Appendix B
Definition of the Resources and Regulatory Settings

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ACRONYMS AND ABBREVIATIONS

11th AF	11th Air Force
AAC	Alaskan Air Command
ACMAC	Alaska Civil/Military Aviation Council
ADEC	Alaska Department of Environmental Conservation
ADFG	Alaska Department of Fish and Game
ADNR	Alaska Department of Natural Resources
AFB	Air Force Base
AFCEE	Air Force Center for Engineering and the Environment
AFI	Air Force Instruction
AFS	Alaska Fire Service
AGL	above ground level
AHERA	Asbestos Hazard Emergency Response Act
AICUZ	Air Installation Compatible Use Zone
AIRFA	American Indian Religious Freedom Act
ALCOM	Alaskan Command
ALCOM/PA	Alaskan Command Public Affairs Office
ANCSA	Alaska Native Claims Settlement Act
ANG	Air National Guard
ANHP	Alaska Natural Heritage Program
ANILCA	Alaska National Interest Lands Conservation Act
ANSI	American National Standards Institute
AP	Area Planning
AQCR	air quality control region
AR	Army Regulation
ARRC	Alaska Railroad Corporation
ARTCC	Air Route Traffic Control Center
AS	Alaska Statute
AST	aboveground storage tank
ATC	Air Traffic Control
ATCAA	Air Traffic Control Assigned Airspace
ATV	all-terrain vehicle
BA	biological assessment
BASH	bird-wildlife aircraft strike hazard
BAX	Battle Area Complex
BLM	Bureau of Land Management
BRTA	Black Rapids Training Area
CDNL	C-weighted day-night average sound level
CEA	Chugach Electric Association
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERFA	Community Environmental Response Facilitation Act
CFA	Controlled Firing Area
CFC	chlorofluorocarbons
CFR	Code of Federal Regulations
CRTC	Cold Regions Test Center
CVEA	Copper Valley Electric Association
CWA	Clean Water Act
DA PAM	Department of the Army Pamphlet
dB	decibels
dBP	peak decibel noise levels
DERP	Defense Environmental Restoration Program
DNL	day-night average sound level
DoD	U.S. Department of Defense
DOI	U.S. Department of the Interior
DTA	Donnelly Training Area
EA	environmental assessment
EIS	environmental impact statement
ENMP	Environmental Noise Management Program (Army)
EO	Executive Order
EPA	U.S. Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FL	flight level
FLPMA	Federal Land Policy and Management Act
FNSB	Fairbanks North Star Borough
FUDS	Formerly Used Defense Sites
FWA	Fort Wainwright, Alaska

GHG	greenhouse gas
GIS	geographic information system
GMU	Game Management Unit
GOA	Gulf of Alaska
GRTA	Gerstle River Training Area
GVEA	Golden Valley Electric Association
GWP	global warming potential
HAP	hazardous air pollutant
HC	hydrocarbon
HEA	Homer Electric Association
Hz	hertz
ICRMP	Integrated Cultural Resources Management Plan
IFR	Instrument Flight Rules
INRMP	Integrated Natural Resource Management Plan
IRP	Installation Restoration Program (DoD)
IR	instrument route
ISB	Intermediate Staging Base
ITAM	Integrated Training Area Management
IWFMP	Integrated Wildland Fire Management Plan
JBER	Joint Base Elmendorf-Richardson
JPARC	Joint Pacific Alaska Range Complex
kV	kilovolts
LATN	low-altitude tactical navigation
L_{cdn}	C-weighted day-night average sound level
L_{dnmr}	onset rate-adjusted day-night average sound level
L_{eq}	equivalent continuous sound pressure level
L_{max}	maximum noise level
L_{pk}	peak noise level
LRAM	Land Rehabilitation and Maintenance
MACA	mid-air collision avoidance
MBTA	Migratory Bird Treaty Act
MFE	major flying exercise
ML&P	Anchorage Municipal Light and Power
MLRA	major land resource area
MMPA	Marine Mammal Protection Act
MMRP	Military Munitions Response Program
MOA	Military Operations Area
MOUT	Military Operations on Urban Terrain
MSL	mean sea level
MTR	Military Training Route
MW	megawatt
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection and Repatriation Act
NEPA	National Environmental Policy Act
NESHAPs	National Emissions Standards for Hazardous Air Pollutants
NFMA	National Forest Management Act
NHPA	National Historic Preservation Act
NHS	National Highway System
NM	nautical mile
NMFS	National Marine Fisheries Service
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NPS	National Park Service
NRCS	National Resources Conservation Service
NRHP	National Register of Historic Places
ORRV	off-road recreational vehicle
PM_{10}	particulate matter 10 microns or less in diameter
$PM_{2.5}$	particulate matter 2.5 microns or less in diameter
ppm	parts per million
PSD	prevention of significant deterioration
psf	pounds per square foot
RCRA	Resource Conservation and Recovery Act
RF	Radio Frequency
RMO	Range Management Office
RNAV	area navigation
ROI	region of influence
RPA	remotely piloted aircraft
RTLA	Range and Training Land Assessment
SARA	Superfund Amendments and Reauthorization Act
SDZ	surface danger zone
SES	Seward Electric System

