ingress/egress of the construction sites to minimize transport of dust off site.

Physical Resources (Section 4.5)

For Alternative A, Alternative D, Alternative E, or No Action, there are no effects to any physical resources, and, therefore, no mitigation measures are proposed for any of these alternatives.

The following mitigation measures would be undertaken at JBER to reduce, to the extent practicable, environmental impacts to physical resources associated with Alternative B, Alternative C, and Alternative F that would involve RW 16/34 extension construction.

- Develop a site-specific Storm Water Pollution Prevention Plan (SWPPP) as part of the required construction National Pollutant Discharge Elimination System (NPDES) storm water permit, that would specify standard erosion control practices to be implemented to eliminate or reduce sediment and non-storm water discharges, including:
  - Use of mulch or artificial cover where repeated disturbance is expected, and
  - Stabilization of soil within 30 days of final disturbance through vegetative or permanent artificial means (e.g., paving or rip-rapping).
- Ensure that contracts specify, and contactors adhere to, all DoD, JBER, and state of Alaska standard operating procedures for construction, operation of vehicles, and spill prevention.
- Ensure that construction activities are conducted in accordance with the applicable storm water discharge permit for any areas that result in soil disturbance.
- Identify and implement BMP construction and vehicle operation measures to control/reduce wind erosion and control emissions, including:
  - Site watering, and

  - Placing gravel at ingress/egress of the construction sites to minimize transport of dust off site.
- Place groundwater monitoring wells and piezometers in locations where there is a potential for indirect adverse impacts to hydrology.
- Construct retaining walls or install a drainage system, if needed, to minimize changes in hydrology due to potential indirect impacts.
- Coordinate with the USACE to determine the jurisdictional status of 28 acres of wetlands that are expected to be unavoidably impacted during the construction of the runway extension. The final impacted wetland acres would be delineated to determine precise wetland boundaries and the function and value of those approximately 28 acres of wetlands as part of site design. Coordination would be in compliance with Executive Order (EO) 11990, *Protection of Wetlands*. Jurisdictional wetland impacts that cannot be avoided or minimized may require compensatory mitigation, to be determined by the USACE. Mitigation requirements may be determined using a debit-credit calculation approved by the USACE, such as the Methodology published for public comment in April 2016 (USACE 2016).

Hazardous Materials and Waste Management (Section 4.6)

For Alternative A, Alternative D, Alternative E, and No Action, there would be no hazardous materials and wastes impacts, and, therefore, no mitigation is proposed for these alternatives.

The following mitigation measures would be undertaken at JBER to avoid, to the extent practicable, potential environmental impacts associated with the generation and disposal of hazardous materials and waste management for Alternatives B, C, and F that would involve RW 16/34 extension construction.

- Prepare/update, as needed, on- and off-site hazardous materials handling and waste disposal information.
- Prior to implementing a runway extension construction project, prepare, with agencies, the required updates to required hazardous materials handling and waste disposal permits and procedures.
- Require adherence to established JBER procedures for all hazardous materials and/or waste in all construction contracts.
- Handle, store, and dispose of all hazardous materials and construction debris in accordance with existing laws and established JBER procedures.
- Handle any undocumented contaminated soils in accordance with established JBER procedures during surveys and/or construction.
- Perform a Munitions and Explosives of Concern Investigation prior to construction.

Biological Resources (Section 4.7)

For all alternatives, JBER would:

- Continue to implement conservation measures for the protection of the CIBW as well as other marine mammals in Knik Arm and to minimize impacts to the CIBW and CIBW critical habitat, in accordance with the Integrated Natural Resources Management Plan (INRMP) (JBER 2016a).

The following mitigation measures would be undertaken at JBER to avoid, to the extent practicable, environmental impacts on biological resources for Alternative B, Alternative C, and Alternative F runway extension construction.

- The environmental protection and management measures currently being implemented at JBER as described in the INRMP will be applied to construction activities.
- Continue to adhere to any applicable USFWS protection measures, including:
  - Vegetation clearing will be conducted outside of the bird nesting season, to the extent practicable, in accordance with recommendations by USFWS, to avoid violation of the MBTA.
  - Vegetation clearing/logging will be conducted outside the period of April 10 – August 10 to protect species of special concern, as well as other nesting birds. Due to the large area of vegetation removal, a recommended additional two months (February and March) could be added to minimize impacts to owl species. Alternatively, the construction areas could be surveyed for owl nests prior to tree removal.
  - If vegetation clearing activity becomes necessary or desirable during the defined nesting season, JBER will direct performance of reconnaissance actions to identify and protect nest sites as required by the MBTA.
- Implement measures to stabilize temporarily disturbed soils, restore vegetative cover, and prevent the spread and establishment of invasive species in conjunction with terrain cut activities.
- Reclaim and manage any modified unpaved lands in accordance with the current JBER INRMP, including water-conserving landscape design, use of native or regionally adapted plants in developed areas, reduction of fertilizer and pesticide use, and invasive species control (JBER 2016a).
- Prepare/coordinate (with appropriate agencies) studies for special status species effects as a result of construction and operation of an extended runway.
- Mitigation for unavoidable impacts to the estimated 28 acres of wetlands impacted by Alternative B, Alternative C, and Alternative F construction would be coordinated between the Air Force and USACE, as discussed in Section 4.5.

Cultural Resources (Section 4.8)

None of the alternatives would result in impacts to known historic properties. In compliance with NHPA, Section 106, the Air Force consulted with the Alaska SHPO and potentially affected federally recognized Alaska Native tribes, Alaska Native Claims Settlement Act (ANCSA) corporations, and tribal government entities, which concluded with Alaska SHPO concurrence on the finding of "no historic properties affected" for Alternatives A, D, E, and No Action; and "no direct effect or adverse indirect effect to historic properties" for Alternatives B, C, and F.

The following mitigation measure would be undertaken at JBER to avoid, to the extent practicable, environmental impacts on cultural resources associated with the potential discovery of unanticipated cultural resources during runway extension construction for Alternative B, Alternative C, or Alternative F.

- Implement JBER ICRMP SOP 5.2, Reporting Unanticipated Cultural Resources, and 5.3, Unanticipated Human Remains, including notification of the Anchorage Historic Preservation Commission, for cultural resources that may be encountered during clearing, excavation, or other construction related activities.

Land Use and Recreation (Section 4.9)

There is no increase in off-base acoustic effects to residential land use for Alternative B, Alternative C, Alternative D, Alternative E, Alternative F, or No Action. No land use mitigation measures are proposed for any of these alternatives.

The Alternative A increase in off-base residential land use exposed to 65 dB Ldn or greater is an unavoidable impact that would result from implementation of Alternative A. Provision of funds for additional structural noise attenuation to off-base areas is not currently an action that the Air Force is authorized to carry out. There are no mitigations to address this unavoidable land use impact.

Other actions that JBER will implement to address concerns for land use and recreation issues associated with the improvement of F-22 operational efficiency include:

- Use planning, engineering, and runway safety area information, including relevant land use information, to update on-base plans and to provide information to off-base land use planning entities.
- Continue to work with the affected communities to address land use issues.

Transportation and Circulation (Section 4.10)

For Alternative A, Alternative D, Alternative E, and No Action, there would be no transportation and circulation impacts, and, therefore, no mitigation is proposed for these alternatives.

The following mitigation measures would be undertaken at JBER to avoid and/or minimize, to the extent practicable, environmental impacts to transportation and circulation associated with runway extension construction for Alternative B, Alternative C, or Alternative F.

- Prepare and implement construction traffic plans as part of a runway extension construction contracts to reduce roadway congestion.
- Coordinate scheduling and materials delivery (on- and off-site) to reduce traffic during high volume gate periods.
- Designate a specific gate for construction vehicle use to avoid unwanted congestion at commuter gates.

Socioeconomics (Section 4.11)

There are no socioeconomic consequences associated with Alternative A, Alternative D, Alternative E, or No Action. Alternative B, Alternative C, or Alternative F would have short-term minor increases in employment in Anchorage, with no discernable impacts to socioeconomics. No mitigation for construction personnel is proposed. To support the economics of civil aviation in the Anchorage Bowl, JBER, the FAA, representatives of the Aircraft Owners and Pilots Association, and other aviation interests would continue to coordinate in order to provide a safe, efficient, and reasonably compatible airspace environment for all aviation activities.

Environmental Justice (Section 4.12)

Alternative B, Alternative C, Alternative D, Alternative E, Alternative F, and No Action do not result in noise impacts to off-base minority or low-income populations and do not increase noise effects on children or the elderly. Therefore, no mitigation is proposed for these alternatives.

Alternative A results in disproportionate unavoidable noise impacts to off-base environmental justice populations. Provision of funds for additional structural noise attenuation off-base is not currently an action that the Air Force is authorized to carry out. No mitigation is proposed for Alternative A.

ES.6. THE ENVIRONMENTAL IMPACT ANALYSIS PROCESS

This EIS is being prepared pursuant to the National Environmental Policy Act of 1969 (i.e., NEPA), as amended (42 United States Code [U.S.C.] 4321 et seq.), its implementing regulations issued by the Council on Environmental Quality (CEQ) (40 Code of Federal Regulations [CFR] Parts 1500–1508), and Air Force policy and procedures (32 CFR Part 989). 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.

The Air Force published a notice of intent to prepare the EIS in the *Federal Register* on September 22, 2015. Scoping (40 CFR 1501.7) for the EIS was conducted from September 22, 2015, through October 27, 2015.

The Air Force published a notice of Draft EIS availability in the *Federal Register* on August 4, 2017. The Draft EIS was distributed to federal, state, and local agencies, Alaska Native groups, special interest groups, individuals or entities that requested a copy, and libraries. The Draft EIS was made publicly available at http://www.jberf22eis.com. Verbal comments were received during the Draft EIS public hearing at Clark Middle School near Mountain View in Anchorage on August 23, 2017. All public hearing comments as well as mail, e-mail, and website comments postmarked by the close of the Draft EIS review on September 19, 2017, are contained in Appendix A, Section A.10. The Air Force considered all public and agency comments during preparation of the Final EIS and the decision-making process.

ES.7. ENVIRONMENTAL COMPARISON OF ALTERNATIVES

Table ES-3 summarizes the consequences resulting from overlaying the alternatives described in the EIS Chapter 2 on the baseline conditions described in the EIS Chapter 3, to result in the environmental consequences described in the EIS Chapter 4.

The environmental consequences associated with the alternatives represent the extent of consequences for each environmental resource. Actual year-to-year flight operations would not be expected to exceed the environmental consequences for alternatives described in this EIS.

Table ES-3. Environmental Comparison of Alternatives

Resource	Alternative A (RW 34 for Departure; RW 06 Arrival)	Alternative B (RW 16/34 Extension; RW 34 for Departure; RW 06 Arrival)	Alternative C (RW 16/34 Extension; RW 34 for Departure; RW 16 Arrival)	Alternative D (RW 06 for Departure and Arrival)	Alternative E (RW 24 for Departure; RW 06 Arrival)	Alternative F (RW 16/34 Extension; RW 24 for Departure; RW 16 Arrival)	No Action (Departure 25% on RW 34; 75% on RW 06/24; Arrival on RW 06 with ODO restrictions)
Airspace Management and Use (Section 4.1)	Cross runway use meets FAA ODO policy and expedites departures as soon as cross runway is clear. Departure on RW 34 would reduce Anchorage Bowl congestion; RW 06 arrival continues congestion, with a net overall reduction in airspace congestion. Departure to the north is the shortest distance to training airspace. Departures overflying general aviation (GA) traffic using Knik or Sixmile would continue at the same elevation, but increase in frequency. Some benefits from reduced airspace congestion.	Cross runway use meets FAA ODO policy and expedites departures as soon as cross runway is clear. Departure on RW 34 would reduce Anchorage Bowl congestion; RW 06 arrival continues congestion, with a net overall reduction in airspace congestion. Departure to the north is the shortest distance to training airspace. Departure on the extended RW 34 would overfly GA traffic using Knik or Sixmile at a lower elevation than currently with increased frequency and would require continued vigilance. Some benefits from reduced airspace congestion.	Does not meet FAA ODO policy and would require continued JBER tower management. Departure on RW 34 and arrival pattern on RW 16 would reduce Anchorage Bowl congestion Departure to, and arrival from, the north is the shortest distance to training airspace. RW 34 departure and RW 16 arrival would overfly GA traffic using Knik or Sixmile at a lower elevation than currently with increased frequency and would require continued vigilance. Benefits from reduced airspace congestion.	Single direction runway use meets FAA ODO policy. Departures on RW 06 reduce congestion in the high density Anchorage Bowl and RW 06 arrival continues congestion, with a net overall reduction in airspace congestion. RW 06 departures require over 2 miles of taxi and hold from F-22 facilities and turn to north to avoid restricted airspace.	Does not meet FAA ODO policy and will require continued JBER tower management. Departure on RW 24 with a north turn within JBER Class D airspace somewhat avoids Anchorage Bowl congestion. RW 06 arrival continues congestion in high density Anchorage Bowl, with net overall increase in congestion.	Cross runway use meets FAA ODO policy and expedites departures as soon as cross runway is clear. Departure on RW 24 and turn to north within JBER Class D airspace and arrival on RW 16 somewhat reduces congestion in Anchorage Bowl airspace. F-22s arrival on RW 16 from north is the shortest distance from primary training airspace. Arrival on the extended RW 16 would overfly GA traffic using Knik or Sixmile at a lower elevation and with increased frequency than currently and would require continued vigilance.	Departures on RW 34 are restricted by the Plus-up EA/FONSI and departures on RW 24 are restricted by FAA ODO policy. Departure on RW 24 with a north turn within JBER Class D airspace somewhat avoids Anchorage Bowl. RW 06 departures require an F-22 taxi over 2 miles and hold. RW 06 departures reduce Anchorage Bowl congestion. RW 06 arrival continues congestion in high density Anchorage Bowl.
Acoustic Environment (Noise) (Section 4.2)	Off-base residents in Mountain View exposed to annual average 65 dB L_{dn} noise levels increase from 0 to 424. On-base residents exposed to 65 dB L_{dn} noise levels decrease from an estimated 1,424 to 824. The noise measure applied to schools in this EIS is 7 AM to 3 PM and is denoted as $L_{eq\text{-}8hr}$. Instantaneous noise level changes of less than 1 dB are not detectable to the human ear. Changes in instantaneous noise levels in the 3 dB range can be discerned as a noise increase. Calculated equivalent noise levels at Mountain View Elementary School during the school day increase from 68.3 to 70.2 dB $L_{eq\text{-}8hr}$ and Mount Spurr Elementary School facilities decrease from 74.9 to 71.8 dB $L_{eq\text{-}8hr}$. Noise levels at the Katmai Child Development Center decrease from 68.9 to 65.1 dB $L_{eq\text{-}8hr}$. Annual noise levels at the JBER hospital remain at 55.1 dB L_{dn}. Noise levels increase at the developed portion of Davis Park from 60.8 to 61.2 dB L_{dn}. Other noise sensitive points of interest show decreased noise	Shifting extended RW 34 takeoff roll by approximately 2,000 ft north on the extended RW 34 results in no off-base residents exposed to annual average 65 dB L_{dn} noise levels. On-base residents exposed to 65 dB L_{dn} noise levels decrease from an estimated 1,424 to 775. The noise measure applied to schools in this EIS is 7 AM to 3 PM and is denoted as $L_{eq\text{-}8hr}$. Instantaneous noise level changes of less than 1 dB are not detectable to the human ear. Changes in instantaneous noise levels in the 3 dB range can be discerned as a noise increase. Noise levels at Mountain View Elementary School decrease from 68.3 to 67.8 dB $L_{eq\text{-}8hr}$ and at Mount Spurr Elementary School facilities decrease from 74.8 to 71.6 dB $L_{eq\text{-}8hr}$ Noise levels at the Katmai Child Development Center decrease from 68.9 to 65.3 dB $L_{eq\text{-}8hr}$. Noise levels at the JBER hospital decrease from 55.1 to 54.5 dB L_{dn} and decrease at the developed portion of Davis Park from 60.8 to 60.4 dB L_{dn}. Other noise sensitive points of interest show decreased noise levels from 0.1 to 3.4 dB	Shifting extended RW 34 takeoff roll by approximately 2,000 ft north on the extended RW 34 results in no off-base residents exposed to annual average 65 dB L_{dn} noise levels. On-base residents exposed to 65 dB L_{dn} noise levels decrease from an estimated 1,424 to 915. The noise measure applied to schools in this EIS is 7 AM to 3 PM and is denoted as $L_{eq\text{-}8hr}$. Instantaneous noise level changes of less than 1 dB are not detectable to the human ear. Changes in instantaneous noise levels in the 3 dB range can be discerned as a noise increase. Noise levels at Mountain View Elementary School facilities are effectively unchanged from 68.3 to 68.2 dB $L_{eq\text{-}8hr}$ At Mount Spurr Elementary School facilities noise levels decrease from 74.9 to 71.0 dB $L_{eq\text{-}8hr}$ Noise levels at the Katmai Child Development Center decrease from 68.9 to 64.6 dB $L_{eq\text{-}8hr}$. Noise levels at the JBER hospital increase from 55.1 to 56.6 dB L_{dn} and decrease at the developed portion of Davis Park from 60.8 to 60.5 dB L_{dn}. Other noise sensitive points of interest show decreased noise from 0.3 to 4.3 dB levels of $L_{eq\text{-}8hr}$. No	No off-base residents would be exposed to annual average 65 dB L_{dn} noise levels. On-base, residents exposed to 65 dB L_{dn} noise levels decrease from an estimated 1,424 to 1,193. The noise measure applied to schools in this EIS is 7 AM to 3 PM and is denoted as $L_{eq\text{-}8hr}$. Instantaneous noise level changes of less than 1 dB are not detectable to the human ear. Changes in instantaneous noise levels in the 3 dB range can be discerned as a noise increase. Noise levels at Mountain View Elementary School facilities decrease from 68.3 to 67.3 dB $L_{eq\text{-}8hr}$ and Mount Spurr Elementary School facilities increase from 74.9 to 75.7 dB $L_{eq\text{-}8hr}$. Annual noise levels at the Katmai Child Development Center decrease from 68.9 to 68.6 dB $L_{eq\text{-}8hr}$. Annual noise levels at the JBER hospital increase from 55.1 to 56.2 dB L_{dn}. The developed portion of Davis Park remains unchanged at 60.8 dB L_{dn}. Most noise sensitive points of interest show decreased noise levels of from 0.3 to 1.1 dB $L_{eq\text{-}8hr}$ Noise levels over Matanuska-Susitna Valley would not discernably change. Acoustic energy over critical habitat does not produce	No off-base residents would be exposed to annual average 65 dB L_{dn} noise levels. On-base, residents exposed to 65 dB L_{dn} noise levels increase from an estimated 1,424 to 1,718. The noise measure applied to schools in this EIS is 7 AM to 3 PM and is denoted as $L_{eq\text{-}8hr}$. Instantaneous noise level changes of less than 1 dB are not detectable to the human ear. Changes in instantaneous noise levels in the 3 dB range can be discerned as a noise increase. Noise levels at Mountain View Elementary School facilities decrease from 68.3 to 67.5 dB $L_{eq\text{-}8hr}$ and Mount Spurr Elementary School facilities increase from 74.9 to 75.7 dB $L_{eq\text{-}8hr}$. Annual noise levels at the Katmai Child Development Center increase from 68.9 to 70.2 dB $L_{eq\text{-}8hr}$. Annual noise levels at the JBER hospital decrease from 55.1 to 53.9 dB L_{dn} and decrease at the developed portion of Davis Park from 60.8 to 60.6 dB L_{dn}. Other noise sensitive points of interest show increased noise levels of from 0.9 to 1.7 dB $L_{eq\text{-}8hr}$. Noise levels over Matanuska-Susitna Valley would not discernably change. Acoustic energy over critical habitat does not produce	No off-base residents would be exposed to annual average 65 dB L_{dn} noise levels. On-base, residents exposed to 65 dB L_{dn} noise levels increase from an estimated 1,424 to 1,955. The noise measure applied to schools in this EIS is 7 AM to 3 PM and is denoted as $L_{eq\text{-}8hr}$. Instantaneous noise level changes of less than 1 dB are not detectable to the human ear. Changes in instantaneous noise levels in the 3 dB range can be discerned as a noise increase. Noise levels at Mountain View Elementary School facilities decrease from 68.3 to 67.6 dB $L_{eq\text{-}8hr}$ and at Mount Spurr Elementary School facilities increase from 74.9 to 75.3 dB $L_{eq\text{-}8hr}$. Noise levels at the Katmai Child Development Center increase from 68.9 to 70.0 dB $L_{eq\text{-}8hr}$. Noise levels at the JBER hospital increase from 55.1 to 56.2 dB L_{dn} and decrease at the developed portion of Davis Park from 60.8 to 60.6 dB L_{dn}. Other noise sensitive points of interest show increased noise levels from 1.1 to 1.3 dB $L_{eq\text{-}8hr}$. No discernable change to overflight noise over Matanuska-Susitna Valley. Acoustic energy over critical habitat, including overflights on	No off-base residents are exposed to annual average 65 dB L_{dn} noise levels. On-base,1,424 residents are exposed to 65 dB L_{dn} or greater noise levels. The noise measure applied to schools in this EIS is 7 AM to 3 PM and is denoted as $L_{eq\text{-}8hr}$. All noise sensitive points of interest would continue to experience existing noise exposure. Noise levels at Mountain View Elementary School facilities would remain at 68.3 dB $L_{eq\text{-}8hr}$ and at Mount Spurr Elementary School facilities would remain at 74.9 dB $L_{eq\text{-}8hr}$. Noise levels at the Katmai Child Development Center would remain at 68.9 dB $L_{eq\text{-}8hr}$. Noise levels at the JBER hospital would remain at 55.1 dB L_{dn} and the developed portion of Davis Park would remain at 60.8 dB L_{dn}. Noise levels over Matanuska-Susitna Valley would not change. Acoustic energy over critical habitat does not produce significant impacts to species, including the CIBW.

Table ES-3. Environmental Comparison of Alternatives (continued)

Resource	Alternative A (RW 34 for Departure; RW 06 Arrival)	Alternative B (RW 16/34 Extension; RW 34 for Departure; RW 06 Arrival)	Alternative C (RW 16/34 Extension; RW 34 for Departure; RW 16 Arrival)	Alternative D (RW 06 for Departure and Arrival)	Alternative E (RW 24 for Departure; RW 06 Arrival)	Alternative F (RW 16/34 Extension; RW 24 for Departure; RW 16 Arrival)	No Action (Departure 25% on RW 34; 75% on RW 06/24; Arrival on RW 06 with ODO restrictions)
	levels of from 1.3 to 3.8 dB $L_{eq\text{-}8hr}$. Noise levels over Matanuska-Susitna Valley would not discernably change. Acoustic energy over critical habitat does not produce significant impacts to species, including the Cook Inlet beluga whale (CIBW).	$L_{eq\text{-}8hr}$. No discernable change to overflight noise over Matanuska-Susitna Valley. Acoustic energy over critical habitat does not produce significant impacts to species, including the CIBW.	discernable change to overflight noise over Matanuska-Susitna Valley. Acoustic energy over critical habitat does not produce significant impacts to species, including the CIBW.	significant impacts to species, including the CIBW.	significant impacts to species, including the CIBW.	RW 16 arrival, does not produce significant impacts to species, including the CIBW.	
Safety (Section 4.3)	Departures on RW 34 reduce airspace congestion somewhat and benefit flight safety. No change in RW 06 arrival traffic. Airfield safety zones and BASH comparable to existing conditions.	Departures on RW 34 reduce airspace congestion somewhat benefits flight safety. No change in RW 06 traffic. CZ and APZs north of RW 16/34 shift north; Hill Chalet then would be in APZ I and, when rented, would become a place of assembly incompatible with APZ I. APZ shift north would encompass four additional munitions storage igloos, which would be under the existing waiver. No change in CZ or APZ at southern end of RW 16/34. BASH potential slightly increases over JBER runways and Sixmile Lake with RW 16/34 extension use; BASH is a very sensitive issue at JBER since E-3 Class A event.	Does not meet FAA ODO policy. Departures on RW 34 and arrivals on RW 16 reduce airspace congestion and benefit civil flight safety but do not benefit military flight safety. CZ and APZs north of RW 16/34 shift north; Hill Chalet then would be in APZ I, and when rented, would become a place of assembly incompatible with APZ I. APZ shift north would encompass four additional munitions storage igloos, which would be under the existing waiver. No change in CZ or APZ at southern end of RW 16/34. BASH potential slightly increases over JBER runways and Sixmile Lake with RW 16/34 extension; BASH is a very sensitive issue at JBER since E-3 Class A event.	No change in RW 06 arrival traffic. Airfield safety zones and BASH comparable to existing conditions. Reduced airspace congestion. Departures on RW 06 somewhat benefit flight safety.	Does not meet FAA ODO policy. No change in RW 06 arrival traffic. Airfield safety zones and BASH comparable to existing conditions. No benefits to civilian airspace safety and ODO risks to military operations.	Meets FAA ODO policy. Arrivals on RW 16 reduce airspace congestion and somewhat benefit civil flight safety. CZ and APZs north of RW 16/34 shift north; Hill Chalet then would be in APZ I, and when rented, would become a place of assembly incompatible with APZ I. APZ shift north would encompass four additional munitions storage igloos which would be under the existing waiver. No change in CZ or APZ at southern end of RW 16/34. BASH potential slightly increases over JBER runways and Sixmile Lake with RW 16/34 extension. BASH is a very sensitive issue at JBER since E-3 Class A event.	No change in airfield safety zones or BASH safety. Four munitions storage igloos are under a waiver for up to 8 storage igloos.
Air Quality (Section 4.4)	No construction emissions. Improved efficiency of flight operations. No contribution to exceedance of any air quality standards. Less than significant air quality effects.	Mobile and intermediate operations over a large construction area combined with dust suppression would not contribute to exceedance of any ambient air quality standard. Annual maintenance would generate nominal amounts of emissions. Less than significant air quality effects	Mobile and intermediate operations over a large construction area combined with dust suppression would not contribute to exceedance of any ambient air quality standard. Annual maintenance would generate nominal amounts of emissions. Less than significant air quality effects	Increased taxi and hold time would result in a nominal, localized increase in mobile and intermittent emissions, no construction emissions, and no contribution to exceedance of any air quality standards. Less than significant air quality effects.	No construction emissions. No contribution to exceedance of any air quality standards. Less than significant air quality effects.	Mobile and intermediate operations over a large construction area combined with dust suppression would not contribute to exceedance of any ambient air quality standard. Annual maintenance would generate nominal amounts of emissions. Less than significant air quality effects.	No contribution to exceedance of any air quality standards. Less than significant air quality effects.
Physical Resources (Soils, Water, and Wetlands) (Section 4.5)	No construction and no effects to physical resources, water resources, or wetlands.	Runway extension and glide slope could directly involve 15.3 million cubic yards of earth moving with 557 acres disturbed. Excess fill would be deposited at three previously excavated gravel pits. NPDES permit will be required with site-specific SWPPP and BMPs to eliminate or reduce sediment and non-storm water discharges. Water resources disturbance would occur. Surface, storm water and wetlands, are anticipated to be	Runway extension and glide slope could directly involve 15.3 million cubic yards of earth moving with 557 acres disturbed. Excess fill would be deposited at three previously excavated gravel pits. NPDES permit will be required with site-specific SWPPP and BMPs to eliminate or reduce sediment and non-storm water discharges. Water resources disturbance would occur. Surface, storm water and wetlands anticipated to be	No construction and no effects to physical resources would occur. Taxi and hold times on RW 06 have the potential to increase de-icing during winter months. Use of more efficient application equipment, environmentally friendly products, and distances to discharge areas avoid effects to water resources or wetlands.	No construction and no effects to physical resources, water resources, or wetlands.	Runway extension and glide slope could directly involve 15.3 million cubic yards of earth moving with 557 acres disturbed. Excess fill would be deposited at three previously excavated gravel pits. NPDES permit will be required with site-specific SWPPP and BMPs to eliminate or reduce sediment and non-storm water discharges. Water resources disturbance would occur. Surface, storm water and wetlands, are anticipated to be	No construction and no change in effects to physical resources, water resources, or wetlands.

Table ES-3. Environmental Comparison of Alternatives (continued)

Resource	Alternative A (RW 34 for Departure; RW 06 Arrival)	Alternative B (RW 16/34 Extension; RW 34 for Departure; RW 06 Arrival)	Alternative C (RW 16/34 Extension; RW 34 for Departure; RW 16 Arrival)	Alternative D (RW 06 for Departure and Arrival)	Alternative E (RW 24 for Departure; RW 06 Arrival)	Alternative F (RW 16/34 Extension; RW 24 for Departure; RW 16 Arrival)	No Action (Departure 25% on RW 34; 75% on RW 06/24; Arrival on RW 06 with ODO restrictions)
		impacted by construction cut/fill and storm water run-off. Coordination with U.S. Army Corps of Engineers (USACE) would be expected to require mitigation for approximately 28 acres of impacted wetlands using a system comparable to the Anchorage Wetlands Credit/Debit Methodology.	impacted by construction cut/fill and storm water run-off. Coordination with USACE would be expected to require mitigation for approximately 28 acres of impacted wetlands using a system comparable to the Anchorage Wetlands Credit/Debit Methodology.			impacted by construction cut/fill and storm water run-off. Coordination with USACE would be expected to require mitigation for the approximately 28 acres of impacted wetlands using a system comparable to the Anchorage Wetlands Credit/Debit Methodology.	
Hazardous Materials and Waste Management (Section 4.6)	No construction; no change in hazardous materials or waste management.	All hazardous materials and construction debris would be handled, stored, and disposed of in accordance with existing laws and established JBER procedures. Construction would occur in proximity to two closed ERP sites from which radiological waste was removed in 1980. Any undocumented contaminated soils would be handled in accordance with established JBER procedures. A Munitions and Explosives of Concern Investigation would be performed prior to construction.	All hazardous materials and construction debris would be handled, stored, and disposed of in accordance with existing laws and established JBER procedures. Construction would occur in proximity to two closed ERP sites from which radiological waste was removed in 1980. Any undocumented contaminated soils would be handled in accordance with established JBER procedures. A Munitions and Explosives of Concern Investigation would be performed prior to construction.	No construction; no change in hazardous materials or waste management. De-icing has been converted to environmentally friendly products.	No construction; no change in hazardous materials or waste management.	All hazardous materials and construction debris would be handled, stored, and disposed of in accordance with existing laws and established JBER procedures. Construction would occur in proximity to two closed ERP sites from which radiological waste was removed in 1980. Any undocumented contaminated soils would be handled in accordance with established JBER procedures. A Munitions and Explosives of Concern Investigation would be performed prior to construction.	No change in hazardous materials or waste management.
Biological Resources (Section 4.7)	No construction disturbance of Uplands areas. Consultation between the Air Force and National Marine Fisheries Service on potential effects to CIBW population resulted in a finding of may affect but not likely to adversely affect. No adverse effect on any federally listed, candidate, or proposed species and/or designated or proposed critical habitat is anticipated.	Upland areas on JBER and wetland habitats would be impacted by runway extension and roadway construction. Approximately 78% of the distributed acreage has previously been human modified. Two plant species considered rare in Alaska are in proximity to, and could be affected by, runway expansion. Scheduling removal of vegetation outside sensitive avian species breeding season would reduce impact potential. No T&E species on JBER would be affected by construction. Mitigation for wetlands impacts to be coordinated between Air Force and USACE. Air Force and National Marine Fisheries Service consulting on potential effects to CIBW population resulted in a finding of may affect but not likely to adversely affect. No significant effect on any federally listed,	Upland areas on JBER and wetland habitats would be impacted by runway extension and roadway construction. Approximately 78% of the distributed acreage has previously been human modified. Two plant species considered rare in Alaska are in proximity to, and could be affected by, runway expansion. Scheduling removal of vegetation outside sensitive avian species breeding season would reduce impact potential. No T&E species on JBER would be affected by construction. Mitigation for wetlands impacts to be coordinated between Air Force and USACE. Air Force and National Marine Fisheries Service consulting on potential effects to CIBW population resulted in a finding of may affect but not likely to adversely affect. No significant effect on any federally listed, candidate, or proposed species and/or	No construction disturbance of Uplands areas. Consultation between the Air Force and National Marine Fisheries Service on potential effects to CIBW population resulted in a finding of may affect but not likely to adversely affect. No adverse effect on any federally listed, candidate, or proposed species and/or designated or proposed critical habitat is anticipated.	No construction disturbance of Uplands areas. Air Force and National Marine Fisheries Service consulting on potential effects to CIBW population resulted in a finding of may affect but not likely to adversely affect. No adverse effect on any federally listed, candidate, or proposed species and/or designated or proposed critical habitat is anticipated.	Upland areas on JBER and wetlands impacted by runway extension and roadway construction. Approximately 78% of the distributed acreage has previously been human modified. Two plant species considered rare in Alaska are in proximity to, and could be affected by, a runway expansion. Scheduling removal of vegetation outside sensitive avian species breeding season of would reduce impact potential. No T&E species on JBER affected by construction. Mitigation for wetlands impacts to be coordinated between Air Force and USACE. Air Force and National Marine Fisheries Service consulting on potential effects to CIBW population resulted in a finding of may affect but not likely to adversely affect. No significant effect on any federally listed, candidate, or proposed species and/or designated or proposed critical habitat is anticipated.	No change to JBER runway use or overflight of sensitive habitats.

Table ES-3. Environmental Comparison of Alternatives (continued)

Resource	Alternative A (RW 34 for Departure; RW 06 Arrival)	Alternative B (RW 16/34 Extension; RW 34 for Departure; RW 06 Arrival)	Alternative C (RW 16/34 Extension; RW 34 for Departure; RW 16 Arrival)	Alternative D (RW 06 for Departure and Arrival)	Alternative E (RW 24 for Departure; RW 06 Arrival)	Alternative F (RW 16/34 Extension; RW 24 for Departure; RW 16 Arrival)	No Action (Departure 25% on RW 34; 75% on RW 06/24; Arrival on RW 06 with ODO restrictions)
		candidate, or proposed species and/or designated or proposed critical habitat is anticipated.	designated or proposed critical habitat is anticipated.				
Cultural Resources (including Tribal/Alaska Native Concerns) (Section 4.8)	No ground disturbing activities. In compliance with NHPA, Section 106, the Air Force consulted with potentially affected federally recognized Alaska Native tribes, ANCSA corporations, tribal government entities, and the Alaska SHPO, who concurred with the finding of "no historic properties affected" for the change in runway use.	RW 16/34 extension directly disturbs 557 acres in areas surveyed and determined to not contain historic properties. In compliance with NHPA, Section 106, the Air Force consulted with potentially affected federally recognized Alaska Native tribes, ANCSA corporations, tribal government entities, and the Alaska SHPO, who concurred with the finding of "no direct effect and no adverse indirect effect to historic properties" for the extension to RW 16/34 and the change in runway use.	RW 16/34 extension directly disturbs 557 acres in areas surveyed and determined to not contain historic properties. In compliance with NHPA, Section 106, the Air Force consulted with potentially affected federally recognized Alaska Native tribes, ANCSA corporations, tribal government entities, and the Alaska SHPO, who concurred with the finding of "no direct effect and no adverse indirect effect to historic properties" for the extension to RW 16/34 and the change in runway use.	No ground disturbing activities. In compliance with NHPA, Section 106, the Air Force consulted with potentially affected federally recognized Alaska Native tribes, ANCSA corporations, tribal government entities, and the Alaska SHPO, who concurred with the finding of "no historic properties affected" for the change in runway use.	In compliance with NHPA, Section 106, the Air Force consulted with potentially affected federally recognized Alaska Native tribes, ANCSA corporations, tribal government entities, and the Alaska SHPO, who concurred with the finding of "no historic properties affected" for the change in runway use.	RW 16/34 extension directly disturbs 557 acres in areas surveyed and determined to not contain historic properties. In compliance with NHPA, Section 106, the Air Force consulted with potentially affected federally recognized Alaska Native tribes, ANCSA corporations, tribal government entities, and the Alaska SHPO, who concurred with the finding of "no direct effect and no adverse indirect effect to historic properties" for the extension to RW 16/34 and the change in runway use.	No ground disturbing activities and no change in airspace use.
Land Use and Recreation (Section 4.9)	Approximately 8.8 acres of residential land in Mountain View, including approximately 80 residences, would be within the 65 dB L_{dn} contour. Outdoor recreation is compatible with noise levels of 69 dB L_{dn} and lower (AFI 32-7063). No acres of Davis Park would be exposed to noise levels of 70 dB L_{dn} or above. Noise changes at Mountain View Elementary School and other noise sensitive points of interest are described above under Acoustic Environment. Off-base land under 65 dB L_{dn} noise contour increases by 10.2 acres. On-base residential land under the 65 dB L_{dn} noise contour decreases by 54.9 acres. Noise increases to the north over JBER are compatible with existing recreation and industrial land uses.	Departure shift to north on extended RW 34 decreases off-base land within 65 dB L_{dn} by approximately 10.1 acres. No off-base residential areas or schools would experience noise levels above 65 dB L_{dn}. Outdoor recreation is compatible with noise levels of 69 dB Ldn and lower (AFI 32-7063). No acres of Davis Park would be exposed to noise levels of 70 dB L_{dn} or above. On-base residential land under the 65 dB L_{dn} noise contour decreases by 59.4 acres Noise exposure to noise sensitive points of interest is described above under Acoustic Environment. Portions of open space used for individual recreation north of the existing RW 16 would become airfield or be under the CZ/APZ extension. Open space is compatible with APZs. Hill Chalet would be in the new APZ I, and, when rented, would become a place of assembly incompatible with APZ I.	Departure shift to north on extended RW 34 decreases off-base land within 65 dB L_{dn} by approximately 7.8 acres. No off-base residential areas or schools would experience noise levels above 65 dB L_{dn}. Outdoor recreation is compatible with noise levels of 69 dB L_{dn} and lower (AFI 32-7063). No acres of Davis Park would be exposed to noise levels of 70 dB L_{dn} or above. On-base residential land under the 65 dB L_{dn} noise contour decreases by 46.5 acres Noise exposure to noise sensitive points of interest is described above under Acoustic Environment. Portions of open space used for individual recreation north of the existing RW 16 would become airfield or be under the CZ/APZ extension. Open space is compatible with APZs. Hill Chalet would be in new APZ I, and, when rented, would become a place of assembly incompatible with APZ I.	No off-base residential land would experience noise levels above 65 dB L_{dn}. There would be no measurable change in noise to Mountain View Elementary School or surrounding residential land uses. Outdoor recreation is compatible with noise levels of 69 dB L_{dn} and lower (AFI 32-7063). No acres of Davis Park would be exposed to noise levels of 70 dB L_{dn} or above. Noise exposure for noise sensitive points of interest is described above under Acoustic Environment. Off-base land use within 65 dB L_{dn} increases by approximately 19 acres. On-base residential land uses under the 65 dB L_{dn} or greater noise contour increase by 21.1 acres.	No off-base residential land would experience a noise level above 65 dB L_{dn}. Outdoor recreation is compatible with noise levels of 69 dB L_{dn} and lower (AFI 32-7063). No acres of Davis Park would be exposed to noise levels of 70 dB L_{dn} or above. Noise exposure for noise sensitive points of interest is described above under Acoustic Environment. On-base residential land uses under the 65 dB L_{dn} or greater noise contour increase by 26.8 acres. An additional approximately 6.9 acres of compatible off-base land use west of JBER is within the 65 dB L_{dn} noise contour.	RW 24 departures with arrivals on extended RW 16 increases off-base land within 65 dB L_{dn} noise contour by approximately 7.5 acres of transportation land west of JBER. Outdoor recreation is compatible with noise levels of 69 dB L_{dn} and lower (AFI 32-7063). No acres of Davis Park would be exposed to noise levels of 70 dB L_{dn} or above. Mountain View noise levels would be below 65 dB L_{dn}. Noise exposure to noise sensitive points of interest is described above under Acoustic Environment. On-base residential land uses under the 65 dB L_{dn} or greater noise contour increase by 48.6 acres. Portions of open space used for individual recreation north of the existing RW 16 would become airfield or be under the CZ/APZ extension. Open space is compatible with APZs. Hill Chalet would be in new APZ I, and, when rented, would become a place of assembly incompatible with APZ I.	No change to flight operations and no change to on- or off-base land affected by existing noise conditions.
Transportation and Circulation (Section 4.10)	Change in runway use would not affect the transportation network on or off JBER. There would be no surface transportation or circulation impacts. Airspace effects are described above under	Extending RW 16/34 would increase gate and on-base traffic during the expected three years of construction. Traffic associated with the extension of RW 16/34 would occur primarily on the existing	Extending RW 16/34 would increase gate and on-base traffic during the expected three years of construction. Traffic associated with the extension of RW 16/34 would occur primarily on the existing road network	Change in runway use would not affect the transportation network on or off JBER. There would be no surface transportation or circulation impacts. Airspace effects are described above under airspace	Change in runway use would not affect the transportation network on or off JBER. There would be no surface transportation or circulation impacts. Airspace effects are described above under airspace	Extending RW 16/34 would increase gate and on-base traffic during the expected three years of construction. Traffic associated with the extension of RW 16/34 would occur primarily on the existing road network	No change in use of transportation network on or off JBER.

Table ES-3. Environmental Comparison of Alternatives (continued)

Resource	Alternative A (RW 34 for Departure; RW 06 Arrival)	Alternative B (RW 16/34 Extension; RW 34 for Departure; RW 06 Arrival)	Alternative C (RW 16/34 Extension; RW 34 for Departure; RW 16 Arrival)	Alternative D (RW 06 for Departure and Arrival)	Alternative E (RW 24 for Departure; RW 06 Arrival)	Alternative F (RW 16/34 Extension; RW 24 for Departure; RW 16 Arrival)	No Action (Departure 25% on RW 34; 75% on RW 06/24; Arrival on RW 06 with ODO restrictions)
	airspace and safety.	road network and within the construction area. Construction vehicle truck traffic would temporarily increase traffic volume at the Post Road Gate by approximately 7% to 8%. During peak construction periods there would be an increase in traffic volume at other JBER gates of approximately 1% to 2% when compared with existing traffic volume. Excess fill material would be transported on existing JBER haul or surface roads from the excavation to historic borrow pits on JBER. Rerouting Airlifter Drive to the north to meet Air Force APZ avoidance requirements would increase the distance to traverse the north end of RW 16 by 1.2 miles.	and within the construction area. Construction vehicle truck traffic would temporarily increase traffic volume at the Post Road Gate by approximately 7% to 8%. During peak construction periods there would be an increase in traffic volume at other JBER gates of approximately 1% to 2% when compared with existing traffic volume. Excess fill material would be transported on existing JBER haul or surface roads from the excavation to historic borrow pits on JBER. Rerouting Airlifter Drive to the north to meet Air Force APZ avoidance requirements would increase the distance to traverse the north end of RW 16 by 1.2 miles.	and safety.	and safety.	and within the construction area. Construction vehicle truck traffic would temporarily increase traffic volume at the Post Road Gate by approximately 7% to 8%. During peak construction periods there would be an increase in traffic volume at other JBER gates of approximately 1% to 2% when compared with existing traffic volume. Excess fill material would be transported on existing JBER haul or surface roads from the excavation to historic borrow pits on JBER. Rerouting Airlifter Drive to the north to meet Air Force APZ avoidance requirements would increase the distance to traverse the north end of RW 16 by 1.2 miles.	
Socioeconomics (Section 4.11)	No construction and no economic stimulation. Increased use of RW 34 is efficient for F-22 operations and could decrease congestion in the Anchorage Bowl airspace and have some benefit for civil aircraft operations. A calculated 1- to 2-dB L_{dn} noise increase to an estimated 80 residential units in Mountain View, which are already subject to airport noise, would not be expected to result in a measurable change to property values.	Construction provides short-term economic stimulation through construction employment and materials purchase. Construction expenditures could generate a calculated 1,300 regional direct, indirect, and induced jobs spread over the three-year construction period. This would include a peak seasonal demand for 300 to 350 direct construction jobs, or approximately 3.2% of Anchorage's construction labor force. An estimated average of 200 indirect and induced jobs would represent less than 1% of the Anchorage labor force. Local labor supply is sufficient without requiring in-migration of workers to the area. An annual increase in runway maintenance would create an additional 25 one-month jobs, which would extend the annual summer runway maintenance work. RW 34 departure to the north has the potential to reduce airspace congestion in the Anchorage Bowl, which could have some potential benefit to civil aircraft operations.	Construction provides short-term economic stimulation through construction employment and materials purchase. Construction expenditures could generate a calculated 1,300regional direct, indirect, and induced jobs spread over the three-year construction period. This would include a peak seasonal demand for 300 to 350 direct construction jobs, or approximately 3.2% of Anchorage's construction labor force. An estimated average of 200 indirect and induced jobs would represent less than 1% of the Anchorage labor force. Local labor supply is sufficient without requiring in-migration of workers to the area. An annual increase in runway maintenance would create an additional 25 one-month jobs, which would extend the annual summer runway maintenance work. RW 34 departure to, and RW 16 arrival from, the north is efficient for F-22 operations and reduces airspace congestion in the Anchorage Bowl, with benefits to civil aircraft operations.	No construction and no economic stimulation. Use of RW 06 for F-22 departures increases F-22 taxi and hold costs, while somewhat decreasing congestion in the Anchorage Bowl airspace and have some potential benefit for civil operations.	No construction and no economic stimulation. No decrease in congestion in the Anchorage Bowl airspace.	Construction provides short-term economic stimulation through construction employment and materials purchase. Construction expenditures could generate a calculated 1,300 regional direct, indirect, and induced jobs spread over the three-year construction period. This would include a seasonal demand for 300 to 350 direct construction jobs, or approximately 3.2% of Anchorage's construction labor force. An estimated average of 200 indirect and induced jobs would represent less than 1% of the Anchorage labor force. Local labor supply is sufficient without requiring in-migration of workers to the area. An annual increase in runway maintenance would create an additional 25 one-month jobs which would extend the annual summer runway maintenance work. RW 16 arrival from the north is efficient for F-22 operations and has the somewhat reduces airspace congestion in the Anchorage Bowl, which could have potential benefit to civil aircraft operations.	No construction. No change in airspace congestion in the Anchorage Bowl.

Table ES-3. Environmental Comparison of Alternatives (continued)

Resource	Alternative A (RW 34 for Departure; RW 06 Arrival)	Alternative B (RW 16/34 Extension; RW 34 for Departure; RW 06 Arrival)	Alternative C (RW 16/34 Extension; RW 34 for Departure; RW 16 Arrival)	Alternative D (RW 06 for Departure and Arrival)	Alternative E (RW 24 for Departure; RW 06 Arrival)	Alternative F (RW 16/34 Extension; RW 24 for Departure; RW 16 Arrival)	No Action (Departure 25% on RW 34; 75% on RW 06/24; Arrival on RW 06 with ODO restrictions)
Environmental Justice and Protection of Children (Section 4.12)	Outside noise levels of 65 dB L_{dn} or greater would affect an estimated 424 residents of the off-base community of Mountain View and 824 on-base residents. The four census block groups that make up the regions of influence (ROIs) are compared with the community of comparison (COC) to identify disproportionate effects. Three off-base ROIs have percentages of minority and low-income populations that exceed the percentages in the COC and result in disproportionate effects to 353 minority and 140 low-income persons living in Mountain View. There would be no disproportionate effect to the 303 minority or 45 low-income on-base persons. A calculated total of 299 on-base and 158 off-base children and two on-base and 23 off-base elderly persons are exposed to outside noise levels of 65 dB L_{dn} or greater. The percentage of children exposed to 65 dB L_{dn} in both the on-base and off-base ROI is higher than in the COC. One off-base ROI has a greater percentage of elderly than the COC percentage. Schools would be impacted as described above under Acoustic Environment.	Outside noise levels of 65 dB L_{dn} or greater would affect no off-base residential areas and 775 on-base residents. There would be no disproportionate effect to the 285 minority or 43 low-income on-base persons. A calculated total of 281 on-base and no off-base children and two on-base and no off-base elderly persons would be exposed to outside noise levels of 65 dB L_{dn} or greater. The on-base ROI percentage of children exposed is greater than the COC percentage. Schools would be impacted as described above under Acoustic Environment.	Outside noise levels of 65 dB L_{dn} or greater would affect no off-base residential areas and 915 on-base residents. There would be no disproportionate effect to the 336 minority or 50 low-income on-base persons. A calculated total of 332 on-base and no off-base children and two on-base and no off-base elderly persons would be exposed to outside noise levels of 65 dB L_{dn} or greater. The on-base ROI percentage of children exposed is greater than the COC percentage. Schools would be impacted as described above under Acoustic Environment.	Outside noise levels of 65 dB L_{dn} or greater would affect no off base residential areas and 1,193 on-base residents. There would be no disproportionate effect to the 439 minority or 66 low-income on-base persons. A calculated total of 432 on-base and no off-base children and three on-base and no off-base elderly persons would be exposed to outside noise levels of 65 dB L_{dn} or greater. The on-base ROI percentage of children exposed is greater than the COC percentage. Schools would be impacted as described above under Acoustic Environment.	Outside noise levels of 65 dB L_{dn} or greater would affect no off base residential areas and 1,718 on-base residents. There would be no disproportionate effect to the 631 minority or 95 low-income on-base persons. A calculated total of 623 on-base and no off-base children and four on-base and no off-base elderly persons would be exposed to outside noise levels of 65 dB L_{dn} or greater. The on-base ROI percentage of children exposed is greater than the COC percentage. Schools would be impacted as described above under Acoustic Environment.	Outside noise levels of 65 dB L_{dn} or greater would affect no off-base residential areas and 1,955 on-base residents. There would be no disproportionate effect to the 718 minority or 108 low-income on-base persons. A calculated total of 709 on-base and no off-base children and five on-base and no off-base elderly persons would be exposed to outside noise levels of 65 dB L_{dn} or greater. The on-base ROI percentage of children exposed is greater than the COC percentage. Schools would be impacted as described above under Acoustic Environment.	Outside noise levels of 65 dB L_{dn} or greater affect no off-base residential areas and 1,424 on-base residents, of whom 523 are minority and 78 are low-income. A calculated total of 516 on-base and no off-base children and three on-base and no off-base elderly persons are exposed to outside noise levels of 65 dB L_{dn} or greater. Schools are impacted as described above under Acoustic Environment.

Key:

ACHP = Advisory Council on Historic Preservation
AFI = Air Force Instruction
ANC = Ted Stevens Anchorage International Airport
ANCSA = Alaska Native Claims Settlement Act
APZ = Accident Potential Zones
BASH = bird/wildlife-aircraft strike hazard
BMP = best management practice
CIBW = Cook Inlet beluga whale
COC = community of comparison
CZ = Clear Zone
dB = decibel
ERP = Environmental Restoration Program
FAA = Federal Aviation Administration
ft = feet
GA = General Aviation
IFR = instrument flight rule
JBER = Joint-Base Elmendorf Richardson
L_{dn} = day-night average sound level
M = million
NHPA = National Historic Preservation Act
NPDES = National Pollutant Discharge Elimination System
ODO = Opposite Direction Operation
ROI = region of influence
RW = runway
SHPO = State Historic Preservation Officer
SWPPP = Storm Water Pollution Prevention Plan
T&E = threatened and endangered
USACE = U.S. Army Corps of Engineers

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ABBREVIATION / ACRONYM LIST

Acronym	Acronym Definition
μPa	micropascal
3 WG	3rd Wing
525 FS	525th Fighter Squadron
673 CES/CEIEC	673d Civil Engineer Squadron, Natural Resources Management
90 FS	90th Fighter Squadron
AAC	Alaska Administrative Code
AADT	average annual daily traffic
ADEC	Alaska Department of Environmental Conservation
ADOT	Alaska Department of Transportation
AEDC	Anchorage Economic Development Corporation
AFB	Air Force Base
AFI	Air Force Instruction
AFOSH	Air Force Occupational Safety, Fire Protection, and Health
AGL	above ground level
AGRS	18th Aggressor Squadron
AICUZ	Air Installation Compatible Use Zone
Air Force	U.S. Air Force
ALSF	approach lighting system-flashing
ANC	Ted Stevens Anchorage International Airport
ANCSA	Alaska Native Claims Settlement Act
APDES	Alaska Pollutant Discharge Elimination System
APE	Area of Potential Effects
APZ	Accident Potential Zone
AQCR	Air Quality Control Region
ASD	Anchorage School District
ATADS	Air Traffic Activity Data System
ATC	Air Traffic Control
ATCAA	Air Traffic Control Assigned Airspace
AWACS	Airborne Warning and Control System
BASH	bird/wildlife-aircraft strike hazard
BEA	U.S. Department of Commerce, Bureau of Economic Analysis
BMPs	best management practices
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CIBW	Cook Inlet beluga whale
CO	carbon monoxide
CO_2e	carbon dioxide equivalent
COC	community of comparison
CTAF	common traffic advisory frequency
CZ	Clear Zone
DAQ	Alaska Division of Air Quality
dB	decibels
dB re 1 μPa	decibels referenced to 1 micropascal
DoD	Department of Defense
DODI	Department of Defense Instruction
EA	Environmental Assessment
EIAP	Environmental Impact Analysis Process
EIS	Environmental Impact Statement
EO	Executive Order
EPR	engine pressure ratio
ERP	Environmental Restoration Program
ESA	Endangered Species Act
ESS	Explosives Safety Submission
ESU	Evolutionary Significant Unit
ETR	engine thrust request
FAA	Federal Aviation Administration
FC	Candidate for federal listing
FE	Listed as endangered under ESA
FEMA	Federal Emergency Management Agency
FICON	Federal Interagency Committee on Noise
FICUN	Federal Interagency Committee on Urban Noise
FNSI	Finding of No Significant Impact (Army)
FONSI	Finding of No Significant Impact (Air Force)
FS	Fighter Squadron
FT	Listed as threatened under ESA
FTA	Federal Transit Administration
GHG	greenhouse gas
GWP	global warming potential
HAZMART	Hazardous Materials Pharmacy
IFR	instrument flight rules
ILS	Instrument Landing System
INRMP	Integrated Natural Resources Management Plan
JBER	Joint Base Elmendorf-Richardson
JBER-E	JBER-Elmendorf
JBER-R	JBER-Richardson
JPARC	Joint Pacific Alaska Range Complex
kHz	kilohertz
L_{dn}	day-night average sound level
L_{dnmr}	onset rate adjusted monthly day-night average A-weighted sound level
$L_{eq\text{-}8hr}$	time-averaged exterior noise levels over an 8-hour period
L_{max}	maximum sound level
MBTA	Migratory Bird Treaty Act
MEC	munitions and explosives of concern
MMPA	Marine Mammal Protection Act
MOA	Military Operation Areas
MS4	municipal separate storm sewer system
MSL	mean sea level
mt	metric ton
MTR	Military Training Route
NA50 closed	50 dB indoors with windows closed
NA50 open	50 dB indoors with windows opened
NAAQS	National Ambient Air Quality Standards
NAF	Nonappropriated Fund

Acronym	Acronym Definition
NC	core rotation speed
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NO_x	nitrogen oxide
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
ODO	Opposite Direction Operations
OPLAN	Operations Plan
OSHA	Occupational Safety and Health Administration
PAA	Primary Aircraft Authorized
PACAF	Pacific Air Forces
PM_{10}	particulate matter less than or equal to 10 microns in diameter
$PM_{2.5}$	particulate matter less than or equal to 2.5 microns in diameter
POLs	petroleum, oil, or lubricants
PSD	Prevention of Significant Deterioration
RNAV	area navigation
ROD	Record of Decision
ROI	region of influence
RW	Runway
SHPO	State Historic Preservation Officer
SO_2	sulfur dioxide
SPL	sound pressure level
SWPPP	Storm Water Pollution Prevention Plan
TACAN	Tactical Air Navigation
UFC	Unified Facilities Criteria
U.S. Army	U.S. Department of the Army
U.S.C.	United States Code
USACE	U.S. Army Corps of Engineers
USARAK	United States Army Alaska
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
UXO	unexploded ordnance
VFR	visual flight rules
VOCs	volatile organic compounds
WG	Wing
yd^2	square yard
yd^3	cubic yard

1.0 PURPOSE AND NEED FOR IMPROVEMENT OF F-22 OPERATIONAL EFFICIENCIES AT JOINT BASE ELMENDORF-RICHARDSON

1.1 Introduction

This Environmental Impact Statement (EIS) addresses a proposal to improve F-22 operational efficiency and reduce operational restrictions on runway use at Joint Base Elmendorf-Richardson (JBER), Alaska. This EIS is being prepared pursuant to the National Environmental Policy Act of 1969 (NEPA), as amended (42 United States Code [U.S.C.] 4321 et seq.), its implementing regulations issued by the Council on Environmental Quality (CEQ) (40 Code of Federal Regulations [CFR] Part 1500–1508), and Air Force policy and procedures (32 CFR Part 989).

JBER-based F-22 fighter aircraft have restrictions to operational efficiency that affect the pilot's ability to select a runway for departure and/or arrival. A pilot needs to be able to select a runway for departure based on airfield and air traffic conditions at the time. Currently, a pilot does not have the ability to select the departure runway because there are additional runway use restrictions from the F-22 Plus-Up Environmental Assessment/Finding of No Significant Impact (EA/FONSI), from Federal Aviation Administration (FAA) opposite direction operations (ODO) policy, and from airspace congestion associated with civil aircraft operations. These constraints result in losses of efficiency in training time in the training airspace.

The Proposed Action would remove or reduce the magnitude of the constraints and improve F-22 operational efficiency. See Section 2.2 for descriptions of JBER runways and training airspace. The Proposed Action would result in a larger number of F-22 departures on runway (RW) 34 with flights directly toward primary training airspace, would remove the runway use constraints identified in the F-22 Plus-Up EA/FONSI, would reduce opposite direction arrival and departure conflicts, and would reduce potential unsafe interactions with other civil and military operations.

1.1.1 JBER Location

JBER, the former U.S. Air Force (Air Force) Elmendorf Air Force Base (AFB) and U.S. Department of the Army (U.S. Army) Fort Richardson, became a joint-base in 2010. JBER is located north and east of the Municipality of Anchorage (see Figure 1.1-1). JBER is under Air Force command as part of the Pacific Air Forces (PACAF) and is the home of the Alaskan Command, 11th Air Force, Alaskan North American Air Defense region, Air National Guard, and the 3rd Wing (3 WG). The base includes the United States Army Alaska (USARAK) and Alaska National Guard.

This EIS evaluates operational and/or infrastructure changes that could improve F-22 runway use flexibility and efficiency.

1.1.2 F-22 Operational Efficiency

Efficient flight operations are defined in this EIS as time available to a pilot in training airspace using internal F-22 fuel. The F-22 begins a sortie with 15,000 pounds of fuel and plans to touchdown at the end of the sortie with approximately 2,500 pounds of fuel. The more time available to F-22 pilots for training in the airspace with the available fuel, the more efficient the F-22 training sortie.

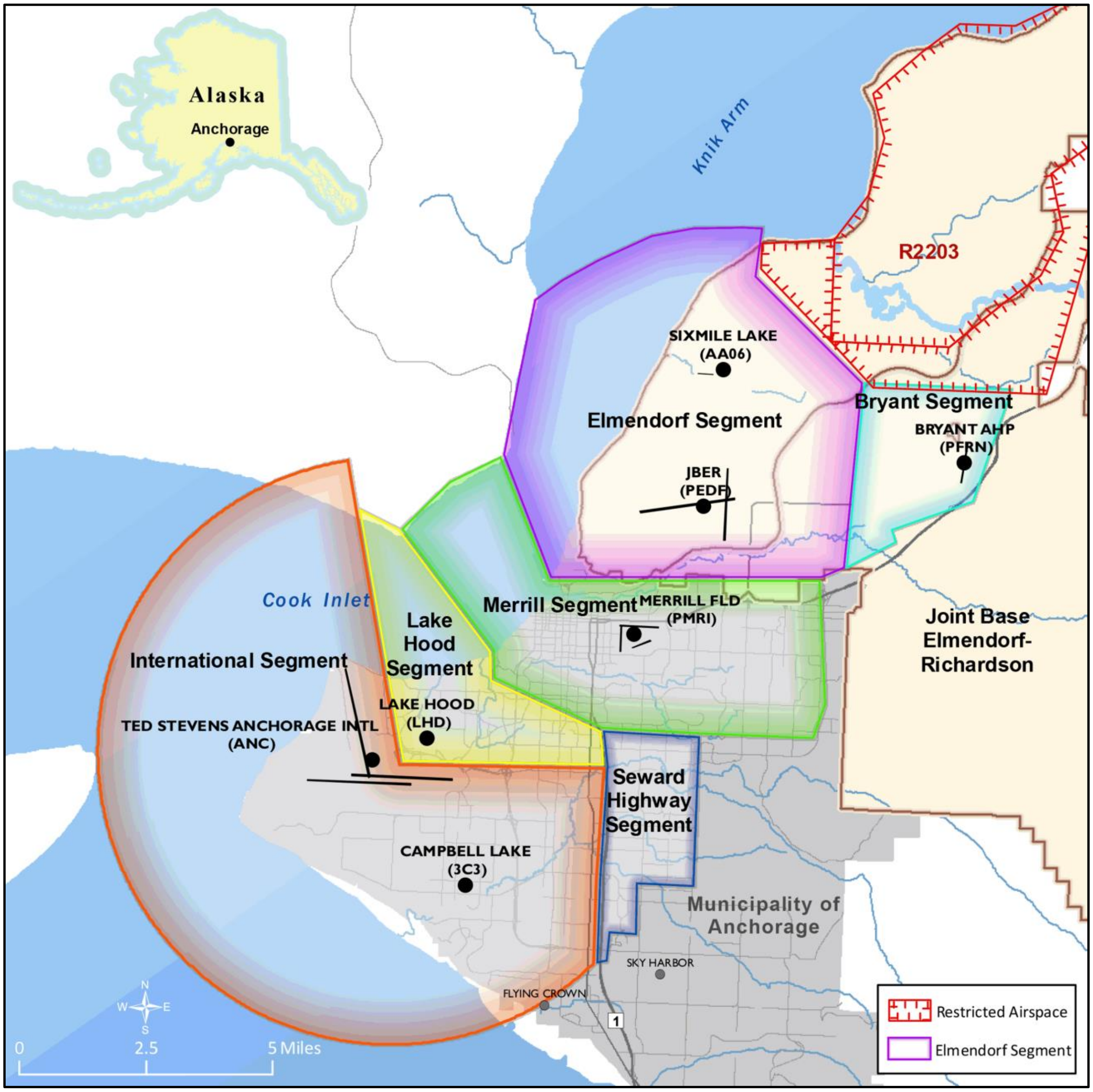

Figure 1.1-1. JBER Location and Anchorage Bowl Airspace Segments

Efficient flight operations are affected by multiple factors. For the purpose of this EIS analysis, the training mission, pilot performance, internal fuel only, weather conditions, and other factors that affect training in the airspace are assumed to be held constant. Efficiency, in this EIS, focuses on variables that are runway-dependent. Runway alternatives affect available training flight time as a result of (1) different taxi times from a specific squadron location to a specific departure runway; (2) departure time toward primary training airspace; and (3) arrival from primary training airspace to different runways. Available training flight time in the airspace is calculated for the Proposed Action and each alternative (including the No Action Alternative) based on the distribution of runway use described in Section 2.4 factored through 14 different runway departure-training-arrival scenarios presented in Appendix B.1. This series of calculations produces an average number of minutes in the training airspace for a representative 1.4-hour F-22 mission for each alternative. For example, the average minutes of pilot training time in the airspace for the No Action Alternative is calculated to be 28.54 minutes (see Appendix B.1).

Runway use alternatives that increase F-22 pilot training time over the calculated average training time of the No Action Alternative are considered to *improve efficiency*. Runway use alternatives that decrease F-22 pilot training time when compared with the calculated average training time of the No Action Alternative are considered to *reduce efficiency*. The calculations from Appendix B.1 are presented in Section 2.3 as the percentage change in efficiency for the Proposed Action and alternatives when compared with the No Action Alternative.

1.1.3 3 WG Flight Operations Challenges

The 3 WG is facing multiple flight operational challenges to achieve the highest level of pilot training within budgeted resources. This requires that the 3 WG efficiently and flexibly use JBER runways. Restrictions to F-22 use of JBER runways include:

- The 2011 Plus-Up EA/FONSI (Air Force 2011) restricts RW 34 departures to not more than 25 percent of annual F-22 departures. Only F-22 aircraft based at JBER are under this Plus-Up EA/FONSI restriction.
- The 2014 FAA direction applies to the use of one runway for two-directional traffic (FAA 2014a; 2014b; 2015a). The policy states that each facility must determine the operational feasibility of conducting ODO, also called counterflow, and, at a minimum, develop ODO procedures necessary to accommodate aircraft that have an operational need. The Air Force cannot conduct normal flight operations ODO but limits ODO operations to a case-by-case basis for approved operational necessity and/or emergency operations, including alert operations, the first snow of the day and no time to clear, wind conditions favoring RW 24, and aircraft technical order guidance that would not allow use of a different runway. ODO policy, combined with RW 06 as the primary arrival runway, severely limits the use of RW 24 for departure.
- Congestion in the Anchorage Bowl airspace poses serious safety concerns for the missions at JBER. Airspace congestion is the result of commercial and military traffic using overlapping arrival and departure patterns combined with a high volume of general aviation. The current situation imposes delays for civilian and military flights and generates serious safety concerns for the missions at JBER as reflected in a number of near misses. Runway use restrictions contribute to this congestion and safety risk.
- The public and agencies have expressed concerns regarding off-base noise south of JBER. Noise from F-22 operations affects noise-sensitive locations on- and off-base.

1.2 Purpose

The purpose of this action is to provide the 3 WG with the flexibility to distribute F-22 departures and arrivals on JBER's runways. Flexibility is defined as the Air Force's ability to use JBER runways in as efficient a manner as possible within operational, airspace, and environmental constraints. Efficiency is measured by the amount of pilot training time in the airspace during a training mission. Improved flexibility would permit JBER to address the existing challenges to flight operations, including efficiency and safety.

1.2.1 Need

The 3 WG needs to reduce restrictions to F-22 use of JBER runways to accomplish improved flexibility and efficiency of F-22 flight operations. The restrictions that need to be addressed consist of those established by the Plus-Up EA/FONSI, restrictions to runway use that do not permit the Air Force to avoid and/or reduce ODO constraints, and restrictions that do not allow for military departure and/or arrival operations to reduce congestion and improve safety. In the process of removing and/or reducing restriction to runway use, the Air Force needs to address on- and off-base acoustical impacts.

The five factors that have created the need are the challenges explained in Section 1.1.3. The Air Force needs to:

(1) Maintain all F-22 mission capabilities at JBER and maintain operational capabilities in the PACAF region while providing pilots with the highest degree of training possible. Efficiency means using available fuel for pilot training;

(2) Address 3 WG operational flexibility on JBER runways to reduce the restrictions on flight operations derived from the F-22 Plus-Up EA/FONSI (Air Force 2011). The F-22 Plus-Up EA/FONSI restricts F-22 departures on RW 34 to not more than 25 percent of total annual departures and has approximately 75 percent of F-22 departures on RW 06/24 (primarily on RW 24);

(3) Address the use of JBER runways to respond to 2014 FAA ODO regulations (FAA 2014a; 2014b). ODO requirements restrict the use of one active runway for departure and arrival in both directions (counterflow) in response to a number of events in the National Airspace System in which ODO were identified as a safety risk. The FAA issued Joint Order (JO) 7210.3, *Facility Operation and Administration*, restricting ODO traffic when using one runway for two-directional traffic. Application of this restriction limits RW 24 to fewer than 38 percent of departures and introduces inefficiencies into F-22 flight operations;

(4) Reduce traffic congestion with civil aircraft and improve safety within the Anchorage Bowl airspace segments. This could include redirecting F-22 flight operations to Anchorage Bowl airspace segments used less by civil air traffic; and

(5) Address F-22 runway operations that have the potential to affect noise over residential and other noise-sensitive areas.

To the extent practicable, F-22 flight operation efficiencies from runway use flexibility need to be achieved within the constraints of infrastructure, air traffic, ODO, weather, and noise effects.

1.2.2 Background of Beddown and Operation of F-22s at JBER

This section explains the history of the F-22 beddown at JBER and describes the events that have made it necessary to evaluate F-22 runway use to achieve efficient flight operations at JBER. The history addresses the 2011 F-22 Plus-Up EA/FONSI constraints, FAA ODO restrictions, safety, and environmental factors.

The Initial F-22 Operational Wing Beddown EIS (2001) included Elmendorf AFB (JBER) as an alternative beddown location for three squadrons of F-22s with a total of 72 aircraft. The environmental analysis was based upon an average of one squadron of 24 F-22s being deployed at all times and an average of 48 F-22s flying from JBER. At that time, there were no measured noise data for operational F-22s, so acoustical impacts were based on F/A 18 aircraft. The EIS assumed the F-22 departure and arrival procedures would be similar to then current F-15C operations based at Elmendorf, primarily on RW 06/24. The Final EIS Record of Decision (ROD) selected Langley AFB, Virginia, as the location for the initial F-22 operational wing.

In 2006, an F-22 Beddown EA/FONSI was tiered from the F-22 Operational Wing Beddown EIS and evaluated the environmental consequences associated with the beddown of two squadrons of F-22s at JBER with a total of 36 aircraft. The two squadrons of F-22s would replace two squadrons of F-15Cs and one squadron of F-15Es. The 2006 F-22 Beddown EA/FONSI assumed the F-22s would operate primarily on RW 06/24 as the departing F-15Cs and F-15Es operated. The two F-22 squadrons arrived at JBER, and the remaining F-15C squadron was subsequently assigned to another location.

Acoustic analysis of the F-22 operational wing in the 2006 F-22 Beddown EA/FONSI assumed 5,500 sorties per year from JBER. F-22s were assumed to use base runways (primarily RW 24 for departure) and fly in the base environs similar to the comparably sized F-15C and F-15E aircraft. Noise levels of 65 decibels (dB) day-night average sound levels (L_{dn}) or greater were projected to mostly affect JBER lands, overwater areas, and, to a small degree, the industrial Port of Anchorage. No off-base noise levels of 65 dB L_{dn} or greater were projected to occur in off-base residential areas.

However, when the F-22s began operations from JBER runways in 2007, the F-22 greater performance permitted departure on the shorter RW 34 directly toward the primarily used training airspace. This departure pattern provided for more training time in the airspace. That, coupled with the potential for reduced interactions with other air traffic in the Anchorage Bowl, provided a strong operational rationale for the increased use of RW 34 for F-22 departures.

In 2010 the Air Force proposed to consolidate the F-22 fleet by redistributing F-22 aircraft from Holloman AFB (New Mexico) to existing F-22 units at JBER, Langley AFB (Virginia), Nellis AFB (Nevada), and Tyndall AFB (Florida). The proposal added six primary F-22 aircraft to JBER to plus-up JBER's two squadrons. An F-22 Plus-up EA/FONSI was completed in 2011 (Air Force 2011) with the proposed action of approximately 25 percent of existing and plus-up F-22 departures from RW 34 and the remaining departures from RW 06/24 (primarily on RW 24). The decision to adjust the project by proportionately distributing F-22 departures on JBER runways to avoid noise levels of 65 dB L_{dn} or greater to off-base residential areas made it possible for the relocation of operational F-22s from Holloman AFB from the same production block as existing F-22s at JBER. Having all the F-22s from the same production block provided both operational and maintenance advantages for the 3 WG.

Prior to completion of an updated Air Installation Compatible Use Zone (AICUZ) study, an environmental analysis was initiated to evaluate the proposal to relocate the 18th Aggressor Squadron (18 F-16 aircraft) from Eielson AFB to JBER. A *Proposal to Relocate the 18th Aggressor Squadron Draft EIS* was prepared and distributed to the public in 2013. The Draft EIS identified baseline noise conditions associated with JBER F-22 operations, which were calculated to expose an estimated 408 off-base residents in the community of Mountain View south of JBER, to noise levels of 65 dB L_{dn} or greater.

Following release of the *Proposal to Relocate the 18th Aggressor Squadron Draft EIS*, the Air Force collected runway use data from May 2013 through April 2014. The data demonstrated that approximately 42 percent of the 4,437 documented F-22 sorties (or approximately 1,900 F-22 sorties) departed on RW 34. The F-22 Plus-Up EA/FONSI projected that 25 percent of an estimated 5,210 sorties per year (or 1,303 sorties) would depart on RW 34. During that year of data collection, the annual number of F-22 departures and the percentage of annual departures were found to be higher than the RW 34 departures evaluated for the F-22 Plus-Up EA/FONSI (Air Force 2011).

The No Action Alternative in this EIS applies the Plus-Up EA/FONSI runway distribution to the reasonably highest annual sorties of 5,710, assuming that all F-22s are at JBER for an entire year. This results in approximately 1,422 annual sorties departing on RW 34 (see Table 2.4-1). Continued compliance with the restrictions of the F-22 Plus-Up EA/FONSI runway departure percentages required F-22 departures on RW 34 be reduced by 500 to 600 sorties annually from the number of F-22 sorties recorded between May 2013 and April 2014.

Thus, the F-22 Plus-up EA/FONSI restriction to not more than 25 percent of total annual F-22 departures on RW 34 acts to constrain F-22 flight operations. More efficient flight operations would allow F-22s from the 90th Squadron to primarily depart on RW 34 toward normally used training airspace. Furthermore, application of 2014 FAA ODO policy requirements severely limits RW 24 departures because RW 06 is the primary arrival runway and regular RW 24 departures in the opposite direction from arrival traffic are not consistent with those policy requirements. The FAA ODO policy has been instituted to reduce the potential for mishaps, and thus improve public and pilot/aircrew safety.

The combined effect of the F-22 Plus-Up EA/FONSI restrictions and the application of FAA ODO policy requirements means that not more than 25 percent of F-22 total annual departures can occur on RW 34 and a calculated 37.5 percent of all F-22 departures would be required to taxi in excess of 2 miles to RW 06, hold for traffic, and then depart. The time required to depart from RW 06 reduces training time in training airspace and introduces substantial inefficiencies into JBER flight operations.

The Proposed Action and alternatives in this EIS address the need to achieve the F-22 operational mission with greater efficiency and safety. The runway use alternatives address F-22 flight operations with recognition of the 2011 F-22 Plus-Up EA/FONSI constraints, FAA ODO policy restrictions, safety, and environmental factors.

1.3 EIS Goal and Organization

The goal of this EIS is to ensure that comprehensive and systematic consideration is given to potential environmental impacts that may result upon the natural, man-made, or social environment from implementing a reasonable action to accomplish the purpose and need. This EIS analysis evaluates the environmental effects associated with improving F-22 efficiency by removing existing restrictions on F-22 runway use, reducing opposite direction arrival and departure conflicts, and reducing potential unsafe interactions with other civil and military operations.

This EIS considers the No Action Alternative plus the Proposed Action and five runway use alternatives that define the reasonably highest number of F-22 operations on each JBER runway and identify the associated environmental effects. This EIS is organized to facilitate review by the public, agencies, Alaska Natives, and Air Force decision makers. The organization and contents are described below.

Chapter 1 presents the purpose of, and need for, the Proposed Action to improve F-22 operational efficiencies at JBER.

Chapter 2 describes the Proposed Action and alternatives to accomplish the purpose and need. The Proposed Action and alternatives are described in the context of the five purpose and need factors described in Section 1.2.1. The No Action Alternative is described as baseline conditions and is derived from the F-22 Plus-Up EA/FONSI and FAA ODO policy restrictions. Chapter 2 explains the NEPA process, including public involvement and scoping results, and provides a comparative summary of effects on environmental resources associated with each alternative. The comparative summary in Chapter 2 is derived from the analysis in Chapter 4. A consideration of variations in runway operations is presented after the Table 2.7-1 comparison summary of the Proposed Action and alternatives.

Chapter 3 provides a baseline of environmental resources and issues that have the potential to be affected by implementing the Proposed Action, an alternative, or continuing No Action. F-22 baseline flight operations are derived from two primary sources: (1) the F-22 Plus-Up EA (Air Force 2011); and (2) data collected through interviews and from JBER-Elmendorf records.

Chapter 4 overlays the Proposed Action and alternatives from Chapter 2 on the baseline conditions of Chapter 3 to identify the potential environmental consequences of implementing the Proposed Action or an alternative (including the No Action Alternative).

Chapter 5 identifies other actions occurring in the region and analyzes the cumulative impacts of past, present, and reasonably foreseeable actions in combination with implementation of an alternative to accomplish the Proposed Action. Chapter 5 also addresses other NEPA considerations, such as unavoidable adverse environmental effects, the relationship between short-term use of man’s environment, maintaining and enhancing long-term productivity, and irreversible and irretrievable commitments of resources.

Chapter 6 provides references cited in the EIS, including persons or agencies contacted during the course of preparing this EIS.

Chapter 7 provides the list of preparers of the EIS.

The **Appendices** contain analysis information not readily available to the public, as well as additional technical material to enhance understanding of the environmental effects.

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2.0 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

2.1 Identification of the Proposed Action and Alternatives

Air Force regulations (32 CFR Part 989) implementing NEPA (40 CFR Section 1502.14) require rigorous exploration and objective evaluation of all reasonable alternatives for a federal action. As described in Chapter 1, the purpose is to provide 3 WG with operational flexibility so that F-22s can efficiently use JBER runways. Constraints to runway operations, primarily as a result of the 2011 F-22 Plus-Up EA and FONSI (Air Force 2011) and FAA ODO requirements (FAA 2015a) have created the need. The Proposed Action is to implement F-22 flight operations on JBER runways to accomplish the purpose and address the need described in Section 1.2.1.

This chapter identifies and describes F-22 runway use alternatives that are operationally achievable and meet the stated purpose and need. Three alternatives use existing runways, and three alternatives include construction to extend one of the runways. The Proposed Action (Alternative A) would release the F-22 Plus-Up EA restrictions on runway use while meeting FAA ODO requirements. The No Action Alternative, which combines the F-22 flight operations from the 2011 Plus-Up EA/FONSI (Air Force 2011) with FAA ODO restrictions, serves as the baseline against which environmental effects of the Proposed Action and alternatives can be measured. Identifying and evaluating alternatives, including the No Action Alternative, is in accordance with CEQ regulations (40 CFR Section 1502.14[d]).

2.2 Background for Identifying Alternatives to Meet the Purpose and Need

2.2.1 JBER Missions

JBER has multiple Air Force and U.S. Army missions. The focus of this document is 3 WG F-22 operations; however, it is worthwhile to briefly explain other missions at JBER to provide additional context. The JBER primary airfield (Figure 2.2-1) supports two flying wings (one is Air Force and one is Air National Guard), and a reserve flying group. The active duty 3 WG consists of the 90th Fighter Squadron (90 FS) (F-22s), the 525th Fighter Squadron (525 FS) (F-22s), the 517th Airlift Squadron (C-17s/C-12s), and the 962d Air Control Squadron (E-3 Airborne Warning and Control System [AWACS]). In association with the 3 WG, the 477th Fighter Group supplements the 3 WG with personnel (no additional aircraft) for flying operations. The Air National Guard 176th Wing includes C-130H/HC-130N aircraft and HH-60G helicopters (see Table 2.2-1). U.S. Army missions include live-fire training within the restricted area R2203 (see Figure 1.1-1). This proposal to improve F-22 operational efficiency does not change JBER assigned personnel or the number or operations of assigned aircraft or transient aircraft using JBER runways.

Table 2.2-1. Primary Aircraft Assigned to JBER-Elmendorf

Aircraft Type	Number Assigned
F-22	42
C-17	8
C-130	16
C-12	5
E-3	2
HH-60G	5

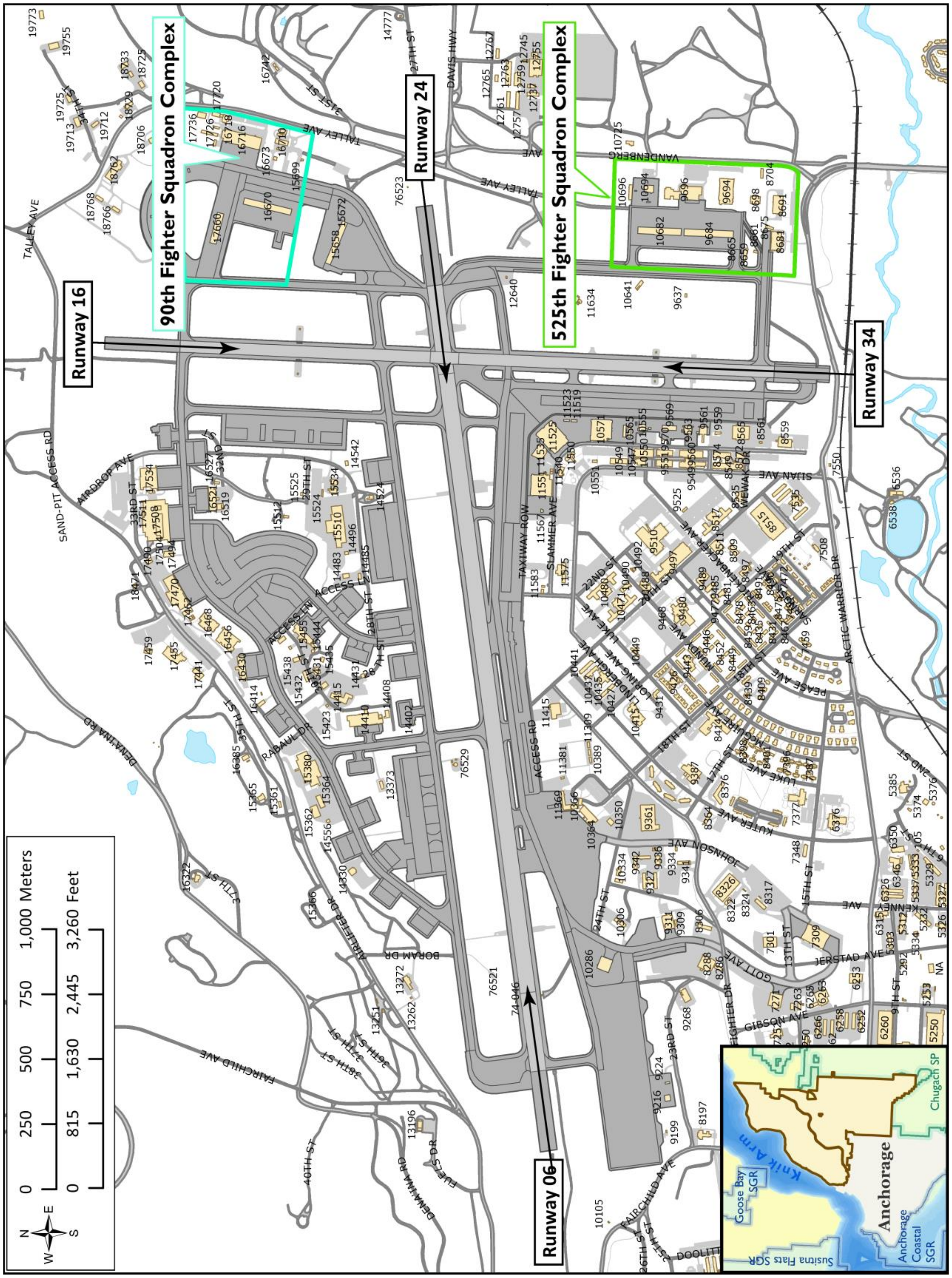

Figure 2.2-1. JBER Primary Airfield with Runway 06/24 (East-West), Runway 16/34 (North-South), and the F-22 Squadron Facility Complexes

2.2.2 JBER F-22 Aircraft

F-22 aircraft combine advanced sensor capability, integrated avionics, enhanced situational awareness, a suite of weapons, low visibility, the ability to maintain supersonic speeds without afterburners (supercruise), and superior maneuverability (thrust vectoring) to achieve and maintain air superiority. The 42 Primary Aircraft Authorized (PAA) F-22s based at JBER are equally divided between the 90 FS and 525 FS (see Figure 2.2-1). F-22 pilots must regularly train to maintain proficiency in all F-22 systems and capabilities. There is no proposed change in the number of F-22 aircraft based at JBER.

The 90 FS and the 525 FS are the two F-22 combat squadrons based at JBER.

The combat-ready 90 FS and 525 FS are prepared for rapid worldwide deployment to accomplish air superiority and/or precision engagement of surface targets using a wide variety of air-to-air and air-to-surface munitions. The 90 FS and 525 FS train in the Joint Pacific Alaska Range Complex (JPARC) training airspace units which are illustrated in Figure 2.2-2. Fighter mission training includes offensive and defensive counterair (air-to-air), strategic attack, offensive counterair (air-to-surface), suppressing enemy air defenses, and support for other allied aircraft (JBER 2014a). Depending on the weapons carried, the F-22 can execute air-to-air combat and/or, with the air-to-ground configuration, conduct precision attacks on surface targets from a low visibility platform. There are no proposed training airspace changes associated with this EIS.

2.2.3 JBER Flight Operations

This EIS uses two terms to describe different components of aircraft flying activities: *sortie* and *operation*. Each term has a distinct meaning and commonly applies to a specific set of activities in a particular airspace environment. These terms also provide a means to quantify activities for the purposes of analysis. At an airfield, a sortie is all flight activities of an aircraft from departure to arrival. An operation comprises one action such as a departure, arrival, or closed-pattern, such as a touch and go. There is no proposed change in the total number of JBER F-22 flight operations. The proposed improvements in F-22 operations efficiency do not require or include any proposed change in JBER Class D airspace or in any other Anchorage Bowl airspace (see Figure 1.1-1 and Figure 3.1-1). Operations in training airspaces and ranges (see Figure 2.2-2) are not proposed to be changed and are not discussed in this EIS.

A *sortie* consists of activities related to a single military aircraft from a departure to arrival and includes the flying mission. For this EIS, the term *sortie* is the duration of a flight activity from JBER.

An *operation* is a single portion of a sortie. When applied to JBER F-22s, one operation represents a single departure or a single arrival.

Annual JBER airfield operations of all aircraft conducted in recent years (Table 2.2-2) have been affected by many factors, including drawdown of F-15C aircraft (fiscal year [FY] 2010–FY 2011), deployments of assigned units, and the number of the major flying exercises, such as Red Flag Alaska and Northern Edge.

The JBER runways discussed in this section and the location of the 90 FS and the 525 FS are presented on Figure 2.2-1. Runway 06 (RW 06) is used for departures and arrivals from west to east, RW 24 is used from east to west, RW 34 is used from south to north, and RW 16 is used north to south.

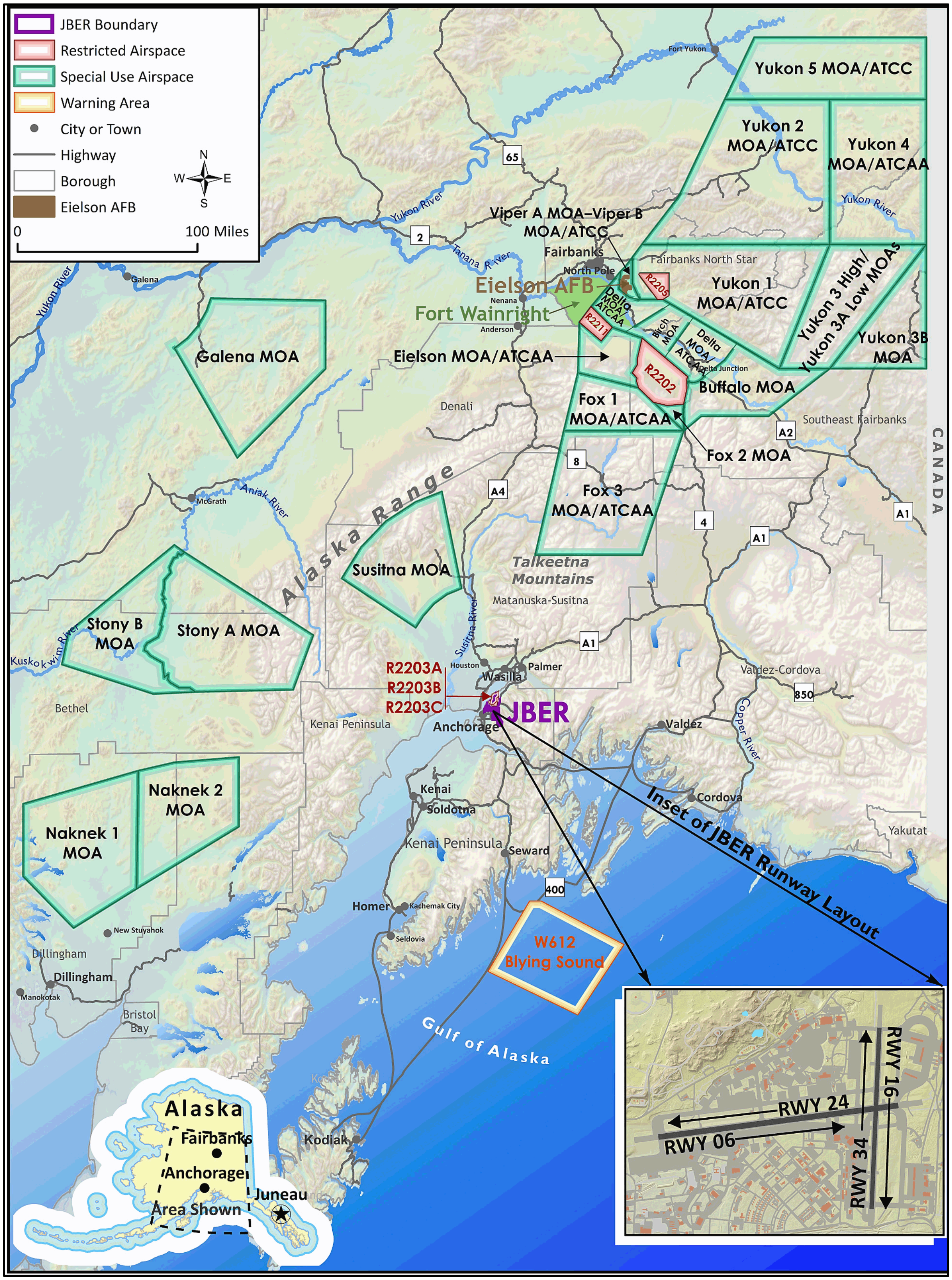

Figure 2.2-2. Joint Pacific Alaska Range Complex (JPARC) Training Special Use Airspace and Ranges

Table 2.2-2. JBER Flight Operations by Year for all JBER-Based and Transient Aircraft

Year[1]	Airfield Operations[2]
FY 2015[3]	36,975
FY 2014	34,429
FY 2013	31,927
FY 2012	34,889
FY 2011	34,490
FY 2010	47,315
FY 2009	44,561

Notes:

1 Fiscal Year (FY) F-22 flight operations represent approximately one-third of all JBER operations.
2 Includes annual operations of Runway 06/24 and Runway 16/34.
3 Includes 12,277 F-22 operations with both F-22 squadrons at full strength.

F-22 departure operations are primarily on RW 06, RW 24, and RW 34. Departures on RW 16 are very infrequent because of civil aircraft activities south of the base (refer to Figure 2.2-3). The majority of F-22 arrivals are on RW 06. Although arrivals can occur on any other runway, terrain or proximity to other Anchorage Bowl airspace makes arrivals more difficult on runways other than RW 06. C-17 flight operations primarily use RW 06/24. C-17 short field practice approaches use RW 16 and typically depart on RW 24 and then maneuver for another approach to RW 16. The E-3 aircraft almost exclusively use RW 06/24 for arrival and departure. The C-130 and C-12 aircraft use all available runways. JBER also supports a range of transient users, including those in transit to or from Asia and those participating in major flying exercises. Transient aircraft almost exclusively use RW 06/24 for arrival and departure.

F-22 flight operations at JBER are distributed throughout the year based on mission requirements, and operations in different years can be adjusted based on missions and scheduling of training exercises. F-22 pilots train for combat operations, participate in alert operations, experience realistic combat conditions in exercises, such as Red Flag Alaska, and conduct other flying activity. During 2013 and 2014, F-22 flight operations by calendar quarter were approximately 24 percent of the total annual operations in January through March, 34 percent in April through June, 23 percent in July through September, and 19 percent in October through December. During any given year, F-22 flight operations are typically lower in March, September, November, and December and higher in April, June, and part of August. Flight operations reflect seasonal runway maintenance and are typically lower in July and early August than in the other summer months of June and late August. The 2013–2014 seasonal distribution is representative, and actual numbers as well as the seasonal distributions of operations are subject to mission requirements.

2.2.3.1 F-22 Flight Operations in JPARC

The extensive combat capabilities of the F-22 require continual pilot training to ensure expertise with all system capabilities. This training is primarily conducted within JPARC. JPARC also supports Eielson AFB aircraft and multiple other training aircraft during flying exercises. This EIS does not propose any change in the JPARC airspace or to F-22 training within the airspace.

F-22 aircraft regularly use the Fox, Susitna, and Stony Military Operation Areas (MOAs) for training and proficiency (see Figure 2.2-2). F-22 aircraft departing RW 34 are on a heading directly toward this training airspace. An F-22 aircraft departing to the west on RW 24 turns north after takeoff to vector toward the most commonly used Fox, Susitna, and Stony MOAs. A departure to the east from RW 06 turns north after takeoff to avoid restricted airspace used for Army live-fire training (R2203) prior to vectoring toward these MOAs.

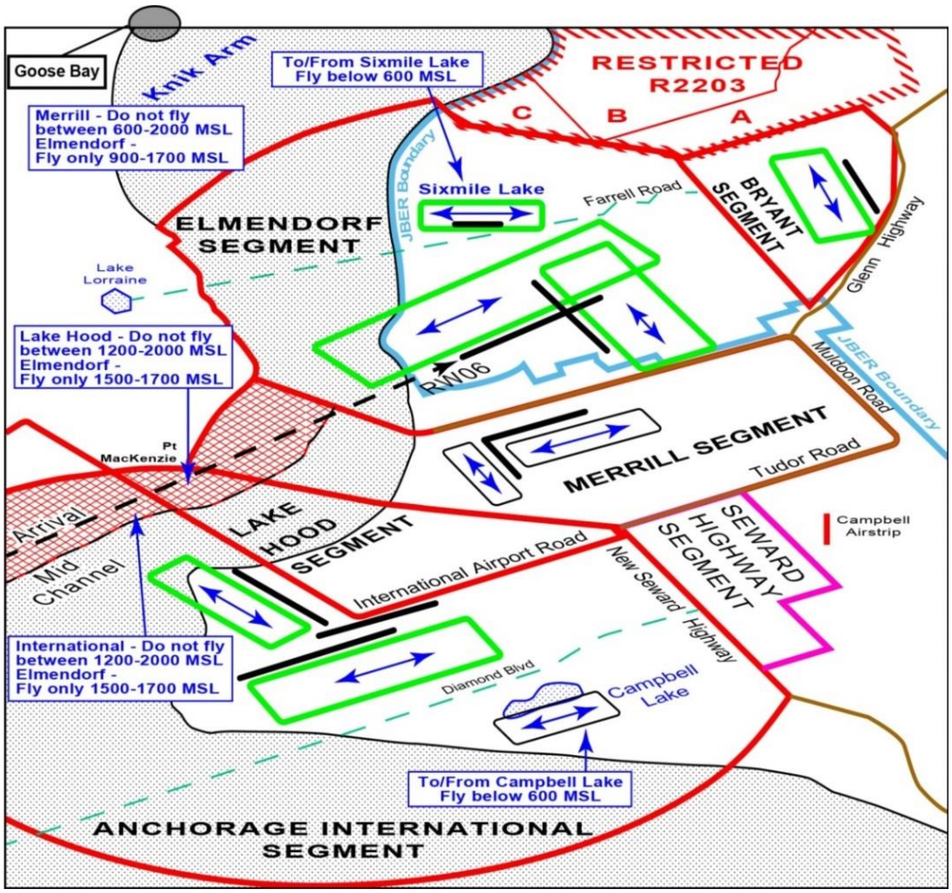

Figure 2.2-3. Anchorage Terminal Area Airspace Segments and Commercial and Military Runways, Perspective View North (after JBER 2012a; not to scale)
Compare with Figure 2.2-4 for Arrival on Runway 06

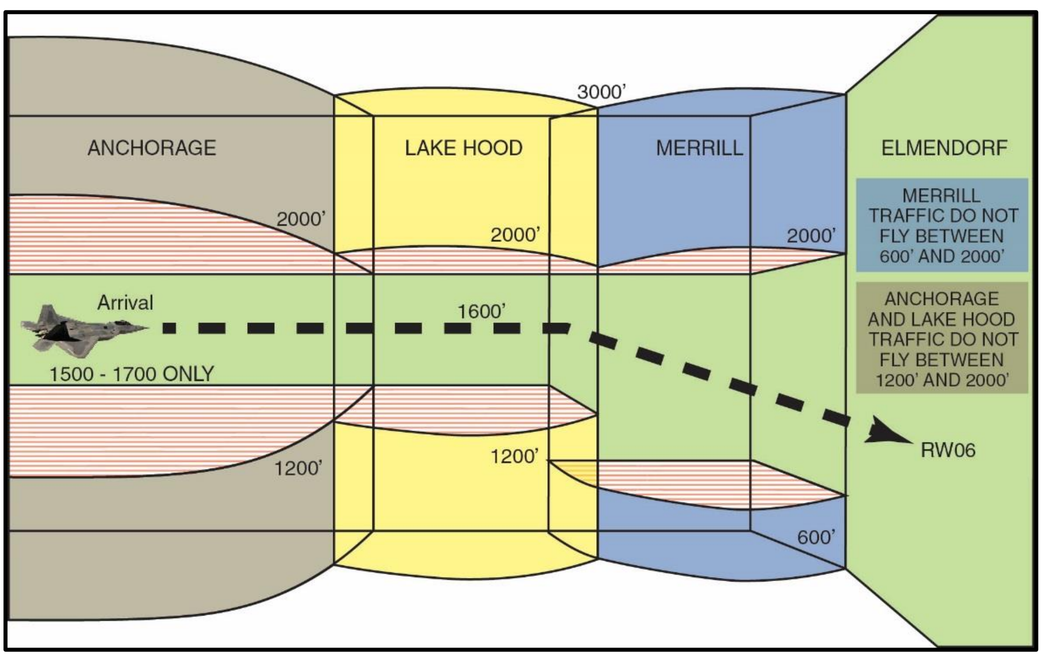

Figure 2.2-4. Section View North of 14 CFR Part 93 Airspace
Compare with Figure 2.2-3 for Arrival on Runway 06 (not to scale)

2.2.3.2 Existing On- and Off-Base Constraints to JBER Runway Use

JBER must achieve the missions described in Section 2.2.1, and F-22 operations are a key component of the JBER mission. This section describes the constraints to the JBER runway use for the F-22s that affect mission training.

The 2011 Plus-Up EA/FONSI

Arriving aircraft on RW 06 are required to transition through four of the six Anchorage Terminal Area airspace segments.

In 2010, the F-22 squadrons each had a “plus-up” of aircraft which increased each squadron to 21 PAA. The F-22 Plus-Up EA and subsequent FONSI (Air Force 2011) evaluated the environmental effects of the expected use by F-22s of the JBER runways and applied the then current acoustic model to calculate the potential for off-base noise impacts. For the then expected 5,210 F-22 sorties, an estimated 1,300 departures on RW 34, or 25 percent of departures, were determined to avoid modeled noise above 65 decibels (dB) day-night average sound level (L_{dn}) from going off-base into the community of Mountain View. Although single event noise effects of aircraft operations can be experienced throughout the Mountain View community, the calculated 65 dB L_{dn} noise contour has been accepted as the indicator of potential for substantial annoyance in a residential area by Air Force, Department of Defense (DoD), and FAA for 35 years (FICUN 1980; FICON 1992; Federal Transit Administration [FTA] 2006). Explanation of noise, noise perception, and noise modeling are included in the Acoustic Environment Sections 3.2 and 4.2, and in Appendix E of this EIS.

The 2011 Plus-Up EA/FONSI (Air Force 2011) restricted runway (RW) 34 departures to not more than 25 percent of annual F-22 departures. RW 06/24 was expected to be the primary runway used by F-22 and other JBER-based and transient aircraft except in the case of national emergencies, major flying exercises, runway or taxiway maintenance, or limited programs to evaluate alternative flight operations. Departures on RW 16 would be rare. At the time the F-22 Plus-Up EA/FONSI was signed, 3 WG was positioned to comply with operations distributed primarily on RW 24 and RW 34 to reduce off-base noise effects to nearby communities/sensitive receptors.

Figure 2.2-2 demonstrates that the most efficient departure runway for the F-22s from the airfield (Figure 2.2-1, inset lower right) to the most commonly used MOAs of Fox, Susitna, and Stony airspace units, would be to depart on RW 34 directly toward the training airspaces. RW 24 departures (from east to west) require a turn to the north to align toward the training airspace, and a RW 06 departure (from west to east) requires extensive taxi and hold time from the F-22 squadron locations (Figure 2.2-1) and a turn to the north to avoid the restricted airspace and be aligned directly toward the primary training MOAs. The Plus-Up EA/FONSI restriction on RW 34 departures does not permit pilots the flexibility to use JBER runways in as efficient manner as possible within operational, airspace, and environmental constraints.

2014 FAA ODO Policy

The 2014 FAA ODO policy applies to use of one runway for two-directional traffic (FAA 2014a; 2014b; 2015a). The policy states that “each facility must determine the “operational feasibility” of conducting opposite direction operations” and, “at a minimum, develop the opposite direction operations procedures necessary to accommodate aircraft that have an operational need….” (FAA 2015a). JBER coordinates with FAA on ODO operations.

With RW 06 as the primary arrival runway, the FAA ODO policy limits the use of RW 24 for departure because a RW 24 departure is ODO (also termed counterflow) into the RW 06 arrival pattern. Application of FAA ODO policy limits departures on RW 24 to FAA-approved operational necessity and/or emergency operations, including alert operations, the first snow of the day and no time to clear, wind conditions favoring RW 24, and aircraft technical order guidance that would not allow use of a different runway. The combination of FAA ODO restrictions on RW 24 departure and the Plus-Up EA/FONSI restrictions on RW 34 departures severely limits Air Force use of JBER runways. As of summer 2016, FAA ODO policy restricted F-22 departures on RW 24 to approximately one-half the annual departures remaining after the 25 percent restriction on departures from the Plus-Up EA/FONSI. The combination of restrictions means that approximately 37 percent of all F-22 departures are required to taxi over two miles to the west end of RW 06 and hold for traffic prior to departing on a training mission.

