DRAFT SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT (SEA) FOR

Proposal to Improve F-22 Operational Efficiency at Joint Base Elmendorf-Richardson, Alaska

Prepared for:

Department of the Air Force

24 March 2022

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Letters or other written comments provided may be published in the Final EA. As required by law, substantive comments will be addressed in the Final EA and made available to the public. Any personal information provided will be kept confidential. Private addresses will be compiled to develop a mailing list for those requesting copies of the Final EA. However, only the names of the individuals making comments and their specific comments will be disclosed. Personal home addresses and phone numbers will not be published in the Final EA.

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Purpose of and Need for Action

1.1 INTRODUCTION

This Supplemental Environmental Assessment (SEA) is for the Proposed Action, "Proposal to Improve F-22 Operational Efficiency at Joint Base Elmendorf-Richardson, Alaska."

1.1.1 Project Setting

Joint Base Elmendorf-Richardson (JBER), the former U.S. Air Force (Air Force) Elmendorf Air Force Base and U.S. Department of the Army Fort Richardson, is in Southcentral Alaska, adjacent to the City of Anchorage, and occupies 73,013 acres of land (Figure 1-1). It became a joint base in 2010 and has hosted a variety of missions and aircraft types throughout its history. 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.

Runway Extension Project and 2018 EIS

The 3 WG at JBER and Headquarters (HQ) PACAF identified the need to maintain and improve F-22 operational efficiency, as measured by pilot training time in the training airspace.

An Environmental Impact Statement (EIS), *Proposal to Improve F-22 Operational Efficiency at Joint Base Elmendorf-Richardson, Alaska* (referred herein as the 2018 EIS) was prepared to evaluate the potential environmental impacts of this Preferred Alternative in compliance with the National Environmental Policy Act (NEPA) of 1969 (42 United States Code [USC] 4331 et seq.), the regulations of the President's Council on Environmental Quality (CEQ) that implement NEPA procedures (40 Code of Federal Regulations [CFR] § 1500-1508), the Air Force Environmental Impact Assessment Process Regulations at 32 CFR § 989, and Air Force Instruction (AFI) 32-7061.

After consideration of relevant mission, operational, environmental, efficiency, and technical factors, as well as environmental consequences explained in the 2018 EIS, inputs from the public and regulatory agencies during scoping, and other relevant factors, the Air Force identified Alternative F as the Preferred Alternative (Figure 1-2). In September 2018, the Air Force issued a Record of Decision (ROD) to implement the Final Environmental Impact Statement (FEIS) Preferred Alternative, Alternative F, which consists of extending Runway 16/34 to the north for 2,500 feet to create a 10,000-foot north-south runway (RW) and changing operations to use the extended RW for more efficient F-22 flight operations, subject to the availability of funding. The ROD also

concluded, in the interim, that Alternative A, which included reconfiguration of operational flight patterns, would be executed until final design and execution of Alternative F was completed. Major project features of Alternative F are described in Section 2.4.2 of the 2018 EIS.

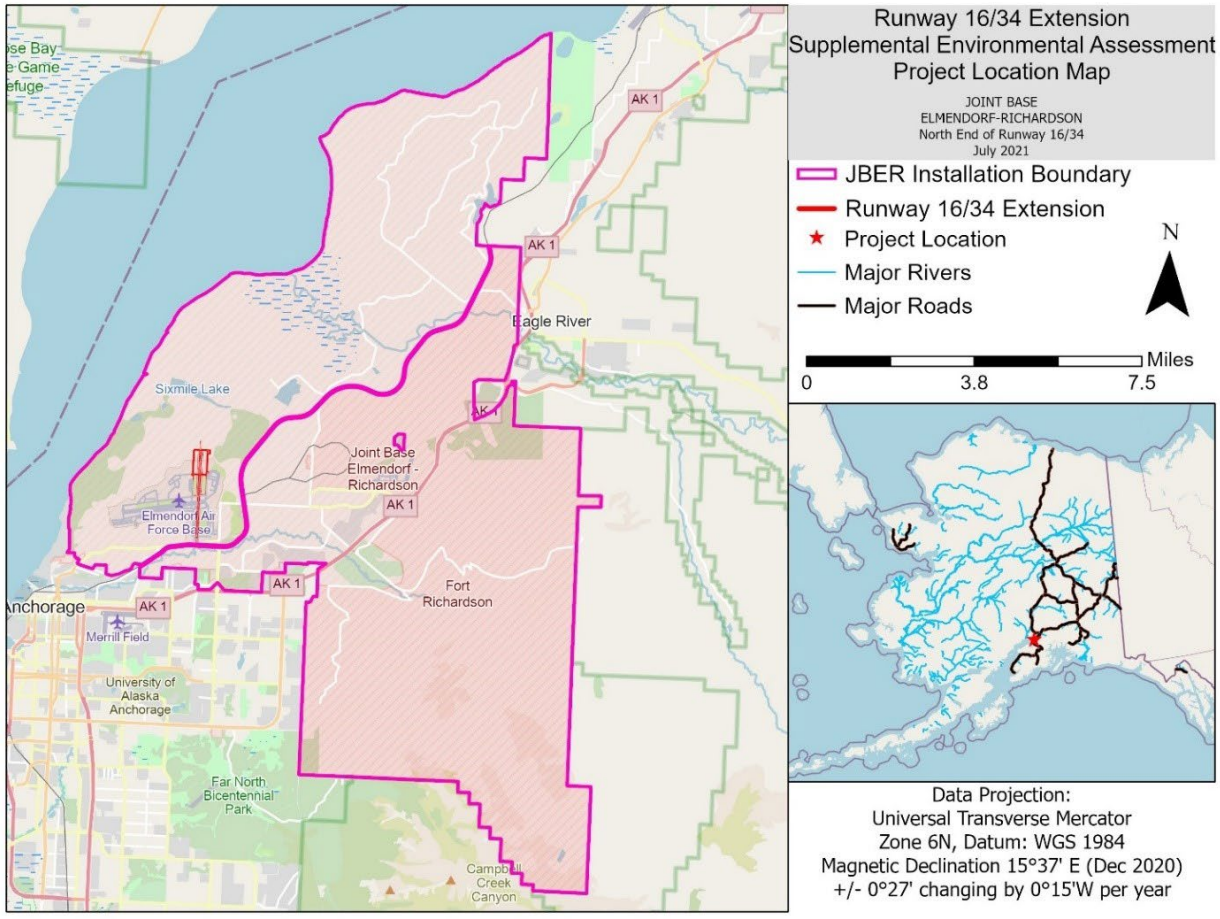
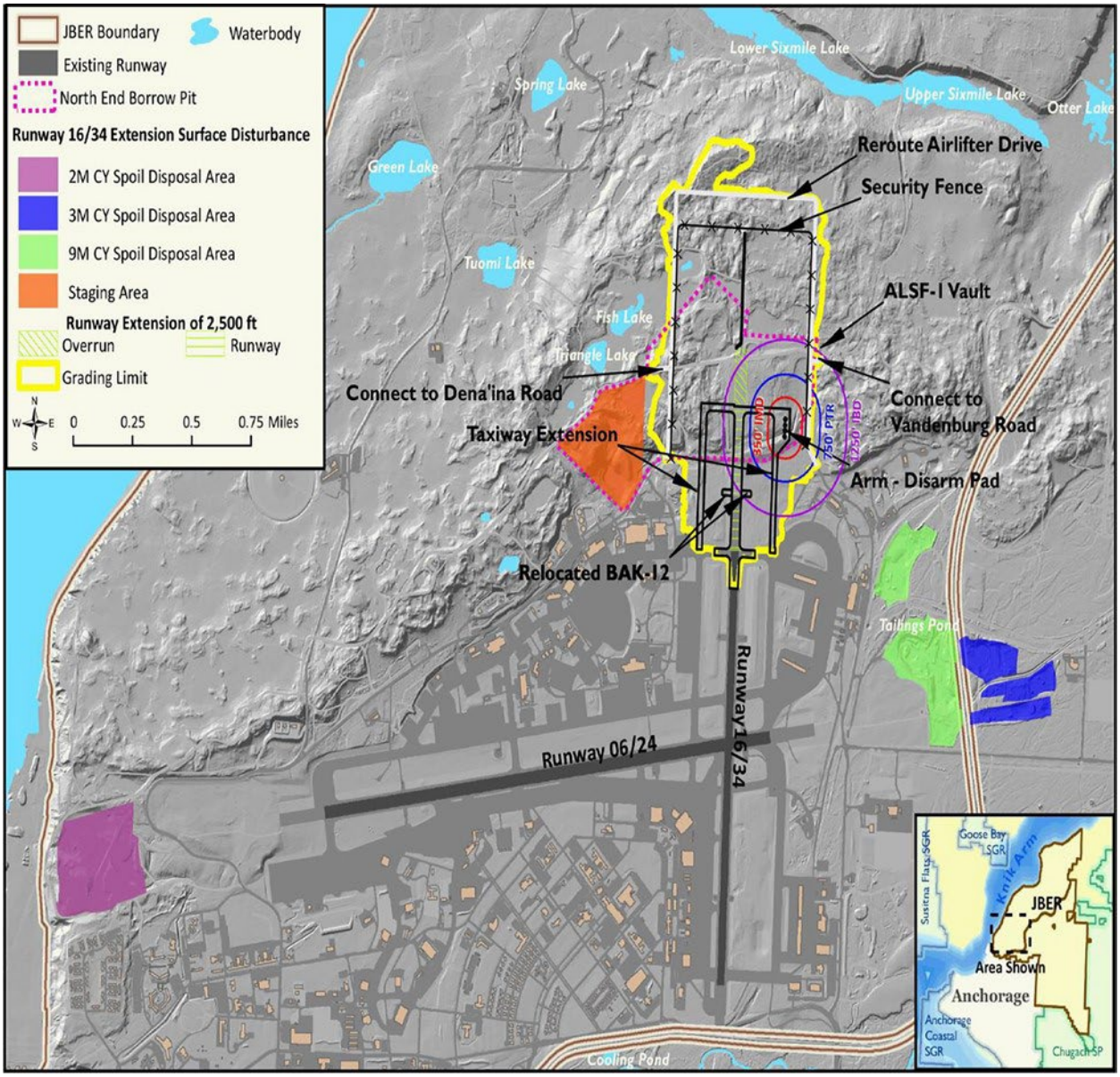


Figure 1-2. 16/34 Extension and Associated Surface Modifications, as described in 2018 EIS



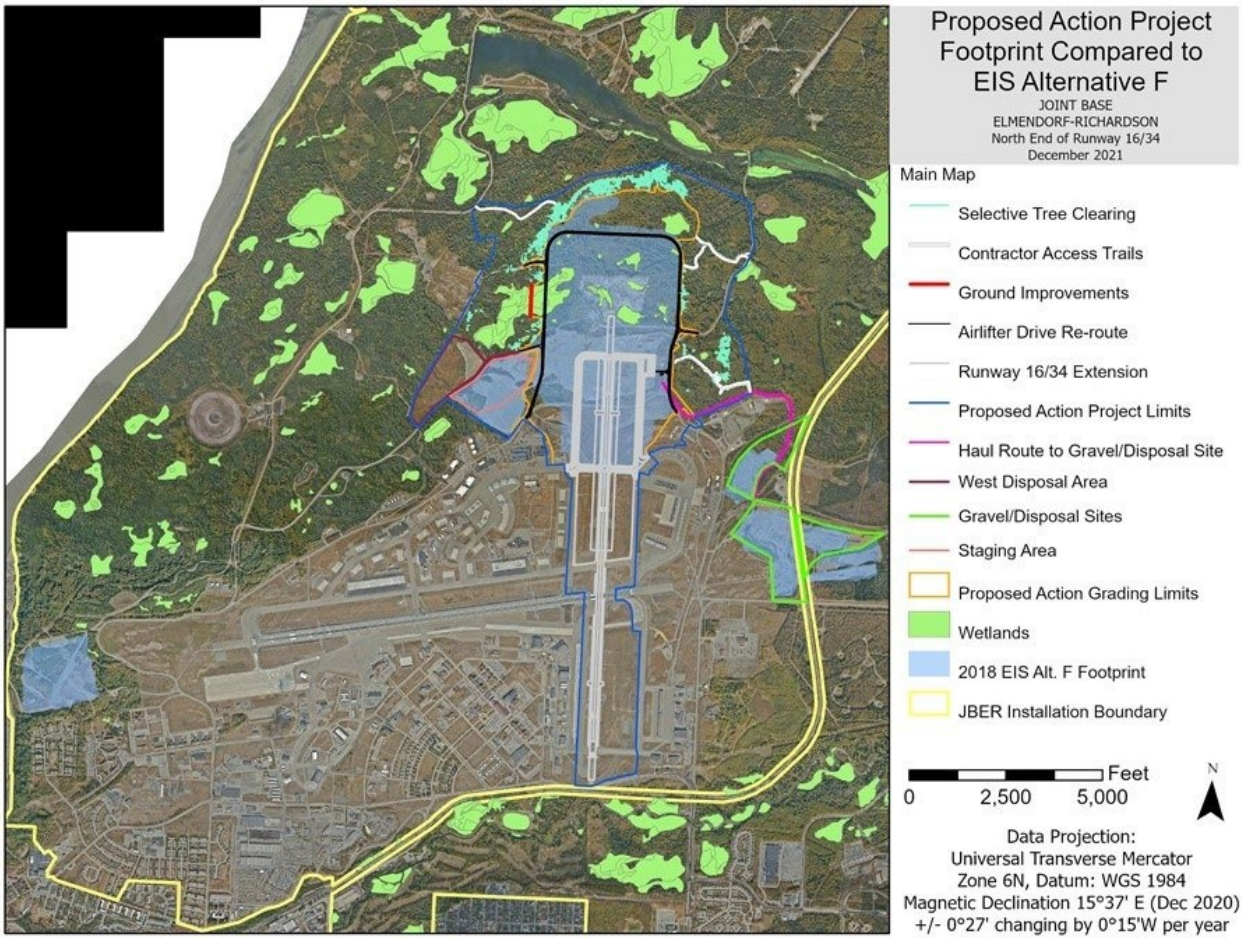
1.1.2 Decision to Supplement

Two principal factors led to the decision to supplement the analysis performed in the 2018 EIS. First, while completing the design of the runway extension alternative, selected by the 2018 ROD, the Air Force, in consultation with the U.S. Army Corps of Engineers (USACE), determined that changes were necessary to meet the project's purpose and need. Second, the Air Force identified data gaps in the Environmental and Cultural Resource analyses that could be addressed through supplemental analysis. Table 1-1 and Figure 1-3 summarize the changes to Alternative F that will be analyzed in this SEA.

Table 1-1. Summary of Project Feature Changes between 2018 EIS and SEA Preferred Alternative

	Project Feature in 2018 EIS	Changes to Preferred Alternative in SEA
1	*Excavating Existing Terrain to Remove Topographic Barriers and Demolition of Existing Facilities*	• Reduced excavation from ~15 mcy (million cubic yards) to 12 mcy • Affected area, including staging, increased from 557 acres to 655 acres to accommodate the roadway Airlifter Drive design and optimal ground improvements alignment. • Ground improvements design adds appx. 7.2 acres of wetland impacts • Selective tree clearing added to project scope • Enlarged Area of Potential Effect for cultural resources
2	*Disposition of Excavated Material and Demolition Debris*	• Reduced disposal of excavated material (15 mcy to 12 mcy) • Removed 2 mcy disposal area off end of RW 24 • Included additional gravel extraction/disposal areas analyzed in 2008 Gravel Pit Expansion EA (Air Force 2008) • Identified presence of pre- and polyfluoroalkyl substance (PFAS) /perfluorooctanoic acid (PFOA) within excavation limits • Enlarged Area of Potential Effect for cultural resources
3	*Runway, Overrun, and Taxiway Sub-Base Preparation*	• Primary source of sub-base material to be sourced onsite rather than off-installation
4	*Drainage Design and Construction*	• Completed ground improvement design shifted alignment to the west to optimize geotechnical conditions; increasing acreage of wetland impacts by about 7.2 acres
5	*Runway and Taxiway Paving and Completion*	• Length of runway extension increased from 2,500 feet to ~2,900 feet to ensure 10,000 feet of useable runway
6	*Constructing and/or Relocating Runway Support Elements*	• Revised Area of Potential Effect for Cultural Resources
7	*Roadway Relocation*	• The final design of the Airlifter Drive design added ~5.8 acres of wetland impacts
8	*Flight Operations*	No change

Figure 1-3. Preferred Alternative Project Footprint and Features in Contrast to 2018 EIS Selected Alternative F Footprint



The CEQ NEPA regulations direct agencies to prepare a supplement to either a draft or final EIS when either the "agency makes substantial changes to the Preferred Alternative that are relevant to environmental concerns" or there are "significant new circumstances or information relevant to environmental concerns and bearing on the Preferred Alternative or its impacts." Alternatively, agencies may choose to conduct supplemental analysis when they determine that the additional analysis would further the purposes of NEPA. (40 CFR § 1502.9(d)(1)(i)–(ii), (d)(2)). The regulations additionally permit an EIS to be supplemented by an Environmental Assessment (EA) if the agency's analysis supports a Finding of No Significant Impact (FONSI).

The changes to the Preferred Alternative that are relevant to environmental concerns are associated with modifications to the excavation limits, the inclusion of additional areas for gravel sources and disposal areas, development of the ground improvements design, and the evolution of the Airlifter Drive reroute design. Some changes have led to increased impacts, (for example, there is a net increase of about 10.6 acres of wetland impacts) while other changes potentially reduce the environmental impacts (for example, the updated plans to borrow soil from more proximate locations).

In the time since the ROD was signed, the Air Force also became aware of additional information relevant to the environmental concerns of the Preferred Alternative. The additional information is based on:

- A wetland delineation conducted by the Air Force that received an Approved Jurisdictional Determination (AJD) from USACE in December 2020.
- Cultural resources surveys conducted by the Air Force in 2020 and USACE in the summer of 2021.
- A Bird-Aircraft Strike Hazard (BASH) survey conducted by Wildlife Services that collected bird data around the Fish and Triangle Lake complex from December 2020 to December 2021.
- Per- and Polyfluoroalkyl Substances (PFAS) encountered by USACE during the geotechnical investigation.
- The requirement to assess the effects of in-air noise on marine mammals identified by the Air Force.

The 2018 EIS included a conservative planning assumption that the project area wetlands, including those in the Fish and Triangle Lake complex, were under the jurisdiction of USACE and that a Department of the Army (DA) permit would be required prior to the placement of fill material in the surface waters and wetlands of the complex and other depressional wetlands within the project area. A wetland delineation of the area was performed in July 2020 and the subsequent wetland delineation report requesting an AJD was submitted in September 2020 to define the jurisdictional status of the wetlands in the runway extension project area. USACE Regulatory Division determined on December 15, 2020 that all the wetlands and surface waters within the scope of the wetland delineation report were “excluded waters” and not subject to regulation under the Clean Water Act (CWA). The AJD is included in Appendix B.

The new wetland information is relevant to the environmental concerns because it changed the acreage of wetlands in the Preferred Alternative area, assigned a non-jurisdictional status to all the wetlands in the Preferred Alternative area, and removed wetland permitting requirements. The new cultural resources information is relevant to environmental concerns because it documented previously unreported sites and evaluated the eligibility of historic properties in the area of potential effect (APE) for direct and reasonably foreseeable effects. The BASH information is relevant because it influences the Air Force’s understanding of flight safety risk and potential mitigation measures. The effects of in-air noise on marine mammals and the discovery of PFAS is relevant to the environmental considerations of the Proposed Action, because the Air Force is required to take a hard look at the effects of its actions on the environment. This additional information informed the proposed project’s design changes. The changes and new information are summarized in Table 1-2.

The information presented in this document will serve as the basis for deciding whether the modified Preferred Alternative would result in a significant impact to the human environment, requiring the preparation of a supplemental EIS, or whether no significant impacts would occur, in which case a FONSI would be appropriate.

Table 1-2. Comparison of Potential Environmental Impacts

Resource Area	Summary of Potential Impacts from Alternative F, the Selected Alternative from the 2018 F-22 Operational Efficiency EIS	Summary of Potential Impacts as a Result of Changes to the Preferred Alternative or New Circumstances or Information	Difference in Potential Impacts
Airspace Management and Use	Increases F-22 runway use efficiency, adheres to Federal Aviation Administration (FAA) Opposite Direction Operations (ODO) guidance, and has the additional benefit of permitting JBER cross runway operations which would expedite both arrivals and departures and reduce hold times.	No change	No change
Acoustic Environment	Minor expansion of the 65 dB noise contour north and south of RW 34.	Shifting the runway 400 feet to the north would slightly reduce noise levels at Mountain View and shift noise contours slightly further north over Knik Arm.	Insignificant reduction to community and expansion to marine mammal noise impact contours.
Safety	Slight increase for the potential for bird-aircraft strikes associated with proximity to Sixmile Lake.	Preliminary study results do not indicate unmitigable BASH risk presented by Fish and Triangle Lake.	Preliminary BASH study results indicate adherence to the JBER BASH plan continues to present typically low BASH risk under 2018 EIS Alternative F or SEA Preferred Alternative.
Air Quality	Nominal increase in temporary, construction phase emissions due to additional paved surface maintenance requirements and change in F-22 operations.	Increase in temporary, construction phase emissions resulting from additional 400 feet of paved surface and maintenance requirements. De minimis increase in annual emissions from installation of three diesel-fired emergency generators.	Increase in temporary, construction phase emissions resulting from additional 400 feet of paved surface and maintenance requirements. De minimis increase in annual emissions from installation of three diesel-fired emergency generators.
Physical Resources *Earth Resources*	15.3 mcy excavated material disposed in three existing borrow pits.	12 mcy excavated material disposed in two borrow pits. Soils containing PFAS encountered in excavation limits.	3.3 mcy reduction in excavation quantity. Removed 2mcy western borrow pit. Adopted borrow pits from 2008 gravel pit expansion EA. Engaged in Alaska Department of Environmental Conservation (ADEC) coordination to define PFAS management requirements.
Physical Resources *Wetlands*	27.9 acres of direct wetland impacts.	Preferred Alternative would directly impact 38.52 acres of wetlands. 2020 wetland delineation and AJD altered acreage and jurisdictional status of wetlands.	10.6 additional acres of wetland impacts. All wetlands in Preferred Alternative area are non-jurisdictional.

Resource Area	Summary of Potential Impacts from Alternative F, the Selected Alternative from the 2018 F-22 Operational Efficiency EIS	Summary of Potential Impacts as a Result of Changes to the Preferred Alternative or New Circumstances or Information	Difference in Potential Impacts
Physical Resources *Surface Water*	No potential to directly disturb any surface waters in proximity to the areas under consideration for runway construction, excavation, or cut and fill activities. reasonably foreseeable effects to hydrology suspected.	The potential for reasonably foreseeable impacts to hydrology in Fish and Triangle Lakes due to watershed alteration is confirmed.	Potential for minor impacts to hydrograph of Fish and Triangle Lakes are possible; design of ground improvements implemented to mitigate potential effects.
Hazardous Materials and Hazardous Waste	Potential unexploded ordnance (UXO) discovery. Normal hazardous waste generation.	PFAS management required due to discovery within excavation limits. Coordinating PFAS management with ADEC.	No change
Biological Resources *Fish and Wildlife*	Loss of habitat would have an adverse, but less than significant impact on fish and wildlife.	Additional areas of tree clearing (+13 acres) and selective tree removal (+41 acres) as required by current airfield and airspace requirements.	Minor decrease in fish and wildlife habitat will occur due to expansion of the excavation limits and additional vegetation impacts since the 2018 EIS.
Biological Resources *Special Status Species: Marine Mammals*	May affect, not likely to adversely affect, Endangered Species Act (ESA) listed Cook Inlet Beluga Whales (CIBW) 2018 EIS does not explicitly describe impacts to non-ESA listed marine mammals.	Potential in-air or waterborne effects to marine mammals such as harbor seals is unlikely and therefore insignificant.	No change
Biological Resources *Vegetation*	Less than significant adverse impact to vegetation types and communities abundant in the region.	Selective removal of large trees within the project limits to prevent objects from extending upward into navigable airspace.	Minor increase in vegetation/habitat impacts.
Cultural Resources	No historic properties adversely affected.	No historic properties adversely affected providing avoidance measures identified in Section 3.5.2 are implemented.	No change
Recreation/ Land Use	No impacts to recreational fishing.	Potential impacts to fishing at Fish and Triangle Lakes to mitigate BASH risk. Enlarged grading limits increase impacts to wildlife viewing/hiking opportunities.	Minor increase in recreation/land use impacts associated with enlarged grading limits and potential BASH mitigation.
Transportation and Circulation	Short term construction related impacts to traffic.	No change	No change
Socioeconomics	Beneficial impacts from construction employment and reduced air traffic congestion in the Anchorage Bowl.	No change	No change
Environmental Justice	No disproportionate impacts to off-base minority or low-income populations.	No change	No change

1.2 PURPOSE OF THE ACTION

The purpose of the SEA Preferred Alternative has not changed from the purpose of the 2018 EIS; it is to provide the 3 WG with the flexibility to distribute F-22 departures and arrivals on JBER's runways by extending the runway to the north to achieve a 10,000-foot north/south runway. Flexibility is defined as the Air Force's ability to use JBER runways in the most efficient manner 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 (Air Force 2018).

1.3 NEED FOR THE ACTION

As discussed in Section 1.2.1 of the 2018 EIS, 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 (Air Force 2011), 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 associated with airspace congestion. In the process of removing and/or reducing restriction to runway use, the Air Force needs to address on- and off-base acoustical impacts. Additional information regarding the factors that created the Air Force's need are found in Section 1.2.1 of the 2018 EIS.

1.4 DECISION TO BE MADE

This SEA evaluates whether the implementation of the fully designed Alternative F, the selected alternative from the 2018 ROD, would result in significant impacts on the human environment, with consideration of the design changes and new information relevant to the environmental concerns of the Preferred Alternative. If significant impacts are identified, JBER would undertake mitigation to reduce impacts to below the level of significance, supplement the 2018 EIS in accordance with CEQ regulations, or abandon the Preferred Alternative.

This SEA is a planning and decision-making tool that will be used to guide JBER in implementing the Preferred Alternative in a manner consistent with Air Force standards for environmental stewardship.

1.5 COOPERATING AGENCY AND INTERGOVERNMENTAL COORDINATION/CONSULTATIONS

Per the requirements of Intergovernmental Cooperation Act of 1968 (42 USC 4231(a)) and Executive Order (EO) 12372, Federal, state, and local agencies with jurisdiction that could be affected by the Preferred Alternative were notified during the development of this SEA.

Appendix A contains the list of agencies consulted during this analysis and copies of correspondence.

1.5.1 Cooperating Agencies

There are no cooperating agencies participating in this NEPA evaluation.

1.5.2 Interagency Consultations

Per the requirements of Section 106 of the National Historic Preservation Act and implementing regulations (54 U.S.C. 300101 et seq.), findings of effect, where not already addressed in the 2018 EIS, and request for concurrence on those findings were transmitted to the Alaska State Historic Preservation Officer (Alaska SHPO) on 25 October 2021 (Air Force 2021b). Concurrence with a finding that two historic properties were not adversely affected, and no historic properties were affected regarding 39 cultural resources was received from the Alaska SHPO on 17 November 2021 (SHPO 2021). Correspondence regarding the findings and concurrence on the assessment of effect is included in Appendix A.