SH	State Highway
SIP	state implementation plan
SPCC	Spill Prevention Control and Countermeasure (Rule)
SRA	State Recreation Area
SUA	Special Use Airspace
SUAIS	Special Use Airspace Information System
SWDA	Solid Waste Disposal Act
TFTA	Tanana Flats Training Area
TMAA	Temporary Maritime Activities Area
tpy	tons per year
TRACON	Terminal Radar Approach Control
TRI	training requirements integration
TSCA	Toxic Substances Control Act
U.S.	United States
USACE	U.S. Army Corps of Engineers
USAG-FRA	U.S. Army Garrison Fort Richardson, Alaska
USAG-FWA	U.S. Army Garrison Fort Wainwright, Alaska
USARAK	U.S. Army Alaska
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UST	underground storage tank
UXO	unexploded ordnance
VFR	Visual Flight Rules
VOC	volatile organic compound
VR	visual route
W-	Warning Area; e.g., Warning Area 612 (W-612)
WRCC	Western Regional Climate Center
WSR	Wild and Scenic Rivers
YTA	Yukon Training Area

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APPENDIX B
DEFINITION OF THE RESOURCES AND REGULATORY SETTINGS

This chapter presents an overview of the resources, ecosystems, and human communities of concern that could be affected by the enhancement and modernization proposals for the Joint Pacific Alaska Range Complex (JPARC).

Each resource discussion begins with a definition of the resource attributes. A description of applicable environmental or managerial regulations, Federal and state, is provided for each resource. Pertinent local regulations and resource management plans are also identified. A general description of the existing conditions for the resource is provided, focusing on the regional context. The regional context encompasses areas potentially affected by the geographic extent of any of the JPARC enhancement proposals addressed in this environmental impact statement (EIS). Relevant details on the affected environment of each resource are provided for each proposal in Chapter 3.

The key government agencies involved with the *Environmental Impact Statement for the Modernization and Enhancement of Ranges, Airspace, and Training Areas in the Joint Pacific Alaska Range Complex in Alaska (JPARC Modernization and Enhancement EIS)* have established standard lists of environmental impact topics or categories that are typically evaluated in their National Environmental Policy Act (NEPA) documents. Table B–1 provides a breakdown by the responsible Federal agencies of the various topics and resource analyses covered in this EIS.

Table B–1. Environmental Impact Resource Mapping

EIS Resources	Air Force Resource Categories	Army Valued Environmental Component Categories	FAA Impact Analysis Categories
Airspace Management • Coordination/ATC • Military • Commercial Aviation • General Aviation • Emergency Access (fire, RX)	Airspace Management	Airspace Management	Airspace Management
Noise • Single events/frequency • Average noise levels in SUAs (L_{dnmr}) • Sonic Booms (event (frequency) effects) • CDNL/Impulsive Noise • Annoyance/population	Noise	Noise	Noise, Compatible Land Use
Safety (flight) • Mishaps • BASH • Radio Frequency (RF) Management	Safety (Flight)	Radio Frequency Management, Fire Management (access), Safety	Compatible Land Use
Safety (Ground) • APZ, CZs • Occupational • Explosives (WDZs, storage and handling, transport, UXO) • Public access control • Fire Management	Safety (Ground)	Radio Frequency hazards, Fire Management, Safety	Environmental health and Safety Risks, Compatible Land Use
Air Quality • Conformity • Greenhouse Gases (GHGs) • PSD Class 1 areas	Air Quality and GHGs	Air Quality and GHGs	Air Quality
Physical Resources • Geologic/seismic • Soils (erosion) • Wet Areas and Permafrost	Physical Resources	Soils and Permafrost, Wetlands, Geological resources	Construction impacts, Farmlands, Floodplains, Wetlands
Water Resources • Water Quality • Water Quantity (regional supply) • Floodplains • Wet Areas/Permafrost	Water Resources	Water Resources (Surface Water and Groundwater)	Water quality, Construction impacts