Anchorage Airspace Safety

The primary arrival runway for all JBER aircraft operations is RW 06 (see Figure 2.2-1). This approach passes through the complex Anchorage Airspace, which is used by multiple commercial, general aviation, and military aircraft. The Anchorage Airspace is managed by FAA through the Anchorage Terminal Area, which is subdivided into the six segments illustrated on Figure 2.2-3. The Anchorage International Segment supports commercial air carriers at Ted Stevens Anchorage International Airport (ANC). The Merrill Segment and Lake Hood Segment, as well as the Seward Highway Segment and Sixmile Lake primarily support general aviation, including float planes. Alaska has 16-times as many private aircraft per capita as the lower 48. The Elmendorf and Bryant Segments are primarily for JBER military flight operations.

Figure 2.2-4 provides a side (or sectional) view looking south to north of an F-22 aircraft landing on RW 06 (see Figure 2.2-1). The figure, which is not to scale, demonstrates that a military pilot must transition at restricted altitudes through portions of the Anchorage International Segment, the Lake Hood Segment, and the Merrill Segment before entering the Elmendorf Segment to land on RW 06. Military aircraft seeking to depart from JBER and civilian aircraft seeking to depart from ANC face ground holds as a result of Anchorage Bowl aircraft traffic. Safety for traffic control affects F-22 departures on RW 24 and arrivals on RW 06. Potential conflict with the busy general aviation at Merrill Field (see Figure 2.2-3) effectively prevents regular departures from RW 16. Air traffic conflicts for RW 34 arrivals are Merrill Field traffic and the existence of the densely populated community of Mountain View within the Elmendorf Segment immediately south of RW 34.

The priority for snow and ice removal equipment, chemicals, fuel, and personnel is to ensure mission readiness. Snow and ice build-up and clearing capabilities may result in RW 16/34 being unavailable for F-22 operations.

General aviation flights result in additional safety concerns. The busy general aviation from Merrill Field and Lake Hood use the Merrill and Lake Hood Airspace Segments and regularly transit the Elmendorf Segment up the Knik Arm (see Figure 2.2-3). Military aircraft flying within the Elmendorf Segment were required to maneuver a halfdozen times during the first half of 2016 to avoid general aviation aircraft that were not adhering to the altitude restrictions identified in Figure 2.2-4.

Anchorage Airspace Safety is of concern to military and civil aviation. The FAA and the Air Force continue to take all possible steps to ensure airspace safety and avoid a catastrophic event.

Other Constraints

Other constraints include weather, runway maintenance and resurfacing, restricted airspace, and topographic obstacles.

During winter months, JBER snow and ice removal equipment, chemicals, fuel, and personnel are committed to mission priority clearance. The first priority is to keep RW 06/24, associated taxiways, and mission critical areas free of snow and ice. Snow and ice removal capabilities and the extent of snowfall make RW 16/34 and associated taxiways a somewhat lower priority for clearance. For the 52 snow events which occurred during the 2012-2013 season, base snow and ice clearance capabilities maintained RW 06/24 areas for the operational mission and RW 16/34 was restricted for fighter aircraft operations. Snowfall levels are not the only measure for RW 16/34 weather-related closure. High wind conditions and ice build-up with freezing rain can affect RW 16/34 use. During the 2013-2014 through 2015-2016 seasons, JBER snow and ice removal capabilities kept pace with snow levels so that F-22 operations could be conducted on RW 16/34 throughout the year, though historically that has been the exception and not the rule.

Runways and associated areas require seasonal maintenance. The arctic environment is extremely hard on a paved surface, and annual maintenance and periodic repaving are required to stabilize the runway. Typically, runway maintenance closes RW 16/34 for two weeks in May, and RW 06/24 is closed for a month in July and/or August. When RW 16/34 is closed, all flight traffic is diverted to RW 06/24, and when RW 06/24 is closed, all flight traffic is diverted to RW 16/34. Periodic runway resurfacing every 7 to 10 years results in longer runway closures and changes in flight patterns. Public notices provide both on- and off-base information of scheduled changes in runway operations.

The Restricted Area R2203 (see Figure 2.2-3) constrains flight operations, as flight through R2203 is unsafe and prohibited when R2203 is scheduled for live-fire training. During interviews, JBER pilots stated that they consistently avoided R2203, regardless of whether there is a published schedule for live-fire training, to ensure safety. To adequately avoid R2203 during RW 06 departures, a pilot must begin his aircraft roll at the western end of RW 06 and sharply turn to the north after takeoff.

Additional constraints to runway use include topographic obstacles between the north end of RW 16 and Sixmile Lake (see Figure 2.2-3). These topographic obstacles interfere with the glide slope for arrivals on RW 16. F-22 departures from RW 34 can normally safely clear the obstacles without using afterburners, although afterburners are used when the aircraft is departing heavy, such as with attached fuel tanks for extended flight. A series of annual projects have removed the topographic obstacles to achieve a safer glide slope for RW 16 arrivals (see Chapter 5).

2.3 Identifying the Proposed Action and Alternatives

The Proposed Action and a series of alternatives are identified in Section 2.3.1 to address the constraints through changes to F-22 runway operations at JBER. The Proposed Action and alternatives are designed to address the purpose and need described in Chapter 1: to improve efficiency of F-22 operations at JBER that are currently constrained by the F-22 Plus-Up EA/FONSI (Air Force 2011) and FAA ODO restrictions, as well as other factors described in Section 2.2.3.

2.3.1 Alternatives to Address the Purpose and Need

This section describes runway use alternatives designed to address the purpose and need identified in Chapter 1. The Air Force must also consider reasonable alternatives identified during the scoping process or suggested by others, as well as combinations of alternatives. If the Air Force (or the public) identifies a large number of reasonable alternatives, the Air Force may limit alternatives selected for detailed environmental analysis to a reasonable range or number of examples covering the full spectrum of potential environmental effects of alternatives.


The alternatives are designed to efficiently achieve mission requirements while addressing restrictions that affect F-22 operations at JBER.

The alternatives carried forward for analysis in this EIS address variations in F-22 runway use. Other JBER flight operations, including JBER-based heavy aircraft, such as C-17s, and transients (see Table 2.2-1 and Table 2.2-2), are projected to continue to operate on JBER runways at the existing levels. Relevant environmental resource analysis in this EIS, such as noise analysis, includes all JBER flight operations.

There is a very large number of ways to distribute the 5,710 annual F-22 sorties among the four JBER runways. Although it is not possible to assess all of the different alternative runway distributions of F-22 operations, it is possible to identify alternatives that have the highest reasonable number of F-22 annual flight operations concentrated on each runway as constrained by operational, weather, and maintenance requirements. The alternatives described in this section distribute the potential annual F-22 operations among the runways to reflect the full spectrum of potential F-22 runway use. For any given time period, the operations could be concentrated on any runway to support such activities as runway maintenance, runway repaving, other construction, weather events, or mission requirements.

The alternatives have different distributions of F-22 flight operations on each of the existing runways and/or an extended runway: Table 2.3-1 summarizes the extent to which each alternative addresses the challenges identified in Section 1.1.3. Each alternative carried forward for analysis at least partially addresses approximately 80% of the JBER runway use challenges, which is the highest level that can be achieved given the constraints discussed in Section 2.2.3.2.

- **Alternative A: RW 34 for Departure; RW 06 Arrival:** Alternative A would distribute annual F-22 sorties to concentrate departures on RW 34 and arrivals on RW 06. Alternative A would allow F-22 operations to depart directly toward the most commonly used training airspaces.

- **Alternative B: RW 34 for Departure; RW 06 Arrival; RW 16/34 Extension.** Alternative B has the F-22 annual sorties distributed among the runways the same as for Alternative A. Alternative B would extend RW 16/34 to achieve a 10,000-foot runway using Military Construction (MILCON) funding and have increased maintenance costs. RW 16/34 is the only runway on JBER that could be extended. Port property to the west, close proximity of the community of Mountain View to the south, and the rail line and restricted airspace to the east would only permit a runway extension of RW 16/34 to the north.
- **Alternative C: RW 34 for Departure; RW 16 Arrival; RW 16/34 Extension.** Alternative C extends RW 16/34 to the north to achieve a 10,000-foot runway and F-22 departures would primarily use the extended RW 34, as described for Alternative B. F-22 arrivals would primarily use the extended RW 16. To support arrival of F-22 aircraft on the extended RW 16, Alternative C assumes runway scheduling could meet FAA ODO policy requirements by reversing direction of operations so that RW 16 and RW 34 would not be active simultaneously.
- **Alternative D: RW 06 for Departure and Arrival:** Alternative D would concentrate F-22 annual departures on RW 06 which would turn to the north within JBER airspace toward the most commonly used training airspaces. Alternative D would require an additional 10 to 15 minutes of F-22 taxi and hold time to depart on RW 06. Alternative D uses the same arrival to RW 06 as in Alternative A.
- **Alternative E: RW 24 for Departure; RW 06 Arrival:** Alternative E would concentrate F-22 annual departures on RW 24 which would turn north within JBER airspace toward the most commonly used training airspaces. Alternative E would use the same arrival to RW 06 as in Alternatives A and B. For the purpose of this EIS, Alternative E assumes JBER tower would be authorized to manage ODO as it was done in previous years.
- **Alternative F: RW 24 for Departure; RW 16 Arrival; RW 16/34 Extension.** Alternative F would combine the RW 24 departures from Alternative E with the RW 16 arrivals from Alternative C. Alternative F includes the Alternative B extension of RW 16/34 to the north to achieve a 10,000-foot runway. The annual F-22 sorties would have departures primarily on RW 24 and arrivals primarily on an extended RW 16.

NEPA requires that a No Action Alternative also be addressed in the EIS.

- **No Action Alternative:** The No Action Alternative is the baseline or existing condition for the affected environment in this EIS. The No Action Alternative is based on the runway usage from the F-22 Plus-Up EA (Air Force 2011), which maintains approximately 75 percent of the projected F-22 annual operations on RW 06/24 and 25 percent on RW 34. As of summer 2016, the Plus-Up EA/FONSI combined with the FAA ODO policy require that approximately one-half of the 75 percent of F-22 RW 06/24 departures be on RW 24 and one-half on RW 06.

Highest use of RW 16 was an alternative considered but not carried forward (see Section 2.4.8).

In summary, the alphabetical designation, or grouping, of the alternatives reflect similarities in the F-22 runway use patterns on the existing runways and/or an extended runway. Alternatives A, B, and C focus F-22 departures on RW 34, with varying arrival patterns on either RW 06 and RW 16. Alternatives D and E focus all F-22 operations on the east-west runways, RW 06 and RW 24. Alternative F combines the F-22 departures of Alternative E on RW 24, and the arrivals of Alternative C on RW 16.

2.3.2 Application of Purpose and Need Elements

Table 2.3-1 applies the elements of the purpose and need identified in Chapter 1 to the alternatives from Section 2.3.1.

Table 2.3-1. Applying Purpose and Need Elements to the Alternatives

Alternatives	Purpose and Need Elements				
	Achieves Mission Requirements Efficiently	Addresses 2011 EA/FONSI Restrictions	Addresses FAA ODO Policy	Addresses Airspace Safety Concerns	Addresses Community Noise Concerns
Alternative A (Proposed Action): RW 34 for Departure; RW 06 Arrival	• Using RW 34 for departure is efficient for both F-22 squadrons • Efficiency increased with 2.5–4.3% more airspace training time than No Action • Using RW 06 for arrivals requires inefficient approach	• 2011 EA/FONSI restriction addressed by the flexibility to use RW 34 for departures	• Using RW 34 for departure and RW 06 for arrival meets FAA ODO policy	• RW 34 departures safely direct departing aircraft away from the busy Anchorage Bowl • Continued safety concern with RW 06 arrival through multiple Anchorage Bowl airspace segments	• RW 34 departures have the potential to increase noise over off-base residential and other noise sensitive areas
Alternative B: RW 34 for Departure; RW 06 Arrival; RW 16/34 Extension	• Using RW 34 for departure is efficient for both F-22 squadrons • Efficiency increased with 2.2–4.0% more airspace training time than No Action • Using RW 06 for arrivals requires inefficient approach	• 2011 EA/FONSI restriction addressed by the flexibility to use RW 34 for departures	• Using RW 34 for departure and RW 06 for arrival meets FAA ODO policy	• RW 34 departures safely direct departing aircraft away from the busy Anchorage Bowl • Continued safety concern with RW 06 arrival through multiple Anchorage Bowl airspace segments	• Departures on the extended RW 16/34 have the potential to reduce noise over off-base residential and other noise-sensitive areas
Alternative C: RW 34 for Departure; RW 16 Arrival; RW 16/34 Extension	• Using RW 34 for departures is efficient for both F-22 squadrons • Efficiency increased with 8.5–10.5% more airspace training time than No Action • Arrival efficiencies achieved with RW 16 • Greater inefficiencies could arise from ODO constraints	• 2011 EA/FONSI restriction addressed by the flexibility to use RW 34 for departures	• Inconsistent with FAA ODO policy; Management of RW 16/34 required to address	• RW 34 departures safely direct departing aircraft away from the busy Anchorage Bowl • RW 16 arrivals address civil safety concerns by reducing arrivals on RW 06 through the Anchorage Bowl • Potential for decreased safety for military aircraft due to ODO	• Departures on the extended RW 16/34 have the potential to reduce noise over off-base residential and other noise sensitive areas

Table 2.3-1. Applying Purpose and Need Elements to the Alternatives (continued)

Alternatives	Purpose and Need Elements				
	Achieves Mission Requirements Efficiently	Addresses 2011 EA/FONSI Restrictions	Addresses FAA ODO Policy	Addresses Airspace Safety Concerns	Addresses Community Noise Concerns
				• Potential for increased interaction with general aviation at Sixmile Lake and with the Merrill Airspace Segment	
Alternative D: RW 06 for Departure and Arrival	• Increased inefficiencies result from taxiing to RW 06 and hold delay for arriving aircraft • Decrease of efficiency of 4.8–9.0% in airspace training time relative to No Action • Using RW 06 for arrivals requires inefficient approach	• Uses JBER runways to avoid 2011 EA/FONSI restrictions	• Using RW 06 for departure and arrival meets FAA ODO policy	• RW 06 departures safely direct departing aircraft away from the busy Anchorage Bowl • Departure on RW 06 requires avoiding restricted airspace for safety • Continued safety concern with RW 06 arrival through multiple Anchorage Bowl airspace segments	• Noise over off-base residential and other noise sensitive areas is not expected to discernably change
Alternative E: RW 24 for Departure; RW 06 Arrival	• Using RW 24 for departures is efficient for both F-22 squadrons • Efficiency increase of 1.9–3.6% in airspace training time relative to No Action • Using RW 06 for arrivals requires inefficient controlled approach • Greater inefficiencies could arise from	• Uses JBER runways to avoid 2011 EA/FONSI restrictions	• Inconsistent with FAA ODO policy; management of RW 06/24 required to address counterflow	• RW 24 F-22 departures for training turn north within JBER Class D airspace away from the busy Anchorage Bowl • Potential for decreased safety for military aircraft due to ODO • Continued safety concern with RW 06 arrival through	• Noise over off-base residential and other noise sensitive areas is not expected to discernably change

Table 2.3-1. Applying Purpose and Need Elements to the Alternatives (continued)

Alternatives	Purpose and Need Elements				
	Achieves Mission Requirements Efficiently	Addresses 2011 EA/FONSI Restrictions	Addresses FAA ODO Policy	Addresses Airspace Safety Concerns	Addresses Community Noise Concerns
	FAA ODO policy constraints			multiple Anchorage Bowl airspace segments	
Alternative F: RW 24 for Departure; RW 16 Arrival; RW 16/34 Extension	• Using RW 24 for departures is efficient for both F-22 squadrons • 7.4–9.3% increase in airspace training time relative to No Action • Efficiencies achieved with RW 16 arrival	• Uses JBER runways to avoid 2011 EA/FONSI restrictions	• Using RW 24 for departure and RW 16 for arrival meets FAA ODO policy	• RW 24 F-22 departures for training turn north within JBER Class D airspace away from the busy Anchorage Bowl • RW 16 arrivals address safety concerns by reducing arrivals on RW 06 through the Anchorage Bowl. • Potential for increased interaction with general aviation at Sixmile Lake and with the Merrill Airspace Segment	• Noise over off-base residential and other noise sensitive areas is not expected to discernably change
No Action Alternative: Departure 25% on RW 34; 75% on RW 06/24; Arrival on RW 06	• Does not achieve mission efficiencies • Using RW 06 for arrivals requires inefficient controlled approach	• 2011 EA/FONSI restriction continues	• FAA ODO restrictions as of summer 2016 met with limitations on RW 24 departures.	• Departure on RW 06 requires avoiding restricted airspace for safety • Continued safety concern on RW 06 arrival through the Anchorage Bowl	• No change to noise conditions

Notes:

[1] F-22 operational efficient training in the airspace is defined in Section 1.1.2; efficiency comparisons are based on the No Action Alternative with Plus-Up EA/FONSI and ODO constraints as of summer 2016. See Appendix B.1 for percentage calculations of efficiency.

Key:

2011 EA/FONSI = 2011 Plus-Up Environmental Assessment (EA) and the associated Finding of No Significant Impact (FONSI) (Air Force 2011)
FAA = Federal Aviation Administration
FS = Fighter Squadron
ODO = Opposite Direction Operations
RW = runway

2.3.2.1 Identification of Proposed Action

The Proposed Action involves the distribution of F-22 departures and arrivals on JBER runways. After consideration of relevant mission, operational, environmental, efficiency, and technical factors, as well as environmental consequences explained in the EIS, inputs from the public and regulatory agencies during scoping, and other relevant factors, the Air Force has identified Alternative A as the Proposed Action.

The Proposed Action would accomplish the purpose and need by removing the F-22 Plus-Up EA/FONSI RW 34 use constraints to flight operations and permitting flexible use of JBER runways based on airfield, weather, and air traffic conditions at the time. The Proposed Action would result in improved efficiency for the 5,710 annual F-22 sorties at JBER, allow flexible F-22 runway departure choices, provide for efficient access to training airspace, achieve ODO policy requirements, and provide for F-22 departures that would reduce congestion in the Anchorage Bowl airspace. The Proposed Action has the potential to increase off-base noise, and the effects of that noise are evaluated in Chapter 4.

2.3.2.2 Identification of Preferred Alternative

The Air Force has identified Alternative F as the preferred alternative. Alternative F includes the 2,500-foot extension of RW 16/34 to the north to achieve a 10,000-foot runway. The F-22 sorties would have departures primarily on RW 24 and arrivals primarily on an extended RW 16. Alternative F with an extended runway would substantially improve operational efficiency. Alternative F runway operations meet FAA ODO guidance with no change in departure safety due to the F-22's ability to depart from RW 24 and vector toward regular training airspace prior to exiting the Elmendorf airspace. Alternative F addresses F-22 Plus-Up EA/FONSI RW 34 restrictions and does not increase off-base noise. In addition to the Air Force's identification of Alternative F as the preferred alternative, some public and agency input on the Draft EIS expressed preference for a runway extension alternative (see Appendix A).

2.4 Details of Proposed Action and Alternatives

This section details runway use, runway construction, and construction-related project elements applicable to the Proposed Action and alternatives. Table 2.4-1 projects annual F-22 total sorties, arrival operations, and departure operations for the Proposed Action (Alternative A), Alternatives B, C, D, E, F, and the No Action Alternative. Figure 2.4-1 illustrates the runways at JBER and their operational directions for use with Table 2.4-1.

The F-22 runway use numbers for each alternative in Table 2.4-1 represent the F-22 five-year-high sortie count of 5,710. This sortie count represents a reasonable number of flight operations based on both F-22 squadrons operating at full strength at JBER. The runway use numbers are representative annual averages, and actual use during any given month, or during any given year, would be expected to vary due to deployments, mission requirements, construction, maintenance, and/or weather events.

The 5,710 projected F-22 sorties in Table 2.4-1 include an estimated 5,710 departure operations plus 5,710 arrival operations plus an estimated 857 second approach operations. This number of annual operations means that F-22 operations represent approximately one-third of all annual JBER operations (compare with Table 2.2-2). The acoustic analysis in Section 4.2 is a cumulative analysis that includes F-22, other JBER-based aircraft, and transient aircraft operations.

Table 2.4-1. F-22 Total Sorties and Flight Operations by Runway for the Proposed Action and Alternatives

Unit	Sorties / Year[1]	Departure Operations				Arrival Operations			
		RW 34	RW 06[2]	RW 24[3]	RW 16	RW 34	RW 06	RW 24	RW 16
Proposed Action: Alternative A (RW 34 Focus)									
3 WG F-22	5,710	4,335	900	470	5	444	5,231	7	28
Alternative B (RW 34 Focus with RW 16 Extension)									
3 WG F-22	5,710	4,235	900	570	5	444	5,231	7	28
Alternative C (RW 34 Focus with RW 16 Extension/Arrivals)									
3 WG F-22	5,710	4,235	900	570	5	144	800	7	4759[4]
Alternative D (RW 06 Focus)									
3 WG F-22	5,710	470	4,765	470	5	444	5,231	7	28
Alternative E (RW 24 Focus)									
3 WG F-22	5,710	470	900	4335	5	444	5,231	7	28
Alternative F (RW 24 Focus with RW 16 Extension/Arrivals)									
3 WG F-22	5,710	470	900	4335	5	144	800	7	4759[4]
No Action Alternative[5]									
3 WG F-22	5,710	1,422	2,140	2,143	5	444	5,231	7	28

Notes:

1. Each sortie normally includes one departure operation and one arrival operation and may include a second approach. Sorties/year are representative for the EIS analysis and are based on both F-22 squadrons at full strength all year.
2. RW 06 operations are proportioned from FY 2013 recorded use, including weather, runway maintenance, and recorded hot pits.
3. RW 24 departures based on mission requirements.
4. RW 16 arrivals assume instrument approaches using Tactical Air Navigation (TACAN) for the extended runway.
5. No Action Alternative assumes runway use adheres to the runway distribution in the 2011 EA/FONSI. Effects of variations in ODO for the No Action Alternative are explained in Section 2.7.

Key:
RW = runway
3 WG = 3rd Wing

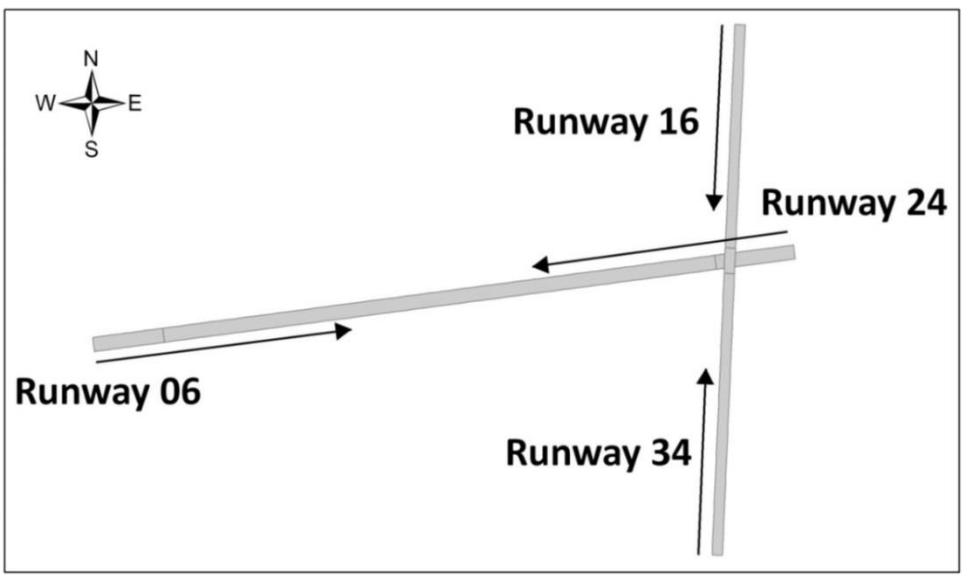

Figure 2.4-1. JBER-Elmendorf Runways and Operational Directions

The western end of RW 06 has an arm/disarm pad (hot pit), which is regularly used where aircraft are armed or disarmed for missions that involve deployment of ordnance. During training, or for other requirements, aircraft taxi to the west end of RW 06, are armed, and then depart on RW 06. This operational activity requires that a proportion of operations depart on RW 06 for all of the alternatives.

The F-22s have specific missions that depart RW 24, and Table 2.4-1 includes a proportion of operations departing on RW 24 for all of the alternatives.

Under all alternatives, the 3 WG F-22s would continue to conduct the required percentage (30 percent) of sorties after dark (i.e., about one hour after sunset) to fulfill the annual after-dark flying requirement under the Air Force's initiative to increase readiness. Aircrews operating from JBER-Elmendorf can normally fulfill the annual night flying requirements during winter months without flying after 10:00 PM or before 7:00 AM to be consistent with the JBER-Elmendorf noise abatement program. After 10:00 PM or before 7:00 AM is defined as environmental night for the purpose of assessing acoustical effects.

The Proposed Action and alternatives plus the No Action Alternative are described in Sections 2.4.1 through 2.4.7 and listed in Table 2.4-1. These runway use numbers reflect potential highest use F-22 departure operations for the runways given mission, maintenance, weather, and other requirements. Arrival operations by runway reflect the existing use of runways with established and/or projected F-22 flight profiles. The No Action Alternative, required to be addressed by NEPA, presents flight operations consistent with the constrained operations from the F-22 Plus-Up EA/FONSI (Air Force 2011) and FAA ODO policy restrictions as of summer 2016. As noted in Table 2.2-1, there are other JBER-based aircraft, as well as transient aircraft, which would be expected to continue to use JBER runways as they currently do. All annual flight operations from Table 2.2-2 are included in the acoustic analysis in this EIS.

2.4.1 Alternative A: RW 34 for Departure; RW 06 Arrival (Proposed Action)

Alternative A would use RW 34 as the primary runway for F-22 departure and RW 06 the primary runway for arrival, as depicted in Figure 2.4-2, up to the number of operations presented in Table 2.4-1. Other runways would be used: (1) when RW 34 is unavailable due to weather events or maintenance; (2) when RW 06/24 is closed in the summer for maintenance, which would require use of RW 16/34 for arrivals and departures; (3) for operationally necessary and emergency operations; or (4) as necessary when airfield and air traffic conditions at the time require use of other runways. Weather events most commonly responsible for the unavailability of RW 34 are snow events where RW 06/24 and associated access are given snow and ice removal priority. This priority can render RW 34 unavailable for takeoffs for days or parts of days during an estimated 52 weather events per year, as was the case in the winter of 2012–2013. RW 34 availability can vary substantially depending upon annual weather events. During the winters of 2013–2014 through 2015–2016, JBER personnel and equipment were able to keep RW 16/34 open for F-22 operations. Though reduced snowfall affects the need for snow removal, conditions which increase rain during winter months can result in more ice on the runways, with an increased need for deicing operations (including chemicals) to keep runways and taxiways open and usable. The analysis uses the representative highest achievable number of operations for Alternative A presented in Table 2.4-1 to estimate potential on- and off-base environmental consequences.

RW 06/24 is closed for maintenance an average of one month per year in July/August and RW 16/34 is closed for maintenance for an average of two weeks per year. Table 2.4-1 presents the F-22 representative operational runway distribution for Alternative A, incorporating the annual average closure of RW 16/34 and RW 06/24 for runway maintenance, other required uses of RW 16/24, and winter of 2013–2014 through 2015–2016 snow events.

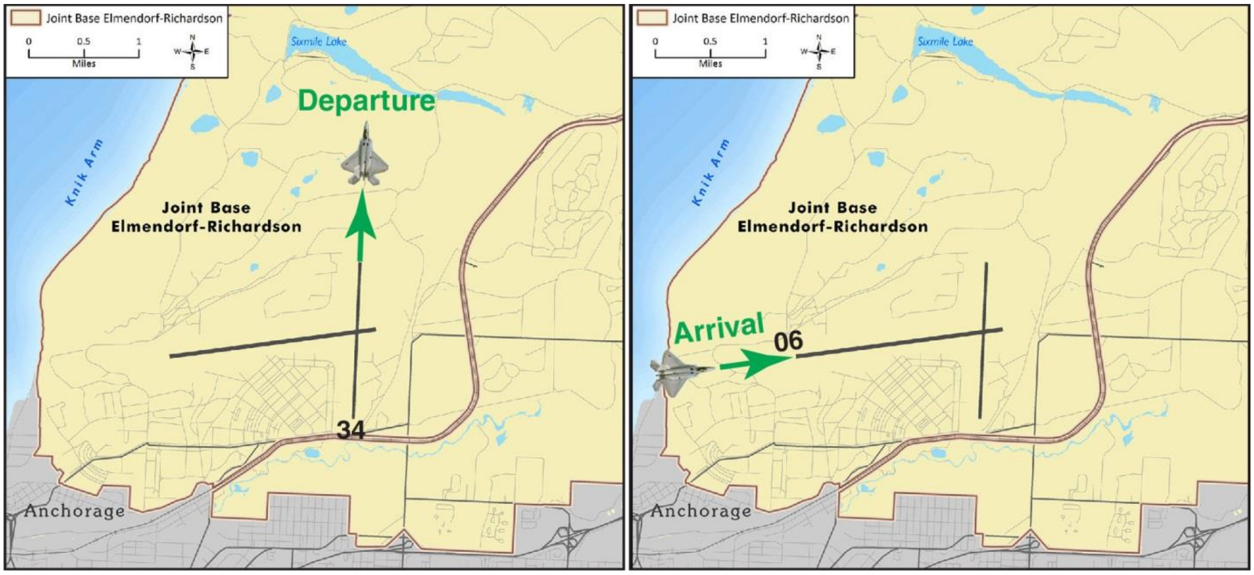

Figure 2.4-2. Alternative A (Proposed Action) Departure and Arrival Directions Representation: RW 34 for Departure; RW 06 Arrival

Safety to military and civilian pilots in the Anchorage Bowl is enhanced by RW 34 departures, which place F-22 aircraft away from civilian operations and directly vectors them to the most commonly used training MOAs. Arrival on RW 06 constrains F-22s to a long approach and restricts approach speeds and altitudes. The long approach continues the existing concerns for safety within the intersecting approach patterns of civil and military aviation (see Figure 2.2-3 and Figure 2.2-4).

F-22 departures on RW 34 are efficient. The use of RW 34 by the 90 FS requires approximately 5 minutes of additional taxi time when compared with RW 24, but RW 34 reduces flight time by approximately 30 seconds when compared with a RW 24 departure to the most commonly used MOAs (Fox, Susitna, and Stony) (Figure 2.2-2). Alternative A addresses F-22 Plus-Up EA/FONSI RW 34 use restrictions, and would address the 2014 FAA ODO policy with RW 24 departures limited to FAA-approved operations, emergencies, and operational necessity, such as first snow of the day and no time to clear, wind conditions favoring RW 24, and aircraft technical order guidance that would not allow a different runway usage. Alternative A would increase noise over off-base residential and other noise sensitive areas (see Section 4.2).

2.4.2 Alternative B: RW 34 for Departure; RW 06 Arrival; RW 16/34 Extension

Alternative B includes a 2,500-foot extension of RW 16/34 north of its present terminus to permit F-22 departures on RW 34 directly toward the training airspace while potentially limiting noise impacts south of the base. Alternative B has approximately the same representative F-22 operations as Alternative A with the number of RW 34 operations adjusted to reflect additional time for runway maintenance for a longer RW 16/34 (see Table 2.4-1).

The project includes the extension of RW 16/34 and two supporting taxiways, and provides appropriate shoulders, grading, drainage, arm and disarm pad, and airfield visual navigation aids required to accommodate the existing mission at JBER. The project will require substantial earth movement, both cutting and filling to extend the runway and comply with Unified Facilities Criteria (UFC) 3-260-01 imaginary surfaces criteria. In addition, the extension involves rerouting Airlifter Drive to the north and constructing a new airfield lighting vault (ALSF-1). The construction elements to extend RW 16/34 in Table 2.4-2 are based on a Preliminary Final Requirements Document and draft form DD 1391 prepared during fall 2016 (Jacobs 2016). A start date of FY 2019 with a three-year construction period was assumed for cost estimating purposes only (Jacobs 2016), but the actual start date is uncertain and could be further in the future. The table summarizes an estimate of the materials and other components associated with a 2,500-foot extension of RW 16/34 to achieve a 10,000-foot runway.

Table 2.4-2. Estimated Project Elements for Runway 16/34 2,500-Foot Extension

Project Element	Project Activity	Construction Action	Quantity
Excavate Existing Terrain	Mass excavation*	Construction Vehicles	15,310,690 yd^3
	Area affected including staging	Construction Vehicles	557 acres
Disposition of Excess Material	Tree/brush removal and disposal	Firewood/green waste (400 trees/acre at 0.33 yd^3/tree for 297 acres, haul 3 mi RT)	39,497 yd^3
	Haul, off-road, spoil material	3 mi RT for 20-yd^3 trucks	13,779,625 yd^3
	Haul, paved road, spoil material	8 mi RT for 20-yd^3 trucks	1,531,070 yd^3
Demolition	Demolition existing RW overrun	Landfill 3 mi RT; 20-yd^3 trucks	1,235 yd^3
	Demolition existing paved road	Landfill and/or reuse pavements	11,019 yd^3
	Demolition building (incl. slab)	Landfill 8 mi RT; 20-yd^3 trucks	7,672 yd^3
Runway and Taxiway Sub-base	Grading	Construction Vehicles	2,787,599 yd^2
	Gravel Base/subbase	Off-base source; 20-yd^3 trucks; 8 mi RT	292,620 yd^3
Drainage Design and Construction Asphalt Pavement	Gravel (base/subbase/erosion control)	Off-base source; 20-yd^3 trucks; 8 mi RT	26,859 yd^3
	Runway pavements	Off-base source; 20-ton trucks; 8 mi RT	60,029 ton
	Taxiway pavements	Off-base source; 20-ton trucks; 8 mi RT	70,628 ton
	Paved overrun	Off-base source; 20-ton trucks; 8 mi RT	22,131 ton
	Paved shoulders	Off-base source; 20-ton trucks; 8 mi RT	48,087 ton
	Arm-disarm pad	Off-base source; 20-ton trucks; 8 mi RT	19,090 ton
Runway Support Elements	Lighting building (50- x 20-foot vault)		1
	Barriers		All
	Navaids		All
	Runway lighting		All
	Airfield Fencing (remove & replace)		4,635 meters
Reroute Airlifter Drive to North	Gravel Base/subbase	Off-base source; 20-ton trucks; 8 mi RT	23,690 yd^3
	Roadway Pavements	Off-base source; 20-ton trucks; 8 mi RT	79,047 tons
Other Construction	Paint striping (linear meters)		30,470 linear meters
	Compaction (yd^2 or yd^3 at 1 yd deep)		293,823.03 yd^2
	Storm water, electrical, comm, trenching & backfill Soils redistribution (yd^3)		331,204 yd^3

Notes:

* Quantity estimated for a 50:1 glide slope, per Unified Facilities Criteria 3-260-01.

Key:

mi = miles
RT = round trip
yd^2; yd^3 = square yard; cubic yard

The direct construction environmental effects associated with a runway extension can be addressed based on the quantities presented in Table 2.4-2. For example, construction of a runway extension would disturb 557 acres and require excavation, soils compaction, preparation of the runway and taxiway sub-base, runway and taxiway pavements, reroute of Airlifter Drive to the north within the disturbed area, and relocation or addition of facilities such as barrier, lighting, and Navaids.

The construction estimates permit an evaluation of the environmental effects within the construction areas depicted on Figure 2.4-3. The estimates shown in Table 2.4-2 can be used to quantitatively evaluate environmental effects in terms of surface disturbed (terrain modification and disposal of excess excavated materials), number of construction vehicles required for excavation and construction activities, and computation of the natural resources (such as wetlands) within the disturbed area or disposal of excess cut material that could be directly affected.

Excavating Existing Terrain to Remove Topographic Barriers and Demolition of Existing Facilities

The existing terrain north of RW 34 consists of low vegetated hills. Constructing a 2,500-foot extension of RW 16/34 with the required 50:1 glide slope for landing aircraft, in accordance with UFC 3-260-01, would require substantial cut to establish a consistent grade and include removal of vegetation as well as disposal of excess fill. A runway extension at the required 50:1 glideslope can be achieved with reduced cut and fill by re-sloping the northern 1,000 feet of existing RW 16/34 to a 1 percent slope. This cut and fill quantity is included as part of the RW 16/34 extension.

Table 2.4-2 and Figure 2.4-3 present the estimated quantity and location of surface modification associated with a runway extension. Excavation of soils materials to achieve a safe arrival glideslope would be expected to affect wetlands within the extension area (see Table 2.4-2). Consistent with Executive Order (EO) 11988 and EO 11990, the Air Force has included notice that wetlands and/or floodplains may be affected. Specific mitigation requirements (e.g., purchase of wetland bank credits or in lieu payments) cannot be determined until the Section 404 permitting for a runway extension action. Effects upon wetlands for a runway extension are addressed in Section 4.5.

JBER is in the planning stages of a North Runway Hill Removal Project, which involves the removal of soil and the excavation of wetlands on a hill north of RW 16/34 and the placement of the fill material in a wetland area near the North End Borrow Pit (see Chapter 5). This project is an independent action to permit safe flight operations on RW 16/34, and as can be seen on Figure 2.4-3, it will impact a portion of the area that would be modified for a runway extension or used as the staging area. The amount of material to be removed for the North Runway Hill Removal Project has been accounted for in calculating the amount of excavated material for the proposed RW 16/34 extension.

Disposition of Excavated Material and Demolition Debris

The amount and location for excess fill disposal are presented in Table 2.4-2 and Figure 2.4-3, and the environmental effects are addressed in this EIS (Section 4.5). A total of approximately 15,310,690 cubic yards of excess excavated material (spoil material) will be disposed of on JBER in three existing gravel borrow pits with estimated 9+, 3+, and 2+ million cubic yard capacities, respectively (Figure 2.4-3).

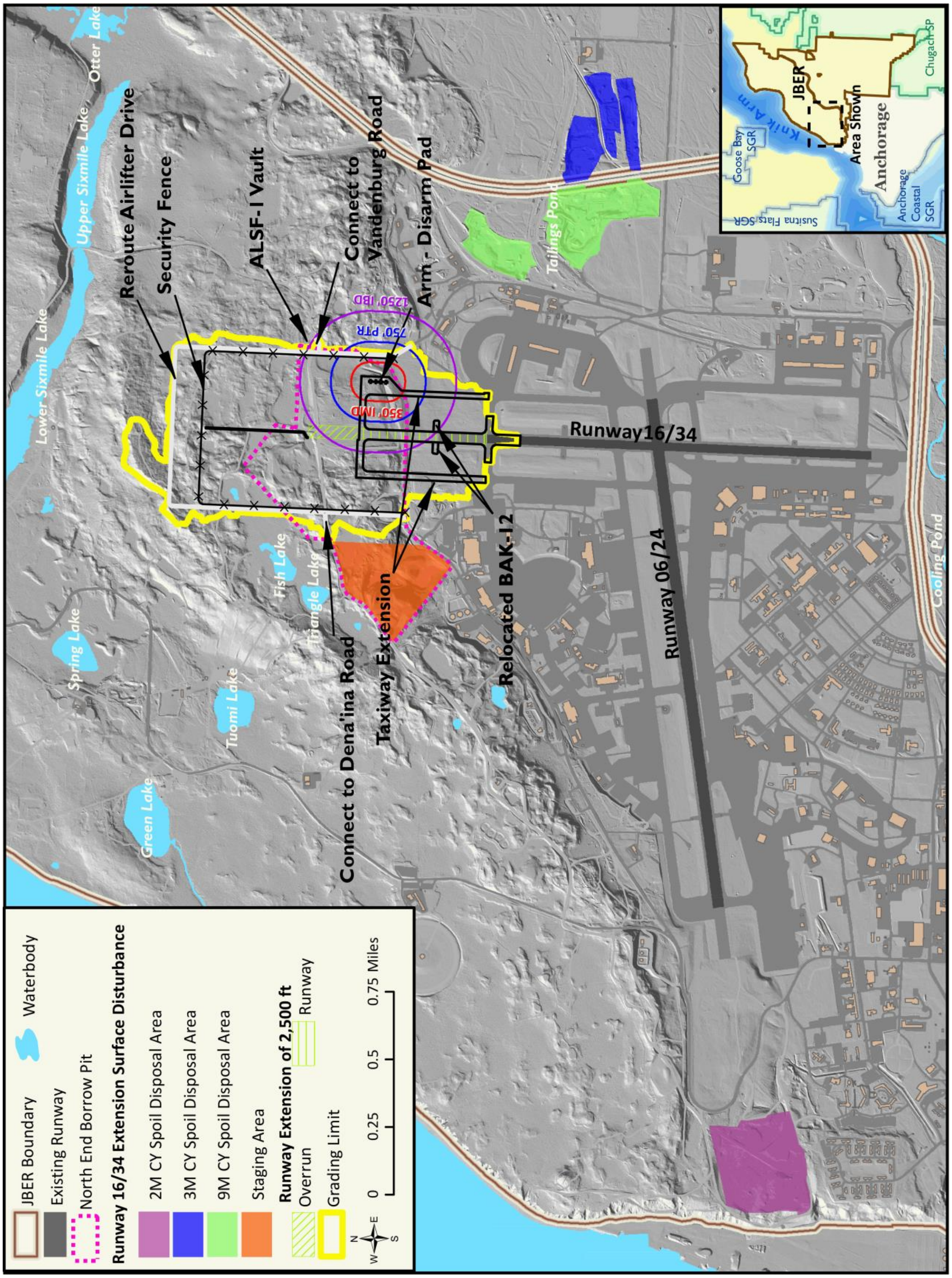

Figure 2.4-3. Runway 16/34 Extension and Associated Surface Modification

Runway, Overrun, and Taxiway Sub-Base Preparation

Runway, overrun, and taxiway construction would require sub-base materials compatible with runway and taxiway design. The source of the sub-base and paving materials could be from an on-site batch plant or by trucking from existing suppliers within the Anchorage area. The initial source of such materials is not known, but is assumed for the purpose of analysis to be from off-base suppliers. The quantities in Table 2.4-2 are used to estimate the area of sub-base and area covered with hard surfaces for environmental analysis.

Drainage Design and Construction

The calculated volume of surface water run-off associated with the impervious runway and taxiway surfaces from Table 2.4-2 are environmentally assessed. The preliminary design of runway drainage features, such as catch basins, and receiving waterways, as well as the construction of a runway drainage system is within the area of disturbance illustrated in Figure 2.4-3.

Runway and Taxiway Paving and Completion

Runway and taxiway paving would involve site preparation, emplacement of sub-base, and emplacement of paving materials, all using of heavy construction equipment. Layers of paving would be built up to achieve the necessary runway specifications. The quantities in Table 2.4-2 are used to estimate the area of pavement for the runway and taxiway and evaluate the environmental effects. Runway pavement finishing and striping would be similar to the annually scheduled maintenance and periodic repaving of the JBER runways.

Constructing and/or Relocating Runway Support Elements

Runway support elements include the RW 16/34 arm/disarm pad (hot pit), Navaids, lighting, arrestor barriers, signage, and other elements. Hot pit operations could occur at the new arm/disarm location at the northeast side of the extended RW 16. Elements such as runway lighting and signage are normal features on an active base. Installation of runway lighting also includes construction of a lighting vault – a 20-foot by 50-foot above ground facility housing regulators, controls, and other equipment necessary to provide power and control for airfield light systems (ALSF-1 vault). An arrestor barrier requires construction of an anchor system, which is done within the base in disturbed areas adjacent to the runway. Navaids are sited to meet specific requirements for safe arrival on a runway. The locations of Navaid sites and any access roads to service such locations are illustrated in Figure 2.4-3.

Roadway Relocation

Current Air Force policy (Air Force Instruction [AFI] 32-7063, AFH 32-7084) states that new roadways should be located outside the clear zone (CZ) for runways. As illustrated in Figure 2.4-3 extension of RW 34 north requires relocating a Airlifter Drive to north around the north end of the extension from Talley Avenue on the east side to Airlifter Drive on the west side of the RW 16/34 extension (see Table 2.4-2). Relocation of Airlifter Drive is planned to occur within the disturbed area to be re-contoured to achieve the proper runway arrival glide slope required by UFC 3-260-01. Relocation of Airlifter Drive does not result in any additional ground disturbance beyond that identified in Figure 2.4-3 and Table 2.4-2.

Flight Operations

The F-22 flight operations by runway for Alternative B are presented in Table 2.4-1, and depicted in Figure 2.4-4. This distribution of operations incorporates mission requirements, maintenance, and weather, as described for Alternative A. Alternative B operations in Table 2.4-1 are adjusted from Alternative A to reflect additional runway maintenance for a longer RW 16/34. A runway extension would result in an estimated 10 percent increase in runway surface area requiring annual maintenance and periodic repaving, increasing the time when the runway is unavailable for use. With the additional length on the north end of RW 34, F-22 departures would be able to initiate their takeoff roll approximately 2,000 feet north of the present start of takeoff and potentially limit noise over off-base residential and other noise sensitive areas. Alternative B arrivals would be primarily on RW 06.

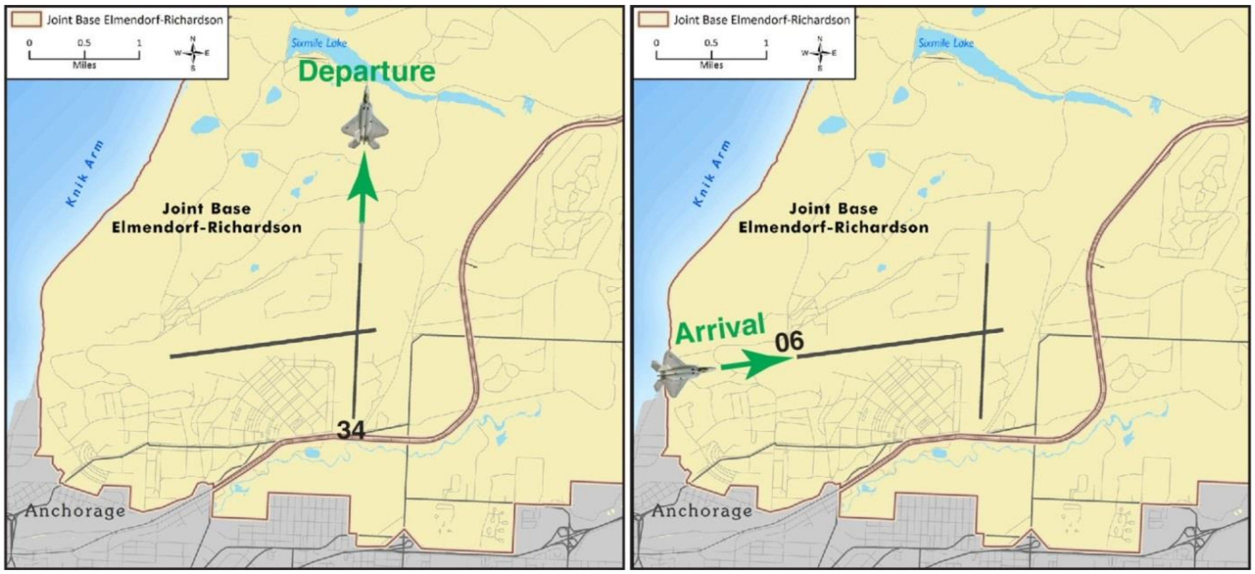

Figure 2.4-4. Alternative B Departure and Arrival Directions Representation: RW 34 for Departure; RW 06 Arrival; RW 16/34 Extension

Alternative B increases F-22 operations efficiency and addresses the F-22 Plus-up EA/FONSI RW 34 use restrictions. Alternative B addresses FAA ODO policy. Safety to military and civilian pilots in the Anchorage Bowl is improved north of JBER comparable to Alternative A. Alternative B with a departure part-way north on RW 34 has the potential to reduce noise effects over residential and other noise sensitive areas.

2.4.3 Alternative C: RW 34 for Departure; RW 16 Arrival; RW 16/34 Extension

Alternative C would extend RW 16/34 by 2,500 feet to achieve a 10,000-foot runway as described for Alternative B. Construction would be as described for Alternative B and as represented in Figure 2.4-5. RW 34 would become the primary F-22 departure runway, and RW 16 would become the primary F-22 arrival runway (Figure 2.4-5). RWs 06 and 24 would continue to be available for F-22 departure and arrival for certain required operations and during temporary closure of RW 16/34 for maintenance during the summer months. Use of RW 16/34 for both departure and arrival operations would not reflect FAA ODO policy and would require coordination with FAA to establish ODO management procedures.

Table 2.4-1 presents the representative distribution of F-22 operations for each runway. Hot pit operations could occur as described for Alternative B.

The F-22 arrivals presented in Table 2.4-1 for Alternative C reflect the highest reasonable number of VFR and IFR arrivals on RW 16 for the purpose of noise modelling and evaluation of acoustic effects over land and marine environments. The majority of F-22 IFR training and arrivals on an extended RW 16 could use the existing Tactical Air Navigation (TACAN) procedures. The establishment of a precision approach procedure for IFR arrival on an extended RW 16 is identified as a potential future independent project in Chapter 5, Cumulative Impacts.

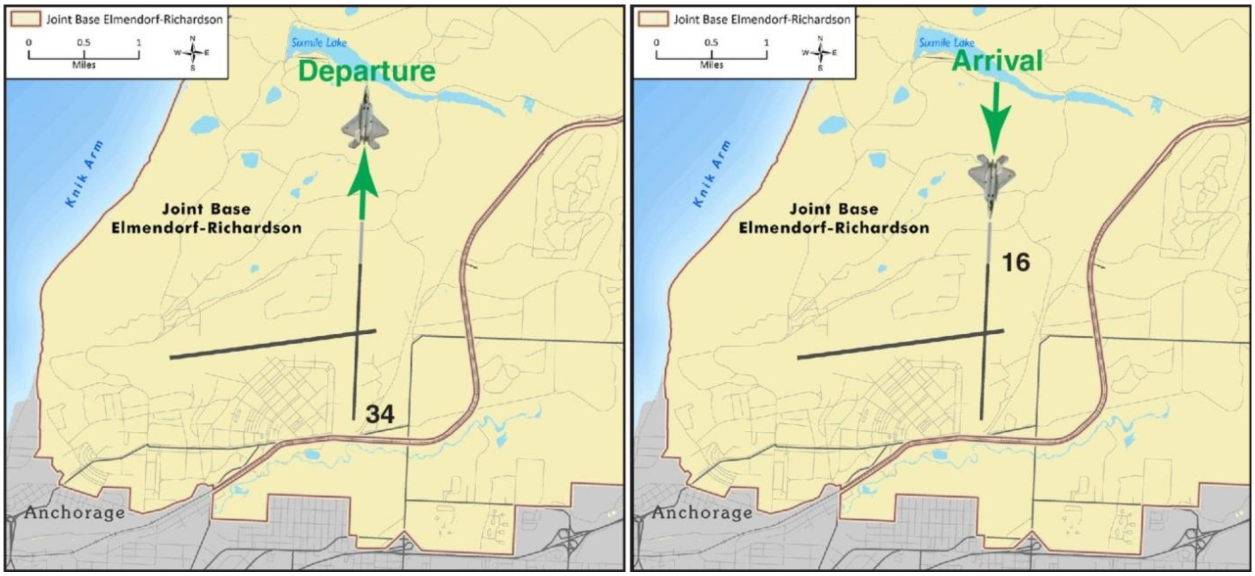

Figure 2.4-5. Alternative C Departure and Arrival Directions Representation: RW 34 for Departure; RW 16 Arrival; RW 16/34 Extension

Alternative C use of RW 16 for F-22 arrivals would improve safety for civil and military aviation in most of the Anchorage Bowl, since the long RW 06 approach for F-22 arrivals would not regularly be used. A lower overflight of Sixmile Lake could increase safety concerns with general aviation using the airfield and the lake. RW 16/34 ODO could affect safety for military operations and would require establishment of ODO management procedures in accordance with FAA ODO policy.

Alternative C improves operational efficiency, addresses F-22 Plus-Up EA/FONSI RW 34 use restrictions, is inconsistent with FAA ODO policy and would require management of counterflow operations, and enhances civil aircraft safety by avoiding the congested Anchorage Bowl for most departures and arrivals. With the additional length on the north end of RW 34, F-22 departures would be able to initiate their takeoff roll approximately 2,000 feet north of the present start of takeoff and potentially limit noise over off-base residential and other noise sensitive areas.

2.4.4 Alternative D: RW 06 for Departure and Arrival

Alternative D would have F-22s use RW 06 for departure and arrival, except: (1) when RW 06/24 is closed for maintenance or (2) when either RW 34 or RW 24 is needed for operationally necessary conditions or during high winds. The representative runway use for Alternative D is presented in Table 2.4-1 and depicted in Figure 2.4-6.

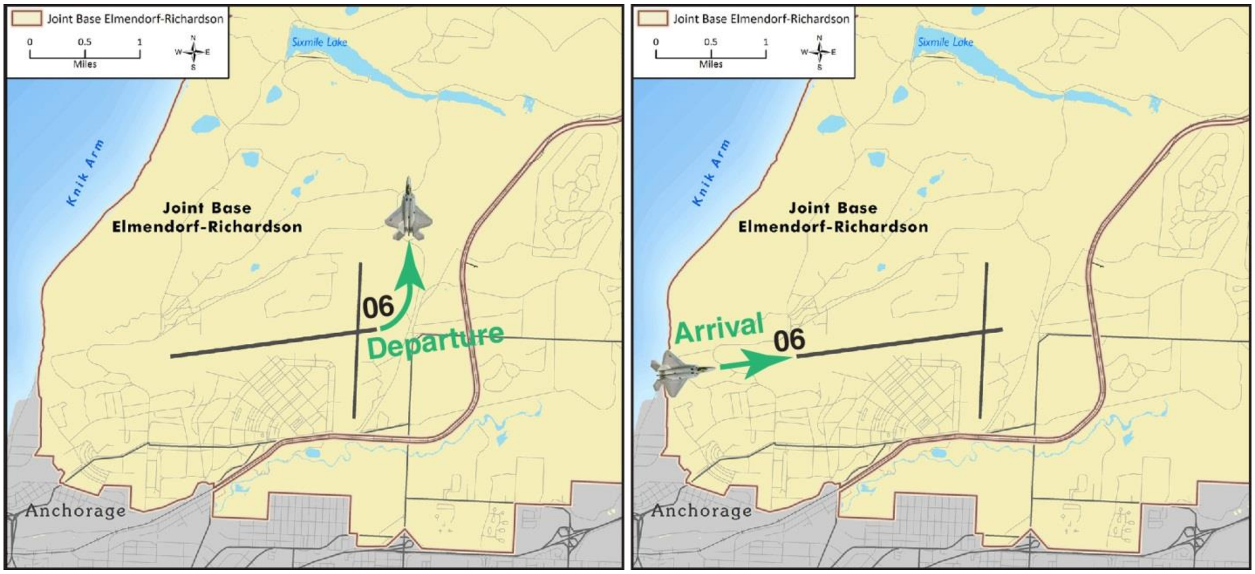

Figure 2.4-6. Alternative D Departure and Arrival Directions Representation: RW 06 for Departure and Arrival

F-22 operations under Alternative D would use JBER runways to avoid the F-22 Plus-Up EA/FONSI restrictions and would be consistent with FAA ODO policy. Departures on RW 06 are not efficient when compared with any other alternative, including the No Action Alternative. Runway 06 (RW 06) departures require the 90 FS and 525 FS F-22s to taxi for over 2 miles, or an additional 10 to 15 minutes, and potentially be on hold another 5 minutes prior to departure to allow for arriving aircraft.

RW 06 would continue to be available for F-22 traffic throughout the winter. There would continue to be summer runway maintenance, which would require using RW 16/34 for approximately 30 days per year.

Arrival on RW 06 constrains F-22 arrival operations to a long approach with restricted altitudes (see Figure 2.2-3 and Figure 2.2-4). The long approach through multiple Anchorage Bowl airspace segments continues existing concerns for safety within the intersecting approach patterns of civil and military aviation. Noise conditions over off-base residential and other noise sensitive areas would be expected to improve slightly under Alternative D.

2.4.5 Alternative E: RW 24 for Departure; RW 06 Arrival

Alternative E increases RW 24 departures by focusing departures for both the 90 FS and the 525 FS on RW 24 to the extent practicable. Table 2.4-1 presents the Alternative E projected departure and arrival operations by runway, which are also depicted in Figure 2.4-7. There would continue to be summer maintenance closure of RW 06/24, which would require shifting operations to RW 16/34 for approximately 30 days per year. Alternative E departures would generally be efficient for F-22 flight operations, although departures involve an approximate 30-second turn to the north toward normally used training airspace.

Continued arrival on RW 06 constrains F-22 arrival operations and continues existing concerns for safety within the intersecting approach patterns of civil and military aviation in the Anchorage Bowl. F-22 operations under Alternative E would use JBER runways to avoid the F-22 Plus-Up EA/FONSI restrictions. Use of RW 06/24 for both departure and arrival operations would not reflect FAA ODO policy and would require coordination with FAA to establish ODO management procedures Noise conditions over off-base residential and other noise sensitive receptors would be expected to slightly improve under Alternative E.

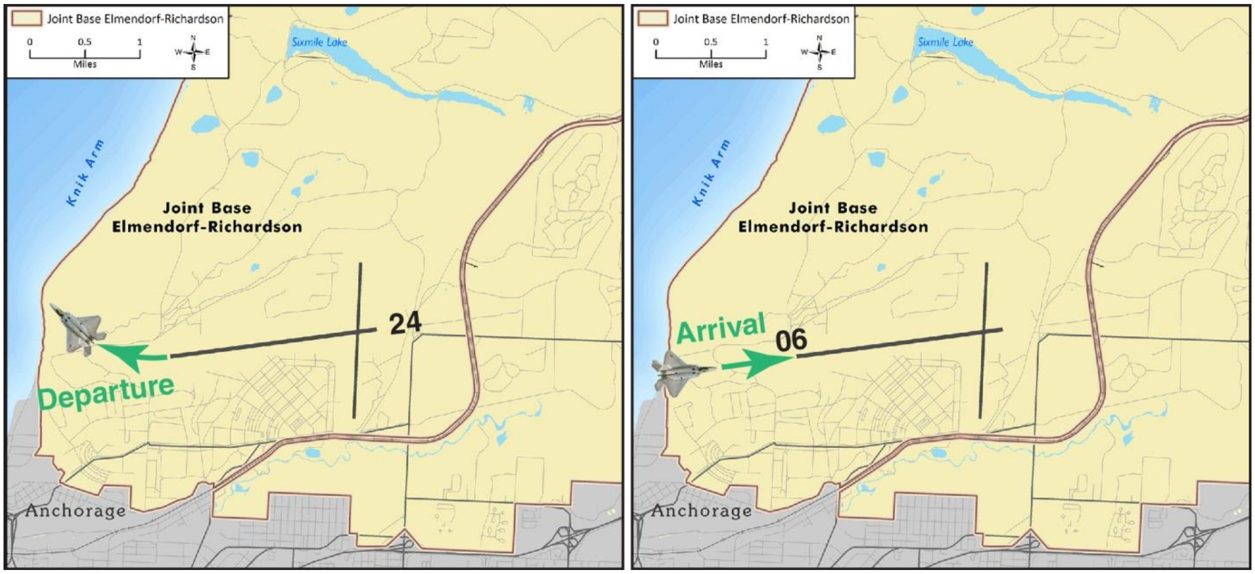

Figure 2.4-7. Alternative E Departure and Arrival Directions Representation: RW 24 for Departure; RW 06 Arrival

2.4.6 Alternative F: RW 24 for Departure; RW 16 Arrival; RW 16/34 Extension

Alternative F would extend RW 16/34 to the north to establish a 10,000-foot runway. Estimated construction would be as described for Alternative B and as represented in Table 2.4-2. Alternative F increases RW 24 departures by focusing departures from both the 90 FS and the 525 FS on RW 24 to the extent practicable. RW 16 would become the primary F-22 arrival runway, as described for Alternative C. Table 2.4-1 presents the Alternative F projected departure and arrival operations by runway, which are also depicted in Figure 2.4-8.

With Alternative F, both F-22 squadrons improve mission efficiencies by using RW 24 for departures and RW 16 for arrivals. F-22 operations under Alternative F would use JBER runways to avoid the F-22 Plus-Up EA/FONSI restrictions. Alternative F would not regularly use the long approach for RW 06 arrival and would improve safety conditions for aviation in most of the Anchorage Bowl. A lower arrival overflight of Sixmile Lake could increase safety concerns with general aviation using the airfield and the lake. The majority of F-22 IFR arrivals on an extended RW 16 could continue to use existing RW 16 TACAN or RW 06 precision approach procedures. Alternative F has the potential to reduce noise over off-base residential and other noise sensitive areas as a result of using RW 24 for most departures.

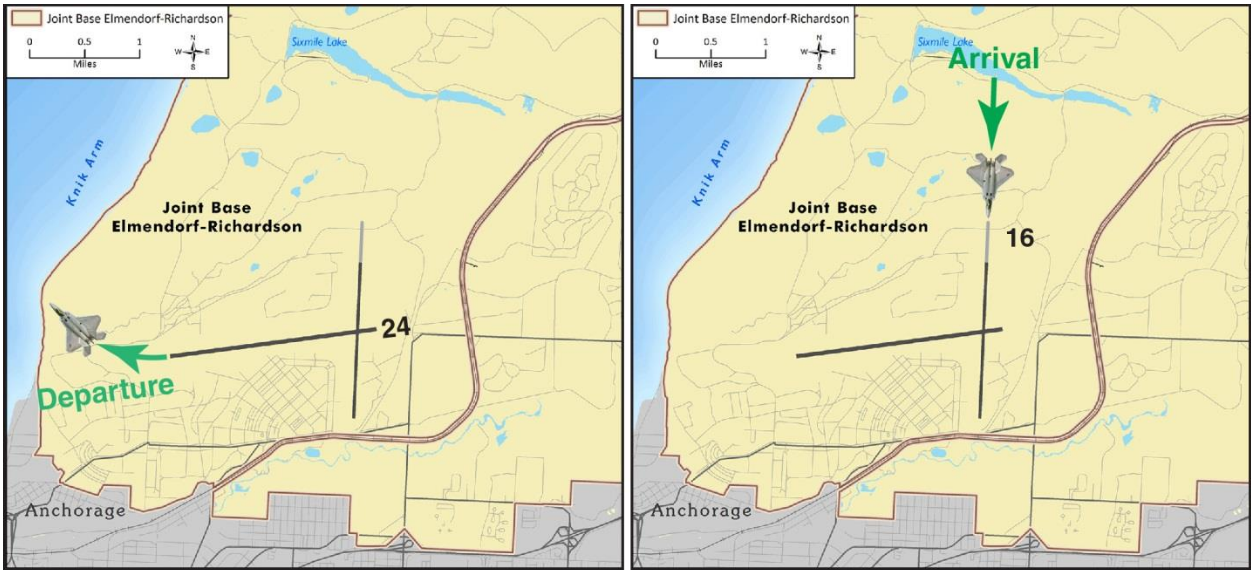

Figure 2.4-8. Alternative F Departure and Arrival Directions Representation: RW 24 for Departure; RW 16 Arrival; RW 16/34 Extension

2.4.7 No Action Alternative: F-22 Flight Operations Continue Constrained

NEPA requires that an EIS include the No Action Alternative, which is the baseline for this EIS analysis. The No Action Alternative is the present runway use. Based on all the activities that the Air Force is aware of and can factor into the analysis at this time, No Action runway use patterns would be expected to prevail in the future if no decision were made to change F-22 runway use beyond the constraints identified in Section 2.2.3.2 and summarized below. The affected environment represents the existing conditions to which each alternative is compared. F-22 representative flight operations for the No Action Alternative (Table 2.4-1) use the runway operation distribution from the F-22 Plus-Up EA/FONSI (Air Force 2011) and the FAA ODO policy restrictions as of summer 2016. The F-22 Plus-Up EA/FONSI includes a requirement not to exceed 25 percent of departures on RW 34 and 75 percent of departures on RW 06/24 (primarily on RW 24). Additional No Action runway use constraints from FAA ODO policy result in approximately 37 percent of annual departures on RW 24. Under the No Action Alternative, runway use would include RW 06 for hot pit operations and continue to be affected by runway maintenance, weather conditions, airspace constraints, and similar existing factors. No Action would not have construction and would continue current maintenance levels. The No Action Alternative does not change noise over residential and other noise sensitive areas, does not improve airspace safety. The No Action Alternative is less efficient than the Proposed Action and the other alternatives in this EIS, except for Alternative D.

2.4.8 Alternatives Considered but not Carried Forward for Analysis

The following alternatives were considered but not carried forward for analysis.

2.4.8.1 Relocation of F-22 Squadrons

During scoping, the possibility of relocating the F-22 squadrons to other bases or airfields within Alaska was raised. The explained purpose of the Proposed Action is to improve efficiency through runway use flexibility. JBER has an investment of over $400 million in F-22 facilities in 2005 dollars. Relocating the F-22 squadrons to another location in Alaska would involve investment in new facilities for the aircraft as well as for personnel and support capabilities. Such expenditure would be contrary to the purpose to improve efficiency. Alternatives that involved relocation of the F-22 squadrons were considered but not carried forward as viable alternatives in this EIS.

2.4.8.2 Use of RW 16 for Departure

Highest use of RW 16, as currently configured, was an alternative considered, but not carried forward. Departure from the existing RW 16 would have F-22 aircraft departing to the south over nearby off-base communities and into congested civilian airspace. As currently configured, RW 16 has limited departures and/or arrival use and is not included as a highest use runway alternative.

2.4.8.3 Extension of RW 16/34 at the Existing RW 16/34 Slope

Alternative RW 16/34 extension design details were considered during preliminary design. The guidelines for runway extension require that the slope of the extended runway be not more than one percent. The approximate slope of RW 16/34 is 0.4 percent, and extension of RW 16/34 at the existing slope would require extensive cut and fill which had the potential to increase both economic costs and environmental impacts. Current RW 16/34 preliminary design to reduce economic and environmental costs has approximately the last 650 feet of the existing runway removed and a slope designed to change the runway grade from 0.4 percent to a 1.0 percent grade. The final design has the advantage of substantially less earthwork than would be the case if the runway were extended at the existing slope. Extending the runway by using the existing runway slope was an alternative considered but not carried forward.

2.4.8.4 Other Considerations

Other alternatives were considered but not carried forward for analysis in this EIS. During the alternative development process for the EIS, reviewers conceptualized multiple options for different runway use, potential relocation of aircraft, changes to flight operations at other regional airports, or changes to off-base conditions. A number of options were considered but not carried forward for environmental analysis because they did not meet the purpose of, and need for, the project to a reasonable degree or could not be implemented by the 3 WG at JBER.

2.5 The Environmental Impact Analysis Process

NEPA requires consideration of environmental issues in federal agency planning and decision making. Under NEPA, federal agencies must prepare an EA or EIS for any major federal action, except those actions that are determined to be "categorically excluded" from further analysis. The EIS involves several steps, which are depicted in Figure 2.5-1. The EIS steps provide for a public review of all information pertinent to the Proposed Action, alternatives to accomplish the Proposed Action, and the No Action Alternative. The review provides a full and fair discussion of potential consequences to the natural and human environment resulting from implementing improvements in F-22 operations efficiency at JBER, Alaska.

2.5.1 Lead and Cooperating Agencies

The Air Force is the proponent for this proposal and is the lead agency for preparation of the EIS. A cooperating agency is defined by CEQ regulations as any federal agency other than a lead agency having jurisdiction by law or special expertise with respect to any environmental issue involved in a proposal (40 CFR 1508.5). To date, the Air Force has not received cooperating agency requests from other agencies for this EIS, nor has the Air Force identified or recommended cooperating agency status for any other agencies.

2.5.2 Coordination for Environmental Planning and Scoping

Scoping is an early and open process for developing the breadth of issues to be addressed in the EIS and for identifying agency and/or public concerns related to a proposed action. The Air Force notified federal, state, and local authorities who may be affected by the Proposed Action or alternatives. The Air Force initiated the scoping and coordination process by sending letters to local, state, and federal agencies informing them of the Air Force's intent to prepare the EIS. The EIS alternatives presented in Table 2.4-1 were briefed to the public and agencies. To the extent possible, scoping comments were used to shape the environmental analysis and focus the issues within this EIS. Comments on the Proposed Action and Alternatives will continue to be accepted throughout the environmental process.

Figure 2.5-1. EIS Timeline

The Air Force published a notice of intent to prepare the EIS in the *Federal Register* on September 22, 2015. Scoping (40 CFR 1501.7) for the EIS was conducted from September 22, 2015, through October 27, 2015.

In addition to utilizing the Agency Coordination letter process, the Air Force held an open-house style public scoping meeting in Anchorage, Alaska, on October 14, 2015, where the public was encouraged to provide written comments. Table 2.5-1 presents details on the public scoping meeting. Throughout the scoping period, the Air Force has actively solicited comments through press releases, newspaper ads, flyers, web posting, and similar communications channels.

Table 2.5-1. Public Scoping Meeting Date and Location

Meeting Date, Time, Description	Location	Number of Attendees	Number of Comments Received
• October 14, 2015, from 6:00 – 8:30 PM – Informal open house, discussions with project representatives; project presentation at 6:20 PM – 6:45 – 8:30 PM: open house, discussions continued	Tyson Elementary School 2801 Richmond Avenue Anchorage, Alaska	2	0

Over the 36-day comment period, two comments were submitted as shown in Table 2.5-2. The "EIS Section" column lists the sections in the EIS where the response may be found.

Table 2.5-2. Scoping Participation by Source

Resource Area/Category	Number of Comments	Percent of Total	EIS Section
Acoustic Environment	2	100	Sections 3.2, 4.2
Total	**2**	**100**	

2.5.3 Draft EIS Public and Agency Review

The public review and comment period for the Draft EIS started on August 4, 2017 and ended on September 19, 2017. Notification of the availability of the Draft EIS was made through the *Federal Register*, newspaper display advertisements, press releases, public service announcements, and letters accompanying the direct mailing of the Draft EIS document. The Draft EIS document was posted on a publicly available website at http://www.jberf22eis.com. Copies of the Draft EIS document were sent to federal, state, and local agencies, Alaska Native groups, and special interest groups. The Draft EIS was also sent to citizens or entities that requested a copy and was made available at libraries throughout the region of influence (ROI).

The Air Force held a public hearing at Clark Middle School in Anchorage on Wednesday, August 23, 2017, from 6:00 to 9:00 pm. Clark Middle School was chosen due to its location in the community of Mountain View, which is the off-base community with the most potential to be affected by the Proposed Action. Comments were received through the mail, e-mail, and the website, and were submitted in writing or presented verbally at the public hearing. While all comments submitted were assessed and considered by the USAF, only substantive comments are addressed either individually or collectively in the Final EIS. Substantive comments are those that identify issues and concerns related to the quality of the document in consideration of the accuracy of the facts, adequacy of analysis, precision of language, consistency of analysis or facts, justifications for conclusions, and/or the merits of other alternatives than those discussed. 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. All of the comments received during the 45-day comment period are contained in Appendix A, Section A.10.

The Air Force appreciates submission of all comments. The fact that a change in the Proposed Action or the EIS analysis did not occur as a result of a comment does not reduce the value of the comment or an individual's participation in the Environmental Impact Analysis Process (EIAP). Public and agency involvement is an important part of the NEPA process, and all comments were considered by the Air Force during its decision-making process.

2.5.4 Consultation/Coordination Requirements

Consultation/coordination requirements with various authorities while conducting the EIAP are listed in Table 2.5-3. The Air Force is committed to work with state and federal regulatory agencies with special expertise in addressing potentially affected environmental resources.

Table 2.5-3. Consultation/Coordination Requirements

Consultation/ Coordination	Topics	Statutory/Regulatory Authorities	Status of Consultation/ Coordination
Alaska Native groups	Government-to-government consultation with Alaska Native groups.	Executive Order 13175; DODI 4710.02, and AFI 90-2002	Consultation was conducted, and the Air Force did not receive any expression of concerns regarding protected tribal resources, tribal rights, or Indian Lands.
Federal Aviation Administration	Anchorage Bowl Airspace	49 U.S.C. Transportation Subtitle VII – Aviation Programs Part A – Air Commerce and Safety; 49 U.S.C. § 40101-40104	Coordination ongoing.
Federal Emergency Management Agency	Floodplain definition	Executive Order 11988, Floodplain Management	The Air Force provided early notice to the public of potential floodplain/wetlands impacts in the Notice of Intent for this EIS.
National Marine Fisheries Service	Protected species (marine mammals and other protected marine species).	Marine Mammal Protection Act, 16 U.S.C. 1361, 50 CFR Part 218; Endangered Species Act (ESA), 16 U.S.C. § 1531 et seq.	ESA Informal Consultation concluded; finding of "may affect not likely to adversely affect" the CIBW and the Stellar sea lion as a result of F-22 overflights, applicable to all of the EIS alternatives.
State Historic Preservation Officer (SHPO)/Advisory Council on Historic Preservation	Buildings, sites, districts, structures, objects, or traditional cultural resources eligible for, or listed on the National Register of Historic Places within the area of potential effect of the undertaking.	National Historic Preservation Act, Title 54 U.S.C. (PL113-287); 36 CFR Part 800	Consultation completed, with AK SHPO concurrence on the finding of "no historic properties affected" for Alternatives A, D, E, and No Action; and "no direct effect or adverse indirect effect to historic properties" for Alternatives B, C, and F.
U.S. Army Corps of Engineers	Authorization to incur impacts to jurisdictional wetlands.	Section 9, 10 Rivers and Harbors Act of 1899; Section 404 of the Clean Water Act (including Section 401 certification from the State of Alaska) (33 CFR Parts 320-332); Executive Order 11990, Protection of Wetlands; Executive Order 11988, Floodplain Management;	Consultation would be conducted prior to implementation of a runway extension Alternative B, C, or F.

Table 2.5-3. Consultation/Coordination Requirements (continued)

Consultation/ Coordination	Topics	Statutory/Regulatory Authorities	Status of Consultation/ Coordination
U.S. Fish and Wildlife Service	Protected species (threatened/ endangered species; migratory birds, bald and golden eagles).	Endangered Species Act, 16 U.S.C. § 1531 et seq., 50 CFR Part 17; Migratory Bird Treaty Act; 16 U.S.C. §§703-712, 50 CFR Part 21; Bald and Golden Eagle Protection Act, 16 U.S.C. 668-668c, 50 CFR Part 22	Coordination concluded.

Key:
AFI = Air Force Instruction
CIBW = Cook Inlet beluga whale
CFR = Code of Federal Regulations
DODI = Department of Defense Instruction
U.S.C. = United States Code

2.5.5 Consultation with Alaska Native Groups

In accordance with EO 13175; DoD Instruction (DODI) 4710.02, and AFI 90-2002, the Air Force conducts government-to-government consultation with federally recognized Alaska Native tribes, Alaska Native corporations, or Alaska Native groups that might have an interest in the proposed action. The Air Force initiated the government-to-government consultation process for this Proposed Action by submitting letters, on two occasions, to Alaska Native groups informing them of the Air Force's intent to prepare the EIS and inviting them to meet to discuss issues that have the potential to significantly affect protected tribal resources, tribal rights, or Indian Lands (Appendix A, Section A.6). As of Winter 2017, no Alaska Native groups have responded to the Air Force's written invitation to discussions regarding the Proposed Action and alternatives and the potential to significantly affect protected tribal resources, tribal rights, or Indian Lands. The Knik Tribe did submit written comments on the Draft EIS, which are included in Appendix A, Section A.10.

The proposed extension of RW 16/34 (north/south) has been briefed regularly at JBER's Encroachment Partnership Meetings conducted to review government, community, and Air Force activities. Alaska Native Groups are invited to, and participate in, the meetings; for example, the village corporation, Eklutna, Inc., was represented at the briefing of the proposal to extend the runway on January 9, 2017. The Air Force continues to conduct government-to-government discussions and briefings to insure that tribes and Native Corporations understand, and have the opportunity to participate in, review of Air Force activities which could have the potential to affect tribal and/or Native Corporation interests. To the extent possible, consultation comments are used in the analysis to address the issues within this EIS.

2.5.6 Scope of Resource Analysis

The EIS addresses all environmental resources which have the potential to be affected by implementing F-22 operation efficiencies at JBER.

The following environmental resources are analyzed in this EIS:

- Airspace management and use
- Acoustic environment
- Safety
- Hazardous materials and waste management
- Air quality
- Physical resources (earth resources, water resources, and wetlands)
- Biological resources
- Cultural resources (including tribal/Alaska Native concerns)
- Land use and recreation
- Transportation and Circulation
- Socioeconomics
- Environmental Justice and Protection of Children

Since there would be no change in base population, no change in potable water or natural gas use is anticipated, and wastewater and solid waste generation will remain the same. Electrical use would have imperceptible changes from additional runway lighting under the three alternatives that include extension of RW 16/34. Therefore, these resources are not included for detailed analysis in this EIS.

2.6 Mitigation Measures

Mitigation measures are identified for potential adoption where management actions are unable to avoid or otherwise reduce an impact that would have a regulatory basis, such as impacts upon USACE-regulated wetland areas.

Mitigation measures can include: (1) avoiding an impact by not taking a certain action or parts of an action; (2) minimizing an impact by limiting the degree or magnitude of the action and its implementation; (3) rectifying an impact by repairing, rehabilitating, or restoring the affected environment; (4) reducing or eliminating an impact over time by preservation and maintenance operations during the life of the action; and/or (5) compensating for an impact by replacing or providing substitute resources or environments (40 CFR Section 1508.20).

This section identifies resource-specific mitigations to address potential impacts or identified significant impacts associated with each runway use alternative. Where an alternative would have an unavoidable impact that the Air Force cannot mitigate, such unavoidable impacts are identified in this EIS for decisionmakers.

Airspace Management and Use (Section 4.1)

Impacts to airspace management and use would be minimal under any of the alternatives, including No Action. There is no proposed change in JBER Class D airspace or in any other Anchorage Bowl airspace.

The Air Force would continue to closely coordinate with FAA and civil aircraft operators to mitigate for potential impacts of the increased frequency of lower overflights of the Knik Arm and Sixmile Lake under Alternative B, C, or F.

Acoustic Environment (Section 4.2)

There is no off-base increase in acoustic effects for Alternative B, Alternative C, Alternative D, Alternative E, or Alternative F. No noise impact mitigation measures are proposed for any of these alternatives.

Alternative A results in increased noise impact to a calculated 424 persons in the community of Mountain View. Provision of funds for additional structural noise attenuation off-base is not currently an action that the Air Force is authorized to carry out. There are no mitigations proposed to address this unavoidable impact.

JBER would continue to undertake the following actions to address concerns for noise issues associated with flight operations.

- JBER will continue to adhere to reduced operations during late night hours except as required for missions to minimize acoustic effects. The seasonal variation in daylight permits F-22 pilots to achieve most of their annual after dark training in wintertime without late-night flights.
- JBER will continue to provide public information when seasonal runway maintenance requires increased flight operations that contribute to off-base acoustic impacts. This information does not reduce noise levels but it has the potential to reduce complaints of annoyance.
- JBER will continue to provide public information when exercises, such as Red Flag Alaska, change flight patterns and include the duration of such exercises in the public information.
- JBER flight operations will adhere to established and/or adjusted flight profiles to maintain altitudes over sensitive habitat and minimize any potential acoustic or visual impact to species such as the CIBW.
- The Air Force will continue to work with the affected communities, per the AICUZ guidelines, to help communities avoid acoustic impacts.

Safety (Section 4.3)

Alternatives that would extend RW 16/34 have the following mitigations, which would be undertaken at JBER to avoid and/or minimize, to the extent practicable, any environmental impacts to safety associated with the improvement of F-22 operational efficiency.

- Expansion of the JBER BASH program to include newly affected areas for Alternative B, Alternative C, and Alternative F would reduce impacts to safety. Areas where vegetation is removed would be restored or revegetated with upland species, to minimize the bird-aircraft strike hazard within the safety area of military aircraft takeoff and landing.
- For Alternative C and Alternative F, the Air Force would work with the FAA to address F-22 arrival flight patterns and missed approach procedures associated with arrivals on an extended RW 16 to minimize potential interaction between military and civil aircraft in the Anchorage Bowl. If acceptable FAA and Air Force missed approach procedures cannot be established,

JBER would use the existing TACAN procedures for arrival on RW 16 and/or the established RW 06 procedures for instrument approach. As explained in Section 5.2.1, the FAA is conducting an independent study to assess military and civil aircraft operations in the Anchorage Bowl, including an Instrument Landing System (ILS) approach to RW 16/34.

Air Quality (Section 4.4)

For Alternative A, Alternative D, Alternative E, and No Action, there would be no air quality impacts; therefore, no mitigation is proposed for these alternatives.

The following mitigation measures would be undertaken at JBER to minimize emissions and avoid, to the extent practicable, potential environmental impacts to air quality associated with the runway extension under Alternative B, Alternative C, or Alternative F.

- Identify and implement best management practice (BMP) construction measures to control/reduce wind erosion, including:
    - Site watering;
    - Installations and regular inspection of all emission control devices on construction equipment;
    - Reduce/eliminate excess equipment and machine idling; and
    - Place gravel at ingress/egress of the construction sites to minimize transport of dust off site.

Physical Resources (Section 4.5)

For Alternative A, Alternative D, Alternative E, or No Action there would be no effects to any physical resources, and, therefore, no mitigation measures are proposed for any of these alternatives.

The following mitigation measures would be undertaken at JBER to reduce, to the extent practicable, environmental impacts to physical resources associated with Alternative B, Alternative C, and Alternative F that would involve RW 16/34 extension construction.

- Develop a site-specific SWPPP as part of the required construction National Pollutant Discharge Elimination System (NPDES) storm water permit, that would specify standard erosion control practices to be implemented to eliminate or reduce sediment and non-storm water discharges, including:
    - Use of mulch or artificial cover where repeated disturbance is expected, and
    - Stabilization of soil within 30 days of final disturbance through vegetative or permanent artificial means (e.g., paving or rip-rapping).
- Ensure that contracts specify, and contactors adhere to, all DoD, JBER, and state of Alaska standard operating procedures for construction, operation of vehicles, and spill prevention.
- Ensure that construction activities are conducted in accordance with the applicable storm water discharge permit for any areas that result in soil disturbance.
- Identify and implement BMP construction and vehicle operation measures to control/reduce wind erosion and control emissions, including:

  - Site watering, and
  - Placing gravel at ingress/egress of the construction sites to minimize transport of dust off site.

- Place groundwater monitoring wells and piezometers in locations where there is a potential for indirect adverse impacts to hydrology.
- Construct retaining walls or install a drainage system, if needed, to minimize changes in hydrology due to potential indirect impacts.
- Coordinate with the USACE to determine the jurisdictional status of 28 acres of wetlands that are expected to be unavoidably impacted during the construction of the runway extension. The final impacted wetland acres would be delineated to determine precise wetland boundaries and the function and value of those approximately 28 acres of wetlands as part of site design. Coordination would be in compliance with EO 11990, *Protection of Wetlands*. Jurisdictional wetland impacts that cannot be avoided or minimized may require compensatory mitigation, to be determined by the USACE. Mitigation requirements may be determined using a debit-credit calculation approved by the USACE, such as the Methodology published for public comment in April 2016 (USACE 2016).

Hazardous Materials and Waste Management (Section 4.6)

For Alternative A, Alternative D, Alternative E, and No Action, there would be no hazardous materials and wastes impacts and, therefore, no mitigation is proposed for these alternatives.

The following mitigation measures would be undertaken at JBER to avoid, to the extent practicable, potential environmental impacts associated with the generation and disposal of hazardous materials and waste management for Alternatives B, C, and F that would involve RW 16/34 extension construction.

- Prepare/update, as needed, on- and off-site hazardous materials handling and waste disposal information.
- Prior to implementing a runway extension construction project, prepare, with agencies, the required updates to required hazardous materials handling and waste disposal permits and procedures.
- Require adherence to established JBER procedures for all hazardous materials and/or waste in all construction contracts.
- Handle, store, and dispose of all hazardous materials and construction debris in accordance with existing laws and established JBER procedures.
- Handle any undocumented contaminated soils in accordance with established JBER procedures during surveys and/or construction.
- Perform a Munitions and Explosives of Concern Investigation prior to construction.

Biological Resources (Section 4.7)

For all alternatives, JBER would:

- Continue to implement conservation measures for the protection of the CIBW as well as other marine mammals in Knik Arm and to minimize impacts to the CIBW and CIBW critical habitat, in accordance with the Integrated Natural Resources Management Plan (INRMP) (JBER 2016a).

The following mitigation measures would be undertaken at JBER to avoid, to the extent practicable, environmental impacts on biological resources for Alternative B, Alternative C, and Alternative F runway extension construction.

- The environmental protection and management measures currently being implemented at JBER as described in the INRMP will be applied to construction activities.
- Continue to adhere to any applicable USFWS protection measures, including:
  - Vegetation clearing will be conducted outside of the bird nesting season, to the extent practicable, in accordance with recommendations by USFWS, to avoid violation of the MBTA.
  - Vegetation clearing/logging will be conducted outside the period of April 10 – August 10 to protect species of special concern, as well as other nesting birds. Due to the large area of vegetation removal, a recommended additional two months (February and March) could be added to minimize impacts to owl species. Alternatively, the construction areas could be surveyed for owl nests prior to tree removal.
  - If vegetation clearing activity becomes necessary or desirable during the defined nesting season, JBER will direct performance of reconnaissance actions to identify and protect nest sites as required by the MBTA.
- Implement measures to stabilize temporarily disturbed soils, restore vegetative cover, and prevent the spread and establishment of invasive species in conjunction with terrain cut activities.
- Reclaim and manage any modified unpaved lands in accordance with the current JBER INRMP, including water-conserving landscape design, use of native or regionally adapted plants in developed areas, reduction of fertilizer and pesticide use, and invasive species control (JBER 2016a).
- Prepare/coordinate (with appropriate agencies) studies for special status species effects as a result of construction and operation of an extended runway.
- Mitigation for unavoidable impacts to the approximately 28 acres of wetlands impacted by Alternative B, Alternative C, and Alternative F construction would be coordinated between the Air Force and USACE, as discussed in Section 4.5.

Cultural Resources (Section 4.8)

None of the alternatives would result in impacts to known historic properties. In compliance with the National Historic Preservation Act (NHPA), Section 106, the Air Force consulted with the Alaska State Historic Preservation Officer (SHPO) and potentially affected federally recognized Alaska Native tribes, Alaska Native Claims Settlement Act (ANCSA) corporations, and tribal government entities, which concluded with Alaska SHPO concurrence on the finding of “no historic properties affected” for Alternatives A, D, E, and No Action; and “no direct effect or adverse indirect effect to historic properties” for Alternatives B, C, and F.

The following mitigation measure would be undertaken at JBER to avoid, to the extent practicable, environmental impacts on cultural resources associated with the potential discovery of unanticipated cultural resources during runway extension construction for Alternative B, Alternative C, or Alternative F.

- Implement JBER ICRMP SOP 5.2, Reporting Unanticipated Cultural Resources, and 5.3, Unanticipated Human Remains, including notification of the Anchorage Historic Preservation Commission, for cultural resources that may be encountered during clearing, excavation, or other construction related activities.

Land Use and Recreation (Section 4.9)

There is no increase in off-base acoustic effects to residential land use for Alternative B, Alternative C, Alternative D, Alternative E, Alternative F, or No Action. No land use mitigation measures are proposed for any of these alternatives.

The Alternative A increase in off-base residential land use exposed to 65 dB L_{dn} or greater is an unavoidable impact that would result from implementation of Alternative A. Provision of funds for additional structural noise attenuation to off-base areas is not currently an action that the Air Force is authorized to carry out. There are no mitigations to address this unavoidable land use impact.

Other actions that JBER will implement to address concerns for land use and recreation issues associated with the improvement of F-22 operational efficiency include:

- Use planning, engineering, and runway safety area information, including relevant land use information, to update on-base plans and to provide information to off-base land use planning entities.
- Continue to work with the affected communities to address land use issues.

Transportation and Circulation (Section 4.10)

For Alternative A, Alternative D, Alternative E, and No Action, there would be no transportation and circulation impacts and, therefore, no mitigation is proposed for these alternatives.

The following mitigation measures would be undertaken at JBER to avoid and/or minimize, to the extent practicable, environmental impacts to transportation and circulation associated with runway extension construction for Alternative B, Alternative C, or Alternative F.

- Prepare and implement construction traffic plans as part of a runway extension construction contracts to reduce roadway congestion.
- Coordinate scheduling and materials delivery (on- and off-site) to reduce traffic during high volume gate periods.
- Designate a specific gate for construction vehicle use to avoid unwanted congestion at commuter gates.

Socioeconomics (Section 4.11)

No mitigation for construction personnel is proposed. To support the economics of civil aviation in the Anchorage Bowl, JBER, the FAA, representatives of the Aircraft Owners and Pilots Association, and other aviation interests would continue to coordinate in order to provide a safe, efficient, and reasonably compatible airspace environment for all aviation activities.

Environmental Justice (Section 4.12)

Alternative B, Alternative C, Alternative D, Alternative E, Alternative F, and No Action do not result in noise impacts to off-base minority or low-income populations and do not increase noise effects on children or the elderly. Therefore, no mitigation is proposed for these alternatives.

Alternative A results in disproportionate unavoidable noise impacts to off-base environmental justice populations. Provision of funds for additional structural noise attenuation off-base is not currently an action that the Air Force is authorized to carry out. No mitigation is proposed for Alternative A.

2.6.1 Mitigation Measures Considered and Determined to not be Operationally Workable

The following acoustic mitigation measures were considered and evaluated but were either not operationally workable or did not substantially reduce noise impacts, and therefore were not practicable.

- Reducing thrust (i.e., lowering of power settings) is not feasible for operational F-22 missions or mission training. F-22 pilots must train as they are expected to conduct operational missions.
- Expanding the limitations on late-night operations occurring between 10:00 PM and 7:00 AM to reduce the modelled off base noise contours is not possible while still accomplishing required night training within required time limitations. JBER already adheres to late night limitations to flight operations.
- Provision of funds for additional structural noise attenuation off-base is not currently an action that the Air Force is authorized to carry out. Noise attenuation of an existing structure can be accomplished by replacing or upgrading individual building components (doors, windows, walls, etc.) with components that have an increased ability to absorb or reflect sound energy.

2.6.2 Adaptive Management of Future Variations in Runway Use

Subsequent to a runway-use decision resulting from this EIAP, the Air Force may use an adaptive management process to monitor and evaluate the ongoing F-22 flight operations and to identify ways to address program-related impacts and manage related issues. Adaptive management is a “predict, mitigate, and implement” environmental management is an ongoing process that includes consideration of the effects of potential adaptive measures to allow for mid-course corrections without requiring new or supplemental NEPA review except where deemed necessary in accordance with 40CFR §1502.9(c). The Air Force will prepare a mitigation plan no more than 90 days after ROD signature for this EIS. The mitigation plan may include adaptive management to identify any changes in JBER sorties which would exceed the highest reasonable sorties evaluated in this EIS and to adjust mitigations to reflect the experience following implementation of a runway use action.

2.7 Environmental Comparison of Alternatives

2.7.1 Summary Comparison of Environmental Consequences

Section 2.7.1 summarizes and compares environmental consequences of alternative F-22 use of JBER existing and an extended runway. Section 2.7.2 discusses variations in runway use, which could occur with variations in factors such as deployments, weather, ODO restrictions, runway use during IFR conditions, and glideslope safety. A qualitative discussion of each variation explains that the environmental effects of the variation are within, and less than, the environmental effects described for one or more of the alternatives analyzed in this EIS.

Table 2.7-1 summarizes the consequences resulting from overlaying the alternatives described in Chapter 2 on the baseline conditions described in Chapter 3, to result in the environmental consequences described in Chapter 4.

The environmental consequences associated with the alternatives represent the extent of consequences for each environmental resource. Actual day-to-day and year-to-year flight operations would not be expected to exceed the environmental consequences for alternatives described in this EIS.

Table 2.7-1. Environmental Comparison of Alternatives

Resource	Alternative A (RW 34 for Departure; RW 06 Arrival)	Alternative B (RW 16/34 Extension; RW 34 for Departure; RW 06 Arrival)	Alternative C (RW 16/34 Extension; RW 34 for Departure; RW 16 Arrival)	Alternative D (RW 06 for Departure and Arrival)	Alternative E (RW 24 for Departure; RW 06 Arrival)	Alternative F (RW 16/34 Extension; RW 24 for Departure; RW 16 Arrival)	No Action (Departure 25% on RW 34; 75% on RW 06/24; Arrival on RW 06 with ODO restrictions)
Airspace Management and Use (Section 4.1)	Cross runway use meets FAA ODO policy and expedites departures as soon as cross runway is clear. Departure on RW 34 would reduce Anchorage Bowl congestion; RW 06 arrival continues congestion, with a net overall reduction in airspace congestion. Departure to the north is the shortest distance to training airspace. Departures overflying general aviation (GA) traffic using Knik or Sixmile would continue at the same elevation, but increase in frequency. Some benefits from reduced airspace congestion.	Cross runway use meets FAA ODO policy and expedites departures as soon as cross runway is clear. Departure on RW 34 would reduce Anchorage Bowl congestion; RW 06 arrival continues congestion, with a net overall reduction in airspace congestion. Departure to the north is the shortest distance to training airspace. Departure on the extended RW 34 would overfly GA traffic using Knik or Sixmile at a lower elevation than currently with increased frequency and would require continued vigilance. Some benefits from reduced airspace congestion.	Does not meet FAA ODO policy and would require continued JBER tower management. Departure on RW 34 and arrival pattern on RW 16 would reduce Anchorage Bowl congestion Departure to, and arrival from, the north is the shortest distance to training airspace. RW 34 departure and RW 16 arrival would overfly GA traffic using Knik or Sixmile at a lower elevation than currently with increased frequency and would require continued vigilance. Benefits from reduced airspace congestion.	Single direction runway use meets FAA ODO policy. Departures on RW 06 reduce congestion in the high density Anchorage Bowl and RW 06 arrival continues congestion, with a net overall reduction in airspace congestion. RW 06 departures require over 2 miles of taxi and hold from F-22 facilities and turn to north to avoid restricted airspace.	Does not meet FAA ODO policy and will require continued JBER tower management. Departure on RW 24 with a north turn within JBER Class D airspace somewhat avoids Anchorage Bowl congestion. RW 06 arrival continues congestion in high density Anchorage Bowl, with net overall increase in congestion.	Cross runway use meets FAA ODO policy and expedites departures as soon as cross runway is clear. Departure on RW 24 and turn to north within JBER Class D airspace and arrival on RW 16 somewhat reduces congestion in Anchorage Bowl airspace. F-22s arrival on RW 16 from north is the shortest distance from primary training airspace. Arrival on the extended RW 16 would overfly GA traffic using Knik or Sixmile at a lower elevation and with increased frequency than currently and would require continued vigilance.	Departures on RW 34 are restricted by the Plus-up EA/FONSI and departures on RW 24 are restricted by FAA ODO policy. Departure on RW 24 with a north turn within JBER Class D airspace somewhat avoids Anchorage Bowl. RW 06 departures require an F-22 taxi over 2 miles and hold. RW 06 departures reduce Anchorage Bowl congestion. RW 06 arrival continues congestion in high density Anchorage Bowl.
Acoustic Environment (Noise) (Section 4.2)	Off-base residents in Mountain View exposed to annual average 65 dB L_{dn} noise levels increase from 0 to 424. On-base residents exposed to 65 dB L_{dn} noise levels decrease from an estimated 1,424 to 824. The noise measure applied to schools in this EIS is 7 AM to 3 PM and is denoted as $L_{eq\text{-}8hr}$. Instantaneous noise level changes of less than 1 dB are not detectable to the human ear. Changes in instantaneous noise levels in the 3 dB range can be discerned as a noise increase. Calculated equivalent noise levels at Mountain View Elementary School during the school day increase from 68.3 to 70.2 dB $L_{eq\text{-}8hr}$ and Mount Spurr Elementary School facilities decrease from 74.9 to 71.8 dB $L_{eq\text{-}8hr}$. Noise levels at the Katmai Child Development Center decrease from 68.9 to 65.1 dB $L_{eq\text{-}8hr}$. Annual noise levels at the JBER hospital remain at 55.1 dB L_{dn}. Noise levels increase at the developed portion of Davis Park from 60.8 to 61.2 dB L_{dn}. Other noise sensitive points of interest show decreased	Shifting extended RW 34 takeoff roll by approximately 2,000 ft north on the extended RW 34 results in no off-base residents exposed to annual average 65 dB L_{dn} noise levels. On-base residents exposed to 65 dB L_{dn} noise levels decrease from an estimated 1,424 to 775. The noise measure applied to schools in this EIS is 7 AM to 3 PM and is denoted as $L_{eq\text{-}8hr}$. Instantaneous noise level changes of less than 1 dB are not detectable to the human ear. Changes in instantaneous noise levels in the 3 dB range can be discerned as a noise increase. Noise levels at Mountain View Elementary School decrease from 68.3 to 67.8 dB $L_{eq\text{-}8hr}$ and at Mount Spurr Elementary School facilities decrease from 74.8 to 71.6 dB $L_{eq\text{-}8hr}$ Noise levels at the Katmai Child Development Center decrease from 68.9 to 65.3 dB $L_{eq\text{-}8hr}$. Noise levels at the JBER hospital decrease from 55.1 to 54.5 dB L_{dn} and decrease at the developed portion of Davis Park from 60.8 to 60.4 dB L_{dn}. Other noise sensitive points of interest show decreased noise levels from 0.1 to 3.4 dB	Shifting extended RW 34 takeoff roll by approximately 2,000 ft north on the extended RW 34 results in no off-base residents exposed to annual average 65 dB L_{dn} noise levels. On-base residents exposed to 65 dB L_{dn} noise levels decrease from an estimated 1,424 to 915. The noise measure applied to schools in this EIS is 7 AM to 3 PM and is denoted as $L_{eq\text{-}8hr}$. Instantaneous noise level changes of less than 1 dB are not detectable to the human ear. Changes in instantaneous noise levels in the 3 dB range can be discerned as a noise increase. Noise levels at Mountain View Elementary School facilities are effectively unchanged from 68.3 to 68.2 dB $L_{eq\text{-}8hr}$ At Mount Spurr Elementary School facilities noise levels decrease from 74.9 to 71.0 dB $L_{eq\text{-}8hr}$ Noise levels at the Katmai Child Development Center decrease from 68.9 to 64.6 dB $L_{eq\text{-}8hr}$. Noise levels at the JBER hospital increase from 55.1 to 56.6 dB L_{dn} and decrease at the developed portion of Davis Park from 60.8 to 60.5 dB L_{dn}. Other noise sensitive points of interest show decreased noise from 0.3 to 4.3 dB levels of $L_{eq\text{-}8hr}$. No	No off-base residents would be exposed to annual average 65 dB L_{dn} noise levels. On-base, residents exposed to 65 dB L_{dn} noise levels decrease from an estimated 1,424 to 1,193. The noise measure applied to schools in this EIS is 7 AM to 3 PM and is denoted as $L_{eq\text{-}8hr}$. Instantaneous noise level changes of less than 1 dB are not detectable to the human ear. Changes in instantaneous noise levels in the 3 dB range can be discerned as a noise increase. Noise levels at Mountain View Elementary School facilities decrease from 68.3 to 67.3 dB $L_{eq\text{-}8hr}$ and Mount Spurr Elementary School facilities increase from 74.9 to 75.7 dB $L_{eq\text{-}8hr}$. Annual noise levels at the Katmai Child Development Center decrease from 68.9 to 68.6 dB $L_{eq\text{-}8hr}$. Annual noise levels at the JBER hospital increase from 55.1 to 56.2 dB L_{dn}. The developed portion of Davis Park remains unchanged at 60.8 dB L_{dn}. Most noise sensitive points of interest show decreased noise levels of from 0.3 to 1.1 dB $L_{eq\text{-}8hr}$ Noise levels over Matanuska-Susitna Valley would not discernably change. Acoustic energy over critical habitat does not produce	No off-base residents would be exposed to annual average 65 dB L_{dn} noise levels. On-base, residents exposed to 65 dB L_{dn} noise levels increase from an estimated 1,424 to 1,718. The noise measure applied to schools in this EIS is 7 AM to 3 PM and is denoted as $L_{eq\text{-}8hr}$. Instantaneous noise level changes of less than 1 dB are not detectable to the human ear. Changes in instantaneous noise levels in the 3 dB range can be discerned as a noise increase. Noise levels at Mountain View Elementary School facilities decrease from 68.3 to 67.5 dB $L_{eq\text{-}8hr}$ and Mount Spurr Elementary School facilities increase from 74.9 to 75.7 dB $L_{eq\text{-}8hr}$. Annual noise levels at the Katmai Child Development Center increase from 68.9 to 70.2 dB $L_{eq\text{-}8hr}$. Annual noise levels at the JBER hospital decrease from 55.1 to 53.9 dB L_{dn} and decrease at the developed portion of Davis Park from 60.8 to 60.6 dB L_{dn}. Other noise sensitive points of interest show increased noise levels of from 0.9 to 1.7 dB $L_{eq\text{-}8hr}$. Noise levels over Matanuska-Susitna Valley would not discernably change. Acoustic energy over critical habitat does not produce	No off-base residents would be exposed to annual average 65 dB L_{dn} noise levels. On-base, residents exposed to 65 dB L_{dn} noise levels increase from an estimated 1,424 to 1,955. The noise measure applied to schools in this EIS is 7 AM to 3 PM and is denoted as $L_{eq\text{-}8hr}$. Instantaneous noise level changes of less than 1 dB are not detectable to the human ear. Changes in instantaneous noise levels in the 3 dB range can be discerned as a noise increase. Noise levels at Mountain View Elementary School facilities decrease from 68.3 to 67.6 dB $L_{eq\text{-}8hr}$ and at Mount Spurr Elementary School facilities increase from 74.9 to 75.3 dB $L_{eq\text{-}8hr}$. Noise levels at the Katmai Child Development Center increase from 68.9 to 70.0 dB $L_{eq\text{-}8hr}$. Noise levels at the JBER hospital increase from 55.1 to 56.2 dB L_{dn} and decrease at the developed portion of Davis Park from 60.8 to 60.6 dB L_{dn}. Other noise sensitive points of interest show increased noise levels from 1.1 to 1.3 dB $L_{eq\text{-}8hr}$. No discernable change to overflight noise over Matanuska-Susitna Valley. Acoustic energy over critical habitat, including overflights on	No off-base residents are exposed to annual average 65 dB L_{dn} noise levels. On-base,1,424 residents are exposed to 65 dB L_{dn} or greater noise levels. The noise measure applied to schools in this EIS is 7 AM to 3 PM and is denoted as $L_{eq\text{-}8hr}$. All noise sensitive points of interest would continue to experience existing noise exposure. Noise levels at Mountain View Elementary School facilities would remain at 68.3 dB $L_{eq\text{-}8hr}$ and at Mount Spurr Elementary School facilities would remain at 74.9 dB $L_{eq\text{-}8hr}$. Noise levels at the Katmai Child Development Center would remain at 68.9 dB $L_{eq\text{-}8hr}$. Noise levels at the JBER hospital would remain at 55.1 dB L_{dn} and the developed portion of Davis Park would remain at 60.8 dB L_{dn}. Noise levels over Matanuska-Susitna Valley would not change. Acoustic energy over critical habitat does not produce significant impacts to species, including the CIBW.