The Air Force engaged in informal consultation under Section 7(a)(2) of the Endangered Species Act (ESA) with the National Marine Fisheries Service (NMFS), Protected Resources Division (PRD) regarding the Preferred Alternative to improve F-22 operational efficiency at JBER in 2016 as part of the 2018 EIS. NMFS concurred with the Air Force's determination that Preferred Alternative "may affect but was unlikely to adversely affect" the endangered Cook Inlet beluga whale (NMFS # AKR-2016-9561) on 5 August 2016. The Air Force engaged in discussion with NMFS in 2021 regarding the continued applicability of the Air Force's 2016 Biological Evaluation (BE) prepared in support of the 2018 EIS as well as to address potential concerns regarding harbor seals and other marine mammals in accordance with the Marine Mammal Protection Act (MMPA). On 1 October 2021, the Air Force determined that the prior consultation pertaining to ESA still applies, and reopening of consultation is not appropriate, and provided that position to NMFS in the form of a memorandum. The Air Force memorandum is located in Appendix A and the 2016 NMFS Letter of Concurrence is included in Appendix B. In the 1 October memorandum, a summary of the discussion pertaining to marine mammals was also included and will be addressed further in this SEA.

The Air Force requested a species list from the U.S. Fish and Wildlife Service (USFWS) on 21 September 2021. The list (included in Appendix A) confirmed that there were no additional threatened, endangered, or candidate species not addressed in the prior consultation. Therefore, the Air Force has determined that no additional consultation is required, and that it has satisfied all requirements for consultation with the U.S. Fish and Wildlife Service (Service) under Section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.).Intergovernmental/Government to Government Consultations

1.5.3 Intergovernmental/Government to Government Consultations

36 CFR 800.4 requires consultation to identify historic properties, including properties of religious and cultural significance, that may be eligible for the National Register. Department of Defense Instruction (DoDI) 4710.02, *Interactions with Federally-*

Recognized Tribes, and Department of Air Force Instruction (DAFI) 90-2002, *Interaction with Federally-Recognized Tribes*, Federally Recognized Tribes that are historically affiliated with the JBER geographic region will be invited to consult on all proposed undertakings that have a potential to affect properties of cultural, historical, or religious significance to the Tribes. Federal agencies must also consult with Alaska Native Claims Settlement Act (ANCSA) corporations on the same basis as Federally Recognized Tribes under Executive Order No. 13175 (see Section 161 of Public Law (PL) 108-199, as amended by Section 518 of PL 108-447). The government-to-government consultation process is distinct from NEPA consultation or the interagency coordination process, and it requires separate notification of all relevant Tribes. The timelines for Tribal consultation are also distinct from those of other consultations. The JBER point-of-contact for Federally Recognized Tribes and ANCSA corporations is the Alaska Native liaison.

The Federally Recognized Tribal governments and ANCSA corporations whose interests might be directly and substantially affected by the Preferred Alternative were invited to engage in Government-to-Government Consultation on 1 October 2021. The Federally Recognized Tribal governments and ANCSA corporations that were coordinated or consulted with regarding these actions, as well as responses received by the time of publication, are listed in Appendix A. Federally Recognized Tribal governments and Certified Local Government (Anchorage Historic Preservation Commission) were also consulted under the National Historic Preservation Act.

An offer for Government to Government consultation was sent by letter to the Tribal partners on 1 October 2021. A Government-to-Government meeting was held 2 February, information, including meeting minutes, are included in Appendix A.

1.6 PUBLIC AND AGENCY REVIEW OF SEA

The Preferred Alternative has the potential to impact wetlands and is subject to the requirements and objectives of EO 11990, *Protection of Wetlands.* The Air Force published early notice that the Preferred Alternative would occur in a wetland in the newspapers of record (listed below) on 24 October 2021 (Appendix A). The notice identified state and Federal regulatory agencies with special expertise that had been contacted and solicited public comment on the Preferred Alternative and any practicable alternatives. No comments were received regarding the Early Public Notice.

A Notice of Availability (NOA) of the Draft SEA and FONSI/Finding of No Practical Alternative (FONPA) was published announcing the availability of the SEA for review on 24 March 2022. The NOA invited the public to review and comment on the Draft SEA. The Draft SEA was posted on the JBER Environmental website https://www.jber.jb.mil/Services-Resources/Environmental/.

The public and agency review period ended on 23 April 2022. The list of contacts, NOA, public and agency comments will be included in Appendix A of the Final SEA.

The NOA and early notice of project execution in wetlands was published in these newspapers as well as on the official JBER Website beginning 24 April 2022:

- Anchorage Daily News, 300 W 31st Ave., Anchorage, AK 99503

- Mat-Su Valley Frontiersman, 5751 Mayflower Ct., Wasilla, AK 99654

Copies of the Draft SEA and FONSI/FONPA were also made available for review at these locations:

- Joint Base Elmendorf-Richardson Library, Bldg. 7, JBER-R, AK 99505
- Anchorage Public Library, 3600 Denali St., Anchorage, AK 99503
- Chugiak-Eagle River Library, 12001 Business Blvd. #176, Eagle River Town Center, Eagle River, AK 99577

Section 2
Description of the Preferred Alternative and Alternatives

2.1 PROPOSED ACTION

The Proposed Action for this SEA is the implementation of Alternative F and the mitigation measures described in the ROD. The Air Force would extend the northward departure and arrival runway (RW), called RW 16/34, and alter flight operations to satisfy the Purpose of and Need for the Action described in Sections 1.2 and 1.3 of this SEA.

Alternative F in the 2018 EIS proposed extending RW 16/34 by 2,500 feet to establish a 10,000-foot north-south runway with two supporting north-south taxiways, and included appropriate shoulders, grading, drainage, an arm and disarm pad, and airfield visual navigation aids required to accommodate the existing mission at JBER. Navigational aids and airfield lighting would be supported by diesel-fired emergency generators to ensure uninterruptable power during outages. Since the 2018 EIS, changes to the original Region of Influence (ROI) were required to include necessary changes to the alignment of Airlifter Drive, additional local gravel resources and disposal areas, additional vegetation removal areas required to meet updated airspace requirements, and resolution of effects to hydrology identified between the airfield and lands adjacent. The SEA also addresses an additional 400-foot northward shift of the runway that is necessary to meet operational requirements for Instrument Landing System (ILS) runway lighting, which the 2018 EIS design did not meet. As a result, the total proposed runway extension will be approximately 2,900 feet. The additional northward shift in the RW 16 final approach causes a minimal drop in altitude above waters of the Knik Arm (approximately 25 feet) given the shallow glide slope (3 degrees). Section 1.1.2 in the Proposed Action's Description of the Proposed Action and Alternatives (DOPAA) includes an extensive discussion of the Proposed Action design compared to the 2018 EIS design.

The most distinctive difference between the alternatives presented in Section 2.3 below can be attributed to varying design alternatives to manage hydrologic effects between the Fish and Triangle Lakes Complex and the extended runway. In Alternatives 1 through 4, the extended runway construction would occur as proposed in the 2018 EIS, incorporating necessary design features described in Table 1-1, above.

2.2 SELECTION STANDARDS

NEPA and the CEQ regulations mandate the consideration of reasonable alternatives for the Preferred Alternative. "Reasonable alternatives" are those that also could be utilized to meet the purpose of and need for the Preferred Alternative. Per the requirements of 32 CFR § 989, the Air Force Environmental Impact Analysis Process (EIAP) regulations, selection standards are used to narrow the field of all possible alternatives to those considered reasonable.

In addition to supporting the Purpose of and Need for the Action, reasonable alternatives must meet these baseline requirements:

- Be compatible with the existing, ongoing military mission and activities at JBER.
- Be compatible with existing infrastructure and development at JBER and in its vicinity.
- Meet applicable Department of Defense (DoD) installation master planning criteria, consistent with UFC 2-100-01, Installation Master Planning.
- Align with the 2011 Air Force Civil Engineering Strategic Plan (Air Force 2011).
- Meet current Air Force requirements for functional space, consistent with Air Force Manual 32-1084, Facility Requirements (20 April 2012).
- Meet applicable DoD antiterrorism/force protection (AT/FP) criteria, consistent with Unified Facilities Criteria (UFC) 4-010-01, DoD Minimum Antiterrorism Standards for Buildings and the Air Force Installation Force Protection Guide.
- Support and enhance the morale and welfare of personnel assigned to the installation, their families, and civilian staff, consistent with Department of Defense Instruction 1015.10, Military Morale, Welfare, and Recreation (MWR) Programs (6 July 2009).
- Be consistent with the Sikes Act and EO 13443.

In addition to the baseline requirements, the Air Force developed these selection standards based on operational, technical, or environmental factors to select reasonable alternatives:

1. Promote the preservation of recreational fishing values and comply with ADFG's stocking program.
2. Meet JBER Flight safety requirements, including BASH objectives.
3. Be consistent with applicable law for the avoidance, minimization, and mitigation of adverse effects to wetlands, surface water, cultural resources (including resources eligible for listing in the National Register of Historic Places or of cultural significance to Federally Recognized Tribes), and other environmental effects as prescribed by law.
4. Enable the complete construction of the RW 34 extension project by October of 2025 to maintain military advantage over near-peer adversaries.

2.3 SCREENING OF ALTERNATIVES

The following alternatives that might meet the purpose and need for the runway extension were considered:

2.3.1 Alternative 1: Construct Runway Extension and Ground Improvements to Stabilize Fish and Triangle Lake Hydrology (Preferred Alternative)

Ground improvements would be constructed east of Fish Lake to stabilize the hydrology in the Fish and Triangle Lake wetland complex. The intent of the ground improvements would be to reduce the potential hydrologic impacts associated with runway extension

excavation. The Preferred Alternative (Alternative 1) would incur the cost of constructing the ground improvements and transporting substantial quantities of spoils material offsite.

2.3.2 Alternative 2: Construct Runway Extension and Fill Fish and Triangle Lake Wetland Complex with Runway Extension Excavation Spoils

The Fish and Triangle Lake wetland complex would be filled with clean spoils material generated by the runway extension excavation. Alternative 2 would have the largest area of wetland impacts, including the complete loss of Fish and Triangle Lakes, but has the lowest construction costs of alternatives under consideration due to the simplicity of the design and reduced material haul costs.

2.3.3 Alternative 3: Construct Runway Extension and Fill Wetlands East of Fish Lake with Runway Extension Excavation Spoils

The wetlands east of Fish Lake would be filled with clean spoil material generated by the runway extension. The footprint of Alternative 3 is the same as Preferred Alternative, but Alternative 3 does not include ground improvements. Alternative 3 would avoid immediate direct impacts to Fish and Triangle Lake. However, the absence of an engineered solution to stabilize local hydrology is expected to cause latent impacts to the Fish and Triangle Lake wetland complex. Alternative 3 avoids the cost of constructing ground improvements but would incur the cost of transporting substantial quantities of spoils offsite.

2.3.4 Alternative 4: Construct Runway Extension and Ground Improvement, Fill Fish Lake with Runway Extension Excavation Spoils

Ground improvements would be constructed east of Fish Lake (along the same alignment as the Preferred Alternative ground improvements). Fish Lake, along with wetlands and other surface waters, on both sides of the ground improvements would be filled. Alternative 4 avoids direct impacts to Triangle Lake and provides high confidence in stabilizing hydrology through the construction of ground improvements. Alternative 4 would provide some cost savings by allowing onsite spoils disposal in the Fish Lake wetlands but would still incur the cost of ground improvement construction.

2.3.5 Alternative 5: Construct Runway Extension by Regrading the Runway

The entire RW 16/34 and RW 06/24 complex would be elevated so that the finished runway elevation was high enough to avoid hydrologic impacts to the Fish and Triangle Lake wetland complex. Alternative 5 would require the demolition of the existing runway, transportation of enough fill material to elevate the runway high enough to prevent water from Fish and Triangle Lake from flowing onto the runway, and reconfiguration of all surrounding facilities such as maintenance hangars, rearming pads, offices, control towers, and related infrastructure.

2.3.6 Alternative 6: Extend RW 16 to the South

RW 16/34 would be extended 2,500 feet to the south to achieve the 10,000-foot runway length. The southern extension of the runway would require the relocation of Arctic

Warrior Drive and the Alaska Railroad. The extended runway would cross Ship Creek and encroach into the Eagleglen Fitness Park.

2.4 RESULTS OF SCREENING

The selection standards described in Section 2.2 were applied to the alternatives to determine which alternative(s) could serve the runway extension project and fulfill the purpose of and need for the action. The results of the screening are depicted in Table 2-1.

The following reasonable alternatives that might meet the purpose and need were considered:

- Alternative 1 (Preferred Alternative): Construct Ground Improvements to Stabilize Fish and Triangle Lake Hydrology

The following alternatives have been eliminated from further consideration on the basis of the Section 2.2 selection standards.

- Alternative 2: Fill Fish and Triangle Lake Wetland Complex with Runway Extension Excavation Spoils
- Alternative 3: Fill Wetlands East of Fish Lake with Runway Extension Excavation Spoils
- Alternative 4: Construct Ground Improvements between Fish and Triangle Lakes, Fill Fish Lake
- Alternative 5: Regrade the runway
- Alternative 6: Extend RW 16

Table 2-1. Screening of Alternatives against Selection Standards

Selection Standards	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
1. Promotes the preservation of recreational fishing values		Complete loss of Fish and Triangle Lake fishing opportunities	Reasonably foreseeable impact to Fish and Triangle Lake fishing opportunities	Partial loss of Fish and Triangle Lake fishing opportunities		
2. Meets JBER flight safety requirements, including BASH objectives						
3. Is consistent with applicable law for the avoidance, minimization, and mitigation of trust resources		Includes significant avoidable direct wetland impacts	Includes significant avoidable Reasonably foreseeable wetland impacts	Includes significant avoidable direct wetland impacts	APE has not been assessed for cultural resources	APE has not been assessed for cultural resources
4. Enables the complete construction of the RW 34 extension project by October of 2025		Significant impacts would require the preparation of an EIS	Significant impacts would require the preparation of an EIS	Significant impacts would require the preparation of an EIS	Design process has not begun and would require several years to complete	Design process has not begun and would require several years to complete

Green cell signifies fully compliant; yellow cell signifies partially compliant, and red cell signifies non-compliant

2.5 DETAILED DESCRIPTIONS OF THE ALTERNATIVES

NEPA and the CEQ regulations mandate the consideration of reasonable alternatives to the Preferred Alternative. “Reasonable alternatives” are those that also could be utilized to meet the purpose of and need for the Preferred Alternative.

The NEPA process is intended to support flexible, informed decision-making; the analysis provided by this SEA and feedback from the public and other agencies will inform decisions made about whether, when, and how to execute the Preferred Alternative. Among the alternatives evaluated is a No Action Alternative. The No Action Alternative will substantively analyze the consequences of not taking the Preferred Alternative, not simply conclude no impact, and will serve to establish a comparative baseline for analysis.

The initial array of alternatives considered in this SEA present potential solutions to the problem of water migrating out of the wetland complex eastward, as a result of the runway extension excavation necessary to conform the extension with the existing airfield. Only the Preferred Alternative: Construct Runway Extension and Ground Improvements to Stabilize Fish and Triangle Lake Hydrology, was found to answer the purpose of and need for the action and to satisfy the selection standards. Preferred Alternative and a “No Action” Alternative are carried forward for detailed analysis.

2.5.1 Preferred Alternative: Construct Runway Extension and Ground Improvements to Stabilize Fish and Triangle Lake Hydrology (Alternative 1)

Under the Preferred Alternative, JBER would extend RW 16/34 as described in the 2018 EIS and modified in Table 1-1, Section 1.1.3 of the SEA, and construct ground improvements to stabilize the hydrology in the Fish and Triangle Lakes wetland complex. Ground improvement is the modification of existing site foundation soils or project earth structures to provide better performance under design and/or operational loading conditions. As described in the alternatives presented here, ground improvement consists of improving the existing soils and embankments with materials such as cement and bentonite to reduce the seepage and hydraulic conductivity of the soils.

The runway extension construction project is expected to last 3 years. Specific details about the construction method and schedule are dependent on the selected construction contractor's means and methods. Those details will not be available until a construction contractor is selected and work plans are submitted. The construction of the ground improvements would likely occur in the early stages of the project and could take approximately 6-12 months to complete. Construction of the ground improvements would occur in both summer and winter conditions as frozen wetland materials are significantly easier to work and offer a more stable environment to minimize impacts to adjacent wetlands. The Preferred Alternative would not be expected to require any additional maintenance beyond the same sort of vegetation management that the other alternatives would incur, and the ground improvement structure does not have a scheduled wear out date or life expectancy.

The wetlands to the east of the ground improvement feature would be drained by the excavation associated with the runway extension and backfilled with clean excess spoils material (sand, gravel, and silt). Organic material, including excavated wetland soils, would be stockpiled for reuse during revegetation. Approximately 1,565 cy of topsoil would be required to revegetate the spoils disposal area, in addition to the reused organics from the wetland excavation. Approximately 6 mcy of the 12 mcy total volume of spoils would be disposed in the runway extension project area and the remaining 6 mcy would be transported to an approved disposal area. Grading in the area of ground improvements would be directed toward the west (away from the runway) to the maximum extent practicable to minimize reducing the drainage area of Fish and Triangle Lakes.

The ground improvement feature is designed to interrupt the west to east groundwater movement within the wetland complex into the adjacent RW 16/34 extension project work area. This low permeability wall-like feature would be constructed from a bentonite/cement mix that would extend across the wetland complex about 120 feet east of Fish Lake (Figure 2-1). It would have a total length of approximately 850 feet with each end terminated into relatively lower permeability soils that occur north and south of the wetland complex. The ground improvement base would extend to a depth of 45 feet below the ground surface, which is at least 30 feet below the more permeable surficial soils depending on location along the alignment. The top of the feature would be at the ground surface elevation of 300 feet, which is approximately 3 to 4 feet above the typical surface water elevation of Fish Lake. The Preferred Alternative would include an overflow culvert to direct excess water above the permanent surface water elevation of Fish Lake under

the realigned portion of Airlifter Drive. The water would be discharged as overland flow where it would infiltrate into vegetated areas or be captured by the extended runway drainage system (Figure 2-2).

The design has incorporated multiple features to minimize impacts to the lakes and wetland complex, including the cement bentonite ground improvements to reduce potential subsurface drainage, civil site grading to direct stormwater runoff from the surrounding areas back to the lakes and wetland complex to recharge the water level, and stormwater overflows to ensure the water level does not exceed that of the existing conditions. The Preferred Alternative is shown in Figure 2-1.

Figure 2-1. Preferred Alternative (Preferred Alternative): Construct Ground Improvements to Stabilize Fish and Triangle Lake Hydrology

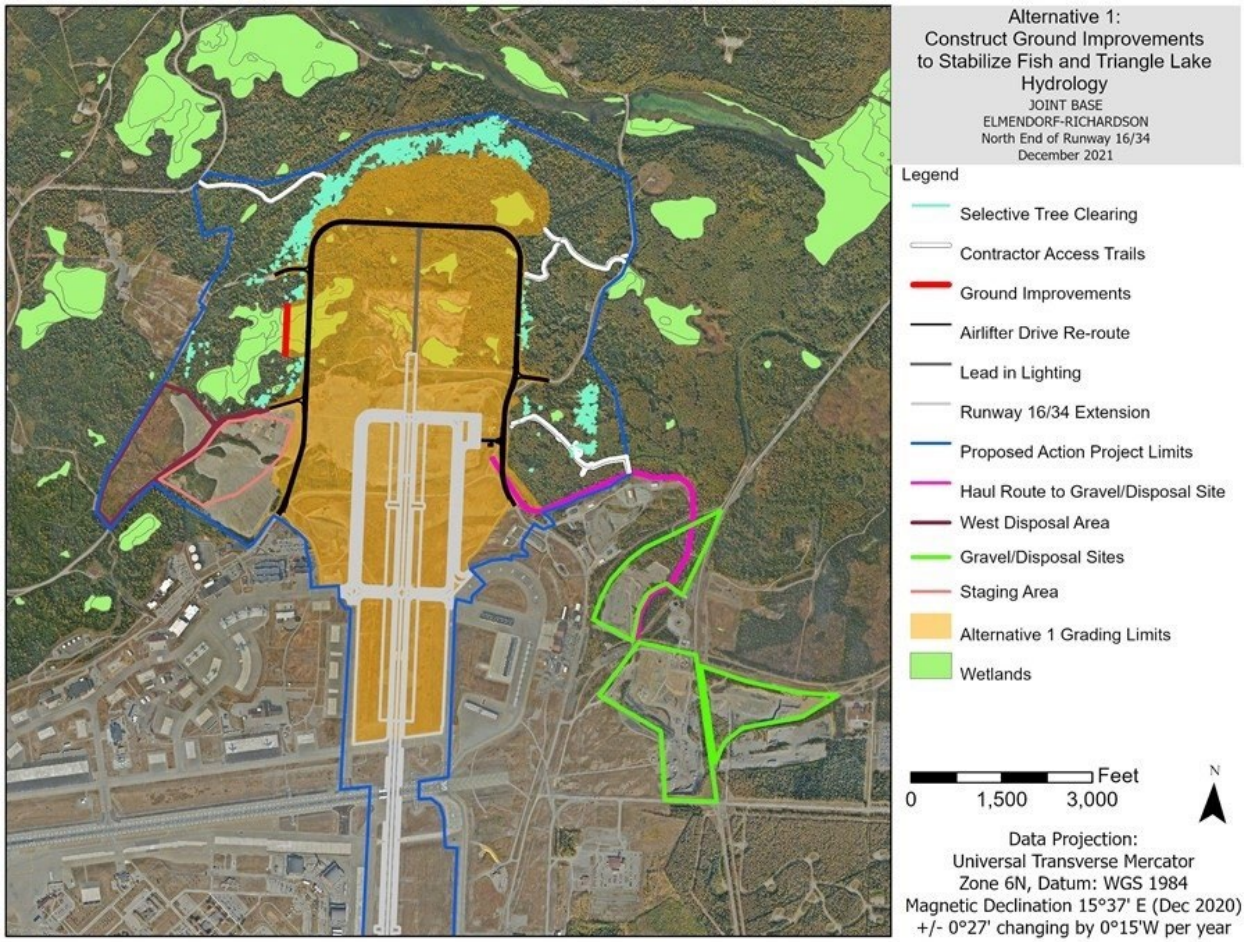
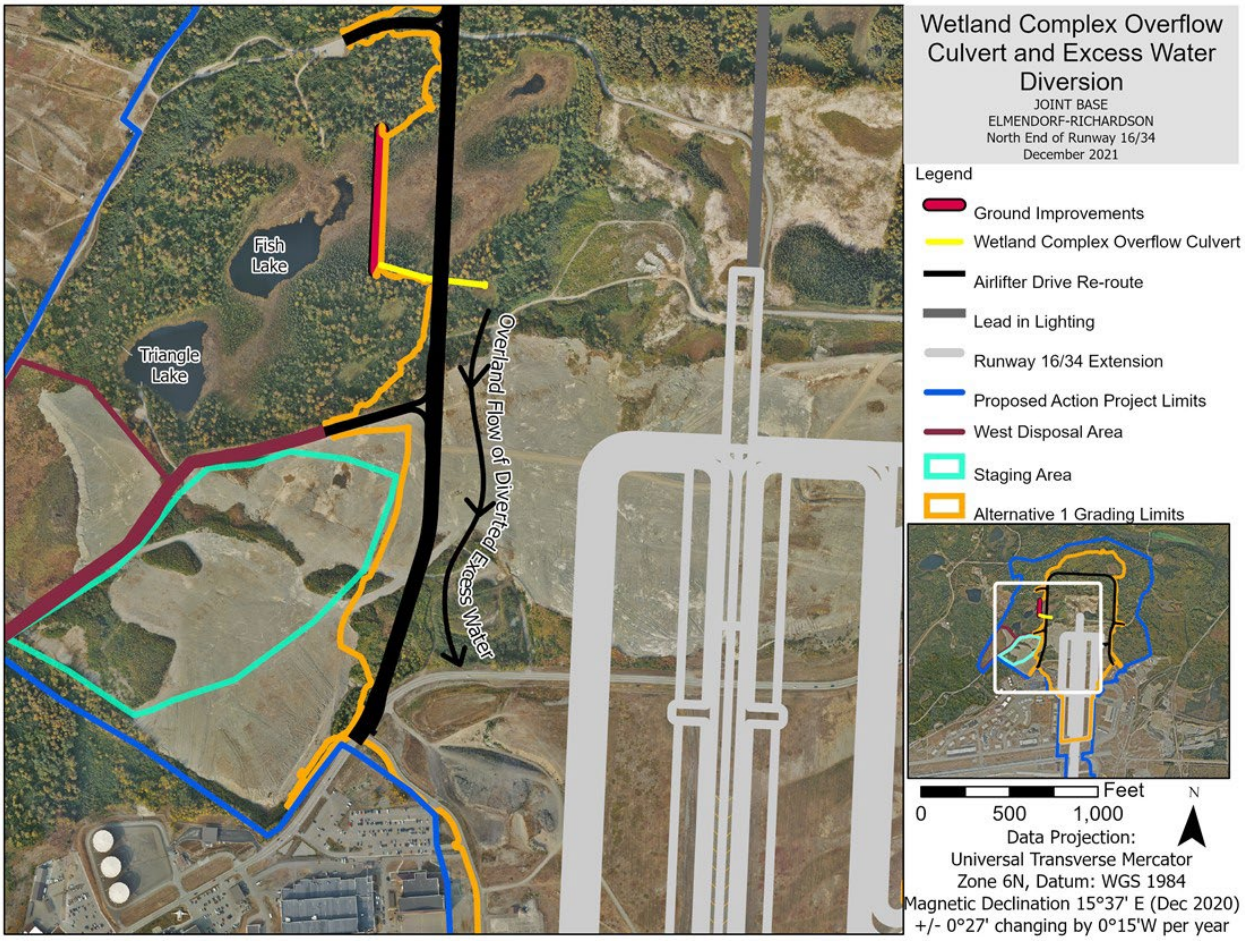


Figure 2-2. Wetland Complex Overflow Culvert and Excess Water Diversion



2.5.2 No Action Alternative

The No Action Alternative cannot be considered reasonable as it fails to address the purpose of and need for the action as described in Section 1. However, it will be carried forward for further analysis, consistent with CEQ regulations, to provide a baseline against which the impacts of the Preferred Alternative can be assessed.

Under the No Action Alternative, the proposed construction of the extended RW 16/34 would not occur and F-22 flight operations at JBER would continue consistent with the description of Alternative A from the 2018 EIS. Alternative A was intended as an interim measure to improve operational efficiency until the runway extension could be designed and constructed.

The No Action Alternative would continue to distribute annual F-22 sorties to concentrate departures on RW 34 and arrivals on RW 06, allowing F-22 operations to depart directly toward the most used training airspaces. The No Action Alternative does not include construction of any features and would only impact runway operations. No new, stationary emission sources would be installed under the No Action Alternative.

Section 3
Affected Environment and Environmental Consequences

The ROI for the Preferred Alternative is the JBE054 RW 16/34 Extension Project Limits, unless otherwise specified below for a particular resource area where a resource would have a different ROI.

This section describes the current conditions of the environmental resources, either man-made or natural, that would be affected by implementing the Preferred Alternative or the No Action Alternative.

Based on the scope of the Preferred Alternative, resource areas with minimal or no changes to the impacts described in the 2018 EIS were identified through a preliminary screening process. This resulted in five resource areas being eliminated from further consideration. Table 3-1 describes those resource areas not carried forward for a detailed analysis, along with the rationale for their elimination.