Table B-1. Environmental Impact Resource Mapping (*continued*)

EIS Resources	Air Force Resource Categories	Army Valued Environmental Component Categories	FAA Impact Analysis Categories
Hazardous Materials and Waste • Hazardous Materials (storage, handling, spills) • Hazardous Waste (quantities, disposal) • Munitions (residues, UXO)	Hazardous Materials and Waste	Hazardous Materials and Waste	Hazardous Materials/PP/Solid Waste
Biological Resources • Vegetation • Wildlife • Fisheries/Aquatic/marine • Migratory Birds • Protected Species/habitats • Mortality from BASH • Wetlands • Game/fish/vegetation management (herd/population management, burns)	Biological Resources	Wildlife and Fisheries, Vegetation, Wetlands	Coastal Resources, Construction impacts, Fish/ Wildlife/Plants, Wetland habitats
Cultural Resources • Archaeological • Historical • Architectural • Cultural/traditional/native resources	Cultural Resources	Cultural Resources	Construction impacts, Historical/Architectural/ Archaeological/Cultural resources
Land Use • Ownership/jurisdiction • Land Uses (management controls) • Public access/trails etc • Special Use Areas (e.g., WSRs) • ROW/Access/Transport • Recreation (activities, hunting/ fishing use, management) • Visual Resources	Land Use	Land Use Visual resources, Access, Subsistence and Recreation,	Compatible Land Use, Farmlands, Light Emissions/Visual impacts, WSRs
Infrastructure/Transportation • Energy and Utilities (public services) • Public highways, and infra (rail, bridges) • Traffic, capacity, network	Infrastructure and Transportation	Traffic/Transportation, Energy, Utilities	Natural Resources and Energy supply

Table B-1. Environmental Impact Resource Mapping (*continued*)

EIS Resources	Air Force Resource Categories	Army Valued Environmental Component Categories	FAA Impact Analysis Categories
Socioeconomics • Population • Economic activity • Public services	Socioeconomics	Socioeconomics, Subsistence (Customary trade)	Natural Resources and Energy supply, Socioeconomic impacts
Subsistence • Subsistence areas and jurisdiction • Subsistence users and activities • Subsistence Resources (biological resource sustainability) • Subsistence economies/livelihood	Not generally applicable	Not generally applicable Subsistence (USARAK NEPA documents)	Not generally applicable
Environmental Justice • Minorities (including Alaska Natives) • Low income populations • Children	Environmental Justice	Environmental Justice, Subsistence impacts	Environmental Justice and Children's Environmental Health and Safety Risks

Key: APZ=Accident Potential Zone; ATC =air traffic control; BASH=bird/wildlife-aircraft strike hazard; BLM= Bureau of Land Management; CDNL=C-weighted day-night average sound level; CZ=clear zones; FAA=Federal Aviation Administration; GHG=greenhouse gases; PP=Pollution Prevention; PSD=prevention of significant deterioration; ROW=Right of Way; RX=medical emergency; SUA=Special Use Airspace; UXO=unexploded ordnance; WDZ=weapon danger zone; WSR=Wild and Scenic River.

B.1 AIRSPACE MANAGEMENT

B.1.1 Definition of Resource

The nation's airspace is designed and managed by the Federal Aviation Administration (FAA) in a manner that strives to meet both the individual and common needs of all military, commercial, and general aviation interests. In general, all navigable airspace is categorized as either regulatory or nonregulatory. Within those two categories are four types of airspace: Controlled, Special Use, Uncontrolled, and Other. Airspace is further defined in terms of classifications according to the operating and flight rules that apply to each airspace area. The manner in which airspace is classified is dependent on (1) the complexity or density of aircraft operations within an airspace area, (2) the nature of those operations, (3) the level of safety required, and (4) national and public interest. Airspace management discussions reference these types/classifications, where appropriate, as they relate to the JPARC proposal regions of influence (FAA 2008).