Table 2.7-1. Environmental Comparison of Alternatives (continued)

Resource	Alternative A (RW 34 for Departure; RW 06 Arrival)	Alternative B (RW 16/34 Extension; RW 34 for Departure; RW 06 Arrival)	Alternative C (RW 16/34 Extension; RW 34 for Departure; RW 16 Arrival)	Alternative D (RW 06 for Departure and Arrival)	Alternative E (RW 24 for Departure; RW 06 Arrival)	Alternative F (RW 16/34 Extension; RW 24 for Departure; RW 16 Arrival)	No Action (Departure 25% on RW 34; 75% on RW 06/24; Arrival on RW 06 with ODO restrictions)
	noise levels of from 1.3 to 3.8 dB $L_{eq\text{-}8hr}$. Noise levels over Matanuska-Susitna Valley would not discernably change. Acoustic energy over critical habitat does not produce significant impacts to species, including the Cook Inlet beluga whale (CIBW).	$L_{eq\text{-}8hr}$. No discernable change to overflight noise over Matanuska-Susitna Valley. Acoustic energy over critical habitat does not produce significant impacts to species, including the CIBW.	discernable change to overflight noise over Matanuska-Susitna Valley. Acoustic energy over critical habitat does not produce significant impacts to species, including the CIBW.	significant impacts to species, including the CIBW.	significant impacts to species, including the CIBW.	RW 16 arrival, does not produce significant impacts to species, including the CIBW.	
Safety (Section 4.3)	Departures on RW 34 reduce airspace congestion somewhat and benefit flight safety. No change in RW 06 arrival traffic. Airfield safety zones and BASH comparable to existing conditions.	Departures on RW 34 reduce airspace congestion somewhat benefits flight safety. No change in RW 06 traffic. CZ and APZs north of RW 16/34 shift north; Hill Chalet then would be in APZ I and, when rented, would become a place of assembly incompatible with APZ I. APZ shift north would encompass four additional munitions storage igloos, which would be under the existing waiver. No change in CZ or APZ at southern end of RW 16/34. BASH potential slightly increases over JBER runways and Sixmile Lake with RW 16/34 extension use; BASH is a very sensitive issue at JBER since E-3 Class A event.	Does not meet FAA ODO policy. Departures on RW 34 and arrivals on RW 16 reduce airspace congestion and benefit civil flight safety but do not benefit military flight safety. CZ and APZs north of RW 16/34 shift north; Hill Chalet then would be in APZ I, and when rented, would become a place of assembly incompatible with APZ I. APZ shift north would encompass four additional munitions storage igloos, which would be under the existing waiver. No change in CZ or APZ at southern end of RW 16/34. BASH potential slightly increases over JBER runways and Sixmile Lake with RW 16/34 extension; BASH is a very sensitive issue at JBER since E-3 Class A event.	No change in RW 06 arrival traffic. Airfield safety zones and BASH comparable to existing conditions. Reduced airspace congestion. Departures on RW 06 somewhat benefit flight safety.	Does not meet FAA ODO policy. No change in RW 06 arrival traffic. Airfield safety zones and BASH comparable to existing conditions. No benefits to civilian airspace safety and ODO risks to military operations.	Meets FAA ODO policy. Arrivals on RW 16 reduce airspace congestion and somewhat benefit civil flight safety. CZ and APZs north of RW 16/34 shift north; Hill Chalet then would be in APZ I, and when rented, would become a place of assembly incompatible with APZ I. APZ shift north would encompass four additional munitions storage igloos which would be under the existing waiver. No change in CZ or APZ at southern end of RW 16/34. BASH potential slightly increases over JBER runways and Sixmile Lake with RW 16/34 extension. BASH is a very sensitive issue at JBER since E-3 Class A event.	No change in airfield safety zones or BASH safety. Four munitions storage igloos are under a waiver for up to 8 storage igloos.
Air Quality (Section 4.4)	No construction emissions. Improved efficiency of flight operations. No contribution to exceedance of any air quality standards. Less than significant air quality effects.	Mobile and intermediate operations over a large construction area combined with dust suppression would not contribute to exceedance of any ambient air quality standard. Annual maintenance would generate nominal amounts of emissions. Less than significant air quality effects	Mobile and intermediate operations over a large construction area combined with dust suppression would not contribute to exceedance of any ambient air quality standard. Annual maintenance would generate nominal amounts of emissions. Less than significant air quality effects	Increased taxi and hold time would result in a nominal, localized increase in mobile and intermittent emissions, no construction emissions, and no contribution to exceedance of any air quality standards. Less than significant air quality effects.	No construction emissions. No contribution to exceedance of any air quality standards. Less than significant air quality effects.	Mobile and intermediate operations over a large construction area combined with dust suppression would not contribute to exceedance of any ambient air quality standard. Annual maintenance would generate nominal amounts of emissions. Less than significant air quality effects.	No contribution to exceedance of any air quality standards. Less than significant air quality effects.
Physical Resources (Soils, Water, and Wetlands) (Section 4.5)	No construction and no effects to physical resources, water resources, or wetlands.	Runway extension and glide slope could directly involve 15.3 million cubic yards of earth moving with 557 acres disturbed. Excess fill would be deposited at three previously excavated gravel pits. NPDES permit will be required with site-specific SWPPP and BMPs to eliminate or reduce sediment and non-storm water discharges. Water resources disturbance would occur. Surface, storm water and wetlands, are anticipated to be	Runway extension and glide slope could directly involve 15.3 million cubic yards of earth moving with 557 acres disturbed. Excess fill would be deposited at three previously excavated gravel pits. NPDES permit will be required with site-specific SWPPP and BMPs to eliminate or reduce sediment and non-storm water discharges. Water resources disturbance would occur. Surface, storm water and wetlands anticipated to be	No construction and no effects to physical resources would occur. Taxi and hold times on RW 06 have the potential to increase de-icing during winter months. Use of more efficient application equipment, environmentally friendly products, and distances to discharge areas avoid effects to water resources or wetlands.	No construction and no effects to physical resources, water resources, or wetlands.	Runway extension and glide slope could directly involve 15.3 million cubic yards of earth moving with 557 acres disturbed. Excess fill would be deposited at three previously excavated gravel pits. NPDES permit will be required with site-specific SWPPP and BMPs to eliminate or reduce sediment and non-storm water discharges. Water resources disturbance would occur. Surface, storm water and wetlands, are anticipated to be	No construction and no change in effects to physical resources, water resources, or wetlands.

Table 2.7-1. Environmental Comparison of Alternatives (continued)

Resource	Alternative A (RW 34 for Departure; RW 06 Arrival)	Alternative B (RW 16/34 Extension; RW 34 for Departure; RW 06 Arrival)	Alternative C (RW 16/34 Extension; RW 34 for Departure; RW 16 Arrival)	Alternative D (RW 06 for Departure and Arrival)	Alternative E (RW 24 for Departure; RW 06 Arrival)	Alternative F (RW 16/34 Extension; RW 24 for Departure; RW 16 Arrival)	No Action (Departure 25% on RW 34; 75% on RW 06/24; Arrival on RW 06 with ODO restrictions)
		impacted by construction cut/fill and storm water run-off. Coordination with U.S. Army Corps of Engineers (USACE) would be expected to require mitigation for approximately 28 acres of impacted wetlands using a system comparable to the Anchorage Wetlands Credit/Debit Methodology.	impacted by construction cut/fill and storm water run-off. Coordination with USACE would be expected to require mitigation for approximately 28 acres of impacted wetlands using a system comparable to the Anchorage Wetlands Credit/Debit Methodology.			impacted by construction cut/fill and storm water run-off. Coordination with USACE would be expected to require mitigation for the approximately 28 acres of impacted wetlands using a system comparable to the Anchorage Wetlands Credit/Debit Methodology.	
Hazardous Materials and Waste Management (Section 4.6)	No construction; no change in hazardous materials or waste management.	All hazardous materials and construction debris would be handled, stored, and disposed of in accordance with existing laws and established JBER procedures. Construction would occur in proximity to two closed ERP sites from which radiological waste was removed in 1980. Any undocumented contaminated soils would be handled in accordance with established JBER procedures. A Munitions and Explosives of Concern Investigation would be performed prior to construction.	All hazardous materials and construction debris would be handled, stored, and disposed of in accordance with existing laws and established JBER procedures. Construction would occur in proximity to two closed ERP sites from which radiological waste was removed in 1980. Any undocumented contaminated soils would be handled in accordance with established JBER procedures. A Munitions and Explosives of Concern Investigation would be performed prior to construction.	No construction; no change in hazardous materials or waste management. De-icing has been converted to environmentally friendly products.	No construction; no change in hazardous materials or waste management.	All hazardous materials and construction debris would be handled, stored, and disposed of in accordance with existing laws and established JBER procedures. Construction would occur in proximity to two closed ERP sites from which radiological waste was removed in 1980. Any undocumented contaminated soils would be handled in accordance with established JBER procedures. A Munitions and Explosives of Concern Investigation would be performed prior to construction.	No change in hazardous materials or waste management.
Biological Resources (Section 4.7)	No construction disturbance of Uplands areas. Consultation between the Air Force and National Marine Fisheries Service on potential effects to CIBW population resulted in a finding of may affect but not likely to adversely affect. No adverse effect on any federally listed, candidate, or proposed species and/or designated or proposed critical habitat is anticipated.	Upland areas on JBER and wetland habitats would be impacted by runway extension and roadway construction. Approximately 78% of the distributed acreage has previously been human modified. Two plant species considered rare in Alaska are in proximity to, and could be affected by, runway expansion. Scheduling removal of vegetation outside sensitive avian species breeding season would reduce impact potential. No T&E species on JBER would be affected by construction. Mitigation for wetlands impacts to be coordinated between Air Force and USACE. Air Force and National Marine Fisheries Service consulting on potential effects to CIBW population resulted in a finding of may affect but not likely to adversely affect. No significant effect on any federally listed, candidate, or proposed	Upland areas on JBER and wetland habitats would be impacted by runway extension and roadway construction. Approximately 78% of the distributed acreage has previously been human modified. Two plant species considered rare in Alaska are in proximity to, and could be affected by, runway expansion. Scheduling removal of vegetation outside sensitive avian species breeding season would reduce impact potential. No T&E species on JBER would be affected by construction. Mitigation for wetlands impacts to be coordinated between Air Force and USACE. Air Force and National Marine Fisheries Service consulting on potential effects to CIBW population resulted in a finding of may affect but not likely to adversely affect. No significant effect on any federally listed, candidate, or proposed species and/or	No construction disturbance of Uplands areas. Consultation between the Air Force and National Marine Fisheries Service on potential effects to CIBW population resulted in a finding of may affect but not likely to adversely affect. No adverse effect on any federally listed, candidate, or proposed species and/or designated or proposed critical habitat is anticipated.	No construction disturbance of Uplands areas. Air Force and National Marine Fisheries Service consulting on potential effects to CIBW population resulted in a finding of may affect but not likely to adversely affect. No adverse effect on any federally listed, candidate, or proposed species and/or designated or proposed critical habitat is anticipated.	Upland areas on JBER and wetlands impacted by runway extension and roadway construction. Approximately 78% of the distributed acreage has previously been human modified. Two plant species considered rare in Alaska are in proximity to, and could be affected by, a runway expansion. Scheduling removal of vegetation outside sensitive avian species breeding season of would reduce impact potential. No T&E species on JBER affected by construction. Mitigation for wetlands impacts to be coordinated between Air Force and USACE. Air Force and National Marine Fisheries Service consulting on potential effects to CIBW population resulted in a finding of may affect but not likely to adversely affect. No significant effect on any federally listed, candidate, or proposed species and/or designated or proposed critical habitat is anticipated.	No change to JBER runway use or overflight of sensitive habitats.

Table 2.7-1. Environmental Comparison of Alternatives (continued)

Resource	Alternative A (RW 34 for Departure; RW 06 Arrival)	Alternative B (RW 16/34 Extension; RW 34 for Departure; RW 06 Arrival)	Alternative C (RW 16/34 Extension; RW 34 for Departure; RW 16 Arrival)	Alternative D (RW 06 for Departure and Arrival)	Alternative E (RW 24 for Departure; RW 06 Arrival)	Alternative F (RW 16/34 Extension; RW 24 for Departure; RW 16 Arrival)	No Action (Departure 25% on RW 34; 75% on RW 06/24; Arrival on RW 06 with ODO restrictions)
		species and/or designated or proposed critical habitat is anticipated.	designated or proposed critical habitat is anticipated.				
Cultural Resources (including Tribal/Alaska Native Concerns) (Section 4.8)	No ground disturbing activities. In compliance with NHPA, Section 106, the Air Force consulted with potentially affected federally recognized Alaska Native tribes, ANCSA corporations, tribal government entities, and the Alaska SHPO, who concurred with the finding of “no historic properties affected” for the change in runway use.	RW 16/34 extension directly disturbs 557 acres in areas surveyed and determined to not contain historic properties. In compliance with NHPA, Section 106, the Air Force consulted with potentially affected federally recognized Alaska Native tribes, ANCSA corporations, tribal government entities, and the Alaska SHPO, who concurred with the finding of “no direct effect and no adverse indirect effect to historic properties” for the extension to RW 16/34 and the change in runway use.	RW 16/34 extension directly disturbs 557 acres in areas surveyed and determined to not contain historic properties. In compliance with NHPA, Section 106, the Air Force consulted with potentially affected federally recognized Alaska Native tribes, ANCSA corporations, tribal government entities, and the Alaska SHPO, who concurred with the finding of “no direct effect and no adverse indirect effect to historic properties” for the extension to RW 16/34 and the change in runway use.	No ground disturbing activities. In compliance with NHPA, Section 106, the Air Force consulted with potentially affected federally recognized Alaska Native tribes, ANCSA corporations, tribal government entities, and the Alaska SHPO, who concurred with the finding of “no historic properties affected” for the change in runway use.	In compliance with NHPA, Section 106, the Air Force consulted with potentially affected federally recognized Alaska Native tribes, ANCSA corporations, tribal government entities, and the Alaska SHPO, who concurred with the finding of “no historic properties affected” for the change in runway use.	RW 16/34 extension directly disturbs 557 acres in areas surveyed and determined to not contain historic properties. In compliance with NHPA, Section 106, the Air Force consulted with potentially affected federally recognized Alaska Native tribes, ANCSA corporations, tribal government entities, and the Alaska SHPO, who concurred with the finding of “no direct effect and no adverse indirect effect to historic properties” for the extension to RW 16/34 and the change in runway use.	No ground disturbing activities and no change in airspace use.
Land Use and Recreation (Section 4.9)	Approximately 8.8 acres of residential land in Mountain View, including approximately 80 residences, would be within the 65 dB L_{dn} contour. Outdoor recreation is compatible with noise levels of 69 dB L_{dn} and lower (AFI 32-7063). No acres of Davis Park would be exposed to noise levels of 70 dB L_{dn} or above. Noise changes at Mountain View Elementary School and other noise sensitive points of interest are described above under Acoustic Environment. Off-base land under 65 dB L_{dn} noise contour increases by 10.2 acres. On-base residential land under the 65 dB L_{dn} noise contour decreases by 54.9 acres. Noise increases to the north over JBER are compatible with existing recreation and industrial land uses.	Departure shift to north on extended RW 34 decreases off-base land within 65 dB L_{dn} by approximately 10.1 acres. No off-base residential areas or schools would experience noise levels above 65 dB L_{dn}. Outdoor recreation is compatible with noise levels of 69 dB Ldn and lower (AFI 32-7063). No acres of Davis Park would be exposed to noise levels of 70 dB L_{dn} or above. On-base residential land under the 65 dB L_{dn} noise contour decreases by 59.4 acres Noise exposure to noise sensitive points of interest is described above under Acoustic Environment. Portions of open space used for individual recreation north of the existing RW 16 would become airfield or be under the CZ/APZ extension. Open space is compatible with APZs. Hill Chalet would be in the new APZ I, and, when rented, would become a place of assembly incompatible with APZ I.	Departure shift to north on extended RW 34 decreases off-base land within 65 dB L_{dn} by approximately 7.8 acres. No off-base residential areas or schools would experience noise levels above 65 dB L_{dn}. Outdoor recreation is compatible with noise levels of 69 dB L_{dn} and lower (AFI 32-7063). No acres of Davis Park would be exposed to noise levels of 70 dB L_{dn} or above. On-base residential land under the 65 dB L_{dn} noise contour decreases by 46.5 acres Noise exposure to noise sensitive points of interest is described above under Acoustic Environment. Portions of open space used for individual recreation north of the existing RW 16 would become airfield or be under the CZ/APZ extension. Open space is compatible with APZs. Hill Chalet would be in new APZ I, and, when rented, would become a place of assembly incompatible with APZ I.	No off-base residential land would experience noise levels above 65 dB L_{dn}. There would be no measurable change in noise to Mountain View Elementary School or surrounding residential land uses. Outdoor recreation is compatible with noise levels of 69 dB L_{dn} and lower (AFI 32-7063). No acres of Davis Park would be exposed to noise levels of 70 dB L_{dn} or above. Noise exposure for noise sensitive points of interest is described above under Acoustic Environment. Off-base land use within 65 dB L_{dn} increases by approximately 19 acres. On-base residential land uses under the 65 dB L_{dn} or greater noise contour increase by 21.1 acres.	No off-base residential land would experience a noise level above 65 dB L_{dn}. Outdoor recreation is compatible with noise levels of 69 dB L_{dn} and lower (AFI 32-7063). No acres of Davis Park would be exposed to noise levels of 70 dB L_{dn} or above. Noise exposure for noise sensitive points of interest is described above under Acoustic Environment. On-base residential land uses under the 65 dB L_{dn} or greater noise contour increase by 26.8 acres. An additional approximately 6.9 acres of compatible off-base land use west of JBER is within the 65 dB L_{dn} noise contour.	RW 24 departures with arrivals on extended RW 16 increases off-base land within 65 dB L_{dn} noise contour by approximately 7.5 acres of transportation land west of JBER. Outdoor recreation is compatible with noise levels of 69 dB L_{dn} and lower (AFI 32-7063). No acres of Davis Park would be exposed to noise levels of 70 dB L_{dn} or above. Mountain View noise levels would be below 65 dB L_{dn}. Noise exposure to noise sensitive points of interest is described above under Acoustic Environment. On-base residential land uses under the 65 dB L_{dn} or greater noise contour increase by 48.6 acres. Portions of open space used for individual recreation north of the existing RW 16 would become airfield or be under the CZ/APZ extension. Open space is compatible with APZs. Hill Chalet would be in new APZ I, and, when rented, would become a place of assembly incompatible with APZ I.	No change to flight operations and no change to on- or off-base land affected by existing noise conditions.
Transportation and Circulation (Section 4.10)	Change in runway use would not affect the transportation network on or off JBER. There would be no surface transportation or circulation impacts. Airspace effects are described above under airspace and safety.	Extending RW 16/34 would increase gate and on-base traffic during the expected three years of construction. Traffic associated with the extension of RW 16/34 would occur primarily on the existing road network and within the	Extending RW 16/34 would increase gate and on-base traffic during the expected three years of construction. Traffic associated with the extension of RW 16/34 would occur primarily on the existing road network and within the construction	Change in runway use would not affect the transportation network on or off JBER. There would be no surface transportation or circulation impacts. Airspace effects are described above under airspace and safety.	Change in runway use would not affect the transportation network on or off JBER. There would be no surface transportation or circulation impacts. Airspace effects are described above under airspace and safety.	Extending RW 16/34 would increase gate and on-base traffic during the expected three years of construction. Traffic associated with the extension of RW 16/34 would occur primarily on the existing road network and within the construction	No change in use of transportation network on or off JBER.

Table 2.7-1. Environmental Comparison of Alternatives (continued)

Resource	Alternative A (RW 34 for Departure; RW 06 Arrival)	Alternative B (RW 16/34 Extension; RW 34 for Departure; RW 06 Arrival)	Alternative C (RW 16/34 Extension; RW 34 for Departure; RW 16 Arrival)	Alternative D (RW 06 for Departure and Arrival)	Alternative E (RW 24 for Departure; RW 06 Arrival)	Alternative F (RW 16/34 Extension; RW 24 for Departure; RW 16 Arrival)	No Action (Departure 25% on RW 34; 75% on RW 06/24; Arrival on RW 06 with ODO restrictions)
		construction area. Construction vehicle truck traffic would temporarily increase traffic volume at the Post Road Gate by approximately 7% to 8%. During peak construction periods there would be an increase in traffic volume at other JBER gates of approximately 1% to 2% when compared with existing traffic volume. Excess fill material would be transported on existing JBER haul or surface roads from the excavation to historic borrow pits on JBER. Rerouting Airlifter Drive to the north to meet Air Force APZ avoidance requirements would increase the distance to traverse the north end of RW 16 by 1.2 miles.	area. Construction vehicle truck traffic would temporarily increase traffic volume at the Post Road Gate by approximately 7% to 8%. During peak construction periods there would be an increase in traffic volume at other JBER gates of approximately 1% to 2% when compared with existing traffic volume. Excess fill material would be transported on existing JBER haul or surface roads from the excavation to historic borrow pits on JBER. Rerouting Airlifter Drive to the north to meet Air Force APZ avoidance requirements would increase the distance to traverse the north end of RW 16 by 1.2 miles.			area. Construction vehicle truck traffic would temporarily increase traffic volume at the Post Road Gate by approximately 7% to 8%. During peak construction periods there would be an increase in traffic volume at other JBER gates of approximately 1% to 2% when compared with existing traffic volume. Excess fill material would be transported on existing JBER haul or surface roads from the excavation to historic borrow pits on JBER. Rerouting Airlifter Drive to the north to meet Air Force APZ avoidance requirements would increase the distance to traverse the north end of RW 16 by 1.2 miles.	
Socioeconomics (Section 4.11)	No construction and no economic stimulation. Increased use of RW 34 is efficient for F-22 operations and could decrease congestion in the Anchorage Bowl airspace and have some benefit for civil aircraft operations. A calculated 1- to 2-dB L_{dn} noise increase to an estimated 80 residential units in Mountain View, which are already subject to airport noise, would not be expected to result in a measurable change to property values.	Construction provides short-term economic stimulation through construction employment and materials purchase. Construction expenditures could generate a calculated 1,300 regional direct, indirect, and induced jobs spread over the three-year construction period. This would include a peak seasonal demand for 300 to 350 direct construction jobs, or approximately 3.2% of Anchorage's construction labor force. An estimated average of 200 indirect and induced jobs would represent less than 1% of the Anchorage labor force. Local labor supply is sufficient without requiring in-migration of workers to the area. An annual increase in runway maintenance would create an additional 25 one-month jobs, which would extend the annual summer runway maintenance work. RW 34 departure to the north has the potential to reduce airspace congestion in the Anchorage Bowl, which could have some potential benefit to civil aircraft operations.	Construction provides short-term economic stimulation through construction employment and materials purchase. Construction expenditures could generate a calculated 1,300regional direct, indirect, and induced jobs spread over the three-year construction period. This would include a peak seasonal demand for 300 to 350 direct construction jobs, or approximately 3.2% of Anchorage's construction labor force. An estimated average of 200 indirect and induced jobs would represent less than 1% of the Anchorage labor force. Local labor supply is sufficient without requiring in-migration of workers to the area. An annual increase in runway maintenance would create an additional 25 one-month jobs, which would extend the annual summer runway maintenance work. RW 34 departure to, and RW 16 arrival from, the north is efficient for F-22 operations and reduces airspace congestion in the Anchorage Bowl, with benefits to civil aircraft operations.	No construction and no economic stimulation. Use of RW 06 for F-22 departures increases F-22 taxi and hold costs, while somewhat decreasing congestion in the Anchorage Bowl airspace and have some potential benefit for civil operations.	No construction and no economic stimulation. No decrease in congestion in the Anchorage Bowl airspace.	Construction provides short-term economic stimulation through construction employment and materials purchase. Construction expenditures could generate a calculated 1,300 regional direct, indirect, and induced jobs spread over the three-year construction period. This would include a seasonal demand for 300 to 350 direct construction jobs, or approximately 3.2% of Anchorage's construction labor force. An estimated average of 200 indirect and induced jobs would represent less than 1% of the Anchorage labor force. Local labor supply is sufficient without requiring in-migration of workers to the area. An annual increase in runway maintenance would create an additional 25 one-month jobs which would extend the annual summer runway maintenance work. RW 16 arrival from the north is efficient for F-22 operations and has the somewhat reduces airspace congestion in the Anchorage Bowl, which could have potential benefit to civil aircraft operations.	No construction. No change in airspace congestion in the Anchorage Bowl.

Table 2.7-1. Environmental Comparison of Alternatives (continued)

Resource	Alternative A (RW 34 for Departure; RW 06 Arrival)	Alternative B (RW 16/34 Extension; RW 34 for Departure; RW 06 Arrival)	Alternative C (RW 16/34 Extension; RW 34 for Departure; RW 16 Arrival)	Alternative D (RW 06 for Departure and Arrival)	Alternative E (RW 24 for Departure; RW 06 Arrival)	Alternative F (RW 16/34 Extension; RW 24 for Departure; RW 16 Arrival)	No Action (Departure 25% on RW 34; 75% on RW 06/24; Arrival on RW 06 with ODO restrictions)
Environmental Justice and Protection of Children (Section 4.12)	Outside noise levels of 65 dB L_{dn} or greater would affect an estimated 424 residents of the off-base community of Mountain View and 824 on-base residents. The four census block groups that make up the regions of influence (ROIs) are compared with the community of comparison (COC) to identify disproportionate effects. Three off-base ROIs have percentages of minority and low-income populations that exceed the percentages in the COC and result in disproportionate effects to 353 minority and 140 low-income persons living in Mountain View. There would be no disproportionate effect to the 303 minority or 45 low-income on-base persons. A calculated total of 299 on-base and 158 off-base children and two on-base and 23 off-base elderly persons are exposed to outside noise levels of 65 dB L_{dn} or greater. The percentage of children exposed to 65 dB L_{dn} in both the on-base and off-base ROI is higher than in the COC. One off-base ROI has a greater percentage of elderly than the COC percentage. Schools would be impacted as described above under Acoustic Environment.	Outside noise levels of 65 dB L_{dn} or greater would affect no off-base residential areas and 775 on-base residents. There would be no disproportionate effect to the 285 minority or 43 low-income on-base persons. A calculated total of 281 on-base and no off-base children and two on-base and no off-base elderly persons would be exposed to outside noise levels of 65 dB L_{dn} or greater. The on-base ROI percentage of children exposed is greater than the COC percentage. Schools would be impacted as described above under Acoustic Environment.	Outside noise levels of 65 dB L_{dn} or greater would affect no off-base residential areas and 915 on-base residents. There would be no disproportionate effect to the 336 minority or 50 low-income on-base persons. A calculated total of 332 on-base and no off-base children and two on-base and no off-base elderly persons would be exposed to outside noise levels of 65 dB L_{dn} or greater. The on-base ROI percentage of children exposed is greater than the COC percentage. Schools would be impacted as described above under Acoustic Environment.	Outside noise levels of 65 dB L_{dn} or greater would affect no off base residential areas and 1,193 on-base residents. There would be no disproportionate effect to the 439 minority or 66 low-income on-base persons. A calculated total of 432 on-base and no off-base children and three on-base and no off-base elderly persons would be exposed to outside noise levels of 65 dB L_{dn} or greater. The on-base ROI percentage of children exposed is greater than the COC percentage. Schools would be impacted as described above under Acoustic Environment.	Outside noise levels of 65 dB L_{dn} or greater would affect no off base residential areas and 1,718 on-base residents. There would be no disproportionate effect to the 631 minority or 95 low-income on-base persons. A calculated total of 623 on-base and no off-base children and four on-base and no off-base elderly persons would be exposed to outside noise levels of 65 dB L_{dn} or greater. The on-base ROI percentage of children exposed is greater than the COC percentage. Schools would be impacted as described above under Acoustic Environment.	Outside noise levels of 65 dB L_{dn} or greater would affect no off-base residential areas and 1,955 on-base residents. There would be no disproportionate effect to the 718 minority or 108 low-income on-base persons. A calculated total of 709 on-base and no off-base children and five on-base and no off-base elderly persons would be exposed to outside noise levels of 65 dB L_{dn} or greater. The on-base ROI percentage of children exposed is greater than the COC percentage. Schools would be impacted as described above under Acoustic Environment.	Outside noise levels of 65 dB L_{dn} or greater affect no off-base residential areas and 1,424 on-base residents, of whom 523 are minority and 78 are low-income. A calculated total of 516 on-base and no off-base children and three on-base and no off-base elderly persons are exposed to outside noise levels of 65 dB L_{dn} or greater. Schools are impacted as described above under Acoustic Environment.

Key:
- ACHP = Advisory Council on Historic Preservation
- AFI = Air Force Instruction
- ANC = Ted Stevens Anchorage International Airport
- ANCSA = Alaska Native Claims Settlement Act
- APZ = Accident Potential Zones
- BASH = bird/wildlife-aircraft strike hazard
- BMP = best management practice
- CIBW = Cook Inlet beluga whale
- COC = community of comparison
- CZ = Clear Zone
- dB = decibel
- ERP = Environmental Restoration Program
- FAA = Federal Aviation Administration
- ft = feet
- GA = General Aviation
- JBER = Joint-Base Elmendorf Richardson
- IFR = instrument flight rule
- L_{dn} = day-night average sound level
- M = million
- NHPA = National Historic Preservation Act
- NPDES = National Pollutant Discharge Elimination System
- ODO = Opposite Direction Operation
- ROI = region of influence
- RW = runway
- SHPO = State Historic Preservation Officer
- SWPPP = Storm Water Pollution Prevention Plan
- T&E = threatened and endangered
- USACE = U.S. Army Corps of Engineers

2.7.2 Additional Review and Qualitative Environmental Evaluation of Variations in Highest Reasonable Runway Use

Section 2.3.1, Alternatives to Address the Purpose and Need, explains that there are multiple ways in which the highest reasonable five-year-high sortie number of 5,710 annual F-22 sorties could be distributed among JBER runways. Table 2.4-1 presents the No Action Alternative as well as the Proposed Action and alternatives, which distribute the highest reasonable number of F-22 annual operations on each runway with consideration of mission requirements, runway maintenance, and weather. Actual runway use during any given month, or during any given year, would be expected to vary due to deployments, weather events, ODO requirements, runway availability, and/or other factors. The environmental analysis of the Proposed Action and alternatives, as summarized in Table 2.7-1, presents environmental consequences for the highest reasonable number of operations on each runway.

This section considers examples of runway use variations and provides a comparative discussion of the environmental effects of such variations. For each example, the potential variation is explained and potential environmental effects are qualitatively compared with the summary in Table 2.7-1.

2.7.2.1 Variation 1: F-22 Deployments

The 5,710 annual sorties reflect both F-22 squadrons operating at full strength for a representative year at JBER. Deployments from JBER to another location for operations and/or training occur. During the May 2013 to April 2014 period, the majority of one F-22 squadron was deployed for an extended period of time, and JBER recorded 4,437 sorties during that year. Any future deployment would result in fewer F-22 sorties from JBER than the 5,710 sorties evaluated in this EIS and would have the potential to reduce F-22 runway use for an alternative. Reduced runway use for an alternative would have the potential to reduce environmental consequences for that alternative when compared with Table 2.7-1. The environmental consequences would be less than the consequences assessed for the highest reasonable numbers of F-22 operations assessed for each runway in this EIS.

2.7.2.2 Variation 2: Annual Snow and Ice Events

The distribution of sorties presented in Table 2.4-1 reflects the highest reasonable use of RW 16/34 assuming a snow and ice season comparable to 2013–2014 through 2015–2016 when existing JBER equipment, personnel, and supplies were able to keep RW 06/24 and RW 16/34 open for fighter use. During 2011–2012 and 2016-2017 there was heavy snow accumulation, and in 2012–2013, there was a record 52 snow and ice events, which, with existing runway clearance capabilities and priorities, resulted in reduced availability of RW 16/34 for fighter operations. Snow and ice events could reduce the availability of RW 16/34 for alternatives with highest reasonable use of RW 16/34 for F-22 departures or arrivals (Alternatives A, B, C, or F). The environmental effects of the highest reasonable use of RW 06, as presented in Alternative D (RW 06 depart; RW 06 arrival), or the highest reasonable use of RW 24, as presented in Alternative E (RW 24 depart; RW 06 arrival), would encompass any shift from RW 16/34 to RW 06/24 during such snow and ice events. This means the environmental consequences of additional snow and ice events for Alternatives A (RW 34 depart; RW 06 arrival), B (RW 34 depart; RW 06 arrival), C (RW 34 depart; RW 16 arrival), or F (RW 24 depart; RW 16 arrival) would be within, and less than, the environmental consequences for each resource summarized for Alternative D (RW 06 depart; RW 06 arrival) or Alternative E (RW 24 depart; RW 06 arrival) in Table 2.7-1.

2.7.2.3 Variation 3: ODO Constraints Affecting RW 06/24 or RW 16/34

The highest reasonable number of F-22 departures by runway presented in Table 2.4-1 for Alternative C (RW 34 depart; RW 16 arrival) and Alternative E (RW 24 depart; RW 06 arrival) reflect the FAA ODO restrictions as of August 2016. Table 2.7-1 summarizes the environmental consequences of the highest reasonable use of runways for these alternatives. The Air Force is continuing discussions with the FAA regarding potential procedures, which could allow return to historic runway management of ODO for normal flight operations by JBER tower. Restricting ODO to a case-by-case basis for operational necessity, weather, or runway maintenance has the potential to affect the runway use distribution presented in Table 2.4-1 for Alternative C (RW 34 depart; RW 16 arrival) and Alternative E (RW 24 depart; RW 06 arrival).

Alternative C (RW 34 depart; RW 16 arrival) with highest reasonable departures on RW 34, would need to shift arrivals from RW 16 to RW 06 to avoid potential ODO. More arrivals on RW 06 would result in Alternative C (RW 34 depart; RW 16 arrival) environmental effects approaching those of Alternative B (RW 34 depart; RW 06 arrival). Arrivals on RW 06 reduce efficiencies and increase congestion, when compared with arrivals on RW 16. There is a potential for reduced safety with civilian aircraft associated with RW 06 arrivals, although there is the potential for improved safety for JBER F-22 operations with a shift away from ODO operations. If Alternative C (RW 34 depart; RW 16 arrival) were to retain arrivals on RW 16 and increase departures on RW 24 to address ODO restrictions, Alternative C (RW 34 depart; RW 16 arrival) environmental effects would approach those presented in Table 2.7-1 for Alternative F (RW 24 depart; RW 16 arrival).

Alternative E (RW 24 depart; RW 06 arrival) assumes ODO managed by JBER tower. To avoid ODO, Alternative E could reduce departures on RW 24 and increase departures on RW 34. In this case, Alternative E (RW 24 depart; RW 06 arrival) would have operations and environmental effects approaching those described in Table 2.7-1 for Alternative A (RW 34 depart; RW 06 arrival).

In all cases, an increase in the application of FAA ODO restrictions could result in changes in runway use and environmental consequences for Alternative C (RW 34 depart; RW 16 arrival) or Alternative E (RW 24 depart; RW 06 arrival). The environmental consequences would be within those analyzed in Chapter 4 and summarized in Table 2.7-1 for Alternative D (RW 06 depart; RW 06 arrival) or Alternative F (RW 24 depart; RW 16 arrival). This is because the Proposed Action and alternatives reflect the highest reasonable F-22 runway departures and arrivals for all JBER runways.

2.7.2.4 Variation 4: ODO Restrictions on No Action

FAA ODO policy under the No Action Alternative limits departures on RW 24 to FAA-approved operational necessity and/or emergency operations, including alert operations, the first snow of the day and no time to clear, wind conditions favoring RW 24, and aircraft technical order guidance that would not allow use of a different runway. No Action in this EIS reflects the combination of FAA restrictions on RW 24 departure as of August 2016 and the 2011 F-22 Plus-Up EA/FONSI (Air Force 2011) restrictions on RW 34 departure. The Plus-Up EA/FONSI has not more than 25 percent of departures on RW 34 and the remaining 75 percent on RW 06/24 (Primarily RW 24). As of summer 2016, FAA ODO policy procedures specified that JBER use of RW 24 included necessary ops (alert), 1st go of day (4 or 8 aircraft [assumed to average 6 for 20 days/month]), runway maintenance, and wind/weather conditions which would dictate RW 24 use for safety. In combination with the Plus-Up EA/FONSI, ODO further limits runway departures. After the 25 percent of departure operations on RW 34 are included, application of both the ODO policy and Plus-Up EA/FONSI restrictions results in a No Action Alternative with approximately 37.5 percent of F-22 operations on RW 24 (see Table 2.4-1).

The procedures coordinated with FAA to comply with the 2014 FAA ODO policy could vary substantially and affect JBER runway use under the No Action Alternative. The 2011 Plus-Up EA/FONSI assumed 75 percent of F-22 departures on RW 06/24 was primarily assumed to be on RW 24, which is immediately adjacent to the F-22 facilities. As of October 2015, JBER managed ODO consistent with then-current procedures and an estimated 58 percent of departures were on RW 24 and 17 percent of F-22 departures were on RW 06. A strict application of ODO, such as without first go of the day could result in an estimated 17 percent of F-22 departures on RW 24 and 58 percent of departure operations on RW 06.

Variations in No Action runway use result from variation in procedures coordinated with FAA to comply with FAA ODO policy. The potential variation in No Action affects the efficiency comparison because the training in the airspace is directly related to runway use, and use of RW 06 for departure has quantifiable inefficient taxi and hold for F-22 departure operations.

The summer 2016 FAA ODO policy procedures and the Plus-Up EA/FONSI have been assumed to be the restrictions which apply to No Action runway use. This distribution is included for efficiency comparison in Table 2.3-1 and is explained in Appendix B.1.

Variations in No Action F-22 departure operations would not change RW 34 use but could result in greater or lesser use of RW 06 or RW 24. Environmental effects of greater use of RW 06 would approach those described for Alternative D (RW 06 depart; RW 06 arrival), and environmental effects of greater use of RW 24 would approach those described for Alternative F (RW 24 depart; RW 16 arrival). Although this could improve safety, as noted in Table 2.7-1 for Alternative D, the No Action Alternative with increased RW 06 departures would require over 2 miles of taxi and hold and would be substantially more inefficient than the Table 2.3-1 or Table 2.7-1 summary for the No Action Alternative. In all cases, a variation in No Action would result in no more environmental effects than those evaluated for the runway use alternatives.

2.7.2.5 Variation 5: Distribution of Arrivals Using Visual Flight Rules (VFR) and Instrument Flight Rules (IFR)

The F-22 arrivals presented in Table 2.4-1 for Alternatives C (RW 34 depart; RW 16 arrival) and F (RW 24 depart; RW 16 arrival) reflect the highest reasonable number of VFR and IFR arrivals on RW 16 for the purpose of noise modelling and evaluation of acoustic effects over land and marine environments. The majority of F-22 IFR arrivals on an extended RW 16 could use the existing TACAN procedures. The establishment of a precision approach procedure for IFR arrival on an extended RW 16 is evaluated as a potential future project in Chapter 5, Cumulative Impacts.

If F-22 arrivals on RW 16 were restricted to VFR only, there would be a reduction in arrivals on RW 16 and an increase in arrivals on RW 06 associated with Alternatives C (RW 34 depart; RW 16 arrival) or F (RW 24 depart; RW 16 arrival) when compared with Table 2.4-1. This would have the potential to reduce efficiency on Table 2.3-1 because arrivals on RW 16 directly from training airspace permit more training time than arrivals on RW 06 through multiple airspace segments (see Figure 2.2-3). Environmental effects from variations in RW 06 arrivals for Alternatives C (RW 34 depart; RW 16 arrival) or F (RW 24 depart; RW 16 arrival) would be within the RW 06 arrivals evaluated for Alternative A (RW 34 depart; RW 06 Arrival), and environmental effects from arrivals on RW 16 would be less than the effects of arrivals on RW 16 evaluated for Alternative C (RW 34 depart; RW 16 arrival) or Alternative F (RW 24 depart; RW 16 arrival).

2.7.2.6 Variation 6: Cumulative Glideslope Safety Improvements

As explained in EIS Chapter 5, there have been a series of REDHORSE safety projects to improve the glideslope for arrivals on RW 16. Alternatives A (RW 34 depart; RW 06 Arrival), D (RW 06 depart; RW 06 arrival), and E (RW 24 depart; RW 06 arrival) reflect the historic, very limited, use of RW 16 for arrivals. This has been primarily because trees and topography historically created unsafe conditions for arrival on RW 16. REDHORSE activities have adjusted the topography toward a 40:1 glideslope to RW 16. This change in glideslope could permit an increase in the number of F-22 arrivals on RW 16 when compared with arrivals presented in Table 2.4-1. Appendix B.1, *Airspace Management and Use,* takes into consideration the potential for increased use of RW 16 for arrivals to calculate and compare training time minutes. The environmental consequences of somewhat increased arrivals on RW 16 for Alternatives A (RW 34 depart; RW 06 Arrival), D (RW 06 depart; RW 06 arrival), or E (RW 34 depart; RW 06 arrival) would be within the environmental consequences described for RW 16 arrivals for Alternative C (RW 34 depart; RW 16 arrival) or Alternative F (RW 24 depart; RW 16 arrival).

2.7.2.7 Summary of Variations in Runway Use

The examples of variations in highest reasonable runway use described above reflect potential changes in assumptions that could affect the distribution of flight operations on JBER runways. These variations would represent variations in runway use distributions from those presented in Table 2.4-1 These examples are not all-inclusive but do demonstrate that the environmental effects of variations in F-22 runway use, whether as the result of deployments, ODO requirements, VFR/IFR arrivals, or other factors, would be within the environmental effects described in Chapter 4 for the highest reasonable departures and arrivals from any JBER runway (Table 2.4-1).

The environmental analyses of the highest reasonable F-22 runway operations presented in Chapter 4 and summarized in Table 2.7-1 encompass the environmental effects that could occur as a result of variations in runway use.

3.0 AFFECTED ENVIRONMENT

This chapter contains information on the environment potentially affected by the F-22 runway use alternatives considered in this EIS. The No Action Alternative represents the baseline conditions presented in this chapter. NEPA requires that the analyses address those areas and components of the environment with the potential to be affected. Locations and resources with no potential to be affected need not be analyzed. Resource definitions, as well as the regulatory setting and methodology of analysis, are found in Appendix B.

Each environmental resource discussion begins with an explanation of the potential geographic scope of any potential consequences or the ROI. For most resources in this chapter, the ROI is defined as the area affected by airfield operations, the area that could be affected by a possible future RW 16/34 extension project, or the Municipality of Anchorage. In this EIS, the airfield and its vicinity are termed JBER-Elmendorf. For some resources (such as noise, air quality, and socioeconomics), the ROI extends over a larger jurisdiction unique to the resource.

The existing condition of each relevant environmental resource is described to give the public and agency reviewers a meaningful point to compare potential future environmental, social, and economic effects.

3.1 Airspace Management and Use

This section describes current JBER airfield operations and standing runway arrival/departures procedures relative to the surrounding Anchorage Bowl airspace environment and its high density use by both IFR and visual flight rules (VFR) aircraft. The FAA has the overall authority and responsibility for managing this terminal airspace complex while JBER is responsible for managing its airfield and runway operations in a manner that safely integrates military flight activities with other air traffic in this region. JBER adheres to those requirements outlined in AFI 13-201, *Air Force Airspace Management*, and related FAA, DoD, and Air Force directives governing the cooperative planning, use, and management of airspace supporting 3 WG flight operations.

3.1.1 Anchorage Bowl Airspace

The FAA has structured the nation’s controlled airspace in a manner that is designed to best meet the individual and common needs of all military, commercial, and general aviation interests. This structure consists of five different airspace classifications (Classes A through E) where each is established, regulated, and controlled based upon the nature and density of the aircraft operations performed within a given airspace environment as defined in Appendix C, under *National Airspace System Description*. Those designated classes within the Anchorage Bowl airspace ROI that are considered most relevant to the Proposed Action and the focus of the airspace discussions are Class C and Class D.

Class C airspace is a subdivided circular area resembling an upside down wedding layer cake established around high density airports such as Anchorage International that are serviced by a radar approach control facility and operational control tower. All aircraft, including VFR general aviation flights, must be in communication with this approach control facility prior to entering and while operating within the published lateral and vertical limits of the designated Class C airspace. This enables air traffic control (ATC) to better monitor and manage all VFR and IFR aircraft flights within this designated area.

The Class C airspace surrounding the Anchorage International Airport is shown in Figure 3.1-1. This airspace extends from the surface to 4,100 feet mean sea level (MSL) around the airport with the outer sectors beginning at 1,400 feet MSL with the exception of the sector overlying Campbell Lake, which begins at 600 feet MSL. The northern sector west of JBER has a lower ceiling (1,900 feet MSL), which allows JBER and other aircraft to transit at lower altitudes while remaining clear of the Class C airspace. VFR aircraft flying above or below the Class C sector altitudes are not subject to Class C communications requirements. This Class C and surrounding terminal areas are controlled by the FAA-operated Anchorage Terminal Radar Approach Control Facility, which provides radar services for all IFR aircraft transiting through this terminal airspace (FAA, 2015).

The FAA has also designated terminal area airspace that is subdivided into six segments as depicted in Figure 1.1-1, Figure 2.2-3, and Figure 3.1-1. These segments are established in accordance with Federal Aviation Regulations (Title 14 CFR Part 93) and published in aeronautical charts and publications to provide a more regulated means for managing air traffic flows through the Anchorage Bowl complex. Each segment has rules that specify those altitudes and flight restrictions that pilots must adhere to when operating within the different segments. Several public and private airfields and seaplane bases are located within or near these segments and the Anchorage Class C airspace that serve the high number of general aviation aircraft operating within this region, to include Lake Hood, Campbell Lake, Sixmile Lake, Robin, Falcon Lake, Flying Crown, and Sky Harbor. Each of these locations is considered according to the overall manner in which JBER flight operations are managed and conducted.

The airspace surrounding JBER, Merrill Field, Lake Hood, and Bryant Army Airfield is Class D. Class D airspace is established around those airfields having an operational control tower where the tower is responsible for all airfield and air traffic operations within this designated airspace during their published hours of operation. All aircraft operating within Class D airspace must establish communications with the control tower unless otherwise under the control of an approach control facility that coordinates the aircraft's approach and landing with the tower. The JBER Class D airspace extends from the surface up to 3,000 feet MSL, with the lateral boundary of this airspace coinciding with the Elmendorf segment boundary depicted in Figure 1.1-1, Figure 2.2-3, and Figure 3.1-1. The adjacent Merrill Field, Lake Hood, and Bryant Army Airfield Class D airspace each extend from the surface to 2,500 feet MSL. The Elmendorf and Lake Hood towers operate continuously while the published operational hours for the Merrill Field and Bryant Army Airfield towers are, respectively, 0730-1700 and 0730-1730, Monday–Friday. During these hours of operation, each control tower manages their Class D operations while coordinating flight activities, as necessary, with the other towers and the radar approach control facility.

The other controlled airspace within this region is Class E. This class generally exists everywhere not designated as Class A, B, C, or D. Class D reverts to Class E during those times the tower is not operational where aircraft operating at or near these airfields must exercise increased vigilance for other aircraft in the area. Given the relevance of the Class C/D and terminal airspace areas to the proposed F-22 operational efficiency alternatives, Class E is not addressed any further.

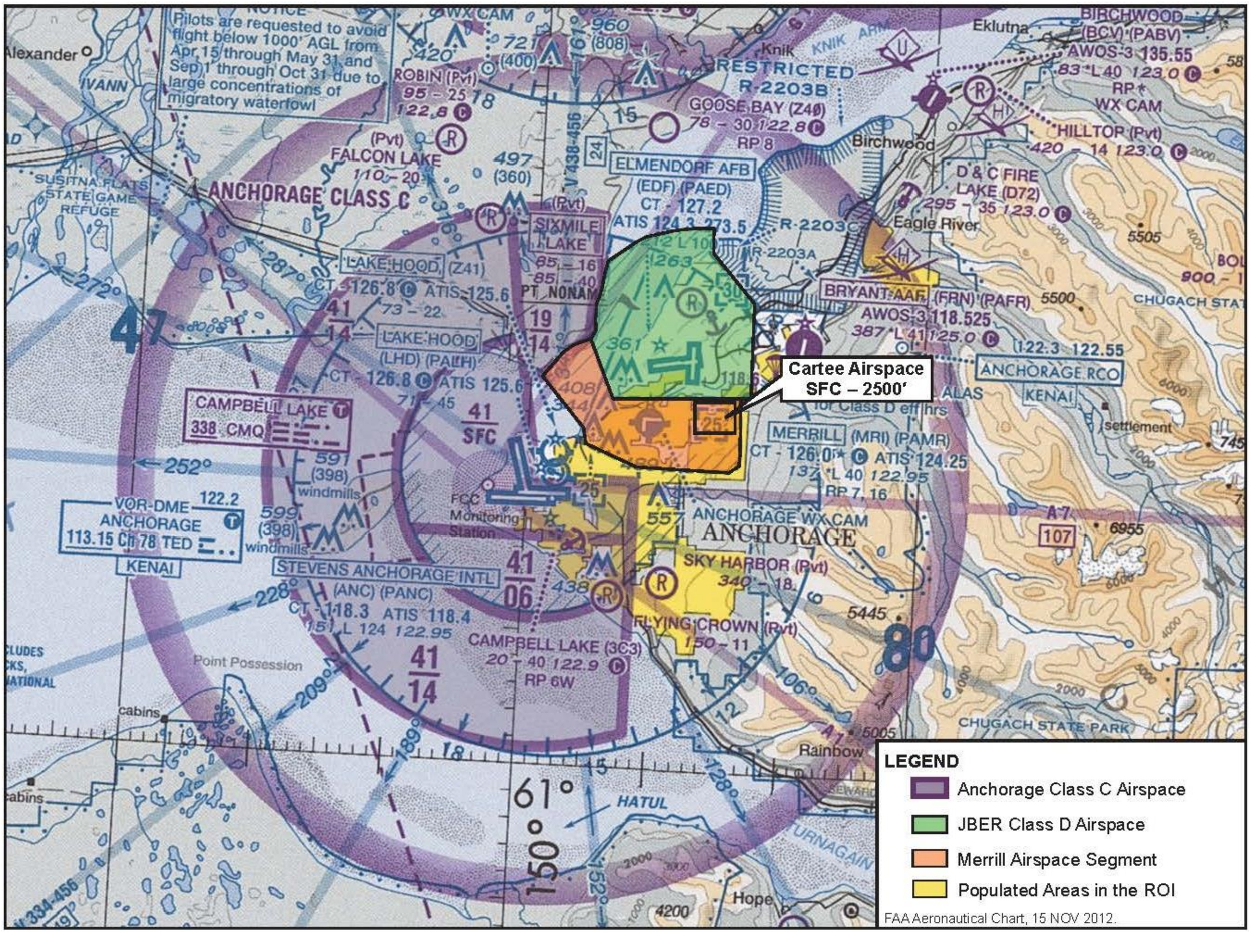

Figure 3.1-1. Anchorage Class C and Terminal Airspace Area
Source: FAA 2015b

3.1.2 Airspace Uses

Airspace uses in this ROI include the different airfield/seaplane base aircraft operations and the visual and instrument arrival and departure routes and VFR corridors most commonly flown by IFR and VFR aircraft while operating within the Anchorage Bowl airspace.

JBER Aircraft Operations

As discussed in Chapter 2, the JBER airfield consists of two intersecting runways (RW 06/24 and RW 16/34) where differing weather/wind conditions, aircraft types, air traffic conditions, and other such factors can affect real-time runway uses. The different runway uses by F-22s and other JBER aircraft are also described in Section 2.2.3 where F-22 departures occur on RW 06, RW 24, and RW 34 with the majority of F-22 instrument arrivals being to RW 06 while responding to FAA ODO guidance. Annual JBER airfield operations are shown in Table 2.2-2 where it is noted that the F-22s account for approximately one-third of JBER operations. F-22 quarterly operations are approximately 24 percent of total annual operations in January through March, 34 percent in April through June, 23 percent in July through September, and 19 percent in October through December (2013-2014 data). Military aircraft operational trends on a monthly/yearly basis can vary somewhat differently than civilian airport trends depending on exercise schedules, aircraft realignments/deployments, budget considerations, and other such factors.

F-22 flights between JBER and the training airspace are conducted either visually or via published instrument arrival/departure procedures as weather conditions, training requirements, or air traffic conditions may warrant. Visual approaches approved by ATC provide more direct and timely routing to the airfield Class D airspace where the aircraft can enter a VFR pattern for landing on the tower assigned runway. Published instrument procedures provide a means for IFR aircraft to navigate to/from a runway environment when marginal weather conditions or proficiency training may require. Such procedures are based on radio signals from ground-based navigational aids such as a precision ILS that provides both lateral and vertical guidance to a runway. Non-precision approaches include those based on a Tactical Air Navigation (TACAN) system or Global Positioning System area navigation (RNAV) that provide lateral direction only with designated minimum altitudes an aircraft maintains while approaching a runway for landing. Precision instrument approaches can be flown under lower cloud ceiling and visibility minimums than non-precision approaches.

Instrument procedures are developed using specific design criteria that include obstacle clearances, navigational aid reception, aircraft categories, other airspace uses, etc., where any new or modified approach procedure requires a formal review and approval process before being published.

JBER published instrument approach procedures include both ILS and TACAN approaches to RW 06 and TACAN approaches to RW 16 with those flight tracks generally illustrated in Figure 3.1-1. Standard arrival and departure routes are established for transitioning between JBER and the training airspace. The initial approach points for the RW 06 ILS and TACAN approaches begin over the Cook Inlet about 15 miles west of JBER at 3,000–4,000 feet MSL where an aircraft conducting these approaches descends through the Anchorage Class C and Lake Hood and Merrill Field segments while being separated from other IFR air traffic. Aircraft flying these approaches to RW 06 may also circle north within the Class D airspace to RW 24 or east to RW 34 for landing, as needed. The RW 16 TACAN approach begins about 17 miles northwest of JBER at 6,000 feet MSL where an aircraft descending to the runway overlies the Sixmile Lake and Knik Arm areas where VFR aircraft may be operating below 600 feet. A circling approach to RW 06 may be permitted. About 35 percent of F-22 arrivals fly these instrument approach procedures for either training in visual weather conditions or as necessary during marginal weather conditions. Otherwise, the F-22s fly published standard arrival and departure routes north of JBER where these flights transit to/from the training areas outside the higher density traffic areas.

Each instrument approach procedure includes a missed approach routing an aircraft would execute if airfield or air traffic conditions prevented a landing. Both the RW 06 and RW 16 missed approaches have an aircraft turning left in a northerly direction outside the Class D airspace where ATC would redirect the aircraft for another approach. The RW 16 missed approach places the aircraft at the south edge of the Class D airspace near the Merrill segment before turning north bound through the R-2203 restricted areas when not in use. The RW 06 missed approaches have aircraft turning left and northbound east of the airfield and west of R-2203. Aircraft are routed clear of the restricted areas when active. Aircraft may also conduct a VFR "go-around" missed approach while remaining within the Class D airspace under the tower's control for landing. Approximately 15 percent of the F-22 instrument approaches result in a missed approach/go-around where those aircraft remaining within the Class D airspace are at VFR traffic pattern altitudes above the lower altitudes at which VFR aircraft are operating around the Sixmile and Knik Arm areas.

The adjacent Merrill Class D airspace (termed "Cartee" airspace by local civil and military pilots and controllers) is requested at times when extended pattern airspace is needed for fighter aircraft recoveries to RW 16 or RW 34. Release of this airspace must be coordinated between JBER and Merrill towers in sufficient time so as not to impose on Merrill Field traffic. Once initiated, this extension is terminated as soon as the last aircraft has exited the Cartee airspace.

Anchorage International Airport Operations

Anchorage International Airport is located just southwest of JBER where its Class C segments abut the JBER, Lake Hood, and Merrill Class D segment boundaries as shown in Figure 1.1-1, Figure 2.2-3, and Figure 3.1-1. Annual Anchorage aircraft operations by month over the past 10 years are shown in Table 3.1-1. The monthly trends have been relatively consistent each year with higher use occurring in May through September and lower use December to February. The 2014 Anchorage Airport Master Plan projects overall commercial and general aviation aircraft operations to grow at an average annual rate of 1.4 percent by 2030 (Alaska Department of Transportation [ADOT] 2015).

The predominant Anchorage runway uses are eastbound aircraft arrivals to the parallel runways 7R and 7L and northwest bound departures from RW 33. Use of these and other available runways (RW 25L/R and RW 15/33) is as weather conditions, aircraft types, air traffic conditions, etc. may dictate. The majority of the different published ILS, RNAV, and standard arrival procedures are for aircraft arrivals to RW 7R/L while most departure procedures are for RW 15/33 and RW 25L/R. These arrival/departure routes and associated missed approach procedures are mainly northwest, west, and south of the airport, as illustrated in Figure 3.1-1, to avoid the JBER, Lake Hood, and Merrill Field airspace operations. Any IFR arriving/departing air traffic that is routed through the JBER or Merrill Field segments are at ATC-assigned altitudes that separate these aircraft from the Class D airspace.

Table 3.1-1. Anchorage International Annual/Monthly Airfield Operations

Month	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
January	18,841	18,026	18,448	17,492	14,703	16,033	16,223	14,637	15,081	15,146
February	17,167	16,900	17,990	17,451	14,461	15,144	14,538	15,653	13,980	14,437
March	21,787	22,591	22,242	21,209	15,895	19,313	20,606	19,831	18,243	20,468
April	22,421	22,097	21,919	20,026	17,187	20,011	19,544	19,457	18,836	19,587
May	29,270	27,907	25,784	26,709	24,001	26,200	25,165	24,299	24,218	25,356
June	38,922	34,170	35,154	32,503	29,920	31,366	31,602	34,183	32,739	31,041
July	37,434	35,391	34,966	33,277	30,521	33,032	34,528	34,065	34,108	34,057
August	37,301	34,312	33,668	34,184	31,233	32,925	31,564	33,032	31,064	33,492
September	29,249	29,364	27,955	25,554	25,960	25,261	26,868	23,712	24,499	27,174
October	25,091	23,135	23,231	20,101	20,421	22,005	20,993	20,005	20,026	21,707
November	19,296	19,795	19,068	16,602	16,553	16,864	16,064	16,686	16,338	17,963
December	19,463	19,420	19,492	15,417	15,777	16,624	15,608	15,437	15,258	16,583
Total	**316,242**	**303,108**	**299,917**	**280,525**	**256,632**	**274,778**	**273,303**	**270,997**	**264,390**	**277,011**

Source: FAA Air Traffic Activity Data System (ATADS) 2015

Other Anchorage Bowl Aircraft Operations

The other higher use airfield in the Anchorage Bowl area is Merrill Field, located south of JBER where its Class D airspace abuts the JBER and Lake Hood Class D segments. Monthly aircraft operations at this airfield over the past 10 years are shown in Table 3.1-2 where the yearly higher and lower use months are reasonably consistent with Anchorage operational levels. While a Master Plan update for this airfield is currently in progress, the 2012 Plan indicates total operations were highest in the 1990s and early 2000s (between 150,000 and 250,000) and have gradually declined over the following years. Aircraft operations are expected to gradually increase through the year 2040; however, they would not likely reach the levels seen in those earlier years. This airfield has two runways (east/west RW 7/25 and north/south RW 16/34) with one published RNAV procedure to RW 7. The vast majority of all aircraft operations occur on RW 25 while remaining clear of the JBER and Lake Hood Class D and Anchorage Class C airspace (Municipality of Anchorage 2012).

Table 3.1-2. Merrill Field Annual/Monthly Airfield Operations

Month	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
January	9,984	8,129	10,837	9,305	8,253	9,916	6,448	4,707	6,748	5,870
February	10,965	9,486	13,686	9,680	9,406	9,547	7,561	6,909	8,530	8,323
March	14,621	14,139	14,938	15,196	11,635	12,501	12,732	9,409	9,845	10,902
April	18,055	16,359	18,293	13,160	16,837	12,887	12,999	11,939	11,305	12,536
May	21,115	21,222	19,737	19,317	19,293	16,101	13,545	13,807	15,126	13,751
June	22,562	21,406	16,801	18,306	20,727	15,482	15,332	13,903	16,134	13,447
July	20,747	22,325	17,195	17,453	18,249	14,598	15,413	14,432	16,153	13,017
August	22,834	19,060	17,798	20,355	18,568	13,577	12,056	15,342	12,931	12,730
September	15,835	17,978	13,127	17,894	15,009	12,815	11,482	9,819	11,521	10,588
October	16,077	14,077	12,787	13,959	11,595	14,238	9,430	10,978	9,780	10,706
November	9,168	12,884	10,022	9,875	8,079	7,786	5,982	8,816	6,328	8,028
December	8,853	10,733	9,627	6,896	7,482	7,099	4,652	5,364	4,151	5,690
Total	**190,816**	**187,798**	**174,848**	**171,396**	**165,133**	**146,547**	**127,632**	**125,425**	**128,552**	**125,588**

Source: FAA Air Traffic Activity Data System (ATADS) 2015

Other airfields/seaplane bases in the ROI and in reasonably close proximity to JBER include Lake Hood, Sixmile Lake, and Campbell Lake. Reported information indicates an average of 169 daily operations (approximately 62,000 annually) is conducted at Lake Hood and an average of 24 weekly operations (about 1250 annually) occurs at Campbell Lake. While no operational data is available for Sixmile Lake and other more distant public/private airfields within this general region, general aviation operations at these locations, while minimal, are also considered in those initiatives that help ensure the safety of all aviation activities in this region. As noted previously, aircraft operating at these locations remain below 600 feet MSL until clear of the JBER airspace (airnav.com 2015).

VFR aircraft operating to/from the different airfield/seaplane locations and transiting through the Anchorage Bowl airspace use “see and avoid” procedures to remain clear of other VFR/IFR aircraft in this congested airspace. Pilots may also request radar flight following from ATC where controllers will provide advisories on other IFR and VFR traffic on a workload permitting basis. A Special VFR clearance may also be requested from ATC when the weather is less than the minimum requirements for VFR flight. VFR corridors are also recognized within this ROI to help identify general routing that VFR aircraft may follow while flying between key destinations such as the Glenn Highway corridor east of JBER that connects the Palmer and Anchorage airports and continues down to the Cook Inlet. VFR aircraft also fly along the Knik Arm through the JBER segment below JBER traffic. Another means by which VFR aircraft may stay abreast of air traffic conditions and other advisories is the use of a published common traffic advisory frequency (CTAF) such as is available in Matanuska-Susitna Valley. A CTAF is used by VFR pilots to communicate their position when not in contact with ATC or a flight service station to enhance situational awareness for all VFR aircraft.

The overall manner in which the high density Anchorage Bowl airspace is configured, managed, and used, as discussed above, has provided a safe, efficient, and reasonably compatible airspace environment that meets both military and civilian aviation needs. Both JBER and FAA representatives coordinate with the Aircraft Owners and Pilots Association and other aviation interests in addressing any operational/airspace matters that could affect regional air traffic patterns/flows. JBER makes every effort to reach out to the aviation community through the Alaska Civilian-Military Aviation Council, the JBER Midair Collision Avoidance Pamphlet, the Special Use Airspace Information Service, and other such initiatives to better inform all concerned of military operations and any planned or proposed actions such as those addressed in this EIS.

3.2 Acoustic Environment

In the acoustic environment, unwanted sounds are referred to as noise. Noise is a subjective experience, and different people can perceive the same sound source as being either "sound" or "noise" depending on their personal preferences and their situation at the time it is heard. Noise can interfere with activities such as sleeping and conversation potentially causing annoyance, and noise at extremely high levels can impact auditory and non-auditory health. Noise has the potential to affect several resource areas. This section discusses general effects of existing noise levels on humans (e.g., annoyance, land use compatibility) and will briefly discuss noise impacts to biological resources. Discussions of existing noise impacts are also contained in Section 3.7, Biological Resources, Section 3.8, Cultural Resources, Section 3.9, Land Use and Recreation, Section 3.11, Socioeconomics, and Section 3.12, Environmental Justice. More in-depth discussions of potential noise impacts and methods used to characterize the acoustic environment are included in Appendix E, *Acoustic Environment.*

The ROI for noise includes areas on and near JBER that would be affected by changes in runway use patterns for F-22 departures and arrivals under all of the alternatives. Changes in aircraft operations would affect noise levels experienced on land (e.g., in the Mountain View community) and in bodies of water (e.g., the Knik Arm). Existing conditions on land will be discussed in Section 3.2.1, Noise Levels on Land, and existing conditions in the water will be discussed in Section 3.2.2, Noise Levels in the Knik Arm. Noise levels in water are considered in detail because of the potential for impacts to aquatic species such as the CIBW.

3.2.1 Noise Levels on Land

This section includes a brief discussion of the metrics used in this EIS to quantify noise levels on land (Section 3.2.1.1) and the methods used to calculate these metrics (Section 3.2.1.2). Section 3.2.1.3 describes noise impacts in several impact categories.

3.2.1.1 Describing Noise Levels on Land

All airborne decibel noise levels stated in this EIS are A-weighted to reflect frequency sensitivity of human hearing unless otherwise noted. By convention, airborne noise levels are expressed using decibels measured against a reference pressure level of 20 micropascals. The primary and supplemental noise metrics used in this EIS to describe airborne noise levels are described briefly below and in more detail in Appendix E, *Acoustic Environment*.

Day-Night Average Sound Level (L_{dn})

In accordance with current DoD guidance, the L_{dn} (day-night average sound level) was the primary metric used to analyze community noise impacts. The L_{dn} metric decibel averages A-weighted noise levels over a 24-hour period, taking into account the number and noise level of each type of aircraft operation (e.g., F-22 departures, C-130 landings) as well as the time of day in which the operations occur. This metric adds 10 A-weighted decibels to those events that occur between 10:00 PM and 7:00 AM to account for the increased intrusiveness of noise events that occur at night (see Appendix E).

Social surveys have found that at 65 dB L_{dn}, about 12 percent of the population can be expected to be highly annoyed by noise, while at 70 and 75 dB L_{dn}, 22 percent and 37 percent, respectively, are annoyed (Schultz 1978, Finegold et al. 1994). Although L_{dn} does not represent the sound level experienced at any particular moment, it is a useful metric in that it characterizes the generalized noise conditions with a single number and has been adopted by several federal agencies as the standard metric for evaluating impacts of noise exposure.

The Air Force and several other federal agencies make land use recommendations based on L_{dn} (see Section 3.9). In accordance with current DoD policy, day-night average noise levels in this EIS were calculated for an average annual day. This means that total annual operations were divided among 365 days to generate an average daily number of operations. Since social surveys of annoyance due to noise and noise-related land use compatibility guidelines are based on yearly average noise levels, noise contours developed based on average annual daily operations are thought to be the best predictor of impacts in most situations. Variability in operations tempo and resulting noise levels over the course of hours, days, and months is noted in discussions of noise impacts, but does not affect land use compatibility under this policy.

Maximum Noise Level (L_{max})

This supplemental noise metric simply states the highest noise level reached during an individual noise event. A typical aircraft noise event experienced on the ground consists of noise onset, noise maximum, and noise decrease as the aircraft approaches, passes the point of closest approach, and then moves away.

Number of Events Above Threshold (NA)

This supplemental metric counts the average number of times per day that some threshold noise level is exceeded. In this EIS, the count provided is the number of noise events with a maximum noise level that could potentially interrupt speech.

Probability of Awakening

The probability of awakening is a supplemental noise metric calculated based on the noise levels of individual flight events and the average number of times per night that each type of event occurs. The likelihood of awakening associated with each individual event between 10:00 PM and 7:00 AM (when most people are asleep) is calculated based on a dose-response relationship derived from the results of several social surveys. Then, the individual probabilities are summed to arrive at an overall probability that an individual will be awakened at least once over the course of the night.

Equivalent Noise Level (L_{eq})

The equivalent noise level (L_{eq}) supplemental noise metric is the average noise level during some specified period of time. This EIS includes L_{eq} values during an 8-hour time period in which school is in session (i.e., 7:00 AM to 3:00 PM). These noise levels are denoted as $L_{eq\text{-}8hr}$.

Potential Hearing Loss (PHL)

This community noise impact metric is used to quantify noise-induced hearing impairment across an entire affected residential population. This metric is calculated in instances where residences are or would be exposed to noise levels associated with a substantial risk of noticeable hearing impairment. Current DoD policy for assessing hearing loss risk as part of NEPA analysis is to conduct a detailed assessment where residences are or would be exposed to noise levels exceeding 80 dB L_{dn}.

3.2.1.2 Calculating Existing Noise Levels/Impacts on Land

Noise levels under existing conditions were modeled using the latest approved technology and in accordance with current DoD policies. Noise levels modeled and presented in this EIS reflect the operations of all aircraft on JBER, including based aircraft and transient aircraft. Noise levels were modeled based on aircraft types, runway use patterns, engine power settings, altitude profiles, flight track locations, airspeed, terrain, and other factors using the program NOISEMAP (Version 7.3). NOISEMAP has been field tested through direct measurement of noise levels and was found to be accurate within a few decibels (Armstrong Laboratory 1991). Incorporated were the effects of terrain (e.g., hills, valleys) and surface impedance (e.g., the ground absorbs sound energy to a greater degree than water). Computer topographic effects modeling was not approved for use by the Air Force when the noise levels were modeled for the 2011 F-22 Plus-Up EA/FONSI (Air Force 2011). It was included in the 2013 *Draft EIS for the Proposal to Relocate the 18th Aggressor Squadron (AGRS) from Eielson Air Force Base to JBER* (Air Force 2013a) and is now standard practice for this type of analysis.

Analyses conducted prior to 2011, including the F-22 Plus-Up EA/FONSI (Air Force 2011), calculated L_{dn} for an average operational day, meaning that annual operations were divided among only those days on which the unit was flying. As was mentioned previously in this section, updated DoD policy requires use of an average annual day (i.e., total annual operations divided evenly among all 365 days of the year) for all regularly-used airfields. At JBER, the tempo of operations is typically higher during warm-weather months and lower in cold-weather months (see Section 2.2.3). During any given year, F-22 flight operations are typically less frequent in March, September, November, and December and more frequent in April, June, and August. Although this variation between seasons is worth noting, it is does not affect the average annual day L_{dn}. The intensity and duration of noise generated during individual aircraft operations (e.g., a departure from RW 34) are approximately the same during summer and winter months.

The number of people affected by elevated noise levels was estimated based on 2010–2014 U.S. Census estimates in combination with data on current land use patterns. For purposes of this analysis, population was assumed to be evenly distributed in the residential portions of census blocks. Residential portions of census blocks were determined based on Municipality of Anchorage land use data as refined based on aerial photography. Including only residential portions of census blocks in population estimation calculations is expected to provide increased accuracy relative to previous JBER NEPA documents.

3.2.1.3 Existing Conditions on Land

This section describes existing noise conditions on land in terms of ongoing impacts in several impact categories. This description of the existing conditions also describes conditions that would exist under the No Action Alternative.

Annoyance and Land Use Compatibility

Noise-related annoyance is a typically a reaction to noise interfering with activities such as conversation, watching television, or sleep. Because annoyance may be a reaction to several separate interference events (e.g., speech disturbance followed later by sleep disturbance), it is a summary measure of the general adverse reactions persons may experience when living in noisy environments. In places where noise events are intense and/or frequent, activity interference and annoyance can be expected to be sufficiently common, that certain noise-sensitive land uses (e.g., residences) are not considered to be compatible with the noise. As discussed in Section 3.2.1, Noise Levels on Land, residences and several other noise-sensitive land uses are not considered compatible with noise levels above 65 dB L_{dn}.

Figure 3.2-1 shows noise contours for current operations (i.e., baseline conditions) for all JBER aircraft operations, using the noise metric L_{dn}. The highest noise levels occur beneath approach and departure corridors along both RW 06/24 and RW 16/34 and in areas immediately adjacent to parking ramps and aircraft staging areas. In general, higher noise levels reflect areas that are overflown frequently. Approximately 25 percent of total departures occur on RW 34, in line with constraints in the F-22 Plus-Up EA/FONSI (Air Force 2011); the other departures are made from RW 06 (37.5 percent), RW 24 (37.5 percent), and RW 16 (less than 1 percent). Initial and second approach operations are primarily made to RW 06 (92 percent) with the remainder being made to RW 34 (8 percent), RW 24 (less than 1 percent), and RW 16 (less than 1 percent). Noise levels of 65 dB L_{dn} or greater affect areas on JBER, portions of the Knik Arm, and industrial areas, including the Port of Anchorage. To minimize noise disturbances during sensitive times, JBER-Elmendorf employs a quiet-hours program in which fighter aircraft operations (takeoff and landing patterns as well as engine run-ups) are avoided between 11:30 PM to before 6:00 AM on weekdays, and 11:30 PM to before 8:00 AM on weekends and holidays. Exceptions to this policy are made for national emergencies, scramble orders for alert aircraft, or a major flying exercise.

A total of 7,196 acres on JBER and 995 acres off-installation (888 over water and 107 over land) are affected by noise levels of 65 dB or greater under existing conditions (Table 3.2-1). Although off-installation areas are affected by noise levels exceeding 65 dB L_{dn}, these affected areas are all located in the Port of Anchorage, the railroad right-of-way that traverses JBER, or open water. No off-installation residences are exposed to noise levels exceeding 65 dB L_{dn} under existing conditions.

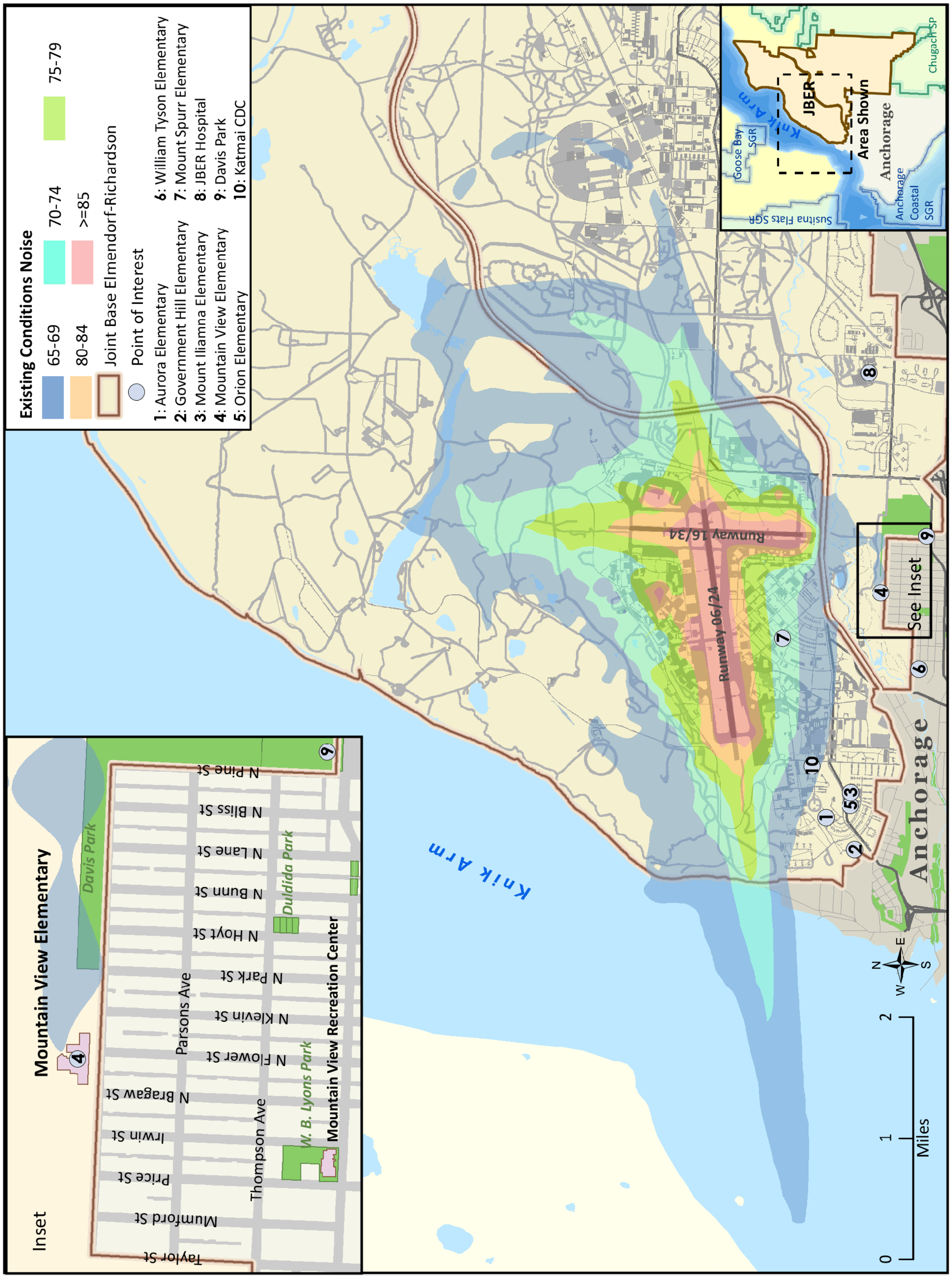

Figure 3.2-1. Noise Contours Under Existing Conditions

Table 3.2-1. Area Exposed to Noise Levels of 65 dB L_{dn} or Greater Under Existing Conditions

Noise Level (dB L_{dn})	Existing Conditions			
	JBER	Off Installation Over Water	Off Installation Over Land	Total
65 – 69	3,583	748	85	4,416
70 – 74	1,598	140	17	1,755
75 – 79	988	0	5	993
80 – 84	510	0	0	510
≥85	517	0	0	517
Total	7,196	888	107	8,191

Key:
≥ = greater than or equal to
dB = decibels, A-weighted
L_{dn} = day-night average sound level

Of the land area on JBER affected by noise levels greater than 65 dB L_{dn}, approximately 130 acres are used for residential purposes, 241 acres are used for community support, and 1,840 acres are used for administrative/industrial. Other land uses on JBER, such as open land and airfield, are not considered as noise-sensitive. Because background noise levels are often low and because sleep, relaxation, and other activities common in a residential environment are easily disturbed by noise, the effects of aircraft noise at residences are of particular concern. On JBER, 115 residential structures are exposed to noise greater than 65 dB L_{dn}. An estimated 1,225 on-base residents are exposed to noise levels between 65 and 70 dB L_{dn}, and an estimated 199 residents are exposed to noise levels between 70 and 75 dB L_{dn} for a total of 1,424 residents exposed to noise at levels greater than 65 dB L_{dn}.

Structures on JBER are designed to avoid any unnecessary heat loss in the cold climate of Alaska. Construction features primarily intended to avoid heat loss such as thicker insulation and double-paned windows also result in improved exterior-to-interior noise attenuation. According to the U.S. Environmental Protection Agency (USEPA) (1974), the average exterior-to-interior noise level reduction provided by a typical American home located in a cold climate is 27 dB if the windows are closed and 17 dB if the windows are open. Exterior-to-interior noise attenuation provided by non-residential structures on JBER varies widely based on structure type. Most structures on JBER that are frequently occupied are also designed with energy-efficient construction elements and provide high levels of structural noise attenuation. A person's indoor experience contains substantially lower noise levels than a person's outdoor noise experience due to structural noise attenuation, and the likelihood of noise-related annoyance is lower indoors rather than outdoors. Residences providing at least 25-dB outdoor-to-indoor noise level reduction would be considered compatible with noise levels up to 70 dB, according to Air Force guidelines.

As discussed at the beginning of this section, noise is a highly subjective phenomenon, and the likelihood that an individual will become annoyed by noise depends on a number of factors, including the attitude of an individual toward the sound source. Because most of the persons on base are either directly or indirectly employed by the military, their attitude towards the military is generally assumed to be positive and they may be less likely to be annoyed due to the noise of Air Force aircraft than civilian population off-base.

Table 3.2-2 lists L_{dn} values at several points of interest located near JBER, which correlate to higher likelihood of annoyance (e.g., Mount Spurr Elementary School at 72.3 dB L_{dn}) or a relatively lower likelihood of annoyance (JBER hospital at 55.1 dB L_{dn}). Locations studied are representative of noise-sensitive locations in the ROI and are not intended to include all locations that could be considered noise sensitive. The areas surrounding the point of interest are exposed to noise levels similar to those experienced at the point of interest. For example, residences located near the hospital are exposed to noise levels similar to the 55.1 dB L_{dn} experienced at the hospital. Mount Spurr Elementary School, which is located on JBER, is exposed to 72 dB L_{dn} under existing conditions. Unless the structure provides at least 30-dB outdoor-to-indoor noise level reduction, schools are not considered a compatible land use at this noise level according to Air Force guidelines (AFI 32-7063, *Air Installations Compatible Use Zones*). The Katmai Child Development Center is exposed to 66 dB L_{dn}. Educational facilities are considered to be incompatible uses at this noise level unless the structure provides a 25 dB outdoor-to-indoor noise level reduction. For each location, Table 3.2-2 also lists the months in which the facility is most noise sensitive. Schools are most noise sensitive during the school year, which lasts from August to May. Other locations, such as the hospital, park, and child development center do not have a time of year during which they are not active. Annual flying operations are concentrated more in warm months (e.g., May through September) and are less concentrated in several months in which school is in session.

Table 3.2-2. Day-Night (24-Hour) Average Noise Levels at Points of Interest Under Existing Conditions

ID on Figure 3.2-1 and Location Description		Primary Usage	Day-Night Average Sound Level (dB L_{dn})
1	Aurora Elementary School	August – May	62.4
2	Government Hill Elementary School	August – May	58.5
3	Mount Iliamna Elementary School	August – May	60.8
4	Mountain View Elementary School	August – May	64.1
5	Orion Elementary School	August – May	60.3
6	William Tyson Elementary School	August – May	57.3
7	Mount Spurr Elementary School	August – May	72.3
8	JBER Hospital	All Months	55.1
9	Davis Park	All Months	60.8
10	Katmai Child Development Center	All Months	66.2

Key: dB = decibels, A-weighted
L_{dn} = day-night average sound level

Classroom Noise

Classroom background noise levels in excess of 40 dB are more likely to negatively affect student performance (ANSI 2009). Time-averaged exterior noise levels during the hours in which school is in session (i.e., 7:00 AM to 3:00 PM) ($L_{eq\text{-}8hr}$) under baseline conditions are shown in Table 3.2-3. The operations tempo during school hours was calculated based on operational records. Classrooms in school structures providing 27-dB outdoor-to-indoor noise-level reduction (windows closed) would be below 40 dB $L_{eq\text{-}8hr}$ in places where the exterior noise level is less than 67 dB $L_{eq\text{-}8hr}$. The child development center, Mount Spurr Elementary School, and Mountain View Elementary School currently experience noise levels exceeding 67 dB $L_{eq\text{-}8hr}$. If the classroom's windows were open, classroom noise levels would exceed 40 dB when outdoor noise levels exceed 57 dB $L_{eq\text{-}8hr}$. All of the studied schools experience noise levels exceeding 57 dB $L_{eq\text{-}8hr}$.

The Air Force has contacted the Anchorage School District to request information on the level of outdoor-to-indoor noise level reduction provided by the structure of schools on and near JBER. A recent noise study conducted at Mountain View Elementary School indicates that the walls, window, and roof are constructed using materials that are typical of school buildings and that the windows are the most acoustically weak construction element (Mullins Acoustics 2014). The report does not state an overall outdoor-to-indoor noise level reduction provided by the structure, but sound transmission characteristics of the construction elements are consistent with the structure providing an approximately 27-dB noise level reduction when windows are closed. However, recently completed and ongoing renovations at Mountain View Elementary School to improve sound insulation will help attenuate indoor noise levels at the school in the future. Studies of the acoustic performance of the other schools do not exist or has not been made available, but it is likely that the other schools' acoustic performance would be similar to Mountain View Elementary. As no information contradicting the USEPA's typical cold-climate outdoor-to-indoor noise level reduction is available, in this analysis, a 27-dB outdoor-to-indoor noise level reduction is assumed for windows-closed conditions and a 17-dB reduction will be assumed for open windows.

Table 3.2-3. School Day (8-Hour) Equivalent Noise Level Under Baseline Conditions

Location ID on Figure 3.2-1		Baseline Exterior $L_{eq\text{-}8hr}$
1	Aurora Elementary	64.8
2	Government Hill Elementary	61.0
3	Mount Iliamna Elementary School	63.3
4	Mountain View Elementary School	68.3
5	Orion Elementary School	62.8
6	William Tyson Elementary School	60.1
7	Mount Spurr Elementary School	74.9
10	Child Development Center	68.9

Key:
$L_{eq\text{-}8hr}$ = time-averaged exterior noise levels over an 8-hour period

Speech interference is difficult to predict because people typically raise their voices when background sound levels increase, allowing conversation to continue, albeit with more effort expended. If voices are not raised in response to rising noise levels, the percent of sentences understood by a listener at a distance drops below 80 percent when the background noise level increases to greater than 50 dB (Sharp and Plotkin 1984). Table 3.2-4 lists the number of JBER aircraft noise events per hour experienced indoors during the school day (i.e., 7:00 AM to 3:00 PM) with potential to interfere with speech if windows are closed and if windows are open. It is assumed that the structures provide 27-dB outdoor-to-indoor noise level reduction with windows closed and 17-dB reduction with windows open, as is typical for structures in cold climates. With windows closed, the number of events per hour at the locations studies ranges between 1.4 (William Tyson Elementary School) and 2.5 (Child Development Center). With windows open, the number of events ranges between 2.4 (William Tyson Elementary) and 4.5 (Mount Spurr Elementary School).

Table 3.2-4. Events Per Hour with Potential to Interrupt Speech Under Baseline Conditions

Location ID on Figure 3.2-1		Events Per Hour With Potential to Interrupt Speech	
		With Windows Closed (Exterior > 77 dB L_{max})	With Windows Open (Exterior > 67 dB L_{max})
1	Aurora Elementary	2.1	3.9
2	Government Hill Elementary	1.6	2.5
3	Mount Iliamna Elementary School	2.0	2.6
4	Mountain View Elementary School	1.9	3.1
5	Orion Elementary School	1.7	2.6
6	William Tyson Elementary School	1.4	2.4
7	Mount Spurr Elementary School	2.2	4.5
10	Child Development Center	2.5	3.9

Key:
> = greater than
dB = decimal
L_{max} = maximum sound level

Sleep Disturbance

Sleep disturbance is often a concern for communities exposed to nighttime noise. The probability that sleep will be disturbed at least once during the night has been calculated based on the intensity and number of noise events during "acoustic night" (10:00 PM to 7:00 AM) when most people are asleep. The analysis was run for three housing areas on JBER as well as a point in the neighborhood of Mountain View near the elementary school. The probability of sleep disturbance is calculated with windows closed conditions (with the structure providing 27-dB noise level reduction) and with windows open (with the structure providing 17-dB noise level reduction) (Table 3.2-5).

Table 3.2-5. Probability of Awakening Under Baseline Conditions with Windows Open and with Windows Closed

Neighborhoods	Probability of Awakening	
	Windows Open	Windows Closed
Dayton (JBER)	6.5% chance	3.8% chance
Silver Run (JBER)	4.1% chance	2.2% chance
Sunflower (JBER)	4.3% chance	1.3% chance
Mountain View (Off-Base)	4.1% chance	2% chance

Noise-Induced Hearing Loss

In certain locations on JBER, noise levels may exceed levels at which long-term noise-induced hearing loss is possible. The potential for noise-induced hearing loss is discussed below in the context of the workplace and communities.

Noise-induced Hearing Loss in the Workplace. The hearing conservation program at JBER-Elmendorf, which is applied to employees in the workplace, is conducted in accordance with Air Force Occupational Safety, Fire Protection, and Health (AFOSH) Standard 48-20, *Occupational Noise and Hearing Conservation Program,* DODI 6055.12, *DoD Hearing Conservation Program,* and 29 CFR 1910.95, *Occupational Noise Exposure*. The DoD, Air Force, and National Institute of Occupational Safety and Health have all established an 85-dB 8-hour time-weighted average with a 3-dB "exchange rate" as a threshold for occupational noise exposure hearing loss risk in a work environment. The "exchange rate" is an increment of decibels that requires the halving of exposure time or a decrement of decibels that requires the doubling of exposure time. For example, a 3-dB exchange rate requires that noise exposure time be halved for each 3-dB increase in noise level. Therefore, an individual would achieve the limit for risk criteria at 88 dB for a period of four hours and at 91 dB, for a period of two hours. The standard assumes "quiet" (where an individual remains in an environment with noise levels less than 72 dB) for the balance of the 24-hour period. Also, Air Force and Occupational Safety and Health Administration (OSHA) occupational standards prohibit any unprotected worker exposure to continuous (i.e., of a duration greater than one second) noise exceeding a 115-dB sound level. OSHA established this additional standard to reduce the risk of workers developing noise-induced hearing loss.

JBER's Hearing Conservation Program is administered by the Bioenvironmental Engineering Office. In accordance with AFI 48-127, representatives from the Bioenvironmental Engineering Office visit potentially hazardous noise areas (i.e., locations where noise levels could exceed Hearing Conservation Program thresholds). A health risk assessment is conducted in those facilities and, as part of the assessment, a representative sample of employees are instructed to carry noise dosimeters for a specified period. If noise exposure exceeds established thresholds, an audiometric monitoring program is initiated. Workers in known high noise exposure locations may be required to wear hearing protection devices including, but not limited to, ear plugs and ear muffs. If noise exposure thresholds are not exceeded, then a schedule is established for return visits to repeat testing to confirm that conditions have not changed.

Noise-induced Hearing Loss in the Community. DoD policy for assessing hearing loss risk in the community pursuant to NEPA is to use the 80-dB L_{dn} noise contour to identify populations at the most risk of potential hearing loss (DoD Noise Working Group 2013). No residences on or off base are exposed to noise levels exceeding 80 dB L_{dn} under existing conditions. Therefore, the risk of noise-induced hearing loss in the community is small, and calculation of the PHL noise metric is not necessary.

AFI 32-7063 recommends that people who are outdoors in areas above 80 dB L_{dn} should consider wearing hearing protection when aircraft noise is present. The presence of aircraft noise at above 80 dB L_{dn} does not imply that the area is a "hazardous noise area" as defined by the Air Force Hearing Conservation Program. However, noise levels exceeding 80 dB L_{dn} do imply that, when people are outdoors near these structures, wearing of hearing protection is recommended in accordance with AFI 32-7063. There are currently 81 structures within the 80-dB L_{dn} contour, all of which are non-residential workplace facilities located on JBER-Elmendorf near the flightline.

Noise in the Matanuska-Susitna Valley

Aircraft departing JBER (including F-22 aircraft) often fly north through the Matanuska-Susitna Valley (locally referred to as Mat-Su Valley, see Figure 3.11-1) to reach training airspace in central Alaska (Figure 2.2-2) and return later following the same transit corridor. While en route to training airspace, aircraft typically fly at high altitudes to maximize fuel efficiency and minimize disturbance to people on the ground. However, as indicated by comments received during scoping, the noise generated by these overflights is still annoying to some people. Transit corridors are defined by a series of waypoints, which facilitate navigation by aircrews and de-confliction of multiple aircraft by ATC. Altitudes used are dependent on several factors including the climb capabilities of each aircraft type, weather conditions, and de-confliction from other air traffic. The corridor connecting JBER to central Alaska training areas roughly parallels the Susitna River from a point just north of Big Lake until the river turns toward the east at the Alaska Range. The majority of the sorties departing JBER use training airspace units north of the base, and this corridor is used regularly.

F-22 aircraft typically climb continuously after departing JBER, reaching an altitude not less than 6,000 feet MSL by the northern shore of the Knik Arm (surface elevation 0 MSL so aircraft at approximately 6,000 above ground level [AGL]) and not less than 13,000 feet MSL just north of Big Lake (surface elevation approximately 250 feet MSL so aircraft at approximately 12,750 AGL). Most aircraft are able to climb faster, reaching altitudes well above these minimums. The F-22 typically reaches 20,000 feet MSL by the time it is just north of Big Lake (surface elevation 150 MSL, so aircraft at approximately 19,850 AGL). Noise levels generated by several aircraft that frequently use the transit corridor are listed in Table 3.2-6. The valley is also overflown by a wide variety of other military and civil aircraft types.

Aircraft approaching JBER descend using low engine power settings and generate lower overflight noise levels than departing aircraft (see Table 3.2-6). While approaching JBER, aircraft follow different flight procedure waypoints from those used by departing aircraft. A frequently used flight procedure involves crossing a point in the Talkeetna Mountains at not less than 11,000 feet MSL (surface is approximately 2,000 to 7,000 feet MSL, so aircraft is at 4,000 to 9,000 AGL) and then descending to reach 3,500 feet MSL at Goose Bay on the northern shore of the Knik Arm (surface elevation 0 feet MSL, so aircraft at approximately 3,500 AGL).

Table 3.2-6. Maximum Noise Level (L_{max}) Under the Flight Track for Aircraft at Various Altitudes

Aircraft Type	Configuration	Power Setting	3,500 AGL	5,000 AGL	10,000 AGL	20,000 AGL
F-22	Departure	70% ETR	86	81	71	58
	Approach	40% ETR	84	80	69	57
F-15E	Departure	90% NC	79	74	64	53
	Approach	33% NC	60	55	45	35
C-17	Departure	1.1 EPR	61	55	44	31
	Approach	1.1 EPR	61	55	44	31

Key:
AGL = above ground level
EPR = engine pressure ratio
ETR = engine thrust request
L_{max} = maximum noise level
NC = core rotation speed

Source: NOISEMAP 7.3 Maximum Omega 10 Results

3.2.2 Noise Levels in the Knik Arm

Noise levels in the Knik Arm are considered in detail as part of an assessment of potential impacts to aquatic species. Noise experienced in the Knik Arm includes noise generated by natural and anthropogenic sources in the water (e.g., tides and ships) as well as sources above the surface of the water (e.g., aircraft operations).

Describing Noise Levels in Water

In-water sound levels in this EIS are not frequency-weighted and, by convention, are stated for a reference pressure level of 1 µPa rather than the 20 µPa reference pressure level used for airborne noise levels (i.e., noise levels experienced on land). This descriptor of noise levels was selected for the assessment of potential impacts to CIBW from aircraft overflight.

Calculating Noise Levels/Impacts in Water

Existing aircraft noise levels in water were calculated using a method that takes into account propagation through the air and transmission into the water. The analysis reflects each flight procedure by all aircraft operating at JBER.

Existing Conditions in the Knik Arm

Natural processes and anthropogenic noise sources generate ambient noise levels in the Knik Arm that may meet or exceed the threshold for behavioral harassment of the CIBW as published by the National Marine Fisheries Service (NMFS) (120 dB referenced [re] to 1 micropascal [µPa] for non-impulse sound). Strong tidal flow, intense wind, and wave action, and sounds generated in the Port of Anchorage are primary contributors to the high levels of noise measured in the Knik Arm. In-water noise levels averaging 119 dB sound pressure level (SPL) were recorded adjacent to JBER-Elmendorf while no overflights were taking place (Blackwell and Greene 2002). The same paper reported measured ambient noise of 124 dB re 1 µPa at the nearby Point Possession during a changing tide. More recently, the Knik Arm Bridge and Toll Authority (2010) summarized a variety of existing noise studies conducted within the Knik Arm and concluded that measured background levels in areas of high activity are rarely below 125 dB re 1 µPa, except in conditions of no wind and slack tide. Of several locations in which measurements have been taken in recent years, Eagle River has been the quietest, with measured 24-hour noise levels at 111 dB SPL (Castellote et al. 2015). Ambient noise energy in the Knik Arm is typically concentrated at frequencies below 10 kilohertz (kHz) (Blackwell and Greene 2002). Although beluga hearing is most sensitive at frequencies from about 10 kHz to 80 kHz, their overall hearing range extends from about 40 Hz to at least 130 kHz (NMFS 2008, Awbrey et al. 1988, Finneran et al. 2005) and would likely be able to detect sounds made by aircraft operations. A detailed analysis of aircraft flight patterns and their estimated effect on CIBW shows that an estimated 0.059 Level B harassment events take place per year under the No Action Alternative (approximately one event every 17 years).

3.3 Safety

This resource area considers safety issues associated with the proposed changes in runway use patterns and whether these changes would affect the potential for bird/wildlife-aircraft strike hazards (i.e., BASH) or result in incompatible lands uses within airfield safety zones (further discussed below). The safety resource area also considers issues associated with ground safety, specifically, construction site job safety associated with possible RW 16/34 extension construction.

The ROI for safety is JBER-Elmendorf and lands immediately adjacent to the base that may fall within airfield safety zones.

3.3.1 Bird/Wildlife Strike Hazard

Bird/wildlife-aircraft strikes constitute a safety concern because they can result in damage to aircraft or injury to aircrews or local human populations if an aircraft crashes. Aircraft may encounter birds at altitudes up to 30,000 feet MSL or higher. However, most birds fly close to the ground. More than 97 percent of reported bird strikes occur below 3,000 feet AGL. Approximately 30 percent of bird strikes happen in the airport environment, and almost 55 percent occur during low-altitude flight training. While any bird-aircraft strike has the potential to be serious, many result in little or no damage to the aircraft, and only approximately 0.04 percent of all reported bird-aircraft strikes result in a Class A mishap (Air Force Safety Center 2015). Class A mishaps are the most serious and result in loss of life, permanent total disability, a total cost in excess of $1 million, destruction of an aircraft, or damage to an aircraft beyond economical repair.

JBER aircraft experience approximately five bird-strikes per year in the airfield environment. The most serious occurred on September 22, 1995, when an E-3 aircraft crashed after striking a flock of geese. Since that time, 3 WG has developed aggressive procedures designed to minimize the occurrence of bird-aircraft strikes. The unit has documented detailed procedures to monitor and react to heightened risk of bird-strikes, and when risk increases, limits are placed on low-altitude flight and some types of training (e.g., multiple approaches, closed pattern work) in the airport environment. Special briefings are provided to pilots whenever the potential exists for greater bird-strike sightings within the airspace. Training and signs in open areas emphasize individual responsibilities and actions. Bird hazards exist at JBER-Elmendorf year-round. Risk increases during spring and fall migration periods. Species of particular concern include Canada geese, swans, other waterfowl, sandhill cranes, gulls, and raptors (including owls) (Air Force 2011).

Other wildlife of concern to flying operations at JBER includes moose, wolves, coyotes, fox, bears, and smaller mammals. Aggressive habitat management, fencing, active and passive dispersal techniques, and effective warning techniques serve to reduce the wildlife strike hazard at JBER. For example, security fencing around the airfield excludes most large mammals (Air Force 2011).

3.3.2 Airfield Safety Zones

Department of Defense analysis of historical flight data has determined that areas immediately beyond the ends of the runways and along the approach and departure flight paths exhibit the highest potential for aircraft mishaps. Based on this information, the DoD developed the following three zones to reflect the proportional risk of accidents (DODI 4165.57).

Clear Zone (CZ) – This 3,000-foot wide by 3,000-foot long area at the immediate ends of the runway warrants special protection due to the highest incidence of aircraft accidents. Overall, the risk in this zone is such that the Air Force generally seeks to prevent development through the purchase of easements.

Accident Potential Zone I (APZ I) – Though less critical than the CZ, APZ I still possesses significant potential for accidents. This 3,000-foot wide by 5,000-foot long area just beyond the CZ can safely accommodate a wide variety of industrial, manufacturing, transportation, open space and agricultural uses. However, uses that concentrate people in small areas, such as housing, pose a conflict with the safety risks associated with this zone.

Accident Potential Zone II (APZ II) – APZ II displays the lowest historical incidence of aircraft mishaps among the three zones, but still carries a measurable risk of an accident. This zone is 3,000 feet wide and extends 7,000 feet in length beyond the APZ I. Compatible land uses include those of APZ I, as well as low density single family residential and lower intensity commercial activities. High density functions such as multi-story buildings and places of assembly (e.g., theaters, schools, churches and restaurants), however, raise compatibility issues.

Figure 3.3-1 shows the airfield safety zones at JBER, while Table 3.3-1 shows JBER structures with existing airfield safety zones. Some uses in the CZ and APZs may not comply with recommended land use standards but have been approved for use through the airfield waiver process.

Table 3.3-1. JBER Structures Within Existing Airfield Safety Zones

Building Name	Building Number	Year Built	Status
Clear Zone			
C-130 Engine Test Stand	17569	2014 and prior	Currently under waiver
APZ I			
None	NA		
APZ II			
Hazmat Storage	NA		
Munitions Storage Igloo	36563	1956	Currently under waiver
Munitions Storage Igloo	36557	1956	Currently under waiver
Munitions Storage Igloo	36537	1956	Currently under waiver
Munitions Storage Igloo	36545	1956	Currently under waiver
6-Mile Lake Chalet	31550	1990	AICUZ variance
Top of the Hill Chalet	28590	1984	AICUZ variance
611th Chalet	31562	1956	Exempt

Key:
AICUZ = Air Installation Compatible Use Zone
APZ = Accident Potential Zone
NA = not applicable

As Table 3.3-1 shows, only the C-130 Engine Test Stand (building 17569) is located within a designated CZ. This facility is located approximately 1,000 feet west-northwest from the north end of RW 16/34. This is an industrial facility that is manned only during engine testing activities.

There are no Air Force structures located within APZ I of any of the runways. However, there are structures within APZ I south of RW 16/34 in Davis Park, which is land that is leased to the Municipality of Anchorage.

Several munitions storage igloos and a hazardous material storage shed are located within APZ II. These structures present no incompatibility issues. Also, within APZ II are three recreational facilities north of RW 16/34, which are located around Sixmile Lake: 6-Mile Lake Chalet, Top of the Hill Chalet, and the 611th Chalet. These facilities, which are managed by various JBER organizations, are typically unoccupied and available for rental year-round to host a number of different events from wedding to official training and functions. When occupied, these facilities represent places of assembly that may pose an incompatible use under the AICUZ guidelines for APZ II.