Table 3-1. Resource Areas Eliminated from Detailed Analysis

Resource Area	Reason Eliminated from Detailed Analysis
Airspace Management and Use	The impacts of the Preferred Alternative on Airspace Management and Use were analyzed in sufficient detail in Section 4.1 of the 2018 EIS. The changes to the Preferred Alternative and new information that emerged after the 2018 EIS would not alter the description of consequences to Airspace Management and Use described in the 2018 EIS. The Preferred Alternative would have a beneficial impact on Airspace Management and Use due to reduced airspace congestion in the Anchorage Bowl.
Acoustic Environment	The impacts of the Preferred Alternative on the Human Acoustic Environment were analyzed in detail in Section 4.2 of the 2018 EIS. Changes to the Preferred Alternative pursuant to the complete design of the runway extension (specifically the approximate 400-foot increase in the length of the runway extension) were evaluated and found to be inconsequential to the impacts already analyzed for the Acoustic Environment. The 400 feet northward shift would slightly reduce the community noise effects of F-22 flight operations (refer to the Memorandum for Record (MFR) in Appendix B dated 25 March 2021). The northward shift would reduce the altitude at which aircraft using RW 16/34 cross over the Knik Arm by less than 50 feet, but the minor altitude reduction would not have perceptibly different consequences on the acoustic impacts of F-22 operations on endangered marine mammals under the flight path than the consequences described in the 2018 EIS. The Air Force determined the ESA consultation associated with the 2018 EIS continues to be applicable to the Preferred Alternative in a MFR dated 1 October 2021 (Appendix A). For marine mammals not addressed in the 2018 EIS, additional analysis is included in this SEA.

Transportation and Circulation	The impacts of the Preferred Alternative on Transportation and Circulation were described in sufficient detail in Section 4.10 of the 2018 EIS. Construction activity would result in minor increases to local traffic; however, these increases would be temporary and cease once the project is complete. As a result, the Air Force anticipates no new significant short or long-term adverse impacts.
Socioeconomic Resources/Environmental Justice	Impacts to Socioeconomic Resources and Environmental Justice were analyzed in sufficient detail in Section 4.11 and 4.12, respectively, of the 2018 EIS. There have been no changes to the Preferred Alternative that would substantially alter the Socioeconomic Resources and Environmental Justice impacts analyzed in the 2018 EIS since the ROD was signed. There are no new Socioeconomic Resources or Environmental Justice circumstances or information relevant to environmental concerns that warrant detailed analysis.

These resource areas are carried forward for detailed analysis:

- Safety
- Physical Resources
    - Earth Resources
    - Water Resources
    - Wetlands
- Hazardous Materials and Hazardous Waste
- Biological Resources
    - Vegetation
    - Fish and Wildlife
    - Special Status Species
- Cultural Resources
- Land Use and Recreation
- Air Quality

3.1 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 BASH. Safety in the affected environment was described in Section 3.3 of the 2018 EIS and the consequences of the Preferred Alternative on safety were described in Section 4.3 of the 2018 EIS. Preliminary results of the US Department of Agriculture Wildlife Services Program 2021 BASH study were briefed to the Air Force on October 2021 and those early indications were used to inform the content of this section of the SEA.

3.1.1 Affected Environment

The BASH plan for JBER-Elmendorf is 3rd Wing Instruction (3WGI) 91-212, *Bird/Wildlife Aircraft Strike Hazard (BASH) Program* (23 July 2020). 3WGI 91-212 implements Air Force Instruction 91-212, *Bird Aircraft Strike Hazard (BASH) Management Techniques*, and is used in conjunction with Air Force Policy Directive (AFPD) 91-2, Safety Programs, AFI 91-202, *U.S. Air Force Mishap Prevention Program,* AFI 91-204, *Safety Investigations and Reports*, AFI 91-223, *Aviation Safety Investigations and Reports*, Pacific Air Command Air Force guidance, and 11th Air Force guidance.

BASH extends to terrestrial animals, but the presence of the airfield perimeter fence excludes most large mammals (such as moose and bears) that have the potential to present an aircraft safety hazard, so the primary BASH risk on JBER is presented by birds. Species of particular concern include waterfowl such as Canada Goose, Trumpeter and Tundra Swan, Sandhill Crane and gulls, as well as raptors, including owls (Air Force 2011). The 2021 BASH study indicated the guilds (a guild is a group of species that use the same class of environmental resources in the same way) observed in the ROI include raptors, corvids, passerines, waterfowl, loons, shorebirds, wading birds, gulls, and upland birds. Raptors, corvids, and waterfowl are the guilds of greatest concern due to the size and behavior of the birds. For example, raptors, corvids (particularly Common Ravens), and waterfowl are large and the altitude of their flight has the potential to interact with arriving and departing aircraft.

Current BASH management plan components include bird dispersal, habitat modification, and research related to the management programs. The application of the BASH plan components is organized by the bird and waterfowl exclusion zones depicted in Figure 3-1.

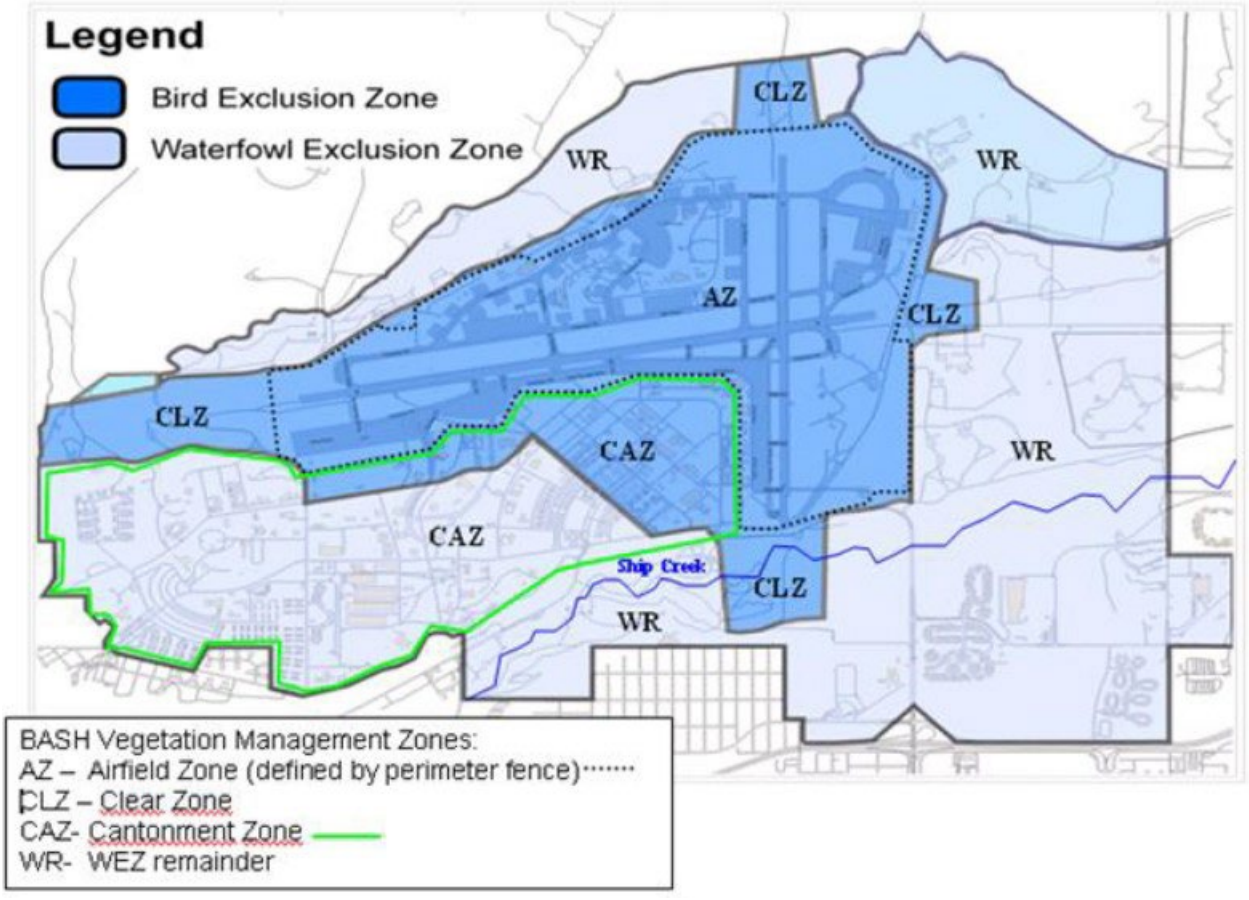
Bird Dispersal: The US Department of Agriculture, Wildlife Services (USDA-WS) is primarily responsible for dispersal of terrestrial wildlife within and up to ¼ mile outside the airfield security fence and birds within the exclusion zones following guidance in both the wildlife hazard management protocol and the 3 WG/JBER USDA -WS Memorandum of Agreement (MOA). Dispersal priority is large birds, flocking birds, and singular smaller species. Birds and mammals are dispersed using methods including, but not limited to, physical harassment, vehicle harassment, shooting, or with pyrotechnics.

Habitat modification: The 673d Civil Engineer Group (673 CEG) is responsible for vegetation management. Portions of the ROI fall within the Elmendorf Field Bird and

Waterfowl Exclusion Zone (WEZ), including the airfield zone (AZ), clear zone (CLZ), and WEZ remainder (WR). The AZ is bounded by the airfield perimeter fence, the CLZ is off the end of the runway outside the perimeter fence, and the WR is that portion of the WEZ not otherwise designated. The AZ is managed with the goal of establishing and maintaining the dominance of dense, erect grasses such as bluejoint reed-grass, beach wildrye, red fescue, and similar domestic species. The CLZ is managed to establish and maintain the dominance of shrubland species. The WR is managed to establish and maintain shrubland, except for the grasses within 50 meters of the airfield perimeter fence. The area outside the WEZ is not managed with a specific vegetation goal and some areas are ponded during portions of the year, which can attract waterfowl.

The BASH risk to aircraft operating on the Elmendorf Field is normally low due to the cooperation of 673d CEG, USDA-WS, and airfield users, but may increase during migration seasons or in response to other factors.

Figure 3-1. Elmendorf Field Bird and Waterfowl Exclusion Zones from 3WGI 91-212



3.1.2 Environmental Consequences: Preferred Alternative

The extension of the runway by approximately 2,900 feet would translocate the end of the runway closer to the Fish and Triangle Lake wetland complex and Sixmile Lake, which

would reduce the altitude of departing and arriving aircraft in vicinity of the waterbodies (Figure 2-1). The reduction in altitude has the potential to bring more birds into conflict with airfield operations.

The Bird Exclusion Zone (BEZ) and WEZ would be expanded northward to envelop the extended runway and allow proper mitigation of BASH risks. The AZ expansion would convert the ground within the perimeter fence to semi-improved and vegetation would be managed to improve visibility and discourage bird use by planting erect grasses, while the CLZ would begin outside the perimeter fence and be managed in the same way. The grounds within the expanded AZ and CLZ are inside the excavation limits of the Preferred Alternative, so they would be graded to bring the terrain into compliance with the drainage design and prevent ponding. The expansion of vegetation management and drainage improvements within the excavated area would make the ROI less desirable for birds and reduce activity. An area extending approximately 3,000 feet from the end of the proposed runway and 1,500 feet from either side would be excavated to construct the design grade, which would have the additional effect of removing snags such as fallen trees, widow-makers (detached or broken limb or tree-top), seed bearing trees, and branches from the ROI, further reducing the desirability of the ROI to birds.

The Air Force has multiple mitigation options available under 3WGI 91-212 to reduce the BASH risk associated with the runway extension. Additional effort could be invested in hazing wildlife and the management of all areas of the airfield, which could reduce airfield desirability to wildlife. Fish and Triangle Lake management could also be modified to reduce the presence of raptors attracted to fish waste. These modifications could range from increasing education, outreach, and signage to alert anglers of the hazards and illegality of feeding raptors to the suspension of lake stocking. The JBER BASH plan would be updated after the construction of the runway extension is completed and the 2021 BASH survey report is finalized.

The implementation of the Preferred Alternative would have positive impacts on aircraft safety over the Anchorage bowl by reducing airspace congestion. The Preferred Alternative would shift F-22 sorties farther away from the Ted Stevens International Airport by reducing the emphasis on RW 06/24 in favor of RW 16/34. The impact of extending the runway on safety remains low, with consideration of applicable management strategies and mitigations consistent with the description of safety impacts described in the 2018 EIS.

3.1.3 Environmental Consequences: No Action Alternative

Under the No Action Alternative, the Air Force would continue airfield operations in the current manner, including the implementation of the existing BASH plan. The risk of bird and wildlife hazards to aircraft operation would not change. Negative flight safety impacts would persist due to the continued airspace congestion over the Anchorage Bowl caused by the emphasis of annual F-22 arrivals on RW 06.

3.2 PHYSICAL RESOURCES

Physical resources consist of earth and water resources, including wetlands. Physical Resources are discussed in Sections 3.5 and 4.5 of the 2018 EIS.

3.2.1 Earth Resources

Earth Resources include the geology, soils, and topography of JBER.

3.2.1.1 Affected Environment

Earth Resources are discussed in Section 3.5.1 of the 2018 EIS. The only substantive change to information regarding the earth resources in the affected environment includes the discovery of per- and polyfluoroalkylated substances (PFAS).

3.2.1.2 Environmental Consequences: Preferred Alternative

The type of consequences to Earth Resources are unchanged from the consequences described in the 2018 EIS, but quantities and areas have slightly changed. The quantity of excess material excavated from the project area that would require disposal would decrease from approximately 15 mcy to 12 mcy (Table 1-1, row 1). The 2 mcy disposal area off the end of RW 24 (Figure 1-2) would not be used, instead all disposal would occur within the runway extension excavation limits or within the limits of the JBER Gravel Pit Expansion area. The area affected by grading would increase from approximately 557 acres to 642 acres. This increase in acreage would be caused primarily by the northward expansion of the excavation limits to accommodate the Airlifter Drive design and the westward expansion of the excavation limits to optimize the ground improvements design.

USACE identified presence of PFAS within the prism of soil that would be excavated for the proposed project during the design investigation. Additional information regarding PFAS can be found in Section 3.3 of the SEA.

3.2.1.3 Environmental Consequences: No Action Alternative

The selection of the No Action Alternative would not incur impacts to earth resources because the No Action Alternative does not include any construction activities or other measures with the potential to impact earth resources. Additional information regarding the consequences of the No Action Alternative on earth resources can be found in Section 4.5.1 of the 2018 EIS.

3.2.2 Water Resources

Water Resources include the ground water, surface water, drinking water, and stormwater of JBER.

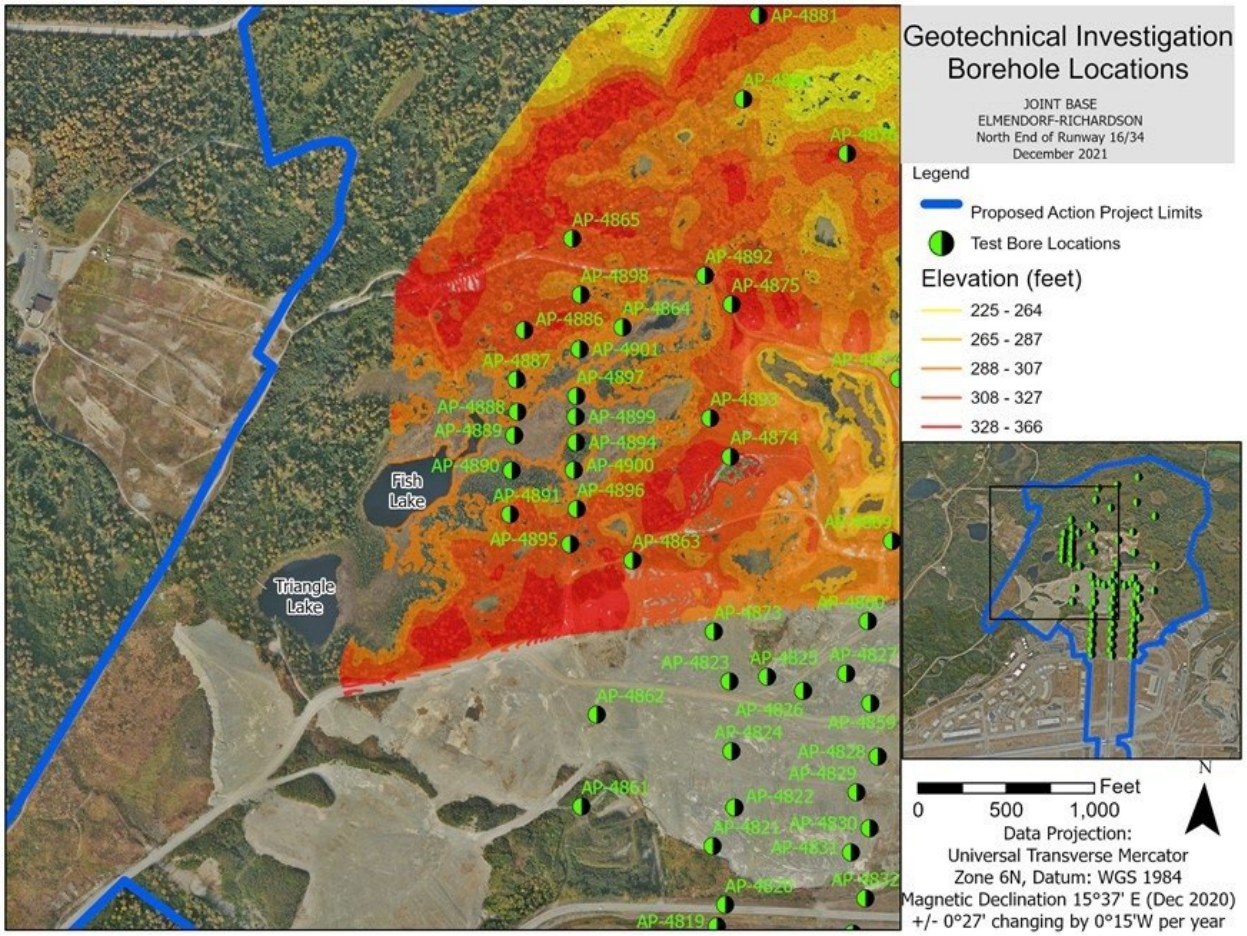
3.2.2.1 Affected Environment

Water Resources are discussed in Section 3.5.2 of the 2018 EIS. After the preparation of the 2018 EIS, geotechnical investigations were conducted to further understand the subsurface characteristics of the wetland complex east of Fish Lake and surrounding drainage area (USACE 2021). The wetland complex is within a west to east trending low-lying depression where the surrounding topography hydraulically isolates the wetland complex. There are no specific inlets or outlets connecting the depressional complex to other waters. Water enters this system by sheet flow from the surrounding drainage area and leaves the system by evapotranspiration and percolation (groundwater recharge). Additionally, subsurface conditions encountered during geotechnical investigations indicate that water within the wetland complex is hydraulically contained by underlying low permeability soil, creating a perched system. At the location of the ground improvement alignment, organic-rich surficial soils (e.g., peat and organic silt) or silt with sand ranging from approximately 1-foot thick at borehole AP-4886 to approximately 15 feet at borehole AP-4890 (Figure 3-2) are underlain by silty sand and gravel with a silt content that appears high enough (15-59 percent, with an average of 32 percent) to minimize groundwater flow away from the wetland complex.

Perched groundwater was typically encountered east of Fish Lake at a depth of 1 to 2.5 feet below grade in the low-relief areas of the wetland complex (boreholes AP-4889, 4888, 4891, 4897, 4900). Groundwater at the edge or outside of the low relief area (AP4887 and 4891) was encountered at a depth of 20 feet below ground surface (AP-4887, 4890), or not encountered at all to the depth drilled (AP 4886, 4898, 4895, 4896) (Figure 3-2).

Water level in the wetland complex is maintained based on a water balance between the rate and amount of water that recharges and discharges from this perched and isolated wetland system. Precipitation falling within the wetland and the wetland's drainage basin is the predominant source of recharge since the regional groundwater table exists at a depth that is well below the base of the wetland complex. Precipitation that falls in the drainage area recharges the wetlands as either overland flow (stormwater or snow melt runoff) or as subsurface flow (shallow perched groundwater) after it percolates into the ground. Water leaves the wetlands and drainage area by evaporation and evapotranspiration and groundwater movement. The rate and amount of groundwater that flows from the wetland complex is unknown, but it is likely relatively low due to the low permeability of the underlying soils.

Figure 3-2. Geotechnical Borehole Locations



3.2.2.2 Environmental Consequences: Preferred Alternative

The runway expansion project has potential to impact the volume and/or rate of recharge to the wetland complex by changing the catchment area size and slopes after construction. Alternatively, it could also temporarily lower water levels in the wetland complex during construction when the wetland's surficial soil east of the ground improvement feature is excavated and replaced with locally derived fill excavated from other project areas.

The purpose of the ground improvement feature is to maintain water levels in the wetland complex including Triangle Lake and Fish Lake during and after construction of the runway extension. Details regarding the construction of the ground improvements can be found in Section 2.5.1. While the ground improvement feature would preserve water levels by reducing or preventing subsurface drainage of the wetlands, changes to the size of the wetland's existing catchment area as a result of construction could potentially have a longer-term impact to the water levels in the wetland complex. The pre-construction catchment area is estimated to cover 135.3 acres and the runway extension project would reduce the catchment area to approximately 96.6 acres, reducing the contributing area by 38.7 acres (approximately 29 percent).

Implementation of the Preferred Alternative would reduce the size of the catchment area that recharges the wetland complex, which could potentially reduce the runoff quantities to the wetlands. The construction of the runway extension would also cause the loss of 16.7 acres out of 38.2 acres of wetlands in the Fish and Triangle Lake complex, an approximately 44 percent reduction in the areal demand for runoff. Because the post-construction reduction in wetland area is greater than the proportional reduction in drainage area, the net hydrologic impact of modifying the drainage area is expected to supply surplus water to the wetland complex. The Preferred Alternative includes the construction of a culvert at the existing surface water elevation of the lakes to redirect excess water to the stormwater drainage system, preventing changes to the area and duration of inundation.

Because precipitation and associated runoff appear to be the main recharge mechanism for the wetland complex, a detailed runoff analysis considering pre- and post-construction site conditions could be exercised to confirm and further quantify the expected change in recharge and potential impacts to water levels. A detailed runoff analysis has not been conducted, and the data are not available; however, based on the analysis above, the Air Force expects the impacts to water resources to be minimal due to the implementation of ground improvements to stabilize hydrology, the installation of a culvert to redirect excess runoff, and because the reduction in wetland area is disproportionately larger than the reduction in catchment area.

3.2.2.3 Alternative Environmental Consequences: No Action Alternative

The selection of the No Action Alternative would not incur impacts to water resources because the No Action Alternative does not include any construction activities or other measures with the potential to impact water resources. Additional information regarding the consequences of the No Action Alternative on water resources can be found in Section 4.5.1 of the 2018 EIS.

3.2.3 Wetlands

Wetlands are among the most productive ecosystems in the world and are a source of substantial biodiversity (EPA 2021). Wetlands are those areas that are “inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions” (33 CFR Part 328.3[b]).

3.2.3.1 Affected Environment

Detailed descriptions of the wetlands on JBER and the ROI can be found in the *2018 JBER Installation Natural Resources Management Plan* (INRMP), Section 3.5.3 of the 2018 EIS, and the 2020 Wetland Delineation Report (available upon request).

The current JBER wetland inventory includes about 7,387 acres of wetlands, which cover approximately 10 percent of the area within the installation boundary (AFCEC 2021c, JBER 2018). JBER’s wetlands are comprised of thirteen types according to the current "GEODATA_Wetlands_A” dataset. JBER wetland types and acreage are shown in

Table 3-2 and a map depicting the distribution of JBER's wetlands is shown in Figure 3-3. These wetlands were characterized in the 2018 EIS based on a slightly older dataset which has since been updated, accounting for the differences in acreage between the two analyses. For accuracy, the SEA uses the current geospatial dataset, unless specified.

The 2018 EIS wetland analysis was based primarily upon wetland mapping developed by the interpretation of vegetation signatures in high altitude imagery with collateral remote data and few of the mapped polygons had been the subject of field work; meaning the dataset included an inherent margin of error. The 2018 EIS directed that a field-based wetland delineation would be required during the final design phase of the project, in order to determine regulatory jurisdiction and calculate appropriate compensatory mitigation. That field-based study was conducted in July 2020 (USACE 2020). The 2020 wetland delineation confirmed the size and shape of wetlands in the project area and updated the Air Force wetland database with field-based data. The wetland mapping used to calculate wetland impacts for the 2018 EIS compared to the current wetland mapping is shown in Figure 3-4. The delineation resulted in minor alterations to the areal extent of several wetlands, updated the vegetation classification of several wetland polygons, determined that at least one small polygon was not a wetland, and added one wetland area, not previously documented.

Wetlands in the ROI belong to the "palustrine" system described in the *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin et al. 1979) and include palustrine emergent (herbaceous), palustrine scrub-shrub, palustrine forested, palustrine unconsolidated bottom (ponds), and palustrine aquatic bed (vegetated ponds). Needle-leaved evergreen scrub-shrub wetlands were dominated by dwarfed black spruce (*Picea mariana*) and found on depressional margins. Freshwater emergent/scrub-shrub wetlands, inundated from breakup through June, were dominated by leatherleaf (*Chamaedaphne calyculata*), sedges (*Carex utriculata* and *Eriophorum angustifolium)*. Freshwater emergent wetlands were dominated by bluejoint grasses *(Calamagrostis canadensis)* and marsh five-finger *(Comarum palustris)*. Some wetland communities may also be described as mixed classes, e.g., *palustrine scrub-shrub/emergent* when the dominant vegetation of multiple types are represented in the same community. The ecology of wetlands within the ROI are described in Section 3.5.3 of the 2018 EIS. A comprehensive field delineation of the ROI wetlands was conducted in July 2020 and details are described in the Wetland Delineation Report (USACE 2020). *Cowardin et al.* provides detailed descriptions of the relationship between "Wetland Type" (i.e., freshwater emergent, freshwater forested, freshwater shrub, etc.) and "Wetland Class" (i.e., PSS, PSS1, PEM, etc.) depicted in the tables and figures within this section.

The jurisdictional determination requested from USACE Regulatory authority resulted in a determination that the wetlands, including Fish and Triangle Lakes, do not have a surface water connection to any traditional navigable waters (TNW), and therefore were not considered Waters of the United States (WOTUS), under the prevailing legal definition at the time of the request. A CWA Section 404 Permit issued by USACE Regulatory is not required, because there are no jurisdictional wetlands in the project area. A copy of the Approved Jurisdictional Determination can be found in Appendix B.