Table B–2 provides basic definitions of the more-common aeronautical terms used throughout the airspace management sections.

Table B–2. Aviation and Airspace Use Terminology

Term	Definition
Visual Flight Rules (VFR)	A standard set of rules that all pilots, both civilian and military, must follow when not operating under IFR and in visual meteorological conditions. These rules require that pilots remain clear of clouds and avoid other aircraft.
Instrument Flight Rules (IFR)	A standard set of rules that all pilots, civilian and military, must follow when operating under flight conditions that are more stringent than VFR. These conditions include operating an aircraft in clouds, operating above certain altitudes prescribed by FAA regulations, and operating in some locations such as major civilian airports. ATC agencies ensure separation of all aircraft operating under IFR.
Above Ground Level (AGL)	Altitude expressed in feet measured above the ground surface.
Mean Sea Level (MSL)	Altitude expressed in feet measured above average (mean) sea level.
Flight Level (FL)	Manner in which altitudes at 18,000 feet MSL and above is expressed, as measured by a standard altimeter setting of 29.92. For example, an aircraft flying at 20,000 feet MSL is considered to be at FL200.
Sortie/Sortie-Operation	Sortie refers to an operational mission conducted by a single aircraft. Sortie-operation refers to a flight activity conducted by that single aircraft within a designated airspace area during the sortie mission. Airspace use tracking typically accounts for an aircraft sortie-operation within each area it operates throughout the course of the overall training mission.

Key: FAA=Federal Aviation Administration; ATC=air traffic control; AGL=above ground level; MSL=mean sea level; FL=flight level.
Source: FAA 2011a.

Controlled airspace is airspace of defined dimensions within which Air Traffic Control (ATC) services are provided to Instrument Flight Rule (IFR) and Visual Flight Rule (VFR) flights in accordance with the airspace classification (FAA 2011a). Controlled airspace is categorized into five separate classes: Classes A through E. These classes identify airspace that is controlled, airspace supporting airport operations, and designated airways affording en route transit from place to place. The classes also dictate pilot qualification requirements, rules of flight that must be followed, and the type of equipment necessary to operate within that airspace class. Military flight crews fly under FAA rules when not training in Special Use Airspace (SUA). Uncontrolled airspace (designated as Class G) has no specific prohibitions associated with its use. See Appendix D for a description of all airspace classifications and designations.

B.1.2 Regulatory Setting

The U.S. Government has exclusive sovereignty over all airspace and Congress has charged the FAA with the responsibility to develop plans and policy for the use of the navigable airspace and to assign by regulation or order, the use of the airspace necessary to ensure the safety of aircraft and its efficient use (49 U.S.C. 40103(a) and (b)).

The FAA recognizes that air traffic, aviation, and technology are constantly evolving and continues to seek ways to improve safety, efficiency, and flexibility, while working with the public on quality-of-life concerns. For that reason, airspace use is constantly reviewed by the FAA, U.S. Department of Defense (DoD), airport operators, and other affected stakeholders to ensure operational efficiency, user compatibility, and flight safety are maintained to the greatest extent possible. In that regard, DoD agencies that use airspace are required to submit annual utilization reports for SUA to the FAA that describe the types of activities conducted in the airspace, the times and altitudes used, and other such details that characterize airspace use. The FAA uses this information in its overall management of the National Airspace System and SUA program (FAA 2008).

SUA identified by the FAA for military and other governmental activities is charted and published by the National Aeronautical Charting Office in accordance with FAA Order 7400. 2H (FAA 2011b) and other applicable regulations and orders. Prior to any SUA charting, the initial proposal for this airspace—as an Military Operations Area (MOA) or restricted area, for example—and the potential consequences of this action for the environment and other airspace uses in the region must be examined by the proponent through NEPA processes, to include completion of an environmental assessment (EA) or EIS. Once this process is completed, to include public review and comment, the preferred airspace alternative is examined in greater depth by the FAA in an Aeronautical Study that identifies specific impacts on the National Airspace System and how those impacts may be minimized through mitigation measures. This study may also result in modifications to the proponent’s airspace proposal if necessary.