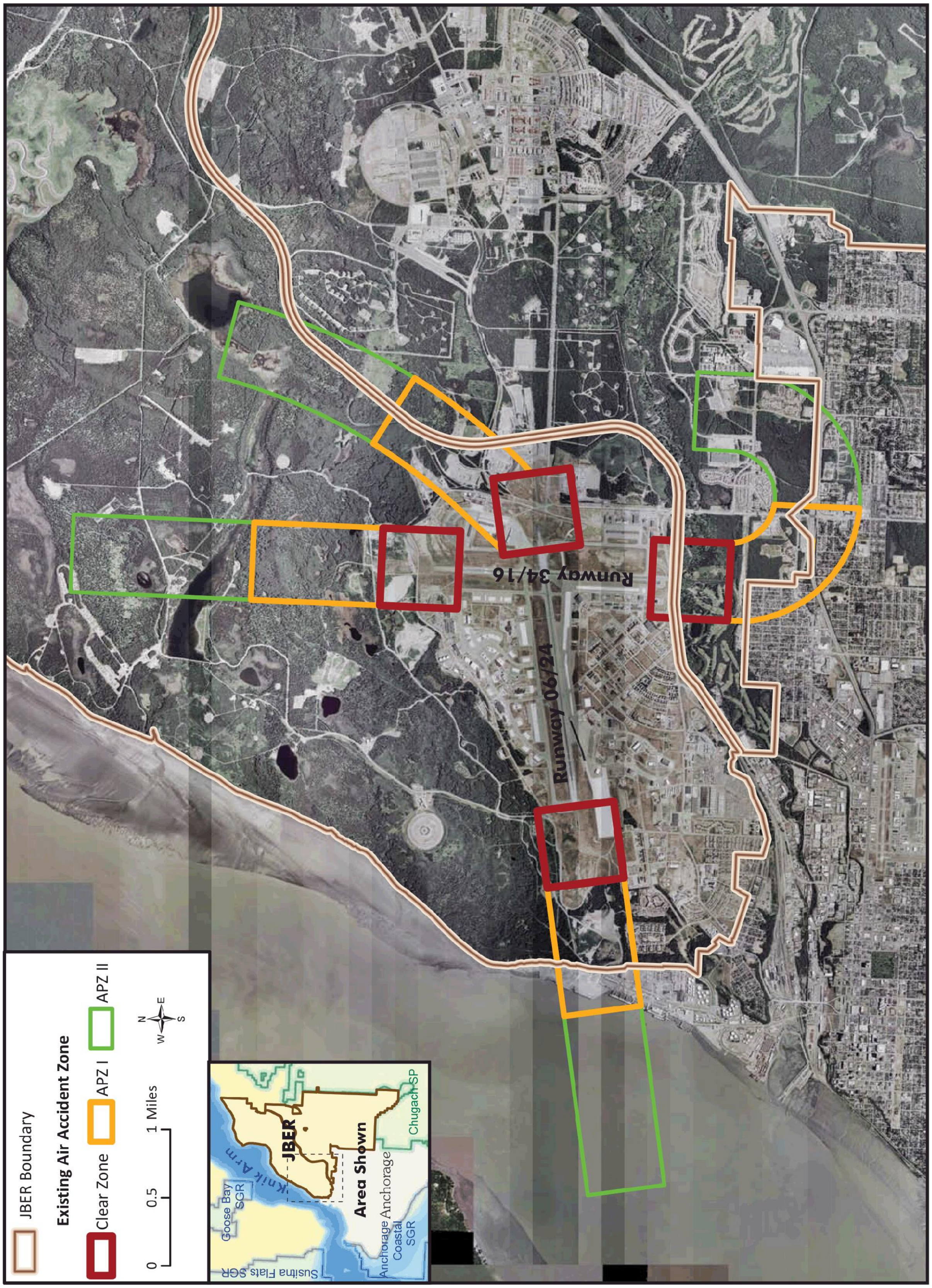

Figure 3.3-1. Existing Airfield Safety Zones at JBER

3.3.3 Ground Safety

Ongoing F-22 operations and maintenance activities conducted by the 3 WG 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. Contractors working on the base must prepare appropriate job site safety plans explaining how job safety will occur throughout the life of the project. Contractors must also follow applicable OSHA requirements.

3.4 Air Quality

3.4.1 Region of Influence and Existing Air Quality

Air quality in a given location is defined by the size and topography of an air basin, the local and regional meteorological influences, and the types and concentrations of pollutants in the atmosphere. The significance of a pollutant concentration is determined by comparing its concentration with a national or state ambient air quality standard. These standards represent the allowable atmospheric concentrations at which the public health and welfare are protected and include a reasonable margin of safety to protect the more sensitive individuals in the population. The USEPA established the National Ambient Air Quality Standards (NAAQS) to regulate the following criteria pollutants: ozone, carbon monoxide (CO), nitrogen dioxide, sulfur dioxide, particulate matter less than or equal to 10 microns in diameter (PM_{10}), particulate matter less than or equal to 2.5 microns in diameter ($PM_{2.5}$), and lead. The NAAQS generally may not be exceeded more than once per year, except for annual standards, which may never be exceeded. The Alaska Department of Environmental Conservation (ADEC) has also developed state ambient air quality standards to regulate air quality within Alaska. Table B.4-1 of Appendix B presents the NAAQS and Alaska ambient air quality standards.

JBER is adjacent to the northern boundary of the Municipality of Anchorage and is within the Cook Inlet Intrastate Air Quality Control Region (AQCR) of Alaska. This AQCR consists of the territorial area encompassed by the greater Anchorage Area Borough, Kenai Peninsula Borough, and the Matanuska-Susitna Borough.

Alternatives considered in this EIS would result in air emissions produced from construction and, to a much lesser extent, F-22 operations and mainly would affect air quality within the immediate vicinity of JBER. Identifying the ROI for air quality requires knowledge of the pollutant type, source emission rates, the proximity of project emission sources to other emission sources, and local and regional meteorology. For inert pollutants (such as CO and particulates in the form of dust), the ROI is generally limited to a few miles downwind from a source. The ROI for reactive pollutants such as ozone may extend much farther downwind than for inert pollutants. Ozone is formed in the atmosphere by photochemical reactions of previously emitted pollutants called precursors. Ozone precursors are mainly nitrogen oxides (NO_x) and photochemically reactive volatile organic compounds (VOCs). In the presence of solar radiation, the maximum effect of precursor emissions on ozone levels usually occurs several hours after they are emitted and many miles from their source.

The USEPA designates all areas of the United States in terms of having air quality better (attainment) or worse (nonattainment) than the NAAQS. An area generally is in nonattainment for a pollutant if the applicable NAAQS has been exceeded more than once per year. Former nonattainment areas that have attained the NAAQS are designated as maintenance areas. Currently, JBER is in attainment for all NAAQS. The Eagle River area, located north of JBER, was a moderate nonattainment area for PM_{10}, but it was re-designated as a maintenance area in 2013 by the USEPA (Alaska Division of Air Quality [DAQ] 2015a). The Municipality of Anchorage was in nonattainment for CO, but it was re-designated as a maintenance area in 2002 by the USEPA (DAQ 2015b). No federal Prevention of Significant Deterioration (PSD) Class I areas (pristine air quality areas) are located within the project ROI. The PSD Class I area nearest to JBER is the Denali National Park and Preserve, about 150 miles to the north.

Table 3.4-1 summarizes the most recent estimates of the annual emissions generated from stationary and mobile sources within the Anchorage Borough for calendar year 2011 (USEPA 2015). The majority of emissions within the region occur from (1) on-road and nonroad mobile sources (VOCs, CO, and NO_x), (2) solvent/surface coating usages (VOCs), and (3) fugitive dust (PM_{10}/$PM_{2.5}$).

Table 3.4-1. 2011 Emissions Inventory for Anchorage Borough

Source Category	Air Pollutant (tons/year)						GHG
	VOCs	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$	CO_2e (mt)
Stationary Sources	4,643.52	5,374.87	3,082.68	83.12	7,595.72	1,419.53	19,588
Mobile Sources	9,784.52	52,807.70	9,215.08	346.34	538.54	496.53	1,388,790
Total Emissions	**14,428.04**	**58,182.56**	**12,297.76**	**429.46**	**8,134.26**	**1,916.06**	**1,408,378**

Key:
CO_2e = carbon dioxide equivalent
GHG = greenhouse gas
mt = metric tons
$PM_{2.5}$ = particulate matter with an aerodynamic diameter of 2.5 microns or less
PM_{10} = particulate matter with an aerodynamic diameter of 10 microns or less
SO_2 = sulfur dioxide
VOC = volatile organic compound
Source: USEPA 2015b

Air emissions at JBER result from stationary and mobile sources. Stationary sources include boilers, emergency generators, and aircraft maintenance operations. Mobile sources include aircraft, government-owned vehicles, and nonroad equipment. JBER is considered to be a major source of air emissions, and various sources are accumulated under air permits for purposes of regulation.

3.4.2 Climate

JBER is located in the maritime zone of south-central Alaska. Meteorological data collected at JBER show that at this location, the mean annual precipitation total is 16.2 inches, with an average annual snowfall of about 77 inches (Western Regional Climate Center 2015). July average high and low temperatures range from 65 to 52 degrees Fahrenheit. January average high and low temperatures range from 19 to 6 degrees Fahrenheit. Prevailing winds at JBER are generally from the north to northeast during September through April and from the south to southwest from May to August.

3.4.3 Climate Change

It is well documented that the earth's climate has fluctuated throughout its history. However, recent scientific evidence indicates a correlation between increasing global temperatures over the past century and the worldwide proliferation of greenhouse gas (GHG) emissions by mankind. Climate change associated with global warming is predicted to produce negative environmental, economic, and social consequences across the globe. These global impacts would be manifested as impacts on resources and ecosystems in Alaska.

GHGs are gases that trap heat in the atmosphere by absorbing infrared radiation. GHG emissions occur from natural processes and human activities. GHGs include water vapor, carbon dioxide, methane, nitrous oxide, ozone, and several hydrocarbons and chlorofluorocarbons. Each GHG has an estimated global warming potential (GWP), which equates to the ability of a gas or aerosol to trap heat in the atmosphere. The GWP rating system is standardized to carbon dioxide, which has a value of one. To simplify GHG analyses, total GHG emissions from a source are often expressed as a carbon dioxide equivalent (CO_2e). The CO_2e is calculated by multiplying the emissions of each GHG by its GWP and adding the results together to produce a single, combined emission rate representing all GHGs. While methane and nitrous oxide have much higher GWPs than carbon dioxide, carbon dioxide is emitted in such greater quantities that it is the overwhelming contributor to CO_{2e} from both natural processes and human activities. Table 3.4-1 summarizes the most recent estimates of annual CO_{2e} emissions generated from stationary and mobile sources within the Anchorage Borough for calendar year 2011.

Recent observed changes due to global warming include rising temperatures, shrinking glaciers and sea ice, thawing permafrost, sea level rise, a lengthened growing season, and shifts in plant and animal ranges (U.S. Global Change Research Program 2014). The impacts from climate change are already occurring in Alaska and include coastal erosion, increased storm effects, sea ice retreat, permafrost melt, and increased forest fires. The State of Alaska actively implements an Alaska Climate Change Strategy to adapt to current and anticipated impacts from climate change (State of Alaska 2015).

This EIS quantifies GHG emissions to the extent feasible to provide information that is useful to distinguish among project alternatives. In addition, the analysis determined how future climate change would affect implementation of the proposed alternatives.

3.5 Physical Resources

Physical resources consist of earth and water resources and wetlands.

3.5.1 Earth Resources

Earth resources include the geology, soils, and topography of JBER. The principal geologic factors influencing stability of structures are soil stability and seismic properties. Soil, in general, refers to unconsolidated earthen materials overlying bedrock or other parent material. Soil structure, elasticity, strength, shrink-swell potential, and erodibility all determine the ability for the ground to support structures and facilities. Long-term geological, erosional, and depositional processes typically influence the topographic relief of an area.

Landforms on JBER and in the Anchorage area are dominated by glacial and related deposits, including terminal moraines, ground moraines, and glacial outwash plains. The most distinctive landform at JBER is the Elmendorf Moraine, a southwest-northeast trending terminal moraine, which consists of poorly sorted boulders, gravel, sand, and silt deposits. The southern boundary of the moraine is visible as a rising bluff line along the north side of JBER-Elmendorf's east-west runway (RW 06/24). Moraine elevations range from 200 to 300 feet above MSL.

South of the Elmendorf Moraine lies the glacial outwash plain alluvium, consisting of unconsolidated fine- to medium-grained, poorly sorted sand and gravel. Elevations range from 100 to 225 feet above MSL. Relief is mostly flat and slopes gently to the south-southwest. Most of the developed areas on the base have been built in the outwash plain alluvium.

Underlying glacial moraine and outwash deposits are the shallow marine deposits of the Bootlegger Cove formation, consisting of silt and clay. Depth to the Bootlegger Cove formation ranges from 1 to 60 feet below ground surface near the moraine and from 75 to 100 feet below ground surface throughout the outwash plain.

Soils at JBER and the surrounding area are dominated by three types of unconsolidated deposits: coarse grained, fine grained, and till (Figure 3.5-1). The cantonment and runway area at JBER-Elmendorf is underlain by soil classified as Cryorthents and Urban Land (Natural Resources Conservation Service [NRCS] 2001). This soil classification consists of very gravelly sandy loam deposited as either glacial outwash or alluvium along stream channels. The sand and gravel is typically well drained, high in strength, low in compressibility, non-frost susceptible, and an excellent foundation material.

The dominant soil classification in the higher elevation areas to the north of the existing RW 16/34 is the Deception-Estelle-Kichatna complex (NRCS 2001). This soil complex is characterized by silt loam over very gravelly sandy loam with large cobbles and high gravel content. This soil is well drained, high in strength, low in compressibility, non-frost susceptible, and an excellent foundation material. This soil is considered to have a high erosion potential when the organic matter is removed. In the lower-elevation areas (especially east of RW 16/34), the Kashwitna-Kichatna complex (NRCS 2001) is common. This soil complex consists of gravelly sand overlain by silt loam. The suitability for construction and erosion potential are similar to the Deception-Estelle-Kichatna complex. One of the other common soil associations in that area is Whitsol silt loam (NRCS 2001), a silt and gravelly loam that occurs on till plains. It has moderate erosion potential by water and severe erosion potential by wind when the organic matter is removed. In the lower elevations north of RW 16/34, there are pockets of Icknuun peat and Salamatof peat (NRCS 2001). These are peat and silt loam soil associations that primarily occur in depressions in till and outwash plains. These soil types have a slight erosion hazard when the organic matter is removed.

JBER is located in an area that is seismically active and has been affected by volcanic eruptions of Mount Spurr, Mount St. Augustine, and Mount Redoubt. The Mount St. Augustine volcanic eruption in January 2006 threatened the Anchorage area with ash deposition. Two earthquake faults border the Anchorage area. The Border Ranges Fault bisects the area east of JBER, and a second fault runs in the Chugach Mountains. JBER lies in a tectonic basin bounded by the Bruin Bay-Castle Mountain fault system to the west and the Denali fault system to the north. This is an active tectonic setting, with seismic events along both fault systems as well as the underlying Benioff zone. This zone results from subduction forces pushing the Pacific tectonic plate beneath the North American plate. Intermediate to shallow seismic incidents related to the fault systems, as well as deeper events associated with the subduction, are common.

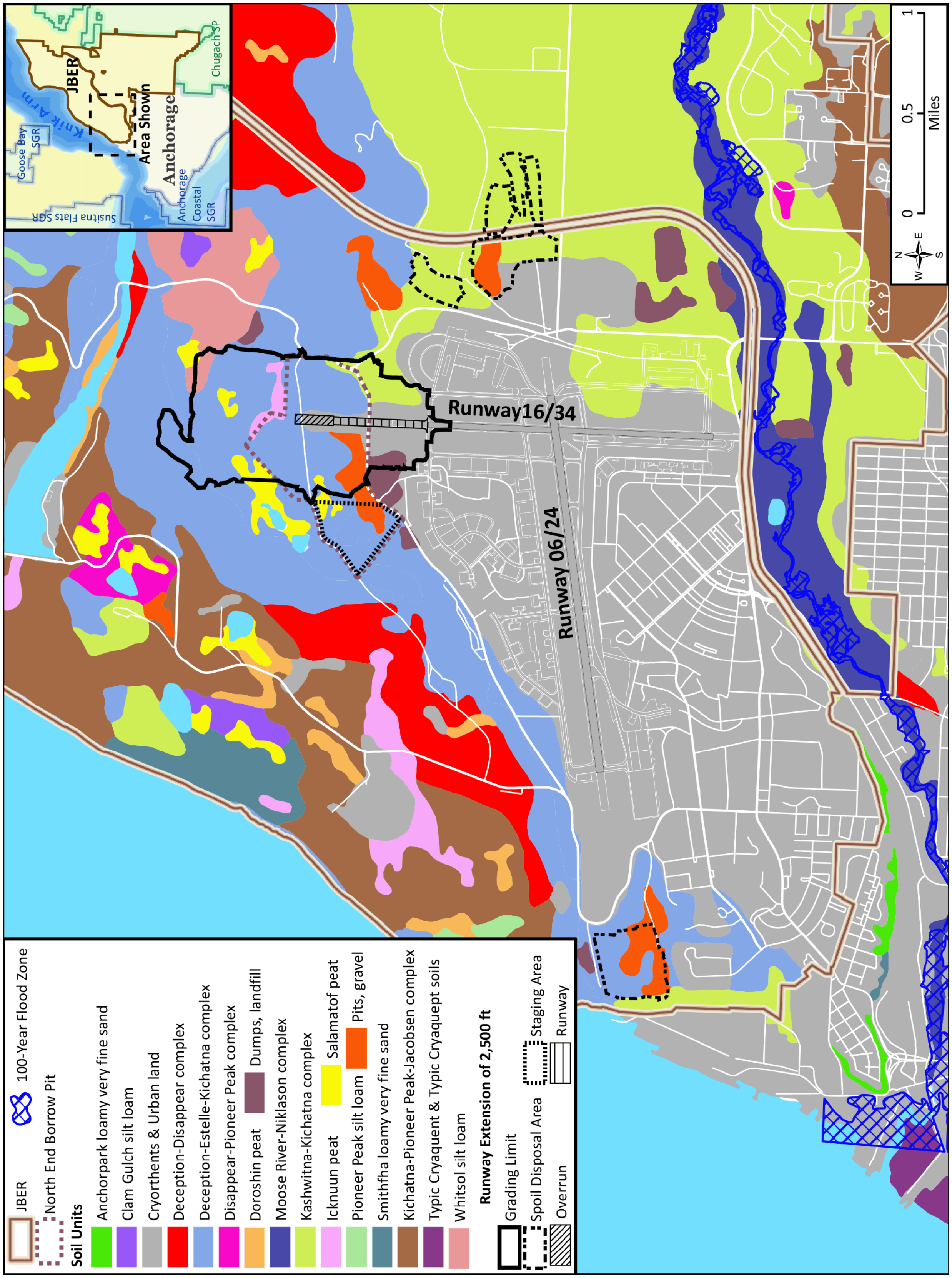

Figure 3.5-1. Soils and 100-Year Flood Zone at JBER

3.5.2 Water Resources

Ground Water

Two unnamed freshwater aquifers underlie most of JBER: one shallow, unconfined aquifer and a deeper, confined aquifer. The aquifers are separated by a 60- to 200-foot-thick layer of an impermeable formation known as the Bootlegger Cove Clay and, as a result, the two aquifers appear to have no interconnection (JBER 2016a). Both aquifers flow west from the Chugach Mountains toward the Knik Arm of the Cook Inlet and are recharged by precipitation from the mountains. In general, groundwater movement, especially in the shallow aquifer, follows that of the surface topography.

The upper aquifer is located in a 30- to 100-foot-deep layer of gravel near the surface, and water can typically be accessed at depths less than 50 feet. Ground water in this aquifer flows to the northwest along the northern limb and to the southeast along the southern limb (JBER 2016a). This aquifer is not used for drinking water.

The lower aquifer is located in a 100- to 200-deep-foot layer of sand and gravel. The impermeable Bootlegger Cove Clay lies above the aquifer and results in artesian conditions, protecting this aquifer from surface pollutants; as a result, water quality of the aquifer is excellent. Water in the aquifer usually can be accessed at 200 to 400 feet below the surface. JBER does not use this aquifer for a primary drinking water source but as a standby drinking water supply when surface water supplies are not sufficient to meet demand (sources of drinking water for JBER are discussed below). However, the Municipality of Anchorage utilizes water from this aquifer for various purposes, including industrial, commercial, domestic, and public supply (JBER 2016a).

Surface Water

Major watersheds on JBER include all or parts of Ship Creek, Eagle River (including Otter Creek and Clunie Creek), Chester Creek, Fire Creek, Kettle Lakes, Campbell Creek, and Sixmile Creek. Lesser waterways include Cherry Hill Ditch, Moonshine Creek, and EOD Creek. The Ship Creek watershed contains two secondary watersheds: McVeigh (Gunnery) Creek and Snowhawk Creek (JBER 2016a). JBER-Elmendorf is located within portions of three of these watersheds: Ship Creek, Cherry Hill Ditch, and Moonshine Creek. To the north of the base are the Sixmile Creek and EOD Creek watersheds and to the south is the Chester Creek watershed (see Figure 3.5-2).

The Cherry Hill Ditch watershed is a storm drainage system that receives flow from developed portions of JBER-Elmendorf, including the flightline, and drains approximately 2,912 acres. Water flow in this watershed can occur year-round, but flow is minimal in winter. Moonshine Creek watershed drains approximately 696 acres and is composed of Green Lake and its outflow, Moonshine Creek, which drains into Knik Arm south of the Sixmile Creek drainage area (JBER 2016a).

Sixmile Creek watershed flows into Knik Arm and encompasses approximately 2,326 acres. The watershed is located within a historical channel of Eagle River and is composed of 1 mile of creek channel and 2 miles of man-made lakes, which originate from springs on the southern side of Upper Sixmile Lake (JBER 2012b). The EOD Creek watershed drains approximately 1,500 acres. It consists of 1 mile of stream channel, originating from seeps in a bog wetland area (JBER 2016a).

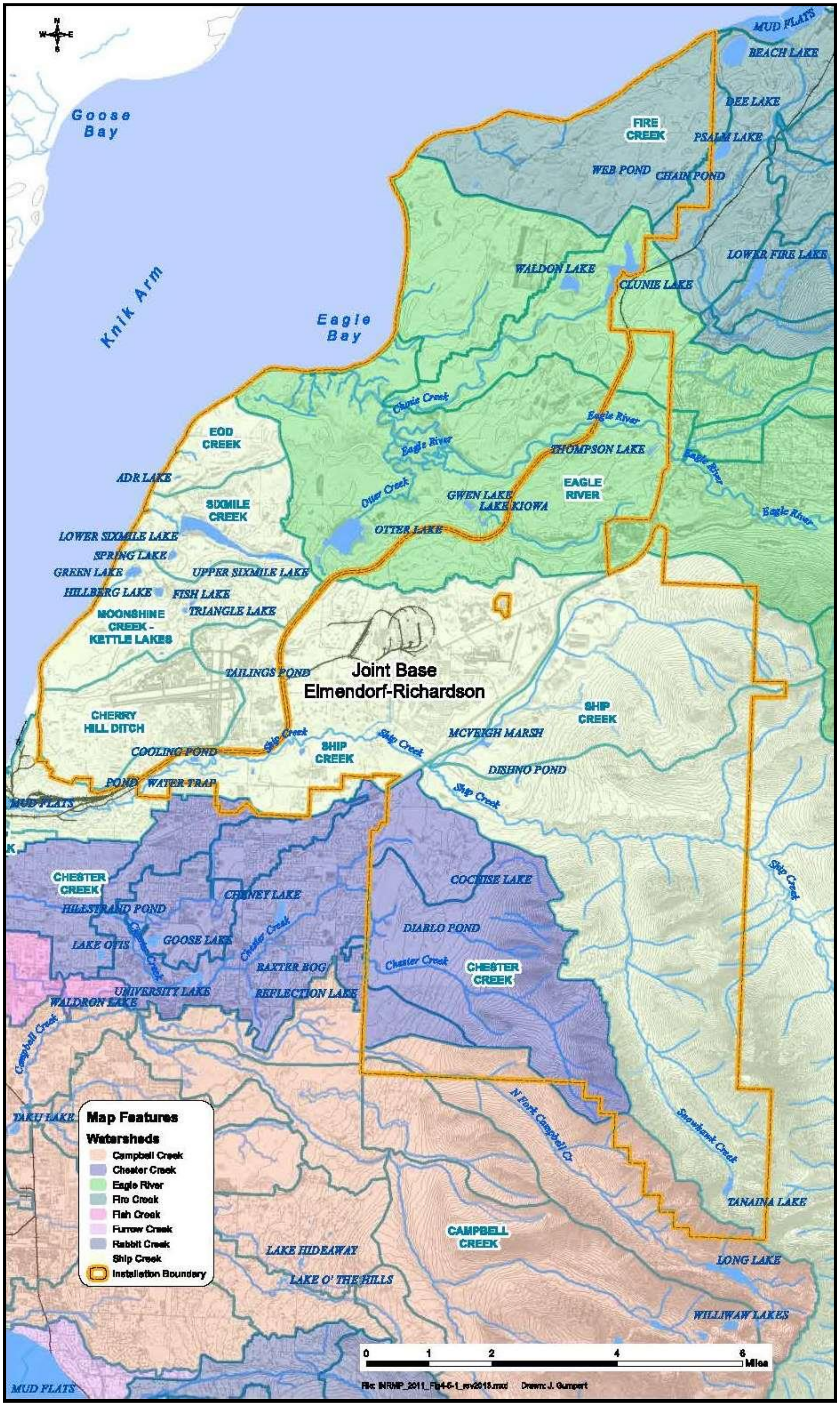

Figure 3.5-2. Watersheds, Surface Waters, and Topography on JBER
Source: JBER 2016a

The Ship Creek watershed is the largest surface water drainage system on JBER, draining approximately 31,215 acres. The Ship Creek headwaters are located within the Chugach Mountains, east of JBER, and the creek flows through the installation for approximately 13.3 miles before emptying into the Knik Arm. The upper portion of the Ship Creek watershed basin is an important area of recharge for the lower aquifer below JBER and provides approximately 25 percent of total recharge to the system (JBER 2016a).

Most streams on JBER begin from headwaters in the Chugach Mountains and flow across the installation in a generally westerly direction toward Cook Inlet. From October to April, when most water is frozen, flow is limited to seepage from aquifers into streams. Snowmelt usually starts in April and peaks in June; melts typically have the greatest impact on stream flow during June and July. High rainfall amounts often occur in August and September, and flood events in the Upper Cook Inlet have occurred during these months, impacting Ship Creek and the Eagle River (JBER 2016a).

As of December 2010, the segment of Ship Creek from the Glenn Highway Bridge crossing to its mouth at the Knik Arm has been listed under Section 303(d) of the Clean Water Act as being impaired for one or more designated pollutants. This portion of Ship Creek was listed because of the presence of petroleum products from urban runoff in quantities greater than established state and federal water quality standards (ADEC 2010).

There are 36 natural and man-made lakes and ponds of 1 acre or larger on JBER, with a combined surface area of 685.8 acres. Otter Lake, the largest surface water body, has a surface area of 136.6 acres; Lower Sixmile Lake is second largest at 122.2 acres. Sixteen of these lakes and ponds are managed for their wildlife or recreational value (JBER 2016a). Water bodies located in proximity to the runways at JBER-Elmendorf (see Figure 3.5-4, in the *Wetlands* subsection) include Triangle Lake, Fish Lake, Hillberg Lake, Spring Lake, and Green Lake. Further to the north are Upper and Lower Sixmile Lake and Otter Lake. For a discussion of wetlands on JBER, see Section 3.7.

Drinking Water

JBER draws the majority of its drinking water from sources in Upper Ship Creek Drainage Area located in the Ship Creek watershed. A water treatment plant below the Ship Creek Dam on JBER-Richardson obtains water from the Ship Creek Reservoir, which is filtered and treated before being delivered to residential and industrial sites on JBER by way of four water mains. JBER-Richardson also has three groundwater wells that are available to provide potable water during periods of high demand, usually during the summer (JBER 2012b).

JBER-Richardson has restricted development along Upper Ship Creek above the dam and around its three main groundwater wells. Development near Ship Creek on JBER-Elmendorf has been restricted to the greatest extent possible (JBER 2012b).

Floodplains

Executive Order 11988, *Floodplain Management,* requires federal agencies to avoid adverse impacts associated with the occupancy and modification of floodplains and to avoid floodplain development whenever possible.

While JBER has not completed an installation-wide effort to map floodplains, portions of Ship Creek, which runs south of developed areas on JBER before emptying into the Knik Arm, has been identified by JBER as meeting the criteria defined by the Federal Emergency Management Agency (FEMA) as a 100-year return period flood hazard zone, or floodplain (as defined by EO 11988) (Figure 3.5-1). Although FEMA does not typically map floodplain areas on military installations, it has identified areas surrounding Ship Creek from where it flows off JBER to its mouth at the Knik Arm to be within the 100-year floodplain (FEMA 2009). This equivalent 100-year flood zone is located south of the cantonment area of JBER-Elmendorf, and is not within the ROI for the three alternatives that include an extension to RW 16/34.

Coastal Zone Management

JBER protects, preserves, and restores coastal ecosystems through the Environmental Planning section with the NEPA/EIAP program for developing projects, through the Environmental Compliance section for daily operations, and through the Environmental Restoration section for clean-up and restoration of contaminated sites (JBER 2016a).

JBER is divided into 13 resource management units based on environmental, physical, and/or social features such as watersheds, topography, land use patterns, ownership, and roads. The only unit under coastal zone management is Unit 1, Coastal Mudflats. Within this unit, there may be areas of special concern that require special management activities. The Coastal Mudflats (Unit 1) contains approximately 1,938 acres of shoreline that are within the coastal zone boundary managed by JBER (JBER 2016a). In addition to the Coastal Zone Management Act of 1972 (16 U.S.C. 1451 et seq.) as amended through the Coastal Zone Act Reauthorization Amendments of 1990 and Public Law 104-150, the Coastal Zone Protection Act of 1996, this unit falls under other specific regulations, including the Marine Protection, Research, and Sanctuaries Act (33 U.S.C. 1401 et seq.), the Marine Mammal Protection Act of 1972 (16 U.S.C. 1361 et seq.) as amended through 1997, and the Rivers and Harbors Act of 1899 (33 U.S.C. 403). Federal lands are excluded from coastal zone boundaries. However, all uses and activities that directly affect the coastal area must be consistent to the maximum extent practical with the Alaska Coastal Management Program. Alaska withdrew from the national Coastal Zone Management Program in 2011, and Section 307 of the Coastal Zone Management Act no longer applies (see *Federal Register* 16987, 2011). The “Integrated Natural Resources Management” implementation guidance (AFI 32-7064) directs that bases with coastal or marine properties must enter into an agreement with the Coastal American National Implementation Team to assist in the restoration and protection of coastal areas.

The Air Force has a Memorandum of Understanding with Coastal America (Coastal America 1992) to perform the following:

- Protect, preserve, and restore the nation’s coastal ecosystems through existing federal capabilities and authorities.
- Collaborate and cooperate in the stewardship of coastal living resources by working together and in partnership with other federal programs.

- Provide a framework for action that effectively focuses expertise and resources on jointly identified problems to produce demonstrable environmental and programmatic results that may serve as models for effective management of coastal living resources.

The location of the possible RW 16/34 expansion project associated with Alternatives B, C, and F is not within the 1,938 acres of shoreline that are within the coastal zone boundary managed by JBER.

Drainage/Storm Water

Storm water and spring snowmelt are carried to the Knik Arm of the Cook Inlet through a network of storm drainage lines and canals or ditches. Much of the drainage system of JBER connects to the Knik Arm by way of release of waters to Ship Creek. For the purposes of categorizing drainage areas, the JBER Storm Water Management Plan divides JBER into two sections, JBER-E (Elmendorf) and JBER-R (Richardson) (JBER 2014b). Much of the drainage from developed areas on JBER-R is directed toward a single outfall (JBER-R Outfall 1) at Ship Creek, the easternmost outfall area on JBER.

While 17 drainage areas have been identified on JBER-E, not all of these discharge to a defined outfall area; only those outfalls that discharge to "waters of the United States" are discussed in this section. In addition to discharging to the outfalls, storm water runoff from these drainage areas may enter Ship Creek and Knik Arm as sheet flow, infiltrate into the ground, and/or evaporate. These five drainage areas are identified in Figure 3.5-3 and discussed below (JBER 2014b):

- Drainage Area 1 is approximately 3,586 acres and receives runoff from the majority of developed areas of JBER-Elmendorf, including the airfield, taxiways, and support infrastructure. Water in this drainage area enters the storm sewer system by way of catch basins, eventually emptying into the Cherry Hill Ditch, which flows southwest from the runway area and discharges to the Knik Arm by way of JBER-E Outfall 1.
- Drainage Area 2 encompasses approximately 378 acres of the installation and is located southwest of Drainage Area 1. Water from this drainage area empties outside the installation boundary to the west, approximately 300 feet south of the Cherry Hill Ditch. Eventually water empties outside the installation boundary to the west, approximately 300 feet south of the Cherry Hill Ditch at JBER-E Outfall 2.
- Drainage Area 3 encompasses approximately 96 acres of the installation just to the east of and south of Drainage Area 2. Storm water from this drainage area is channeled into culverts and discharges at JBER-E Outfall 3 on the south side of the installation into an engineered wetland on property owned by the Alaska Railroad Corporation and is part of a system for remediating contaminated groundwater.
- Drainage Area 4 encompasses approximately 97 acres of the installation, just east of Drainage Area 3 with its northern boundary formed by Arctic Warrior Drive. Storm water in this drainage area is channeled through culverts, eventually draining into Ship Creek at JBER-E Outfall 4. Drainage Area 4 contains mostly administrative buildings and is the only drainage area described in this section that does not contain industrial facilities.
- Drainage Area 5, approximately 154 acres and located to the southeast of Drainage Area 1, is situated north of the rail line, between Vandenberg Avenue to the east and Talley Avenue to the

west. Storm water from this area is carried by pipes under the railroad tracks and drains into Ship Creek by way of JBER-E Outfall 5.

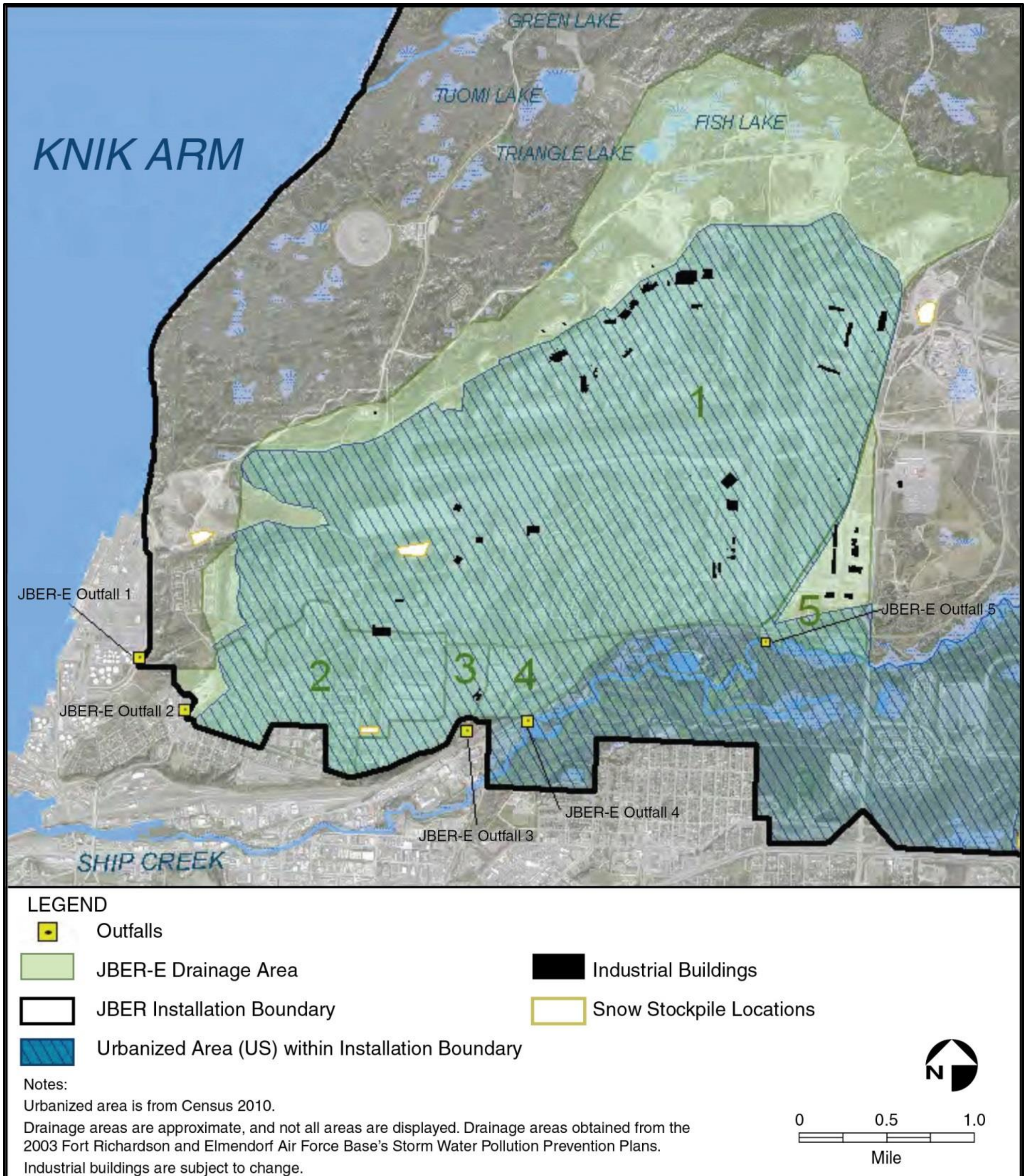

Figure 3.5-3. Drainage Areas on JBER-Elmendorf

Source: JBER 2016a

In October 2009, USEPA granted the State of Alaska primacy over the NPDES program in Alaska, which was then renamed the Alaska Pollutant Discharge Elimination System (APDES), and the ADEC became the NPDES permitting authority for Alaska. ADEC issued JBER a Municipal Separate Storm Sewer System (MS4) Permit on April 4, 2014, which took effect on June 1, 2014 (JBER 2014b). The MS4 program serves as the umbrella program for all storm water management on JBER. Commitments of the MS4 program apply to military facilities and personnel, base residents, businesses and contractors operating at JBER, DoD and non-DoD tenants, and privatized services contractors.

JBER is not authorized to discharge storm water that the ADEC determines will cause, or has the reasonable potential to cause or contribute to, violations of water quality standards in the receiving water. Alaska water quality standards, set forth in the Alaska Administrative Code (18 AAC 70), state that an operation may not be conducted that can cause or contribute to the violation of the Alaska's water quality standards (ADEC 2012). Thus, JBER storm water discharges reaching state water bodies must not result in the exceedance of water quality standards established for those water bodies (JBER 2014b).

Depressional wetlands in the Elmendorf Moraine serve as storage basins for storm water crossing overland toward Cook Inlet. These basins are often closed and therefore store water until it is released into the groundwater. This effectively minimizes the amount of floodwaters passing across the Elmendorf Moraine, protecting water quality. Surface water is protected by measures outlined in the JBER SWPPP (JBER 2012b) and the JBER Storm Water Management Plan (JBER 2014), which have identified potential pollutant sources and relevant BMPs to reduce the potential for pollution of receiving waters. In addition to the JBER SWPPP and Storm Water Management Plan, any new construction projects on JBER that would affect more than 1 acre are required to develop a project-specific SWPPP, implement BMPs, and notify the USEPA about the project.

3.5.3 Wetlands

Approximately half of Alaska is classified as wetlands and includes both freshwater and estuarine (tidal) wetlands. In the Cook Inlet region of Alaska, 28 percent of the land (2,644,000 acres) is estimated to be wetlands (Hall et al. 1994).

Wetlands are transitional ecosystems that occur in areas of shallow water and saturated or waterlogged soils. Some wetlands may hold water year-round while others are only seasonally wet. Wetlands provide several important functions, including fish and wildlife habitat, erosion control, sedimentation control, flood control, and removal of contaminants. Which functions and the degree to which that function is performed depends on several factors, including the location of the wetland within the landscape and the types of vegetation found in the wetland.

Wetlands may be classified in part by their location within the landscape or hydrogeomorphic position. These include slopes, depressions, flats, open water, riverine, and estuarine systems. Wetlands may be further classified by the vegetation types found within the wetland. These include aquatic, emergent, shrub, and forested.

Elmendorf Moraine Kettle Wetlands

As discussed in Section 3.5.1 (Earth Resources), the most distinctive landform at JBER-Elmendorf is the Elmendorf Moraine. In most places, south-facing slopes are steep and north-facing slopes are gentle. Much of the moraine is covered by kettles (steep-sided depressions) and kames (conical hills or short irregular ridges) created by melting blocks of ice during the glacial retreat (Rothe et al. 1983). Many kettles on the moraine contain ponds and lakes while others contain bog (peat) deposits. These types of depressions are typically surrounded by uplands and may have no distinguishable inlet or outlet and thus are fed either by groundwater or by surface water in the form of sheet flow. The water balance in the basin is achieved via groundwater recharge or basin overflow (JBER 2016a).

Within the Elmendorf Moraine, which stretches from the main cantonment area on JBER north, beyond the installation boundary, and from the foothills of the Chugach Mountain to the bluffs above Cook Inlet, there are over 3,025 acres of depressional wetlands and waterways that lack a clear surface water connection to the Knik Arm of Cook Inlet, a tidal water. Wetland types include freshwater (palustrine) emergent, scrub-shrub, and forested wetlands ranging in size from 0.03 acre to over 30 acres, including small lakes or ponds. Spring Lake (9.6 acres), Hillberg Lake (10.9 acres), Triangle (3.8 acres), and Fish Lake (4.0 acres) are all present within the Elmendorf Moraine and lack clear surface water connections to Cook Inlet, or its tributaries (JBER 2016a).

Most kettles are groundwater fed, have significant accumulations of peat, and have an abundance of sphagnum moss throughout the wetland area—whether emergent, scrub-shrub, or forested. Otherwise, dominant vegetation in these kettles varies by wetland class. Emergent wetlands are dominated by sedges and grasses, including *Calamagrostis canadensis*, *Carex aquatilis*, *C. lyngbyei*, *C. rostrata*, *Poa palustris*, *P. arctica*, and *Comarum palustre*. Scrub-shrub wetlands may be dominated by dwarf shrubs such as *Vaccinium vitis-idaea*, *Chamaedaphne calyculata*, *Betula glandulosa*, *Myrica gale*, and *Rhododendron tomentosum* or by tall shrubs such as *Alnus viridis* or *Salix pulchra*. In areas where shallow open water persists, vegetation such as *Alisma triviale*, *Sparganium* sp., *Comarum palustre*, and *Carex* spp. are common (Johnson 2014, 2015). Forested systems are dominated by *Betula papyrifera* (*neoalaskana*) and *Picea mariana*, which persist in a stunted growth form in sphagnum dominated bogs and on floating mats.

Hydrologically, the water table is typically high, near the ground surface (Johnson 2014, 2015). Most kettles are at least shallowly inundated at their lowest point for most of the growing season. Floating mats have formed around the edges on most of the open waterbodies, most prominently in the Fish-Triangle Lake complex, where the two waterbodies are actually hydrologically connected below the surface of a dense floating mat. In smaller kettle ponds, floating mats may have formed over the majority of the surface area. Surrounding the kettle are typically steep banks where hydrologic features meeting wetland criteria are often clearly defined 12 to 16 inches above the edge terrain. Primary and secondary hydrologic characteristics, defined by the U.S. Army Corps of Engineers (USACE) (1987, 2007) found in Elmendorf Moraine kettles include surface water (A1), high water table (A2), saturation (A3), water marks (A4), water stained leaves (B9), drainage patterns (B10), geomorphic position (D2), and microtopographic relief (D4), among others.

Functionally, depressional kettles serve to retain and filter storm water runoff and serve as wildlife habitat (Johnson and Schoofs 2017). Most of these kettles are also considered important components in groundwater recharge. Vegetated wetlands help to remove pollutants, including chemicals and sediment from storm water and prevent release into rivers and streams. The value of this function depends on the amount of development around the depression. While there is not always direct connectivity between depressional kettles and larger open bodies of water such as lakes and streams, the capacity of kettles across the landscape can be important to overall hydrologic function within the watershed. The small size of many of these wetlands limits their overall impact, individually.

Approximately 10 percent of JBER (7,474 acres) is classified as wetlands (JBER 2016b). Wetlands on the installation generally occur in depressional areas and within flats (Table 3.5-1 and Figure 3.5-4). The majority of these wetlands (more than 80 percent) consist of estuarine emergent, freshwater forested, and freshwater shrub wetlands (Table 3.5-2) (JBER 2016b).

Table 3.5-1. Wetlands Classified by Landscape Position on JBER

Wetland Type	Total Acres	Percent
Depressional	3,024.52	40.42
Estuarine	2,179.3	29.12
Flat	1,361.76	18.19
Lacustrine	102.55	1.37
Open water	184.3	2.46
Riverine	331.53	4.43
Slope	300.38	4.01
Total	**7,484.34**	**100.00**

Source: JBER 2016b

Table 3.5-2. Wetland Vegetation Types on JBER

Wetland Description	Total Acres	Percent of Total Wetland Area
Estuarine Emergent Wetland	2,088.83	27.9
Estuarine Forested Wetland	12.74	0.2
Estuarine Shrub Wetland	77.73	1.0
Freshwater Alpine Lake	0.31	0.0
Freshwater Emergent Wetland	268.51	3.6
Freshwater Forested Shrub Wetland	32.61	0.4
Freshwater Forested Wetland	1,940.14	25.9
Freshwater Pond	183.99	2.5
Freshwater Riverine Emergent Wetland	10.47	0.1
Freshwater Riverine Forested Shrub Wetland	1.36	0.0
Freshwater Riverine Forested Wetland	129.32	1.7
Freshwater Riverine Shrub Wetland	99.94	1.3
Freshwater Riverine Wetland	2.12	0.0
Freshwater Shrub Wetland	2,636.27	35.2
Total	**7,484.34**	**100**

Source: JBER 2016b

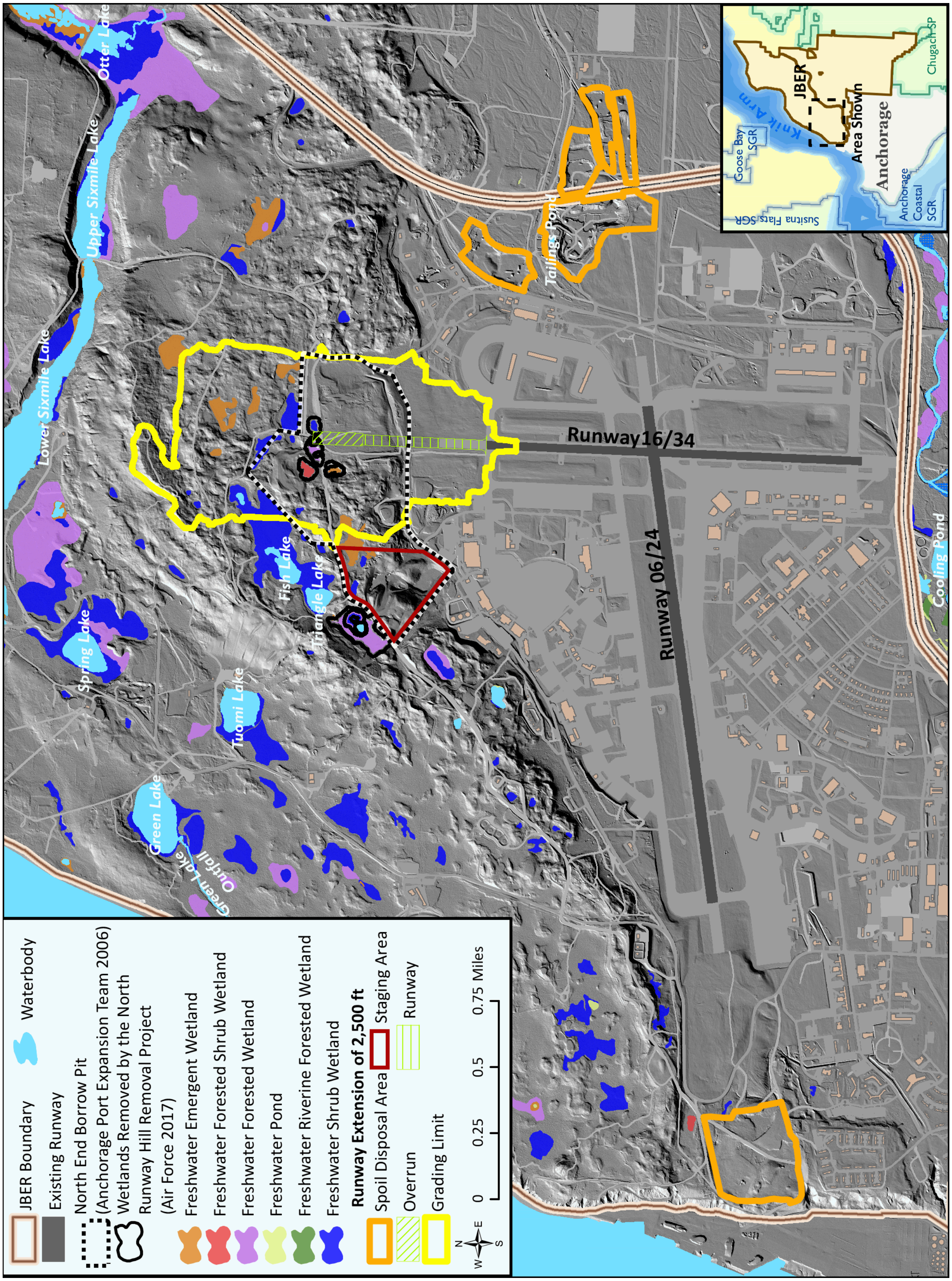

Figure 3.5-4. Waterbodies and Wetlands on JBER

3.6 Hazardous Materials and Waste Management

3.6.1 Hazardous Materials

All hazardous materials used by Air Force and contractor personnel at JBER are controlled through an Air Force pollution prevention process called the Hazardous Materials Pharmacy (HAZMART). This process provides centralized management of the procurement, handling, storage, and issuance of hazardous materials and turn-in, recovery, reuse, or recycling of hazardous materials. The HAZMART process includes review and approval by Air Force personnel to ensure users are aware of exposure and safety risks. Pollution prevention measures are required by law and regulation (Resource Conservation and Recovery Act) (JBER 2016) and will be implemented to minimize chemical exposure to employees, reduce potential environmental impacts, and minimize costs for materials purchasing and waste disposal.

3.6.2 Hazardous Waste Management

JBER is a large-quantity hazardous waste generator. Hazardous wastes generated during operations and maintenance activities include combustible solvents from parts washers, inorganic paint chips from lead abatement projects, fuel filters, metal-contaminated spent acids from aircraft corrosion control, painting wastes, battery acid, spent x-ray fixer, corrosive liquids from boiler operations, toxic sludge from wash racks, aviation fuel from tank cleanouts, and pesticides.

Hazardous wastes are managed in accordance with the JBER Operations Plan (OPLAN) 19-3, *Environmental Management Plan* (JBER 2016). Hazardous wastes are initially stored at approximately 228 satellite accumulation areas. Satellite accumulation areas allow for the accumulation of up to 55 gallons of hazardous waste (or 1 quart of an acute hazardous waste) to be stored at or near the point of waste generation. There are two 90-day waste accumulation sites on JBER. The base is identified by USEPA identification number AK8570028649. In 2014, approximately 98,000 pounds of hazardous waste were removed from JBER and disposed of in off-base permitted disposal facilities (Morey 2015).

The JBER Spill Prevention Control and Countermeasures Plan addresses on-base storage locations and proper handling procedures of all hazardous materials (including JP-8 used by the aircraft) to minimize potential spills and releases (JBER 2012c). The plan further outlines activities to be undertaken to minimize the adverse effects of a spill, including notification, containment, decontamination, and cleanup of spilled materials.

3.6.3 Environmental Restoration Program

The DoD developed the Environmental Restoration Program (ERP) to identify, investigate, and remediate potentially hazardous material disposal sites on DoD property. In August 1990, JBER was placed on the National Priorities List bringing it under the federal facility provisions of Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 120. Currently JBER has identified 276 sites contaminated from operations. These sites have been placed into three groups: CERCLA sources (166 sites), Compliance Restoration Program sites (74 sites), and Military Munitions Response Program Sites (36 sites). There are no open ERP sites within or in the immediate vicinity of the area that would undergo ground disturbance under three of the alternatives. Specific information regarding the sites in the vicinity of the Proposed Action at JBER is presented in Section 4.6.2.

3.7 Biological Resources

The ROI for biological resources encompasses the developed airfield facilities on JBER, undeveloped areas north of RW 16/34, and portions of JBER and the adjacent waters of Knik Arm that would be overflown by F-22s at low altitudes during takeoffs and landings.

3.7.1 Vegetation

JBER is situated near the Knik Arm at the head of the Cook Inlet in south central Alaska. Natural vegetation in the region is a transition between the Pacific Coast forest and interior boreal forests. The land cover types within the proposed project area are in the Lowland Interior Forest Physiographic Zone and include human modified areas, uplands, and lowland areas (including wetlands), and riverine (JBER 2016a). Forest and woodland are the predominant vegetation types, with the largest component being a mixed forest of paper birch (*Betula papyrifera*) and white spruce (*Picea glauca*), as well as quaking aspen (*Populus tremuloides*) on drier sites. Cottonwood (*Populus trichocarpa*) and balsam poplar (*Populus balsamifera*) are common in areas bordering streams. Black spruce (*Picea mariana*) is the dominant tree in wetter areas and on some well-drained sites. Most bogs are treeless and support stands of stunted black spruce. Grasses, herbs, alder (*Alnus* spp.), and willow (*Salix* spp.) dominate the vegetation in a narrow band along Cook Inlet (Rothe et al., 1983). Wetland communities along the coast include estuarine systems such as saltmarshes and vegetated mudflats. The human modified areas include cantonment areas and airfields, roads and roadsides, paved areas, rights-of-way, borrow pits, moose (*Alces alces*) mitigation areas, landing zones, and other areas where turf and landscape maintenance occurs as required (JBER 2016a).

JBER's policy is to conserve vegetation for wildlife habitat, timber, erosion control, and military cover and concealment. Maintaining ecological processes and functions provides opportunities for soldier training in realistic environments that are not heavily degraded due to past training impacts. JBER's forest management program supports and enhances the immediate and long-term military mission in addition to meeting natural resource stewardship requirements set forth in federal laws. Objectives and benefits of forest ecosystem management include sustainment of viable and diversified training lands to meet the military mission; biodiversity of wildlife species and habitat, including habitat for threatened, endangered, and species of concern; outdoor recreation opportunities; wildlife habitat; soil conservation and watershed protection, including erosion control; improvement of air and water quality; sustained production of commercially valuable forest products; and noise abatement. JBER applies a landscape-level, ecological approach to blend the needs of the military mission with the health of the environment to ensure JBER ecosystems are diverse, productive, and economically sustainable (JBER 2016a).

3.7.2 Fish and Wildlife

Most species indigenous to south-central Alaska can be found on JBER. Large mammals including moose (*Alces alces*), black bears (*Ursus americanus*), brown bears (*U. arctos*), and wolves (*Canis lupus*) are prevalent on the base and are typical residents of the Alaskan environment. Black and brown bears occur on JBER in summer and a small number winter in dens on JBER. Coyotes (*Canis latrans*) are also common and lynx (*Lynx canadensis*), wolverines (*Gulo gulo*), and red fox (*Vulpes laska*) also occur (JBER 2016a). Marine mammals that may use habitat in the Knik Arm offshore of JBER are discussed under Special-Status Species.

At least 103 bird species are known to occur or have the potential to occur at JBER (JBER 2016a). Waterfowl and shorebirds use the base's ponds, bogs, wetlands, and coastal marshes in summer and during spring and fall migration. Spring waterfowl migration is generally mid-April to mid-May and fall migration is generally August to late October. Raptors that occur on base include osprey (*Pandion haliaetus*), bald eagle (*Haliaeetus leucocephalus*), red-tailed hawk (*Buteo jamaicensis*), rough-legged hawk (*B. lagopus*), sharp-shinned hawk (*Accipiter striatus*), northern goshawk (*A. gentilis*), merlin (*Falco columbarius*), northern harrier (*Circus cyaneus*), northern saw-whet owl (*Aegolius acadicus*), boreal owl (*A. funereus*), and great horned owl (*Bubo virginianus*). Common breeding birds include alder flycatcher (*Empidonax alnorum*), boreal chickadee (*Poecile hudsonica*), black-capped chickadee (*P. atricapillus*), gray jay (*Perisoreus canadensis*), Swainson's thrush (*Catharus ustulatus*), yellow-rumped warbler (*Dendroica coronata*), American robin (*Turdus migratorius*), dark-eyed junco (*Junco hyemalis*), ruby-crowned kinglet (*Regulus calendula*), and white-winged crossbill (*Loxia leucoptera*). Twenty-one fish species occur at JBER including five Pacific salmon (*Onchorhynchus* spp.) species. Ship Creek, Sixmile Creek, Chester Creek, and Eagle River are the main spawning creeks for these anadromous fish on JBER. One species of amphibian, the wood frog (*Rana sylvatica*), is common in bogs, wetlands, and marshes (JBER 2016a).

3.7.3 Special-Status Species

Floristic inventories on JBER have identified no threatened or endangered plant species or species that have been proposed for listing. Five vascular plants that are considered rare in Alaska, but more common globally were found during floristic surveys, including: Northern bugle weed (*Lycopus unifloris*), found on wet lakeshores of Hillberg (Tuomi) Lake and Sixmile Lake; bog adder's-mouth (*Malaxis paludosa*), observed at Triangle Lake fen in sphagnum mats; pod grass (*Scheuchzeria palustris*), found in several bogs and fens, including fens adjacent to Triangle Lake in sphagnum mats; and sea saltwort (*Salicornia maritima*) and saltmarsh bulrush (*Scirpus maritimus*), both found in a small salt marsh below the bluffs adjacent to the Port of Anchorage (Lipkin and Tande 2001). The occurrences of sea saltwort and saltmarsh bulrush were recently lost due to placement of fill associated with the nearby Port of Anchorage expansion (JBER 2016a). The proximity of this location to JBER suggests that one or more of these species could occur in the potential runway expansion area.

No federally listed, proposed, or candidate threatened or endangered terrestrial plant or wildlife species (or their critical habitat) occur on the JBER installation (USFWS 2016), but the CIBW (*Delphinapterus leucas*), which is federally listed as endangered, inhabits the waters of Knik Arm of the Cook Inlet adjacent to JBER. Other listed marine species are unlikely but possible in these waters (see Table 3.7-1). CIBW are also known to travel as far as 2.9 river miles up the Eagle River on JBER, which drains into the Knik Arm at Eagle Bay, during the late summer/early fall (Garner 2015). Designated critical habitat for the species includes portions of the Knik Arm (76 *Federal Register* 20180). The Knik Arm is located to the west and north of JBER runways and is overflown by existing aircraft on established approach, departure, and reentry patterns. The heaviest use by CIBW of the Knik Arm near JBER, including the Eagle River and Eagle Bay, is from August through October.

Table 3.7-1. Species Federally Listed, Proposed, and Candidates for Listing as Endangered or Threatened Under the Endangered Species Act that May Occur in the JBER Project Region

Common Name	Scientific Name	Status	Occurrence at JBER
Cook Inlet Beluga Whale (distinct population segment)	*Delphinapterus leucas*	FE, MMPA	Occurs in waters of the Knik Arm adjacent to JBER, which would be overflown by F-22s. Portions of the Knik Arm near JBER are included in designated critical habitat for the species.
Chinook Salmon (Puget Sound; and Lower Columbia, Snake, and Upper Willamette rivers Evolutionary Significant Units)	*Oncorhynchus tshawytscha*	FT (1 ESU is FE)	No. These ESUs range throughout the North Pacific. However, the specific occurrence of listed salmonids within close proximity to JBER is highly unlikely.
Steelhead (Columbia, Snake, and Willamette rivers populations)	*Onchorhynchus mykiss*	FT	No. These stocks range throughout the North Pacific. However, the specific occurrence of listed salmonids within close proximity to JBER is highly unlikely.
Steller Sea Lion	*Eumetopias jubatus*	FE=western population, MMPA	No. May potentially move within close proximity to JBER but occurs so infrequently that projects are expected to have no effect.
Northern Sea Otter (southwest Alaska distinct population segment)	*Enhydra lutris kenyoni*	FT, MMPA	No. Closest occurrence is lower Cook Inlet.

Key:
ESU = Evolutionary Significant Unit
FE = Listed as endangered under ESA
FT = Listed as threatened under ESA
MMPA = Protected under Marine Mammal Protection Act
Source: JBER 2016a

Steller sea lion (*Eumetopias jubatus*) is an endangered species that has been documented very infrequently in the Knik Arm near JBER. The northern sea otter (southwest Alaska distinct population segment) is listed as a threatened species. These sea otters occur along the Alaskan Peninsula to the Aleutian Islands with the nearest population to the project area occurring in the lower Cook Inlet, which is well outside of the ROI.

Marine mammal species, including the Endangered Species Act (ESA)-listed species identified above, are all protected under the Marine Mammal Protection Act. Non-listed marine mammals include the harbor seal (*Phoca vitulina*), harbor porpoise (*Phocoena phocoena*), and orca or killer whale (*Orcinus orca*). Harbor seals are present in the upper Cook Inlet and range into the Knik Arm. They are becoming increasingly common. Harbor porpoises occur infrequently and killer whales are uncommon in upper Cook Inlet but are sighted occasionally (JBER 2016a).

Table 3.7-2 lists several bird species of special concern that are either known to occur or may occur on JBER (JBER 2015a, USFWS 2016). All avian species included in Table 3.7-2 as well as most native bird species on JBER are protected under the MBTA. The bald eagle, which also receives protection under the Federal Bald and Golden Eagle Protection Act (16 U.S.C. 668a-668d), is common locally, and a 2014 survey recorded 38 bald eagle nests with 16 active nests within the JBER boundary, seven of which were new nests (JBER 2015b). The 2014 survey also noted one osprey (*Pandion haeliaetus*) nest, two red-tailed hawk (*Buteo jamaicensis*) nests, and two common raven (*Corvus corax*) nests on or adjacent to JBER (JBER 2015b). Surveys conducted in May 2016 noted 16 active bald eagle nests, 4 active red-tailed hawk nests, and 1 active nest each for raven and osprey (Walker 2016).

Table 3.7-2. Species of Special Concern Known to Occur or that May Occur on JBER

Common Name	Scientific Name	JBER Status	Source
Aleutian tern	*Sterna aleutica*	Breeding	USFWS 2016
Arctic tern	*Sterna paradisaea*	Breeding	USFWS 2016
Bald eagle	*Haliaeetus leucocephalus*	Year-round	USFWS 2016
Blackpoll warbler	*Dendroica striata*	Breeding	JBER 2015a
Fox sparrow	*Passerella illaca*	Breeding	USFWS 2016
Greater yellowlegs	*Tringa melanoleuca*	Breeding	JBER 2015a
Horned grebe	*Podiceps auritus*	Wintering	USFWS 2016
Lesser yellowlegs	*Tringa flavipes*	Breeding	JBER 2015a, USFWS 2016
Olive-sided flycatcher	*Contopus cooperi*	Breeding	JBER 2015a, USFWS 2016
Pink-footed shearwater	*Puffinus creatopus*	Year-round	USFWS 2016
Rufous hummingbird	*Selasphorus rufus*	Breeding	USFWS 2016
Rusty blackbird	*Euphagus carolinus*	Breeding	JBER 2015a
Short-billed dowitcher	*Limnodromus griseus*	Breeding	JBER 2015a
Short-eared owl	*Asio flammeus*	Breeding	USFWS 2016
Solitary sandpiper	*Tringa solitaria*	Breeding	JBER 2015a, USFWS 2016
Tree swallow	*Tachycineta bicolor*	Breeding	JBER 2015a
Violet green swallow	*Tachycineta thalassina*	Breeding	JBER 2015a

In addition to species protection, JBER has designated special interest areas as an important management tool to minimize damage or disturbance to sensitive or fragile areas. Special interest area management includes protecting these areas through regulations, map overlays showing restrictions, and actual barriers. The following areas on JBER are recognized as special interest areas: old growth forests, EOD Creek Natural Area, Ship Creek Riparian Zone, Sixmile Lake System, Alpine Areas, and Eagle River Flats. Eagle River Flats and Sixmile-Otter Lake are also identified as important land management units for migratory birds (JBER 2016a).

3.8 Cultural Resources

Cultural resources are any prehistoric or historic district, site, or building, structure, or object considered important to a culture or community for scientific, traditional, religious, or other purposes. They include archaeological resources, historic architectural resources, and traditional resources. Cultural resources that meet the criteria for listing on the National Register of Historic Places (NRHP) are also known as historic properties (36 CFR 800.16(l)). Historic properties are treated as if they are listed on the NRHP, regardless of whether they are actually listed.

For this EIS, the ROI for cultural resources is equivalent to the area of potential effects (APE). The APE of an undertaking is “the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if any such properties exist” (36 CFR 800.16(d)). The APE for cultural and traditional resources for all alternatives encompasses areas where overflights would occur, as well as the area where noise and visual effects attributable to F-22 flight operations at JBER are projected to occur (see Figure 3.8-1 and Figure 3.8-2). The APE is three-dimensional, and effects on resources are analyzed for subsurface, surface, and airspace components. Most of the areas within the APE will experience only indirect effects.

The cultural resources APE for Alternatives B, C, and F, which include construction of an extension to RW 16/34, is further defined as including a smaller portion of the larger APE that may also experience both direct and indirect effects through ground-disturbing activities (direct effects) (Figure 3.8-1 and Figure 3.8-2). These areas include approximately 475 acres that could be subject to excavation and another 59 acres for construction staging north of RW 16/34; approximately 68 acres west of RW 06/24 for spoil disposal; and another spoil disposal area of 117 acres east of RW 06/24. In compliance with the NHPA, Section 106, the Air Force consulted with the Alaska SHPO regarding the APE (Appendix A).

3.8.1 Archaeological Resources

Since the beginning of cultural resource investigations at JBER in 1978, most archaeological survey has occurred west and east of RW 06/24, and north of runway 16/34, although there have been surveys elsewhere at JBER. These survey efforts have located 26 archaeological sites within the APE for ground-disturbing effects. All 26 sites are recommended as ineligible for the NRHP (Braund & Associates 2006; JBER 2012d, 2015c, 2016c, 2016d, 2016e; Elmendorf AFB 2010). The SHPO has concurred with the determinations of eligibility for 20 sites (Alaska Department of Natural Resources 2016), and the Air Force is seeking concurrence for the remaining 6 sites. No NRHP-listed or NRHP–eligible archaeological resources have been located in the APE (JBER 2012d, 2015c, 2016c, 2016d, 2016e; NRIS 2015).

North of RW 16/34, approximately 475 acres could be subject to excavation and another 59 acres designated for construction staging for the alternatives that include construction of an extension to RW 16/34 (Figure 3.8-2). The staging area and all but approximately 108 acres of the potential excavation area have been surveyed for cultural resources (USACE 2007; JBER 2015c, 2016c, 2016d, 2016e; Braund & Associates 2006). Sites north of the existing RW 16/34 include several military-related sites (bunker/igloo complex, military training features, gun emplacements), a homestead, and a site of unknown characteristics (JBER 2015c, 2016c, 2016d, 2016e). None of these archaeological sites are eligible for listing on the NRHP (USACE 2007; JBER 2015c, 2016c, 2016d, 2016e; Braund & Associates 2006). The area immediately north of RW 16/34 that has not been surveyed and that could be subject to surface modification consists of highly disturbed landfill, borrow areas, and gravel sources. The 68-acre spoil disposal area west of RW 06/24 has been 100 percent surveyed, and no archaeological sites were located. Of the 117 acres east of RW 06/24 that could be used for spoil disposal, about 28 acres have been surveyed, leaving fewer than 90 acres that are gravel borrow pits. In the surveyed portion, three military-related archaeological sites were located, and none are eligible for the NRHP (JBER 2016e).

A probability study and analysis (JBER 2016f) identified the area north of RW 16/34 primarily as highly disturbed and thus low-sensitivity for the presence of historic properties, with some areas of moderate sensitivity. The category of moderate sensitivity includes "areas containing geological features that often attracted human activity, but that have likely experienced modern disturbance" (JBER 2015d). Archaeological survey of the majority of this area supports the probability analysis, finding no NRHP-eligible archaeological sites (JBER 2016c, 2016d, 2016e). The areas east and west of RW 06/24 designated for possible spoil disposal have also been previously surveyed or have a low probability for NRHP-eligible archaeological sites (JBER 2016f). Overall, the portion of the APE where ground-disturbing modifications and runway construction could occur is considered to have a low probability for the presence of archaeological resources because of the presence of existing disturbances, including grading, borrow pits, and landfill (JBER 2016f).

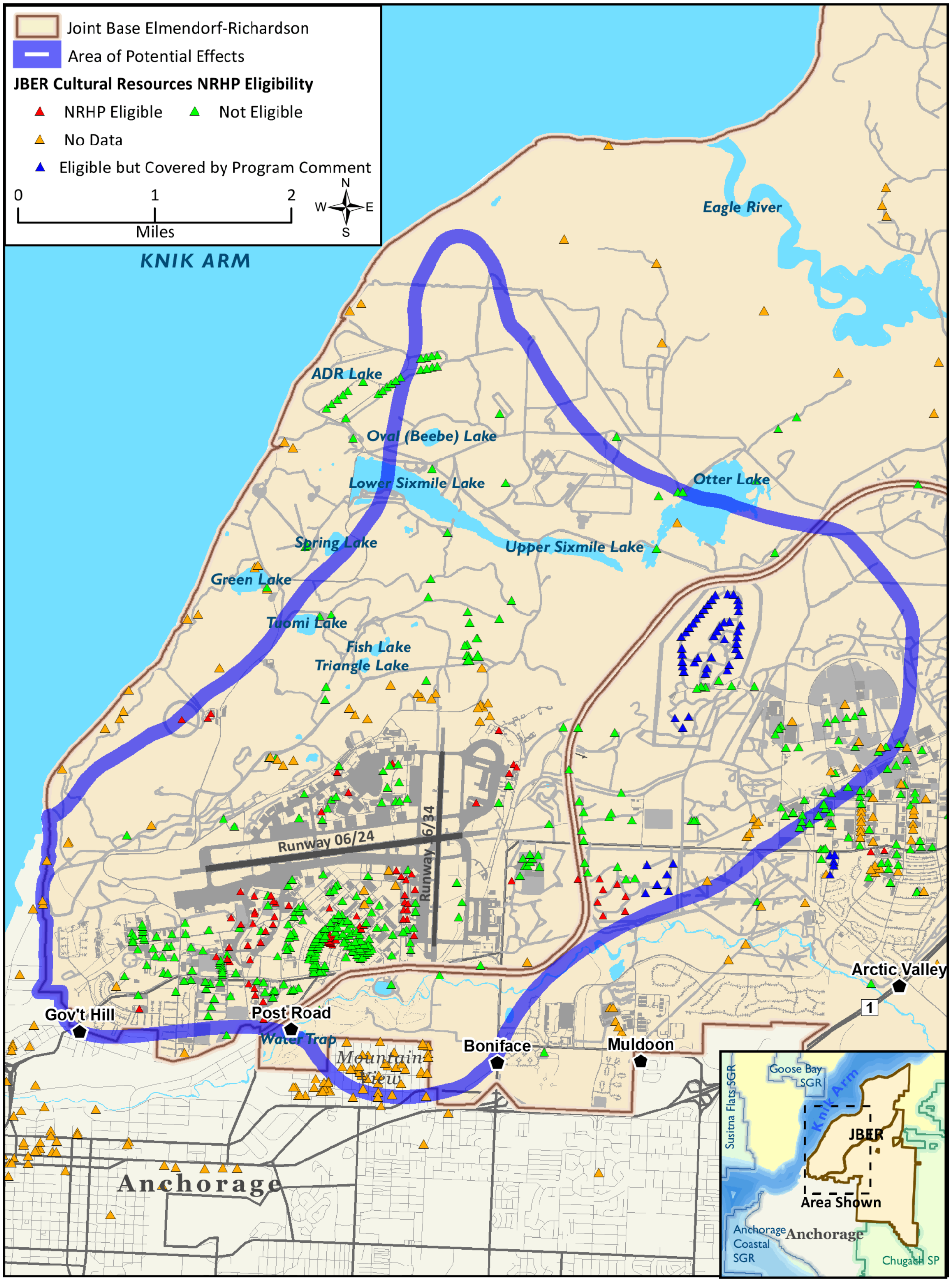

Figure 3.8-1. Cultural Resources Area of Potential Effects

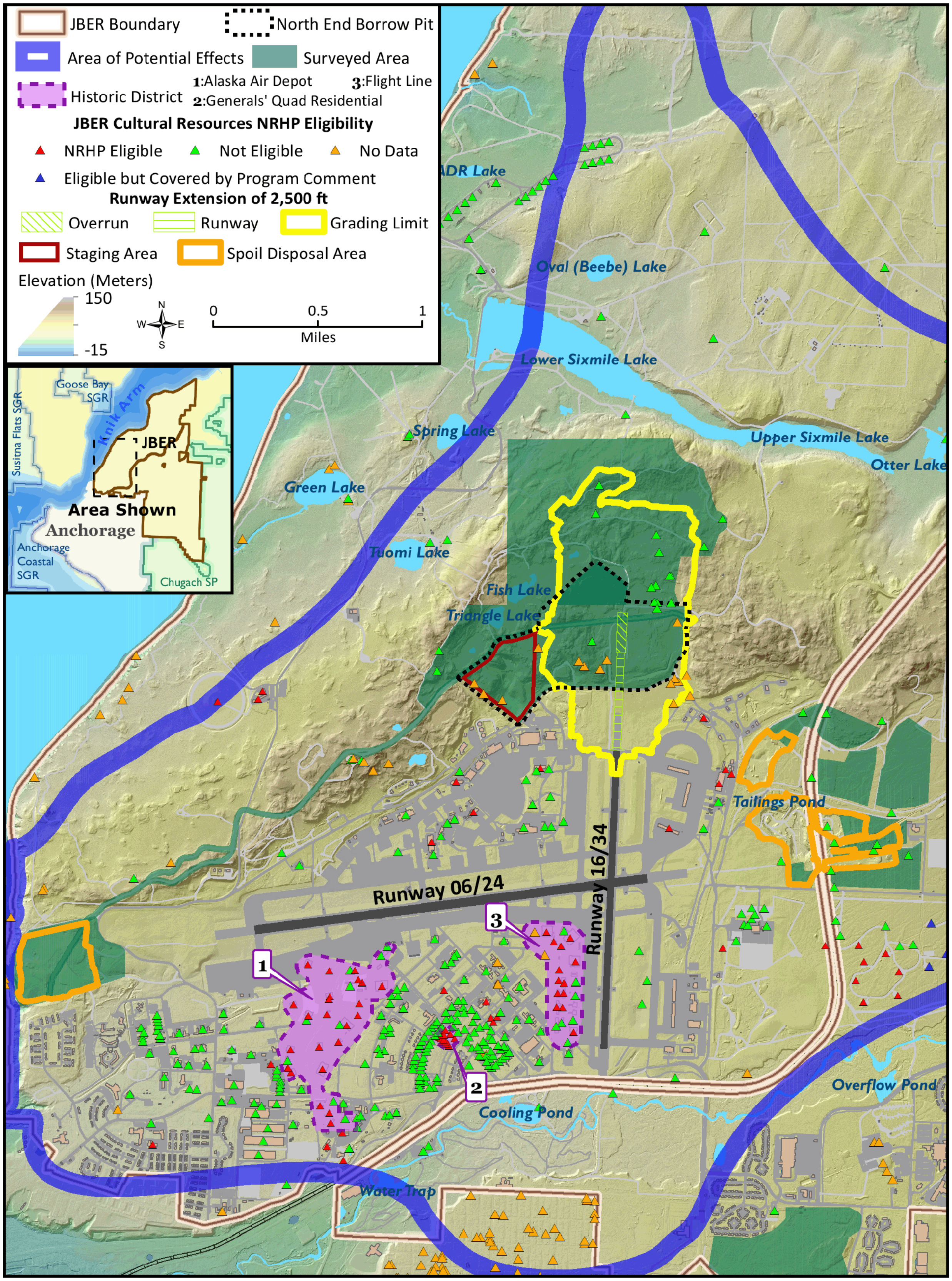

Figure 3.8-2. Historic Districts Within Cultural Resources Area of Potential Effects

3.8.2 Architectural Resources

No NRHP-listed resources have been located within the APE (NRIS 2015). However, there are 52 NRHP-eligible buildings or structures on JBER, most of which are located in one of three NRHP-eligible historic districts. The Flightline Historic District is adjacent to the runways; the Alaska Air Depot Historic District is located in the main cantonment, as is the third district, the Generals' Quad Historic District (Figure 3.8-2). To the east of the airfield, on JBER-Richardson, is the NRHP-listed Fort Richardson National Cemetery.

3.8.3 Traditional Cultural Properties and Alaska Native Concerns

Although no traditional cultural properties (understood to be properties of traditional religious or cultural importance to Alaska Natives that are also eligible for listing on the NRHP) have yet been identified on JBER, neighboring Alaska Natives have raised concerns regarding the possibility of Alaska Native burials located on JBER property (JBER 2012d). There may also be traditional resources that are not considered eligible for listing on the NRHP, but are of importance or concern to Alaska Natives and that are also considered for potential effects in accordance with EO 13175: *Memorandum on Government-to-Government Relations with Native American Tribal Governments* and DoD and Air Force policy, including*;* DoD Instruction 4710.02: *DoD Interactions with Federally Recognized Tribes*; and AFI 90-2002: *Air Force Interactions with Federally-Recognized Tribes*.

In accordance with EO 13175, DoD Instruction 4710.02, and AFI 90-2002, the Air Force consulted with federally recognized Alaska Native tribes, ANCSA corporations, and tribal government entities on a government-to-government basis. These include Knik Village, Wasilla; Eklutna Native Village, Chugiak; Native Village of Tyonek, Tyonek; Chickaloon Village Traditional Council, Chickaloon; Cook Inlet Region, Inc.; and Eklutna, Inc., Eagle River (Appendix A). The Air Force also conducted consultation with the same Alaska Native entities as required under Section 106 of the NHPA and its implementing regulations (36 CFR Part 800.2(c)(2)), and NEPA (Appendix A).

3.9 Land Use and Recreation

The ROI for land use and recreation includes the base and immediate surrounding areas, within the footprint of the largest noise contours, plus a buffer of about a half-mile to capture the context of the surrounding land and jurisdictions. JBER is located at the head of Cook Inlet within the Anchorage municipality. JBER-Elmendorf comprises 13,455 acres of JBER's total 84,000 acres of federal land directly north of Anchorage in the south-central portion of Alaska.

Figure 3.9-1 depicts existing land uses on JBER-Elmendorf. The airfield and related aircraft functional areas are located in the center and southern part of the base. A mixture of land uses (community services and commercial retail, unaccompanied housing, family housing, recreation, and administration) is located in the core areas south and west of the two runways. West of this area, a large industrial area forms a boundary between the central mixed-use core of the base and the housing and services area in the base's southwest corner near the Government Hill gate.

Between the core areas and the base boundary (south of Arctic Warrior Road and west of Vandenberg Avenue), the land is primarily open or used for recreation, with a community park and Eagle Glen Golf

Course, a small explosive safety hazard zone, and unaccompanied housing area. The Eagle Glen Golf Course south of the airfield was recently closed but still supports hiking, biking, and other open recreation. Davis Park/Mountain View Lions Park (Davis Park), also on JBER land, is leased to the Municipality of Anchorage.

This neighborhood park serves a community of over 7,700 persons, and includes rugby, baseball, and ultimate Frisbee fields, basketball courts, picnic area, and an active community garden. Activities at Davis Park that fall within APZ I are compatible. With future coordination between the municipality and JBER, and following the Davis Park Master Plan, activities will continue to comply with compatibility guidelines. There are plans to expand the amenities of this popular park with disc golf and skate parks. East of Vandenberg Avenue, medical facilities are located in the southeast corner, along with some housing and recreational areas.

Davis Park is a 77.92-acre community–use park and provides soccer and rugby fields, ultimate Frisbee fields, a baseball field, a basketball court, walking trails, picnic tables, and other amenities to the high minority and low-income population of Mountain View (Municipality of Anchorage 2016). The Mountain View Lions Park, co-located with Davis Park, provides additional community recreation opportunities. The combined recreation area is considered a noise-sensitive area. Approximately 2.1 acres of the park are currently exposed to noise levels within the 65- to 69-dB L_{dn} noise contour (see Figure 3.12-2). Outdoor recreation is compatible with noise zones up to 69 dB L_{dn} (AFI 32-7063). Davis Park is leased from the Air Force by the Municipality of Anchorage and continues to be used as a recreational area. JBER and the Municipality of Anchorage recently renewed the lease for recreational activities.

There are six schools located in the southern portion of JBER. Three elementary schools, Orion, Aurora, and Mount Iliamna, are located in the southwest near the Government Hill gate. Three others, Mountain View Elementary, Government Hill Elementary, and Bartlett High School, are outside the installation fenceline but are on JBER land leased to the school district.

Large recreational areas and open space are located north and south of the airfield (Air Force 2005). The undeveloped land north of the airfield is used by military and their families for recreational purposes, such as hiking, hunting, fishing, boating, float plane use, sightseeing, and wildlife viewing.

JBER-Elmendorf is bordered to the east by JBER-Richardson. There are various training ranges within the military installations, including maneuver, impact, and training areas. JBER has prepared an Installation Development Plan (IDP) to manage and provide direction for current and future use and development of land and physical assets (JBER 2015d). This plan replaces the general plans previously developed for each of the separate installations of Elmendorf AFB and Fort Richardson. The IDP presents a comprehensive planning strategy to support military missions assigned to the installation and serves as a guide for future installation development decisions. The plan summarizes existing conditions and provides a framework for programming, design, and construction, as well as resource management for the future. Some areas on the base have land use restrictions that prohibit construction of manned facilities in areas that were previously contaminated. In the Future Land Use map, the IDP expands the areas categorized as Airfield Pavement and Aircraft Operations and Maintenance, providing for more review and control of future development and uses in the areas where airfield safety and operations are a priority.

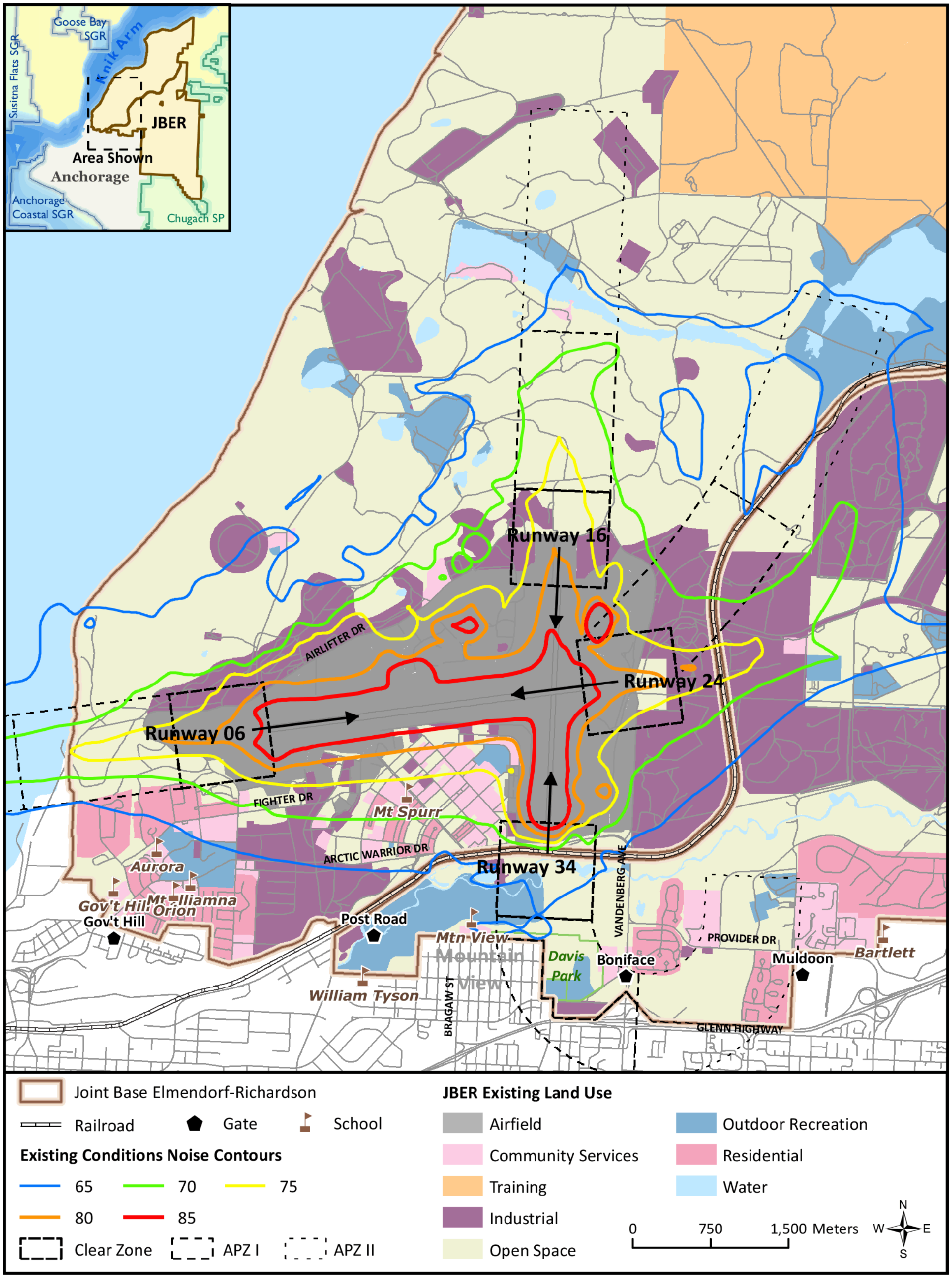

Figure 3.9-1. JBER Land Use and Current Noise Exposure

The IDP and other existing studies present factors affecting both on- and off-base compatible land use and also include recommendations to assist on-base officials and local community leaders in ensuring compatible development in the vicinity of the base. In general, land use recommendations are based on safety factors (refer to Section 3.3) and aircraft noise (refer to Section 3.2). As described in Section 3.3.3, areas around the airfield are exposed to varying degrees of accident risks.

Prior to joint basing, Elmendorf AFB prepared an AICUZ study, originally in 1993, with updates in 2000 and 2006 (Elmendorf AFB 2006). Under the AICUZ program, the base shares information about noise contours and airfield hazard areas with surrounding jurisdictions. This coordination is aimed at enabling more compatible land use planning and development decisions in surrounding areas influenced by noise and airfield operations. Noise is one of the major factors used in determining appropriate land uses since elevated sound levels are incompatible with certain land uses. When noise levels exceed an of 65 dB L_{dn}, some uses such as residential land uses are normally considered incompatible (DODI 4165.57, *Air Installations Compatible Use Zones*).

Another factor used to assess compatibility is safety, in consideration of accident potential of arriving and departing aircraft (see Section 3.3). Noise levels and accident zones for both on-base and off-base areas are depicted on Figure 3.9-1 and Figure 3.9-2, respectively. Currently, on base, some land is categorized as industrial within the CZ (i.e., the clear zone), but no structures are in the CZ. Industrial uses are not compatible in a CZ and any ongoing industrial activity would function with a waiver. The updated IDP has recategorized this land as entirely for airfield type uses. APZ I is almost entirely open space, and APZ II is predominantly open space with a mixture of community service (5 acres), industrial 29 acres), and outdoor recreation (29 acres). Depending on the density and intensity of the community functions and industrial use, these uses may or may not be compatible with airfield safety criteria.

In the surrounding community to the south of the base, about 75 acres within APZ I and about 14 acres in APZ II are residential. Lower density residential can be acceptable in APZ II. However, residential use and any use that consistently congregates people (such as retail commercial, lodging and restaurants, hospitals, and care facilities) are not recommended for new development in APZs. Outdoor recreation is generally compatible in APZ I and II for low intensity facilities, including activities at Davis Park (on JBER land leased to the Municipality of Anchorage), which falls within APZ I. About 18 acres of commercial use, 24 acres of industrial land and 0.2 acre of institutional land in the Mountain View area are situated in the APZs and may be compatible depending on the intensity of the uses. High structures (for example, communication towers or high-rise commercial or apartment buildings) may conflict with safe navigation and are also restricted. For safety purposes, AFI 32-7063, *Air Installations Compatible Use Zones Program,* limits density of development by recommended floor area ratios.

Table 3.9-1 summarizes the land acres exposed to noise levels of 65 dB L_{dn} and above on JBER. Almost 7,200 acres experience noise levels of 65 dB L_{dn} and greater on base with about 130 acres used for residential purposes (housing in the core of the base) and about 241 acres for community services (which includes administrative, commercial, health and other services, and schools). Residential land uses and community uses such as schools are generally considered incompatible with these noise levels and sensitive to auditory intrusion; however, these uses can be considered compatible so long as they have adequate sound attenuation as noted in the AICUZ land use compatibility tables (DODI 4165.57).

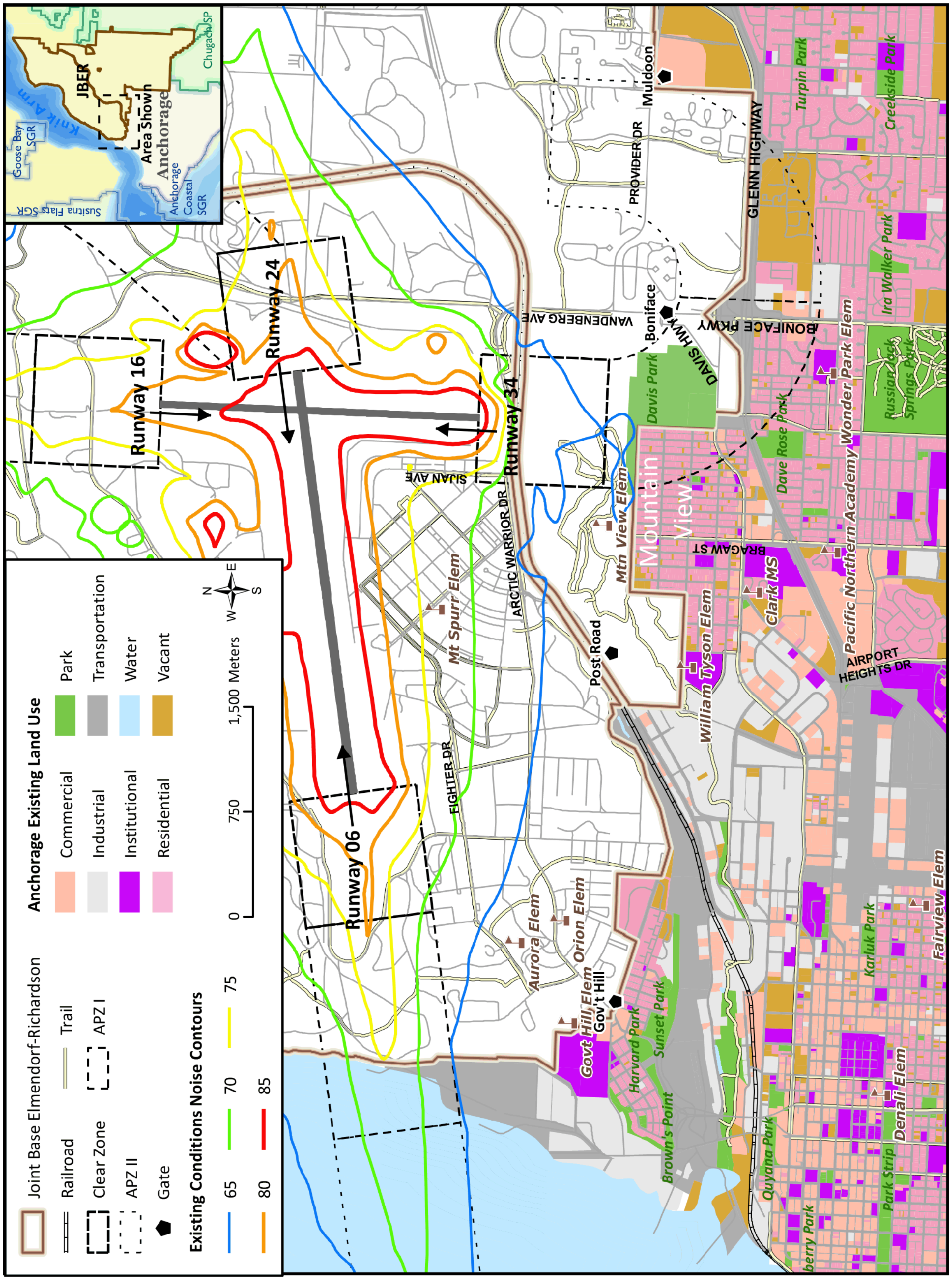

Figure 3.9-2. Land Use Surrounding JBER and Current Noise Exposure

Table 3.9-1. Current Noise Exposure on JBER (Acres by Land Use)

JBER Land Use	Current Noise Exposure				
	65–69.9 dB L_{dn}	70–74.9 dB L_{dn}	75–79.9 dB L_{dn}	80–84.9 dB L_{dn}	≥85 dB L_{dn}
Airfield	12.3	229.4	531.2	447.7	508.2
Community Services	82.3	110.2	41.6	6.4	0
Industrial	973.8	629.8	214.6	17.4	4.7
Open Space	1,998.5	604	185.4	38.5	4.1
Outdoor Recreation	235.7	4.9	15.2	0	0
Residential	112	18.2	0	0	0
Training	32.3	0	0	0	0
Water	136.1	1.5	0	0	0
Total	**3,583**	**1,598**	**988**	**510**	**517**

Key:
dB = decibels
L_{dn} = day-night average sound level

Residential (housing) and community services in the Government Hill part of the base (southwest of the airfield) and east of Vandenberg Avenue and the Boniface Gate (including the JBER hospital) are affected by average noise levels above 64 dB L_{dn} and are compatible with current noise conditions. About 1,840 acres used for industrial and about 1,760 used for mission purposes is affected by noise levels above 65 dB L_{dn} and is generally compatible depending on the type of interior activity. Office uses would be less suitable with noise levels in the 70 to 80 dB range, but could be compatible if the construction provides adequate interior sound attenuation.

On JBER, two schools, Mount Spurr, and Aurora, experience noise exposure levels of 72.3 and 62.4 dB L_{dn}, respectively. Noise levels of 65 dB L_{dn} and greater is generally compatible with most other mission-related uses (excluding residential and community uses), including outdoor recreation. Mountain View Elementary, located outside the installation fenceline but on JBER land leased to the school district, experiences noise exposure level of 64.1 dB L_{dn}. In 2014, the Anchorage School District (ASD) retrofitted Mountain View Elementary School to provide indoor sound attenuation. Further upgrades are also included in 2015 school district bond recommendations (ASD 2015).

The Municipality of Anchorage borders the base to the south and west. To the west of JBER-Elmendorf is the Port of Anchorage and Cook Inlet/Knik Arm (shown in Figure 3.9-2). Much of the land in the vicinity of the base to the south is residential with industrial land further to the southwest. Immediately south of the base boundary, a residential neighborhood known as Mountain View has a combination of single and multi-unit dwellings, with a medium-to-high population density averaging about 46 persons per acre, parks and recreational facilities, and neighborhood institutional uses such as care centers and churches. To the west, surrounded by industrial areas is the Government Hill neighborhood.

Surrounding JBER, about 233 acres of land used for transportation purposes and about 2.5 acres of land used for institutional purposes experience noise levels of 65 dB L_{dn} and above (see Table 3.9-2). These noise levels are compatible with industrial and transportation operations around the Port of Anchorage. As shown in Figure 3.9-2, four schools (William Tyson Elementary School, Clark Middle School, Pacific Northern Academy, and Wonder Park Elementary) are located south of the base, but outside the 65 dB L_{dn} exposure zone. No off-base parks or outdoor recreational facilities are exposed to noise above 65 dB L_{dn}, with the exception of the northwest corner of Davis Park in Mountain View (which is on JBER land leased to the Municipality of Anchorage).

Table 3.9-2. Current Noise Exposure in Areas Surrounding JBER (Acres by Land Use)

Land Use	Existing Noise Exposure		
	65–70 dB L_{dn}	70–75 dB L_{dn}	75–80 dB L_{dn}
Institutional	1.9	0.6	0
Transportation	147.6	80.4	5
Total acres	149.5	81	5

Key:
dB = decibels
L_{dn} = day-night average sound level

3.10 Transportation and Circulation

Regional access to JBER is provided by Glenn Highway (a part of Alaska Route 1), which serves as the primary highway connection to much of the state, linking Anchorage to the communities of Eagle River and Chugiak to the northeast as well as to communities located on the Kenai Peninsula to the south. In the vicinity of JBER, Glenn Highway runs to the south of developed areas and bisects the installation as it progresses eastward. Several interchanges of Glenn Highway provide direct connections to JBER gates.

Access to JBER is provided by five gates: Boniface, Muldoon, Post Road, Government Hill, and D Street/Richardson (see Figure 3.10-1). Two major arterial roads, accessible from Anchorage and by way of exits on Glenn Highway, provide access to the Boniface and Muldoon Gates, respectively. After entering JBER, Boniface Parkway becomes Vandenberg Avenue and Muldoon Road becomes Provider Drive. The primary Visitor Control Center, open 24 hours a day, seven days a week, is located at Boniface Gate. Commuters from residential areas in the Anchorage area can also use Post Road Gate and Government Hill Gate to access JBER from the west. Access to JBER from the east is provided by the D Street/Richardson Gate, which feeds directly into an exchange on Glenn Highway. This gate is the location of the second Visitor Control Center on JBER, open from 6 AM to 9 PM, Monday through Friday. A sixth gate, Arctic Valley, an exit-only gate, is open weekdays from 3 PM to 6 PM and connects to Glenn Highway by way of a frontage road. Table 3.10-1 lists the hours of operation of the access gates on JBER and the AADT at these gates in 2012 and 2013.

Table 3.10-1. JBER Access Gates, Hours of Operation and Average Annual Daily Traffic in 2012 and 2013

Gate	Hours of Operation	2012 AADT	2013 AADT
Boniface	Continuous (24 hours a day, seven days a week)	10,812	11,007
D-Street/Richardson	Continuous (24 hours a day, seven days a week)	no data	10,571
Muldoon	Monday–Friday, 5 AM – 12 AM; Saturday–Sunday, 9 AM – 12 AM	23,751	24,687
Post Road	Seven days a week, 6 AM – 6 PM	2,988	2,926
Government Hill	Monday–Thursday, 6 AM – 10 PM; Friday, 5:30 AM – 11 PM; Saturday, 6 AM – 11 PM; Sunday, 6 AM – 10 PM	9,663	9,345
Arctic Valley (exit only)	Monday–Friday, 3 pm – 6 pm	no data	2,900

Key:
AADT = average annual daily traffic
Source: ADOT 2013, 2015a

Commercial vehicles enter the base through the Post Road Gate and are subject to inspection at the Commercial Vehicle Inspection area located approximately 328 feet (100 meters) inside the gate. The Commercial Vehicle Inspection area is open seven days a week from 6 AM to 6 PM.

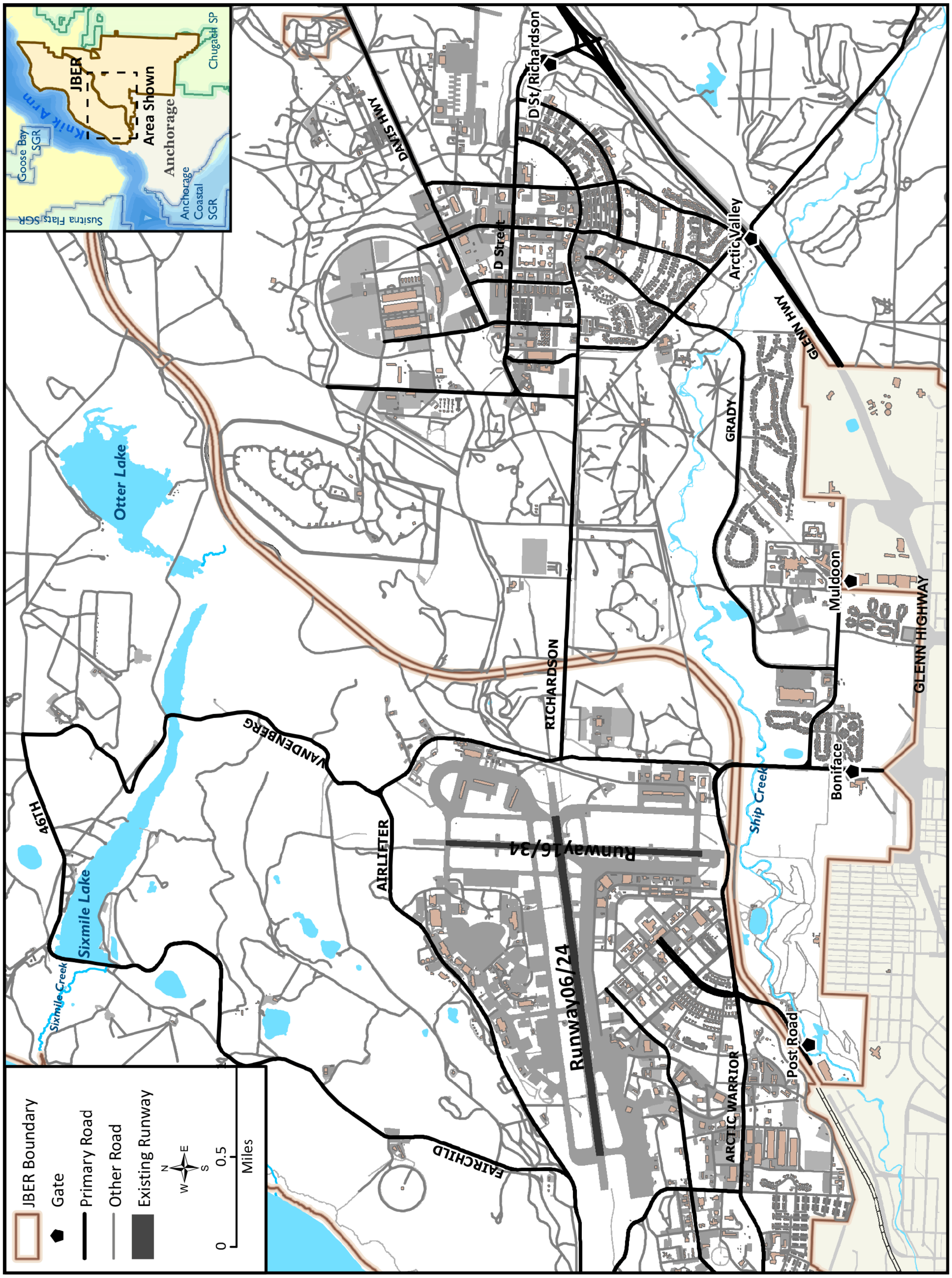

Figure 3.10-1. Transportation on JBER

While traffic flow is generally considered good in Anchorage, several intersections along the Glenn Highway corridor experience higher volumes of traffic and impaired levels of service during peak commuting periods, including Airport Heights Drive, Bragaw Street, and Boniface Parkway. The section of Glenn Highway from the eastern edge of Merrill Field to the Vandenberg Avenue exchange can experience high congestion during the morning and evening rush hours (Anchorage Metropolitan Area Transportation Solutions 2012). In addition, ADOT has targeted the Glenn Highway and Muldoon Road interchange for an improvement project designed to improve operations, capacity, and safety, with construction on the project scheduled for spring 2016 through fall 2018 (ADOT 2015b).