Table 3-2. JBER Wetland Types, Acreage, and Proportion

Wetland Type	Acreage	Percent JBER Wetland Acreage
Estuarine Emergent	2043.11	27.66%
Estuarine Shrub	77.73	1.05%
Estuarine Forested	12.74	0.17%
Freshwater Emergent	256.30	3.47%
Freshwater Scrub-Shrub	2615.65	35.41%
Freshwater Forested/Scrub-Shrub	31.75	0.43%
Freshwater Forested	1932.08	26.15%
Freshwater Pond	174.91	2.37%
Freshwater Riverine	2.12	0.03%
Freshwater Riverine Emergent	10.46	0.14%
Freshwater Riverine Forested Shrub	1.36	0.02%
Freshwater Riverine Forested	129.32	1.75%
Freshwater Riverine Shrub	100.01	1.35%
Total	**7387.54**	**100.00%**

Figure 3-3. JBER Wetlands (AFCEC 2021c)

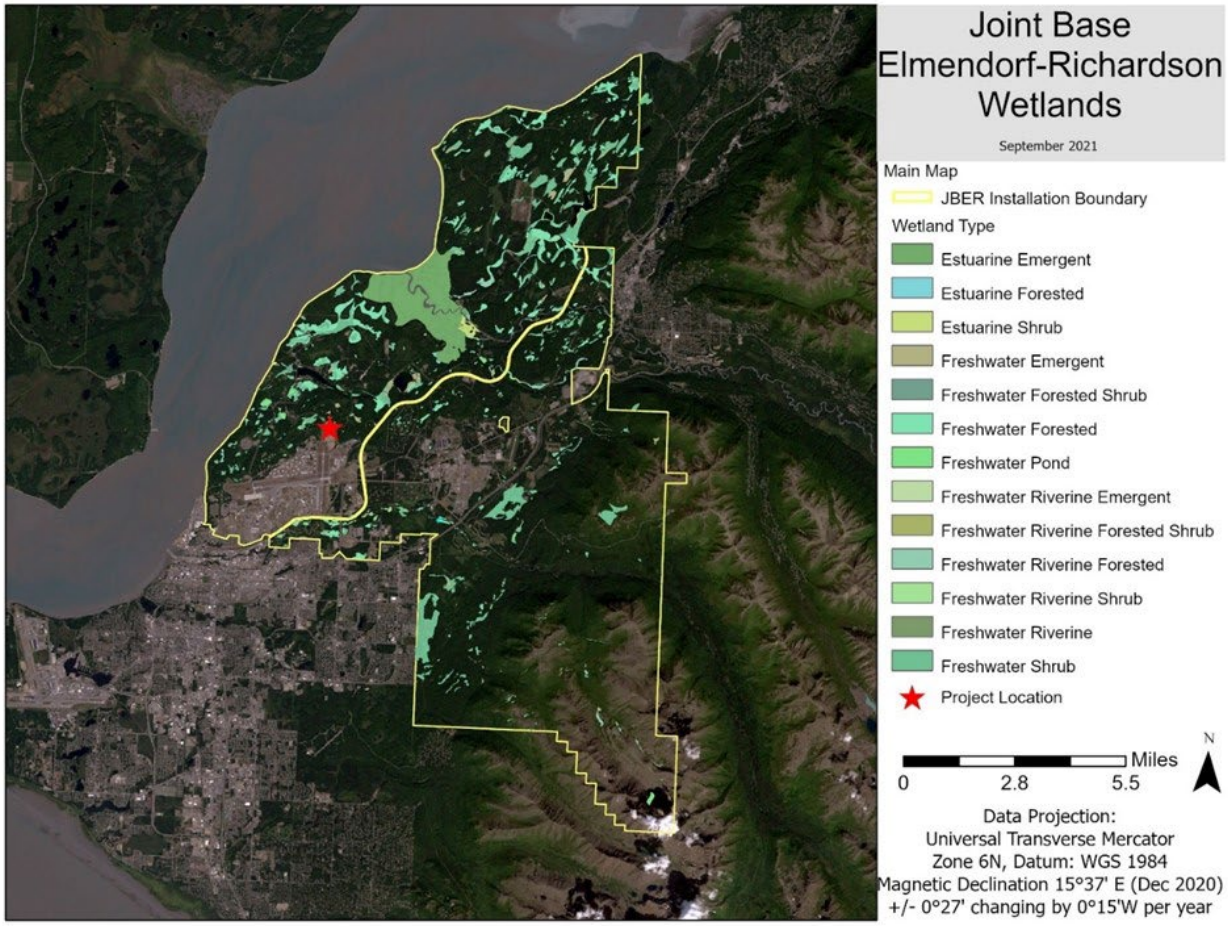
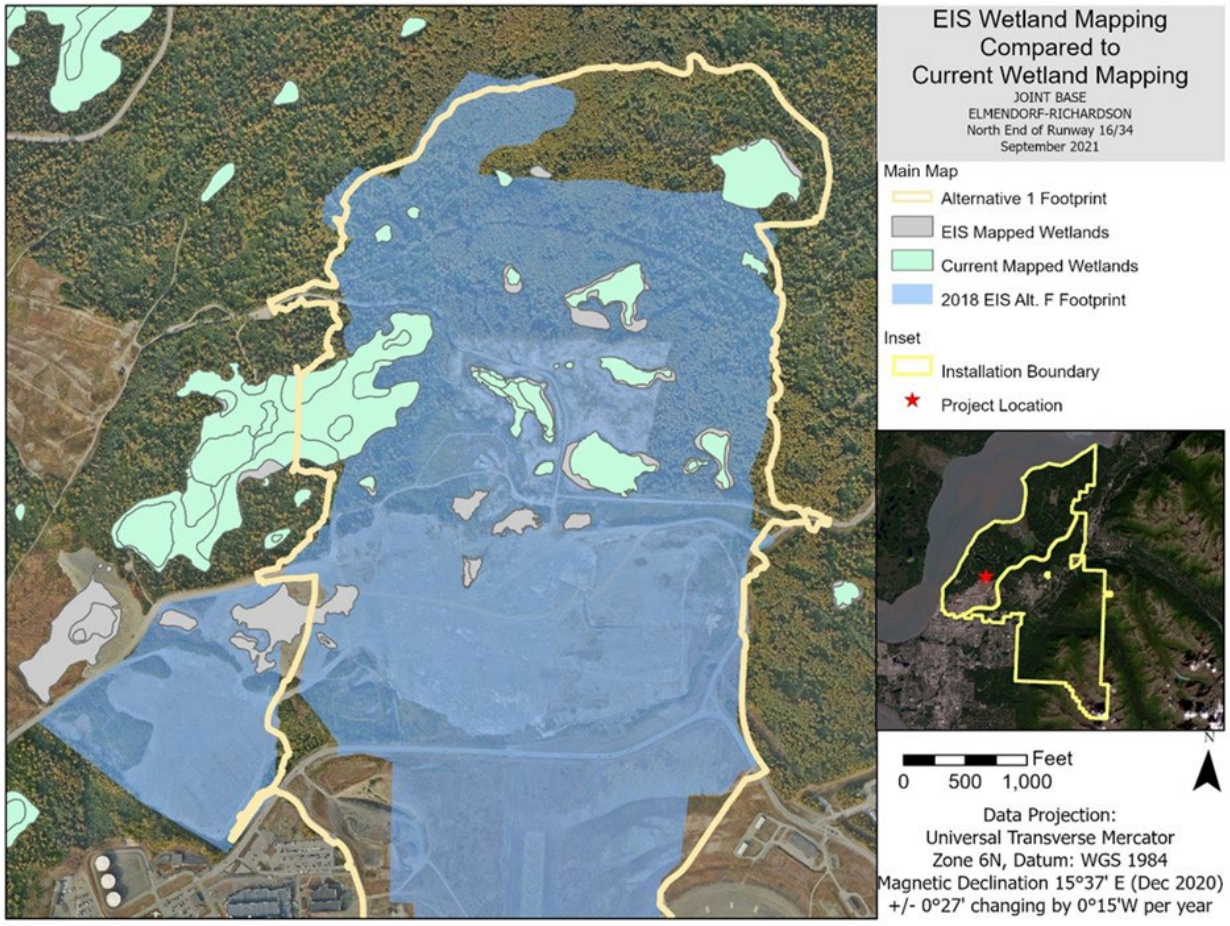


Figure 3-4. 2018 Wetland Mapping in Contrast to Current Wetland Mapping



Wetlands lie within watersheds, defined concentrically by their Hydrologic Unit Code (HUC). Wetlands in the ROI lie within the Sixmile Creek Outlet (HUC 19020401080803) and Ship Creek Outlet (HUC 19020401040402) sub-watersheds, which cover 1,989.4 acres and 3,396.5 acres respectively.

The Sixmile Creek sub-watershed (Figure 3-5) is relatively undeveloped (compared to the urbanized areas to the south) and is host to one paved secondary road and a small number of gravel roads, a small grass airstrip/floatplane base on the shore of Sixmile Lake, and minor filling for building construction. Sixmile Lake, which lies north of the ROI, is a large waterbody that supports many populations of waterbirds and waterfowl, and an anadromous fishery that has been recognized for its role in supporting primary constituent elements (food) for the recovery of Cook Inlet beluga whale. The natural hydrologic integrity of the area remains largely undeveloped; however, the natural watercourse of Sixmile Creek was dramatically altered in the 1950s, when the western portion of the watercourse was impounded to create the lake used by float planes.

The majority of the Ship Creek Outlet sub-watershed (Figure 3-6) has been heavily developed since the 1940s for military-industrial purposes such as the airfield, aircraft hangars, support infrastructure, military family housing, and government offices. Nearly

all the remaining wetlands are clustered remnants in the northern end of the sub-watershed. These wetlands, (particularly the Fish and Triangle Lake complex) are the largest concentration remaining in the sub-watershed. Many of the hydrologic functions of wetlands have been nearly entirely replaced with constructed stormwater infrastructure in the form of above-ground ditches and detention areas as well as underground storm sewer infrastructure. Natural soil properties have been replaced by development of the Elmendorf cantonment and airfield (turf). Species formerly occupying wetlands in the Ship Creek Outlet sub-watershed are driven northward toward undeveloped range training areas, including within the adjacent Sixmile Creek sub-watershed. Wetland acreages within the two sub-watersheds, are shown by class in Table 3-3 and Table 3-4.

Wetlands within the ROI fall into two distinctive groups. The first is the Fish and Triangle Lake Complex, which lies wholly within the Ship Creek Outlet sub-watershed. This is a large and highly interconnected matrix of floating bog, and scrub-shrub wetlands within which Fish and Triangle Lakes lie. The second group is comprised of hydrologically isolated depressional wetlands of various sizes that occur throughout the Elmendorf Moraine and in both Sixmile Creek and Ship Creek Outlet sub-watersheds.

Table 3-3. Wetland Acreage by Class in the Sixmile Creek Outlet Sub-watershed

Wetland Type	Code	Acreage
Palustrine Emergent	PEM	15.5
Palustrine Emergent/Scrub-Shrub	PEM/PSS	3.2
Palustrine Forested	PFO	139.2
Palustrine Scrub-Shrub	PSS	81.9
Palustrine Scrub-Shrub/Emergent	PSS/PEM	20.9
Palustrine Unconsolidated Bottom	PUB	7.3
Total		**268**

Figure 3-5. Sixmile Creek Outlet Sub-watershed Wetlands

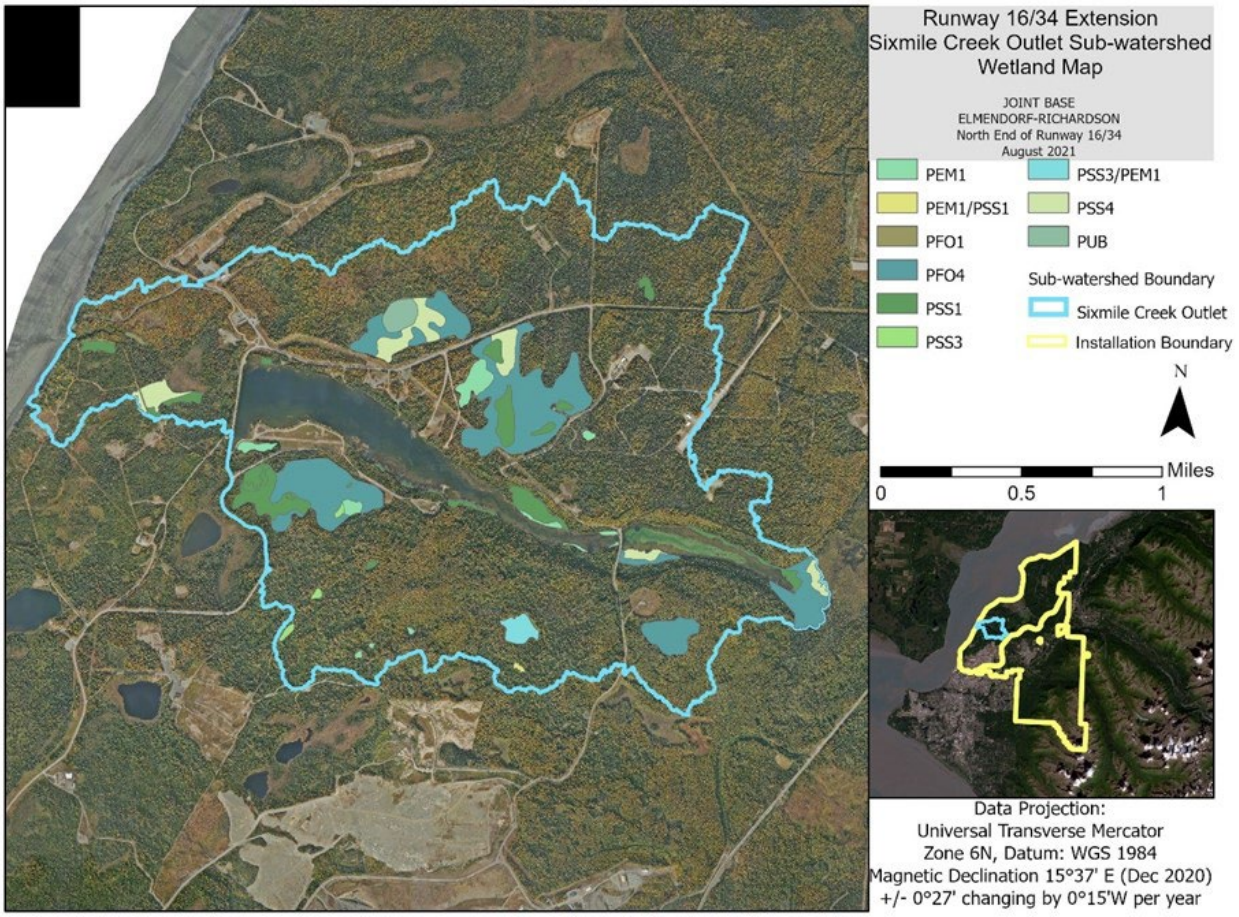
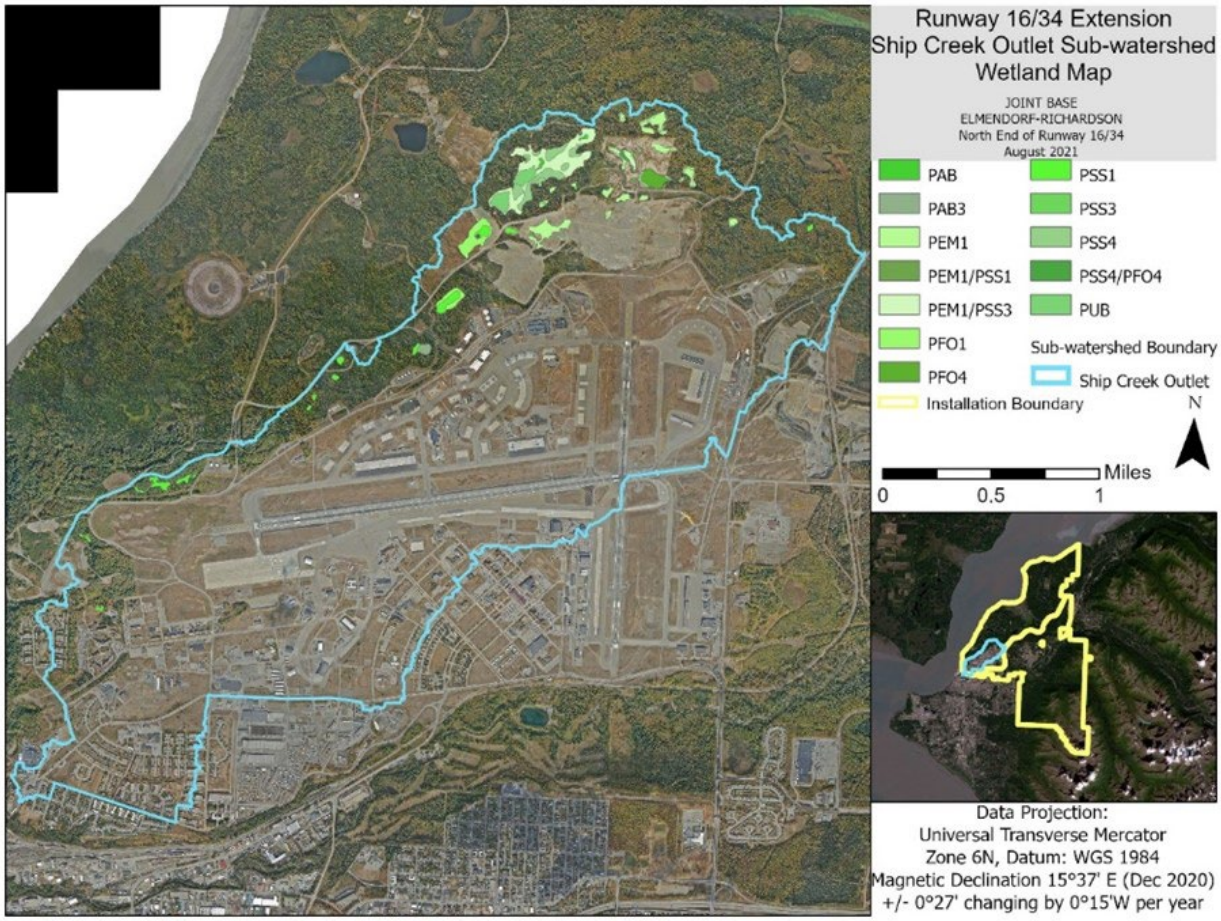


Table 3-4. Wetland Acreage by Class in the Ship Creek Outlet Sub-watershed

Wetland Class	Code	Acreage
Palustrine Aquatic Bed	PAB	2.5
Palustrine Emergent	PEM	8.6
Palustrine Emergent/Scrub-Shrub	PEM/PSS	25.2
Palustrine Forested	PFO	7.2
Palustrine Scrub-Shrub	PSS	21.3
Palustrine Scrub-Shrub/Forested	PSS/PFO	0.6
Palustrine Unconsolidated Bottom	PUB	7.3
Total		**72.7**

Figure 3-6. Ship Creek Outlet Sub-watershed Wetlands



Wetlands perform many different functions based on their size, position in the watershed, hydrologic regime, vegetation type, support to plant and wildlife populations, accessibility by the public, and other factors. Functional assessments can be used to quantify wetland functions for planning purposes. Regionally, the Anchorage Wetland Assessment Method (AWAM) was developed to evaluate critical functions of wetlands (Appendix D in Dean 2011).

Functions of the Fish and Triangle Lake complex are high, particularly due to the diversity and size of the system. The regularly inundated wetlands are typically underlain with thick peat deposits which function to store water and stabilize the hydrology of the lake and wetland complex. The anaerobic condition of the regularly inundated wetlands slows decomposition, which provides geochemical cycling functions through the sequestration of carbon. Buffer wetlands around the lakes perform hydrologic functions by slowing and capturing water coming off the hillside and filtering before water enters the lakes. The diversity of wetland and vegetation community types found in this specific complex are unique, especially within the Ship Creek Outlet sub-watershed, because large contiguous complexes have otherwise been filled or fragmented. Wildlife, including birds, mammals, and even some amphibians, use the complex habitat created by the diversity in topography, vegetation, and hydrology. Wildlife functions include nesting and breeding habitat, as well as safety and cover adjacent to the openness of the lakes, where wildlife feed.

Functions served by other depressional wetlands in the ROI vary widely, based, primarily, on size, hydrology, and accessibility. The 6.2-acre freshwater emergent wetland in the northeastern corner of the project area performs many of the same functions as the regularly inundated wetlands around Fish and Triangle Lake (hydrology, geochemical cycling, habitat), but is much less accessible due to its location away from roads. Palustrine emergent wetlands generally presented a thick peat layer, though scrub-shrub wetlands occurred over mineral soils. Due to the isolation, size, and adjacent land disturbance around many of these depressions, hydrologic functions are marginal, though even very small or highly altered depressions perform some water storage functions due to the presence of deep organic soils. Unvegetated soil surrounding these depressional wetlands can allow erosion to deposit sediment into the wetlands, and the removal of natural vegetation can alter the water balance of the soils by reducing the local evapotranspiration potential. Very small, hydrologically-isolated depressional emergent wetlands are unlikely to perform substantial functions in support of wildlife, especially waterfowl because they are rarely inundated, but other wildlife (AMBI 2020), including waterbirds, make use of areas for nesting and staging during migration.

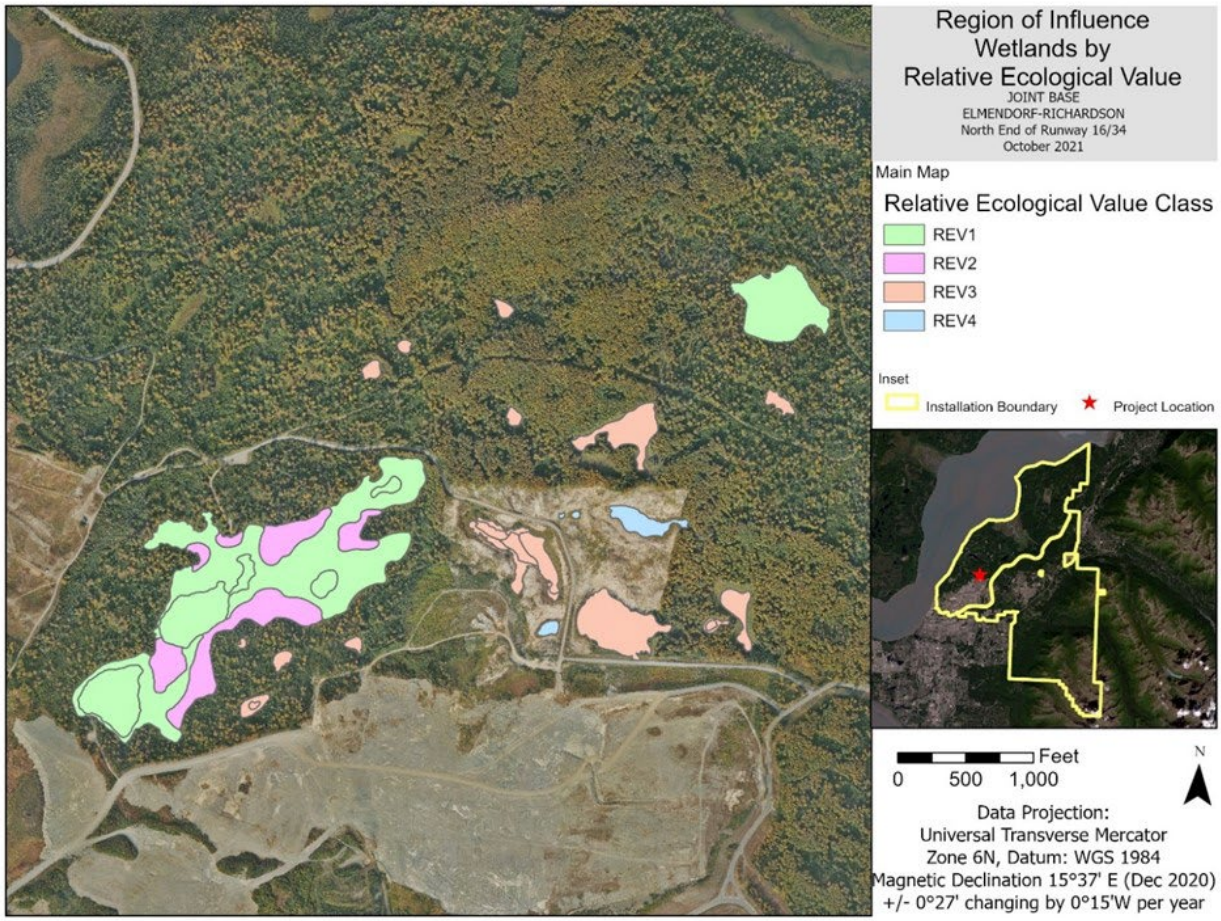
Wetlands can also be characterized by their relative ecological value (REV), which has been developed for use in calculating compensatory mitigation credits using the Anchorage Debit-Credit Methodology (ADCM). The ADCM contains four REV classes with REV1 wetlands being the highest ecologic value and REV4 wetlands being the lowest ecologic value. The REV ranking system is primarily based on landform and hydrologic factors; large, natural wetlands that are frequently inundated are considered more valuable than small, unnatural wetlands that are rarely inundated.

REV1 wetlands in the ROI are regularly inundated, minimally fragmented, complex, and natural. REV2 wetlands are rarely or never inundated, but naturally occurring and typically larger in size. The REV3 wetlands in the ROI are rarely inundated, small and remote. REV4 wetlands in the ROI are rarely or never inundated, small and remote, and non-naturalized as a result of disturbance such as adjacent land clearing. The REV classification system does not consider specific factors like connectivity, habitat function, social value, or species occurrence when determining which ecological value class. ADCM calculations were completed, assigning REV classes for wetlands in the ROI to support potential mitigation opportunities. The REV class of wetlands in the ROI is shown in Figure 3-7.

The Fish and Triangle Lake Complex holds the majority of REV1 wetlands in the ROI and all of the REV2 wetlands. REV2 wetlands include those adjacent to the lakes, which are situated in the transitional area between open water and uplands, though are rarely or never inundated themselves.

Among the other depressional wetlands in the ROI, one 6.2-acre freshwater wetland in the northeastern corner of the project area was classified as REV1, due to its size and the persistence of open water well into the growing season. Most of the remaining depressional wetlands in the ROI are classified as REV3 wetlands; lacking persistent inundation and most having been affected by adjacent land clearing. REV3 wetlands do appear to function naturally, despite the nearby alteration. This area also contains all the REV4 wetlands, classified due to their size, lack of inundation, and degradation due to adjacent land clearing activities.

Figure 3-7. Region of Influence (ROI) Wetlands by Relative Ecological Value (REV) Class



3.2.3.2 Environmental Consequences: Preferred Alternative

The 2018 EIS described wetland impacts totaling 27.9 acres; of which 10.6 acres were freshwater emergent and 17.3 acres were freshwater shrub. The final design of the runway extension as proposed here would impact 38.5 acres, representing approximately 0.2 percent more JBER wetlands of the affected classes than were described in the 2018 EIS. A detailed description of the reconciliation processes the Air Force performed to compare 2018 EIS wetland acreages with respect to the more detailed wetland data available in 2021 is included in Section 3.2.3.1. Acres and percent impacts by wetland class for the originally proposed project compared to the currently Preferred Alternative are shown in Table 3-5.

The increase in wetland impacts from the Preferred Alternative with respect to the wetland impacts for the originally selected Alternative F described in the 2018 EIS is attributable to the development of the Preferred Alternative from conceptual to fully designed. The 2018 EIS was based on a design requirements analysis prepared on the behalf of the Air Force, incorporating Air Force, Federal Aviation Administration, and Unified Facility Criteria, which have been updated since the original analysis in 2016. A design

requirements analysis was also prepared prior to the wetland delineation, geotechnical investigation, and topographic surveys refining the final project scope. Specific changes that effected wetland resources are the realignment of Airlifter Drive and the ground improvements east of Fish Lake. Figure 3-8 depicts the wetland impacts of the Preferred Alternative in contrast to the impacts described in the 2018 EIS.