The U.S. Air Force requests airspace from the FAA and schedules and uses airspace in accordance with processes and procedures detailed in Air Force Instruction (AFI) 13-201, Air Force Airspace Management (Air Force 2006a). AFI 13-201 implements Air Force Planning Document 13-2, Air Traffic Control, Airspace, Airfield, and Range Management (Air Force 2007a), and DoD Directive 5030.19, DoD Responsibilities on Federal Aviation and National Airspace System Matters (DoD 1997). It addresses the development and processing of SUA, and covers aeronautical matters governing the efficient planning, acquisition, use, and management of airspace required to support Air Force flight operations. Alaskan SUA is managed by both the 11th Air Force (11th AF) Commander and the U.S. Army Alaska (USARAK) Commander.

Army Regulation (AR) 95-2, *Airspace, Airfields/Heliports, Flight Activities, Air Traffic Control, and Navigational Aids* (Army 2007a), covers Army policy, responsibilities, procedures and rules for airspace, airfields/heliports, flight activities, air traffic systems and navigational aids. Additionally, DoD Directive 5030.19 establishes procedures and policy regarding DoD and FAA coordination of matters impacting the Federal airspace system. Specific instructions for operating remotely piloted aircraft (RPA)/unmanned aerial vehicles (UAVs) are contained in FAA Order 7610.4P, *Special Military Operations* (FAA 2009). Further description of procedures and approvals governing the operations of UAV is provided in Section 3.6.3.1 in the EIS.

B.1.3 General Description of Affected Environment

B.1.3.1 Military Use Airspace

The Alaska airspace used by each of the Services to conduct their respective and joint training requirements include MOAs with overlying Air Traffic Control Assigned Airspace (ATCAAs), restricted areas, military training routes (MTRs), warning areas, and Controlled Firing Areas (CFAs). The following sections describe the structure, representative annual use, and the responsible scheduling/using agency for each JPARC airspace area. Representative annual use reflects the number of sortie-operations that are typically conducted by the different aircraft types during a full annual schedule of exercise and training activities. Estimated future sortie-operations consider this representative use, planned aircraft realignments, and other actions that may affect future JPARC operations. More-detailed information on airspace use and management is provided for the specific proposed actions in Chapter 3.

This section also identifies jet routes, Federal airways, and corridors used by transiting civil aviation aircraft within the proximity of JPARC airspace. The locations and use of those airspace areas are considered in determining JPARC airspace actions.

JPARC Airspace Scheduling Responsibilities/Procedures. Processes for managing, coordinating, and scheduling use of the individual JPARC airspace areas are the responsibility of the different service organizations designated as the scheduling agency for each. Procedures and guidance for Air Force scheduling of this airspace is contained in AFI 13-212, *Range Planning and Operations* (Air Force 2007b), 11th AF Supplement 1, and the 11th Airspace Handbook. In most cases, MOAs, ATCAAs, and MTRs are used primarily for Air Force aircrew training and exercises where there are minimal multiservice competing needs for this airspace. For those ranges and associated restricted areas having competing multiservice requirements, procedures have been established for coordinating use of this airspace in a Memorandum of Agreement USARAK-MOA-040 (supersedes AK-MOA-153) between USARAK, U.S. Army Garrison Fort Wainwright, Alaska (USAG-FWA), 11th AF, and the Cold Regions Test Center (CRTC).

This Agreement identifies the responsible scheduling/using agency for each range/restricted area and delineates range scheduling protocols, scheduling priorities, range activation/deactivation and clearance authorities, authorized ordnance, and ground operations responsibilities to be adhered to by all user agencies. Range/restricted area use normally requires scheduling a minimum of 28 days prior to the requested training date; is based on priorities, regardless of the service branch; and is offered on a first-come, first-served basis. Shared use of these assets by multiple components is accommodated to the extent possible. Any conflicts are resolved through coordination among the responsible range controlling agencies, such as the monthly scheduling meetings, to help ensure use of the Alaska ranges and associated restricted areas is managed in a manner that strives to meet all airspace user requirements (Air Force 2010).