A rail line is located in the south and east portions of JBER-Elmendorf. A portion of the tracks on this line, within the right-of-way and owned by the Alaska Railroad Corporation, was relocated to the east to avoid security and safety hazards. All other rail tracks on the base are owned by the Air Force (JBER 2011). The Alaska Railroad Corporation maintains and operates the freight and passenger lines that run to the south of JBER-Elmendorf and bisects the northern portion of JBER-Richardson. These rail lines link Anchorage to ports and other communities throughout south-central and the interior of Alaska. The Denali Star passenger line provides rail service from Anchorage to Talkeetna in the interior and the Coastal Classic passenger line provides service to Seward and other towns on the Kenai Peninsula to the south.

3.11 Socioeconomics

Socioeconomics refers to features or characteristics of the social and economic environment. The socioeconomics assessment typically includes employment, earnings, population, housing, education, and community services and varies according to factors that could be affected by the Proposed Action or an alternative. There is no proposal to change the number of aircraft or personnel at JBER. Runway use alternatives would not affect population density, demand for housing, student enrollment, or the need for public services. This section includes information on population and housing, employment and income, schools, and aircraft traffic. Published data were used to identify the affected environment.

Construction activities associated with an extension of RW 16/34 would affect demand for construction resources within the Municipality of Anchorage and surrounding communities. The Municipality of Anchorage is the primary ROI for the socioeconomics analysis (Figure 3.11-1).

3.11.1 Population and Housing

In 2015, the population for the Municipality of Anchorage was estimated at 298,908, representing a 2.4 percent increase from the 2010 Census population of 291,826 (U.S. Census Bureau 2010, 2015). The Matanuska-Susitna Borough (encompassing the Mat-Su Valley in Figure 3.11-1) had an estimated population of 88,995 in 2010 and 100,178 in 2015, for a 12.6 percent increase. In 2010, the 6.9-square-mile neighborhood of Mountain View (ZIP code areas 99501 and 99508) had a population of 35,857, which represents approximately 12 percent of the total population for the Municipality of Anchorage. The 2014 population estimate of Mountain View was 35,135 persons, representing a 2 percent decrease in total population since 2010 (U.S. Census Bureau 2010, 2015).

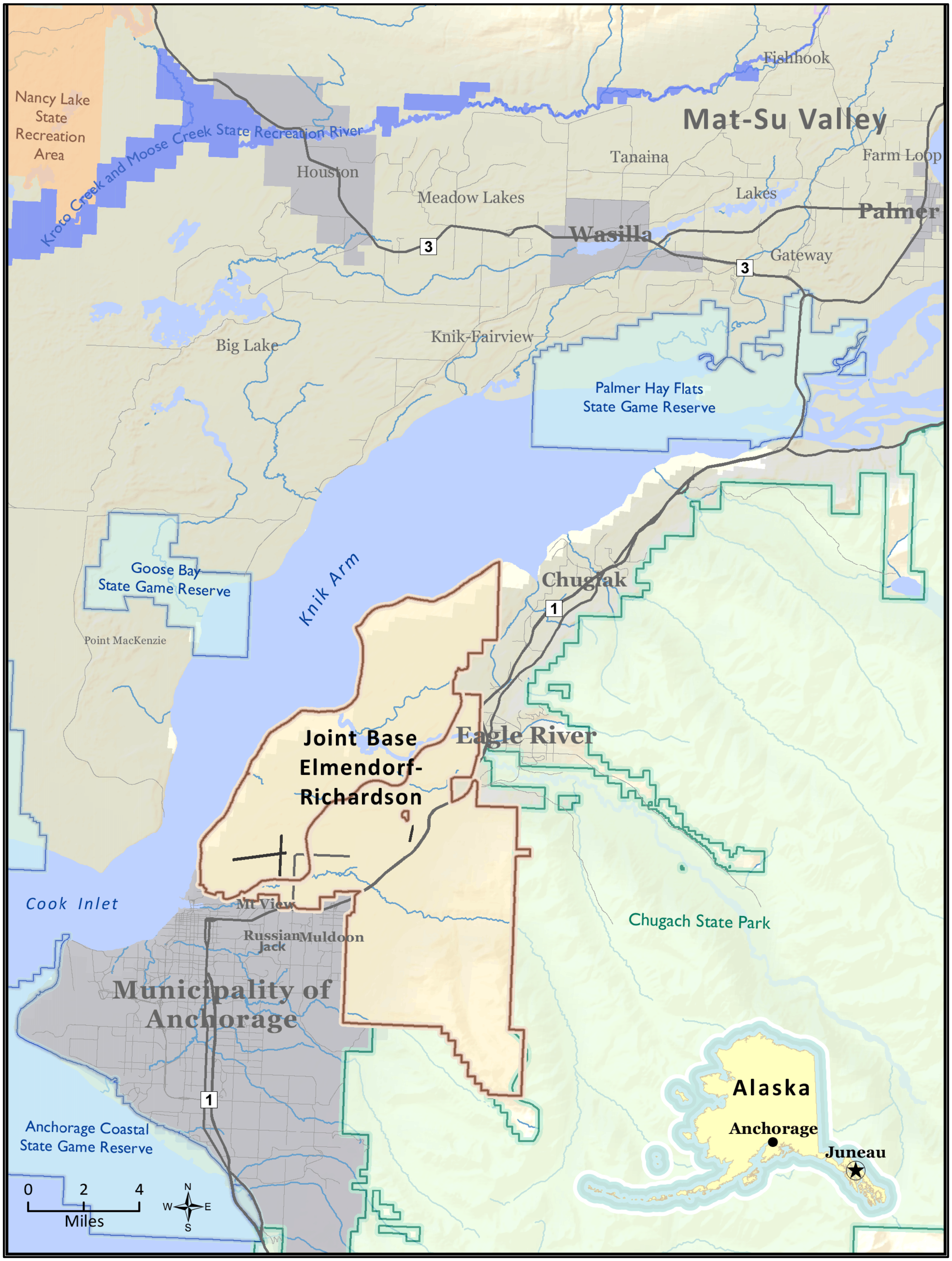

Figure 3.11-1. JBER and the Municipality of Anchorage

The Municipality of Anchorage has 114,332 housing units, an increase of 1.2 percent over 2010 Census estimates. In 2013, approximately 8,070 housing units were vacant, which amounts to a vacancy rate of 7.1 percent (U.S. Census Bureau 2015). Anchorage has a number of seasonally occupied housing units. The 2014 estimates suggest that there are 13,350 housing units in the Mountain View neighborhood, a decrease of 139 housing units since the 2010 estimates of 13,489 housing units (U.S. Census Bureau 2010, 2014a).

Demand for housing in Anchorage slowed by 4.2 percent between 2013 and 2014. Home prices increased between 2010 and 2014. The average single-family residence sold in 2014 for $348,000, up 8.6 percent since 2010 (Brehmer 2015). In 2014, there were 171 new single family homes built in Anchorage, and the average price of a new home was $489,000 (Brehmer 2015). A total of 166 new multifamily housing units were expected to be constructed in 2015 in the Muldoon, Mountain View, and Russian Jack neighborhoods (Anchorage Economic Development Corporation [AEDC] 2015).

3.11.2 Employment and Earnings

Anchorage is the center of commerce for the state of Alaska. The municipality's economy is driven by four major sectors: oil/gas, military, transportation, and tourism. A number of Alaska industries are headquartered in Anchorage, including oil and gas enterprises, finance and real estate, transportation, communications, and government agencies. While Anchorage has diversified its economy, the area is substantially influenced by the oil and gas industry, and sharp changes in the price of crude oil affect the local economy.

JBER is an important contributor to the Anchorage economy through employment of military and civilian personnel and expenditures for goods and services. The 2011 payroll for military, appropriated fund civilians, and nonappropriated fund (NAF) civilians was $1.289 billion. A portion of this payroll consumed regional goods and services. Approximately $115 million worth of base construction also occurred in 2011 (JBER 2011). In early October 2015, a proposed Army troop reduction was put on hold pending a comprehensive review of military requirements in Alaska and the Arctic.

Table 3.11-1 shows the total employment by industry in the Municipality of Anchorage. The most recent complete data available show that the largest employment sectors in the Municipality of Anchorage in 2013 included government (21.2 percent), health care and social services (12.8 percent), and retail trade (9.8 percent).

Military and federal civilian employment accounted for 23,295 jobs in Anchorage, which represented approximately 11.3 percent of total employment (Bureau of Economic Analysis [BEA] 2014). Construction employment comprises approximately 10,926 jobs (5.3 percent) of the total employment in the Municipality of Anchorage (BEA 2014). In 2014, the unemployment rate in the Municipality of Anchorage was 5.1 percent, down from 6.6 percent in 2010 (Bureau of Labor Statistics 2015a). Figure 3.11-2 presents the unemployment rates between 2010 and 2014.

Table 3.11-1. Employment by Industry in the Region of Influence, 2010 to 2013

Industry	2010	2013	Percent Change
Total employment	197,741	205,463	3.9%
Farm employment	0	0	0.0%
Forestry, fishing, related activities, other	1,324	1,176	-11.2%
Mining (oil and gas extraction, mining operations and support)	3,151	4,510	43.1%
Utilities	631	648	2.7%
Construction	10,864	10,926	0.6%
Manufacturing	2,427	2,849	17.4%
Wholesale trade	4,832	5,286	9.4%
Retail trade	20,017	20,113	0.5%
Transportation and warehousing	11,451	11,878	3.7%
Information	4,468	4,198	-6.0%
Finance and insurance	6,512	6,471	-0.6%
Real estate and rental and leasing	7,262	7,238	-0.3%
Professional, scientific, and technical	14,983	15,653	4.5%
Management of companies and enterprises	1,805	2,126	17.8%
Administrative and waste management	9,567	9,909	3.6%
Educational services	2,654	2,651	-0.1%
Health care and social assistance	23,415	26,313	12.4%
Arts, entertainment, and recreation	4,139	4,528	9.4%
Accommodation and food services	14,867	15,883	6.8%
Other services, except public administration	8,795	9,476	7.7%
Government and government enterprises	44,577	43,631	-2.1%
Federal, civilian	9,804	8,750	-10.8%
Military	14,165	14,545	2.7%
State and local	20,608	20,336	-1.3%

Source: BEA 2014

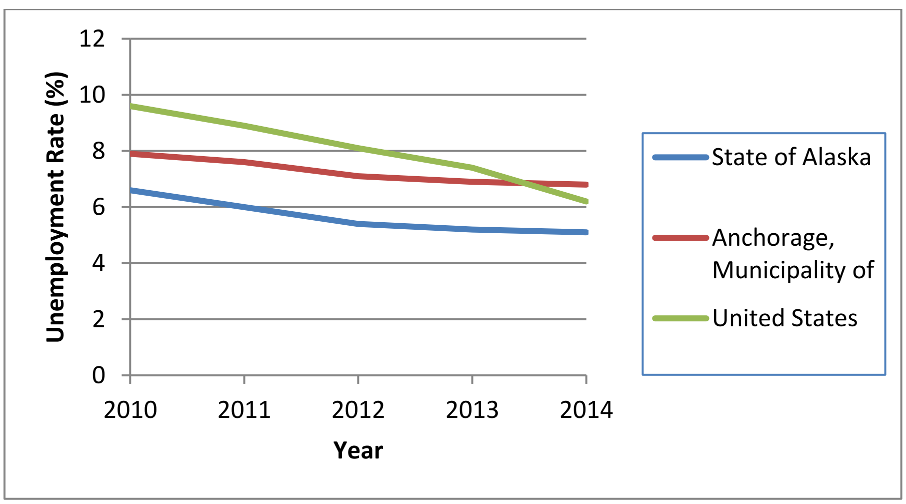

Figure 3.11-2. Unemployment Rates in the Region of Influence, 2010-2014
Source: Bureau of Labor Statistics 2015a, 2015b

The *2015 Economic Forecast for Anchorage*, prepared by the AEDC, predicts that Anchorage employment will remain relatively flat and continue to follow recent trends, with employment reductions in the government, construction, financial, and oil and gas industry (AEDC 2015). Employment reductions in these sectors are anticipated to be offset slightly by increased employment in the retail trade, leisure and hospitality, and healthcare sectors (AEDC 2015).

3.11.3 Schools

The Anchorage School District serves the Municipality of Anchorage and has 28,515 students enrolled throughout the 60 elementary schools, 12 middle schools, 8 high schools, and 17 alternative/charter schools (ASD 2014). Five Anchorage School District elementary schools are located on JBER: Aurora Elementary School, Orion Elementary School, Ursa Major Elementary School, Ursa Minor Elementary School, and Mount Spurr Elementary School. Combined, these schools include kindergarten through sixth grade classes with a total enrollment of 1,905 students for the 2013–2014 school year (ASD 2014). Also located on JBER is Mount Iliamna Elementary, a qualification-only school that is part of the Anchorage School District. Middle school and high school students living on JBER attend one of the middle schools and high schools within the Anchorage municipality. Two elementary schools are located within the Mountain View community: Mountain View Elementary and William Tyson Elementary. These two schools had a total enrollment of 774 students for the 2013–2014 school year (ASD 2014). Section 3.2.1.3, Existing Conditions on Land, identifies existing acoustical conditions for the schools which are potentially affected by changes in noise. The Proposed Action and alternatives have no projected change in student population, and there is no further socioeconomic analysis of impacts to schools.

3.11.4 Anchorage Bowl Airspace

There is potential for the JBER runway use alternatives to change military flights within the Anchorage Bowl (Figure 1.1-1). As described in Section 3.1, there continues to be extensive and ongoing coordination among JBER, the FAA, representatives of the Aircraft Owners and Pilots Association, and other aviation interests to provide a safe, efficient, and reasonably compatible airspace environment for all aviation activities. Civil aviation, including general aviation, provides access to most of Alaska and is an important means of transportation. At the state level in 2012, civil aviation generated $6.847 billion in economic activity, supporting 59,870 jobs with $2.054 billion in earnings (U.S. Department of Transportation and FAA 2015).

3.12 Environmental Justice

Environmental justice is defined by the USEPA 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 (Air Force 2014). Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, is designed to ensure that disproportionately high and adverse human health or environmental effects on citizens in either of these categories are identified and addressed, as appropriate. Additionally, potential health and safety impacts that could disproportionately affect children and elderly persons are considered in this EIS.

3.12.1 Environmental Justice and Other Sensitive Populations

The terms “minority” and “low income” are defined below for purposes of this analysis.

- Minority: The term “minority” for purposes of environmental justice analysis includes those individuals who have identified themselves as having one of the following origins: “Hispanic,” "Asian-American," "Native Hawaiian and Other Pacific Islander," "Black or African-American," "American Indian or Alaska Native," or "Some Other Race" (which does not include "White," "Black or African-American," "American Indian or Alaska Native," "Asian," and "Native Hawaiian or Other Pacific Islander" race categories) (Air Force 2014).

- Low income: The U.S. Census Bureau defines the term "poverty" (also referred to as "low income") as "a set of money income thresholds that vary by family size and composition to determine who is in poverty" (U.S. Census Bureau 2015). A family and each individual in the family is considered in poverty if the total family income is less than the family's threshold or the dollar amount calculated by the U.S. Census to determine poverty status.

Although children and the elderly are not specifically included as environmental justice populations, they are identified as sensitive receptors by the Air Force (Air Force 2014). Children are vulnerable to environmental exposure, and potential health and safety effects to children are considered in this EIS under the guidelines established by EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*. For purposes of this analysis, the term "children" refers to any person age 17 or younger. The USEPA and the Air Force EIAP guidance identify the importance of considering an elderly person as a sensitive receptor to potential environmental impacts. The term "elderly" refers to any person age 65 or older.

Environmental justice analysis focuses on the on-base and off-base minority and low-income populations in the affected area defined as areas exposed to noise above a certain decibel level. The affected area is defined as those areas on-base and off-base that are exposed to noise levels of 65 dB L_{dn} or greater (see Section 3.2.1 and Appendix E for a discussion of 65 dB L_{dn}). For this analysis, calculated noise levels of 65 dB L_{dn} or greater are considered adverse, and the affected area represents on-base and off-base residential areas that experience annual average noise levels of 65 dB L_{dn} or greater. The baseline affected area was mapped using the noise contours from Section 3.2. Section 3.2 provides a description of the method applied to calculate the proportion of the population in the affected area. Air Force environmental policy emphasizes that the environmental justice populations need to have opportunities to provide community input, and for this EIS, the public scoping meeting for community input was conducted with extensive notice in the community of Mountain View (see Section 2.5). In addition, as explained in Section 2.5, the Air Force has conducted government-to-government consultation with Alaska Native tribes, Alaska Native corporations, and Alaska Native groups that might have an interest in JBER runway use alternatives.

3.12.2 Identification of the Region of Influence and the Community of Comparison

Analysis of environmental justice is conducted pursuant to EO 12898 and EO 13045 and follows the guidelines outlined in the 2014 Air Force EIAP (Air Force 2014). The EIAP guidance includes seven steps, with respect to environmental justice impacts analysis. Table 3.12-1 summarizes each step and identifies each EIS section explaining the step.

Table 3.12-1. Environmental Justice Summary

1. National Environmental Policy Act (NEPA) scoping/public involvement (see Section 2.5).
2. Identify potential environmental impacts (see Section 4.2).
3. Identify which impacts (from Step 2) would be considered adverse (see Section 3.12).
4. Identify the affected area and map the footprint of adverse environmental impacts (see Section 4.2).
5. Identify the region of influence (ROI) and collect data for the affected area (see Section 3.12.2).
6. Identify the community of comparison (COC) and collect data for threshold analysis (see Section 3.12.2).
7. Calculate and compare the ROI and the COC data and determine whether there are disproportionate effects (see Section 4.12).

Source: Air Force 2014

The Air Force Environmental Justice guidelines direct that the community of comparison (COC) be the "smallest set of Census data encompassing the ROI for each resource and is used to establish appropriate threshold for comparison analysis" (Air Force 2014). Census tract 020200004 and census tract 020200006 compose the smallest set of census data encompassing the on-base and off-base ROI, respectively, and are used for comparative analysis. Hence, the census tracts make up the COC for environmental justice populations (Table 3.12-2). Minority populations were calculated by taking the total population and subtracting those individuals that identified themselves in the American Community Survey Five-year Estimate, 2010 to 2014, as "Not Hispanic or Latino, White Alone."

Table 3.12-2. Environmental Justice Populations in the Community of Comparison

Region	Total Population	Minority		Low-Income
		Number	Percent	Percent
United States	314,107,084	116,947,592	37.2%	15.60%
State of Alaska	728,300	270,016	37.1%	10.10%
Anchorage, municipality	298,178	116,082	38.9%	8.30%
Census Tract 020200004 (On-base COC)	5,519	2,028	36.7%	5.4%
Census Tract 020200006 (Off-base COC)	7,028	5,567	79.2%	31.9%
Total On- and Off-base COC	12,547	7,595	60.5%	20.2%

Key:
COC = community of comparison
Source: U.S. Census Bureau 2014

The census block groups presented in Table 3.12-3 contain the best available and most current estimates of minority and low-income populations in the affected area and therefore, represent the ROI for minority and low-income populations. The most recent American Community Survey (ACS) 2010 to 2014 estimate was used to determine the percentage of minority and low-income individuals in the census block groups. Currently, there are no off-base residential areas within the 65 dB L_{dn} noise contour associated with baseline flight operations at JBER (Section 3.2; Table 3.12-3). There is a total of 1,424 people residing on-base that are affected by noise levels of 65 dB L_{dn} or greater under baseline conditions. Of those, 36.7 percent are identified as minority and 5.5 percent are identified as low-income. There are no people residing in areas with noise levels of 75 dB L_{dn} or greater.

Disproportionate impacts apply to minority and low income populations (Air Force 2014). Disproportionate impacts are determined by comparing the percent of minority and low-income populations in the appropriate ROI with the corresponding percent in the appropriate COC. If the ROI percent is less than the COC percent, then there would be no disproportionate impacts. If, however, the ROI percent is greater than or equal to the COC percent, disproportionate effects could be present and require mitigation (Air Force 2014).

Table 3.12-3. Environmental Justice Populations in the Affected Area Under Baseline or No Action Conditions

Census Block Group (GEOID)	Total Population in the Affected Area	Total Minority		Total Low-Income		Population in the Affected Area									
						65–69 dB L_{dn}					70–74 dB L_{dn}				
		(#)	(%)	(#)	(%)	Population	Minority		Low-Income		Population	Minority		Low-Income	
							(#)	(%)	(#)	(%)		(#)	(%)	(#)	(%)
On-Base															
020200004001	1,424	523	36.7%	78	5.5%	1,225	450	36.7%	67	5.5%	199	73	36.7%	11	5.5%
Off-Base															
020200006003	0	0	0.0%	0	0.0%	0	0	0.0%	0	0.0%	0	0	0.0%	0	0.0%
020200006004	0	0	0.0%	0	0.0%	0	0	0.0%	0	0.0%	0	0	0.0%	0	0.0%
020200006005	0	0	0.0%	0	0.0%	0	0	0.0%	0	0.0%	0	0	0.0%	0	0.0%
Total ROI	1,424	523	36.7%	78	5.5%	1,225	450	36.7%	67	5.5%	199	73	36.6%	11	5.5%

Key:
COC = community of comparison
dB = decibel
L_{dn} = day-night average sound level
ROI = region of influence
Source: U.S. Census Bureau 2014

Figure 3.12-1 overlays the ROI and COC for minority populations and low-income populations on the affected area as defined by calculated noise contours under baseline conditions (Table 3.12-3).

3.12.3 Other Sensitive Populations in the Affected Area

Table 3.12-4 presents the children and elderly population data comparable to that provided for the environmental justice populations in the COC. The most recent American Community Survey (ACS) five-year estimate (2010 to 2014) was used as the source of data collection for youth (children under 18) and elderly (age 65 or over).

Figure 3.12-1 overlays the ROI and COC for youth and elderly populations on the affected area as defined by calculated noise contours under baseline conditions (Table 3.12-5).

Table 3.12-4. Children and Elderly Populations in the Community of Comparison

Region	Total Population	Children (under 18)		Elderly (over 65)	
		Number	Percent	Number	Percent
United States	314,107,084	73,777,658	23.5%	43,177,961	13.7%
State of Alaska	728,300	188,090	25.8%	62,241	8.5%
Anchorage, municipality	298,178	75,602	25.4%	24,125	8.1%
Census Tract 020200004 (On-base COC)	5,519	2,001	36.3%	13	0.2%
Census Tract 020200006 (Off-base COC)	7,028	2,304	32.8%	487	6.9%
Total On- and Off-base COC	12,547	4,305	34.3%	500	4.0%

Key:
COC = community of comparison
ROI = region of influence
Source: U.S. Census Bureau 2014

Table 3.12-5. Children and Elderly Populations in the Affected Area Under Baseline or No Action Conditions

Census Block Group (GEOID)	Total Population in the Affected Area	Total Youth		Total Elderly		Population in the Affected Area									
						65–69 dB L_{dn}					70–74 dB L_{dn}				
						Population	Youth		Elderly		Population	Youth		Elderly	
		(#)	(%)	(#)	(%)		(#)	(%)	(#)	(%)		(#)	(%)	(#)	(%)
On-Base															
020200004001	1,424	516	36.2%	3	0.2%	1,225	450	36.7%	3	0.2%	199	72	36.2%	0	0.0%
Off-Base															
020200006003	0	0	0.0%	0	0.0%	0	0	0.0%	0	0.0%	0	0	0.0%	0	0.0%
020200006004	0	0	0.0%	0	0.0%	0	0	0.0%	0	0.0%	0	0	0.0%	0	0.0%
020200006005	0	0	0.0%	0	0.0%	0	0	0.0%	0	0.0%	0	0	0.0%	0	0.0%
Total (ROI)	1,424	516	36.2%	3	0.2%	1,225	450	36.7%	3	0.2%	199	72	36.2%	0	0.0%

Key:
COC = community of comparison
dB = decibel
L_{dn} = day-night average sound level
ROI = region of influence
Source: U.S. Census Bureau 2014

This environmental justice existing condition discussion includes a discussion of the off-base school, Mountain View Elementary and the on-base school, Mount Spurr Elementary, as shown in Figure 3.12-2. These schools are currently exposed to noise levels of 65 dB L_{dn} or greater (Section 3.2). During the 2015–2016 school year, Mountain View Elementary in Anchorage had a total enrollment of 373 students in pre-kindergarten through fifth grade (ASD 2016). All of the students at Mountain View Elementary are considered economically disadvantaged (ASD 2016). During the 2015–2016 school year, Mount Spurr Elementary, located on JBER, had a total enrollment of 301 students in pre-kindergarten through sixth grade (ASD 2016). Mountain View Elementary School was upgraded during the 2015 construction season, and the upgrades included weather and acoustic improvements to insulation and windows; additional upgrades were completed during 2016 (ASD 2014a and ASD 2016a). Mount Spurr and other on-base schools were built to meet federal on-base Arctic conditions with insulation and windows. Table 3.2-3 calculates an equivalent exterior noise level during a school day, and, under baseline conditions, Mount Iliamna and William Tyson Elementary Schools experience exterior $L_{eq\text{-}8hr}$ noise levels of 63.3 dB to 60.1 dB respectively, and Orion Elementary School experiences exterior $L_{eq\text{-}8hr}$ noise levels of 62.8 dB.

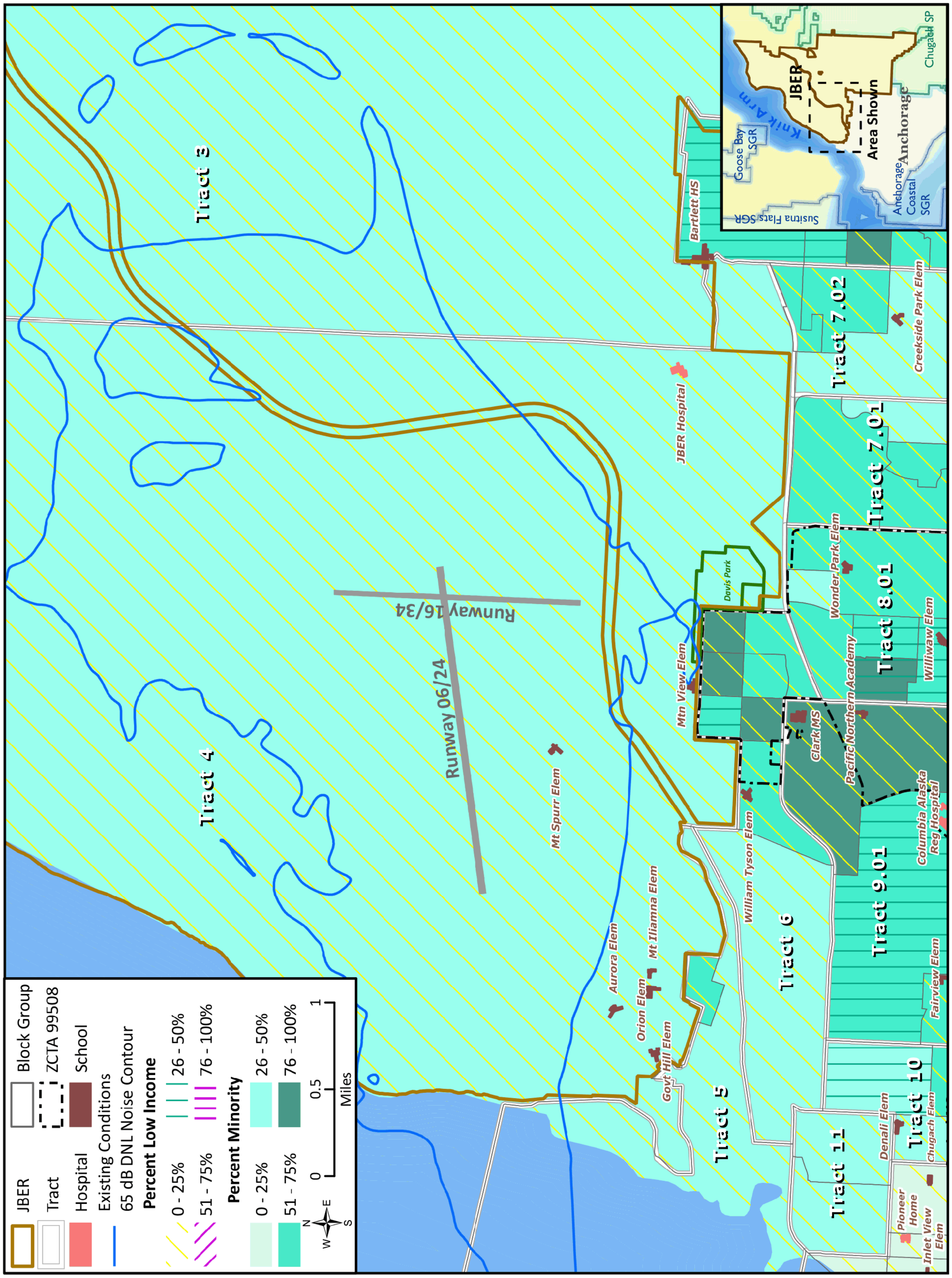

Figure 3.12-1. Minority and Low-income Populations South of JBER and Calculated Noise Contours

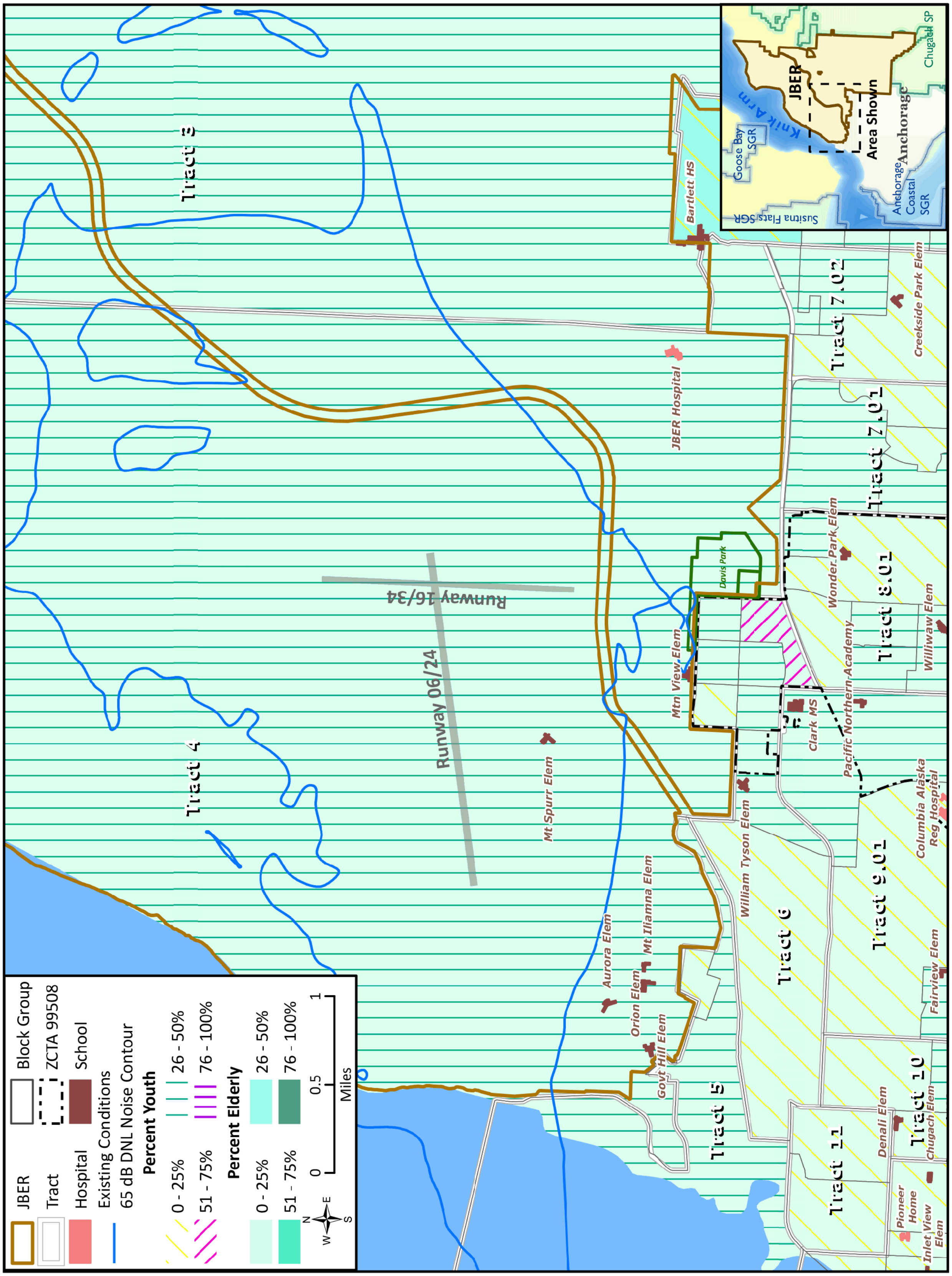

Figure 3.12-2. Youth and Elderly Populations South of JBER and Calculated Noise Contours

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4.0 ENVIRONMENTAL CONSEQUENCES

This chapter overlays the Proposed Action and alternatives upon the existing conditions described in Chapter 3 for each relevant environmental resource. As in Chapter 3, the expected geographic scope of potential environmental consequences is identified as the ROI. Resource definitions, as well as the regulatory setting and methodology of analysis, are found in Appendix B. Cumulative effects are discussed in Chapter 5.

For the purpose of this EIS, the term JBER refers to the entire combined base. The term JBER-Elmendorf refers to the historic Elmendorf AFB, which is primarily affected by proposed F-22 operational efficiency improvements at JBER. JBER- Richardson refers to the historic Fort Richardson portion of JBER.

4.1 Airspace Management and Use

There are no additional F-22 operations proposed for this action. Existing FAA procedures are in place for departures and arrivals on all JBER runways, and there is no proposed change in the boundaries of JBER Class D airspace as part of any F-22 alternative runway use. The runway use alternatives were examined relative to the potential effects that different F-22 use of the runways could have on civil and military flight activities within the Anchorage Bowl airspace as described in Section 3.1. As noted in Section 2.2.3, F-22s typically depart from RW 06, RW 24, and RW 34 to the north while the majority of arrivals, except for times of runway maintenance and certain wind conditions, are to RW 06. Terrain and proximity to other airspace uses add complexity to arrivals on other runways. This Airspace Management analysis examines the arrival and departure routes that F-22s would mainly use under each runway alternative, the Anchorage terminal airspace areas they would transit, and the potential effects they may have on other IFR and VFR air traffic. Table 2.4-1 provides a representative distribution of F-22 operations for each runway use alternative.

The FAA has identified a desire for a more in-depth study of precision approach and missed approach procedures for establishment of precision approach capabilities on alternatives that involve an extension of RW 16/34. The FAA, in conjunction with the 3 WG, would assess ATC procedures and practices currently used by Anchorage radar approach control to safely and effectively manage all IFR air traffic within their delegated airspace. As with any other proposed or planned actions that may affect airspace uses within this ROI, JBER and/or FAA representatives would address a precision approach on an extended RW 16/34 with other aviation interests through the Alaska Civil/Military Aviation Council and other available means. The establishment of a precision approach procedure for IFR arrival on an extended RW 16 is identified as a potential future independent project in Chapter 5, Cumulative Impacts. Any such actions would also be communicated through the JBER Midair Collision Avoidance Pamphlet, the Special Use Airspace Information Service, and other such initiatives, as appropriate, to enhance flight safety interests of all concerned.

4.1.1 Alternative A: RW 34 for Departure; RW 06 Arrival (Proposed Action)

Under Alternative A, F-22 aircraft would depart primarily on RW 34 northbound to the training airspace areas and return to JBER from the west/southwest for landing on RW 06 (see Section 2.4.1 and Table 2.4-1). The RW 34 departure routing to the north is sufficiently clear of the higher density Anchorage Class C airspace and the Lake Hood and Merrill segments so as not to affect that traffic.

RW 34 departures would climb over lower density air traffic around the Sixmile Lake and Knik Arm areas where VFR aircraft operate below 600 feet MSL while in the Elmendorf segment.

As visual weather conditions permit, F-22s returning from the training airspace would normally fly a standard arrival or visual approach, as approved by ATC, that more directly routes an aircraft to the JBER Class D airspace for landing on RW 06 or other tower-assigned runway. For training, traffic, or as weather conditions may require, ATC would vector F-22 arrivals to an initial point where they would fly a published ILS or TACAN instrument approach to RW 06. As discussed in Section 3.1.2 and illustrated in Figure 3.1-1, ILS procedures approach RW 06 from the west over the Cook Inlet, through the Class C and upper Lake Hood and Merrill segments. As necessary, once within the JBER Class D airspace, aircraft flying these approaches may circle north to RW 24 or east to RW 34 for landing. The missed approaches for these instrument procedures have aircraft turning to the north within the airfield environment where the aircraft may either be rerouted for another approach or remain in the Class D airspace for landing.

RW 06 F-22 arrivals under Alternative A addresses FAA ODO guidance while continuing to require ATC attention to integrating these arrivals with other IFR traffic in the affected Class C, Lake Hood, and Merrill airspace segments (see Figure 1.1-1, Figure 2.2-3, and Figure 3.1-1). Civil and military flight operations vary with seasons at JBER, Anchorage International, Merrill Field, and other higher use areas. As discussed in Section 3.1.2, F-22 quarterly operations are approximately 24 percent of total annual operations in January through March, 34 percent in April through June, 23 percent in July through September, and 19 percent in October through December. Both the Anchorage International and Merrill Field experience lower operations in December through February and higher use in May through September. While these high/low trends are relatively consistent for all three airfields, any special events/activities that increase military or civilian flight operations during those typical higher use months may complicate use of RW 06 as the primary arrival runway. The RW 34 departures during any such periods would not affect the higher density airspace segments and not be expected to affect the lower altitude Sixmile/Knik Arm traffic.

Alternative A increases F-22 runway use efficiency, adheres to FAA ODO policy, and has the additional benefit of permitting cross-runway operations, which would expedite both arrivals and departures and reduce hold times for departing aircraft that are waiting for arriving aircraft to completely exit the arrival runway. Increased use of RW 34 for F-22 departures could decrease airspace congestion in the Anchorage Bowl associated with JBER departures and would partially address public/agency concerns regarding safety in the Anchorage Bowl airspace. Alternative A continues to have most F-22 arrival traffic on RW 06 through the higher density segments of the Anchorage Bowl airspace. This continued heavy use of RW 06 would not provide the most effective and efficient means for integrating F-22 arrivals with other airspace users.

4.1.2 Alternative B: RW 34 for Departure; RW 06 Arrival; RW 16/34 Extension

Alternative B has RW 16/34 being extended 2,500 feet to the north to make RW 16/34 a 10,000-foot runway. Alternative B would use the extended RW 34 as the primary departure runway and would continue to use RW 06 as the primary arrival runway as described for Alternative A. Aircraft arrival and departure route options and the potential effects they may have on other Anchorage Bowl airspace uses are the same as described for Alternative A.

Although Alternative B would not normally use RW 16 for arrival, the relocated RW 16 threshold could involve adjustment to the existing VFR approach and would require adjustment to the descent profile currently established for the TACAN RW 16 approach. The extent of such modification and how it may affect an ILS approach and missed approach altitudes/routings would be examined through the FAA precision approach study noted in Section 4.1.

Alternative B increases F-22 runway use efficiency, adheres to FAA ODO guidance, and has the additional benefit of permitting JBER cross runway operations which would expedite both arrivals and departures and reduce hold times for departing aircraft awaiting arriving aircraft to exit the arrival runway. As with Alternative A, increased use of RW 34 for F-22 departures could decrease airspace congestion in the Anchorage Bowl normally associated with JBER departures and would partially address public/agency concerns regarding safety in the Anchorage Bowl airspace.

Alternative B continues with most F-22 arrival traffic on RW 06 approach through the higher density segments of the Anchorage Bowl airspace complex. This continued heavy use of RW 06 would not provide the most effective and efficient means for integrating F-22 arrivals with other airspace users.

4.1.3 Alternative C: RW 34 for Departure; RW 16 Arrival; RW 16/34 Extension

Alternative C would extend RW 16/34, as noted for Alternative B, with F-22 departures primarily on the extended RW 34 and arrivals on the extended RW 16. Arrival and departure routes for F-22s would primarily be through the JBER Class D airspace segment. The primary use of RW 16/34 for both F-22 arrivals and departures would avoid the higher density Anchorage Bowl airspace segments, which would decrease airspace congestion in the Anchorage Bowl and partially address public/agency concerns regarding safety in the Anchorage Bowl airspace. There would be an increase in flights over the Sixmile Lake and Knik Arm areas. Given the lower general aviation VFR altitudes following the Knik Arm and crossing Sixmile Lake, within the Elmendorf airspace segment, general aviation would normally be operating below the higher altitudes flown by F-22s when departing or arriving VFR through this airspace. This would require continued vigilance by both military and civilian pilots to ensure they remain clear of each other.

An ILS precision approach capability to RW 16 would enhance use of RW 16. The existing RW 16 TACAN missed approach has an aircraft climbing in a left turn over the R-2203A/B restricted areas where it may be redirected by ATC when necessary to avoid active restricted airspace. VFR missed approaches remain within the Class D airspace and would not affect other air traffic. Extending RW 16/34 with a modified TACAN approach and any added ILS would need to consider the missed approach routings and their avoidance of the restricted areas and the Merrill segment. The extent of such modification and how it may affect an ILS approach and missed approach altitudes/routings would be examined through the FAA precision approach study noted in Section 4.1.

Until procedures were in place for a precision approach on RW 16, F-22s would continue to use the TACAN or the RW 06 precision approach for training and/or low visibility conditions. As explained for Alternative A, other runway options would be used for arrivals/departures as air traffic and weather conditions may dictate.

Use of an extended RW 34 for departure and RW 16 for arrival would not be consistent with FAA ODO directions and would require active management of each runway so as to avoid simultaneous ODO. The coincidental use of RW 16/34 for both arrivals and departures would not address FAA ODO policy although continuing management of the runways by JBER tower could continue to partially address ODO issues.

Alternative C could function without an FAA precision approach to an extended RW 16 although establishment of procedures for such an approach would improve the flexibility and use of RW 16 and reduce military traffic in other portions of the Alaska Bowl. Alternative C increases JBER runway use efficiency while appreciably reducing F-22 operations within the higher use Anchorage Bowl airspace.

4.1.4 Alternative D: RW 06 for Departure and Arrival

Under Alternative D, RW 06 would be primarily used for both F-22 departures and arrivals. F-22 aircraft would taxi over 2 miles and hold for arriving aircraft on RW 06. Departures would take off to the east and turn north within the Class D airspace or western edge of the Bryant/R-2203C airspace where they would be clear of the more congested areas. These departures would climb to higher altitudes while overflying the Sixmile Lake and Knik Arm areas where they would not conflict with the lower altitudes at which VFR aircraft operate within the Class D airspace.

Alternative D would continue to use RW 06 for F-22 arrivals. F-22 arrivals on RW 06 would be as described for Alternative A. Alternative D partially addresses FAA ODO policy while continuing to require ATC attention to integrating military arrivals with other IFR traffic in the affected Class C, Lake Hood, and Merrill airspace segments (see Figure 1.1-1, Figure 2.2-3, and Figure 3.1-1). F-22 arrivals to RW 06 would fly a visual approach directly towards the airfield or be routed to the west for an ILS or TACAN approach through the Class C airspace and the Lake Hood and Merrill Field segments. Aircraft executing an ILS or TACAN missed approach to this runway would turn left to the north within the JBER Class D and vectored for another IFR approach or remain in a VFR pattern for landing.

Alternative D continuing use of RW 06 for F-22 arrivals and use of RW 06 for departures would address FAA ODO policy. RW 06 arrivals would continue congestion in high density Anchorage Bowl, and departures on RW 06 reduce congestion, with some improvement in airspace safety.

4.1.5 Alternative E: RW 24 for Departure; RW 06 Arrival

Alternative E would have F-22s departing primarily on RW 24 and arriving on RW 06. Use of RW 24 for departure and RW 06 for arrival would not be consistent with FAA ODO directives and would continue to require JBER tower management of RW 06/24 operations to address to FAA ODO policy. F-22 departures on RW 24 would turn northbound while remaining within the Elmendorf airspace segment so as to be clear of the adjacent Class C and Merrill Field airspace segments. As with other northern departure routes overflying the Sixmile Lake and Knik Arm areas, pilot observance of the altitude limitations help ensure the safety of both military and VFR aircraft operating within this area. Visual or instrument F-22 arrivals to RW 06 and their potential effects on IFR and VFR air traffic through the higher use areas would be as described for Alternative A for arrivals to RW 06.

Alternative E continuing use of RW 06 for F-22 arrivals and use of RW 06 for departures would not address FAA ODO policy and would not result in changes to military operations within the Anchorage Bowl.

4.1.6 Alternative F: RW 24 for Departure; RW 16 Arrival; RW 16/34 Extension

Alternative F would extend RW 16/34 as discussed for Alternative B with F-22s departing primarily on RW 24 to the west and turning north towards the training areas. Runway 24 departures would be as discussed for Alternative E with the potential effects primarily being on VFR aircraft operating around the Sixmile and Knik Arm as the F-22 departures are climbing northbound over those VFR traffic areas.

Alternative F arrivals would primarily be on RW 16 directly from the most commonly used training airspace via a standard arrival route or visual approach or a TACAN approach as approved by ATC to enter JBER Class D airspace. Once within the Class D airspace, a pilot would be directed to RW 16 or circle within the Class D airspace to another assigned runway. As described for Alternative C, until procedures were in place for precision approach on RW 16, F-22s would continue to use the existing TACAN or RW 06 precision approach for training and/or low visibility conditions.

Alternative F would substantially reduce military traffic arriving on RW 06 through the more congested Anchorage Bowl airspace segments while increasing flights over the Sixmile Lake and Knik Arm areas. Military and VFR general aviation aircraft would continue to follow current practices and altitude limitations that provide for safety of flight within those areas. Some improvement in Anchorage Bowl airspace safety is anticipated with RW 24 departures turning to north within JBER Class D airspace and F-22s arriving on RW 16 from the north.

Alternative F provides for runway use efficiency, adheres to FAA ODO policy, and has the additional benefit of permitting JBER cross runway operations, which would expedite both arrivals and departures and reduce hold times for departing aircraft that are waiting for arriving aircraft to completely exit the arrival runway.

4.1.7 No Action Alternative

The No Action Alternative limits F-22 annual departure operations to an approximate 75 percent use of RW 06/24 and 25 percent use of RW 16/34 as was previously assessed in the F-22 Plus-Up EA/FONSI. The No Action Alternative continues to use primarily RW 06 for arrivals, requiring ATC's attention to integrate such arrivals with other IFR traffic in the affected Class C, Lake Hood, and Merrill airspace segments as described for Alternative A (see Figure 1.1-1, Figure 2.2-3, and Figure 3.1-1). The No Action Alternative does not affect the common VFR/IFR routes discussed in Section 3.1, which are flown through the Anchorage terminal airspace sectors/segments while en route to/from the training areas. The No Action Alternative departures on RW 24 are restricted by FAA ODO requirements to emergency, weather, and/or operational necessary conditions. The No Action Alternative requires continued JBER tower management of RW 06/24 to partially address FAA ODO policy.

The No Action Alternative does not reduce military operations in the Anchorage Bowl, does not provide for JBER flexibility in runway use, and does not use alternative runways to address FAA ODO guidance. Airspace management impacts would not change from existing conditions.

4.1.8 Conclusion

The environmental consequences and potential mitigation measures for airspace management and use are summarized in this section.

Environmental Consequences Summary

There is no proposed change in JBER Class D airspace or in any other Anchorage Bowl airspace. Alternative D and Alternative E would continue use of RW 06/24 for F-22 arrivals and departures and would not result in impacts to airspace management and use.

Alternative A, Alternative B, Alternative C, and Alternative F redirect F-22 flight operations to RW 16/34 and have the potential to reduce delays and/or potential interactions between military and civil aircraft in the majority of the Anchorage Bowl. Increased use of an extended RW 16/34 under Alternative B, C, or F has the potential to increase F-22 overflights of the Knik Arm and Sixmile Lake at a lower elevation than current overflights.

Mitigation

Mitigations are identified that can be applied to avoid, minimize, rectify, reduce, or compensate the effect for significant impacts (see Appendix B.1). The Air Force would continue to closely coordinate with FAA and civil aircraft operators to mitigate for potential impacts of the increased frequency of lower overflights of the Knik Arm and Sixmile Lake under Alternative B, C, or F.

4.2 Acoustic Environment

Changes in the acoustic environment would result from F-22 runway use patterns under the Proposed Action and alternatives (see Section 2.4). Alternatives that include an extension of RW 16/34 would generate noise during construction activities. The operations of aircraft other than the F-22 would not change under any alternative. Likewise, noise generated by aircraft other than the F-22 would not change relative to baseline conditions under any alternative. However, operations of all aircraft that operate at JBER, including based aircraft and transient aircraft, are included in the noise modeling and analysis.

Noise has the potential to affect several resource areas. This section will discuss general effects of existing noise levels on humans, including annoyance and land use compatibility, as well as a brief discussion of noise impacts to biological resources. Noise impacts are also discussed in Section 4.7, Biological Resources, Section 4.8, Cultural Resources, Section 4.9, Land Use and Recreation, Section 4.11, Socioeconomics, and Section 4.12, Environmental Justice.

The U.S. Air Force has not defined universally-applicable thresholds above which noise impacts are to be considered significant in NEPA analysis. Instead, significance is assessed in the context of location-specific sensitivities with the intensity of impacts being measured against accepted criteria where applicable. Noise impacts would be more likely to be considered significant where:

- Noise-sensitive locations would experience substantial increases in noise level (e.g., increases of 3 dB L_{dn} or greater);
- A large quantity of land would become exposed to noise levels at which the current land use is considered incompatible (e.g., a large numbers of residences newly exposed to noise levels exceeding 65 dB L_{dn});
- Classrooms would be newly exposed to noise levels exceeding established criteria;
- The risk of sleep disturbance would increase substantially;
- Unprotected populations would be exposed to noise levels at which noise-induced hearing loss risk is a concern;
- Noise levels would increase substantially in areas where quiet conditions are a notable attribute (e.g., the Matanuska-Susitna Valley); and
- This risk of injuring/harassing protected species would increase to levels considered unacceptable.

Noise impacts are quantified in Sections 4.2.1 through 4.2.7, and the expected perceived significance of the impacts is assessed in Section 4.2.8. It is worth noting that noise levels and the number of disruptive noise events decrease under certain alternatives at certain locations.

4.2.1 Alternative A: RW 34 for Departure; RW 06 Arrival (Proposed Action)

Under Alternative A, RW 34 would be used more frequently for F-22 departure operations than it is used under the No Action Alternative (see Table 2.4-1). The number of sorties flown annually by the 3 WG would be the same for any alternative.

Noise Levels on Land

The procedures used by 3 WG aircraft would not change under Alternative A. Concentration of approximately 76 percent of total annual F-22 departure operations on RW 34 would result in increased frequency of loud noise events in areas south of the runway (i.e., behind departing aircraft). Closures of RW 16/34 due to heavy snowfall would drive the use of the main runway during winter months. F-22 aircraft would continue to conduct afterburner departures on an infrequent basis.

Annoyance and Land Use Compatibility

As discussed in Section 3.2.1, Noise Levels on Land, annoyance is often triggered when noise interferes with some activity, such as conversation, watching television, or sleeping. Because annoyance may occur after several interference events, annoyance acts as a summary of adverse impacts. In locations exposed to greater than 65 dB L_{dn}, disturbing noise events are experienced relatively frequently, and noise-sensitive land uses (e.g., residences) are not considered to be compatible.

Noise levels (L_{dn}) were calculated using the same methods used for existing conditions as described in Section 3.2, and resulting noise contours are shown in Figure 4.2-1. As shown in Table 4.2-1, the number of off-installation land and water acres exposed to noise levels greater than 65 dB L_{dn} would decrease from 995 to 878 under Alternative A, over-land acres would increase from 107 to 116, and over-water acres would decrease from 888 to 762. Off-installation areas affected by noise levels greater than 65 dB L_{dn} would include small portions of the neighborhood of Mountain View, which is located immediately south of Mountain View Elementary School (Figure 4.2-1). Off-base populations were estimated by proportioning the area of the census blocks that are residential and affected by noise contours. Total off-installation population affected would increase from approximately 0 to approximately 424 under Alternative A (Table 4.2-2). On-base population affected would decrease from 1,424 to 824 (Table 4.2-3). As discussed in Section 3.2.1, social surveys have found that at 65 dB L_{dn}, about 12 percent of the population can be expected to be highly annoyed by noise, while at 70 and 75 dB L_{dn}, 22 percent and 37 percent, respectively, are annoyed (Schultz 1978, Finegold et al. 1994).

Table 4.2-1. Land and Water Area Exposed to Noise Levels of 65 dB L_{dn} or Greater Under the No Action Alternative, the Proposed Action (Alternative A), and Alternatives B, C, D, E, and F

Alternative	Noise Level (dB L_{dn})	Area (in Acres) Exposed to Indicated Noise Levels					
		65–69	70–74	75–79	80–84	≥85	TOTAL
No Action	JBER	3,583	1,598	988	510	517	**7,196**
	Off-installation land	85	17	5	0	0	**107**
	Off-installation water	748	140	0	0	0	**888**
	Total	4,416	1,755	993	510	517	**8,191**
A (Proposed Action)	JBER	3,819	1,659	1,016	579	499	**7,572**
	Off-installation land	84	26	6	0	0	**116**
	Off-installation water	629	133	0	0	0	**762**
	Total	4,532	1,818	1,022	579	499	**8,450**
B	JBER	3,816	1,811	1,057	513	485	**7,682**
	Off-installation land	68	16	5	0	0	**89**
	Off-installation water	771	198	0	0	0	**969**
	Total	4,655	2,025	1,062	513	485	**8,740**
C	JBER	4,420	1,959	1,022	519	483	**8,403**
	Off-installation land	88	20	5	0	0	**113**
	Off-installation water	683	49	0	0	0	**732**
	Total	5,191	2,028	1,027	519	483	**9,248**
D	JBER	3,539	1,537	969	515	462	**7,022**
	Off-installation land	94	23	6	0	0	**123**
	Off-installation water	646	136	0	0	0	**782**
	Total	4,279	1,696	975	515	462	**7,927**
E	JBER	3,391	1,545	985	454	451	**6,826**
	Off-installation land	79	17	4	0	0	**100**
	Off-installation water	1,100	155	0	0	0	**1,255**
	Total	4,570	1,717	989	454	451	**8,181**
F	JBER	5,749	1,889	993	454	451	**9,536**
	Off-installation land	87	23	5	0	0	**115**
	Off-installation water	967	69	0	0	0	**1,036**
	Total	6,803	1,981	998	454	451	**10,687**

Key:
dB = decibels, A-weighted
L_{dn} = day-night average sound level

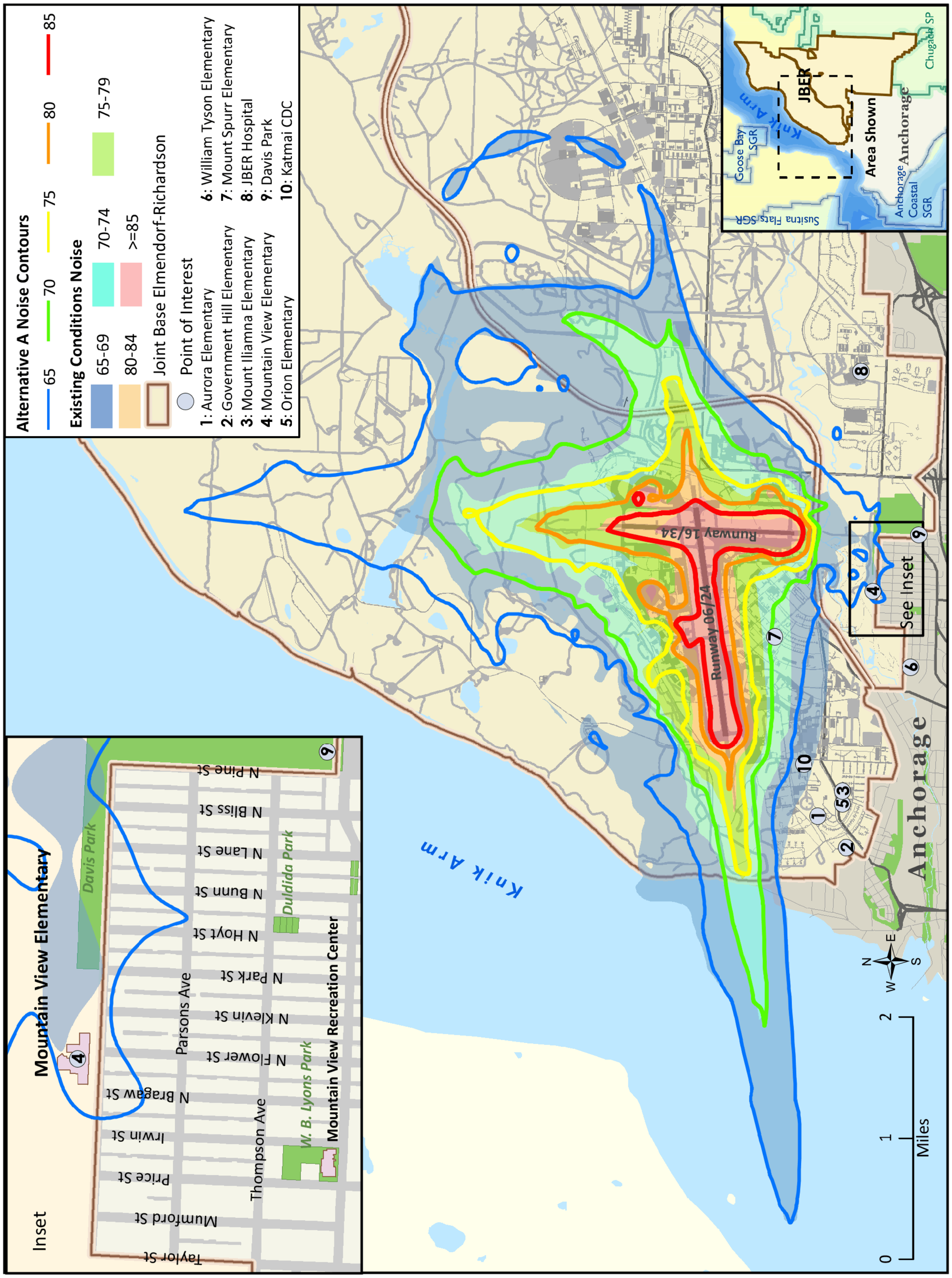

Figure 4.2-1. Noise Contours Under Existing Conditions and Alternative A (Proposed Action)

Table 4.2-2. Estimated Off-Installation Population Exposed to Noise Levels of 65 dB L_{dn} or Greater Under the No Action Alternative, the Proposed Action (Alternative A), and Alternatives B, C, D, E, and F

Noise Level (dB L_{dn})	Off-Installation Population (Census 2010)						
	No Action	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E	Alternative F
65–69	0	424	0	0	0	0	0
70–74	0	0	0	0	0	0	0
75–79	0	0	0	0	0	0	0
80–84	0	0	0	0	0	0	0
≥85	0	0	0	0	0	0	0
Total	0	424	0	0	0	0	0

Key:
dB = decibels, A-weighted
L_{dn} = day-night average sound level

Table 4.2-3. Estimated On-Installation Population Exposed to Noise Levels of 65 dB L_{dn} or Greater Under the No Action Alternative, the Proposed Action (Alternative A), and Alternatives B, C, D, E, and F

Noise Level (dB L_{dn})	On-Installation Population (Census 2010)						
	No Action	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E	Alternative F
65–69	1,225	824	775	915	933	1,271	1,581
70–74	199	0	0	0	260	447	374
75–79	0	0	0	0	0	0	0
80–84	0	0	0	0	0	0	0
≥85	0	0	0	0	0	0	0
Total	**1,424**	**824**	**775**	**915**	**1,193**	**1,718**	**1,955**

Key:
dB = decibels, A-weighted
L_{dn} = day-night average sound level

Several locations were selected for specific point calculation of L_{dn} under the alternatives. The noise level at these locations would be similar to noise levels in adjacent areas. For example, the residential area near the JBER hospital would be exposed to noise levels similar to those experienced at the hospital. The locations studied are not intended to include all noise-sensitive locations within the ROI.

As shown in Table 4.2-4, L_{dn} at the Mountain View Elementary School would increase by 2 dB and less than 1 dB at Davis Park under Alternative A. All other noise-sensitive locations studied show a decrease or no change in noise levels. Under Alternative A, noise levels at Mountain View Elementary School and Mount Spurr Elementary School exceed 65 dB L_{dn}, a noise level at which schools are not considered to be a compatible land use. If special noise attenuation measures are not already implemented, installation of noise attenuation could be considered to reduce noise levels. As is noted in Table 4.2-4, schools are primarily used during the school year (August to May) while other noise-sensitive locations (e.g., hospital, child development center, and Davis Park) are active year round. The operations tempo at JBER is typically higher during warmer months when weather is less likely to delay mission execution and is less concentrated in several of the months in which school is in session. Large training exercises are normally scheduled between April and October for this reason. The number of large training events occurring per year as well as the number and types of aircraft involved in the training events is variable. Training events and the ongoing seasonal pattern of operations would not change as a result of any of the alternatives.

Noise is one of the major factors used in determining appropriate land uses, since elevated sound levels are incompatible with activities commonly associated with certain land uses. Residences, which are commonly used for noise-sensitive activities such as conversation and sleeping, are not considered by the DoD to be compatible with noise levels exceeding 65 dB L_{dn} unless measures are taken to increase outdoor-to-indoor noise level reduction. A complete list of DoD recommendations for compatibility of noise with various land uses can be found in AFI 32-7063. JBER land area affected by noise levels greater than 65 dB L_{dn} would decrease by 55 acres, from 130 to 75 acres residential land; decrease by 43, from 241 to 198 acres for community support land; and decrease by 124, from 1,840 to 1,716 acres for administrative/industrial land use. Other land uses on JBER, such as open land, range areas, and airfield pavements, are not as noise-sensitive. Under Alternative A, the number of on-base residential structures exposed to noise greater than 65 dB L_{dn} would decrease by 21, from 115 to 94. Residents affected by noise levels exceeding 65 dB L_{dn} would be more likely to be annoyed by aircraft noise. However, noise attenuation provided by the residences reduces the noise experienced by residents while indoors. Operations during the late-night period after 10:00 PM and before 7:00 AM would be rare, in line with current JBER policies.

Classroom Noise

Two supplemental noise metrics were used to further characterize noise levels at schools and other educational facilities (i.e., the Katmai Child Development Center). The equivalent noise level during the 8 hours in which school is in session (i.e., 7:00 AM to 3:00 PM) is denoted as "$L_{eq\text{-}8hr}$," and the number of events per hour during which the maximum noise level exceeds 50 dB is denoted as "NA50."

Table 4.2-5 lists $L_{eq\text{-}8hr}$ under baseline conditions and each alternative. The percentage of operations occurring between 7:00 AM and 3:00 PM were calculated based on JBER operational records. In a classroom setting, background noise levels caused by transportation that exceed 40 dB are more likely to negatively affect student performance (ANSI 2009). In a classroom that provides 27-dB outdoor-to-indoor noise level reduction, exterior noise levels of 67 dB $L_{eq\text{-}8hr}$ result in indoor classroom noise levels of 40 dB $L_{eq\text{-}8hr}$. If windows are open and the structure only provides 17 dB outdoor-to-indoor noise level reduction, exterior noise levels exceeding 57 dB $L_{eq\text{-}8hr}$ result in noise levels of 40 dB $L_{eq\text{-}8hr}$. Under Alternative A, $L_{eq\text{-}8hr}$ noise would be reduced compared with the No Action Alternative at all locations studied except for Mountain View Elementary School, which would experience an increase of 1.9 dB. This decrease would reduce exterior $L_{eq\text{-}8hr}$ at the child development center to less than 67-dB threshold, while the Mount Spurr and Mountain View Elementary Schools would remain above 67 dB.

Noise events that exceed 50 dB have the potential to momentarily disrupt speech (Sharp and Plotkin 1984). Table 4.2-6 lists the number of indoor noise events per hour during the school day (i.e., 7:00 AM to 3:00 PM) that exceed 50 dB if the structure provides 27-dB sound reduction. This level of outdoor-to-indoor noise level reduction is typical of structures in cold climates when the windows are closed (USEPA 1974). When windows are open, a typical cold-climate structure provides only 17-dB outdoor-to-indoor noise level reduction. Table 4.2-7 lists the number of indoor noise events per hour during the school day if windows are open. Under Alternative A, the number of events per hour exceeding 50 dB indoors with windows closed (NA50 closed) would decrease by up to 0.7 events per hour at three of the on-base schools and would remain the same at the other locations. The number of events exceeding 50 dB indoors if windows were open would remain the same at all of the locations studied. The relatively small degree by which the number of events would change reflects the fact the operations of all aircraft types other than the F-22 would not change.

Table 4.2-4. Outdoor Noise Levels (L_{dn}) at Points of Interest Under the No Action Alternative, the Proposed Action (Alternative A), and Alternatives B, C, D, E, and F

ID	Location Description	Primary Usage	No Action (Existing Conditions)	Alternative A		Alternative B		Alternative C		Alternative D		Alternative E		Alternative F	
				dB L_{dn}	Change	dB L_{dn}	Change	dB L_{dn}	Change	dB L_{dn}	Change	dB L_{dn}	Change	dB L_{dn}	Change
1	Aurora Elementary	August – May	62.4	59.1	-3.3	59.4	-3	58.2	-4.2	61.3	-1.1	64.1	+1.7	63.7	+1.3
2	Government Hill Elementary	August – May	58.5	55.4	-3.1	55.6	-2.9	54.6	-3.9	57.5	-1	60.1	+1.6	59.7	+1.2
3	Mount Iliamna Elementary	August - May	60.8	57.2	-3.6	57.6	-3.2	56.8	-4	59.8	-1	62.3	+1.5	62.1	+1.3
4	Mountain View Elementary	August - May	64.1	66.2	+2.1	64.0	-0.1	63.3	-0.8	63.8	-0.3	63.6	-0.5	64.0	-0.1
5	Orion Elementary	August - May	60.3	56.9	-3.4	57.1	-3.2	56.2	-4.1	59.4	-0.9	61.9	+1.6	61.7	+1.4
6	William Tyson Elementary	August - May	57.3	56.2	-1.1	55.4	-1.9	55.2	-2.1	57.7	+0.4	58.2	+0.9	58.3	+1
7	Mount Spurr Elementary	August - May	72.3	69.2	-3.1	69.1	-3.2	68.4	-3.9	73.0	+0.7	72.8	+0.5	72.6	+0.3
8	JBER Hospital	All Months	55.1	55.1	0	54.5	-0.6	56.6	+1.5	56.2	+1.1	53.9	-1.2	56.2	+1.1
9	Davis Park	All Months	60.8	61.2	+0.4	60.4	-0.4	60.5	-0.3	60.8	0	60.6	-0.2	60.6	-0.2
10	Katmai Child Development Center	All Months	66.2	62.4	-3.8	62.8	-3.4	61.9	-4.3	65.1	-1.1	67.6	+1.4	67.3	+1.1

Key:
dB = decibels
L_{dn} = day-night average sound level

Table 4.2-5. Equivalent Noise Level During the School Day Under Each Alternative

ID	Point of Interest	No Action dB L_{eq-8hr}	(Proposed Action) Alternative A		Alternative B		Alternative C		Alternative D		Alternative E		Alternative F	
			dB L_{eq-8hr}	Change (dB)	dB L_{eq-8hr}	Change (dB)	dB L_{eq-8hr}	Change (dB)	dB L_{eq-8hr}	Change (dB)	dB L_{eq-8hr}	Change (dB)	dB L_{eq-8hr}	Change (dB)
1	Aurora Elementary	64.8	61.3	-3.5	61.6	-3.2	60.4	-4.4	63.7	-1.1	66.6	+1.8	66.2	+1.4
2	Government Hill Elementary	61.0	57.7	-3.3	57.9	-3.1	56.6	-4.4	59.9	-1.1	62.6	+1.6	62.2	+1.2
3	Mount Iliamna Elementary	63.3	59.8	-3.5	60.0	-3.3	59.1	-4.2	62.5	-0.8	64.9	+1.6	64.7	+1.4
4	Mountain View Elementary	68.3	70.2	+1.9	67.8	-0.5	68.2	-0.1	67.3	-1.0	67.5	-0.8	67.6	-0.7
5	Orion Elementary	62.8	59.3	-3.5	59.5	-3.3	58.6	-4.2	61.9	-0.9	64.5	+1.7	64.2	+1.4
6	William Tyson Elementary	60.1	58.8	-1.3	58.1	-2.0	58.2	-1.9	60.0	-0.1	60.8	+0.7	60.8	+0.7
7	Mount Spurr Elementary	74.9	71.8	-3.1	71.6	-3.3	71.0	-3.9	75.7	+0.8	75.5	+0.6	75.3	+0.4
10	Child Development Center	68.9	65.1	-3.8	65.3	-3.6	64.6	-4.3	68.6	-0.3	70.2	+1.3	70.0	+1.1

Key:
dB = decibels
ID = identification number of the point of interest (as shown on the noise maps)
L_{dn} = day-night average sound level

Table 4.2-6. Events per Hour with Potential to Interrupt Speech Under Alternatives with Windows Closed

ID	POI	No Action	(Proposed Action) Alternative A		Alternative B		Alternative C		Alternative D		Alternative E		Alternative F	
			NA50 closed	Change	NA50 closed	Change	NA50 closed	Change	NA50 closed	Change	NA50 closed	Change	NA50 closed	Change
1	Aurora Elementary	2.1	1.4	-0.7	1.5	-0.6	0.8	-1.3	2.3	+0.2	2.3	+0.2	1.7	-0.4
2	Government Hill Elementary	1.6	1.0	-0.6	1.0	-0.6	0.5	-1.1	1.8	+0.2	1.8	+0.2	1.3	-0.3
3	Mount Iliamna Elementary	2.0	2.0	0.0	2.0	0.0	1.6	-0.4	2.0	0.0	2.0	0.0	1.6	-0.4
4	Mountain View Elementary	1.9	1.9	0.0	1.9	0.0	1.7	-0.2	1.9	0.0	1.9	0.0	1.7	-0.2
5	Orion Elementary	1.7	1.1	-0.6	1.1	-0.6	0.5	-1.2	1.9	+0.2	1.9	+0.2	1.5	-0.2
6	William Tyson Elementary	1.4	1.4	0.0	1.4	0.0	1.4	0.0	1.4	0.0	1.4	0.0	1.4	0.0
7	Mount Spurr Elementary	2.2	2.2	0.0	2.2	0.0	2.1	-0.1	2.2	0.0	2.2	0.0	2.1	-0.1
10	Child Development Center	2.5	2.5	0.0	2.5	0.0	1.9	-0.6	2.5	0.0	2.5	0.0	1.9	-0.6

Key:
NA50 closed = 50 dB indoors with windows closed
POI = point of interest

Table 4.2-7. Events per Hour with Potential to Interrupt Speech Under Alternatives with Windows Open

ID	Location Description	No Action	(Proposed Action) Alternative A		Alternative B		Alternative C		Alternative D		Alternative E		Alternative F	
			NA50 Open	Change	NA50 Open	Change	NA50 Open	Change	NA50 Open	Change	NA50 Open	Change	NA50 Open	Change
1	Aurora Elementary	3.9	3.9	0.0	3.9	0.0	3.2	-0.7	3.9	0.0	3.9	0.0	3.2	-0.7
2	Government Hill Elementary	2.5	2.5	0.0	2.6	+0.1	2.4	-0.1	2.5	0.0	2.5	0.0	2.4	-0.1
3	Mount Iliamna Elementary	2.6	2.6	0.0	2.6	0.0	2.0	-0.6	2.6	0.0	2.6	0.0	2.0	-0.6
4	Mountain View Elementary	3.1	3.1	0.0	3.1	0.0	2.7	-0.4	3.1	0.0	3.1	0.0	2.7	-0.4
5	Orion Elementary	2.6	2.6	0.0	2.6	0.0	2.1	-0.5	2.6	0.0	2.6	0.0	2.1	-0.5
6	William Tyson Elementary	2.4	2.4	0.0	2.4	0.0	1.9	-0.5	2.4	0.0	2.4	0.0	1.9	-0.5
7	Mount Spurr Elementary	4.5	4.5	0.0	4.5	0.0	4.0	-0.5	4.5	0.0	4.5	0.0	4.0	-0.5
10	Child Development Center	3.9	3.9	0.0	3.9	0.0	3.2	-0.7	3.9	0.0	3.9	0.0	2.9	-1.0

Key:
NA50 open = 50 dB indoors with windows open

It should be noted that noise attenuation does not affect the experience of children while they are outside the school building. Studies of noise effects on children's learning and cognitive abilities, as well as the potential for noise-induced health impacts have been included in research on the effects of noise on children. Many studies have shown varying degrees of effects of noise on the reading comprehension, attentiveness, puzzle-solving, and memory/recall ability of children. Researchers tend to agree that young children are more susceptible than adults to the effects of background noise (Green et al. 1982; Evans and Lepore 1993; Evans et al. 1998; Evans and Maxwell 1997; Haines et al. 2001a, 2001b; Hygge et al. 2002). Noise level recommendations for schools are a direct result of the findings of these studies.

Sleep Disturbance

The estimated probability of sleep disturbance in the Dayton, Silver Run, and Sunflower neighborhoods on base and in the Mountain View neighborhood would not change measurably relative to baseline conditions with Alternative A. Third Wing aircraft rarely fly during the late-night time period when most people are asleep. Therefore, changes in 3 WG flying patterns would have minimal effect on current sleep disturbance patterns.

Noise-Induced Hearing Impairment

Noise-induced Hearing Loss in the Community. Current DoD policy for assessing community hearing loss risk as part of NEPA analysis is to conduct a detailed assessment including calculation of potential hearing loss if residences would be exposed to noise levels exceeding 80 dB L_{dn}. (DoD Noise Working Group 2013). Because no on- or off-base residences are exposed to noise levels greater than 80 dB L_{dn}, risk of hearing loss for on- or off-installation residents is relatively low and calculation of PHL is not necessary.

AFI 32-7063 recommends that people who are outdoors in areas above 80 dB L_{dn} should consider wearing hearing protection when aircraft noise is present. Noise generated by the additional departures from RW 34 by F-22 aircraft under Alternative A would cause the 80 dB L_{dn} contour line to shift outwards from RW 34 by about 250 feet and to contract around RW 06 by about the same distance. This shift would cause a net decrease in number of non-residential facilities on JBER affected by 80 dB L_{dn} or greater from 81 to 68. Although the total number of buildings affected would decrease, eight buildings that had not previously been affected by noise level exceeding 80 dB L_{dn} would be affected by noise levels slightly exceeding 80 dB L_{dn} under Alternative A. These buildings include several industrial structures, a memorial, and a pavilion.

Visitors to JBER, such as airshow attendees, may experience noise levels in excess of 80 dB L_{dn} for short periods of time. Eighty dB L_{dn} has been associated with increased risk of hearing loss when exposure is continued on a daily basis over a period of 40 years. Visiting JBER within areas accessible to visitors carries no risk of noise-induced hearing loss.

Noise-induced Hearing Loss in the Workplace. Potentially hazardous noise levels would continue to occur workplace environments in the JBER flightline area under Alternative A, and the JBER Bioenvironmental Engineering Office would continue to implement the hearing conservation program to minimize risks to workers. As described in Section 3.2.2, to comply with existing policies and regulatory guidance, the JBER Bioenvironmental Engineering Office assesses potential for occupational hearing loss risk and conducts health risk assessments where necessary. Several factors are considered by the JBER Bioenvironmental Engineering Office, including the amount of time workers spend outside, when deciding on the appropriate course of action and structural noise attenuation. Hearing protection devices used to protect worker's hearing would be the same (e.g., earmuffs, earplugs) as are used currently in known high noise environments. The potential hearing loss risk among workers on JBER would be managed in accordance with DoD guidelines. DoD noise management guidelines protect workers on JBER against possible noise impacts.

Noise in the Matanuska-Susitna Valley

Noise levels in the Matanuska-Susitna Valley would change very little under Alternative A. F-22 departures from JBER en route to training areas in central Alaska climb as they travel northwards eventually reaching a cruising altitude at approximately 20,000 feet MSL. Because aircraft departing RW 34 follow a straight line from JBER-Elmendorf to the Matanuska-Susitna Valley, they have slightly less time and distance in which to climb prior to reaching the valley than aircraft departing other JBER-Elmendorf runways. A typical non-afterburner F-22 departure from RW 34 has reached 15,300 feet MSL by the time the aircraft passes Big Lake (surface is approximately 250 feet MSL) whereas non-afterburner departures from RW 06 and RW 24 have reached 17,500 feet MSL and departures from RW 16 have reached 20,000 feet MSL by the same point. Non-afterburner departures from any runway reach 20,000 feet MSL prior to crossing Route 4 (surface is approximately 250 feet MSL). Aircraft departing using afterburner power reach cruising altitude well before reaching the Matanuska-Susitna Valley regardless of the runway used. After reaching cruising altitude, all northbound F-22 aircraft use the same aircraft cruise configuration and would generate the same noise level regardless of the departure runway. An F-22 at 15,300 feet MSL generates 63 dB maximum sound level (L_{max}) when flying directly overhead whereas an F-22 at 17,500 feet MSL generates about 61 dB L_{max}. Outside of a laboratory environment, people with healthy hearing can usually start to discern differences in sound level starting at 3 dB. F-22 approach procedures and runway usage patterns would not change under Alternative A. The increase in the number of slightly lower overflights could be noticed visually by some people, but the difference in overflight sound levels would not be expected to be noticeable. Time averaged noise levels would remain well below 65 dB L_{dn}.

Noise Levels in the Knik Arm

During F-22 overflight, calculated noise levels in the Knik Arm increase from ambient levels to up to 136 dB SPL re 1 μPa in limited areas during the brief period of overflight. As a point of reference, maximum estimated F-22 noise levels are slightly higher than measured F-15 overflight in-water noise levels of 134 dB re 1 μPa measured by Blackwell and Greene. These noise levels are well below the threshold for physical harm, but exceed the basement threshold for behavioral harassment. Increased F-22 departures on RW 34 and decreased F-22 departures on RW 24 would contribute to a very minimal decrease in CIBW harassment risk. A detailed analysis was conducted on potential effects of proposed new F-22 patterns of operations on the CIBW, which is discussed in Section 4.7. The estimated number of CIBW Level B harassment events per year for all JBER flight operations would remain very close to zero, decreasing by 0.017 from 0.059 to 0.042. Noise levels associated with individual F-22 overflights would be the same as under the No Action Alternative; the decreased departure operations on RW 24 would contribute to the decrease in overall harassment risk. The Air Force has determined, and the NMFS has concurred on the determination, that implementation of Alternative A may affect but is not likely to adversely affect protected species.

4.2.2 Alternative B: RW 34 for Departure; RW 06 Arrival; RW 16/34 Extension

Under Alternative B, F-22 runway usage patterns would be similar to those used under Alternative A (see Table 2.4-1), and total sorties flown annually by the 3 WG would be the same as under the No Action Alternative. However, under this alternative, terrain north of RW 34 would be excavated, the runway would be extended to 10,000 feet, and the takeoff roll initiation point for 3 WG aircraft departing RW 34 would be shifted north by approximately 2,000 feet. Noise analysis for potential extension of RW 16/34 was calculated using the conservative glide-slope for arrival “H”, which results in the lowest potential arrival altitude at the point where arriving aircraft would transit from being over the Knik Arm to over land on JBER.

Noise Levels on Land

As shown in Table 2.4-1, the number of approaches made to RW 16 would be the same under Alternative B as under Alternative A, remaining at 28 per year. The extended RW 16/34 threshold would be further north than the current runway threshold, and aircraft descending to land at this new threshold would be at lower altitudes at points further north than the same altitudes are reached currently. If new instrument approaches to RW 16 are established, aircraft would make more shallow descents than they do currently, which would result in increased noise levels in areas north of RW 16.

Approximately 74 percent of total 3 WG departures would be conducted from RW 34 under Alternative B, but the takeoff roll initiation point for these departures would be shifted north by approximately 2,000 feet. This shift in takeoff roll initiation point would increase the distance between loud takeoff events and communities to the south, decreasing noise levels experienced in the neighborhood of Mountain View. Because the runway would also be extended at its northern end, aircrews departing RW 34 would have about the same runway available that is available under the No Action Alternative.

Annoyance and Land Use Compatibility

Noise levels (L_{dn}) under Alternative B and the No Action Alternative are shown in Figure 4.2-2. As shown in Table 4.2-1, the number of off-installation land and water acres exposed to noise levels greater than 65 dB L_{dn} would increase from 995 to 1,058, over-land acres would increase from 107 to 89, and over-water acres would increase from 888 to 969. Relative to Alternative A, noise under Alternative B is more heavily concentrated in on-base areas north of RW 34, and noise levels are lower in the neighborhood of Mountain View due to the northward shift in the RW 34 takeoff roll initiation point. Neither the Mountain View neighborhood nor the Mountain View Elementary School would be affected by noise levels exceeding 65 dB L_{dn} under Alternative B. Total off-installation population affected would be 0 (zero) under Alternative B (Table 4.2-1). Total on-installation population exposed to noise levels greater than 65 dB L_{dn} would decrease from 1,424 to 824 (Table 4.2-3).

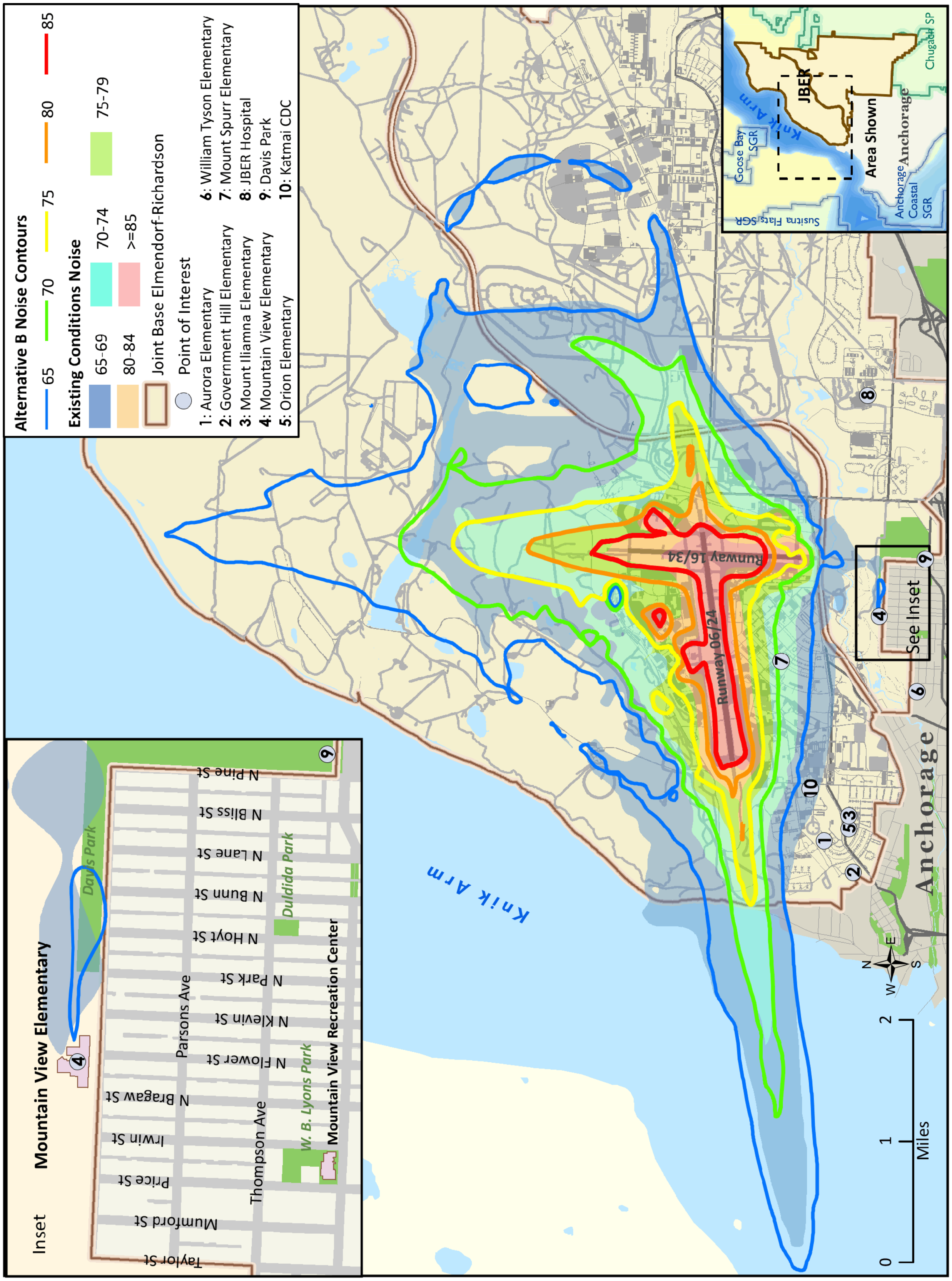

Figure 4.2-2. Noise Contours Under Existing Conditions and Alternative B

As shown in Table 4.2-4, noise levels at all points of interest would decrease by up to 3.4 dB. Under Alternative B, noise levels at Mount Spurr Elementary School would exceed 65 dB L_{dn}. If special noise attenuation measures are not already implemented, installation of noise attenuation could be considered to reduce noise interior levels.

JBER land area affected by noise levels greater than 65 dB L_{dn} would decrease by 59 acres, from 130 to 71 acres of residential land; decrease by 42, from 241 to 199 acres for community support land; and decrease by 132, from 1,840 to 1,708 acres for administrative/industrial land use. Other land uses on JBER, such as open land, range areas, and airfield pavements, are not as noise-sensitive. The number of on-base residential structures exposed to noise greater than 65 dB L_{dn} would decrease by 31, from 115 to 84. Impacts would be similar to those described for Alternative A.

Classroom Noise

The $L_{eq\text{-}8hr}$ would decrease at all of the locations studied by up to 3.6 dB (Table 4.2-5). Exterior $L_{eq\text{-}8hr}$ at Mount Spurr Elementary and Mountain View Elementary would exceed 67 dB, indicating that the background transportation noise levels in the classrooms may exceed 40 dB (assuming 27 dB outdoor-to-indoor noise level reduction). The school-day equivalent noise levels at the other locations studied would be below 67 dB. The NA50 (closed) at Aurora Elementary, Government Hill Elementary, Mount Iliamna Elementary, and Orion Elementary would decrease by up to 0.7 events per hour under Alternative B, but would remain the same at all other locations studied (Table 4.2-6). If windows were open, the NA50 would increase by 0.1 at Government Hill Elementary but remain the same at all of the other locations studied (Table 4.2-7).

Sleep Disturbance

The estimated probability of sleep disturbance would not change measurably in the Dayton, Silver Run, Sunflower, and Mountain View neighborhoods. Because 3 WG aircraft rarely fly during the late-night time period when most people are asleep, changes in 3 WG flying patterns would have minimal effect on current sleep disturbance patterns.

Noise-Induced Hearing Impairment

Noise-induced Hearing Loss in the Community. No on- or off-base residences would be exposed to noise levels greater than 80 dB L_{dn}, risk of hearing loss for on- or off-installation residents is relatively low, and calculation of PHL is not necessary.

Noise generated by the focus of departures from RW 34 by F-22 aircraft under Alternative B would cause the 80 dB L_{dn} contour line to shift outwards from RW 34 by approximately 300 feet and to contract around RW 06 by about 350 feet. This shift would result in a net decrease of 27 buildings being exposed to 80 dB L_{dn}. A C-130 engine test building and a TACAN station that are not affected by noise levels exceeding 80 dB L_{dn} under the No Action Alternative would become exposed to slightly greater than 80 dB L_{dn} under Alternative B.

Noise-induced Hearing Loss in the Workplace. The JBER Bioenvironmental Engineering Office would continue to implement all protective measures required by Air Force occupational safety regulations, minimizing the risk of noise-induced hearing loss in the workplace.

Noise in the Matanuska-Susitna Valley

Under Alternative B, the number of departures made from RW 34 would be higher than under the No Action Alternative and, because these departing sorties follow a straight-line path to the Matanuska-Susitna Valley, they would be at slightly lower altitudes in southern Matanuska-Susitna Valley than departures from other JBER runways. The difference in noise levels between F-22 overflights at 15,300 feet MSL and 17,500 feet MSL would not be noticeable. The number of arrivals on RW 16 would be the same under Alternative B as under Alternative A, but these arrivals would have the option to use precision instrument landing procedures.

Assuming that the instrument landing procedure to RW 16 is similar to that used for existing instrument approaches to RW 06, aircraft inbound on this approach would be at approximately 6,600 feet MSL at Big Lake. Current arrival procedures vary widely in the altitude at which they cross the southern Matanuska-Susitna Valley with some approaches crossing Big Lake at 3,500 feet MSL and others crossing the area at 13,000 feet MSL. The net effect of the addition of a precision approach to RW 16 on noise levels in the Matanuska-Susitna Valley would be minimal. Noise levels would remain well below 65 dB L_{dn}.

Construction Noise

The operation of heavy-duty construction equipment as part of terrain excavation and subsequent runway extension-related construction projects would generate noise in the vicinity of the work site. Construction equipment would be expected to include but not be limited to dozers (82 dB L_{max} at 50 feet) and excavators (81 dB L_{max} at 50 feet) (FHWA 2006). Use of explosives during excavation is not expected at this time. The work site is located immediately north of the existing RW 16/34 and within about 3,000 feet of RW 06/24 in an area affected by frequent, loud aircraft overflights. The tonal characteristics and time patterns of construction noise are different from those of aircraft operations, meaning that construction noise is often distinguishable from aircraft noise even when the aircraft noise contributes vastly more noise energy to the acoustic environment. While construction may be audible at industrial and administrative buildings near the construction site, these buildings are currently exposed to intense aircraft noise and are not considered to be noise-sensitive. Hearing protection would be required of all workers in accordance with applicable regulations and guidelines.

Dump trucks on haul routes generate about 77 dB L_{max} at a distance of 50 feet (FHWA 2006). As shown in Figure 2.4-4, the two haul routes cross industrial, administrative, and open land areas on JBER. The areas traversed by the haul routes are close to JBER runways and currently exposed to elevated aircraft noise levels. Furthermore, the haul routes are currently used by vehicles moving heavy loads (e.g., jet engines). Additional heavy truck traffic noise may be noticed by workers in facilities adjacent to the haul routes but would not be expected to be disruptive in the context of existing noise levels.

The spoil area located east of Talley Avenue and north of Davis Highway is surrounded by industrial and administrative land uses; noise generated by heavy trucks in this area would not be expected to be disruptive. The spoil area located west of Runway 06/24 is immediately surrounded by open space and industrial land uses that are not noise sensitive (i.e., the Port of Anchorage). However, trucks in this spoil area could also generate up to 57 dB L_{max} in the on-base housing area located 500 feet south of the spoil area (assuming a 6-dB reduction in noise level with each doubling of distance). The proposed spoil area has been in use as a borrow pit/spoil area for several years, and surrounding areas have been exposed to the sounds of heavy truck operations. Truck noise at 57 dB L_{max} would be audible to people outdoors but would not be expected to be audible to people indoors. Noise would be limited to normal working hours (i.e., 7:00 AM to 5:00 PM) and would be temporary, lasting only for the duration of the project.

Noise Levels in the Knik Arm

Alternative B changes in F-22 flight operations would result in the estimated number of CIBW Level B harassment events per year for all JBER operations remaining very close to zero, decreasing by 0.017 from 0.059 to 0.042 events per year. Noise levels associated with individual F-22 overflights would be similar to current overflights with minor exceptions. Departures from RW 34 would be at slightly lower altitudes at the point at which they cross the southern Knik Arm shoreline because of the northward shift in takeoff roll initiation point. While approaching RW 16, aircraft would be at slightly lower altitudes at the southern Knik Arm shoreline due to the runway threshold being shifted to the north following runway extension. Precision instrument landings to RW 16 would cross the shoreline at the lowest altitude of all RW 16 approaches. The net effect on the number of CIBW harassment events would be very small, near zero. The Air Force has determined, and the NMFS has concurred on the determination, that implementation of Alternative B may affect but is not likely to adversely affect protected species.

4.2.3 Alternative C: RW 34 for Departure; RW 16 Arrival; RW 16/34 Extension

Under Alternative C, departure F-22 runway usage patterns would be similar to those used under Alternative A, and the number of sorties flown annually by the 3 WG would not change. RW 16/34 would be extended to the north, and arrivals would primarily be on RW 16 (see Table 2.4-1). The RW 34 takeoff-roll initiation point would be shifted north by approximately 2,000 feet, reducing noise levels in the neighborhood of Mountain View.

Noise Levels on Land

The excavation of terrain north of RW 34/16 would allow for precision instrument approaches to be made safely to RW 16 once appropriate supporting equipment is installed. The details of new RW 16 instrument approach procedures would be determined at a later date following extensive coordination with and approval by the FAA. However, all instrument approach procedures involve a relatively slow descent towards landing as compared to typical non-instrument approaches. The slow rate of descent means that aircraft would be at lower altitudes and would generate higher noise levels on the ground in areas north of RW 16/34.

Annoyance and Land Use Compatibility

The increase in approaches to the extended RW 16 would generate increased noise levels (L_{dn}) north of RW 16/34 relative to the No Action Alternative (see Figure 4.2-3). Initial runway approaches are sometimes followed by maneuvering for a second approach. Approaches to RW 16 that maneuver for a second approach typically execute a climbing turn to the east near the southern end of the runway. These climbing turns would result in increased noise levels southeast of RW 16. The northward movement of the RW 34 takeoff roll initiation point would reduce noise levels in the neighborhood of Mountain View associated with RW 34 departures. Noise levels under Alternative C would remain below 65 dB L_{dn} in all noise-sensitive off-installation areas. As shown in Table 4.2-1, the number of off-installation land and water acres exposed to noise levels greater than 65 dB L_{dn} would decrease from 995 to 845 under Alternative C, over-land acres would increase from 107 to 113, and over-water acres would decrease from 888 to 732. The 113 off-installation land acres exposed to noise at greater than 65 dB L_{dn} would be limited to areas within the railroad right-of-way that crosses JBER and land in the Port of Anchorage. Total off-installation population affected would remain 0 under Alternative C (Table 4.2-2). The on-installation population affected would decrease from 1,424 to 915 (Table 4.2-3).

As Table 4.2-4 shows, noise levels at the JBER hospital would increase by 1.5 dB while all other points of interest would either remain the same or decrease by up to 4.3 dB. Under Alternative C, noise levels at Mount Spurr Elementary School would exceed 65 dB L_{dn}. If special noise attenuation measures are not already implemented, installation of noise attenuation could be considered to reduce interior noise levels.

JBER land area affected by noise levels greater than 65 dB L_{dn} would decrease by 46 acres, from 130 to 84 acres of residential land; decrease by 26, from 241 to 215 acres for community support land; and decrease by 63, from 1,840 to 1,777 acres for administrative/industrial land use. Other land uses on JBER, such as open land, range areas, and airfield pavements, are not as noise-sensitive. Under Alternative C, the number of on-base residential structures exposed to noise greater than 65 dB L_{dn} would increase by 4, from 115 to 119. Impacts would be similar to those described for Alternative A.

Classroom Noise

The $L_{eq\text{-}8hr}$ would decrease at all of the locations studied by up to 4.4 dB (Table 4.2-5). Exterior $L_{eq\text{-}8hr}$ at Mount Spurr Elementary and Mountain View Elementary would exceed 67 dB, indicating that, even if the school structure provides 27-dB outdoor-to-indoor noise level reduction with windows closed, the background transportation-related noise levels in the classrooms may exceed 40 dB. The school-day equivalent noise levels at the other locations studied would be below 67 dB. The NA50 (closed) at all of the locations studied would decrease by up to 1.3 or remain the same (Table 4.2-6). If windows were open, the NA50 (open) would decrease by up to 0.7 at all of the locations studied (Table 4.2-7).

Sleep Disturbance

Under Alternative C, the estimated probability of sleep disturbance would not change measurably at any of the locations studied. Because 3 WG aircraft rarely fly during the late-night time period when most people are asleep, changes in 3 WG flying patterns would have minimal effect on current sleep disturbance patterns.

Noise-Induced Hearing Impairment

Noise-induced Hearing Loss in the Community. No on- or off-base residences would be exposed to noise levels greater than 80 dB L_{dn}, risk of hearing loss for on- or off-installation residents is relatively low, and calculation of PHL is not necessary.

Noise generated by the focus of departures from RW 34 by F-22 aircraft under Alternative C would cause the 80 dB L_{dn} contour line to shift outwards from RW 16/34 by approximately 300 feet and to contract around RW 06/24 by about 500 feet. This shift would cause a C-130 test building and a memorial previously exposed to slightly less than 80 dB L_{dn} to be exposed to slightly greater than 80 dB L_{dn}. The total number of buildings on JBER affected by 80 dB L_{dn} would decrease by 27, from 81 to 54.

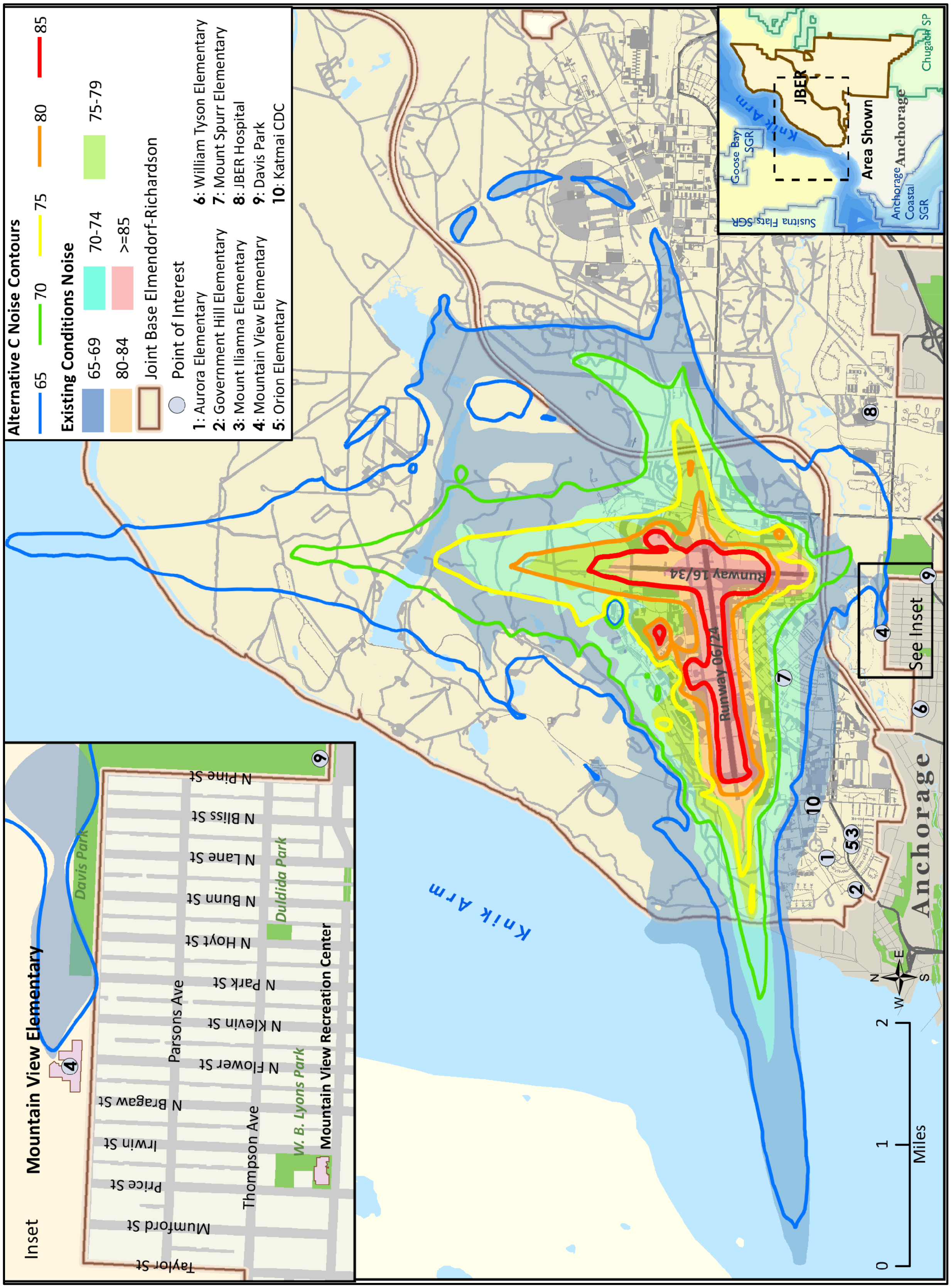

Figure 4.2-3. Noise Contours Under Existing Conditions and Alternative C

Noise-induced Hearing Loss in the Workplace. The JBER Bioenvironmental Engineering Office would continue to implement all protective measures required by Air Force occupational safety regulations, minimizing the risk of noise-induced hearing loss in the workplace.

Noise in the Matanuska-Susitna Valley

The number of departures made from RW 34 and the number of arrivals made to RW 16 would be higher under Alternative C than under the No Action Alternative and, because these operations often follow a straight path between JBER and the Matanuska-Susitna Valley, they may be at slightly lower altitudes in southern Matanuska-Susitna Valley than operations on other JBER runways.