Changes to the alignment of Airlifter Drive after the 2018 EIS were required to meet minimum design criteria for a speed limit of 40 miles per hour (mph). The original design for Airlifter Drive was intended to minimize impacts to the wetland in the northeast corner of the road course. However, this resulted in the northeast turn being excessively abrupt and the shoulder excessively steep, which was impracticable since the roadway is used by emergency response vehicles and is a designated munitions route. Increasing the turn radius for a more gradual curve in the vicinity of the large wetland (wetland #598) resulted in a substantially larger excavation in this area and an associated increase in impacts from approximately 0.6 acres to 6.2 acres with respect to the acreage of wetland impacts presented in the 2018 EIS.

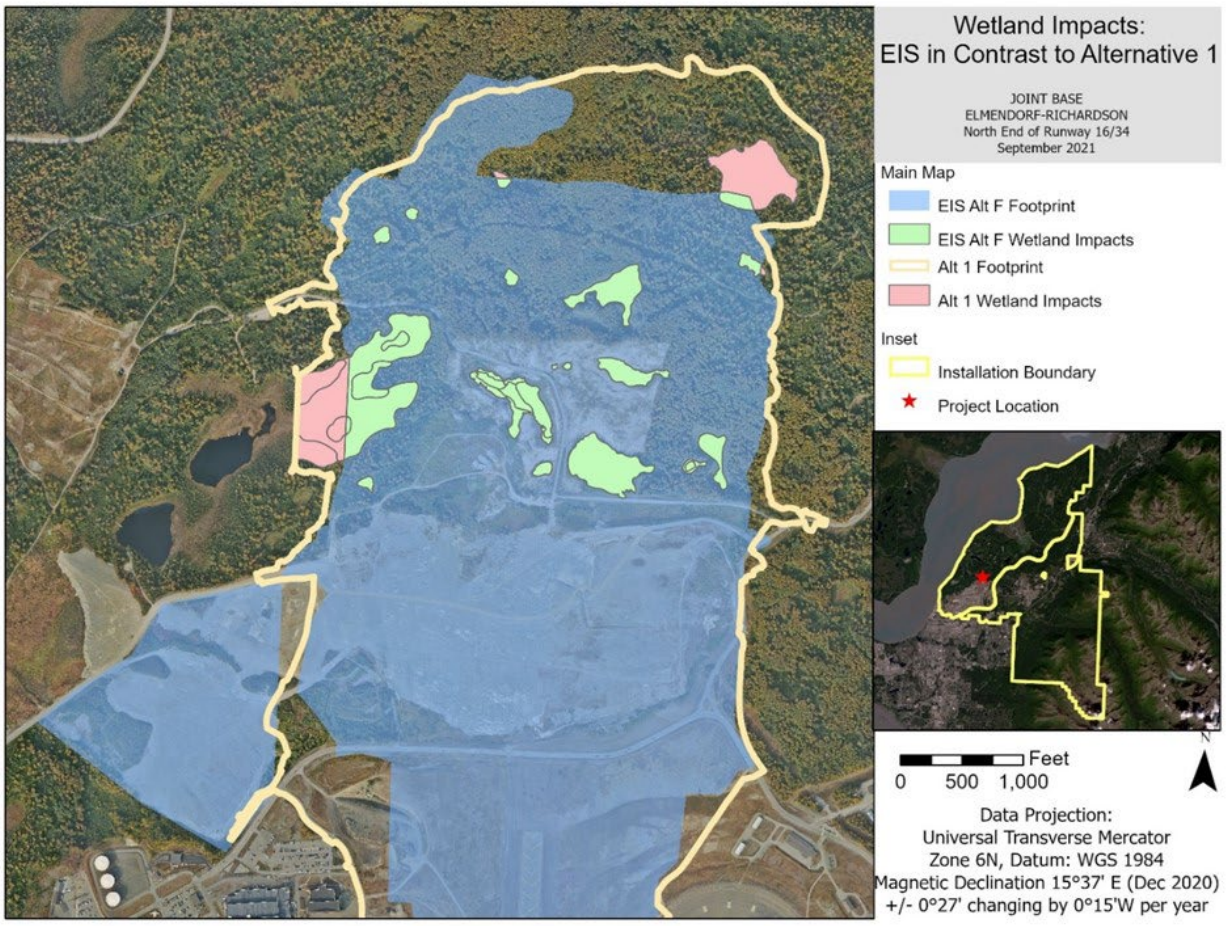
Additional geotechnical investigation in 2021 was undertaken to further understand the subsurface environment in the project area necessary to effectively design the ground improvements to minimize the potential effects to the hydrology between the Fish and Triangle Lakes complex and the airfield. The results of the investigation required that the alignment of the ground improvements be shifted approximately 430 feet west; thus, increasing the area of wetlands that would be impacted by approximately 7.2 acres with respect to the acreage of wetland impacts presented in the 2018 EIS.

The wetland impacts resultant of the changes to the Preferred Alternative are shown in Table 3-5.

Table 3-5. 2018 EIS Wetland Impacts for 2018 EIS Selected Alternative F Compared to the Preferred Alternative. (*) = % of Total Mapped Wetlands on JBER

Wetland Type	Wetland Class Area at JBER (Acres)	2018 EIS Alt. F Acres	Delineated 2018 EIS Acres	Delineated 2018 EIS % Wetland Class Area*	Preferred Alternative Acres	Preferred Alternative % Wetland Class Area*
Freshwater Emergent Wetland (PEM)	256.3	10.6	9.1	3.56%	14.5	5.67%
Freshwater Forested Wetland (PFO)	1932.1	0	4.5	0.23%	4.5	0.23%
Freshwater Pond (PUB)	174.9	0	0.4	0.21%	0.4	0.21%
Freshwater Shrub Wetland (PSS)	2615.6	17.3	11.6	0.45%	19.1	0.73%
Subtotal	**4978.9**	**27.9**	**25.6**	**0.52%**	**38.5**	**0.77%**

Figure 3-8. 2018 EIS Wetland Impacts in Contrast to Preferred Alternative Wetland Impacts



The Preferred Alternative would include construction of ground improvements to stabilize the Fish and Triangle Lake hydrology. The project would fill 38.5 acres of freshwater wetlands, mostly in the Ship Creek Outlet sub-watershed. These would be permanent, direct impacts caused by the excavation and/or backfilling of wetlands in the footprint. All direct wetland impacts would be attributable to the construction of the runway and Airlifter Drive reroute; there are no wetlands in the proposed borrow or disposal areas and wetlands outside of the excavation limits would not be filled. Reasonably foreseeable effect to wetlands proximal to the excavation limits could occur as the watershed around those wetlands would be modified to satisfy grading and drainage requirements. Direct wetland impacts associated with the Preferred Alternative are shown in Figure 3-9.

Freshwater scrub-shrub wetlands would be the class most impacted by the Preferred Alternative with 19.1 acres of impacts, but they are also the most common wetland class on JBER, and the project would only incur the loss of 0.73 percent of like wetlands. The majority (16.4 acres) of the freshwater scrub-shrub wetlands that would be affected by the Preferred Alternative are in the eastern end of the Fish and Triangle Lake wetland complex. These wetlands are composed of two freshwater scrub-shrub sub-classes;

needle-leaved evergreen and broad-leaved evergreen/emergent mosaic. The remaining freshwater scrub-shrub wetlands that would be impacted by the Preferred Alternative are surrounded by previous disturbance near the center of the project area (2.5 acres) or surround a small emergent wetland in the southeastern corner of the footprint (0.2 acres).

Freshwater emergent wetlands would have the highest proportion of impacts with respect to intraclass acreage since the 14.5 acres of impacts associated with the Preferred Alternative would cause the loss of 5.67 percent of JBER's freshwater emergent wetlands. The freshwater emergent wetland impacts are generally located in the isolated wetland communities in the northern and eastern reaches of the project area, with the single largest area of impact (6.2 acres) coming from the northeastern-most wetland in the project area. This wetland is a broad-leaved shrub/emergent mosaic inundated from breakup through June dominated by leatherleaf and sedges. A single medium sized (2.7 acres), rarely inundated wetland in the north-central part of the project area dominated by bluejoint is the largest emergent wetland impacted. The remaining emergent wetland area (5.6 acres) is made up of several small-medium (0.2 to 1.5 acres each), rarely-inundated wetlands scattered throughout the project area.

The single freshwater forested wetland (PFO) that would be lost due to the construction of the Preferred Alternative is a 4.5-acre wetland in the southeastern reach of the project area. This community was dominated by black spruce large enough to be considered trees rather than saplings. The wetland is rarely inundated and on the edge of a previously cleared area.

The single freshwater pond that would be lost to the construction of the Preferred Alternative is a 0.4-acre inclusion in the northeastern corner of the Fish and Triangle Lake wetland complex. This wetland is persistent and natural, and it is part of the additional area of wetland impacts caused by the westward expansion of the excavation limits.

Additionally, the project may incur effects to wetlands west of the project footprint occurring later in time and further removed than the physical footprint of the preferred alternative. These effects could occur as a result of watershed alteration and conversion of the vegetation community inside the excavation limits. Hydrologic effects of the preferred alternative could result in a more erratic hydrograph in Fish and Triangle Lakes and the remaining associated complex. A reduction in the water storage capacity of the Fish and Triangle Lake complex could result in a temporary increase of the water table elevation.

The vegetation community would be converted from forest/woodland to urban/anthropogenically modified landscaping to conform with the JBER INRMP for managing the newly expanded airfield and adjacent clear zone. The trees and shrubs that currently grow on the east edge of the Fish and Triangle Lake wetland complex slow and filter precipitation runoff. If the project were constructed, the runoff would arrive at the edge of the wetlands faster and more turbid. The presence of additional sediments could alter the vegetation community in the wetlands over time by changing the characteristics of the soil. It could also eventually convert some of the wetlands to uplands if enough sediment is deposited to meaningfully increase the elevation.

Impacts to hydrology would be minimized by constructing the finished grade within the excavation limits west of Airlifter Drive to direct surface flows towards the Fish and Triangle Lake wetland complex. The current grading design includes two topographic features that would help to diversify the landscape as well as provide some interception to runoff as it moves westward from the airfield toward the lakes. Topsoil in the area east of the ground improvements would be sourced from the topsoil and organics in the cleared overburden and vegetation to be planted would include native grasses and non-fruit bearing shrubs and trees in accordance with the BASH Management Plan. While the natural vegetation would be converted from forest to open woodland, the capacity for interception and infiltration of surface runoff toward the lakes would be sufficient to prevent significant sedimentation. The abundance and absorptive capacity of peatlands surrounding the lake would help normalize recharge into the lakes, though some fluctuation in the hydrograph would still be likely, especially during major storm and the spring freshet. Wetland communities that could experience reasonably foreseeable impacts from the construction of the Preferred Alternative are shown in Figure 3-11.

Wetlands that would be impacted by the Preferred Alternative are of REV classes 1, 2, 3, and 4 according to the ADCM ranking system. Acreage of wetland impacts by REV class is shown in Table 3-6 and Table 3-7 and on Figure 3-10 and Figure 3-11. The Air Force would purchase adequate wetland mitigation credits to offset unavoidable wetland impacts, consistent with the general wetland mitigation objectives described in the 2018 EIS.

Figure 3-9. Preferred Alternative Wetland Type Direct Impacts by Wetland Type

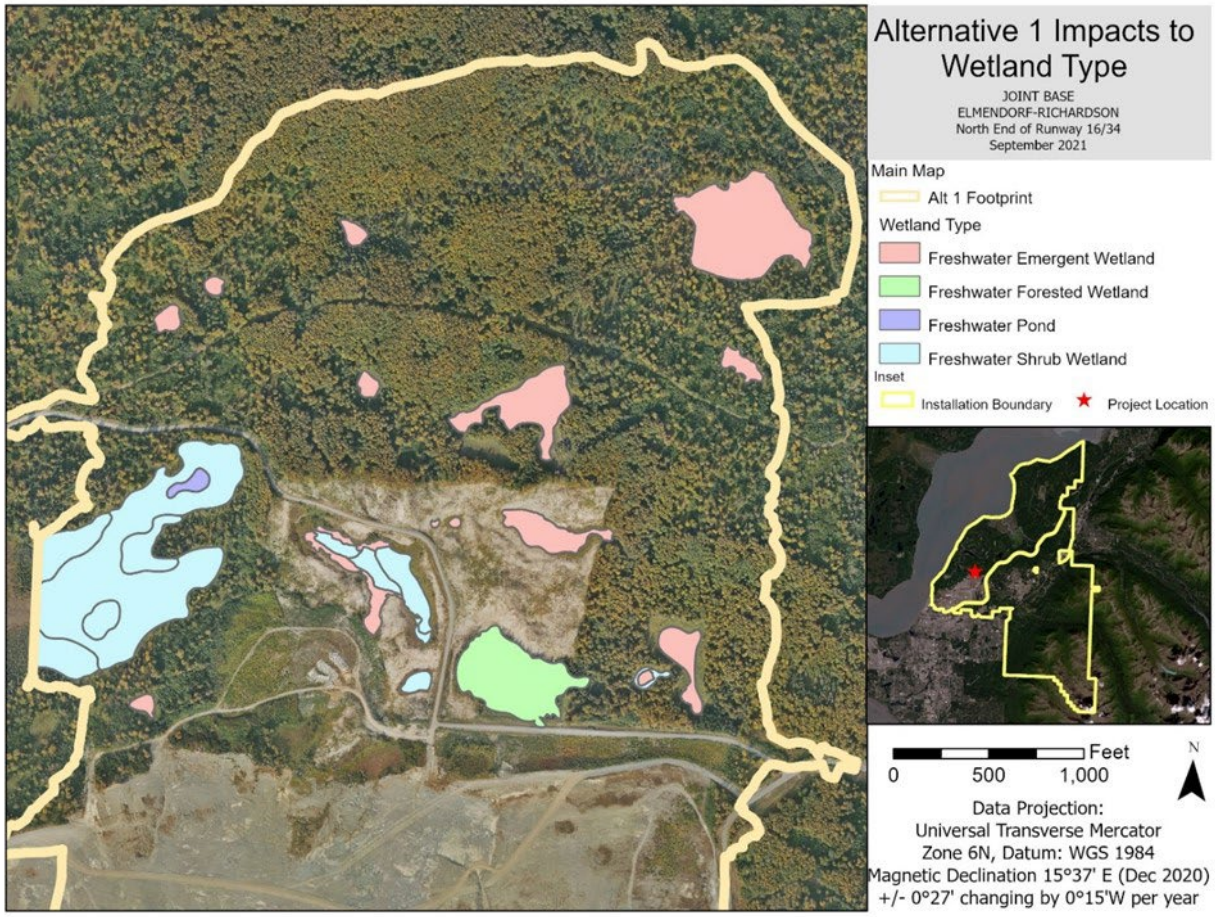


Table 3-6. Preferred Alternative Direct Wetland Impacts by REV class

REV Class	Acres	Number of Wetland Polygons
REV 1	18.98	4
REV 2	3.94	3
REV 3	13.74	16
REV 4	1.86	4
Total	**38.52**	**27**

Figure 3-10. Preferred Alternative Direct Wetland Impacts to Relative Ecological Value Class

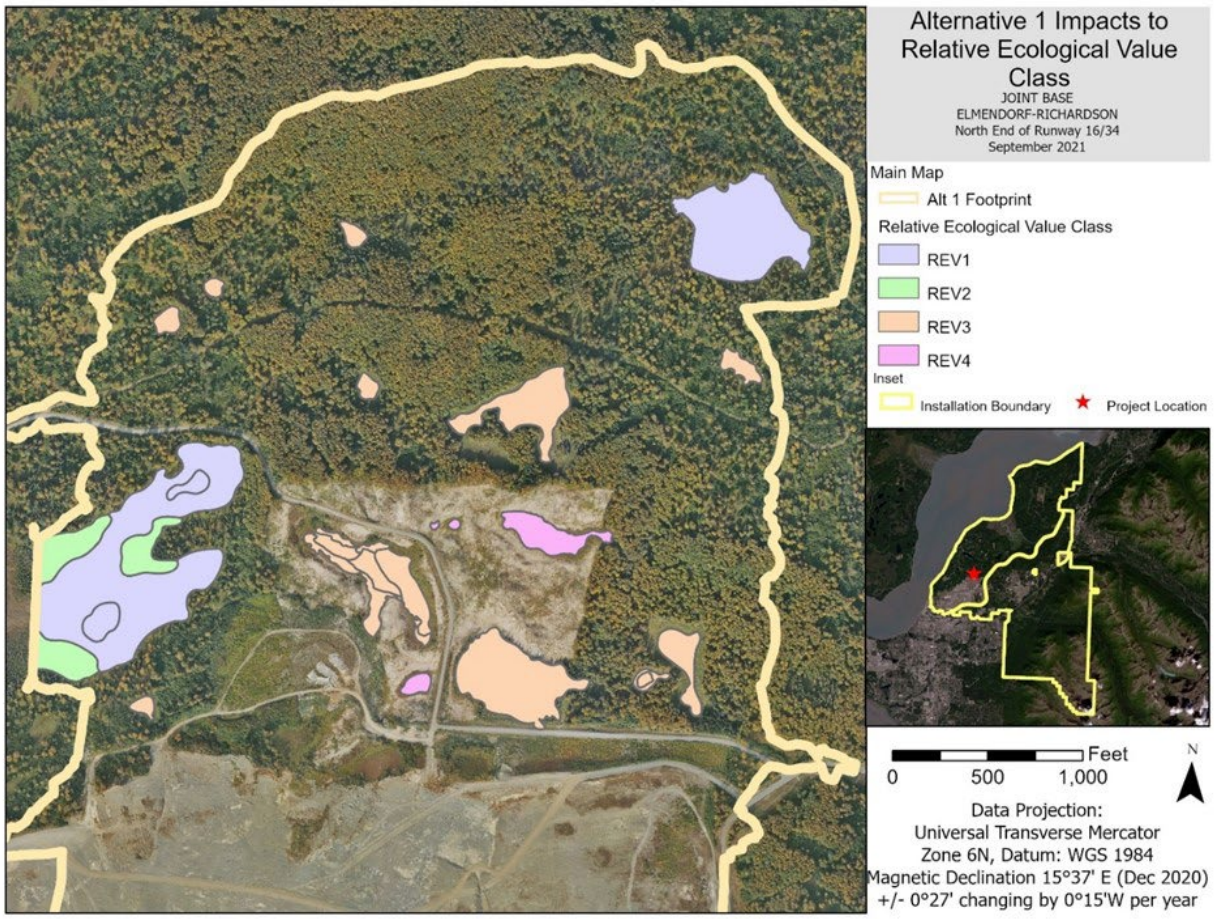
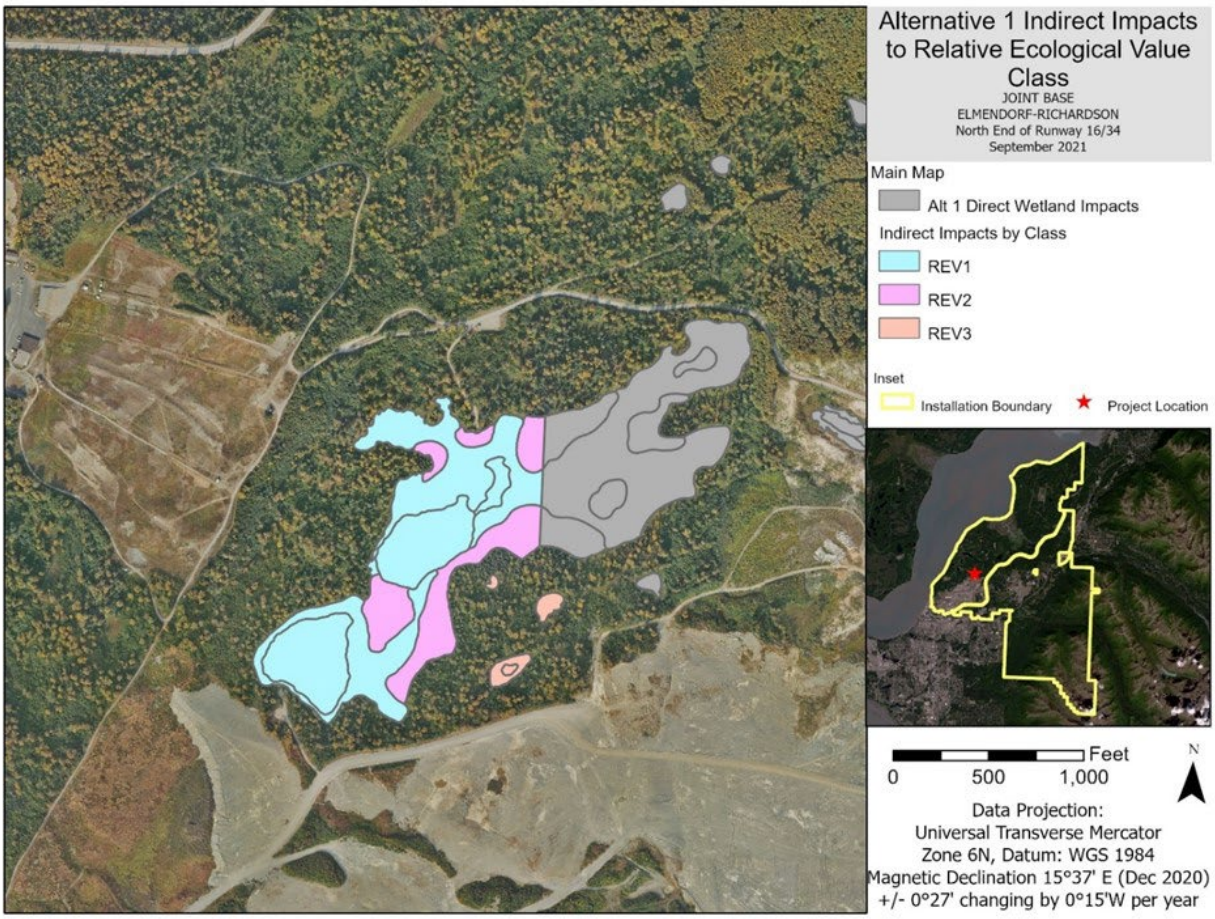


Table 3-7. Preferred Alternative Reasonably Foreseeable Wetland Impacts by REV Class

REV Class	Acres	Number of Wetland Polygons
REV 1	19.18	4
REV 2	7.15	5
REV 3	0.92	4
REV 4	0.00	0
Total	**27.25**	**13**

Figure 3-11. Preferred Alternative Reasonably Foreseeable Wetland Impacts by REV Class



3.2.3.3 Environmental Consequences: No Action Alternative

The No Action Alternative would not incur wetland impacts because it does not involve construction or any other actions with the potential to cause wetland impacts.

3.3 HAZARDOUS MATERIALS AND HAZARDOUS WASTE

Hazardous Materials and Hazardous Waste is discussed in Sections 3.6 and 4.6 of the 2018 EIS. An emerging environmental issue is the past release of per- and polyfluoroalkylated substances (PFAS). The discovery of soils containing PFAS and other volatile organic compounds during the final runway design process is the new information associated with this resource area.

PFAS are a large class of human-made chemical compounds, used since the 1950s in products such as non-stick cookware, stain-resistant fabrics, and firefighting foams. The Air Force began using a firefighting agent called Aqueous Film Forming Foam (AFFF) in 1970, which contained two of the many PFAS compounds:

- Perfluorooctanoic acid (PFOA), and
- Perfluorooctane sulfonate (PFOS).

AFFF is highly efficient at extinguishing petroleum-based fires, and has been widely used by the firefighting industry, including at military and commercial airports. However, the PFAS components of AFFF are water-soluble, and have been known to infiltrate to and enter the groundwater when released outdoors. Growing evidence of the toxicity of PFAS and its persistence in the environment led to the curtailment of its manufacture and use. The Air Force began a comprehensive evaluation process in 2010 to identify locations at active and closed installations where PFOA/PFOS may have been released. Air Force stocks of AFFF are being replaced with a short-chain PFAS alternative. The use of remaining AFFF is limited to actual firefighting; water alone is now used for fire training exercises (AFCEC 2021a, AFCEC 2021b).

EPA has designated PFAS an “emerging contaminant” under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), but has not promulgated a cleanup standard. The Alaska Department of Environmental Conservation (ADEC) promulgated cleanup levels for PFOS and PFOA in 2016. Current ADEC regulations (ADEC 2021) include risk-based soil and groundwater cleanup levels for PFOS and PFOA, shown in Table 3-8.

.

Table 3-8. State of Alaska Soil and Groundwater Cleanup Levels for PFOS and PFOA

Compound	Soil Human Health Cleanup Level (mg/kg)[1]	Soil Migration-to-Groundwater Cleanup Level (mg/kg)[2]	Groundwater Human Health Cleanup Level (µg/l)[3]
PFOS – Perfluorooctane sulfonate[4]	1.6	0.0030	0.4
PFOA – Perfluorooctanoic acid	1.6	0.0017	0.4

1. for "Under 40-Inch Zone", Table B1 of ADEC 2021.
2. Table B1 of ADEC 2021.
3. Table C of ADEC 2021.
4. Referred to as "Perfluorooctanesulfonic Acid (PFOS)" in ADEC 2021.

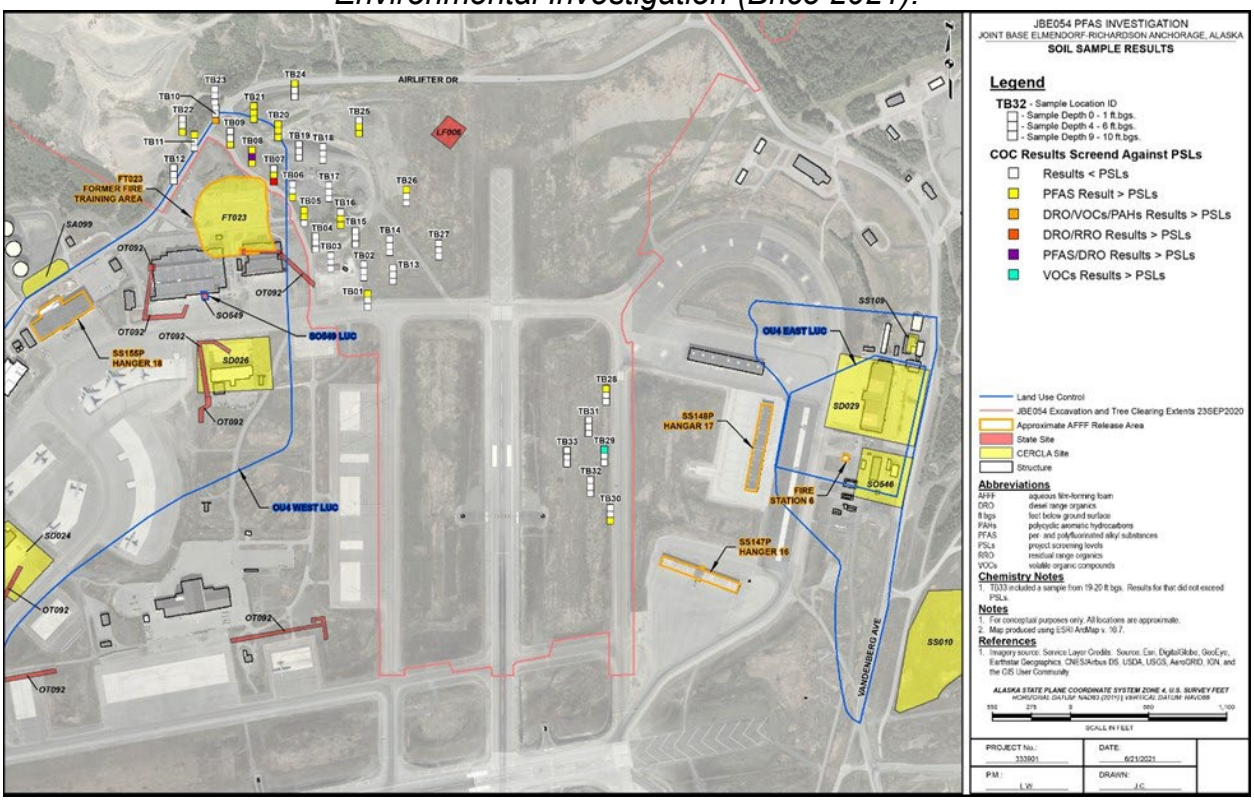
3.3.1 Affected Environment

The purpose of the Preferred Alternative does not include remedial action, but the discovery of chemically impacted soils during the design process requires the Air Force work with regulatory agencies to develop a suitable management strategy for chemically impacted excavation soils. Chemically impacted soils are described under the Hazardous Materials and Hazardous Waste section of the SEA to align with the organization of the 2018 EIS.