MOAs/ATCAAs. The horizontal and vertical structures of the Alaska MOAs/ATCAAs (shown in Figure B-1) vary, depending on their locations relative to the civil air traffic routes, land uses, natural resources, and other factors that have been considered in the establishment of each area. The types of activities typically conducted in the MOAs and their overlying ATCAAs include air combat tactics, basic fighter and air combat maneuvers, composite force training, intercept training, low-altitude air-to-air training, low-altitude step-down training, and simulated low-altitude surface attack tactics. Several of the MOAs/ATCAAs provide maneuvering airspace for conducting air-to-ground weapons activities within the ranges and restricted areas. Appendix D includes the description and representative use of each Alaska MOA/ATCAA.

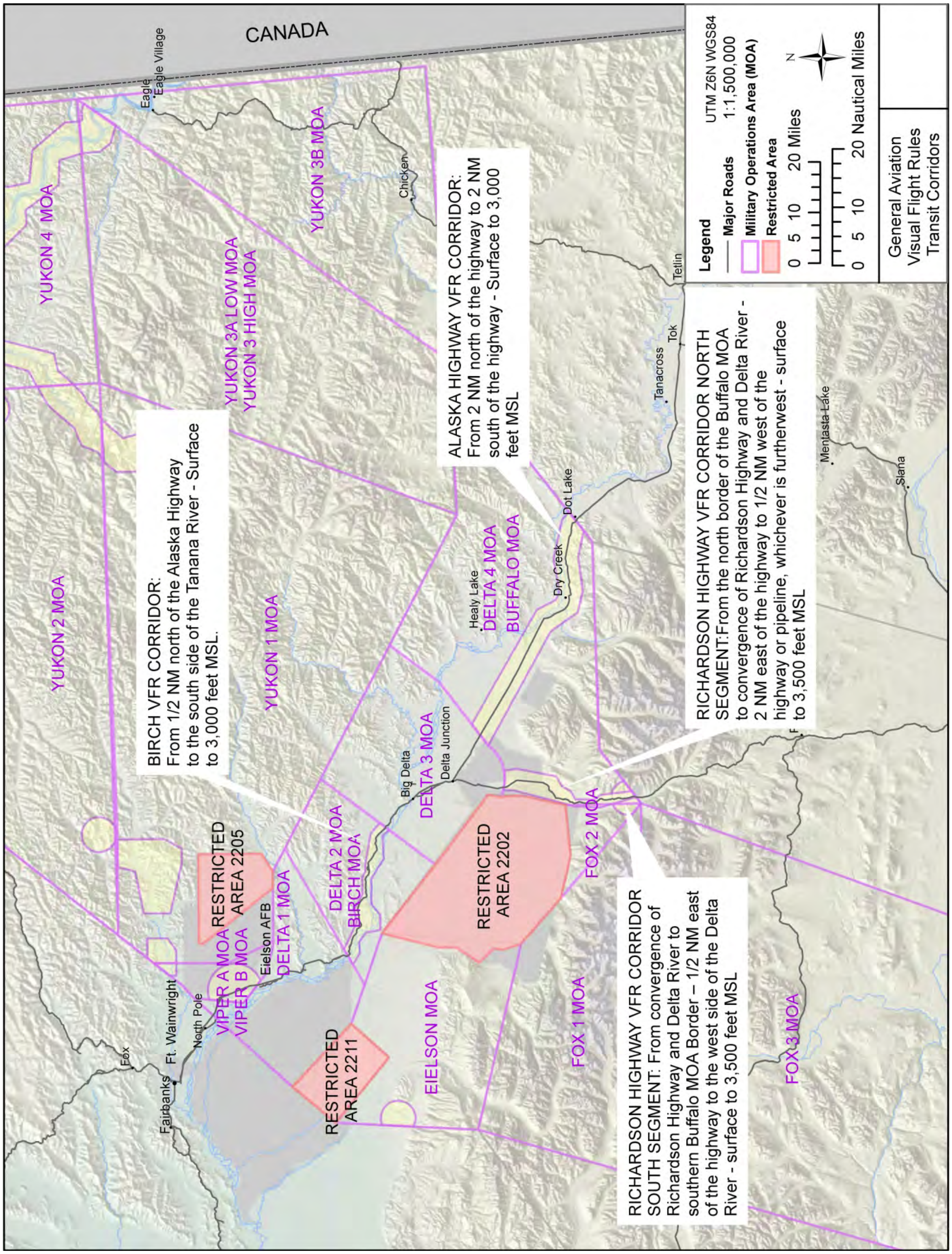

Figure B-1. Visual Flight Rules Corridors

A Finding of No Significant Impact was issued in January 2010 for an EA that proposed charting of a permanent Delta MOA within airspace activated as temporary Delta MOAs (Delta 1-4 T-MOAs) to provide a corridor for transiting the Yukon/Fox Complex during major flying exercise (MFE) periods. This action to establish a permanent Delta MOA focused primarily on alleviating impacts on MFE mission accomplishment within the Yukon/Fox Complex.