As discussed in Section 4.2.1, F-22 departures from RW 34 are often louder than departures from other runways by an amount that is not noticeable. As discussed in Section 4.2.2, F-22 approaches use highly variable altitudes in the southern Matanuska-Susitna Valley, and aircraft using a hypothetical precision instrument approach to RW 16 would cross the southern Matanuska-Susitna Valley at an altitude that is within the altitude range used by existing approach procedures. The effect of the increase in overflights at slightly lower altitudes on overall noise levels would be minimal, with noise levels remaining well below 65 dB L_{dn}.

Construction Noise

The operations of heavy-duty construction equipment and trucks under Alternative C would the same as described for Alternative B. Noise impacts at the construction site would be localized and temporary and would occur in an area currently exposed to frequent, loud aircraft overflights.

Noise Levels in the Knik Arm

Alternative C changes in F-22 flight operations would result in the estimated number of CIBW Level B harassment events per year for all JBER operations remaining very close to zero, decreasing by 0.029 from 0.059 to 0.030 events per year. Noise levels associated with individual F-22 overflights would be similar to current overflights with minor exceptions, which would be the same as those described in Section 4.2.2 under Alternative B. The Air Force has determined, and the NMFS has concurred on the determination that implementation of Alternative C may affect but is not likely to adversely affect protected species.

4.2.4 Alternative D: RW 06 for Departure and Arrival

Under Alternative D, F-22 runway usage patterns are identical to the No Action scenario for arrivals, but departures would take place primarily on RW 06 (see Table 2.4-1). The number of sorties flown annually by the 3 WG would not change under Alternative D. RW 16/34 would not be extended and the RW 34 takeoff roll initiation point would not be moved.

Noise Levels on Land

Concentration of F-22 departure and arrival operations on RW 06 under Alternative D would result in decreased frequency of loud noise events over land south of the runway compared to the No Action Alternative (see Figure 4.2-4).

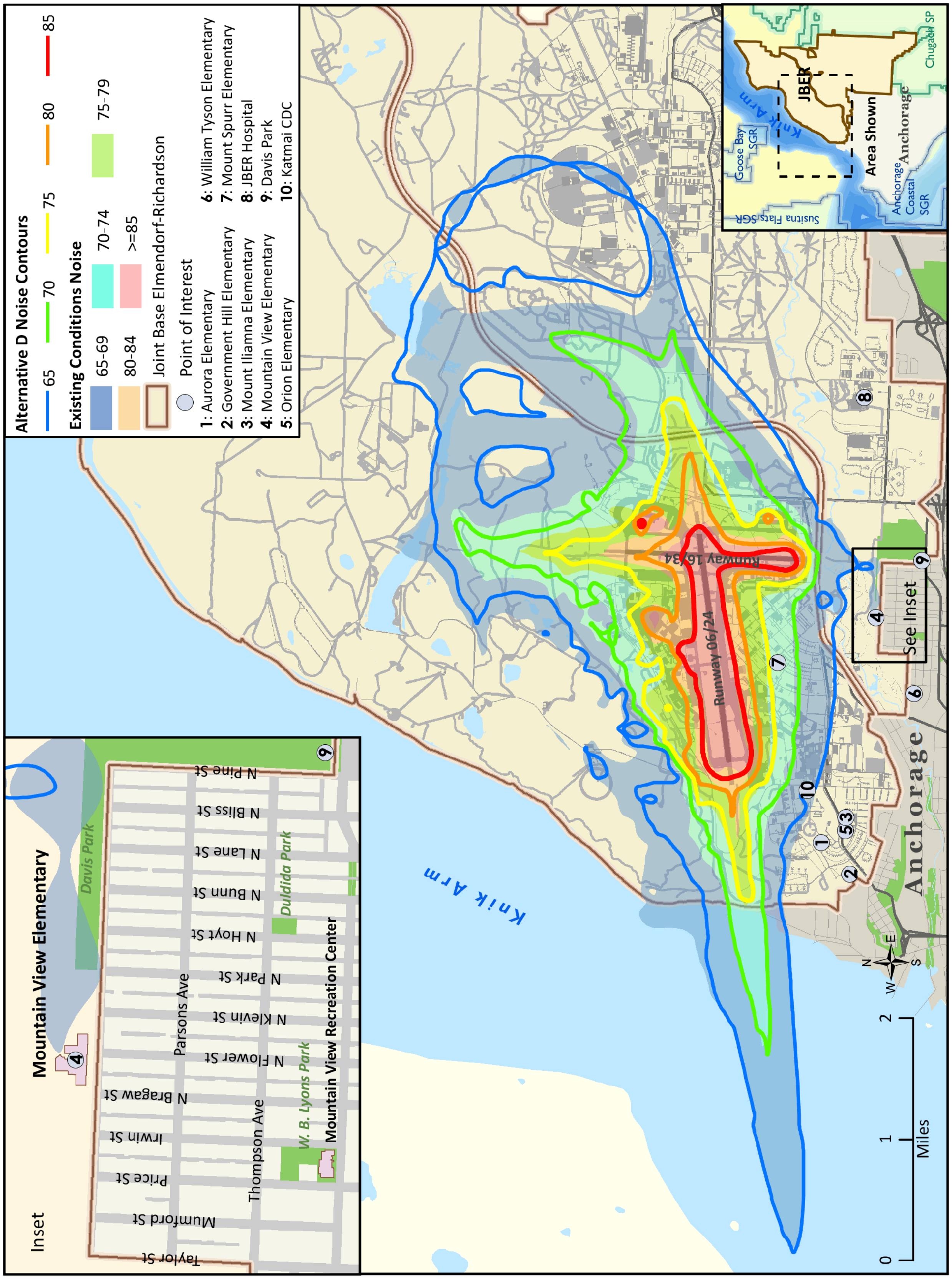

Figure 4.2-4. Noise Contours Under Existing Conditions and Alternative D

Annoyance and Land Use Compatibility

As shown in Table 4.2-1, the number of off-installation land and water acres exposed to noise levels greater than 65 dB L_{dn} would decrease from 995 to 905 under Alternative D, over-land acres would increase from 107 to 123, and over-water acres would decrease from 888 to 782. Off-installation land affected by noise levels exceeding 65 dB L_{dn} would be limited to the railroad right-of-way that traverses the base and the Port of Anchorage. Total off-installation population affected would remain 0 (Table 4.2-2). On-installation population would decrease from 1,424 to 1,193 (Table 4.2-3).

As shown in Table 4.2-4, L_{dn} at the JBER hospital would increase by 1.1 dB, levels at William Tyson Elementary would increase by 0.4 dB, and L_{dn} at Mount Spurr Elementary would increase by 0.7 dB. All other points of interest would either remain the same or decrease by up to 1.1 dB L_{dn}. Under Alternative D, noise levels at Mount Spurr Elementary School and the Katmai Child Development Center would exceed 65 dB L_{dn}. If special noise attenuation measures are not already implemented, installation of noise attenuation could be considered to reduce noise levels.

JBER land area affected by noise levels greater than 65 dB L_{dn} would decrease by 21 acres, from 130 to 109 acres of residential land; decrease by 25, from 241 to 216 acres for community support land; and increase by 193, from 1,840 to 2,033 acres for administrative/industrial land use. Other land uses on JBER, such as open land, range areas, and airfield pavements, are not as noise-sensitive. Under Alternative D, the number of on-base residential structures exposed to noise greater than 65 dB L_{dn} would decrease by 6, from 115 to 109. Impacts would be similar to those described for Alternative A.

Classroom Noise

The $L_{eq\text{-}8hr}$ at Mount Spurr Elementary would increase by 0.8 dB and would decrease at all of the other locations studied by up to 1.1 dB (Table 4.2-5). Exterior $L_{eq\text{-}8hr}$ at Mount Spurr Elementary, Mountain View Elementary, and the Katmai Child Development Center would exceed 67 dB, indicating that the background transportation-related noise levels in the classrooms may exceed 40 dB (assuming 27 dB outdoor-to-indoor noise level reduction). The school-day equivalent noise levels at the other locations studied would be below 67 dB. The NA50 with windows closed at Aurora Elementary, Government Hill Elementary, and Orion Elementary would increase by 0.2 events per hour under Alternative D while the NA50 (closed) at all other locations studied would remain the same (Table 4.2-6). If windows were open, the NA50 (closed) would remain the same at all of the locations studied (Table 4.2-7).

Sleep Disturbance

The estimated probability of sleep disturbance in the Dayton, Silver Run, and Sunflower neighborhoods on base and in the Mountain View neighborhood would not change measurably relative to baseline conditions under Alternative D. Third Wing aircraft rarely fly during the late-night time period when most people are asleep. Therefore, changes in 3 WG flying patterns would have minimal effect on current sleep disturbance patterns.

Noise-Induced Hearing Impairment

Noise-induced Hearing Loss in the Community. No on- or off-base residences would be exposed to noise levels greater than 80 dB L_{dn}, risk of hearing loss for on- or off-installation residents is relatively low, and calculation of PHL is not necessary.

Noise generated by the focus of departures from RW 06 by F-22 aircraft under Alternative D would cause the 80 dB L_{dn} contour line to shift outwards from RW 06/24 by approximately 300 feet and to contract around RW 16/34 by about 170 feet. This shift would cause nine buildings previously exposed to slightly less than 80 dB L_{dn} to be exposed to slightly greater than 80 dB L_{dn}. The eight buildings newly within the 80 dB L_{dn} contour include administrative, industrial, and community support buildings, some of which would be occupied for at least a portion of the day. The total number of buildings on JBER affected by 80 dB L_{dn} or greater would decrease by 16 from 81 to 65.

Noise-induced Hearing Loss in the Workplace. The JBER Bioenvironmental Engineering Office would continue to implement all protective measures required by Air Force occupational safety regulations, minimizing the risk of noise-induced hearing loss in the workplace.

Noise in the Matanuska-Susitna Valley

The number of departures made from RW 34 and the number of arrivals made to RW 16 would be the same under Alternative D as under the No Action Alternative. The number and altitude of overflights over the southern Matanuska-Susitna Valley would not change under Alternative D relative to the No Action Alternative.

Noise Levels in the Knik Arm

Alternative D changes in F-22 flight operations would result in the estimated number of CIBW Level B harassment events per year for all JBER operations remaining very close to zero, decreasing by 0.019 from 0.059 to 0.040 events per year. Noise levels associated with individual F-22 overflights would be the same as under the No Action Alternative. Decreased departure operations on RW 24 and RW 34 would contribute to the decrease in overall harassment risk. The Air Force has determined, and the NMFS has concurred on the determination, that implementation of Alternative D may affect but is not likely to adversely affect protected species.

4.2.5 Alternative E: RW 24 for Departure; RW 06 Arrival

Under Alternative E, F-22 runway usage patterns would be similar to Alternative D, but RW 24 would be primarily used for departures instead of RW 06 (see Table 2.4-1). The number of sorties flown annually by the 3 WG would not change under Alternative E. RW 16/34 would not be extended, and there would be no excavation of terrain.

Noise Levels on Land

Concentration of approximately 76 percent of total annual F-22 departure operations on RW 24 would result in decreased frequency of loud noise events in areas south of the runway relative to the No Action Alternative (Figure 4.2-5).

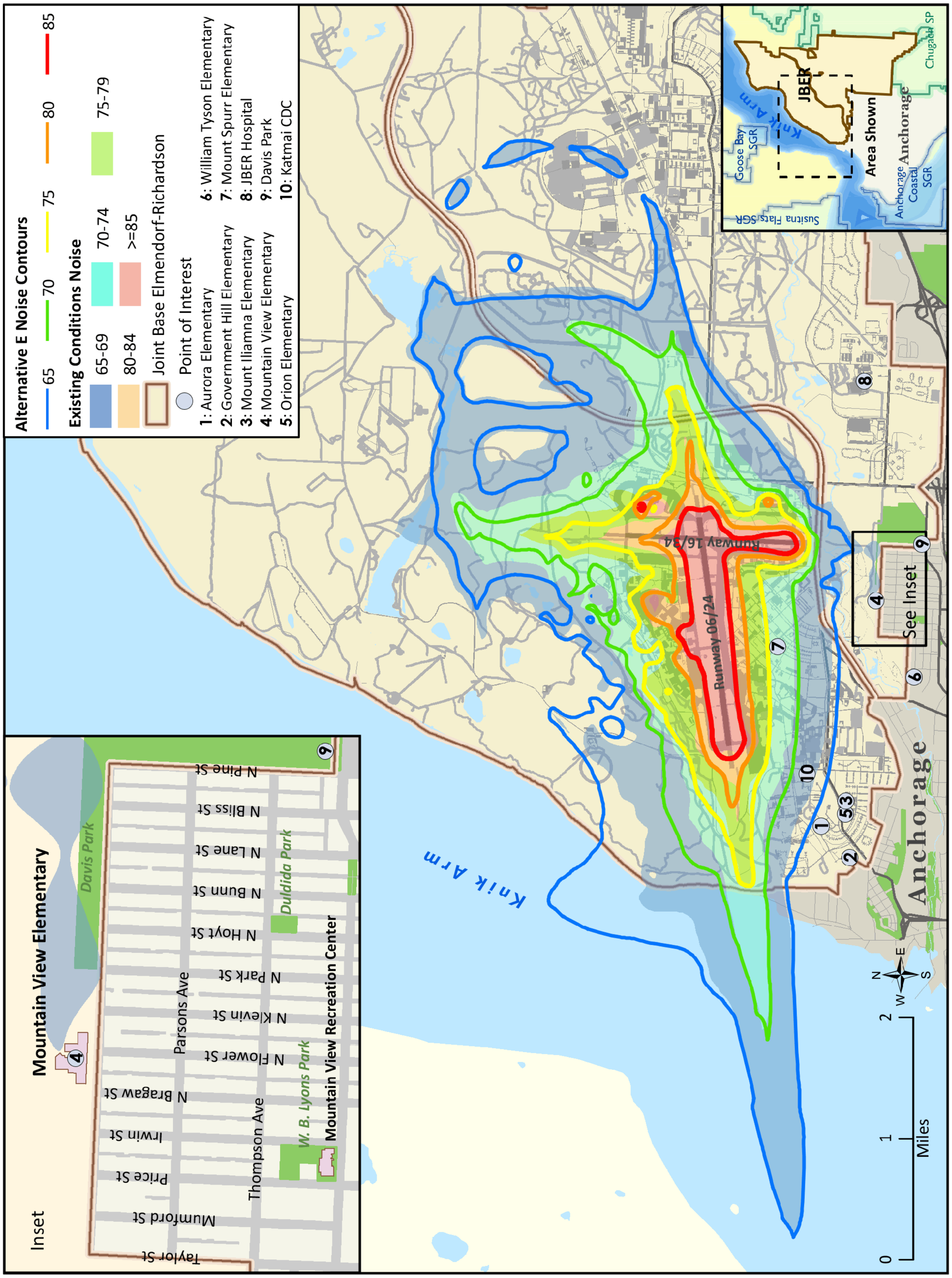

Figure 4.2-5. Noise Contours Under Existing Conditions and Alternative E

Annoyance and Land Use Compatibility

As shown in Table 4.2-1, the number of off-installation land acres exposed to noise levels greater than 65 dB L_{dn} would decrease from 107 to 100, while the number of over-water acres would increase from 888 to 1,255 under Alternative E. Off-installation land areas affected by noise levels exceeding 65 dB L_{dn} would be limited to the railroad right-of-way that traverses JBER and the Port of Anchorage. Total off-installation population affected would remain 0 under Alternative E (Table 4.2-2). On-installation population affected would increase from 1,424 to 1,718 (Table 4.2-3).

As shown in Table 4.2-4, noise levels at Aurora Elementary School, Government Hill Elementary, Mount Iliamna Elementary, Orion Elementary, and the Katmai Child Development Center would increase by between 1 and 2 dB. Noise levels at William Tyson Elementary School and Mount Spurr Elementary School would increase by less than 1 dB L_{dn}. Noise levels at all other points of interest would decrease relative to the No Action Alternative. Under Alternative E, noise levels at Mount Spurr Elementary School and the Katmai Child Development Center would exceed 65 dB L_{dn}. If special noise attenuation measures are not already implemented, installation of noise attenuation could be considered to reduce noise levels.

JBER land area affected by noise levels greater than 65 dB L_{dn} would increase by 27 acres, from 130 to 157 acres of residential land; decrease by 2, from 241 to 239 acres for community support land; and increase by 59, from 1,840 to 1,781 acres for administrative/industrial land use. Other land uses on JBER, such as open land, range areas, and airfield pavements, are not as noise-sensitive. Under Alternative E, the number of on-base residential structures exposed to noise greater than 65 dB L_{dn} would increase by 15, from 115 to 130. Noise impacts in these areas would be the same as those described for Alternative A.

Classroom Noise

The $L_{eq\text{-}8hr}$ at Aurora Elementary, Government Hill Elementary, the Katmai Child Development Center, Mount Spurr Elementary, Mount Iliamna Elementary, Orion Elementary, and William Tyson Elementary would increase by less than 2 dB while the $L_{eq\text{-}8hr}$ would decrease at Mountain View Elementary by less than 1 dB (Table 4.2-5). Exterior $L_{eq\text{-}8hr}$ at the Katmai Child Development Center, Mount Spurr Elementary, and Mountain View Elementary would exceed 67 dB while the school-day equivalent noise levels at the other studied locations would be below 67 dB. The indoor NA50 (closed) at Aurora Elementary, Government Hill Elementary, and Orion Elementary would increase by 0.2 events per hour under Alternative E while the NA50 (closed) at all other locations studied would remain the same (Table 4.2-6). If windows were open, the NA50 (open) would remain the same at all of the locations studied (Table 4.2-7).

Sleep Disturbance

The estimated probability of sleep disturbance in the Dayton neighborhood would decrease by 0.2 percent (3.8 percent chance to 3.6 percent chance) with windows closed but would remain the same with windows open. The probability of sleep disturbance in the Silver Run and Sunflower neighborhoods on base and in the Mountain View neighborhood would not change measurably relative to baseline conditions under Alternative E. Third Wing aircraft rarely fly during the late-night time period when most people are asleep. Therefore, changes in 3 WG flying patterns would have minimal effect on current sleep disturbance patterns.

Noise-Induced Hearing Impairment

Noise-induced Hearing Loss in the Community. No on- or off-base residences would be exposed to noise levels greater than 80 dB L_{dn}, risk of hearing loss for on- or off-installation residents is relatively low, and calculation of PHL is not necessary.

Noise generated by the focus of F-22 departures from RW 24 by F-22 aircraft under Alternative E would cause the 80 dB L_{dn} contour line to shift outwards from RW 06/24 by about 300 feet and to contract around RW 16/34 by about 120 feet. This shift would cause two buildings previously exposed to slightly less than 80 dB L_{dn} to be exposed to slightly greater than 80 dB L_{dn}. The number of buildings on JBER affected by 80 dB L_{dn} would decrease by 18 from 81 to 63. The four buildings newly within the 80 dB L_{dn} contour would include administrative and industrial buildings, which are occupied for at least a portion of the day.

Noise-induced Hearing Loss in the Workplace. The JBER Bioenvironmental Engineering Office would continue to implement all protective measures required by Air Force occupational safety regulations, minimizing the risk of noise-induced hearing loss in the workplace.

Noise in the Matanuska-Susitna Valley

The number of departures made from RW 34 and the number of arrivals made to RW 16 would be the same under Alternative E as under the No Action Alternative. The number and altitude of overflights over the southern Matanuska-Susitna Valley would not change under Alternative E relative to the No Action Alternative.

Noise Levels in the Knik Arm

Alternative E changes in F-22 flight operations would result in the estimated number of CIBW Level B harassment events per year for all JBER operations remaining very close to zero, increasing by 0.006 from 0.059 to 0.065 events per year. Noise levels associated with individual F-22 overflights would be the same as under the No Action Alternative. Increased concentration of departure operations on RW 24 would contribute to the extremely minor increase in overall harassment risk. The Air Force has determined, and the NMFS has concurred on the determination, that implementation of Alternative E may affect but is not likely to adversely affect protected species.

4.2.6 Alternative F: RW 24 for Departure; RW 16 Arrival; RW 16/34 Extension

Under Alternative F, F-22 departure operations would be conducted primarily from RW 24, and arrival operations would be conducted primarily to RW 16 (see Table 2.4-1). Terrain north of RW 16/34 would be excavated and the runway would be extended. The number of sorties flown annually by the 3 WG would not change under Alternative F.

Noise Levels on Land

Noise levels (L_{dn}) under Alternative F are shown in Figure 4.2-6. As was the case with Alternative C, F-22 aircraft maneuvering to make a second approach after making an initial approach to an extended RW 16 would generate increased noise to the southeast of RW 16/34. Movement of the RW 16 threshold to the north and addition of a precision approach to RW 16 would slightly decrease the altitude of aircraft north of RW 16/34.

Annoyance and Land Use Compatibility

As shown in Table 4.2-1, the number of off-installation land and water acres exposed to noise levels greater than 65 dB L_{dn} would decrease from 995 to 1,151 under Alternative F, over-land acres would increase from 107 to 115, and over-water acres would increase from 888 to 1,036. All off-installation land affected by noise exceeding 65 dB L_{dn} is within the railroad right-of-way or in the Port of Anchorage, areas that are not noise-sensitive. Total off-installation population affected would remain 0 under Alternative F (Table 4.2-2). The total on-installation population affected would increase from 1,424 to 1,955 (Table 4.2-3).

As shown in Table 4.2-4, L_{dn} at Aurora Elementary School, Government Hill Elementary, Mount Iliamna Elementary, Orion Elementary, William Tyson Elementary, JBER hospital, and the Katmai Child Development Center would increase by between 1 and 2 dB. Levels at Mount Spurr Elementary School would increase by 0.3 dB. Noise (L_{dn}) at Mountain View Elementary and Davis Park would decrease slightly from the No Action Alternative. Under Alternative F, noise levels at Mount Spurr Elementary School and Katmai Child Development Center would exceed 65 dB L_{dn}. If special noise attenuation measures are not already implemented, installation of noise attenuation could be considered to reduce noise levels.

JBER land area affected by noise levels greater than 65 dB L_{dn} would increase by 49 acres, from 130 to 179 acres of residential land; increase by 14, from 241 to 255 acres for community support land; and increase by 12, from 1,840 to 1,852 acres for administrative/industrial land use. Other land uses on JBER, such as open land, range areas, and airfield pavements, are not as noise-sensitive. Under Alternative F, the number of on-base residential structures exposed to noise greater than 65 dB L_{dn} would increase by 50 from 115 to 165. Impacts would be similar to those described for Alternative A.

Classroom Noise

The school day $L_{eq\text{-}8hr}$ would increase by less than 2 dB at all of the locations studied except Mountain View Elementary. At Mountain View Elementary, the school day $L_{eq\text{-}8hr}$ would decrease by l0.8 dB (Table 4.2-5). Exterior $L_{eq\text{-}8hr}$ at Mount Spurr Elementary, Mountain View Elementary, and the Katmai Child Development Center would exceed 67 dB, indicating that background noise levels in the classroom would be expected to exceed 40 dB. Under Alternative F, the NA50 (closed) at William Tyson Elementary would remain the same while NA50 (closed) at other locations would decrease by up to 0.6 dB (Table 4.2-6). If windows were open, the NA50 (open) would decrease by up to 1 at all of the locations studied (Table 4.2-7).

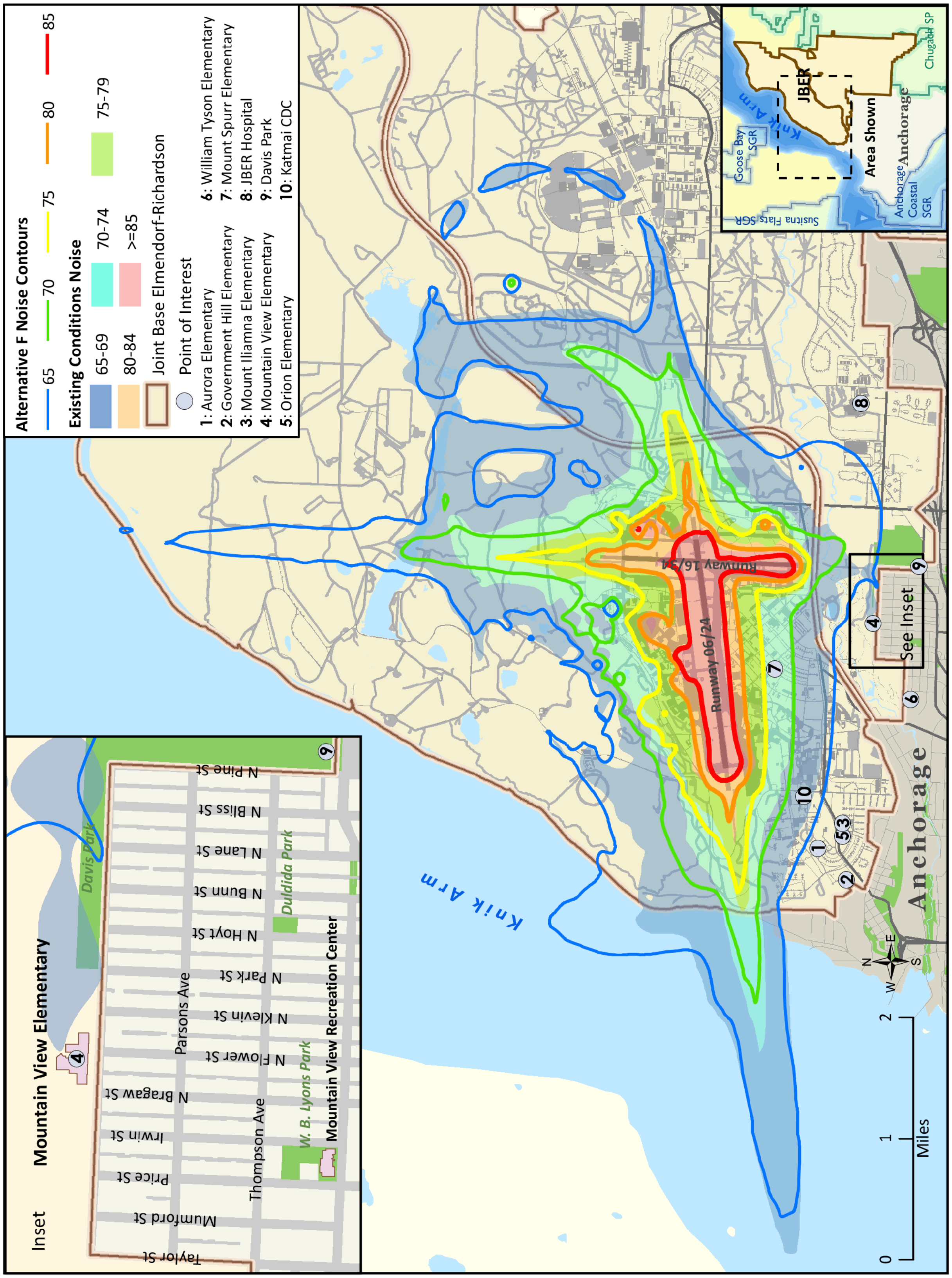

Figure 4.2-6. Noise Contours Under Existing Conditions and Alternative F

Sleep Disturbance

Under Alternative F, the estimated probability of sleep disturbance would not change measurably relative to baseline conditions in the Silver Run, Dayton, and Sunflower neighborhoods on base and in the Mountain View neighborhood. Because 3 WG aircraft rarely fly during the late-night time period when most people are asleep, changes in 3 WG flying patterns would have minimal effect on current sleep disturbance patterns.

Noise-Induced Hearing Impairment

Noise-induced Hearing Loss in the Community. No on- or off-base residences would be exposed to noise levels greater than 80 dB L_{dn}, risk of hearing loss for on- or off-installation residents is relatively low, and calculation of PHL is not necessary.

Noise generated by the focus of departures from RW 24 by F-22 aircraft under Alternative F would cause the 80 dB L_{dn} contour line to shift outwards from RW 06/24 by 50 feet and to contract around RW 16/34 by about 300 feet. This shift would cause one building previously exposed to slightly less than 80 dB L_{dn} to be exposed to slightly greater than 80 dB L_{dn}. The number of buildings on JBER affected by 80 dB L_{dn} would decrease by 20 from 81 to 61. The single newly affected building is a truck fill stand that is occupied for at least a portion of the day.

Noise-induced Hearing Loss in the Workplace. The JBER Bioenvironmental Engineering Office would continue to implement all protective measures required by Air Force occupational safety regulations, minimizing the risk of noise-induced hearing loss in the workplace.

Noise in the Matanuska-Susitna Valley

Movement of the RW 16 threshold to the north and addition of a precision approach to RW 16 would slightly decrease the altitude of aircraft north of RW 16/34. The effect of the increase in overflights at slightly lower altitudes on overall noise levels would be minimal, with noise levels remaining well below 65 dB L_{dn}.

Construction Noise

The operations of heavy-duty construction equipment and trucks under Alternative F would the same as described for Alternative B. Noise impacts at the construction site would be localized and temporary and would occur in an area currently exposed to frequent, loud aircraft overflights. Because the disposal location and haul routes used to reach the disposal location are not known at this time, the existing traffic conditions and amount by which traffic noise would increase are also unknown.

Noise Levels in the Knik Arm

Alternative F changes in F-22 flight operations would result in the estimated number of CIBW Level B harassment events per year for all JBER operations remaining very close to zero, decreasing by 0.009 from 0.059 to 0.050 events per year. Noise levels associated with individual F-22 overflights would be the same as under the No Action Alternative. A very minor increase in the number of harassment events associated with increased departures on RW 24 would be more than offset by the decrease in harassment events associated with decreased arrival operations on RW 06. The Air Force has determined, and the

NMFS has concurred on the determination, that implementation of Alternative F may affect but is not likely to adversely affect protected species.

4.2.7 No Action Alternative

Under the No Action Alternative, runway usage patterns would not change and the number of sorties conducted annually would not change (see Table 2.4-1). No terrain excavation or runway extension would be conducted.

Noise Levels on Land

Because the tempo and pattern of JBER-Elmendorf operations would not change under the No Action Alternative, noise levels on and near the base would also not change. As described Section 3.2.1, no off-base noise-sensitive land areas would be exposed to noise levels exceeding 65 dB L_{dn}. Although portions of the Mountain View Elementary School property are exposed to noise levels exceeding 65 dB L_{dn}, the school building itself is exposed to noise levels below 65 dB L_{dn}. Noise levels on-base exceed 65 L_{dn} in certain noise-sensitive areas, including 115 residences. Residents affected by elevated noise levels are more likely to become annoyed by the noise. Noise levels exceeding 80 dB L_{dn} would continue to affect 81 on-base structures, of which none are residential. The JBER Bioenvironmental Engineering Office would continue to monitor conditions in portions of the base known to be exposed to very high noise levels and implement all protective measures required by Air Force occupational safety regulations.

Noise Levels in the Knik Arm

Noise levels in the Knik Arm would remain the same under the No Action Alternative. Individual overflights would continue to exceed CIBW behavioral harassment thresholds for limited periods of time in certain portions of the Knik Arm. The overall risk of CIBW behavioral harassment for all JBER flight operations would remain very low at about 0.059 harassment events per year on average.

4.2.8 Conclusion

The environmental consequences and potential mitigation measures for acoustic environment are summarized in this section.

Environmental Consequences Summary

Alternative A would increase the number of off-base residents in the community of Mountain View exposed to noise levels above 65 dB L_{dn} from a calculated 0 to 424 residents. This increase in the number of off-base residents exposed to noise levels at which residences are not considered generally compatible is an unavoidable impact. The number of on-base residents exposed to 65 dB L_{dn} or greater would decrease from a calculated 1,424 to 824. Changes in L_{dn} at several representative noise-sensitive locations studied would range from a 2-dB increase (at Mountain View Elementary School) to decreases of up to 4 dB (at Katmai Child Development Center). Increases in L_{dn} would be expected to result in an increased likelihood of annoyance due to noise. Calculated equivalent noise levels at Mountain View Elementary School during the school day would increase from 68.3 to 70.2 dB $L_{eq\text{-}8hr}$, remaining above the recommended noise level threshold (i.e., 67 dB $L_{eq\text{-}8hr}$), while $L_{eq\text{-}8hr}$ at all other schools studied would decrease (by as much as 4 dB). Given the relatively minor increases in noise levels (i.e., 2 dB or less L_{dn}

or $L_{eq\text{-}8hr}$) at those locations where noise levels would increase and the fact that no schools would be newly exposed to $L_{eq\text{-}8hr}$ exceeding recommended classroom thresholds, impacts to annoyance, land use compatibility, and classroom noise under Alternative A would not be expected to be considered significant.

Under all of the alternatives, the risk of sleep disturbance, noise-induced hearing loss, and harassment of protected marine mammal species would remain minimal, and noise levels in the Matanuska-Susitna Valley would remain essentially the same as under existing conditions. Noise impacts in these impact categories would not be expected to be considered significant under any alternative.

Alternative B, Alternative C, Alternative D, Alternative E, and Alternative F do not result in off-base residences experiencing noise levels of 65 dB L_{dn} or greater. These alternatives result in noise levels at the noise sensitive locations studied either decreasing or not increasing by more than 2 dB L_{dn}. Alternative A, Alternative B, Alternative C, and Alternative D reduce the number of on-base residents experiencing noise levels of 65 dB L_{dn} or greater by approximately 200 to 650 persons. Alternative E and Alternative F increase the number of on-base residents experiencing noise levels of 65 dB L_{dn} or greater by approximately 300 to 500 persons. Alternative B and Alternative C would result in classroom noise, measured using $L_{eq\text{-}8hr}$ decreasing at all locations studied. Alternative D, Alternative E, and Alternative F would increase $L_{eq\text{-}8hr}$ at Mount Spurr Elementary by less than 1 dB remaining above the recommended noise level, while $L_{eq\text{-}8hr}$ at the other schools would increase by less than 2 dB remaining below the 67 dB threshold or decrease. Classroom noise levels would not newly increase to above recommended $L_{eq\text{-}8hr}$. Under Alternatives B, C, D, E, and F, impacts on annoyance, land use compatibility, and classroom noise would not be expected to be considered significant.

Construction noise impacts, which would only occur under Alternatives B, C, and F, would be temporary and limited to normal working hours. Although the noise could be audible at times in residential areas, it would occur in the context of an area exposed to frequent, loud aircraft overflight events, and impacts would not be expected to be considered significant.

Under the No Action Alternative, noise impacts would not increase relative to existing conditions. No significant noise impacts would occur under the No Action Alternative.

Mitigation

Mitigations are identified that can be applied to avoid, minimize, rectify, reduce, or compensate the effect for significant impacts (see Appendix E). There is no off-base increase in acoustic effects for Alternative B, Alternative C, Alternative D, Alternative E, or Alternative F. Noise impact mitigation measures are proposed for any of these alternatives.

Alternative A results in increased noise impact to a calculated 424 persons in the community of Mountain View. Provision of funds for additional structural noise attenuation off-base is not currently an action that the Air Force is authorized to carry out. There are no mitigations to address this unavoidable impact.

JBER would continue to undertake the following actions to address concerns for noise issues associated with flight operations.

- JBER will continue to adhere to reduced operations during late night hours except as required for missions to minimize acoustic effects. The seasonal variation in daylight permits F-22 pilots to achieve most of their annual after dark training in wintertime without late-night flights.
- JBER will continue to provide public information when seasonal runway maintenance requires increased flight operations that contribute to off-base acoustic impacts. This information does not reduce noise levels but it has the potential to reduce complaints of annoyance.
- JBER will continue to provide public information when exercises, such as Red Flag Alaska, change flight patterns and include the duration of such exercises in the public information.
- JBER flight operations will adhere to established and/or adjusted flight profiles to maintain altitudes over sensitive habitat and minimize any potential acoustic or visual impact to species such as the CIBW.
- The Air Force will continue to work with the affected communities, per the AICUZ guidelines, to help communities avoid acoustic impacts.

4.3 Safety

This section addresses potential environmental consequences to safety that could occur at or in the vicinity of JBER or within the training airspace. The analysis evaluates issues that have a potential to affect safety relative to the degree to which the activity increases or decreases safety risks to military personnel, the public, and property. Impacts are also assessed based on whether proposed activities would be compatible with existing land uses and development.

4.3.1 Alternative A: RW 34 for Departure; RW 06 Arrival (Proposed Action)

Under the proposed change in runway use patterns of Alternative A (see Section 2.4.1 and Table 2.4-1), there would be no changes to airfield safety zones, BASH, airfield flight procedures, or construction safety from those of baseline conditions. Therefore, no adverse impacts would be anticipated.

4.3.2 Alternative B: RW 34 for Departure; RW 06 Arrival; RW 16/34 Extension

Airfield Safety Zones

Alternative B would extend RW 16/34 2,500 feet to the north to achieve a 10,000-foot runway. This runway extension would result in an associated shift north of the existing CZ and APZs. Figure 4.3-1 shows airfield safety zones for all alternatives. Under Alternative B, there would continue to be no structures within the CZ. Structures currently located within APZ II (baseline) would continue to remain within APZ II under Alternative B (Table 4.3-1). The shift north of APZ II would also encompass four additional munitions storage igloos (buildings 36535, 36547, 36553, and 36561), in addition to the four already in APZ II. No additional waiver would be needed for the additional munitions storage igloos in APZ II, since JBER’s waiver for munitions storage igloos in the Sixmile complex allows for eight structures and currently has four.

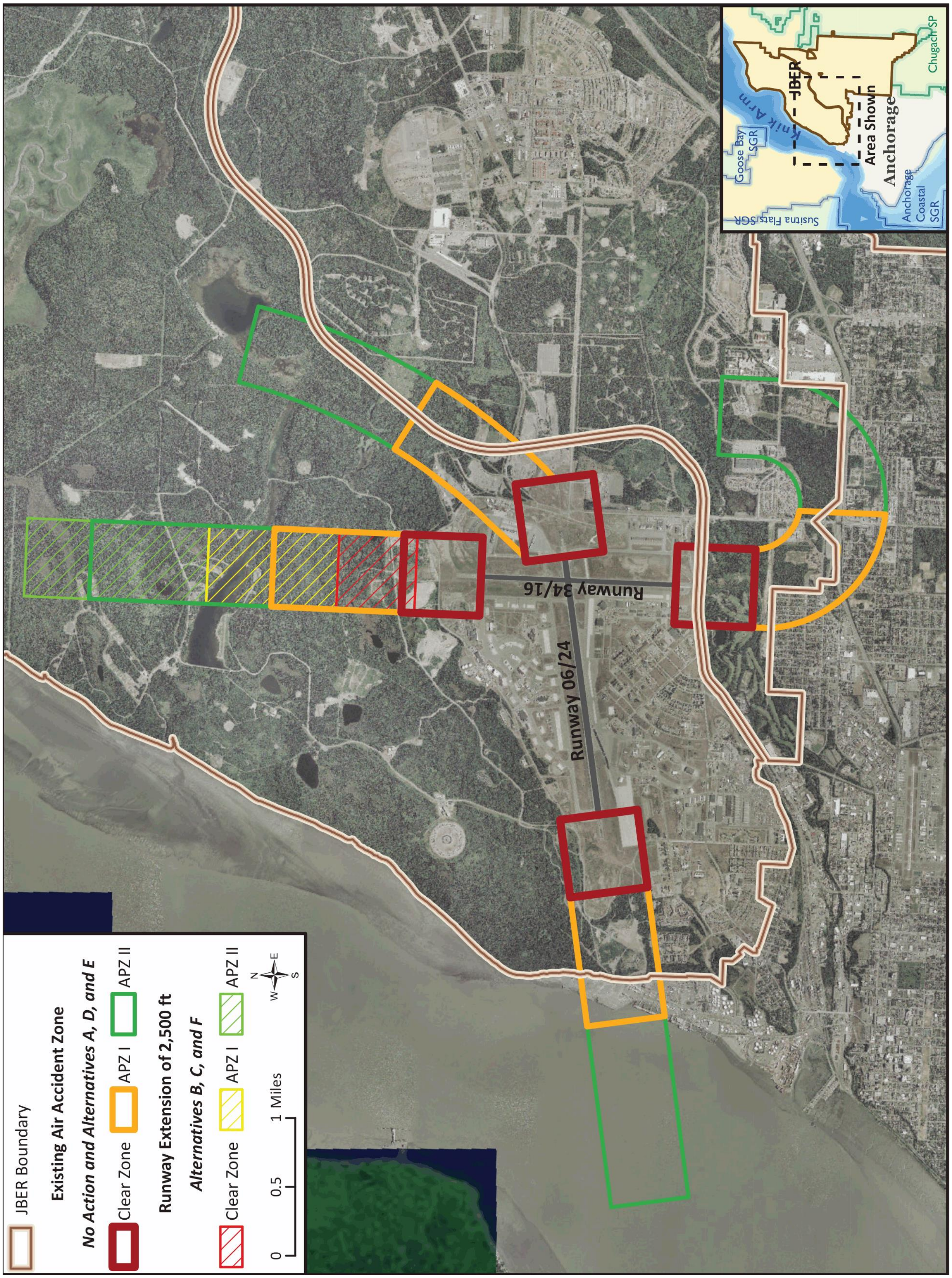

Figure 4.3-1. Airfield Safety Zones for All Alternatives

Table 4.3-1. JBER Structures Within Airfield Safety Zones under Runway Extension Alternatives

Building Name	Building Number	Year Built	Status
Clear Zone			
C-130 Engine Test Stand	17569	2014 and prior	Currently under waiver
APZ I			
None	NA		
APZ II			
Hazmat Storage	NA		
Munitions Storage Igloo	36563	1956	Currently under waiver
Munitions Storage Igloo	36557	1956	Currently under waiver
Munitions Storage Igloo	36537	1956	Currently under waiver
Munitions Storage Igloo	36545	1956	Currently under waiver
Munitions Storage Igloo	36535	1956	Add to existing waiver
Munitions Storage Igloo	36547	1956	Add to existing waiver
Munitions Storage Igloo	36553	1956	Add to existing waiver
Munitions Storage Igloo	36561	1956	Add to existing waiver
6-Mile Lake Chalet	31550	1990	AICUZ Variance
Top of the Hill Chalet	28590	1984	AICUZ Variance
611th Chalet	31562	1956	Exempt

Key:
APZ = Accident Potential Zone
NA = not applicable

The Top of Hill Chalet would shift from APZ II under the baseline conditions to APZ I under Alternative B. As previously stated, this recreational facility is typically unoccupied, but it is available for rental year-round to host different events. The Top of Hill Chalet can accommodate up to approximately 150 personnel. When occupied, this facility represents a place of assembly that would pose an incompatible use under APZ I guidelines.

Bird/Wildlife Strike Hazard

The northward extension of the airfield would place departing aircraft closer to the Sixmile Lake area, which is located approximately 1.5 miles north of the end of the existing RW 16/34. This natural area supports a variety of wildlife species, including wading birds and migratory waterfowl.

The potential for bird-aircraft strikes would increase slightly as aircraft would be closer to this area during departures. As noted for BASH risks at JBER, multiple programs are in place to reduce the risk of bird and wildlife strikes. The preliminary RW 16/34 extension design includes detention basins at the north end of extended RW 16/34. Construction of water features are not encouraged per AFI 32-7063 due to BASH risks. The preliminary design has the potential for increased safety risks from BASH events.

To minimize the potential for any future bird/wildlife-aircraft strikes, JBER would continue to implement an aggressive BASH program, including the Wildlife Hazard Warning System. JBER would also continue to coordinate extensively with on-staff U.S. Department of Agriculture wildlife experts regarding BASH-related issues. The overall risks associated with bird-aircraft strikes is expected to remain low, and no adverse impacts to safety would be anticipated with continued implementation of existing mishap prevention and BASH program procedures and application of the procedures necessary for the modified topography and drainage that would be created with the extension of RW 16/34.

Ground Safety

There is the potential of finding unexploded ordnance (UXO) within areas proposed for runway extension site development on the east side of the project (see Figure 4.3-2). A munitions and explosives of concern (MEC) investigation would be performed before development activities begin. The MEC investigation must be preceded by an Explosives Safety Submission (ESS), which must also be approved by the appropriate authorities before work begins (see DoD 6055.9-STD, *DoD Ammunition and Explosives Safety Standards*). The ESS is designed to provide an assessment of the explosives hazards likely to be encountered during the implementation of the MEC investigation and any resulting response action. Adherence to DoD 6055.9-STD for MEC remediation activities would minimize the UXO hazard during runway extension construction activities.

No unique construction practices or materials would be required to construct the runway expansion. During construction, standard industrial safety standards and BMPs would be followed including: implementing procedures to ensure that guards, housekeeping, and personal protective equipment are in place; establishing programs and procedures for lockout, right-to-know, confined space, hearing conservation, forklift operations, etc.; conducting employee safety orientations and performing regular safety inspections; and developing a plan of action for the correction of any identified hazards. No unusual ground safety risks would be expected from these activities.

4.3.3 Alternative C: RW 34 for Departure; RW 16 Arrival; RW 16/34 Extension

Airfield Safety Zones

As with Alternative B, Alternative C would extend RW 16/34 to the north. Under Alternative C, there would continue to be no structures within the CZs; structures currently located within APZ II (baseline) would continue to remain within APZ II. As with Alternative B, the only exception would be the Top of Hill Chalet, which would shift from APZ II under the baseline to APZ I. When occupied, this facility represents a place of assembly that would pose an incompatible use under APZ I guidelines.

Bird/Wildlife Strike Hazard

As noted for BASH risks at JBER, multiple programs are in place to reduce the risk of BASH. The preliminary RW 16/34 extension design includes detention basins at the north end of extended RW 16/34. Construction of water features are not encouraged per AFI 32-7063 due to BASH risks. The preliminary design has potential for increased safety risks from BASH events. Also, the northward extension of RW 16/34 would place departing aircraft closer to, and arriving aircraft at lower elevations over, the Sixmile Lake area. As discussed under Alternative B, the overall risks associated with bird-aircraft strikes is expected to remain low, and no adverse impacts to safety would be anticipated with continued implementation of existing mishap prevention and BASH program procedures and application of the procedures necessary for the modified topography and drainage that would be created with the extension of RW 16/34.

Ground Safety

There are no impacts to safety for Alternative C associated with ground safety that were not previously discussed under Alternative B; consequently, no adverse impacts would be anticipated.

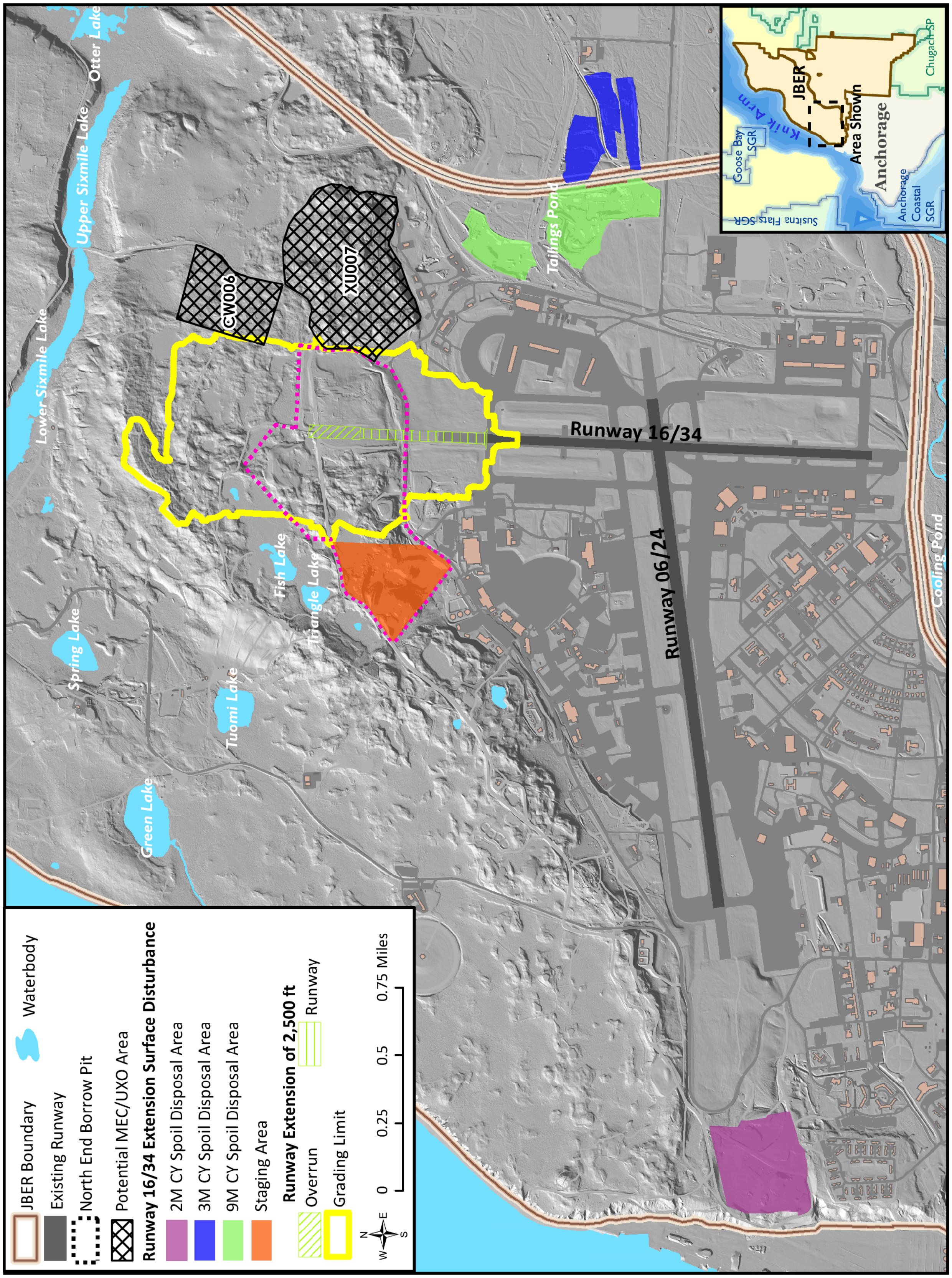

Figure 4.3-2. Areas with Potential of Unexploded Ordnance

4.3.4 Alternative D: RW 06 for Departure and Arrival

Under Alternative D, issues related to airfield safety zones, BASH, or construction safety would not differ from those of baseline conditions; consequently, no adverse impacts would be anticipated.

4.3.5 Alternative E: RW 24 for Departure; RW 06 Arrival

Under Alternative E, issues related to airfield safety zones, BASH, or construction safety would not differ from those of baseline conditions; consequently, no adverse impacts would be anticipated.

4.3.6 Alternative F: RW 24 for Departure; RW 16 Arrival; RW 16/34 Extension

Alternative F would extend RW 16/34 to the north the same as described for Alternatives B and C and would have F-22 departures the same as for Alternative E and arrivals the same as for Alternative C. Under Alternative F, issues related to airfield safety zones, BASH, or construction safety would not differ from those of Alternatives B, C, and E.

As noted for BASH risks at JBER, multiple programs are in place to reduce the risk of BASH. The preliminary RW 16/34 extension design includes detention basins at the north end of extended RW 16/34. Construction of water features are not encouraged per AFI 32-7063 due to BASH risks. The preliminary design has potential for increased safety risks from BASH events. As discussed under Alternatives B and C, the overall risks associated with bird-aircraft strikes is expected to remain low, and no adverse impacts to safety would be anticipated with continued implementation of existing mishap prevention and BASH program procedures and application of the procedures necessary for the modified topography and drainage that would be created with the extension of RW 16/34.

No adverse impacts would be anticipated with regard to construction safety; however, the Top of Hill Chalet would shift from APZ II under the baseline to APZ I, which would pose an incompatible use under APZ I guidelines.

4.3.7 No Action Alternative

Under the No Action Alternative, JBER would not implement proposed changes associated with F-22 runway usage. Issues related to airfield safety zones, BASH, or construction safety would not differ from those of baseline conditions; consequently, impacts would not change from existing conditions.

4.3.8 Conclusion

The environmental consequences and potential mitigation measures for safety are summarized in this section.

Environmental Consequences Summary

The Air Force has a history of closely coordinating with FAA and civil aircraft operators and an extensive BASH safety program. Alternative A, Alternative B, Alternative C, and Alternative F redirect F-22 flight operations to RW 16/34 and have the potential to reduce delays and/or potential interactions between military and civil aircraft in the Anchorage Bowl. Alternative D and Alternative E would continue use of RW 06/24 for F-22 arrivals and departures.

Alternative C and Alternative D do not meet FAA ODO requirements which are designed to improve runway safety. No alternative has impacts to airspace management and use.

Alternative B, Alternative C, and Alternative F have potential for increased BASH potential over Sixmile Lake. Expansion of the JBER BASH program to include newly affected areas would result in a less than significant impact to safety.

With application of the mitigation measures described below, none of the alternatives, including No Action, would result in a discernible change in safety associated with the improvement of F-22 operational efficiency.

Mitigation

Mitigations are identified that can be applied to avoid, minimize, rectify, reduce, or compensate the effect for significant impacts (see Appendix B.3). The following mitigations would be undertaken at JBER to avoid and/or minimize, to the extent practicable, any environmental impacts to safety associated with the improvement of F-22 operational efficiency.

- Expansion of the JBER BASH program to include newly affected areas for Alternative B, Alternative C, and Alternative F would reduce impacts to safety. Areas where vegetation is removed would be restored or revegetated with upland species, to minimize the bird-aircraft strike hazard within the safety area of military aircraft takeoff and landing.
- For Alternative C and Alternative F, the Air Force would work with the FAA to address F-22 arrival flight patterns and missed approach procedures associated with arrivals on an extended RW 16 to minimize potential interactions between military and civil aircraft in the Anchorage Bowl. If acceptable FAA and Air Force missed approach procedures cannot be established, JBER would use the existing TACAN procedures for arrival on RW 16 and/or the established RW 06 procedures for instrument approach. As explained in Section 5.2.1, the FAA is conducting an independent study to assess military and civil aircraft operations in the Anchorage Bowl, including an ILS approach to RW 16/34.

4.4 Air Quality

The following air quality analysis estimated the magnitude of emissions that would occur from F-22 operations and potential construction at JBER under three of the alternatives. If emissions from alternatives would not contribute to an exceedance of an ambient air quality standard, they would produce less than significant air quality impacts (See Appendix B).

The typical depth of the atmospheric mixing layer where the release of aircraft emissions would affect ground-level pollutant concentrations is 3,000 feet (914 meters). The analysis of alternative aircraft operations focuses on operations that would occur within the lowest 3,000 feet (914 meters) of the atmosphere. In general, aircraft emissions released above the mixing layer would not appreciably affect ground-level air quality. The project alternatives include changes in F-22 aircraft departure and arrival patterns that could affect F-22 operations below 3,000 feet AGL, and emissions below 3,000 feet are included in the analysis of alternatives. Emission effects of F-22 operations would occur within the immediate airspace surrounding JBER and the JBER-Elmendorf runways. The air quality analysis for proposed F-22 aircraft operations focuses on emission effects within this domain. Generally, emissions of CO and PM_{10} from operations or from runway construction would minimally impact the air quality maintenance areas identified in Section 3.4.1, due to the low strengths and/or substantial distances associated with the emission sources.

4.4.1 Alternative A: RW 34 for Departure; RW 06 Arrival (Proposed Action)

Alternative A involves changes in runway use patterns for F-22 departures and arrivals only (see Section 2.4.1 and Table 2.4-1) and would not include any emissions from facility improvements, construction, or changes in aircraft maintenance. Alternative A would improve the efficiency for F-22 operations at JBER. F-22 operations under Alternative A would not result in any substantial increase in emissions compared to existing conditions. As a result, emissions from Alternative A would not contribute to an exceedance of any ambient air quality standard and would produce less than significant air quality impacts.

4.4.2 Alternative B: RW 34 for Departure; RW 06 Arrival; RW 16/34 Extension

Construction

Alternative B would extend RW 16/34 by 2,500 feet to achieve a 10,000-foot runway with changes in F-22 runway use patterns. The air quality analysis of Alternative B assumes construction activity would involve the following components: (1) excavate terrain to remove topographic barriers, (2) cut and fill operations to create the runway foundation, (3) dispose of surplus excavated material, (4) construct the runway pavements, (5) construct a taxiway on one side of the proposed extension, (6) construct/relocate support features, such as Navaids, arrestor barriers, signage, and drainage, and (7) relocate the roadway around the north end of the runway extension. The air quality analysis evaluated impact scenarios to extend RW 16/34 by 2,500 feet.

Air quality impacts due to construction activities would occur from (1) combustive emissions due to the use of nonroad fossil fuel-powered equipment and on-road trucks that would deliver materials and supplies/haul debris from and to off-base locations and (2) fugitive dust emissions (PM_{10}/$PM_{2.5}$) due to the operation of equipment on dry soil. Assumed construction activity data were developed to estimate equipment and trucking usages and associated combustive and fugitive dust emissions. The analysis assumed construction would begin in year 2018 and would require three years to complete.

Factors needed to derive construction source emission rates were obtained from the USEPA NONROAD2008a model for nonroad construction equipment (USEPA 2009), the USEPA MOVES2014 model for on-road vehicles (USEPA 2014), and special studies on fugitive dust (Countess Environmental 2006).

Table 4.4-1 presents estimates of construction emissions that could occur with the extension of RW 16/34 by 2,500 feet. Peak annual emissions would occur in construction year two and would include (1) half of excavate terrain/cut and fill operations, (2) runway overrun – remove existing asphalt, (3) paved road – remove existing asphalt, (4) install gravel for erosion control, (5) half of install gravel and backfill, and (6) half of construct/relocate requisite support features activities. Due to the mobile and intermittent operation of proposed diesel-powered construction equipment over a large construction area, there would be minimal emissions in a localized area. Comparing Table 3.4-1 with Table 4.4-1 demonstrates that construction activities due to Alternative B would not contribute to an exceedance of any ambient air quality standard and therefore would produce less than significant air quality impacts.

Table 4.4-1. Air Emissions from Construction Activities for Extension to Runway 16/34 at JBER

Activity	Emission (tons per year) Proposed Action JBER						
	VOCs	CO	NO_x	SO_x	PM_{10}	$PM_{2.5}$	CO_{2e}
Vegetation Removal – Cut and Fill Operations	0.23	0.85	2.44	0.00	0.13	0.13	655
Building Demolition	0.01	0.04	0.13	0.00	0.01	0.01	36
Excavate Terrain/Cut and Fill Operations	8.08	31.81	90.10	0.13	17.47	5.22	19,376
Runway Overrun – Remove Existing Asphalt	0.00	0.01	0.03	0.00	0.00	0.00	8
Paved Road – Remove Existing Asphalt	0.02	0.05	0.14	0.00	0.01	0.01	43
Install Gravel for Erosion Control	0.05	0.15	0.47	0.00	0.03	0.02	137
Install Gravel and Backfill	0.30	0.93	3.02	0.01	0.15	0.14	833
Construct/Relocate Requisite Support Features	0.14	0.61	1.49	0.00	0.10	0.10	341
Asphalt and Resurfacing	0.62	1.97	5.81	0.01	0.37	0.35	1,637
Peak Annual Emissions[1]	**4.33**	**16.88**	**47.94**	**0.07**	**8.90**	**2.77**	**10,462**

Note:

[1] Includes (1) half of excavate terrain/cut and fill operations, (2) runway overrun – remove existing asphalt, (3) paved road – remove existing asphalt, (4) install gravel for erosion control, (5) half of install gravel and backfill, and (6) half of construct/relocate requisite support features activities.

Key:

CO = carbon monoxide
CO_{2e} = carbon dioxide equivalent
NO_x = nitrogen oxides
PM_{10} = particulate matter with an aerodynamic diameter of 10 microns or less
$PM_{2.5}$ = particulate matter with an aerodynamic diameter of 2.5 microns or less
SO_x = sulfur dioxide
VOC = volatile organic compound

Operations

Alternative B would improve the efficiency for F-22 operations at JBER and therefore would not result in any substantial increase in F-22 emissions compared to existing conditions. The extension of RW 16/34 and associated facilities would require annual maintenance and periodic repaving. These activities would generate nominal amounts of air emissions due to the use of fossil fuel-fired equipment. As a result, emissions from the implementation of Alternative B would not contribute to an exceedance of any ambient air quality standard and would produce less than significant air quality impacts.

4.4.3 Alternative C: RW 34 for Departure; RW 16 Arrival; RW 16/34 Extension

Construction

Alternative C is assumed to extend RW 16/34 as described for Alternative B. Table 4.4-1 presents estimates of emissions from construction. Due to the mobile and intermittent operation of proposed diesel-powered construction equipment over a large construction area, there would be minimal ambient impact of emissions in a localized area. As a result, construction activities due to Alternative C would not contribute to an exceedance of any ambient air quality standard and therefore would produce less than significant air quality impacts.

Operations

The quantity of F-22 operations at JBER under Alternative C would be equal to baseline conditions and therefore would not result in any substantial increases in F-22 emissions compared to existing conditions. The extension of RW 16/34 and associated facilities would require annual maintenance and periodic repaving. Alternative C also could include additional snow and ice removal activities to make RW 16/34 available for F-22 operations during weather events. These activities would generate nominal amounts of air emissions due to the use of fossil fuel-fired equipment. As a result, emissions from the implementation of Alternative C would not contribute to an exceedance of any ambient air quality standard and would produce less than significant air quality impacts.

Regarding potential operational air quality impacts to the nearby Eagle River PM_{10} and Municipality of Anchorage CO Maintenance Areas, F-22 operations and resulting emissions below 3,000 feet AGL within the Eagle River PM_{10} Maintenance Area would not change compared with baseline operations for any project alternative. Alternative C would slightly reduce F-22 flight operations below 3,000 feet AGL within the Municipality of Anchorage CO Maintenance Area. Currently, F-22s fly about 355 times per year for very brief time intervals within the Municipality of Anchorage CO Maintenance Area below 3,000 feet AGL. The number of F-22 flights through the CO maintenance area would decrease to 115 per year under Alternative C, although the modes of operation for each flight would be the same as baseline operations. The noise analysis determined that F-22s fly through the Municipality of Anchorage CO maintenance area below 3,000 feet AGL for a duration of about 28 seconds per flight in approach mode.

Table 4.4-2 presents estimates of the net change in emissions that would occur from F-22 operations within the Municipality of Anchorage CO Maintenance Area under Alternative C (Appendix D presents the emission calculations for this conformity evaluation). These data show that Alternative C would reduce F-22 emissions and therefore would result in less than significant CO impacts within this area. As a result, Alternative C would conform to the applicable State Implementation Plan for the project region.

Table 4.4-2. Net Change in Emissions from F-22 Operations Within the Municipality of Anchorage CO Maintenance Area – Alternative C

Scenario/Aircraft Type	Emission (tons per year)						
	VOCs	CO	NO_x	SO_x	PM_{10}	$PM_{2.5}$	CO_2e (mt)
Existing Conditions							
F-22	0.00	0.06	0.05	0.01	0.01	0.01	24.47

Table 4.4-2. Net Change in Emissions from F-22 Operations Within the Municipality of Anchorage CO Maintenance Area – Alternative C (continued)

Scenario/Aircraft Type	Emission (tons per year)						
	VOCs	CO	NO_x	SO_x	PM_{10}	$PM_{2.5}$	CO_2e (mt)
Alternative C							
F-22	0.00	0.02	0.02	0.00	0.00	0.00	7.93
Net Change in Annual Emissions[1]	**(0.00)**	**(0.04)**	**(0.03)**	**(0.01)**	**(0.01)**	**(0.01)**	**(16.54)**

Notes:
[1] Equal to Alternative C minus existing conditions emissions.
() = negative value.
Key:
CO = carbon monoxide
CO_{2e} = carbon dioxide equivalent
mt = metric tons
NO_x = nitrogen oxides
PM_{10} = particulate matter with an aerodynamic diameter of 10 microns or less
$PM_{2.5}$ = particulate matter with an aerodynamic diameter of 2.5 microns or less
SO_x = sulfur dioxide
VOC = volatile organic compound

4.4.4 Alternative D: RW 06 for Departure and Arrival

Alternative D would change runway use patterns for F-22 departures and arrivals only with no facility improvements, no construction emissions, nor any change in aircraft maintenance. Shifting existing F-22 departures to RW 06 would require F-22s to taxi an additional 10 to 15 minutes compared to takeoffs from other runways, and potentially be on hold another 5 minutes due to arriving aircraft. Table 4.4-3 presents estimates of emissions from additional F-22 taxiing and holding operations (engine in idle mode) that would occur under Alternative D. Due to the mobile and intermittent operation of F-22s over such a large taxiway, there would be nominal emission increases in a localized area when compared to existing conditions. As a result, implementation of Alternative D would not contribute to an exceedance of any ambient air quality standard, and therefore would produce less than significant air quality impacts.

Table 4.4-3. Air Emissions from Additional F-22 Idling Times Due to Departures from Runway 06 at JBER – Alternative D

Scenario/Aircraft Type	Emission (tons per year)						
	VOCs	CO	NO_x	SO_x	PM_{10}	$PM_{2.5}$	CO_2e (mt)
Existing Conditions							
F-22	0.56	16.08	1.01	0.35	0.81	0.80	1,087
Alternative D							
F-22	2.74	78.98	4.94	1.74	3.97	3.93	5,340
Net Increase in Annual Emissions[1]	**2.18**	**62.90**	**3.93**	**1.38**	**3.16**	**3.13**	**4,253**

Note:
[1] Equal to Alternative D minus existing conditions emissions.
Key:
CO = carbon monoxide
CO_{2e} = carbon dioxide equivalent
mt = metric tons
NO_x = nitrogen oxides
PM_{10} = particulate matter with an aerodynamic diameter of 10 microns or less
$PM_{2.5}$ = particulate matter with an aerodynamic diameter of 2.5 microns or less
SO_x = sulfur dioxide
VOC = volatile organic compound

4.4.5 Alternative E: RW 24 for Departure; RW 06 Arrival

Alternative E would change runway use patterns for F-22 departures and arrivals only, with no facility improvements or any construction. Operations under Alternative E would not result in any substantial increase in emissions compared to existing conditions. As a result, emissions from Alternative E would not contribute to an exceedance of any ambient air quality standard and would produce less than significant air quality impacts.

4.4.6 Alternative F: RW 24 for Departure; RW 16 Arrival; RW 16/34 Extension

Construction

Alternative F would extend RW 16/34 as described for Alternative B. Table 4.4-1 presents estimates of emissions from construction. Due to the mobile and intermittent operation of proposed diesel-powered construction equipment over a large construction area, there would be minimal ambient impacts of emissions in a localized area. As a result, construction activities due to Alternative F would not contribute to an exceedance of any ambient air quality standard and therefore would produce less than significant air quality impacts.

Operations

The quantity of F-22 operations at JBER under Alternative F would be equal to baseline conditions, and therefore would not result in any substantial increases in F-22 emissions compared to existing conditions. The extension of RW 16/34 and associated facilities would require an increase in annual maintenance and periodic repaving. Alternative F also could include additional snow and ice removal activities to make RW 16/34 available for F-22 operations during weather events. These activities would generate nominal amounts of air emissions due to the use of fossil fuel-fired equipment. As a result, emissions from the operation of Alternative F would not contribute to an exceedance of any ambient air quality standard and would produce less than significant air quality impacts.

Regarding potential operational air quality impacts to the nearby Eagle River PM_{10} and Municipality of Anchorage CO Maintenance Areas, F-22 operations and resulting emissions under Alternative F would be identical to those estimated for Alternative C. As a result, Alternative F would conform to the applicable State Implementation Plan for the project region.

4.4.7 No Action Alternative

Under the No Action Alternative, ambient air quality in the region would not change, as existing runway operations at JBER would continue. Air quality associated with the No Action Alternative would be the same as under current conditions.

4.4.8 Conclusions

The environmental consequences and potential mitigation for air quality are summarized in this section.

Environmental Consequences Summary

Implementation of Alternative A, Alternative D, Alternative E, or No Action would not produce any change in emissions, and therefore there would be no air quality impacts associated with these alternatives.

Alternative B, Alternative C, and Alternative F have temporary construction emissions. Emissions calculations were prepared for a RW 16/34 extension construction and F-22 operations on an extended runway. With application of the mitigation measures described below, impacts to air quality would be less than significant for Alternative B, Alternative C, and Alternative F. Emissions were found to not contribute to an exceedance of any ambient air quality standards. Alternative B, Alternative C, and Alternative F would produce less than significant air quality impacts.

Mitigation

Mitigations are identified that can be applied to avoid, minimize, rectify, reduce, or compensate the effect for significant impacts (see Appendix B.4). For Alternative A, Alternative D, Alternative E, and No Action, there would be no air quality impacts and, therefore, no mitigation is proposed for these alternatives.

The following mitigation measures would be undertaken at JBER to minimize emissions and avoid, to the extent practicable, potential environmental impacts to air quality associated with the runway extension under Alternative B, Alternative C, or Alternative F.

- Identify and implement BMP construction measures to control/reduce wind erosion and control emissions, including:
  - Site watering,
  - Installations and regular inspection of all emission control devices on construction equipment,
  - Reduce/eliminate excess equipment and machine idling, and
  - Place gravel at ingress/egress of the construction sites to minimize transport of dust off site.

4.5 Physical Resources

4.5.1 Alternative A: RW 34 for Departure; RW 06 Arrival (Proposed Action)

Earth Resources

Alternative A involves changes in runway use patterns for F-22 departures and arrivals only, with no facility construction and no change in the overall number of aircraft operations (see Section 2.4.1 and Table 2.4-1). There would be no impacts to earth resources of JBER.

Water Resources

Groundwater **–** Alternative A does not involve any ground-disturbance or activities that could affect groundwater at JBER. There would be no associated impacts to groundwater resources.

Surface Water **–** Alternative A does not involve any ground-disturbance or other activities in existing surface waters, nor does it include any activities that could increase sediment loads at JBER. There would be no associated impacts to surface water resources.

Drinking Water **–** Alternative A does not involve any activities that could affect the drinking water at JBER, and there would be no impacts.

Storm Water **–** Alternative A does not involve any activities that would result in new impervious surfaces, increase water volumes contributing to storm water flow, or introduce any additional substances into the storm water system. There would be no associated impacts to the storm water system at JBER.

Floodplains **–** Alternative A does not involve any ground-disturbance or other activities in or near existing floodplain areas on JBER. There would be no associated impacts to floodplains.

Wetlands

Alternative A involves changes in runway use patterns for F-22 departures and arrivals only, with no facility construction and no change in the overall number of aircraft operations (see Section 2.4.1 and Table 2.4-1). Therefore, no impacts to wetland resources are anticipated.

4.5.2 Alternative B: RW 34 for Departure; RW 06 Arrival; RW 16/34 Extension

Alternative B involves changes in runway use patterns for F-22 departures and arrivals, and includes the addition of a 2,500-foot extension at the north end of RW 16/34 to achieve a 10,000-foot runway (Section 2.4.2). The analysis of the runway extension is based on the construction components described in Section 2.4.2 and Table 2.4-2.

Earth Resources

The existing terrain north of RW 16/34 consists of low, generally east/west trending hills that rise approximately 50 to 125 feet above the elevation of RW 16/34. Constructing a 2,500-foot extension of RW 16/34 with the required glide slope would require substantial cut and fill of two topographic barriers (Figure 2.4-3). The majority of the excavated material would consist of a mix of gravelly sandy loam with cobbles, sand, and silt loam (Section 3.5.1). In general, these soils are well drained, high in strength, low in compressibility, not susceptible to frost, and an excellent foundation material (NRCS 2001). The total material from the cut-and-fill activities is estimated to be approximately 15.31 million cubic yards, all of which will be disposed of in three existing gravel borrow pits (Figure 2.4-3). It is anticipated that approximately 1.52 million cubic yards of this material would be disposed of in the existing gravel borrow pit at the west end of RW 06/24, and that approximately 13.78 million cubic yards would be disposed of in the existing gravel borrow pits east of the airfield (Figure 2.4-3).

Excavation for the runway extension and its associated features would disturb an estimated total of 557 acres, including the staging area and relocation of Airlifter Drive). The ground surface would be cleared of existing vegetation, graded and/or filled, and prepared for the installation of subsurface utilities and road/runway foundations. Since more than 1 acre would be disturbed by construction, a construction NPDES storm water permit would be required. Under the permit, the base must develop a site-specific SWPPP that describes BMPs to be implemented to eliminate or reduce sediment and non-storm water discharges. Some of the soils in the cut-and-fill area for the possible extension of RW 16/34 are highly susceptible to erosion once the surface vegetation is removed. With proper design and implementation of the SWPPP, impacts from erosion and off-site sedimentation would be negligible. All constructed features would be designed and constructed to meet seismic design standards for the base. No significant impacts to soil or geologic resources would result from the implementation of Alternative B.

Water Resources

Groundwater **–** Alternative B would include ground disturbances associated with runway construction, and terrain excavation activities. These disturbances would not occur in any areas in or near waterbodies that have a direct, known relationship with groundwater recharge (for example, Ship Creek). Excavations undertaken in order to level existing topography would occur above ground level; groundwater would not be present in these areas. In addition, excavation depths necessary for the actual runway construction (estimated to be approximately 6 feet) would not be expected to be in proximity to the shallow aquifer underlying much of JBER. According to the NRCS, the primary soil types in the vicinity of runway construction, including the Deception-Estelle-Kichatna complex (soils are discussed in Section 3.5, *Physical Resources, Earth Resources*), do not have construction limitations based on depth to groundwater (NRCS 2015).

Potential groundwater contaminants include petroleum, oil, lubricants (POLs) associated with the operation and maintenance of construction vehicles. JBER would ensure that contactors adhere to all DoD, JBER, and State of Alaska standard operating procedures and BMPs for construction, operation of vehicles, and spill prevention. Therefore, any potential impacts from such materials would be minimal.

Surface Water **–** Construction activities under Alternative B would occur in the Ship Creek and Moonshine Creek watersheds, each of which eventually drain westward and empty into Knik Arm. Since these drain to Knik Arm, they would be considered federally designated “waters of the United States” and subject to regulatory jurisdiction. However, activities associated with the extension of RW 16/34 would not occur in, or have the potential to directly disturb, any surface waters in proximity to the areas under consideration for runway construction, excavation, or cut and fill activities. JBER would ensure that contractors would adhere to all DoD, JBER, and State of Alaska standard operating procedures and BMPs, thus minimizing the potential for sediment transport (see Section 4.5.8, Conclusions). Potential secondary impacts from proposed activities could result in additional sediment loads being transported to Ship Creek, Fish Lake, or Triangle Lake, especially during excavation and cut and fill activities. Fish Lake and Triangle Lake are groundwater and sheet flow fed waters with no defined inlets/outlets. These waters are depressional and do not have a direct surface water connection to tidal waters, but have been determined by the USACE as “waters of the United States.” Additional consultation with the USACE would occur to ensure the minimization of impacts to “waters of the United States.” Both of the man-made Upper and Lower Sixmile Lakes are fed by springs that come out of the side of the hill that would be partially cut for a potential RW 16/34 extension. Grading of the hill would be limited to a very small area of the ridgetop to remove approximately 10 vertical feet from the ridge, and would not be expected to impact these springs or change the hydrology of these lakes.

Drinking Water – Ground disturbances associated with runway construction would occur well downstream of drinking water sources and drinking water infrastructure located on JBER-Richardson. In addition, development in areas that could impact the drinking water system is restricted to the greatest extent possible on JBER (JBER 2012). Thus, there would be no expected impacts to the drinking water system on JBER.

Storm Water –Construction activities under Alternative B would result in the creation of new impervious surface areas on JBER, resulting in additional storm water loads to the drainage system. Table 4.5-1 presents the potential additional storm water volumes for several features of runway construction based on surface area estimates made for the extension of RW 16/34 (see Table 2.4-1). This additional volume would occur in Drainage Area 1, the largest drainage area on JBER, and would be directed towards Outfall Area 1, which collects in the Cherry Hill Ditch before emptying to Knik Arm. Due to the length of the storm sewer system and the distance of the runway area and areas of proposed construction from Cherry Hill Ditch, Ship Creek, and Knik Arm, there is often ample opportunity to intercept potential spills prior to any contaminants reaching the outfall area. Further, JBER would ensure that contactors would adhere to all DoD, JBER, and State of Alaska standard operating procedures and BMPs for construction, the operation of vehicles, and spill prevention. Anticipated impacts that could result in the introduction of increased sediment loads, chemical agents, or POLs would be minimal.

Since these new impervious areas would only represent a fraction of the total impervious surface located in Drainage Area 1 (which contains most developed areas, runways, and industrial areas on JBER-Elmendorf), coupled with the low yearly average annual rainfall totals for the Anchorage area and gradual snowmelts, the existing storm water system is not anticipated to be significantly impacted by the additional storm water volumes added by the potential extension of RW 16/34 and related construction.

Table 4.5-1. Additional Storm Water Volume from New Impervious Surface from Runway 16/34 Extension Construction

	New impervious surface (m^2)	Estimated runoff volume (m^3)*
Runway	62,074	48,976
Runway Paved Overrun and Shoulders	81,058	63,954
Taxiway Pavements	57,819	45,619
Arm/disarm Pad	17,010	13,420
	Total	**171,969**

Note:
* includes yearly average rainfall and meltwater potential from average yearly snowfall
Key:
m^2 = square meter
m^3 = cubic meter

Potential storm water contaminants include POLs associated with the operation and maintenance of construction vehicles. JBER would ensure that contactors would adhere to all DoD, JBER, and State of Alaska standard operating procedures and BMPs for construction, the operation of vehicles, and spill prevention, and any potential impacts from such materials would be minimal.

Another potential impact could result from increased sediment load into the storm water system and eventually to the outfall area receiving waters. The primary soil type in the proposed excavation areas, the

Deception-Estelle-Kichatna complex, is considered to have a high susceptibility to wind erosion (NRCS 2015). JBER is situated on land with relatively flat topography, and as a result, erosion is generally not an issue on the installation. In addition, many areas of JBER are vegetated and permeable, allowing storm water to infiltrate into the ground.

Grading necessary for construction of the runway extension will result in an internally draining topography with catch-basins on both sides of the extended runway, designed to prevent increased sediment load into the storm water system. Upon the completion of construction, the ground surface will be revegetated with local native vegetation to stabilize the surface and minimize wind erosion of soils. The existing gravel borrow pits where spoil would be deposited are in areas of JBER with relatively flat topography and would be stabilized with local native vegetation upon the completion of the project. Therefore, potential impacts from increased sediment load would be minimized.

However, since construction activities for the potential extension to RW 16/34 would result in ground disturbance greater than 1 acre, coverage would be needed under an APDES construction storm water permit. This would require the development and implementation of an Erosion and Sediment Control Plan, which would be submitted to 673d Civil Engineer Squadron, Natural Resources Management (673 CES/CEIEC) for approval before construction activity is authorized. Oversight during construction activities would be undertaken by 673 CES/CEIEC to ensure all required and appropriate BMPs are properly implemented. Regular inspections by 673 CES/CEIEC staff as well as construction project coordinators identify and correct potential BMP deficiencies to ensure that runoff from these sites is uncontaminated and free of sediment. Therefore, potential impacts to the storm water system would be minimal.

***Floodplains* –** Alternative B does not involve any ground-disturbance or other activities in or near existing floodplain areas on JBER. There would be no associated impacts to floodplains. The Air Force provided early notice to the public of potential floodplain/wetlands impacts in the Notice of Intent for this EIS (see Appendix A).

Wetlands

As described in Section 2.4.2, the preliminary construction requirements for a 2,500-foot extension of RW 16/34 that would relate to wetland impacts are:

- Excavation of existing terrain to remove topographic barriers;
- Cutting and filling operations to create the necessary foundation for a runway;
- Disposing of surplus excavated material;
- Construction of the runway and taxiway;
- Construction or relocation of support features and drainages; and
- Relocating the roadway.

Impacts to wetlands would occur directly through the grading operations, disposal of excess excavated materials, and construction of the infrastructure necessary to extend the runway. Indirect wetland impacts could occur to wetlands outside the construction footprint by soil disturbance, storm water, alteration of hydrology and receipt of sediments and other pollutants.

Direct impacts associated with Alternative B were estimated by overlying the footprint for grading activities and spoil disposal areas with the known wetlands at JBER (Figure 3.5-4). A portion of the proposed grading limit overlaps the North End Borrow Pit. The wetlands shown inside the North End Borrow Pit are historic wetlands that have been previously impacted as part of the airfield obstruction removal project (see Chapter 5). The areas proposed for spoil disposal are currently being used or historically have been used as gravel borrow pits or as disposal areas, and no wetlands occur in these locations. Therefore, direct impacts to wetlands associated with Alternative B would occur in the areas of the grading limits outside the boundaries of the North End Borrow Pit.

The acreage of potential wetland loss due to direct impacts is summarized by wetland type in Table 4.5-2. In total, approximately 27.9 acres of wetland would be directly affected by Alternative B. This represents 0.37 percent of the total known wetlands of all types at JBER.

Table 4.5-2. Alternative B Potential Wetland Impacts

Wetland Type	Acres	Total Wetland Area at JBER	% Total Wetland Area
Freshwater Emergent Wetland	10.6	268.51	3.95%
Freshwater Shrub Wetland	17.3	2,636.27	0.66%
Total	**27.9**	**7,484.34**	**0.37%**

Additional indirect impacts could occur to wetlands that are only partially located within the proposed grading limit. For example, a large freshwater shrub wetland is located adjacent to and directly hydrologically connected to Fish Lake, with a floating mat separating the two areas. Proposed cuts in the vicinity of this wetland could result in elevations that are 30 feet below the existing surface of the wetland and could result in hydrology changes to the wetlands and the Lake. Avoidance and measures to prevent and/or reduce hydrologic impacts to Fish Lake would be considered in the final construction design and could include establishing a buffer around wetlands near the boundaries of the grading limit prior to beginning construction in the grading limits. Such buffers will be created based on hydrology, vegetation, and topography characteristics identified in the field.

Any wetland impacts that cannot be avoided or minimized may require compensatory mitigation, to be determined by the USACE. Mitigation requirements may be determined using a debit-credit calculation approved by the USACE, such as the Methodology published for public comment in April 2016 (USACE 2016). Potential mitigation for indirect impacts could include the placement of groundwater monitoring wells and piezometers could be placed in locations where there is a potential for indirect adverse impacts to hydrology. Further mitigation such as the construction of retaining walls or the installation of a drainage system would be implemented if needed to minimize changes in hydrology.

4.5.3 Alternative C: RW 34 for Departure; RW 16 Arrival; RW 16/34 Extension

Alternative C involves changes in runway use patterns for F-22 departures and arrivals, and includes extension of RW 16/34 as described for Alternative B. Impacts to all of the physical resources (earth resources, water resources, and wetlands) of JBER would be the same as for Alternative B.

4.5.4 Alternative D: RW 06 for Departure and Arrival

Alternative D involves changes in runway use patterns for F-22 departures and arrivals only, with no facility construction.

Earth Resources

With no facility construction, there would be no impacts to the earth resources of JBER.

Water Resources

With no facility construction, there would be no addition of impervious surfaces and the associated additional added water volumes to the JBER storm water system.

Under Alternative D, the concentration of departures on RW 06 could result in an increased use of de-icing agents during winter months, due to the long taxi time and possible hold times at the end of the runway waiting for clearance to takeoff. This could result in the introduction of additional de-icing agent into storm water runoff flows over the existing conditions. Over the last several years, JBER has lightened its de-icing footprint by using more environmentally friendly products, and replacing older equipment with newer, more efficient application components (JBER 2016a). Any de-icing agents entering the storm water system in Drainage Area 1 would travel a significant distance, through culverts and vegetated ditches, before being discharged to a large swale, above the outfall area. In the event that a large spill of any kind occurred, spill response actions could mitigate potential contaminants before they reached the outfall.

Wetlands

With no facility construction, there would be no ground disturbance, and, therefore, no impacts to wetland resources would be anticipated.

4.5.5 Alternative E: RW 24 for Departure; RW 06 Arrival

Alternative E involves changes in runway use patterns for F-22 departures and arrivals only, with no facility construction, and no anticipated increase in de-icing agent use. Therefore, there would be no impacts to any of the physical resources (earth resources, water resources, or wetlands) of JBER, as noted for Alternative A.

4.5.6 Alternative F: RW 24 for Departure; RW 16 Arrival; RW 16/34 Extension

Alternative F would focus F-22 departures from RW 24 and F-22 arrivals on an extended RW 16. This alternative would also include the extension of RW 16/34 as described for Alternative B. Impacts to physical resources (earth resources, water resources, and wetlands) would be the same as for Alternative B.

4.5.7 No Action Alternative

Under the No Action Alternative, F-22 flight operations would continue as they are currently configured. There would be no facility construction and no change in the overall number of aircraft operations. Thus, no impacts to the physical resources (earth resources, water resources, and wetlands) of JBER would occur.

4.5.8 Conclusions

The environmental consequences and potential mitigation for physical resources are summarized in this section.

Environmental Consequences Summary

There would be no construction and no impacts to physical resources with Alternative A, Alternative D, Alternative E, and No Action.

Construction of the RW 16/34 extension with Alternative B, Alternative C, and Alternative F would impact water resources and earth resources. Application of the mitigation measures described below would result in less than significant impacts to water and earth resources for Alternative B, Alternative C, or Alternative F. Construction associated with Alternative B, Alternative C, and Alternative F would result in unavoidable impacts to approximately 28 acres of wetlands. Measures to compensate for these impacts are described below.

Mitigation

Mitigations are identified that can be applied to avoid, minimize, rectify, reduce, or compensate the effect for significant impacts (see Appendix B.5). For Alternative A, Alternative D, Alternative E, or No Action, there would be no effects to any physical resources, and, therefore, no mitigation measures are proposed for any of these alternatives.

The following mitigation measures would be undertaken at JBER to reduce, to the extent practicable, environmental impacts to physical resources associated with Alternative B, Alternative C, and Alternative F that would involve RW 16/34 extension construction.

- Develop a site-specific SWPPP as part of the required construction NPDES storm water permit, that would specify standard erosion control practices to be implemented to eliminate or reduce sediment and non-storm water discharges, including:
    - Use of mulch or artificial cover where repeated disturbance is expected, and
    - Stabilization of soil within 30 days of final disturbance through vegetative or permanent artificial means (e.g., paving or rip-rapping).
- Ensure that contracts specify, and contactors adhere to, all DoD, JBER, and state of Alaska standard operating procedures for construction, operation of vehicles, and spill prevention.
- Ensure that construction activities are conducted in accordance with the applicable storm water discharge permit for any areas that result in soil disturbance.
- Identify and implement BMP construction and vehicle operation measures to control/reduce wind erosion and control emissions, including:

  - Site watering, and
  - Placing gravel at ingress/egress of the construction sites to minimize transport of dust off site.
- Place groundwater monitoring wells and piezometers in locations where there is a potential for indirect adverse impacts to hydrology.
- Construct retaining walls or install a drainage system, if needed, to minimize changes in hydrology due to potential indirect impacts.
- Coordinate with the USACE to determine the jurisdictional status of 28 acres of wetlands that are expected to be unavoidably impacted during the construction of the runway extension. The final impacted wetland acres would be delineated to determine precise wetland boundaries and the function and value of those approximately 28 acres of wetlands as part of site design. Coordination would be in compliance with EO 11990, *Protection of Wetlands*. Jurisdictional wetland impacts that cannot be avoided or minimized may require compensatory mitigation, to be determined by the USACE. Mitigation requirements may be determined using a debit-credit calculation approved by the USACE, such as the Methodology published for public comment in April 2016 (USACE 2016).

4.6 Hazardous Materials and Waste Management

4.6.1 Alternative A: RW 34 for Departure; RW 06 Arrival (Proposed Action)

Alternative A would use RW 34 as the primary focus for F-22 departure and RW 06 as the primary runway for arrival. There would be no facility construction and no change in the overall number of aircraft operations. There would be no change in the use of hazardous materials and generation of hazardous waste at JBER. Therefore, no impacts to hazardous materials and waste at JBER are anticipated.

4.6.2 Alternative B: RW 34 for Departure; RW 06 Arrival; RW 16/34 Extension

Alternative B involves changes in runway use patterns for F-22 departures and arrivals (Table 2.4-1) and would include the addition of a 2,500-foot extension of RW 16/34 to achieve a 10,000-foot runway (Section 2.4.2).

Hazardous Materials

Existing procedures for the centralized management of the procurement, handling, storage, and issuing of hazardous materials through the HAZMART are adequate to handle the changes anticipated under Alternative B. Construction of the runway extension and associated infrastructure may require the use of hazardous materials by contractor personnel. Project contractors would comply with federal, state, and local environmental laws and would employ affirmative procurement practices when economically and technically feasible.

All hazardous materials and construction debris generated by the proposed project would be handled, stored, and disposed of in accordance with federal, state, and local regulations and laws. Permits for handling and disposal of hazardous material would be coordinated by the contractor with the base hazardous waste program manager. The use of hazardous materials would not cause adverse impacts.

In the event of fuel spillage during construction, the contractor would be responsible for its containment, clean up, and related disposal costs. JBER would require the contractor to have sufficient spill supplies readily available on the pumping vehicle and/or at the site to contain any spillage. In the event of a contractor-related release, the contractor would immediately notify the 3 WG Civil Engineering/ Environmental Flight and take appropriate actions to correct its cause and prevent future occurrences.

Hazardous Waste

As described in Section 4.3, Safety, there is the potential of finding UXO within areas proposed for runway extension site development on the east side of the project. An MEC investigation would be performed prior to the start of development activities. Adherence to DoD 6055.9 STD, *DoD Ammunition and Explosives Safety Standards*, for MEC remediation activities would minimize the UXO hazard during runway extension construction activities.

JBER-Elmendorf would continue to generate hazardous wastes during various operations and maintenance activities. Hazardous waste disposal procedures, including off-base disposal procedures, are adequate to handle changes in quantity and would remain the same. The base's OPLAN 19-3 (JBER 2016) would be updated to reflect any changes of hazardous waste generators and waste accumulation point monitors. The number of hazardous waste accumulation sites would be modified to handle any change in waste generation. JBER-Elmendorf would implement appropriate hazardous waste control procedures to minimize potential risks to personnel and the environment, and no adverse impacts would be anticipated.

Environmental Restoration Program

Construction of the runway extension and associated features facilities under Alternative B would occur in proximity to two closed ERP sites. RW017 is a closed CERCLA site located north and slightly east of the proposed runway extension. Radiological waste at RW017 was removed in 1980 and no remaining contamination was detected at site closure. LF006 is a closed State site located just to the north and east of the current runway configuration. LF006 was filled with construction and demolition debris, which should be encountered during the earthwork for this project. There are no soil or groundwater restrictions with either site. The Air Force would coordinate with the restoration office before any construction work is initiated. The Air Force would ensure that construction activities are coordinated with ongoing remediation or investigation activities at any CERCLA site.

There is the possibility that undocumented contaminated soils from historical fuel spills could be present beneath portions of the base. Any potential impacts associated with unknown contamination would be mitigated through adherence to the JBER OPLAN 19-3 (JBER 2016), which provides the procedures for reporting previously unidentified wastes and guidance for the management of hazardous materials and waste.

4.6.3 Alternative C: RW 34 for Departure; RW 16 Arrival; RW 16/34 Extension

Alternative C involves changes in runway use patterns for F-22 departures and arrivals (Table 2.4-1) and includes the extension of RW 16/34 as described for Alternative B. Impacts to hazardous materials and waste management would be the same as for Alternative B.

4.6.4 Alternative D: RW 06 for Departure and Arrival

Alternative D involves changes in runway use patterns for F-22 departures and arrivals only, with no facility construction and no change in the overall number of aircraft operations. Therefore, there would be no change in the use of hazardous materials and generation of hazardous waste at JBER. No impacts to hazardous materials and waste management would be anticipated.

4.6.5 Alternative E: RW 24 for Departure; RW 06 Arrival

Alternative E involves changes in runway use patterns for F-22 departures and arrivals only, with no facility construction and no change in the overall number of aircraft operations. Therefore, there would be no change in the use of hazardous materials and generation of hazardous waste at JBER. No impacts to hazardous materials and waste management would be anticipated.

4.6.6 Alternative F: RW 24 for Departure; RW 16 Arrival; RW 16/34 Extension

Alternative F involves changes in runway use patterns for F-22 departures and arrivals (Table 2.4-1) and also includes the extension of RW 16/34 as described for Alternative B. Impacts to hazardous materials and waste management would be the same as for Alternative B.

4.6.7 No Action Alternative

Under the No Action Alternative, F-22 flight operations would continue as they are currently configured. As there would be no facility construction and no change in the overall number of aircraft operations, there would be no change in the generation of hazardous waste at JBER, and impacts would not change from existing conditions.

4.6.8 Conclusions

The environmental consequences and potential mitigation measures for hazardous materials and waste management are summarized in this section.

Environmental Consequences Summary

There would be no construction and no impacts to existing JBER hazardous materials and waste management with Alternative A, Alternative D, Alternative E, or No Action.

Alternative B, Alternative C, and Alternative F construction would generate hazardous materials and construction debris. Construction would occur in proximity to two closed ERP sites from which radiological waste was removed in 1980. With application of the mitigation measures described below, hazardous materials and construction debris generated by Alternative B, Alternative C, and Alternative F would be handled in accordance with established procedures and would result in less than significant hazardous materials and construction debris environmental impacts. Impacts to hazardous materials and waste management would be less than significant.

Mitigation

Mitigations are identified that can be applied to avoid, minimize, rectify, reduce, or compensate the effect for impacts. For Alternative A, Alternative D, Alternative E, and No Action, there would be no hazardous materials and wastes impacts and, therefore, no mitigation is proposed for these alternatives.

The following mitigation measures would be undertaken at JBER to avoid, to the extent practicable, potential environmental impacts associated with the generation and disposal of hazardous materials and waste management for Alternatives B, C, and F that would involve RW 16/34 extension construction.

- Prepare/update, as needed, on- and off-site hazardous materials handling and waste disposal information.
- Prior to implementing a runway extension construction project, prepare, with agencies, the required updates to required hazardous materials handling and waste disposal permits and procedures.
- Require adherence to established JBER procedures for all hazardous materials and/or waste in all construction contracts.
- Handle, store, and dispose of all hazardous materials and construction debris in accordance with existing laws and established JBER procedures.
- Handle any undocumented contaminated soils in accordance with established JBER procedures during surveys and/or construction.
- Perform a Munitions and Explosives of Concern Investigation prior to construction.

4.7 Biological Resources

Four areas of consideration are used to identify the potential environmental consequences to biological resources. These areas are: (1) the importance of the resource (i.e., legal, commercial, recreational, ecological, or scientific); (2) the proportion of the resource that would be affected relative to its occurrence in the region; (3) the sensitivity of the resource to proposed activities; and (4) the duration of any ecological ramifications.

Under CEQ guidelines for NEPA, impact assessment is based on intensity (how severely the resource is affected) and context (what proportion of the resource is affected). Context includes the importance of the resource, which is related to factors including function, condition, and relative scarcity. Impacts to resources would be considered significant if project-related disturbances would cause measurable reductions in population size or distribution of a special-status species.

Construction (Alternatives B, C, and F Only)

No construction would occur under Alternatives A, D, and E. Alternatives B, C, and F include a 2,500-foot northerly extension of RW 16/34, which is addressed in this EIS. Grading and soil disposal activities would remove habitat and an extended runway would allow changes in aircraft flight patterns potentially affecting noise levels over fish and wildlife habitat north of the runway including the Knik Arm, which is critical habitat for the endangered CIBW.

Operations (All Alternatives)

In general, continuing F-22 flight operations under all Alternatives would have few measurable effects on current uses of JBER by wildlife. The overall noise environment at JBER would not increase (see Section 4.2) under any Alternative. The number of primary assigned aircraft, total annual sorties, and airfield operations (takeoffs and landings) for the 3 WG would be the same as the projected number of annual sorties with all F-22s at JBER. In addition, no changes to existing training airspace used by JBER aircraft would occur under any of the alternatives.

The alternatives differ in the distribution of takeoffs and landings among runways at JBER in their current dimensions. Alternatives C and F, which emphasize landings on extended RW 16, would result in an increase of disturbance (noise and visual) for avian species of special concern, including bald eagles, that may be nesting in the overflight area, because landings on existing RW 16 are very infrequent. While the overall noise environment for JBER would not increase, the location, duration, and frequency would increase over the RW 16 terrain analysis boundary. This increase would have the potential to affect species of special concern and nesting bald eagles. Based on 2016 survey data, no bald eagles are nesting in the overflight area on approach to an extended RW 16. Some bird species are able to acclimate or tolerate such activities over time.

4.7.1 Alternative A: RW 34 for Departure; RW 06 Arrival (Proposed Action)

Alternative A would have the majority of F-22 departures on RW 34 and arrivals on RW 06 and would involve no runway extension or other infrastructure changes (see Section 2.4.1 and Table 2.4-1).

Construction Impacts

There would be no construction associated with this alternative, and, therefore, there would be no construction impacts on biological resources.

Operations Impacts

In the airfield vicinity where low-level overflight associated with approaches, landings, and departures would occur, wildlife, including game animals, waterfowl, bald eagles, other raptors, and songbirds, are regularly exposed to noise and human activity, including military aircraft operations, and would not be expected to be adversely affected in any perceivable way by incremental changes in takeoff and landing frequencies on existing runways.

Approaches, departures, and landing patterns are established and defined based on patterns currently in use. Some of these flight patterns overfly portions of the Knik Arm of Cook Inlet located to the west and north of RW 06/24 and RW 16/34, respectively. Departures from RW 34 would generally pass to the west of Eagle Bay, an important area for the CIBW. Approaches for landing would cross the Knik Arm near Cairn Point, an area generally used by CIBW in transit. The aircraft noise would extend into the Knik

Arm, which includes designated critical habitat for CIBW, which can be present all year but is most abundant during August, September, October, and November, generally coinciding with the coho salmon run (NMFS 2010). CIBW could be exposed to noise associated with the F-22 overflights while at the surface or while submerged.

The ESA prohibits the unauthorized "take" of listed wildlife species. "Take" includes actions that would harass, harm, or kill a listed species. Potential effects on listed species include possible behavioral responses to overflight of F-22s. Animals may react to the sound of jet aircraft or the visual stimulus of the aircraft overhead by avoiding the area or altering their natural behavior patterns, which could constitute behavioral harassment. Under current flight operations, no evidence of listed species harassment has been reported, and the NMFS has concurred with the 2016 consultation finding that fighter aircraft overflights "may affect, not likely adversely affect" listed species (NMFS 2016).

As for all jet aircraft, exposure to the sight and sounds of the F-22 aircraft would be brief (seconds) as it passes overhead (also see discussion on Noise Levels in Knik Arm in Section 4.2.1). The closest approach to the water surface of the Knik Arm by F-22s would range from 536 to 18,158 feet MSL, depending on the flight procedure being conducted. Because of the altitude, small size, and the rapidity of overflight of the F-22 aircraft there are no predicted adverse behavioral reactions by CIBW in the Knik Arm to the visual aspect of overflight.

The Air Force prepared a Biological Evaluation with a detailed analysis on the potential effects of F-22 flying operations on the CIBW and submitted it to the NMFS as part of compliance with Section 7 of the ESA (see Appendix A.5). The analysis took into account the following factors:

- Area affected by several noise level intervals with potential to negatively affect the CIBW associated with each F-22 flight profile type;
- Estimated average number of CIBW individuals per unit area;
- The probability of behavioral harassment associated with each noise level; and
- The frequency and duration of overflights.

Although CIBW are likely to be present during some proportion of the proposed overflights, analysis of modeled noise shows that exposure to projected in-water noise levels exceeding levels (approximately 120 dB re 1 µPa) that may result in behavioral harassment would be very unlikely to occur (see also, Section 4.2.1). The analysis estimates that the number of CIBW individuals per year that would be exposed to such noise levels from proposed F-22 flying operations would approach zero: 0.023 for F-22 operations and 0.018 for all other JBER flight operations, for a total of 0.041. In other words, overlapping events of an F-22 overflight of the Knik Arm at an elevation low enough to produce in-water noise equaling or exceeding the in-water background noise levels at the same time a CIBW was present in the localized affected area would need to occur to approach a NMFS Level B harassment event. This is a very unlikely combination of circumstances because of (1) the infrequency of overflights that would generate in-water noise exceeding the background levels, (2) the very localized nature of the elevated in-water noise (directly under the flight path), and (3) the low average density of CIBW in the action area. Additionally, there would be no adverse modification of the designated critical habitat for the CIBW from implementation of Alternative A. Therefore, impacts of Alternative A on CIBW and its critical habitat are expected to be less than significant. A biological evaluation that contains a detailed analysis of potential effects on the CIBW and other federally listed endangered or threatened wildlife species that could occur on or near JBER was submitted to the NMFS to support Section 7 ESA compliance and a letter of concurrence was received from NMFS with regard to JBER's "may affect, not likely to adversely affect" determination (NMFS, 2016), which is included in Appendix A.5 (*Public and Agency Outreach, Endangered Species Act (ESA) Section 7 Consultation*). A summary of the CIBW analysis follows.

There are no other federally listed or proposed species and/or designated or proposed critical habitat that would be adversely affected by Alternative A. Therefore, implementation of Alternative A would not be expected to have a significant effect upon the CIBW or any federally listed, candidate, or proposed species, and/or designated or proposed critical habitat.

Impacts on all marine mammals are regulated under the Marine Mammal Protection Act, which prohibits the unauthorized take or harassment of marine mammals. In the context of military aircraft noise examined here, the updated Marine Mammal Protection Act (2004) defines *harassment* as "any act that injures or has the significant potential to injure a marine mammal or marine mammal stock in the wild (Level A harassment)," or "any act that disturbs or is likely to disturb a marine mammal or marine mammal stock in the wild by causing disruption of natural behavioral patterns, including, but not limited to, migration, surfacing, nursing, breeding, feeding, or sheltering, to a point where such behavioral patterns are abandoned or significantly altered" (Level B harassment) (16 U.S.C. 1362[(18]). Other marine mammal species occasionally documented in the Knik Arm ROI include Steller sea lion (also listed as endangered under the ESA), harbor seal, harbor porpoise, and killer whale. Their occurrences are very infrequent and in much lower abundance in the Knik Arm than the CIBW, and, therefore, adverse effects on these mammal species from implementation of Alternative A would not be expected.

4.7.2 Alternative B: RW 34 for Departure; RW 06 Arrival; RW 16/34 Extension

Alternative B would extend RW 16/34 to the north by 2,500 feet and have F-22 departures primarily on RW 34 with arrivals primarily on RW 06. The distribution of F-22 flight operations on the extended RW 16/34 and on RW 06 would be essentially the same as described for Alternative A. The noise analysis assumes an approximate 2,000-foot northward shift of the takeoff roll initiation point compared with that of Alternative A.