Brice Engineering, LLC (Brice) was contracted to investigate suspected chemically impacted soils near potential PFAS source areas in the vicinity of the runway extension project site (Brice 2021). Soil samples were collected from 33 borings in April and May 2021. The soil samples were analyzed for PFAS, along with volatile organic compounds (VOCs; e.g., chlorinated solvents) and fuel-related chemicals. The results of the analyses were screened against relevant State of Alaska soil cleanup levels (ADEC 2021). Concentrations of PFOA and PFOS, along with other chemical products such as fuels and solvents, were detected above soil cleanup levels in soil samples from 18 borings (Figure 3-12).

The chemically impacted soil excavated from the project site during project construction will be segregated from clean soil and subject to existing specific management and regulatory requirements. In accordance with the EPA's PFAS Strategic Roadmap (https://www.epa.gov/system/files/documents/2021-10/pfas-roadmap_final-508.pdf), the EPA has committed to developing PFAS regulations in upcoming years, including issuing updated guidance on destroying and disposing of certain PFAS and PFAS-containing materials by fall of 2023. There may be additional or increased compliance requirements to address any PFAS regulation changes during project work. More stringent cleanup levels and testing requirements for PFAS chemicals may be promulgated during the construction phases of this project, which could potentially impact the volume of PFAS-impacted soil needed to be mitigated and/or excavated and managed. USAF coordination with ADEC regarding the delineation and management of impacted soils is ongoing.

Figure 3-12. Draft Schematic of Soil Analytical Results from the May-June 2021 Environmental Investigation (Brice 2021).



3.3.2 Environmental Consequences: Preferred Alternative

The Preferred Alternative would require excavation of approximately 12 mcy. Of the total quantity of soil to be excavated, the quantity of chemically impacted soil that would be disturbed is estimated to be approximately 92,270 cubic yards (cy).

The Air Force is working with regulatory agencies to explore options for the disposition of PFAS-impacted soil generated by the construction project that will be protective of human health and the environment and consistent with applicable laws and regulations. The Air Force's preliminary management strategy would seek to minimize the quantity of chemically impacted soil that must be transported from the project area, thus reducing the potential impact to other areas.

Pending the outcome of the Air Force's coordination with regulatory agencies, the chemically impacted soil could be relocated into a confined depression where similarly chemically impacted soils also exist (Figure 3-13). This material would be placed on and covered by an impermeable liner to isolate it and inhibit migration of chemicals of concern into deeper soil strata and groundwater. The chemically impacted soil surface would be graded, and the liner covered with clean topsoil and seeded with grasses for stabilization. Following construction, any impacted soils left in place could be managed as part of ERP Site SS152P (Airlifter Drive PFAS). Any excess PFAS impacted soil could be stockpiled separately in a confined corner area just south of Airlifter Drive and east of Airdrop

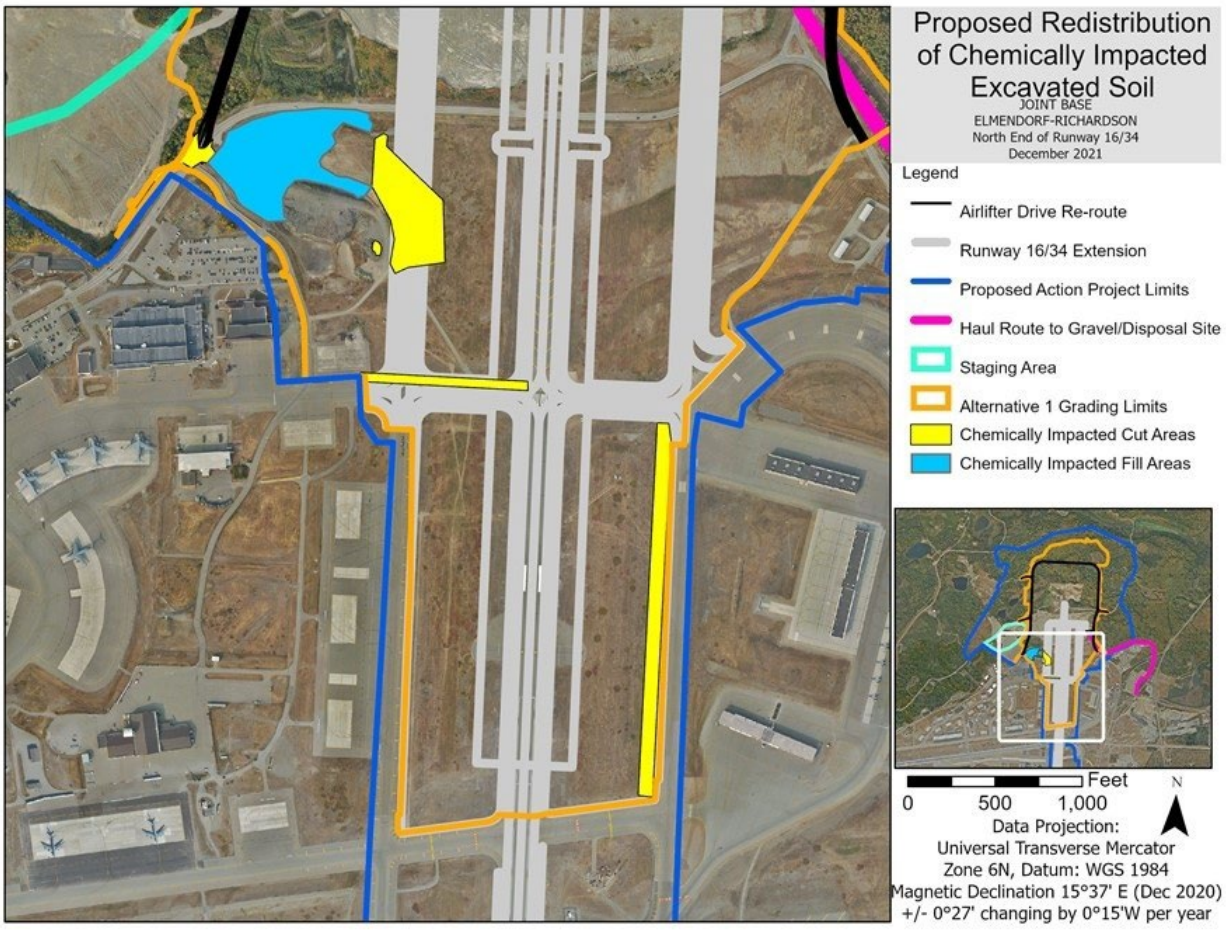
Avenue. This stockpile would also be isolated and stabilized to prevent the migration of chemicals. Other necessary mitigation measures to minimize the incidental translocation of chemically impacted soils during construction may be included in a Soil Management Plan, if required.

Another potential outcome of the Air Force's coordination with regulatory agencies could involve the removal of chemically impacted soils from the project area for offsite management or disposal in an appropriately designated landfill, most likely in the contiguous United States.

3.3.3 Environmental Consequences: No Action Alternative

Under the No Action Alternative, the proposed construction of the extended Runway 16/34 would not occur. The potential environmental risks inherent in disturbing, transporting, and stockpiling chemically impacted soil would not occur. The chemically impacted soils would remain onsite, in-situ; unless the Air Force elects to act on the information developed during the design of the Preferred Alternative and establish an ERP site to be managed in accordance with applicable regulations.

Figure 3-13. Proposed Redistribution of Chemically Impacted Soil



3.4 BIOLOGICAL RESOURCES

Biological resources include the vegetation, fish and wildlife, and special-status species in the ROI.

3.4.1 Vegetation

Vegetation refers to the plants (including trees, shrubs, grasses, herbs, and forbs) present in the ROI.

3.4.1.1 Affected Environment

Vegetation is discussed in Section 3.7.1 of the 2018 EIS. There have been no substantive changes to information regarding vegetation of the affected environment.

3.4.1.2 Environmental Consequences: Preferred Alternative

The Preferred Alternative would increase the area affected by the project due to the Airlifter Drive realignment and optimal alignment for the ground improvements. The expanded grading limits would increase the impacts to vegetation described in the 2018 EIS by enlarging the area that would be converted from natural to human-modified land cover. Selective tree clearing was also added to the Preferred Alternative to remove flight path obstacles from the post-construction glide slope.

Some impacts to vegetation in the ROI have been described and accounted for in previous Air Force NEPA documents. The Western Disposal Area was included in the 2017 North Hill Removal EA (Air Force 2017) and the Eastern Gravel/Disposal sites are part of the area assessed in the 2008 Expansion of the Elmendorf Air Force Base (AFB) Gravel Pit EA (Air Force 2008). The vegetation section of the SEA focuses on the changes to the excavation and grading limits for the runway extension and realignment of Airlifter Drive.

Section 4.7.2 of the 2018 EIS describes acreages of impacts according to natural land cover type. The 2018 EIS descriptions of vegetation impacts were based on contemporaneous land cover mapping and a revised comparison of the vegetation impacts associated with the Preferred Alternative based on current land cover mapping is shown in Table 3-9 and in Figure 3-14. The 9 mcy and 3 mcy disposal areas were combined into the “Gravel/Disposal Area” row to align with the current design and allow appropriate comparisons. The “2 mcy Spoil Disposal Area” has been removed from the design, and the “West Disposal Area” has been added since the 2018 EIS. The largest increase in acres affected (67.8 acres) would occur in the “Human Modified” land cover class due to the southward expansion of the grading limits within the airfield. The substantial increase in “Upland” land cover class impacts (62.5 acres) would mostly be due to the revised grading limits in the northern part of the project area.

Selective tree clearing was not described in the 2018 EIS. Selective tree clearing would be conducted outside of the excavation limits to remove trees that are tall enough to penetrate the imaginary surface that defines the lower limits of the navigational airspace. Selective tree clearing is a minimally invasive technique of felling individual trees with

timbering equipment or by hand. Access to the areas subject to selective tree clearing would be from the excavation, existing roads and trails, or contractor access trails.

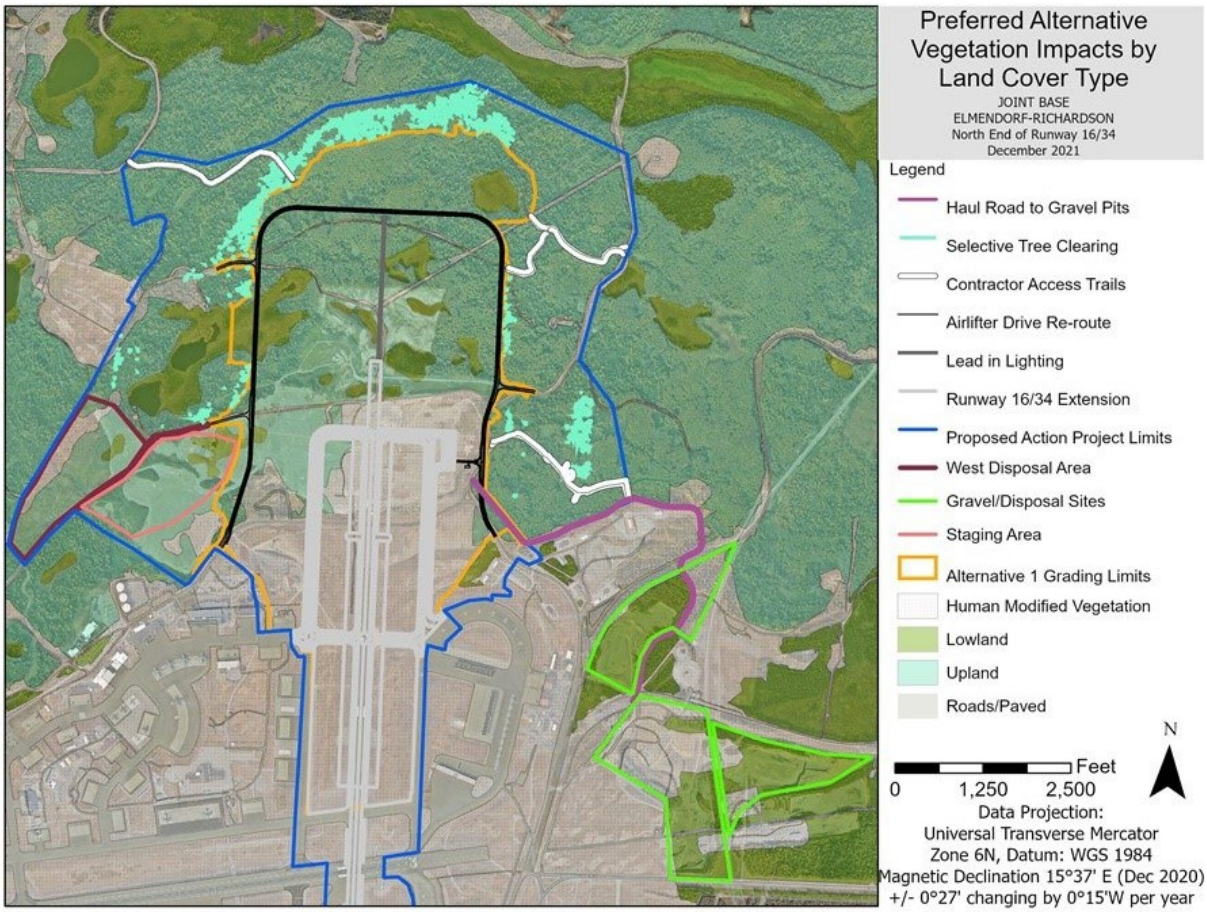
The trees in the ROI that could be tall enough to penetrate the imaginary surface are predominantly black cottonwood but could also include white spruce or paper birch. Approximately 41 acres of upland forests north of the excavation limits could be impacted by the selective tree clearing, while about 8.5 acres and 5.4 acres on the eastern and western edges, respectively, of the excavation limits would be subject to selective tree clearing. Minor vegetation clearing along contractor access trails may also be required to widen the trails enough for minimum equipment clearances. Preferred Alternative vegetation impacts by land cover are shown in Figure 3-14.

The land cover types that would be impacted by the Preferred Alternative are abundant in the region and are not known to be important for the life histories of any special status species. The Preferred Alternative would have minor impacts to vegetation.

Table 3-9. Preferred Alternative Vegetation Impacts Compared to 2018 EIS

Runway 16/34 Extension Disturbance	Human Modified		Lowland		Roads/Paved		Upland	
	2018 EIS	Preferred Alternative	2018 EIS	Preferred Alternative	2018 EIS	Preferred Alternative	2018 EIS	Preferred Alternative
Staging Area	6.4	0.0	3.8	4.3	0.2	0.0	49.5	35.0
Grading Limit	180.4	269.9	33.4	46.5	19.6	37.2	243.5	302.8
2 mcy Spoil Disposal Area	36.8	-	12.0	-	5.6	-	14.9	-
Gravel/Disposal Site	41.8	52.5	71.5	72.4	5.0	5.0	0.0	0.3
West Disposal Area	-	10.7	-	1.4	-	0.6	-	32.3
2018 EIS Total	265.3	-	120.7	-	30.3	-	307.9	-
Preferred Alternative Total	-	333.1	-	124.6	-	42.8	-	370.4

Figure 3-14. Vegetation Impacts by Land Cover Type



3.4.1.3 Environmental Consequences: No Action Alternative

The No Action Alternative would not impact vegetation because it would not involve construction. The vegetation around the airfield would continue to be managed in accordance with the INRMP, BASH plan, and other applicable Air Force guidance documents.

3.4.2 Fish and Wildlife

Fish and wildlife are the terrestrial and aquatic species of the ROI.

3.4.2.1 Affected Environment

Fish and wildlife are discussed in Section 3.7.2 of the 2018 EIS, but the EIS did not mention the presence of stocked fish (rainbow trout and char) in Fish and Triangle Lakes.

3.4.2.2 Environmental Consequences: Preferred Alternative

Minor increases to the fish and wildlife consequences described in Section 4.7.2 of the 2018 EIS would be caused by the expansion of the excavation limits and vegetation

impacts described in Section 3.4.1 of the SEA. The habitats impacted by the Preferred Alternative would be the same types of habitats described in the 2018 EIS.

The acoustic impact of operational changes on fish and wildlife were described in the 2018 EIS. Changes and new information relevant to the environmental concerns of the Preferred Alternative would not affect the description of noise impacts on wildlife presented in the 2018 EIS.

3.4.2.3 Environmental Consequences: No Action Alternative

The No Action Alternative would present the same impacts to fish and wildlife as described in Section 4.7.1 of the 2018 EIS.

3.4.3 Special-Status Species

Special-status species includes federally listed, proposed, or candidate threatened or endangered plants and animals, as well as animals protected by laws like the Marine Mammal Protection Act (MMPA). Special-status species are discussed in Section 3.7.3 of the 2018 EIS. There have been no substantial changes to information regarding the special-status species' affected environment.

The Air Force prepared a Biological Evaluation (BE) of the effects of the Preferred Alternative on Cook Inlet beluga whales (CIBW) in 2016 to enable informal consultation with the NMFS. The Air Force determined the Preferred Alternative may affect but was unlikely to adversely affect CIBW. NMFS concurred with the Air Force's determination on 5 August 2016. Since the BE and 2018 EIS were prepared, the design of the runway required a northward shift of approximately 400 feet to meet instrument landing system requirements that weren't accounted for in the original design. Based on the flight profile for the F-22, this northward shift would only reduce the altitude of aircraft over the Knik Arm by about 25 feet and would not constitute a meaningful change to underwater noise levels with the potential to affect CIBW. The Air Force BE and NMFS letter of concurrence (LoC) is available on the JBER Environmental website in Appendix A to the 2018 EIS (https://www.jber.jb.mil/Portals/144/Services-Resources/environmental/Completed-NEPA/Environmental-Vol%202-JBER-F22-FEIS-Appendices-Feb2018.pdf). Additionally, a memorandum to NMFS dated 1 October 2021 was prepared to summarize the updated status of the project. The memorandum is included in Appendix A.

A list of threatened or endangered species that may occur in the proposed project area was again requested from the U.S. Fish and Wildlife Service in case new listings or occurrences may have been determined since the 2018 EIS. In a letter returned by the USFWS dated 21 September 2021, there were no known special-status plants or terrestrial animals in the area that would be impacted by the construction of the Preferred Alternative. The letter is included in Appendix A.

The special-status species section of the 2018 EIS focused on the hydro-acoustic (in-water) impacts of aircraft noise on marine mammals. It did not include discussion of potential impacts on marine mammals such as harbor seals with amphibious hearing. The Air Force determined during internal scoping for the SEA that analysis of the effects of in-

air noise on harbor seals could provide useful information and the results of that analysis are included in Appendix B.

3.4.3.1 Affected Environment

A detailed analysis of the occurrence of harbor seals (*Phoca vitulina*) proximal to the proposed project is included in Appendix B. Harbor seals are widely distributed in both the Atlantic and Pacific Oceans, are closely associated with coastal waters, and may sometimes be found in lakes or rivers. Harbor seals were rarely noted in Knik Arm during NOAA aerial surveys with the notable exception of a group of 10 in Eagle Bay in June 2003, a group of 75 in northern Goose Bay in June 2005 and a group of 40 near Knik River in June 2006. Such relatively large aggregations in Knik Arm could be considered rare with only 3 out of 23 years of data (13%) recording seal groups of greater than three animals and with the last observation occurring 16 years ago.

Marine mammal monitoring in Eagle Bay and along coastal waters, including the mouth of Sixmile Creek, adjacent to JBER has occurred annually since 2008. Harbor seal observations were recorded during systematic visual observations made by JBER Natural Resources with federal and other cooperative partners. A detailed account of these observations is included in the analysis in Appendix B.

Small numbers of harbor seals have been commonly observed in both Eagle Bay and at the mouth of Sixmile Creek, with the greatest concentration of observations occurring at or near the mouth of Eagle River. Harbor seals in both Eagle Bay and Sixmile are most consistently observed in August and September, coinciding with the peak of beluga activity and presumably the peak of the salmon run. Observations of small numbers (1-3) of seals in the other open water months- i.e. June, July, October and November have also been made but with much less frequency.

Seals are commonly observed traveling along the coast, including at the mouth of Sixmile Creek, in Eagle Bay, and within Eagle River, exhibiting normal behaviors including swimming at the surface with nostrils exposed, drifting while floating vertically and looking around, sinking from that vertical position and moving underwater to another position, milling, following belugas, pursuing prey, and feeding (fish observed in mouth). They also occasionally haul out, porpoise, swim on their side with foreflipper visible at water surface, and spin. Other observed behavior that has been associated with disturbance in other studies, but which did not appear to be caused by any overt anthropogenic stressor at the time includes, slapping a foreflipper against the water, splashing, diving, and moving away from the mouth of the river.

Hauling out is an important behavior in that it is tied to pupping and molting (Pitcher, 1984). Seals were observed hauled-out in Eagle Bay/River in five out of 79 (6.3%) observations indicating harbor seal presence between 2008 and 2021 (total observation time=4238.5 min over 813 days). Haul out substrate included silt for four of the observations and a drifting ice pan in one. Seals (groups of 1-2) hauled out in June (n=1 haul-out), July (n=1), August (n=2) and November (n=1). At Sixmile Creek, 23 harbor seal observation were recorded between 2018 and 2022 (total observation time=620.5 hours over 141 days) with one observed haul-out (4%) of a single harbor seal onto the silt at the

mouth of the creek on 14 September 2021. No pups were observed in any of the observations from Eagle Bay or Sixmile Creek.

JBER has not led regular monitoring of marine mammals in Lower Knik Arm, near Cairn Point, however, local data is available. Monitoring of marine mammal location and behavior relative to construction of the Port and Cement Terminal at the Port of Anchorage in lower Knik Arm in 2020 and in 2021. Behaviors observed include looking, travelling, milling, sinking, diving, feeding, resting, and “other”. While many observations were made, groups were small (1-3). All animals reported were adults with the exception of a single juvenile/pup. No overt behavioral reactions in response to port construction were noted. Occurrences in 2020 and 2021 are detailed in the analysis in Appendix B. In general, harbor seal usage of lower Knik Arm, near and adjacent to the Port of Anchorage, appears to be low in April, moderate in May, high from June through September and then zero in October and November, though the average group size observed is low.

No observations of hauling-out were specifically mentioned in either 2020 or 2021, however, in 2020 a single harbor seal was observed hauled out for about an hour on the silt at the mouth of Ship Creek (C. Neumann, personal communication, 9 February 2022). This incident was likely categorized as “other” behavior in the report.

Behavioral reactions to anthropogenic noise are detailed in the analysis included in Appendix B. Observations of harbor seals exposed to potential disturbance from overflights of various types of aircraft were documented by JBER between 2008-2021 at the mouth of Eagle River. Of those observations, seven involved known military aircraft (Blackhawk helicopter, C17, E3 Sentry, F-22) and three involved small civilian or unknown aircraft (Table). Two of the ten observations noted an overt behavioral reaction. One involved the low overflight of two seals by a C17 in which one seal did not appear to react while the other seal dove. Both seals remained in the area. The other noted reaction of a seal in Eagle Bay involved the low overflight of a Blackhawk helicopter, in which the seal submerged before the aircraft was overhead and then surfaced a minute later. No overt behavioral reactions were noted to overflights by the other aircraft types (F-22, n=8 overflights; E3 Sentry, n=5; commercial jet,n=1; small plane,n=”multiple”; unknown plane, n=2). All seals in these ten observations were in the water throughout the duration of their respective observational periods.

Between 2018 and 2022, only one observation of harbor seals exposed to potential disturbance from aircraft overflights was noted at the mouth of Sixmile Creek. During this observation, two seals, one hauled out and one in the water milling and feeding, were exposed to 66 individual aircraft overflights from a variety of aircraft type over the course of a four hour period (F-22, n=56; C12F, n=3; C130, n=1; E-3 Sentry, n=1; Commercial jet, n=2; Blackhawk helicopter, n=3). No overt behavioral reactions were noted from either seal to any of the overflights. The backup alarm from a large truck at the observation point, however, caused the seal that was hauled out to flee into the water and leave the area to the southwest. The seal that was in the water also swam off in the same direction but did so slightly after the first seal and at a slower pace.

Date	Potential Stressor	Harbor seal reaction
8/24/2013	Low overflight, small plane (n=1)	Harbor seal remains in Eagle River mouth after small plane low overflight of Bay.
9/5/2014	Overflight of unknown plane type (n=1)	Harbor seal remains in Eagle River area from 11:09 - 13:46 after overfight of really loud plane (could not hear partner talking) @ 13:30
8/21/2016	Low overflight of C17 (n=1)	Low overflight of C17 over two harbor seals in Eagle Bay elicits no reaction from one seal while the other dives. Both seals remain in area
9/7/2016	Low overflight of Blackhawk helicopter, approaching from N (n=1)	Blackhawk helicopter approaches from N flying low. Harbor seal in Eagel Bay submerges before it passess overhead and resurfaces 1 minute later
8/20/2021	Overflight of C17 and F22 (n=1 each)	Harbor seal milling south of ER mouth with no change in behavior from C17 overflight and no change noted for seal in Eagle River. No behavioral change noted for either seal from F22 overflight- i.e. both continue milling.
8/20/2021	Overflight of E3 Sentry (n=2)	Harbor seal in middle of milling whales remains in Eagle River after overflight of E3 Sentry
8/23/2021	Multiple overflights of C17 (n=2) and F22 (n=7)	Harbor seal following the prey pursuit of a whale in Eagle River mouth at 13:22 with C17 and F22 overflights occurring before (C17=13:06 & 13:17; F22=13:19,13:20) and multiple F22 flights after this following event (F22= 13:23, 13:24, 13:27, 13:30 (2) and 13:31).
8/23/2021	Overflight of E3 Sentry (n=2)	Harbor seal continues milling in Eagle River mouth after E3 sentry overflight.
9/6/2021	Multiple overflights of small plane conducting survey of Eagle River Flats	Harbor seal milling at mouth of Eagle River while small plane conducts survey in flats.
9/17/2021	Overflight of small plane (n=1), unknown aircraft (n=1), commercial jet (n=1) and E3 Sentry (n=1)	Harbor seal remains in ER mouth after overflights of small plane, commercial jet and E3 Sentry.