Restricted Airspace. The restricted areas shown in Figures 1–2 and described in Table 2–5 provide protected airspace to confine hazardous air and range-based training activities. Range training areas, associated with restricted airspace, provide capabilities for conducting weapons delivery, small-arms live-fire training, and other such training operations. These areas usually include instrumentation, airfields, drop zones, landing zones, and other infrastructure for training and logistical support. Combined with the MOAs/ATCAAs, restricted airspace and ground training areas provide the capability to drop live and inert weapons on instrumented ranges in large, complex flying evolutions.

Military Training Routes. The MTRs described in Appendix D are used to conduct low-level, high-speed training to help pilots remain proficient in a variety of functions, such as avoidance of enemy detection and destruction, air defense, strategic and tactical bombing, electronic warfare, and tactical reconnaissance. An EA was completed in 2007 for proposed modifications to the Alaska MTR structure managed by 11th AF. These changes, now in effect, better serve air combat training requirements. The MTRs provide access to MOAs and restricted airspace primarily for routine training and, to a lesser extent, MFEs. Both instrument routes (IRs), which allow flight in IFR conditions, and visual routes (VRs), which limit flight to VFR conditions, are used primarily by C-17s, C-130s, and fighter-type aircraft (F-15s, F-16s, and F-22s). Most of the MTRs in Alaska are co-located in groups of four, consisting of two reversible IRs and two reversible VRs, such that training along these routes can be conducted in either direction following the same ground track. All routes have a maximum width of 5 nautical miles (NM) on either side of the centerline. Published hours of use are 8:00 a.m. to 8:00 p.m. (Air Force 2007c).

Low-Altitude Tactical Navigation Areas. Low-altitude tactical navigation areas (LATNs) are defined geographic areas within which low-altitude navigation can be practiced. Aircrew training in LATNs fly in accordance with FAA flight rules, and such training is not considered to be hazardous to nonparticipating aircraft. FAA and Air Force regulations require aircraft utilizing the LATN to avoid airfields, towns, noise-sensitive areas, and wilderness areas by prescribed vertical and/or horizontal distances. Aircraft must fly at airspeeds of 250 knots (288 miles per hour) or less and are precluded from flying over the same point more than once per day.

Warning Area/Gulf of Alaska. The Temporary Maritime Activities Area (TMAA) in the Gulf of Alaska is roughly rectangular, oriented from northwest to southeast, approximately 300 NM long by 150 NM wide, and situated south of Prince William Sound and east of Kodiak Island (shown in Figure 1–1). The TMAA extends from the surface to flight level (FL) 600 and is scheduled by the Pacific Fleet. This over-water airspace supports most aircraft training activities conducted by Navy and Joint Service aircraft throughout the Northern Edge exercise. Approximately 450 sorties are conducted annually within the TMAA. The TMAA includes surface and subsurface operating areas and overlying airspace that includes Warning Area 612 (W-612) located over Blying Sound. W-612 extends from the surface to FL290, and the scheduling agency for this airspace is the 3rd Wing. When not included as part of the TMAA, W-612 is used by the Air Force to conduct training in anti-air warfare and by the U.S. Coast Guard to fulfill some of its training requirements. Most Navy training activities occur in the TMAA (Navy 2011).

Controlled Firing Areas. Several CFAs have been established for USARAK's use in conducting small-arms, mortar, and artillery firing. The Battle Area Complex (BAX) CFA provides protected airspace for the training activities within the general area proposed for restricted airspace. The Combined Arms Live

Fire Exercise North and South CFAs are established over portions of the Yukon Training Area and are within the general area proposed for the Digital Multipurpose Training Range (expanded R-2205).