Construction Impacts

Construction associated with the extension of RW 16 would include direct removal/alteration of vegetation and land cover types within the ROI. In addition to construction of the runway, land adjacent to the runway would be graded (cut and fill) for safety. There would be additional disturbances associated with staging areas and deposition of fill material. A start date of FY 2019 with a three-year construction period was assumed for cost estimating purposes only (Jacobs 2016), but the actual start date is uncertain and could be further in the future. A total of 719.5 acres would be directly affected by the project, of which, 58 percent (420.5 acres) is human modified, 24 percent (170.6 acres) is uplands, 16 percent (113.1 acres) is lowlands, 2 percent (15 acres) is paved, and less than 1 percent is riparian (see Table 4.7-1 and Figure 4.7-1). The project would convert lowland and upland areas to human modified lands that include infrastructure (runway, roads, and other paved areas) and maintained lands. Soils removed from cut areas would be deposited in existing disturbed areas including landfill and gravel borrow pits, although the designated disposal areas do include lowlands and uplands in addition to the existing human-modified land cover types. The lowland land cover types may include wetlands (discussed in Section 4.5, *Physical Resources*).

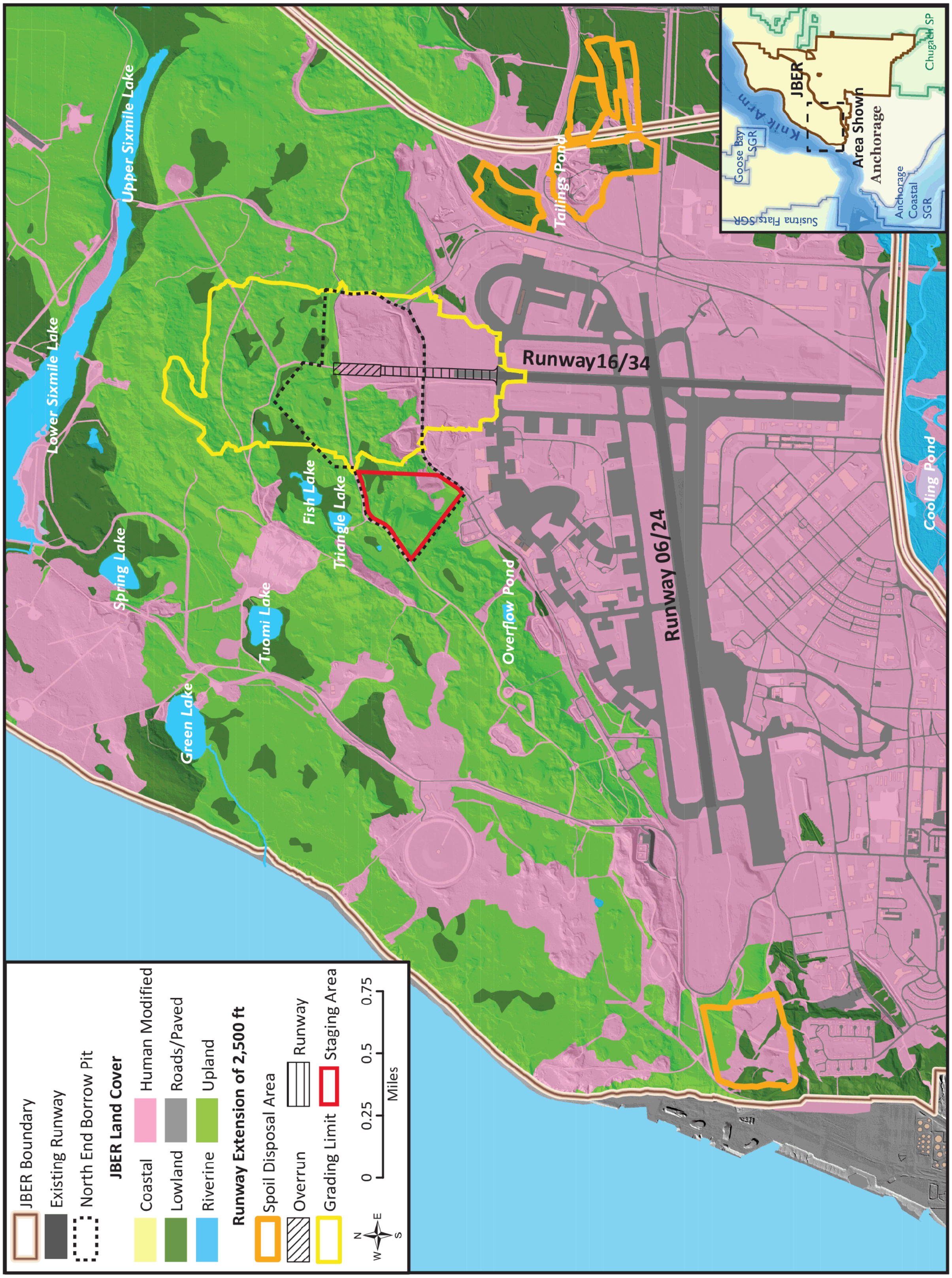

Figure 4.7-1. Land Cover Types

Table 4.7-1. Estimated Acreage of Land Cover Types Directly Affected by Activities Associated With the Extension of Runway 16

Runway 16/34 Extension Disturbance	Human Modified*	Lowland	Riverine	Roads/Paved	Upland
Staging Area	59.1	0	0	0	0
Grading Limit	279.1	28.1	0.3	11.9	155.8
9M yd^3 Spoil Disposal Area	32	40.2	0	2.7	0
3M yd^3 Spoil Disposal Area	9.4	32.6	0	0.4	0
2M yd^3 Spoil Disposal Area	40.9	12.2	0	0	14.8
TOTAL (719.5 acres)	**420.5**	**113.1**	**0.3**	**15**	**170.6**

Note: * Portions of the proposed project area that overlap with the North End Borrow Pit project are included under the Human Modified Land Use Category for this assessment.

Key:

M yd^3 = million cubic yard

The following is a general account of the impacts of runway extension and associated staging, grading, and spoil disposal based on existing information. No federally listed threatened or endangered plant species or terrestrial wildlife species have been identified at JBER, so no impacts would occur. No critical habitat for plants or terrestrial wildlife is present within or near the proposed action area. Five plant species that are considered rare in Alaska were recorded in bogs, sphagnum mats, and saltmarshes during general botanical surveys on and in the vicinity of JBER. These are among the habitat types that may be affected by runway construction or cut and fill operations to create safety zones. In particular, nearby occurrences of sea saltwort (*Salicornia maritima*) and saltmarsh bulrush (*Scirpus maritimus*), which were lost during the Port of Anchorage expansion, are in proximity to the potential runway expansion area suggesting these species could be affected by activities associated with runway expansion if they were found to be present in areas affected by the project.

Extension of RW 16/34 would remove vegetation and wetland habitat for avian species of special concern and migratory birds including rusty black bird, lesser yellowlegs, and olive-sided flycatcher. Historical and current observations place these species of special concern within and outside of the construction boundary for foraging and breeding. The permanent removal of vegetation and filling of wetlands associated with construction of the runway extension and associated safety zones would directly impact habitat for foraging and possibly breeding; however, there are currently no documented observations of species of special concern or migratory birds nesting within the identified vegetation removal area. Additional impacts to species of special concern outside the construction buffer could affect breeding and/or foraging with attendant effects on reproduction, energetics, and predation. Habitat fragmentation can also impact vegetation and wildlife habitats when a project bisects, isolates, or creates a barrier to wildlife movement and genetic exchange. Construction activities and expansion of the existing runway will likely result in minor and localized habitat fragmentation.

To minimize impacts to species of special concern, migratory birds, and other avian species on JBER, it is recommended that vegetation removal occur outside the breeding season. USFWS recommends avoiding vegetation removal between April 10 and August 10 to avoid impacts on nesting birds protected by the MBTA. It is also recommended that, due to the large area of vegetation removal, an additional two months (February and March) be added to minimize impacts to owl species or to survey the construction area for owl nests prior to tree cutting. Currently there are no known bald eagle nests within the preliminary construction boundary. Based on 2016 surveys (Walker 2016), there are three active bald eagle nests in the vicinity of the action areas; (1) near Sixmile Lake, approximately 0.3 mile northeast from the northern edge of the grading limit, (2) east of the railroad, north of Ship Creek and the Overflow Pond 0.7 mile away from the 9-million-cubic-yard disposal area, and (3) along the Knik arm shoreline, 1.6 miles north of the 2-million-cubic-yard disposal area and 1.3 miles west of the staging area. The National Bald Eagle Management Guidelines include recommended nearest distances for certain activities, such as grading, relative to an active nest. The closest active nest (based on 2016 surveys) is 0.3 mile (more than 1,500 feet) from the construction boundary and more than twice the recommended distance of 660 feet. Eagle River Flats and Sixmile-Otter Lakes (important land management units for migratory birds) are from one-third of a mile to more than a mile north to northeast of the construction boundary and are not likely to be affected by the project activities (JBER 2016a).

Environmental protection and management measures currently being implemented at JBER as described in the INRMP would apply to this project. Given that the amount of vegetation and habitat affected is relatively small compared to what is present in the area, that there is low potential for occurrence of special status plant and animal species, and that the action extends an existing disturbed area rather than creating an entirely new disturbance, the potential effects of construction associated with the extension of RW 16 on biological resources are expected to be adverse but less than significant.

Operations Impacts

Since there would be minimal change in number or distribution of flights, the environmental consequences to fish and wildlife and threatened or endangered wildlife species from Alternative B would generally be the same as described for Alternative A. Under Alternative B, extension of RW 16/34 would allow for a differing flight profile during takeoffs. With the additional length on the north end of RW 34, F-22 departures would be able to initiate their takeoff roll approximately 2,000 feet north of the present start of takeoff, potentially limiting noise over residential and other noise sensitive areas, but putting the F-22s slightly closer to the water surface of the Knik Arm near Eagle Bay as they climb to cruising altitude, resulting in slightly greater areas exposed to elevated in-water SPLs from departures on RW 34 than for Alternative A.

Although CIBW are likely to be present during some proportion of the proposed overflights, analysis of modeled noise shows that exposure to projected in-water noise levels exceeding levels (approximately 120 dB re 1 μPa) that may result in behavioral harassment would be very unlikely to occur (see also, Section 4.2.2). The analysis estimates that the number of CIBW individuals per year that would be exposed to such noise levels from proposed F-22 flying operations would approach zero: 0.027 for F-22 operations and 0.018 for all other JBER flight operations, for a total of 0.045. In other words, overlapping events of an F-22 overflight of the Knik Arm at an elevation low enough to produce in-water noise equaling or exceeding the in-water background noise levels at the same time a CIBW was present in the localized affected area would need to occur to approach a NMFS Level B harassment event. This is a very unlikely combination of circumstances because of the infrequency of overflights that would generate in-water noise exceeding the background levels, the very localized nature of the elevated in-water noise (directly under the flight path), and the low average density of CIBW in the action area. Additionally, there would be no adverse modification of the designated critical habitat for the CIBW from implementation of Alternative B. Therefore, impacts of Alternative B on CIBW and its critical habitat are expected to be less than significant. The Air Force prepared a biological evaluation analyzing potential effects on CIBW for submittal to NMFS as part of compliance with Section 7 of the ESA and has received a letter of concurrence with the “may affect, not likely to adversely affect” determination in the biological evaluation as described in Section 4.7.1, above. The biological evaluation and letter of concurrence are presented in Appendix A.5 (*Public and Agency Outreach, Endangered Species Act (ESA)*

Section 7 Consultation). Potential effects of F-22 flight operations on wildlife in the runway environment, and on marine mammals would be less than significant and generally would be as described under Alternative A.

4.7.3 Alternative C: RW 34 for Departure; RW 16 Arrival; RW 16/34 Extension

Alternative C would extend RW 16/34 (the same as Alternative B), with F-22 departures primarily on the extended RW 34. In contrast to Alternative B, F-22 arrivals would be on RW 16 to the extent practicable. Construction impacts of Alternative C on biological resources would be the same as described for Alternative B for the proposed runway extension. Extension of RW 16/34 would allow for a slightly different flight profile during takeoffs than for Alternative B; the takeoff roll initiation point shift northward would be approximately 2,000 feet, which would result in a negligible difference in in-water SPLs compared with those for Alternative B. F-22 departures on RW 34 and landings on RW 16, which are emphasized in this alternative, are at higher elevation over the Knik Arm and would expose smaller areas of the Knik Arm to elevated in-water SPLs compared with existing conditions under the No Action Alternative (most departures on RW 24 and arrivals on RW 06).

Although CIBW are likely to be present during some proportion of the proposed overflights, analysis of modeled noise shows that exposure to projected in-water noise levels exceeding levels (approximately 120 dB re 1 μPa) that may result in behavioral harassment would be very unlikely to occur (see also, Section 4.2.3). The analysis estimates that the number of CIBW individuals per year that would be exposed to such noise levels from proposed F-22 flying operations would approach zero: 0.012 for F-22 operations and 0.018 for all other JBER flight operations, for a total of 0.030. In other words, overlapping events of an F-22 overflight of the Knik Arm at an elevation low enough to produce in-water noise equaling or exceeding the in-water background noise levels at the same time a CIBW was present in the localized affected area would need to occur to approach a NMFS Level B harassment event. This is a very unlikely combination of circumstances because of (1) the infrequency of overflights that would generate in-water noise exceeding the background levels, (2) the very localized nature of the elevated in-water noise (directly under the flight path), and (3) the low average density of CIBW in the action area. Additionally, there would be no adverse modification of the designated critical habitat for the CIBW from implementation of Alternative C. Therefore, impacts of Alternative C on CIBW and its critical habitat are expected to be less than significant. The Air Force submitted a biological evaluation, which analyzes potential effects on CIBW, to NMFS as part of compliance with Section 7 of the ESA, and has received a letter of concurrence with the “may affect, not likely to adversely affect” determination in the biological evaluation as described in Section 4.7.1, above. The biological evaluation and letter of concurrence are presented in Appendix A.5 (*Public and Agency Outreach*, *Endangered Species Act (ESA) Section 7 Consultation*).

Potential effects of F-22 flight operations on wildlife in the runway environment and on marine mammals would be less than significant and generally as described under Alternative A, with the exception that the potential for overflight-related noise effects on species of special concern in the vicinity of the extended RW 16 would increase due to the increase in landing operations on extended RW 16 compared with the No Action Alternative.

4.7.4 Alternative D: RW 06 for Departure and Arrival

Alternative D would primarily use RW 06/24 for F-22 departures and arrivals. There would be no changes in infrastructure associated with Alternative D, and, therefore, there would be no construction effects on biological resources. Potential effects of F-22 operations on wildlife in the runway environment, on CIBW, and on marine mammals generally would be as described under Alternative A. However, since departures would be to the east from RW 06, most departures under this Alternative would not involve low-level overflight of the Knik Arm, reducing the potential for impact on CIBW and marine mammals.

Although CIBW are likely to be present during some proportion of the proposed overflights, analysis of modeled noise shows that exposure to projected in-water noise levels exceeding levels (approximately 120 dB re 1 μPa) that may result in behavioral harassment would be very unlikely to occur (see also, Section 4.2.4). The analysis estimates that the number of CIBW individuals per year that would be exposed to such noise levels from proposed F-22 flying operations would approach zero: 0.022 for F-22 operations and 0.018 for all other JBER flight operations, for a total of 0.040. In other words, overlapping events of an F-22 overflight of the Knik Arm at an elevation low enough to produce in-water noise equaling or exceeding the in-water background noise levels at the same time a CIBW was present in the localized affected area would need to occur to approach a NMFS Level B harassment event. This is a very unlikely combination of circumstances because of (1) the infrequency of overflights that would generate in-water noise exceeding the background levels, (2) the very localized nature of the elevated in-water noise (directly under the flight path), and (3) the low average density of CIBW in the action area. Additionally, there would be no adverse modification of the designated critical habitat for the CIBW from implementation of Alternative D. Therefore, impacts of Alternative D on CIBW and its critical habitat are expected to be less than significant. The Air Force submitted a biological evaluation, which analyzes potential effects on CIBW, to NMFS as part of compliance with Section 7 of the ESA, and has received a letter of concurrence with the “may affect, not likely to adversely affect” determination in the biological evaluation as described in Section 4.7.1, above. The biological evaluation and letter of concurrence are presented in Appendix A.5 (*Public and Agency Outreach, Endangered Species Act (ESA) Section 7 Consultation*).

Potential effects of F-22 flight operations on wildlife in the runway environment and on marine mammals would be less than significant and generally would be as described under Alternative A.

4.7.5 Alternative E: RW 24 for Departure; RW 06 Arrival

Alternative E would concentrate F-22 departures on RW 24 with arrivals primarily on RW 06. There would be no changes in infrastructure associated with Alternative E, and, therefore, there would be no construction effects on biological resources. This alternative is most similar to the existing conditions (No Action Alternative) in that the majority of departures and arrivals would be on the east-west oriented RW 06/24 with overflight of Knik Arm near Cairn Point. F-22 departures on RW 24 and arrivals on RW 06, which are emphasized in this alternative, are generally at lower elevations over the Knik Arm and would expose greater areas of the Knik Arm to elevated in-water SPLs compared with departures on RW 34 and arrivals on RW 16.

Although CIBW are likely to be present during some proportion of the proposed overflights, analysis of modeled noise shows that exposure to projected in-water noise levels exceeding levels (approximately 120 dB re 1 μPa) that may result in behavioral harassment would be very unlikely to occur (see also, Section 4.2.5). The analysis estimates that the number of CIBW individuals per year that would be exposed to such noise levels from proposed F-22 flying operations would approach zero, but that would be slightly higher than the other alternatives under consideration, including the No Action Alternative: 0.047 for F-22 operations and 0.018 for all other JBER flight operations, for a total of 0.065. Overlapping events of an F-22 overflight of the Knik Arm at an elevation low enough to produce in-water noise equaling or exceeding the in-water background noise levels at the same time a CIBW was present in the localized affected area would need to occur to approach a NMFS Level B harassment event. This is a very unlikely combination of circumstances because of (1) the infrequency of overflights that would generate in-water noise exceeding the background levels, (2) the very localized nature of the elevated in-water noise (directly under the flight path), and (3) the low average density of CIBW in the action area. Additionally, there would be no adverse modification of the designated critical habitat for the CIBW from implementation of Alternative E. Therefore, impacts of Alternative E on CIBW and its critical habitat are expected to be less than significant. The Air Force submitted a biological evaluation, which analyzes potential effects on CIBW, to NMFS as part of compliance with Section 7 of the ESA, and has received a letter of concurrence with the “may affect, not likely to adversely affect” determination in the biological evaluation as described in Section 4.7.1, above. The biological evaluation and letter of concurrence are presented in Appendix A.5 (*Public and Agency Outreach, Endangered Species Act (ESA) Section 7 Consultation*).

Potential effects of F-22 flight operations on wildlife in the runway environment and on marine mammals would be less than significant and generally as described under Alternative A.

4.7.6 Alternative F: RW 24 for Departure; RW 16 Arrival; RW 16/34 Extension

Alternative F would extend RW 16/34 (as for Alternatives B and C), with F-22 departures primarily on RW 24 (as for Alternative E) and arrivals primarily on an extended RW 16 (as for Alternative C). Construction impacts of Alternative F on biological resources would be the same as described for Alternative B for the proposed runway extension. Extension of RW 16/34 would allow for the same flight profile during F-22 arrivals on an extended RW 16, as described for Alternative C. F-22 arrivals on RW 16 expose less of the critical habitat in Knik Arm to elevated in-water SPLs than would arrivals on RW 06, because the latter involve lower aircraft elevations over water.

Although CIBW are likely to be present during some proportion of the proposed overflights, analysis of modeled noise shows that exposure to projected in-water noise levels exceeding levels (approximately 120 dB re 1 μPa) that may result in behavioral harassment would be very unlikely to occur (see also, Section 4.2.6). The analysis estimates that the number of CIBW individuals per year that would be exposed to such noise levels from proposed F-22 flying operations would approach zero: 0.032 for F-22 operations and 0.018 for all other JBER flight operations, for a total of 0.050. In other words, overlapping events of an F-22 overflight of the Knik Arm at an elevation low enough to produce in-water noise equaling or exceeding the in-water background noise levels at the same time a CIBW was present in the localized affected area would need to occur to approach a NMFS Level B harassment event. This is a very unlikely combination of circumstances because of (1) the infrequency of overflights that would generate in-water noise exceeding the background levels, (2) the very localized nature of the elevated in-water noise (directly under the flight path), and (3) the low average density of CIBW in the action area. Additionally, there would be no adverse modification of the designated critical habitat for the CIBW from implementation of Alternative F. Therefore, impacts of Alternative F on CIBW and its critical habitat are expected to be less than significant. The Air Force submitted a biological evaluation, which analyzes potential effects on CIBW, to NMFS as part of compliance with Section 7 of the ESA, and has received a letter of concurrence with the “may affect, not likely to adversely affect” determination in the biological evaluation as described in Section 4.7.1, above. The biological evaluation and letter of concurrence are presented in Appendix A.5 (*Public and Agency Outreach, Endangered Species Act (ESA) Section 7 Consultation*).

Potential effects of F-22 flight operations on wildlife in the runway environment and on marine mammals would be less than significant and generally would be as described under Alternative A.

4.7.7 No Action Alternative

The No Action Alternative is the baseline or existing condition for this EIS. Under the No Action Alternative, F-22 runway use operations would continue as they are currently configured, and there would be no extension of RW 16/34. Impacts to biological resources would not change from existing conditions. The analysis estimates that the number of CIBW individuals per year that would be exposed to projected in-water noise levels exceeding levels (approximately 120 dB re 1 μPa) that may result in behavioral harassment from existing F-22 flying operations approaches zero: 0.041 for F-22 operations and 0.018 for all other JBER flight operations, for a total of 0.059 (see also, Section 4.2.7).

4.7.8 Conclusions

The environmental consequences and potential mitigations for biological resources are summarized in this section.

Environmental Consequences Summary

Alternative A, Alternative D, Alternative E, and No Action have no construction disturbance of any land areas. No adverse effect on any federally listed, candidate, or proposed species and/or designated or proposed critical habitat is anticipated. Consultation between the Air Force and NMFS on potential effects to the CIBW population resulted in a “may affect, not likely adversely affect” finding which is applicable to all alternatives.

Alternative B, Alternative C, and Alternative F would impact upland areas on JBER and wetland habitats by RW 16/34 extension and roadway construction. Approximately 78 percent of the 557 acres of project area is distributed acreage that has previously been human modified. Two plant species considered rare in Alaska are in proximity to, and could be affected by, RW 16/34 extension construction. No federally listed threatened or endangered plant species or terrestrial wildlife species on JBER would be affected by construction. Given that the amount of vegetation and habitat affected is relatively small compared to what is present in the area, that there is low potential for occurrence of special status plant and animal species, and that the action extends an existing disturbed area rather than creating an entirely new disturbance, the potential effects of construction associated with the extension of RW 16 on biological resources are expected to be adverse but less than significant. The mitigation measures described below, would avoid any significant impact on any federally listed, candidate, or proposed species and/or designated or proposed critical habitat associated with Alternative B, Alternative C, and Alternative F runway construction.

Mitigation

Mitigations are identified that can be applied to avoid, minimize, rectify, reduce, or compensate the effect for significant impacts (see Appendix B.8).

For all alternatives, JBER would:

- Continue to implement conservation measures for the protection of the CIBW as well as other marine mammals in Knik Arm and to minimize impacts to the CIBW and CIBW critical habitat, in accordance with the INRMP (JBER 2016a).

The following mitigation measures would be undertaken at JBER to avoid, to the extent practicable, environmental impacts on biological resources for Alternative B, Alternative C, and Alternative F runway extension construction.

- The Environmental protection and management measures currently being implemented at JBER as described in the INRMP will be applied to construction activities.
- Continue to adhere to any applicable USFWS protection measures, including:
  - Vegetation clearing will be conducted outside of the bird nesting season, to the extent practicable, in accordance with recommendations by USFWS, to avoid violation of the MBTA.
  - Vegetation clearing/logging will be conducted outside the period of April 10 – August 10 to protect species of special concern, as well as other nesting birds. Due to the large area of vegetation removal, a recommended additional two months (February and March) could be added to minimize impacts to owl species. Alternatively, the construction areas could be surveyed for owl nests prior to tree removal.
  - If vegetation clearing activity becomes necessary or desirable during the defined nesting season, JBER will direct performance of reconnaissance actions to identify and protect nest sites as required by the MBTA.
- Implement measures to stabilize temporarily disturbed soils, restore vegetative cover, and prevent the spread and establishment of invasive species in conjunction with terrain cut activities.
- Reclaim and manage any modified unpaved lands in accordance with the current JBER INRMP, including water-conserving landscape design, use of native or regionally adapted plants in developed areas, reduction of fertilizer and pesticide use, and invasive species control (JBER 2016a).
- Prepare/coordinate (with appropriate agencies) studies for special status species effects as a result of construction and operation of an extended runway.

- Mitigation for unavoidable impacts to the approximately 28 acres of wetlands impacted by Alternative B, Alternative C, and Alternative F construction would be coordinated between the Air Force and USACE, as discussed in Section 4.5.

4.8 Cultural Resources

No issues and concerns regarding cultural resources were identified for traditional cultural properties, traditional resources, or Alaska Native concerns during scoping, and no issues were identified for archaeological and architectural resources.

4.8.1 Alternative A: RW 34 for Departure; RW 06 Arrival (Proposed Action)

Archaeological and Architectural Resources

Actions associated with Alternative A change distribution of F-22 departures and arrivals, within existing airspace usage (see Section 2.4.1 and Table 2.4-1). No ground-disturbing activities are proposed, including no construction or demolition. There would be no change in the auditory visual environment that could affect archaeological historic properties. For these reasons, there would be no direct or indirect effect to archaeological historic properties, nor would there be the possibility for effects to unanticipated archaeological resources.

Impacts to historic buildings, including historic districts, on the installation from noise are not expected to result from changes in runway use by the F-22s. Architectural historic properties would experience no measurable change in their visual or auditory setting. Variance in noise contours on JBER from the baseline noise environment is minimal and would not be expected to have a direct or indirect effect on historic properties. Furthermore, NRHP eligibility of the historic properties is based, in large part, on their association with an active Air Force installation at which jet aircraft routinely operate. No historic properties have been identified within the portion of the 65 dB noise contour that is outside the installation.

In compliance with Section 106 of NHPA, JBER consulted with the Alaska SHPO, federally recognized Alaska Native tribes, ANCSA corporations, and tribal government entities regarding potential effects for the proposed change in F-22 operations at JBER. In a letter dated June 29, 2016, the consultation concluded with the Alaska SHPO’s concurrence with JBER’s finding of “no historic properties affected” for Alternatives A, D, E, and No Action (refer to Appendix A, Section A.7).

Traditional Cultural Properties and Alaska Native Concerns

No traditional cultural properties have been specifically identified in the vicinity of JBER. However, this does not mean that none are present. As a component of the consultation required by NEPA and Section 106 of the NHPA, JBER consulted with federally recognized Alaska Native tribes, ANCSA corporations, and tribal government entities regarding traditional cultural resources (Appendix A).

JBER also consulted with federally recognized Alaska Native tribes, ANCSA corporations, and tribal government entities on a government-to-government basis regarding resources of traditional religious or cultural importance as required by EO 13175, DODI 4710.02, and AFI 90-2002 (Appendix A). The consultation correspondence included an invitation to participate in the EIAP and attend the scoping meeting, and a follow-up written invitation to consult directly with the JBER Commander, or communicate with the Air Force's Native Liaison, regarding any comments, concerns, and suggestions (Appendix A).

No concerns regarding traditional cultural properties, properties of traditional religious or cultural importance, or other cultural concerns have been received to date. The Air Force continues to engage the federally recognized Alaska Native tribes in government-to-government consultation as required by EO 13175, as well as with Alaska Native corporations and tribal government entities regarding the Proposed Action and alternatives and other issues of concern.

4.8.2 Alternative B: RW 34 for Departure; RW 06 Arrival; RW 16/34 Extension

Archaeological and Architectural Resources

Alternative B involves changes in runway use patterns for F-22 departures and arrivals (Table 2.4-1) and would include the addition of a 2,500-ft extension of RW 16/34 to achieve a 10,000-foot runway (Section 2.4.2). Variance in noise contours on JBER from the baseline noise environment would be minimal and would not be expected to have a direct or indirect effect on historic properties.

Extensive cut and fill would occur for a runway extension construction to the north end of RW 16/34. Those areas that have not previously been subject to grading, borrow, or landfill activities have been surveyed for archaeological and architectural resources (JBER 2015c, 2016c, 2016d, 2016e, 2016f), and no historic properties were located (USACE 2007; JBER 2015c, 2016c, 2016d, 2016e; Braund & Associate 2006). In compliance with Section 106 of the NHPA, the Air Force consulted with the Alaska SHPO and potentially affected Alaska Native tribes, ANCSA corporations, and tribal government entities. In a letter dated September 14, 2017, the consultation concluded with the Alaska SHPO's concurrence with the finding of "no direct effect on historic properties and no adverse indirect effect on historic properties" for Alternative B (refer to Appendix A, Section A.7).

Traditional Cultural Properties and Alaska Native Concerns

No impacts to traditional cultural properties or issues of Alaska Native concern are anticipated under Alternative B. As described in Section 2.5.2, as of Winter 2017, no Alaska Native groups have responded to the Air Force's written invitation to discussions regarding the Proposed Action and alternatives and the potential to significantly affect protected tribal resources, tribal rights, or Indian Lands. The Knik Tribe did submit written comments on the Draft EIS, which are included in Appendix A, Section A.10. The Air Force continues to engage in government-to-government consultation with interested federally recognized Alaska Native tribes as required by EO 13175, as well as with Alaska Native tribes and Alaska Native corporations in accordance with DODI 4710.02, and AFI 90-2002 (see Section 4.8.1 and Appendix A).

4.8.3 Alternative C: RW 34 for Departure; RW 16 Arrival; RW 16/34 Extension

Archaeological and Architectural Resources

Alternative C involves changes in runway use patterns for F-22 departures and arrivals (Table 2.4-1) and would include construction of an extension to RW 16/34 as described for Alternative B. Impacts to archaeological and architectural resources would be the same as for Alternative B. The Air Force completed NHPA Section 106 consultation, with receipt of Alaska SHPO concurrence on the finding of "no direct effect or adverse indirect effect to historic properties" for Alternative C (refer to Appendix A, Section A.7).

Traditional Cultural Properties and Alaska Native Concerns

As with Alternative B, no impacts to traditional cultural properties or issues of Alaska Native concern are anticipated under Alternative C. The Air Force continues to engage in government-to-government consultation with interested federally recognized Alaska Native tribes, ANCSA corporations, and tribal government entities as required by EO 13175, DODI 4710.02, and AFI 90-2002 (see Section 4.8.1 and Appendix A).

4.8.4 Alternative D: RW 06 for Departure and Arrival

Archaeological and Architectural Resources

Alternative D involves changes in runway use patterns for F-22 departures and arrivals only (Table 2.4-1), with no facility construction. There would be no direct or indirect effects to historic properties. The Air Force completed NHPA Section 106 consultation, with receipt of Alaska SHPO concurrence on the finding of "no historic properties affected" for Alternative D (refer to Appendix A, Section A.7).

Traditional Cultural Properties and Alaska Native Concerns

As with Alternative A, no impacts to traditional cultural properties or issues of Alaska Native concern are anticipated under Alternative D. The Air Force continues to engage in government-to-government consultation with interested federally recognized Alaska Native tribes, ANCSA corporations, and tribal government entities as required by EO 13175, DODI 4710.02, and AFI 90-2002 (see Section 4.8.1 and Appendix A).

4.8.5 Alternative E: RW 24 for Departure; RW 06 Arrival

Archaeological and Architectural Resources

Alternative E involves changes in runway use patterns for F-22 departures and arrivals only (Table 2.4-1), with no facility construction. There would be no direct or indirect effects to historic properties. The Air Force completed NHPA Section 106 consultation, with receipt of Alaska SHPO concurrence on the finding of "no historic properties affected" for Alternative E (refer to Appendix A, Section A.7).

Traditional Cultural Properties and Alaska Native Concerns

As with Alternative A, no impacts to traditional cultural properties or issues of Alaska Native concern are anticipated under Alternative E. The Air Force continues to engage in government-to-government consultation with interested federally recognized Alaska Native tribes, ANCSA corporations, and tribal government entities as required by EO 13175, DODI 4710.02, and AFI 90-2002 (see Section 4.8.1 and Appendix A).

4.8.6 Alternative F: RW 24 for Departure; RW 16 Arrival; RW 16/34 Extension

Archaeological and Architectural Resources

Alternative F involves changes in runway use patterns for F-22 departures and arrivals (Table 2.4-1) and includes the extension of RW 16/34 as described for Alternative B. Impacts to archaeological and architectural resources would be the same as for Alternative B. The Air Force completed NHPA Section 106 consultation, with receipt of Alaska SHPO concurrence on the finding of “no direct effect or adverse indirect effect to historic properties” for Alternative F (refer to Appendix A, Section A.7).

Traditional Cultural Properties and Alaska Native Concerns

As with Alternative B, no impacts to traditional cultural properties or issues of Alaska Native concern are anticipated under Alternative F. The Air Force continues to engage in government-to-government consultation with interested federally recognized Alaska Native tribes, ANCSA corporations, and tribal government entities as required by EO 13175, DODI 4710.02, and AFI 90-2002 (see Section 4.8.1 and Appendix A).

4.8.7 No Action Alternative

Under the No Action Alternative, runway use would remain the same as current practice (Table 2.4-1). There would be no change in the noise environment and no construction of a runway extension. Impacts to cultural resources would not change from existing conditions; cultural resources would continue to be managed in compliance with federal law and Air Force regulations.

4.8.8 Conclusions

The environmental consequences and potential mitigations for cultural resources are summarized in this section.

Environmental Consequences Summary

There would be no adverse effects to archaeological or architectural historic properties due to changes in the distribution of F-22 departures and arrivals associated with all alternatives.

Alternative B, Alternative C, and Alternative F runway extension construction would directly disturb 557 acres, which has been surveyed and determined to have no historic properties. In compliance with NHPA, Section 106, the Air Force consulted with the Alaska SHPO and potentially affected federally recognized Alaska Native tribes, ANCSA corporations, and tribal government entities regarding potential impacts to cultural resources for all alternatives. Consultation was completed with the Alaska SHPO’s concurrence on the finding of “no historic properties affected” for Alternatives A, D, E, and No Action and “no direct effect or adverse indirect effect to historic properties” for Alternatives B, C, and F (refer to Appendix A, Section A.7). With application of the mitigation measure described below, potential inadvertent discovery of cultural resources during implementation of Alternative B, Alternative C, and Alternative F would result in less than significant environmental impacts to cultural resources.

Mitigation

Mitigations are identified that can be applied to avoid, minimize, rectify, reduce, or compensate the effect for significant impacts (see Appendix B.8). None of the alternatives would result in impacts to known historic properties. The following mitigation measure would be undertaken at JBER to avoid, to the extent practicable, environmental impacts on cultural resources associated with the potential discovery of unanticipated cultural resources during runway extension construction for Alternative B, Alternative C, or Alternative F.

- Implement JBER ICRMP SOP 5.2, Reporting Unanticipated Cultural Resources, and 5.3, Unanticipated Human Remains, including notification of the Anchorage Historic Preservation Commission, for cultural resources that may be encountered during clearing, excavation, or other construction related activities.

4.9 Land Use and Recreation

As described in Chapter 2, the key elements of the proposal are F-22 flight operations on the runways for all alternatives and an extension to RW 16/34 for three of the alternatives. Impacts could result from changes in flight operations and runway safety zones that cause incompatible conditions for land use and outdoor recreation.

4.9.1 Alternative A: RW 34 for Departure; RW 06 Arrival (Proposed Action)

The DoD and FAA use the change in noise levels to assess land use compatibility; the USEPA has reaffirmed these concepts (Air Force 2012). The FAA has guidelines that establish the best means for determining noise impact in airport communities.

Alternative A involves changes in runway use patterns for F-22 departures and arrivals only, with no facility construction and no change in the overall number of aircraft operations (see Section 2.4.1 and Table 2.4-1).

Under Alternative A, the land use exposed to 65 dB L_{dn} or more on JBER-Elmendorf and in the surrounding area is shown in Figure 4.9-1 and Figure 4.9-2, respectively.

The change in noise exposure to off-base land uses reported in Table 4.9-1 shows an increase of 10.2 acres (excluding water areas) exposed to noise levels of 65 dB L_{dn} and greater, representing an increase of about 1.3 percent of affected off-base land. The 65 dB L_{dn} contour at the south end of RW 34 would affect approximately 8.8 acres of residential land use in Mountain View. Noise levels would increase from just under 65 dB L_{dn} to just over 65 dB L_{dn}. This area is characterized by single family dwellings and may expose approximately 80 homes and the Mountain View Elementary School to noise levels above 65 dB L_{dn} that were previously not within the 65 dB L_{dn} noise contour. Residential land use is generally considered incompatible with noise levels of 65 dB L_{dn} and greater unless the structure provides at least 25 dB of outdoor to indoor sound attenuation. Several schools south of the base (currently with noise levels below 65 dB L_{dn}) would experience slight beneficial decreases in noise exposure (see Table 4.2-4).

Table 4.9-1. Noise Exposure in Areas Surrounding JBER (Acres by Land Use) by Alternative

Land Use	65–69 L_{dn} dB	70–74 L_{dn} dB	75–79 L_{dn} dB
	Potential Noise Exposure on Surrounding Areas (acres)[1]		
No Action Alternative			
Transportation	147.6	80.4	5.0
Total acres	**228.5**		
Alternative A (Proposed Action)			
Institutional	0.6	0.6	0
Park	0.1	0	0
Residential	8.8	0	0
Transportation	135.3	87.2	6.0
Vacant	0.1	0	0
Total acres	**238.7**		
Alternative B			
Institutional	0.5	0.6	0
Park	0.1	0.0	0
Transportation	130.8	80.4	5.0
Total acres	**217.4**		
Alternative C			
Institutional	0.4	0.6	0
Transportation	158.6	56.2	5.0
Total acres	**220.8**		
Alternative D			
Institutional	0.4	0.6	0.0
Transportation	156.2	84.3	6.0
Total acres	**247.5**		
Alternative E			
Institutional	3.3	0.7	
Transportation	144.9	82.5	4.0
Total acres	**235.4**		
Alternative F			
Institutional	3.3	0.6	0
Transportation	164	65.1	4
Total acres	**236**		

Notes:
[1] All acreages exclude water areas.

Key:
dB = decibel
L_{dn} = day-night average sound level

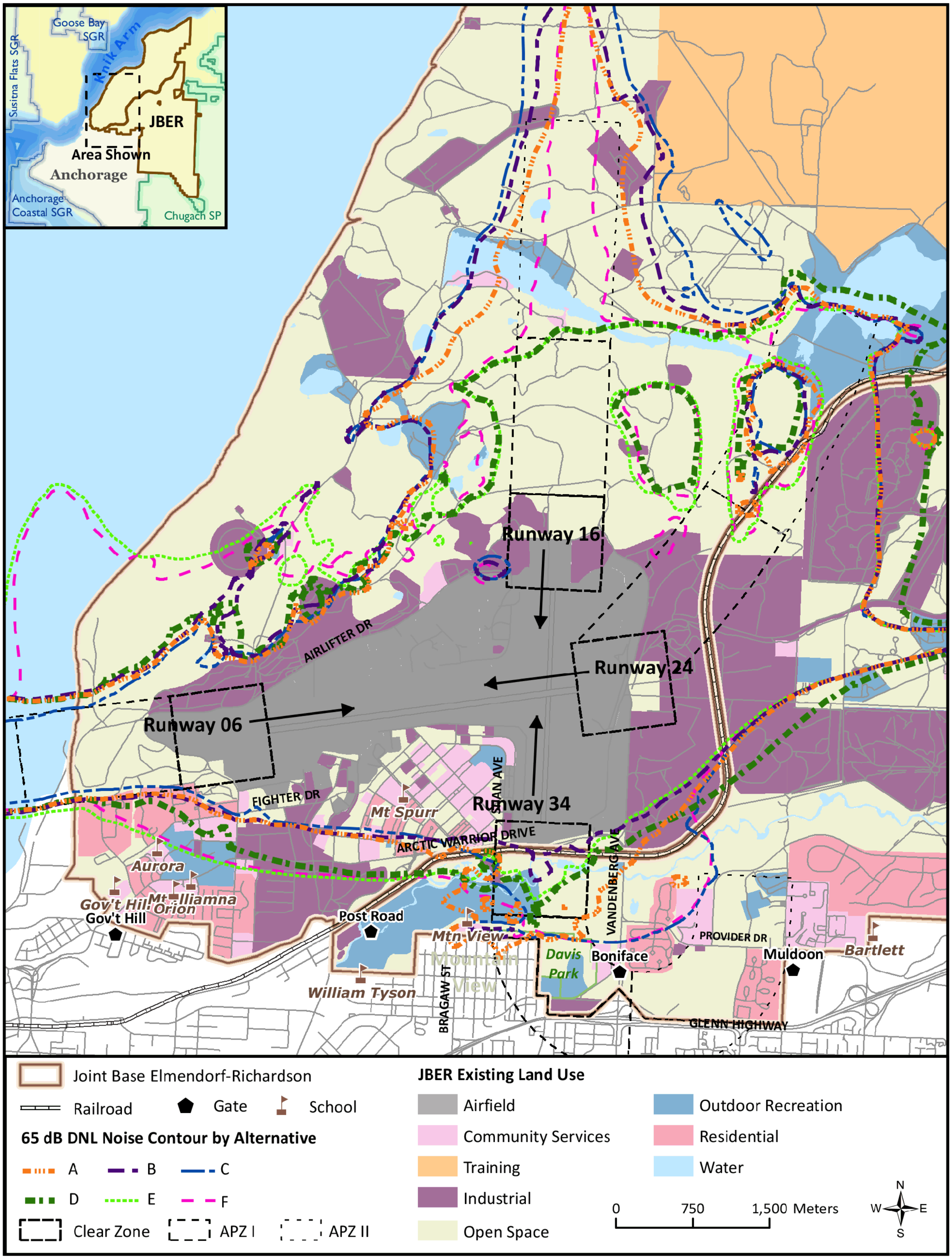

Figure 4.9-1. Land Use and Noise on JBER for No Action, the Proposed Action (Alternative A), and Alternatives B, C, D, E, and F

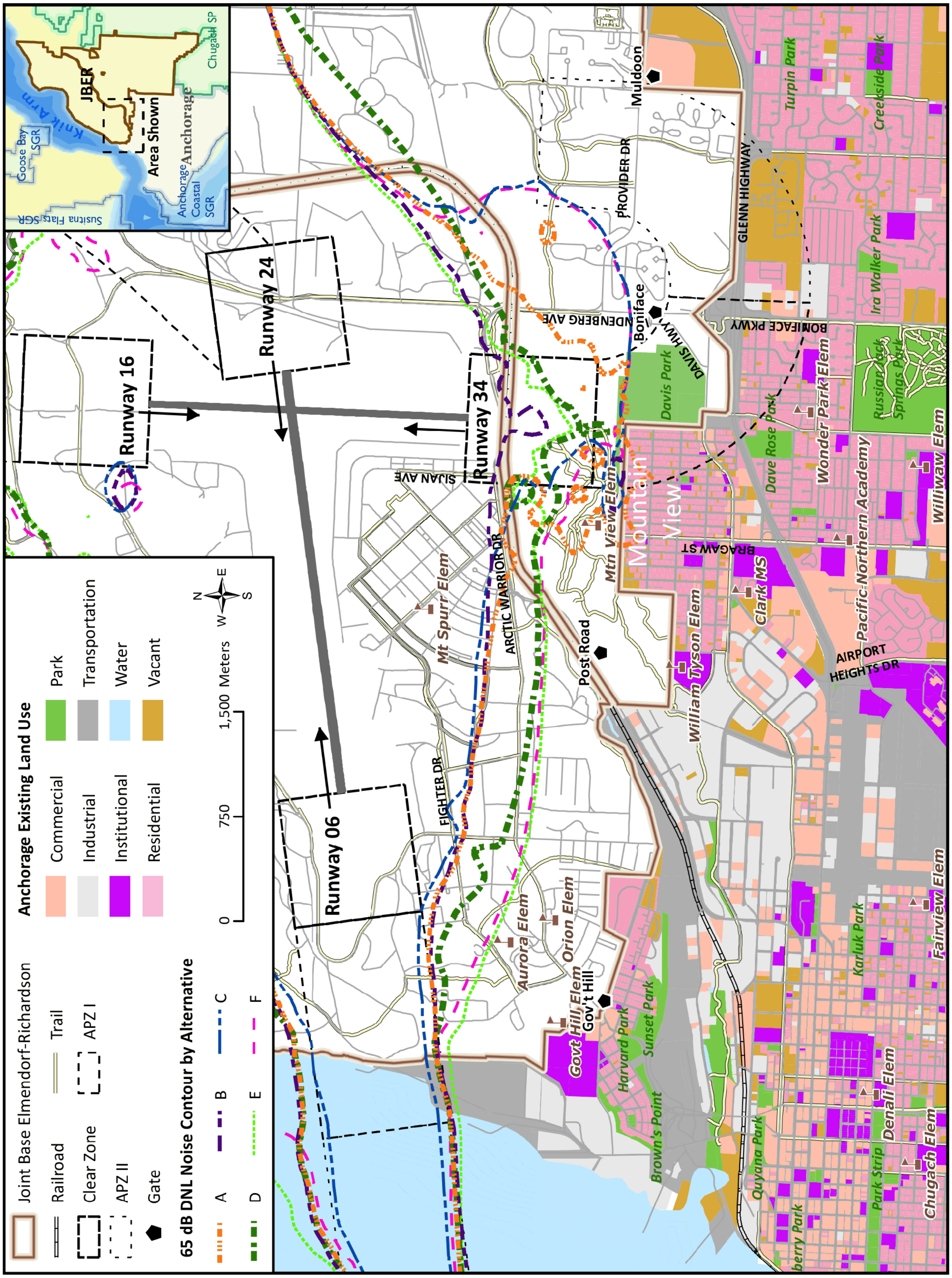

Figure 4.9-2. Land Use and Noise Surrounding JBER for No Action, the Proposed Action (Alternative A), and Alternatives B, C, D, E, and F

Some land uses on-base would experience higher noise levels directly around the airfield and in open/recreational areas on base (see Figure 4.9-1 and Figure 4.9-2, and Table 4.9-2). Under this alternative, approximately 7.9 acres more of Davis Park on JBER land leased to the municipality of Anchorage would be within the 65 dB L_{dn} or greater noise contour, for a total of 11.2 acres. Outdoor recreation is compatible with noise levels of 69 dB L_{dn} and lower (AFI 32-7063). No acres of Davis Park would be exposed to noise levels of 70 dB L_{dn} or above. A slight decrease in noise for housing and community services in the core of the base would likely be imperceptible. Noise exposure for Mount Spurr Elementary School land use would decrease from 72 to 69 dB L_{dn}. Mountain View Elementary School land use would experience an average annual increase of about 2 dB, increasing from 64 to 66 dB L_{dn} due to aircraft takeoffs from the southern threshold of RW 34. Retrofits in 2015 at this school provide increased sound insulation. Construction with insulation and windows for an arctic climate result in energy savings and acoustic attenuation. With windows closed, there is an estimated 27-dB reduction between outside and inside acoustic conditions inside a classroom or a hospital. The noise environment at the JBER hospital land use would not change. Changes of less than 3 dB are generally not perceptible to most people; however, for land uses that already experience incompatible exposure, any increase is a concern. Noise intrusions can interfere with effective teaching and verbal communication for education land uses. Housing and community services/land uses (including schools in the Government Hill part of the base southwest of the airfield) are currently below 65 dB L_{dn} and would experience decreases of about 3 dB.

Table 4.9-2. Noise Exposure on JBER (Acres by Land Use) by Alternative

JBER Land Use	65–69.9 dB L_{dn}	70–74.9 dB L_{dn}	75–79.9 dB L_{dn}	80–84.9 dB L_{dn}	≥85 dB L_{dn}
	Potential Noise Exposure on JBER (acres)[1]				
No Action Alternative					
Airfield	12.3	229.4	531.2	447.7	508.2
Community Services	82.3	110.2	41.6	6.4	0
Industrial	973.8	629.8	214.6	17.4	4.7
Open Space	1,998.5	604	185.4	38.5	4.1
Outdoor Recreation	235.7	4.9	15.2	0	0
Residential	112	18.2	0	0	0
Training	32.3	0	0	0	0
Water	136.1	1.5	0	0	0
Total	**3,583**	**1598**	**988**	**510**	**517**
Alternative A (Proposed Action)					
Airfield	13.7	253.6	485.6	477.5	499
Community Services	56.5	107.5	28.6	5.8	0
Industrial	880.2	622.7	181.5	31.6	0
Open Space	2,241.6	665.2	305.5	64.1	0
Outdoor Recreation	345.2	4.8	14.8	0	0
Residential	75.3	0	0	0	0
Training	30.3	0	0	0	0
Water	176.2	5.2	0	0	0
Total	**3,819**	**1659**	**1016**	**579**	**499**
Alternative B					
Airfield	71	314.4	474.8	381.4	485
Community Services	87.7	88.5	18.4	4.6	0
Industrial	882.4	617	167.4	41.1	0
Open Space	2,240.1	730.3	386.7	85.9	0

Table 4.9-2. Noise Exposure on JBER (Acres by Land Use) by Alternative (continued)

JBER Land Use	65–69.9 dB L_{dn}	70–74.9 dB L_{dn}	75–79.9 dB L_{dn}	80–84.9 dB L_{dn}	≥85 dB L_{dn}
	Potential Noise Exposure on JBER (acres)[1]				
Outdoor Recreation	290.6	14.5	9.7	0	0
Residential	70.8	0	0	0	0
Training	38.7	0	0	0	0
Water	134.7	46.3	0	0	0
Total	**3,816**	**1811**	**1057**	**513**	**485**
Alternative C					
Airfield	43.7	344.4	480.8	375.7	481.6
Community Services	106.4	88.3	15.5	4.9	0
Industrial	987.3	602.1	148	39.5	0.2
Open Space	2,701.5	835.5	367.5	98.9	1.2
Outdoor Recreation	302.1	28.1	10.2	0	0
Residential	83.7	0	0	0	0
Training	53.5	0	0	0	0
Water	141.8	60.6	0	0	0
Total	**4,420**	**1,959**	**1022**	**519**	**483**
Alternative D					
Airfield	23.7	275.9	564	416.8	450.3
Community Services	60.8	104.1	44.4	7.1	0
Industrial	1,099.6	663.2	223.4	41.5	5.6
Open Space	1,796	460.1	122.4	49.6	6.1
Outdoor Recreation	295.7	8.4	14.8	0	0
Residential	85.3	23.8	0	0	0
Training	47.8	0	0	0	0
Water	130.1	1.5	0	0	0
Total	**3,539**	**1,537**	**969**	**515**	**462**
Alternative E					
Airfield	43.4	273.2	581.3	393.6	436.9
Community Services	82.5	103.7	42.2	10.9	0
Industrial	1,023.8	533	202.8	14.1	6.8
Open Space	1,810.5	589.8	144	35.3	7.3
Outdoor Recreation	207.9	2.3	14.7	0.1	0
Residential	116.2	40.8	0	0	0
Training	26.7	0	0	0	0
Water	80	2.2	0	0	0
Total	**3,391**	**1,545**	**985**	**454**	**451**
Alternative F					
Airfield	58.6	240.8	554.1	446.8	425.5
Community Services	90.3	114.3	41.5	9.3	0
Industrial	1,096.9	542.2	193.1	13.5	6.3
Open Space	2,337.2	695	126.2	33.4	6.2
Outdoor Recreation	272.2	2	15.1	0	0
Residential	144.6	34.2	0	0	0
Training	32.4	0	0	0	0
Water	121.8	20.5	0	0	0
Total	**4,154**	**1,649**	**930**	**503**	**438**

Key:
dB = decibels
L_{dn} = day-night average sound level

4.9.2 Alternative B: RW 34 for Departure; RW 06 Arrival; RW 16/34 Extension

Alternative B is similar to Alternative A in the distribution of operations on runways, but includes a 2,500-foot extension of RW 16/34 to the north to achieve a 10,000-foot runway. For Alternative B, the geographic area exposed to 65 dB L_{dn} or more on JBER-Elmendorf and in the surrounding area is shown in Figure 4.9-1 and Figure 4.9-2.

The change in noise exposure to off-base land uses in Table 4.9-1 shows a beneficial decrease of about 18 acres (excluding water areas) exposed to noise levels of 65 dB L_{dn} and greater, representing a decrease of about 8.3 percent of affected off-base land to the south and west of the airfield. With the runway extension and three times as many aircraft departing on RW 34 heading northward compared to the No Action Alternative, the noise contours shift northward, but also have a slight contraction at the south end of the airfield. No off-base residential areas or schools would experience noise levels above 65 dB L_{dn}. Noise exposure to the west over the Port of Anchorage may increase by a few decibels over current levels, but transportation and industrial-type uses in this area are compatible with projected noise levels. With the additional length on the north end of RW 34, F-22 departures would be able to initiate their takeoff roll north of the present start of takeoff by approximately 2,000 feet and potentially limit noise over residential and other noise sensitive areas. Alternative A off-base noise conditions would be applicable to Alternative B if the takeoff roll was not shifted north on RW 34.

Noise effects to on-base land use would generally decrease for residential and community uses south of the airfield. The portion of Davis Park beneath the 65 dB L_{dn} contour would decrease by 0.1 acre. Outdoor recreation is compatible with noise levels of 69 dB L_{dn} and lower (AFI 32-7063). No acres of Davis Park would be exposed to noise levels of 70 dB L_{dn} or above. Minimal decreases in noise (of about 2 to 3 dB) could occur in the housing and community service areas in the core of the base. Noise exposure for Mount Spurr Elementary School would decrease from 72 to 69 dB L_{dn}, and Mountain View Elementary School would be about the same. The JBER hospital and housing east of Boniface Gate would experience essentially no change in noise exposure. Small changes are generally not perceptible; however, for locations that already experience incompatible exposure, any increase is a concern. Noise intrusions can interfere with effective teaching and verbal communication.

Arrivals and departures over areas within the APZs for on the south end RW 34/16 would remain the same as under the No Action Alternative and Alternative A. Departures heading north on RW 34 would increase. On this north end, a 2,500-foot runway extension would shift the CZs and APZs northward by the same distance, but would remain within the JBER boundary as shown in Figure 4.9-3.

The underlying land in the adjusted CZ is mostly open space (200 acres) with some industrial land (7 acres), and 39 acres of industrial use in APZ II. A portion of outdoor recreation land shifts from APZ II into APZ I, but should be compatible depending on the density of activities. The only allowable uses in a CZ are agriculture, livestock grazing, open space, transportation right-of-ways (limited), underground utilities, and essential navigational aids. Any industrial use is incompatible in a CZ, and would require a waiver for any persisting uses or changing the use to something that does not involve habitation or high structures.

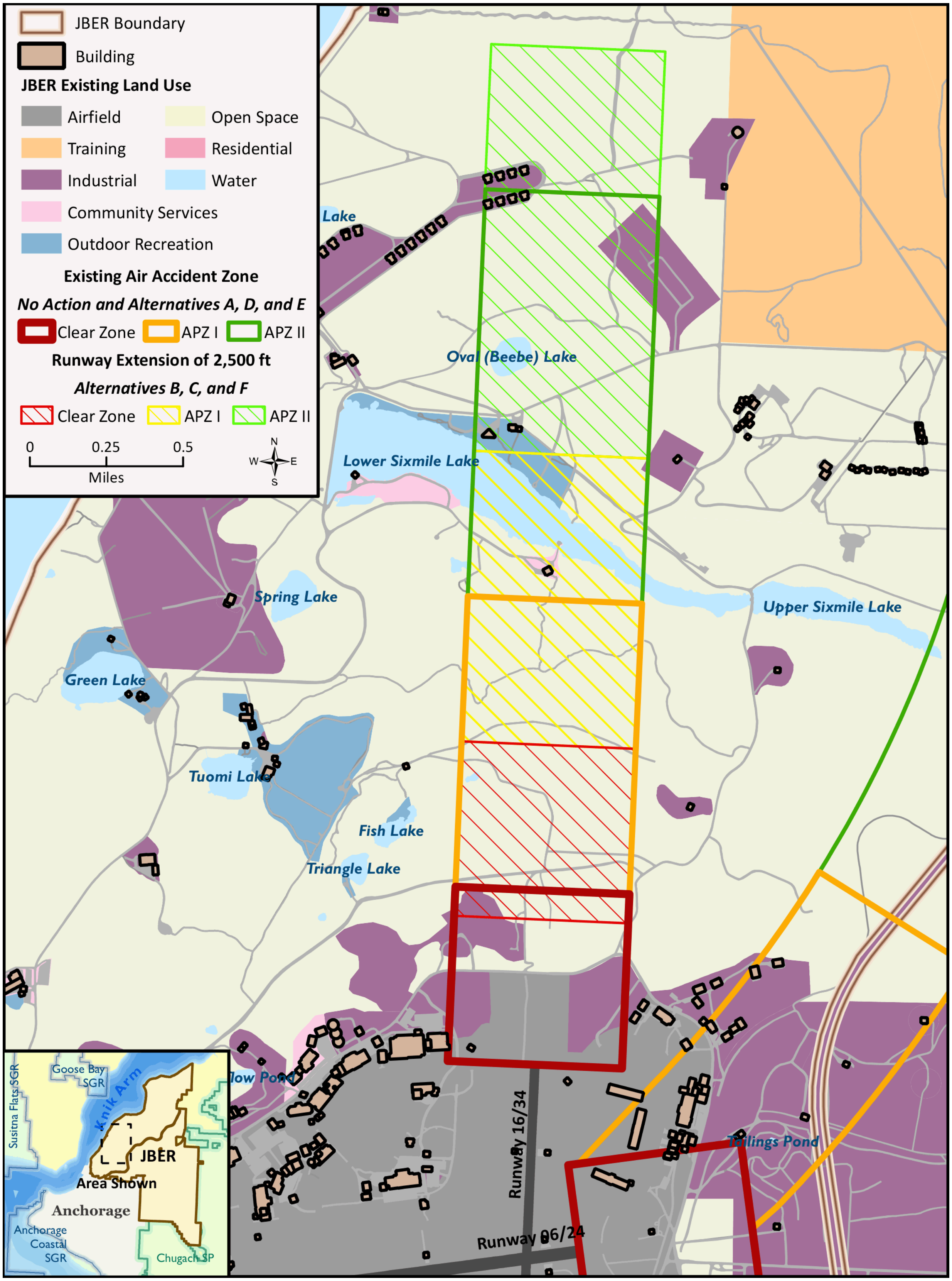

Figure 4.9-3. Clear Zone and Accident Potential Zones for Potential Runway 16 Extension

The future land use plan in the IDP provides this direction and identifies all land in the CZ and APZ I as airfield pavement to provide greater control of future use and development decisions (JBER 2015d). The IDP identifies the areas in APZ II as open space. Currently, the APZs include a mixture of mostly compatible uses such as open space (used for some military purpose such as training), outdoor recreation (28 acres) and water (about 87 acres). These are compatible uses within APZs. A 5-acre area used for community service functions (currently in APZ II) would fall within APZ I. This use would require a waiver or be discontinued depending on the level of activity in associated facilities. There would be no change in AICUZ safety conditions in the off-base areas within the APZs to the south of RW 16/34.

4.9.3 Alternative C: RW 34 for Departure; RW 16 Arrival; RW 16/34 Extension

Under Alternative C, airfield departure operations would be similar to Alternatives A and B, but would concentrate arrivals on RW 16, arriving from the north. This alternative also involves an extension to RW 16 as described for Alternative B.

For Alternative C, the land use exposed to 65 dB L_{dn} or more on JBER-Elmendorf and in the surrounding area is shown on Figure 4.9-1 and Figure 4.9-2. Off-base land uses Table 4.9-1 show a decrease of 14.7 acres (excluding water areas) exposed to noise levels of 65 dB L_{dn} or greater. This represents a decrease of about 6.6 percent of affected off-base land to the south of the airfield. Most off-base schools and residential land uses south of the base would experience decreases in noise levels and remain well below the levels of concern established by the DoD and FAA (FICUN 1980, FICON 1992, FTA 2006) and affirmed by the USEPA (Air Force 2012). With the additional length on the north end of RW 34, F-22 departures would be able to initiate their takeoff roll north of the present start of takeoff by about 2,000 feet and potentially limit noise over residential and other noise sensitive areas. Off-base noise conditions similar to Alternative A would be applicable to Alternative C if the takeoff roll was not shifted north on RW 34.

On-base land use noise effects would be similar to those described for Alternative B. Some areas on the north side of the airfield under the arrival tracks for RW 16 would experience higher noise levels than under No Action. Underlying land uses include open space, recreation, and industrial uses and are compatible with projected noise levels (see Figure 4.9-2). Noise levels in open/recreational land uses on base on the south side, except for Davis Park, would decrease slightly. The portion of Davis Park beneath the 65 dB L_{dn} contour would increase by 5.5 acres, to a total of 6.8. Outdoor recreation is compatible with noise levels of 69 dB L_{dn} and lower (AFI 32-7063). No acres of Davis Park would be exposed to noise levels of 70 dB L_{dn} or above. The schools on the south side of the airfield in the Government Hill area would experience decreases in noise levels of about 3 to 4 dB. Similar decreases would also apply to housing areas and community services in the core of the base. Noise exposure for Mount Spurr Elementary School would decrease from 72 to 68 dB L_{dn}. The JBER hospital and nearby housing areas would also experience an increase of 1.5 dB (increasing at the hospital from 55.1 to 56.6 dB L_{dn}). Changes of less than 3 dB are generally not perceptible to most persons.

Alternative C includes the runway extension on the north end of RW 16/34 with similar impacts on uses in the CZs and APZs as described for Alternative B. Limited types of industrial use are compatible in APZ I and II. Similarly, intermittent scheduled community service functions in the expanded APZ-I would require a waiver or be discontinued depending on the level of activity in associated facilities. There would be a decrease in arrivals on RW 34 from the south.

4.9.4 Alternative D: RW 06 for Departure and Arrival

Alternative D focuses on the use of RW 06/24 for F-22 operations, with arrivals coming from the west over Cook Inlet and the Port of Anchorage and departures starting due east over JBER-Richardson and quickly turning north to avoid the Restricted Area, R2203 (see Figure 1.1-1) and to vector toward the most commonly used training airspace.

Under Alternative D, the geographic area and land use exposed to 65 dB L_{dn} or more on JBER-Elmendorf and in the surrounding area is shown in Figure 4.9-1 and Figure 4.9-2. The change in noise exposure to off-base land uses in Table 4.9-1 shows an increase of 12 acres (excluding water areas) exposed to noise levels of 65 dB L_{dn} and greater, representing an increase of about 5 percent of affected off-base land, primarily to the west over areas used for transportation and associated industry in the Port of Anchorage. No off-base residential land would experience noise levels above 65 dB L_{dn}. Several schools south of the base would experience slight decreases (about 1 dB) in noise exposure or would have no perceptible change in noise. The projected affected population and area is reported in Table 4.2-1 and Table 4.2-2.

The focus of F-22 arrivals from the west and departures heading east over JBER-Richardson using RW 06 concentrates more noise in the central areas of the base just south of the runways, where land use is mostly a mixture of airfield, community services, open space and industrial. This is reflected in a less than 1-dB increase in noise at Mount Spurr Elementary School from 72.3 to 73 dB L_{dn}. Noise levels affecting housing land use and schools in the core of the base south of the airfield and the Government Hill area would be similar to the No Action Alternative (current conditions). There would be no perceptible change in noise at Mountain View Elementary School and surrounding residential land use to the south. The JBER hospital would experience a minimal increase of 1.1 dB, increasing from 55.1 to 56.2 dB L_{dn}. Small changes are generally not perceptible; however, for locations that already experience incompatible exposure, any increase is a concern. Noise intrusions can interfere with effective teaching and verbal communication for education land uses.

There would be no change to the CZ or APZs, and no change in safety conditions in the off-base areas within the APZs.

4.9.5 Alternative E: RW 24 for Departure; RW 06 Arrival

Alternative E focuses F-22 airfield operations on RW 06/24, with most departures heading west and most arrivals arriving from the west over Cook Inlet.

Under Alternative E, the land use exposed to 65 dB L_{dn} or more on JBER-Elmendorf and in the surrounding area is shown in Figure 4.9-1 and Figure 4.9-2. The change in noise exposure to off-base land uses reported in Table 4.9-1 shows a decrease of just 0.1 acre (excluding water areas) exposed to noise levels of 65 dB L_{dn} and greater, representing no appreciable change in affected off-base land. Off-base land used for transportation and associated industry in the Port of Anchorage and over the Cook Inlet would be compatible industrial land uses (see Table 4.9-1). No off-base residential land use would experience noise levels above 65 dB L_{dn}. Several schools in the southwest part of the base would experience slight increases (between about 1 and 2 dB) in noise exposure near the Government Hill gate, but Mountain View Elementary would have no perceptible change in noise. The projected affected population and area is reported in Table 4.2-1 and Table 4.2-2.

The focus of F-22 departures to the west (about a third more than current levels) in conjunction with most arrivals coming in from the west on RW 06 would concentrate more noise in the west portion of the base. This is reflected in a projected 0.5-dB increase in noise at Mount Spurr Elementary School from 72.3 to 72.8 dB L_{dn}. Residential and community service land use areas directly south of the runway would experience similar slight increases in noise exposure. Outdoor recreation is compatible with noise levels of 69 dB L_{dn} and lower (AFI 32-7063). Open/recreational land use areas to the south, including Davis Park would experience little change from current conditions and would not be within the 70 dB L_{dn} contour. The hospital and housing areas east of Boniface Gate may experience slight 1-dB decreases and remain well below 65 dB L_{dn}.

There would be no change to the CZ or APZs, and no change in safety conditions in the off-base areas within the APZs.

4.9.6 Alternative F: RW 24 for Departure; RW 16 Arrival; RW 16/34 Extension

Under Alternative F, most F-22 departures would be on RW 24 and most arrivals would be on RW 16. Alternative F would extend RW 16/34 by 2,500 feet to the north, the same as Alternatives B and C.

For Alternative F, the land use exposed to 65 dB L_{dn} or more on JBER-Elmendorf and in the surrounding area is shown on Figure 4.9-1 and Figure 4.9-2. Off-base land uses reported in Table 4.9-1 show an increase of just 0.5 acre (excluding water areas) exposed to noise levels of 65 dB L_{dn} and greater. This represents no appreciable change in affected off-base land, mostly compatible use transportation land to the west of the base. Most off-base schools and residential areas south of the base would experience little change in noise levels. Land uses in the Mountain View area would be below 65 dB L_{dn}.

On-base land use noise effects would be similar to Alternative E. Some land use on the north side of the airfield under the arrival tracks for extended RW 16 may experience higher noise levels similar to Alternative C. Underlying land uses north of the airfield include open space, recreation, and industrial uses which would be compatible with projected noise levels. Outdoor recreation is compatible with noise levels of 69 dB L_{dn} and lower (AFI 32-7063). Open/recreational land uses to the south, including Davis Park, would remain similar to current levels, and no acres of Davis Park would be exposed to noise levels of 70 dB L_{dn} or above. The schools and housing on the south side of the airfield in the Government Hill area would experience a slight increase of up to 1 dB L_{dn}. Noise exposure for Mount Spurr Elementary School would increase by less than 1 dB from 723 to 72.6 dB L_{dn}. The JBER hospital and nearby housing areas would also experience an increase of about 1 dB, increasing from 55.1 to 56.2 dB L_{dn}. Changes of less than 3 dB are generally not perceptible to most persons.

Alternative F includes the runway extension on the north end of RW 16/34 with similar impacts on uses in the CZs and APZs as described for Alternatives B and C. Limited types of industrial use are compatible in APZ I and II. Community service functions with intermittent scheduled use would require a waiver or be discontinued depending on the level of activity in associated facilities. There would be a decrease in arrivals on RW 34 from the south.

4.9.7 No Action Alternative

Under the No Action Alternative, F-22 operations and runways would be unchanged from the baseline conditions. Conditions and impacts for noise and safety (AICUZ) on land use would be unchanged from those described in Section 3.9.

4.9.8 Conclusions

The environmental consequences and potential mitigations for land use and recreation are summarized in this section.

Environmental Consequences Summary

In general, residential land uses, schools, hospitals, and places of worship normally are not compatible with outdoor L_{dn} values of 65 dB or greater. Therefore, the extent of exposure of these sensitive-type receptors to L_{dn} of 65 dB and higher provides the best means for assessing the noise impacts of the Proposed Action to land uses.

Alternative B, Alternative C, Alternative D, Alternative E, Alternative F, or No Action do not result in changes to off-base land use compatibility. The community of Mountain View would continue to experience noise levels less than 65 dB L_{dn}.

Alternative A is calculated to increase annual average noise levels over 8.8 acres of residential land use in the community of Mountain View from just under 65 dB L_{dn} to just over 65 dB L_{dn}. Residential land use is generally considered incompatible with noise levels of 65 dB L_{dn} or greater unless structures provide at least 25 dB of outdoor to indoor sound attenuation. Mountain View Elementary School is calculated to experience an increase in 1.9 dB annual average noise levels from just under 65 dB L_{dn} to just over 65 dB L_{dn}.

Land on JBER north of RW 16/34 is used for recreation and would be reduced with Alternatives B, C, and F as a result of runway extension. A calculated 557 acres of land designated as open space would be designated as airfield and would be affected by runway construction. The northward adjusted CZ is mostly open space, and the northward adjusted APZs would be compatible with low density recreation. However, five acres of community service functions land would be incompatible with the northward-adjusted APZ 1 and would require a waiver of discontinuance.

Changing the designation of on-base land use from open space to airfield would be consistent with the military use of JBER and would be a less than significant impact to land use and recreation.

Mitigation

Mitigations are identified that can be applied to avoid, minimize, rectify, reduce, or compensate the effect for significant impacts (see Appendix B.9).

There is no increase in off-base acoustic effects to residential land use for Alternative B, Alternative C, Alternative D, Alternative E, Alternative F, or No Action. No land use mitigation measures are proposed for any of these alternatives.

The Alternative A increase in off-base residential land use exposed to 65 dB L_{dn} or greater is an unavoidable impact that would result from implementation of Alternative A. Provision of funds for additional structural noise attenuation to off-base areas is not currently an action that the Air Force is authorized to carry out. There are no mitigations to address this unavoidable land use impact.

Other actions that JBER will implement to address concerns for land use and recreation issues associated with the improvement of F-22 operational efficiency include:

- Use planning, engineering, and runway safety area information, including relevant land use information, to update on-base plans and to provide information to off-base land use planning entities.
- Continue to work with the affected communities to address land use issues.

4.10 Transportation and Circulation

Surface transportation and circulation resources include the infrastructure required for the movement of people, materials, and goods. The ROI for transportation and circulation resources include primary and secondary roads on JBER, access gates, the roadway network leading to and from JBER, and rail lines adjacent to or running though JBER. No effects would be anticipated on rail lines.

4.10.1 Alternative A: RW 34 for Departure; RW 06 Arrival (Proposed Action)

Alternative A involves changes in runway use patterns for F-22 departures and arrivals only, with no facility construction and no change in the overall number of aircraft operations (see Section 2.4.1 and Table 2.4-1). There would be no change in utilization of roads on or off JBER. No impacts to the internal transportation network on JBER or the surrounding Anchorage roadways would be anticipated.

4.10.2 Alternative B: RW 34 for Departure; RW 06 Arrival; RW 16/34 Extension

Alternative B includes the extension of RW 16/34 by 2,500 feet to achieve a 10,000-foot runway (Section 2.4.2). F-22 departures would primarily be on the extended RW 34 with arrivals primarily on RW 06.

Construction of an extension to RW 16/34 includes terrain excavation, cut and fill operations, relocation (removal and construction) of an existing roadway, and construction of taxiway, runway surfaces, and other construction as discussed in Section 2.4.2. The preliminary design details of the runway extension, including the roadway relocation, land contours, and the final disposition of the excess material, have been quantified in Air Force planning documents. Section 2.4.2 describes the RW 16/34 construction. Construction of an extension to RW 16/34 would involve employment of various types of equipment, much of which would need to be transported to JBER at the onset of construction activities and as needed during the various phases of the project. Such equipment would either be driven onto the installation under their own power, or passively transported by other means (i.e., on a flatbed or other transport truck). Typically, equipment such as backhoes, dozers, graders, loaders, scrapers, rollers, supply trucks, and debris haul trucks would be needed throughout the project's three-year construction period. Equipment types could include multiple axle vehicles, wide-load carriers, and other heavy-haul equipment. Once transported to JBER, many of these vehicles would remain in the immediate area of construction and would increase the volume of off-installation traffic during the initial stages of construction, during delivery of equipment and materials, and after project activities have concluded and the vehicles are being moved off-base.

Table 2.4-2 identifies the volume of material to be transported and the estimated distance for disposition of excess materials. It is anticipated that some excavated materials could be reused for other phases of construction (e.g., as fill for the runway extension) or used as fill on other parts of JBER. For the purpose of this EIS, all excess excavated material is assumed to be disposed of at locations on JBER. Adequate historic borrow pits have been identified on JBER with the capacity to accept the excess materials (Figure 2.4-3). Tree and brush materials would be removed and firewood would be separated from green waste to be disposed of at the existing JBER green waste recycling site. There would be a gravel haul road between the excavation area and the largest existing borrow pits on the east side of the airfield (see Figure 2.4-3). The 3-mile round trip for the 20-cubic-yard trucks to transport an estimated 13.8 million cubic yards of fill material from the excavation site to this disposal site would not be on existing JBER paved roadways and would not be expected to increase roadway traffic.

The other 1.5 million cubic yards of fill would be transported via a round trip of 8 miles from the excavation site to the fill site on the western end of RW 06 (see Figure 2.4-3). The 20-cubic-yard trucks would be expected to use Dena'ina Road and would be north and west of Airlifter Drive, which supports base activities northwest of the intersection of RW 16/34 and RW 06/24. The closing of the existing Airlifter Drive would be scheduled to correspond with the opening of a rerouted Airlifter Drive. The rerouted Airlifter Drive would remove an existing safety hazard with the existing roadway that is unacceptably close to the end of RW 06/34. The rerouted Airlifter Drive would require an estimated additional 1.2 miles to traverse the north end of RW 16/34.

All truck traffic associated with construction of the RW 16/34 extension would be expected to enter JBER by way of the Post Road Gate, and, like all other commercial vehicles entering the base, be subject to inspection at the Commercial Vehicle Inspection area (Figure 3.10-1). Project-related construction vehicles exiting JBER would normally use the Post Road Gate for egress. However, commercial vehicles are not required to exit JBER through the Post Road Gate, and other gates are in proximity to the proposed areas of construction, including the Government Hill, Boniface, and Muldoon gates, each of which allow access to Glenn Highway either by a direct interchange or by way of a frontage road. Depending upon the final destination of trucks with haul material or empty supply trucks, the Arctic Valley gate could be used to access areas north of Anchorage.

Equipment involved in the delivery and transport of raw materials for construction (for example, aggregate and asphalt for runway, taxiway, and roadway construction) would be expected to make multiple trips on a daily basis during active construction periods. This would result in an increase of daily traffic to and from JBER.

Gravel and asphalt delivery for roadways, taxiways, runways, and other surface areas could result in a calculated eight to nine trips per hour for the final two construction years. If it is assumed that commercial traffic would enter and exit through the Post Road Gate, which has the lowest AADT of the five two-way access gates (see Table 3.10-1), truck trips would represent a range of 7.0 percent to 8.0 percent of the total average annual daily traffic (AADT) at the gate (ADOT 2015). This could increase wait times during peak traffic periods. Should wait times be perceived as excessive by commuters, they would be expected to temporarily vary their commute patterns and use different JBER gates during the construction period. If trucks exited JBER using gates other than Post Road, each of which have higher AADTs, the percentage increase of traffic would be less than experienced at the Post Road Gate.

An additional potential source of daily traffic on and off JBER during all phases of runway extension could be in the form of construction workers commuting to JBER in privately owned vehicles. During peak construction periods, workers could increase on-base traffic by an estimated 350 vehicles for two trips per day (assuming one person per vehicle). If the vehicles were distributed across the Boniface, Muldoon, and Government Hill Gates, the additional trips would represent less than two percent of the AADT at those gates (see Table 3.10-1). Little to no impact from additional traffic would be anticipated, and construction of a runway extension would be expected to have little effect on gate time or the dispersed JBER roadway network.

For many phases of the project, construction traffic would be limited to the areas around the northern portions of RW 16/34 and areas to the north where excavation would occur. With the exception of trucks hauling fill or debris material to other locations on JBER, on-installation traffic associated with the extension of RW 16/34 would occur primarily on the existing road network, dirt roads and within the construction area associated with the project.

Roadways on JBER that would experience construction traffic (either by way of relocation, use by construction vehicles, or cut and fill activities) would include Talley Avenue/Airlifter Drive, 46th Street, and Fish Lake Road, in addition to several unnamed roads (see Figure 4.10-1).

Temporary construction- related increased traffic at specific JBER gates could be from 2 to 8 percent more than existing AADT during the construction period and could revert to existing AADT after the conclusion of construction. Depending on commuter choices, off-base Airport Heights Drive, Bragaw Street, and/or Boniface Parkway could experience temporary higher volumes of traffic during the construction period. The relocation of Airlifter Drive would remove an existing safety hazard and increase the transit distance around the north end of RW 16/34 by 1.2 miles.

Construction and operation of an extended runway with Alternative B would not be expected to result in any long-term effects on the surface transportation network on JBER or in the surrounding Anchorage roadways. A 2 to 8 percent temporary increase in gate AADT would be a less than significant impact on transportation and circulation (Appendix B.10.3).

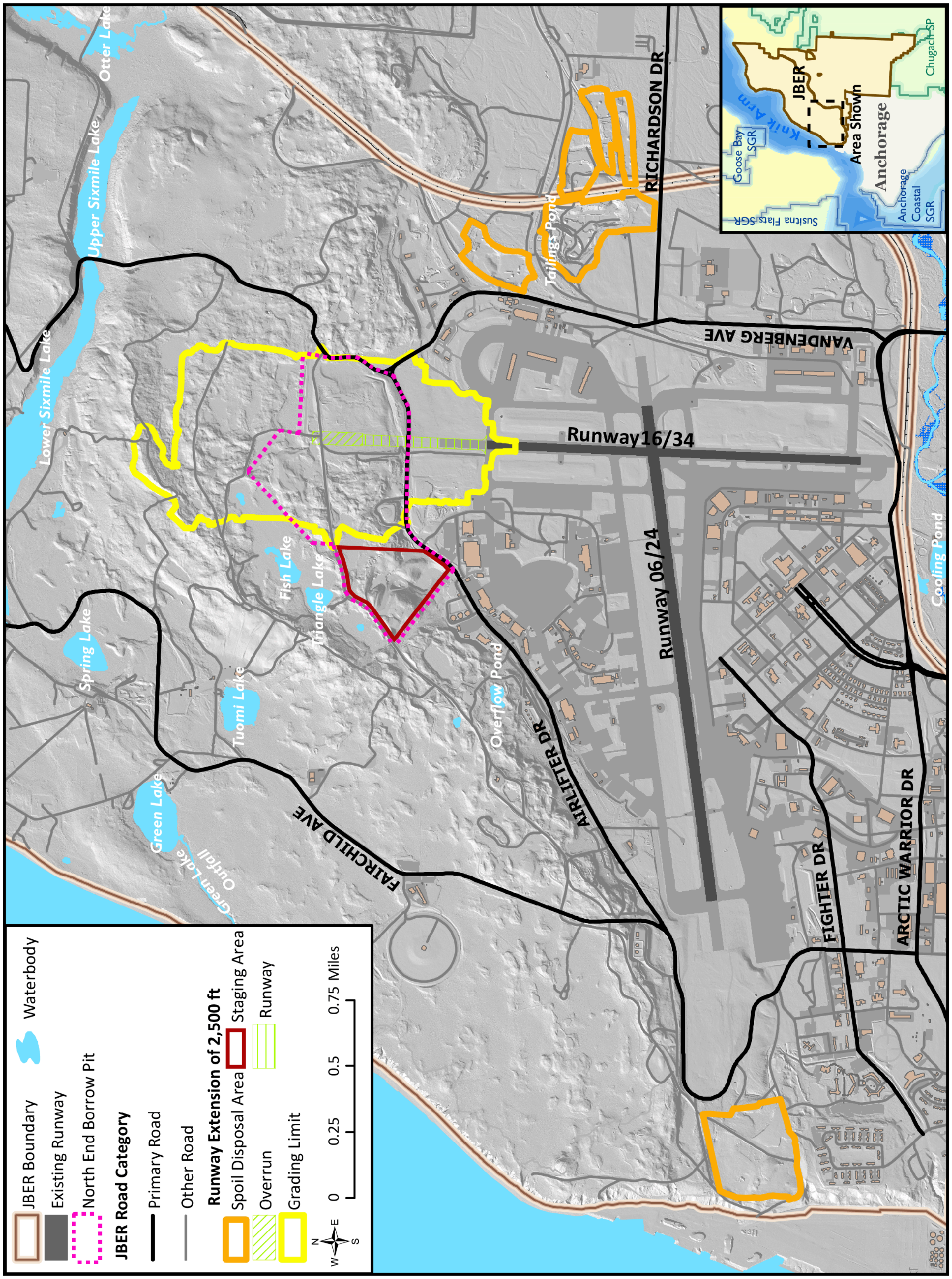

Figure 4.10-1. Roads in the Vicinity of Potential Runway 16/34 Extension Construction

4.10.3 Alternative C: RW 34 for Departure; RW 16 Arrival; RW 16/34 Extension

Alternative C includes the extension of RW 16/34 and all of the construction and related effects described for Alternative B in Section 4.10.2. F-22 departures would primarily be on the extended RW 34 with arrivals primarily on the extended RW 16. There would be a calculated overall increase in JBER AADT by less than 2 percent. A temporary increase in traffic at the Post Road gate by up to 8 percent could be experienced during peak construction. This could result in some adjustments by commuters if they experience delays. Rerouting Airlifter Drive to the north would improve safety while requiring an additional 0.6 mile of travel to transit the north end of RW 16/34.

As with Alternative B, Alternative C would have no long-term surface transportation or circulations impacts to the internal transportation network on JBER or to the surrounding Anchorage roadways.

4.10.4 Alternative D: RW 06 for Departure and Arrival

Alternative D involves changes in runway use patterns for F-22 departures and arrivals only, with no facility construction and no change in the overall number of aircraft operations (see Section 2.4.2 and Table 2.4-1). There would be no change in utilization of roads on or off JBER. No impacts to the internal transportation network on JBER or the surrounding Anchorage roadways would be anticipated.

4.10.5 Alternative E: RW 24 for Departure; RW 06 Arrival

Alternative E involves changes in runway use patterns for F-22 departures and arrivals only, with no facility construction and no change in the overall number of aircraft operations (see Section 2.4.5 and Table 2.4-1). There would be no change in utilization of roads on or off JBER. No impacts to the internal transportation network on JBER or the surrounding Anchorage roadways would be anticipated.

4.10.6 Alternative F: RW 24 for Departure; RW 16 Arrival; RW 16/34 Extension

Alternative F includes the extension of RW 16/34 and all the construction and related effects described for Alternative B in Section 4.10.2. F-22 departures would primarily be on the RW 24 with arrivals primarily on the extended RW 16. There would be a calculated overall increase in JBER AADT by less than 2 percent. A temporary increase in traffic at the Post Road Gate by up to 8 percent could be experienced during peak construction. This could result in some adjustments by commuters if they experience delays. Rerouting Airlifter Drive to the north would improve safety while requiring an additional 0.6 mile of travel distance to transit the north end of RW 16/34.

As with Alternative B, Alternative F would have no long-term surface transportation or circulations impacts to the internal transportation network on JBER or to the surrounding Anchorage roadways.

4.10.7 No Action Alternative

Under the No Action Alternative, F-22 flight operations continue as they are currently configured. As there would be no facility construction and no change in the overall number of aircraft operations, the internal transportation network on JBER and the surrounding Anchorage roadways would remain unchanged. Impacts to transportation would not change from existing conditions.

4.10.8 Conclusions

The environmental consequences and potential mitigation for transportation and circulation are summarized in this section.

Environmental Consequences Summary

Alternative A, Alternative D, Alternative E, or No Action would have no construction and no impact on transportation or circulation.

Alternative B, Alternative C, or Alternative F would have temporary construction- related increased traffic of 2 to 8 percent at specific JBER gates. Such an increase in temporary traffic is less than a significant impact (see Appendix 10.3). The relocation of Airlifter Drive would remove an existing safety hazard and increase the transit distance around the north end of RW 16/34 by 1.2 miles. These temporary construction-related impacts and roadway improvements would not impact transportation and circulation.

Application of the mitigation measures described below would result in avoiding and/or minimizing consequences to transportation and circulation during the extension of RW 16/34 if Alternative B, Alternative C, or Alternative F were selected for implementation. There would be no substantial short-term construction impacts or discernible long-term changes in JBER transportation or circulation.

Mitigation

For Alternative A, Alternative D, Alternative E, and No Action, there would be no transportation and circulation impacts, and, therefore, no mitigation is proposed for these alternatives.

Mitigations are identified that can be applied to avoid, minimize, rectify, reduce, or compensate the effect for significant impacts (see Appendix B.10). The following mitigation measures would be undertaken at JBER to avoid and/or minimize, to the extent practicable, environmental impacts to transportation and circulation associated with runway extension construction for Alternative B, Alternative C, or Alternative F.

- Prepare and implement construction traffic plans as part of a runway extension construction contracts to reduce roadway congestion.
- Coordinate scheduling and materials delivery (on- and off-site) to reduce traffic during high volume gate periods.
- Designate a specific gate for construction vehicle use to avoid unwanted congestion at commuter gates.

4.11 Socioeconomics

Socioeconomics includes the effects of aircraft operations and the effects of construction expenditures associated with an extension of RW 16/34. Construction economic effects are analyzed by introducing a change to a specific industry such as an increase or decrease in employment or spending. The nationally and regionally recognized IMPLAN economic model was used to estimate the employment and expenditure effects within the ROI. The IMPLAN model uses data from the U.S. Bureau of Labor Statistics and the U.S. Bureau of Economic Analysis to construct a mathematical representation of the Anchorage economy using region-specific spending patterns, economic multipliers, and industries (IMPLAN Group LLC 2015a). For this analysis, the IMPLAN model estimated the economic effects of an estimated range of construction expenditures on spending and employment in the Municipality of Anchorage.

The quantifiable economic impact analysis separates effects into three components: direct, indirect, and induced (see Appendix B for definitions and regulatory setting). The IMPLAN model uses extensive data and mathematical calculations to aggregate the economic effects. The resultant total effect from the economic impact analysis is the sum of the direct, indirect, and induced effects throughout the ROI.

4.11.1 Alternative A: RW 34 for Departure; RW 06 Arrival (Proposed Action)

Under Alternative A, RW 34 would be the primary departure runway and RW 06 would be the primary arrival runway for F-22 operations (Table 2.4-1). There would be no construction activities or related expenditures associated with Alternative A, and thus no direct or indirect effects to employment or earnings in the ROI.

Property value acoustic effects are difficult to estimate because multiple variables affect property values. Property size, improvements, location of the property, current conditions in the real estate market, interest rates, housing sales in the area, and overall regional economic conditions have a greater effect on property values than the acoustic environment (see Appendix B-11.1).

Several studies have analyzed property values as they relate to airports. A regression analysis study of property values as they relate to aircraft noise at two military installations found that, while aircraft noise at these installations may have had minor impacts on property values, it was difficult to quantify that impact (Fidell et al. 1996). Other factors, such as the quality of the housing near the installations and the local real estate market, had a larger impact on property values. Therefore, the regression analysis was not able to predict the impact of aircraft noise on the property values. Another study (Nelson 2004) analyzed 33 studies of noise effects on property values at 23 airports in Canada and the United States that compared properties not subject to airport noise with properties subject to airport noise (some of the airports were studied more than once). The Nelson study concluded that property values within an area exposed to airport noise levels between 65 dB L_{dn} to 75 dB L_{dn} could have discounted property values of between 0.5 and 0.6 percent per decibel (see Appendix B.11.1).

The Mountain View neighborhood currently experiences aircraft noise. Alternative A would expose a calculated 80 residential units currently exposed to an estimated 63 to 64 dB L_{dn} noise level to be exposed to a calculated 65 to 66 dB L_{dn} noise level. Based on the Fidell report, it would not be possible to quantify any change in property values. The Nelson report found that properties exposed to a calculated 65 dB L_{dn} noise level or greater could experience an estimated reduction in property value from 0.5 to 0.6 percent per 1 dB L_{dn} when compared with properties not exposed to airport noise. The Mountain View neighborhood existing property values reflect existing noise conditions. The Fidell and Nelson studies assessing airport noise effects on property values do not produce reproducible results when the difference between the existing conditions and changed conditions are small, such as 1 to 2 dB L_{dn}. The calculated Alternative A increase of 1 to 2 dB L_{dn} could result in a 0.5 to 1.0 percent reduction in property values when compared with comparable properties not subject to airport noise. In Mountain View, a 1 to 2 dB L_{dn} noise increase in an area already subject to airport noise would not be expected to result in a measurable change to property values.

Potential economic benefits to both military and civil aircraft operations could be associated with the increased use of JBER's RW 16/34 to reduce wait times for JBER aircraft departures. Military aircraft departures on RW 34 have the potential to reduce F-22 flights in the Merrill, Lake Hood, and International airspace segments (Figure 1.1-1). Increased use of RW 34 for F-22 departures could benefit JBER by reducing F-22 taxi and ground hold time and increasing training time in the airspace. Increased use of RW 34 could benefit civil flight time by reducing military operations in portions of the Anchorage Bowl used by civil aviation. The reduced congestion could have a potential benefit to planned ANC expanded operations (ADOT 2015). F-22 arrivals on RW 06 through the Anchorage Bowl would continue through the congested airspace and involve interaction with general and commercial aviation. JBER, the FAA, representatives of the Aircraft Owners and Pilots Association, and other aviation interests would continue to coordinate in order to provide a safe, efficient, and reasonably compatible airspace environment for all aviation activities.

4.11.2 Alternative B: RW 34 for Departure; RW 06 Arrival; RW 16/34 Extension

Alternative B has an extended RW 34 as the primary departure runway and RW 06 as the primary arrival runway for F-22 operations (Table 2.4-1). Increased use of RW 16/34 has the potential to reduce wait times for aircraft departures as described for Alternative A. Alternative B includes construction to extend RW 16/34 to achieve a 10,000-foot north-south runway. Construction activities would provide economic stimulation to the surrounding areas through the employment of construction and related workers as well as the purchase of materials and equipment. These construction activities and associated economic stimulation would be expected to occur over a three-year period. Construction activities and expenditures would be anticipated to create direct, indirect, and induced employment and earnings in the Anchorage Borough and surrounding areas.

Preliminary construction expenditures are estimated to total $158.0 million. These expenditures could support a total of approximately 670 direct one year-equivalent jobs (Table 4.11-1). This would be an average of approximately 200 to 250 direct jobs per years for the three-year construction period. The construction period in Anchorage is not year-round, so the seasonal construction period could result in a seasonal construction work force demand of 300 to 350 direct jobs. The total indirect and/or induced jobs as a result of direct purchases of goods and services and other expenditures would increase within related industries, including wholesale trade, services, and retail. Table 4.11-1 calculates the three-year total number of direct, indirect, and induced jobs projected to result from the extension of RW 16/34.

Table 4.11-1. Employment Associated With Runway 16/34 Extension Alternatives

IMPLAN Results	Runway Extension
Total expenditures	$158.0 million
Direct employment (number)	670
Indirect employment (number)	240
Induced employment (number)	390
Total employment	1,300
Direct labor income	$82.0 million
Indirect labor income	$15.0 million
Induced labor income	$22.0 million
Total labor income	$119.0 million

Section 3.11.2 identified 10,926 construction jobs in Anchorage in 2013 as well as 11,878 jobs in transportation and 4,510 jobs in mining operations and support. The extension of RW 16/34 would primarily involve construction workers, but would also draw from transportation, specifically road construction and trucking, as well as large haul vehicles such as used in mining. RW 16/34 excavation and construction would be expected to distribute excavation, grading, paving, and other activities over a three-year construction period.

During the peak year, construction employment of 350 direct employees could represent approximately 3.2 percent of the Anchorage construction work force. A lesser overall percentage would be expected when the transportation and hauling workers are included. The estimated direct, indirect, and induced labor income total for the entire three-year construction period would be approximately $119.0 million (Table 4.11-1).

The project indirect and induced labor would be expected to be distributed over the construction period. Indirect and induced employment could be approximately 200 jobs for the construction period. The overall labor requirements would represent less than 1 percent of the Anchorage labor force. The local labor force in Anchorage, as well as in the Matanuska-Susitna Borough, is expected to be adequate to supply the direct construction labor, indirect labor, and induced labor without a migration of workers into the area. If a portion of seasonal jobs were to be filled by temporary workers, there would be seasonal housing available based on the most recent American Community Survey of vacant housing units in the Municipality of Anchorage, which estimates there are over 8,000 vacant housing units (U.S. Census Bureau 2014a).

Alternative B would result in an estimated increase in runway maintenance costs of $500,000 per year, which would be typically concentrated in a one-month summer period. This would result in an estimated additional 25 one-month jobs, which would typically be an extension of the annual summer maintenance and periodic repaving of JBER runways and other surfaces. This labor demand would begin after construction was completed and continue to support maintenance of an extended RW 16/34. The additional runway maintenance costs would be projected to support an estimated 12 indirect and induced employees over a two-month period after completion of a RW 16/34 extension. Refinement of construction costs and schedules associated with a runway extension could refine estimated labor requirements.

Alternative B has the potential to reduce airspace congestion in the Anchorage Bowl associated with JBER departures. Reduced congestion has potential benefit to planned ANC expanded operations (ADOT

2015). Use of an extended RW 34 for most F-22 departures would lessen departure wait times for both military and civil aircraft. F-22 arrivals on RW 06 through the congested Anchorage Bowl would continue to involve interaction with general and commercial aviation.

JBER, the FAA, representatives of the Aircraft Owners and Pilots Association, and other aviation interests would continue to coordinate in order to provide a safe, efficient, and reasonably compatible airspace environment for all aviation activities.

4.11.3 Alternative C: RW 34 for Departure; RW 16 Arrival; RW 16/34 Extension

Under Alternative C, RW 34 would be the primary departure runway and RW 16 would be the primary arrival runway for F-22 operations (Table 2.4-1). Alternative C construction activities, and effects, would be the same as described for Alternative B. Economic effects associated with construction activities and expenditures are listed in Table 4.11-1. These estimates may change as construction expenditures and schedules become more refined.

Alternative C would involve F-22 flights departing from RW 34 and arriving on RW 16 and would reduce military aircraft operations and associated airspace congestion for civil aircraft operations in the Anchorage Bowl. This could lead to reduced wait times and less rerouting from that currently experienced by both military and civil aviation. IFR arrivals on RW 16, using a precision approach system, would avoid the more congested portions of the Anchorage Bowl. RW 34 departures and RW 16 arrivals would not be consistent with FAA ODO directives. Alternative C could increase general aviation encounters near Sixmile Lake. Coordination among JBER, the FAA, representatives of the Aircraft Owners and Pilots Association, and other aviation interests would continue to provide a safe, efficient, and reasonably compatible airspace environment for all aviation activities. As with Alternatives A and B, a reduction in Anchorage Bowl congestion could have a potential benefit to planned ANC expanded operations (ADOT 2015).

4.11.4 Alternative D: RW 06 for Departure and Arrival

Under Alternative D, RW 06 would serve as the primary departure and arrival runway for F-22 operations (Table 2.4-1). Alternative D does not include a runway extension or construction activities and related expenditures, and thus would have no direct or indirect effects to employment or earnings in the ROI.

Potential increased RW 06 departures, as compared with existing RW 24 departures, could reduce airspace congestion in the Anchorage Bowl associated with JBER departures on RW 24 and also have some potential benefit to planned ANC expanded operations (ADOT 2015). F-22 arrivals on RW 06 through the Anchorage Bowl would continue through the congested airspace and involve interaction with general and commercial aviation. JBER, the FAA, representatives of the Aircraft Owners and Pilots Association, and other aviation interests would continue to coordinate in order to provide a safe, efficient, and reasonably compatible airspace environment for all aviation activities.

4.11.5 Alternative E: RW 24 for Departure; RW 06 Arrival

Under Alternative E, RW 24 would be the primary departure runway and RW 06 would be the primary arrival runway for F-22 operations (Table 2.4-1). There would be no construction activities or related expenditures associated with Alternative E, and thus no direct or indirect effects to employment or earnings in the ROI.

Increased F-22 departures on RW 24 combined with a turn north within the JBER Class D airspace would not be expected to adversely affect civil aviation. Departures to the west on RW 24 and arrivals on RW 06 would not be consistent with FAA ODO directives. Arrivals on RW 06 traverse the congested Anchorage Bowl and would continue to involve interaction with general and commercial aviation. JBER, the FAA, representatives of the Aircraft Owners and Pilots Association, and other aviation interests would continue to coordinate in order to provide a safe, efficient, and reasonably compatible airspace environment for all aviation activities.

4.11.6 Alternative F: RW 24 for Departure; RW 16 Arrival; RW 16/34 Extension

Under Alternative F, RW 24 would be the primary departure runway and RW 16 would be the primary arrival runway for F-22 operations (Table 2.4-1). As with Alternative B, Alternative F involves construction of an extended RW 16/34. Construction activities, including employment of construction workers and the purchase of materials and equipment would be as described for Alternative B. Economic effects associated with construction activities and expenditures are listed in Table 4.11-1. These estimates may change as construction expenditures and schedules become more refined.

Cross-runway use under Alternative F would have the potential to reduce F-22 departure wait times because aircraft could depart as soon as an arriving aircraft passed the runway intersection. Increased F-22 departures on RW 24 combined with a turn north within the JBER Class D airspace and would not be expected to adversely affect civil aviation in the congested Anchorage Bowl. Arrivals on RW 16 would avoid the congested portion of the Anchorage Bowl. A reduction in Anchorage Bowl congestion could have a potential benefit to planned ANC expanded operations (ADOT 2015). Alternative F could require an increase in general aviation awareness along the Knik Arm and Sixmile Lake. Coordination among JBER, the FAA, representatives of the Aircraft Owners and Pilots Association, and other aviation interests would continue to provide a safe, efficient, and reasonably compatible airspace environment for all aviation activities.

4.11.7 No Action Alternative

For purposes of this EIS, the No Action Alternative represents 75 percent of F-22 departures on RW 06/24 and 25 percent of F-22 departures on RW 34. This is the affected environment condition described in Chapter 3. There would be no construction activities or expenditures that would directly or indirectly affect employment or earnings in the ROI. There would continue to be traffic congestion within the Anchorage Bowl associated with military operations. Coordination among JBER, the FAA, representatives of the Aircraft Owners and Pilots Association, and other aviation interests would continue to provide a safe, efficient, and reasonably compatible airspace environment for all aviation activities.

4.11.8 Conclusions

The environmental consequences and potential mitigation for socioeconomics are summarized in this section.

Environmental Consequences Summary

There is no construction and no change in JBER employment associated with Alternative A, Alternative D, Alternative E, or No Action. Socioeconomics would not be impacted by the changes to runway use patterns with any of the alternatives.

Alternative B, Alternative C, or Alternative F RW 16/34 construction would increase seasonal employment for construction and support workers. A one-year increase in demand for construction personnel would represent an estimated 3.2 percent of the available Anchorage construction workers. Demand for direct, indirect, and induced employment would be less than 1 percent of the Anchorage workforce. This small increase in demand for construction or other workers would be temporary and not result in socioeconomic consequences. Alternatives that would reduce military flight operations in the Anchorage Bowl airspace would have the potential to enhance local economic activities that rely on civil aircraft operations.

Mitigation

There are no socioeconomic consequences associated with Alternative A, Alternative D, Alternative E, or No Action, and no mitigation is proposed. Mitigations are identified that can be applied to avoid, minimize, reduce and/or compensate the effect for significant impacts (see Appendix B.11). Alternative B, Alternative C, or Alternative F would have short-term minor increases in employment in Anchorage with no discernable impacts to socioeconomics (see Appendix B.11). No mitigation for construction personnel is proposed. To support the economics of civil aviation in the Anchorage Bowl, JBER, the FAA, representatives of the Aircraft Owners and Pilots Association, and other aviation interests would continue to coordinate in order to provide a safe, efficient, and reasonably compatible airspace environment for all aviation activities.

4.12 Environmental Justice

Analysis of environmental justice is conducted pursuant to EO 12898 and EO 13045 and follows the 2014 Air Force EIAP guidelines (Air Force 2014), which include the seven steps summarized in Table 3.12-1. Environmental justice analysis focuses on the on-base and off-base populations in the affected area defined as those areas exposed to noise levels of 65 dB L_{dn} or greater. The area currently affected is the baseline and represents the No Action Alternative. Section 3.2 provides a description of the method applied to calculate the proportion of the population in the affected area. Section 3.12 explains the environmental justice minority and low-income populations in the ROI and COC. Section 3.12 also presents the distribution of children (under 18) and elderly (over 65) in the affected area.

The Mountain View community was identified early in the EIS process as an area of environmental justice concern. Alternatives with the potential to affect environmental justice populations are primarily those which result in noise generated by aircraft operations in the vicinity of JBER and especially on RW 34. The Mountain View Community Council received an Agency Coordination Letter on September 22, 2015, prior to the scoping meeting in Anchorage. As explained in Section 2.5.2 and Table 2.5-1, the public scoping meeting was held in Mountain View. The Air Force continues to engage with the community through the council regarding the proposal and the EIS.

Aircraft-generated noise levels of 65 dB L_{dn} or greater occur on portions of the base and extend beyond the base boundary over portions of the Knik Arm waterway and industrial areas, including the Port of Anchorage (see Section 3.2). Traffic access routes would produce noise during construction of a RW 16/34 extension. Most construction activities associated with RW 16/34 extension alternatives would occur approximately 3 miles inside the base boundary, and construction noise would not be expected to adversely affect on- or off-base residential locations. Truck noise would be audible to persons outdoors in the on-base housing area located 500 feet south of one of the proposed fill areas. The fill area has been subject to heavy equipment noise for decades and should not be different from existing conditions. Traffic would not be expected to increase noise greater than aircraft-generated noise.