Table 3-10. Table of behavioral reactions of harbor seals in Eagle Bay and Eagle River to potential aircraft-related disturbance. JBER unpublished data

Given the lack of observed overt behavioral reactions of harbor seals within Knik Arm to F-22 overflights, combined with other studies describing similar habituation to anthropogenic activities, it seems likely that the seals present in Knik Arm have either habituated to overflights or at least have an increased tolerance for them. Additionally, both reactions observed in response to low overflights of military aircraft (C17 and Blackhawk helicopter) involved diving beneath the water but with subsequent resurfacing in the same area (i.e. no displacement). Such a reaction would not be considered a significant alteration of normal behavior.

Most studies of disturbance to pinnipeds from aircraft overflight focus on flushing of seals from haul-outs and report altitude as a behavioral threshold metric without consideration of received SPL. Several studies, for instance, found that overflights of harbor seal haul-outs at altitudes of ~300-305 m sometimes caused increased alertness or flushing of some, but not all seals at a haul-out (Osinga et al., 2012; Johnson, 1977) whereas overflights at altitudes between 122 m and 305m produced varied results based on the weather, the frequency of recent disturbance, the type of aircraft and the altitude of the overflight (Vania et al., 1968; Johnson, 1977). Stronger reactions were noted on calm days, during periods of frequent disturbance, with helicopter or large plane overflights and with low altitude-overflights (Johnson, 1977). Overflights at altitudes of less than 122 m, especially less than 30 m, usually resulted in desertion of the observed haul-out by most

or all of the seals aggregated there, usually with subsequent haul-out in a new location after a prolonged (2+ hour) period in the water (i.e. major disturbance) (Johnson, 1977).

Flight patterns flown by F-22s at JBER include arrivals and departures over water to the north and west of the Elmendorf Airfield. Flight operations are described in Section 2.0 of the 2018 EIS. Sound modelling by F-22 event type is detailed in the 2016 BE. In general, arrivals on Runway 16 and departures on Runway 34 result in time over Knik Arm, next to Eagle Bay to the north. Arrivals on Runway 06 and departures on Runway 24 result in time over Knik Arm near Cairn Point to the west.

The data in the noise analysis used for the 2016 BE was based on overflight altitudes conservatively lower than actual flight patterns flown by F-22s (3Wg OSS, personal communication). Based on information provided by JBER Flight Operations for the 2016 BE, arrivals from the west, over Knik Arm near Cairn Point, occur at a minimum altitude over-water of 709 feet (216 m) MSL. The lowest over-water altitude for arrivals on Runway 16, over Knik Arm near Eagle Bay would be 1,184 feet (360 m) MSL. Under typical arrival and departure scenarios, however, the outside downwind altitude is approximately 2,200 feet (670 m) MSL, which is higher than the original altitude modeled, at 1,700 feet (518 m) MSL (3Wg OSS, personal communication).

There are no proposed changes to the flight patterns or frequency of flight occurrences since the 2018 EIS, with the exception of an additional 400 foot extension of the north-south runway 16/34.

The data that was used to analyze the noise effect of F-22 overflights on odontocetes in the 2016 BE was reviewed during the scoping for this SEA and it was determined that the acoustic modeling could be reasonably adapted to assess in-air noise effects on harbor seals by removing the reference pressure conversion factor, water surface reflectance factor, and converting A-weighted values to unweighted, giving an estimate of the sound level just above the surface of the water. The adapted values produced outputs characterizing the estimated duration of sound over 88 dB re 20 µPa. While this is 2 dB lower than the proxy threshold for harbor seals, the reference point serves as a conservative threshold for the in-air analysis of powerful sound just above the water surface and thus sufficient to approximate the potential effects of overflights to marine mammals under the flight path.

The data used to model noise effects of F-22 overflights was examined for the total number of events and total duration of time that the in-air sound threshold exceeded 88 dB re 20 µPa over water. Only certain flight operations resulted in occurrences of noise exceeding the in-air disturbance threshold, including arrivals and departures over Knik Arm near Eagle Bay to the north and near Cairn Point to the west.

The results of the in-air analysis are detailed in Appendix B and summarized in the Environmental Consequences section below.

3.4.3.2 Environmental Consequence: Preferred Alternative

The Preferred Alternative does not include construction features with the potential to effect special-status species, but F-22 operation could be a source of noise of sufficient

amplitude to disturb marine mammals and is therefore the focus of this analysis. Potential effects of F-22 overflights on harbor seals theoretically include 1) injury or mortality to hauled out harbor seal pups as a result of crushing during mass flight, maternal abandonment shortly after birth or permanent mother-pup separation 2) noise-induced effects including auditory injury (permanent threshold shift or PTS), auditory fatigue (temporary threshold shift or TTS), auditory masking and 3) behavioral responses. A detailed analysis of the potential effects is included in analysis in Appendix B.

Under the Preferred Alternative, the total operations creating powerful sounds just above the water surface would occur an average of 21.74-minutes per day (7,934.85 minutes per year) (Table). Compared to the current conditions, which would be reflected in the no-action alternative. This results in a 22% reduction in the duration of powerful sound over water under the Preferred Alternative.

Under the Preferred Alternative, powerful sound generated by F-22 activity over Knik Arm near Eagle Bay using RW 16/34 flights would occur for a duration of approximately 6.90 minutes per day (2,519 minutes annually). Over Knik Arm near Cairn Point, using Runway 06/24, flights producing power sound over water would occur for a duration of approximately 14.84 minutes per day (5,415 minutes annually) (Table).

While not modelled specifically, of additional consideration is that under current runway usage, when F-22s are using the runway, large aircraft including C-17s must circle at altitudes of 1000-1200 feet MSL until the runway is clear, which includes sustained sound exposure over water. Under the Preferred Alternative, runway use would deconflict this circumstance and thus reduce the total time large aircraft would be in standby over water.

Based on available information detailed in the analysis included in Appendix B, the following conclusions were drawn on the potential effects of the Preferred Alternative on harbor seals which may occur under the north and west flight paths associated with the project.

Observations of pups are exceedingly rare in Knik Arm with only one “juvenile/pup” noted over the course of 6833 observation hours accrued between 2008 and early 2022 (JBER unpublished data; POA, 2020, 2021). Additionally, observations of seals hauled-out is rare in Knik Arm with only seven known incidences documented in the same time span (6833 hours during the span 2008-2022). Given that the large aggregations of seals in the upper Cook Inlet during the pupping season occur outside of the Knik Arm and that observations of seals hauled-out as well as observations of pups in Knik Arm are rare and exceedingly rare, respectively, it seems highly unlikely that harbor seals pups would be present, much less hauled-out in the action area. Thus, without pupping aggregations to disturb or pups to be crushed, abandoned or separated, the potential for pup injury or mortality as a result of an F-22 overflight seems highly unlikely.

Auditory fatigue, or temporary threshold shift (TTS) may result from overstimulation of the delicate hair cells and tissues within the auditory system. The result of TTS is a temporary increase in hearing threshold (i.e., decreased hearing sensitivity) which eventually returns to normal. Decreased hearing sensitivity that does not return to normal after a relatively long period of time post-exposure (usually in the order of weeks), is considered auditory

injury or permanent threshold shift (PTS) (Southall et al. 2007). Given the parameters indicated in the analysis included in Appendix B, the calculated PTS and TTS safe distance isopleth for all hearing groups as a result of overflight by the loudest F-22 flight profile (136.8 dB re: 1µ Pa) is 0 m, meaning that there is no PTS or TTS isopleth for a sound of this level from a source traveling the velocity of an F-22. Given this result, the potential for an F-22 overflight to cause PTS or TTS in any submerged marine mammal within the action area, to include harbor seal, is highly unlikely.

Auditory masking occurs when the perception of a sound is interfered with by a second sound and the probability of masking increases as the two sounds increase in similarity and the masking sound increases in level. F-22 overflights have the potential to mask male breeding vocalizations and mother attraction calls (MAC) by pups as well as the sounds of an approaching predator. The analysis included in Appendix B details potential for masking in these circumstances and compares them to the sound frequency and range of F-22 flight occurrences at JBER.

For male harbor seals, a portion of male roars (198-500 Hz) are within the peak frequency range of F-22 overflights and of a short enough duration that they could be covered entirely by a double ship overflight. Additionally, if the calling male were under or near the direct overflight path, the waterborne SPL just beneath the surface of the water would be loud enough to mask the call even if another seal were very close to the caller. The result of periodic masking of vocalizations associated with breeding could lead to the loss of breeding opportunities for individual males or the need for increased calling with potential additional energetic costs. However, given that the onset of harbor seal breeding coincides roughly with weaning (thus occurring near pupping aggregations) and that a distinguishing characteristic of harbor seals is that they breed in large aggregations, in addition to the fact that large aggregations of seals are rarely observed in Knik Arm and not at all for the last 16 years, it seems highly unlikely that breeding activity, to include male vocalizations, would occur in Knik Arm. The potential for an F-22 overflight to mask breeding vocalizations then, also seems highly unlikely.

Harbor seal pups vocalize nearly continuously while following their mother and it is thought that these calls, which disappear from their vocal repertoire shortly after weaning, may allow the mother to recognize and keep track of her pup, especially while in the water (Renouf, 1985). These calls, dubbed “mother attraction calls” (MAC), are highly individualized, tonal, and low frequency. Individual mother attraction calls could be masked by F-22 overflight both in air and underwater. Complete masking of these calls could theoretically lead to separation of the mother and pup, a potentially fatal result for the pup. However, given observations by Renouf, (1985) that harbor seal pups vocalize nearly continuously in the water, it seems unlikely that even multiple-ship overflights would lead to such a catastrophic masking event. Furthermore, given that the large aggregations of seals in the upper Cook Inlet during the pupping season occur outside of the Knik Arm and that observations of seals hauled-out as well as observations of pups in Knik Arm are rare and exceedingly rare, respectively, it seems highly unlikely that mother-pup pairs would even be present in the action area. Thus, the potential for F-22 overflights in the action area to mask pup mother-attraction calls completely seems highly unlikely.

Masking of sound by predators may affect survival of harbor seals. Transient orca tend to be quiet while hunting with infrequent use of vocalizations and echolocations. Sea lions, which may also predate on harbor seals, do not echolocate and while they are quite vocal at times, it is unlikely that they vocalize while hunting for harbor seals. Pacific sleeper sharks are thought to prey on harbor seals, though data is limited. Their hunting strategy is silent and typically occurs while submerged. Bald eagles may opportunistically prey on newborn harbor seal pups, however, assuming that a harbor seal mother was to pup on a Knik Arm sandbar (which has only been noted in exceedingly rare instances), the approach of a flying eagle would likely not be heard by the seals even in the absence of any anthropogenic sound, such as an F-22 overflight.

While vocalizations as well as sounds of movement may be masked by F-22 overflights, it is not likely the sound of an approaching predator would be significantly masked by the sound of F-22 overflights. A more detailed analysis of the habits and sound frequencies associated with these predator-prey relationships is included in Appendix B.

Potential behavioral reactions to aircraft overflight for hauled-out harbor seals may include increased alertness and flight into the water (Bishop, 1967). Potential behavioral reactions to overflight of seals in the water include increased time with head out of water, jumping, porpoising, avoidance behavior (swimming away, submergence, diving, etc.), area displacement, disruption of feeding and increased haul-out frequency (Götz & Janik, 2010; Kastelein et al., 2017; JBER unpublished data)

The lowest over-water altitude proposed in the preferred alternative is 216 m which is within the variable effects range (122 -305 m) noted by Johnson, (1977) on Tugidak Island but above the altitude (76 m) shown to elicit only mild responses from seals in Glacier Bay (Streveler, 1979; Murphy and Hoover, 1981; both as cited in Hoover, 1988) and seals on Tugidak Island/Alaska Peninsula (61-91m) (Vania et al., 1968). It is thus not clear, from the literature, whether or not an F-22 overflight at that altitude would result in seal flight into the water. Based only on the altitude data presented in the literature, the potential for a strong reaction resulting from an overflight of an F-22 at 216 m seems unlikely to somewhat likely. However, in consideration of observations of multiple (64) F-22 overflights of harbors seals within the action area, none of which elicited an overt behavioral reaction, in addition to the high likelihood that Knik Arm seals are either habituated or at least have increased tolerance for aircraft overflights, the overall potential for an F-22 overflight to cause a strong reaction in a hauled-out harbor seal seems unlikely.

This is bolstered by the rarity of observations of seals hauled-out in Knik Arm (seven known incidences documented in ~6833 hours of observation over the span 2008-2022). Furthermore, the flight pattern associated with this minimum over-water altitude (ILS on RW 06) is expected to occur, on average, less than one time per day (0.91) further decreasing the likelihood of a hauled-out seal overflight. The next lowest altitude, 360 m, is above the variable range and would thus be unlikely to cause a strong reaction of a hauled-out seal.

The maximum in-air sound pressure level predicted from an F-22 overflight under either Alternative A or the preferred alternative is 104.8 dB re 20 µPa (JBER, 2016b), above

the threshold of 60-70 dB re 20 µPa where a "no reaction" response would be expected; but below the level at which pinnipeds tended to flee into water during activities such as rocket launches (~110-120 dB re: 20 µPa) (reviewed in Southall et al., (2007). Thus, the potential for strong reaction from a harbor seal to an F-22 overflight at this maximum SPL seems unlikely to somewhat likely.

Additionally, the maximum waterborne sound pressure level predicted from an F-22 overflight under the preferred alternative is 136.8 dB re 1 µPa for a few seconds duration at any given point in the water (JBER, 2016). Given that this modeled maximum SPL level falls below the SPL range for nonpulse sounds generally thought to induce strong behavioral responses for submerged pinnipeds, as concluded by Southall et al. (2007) and just reaches the behavioral response thresholds for temporary displacement and jumping (Götz & Janik, 2010; Kastelein et al., 2017) it seems unlikely to somewhat likely that an animal positioned directly underneath the flight path of an F-22 would exhibit a strong reaction.

Regarding sound levels both in-air and underwater; the overall potential for an F-22 overflight to cause a strong reaction seems unlikely. This conclusion is drawn in consideration of observations of multiple (64) F-22 overflights of harbors seals within the action area, none of which elicited an overt behavioral reaction in addition to the high likelihood that Knik Arm seals are either habituated or at least have increased tolerance for aircraft overflights.

Based on the analysis included in Appendix B, JBER has determined that the potential for F-22 overflights to cause significant alteration or abandonment of natural behaviors both in air and underwater, such as would constitute a Level B harassment under the MMPA by a military readiness activity is unlikely and therefore insignificant.

3.4.3.3 Environmental Consequence: No Action Alternative

Under the no action alternative, there would be no extension of Runway 16 and no redistribution of flight patterns, including sustained runway user conflicts with large aircraft circling over water.

Current F-22 operations at JBER are associated with Alternative A from the 2018 EIS, the interim operational scenario selected in the 2018 RoD. There are currently seven F-22 flight profile patterns at JBER that include sound pressure levels estimated to exceed 88 dB re 20 µPa. These are shown in Table 3-11. Alternatively, the flight patterns may be considered based on whether they occur to the north, near Eagle Bay or to the west, near Cairn Point. The occurrence and duration of powerful sound over each waterbody is presented in Table 3-12. The water surface area affected by in-air noise related to F-22 operations under the Preferred Alternative is shown in figure 3-15 and under the No Action alternative in Figure 3-16.

The potential in-air or waterborne effects to marine mammals such as harbor seals would be the same as under the preferred alternative, however, the No Action alternative would result in a duration of powerful sound that is 22% longer, on average, per day than the Preferred Alternative.

Table 3-11 Preferred Alternative Sortie Pattern Overwater Flight Time for Patterns Producing Powerful Sound

F-22 Flight Profile	Noise Levels		Ops Tempo				Powerful Sound Over Water			
			Preferred Alternative		Current Operations		Preferred Alternative		Current Operations	
	LAmax Just Above Surface (dB re 20 µPa)	SPL Just Above Surface	Annual Total Events	Events/ average flying day	Annual Total Events	Events/ average flying day	Annual duration over water @ >88 dB (mins)	Daily average duration over water @ > 88 dB (mins)	Annual duration over water @ >88 dB (mins)	Daily average duration over water @ > 88 dB (mins)
A/B EEEGL Departure on RW 24	87.4	90.4	173.41	0.48	18.8	0.05	9.02	0.02	0.98	0.00
Mil EEEGL Departure on RW 24	101.1	104.1	4161.58	11.40	451.21	1.24	4652.25	12.75	504.41	1.38
Arrivals (ILS) on RW 06	101.8	104.8	332.84	0.91	1998.48	5.48	754.38	2.07	4529.54	12.41
ALL VFR approaches (overhead break) AND visual closed patterns	90.5	93.5	617.20	1.69	4036.9	11.06	273.32	0.75	1787.68	4.90
Mil EEEGL 2 Departure on RW 34	95.1	98.1	468.59	1.28	4322.0	11.84	368.96	1.01	3403.12	9.32
ILS to RW 16	95.4	98.4	1665.64	4.56	0.00	0.00	1875.58	5.14	0.00	0.00
Re-entry Pattern (initial approach)	91.3	94.3	1.20	0.00	7.84	0.02	1.34	0.00	8.72	0.02
TOTAL			**7420.46**	**20.32**	**10835.23**	**29.69**	**7934.85**	**21.74**	**10234.45**	**28.03**

Table 3-12 Frequency of Occurrence and Duration for F-22 Flying Patterns Producing Powerful Sound Over Water, by Water Body.

F-22 Flight Profile Effective Sound Occurrence	Noise Levels		Ops Tempo (# flight events)				Duration of Powerful Sound Over Water			
	LAmax Just Above Surface (dB re 20 µPa)	SPL Just Above Surface	Preferred Alternative		Current Operations		Preferred Alternative		Current Operations	
			Annual Total Events	Events/ average flying day	Annual Total Events	Events/ average flying day	Annual duration over water @ >88 dB (mins)	Daily average duration over water @ > 88 dB (mins)	Annual duration over water @ >88 dB (mins)	Daily average duration over water @ > 88 dB (mins)
Sound over Knik Arm (Cairn Pt) RW 06/24	87.40 - 101.80	90.40 - 104.80	4667.83	12.79	6505.39	17.83	5415.65	14.84	6822.61	18.69
Sound over Knik Arm (Eagle Bay) RW 16/34	90.5 - 95.40	93.50 - 98.40	2752.63	7.53	4329.84	11.86	2519.2	6.9	3411.84	9.34
Total			**7420.46**	**20.32**	**10835.23**	**29.69**	**7934.85**	**21.74**	**10234.45**	**28.03**

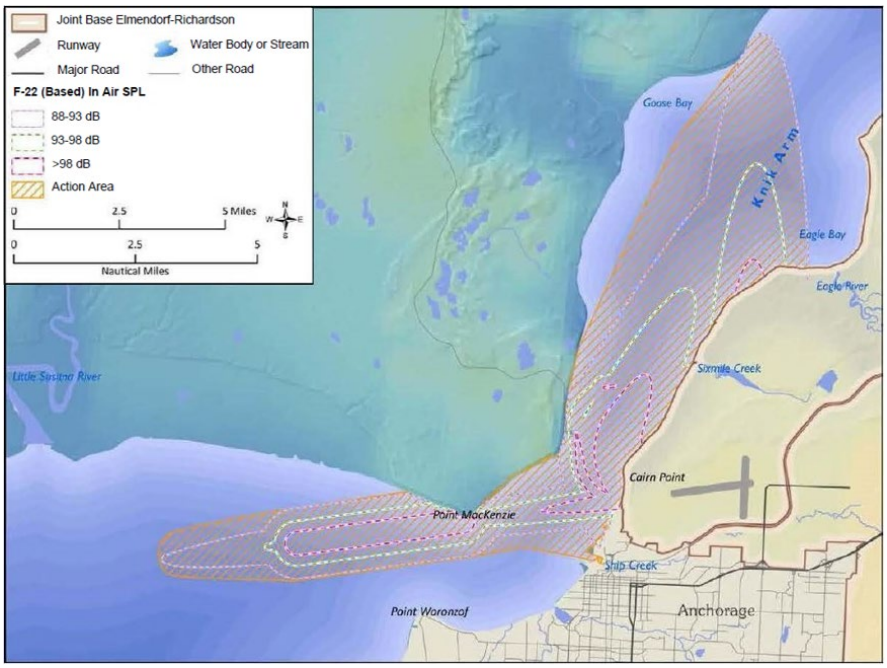


Figure 3-15 Water Surface Area Affected by F-22 Related In-Air Sound Levels Under the Preferred Alternative

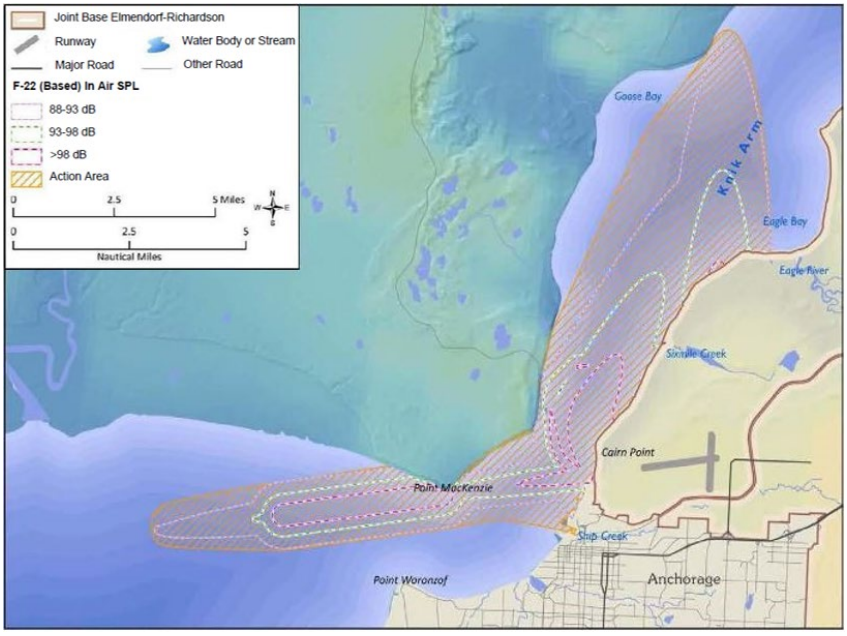


Figure 3-16 Water Surface Area Affected by F-22 Related In-Air Sound Levels under the No Action Alternative.

3.5 CULTURAL RESOURCES

The SEA reviewed the effects of the proposed action on the cultural resources within the Area of Potential Effects. 40 CFR 1508.1(g) defines these effects as those that "are reasonably foreseeable and have a close causal relationship to the proposed action or alternatives." The Air Force anticipates that the reasonably foreseeable effects of this action include tree-cutting, grading, construction of the runway, and other ground-disturbing activities. Because the proposed action included these types of activities, the USAF and USACE conducted pedestrian surveys of locations within the APE that had not been previously surveyed by archaeologists as part of the 2018 EIS.

3.5.1 Affected Environment

Section 3.8.1 of the 2018 EIS identifies 26 cultural resources within the original APE. As a result of the final design described in the Preferred Alternative, the APE was altered and expanded, requiring the completion of additional pedestrian surveys and analysis. According to the Alaska Historic Resources Survey (AHRS) there are 41 known cultural resources within the expanded APE. Of these resources, 24 have been determined to be not eligible for listing in the National Register of Historic Places (NRHP), 15 were destroyed during previous projects, and 2 are eligible for listing (Air Force 2021b). None of the facilities that would be demolished in preparation for the runway expansion (e.g., runway pavement, below-ground 14-inch transit waterline, below-ground primary distribution feeder conduit, in-ground runway lights, runway distance markers, wind cones, dual BAK-12 aircraft arresting systems) are older than 50 years.

Five new cultural resources (ANC-04712, ANC-04713, ANC-04714, ANC-04715, ANC-04716) were discovered during the 2021 pedestrian surveys. Two of these were discovered near Fish and Triangle Lakes and three were discovered in the new excavation areas (Air Force 2021a). USACE provided the Air Force with recommendations on the eligibility of these cultural resources and one previously unevaluated site (ANC-04717). In addition to the new resources, many scattered fighting positions were identified during the surveys. USACE recommended that the fighting positions were not eligible for listing in the NRHP. At the Air Force's request, USACE also re-evaluated one site (ANC-02978) and recommended that it was eligible for listing in the NRHP (Air Force 2021a). The Air Force also evaluated facilities that would be demolished during the project and were more than 50 years old. The Air Force submitted a letter regarding these recommended determinations of eligibility to the Alaska SHPO on 25 October 2021 (Air Force 2021b; see Appendix A). The Air Force received concurrence with the determinations of eligibility from the Alaska SHPO on 17 November 2021 (SHPO 2021; see Appendix A).

3.5.2 Environmental Consequences: Preferred Alternative

Grading, ground improvements, and fill disposal will destroy 19 resources that are not eligible for listing in the NRHP. Selective tree clearing will have direct or reasonably foreseeable effects to four ineligible resources. The Preferred Alternative has the potential to affect two NRHP-eligible historic properties within the expanded APE. The Preferred Alternative will not impact cultural resources, because the runway expansion has been

designed to avoid direct impacts on any historic properties by establishing buffers along the haul roads, placing construction barriers, and occasionally monitoring sites to ensure compliance with the assessment of effect. Per 36 CFR § 800.5(b), the Air Force submitted a letter to the Alaska SHPO and consulting parties on 25 October 2021 stating that the Preferred Alternative would result in "no historic properties affected" for 39 cultural resources and "no adverse effect to historic properties" for two historic properties (Air Force 2021b; see Appendix A). On 17 November 2021, the Air Force received concurrence from the Alaska SHPO on this finding (SHPO 2021; see Appendix A).

3.5.3 Environmental Consequences: No Action Alternative

Under the No Action Alternative, no construction or any other actions with the potential to cause cultural resources impacts would occur. The potential impacts on cultural resources associated with the No Action Alternative would remain consistent with those described in Alternative A of the 2018 EIS.

3.6 LAND USE AND RECREATION

Land Use and Recreation resources are the ongoing and potential uses for a given land area, considering factors of size, land cover, topography, ownership, and other constraints. Land Use and Recreation affected environment is discussed in Section 3.9 of the 2018 EIS and the environmental consequences to Land Use and Recreation are discussed in Section 4.9 of the 2018 EIS.

3.6.1 Affected Environment

In general, the preeminent land use on military installations is military operations, including training. New technology allowing combatants to become more elusive and lethal is constantly developed by the US military and its potential adversaries. JBER and associated airspace is dedicated to training to use those new technologies developed by the US and guard against technologies developed by potential adversaries. Other land uses, including recreation, are subordinate to the needs of the military mission.

The 2018 EIS ROI did not include areas around Fish and Triangle Lakes, as it was intended that all impacts here would be avoided. In the Preferred Alternative's final design, however, it was determined that impacts to this area could not be avoided due to the addition of ground improvements proposed to protect subsurface hydrology between the Fish and Triangle Lake Complex and the extended airfield. The ROI includes both semi-improved and unimproved lands. Semi-improved areas include the Fish and Triangle Lake Complex and the cleared land directly north of the runway, where periodic maintenance of tall trees is performed in accordance with the BASH Plan. Unimproved lands cover the remainder of the ROI where the natural forest, shrub, and wetland vegetation are allowed to grow unimpeded from maintenance activities per the INRMP (JBER 2018). Unimproved lands on JBER "are comprised of maneuver areas and impact areas" (JBER 2018). A secondary military land use category on unimproved lands is "foot use areas," which allow for movement-to-contact and land navigation activities (JBER 2018).