As described in Section 3.12, and in accordance with Air Force EIAP guidelines, the COC is the “smallest set of Census data encompassing the ROI for each resource and is used to establish appropriate threshold for comparison analysis” (Air Force 2014). For minority and low-income populations on-base, census tract 020200004 is part of the COC. The census block group for the State of Alaska, Anchorage Borough, census tract 4 block group 1 (020200004001) encompasses the affected base ROI. For minority and low-income populations off-base, census tract 020200006 is the second part of the COC. The census block groups that represent the off-base ROIs are block groups 3 (020200006003), 4 (020200006004), and 5 (020200006004). The block groups are from the census data for the State of Alaska, Anchorage Borough, census tract 6.

The potential for disproportionate impacts to minority or low-income populations was determined by comparing the percent of each population in the respective ROI with the percent of each population in the total COC. If the ROI percent is less than the COC percent, then there would be no disproportionate impact. If, however, the ROI percent is greater than or equal to the COC percent, disproportionate effects could be present and mitigations could be applied (Air Force 2014).

Youth and elderly populations are calculated similarly to the environmental justice minority and low-income populations (see Section 3.12).

4.12.1 Alternative A: RW 34 for Departure; RW 06 Arrival (Proposed Action)

Under Alternative A, the affected area within the 65 to 69 dB L_{dn} noise contours) is contained within the four census block groups defined as the four ROIs (see Figure 4.12-1). The total COC population is calculated to be composed of 60.5 percent minority and 20.2 percent low-income (see Table 4.12-1). A portion of each census block group is within the affected area. Alternative A has a calculated total of 1,248 residents exposed to an annual average noise level of 65 to 69 dB L_{dn}. Of these 424 residents are in the community of Mountain View. A calculated 353 persons (83.3 percent) are minority and 140 persons (33.0 percent) are low-income. Although not part of the environmental justice population, a calculated 457 children (36.6 percent) and 25 elderly persons (5.4 percent) are included in the 1,248 persons exposed to 65 dB L_{dn} or greater noise (see Table 4.12-2).

Table 4.12-2 demonstrates that the percentage of minority persons in ROI 6003, ROI 6004, and ROI 6005 is greater than the percentage of minority persons in the total COC. The percentage of low-income persons in ROI 6003, ROI 6004, and ROI 6005 is greater than the percentage of low-income persons in the total COC. This means that Alternative A would result in a disproportionate effect upon 353 minority and 140 low-income off-base persons in the community of Mountain View. There is not a disproportionate effect to on-base minority or low-income persons in ROI 4001.

As explained in the Air Force guidelines, when it is determined that a disproportionate impact upon an environmental justice population will occur, the difference between the ROI and the COC percentages are documented (Air Force 2014). Potential mitigation measures could include pursuing an alternative with an extension of RW 16/34 combined with a displaced aircraft takeoff roll initiation part way up the extended runway to result in 65 dB onset rate adjusted monthly day-night average A-weighted sound level (L_{dnmr}) noise contours being within the base and away from the community of Mountain View.

Table 4.12-2 presents the number of youths and elderly calculated to be exposed to 65 to 69 dB L_{dn} noise levels (see Figure 4.12-2). Table 4.12-2 demonstrates that the percentage of on-base affected youths is greater than the total COC affected youths. This means there would be a greater proportion of on-base youths exposed to noise levels of 65 dB L_{dn} than in the COC as a whole. Off-base, the percentage of youths exposed to comparable noise levels is less than the COC for ROI 6003 and ROI 6004 and more for ROI 6005. Table 4.12-2 demonstrates that the percentage of elderly populations in the off-base ROI 6003 and ROI 6004 is greater than the COC percentage. Retired military people do not normally live on-base, so the percentage of on-base persons over 65 is low. Noise effects on individuals, including children, are presented in Section 4.2.

Under Alternative A, Mountain View and Mount Spurr Elementary Schools would be exposed to 65 to 69 dB L_{dn} noise levels (Table 3.12-5). Equivalent noise level during the school day would increase by 1.9 dB at Mountain View Elementary School and be reduced at other points of interest by 1.3 dB to 3.8 dB (Table 4.2-5). With Alternative A, approximately 11.2 acres of Davis Park would be within the 65 dB L_{dn} or greater noise contour. This means that 7.9 additional acres of the park adjacent to a disproportionate low-income population would experience greater noise exposure than with the existing (No Action) conditions. Annual average noise experienced by children, the elderly, and other regular park visitors would be increased from baseline conditions (Table 4.12-2). Potential mitigation measures to reduce impacts on low-income residents could also benefit park visitors.

4.12.2 Alternative B: RW 34 for Departure; RW 06 Arrival; RW 16/34 Extension

Under Alternative B, no off-base residential populations would be within noise levels of 65 dB L_{dn} or greater (see Figure 4.12-1 and Table 4.12-3). There would be no disproportionate impacts to off-base minority or low-income populations. A total of 775 people on-base would be within the affected area. This is 649 fewer people than under baseline, or No Action, conditions. Of the 775 on-base persons in the affected area, 285 are minority and 43 are low-income. These persons living on-base would continue to experience noise levels in the 65 to 69 dB L_{dn} range. The percentage of on-base minority and low-income persons in the affected area is less than the percentage in the COC. There would be no disproportionate impacts to on-base minority or low-income populations.

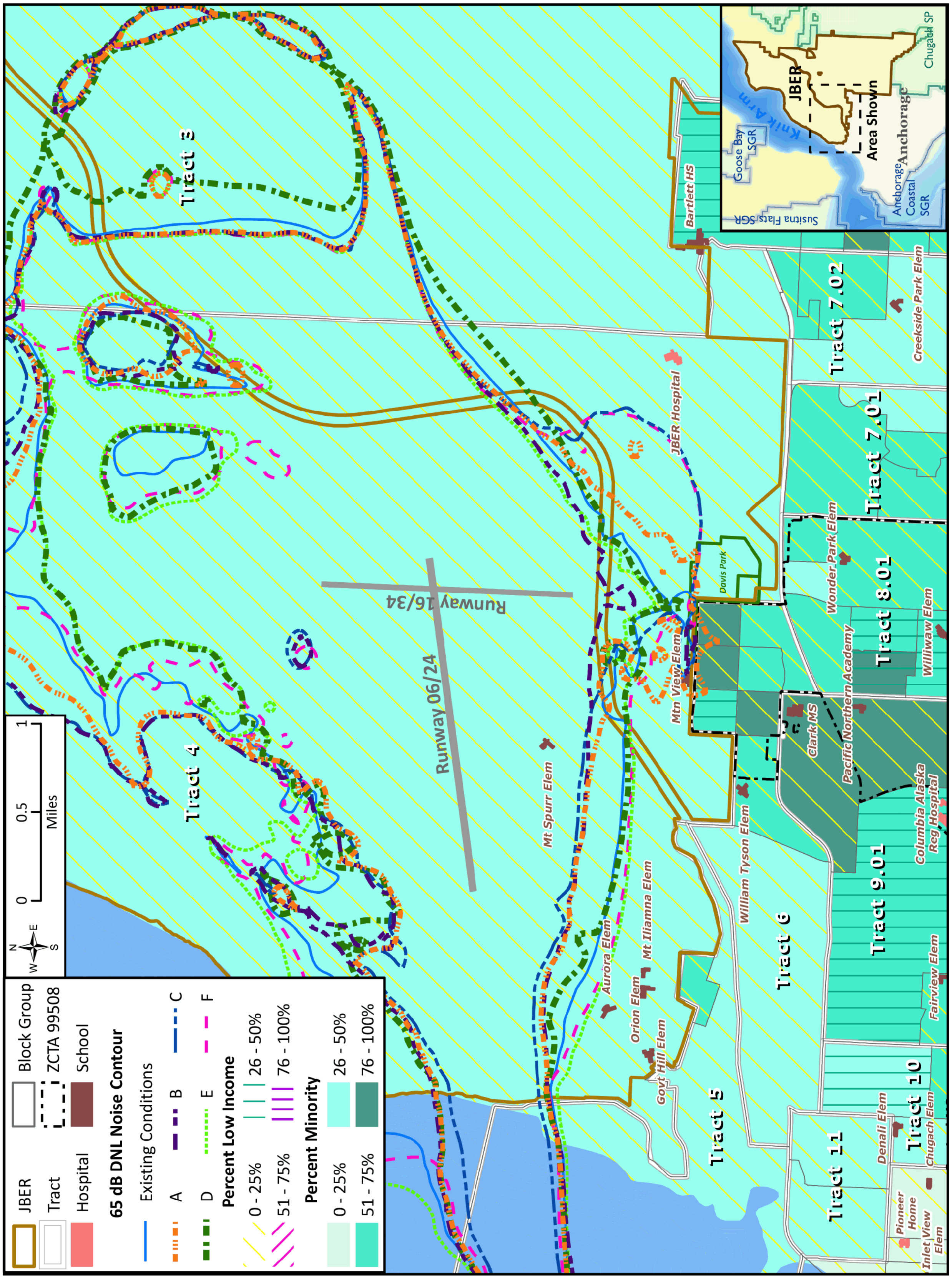

Figure 4.12-1. Minority and Low-income Populations in the Region of Influence Potentially Affected by Alternatives

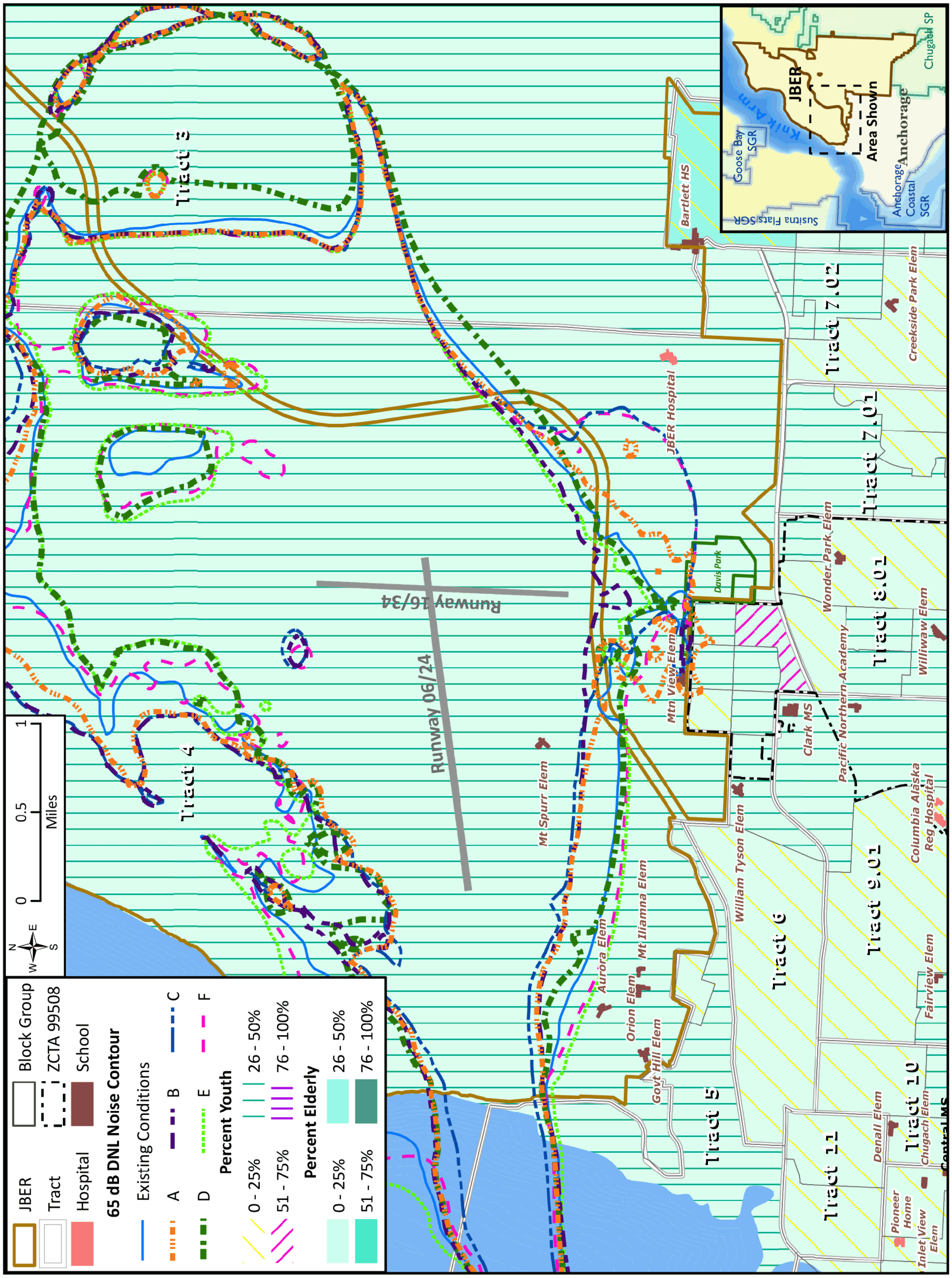

Figure 4.12-2. Youth and Elderly Populations in the Region of Influence Potentially Affected by Alternatives

Table 4.12-1. Percentage of On-Base and Off-Base Environmental Justice Population Potentially Exposed to Noise Levels of 65 dB L_{dn} or Greater Under Alternative A (Proposed Action)

Census Block Group (GEOID)	Baseline							Alternative A (Proposed Action)						
	Total Population in the Affected Area	Total Minority		Dispro-portionate	Total Low-Income		Dispro-portionate	Total Population in the Affected Area	Total Minority		Dispro-portionate	Total Low-Income		Dispro-portionate
		#	%		#	%			#	%		#	%	
On-Base Compared with Total COC														
020200004001 (65–69 dB L_{dn})	1,225	450	36.7%	No	67	5.5%	No	824	303	36.8%	No	45	5.5%	No
020200004001 (70–74 dB L_{dn})	199	73	36.7%	No	11	5.5%	No	0	0	0.0%	No	0	0.0%	No
Total On-Base ROI	**1,424**	**523**	**36.7%**	**No**	**78**	**5.5%**	**No**	**824**	**303**	**36.8%**	**No**	**45**	**5.5%**	**No**
Off-Base Compared with Total COC														
020200006003 (65–69 dB L_{dn})	0	0	0.0%	No	0	0.0%	No	22	15	68.2%	Yes	11	50.0%	Yes
020200006004 (65–69 dB L_{dn})	0	0	0.0%	No	0	0.0%	No	138	108	78.3%	Yes	33	23.9%	Yes
020200006005 (65–69 dB L_{dn})	0	0	0.0%	No	0	0.0%	No	264	230	87.1%	Yes	96	36.4%	Yes
Total Off-Base ROI	**0**	**0**	**0.0%**	**No**	**0**	**0.0%**	**No**	**424**	**353**	**83.3%**	**Yes**	**140**	**33.0%**	**Yes**
Total ROI	**1,424**	**523**	**36.7%**	**No**	**78**	**5.5%**	**No**	**1,248**	**656**	**52.6%**	**No**	**185**	**14.8%**	**No**
Geographic Unit	Total Population	Total Minority			Total Low-Income			Total Population in the Affected Area	Total Minority			Total Low-Income		
		#	%		#	%			#	%		#	%	
Census Tract 020200004 (On-Base COC)	5,519	2,028	36.7%		298	5.4%		5,519	2,028	36.7%		298	5.4%	
Census Tract 020200006 (Off-Base COC)	7,028	5,567	79.2%		2,242	31.9%		7,028	5,567	79.2%		2,242	31.9%	
Total COC	**12,547**	**7,595**	**60.5%**		**2,534**	**20.2%**		**12,547**	**7,595**	**60.5%**		**2,534**	**20.2%**	

Notes:

[1] Disproportionate environmental justice effects can occur if the percent of each population in the ROI is equal to or greater than the percent of each population in the Total COC.

Key:

COC = community of comparison
dB L_{dn} = decibels day-night average sound level
ROI = region of influence

Table 4.12-2. Percentage of On-Base and Off-Base Youth and Elderly Populations Potentially Exposed to Noise Levels of 65 dB L_{dn} or Greater Under Alternative A (Proposed Action)

Census Block Group (GEOID)	Baseline							Alternative A (Proposed Action)						
	Total Population in the Affected Area	Total Youth		ROI % greater than COC %	Total Elderly		ROI % greater than COC %	Total Population in the Affected Area	Total Youth		ROI % greater than COC %	Total Elderly		ROI % greater than COC %
		#	%		#	%			#	%		#	%	
On-Base Compared with Total COC														
020200004001 (65–69 dB L_{dn})	1,225	444	36.2%	Yes	3	0.2%	No	824	299	36.3%	Yes	2	0.3%	No
020200004001 (70–74 dB L_{dn})	199	72	36.1%	Yes	0	0.0%	No	0	0	0.0%	No	0	0.0%	No
Total On–Base ROI	**1,424**	**516**	**36.2%**	**Yes**	**3**	**0.2%**	**No**	**824**	**299**	**36.3%**	**Yes**	**2**	**0.3%**	**No**
Off–Base Compared with Total COC														
020200006003 (65–69 dB L_{dn})	0	0	0.0%	No	0	0.0%	No	22	4	18.2%	No	2	9.1%	Yes
020200006004 (65–69 dB L_{dn})	0	0	0.0%	No	0	0.0%	No	138	37	26.8%	No	12	8.7%	Yes
020200006005 (65–69 dB L_{dn})	0	0	0.0%	No	0	0.0%	No	264	117	44.3%	Yes	9	3.4%	No
Total Off-Base ROI	**0**	**0**	**0.0%**	**No**	**0**	**0.0%**	**No**	**424**	**158**	**37.3%**	**Yes**	**23**	**5.4%**	**Yes**
Total ROI	**1,424**	**516**	**36.2%**	**Yes**	**3**	**0.3%**	**No**	**1,248**	**457**	**36.6%**	**Yes**	**25**	**2.0%**	**No**
Geographic Unit	**Total Population**	**Total Youth**			**Total Elderly**			**Total Population in the Affected Area**	**Total Youth**			**Total Elderly**		
		#	**%**		**#**	**%**			**#**	**%**		**#**	**%**	
Census Tract 020200004 (On-Base COC)	5,519	2,001	36.3%		13	0.2%		5,519	2,001	36.3%		13	0.2%	
Census Tract 020200006 (Off-Base COC)	7,028	2,304	32.8%		487	6.9%		7,028	2,304	32.8%		487	6.9%	
Total COC	**12,547**	**4,305**	**34.3%**		**500**	**4.0%**		**12,547**	**4,305**	**34.3%**		**500**	**4.0%**	

Key:

COC = community of comparison
dB L_{dn} = decibels day-night average sound level
ROI = region of influence

Table 4.12-3. Percentage of On-Base and Off-Base Environmental Justice Population Potentially Exposed to Noise Levels of 65 dB L_{dn} or Greater Under Alternative B

Census Block Group (GEOID)	Baseline							Alternative B						
	Total Population in the Affected Area	Total Minority		Dispro-portionate	Total Low-Income		Dispro-portionate	Total Population in the Affected Area	Total Minority		Dispro-portionate	Total Low-Income		Dispro-portionate
		(#)	(%)		(#)	(%)			(#)	(%)		(#)	(%)	
On-Base Compared with Total COC														
020200004001 (65–69 dB L_{dn})	1,225	450	36.7%	No	67	5.5%	No	775	285	36.8%	No	43	5.6%	No
020200004001 (70–74 dB L_{dn})	199	73	36.7%	No	11	5.5%	No	0	0	0.0%	No	0	0.0%	No
Total On-Base ROI	**1,424**	**523**	**36.7%**	**No**	**78**	**5.5%**	**No**	**775**	**285**	**36.8%**	**No**	**43**	**5.6%**	**No**
Off-Base Compared with Total COC														
020200006003 (65 dB L_{dn} ≤)	0	0	0.0%	No	0	0.0%	No	0	0	0.0%	No	0	0.0%	No
020200006004 (65 dB L_{dn} ≤)	0	0	0.0%	No	0	0.0%	No	0	0	0.0%	No	0	0.0%	No
020200006005 (65 dB L_{dn} ≤)	0	0	0.0%	No	0	0.0%	No	0	0	0.0%	No	0	0.0%	No
Total Off-Base ROI	**0**	**0**	**0.0%**	**No**	**0**	**0.0%**	**No**	**0**	**0**	**0.0%**	**No**	**0**	**0.0%**	**No**
Total ROI	**1,424**	**523**	**36.7%**	**No**	**78**	**5.5%**	**No**	**775**	**285**	**36.8%**	**No**	**43**	**5.6%**	**No**
Geographic Unit	Total Population	Total Minority			Total Low-Income			Total Population in the Affected Area	Total Minority			Total Low-Income		
		(#)	(%)		(#)	(%)			(#)	(%)		(#)	(%)	
Census Tract 020200004 (On-Base COC)	5,519	2,028	36.7%		298	5.4%		5,519	2,028	36.7%		298	5.4%	
Census Tract 020200006 (Off-Base COC)	7,028	5,567	79.2%		2,242	31.9%		7,028	5,567	79.2%		2,242	31.9%	
Total COC	**12,547**	**7,595**	**60.5%**		**2,534**	**20.2%**		**12,547**	**7,595**	**60.5%**		**2,534**	**20.2%**	

Notes:

[1] Disproportionate environmental justice effects can occur if the percent of each population in the ROI is equal to or greater than the percent of each population in the Total COC.

Key:

COC = community of comparison
dB L_{dn} = decibels day-night average sound level
ROI = region of influence

Table 4.12-4. Percentage of On-Base and Off-Base Youth and Elderly Populations Potentially Exposed to Noise Levels of 65 dB L_{dn} or Greater Under Alternative B

Census Block Group (GEOID)	Baseline: Total Population in the Affected Area	Baseline: Total Youth (#)	Baseline: Total Youth (%)	Baseline: ROI % greater than COC %	Baseline: Total Elderly (#)	Baseline: Total Elderly (%)	Baseline: ROI % greater than COC %	Alternative B: Total Population in the Affected Area	Alternative B: Total Youth (#)	Alternative B: Total Youth (%)	Alternative B: ROI % greater than COC %	Alternative B: Total Elderly (#)	Alternative B: Total Elderly (%)	Alternative B: ROI % greater than COC %
On-Base Compared with Total COC														
020200004001 (65–69 dB L_{dn})	1,225	444	36.2%	Yes	3	0.2%	No	775	281	36.3%	Yes	2	0.3%	No
020200004001 (70–74 dB L_{dn})	199	72	36.1%	Yes	0	0.0%	No	0	0	0.0%	No	0	0.0%	No
Total On-Base ROI	**1,424**	**516**	**36.2%**	**Yes**	**3**	**0.2%**	**No**	**775**	**281**	**36.3%**	**Yes**	**2**	**0.3%**	**No**
Off-Base Compared with Total COC														
020200006003 (65 dB L_{dn} ≤)	0	0	0.0%	No	0	0.0%	No	0	0	0.0%	No	0	0.0%	No
020200006004 (65 dB L_{dn} ≤)	0	0	0.0%	No	0	0.0%	No	0	0	0.0%	No	0	0.0%	No
020200006005 (65 dB L_{dn} ≤)	0	0	0.0%	No	0	0.0%	No	0	0	0.0%	No	0	0.0%	No
Total Off-Base ROI	**0**	**0**	**0.0%**	**No**	**0**	**0.0%**	**No**	**0**	**0**	**0.0%**	**No**	**0**	**0.0%**	**No**
Total ROI	**1,424**	**516**	**36.2%**	**Yes**	**3**	**0.2%**	**No**	**775**	**281**	**36.3%**	**Yes**	**2**	**0.3%**	**No**
Geographic Unit	**Total Population**	**Total Youth (#)**	**Total Youth (%)**		**Total Elderly (#)**	**Total Elderly (%)**		**Total Population in the Affected Area**	**Total Youth (#)**	**Total Youth (%)**		**Total Elderly (#)**	**Total Elderly (%)**	
Census Tract 020200004 (On-Base COC)	5,519	2,001	36.3%		13	0.2%		5,519	2,001	36.3%		13	0.2%	
Census Tract 020200006 (Off-Base COC)	7,028	2,304	32.8%		487	6.9%		7,028	2,304	32.8%		487	6.9%	
Total COC	**12,547**	**4,305**	**34.3%**		**500**	**4.0%**		**12,547**	**4,305**	**34.3%**		**500**	**4.0%**	

Key:
COC = community of comparison
dB L_{dn} = decibels day-night average sound level
ROI = region of influence

Figure 4.12-2 overlays the noise contours for all alternatives on the populations of children and elderly. Under this alternative, F-22 takeoff roll initiation would move north on RW 34. Noise levels of 65 to 69 dB L_{dn} would not affect off-base populations and would not affect Mountain View Elementary School. Mount Spurr Elementary School would experience noise levels in the 65 to 69 dB L_{dn} range. Equivalent noise levels during the school day would be reduced by 0.5 dB to 3.6 dB at all points of interest in Table 4.2-5. Approximately 3.2 acres of Davis Park would be within the 65 dB L_{dn} or greater noise contour, which is approximately the same as the 3.3 acres exposed under baseline conditions.

The annual average noise experienced by children, the elderly, or other regular park users would be effectively the same as baseline conditions (Table 4.12-4). Section 4.2.1 explains noise effects on individuals, including children. Alternative B off-base noise conditions would be comparable to Alternative A if the takeoff roll initiation was not moved north on an extended RW 34.

4.12.3 Alternative C: RW 34 for Departure; RW 16 Arrival; RW 16/34 Extension

Under Alternative C, no off-base residential populations would be within noise levels of 65 dB L_{dn} or greater (see Figure 4.12-1). A total of 915 people on-base would be within the affected area under this alternative. This is 509 fewer persons than under the No Action Alternative. As shown in Table 4.12-5, there would be no disproportionate impacts to minority or low-income populations under this alternative. Youth and elderly populations are compared with noise contours in Figure 4.12-2. Table 4.12-6 shows that the on-base ROI youth percentage is greater than the total COC percentage. Elderly populations in the on-base ROI and the off-base ROIs are less than the total COC percentage.

Under this alternative, the F-22 departure takeoff roll would move north on RW 34. Noise levels of 65 to 69 dB L_{dn} would affect a portion of the Mountain View Elementary School and noise levels at Mount Spurr Elementary would be reduced from existing conditions but continue to experience noise levels of 65 to 69 dB L_{dn}. Equivalent noise levels during the school day would be reduced by 0.1 dB to 4.4 dB at schools and other points of interest in Table 4.2-5. Alternative C would have approximately 6.8 acres of Davis Park within the 65 dB L_{dn} or greater noise contour, which is 3.5 acres more than affected under No Action. The annual average noise experienced by children, the elderly, or other park users would be somewhat greater than baseline conditions. Section 4.2.1 explains noise effects on individuals, including children. Alternative C off-base noise conditions would be applicable to Alternative A if the takeoff roll initiation was not moved north on an extended RW 34.

Table 4.12-5. Percentage of On-Base and Off-Base Environmental Justice Population Potentially Exposed to Noise Levels of 65 dB L_{dn} or Greater Under Alternative C

Census Block Group (GEOID)	Baseline							Alternative C						
	Total Population in the Affected Area	Total Minority (#)	Total Minority (%)	Dispro-portionate	Total Low-Income (#)	Total Low-Income (%)	Dispro-portionate	Total Population in the Affected Area	Total Minority (#)	Total Minority (%)	Dispro-portionate	Total Low-Income (#)	Total Low-Income (%)	Dispro-portionate
On-Base Compared with the Total COC														
020200004001 (65–69 dB L_{dn})	1,225	450	36.7%	No	67	5.5%	No	915	336	36.7%	No	50	5.5%	No
020200004001 (70–74 dB L_{dn})	199	73	36.7%	No	11	5.5%	No	0	0	0.0%	No	0	0.0%	No
Total On-Base ROI	**1,424**	**523**	**36.7%**	**No**	**78**	**5.5%**	**No**	**915**	**336**	**36.7%**	**No**	**50**	**5.5%**	**No**
Off-Base Compared with the Total COC														
020200006003 (65 dB L_{dn} ≤)	0	0	0.0%	No	0	0.0%	No	0	0	0.0%	No	0	0.0%	No
020200006004 (65 dB L_{dn} ≤)	0	0	0.0%	No	0	0.0%	No	0	0	0.0%	No	0	0.0%	No
020200006005 (65 dB L_{dn} ≤)	0	0	0.0%	No	0	0.0%	No	0	0	0.0%	No	0	0.0%	No
Total Off-Base ROI	**0**	**0**	**0.0%**	**No**	**0**	**0.0%**	**No**	**0**	**0**	**0.0%**	**No**	**0**	**0.0%**	**No**
Total ROI	**1,424**	**523**	**36.7%**	**No**	**78**	**5.5%**	**No**	**915**	**336**	**36.7%**	**No**	**50**	**5.5%**	**No**
Geographic Unit	**Total Population**	**Total Minority (#)**	**Total Minority (%)**		**Total Low-Income (#)**	**Total Low-Income (%)**		**Total Population in the Affected Area**	**Total Minority (#)**	**Total Minority (%)**		**Total Low-Income (#)**	**Total Low-Income (%)**	
Census Tract 020200004 (On-Base COC)	5,519	2,028	36.7%		298	5.4%		5,519	2,028	36.7%		298	5.4%	
Census Tract 020200006 (Off-Base COC)	7,028	5,567	79.2%		2,242	31.9%		7,028	5,567	79.2%		2,242	31.9%	
Total COC	**12,547**	**7,595**	**60.5%**		**2,534**	**20.2%**		**12,547**	**7,595**	**60.5%**		**2,534**	**20.2%**	

Notes:

Disproportionate environmental justice effects can occur if the percent of each population in the ROI is equal to or greater than the percent of each population in the Total COC.

Key:

COC = community of comparison
dB L_{dn} = decibels day-night average sound level
ROI = region of influence

Table 4.12-6. Percentage of On-Base and Off-Base Youth and Elderly Populations Potentially Exposed to Noise Levels of 65 dB L_{dn} or Greater Under Alternative C

Census Block Group (GEOID)	Baseline							Alternative C						
	Total Population in the Affected Area	Total Youth		ROI % greater than COC %	Total Elderly		ROI % greater than COC %	Total Population in the Affected Area	Total Youth		ROI % greater than COC %	Total Elderly		ROI % greater than COC %
		(#)	(%)		(#)	(%)			(#)	(%)		(#)	(%)	
On-Base Compared with the Total COC														
020200004001 (65–69 dB L_{dn})	1,225	444	36.2%	Yes	3	0.2%	No	915	332	36.3%	Yes	2	0.2%	No
020200004001 (70–74 dB L_{dn})	199	72	36.1%	Yes	0	0.0%	No	0	0	0.0%	No	0	0.0%	No
Total On-Base ROI	1,424	516	36.2%	Yes	3	0.2%	No	915	332	36.3%	Yes	2	0.2%	No
Off-Base Compared with the Total COC														
020200006003 (65 dB L_{dn} ≤)	0	0	0.0%	No	0	0.0%	No	0	0	0.0%	No	0	0.0%	No
020200006004 (65 dB L_{dn} ≤)	0	0	0.0%	No	0	0.0%	No	0	0	0.0%	No	0	0.0%	No
020200006005 (65 dB L_{dn} ≤)	0	0	0.0%	No	0	0.0%	No	0	0	0.0%	No	0	0.0%	No
Total Off-Base ROI	**0**	**0**	**0.0%**	**No**	**0**	**0.0%**	**No**	**0**	**0**	**0.0%**	**No**	**0**	**0.0%**	**No**
Total ROI	**1,424**	**516**	**36.2%**	**Yes**	**3**	**0.2%**	**No**	**915**	**332**	**36.3%**	**Yes**	**2**	**0.2%**	**No**
Geographic Unit	**Total Population**	**Total Youth**			**Total Elderly**			**Total Population in the Affected Area**	**Total Youth**			**Total Elderly**		
		(#)	**(%)**		**(#)**	**(%)**			**(#)**	**(%)**		**(#)**	**(%)**	
Census Tract 020200004 (On-Base COC)	5,519	2,001	36.3%		13	0.2%		5,519	2,001	36.3%		13	0.2%	
Census Tract 020200006 (Off-Base COC)	7,028	2,304	32.8%		487	6.9%		7,028	2,304	32.8%		487	6.9%	
Total COC	**12,547**	**4,305**	**34.3%**		**500**	**4.0%**		**12,547**	**4,305**	**34.3%**		**500**	**4.0%**	

Key:
COC = community of comparison
dB L_{dn} = decibels day-night average sound level
ROI = region of influence

4.12.4 Alternative D: RW 06 for Departure and Arrival

Under Alternative D, no off-base residential populations would be within noise levels of 65 dB L_{dn} or greater (see Table 4.12-1). A total of 1,193 people on-base would be within the affected area under this alternative. This is 231 fewer persons than under the No Action Alternative. As shown in Table 4.12-7 there would be no disproportionate impacts to minority or low-income populations under this alternative. Youth and Elderly populations are compared with noise contours in Figure 4.12-2. Table 4.12-8 shows that the on-base ROI youth percentage is greater than the total COC percentage. Elderly populations in the on-base ROI and the off-base ROIs are less than the total COC percentage.

Under this alternative, noise levels of 65 to 69 dB L_{dn} would no longer affect Mountain View Elementary School. Noise levels at Mount Spurr would remain within 70 to 75 dB L_{dn} noise levels comparable to baseline conditions. Equivalent noise levels during the school day would increase at Mount Spurr Elementary by 0.8 dB and be reduced by 0.1 dB to 1.1 dB at other points of interest listed in Table 4.2-5. No acres of Davis Park would be within the 65 dB L_{dn} or greater noise contour. The annual average noise experienced by children, the elderly, or other regular park users would be less than experienced under baseline conditions. Section 4.2.1 explains noise effects on individuals, including children.

4.12.5 Alternative E: RW 24 for Departure; RW 06 Arrival

Under Alternative E, no off-base residential populations would be within noise levels of 65 dB L_{dn} or greater (see Figure 4.12-1). A total of 1,718 people on-base would be within the affected area under this alternative. This is 294 more persons than under the No Action Alternative. As shown in Table 4.12-9 there would be no disproportionate impacts to minority or low-income populations under this alternative. Youth and elderly populations are compared with noise contours in Figure 4.12-2. Table 4.12-10 shows that the on-base ROI youth percentage is greater than the total COC percentage. Elderly populations in the on-base ROI and the off-base ROIs are less than the total COC percentage. Section 4.2.1 explains noise effects on individuals, including children.

Under this alternative, F-22 departure operations on RW 24 and arrivals on RW 06 would result in noise levels below 65 dB L_{dn} at Mountain View Elementary School. Noise levels at Mount Spurr Elementary School would remain in the 70 to 75 dB L_{dn} range as under baseline conditions. Equivalent noise levels would increase at points of interest by 0.6 dB to 1.8 dB, except at Mountain View Elementary School, which would decrease by 0.8 dB (Table 4.2-5). No acres of Davis Park would be within the 65 dB L_{dn} or greater noise contour. The annual average noise experienced by children, the elderly, or other regular park users would be less than experienced under baseline conditions.

Table 4.12-7. Percentage of On-Base and Off-Base Environmental Justice Population Potentially Exposed to Noise Levels of 65 dB L_{dn} or Greater Under Alternative D

Census Block Group (GEOID)	Baseline							Alternative D						
	Total Population in the Affected Area	Total Minority		Dispro-portionate	Total Low-Income		Dispro-portionate	Total Population in the Affected Area	Total Minority		Dispro-portionate	Total Low-Income		Dispro-portionate
		(#)	(%)		(#)	(%)			(#)	(%)		(#)	(%)	
On-Base Compared with Total COC														
020200004001 (65–69 dB L_{dn})	1,225	450	36.7%	No	67	5.5%	No	933	343	36.8%	No	52	5.6%	No
020200004001 (70–74 dB L_{dn})	199	73	36.7%	No	11	5.5%	No	260	96	36.9%	No	14	5.4%	No
Total On–Base ROI	**1,424**	**523**	**36.7%**	**No**	**78**	**5.5%**	**No**	**1,193**	**439**	**36.8%**	**No**	**66**	**5.5%**	**No**
Off–Base Compared with Total COC														
020200006003 (65 dB L_{dn} ≤)	0	0	0.0%	No	0	0.0%	No	0	0	0.0%	No	0	0.0%	No
020200006004 (65 dB L_{dn} ≤)	0	0	0.0%	No	0	0.0%	No	0	0	0.0%	No	0	0.0%	No
020200006005 (65 dB L_{dn} ≤)	0	0	0.0%	No	0	0.0%	No	0	0	0.0%	No	0	0.0%	No
Total Off-Base ROI	**0**	**0**	**0.0%**	**No**	**0**	**0.0%**	**No**	**0**	**0**	**0.0%**	**No**	**0**	**0.0%**	**No**
Total ROI	**1,424**	**523**	**36.7%**	**No**	**78**	**5.5%**	**No**	**1,193**	**439**	**36.8%**	**No**	**66**	**5.5%**	**No**
Geographic Unit	**Total Population**	**Total Minority**			**Total Low-Income**			**Total Population in the Affected Area**	**Total Minority**			**Total Low-Income**		
		(#)	**(%)**		**(#)**	**(%)**			**(#)**	**(%)**		**(#)**	**(%)**	
Census Tract 020200004 (On-Base COC)	5,519	2,028	36.7%		298	5.4%		5,519	2,028	36.7%		298	5.4%	
Census Tract 020200006 (Off-Base COC)	7,028	5,567	79.2%		2,242	31.9%		7,028	5,567	79.2%		2,242	31.9%	
Total COC	**12,547**	**7,595**	**60.5%**		**2,534**	**20.2%**		**12,547**	**7,595**	**60.5%**		**2,534**	**20.2%**	

Notes:

[1] Disproportionate environmental justice effects can occur if the percent of each population in the ROI is equal to or greater than the percent of each population in the Total COC.

Key:

COC = community of comparison
dB L_{dn} = decibels day-night average sound level
ROI = region of influence

Table 4.12-8. Percentage of On-Base and Off-Base Youth and Elderly Populations Potentially Exposed to Noise Levels of 65 dB L_{dn} or Greater Under Alternative D

Census Block Group (GEOID)	Baseline							Alternative D						
	Total Population in the Affected Area	Total Youth		ROI % greater than COC %	Total Elderly		ROI % greater than COC %	Total Population in the Affected Area	Total Youth		ROI % greater than COC %	Total Elderly		ROI % greater than COC %
		(#)	(%)		(#)	(%)			(#)	(%)		(#)	(%)	
On-Base Compared with Total COC														
020200004001 (65-69 dB L_{dn})	1,225	444	36.2%	Yes	3	0.2%	No	933	338	36.3%	Yes	2	0.2%	No
020200004001 (70-74 dB L_{dn})	199	72	36.1%	Yes	0	0.0%	No	260	94	36.2%	Yes	1	0.4%	No
Total On-Base ROI	**1,424**	**516**	**36.2%**	**Yes**	**3**	**0.2%**	**No**	**1,193**	**432**	**36.2%**	**Yes**	**3**	**0.3%**	**No**
Off-Base Compared with Total COC														
020200006003 (65 dB L_{dn} ≤)	0	0	0.0%	No	0	0.0%	No	0	0	0.0%	No	0	0.0%	No
020200006004 (65 dB L_{dn} ≤)	0	0	0.0%	No	0	0.0%	No	0	0	0.0%	No	0	0.0%	No
020200006005 (65 dB L_{dn} ≤)	0	0	0.0%	No	0	0.0%	No	0	0	0.0%	No	0	0.0%	No
Total Off-Base ROI	**0**	**0**	**0.0%**	**No**	**0**	**0.0%**	**No**	**0**	**0**	**0.0%**	**No**	**0**	**0.0%**	**No**
Total ROI	**1,424**	**516**	**36.2%**	**Yes**	**3**	**0.2%**	**No**	**1,193**	**432**	**36.2%**	**Yes**	**3**	**0.3%**	**No**
Geographic Unit	Total Population	Total Youth			Total Elderly			Total Population in the Affected Area	Total Youth			Total Elderly		
		(#)	(%)		(#)	(%)			(#)	(%)		(#)	(%)	
Census Tract 020200004 (On-Base COC)	5,519	2,001	36.3%		13	0.2%		5,519	2,001	36.3%		13	0.2%	
Census Tract 020200006 (Off-Base COC)	7,028	2,304	32.8%		487	6.9%		7,028	2,304	32.8%		487	6.9%	
Total COC	**12,547**	**4,305**	**34.3%**		**500**	**4.0%**		**12,547**	**4,305**	**34.3%**		**500**	**4.0%**	

Table 4.12-9. Percentage of On-Base and Off-Base Environmental Justice Population Potentially Exposed to Noise Levels of 65 dB L_{dn} or Greater Under Alternative E

Census Block Group (GEOID)	Baseline							Alternative E						
	Total Population in the Affected Area	Total Minority		Dispro-portionate	Total Low-Income		Dispro-portionate	Total Population in the Affected Area	Total Minority		Dispro-portionate	Total Low-Income		Dispro-portionate
		(#)	(%)		(#)	(%)			(#)	(%)		(#)	(%)	
On-Base Compared with Total COC														
020200004001 (65–69 dB L_{dn})	1,225	450	36.7%	No	67	5.5%	No	1,271	467	36.7%	No	70	5.4%	No
020200004001 (70–74 dB L_{dn})	199	73	36.7%	No	11	5.5%	No	447	164	36.7%	No	25	5.4%	No
Total On–Base ROI	**1,424**	**523**	**36.7%**	**No**	**78**	**5.5%**	**No**	**1,718**	**631**	**36.7%**	**No**	**95**	**5.5%**	**No**
Off–Base Compared with Total COC														
020200006003 (65 dB L_{dn} ≤)	0	0	0.0%	No	0	0.0%	No	0	0	0.0%	No	0	0.0%	No
020200006004 (65 dB L_{dn} ≤)	0	0	0.0%	No	0	0.0%	No	0	0	0.0%	No	0	0.0%	No
020200006005 (65 dB L_{dn} ≤)	0	0	0.0%	No	0	0.0%	No	0	0	0.0%	No	0	0.0%	No
Total Off-Base ROI	**0**	**0**	**0.0%**	**No**	**0**	**0.0%**	**No**	**0**	**0**	**0.0%**	**No**	**0**	**0.0%**	**No**
Total ROI	**1,424**	**523**	**36.7%**	**No**	**78**	**5.5%**	**No**	**1,718**	**631**	**36.7%**	**No**	**95**	**5.5%**	**No**
Geographic Unit	**Total Population**	**Total Minority**			**Total Low-Income**			**Total Population in the Affected Area**	**Total Minority**			**Total Low-Income**		
		(#)	**(%)**		**(#)**	**(%)**			**(#)**	**(%)**		**(#)**	**(%)**	
Census Tract 020200004 (On-Base COC)	5,519	2,028	36.7%		289	5.4%		5,519	2,028	36.7%		289	5.4%	
Census Tract 020200006 (Off-Base COC)	7,028	5,567	79.2%		2,242	31.9%		7,028	5,567	79.2%		2,242	31.9%	
Total COC	**12,547**	**7,595**	**60.5%**		**2,534**	**20.2%**		**12,547**	**7,595**	**60.5%**		**2,534**	**20.2%**	

Notes:

[1] Disproportionate environmental justice effects can occur if the percent of each population in the ROI is equal to or greater than the percent of each population in the Total COC.

Key:

COC = community of comparison
dB L_{dn} = decibels day-night average sound level
ROI = region of influence

Table 4.12-10. Percentage of On-Base and Off-Base Youth and Elderly Populations Potentially Exposed to Noise Levels of 65 dB L_{dn} or Greater Under Alternative E

Census Block Group (GEOID)	Baseline							Alternative E						
	Total Population in the Affected Area	Total Youth (#)	Total Youth (%)	ROI % greater than COC %	Total Elderly (#)	Total Elderly (%)	ROI % greater than COC %	Total Population in the Affected Area	Total Youth (#)	Total Youth (%)	ROI % greater than COC %	Total Elderly (#)	Total Elderly (%)	ROI % greater than COC %
On-Base Compared with Total COC														
020200004001 (65–69 dB L_{dn})	1,225	444	36.2%	Yes	3	0.2%	No	1,271	461	36.3%	Yes	3	0.2%	No
020200004001 (70–74 dB L_{dn})	199	72	36.1%	Yes	0	0.0%	No	447	162	36.2%	Yes	1	0.2%	No
Total On-Base ROI	**1,424**	**516**	**36.2%**	**Yes**	**3**	**0.2%**	**No**	**1,718**	**623**	**36.3%**	**Yes**	**4**	**0.2%**	**No**
Off-Base Compared with Total COC														
020200006003 (65 dB L_{dn} ≤)	0	0	0.0%	No	0	0.0%	No	0	0	0.0%	No	0	0.0%	No
020200006004 (65 dB L_{dn} ≤)	0	0	0.0%	No	0	0.0%	No	0	0	0.0%	No	0	0.0%	No
020200006005 (65 dB L_{dn} ≤)	0	0	0.0%	No	0	0.0%	No	0	0	0.0%	No	0	0.0%	No
Total Off-Base ROI	**0**	**0**	**0.0%**	**No**	**0**	**0.0%**	**No**	**0**	**0**	**0.0%**	**No**	**0**	**0.0%**	**No**
Total ROI	**1,424**	**516**	**36.2%**	**Yes**	**3**	**0.2%**	**No**	**1,718**	**623**	**36.3%**	**Yes**	**4**	**0.2%**	**No**
Geographic Unit	**Total Population**	**Total Youth (#)**	**Total Youth (%)**		**Total Elderly (#)**	**Total Elderly (%)**		**Total Population in the Affected Area**	**Total Youth (#)**	**Total Youth (%)**		**Total Elderly (#)**	**Total Elderly (%)**	
Census Tract 020200004 (On-Base COC)	5,519	2,001	36.3%		13	0.2%		5,519	2,001	36.3%		13	0.2%	
Census Tract 020200006 (Off-Base COC)	7,028	2,304	32.8%		487	6.9%		7,028	2,304	32.8%		487	6.9%	
Total COC	**12,547**	**4,305**	**34.3%**		**500**	**4.0%**		**12,547**	**4,305**	**34.3%**		**500**	**4.0%**	

Key:

COC = community of comparison
dB L_{dn} = decibels day-night average sound level
ROI = region of influence

4.12.6 Alternative F: RW 24 for Departure; RW 16 Arrival; RW 16/34 Extension

Under Alternative F, no off-base residential populations would be within noise levels of 65 dB L_{dn} or greater. A total of 1,955 people on-base would be within the affected area under this alternative. This is 531 more persons than under the No Action Alternative. As shown in Table 4.12-11, there would be no disproportionate impacts to minority or low-income populations under this alternative. Youth and elderly populations are compared with noise contours in Figure 4.12-2. Table 4.12-12 shows that the on-base ROI youth percentage is greater than the total COC percentage. Elderly populations in the on-base ROI and the off-base ROIs are less than the total COC percentage.

Under this alternative, F-22 departure operations would be on RW 24. Noise levels at Mountain View Elementary School would be below 65 dB L_{dn}. Noise levels at Mount Spurr Elementary School would remain in the 70 to 75 dB L_{dn} range as under baseline conditions. Equivalent noise levels would increase at all points of interest by 0.4 dB to 1.4 dB, except at Mountain View Elementary School, which would decrease by 0.8 dB (Table 4.2-5). Approximately 4.8 acres of Davis Park would be within the 65 dB L_{dn} or greater noise contour, which is 1.5 acres more than affected under No Action. The annual average noise experienced by children, the elderly, or other regular park users would be somewhat greater than experienced under baseline conditions. Section 4.2.1 explains noise effects on individuals, including children.

4.12.7 No Action Alternative

The No Action Alternative represents the baseline environment conditions described in Chapter 3. Baseline minority and low income populations are presented as the existing condition and compared with noise contours in Figure 4.12-1. Each Table 4.12-1 through Table 4.12-12 includes the baseline percentages of on- and off-base populations of interest. No off-base residential populations are calculated to be within noise levels of 65 dB L_{dn} or greater. As shown under baseline in Table 4.12-11, for example, there are a total of 1,424 on-base residents calculated to be within noise levels of 65 dB L_{dn} or greater. There are no disproportionate impacts to minority or low-income populations under baseline (No Action Alternative) conditions. Baseline elderly and youth populations are presented as the existing condition and compared with noise contours in Figure 4.12-2. Table 4.12-12, for example, shows that the baseline, or No Action Alternative, on-base ROI youth percentage is greater than the total COC percentage. Elderly populations in the on-base ROI and the off-base ROIs are less than the total COC percentage.

Mountain View Elementary School and the on-base child development center would continue to be exposed to noise levels between 65 and 69 dB L_{dn}, while Mount Spurr Elementary School would continue to be exposed to noise levels between 70 and 74 dB L_{dn} (Table 4.2-5). Approximately 3.3 acres of Davis Park would continue to be exposed to noise levels between 65 and 69 dB L_{dn} (Figure 3.12-2). Annual average noise experienced by children, the elderly, or other regular park users would continue. Section 4.2.1 explains noise effects on individuals, including children.

Table 4.12-11. Percentage of On-Base and Off-Base Environmental Justice Population Potentially Exposed to Noise Levels of 65 dB L_{dn} or Greater Under Alternative F

Census Block Group (GEOID)	Baseline							Alternative F						
	Total Population in the Affected Area	Total Minority		Dispro-portionate	Total Low-Income		Dispro-portionate	Total Population in the Affected Area	Total Minority		Dispro-portionate	Total Low-Income		Dispro-portionate
		(#)	(%)		(#)	(%)			(#)	(%)		(#)	(%)	
On-Base Compared with Total COC														
020200004001 (65–69 dB L_{dn})	1,225	450	36.7%	No	67	5.5%	No	1,581	581	36.8%	No	87	5.4%	No
020200004001 (70–74 dB L_{dn})	199	73	36.7%	No	11	5.5%	No	374	137	36.8%	No	21	5.4%	No
Total On-Base ROI	**1,424**	**523**	**36.7%**	**No**	**78**	**5.5%**	**No**	**1,955**	**718**	**36.8%**	**No**	**108**	**5.4%**	**No**
Off-Base Compared with Total COC														
020200006003 (65 dB L_{dn} ≤)	0	0	0.0%	No	0	0.0%	No	0	0	0.0%	No	0	0.0%	No
020200006004 (65 dB L_{dn} ≤)	0	0	0.0%	No	0	0.0%	No	0	0	0.0%	No	0	0.0%	No
020200006005 (65 dB L_{dn} ≤)	0	0	0.0%	No	0	0.0%	No	0	0	0.0%	No	0	0.0%	No
Total Off-Base ROI	**0**	**0**	**0.0%**	**No**	**0**	**0.0%**	**No**	**0**	**0**	**0.0%**	**No**	**0**	**0.0%**	**No**
Total ROI	**1,424**	**523**	**36.7%**	**No**	**78**	**5.5%**	**No**	**1,955**	**718**	**36.8%**	**No**	**108**	**5.4%**	**No**
Geographic Unit	**Total Population**	**Total Minority**			**Total Low-Income**			**Total Population in the Affected Area**	**Total Minority**			**Total Low-Income**		
		(#)	**(%)**		**(#)**	**(%)**			**(#)**	**(%)**		**(#)**	**(%)**	
Census Tract 020200004 (On-Base COC)	5,519	2,028	36.7%		298	5.4%		5,519	2,028	36.7%		298	5.4%	
Census Tract 020200006 (Off-Base COC)	7,028	5,567	79.2%		2,242	31.9%		7,028	5,567	79.2%		2,242	31.9%	
Total COC	**12,547**	**7,595**	**60.5%**		**2,534**	**20.2%**		**12,547**	**7,595**	**60.5%**		**2,534**	**20.2%**	

Notes:

[1] Disproportionate environmental justice effects can occur if the percent of each population in the ROI is equal to or greater than the percent of each population in the Total COC.

Key:

COC = community of comparison
dB L_{dn} = decibels day-night average sound level
ROI = region of influence

Table 4.12-12. Percentage of On-Base and Off-Base Youth and Elderly Populations Potentially Exposed to Noise Levels of 65 dB L_{dn} or Greater under Alternative F

Census Block Group (GEOID)	Baseline							Alternative F						
	Total Population in the Affected Area	Total Youth		ROI % greater than COC %	Total Elderly		ROI % greater than COC %	Total Population in the Affected Area	Total Youth		ROI % greater than COC %	Total Elderly		ROI % greater than COC %
		(#)	(%)		(#)	(%)			(#)	(%)		(#)	(%)	
On-Base Compared with the Total COC														
020200004001 (65–69 dB L_{dn})	1,225	444	36.2%	Yes	3	0.2%	No	1,581	573	36.2%	Yes	4	0.3%	No
020200004001 (70–74 dB L_{dn})	199	72	36.1%	Yes	0	0.0%	No	374	136	36.4%	Yes	1	0.3%	No
Total On-Base ROI	**1,424**	**516**	**36.2%**	**Yes**	**3**	**0.2%**	**No**	**1,955**	**709**	**36.3%**	**Yes**	**5**	**0.3%**	**No**
Off-Base Compared with the Total COC														
020200006003 (65 dB L_{dn} ≤)	0	0	0.0%	No	0	0.0%	No	0	0	0.0%	No	0	0.0%	No
020200006004 (65 dB L_{dn} ≤)	0	0	0.0%	No	0	0.0%	No	0	0	0.0%	No	0	0.0%	No
020200006005 (65 dB L_{dn} ≤)	0	0	0.0%	No	0	0.0%	No	0	0	0.0%	No	0	0.0%	No
Total Off-Base ROI	**0**	**0**	**0.0%**	**No**	**0**	**0.0%**	**No**	**0**	**0**	**0.0%**	**No**	**0**	**0.0%**	**No**
Total ROI	**1,424**	**516**	**36.2%**	**Yes**	**3**	**0.2%**	**No**	**1,955**	**709**	**36.3%**	**Yes**	**5**	**0.3%**	**No**
Geographic Unit	**Total Population**	**Total Youth**			**Total Elderly**			**Total Population in the Affected Area**	**Total Youth**			**Total Elderly**		
		(#)	**(%)**		**(#)**	**(%)**			**(#)**	**(%)**		**(#)**	**(%)**	
Census Tract 020200004 (On-Base COC)	5,519	2,001	36.3%		13	0.2%		5,519	2,001	36.3%		13	0.2%	
Census Tract 020200006 (Off-Base COC)	7,028	2,304	32.8%		487	6.9%		7,028	2,304	32.8%		487	6.9%	
Total COC	**12,547**	**4,305**	**34.3%**		**500**	**4.0%**		**12,547**	**4,305**	**34.3%**		**500**	**4.0%**	

Key:

COC = community of comparison
dB L_{dn} = decibels day-night average sound level
ROI = region of influence

4.12.8 Conclusions

The environmental consequences and potential mitigation for environmental justice and use are summarized in this section.

Environmental Consequences Summary

Alternative B, Alternative C, Alternative D, Alternative E, Alternative F, and No Action do not result in noise impacts to minority or low-income populations and do not increase noise effects on children or the elderly.

Alternative A has a calculated 353 off-base minority persons and 140 low-income persons in the community of Mountain View who would be exposed to an annual average noise level of 65 to 69 dB L_{dn}. Based on the Air Force method to determine a disproportionate effect on environmental justice populations, Alternative A would result in a disproportionate effect upon minority and low-income off-base persons in the community of Mountain View. Although not part of the environmental justice population, a calculated 457 children (158 off-base) and 25 elderly persons (23 off-base) are included in the 1,248 on- and off- base persons exposed to 65 dB L_{dn} or greater noise.

Mitigation

Mitigations are identified that can be applied to avoid, minimize, reduce and/or compensate for an impact (see Appendix B.12).

Alternative B, Alternative C, Alternative D, Alternative E, Alternative F, and No Action do not result in noise impacts to off-base minority or low-income populations and do not increase noise effects on children or the elderly. Therefore no mitigation is proposed for these alternatives.

Alternative A results in disproportionate unavoidable noise impacts to off-base environmental justice populations. Provision of funds for additional structural noise attenuation off-base is not currently an action that the Air Force is authorized to carry out. No mitigation is proposed for Alternative A.

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5.0 CUMULATIVE IMPACTS

The CEQ regulations stipulate that the cumulative effects analysis in an EIS consider the potential environmental consequences resulting from "the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or nonfederal) or person undertakes such other actions" (40 CFR 1508.7). Chapter 3 discusses the baseline conditions for environmental resources in the JBER ROI. Chapter 4 discusses potential consequences within the ROI. Chapter 5 identifies past, present, and reasonably foreseeable projects that could cumulatively affect environmental resources in conjunction with the proposal to improve F-22 operational efficiency at JBER.

Assessing cumulative effects begins with defining the scope of other project actions and the potential interrelationship with the Proposed Action or alternatives (CEQ 1997). The scope must consider other projects that coincide with the location and timetable of the Proposed Action and other actions. Cumulative effects analyses evaluate the interactions of multiple actions. The CEQ of 1997 identified and defined eight ways in which effects can accumulate: time crowding, time lag, space crowding, cross-boundary, fragmentation, compounding effects, indirect effects, and triggers and thresholds. Furthermore, cumulative effects can arise from single or multiple actions and through additive or interactive processes (CEQ 1997). Actions not part of the proposal but that could be considered as actions connected in time or space (40 CFR 1508.25) (CEQ 1997) may include projects that affect areas on or near JBER. This EIS addresses three questions to identify cumulative effects:

1. Does a relationship exist such that elements of the Proposed Action or alternatives might interact with elements of past, present, or reasonably foreseeable actions?
2. If one or more of the elements of the alternatives and another action could be expected to interact, would the alternative affect or be affected by impacts of the other action?
3. If such a relationship exists, does an assessment reveal any potentially significant impacts not identified when the alternative is considered alone?

An effort has been made to identify major actions that have occurred, are implemented, or are in the planning phase at this time. To the extent that details regarding such actions exist and the actions have a potential to interact with the proposal, these actions are included in this cumulative analysis. This approach enables decision makers to have the most current information available so that they can evaluate the environmental consequences of the Proposed Action.

5.1 Past, Present, and Reasonably Foreseeable Actions

To aid decision makers, this EIS describes the cumulative effects of the Proposed Action and alternatives, as well as the incremental contribution of past, present, and reasonably foreseeable actions. Recent past and ongoing military actions in the region were considered as part of the baseline or existing conditions in Chapter 3.

5.1.1 Military Actions

Like other major military installations, JBER regularly requires new construction, facility improvements, and infrastructure upgrades. These include a series of ongoing airfield projects to maintain and improve the runway infrastructure. With a limited construction season, these projects are segmented and accomplished over a multiyear timeframe. Table 5.2-1 lists past, present, and potential future applicable military projects occurring in the region encompassing the JBER ROI (Anchorage and Matanuska-Susitna Valley). With the adoption of the National Defense Authorization Act of 2013, Section 331, states and communities were given a new partnering authority whereby they can enter into sole-source agreements with bases to provide services. Future partnerships at JBER could offer reductions in the cost of services, improvements to the quality of life, and enhancements to mission effectiveness.

As part of Army Force Structure 2020 USARAK announced in July 2015 a loss of about 2,600 positions at JBER from FY 2015 levels. This action was placed on hold in October 2015 as Congress requested an operations plan be prepared to determine the strategic, staffing, and infrastructure needs for the Arctic. In March 2016, the U.S. Army announced that it was delaying its decision to remove the troops from JBER.

5.1.2 Non-DoD Actions

Non-DoD actions include major public and private projects within the ROI. The Municipality of Anchorage is a large urban area with multiple construction projects occurring, especially in the summer. Specific major nonfederal actions with the potential to interact in time or location are listed in Table 5.2-2.

Several of these projects are aimed at improvements to regional transportation infrastructures with a goal toward economic vitalization, such as expansions at Port Mackenzie and Port of Anchorage, and the construction and operations of the Knik Arm Bridge. In addition, construction of the Susitna Hydroelectric Project would provide regional power. These projects would provide direct jobs for construction and, indirectly, stimulate longer-term economic activity and regional growth.

5.2 Cumulative Effects Analysis

Issues and concerns regarding analysis of cumulative effects identified during scoping are related to how other actions in the region (both military and nonmilitary) are factored into the EIS resource area analyses. Particularly, the potential interactive effect of military actions on noise from overflights of JBER aircraft and other military operations were of concern to residents of the Matanuska-Susitna Valley.

The Proposed Action and Alternatives do not include any change in personnel, number of JBER flight operations, or use of training airspace. There would be a potential for cumulative noise impacts, specifically upon the community of Mountain View under the Proposed Action. There would also be a potential for cumulative impacts upon the sensitive Knik Arm habitat, specifically on the CIBW, although the acoustic energy contribution added by any of the alternatives would be extremely small.

The primary activities that could have an incremental impact when added to other past, present, or reasonable foreseeable actions is acoustic energy, or noise, associated with runway construction and use of an extended RW 16/34 under Alternative B, C, or F. These alternatives have the potential to have cumulative effects in conjunction with other on-base past, present, and future projects as well as with other large projects planned for the region.

Table 5.2-1. Past, Present, and Reasonably Foreseeable DoD Actions in JBER Region of Influence

Project	Description	Timeframe[1]			JBER Interface[2]
		Past	Present	Future	
United States Air Force F-35A Operational Beddown-Pacific Final Environmental Impact Statement (Air Force 2016)	This Final EIS analyzed the beddown of 48 F-35A primary assigned aircraft at Eielson AFB with training taking place in the JPARC airspace.			X	D
Supplemental Programmatic Environmental Assessment for Army 2020 Force Structure Alignment and Finding of No Significant Impact (FNSI) (October 2014)	This SPEA analyzed the potential impacts associated with realignment of the Army's force structure between FY 2013 and FY 2020. Under Alternative 1, the Army component at JBER would lose 5,300 of its military population (both military and Army civilians) from its FY 2011 total of 6,861 to 1,561 by FY 2020. (On hold)		X	X	D
Army Force Structure changes at JBER (July 2015)	USARAK planning anticipates inactivation of selected Engineering Brigade units at JBER, with a net loss of 2,600 positions from FY 2015 levels. (On hold)			X	D
JPARC Modernization and Enhancement EIS; (Air Force 2013b); (ROD published in 2013)	JPARC modernizations and enhancements would improve military training for individual services and joint actions. This NEPA action considered six definitive proposals to be included in the ROD; these proposals included the following: Fox 3 MOA Expansion and Paxon MOA Addition (Air Force) Realistic Live Ordnance Delivery (Air Force) Battle Area Complex Restricted Area Addition (Army) Expand R-2205 Restricted Area, including Digital Multi-Purpose Training Range (Army) Night Joint Training (Air Force) Unmanned Aerial Vehicle Access (Army) In addition, six programmatic proposals were evaluated and included the following: Enhanced Ground Maneuver Space (Army) Tanana Flats Training Area Roadway Access (Army) Intermediate Staging Bases (Army) Joint Air-Ground Integration Complex (Army) Missile Live Fire in the Gulf of Alaska for AIM-120 and AIM-9 Missiles (Air Force) Joint Precision Air Drop System Drop Zones (Air Force)		X	X	D
JBER-Elmendorf Flightline Safety Project	Air Force project conducted to improve conditions along the flightline over the 2015-2018 timeframe. These actions include runway, taxiway, and ramp pavement repairs, lighting and utility upgrades and removal of the hill at the end of runway 16.		X	X	D
FY 2014 to FY 2018 Army Military Construction (MILCON) *Alternate Program Objective Memorandum (APOM) September 2011* (Army 2011)	Army projects developed for planning and programming during the FY 2014-2018 period in accordance with the APOM for future construction at JBER in support of the Army transformation program in Alaska.		X	X	I

Table 5.1-1. Past, Present, and Reasonably Foreseeable DoD Actions in JBER Region of Influence (continued)

Project	Description	Timeframe[1]			JBER Interface[2]
		Past	Present	Future	
F-22 Beddown at Elmendorf AFB Alaska, EA/FONSI (Air Force 2006)	Two F-22A squadrons with 36 aircraft eventually replaced 60 F-15C and F-15E aircraft at JBER (Elmendorf AFB). F-22A training flights take place in Alaskan MOAs, ATCAA, and ranges where F-15C and F-15E aircraft previously trained.	X			D
Range Complex Training Land Upgrades, EA/FNSI (USARAK 2010a)	Fort Richardson site-specific range projects in support of training; sustainable range planning for small arms complexes and ranges; using adaptable use zones, and proposed environmental stewardship range construction guidelines to maximize the efficiency and effectiveness of environmental review of range and training land projects.	X			N
JPARC Master Plan (Army and Air Force 2011)	The Master Plan defined military requirements with input from military stakeholders in Alaska. The plan identifies both short-term and funded actions and possible long-range capabilities.	X			D
Resumption of Year-Round Firing Opportunities at Fort Richardson, Alaska, EIS) (USARAK 2010b)	Restoring year-round live-firing capabilities at JBER. Past restrictions caused a shortage of indirect live-fire training opportunities. Resumption of training ensures that Army units are certified in a variety of weapons systems before they can be safely and effectively deployed. The Proposed Action provides for training opportunities necessary for 4th Brigade Combat Team to attain and sustain certification. In progress.			X	N
Gulf of Alaska Navy Training Activities Supplemental EIS/Overseas EIS (Navy 2011)	Ongoing naval training activities and Navy EIS training activities for two large-scale joint force exercises, including anti-submarine warfare activities and the use of active sonar. These exercises would each last up to 21 days and consist of multiple component training activities during 3 to 6 weeks annually in Temporary Maritime Activities Area or other areas of the Gulf of Alaska.			X	D
Relocation of the Air National Guard 176th Wing to Elmendorf AFB, Alaska, EA (Air Force 2007a)	Relocation of the 176th WG and all associated aircraft and expeditionary combat support elements from Kulis ANGB to Elmendorf AFB including the placement of 12 C-130H, three HC-130N, and five HH-60G aircraft, for a total of 20 aircraft; construction of new facilities; renovation or modification of some existing facilities; replacement of support equipment; and assignment of Air National Guard.	X			D
Grow the Army Force Structure Realignment EA (USARAK 2008a)	Stationing of new units in Alaska by approving a variety of projects that would provide necessary support to incoming soldiers and their families, including family housing and support facilities, upgrading ranges to meet increased training requirements, constructing administrative and maintenance facilities, and provision of adequate maneuver and live-fire training facilities.	X			I
Management of Nike Site Summit, Fort Richardson EA/FNSI (USARAK 2008c)	Management strategy for Nike Site Summit that addressed existing U.S. Army Garrison Alaska military training needs, compliance with Section 106 of the NHPA, human health and safety concerns, and vandalism issues associated with trespassing on Fort Richardson.	X			N

Table 5.1-1. Past, Present, and Reasonably Foreseeable DoD Actions in JBER Region of Influence (continued)

Project	Description	Timeframe[1]			JBER Interface[2]
		Past	Present	Future	
C-17 Beddown Elmendorf AFB, Alaska, EA (Air Force 2004b)	Replacement of the existing C-130 cargo aircraft fleet with C-17 aircraft at JBER. The Proposed Action included routine aircraft operations in the vicinity of JBER, the construction and use of support facilities on JBER, and an increase in personnel.	X			D
Alaska MOA EIS (Air Force 1997)	Restructuring and using SUA in Alaska for flight training and exercises. The ROD included mitigations that are part of the existing operational parameters for several MOAs in the JPARC.	X			D
F-22 Plus-Up EA Joint Base Elmendorf-Richardson, Alaska (Air Force 2011a)	Added six primary F-22 aircraft and one backup aircraft to JBER to meet Air Force mission requirements and brought JBER F-22 operational fighters for a total of 47 F-22 aircraft. The F-22 aircraft train in existing Alaska training airspace and ranges.	X			D
C-17 Training Areas Elmendorf AFB, Alaska EA/FONSI 2005 (Air Force 2005b)	C-17 training operations in Alaskan SUA and upgrading runway 07/25 at Allen Army Airfield, frequent use of the runway as a C-17 assault landing zone, and frequent use of five existing drop zones for C-17 training.	X			D
Modification of Military Training Routes (MTRs) EA/ROD 2005 (Air Force 2005c)	Modified MTRs within the state of Alaska to better connect the MTRs with existing SUA. These changed MTRs are used by aircraft with low level navigation missions.	X			D
North End Runway Material Extraction and Transport EA (Anchorage Port Expansion Team 2006)	The U.S. Department of Transportation, Maritime Administration, in cooperation with JBER and the Bureau of Land Management proposed to remove approximately 9.8 million bank cubic yards of material from the North End Borrow Site and improve a roadway between the borrow site and the Port of Anchorage for truck transport. The 255-acre North End Borrow Site includes several borrow pits north of runway 16/34. The purpose of the action is to meet a portion of the fill requirements for the planned 135-acre expansion of the Port of Anchorage.	X			D
North Runway Hill Removal Project (Air Force 2017)	JBER completed an EA for this project that occurs on the north-south runway, runway 16/34. The runway has existing topographic safety hazards to JBER flight operations in the form of a hill to the north. This project is to continue the removal of the hill and transport soil removed from the hill to a disposal site located north of the North End Borrow Pit.		X	X	D

Table 5.1-1. Past, Present, and Reasonably Foreseeable DoD Actions in JBER Region of Influence (continued)

Project	Description	Timeframe[1]			JBER Interface[2]
		Past	Present	Future	
Establishment of an ILS Precision Approach to an Extended RW 16/34	Published instrument procedures provide a means for Instrument Flight Rules (IFR) aircraft to navigate to/from a runway environment when marginal weather conditions or proficiency training may require. Such procedures are based on radio signals from ground-based navigational aids such as a precision Instrument Landing System (ILS) that provides both lateral and vertical guidance to a runway. A missed approach is when an landing aircraft flies past the runway terminus and is required to go around for another approach. The FAA has identified a need for an overall review of changes to the Anchorage Bowl civil and military flight operations and a more in-depth study of precision approach and missed approach procedures to an extended RW 16.			X	D

Notes:

1 - "Past" projects are those with a decision document issued before 2014; "present" projects are those that are in the process of implementation; "future" projects are those for which a decision has not been made.

2 - JBER interface options: D=direct, I=indirect N=no interface.

Key:

AFB = Air Force Base
ANGB = Air National Guard Base
ATCAA = Air Traffic Control Assigned Airspace
BRAC = Base Realignment and Closure
EA = Environmental Assessment
EIAP = Environmental Impact Analysis Process
EIS = Environmental Impact Statement
FNSI = Finding of No Significant Impact (Army)
FONSI = Finding of No Significant Impact (Air Force)
INRMP = Integrated Natural Resources Management Plan
JBER = Joint Base Elmendorf Richardson; Combination of Elmendorf AFB and Fort Richardson
JPARC = Joint Pacific Alaska Range Complex
MOA = Military Operation Area
MTR = Military Training Route
NHPA = National Historic Preservation Act
ROD = Record of Decision
SUA = Special Use Airspace
USARAK = U.S. Army Alaska
USFWS = U.S. Fish and Wildlife Service

Table 5.2-2. Past, Present, and Reasonably Foreseeable Non-DoD Actions in the JBER Region of Influence

Project	Description	Timeframe[1]		
		Past	Present	Future
Cook Inlet Beluga Whale Subsistence Harvest- Supplemental Environmental Impact Statement (EIS)/Record of Decision (ROD) 2008 (USDOC 2008)	Implemented a long-term plan to manage subsistence harvests of the Cook Inlet beluga whale stock.	X		
Essential Fish Habitat Identification and Conservation, Implementation, North Pacific Fishery Management Council, Magnuson-Stevens Fishery Conservation and Management Act of 1976 (USDOC 2002)	Under this act, the National Marine Fisheries Service and regional Fishery Management Councils identified fishery management plans to minimize the adverse effects of fishing on waters and substrate necessary to fish for fish spawning, breeding, feeding, or growth to maturity.	X		
Gulf Apex Predator-Prey Project	A final report was issued in 2005. The project's primary goal is to document trophic relationships between Steller sea lions, their prey, predators, and potential competitors in waters near Kodiak Island, an area of continued sea lion declines and extensive commercial fishing.	X		
Knik Arm Crossing EIS/ROD	Proposed Knik Arm Crossing would be an 8,000- to 14,000-foot long bridge to enhance access between the Municipality of Anchorage and the Matanuska-Susitna Borough to the northwest. This effort includes a request for take of marine mammals incidental to construction over the course of five construction seasons. The ROD selected the Northern Access-Erickson Alternative, which involves land/easement acquisition and construction in the Government Hill neighborhood of Anchorage.			X
Port MacKenzie Development	Matanuska-Susitna Borough is proposing to build an additional deep-water dock facility in the Point MacKenzie area, to facilitate economic development in the borough for about 30 years. Docks increase vessel traffic in the Anchorage area and can contribute to economic, land, and access development.			X
Port of Anchorage Expansion	The Port of Anchorage is planning a major expansion of its marine terminal capacity, including road and rail service expansion and redevelopment of the marine terminal.		X	X
Northern Rail Extension EIS	Proposed construction and operation of approximately 80 miles of new rail line from North Pole, Alaska, to Delta Junction, Alaska. The project includes new structures, bridges, a passenger facility, communication towers, access roads for rail line construction and operations, and sidings.		X	X
The Susitna-Watana Hydroelectric Project	Proposed 735-foot-high dam approximately 90-river miles north of Talkeetna with a 42-mile-long, 1-mile-wide (at widest) reservoir. The type and final height of the dam construction are still being evaluated as part of the engineering feasibility studies. The dam would have a nominal crest elevation of 2,025 feet above mean sea level.			X

Table 5.2-2. Past, Present, and Reasonably Foreseeable Non-DoD Actions in the JBER Region of Influence (continued)

Project	Description	Timeframe[1]		
		Past	Present	Future
Goose Creek Correctional Center (GCCC), Port Mackenzie, Alaska	The GCCC is a new facility designed to accommodate up to 1,536 inmates when fully operational, with a staff of 345 persons. By summer of 2013, a projected 1,075 inmates were to have been moved into the facility from other locations in Alaska and the lower 48 states, with a staff of about 200. Positions include security staff, probation officers, administrators, food service and maintenance staff, medical and mental health providers (GCCC 2012). Some of these positions represent new jobs, and some are relocated from closed facilities.		X	X
Alaska Liquefied Natural Gas Project	Alaska LNG project includes a proposed LNG plant, storage tanks, jetty, loading berths, gas-fired power plant at Nikiski on the Kenai Peninsula and 806 miles of pipeline to bring the gas from the North Slope.			X

Note:
[1] "Past" projects are those with a decision document published before 2014; "present" projects are those that are in the process of implementation; "future" projects are those for which a decision has not been made.

5.2.1 Airspace Management and Use

This EIS analysis considers the cumulative airspace use associated with F-22s, C-17s, C-130s, helicopters, other JBER aircraft, and transient aircraft at JBER. The net effect is an estimated overall reduction in JBER flight operations over those in 2010 (see Table 2.2-2). JBER flight operations are managed by JBER tower as part of the overall responsibility of the Anchorage Alaska Terminal Area management of Anchorage airspace.

Under Alternatives C, E, or the No Action Alternative, arrival and departures would require coordination with FAA concerning the 2014 ODO policy. The FAA has also identified a desire for a more in-depth study of precision approach and missed approach procedures for arrival on an extended RW 16 (Alternatives C or F). The FAA, in conjunction with the 3 WG, would assess ATC procedures and practices currently used by Anchorage radar approach control to safely and effectively manage all IFR air traffic within their delegated airspace. As with any other proposed or planned actions that may affect airspace uses within this ROI, JBER and/or FAA representatives would address precision approach and missed approach procedures on an extended RW 16/34 with other aviation interests through the Alaska Civil/Military Aviation Council and other available means.

As noted in Section 3.1.2, the 2014 Anchorage Airport Master Plan forecasts overall operations to increase at this airport by 1.4 percent annually through 2030. Assuming there would not be any significant increase in JBER or Merrill Field operations in the foreseeable future, a RW 16/34 extension and/or primary use of RW 16 as the arrival runway could have potential cumulative beneficial effects on this projected increased civil air traffic at Anchorage International Airport. No cumulative adverse impacts are expected to this resource when this action is considered along with other projects identified in Table 5.2-1 and Table 5.2-2.

5.2.2 Acoustic Environment

The acoustic analysis in this EIS is a cumulative analysis and includes all JBER-based aircraft identified in Table 5.2-1 as well as transient aircraft such as the F-35A. The acoustic analysis in Section 4.2 is a cumulative analysis which includes F-22 flight operations combined with all other JBER flight operations to identify on- and off-base acoustic effects. The aircraft in the acoustic model represent JBER's experience with flight profiles and noise signatures for all aircraft in the Air Force, Army, Navy, and Marine Corps inventory as well as foreign aircraft that participate in training exercises with American aircraft. As a result, the noise effects calculated in the EIS represent the cumulative effects of JBER flight operations.

Alternative A is the only alternative that has noise of 65 dB L_{dn} or greater over off-base residential land. Alternative A, with all JBER flight operations included, results in a cumulative effect on an estimated 424 persons in the community of Mountain View. Alternative A has a disproportionate noise effect on a calculated 353 minority and 140 low income off-base persons. Although not part of the environmental justice population, a calculated 158 children (under 18) and 23 elderly persons (65 and over) are included in the 424 off-base persons affected by average annual noise levels of 65 dB L_{dn} or greater. No other alternatives, and no other large-scale military or civilian projects, would cumulatively result in increased noise effects on the Mountain View residential area. On-base minority or low-income persons would not be disproportionately affected as defined in the Air Force EIAP guidelines (Air Force 2014).

The FAA and 3 WG study of precision approach and missed approach procedures for establishment of precision approach capabilities for a possible extension of RW 16/34 could result in the routing of JBER aircraft over Mountain View and other portions of Anchorage more frequently than at present. This could result in increased noise over residential areas and cumulatively contribute to the acoustic effects of the Proposed Action and Alternatives considered in this EIS.

Past, present, and reasonably foreseeable projects identified in Table 5.2-1 and Table 5.2-2 could contribute to overwater cumulative effects in the Knik Arm and have the potential to impact sensitive habitat and, specifically, the CIBW. The primary projects include:

- Knik Arm Crossing Bridge, connecting the Municipality of Anchorage with the Matanuska-Susitna Borough, is an 8,000- to 14,000-foot-long bridge, which would be constructed immediately west of the base for vehicular traffic.
- Resumption of year-round firing opportunities at JBER would restore year-round live-fire training at the Eagle River Flats Impact Area, which would permit Army units to be certified in a variety of weapon systems before deployment.

Construction of the Knik Arm Crossing Bridge would include extensive cross-channel traffic and pile driving, which has been identified as having an acoustic impact upon CIBW in the area. Vibration and noise associated with year-round live weapons firing on Eagle River Flats has the potential to affect CIBW behavior at the confluence of the Knik Arm and Eagle River (see Section 5.2.7).

JBER aircraft overflight of the Knik Arm has been occurring for decades. The runway profiles included in the alternatives have been used by F-22s and the acoustic effects of overflights have been determined, in the past, by the NMFS as "may affect, not likely to adversely affect" the CIBW or other species in the sensitive Knik Arm habitat. Alternatives that extend RW 16/34 and aircraft would be at a somewhat lower altitude than existing overflights over the sensitive habitat near the Eagle River confluence with the Knik Arm where CIBW congregate. The overflight of the Eagle River area would lower than existing overflights but be at higher altitude than current overflight of other portions of the Knik Arm. F-22 overflight associated with the runway extension alternatives has acoustic and visual effects consistent with, and, depending upon the alternative, potentially less than the effects of F-22 existing Knik Arm overflight for the past decade. JBER runway use and associated F-22 overflights are expected to have a "may affect, not likely to adversely affect" determination for the CIBW. F-22 overflights are not expected to cumulatively contribute to other actions under consideration for the Knik Arm, which have the potential to impact the CIBW.

5.2.3 Safety

No cumulative adverse impacts are expected as a result of the implementation of the Proposed Action or any of the alternatives. Changes to F-22 runway use patterns presented in Alternatives A, D, and E would be conducted in accordance with established flight safety procedures within local airspace and under the SUA airspace. The Proposed Action and Alternatives C and F would reduce military arrivals on RW 06 and reduce potential interaction with civil aircraft traffic and potential safety concerns. Alternative E has the potential to increase interaction with civil aircraft traffic. Alternative C, with fewer military operations in the congested portions of the Anchorage Bowl, would result in the most beneficial cumulative safety effect for Anchorage Bowl airspace. Alternative F would have the beneficial safety effects of arrivals on RW 16 from the north and outside most congested portions of the Anchorage Bowl. If RW 16/34 were extended, but procedures for a missed approach could not be established, F-22s IFR arrivals would continue to use the TACAN or the RW 06 precision approach for training and/or low-visibility conditions. If RW 16 were to be used for most arrivals and RW 06 were to be used for precision approaches, Alternatives C and F would somewhat reduce military operations in the congested portions of the Anchorage Bowl with potential cumulative benefits to safety. With either Alternative C or F, the FAA and 3 WG study of precision approach and missed approach for establishment of precision approach procedures for an extended RW 16/34 would be expected to result in a cumulative improvement to airspace safety in the Anchorage Bowl.

Interaction of the Proposed Action and alternatives with the *Resumption of Year-Round Firing Opportunities at Fort Richardson* could result in cumulative impacts to safety issues associated with BASH. Currently, indirect fire is limited to winter months when migrating birds are not present, but year-round firing could increase the potential BASH risk during the periods of migration in non-winter months. Established procedures designed to minimize risk related to BASH issues would continue to be implemented.

There would be no cumulative impacts to ground safety. Under Alternatives B, C, and F, a recreational facility would shift from APZ II (baseline) to APZ I. This facility is typically unoccupied, but it is available for rental year-round to host different events, including weddings and other base-sanctioned events. When occupied for these events, this facility represents a place of assembly that would pose an incompatible use under APZ I guidelines. Other DoD and non-military projects would not result in adding to this identified adverse effect under these alternatives.

Potential bridge access routes associated with the Knik Arm Crossing project could cross portions of JBER and through APZ II, but with access routes below the bluff, there is no direct effect to flight safety. The Air Force is working with the Knik Arm Bridge and Toll Authority to ensure that base security is maintained. Mutual concerns for security will benefit from coordinated planning between developers and military planners.

5.2.4 Air Quality

Criteria Pollutants

JBER is in attainment of all criteria pollutants regulated under the NAAQS. The Knik Arm Crossing has the potential for growth along with associated increases in regional vehicle emissions, as it would open the way for further development in areas that are currently undeveloped. Further development and other civilian and military projects could contribute to a net increase in overall cumulative emissions in the project region.

Alternatives B, C, and F would include excavation of terrain and construction of a 2,500-foot runway extension, generating combustive emissions and fugitive dust during the construction period. Emissions from these activities would be mobile, intermittent, and distributed over a large area. Emissions under any project alternative also would be mobile in nature and would occur across the entire JBER runway. As described in Section 4.4.1, construction or operational activities proposed under any project alternative would produce emissions that would not contribute to an exceedance of any ambient air quality standard. Emissions from cumulative projects potentially would contribute to ambient pollutant impacts generated from proposed activities. However, these emissions would occur far enough away from the locations of proposed construction and operational activities such that they would produce low ambient pollutant impacts in proximity to the project footprint. Therefore, emissions from any proposed construction and operational activity, in combination with emissions from cumulative projects, would be expected to result in less than significant cumulative impacts on criteria pollutant levels. As a result, proposed emissions, in combination with emissions from other cumulative projects, would not effect changes to the air quality attainment status within the project region. No cumulative adverse impacts are expected to this resource when this action is considered along with other projects identified in Table 5.2-1 and Table 5.2-2.

Climate Change

The potential effects of proposed GHG emissions are by nature global and cumulative impacts, as worldwide sources of GHGs contribute to climate change. Table 4.4-1, Table 4.4-2, and Table 4.4-3 present estimates of maximum GHG emissions that would occur from any construction and operation scenario proposed for the range of project alternatives. These emissions would produce a negligible contribution to future climate change, the effects of which are identified in Section 3.4.3. In addition, these emissions would be consistent with state and local GHG plans and policies, as they would occur from mobile sources that would comply with the most recent vehicle clean fuels, mileage efficiencies, and emissions regulations (such as the USEPA Heavy-Duty Highway Engine and Nonroad Compression-Ignition Engine Emission Regulations and the Federal Renewable Fuels Standard).

Climate change could impact implementation of DoD projects at JBER and the adaptation strategies needed to respond to future conditions. For the region surrounding JBER, the main effect of climate change to consider includes increased temperatures, as documented by climate analyses presented in Section 3.4.3. These analyses predict that in the future, the project region will experience coastal erosion, increased storm effects, sea ice retreat, and increased forest fires. Current operations at JBER have adapted to these recent climatic changes. However, if these conditions were to exacerbation in the future, they could impede proposed activities during extreme events. For example, an increase in wildfires in proximity to JBER could interrupt flight operations. Continued and additional measures could be needed to adapt to climate changes, such as personnel training and infrastructure to protect JBER assets.

5.2.5 Physical Resources

The proposed excavation of terrain and construction of a 2,500-foot runway extension under Alternatives B, C, and F would result in potential impacts to terrestrial or water and wetland resources at JBER. Past, present, or reasonably foreseeable projects, with potential cumulative on-land effects in combination with the alternative RW 16/34 extension are, primarily:

- The North End Runway Material Extraction and Transport Project, which removed vegetation and excavated and transported soils material to the Port of Anchorage. The project included construction of haul roads and a wetlands remediation agreement.

- Elmendorf Flight Line Safety Project, as part of the REDHORSE exercises, removed vegetation, excavated soils materials, disposed of materials, and wetlands delineation in portions of the project.
- The North Runway Hill Removal Project, which involves the removal of soil and the excavation of wetlands on a hill north of RW 16/34 and the placement of the fill material in a wetland area near the North End Borrow Pit.

The Port of Anchorage North End Runway Material Extraction and Transport was an independent project to obtain fill material for Port of Anchorage expansion. The fill material for Port of Anchorage and the associated haul road are in the area where an extended RW 16/34 could be constructed.

The Elmendorf Flight Line Safety Project and the North Runway Hill Removal Project RW 16/34are independent actions to permit safe flight operations on RW 16/34. During Alaska major flying training exercises, maintenance and resurfacing of RW 06/24, and certain weather conditions, JBER aircraft must arrive and depart on RW 16/34. A series of REDHORSE exercises are reducing the risk to aircraft using RW 16 for arrival over the woody, hilly area north of RW 16/34.

Cumulative effects would be associated with an extension of RW 16/34, the (completed) North End Runway Material Extraction and Transport EA for the Port of Anchorage, the (ongoing) Elmendorf Flight Line Safety Project associated with REDHORSE exercises, and the North Runway Hill Removal Project. These projects are in the area of a potential extension of RW 16/34 where extensive earth removal could occur, and the wetlands removal and remediation for the three projects are in areas potentially affected by disposition of cut materials associated with a RW 16/34 extension. Alternatives B, C, or F runway extension construction activities have the potential to generate adverse effects on regional wetland resources when considered with other projects. It is anticipated that minor cumulative wetlands effects would occur to wetland resources. Impacts to depressional wetlands have the potential for a cumulative reduction in the overall storage capacity for storm water in the watershed. Final wetland impacts would have to be determined and addressed when additional wetland delineations have occurred. Water quality or impacts on wetlands will be subject to regulation and oversight by state agencies and the USACE. Wetlands delineation and mitigation planning and design studies will provide the information that the USACE needs to determine final wetland impacts and mitigation requirements.

The Materials Extraction and Flight Line Safety projects have resulted in vegetation clearing, cut, fill, and roadway improvements in the area where RW 16/34 could be extended. The cumulative effect with a RW 16/34 extension would be that a portion of the soils and woody area have been removed and potential effects on some species using that woody area have already occurred as a result of the independent Materials Extraction and Flight Line Safety projects. On-base recreation use of the area is somewhat reduced as a result of these projects. An additional cumulative effect is that wetland impacts and remediation have been experienced in both projects. The experiences help establish procedures for additional potential wetlands impacts, which could be associated with a 2,500-foot extension to RW 16/34.

5.2.6 Hazardous Materials and Waste Management

No cumulative adverse impacts are expected as a result of the implementation of the Proposed Action or any alternative in conjunction with any other non-military project identified in Table 5.2-2. Changes to F-22 runway use patterns or possible construction of an extension to RW 16/34 would not contribute to substantial hazardous materials or wastes. The possible construction of a runway extension would be conducted in accordance with other projects that are being undertaken or foreseeable future projects at JBER, including projected USARAK restructuring. Such projects would include the Army projects developed for planning and programming in accordance with the *Alternate Program Objective Memorandum* for future mission changes and construction at JBER-Richardson identified in Table 5.2-1.

5.2.7 Biological Resources

The primary biological resource that could be affected by cumulative projects is the CIBW, discussed below. Additionally, avian species protected under MBTA, Bald and Golden Eagle Act and Avian Species of Special Concern all have potential to be affected by cumulative projects. Alternatives B, C, and F involving construction of an extension to RW 16 have the potential to directly affect these species and their habitat by causing both a temporary and permanent loss of vegetation and wildlife habitat as a result of grading for the construction of the extension and related safety zone.

Operation of the extended RW 16 has the potential to increase landings on RW 16 with consequent increases in noise over the terrestrial habitats north of RW 16. Changes in patterns of recreation activities around Otter Lake as well as resumption of year-round firing may have cumulative impacts on resident bald eagle roosting areas in the vicinity. Other recent and future projects including the Port of Anchorage expansion may have cumulative effects on terrestrial species in conjunction with construction of a 2,500-foot northern extension to RW 16/34.

The Air Force conducted an analysis of potential effects of the action on CIBW, found a very low probability of effect to CIBW and, therefore, determined that JBER's existing and proposed F-22 aircraft overflights "may affect, not likely adversely affect" CIBW and other listed species. The Air Force prepared a biological evaluation analyzing potential effects on CIBW and other listed species for submittal to NMFS as part of compliance with Section 7 of the ESA. The Air Force received a letter of concurrence from the NMFS with the "may affect, not likely to adversely affect" determination in the biological evaluation as described in Section 4.7.1.

Several past, present, and planned projects could result in increased noise from facility modification and other sources within the Knik Arm habitat for the CIBW. Cumulative direct impacts would occur from regional development, including coastal zone construction and effects on intertidal and subtidal marine habitats. Indirect effects could come from human activities, including increased recreational boating and increased storm water runoff into the CIBW habitat. The Knik Arm Crossing EIS identifies the main anthropogenic stressors to CIBW as the increased commercial and residential growth in the area. This resulted in additional marine vessel traffic at the Port MacKenzie Dock, greater use of Cook Inlet Ferry, increased vessel noise and traffic, more accidental fuel spills, increased noise from operations, and increased turbidity resulting from resuspension of mud substrate by propeller scour. Facility modification impacts on the CIBW could include avoidance of the construction zone, changes in resting or feeding cycles, displacement from habitat, masking of sounds and changes in vocal behavior, changes in swimming or diving behavior, altered direction of movement, and physical injury (FHWA 2007).

Resumption of year-round live-fire training at Eagle River Flats Impact Area could result in local effects on CIBWs unless mitigated by establishing training protocols that prohibit firing of explosive munitions at Eagle River Flats Impact Area when beluga whales are present in Eagle River. Minor impacts were identified for CIBW from noise associated with 105-mm and 120-mm weapons systems that extends into Eagle Bay. Studies have shown that underwater noise can cause whales and other marine mammals to exhibit a behavioral reaction, which is classified as a “Level B take.” Use of 60-mm and 81-mm mortars would not generate noise within either Eagle River or Eagle Bay at levels greater than 160 dB at frequencies within the hearing range of a beluga whale (40 Hz or higher). Any impacts, even minor, could contribute to the overall cumulative effects on the beluga whale in combination with noise from proposed operations at JBER; however, all of the alternatives have very low potential to affect beluga whales and most alternatives have a lower potential to cause any behavioral response than does the No Action Alternative. The Knik Arm Crossing EIS indicated that cumulative impacts to the beluga whale, mainly from in-water construction activities, could be substantial due to the importance of Knik Arm and Upper Cook Inlet as habitat for whales. The reasons for the decline in the beluga whale population are unknown, and increased human interaction undoubtedly plays a part.

The cumulative effect of the F-22 operational efficiency alternatives under consideration in this EIS would make a negligible contribution to the cumulative impacts on the CIBW population in the Upper Cook Inlet.

5.2.8 Cultural Resources

No cumulative adverse impacts are expected as a result of the implementation of the Proposed Action or any of the alternatives. No F-22 operational efficiency alternatives would be expected to result in adverse impacts (either as a project or cumulatively) on any buildings eligible for listing on the NRHP.

All areas that would experience ground disturbance under Alternatives B, C, or F runway extension construction activities have been surveyed for cultural resources or have already been disturbed by base development, such as grading and/or gravel borrow pit activities. There are no historic properties located in the APE of runway extension activities (USACE 2007, JBER 2015c, 2016c, 2016d, 2016e; Braund & Associates 2006). In compliance with Section 106 of the NHPA, the Air Force has consulted with the Alaska SHPO and potentially affected Alaska Native tribes, ANCSA corporations, and tribal government entities, which concluded with Alaska SHPO concurrence on the finding of “no historic properties affected” for Alternatives A, D, E, and No Action; and “no direct effect or adverse indirect effect to historic properties” for Alternatives B, C, and F.

All proposed operations at JBER to support the F-22 operational efficiency Proposed Action and alternatives would adhere to current and potential future federal and state memoranda of agreement, consultations, statutes, and regulations specific to cultural resources located on JBER. Cultural resources on the installation would not be impacted.

Regional civil projects with the potential to contribute to cumulative impacts to area or regional cultural resources include the Knik Arm Crossing and bridge access routes, Northern Rail Extension, and the future Alaska Pipeline Project in the Anchorage area. These and other actions identified in Table 5.2-2 would have the potential to impact cultural resources, contributing to area cumulative impacts. Any federal or federally supported projects would be subject to compliance with NEPA and Section 106 of the NHPA, with the result that adverse effects would be avoided, minimized, or mitigated, reducing the potential for adverse cumulative impacts to occur.

No Alaska Native concerns or traditional cultural resources have been identified as being affected by the Proposed Action or alternatives at JBER; thus, the Proposed Action or an alternative would not contribute to the cumulative effect expected from other projects in the region. The Air Force would continue to consult with federally recognized Alaska Native tribes and Alaska Native corporations as required.

5.2.9 Land Use and Recreation

No cumulative adverse impacts are expected as a result of the implementation of the Proposed Action or any of the alternatives in conjunction with other past, ongoing, or future projects. Future military actions at JBER would have minimal effect outside the installation. Alternatives B, C, or F would convert undeveloped land use to airfield land use and result in a reduction in the on-base areas used for outdoor recreation to the north of the existing RW 16/34. This reduction in on-base areas for individual recreation could increase use of other on-base recreational areas but would not be expected to have a discernible cumulative effect on off-base recreational areas.

Implementation of other reasonably foreseeable actions could generate land use effects to JBER, with off-base corridors interacting with runway safety zones. The Knik Arm Crossing or the proposed expansion at the Port of Anchorage could alter land use and land ownership patterns on the west side of JBER and in Matanuska- Susitna Borough and increase regional traffic congestion. Changes in land use for these nonmilitary actions are compatible with noise levels at the JBER airfield. Mutual security concerns would warrant close coordination between developers of the port and bridge and military planners.

5.2.10 Transportation

No cumulative long-term adverse impacts are expected as a result of the implementation of the Proposed Action or any of the alternatives. Alternatives B, C, or F would involve construction of a 2,500-foot northerly extension to RW 16/34 resulting in the rerouting of Airlifter Drive and in seasonal and temporary increases to JBER and vicinity traffic associated with construction activities. Several regional projects, including the ports, access roads, and the Knik Arm Bridge, would cumulatively involve changes in regional infrastructure.

Cumulatively, the potential reduction in JBER Army personnel and traffic could reduce effects on base access roadways, as well as those in Anchorage and the surrounding area. Implementation of other reasonably foreseeable actions, however, could generate land use and transportation effects in the vicinity of JBER. The Knik Arm Crossing is proposed to alter circulation and land use by linking the Municipality of Anchorage and Matanuska-Susitna Borough and thereby affecting development patterns in the region. In addition, alternatives to bridge access route would skirt JBER. Proposed expansion at the Port of Anchorage, just west of JBER, could alter land use and land ownership patterns and increase traffic congestion. Construction of these and other reasonably foreseeable projects could increase pressure on regional infrastructure and construction resources.

5.2.11 Socioeconomics

No cumulative adverse impacts are expected as a result of the implementation of the Proposed Action or any of the alternatives. A number of military and nonmilitary projects in the region surrounding the Anchorage and Matanuska-Susitna Borough, including the recent Port MacKenzie Development, the Port of Anchorage Expansion, and other proposed construction projects, could increase the demand for construction employment in the region. Economic activity associated with a runway extension would be temporary, lasting for an estimated three years. Annual maintenance of an extended runway would not have a noticeable effect on the regional economy.

The Goose Creek Correctional Center project in the Matanuska-Susitna Borough and Port MacKenzie area could add a small number of jobs for persons with requisite skills, mostly from the Wasilla-Palmer area. The workforce catchment area could expand to Anchorage upon completion of the Knik Arm Crossing. The Anchorage area workforce is of sufficient size that quantitative long-term cumulative socioeconomic effects would not be anticipated.

Energy and other non-military construction projects could have schedules with the potential to overlap a RW 16/34 extension. Overlapping schedules could place cumulative requirements on regional construction labor, equipment, and/or supplies. Since there will be no decision to extend RW 16/34 until funding becomes available, it would be speculative at this time to attempt to estimate any overlapping requirements or cumulative effects for a runway extension that has not yet been designed or engineered. Runway construction could, depending upon the schedule of other economic activities and/or a decline in oil and gas exploration, have small cumulative beneficial effects on the Anchorage economy.

5.2.12 Environmental Justice

The environmental justice analysis in this EIS takes into consideration the cumulative acoustic effects of all JBER-based and transient aircraft, including the F-35A and other aircraft that participate in Alaska training exercises. The Proposed Action (Alternative A) would result in disproportionate noise effects to 353 minority and 140 low-income persons residing off-base who would experience 65 dB L_{dn} or greater annual average outdoors noise exposure. There would be no cumulative noise effect that would increase noise exposure from other regional projects on the affected population. There are no existing or projected disproportionate effects to off-base minority or low-income populations under baseline conditions or with any other alternative in conjunction with any past, present, or reasonably foreseeable project. Under the No Action Alternative, or baseline conditions, a calculated on-base 523 minority and 78 low-income persons experience noise levels of 65 dB L_{dn} or greater. With the Proposed Action (Alternative A), a calculated 303 minority and 45 low-income on-base persons would experience noise levels of 65 dB L_{dn} or greater. This would not result in a disproportionate impact. A calculated 285 to 718 on-base minority persons and 43 to 108 on-base low-income persons (depending on the alternative) would experience noise levels of 65 dB L_{dn} or greater but would not be disproportionately impacted. The Proposed Action (Alternative A) would result in a calculated 299 on-base and 158 off-base children and 2 on-base and 23 off-base elderly persons being exposed to outside noise levels of 65 dB L_{dn} or greater. Under baseline conditions, no off-base and 516 on-base children are exposed to outside noise levels of 65 dB L_{dn} or greater. Depending on the alternative, no off-base and 281 to 709 on-base children would be exposed to outside annual average noise levels of 65 dB L_{dn} or greater. There would be no additional cumulative disproportionate noise impacts to disadvantaged populations other than the off-base impacts described in this EIS.

Off-base Mountain View Elementary School experiences an existing school-day noise level of 68.3 dB $L_{eq\text{-}8hr}$, which would increase to 70.2 dB $L_{eq\text{-}8hr}$ with Alternative A (the highest increase). On-base Mount Spurr Elementary School experiences an existing noise level of 74.9 dB $L_{eq\text{-}8hr}$ and would decrease to 71.8 dB $L_{eq\text{-}8hr}$ with Alternative D. The highest noise at a school would be 75.7 dB $L_{eq\text{-}8hr}$ at Mount Spurr with Alternative D. Noise level changes of less than 1 dB are not detectable to the human ear. Changes in noise levels in the 3 dB range can be discerned as a noise increase. Renovations at Mountain View Elementary School funded by school bonds in 2014 and 2015 improve sound insulation and help attenuate indoor noise levels at the school. Cumulative projects would not be expected to result in greater impacts to minorities or low-income populations or to children or elderly persons.

Uncertainty associated with gas and oil exploration, extraction, and transport could affect employment in the region, and minority and low income populations are often affected more by an economic decline than other populations. Cumulative effects could include reduced employment if there are relocations of JBER Army personnel. Cumulative beneficial effects from increased economic activity from projects identified in Table 5.2-1 and Table 5.2-2 could occur in conjunction with a runway construction.

5.3 Other Environmental Considerations

5.3.1 Relationship Between Short-Term Uses and Long-Term Productivity

CEQ regulations (Section 1502.16) specify that environmental analysis must address "…the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity." Special attention should be given to impacts that narrow the range of beneficial uses of the environment in the long term or pose a long-term risk to human health or safety. This section evaluates the short-term benefits of the proposal compared with the long-term productivity derived from not pursuing the proposal. Short-term effects to the environment are generally defined as a direct consequence of a project in its immediate vicinity.

Short-term effects could include localized disruptions and higher noise levels in some areas due to runway construction activity. The changes in runway use defined by the Proposed Action and alternatives would not significantly impact the long-term productivity of the land or air, as fighter aircraft have been regularly based at JBER and have trained in regional airspace. The military training that occurs in the airspace is consistent with existing operations

5.3.2 Irreversible and Irretrievable Commitment of Resources

Irreversible and irretrievable resource commitments are related to the use of nonrenewable resources and the effects that the use of these resources have on future generations. Irreversible effects primarily result from the use or destruction of a specific resource (e.g., energy and minerals) that cannot be replaced within a reasonable timeframe. Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored as a result of the action.

At JBER, most impacts are short term, temporary, and minor, such as air emissions and soil erosion from the construction of the runway extension. Longer-lasting impacts would include the change in land use from recreation to air field with construction of an extended RW 16/34. There would be a beneficial reduction in off-base noise levels under five of the six alternatives. Under Alternatives B, C, and F, runway extension construction activities have the potential to generate adverse effects on regional wetland resources when considered with other large-scale infrastructure proposals. These effects might result in the irreversible loss of the resource if appropriate mitigation measures are not implemented after further wetland analysis.

Air Force aircraft and personnel would use fuel, oil, and lubricants during normal activities. Training operations would involve irreversible consumption of nonrenewable resources, such as gasoline used in vehicles and jet fuel used in aircraft. Changes in runway use would not result in increased fuel use; although departure and arrival efficiencies would improve the availability of fuel for enhanced training (see Table 2.3-1).

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