Development in the ROI is limited due to noise levels and the potential for accidents involving arriving and departing aircraft. Currently, the undeveloped land north of the airfield is used by military and their families for recreational purposes, such as hiking, hunting, fishing, sightseeing, and wildlife viewing. Much of the land immediately north of the airfield has been recently cleared to meet clear zone requirements for existing operations. The remaining area within the ROI north of the recent clearing is primarily intact in terms of vegetation community composition.

Fish and Triangle Lakes include accessibility developments, including docks, parking, and boardwalks, to provide year-round recreational fishing opportunities to eligible individuals. These opportunities are considered particularly valuable for junior servicemembers who may lack the means of accessing recreational fishing off-base. Fish and Triangle Lake are stocked by the Alaska Department of Fish and Game (ADFG) as part of their Department of Sport Fish, Region II Statewide Stocking Plan. According to JBER's recreational fishing reports, Fish and Triangle Lakes accounted for a cumulative 17 percent of all recreational fishing on JBER in 2020 and 12.7 percent in 2019 (Brandt 2020, Brandt 2021).

3.6.2 Environmental Consequences: Preferred Alternative

Implementation of the Preferred Alternative would have beneficial impacts on the military training land use of the ROI by improving training opportunities for F-22 pilots, as described in Section 1.1.2 of the 2018 EIS.

The Preferred Alternative would expand area within the grading limits beyond the area described in the 2018 EIS. This increase in area would have minor negative impacts on recreational values in the ROI by converting the existing unimproved grounds inside the excavation limits to semi-improved grounds, part of which would lie within the airfield perimeter fence and be restricted to authorized personnel. The area within the excavation limits would be graded to comply with the drainage design and managed for airfield operations, so there would no longer be hiking or wildlife viewing opportunities within this area. Additionally, the reduction in unimproved grounds would slightly reduce the amount of maneuver areas and impact areas available, including potential foot use areas. However, JBER has nearly 60,000 acres of unimproved grounds and the area that would be converted from unimproved to semi-improved is not particularly rare or valuable for recreational purposes within the context of JBER lands.

The construction of ground improvements to stabilize the hydrology of Fish and Triangle Lakes would ensure adequate depths continue to be available to support fish and the surface area of the lakes is not significantly reduced. The existing docks, boardwalks, and parking would continue to operate in their current manner. Recreational fishing values would not be directly impacted by the implementation of the Preferred Alternative.

The results of the ongoing runway extension BASH study could result in flight safety mitigations that would have reasonably foreseeable impacts to land use. The JBER BASH plan would be updated after construction of the runway extension is completed and the 2021 BASH survey report is finalized. Decisions regarding the implementation of specific safety mitigations are the responsibility of the Wing Commander.

3.6.3 Environmental Consequences: No Action Alternative

The No Action Alternative would continue the operation of the airfield in its current manner. Implementation of the No Action Alternative would negatively impact military training land because training opportunities would continue to be lost due to inefficient operation of the airfield. Potential adversaries of the Air Force seem to be exponentially increasing in tactical and technical proficiency and are now "near-peer" in terms of capability. Missed training opportunities caused by the selection of the No Action Alternative could allow the diminishment of the Air Force's competitive advantage.

There would be no construction or changes to the existing noise contours associated with the No Action Alternative, so there would be no impacts to recreation.

3.7 AIR QUALITY

An in-depth description of the Air Quality affected environment can be found in Section 3.4 of the 2018 EIS. No changes to the attainment status of JBER or within its vicinity have occurred since publication of the 2018 EIS. The environmental consequences to ambient air quality in and around JBER are presented below based on the 400-foot northward shift of RW 16/34 since the ROD for the 2018 EIS was signed. A brief discussion of the long-term emission impacts of the three stationary emergency generators supporting airfield lighting was also added. A summary of the calculation methods used to estimate emissions impacts, as well as the data inputs and assumptions made, are provided in Appendix C to the SEA.

Air Quality Impact Evaluation and General Conformity Criteria

Ambient air quality impacts must be evaluated based on Environmental Impact Analysis Process (EIAP) insignificance indicators and on general conformity de minimis levels. These values are compared to the net annual emissions generated as a result of the proposed action to determine their significance. If the net annual emissions are below these criteria, the proposed action would be considered insignificant. Likewise, if the annual net emissions exceed these values, the proposed action would have a significant impact on the ambient air quality. Emissions were calculated for the following criteria pollutants: CO, PM_{10}, particulate matter 2.5 microns in diameter or less ($PM_{2.5}$), oxides of nitrogen (NO_x), volatile organic compounds (VOC), lead (Pb), and sulfur dioxide (SO_2). Greenhouse Gas (GHG) emissions, expressed as carbon dioxide equivalent (CO_2e), were estimated as well.

The EIAP insignificance indicators are provided in Table 3-13. Nonattainment indicators for criteria pollutants for which a nonattainment area could potentially be affected by the proposed action are also provided in Table 3-13.

Table 3-13. Air Quality EIAP Insignificance Indicators

Criteria Pollutant	Pollutant(s) of Concern	Area Classification	First-Level Indicators (tons/year)	Second-Level Indicators (tons/year
Ozone	VOC and NO_x	Clearly Attainment	100	None
CO	CO	Nonattainment		None
		Clearly Attainment	100	None
SO_2	SO_2	Clearly Attainment	100	None
NO_x	NO_x	Clearly Attainment	100	250
Particulate Matter				
PM_{10}	PM_{10}	Clearly Attainment	70-100[a]	None
		Nonattainment	100	250
$PM_{2.5}$	$PM_{2.5}$	Clearly Attainment	100	250
Lead	Lead	Clearly Attainment	25	None

a. Range depends on severity of the nonattainment. For the air quality impact assessment, the highest value within the range for PM_{10} was used since Eagle River is classified as maintenance area.

A general conformity evaluation is required to assess whether the proposed action results in a significant ambient air quality impact. Criteria used to make this determination are defined in Title 40 of the Code of Federal Regulations (CFR) Part 93. A proposed action is considered to have a significant ambient air quality impact under general conformity if it results in a net annual change in emissions above the de minimis levels as defined in 40 CFR 93.153(b)(1) and (b)(2). The general conformity de minimis levels for the two criteria pollutants associated with the maintenance areas within the region of influence being assessed are provided in Table 3-14.

Table 3-14. General Conformity De Minimis Values for Criteria Pollutants for Maintenance Areas

Criteria Pollutant	De Minimis Level (tons per year)
CO	100
PM_{10}	100

Source: 40 CFR 93.153(b)(1) and (2)

Evaluation criteria for assessing the significance of ambient air quality impacts from GHG have not been established; therefore, CO_2e emissions were not compared against an Air Quality EIAP insignificance indicator.

Potential air quality permit requirements associated with the installation of the three new emergency generators was evaluated as well. The total annual emissions increase from

the three generators were compared to prevention of significant deterioration (PSD) major modification and minor stationary source permitting thresholds described in Appendix C and summarized in Table 3-15 below.

3.7.1 Affected Environment

The Municipality of Anchorage remains a carbon monoxide (CO) Maintenance Area and Eagle River remains a particulate matter less than 10 microns in diameter (PM_{10}) Maintenance Area. Consistent with the 2018 EIS, the proposed action is not exempt from a general conformity evaluation since it has the potential to impact the nearby Municipality of Anchorage CO and Eagle River PM_{10} Maintenance Areas.

The JBER airfield, where the proposed action is set, occurs within JBER Flight Line Title V Major Stationary Source. JBER operates the Flight Line Stationary Source under an ADEC Air Quality Operating Permit Number AQ0886TVP03. The JBER Flight Line Stationary Source is classified as a Title V major source since it has the potential to emit (PTE) greater than 100 tons per year of one or more criteria pollutants. It is not a PSD or hazardous air pollutant major stationary source.

3.7.2 Environmental Consequences: Preferred Alternative

Potential long-term and short-term emissions within the ROI potentially impacted by the Preferred Alternative were calculated and compared to the evaluation criteria presented in Tables 3-13 and 3-14. The long-term ambient air quality impacts expected to occur as a result of the Preferred Alternative include changes to F-22 operations, already addressed in the 2018 EIS, and the addition of three diesel-fired emergency generators to the JBER Flight Line Title V Major Stationary Source, which were not covered in the 2018 EIS. Construction related activities associated with the Preferred Alternative would generate short-term emissions impacts, which would occur over a three-year time span. The revised emission impacts from construction activities assessed under the Preferred Alternative are based on the entire 2,900-foot runway extension rather than just the additional 400 feet added since the ROD was signed for the 2018 EIS.

Long-Term Changes in F-22 Operations

Consistent with the analysis presented in the 2018 EIS, the Preferred Alternative would include changes in F-22 aircraft departure and arrival patterns potentially impacting operations below 3,000 feet above ground level (AGL) and emissions below 3,000 feet. Emission effects of F-22 operations would occur within the immediate airspace surrounding JBER and the JBER-Elmendorf runways. The potential air quality impacts from the proposed changes in F-22 aircraft operations focuses on emission effects within this domain.

The annual CO and PM_{10} emissions from the changes to F-22 operations would minimally impact the air quality maintenance areas due to the low strengths and/or substantial distances associated with the emission sources and would result in a decrease in F-22 aircraft emissions compared to existing conditions at JBER as stated in the 2018 EIS. Changes in the operation of ground support equipment (GSE) and similar mobile sources,

which operate intermittently within the JBER airfield to support F-22 operations, are expected to be minimal; therefore, emissions for this equipment were not estimated.

Furthermore, implementation of the Preferred Alternative would not contribute to an exceedance of an ambient air quality standard and would produce less than significant air quality impacts due to a decrease in F-22 flight operations below 3,000 AGL as described in the 2018 EIS. The ambient air quality impacts would not change as a result of the change in the runway extension from 2,500 feet assessed in the 2018 EIS to the current 2,900-foot extension. Since the emissions impact from the F-22 operations remain the same, the long-term change in emissions from this activity are not summarized within this document. A summary of the emissions impact from the change in F-22 operations can be found in Appendix C.

Long-Term Changes in Stationary Source Emissions

Three new diesel-fired stationary emergency generators would be installed as a direct result of the Preferred Alternative. One of these emergency generators would be installed in association with the Airfield Lighting Vault (ALSF-1) support facility, which was previously identified in 2018 EIS. Two additional emergency generators will be installed to support a Localizer and a Glide Slope Indicator, both part of the new Instrument Landing System (ILS) navigational aids (NAVAIDs) system. The ALSF-1 and the two ILS NAVAIDs would be connected to the local electrical power utility grid; however, due to their critical function, these facilities require emergency back-up power from diesel-fired generators. As with the ALSF-1, the NAVAIDs were referenced in the 2018 EIS but emissions of their associated emergency generators were not quantified. Table 3-15 summarizes the current specifications for each of the emergency generators that would be installed under the Preferred Alternative. These specifications are based on the final design documents produced for the RW 16/34 extension project. The generators that would be installed with the ILS Localizer and Glide Slope Indicator have been sized to the same specifications.

Installation of the three emergency generators under the Preferred Alternative would result in a nominal, annual emission increase to the JBER Flight Line Major Stationary Source potential to emit (Table 3-15) and would not trigger permitting. Notification to ADEC prior to installation of the generators, as stipulated in the JBER Flight Line Stationary Source Title V Operation Permit, would be required.

The air quality impacts resulting from the installation of the three emergency generators are considered insignificant and are well below the de minimis thresholds listed in Tables 3-13 and 3-14. Changes to the Flight Line Stationary Source emission inventory would need to be coordinated with ADEC, Division of Air Quality. These changes to the emission inventory would be accomplished by notifying ADEC as stipulated in the JBER Flight Line Stationary Source Operating Permit.

Table 3-15. Stationary Diesel-fired Emergency Generator Specifications

Unit Description	Generator Parameters		Fuel Consumption Rate (gallons/ hour)	Heat Input Rating (MMBtu/hr)
	Generator (kWe)	Engine (bHp)		
ALSF-1 Emergency Generator	450	755	5.29	5.29
ILS Localizer and Glide Slope Emergency Generators	20	34	1.9	0.24

kWe – kilowatt electric of generator
bHp – brake horsepower of the engine
MMBtu/hr – million British thermal units per hour

Table 3-16. Stationary Source Annual Emissions

Emission Unit Description	Annual Emissions (tons/yr)							
	VOC	CO	NOx	SO_2	PM_{10}	$PM_{2.5}$	Pb	CO_2e
Airfield Lighting Vault Emergency Generator	0.47	1.10	2.01	<0.01	0.06	0.06	0.00	176.15
ILS Localizer Emergency Generator	0.02	0.08	0.10	<0.01	<0.01	<0.01	0.00	9.73
ILS Glide Slope Emergency Generator	0.02	0.08	0.10	<0.01	<0.01	<0.01	0.00	9.73
Total	**0.51**	**1.25**	**2.21**	**<0.01**	**0.07**	**0.07**	**0.00**	**195.61**
Permitting Thresholds								
PSD Major Modification	40	100	40	40	15	10	0.6	--
Minor Stationary Source[1]	--	100	10	10	10	10	--	--

1. Proposed action occurs within the JBER Flight Line Title V Stationary Source; therefore, the minor stationary source thresholds in 18 AAC 50.(3)(A) apply.
2. Annual emissions from CO2e are in metric tonnes consistent with calculation methods established in 40 CFR 98.

Construction Phase Emissions

The Preferred Alternative would extend RW 16/34 2,900 feet to the north. Consistent with the 2018 EIS, the following components were assessed for the construction phase of the proposed action: (1) excavate terrain to remove topographic barriers, (2) cut and fill operations to create the runway foundation, (3) construct the runway pavements, (4) construct taxiways on both sides of the proposed extension, (5) construct/relocate support features, such as NAVAIDs, aircraft arrestor systems, signage, and drainage, and (6) relocate Airlifter Drive around the north end of the runway extension. The air quality analysis evaluated impact scenarios to extend RW 16/34 by 2,900 feet. JBER assumes that construction activities would require three years to complete, and the above components would occur in the following order:

1. Year 1 – (a) Vegetation Removal - Cut and Fill Operations and (b) Building Demolition.
2. Years 1 and 2 - (a) excavate terrain/cut and fill operations.
3. Year 2 - (a) Runway Overrun - Remove Existing Asphalt, (b) Paved Road - Remove Existing Asphalt, and (c) Install Gravel for Erosion Control.
4. Years 2 and 3 - (a) Install Gravel and Backfill and (b) Construct/Relocate Requisite Support Features Activities.
5. Year 3 – Asphalt and Resurfacing.

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. The annual and peak construction phase emissions are summarized in Table 3-17.

The annual emissions generated during each year of construction and at its peak would be de minimis. The ambient air quality impacts from construction phase emissions would be insignificant. The annual increase in emissions from the generators would be de minimis and insignificant as well as documented in Table 3-18 below.

Table 3-17. Yearly and Peak Construction Phase Emissions

Year/Construction Activity	Annual Emissions (Tons)							
	VOC	CO	NOx	SO_2	PM_{10}	$PM_{2.5}$	Pb	CO_2e
Year 1								
Vegetation Removal - Cut and Fill Operations	0.48	1.54	4.45	0.00	0.19	0.18	0.00	953.82
Building Demolition	0.05	0.15	0.47	0.00	0.02	0.02	0.00	123.00
Excavate Terrain/Cut and Fill Operations[1]	4.58	16.32	45.30	0.03	9.59	2.55	0.00	8,709.53
Year 1 Total:	**5.11**	**18.02**	**50.21**	**0.03**	**9.80**	**2.76**	**0.00**	**9,786.34**
Year 2								
Excavate Terrain/Cut and Fill Operations[1]	4.58	16.32	45.30	0.03	9.59	2.55	0.00	8,709.53
Runway Overrun - Remove Existing Asphalt	0.00	0.01	0.05	0.00	0.02	0.00	0.00	7.94
Paved Road - Remove Existing Asphalt	0.03	0.10	0.35	0.00	0.09	0.02	0.00	54.99
Install Gravel for Erosion Control	0.05	0.16	0.48	0.00	0.02	0.02	0.00	129.68
Install Gravel and Backfill[2]	0.22	0.65	1.85	0.00	0.10	0.10	0.00	465.51
Construct/Relocate Requisite Support Features[2]	0.08	0.36	0.88	0.00	1.69	0.22	0.00	197.74
Year 2 Total Emissions	**4.97**	**17.60**	**48.90**	**0.03**	**11.51**	**2.92**	**0.00**	**9,565.39**
Year 3								
Install Gravel and Backfill[2]	0.22	0.65	1.85	0.00	0.10	0.10	0.00	465.51
Construct/Relocate Requisite Support Features[2]	0.08	0.36	0.88	0.00	1.69	0.22	0.00	197.74
Asphalt and Resurfacing	0.75	2.29	6.71	0.00	4.55	0.81	0.00	1,826.11
Year 3 Total Emissions	**1.05**	**3.30**	**9.44**	**0.01**	**6.34**	**1.13**	0.00	**2,489.37**
Peak Annual Emissions	**1.05**	**3.30**	**9.44**	**0.01**	**6.34**	**1.13**	0.00	**2,489.37**

1. Equals half of the total emissions for a given activity occurring in Years 1 and 2
2. Equals half of the total emissions for a given activity occurring in Years 2 and 3

Table 3-18. Annual Emissions Summary Under Preferred Alternative

Phase	Annual Emissions (tons)							
	NO_X	CO	PM_{10}	$PM_{2.5}$	VOC	SO_2	Pb	CO_2e
Construction Phase								
Year 1	5.11	18.02	50.21	0.03	9.80	2.76	0.00	9,786.34
Year 2	4.97	17.60	48.90	0.03	11.51	2.92	0.00	9,565.39
Year 3	1.05	3.30	9.44	0.00	6.34	1.13	0.00	2,489.37
Operating Phase								
Emergency Generators	0.51	1.25	2.21	<0.01	0.07	0.07	0.00	195.61
F-22 Sorties	0.18	0.36	0.06	0.05	0.03	0.06	0.00	93.13

3.7.3 Environmental Consequences: No Action Alternative

The No Action Alternative would continue the operation of the airfield in its current manner. The support features referenced in the 2018 EIS would not be relocated and no new facilities would be constructed. The net emissions increase associated with the installation of the three emergency generators associated with the above facilities would not occur under the No Action Alternative. No changes to the JBER Flight Line Stationary Source emission inventory and potential to emit would occur if the No Action Alternative was selected.

3.8 OTHER NEPA CONSIDERATIONS

Past, Present, and Reasonably Foreseeable Actions are described in Section 5.1 of the 2018 EIS. Past, Present, and Reasonably Foreseeable DoD Actions (cumulative effects) in the JBER ROI are discussed in Section 5.2 of the 2018 EIS. Other NEPA considerations are described in Section 5.3.1 of the 2018 EIS. There are no additional reasonably foreseeable effects than those previously analyzed.

3.8.1 Unavoidable Adverse Effects

This SEA identifies any unavoidable adverse impacts that would result from the implementation of the Preferred Alternative and the significance of the potential impacts to resources and issues. Title 40 of the Code of Federal Regulations §1508.1 defines effects or impacts as "…changes to the human environment from the proposed action or alternatives that are reasonably foreseeable and have a reasonably close causal relationship to the proposed action…". Effects can be beneficial or detrimental and immediate or removed by time or space.

The extension of RW 16/34 would impact the local project area at JBER. The severity of potential impacts would be limited by regulatory compliance for the protection of the human and natural environment.

Unavoidable short-term adverse impacts associated with implementing the Preferred Alternative would include temporary erosion and sedimentation from soils disturbance, a temporary increase in fugitive dust and air emissions during construction, intermittent noise, and minor alterations to local traffic and airfield operations. However, these effects would be minor, when considered with applicable mitigating measures. Use of environmental controls and implementing controls required in permits and approvals obtained would minimize these potential impacts. Mitigation measures described in the 2018 ROD address these impacts.

Unavoidable, long-term, adverse impacts would occur to up to 38.5 acres of wetlands during RW 16/34 extension. Upland habitat loss associated with the expansion of clearing and grading limits compared to the effects described in the 2018 EIS would also contribute long-term adverse effects. A Finding of No Practicable Alternative (FONPA) was concluded in the 2018 ROD with respect to the necessity to impact wetlands in order to meet the project purpose and need. While the acreage of wetlands impacted has

increased from 27.9 acres to 38.5 acres, the types and functions of wetlands to be impacted are similar to those analyzed in the 2018 EIS. Similarly, the overall significance of the effect to wetlands remains the same as was concluded in the 2018 ROD. Accordingly, the Air Force proposes to provide mitigation of the unavoidable impacts in the same manner as was determined appropriate previously. The total number and type of mitigation credits to be purchased would be increased proportionally to cover the total acres, wetland types, and functions to be impacted. Credits will be calculated in accordance with the ADCM method, which is a locally established and Federal agency-approved mechanism for calculating wetland mitigation requirements. Determination of mitigation credit purchase will be calculated and executed as part of a final mitigation plan.

The inclusion of the ground improvements in the Preferred Alternative is anticipated to prevent any delayed adverse effects to wetlands and no other delayed effects would be anticipated.

3.8.2 Relationship of Short-Term Uses and Long-Term Productivity

The relationship between short-term uses and enhancement of long-term productivity from implementation of the Preferred Alternative is evaluated from the standpoint of short-term effects and long-term effects. Short-term effects would be those associated with the construction activities to extend RW 16/34. The long-term enhancement of productivity would be those effects associated with improvements to operational efficiency, safety, and training of the runway after implementation of the Preferred Alternative.

The loss of wetlands and habitat represent long-term impacts directly associated with the Preferred Alternative; however, the Air Force has avoided and/or minimized many of these impacts during the development of the Preferred Alternative and will mitigate those impacts that are not avoided by taking the measures discussed in the prior sections.

The Preferred Alternative represents an enhancement of long-term productivity for aircraft operations at JBER. The negative effects of short-term operational changes during construction activities would be minor compared to the positive benefits from extension of the runway. Immediate and long-term benefits would be realized for operational efficiency and safety after completion of the Preferred Alternative.

3.8.3 Irreversible and Irretrievable Commitments of Resources

This SEA identifies any irreversible and irretrievable commitments of resources that would be involved in the Preferred Alternative if implemented. An irreversible effect results from the use or destruction of resources (e.g., energy) that cannot be replaced within a reasonable time. An irretrievable effect results from loss of resources (e.g., endangered species) that cannot be restored as a result of the Preferred Alternative.

The short-term irreversible commitments of resources that would occur would include planning and engineering costs, building materials and supplies and their cost, use of energy resources during construction, labor, generation of fugitive dust emissions, and creation of temporary construction noise. The purchase of wetland mitigation credits would be required to offset unavoidable wetland impacts, pursuant to the mitigation for

wetland impacts described in the 2018 ROD. The increased maintenance costs associated with an extended runway would represent a minor irretrievable commitment of resources. Additional information regarding the irreversible and irretrievable commitment of resources associated with the Preferred Alternative is provided in Section 5.3.2 of the 2018 EIS.

Section 4
List of Preparers

This SEA has been prepared under the direction of the Air Force Civil Engineer Center (AFCEC), Air Force, and PACAF, JBER 673d CES.

Name/Organization	Education	Resource Area	Years of Experience
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Chris Floyd/USACE	M.S., Hydrology	Hazardous materials and hazardous waste	29
Jan Dieck/USACE	M.S., Biochemistry & Molecular Biology	Water resources	35
Ranna Wells/USACE	M.A., Anthropology	Cultural resources	10
Michael Salyer/USACE	M.S., Wildlife Biology	Oversight and guidance of SEA development	24
Charlene C. Johnson/ 673d Civil Engineer Squadron	M.S. Biology,	Professional Wetland Scientist (P.W.S.), vegetation ecology, soil, stormwater, and hydrology, EIAP	21
Amy Kearns/673d Civil Engineer Squadron	M.S., Natural Resources Management	Air Quality	24
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Section 5
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Section 6
List of Acronyms and Abbreviations

µPa	Micropascale
ABW	Air Base Wing
ADCM	Anchorage Debit-Credit Methodology
ADEC	Alaska Department of Environmental Conservation
ADFG	Alaska Department of Fish and Game
AFB	Air Force Base
AFCEC	Air Force Civil Engineer Center
AFFF	Aqueous Film Forming Foam
AFI	Air Force Instruction
AFPD	Air Force Policy Directive
AHRS	Alaska Historic Resources Survey
AJD	Approved Jurisdictional Determination
ANCSA	Alaska Native Claims Settlement Act
APE	Area of Potential Effect
AT/FP	Antiterrorism/Force Protection
AWAM	Anchorage Wetland Assessment Method
AZ	Airfield Zone
BASH	Bird/ Wildlife Aircraft Strike Hazard
BE	Biological Evaluation
BGEPA	Bald and Golden Eagle Protection Act
CEG	Civil Engineers Group
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CIBW	Cook Inlet Beluga Whale
CLZ	Clear Zone
CWA	Clean Water Act
cy	cubic yards
DA	Department of the Army

DAFI	Department of Air Force Instruction
dB	Decibel
DoD	Department of Defense
DODI	Department of Defense Instruction
DOPAA	Description of the Proposed Action and Alternatives
EA	Environmental Assessment
EIAP	Environmental Impact Analysis Process
EIS	Environmental Impact Statement
EO	Executive Order
ERP	Environmental Restoration Program
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FEIS	Final Environmental Impact Statement
FONPA	Finding of No Practicable Alternative
FONSI	Finding of No Significant Impact
HQ PACAF	Headquarters Pacific Air Forces
HUC	Hydrologic Unit Code
IBCT	Infantry Brigade Combat Team
ID	Infantry Division
ILS	Instrument Landing System
INRMP	Integrated Natural Resources Management Plan
JBER	Joint Base Elmendorf-Richardson
LoC	Letter of Concurrence
MAC	Mother attraction call
mcy	million cubic yards
MFR	Memorandum for Record
mg/kg	milligrams per kilogram
MMPA	Marine Mammal Protection Act
MOU	Memorandum of Understanding
mph	miles per hour
MSL	Mean Sea Level
MWR	Morale, Welfare, and Recreation

NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOA	Notice of Availability
NORAD	North American Aerospace Defense Command
NRHP	National Register of Historic Places
ODO	Opposite Direction Flight Operations
PEM	Freshwater Emergent Wetland
PFAS	Per- and Polyfluoroalkyl Substance
PFO	Freshwater Forested Wetland
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctane Sulfonic Acid
PL	Public Law
PRD	Protected Resource Division
PTS	Permanent Threshold Shift
PUB	Freshwater Pond
RCRA	Resource Conservation Recovery Act
REV	Relative Ecologic Value
ROI	Region of Influence
ROD	Record of Decision
RW	Runway
SBCT	Stryker Brigade Combat Team
SEA	Supplemental Environmental Assessment
SHPO	State Historic Preservation Officer
SPL	Sound Pressure Limit
TNW	Traditional Navigable Waterway
TTS	Temporary Threshold Shift
UFC	Unified Facilities Criteria
USACE	United States Army Corps of Engineers
USAF	United States Air Force
USC	United States Code
USDA-WS	United States Department of Agriculture-Wildlife Services
UXO	Unexploded Ordnance

VOC	Volatile Organic Compound
WEZ	Wildlife Exclusion Zone
WOTUS	Waters of the United States
WG	Wing
WR	WEZ Remainder
3WG1	3rd Wing Instruction