B.1.3.2 Civil Aviation Airspace Use

Civil aviation includes two major categories: scheduled air transport, including all passenger and cargo flights operating on regularly scheduled routes; and general aviation, including all other civil flights, private or commercial. The airspace most generally used by civil aviation aircraft consists of jet routes, Area Navigation (RNAV) routes, Victor Airways, general aviation corridors, and both public airports and private airfields. Information regarding the general use of these routes, corridors, and airports is discussed in the Chapter 3, Airspace Management and Use, affected environment as they relate to the proposed airspace actions.

A key forum for addressing common areas of interest to both the military and civil aviation communities is the Alaska Civil/Military Aviation Council (ACMAC). The ACMAC consists of representatives from the Air Force, Army, FAA, airports, pilot associations, and other stakeholders with the purpose of keeping all participants updated on the respective plans and initiatives that affect aircraft operations and airspace use within Alaska. This forum meets on a semi-annual basis and rotates among different locations to help encourage attendance and representation. While not an authoritative function, the information and concerns expressed at the ACMAC meetings may be considered by the respective military or civilian participants in the decisionmaking processes.

Jet Routes and Area Navigation Routes. Jet routes and RNAV routes encompass the high-altitude (FL180-450) en route system used by air carriers to transit the Alaska airspace. RNAV routes transiting the region provide more-direct routing and reduce flight distances for IFR domestic and international flights operating through this area. Those jet and RNAV routes potentially affected by the proposed actions and their average daily use are discussed in Chapter 3, Airspace Management and Use.

Federal Airways. The Victor and Colored airways that transit through or adjacent to JPARC MOAs and lower restricted airspace altitudes (below FL180) are described in Chapter 3, Airspace Management and Use.

General Aviation Corridors. Several VFR corridors have been identified within the Fairbanks and Eielson Air Force Base (AFB) region for use by general aviation aircraft in transiting the MOA airspace that encompasses that area as shown in Figure B-1. These corridors are shown on the Special Use Airspace Information Service (SUAIS) brochure which is available at http://www.jber.af.mil/shared/media/document/AFD-120330-033.pdf. The following is a description of each corridor.

- ***Richardson Highway VFR Corridor North Segment.*** Runs from the north border of the Buffalo MOA to the convergence of Richardson Highway and the Delta River; from 2 NM east of the highway to 0.5 NM west of the highway or pipeline, whichever is farther west; and from the surface to 3,500 feet MSL.
- ***Richardson Highway VFR Corridor South Segment.*** Runs from the convergence of Richardson Highway and Delta River to the southern Buffalo MOA Border from 0.5 NM east of the highway to the west side of the Delta River; and from the surface to 3,500 feet MSL.
- ***Alaska Highway VFR Corridor.*** Runs from 2 NM north of the highway to 2 NM south of the highway, and from the surface to 3,000 feet MSL.
- ***Birch VFR Corridor.*** Runs from 0.5 NM north of the Alaska Highway to the south side of the Tanana River, and from the surface to 3,000 feet MSL.

Public Airports and Private Airfields. Appendix D, *Airspace*, includes a description and depiction of the public and charted private airfields within the region of the proposed airspace actions that service the large general aviation community in this region. The appendix descriptions note the most recent available information on annual airfield operations for each. Air travel can be the most practical means of transport for remote areas in Alaska. Fire management services use airspace to gain quick access and to stage operations when fighting fires in remote areas, particularly where small communities border on uninhabited forested land. Emergency transport operations use airspace for the medical evacuation of patients from remote areas to regional medical centers. Rapid delivery of machinery parts and personnel can be critical during harvesting periods or other industrial operations. During scoping meetings, private and commercial pilots have described aviation as a primary means of transportation and access throughout Alaska. Often pilots fly without local or regional radio contact, and much of the area in which they fly has limited radio or radar tracking.

Air traffic control services within this region are provided by FAA facilities in Anchorage and Fairbanks. The Anchorage Air Route Traffic Control Center (ARTCC) is responsible for domestic and international flights transiting throughout Alaska as well as being the controlling agency for the SUA. The Anchorage ARTCC provides approach and departure services for Allen Army Airfield (AAF). The Anchorage Terminal Radar Approach Control (TRACON) provides ATC approach and departure services for the Anchorage International Airport, Joint Base Elmendorf-Richardson (JBER), and Bryant AAF (JBER). The JBER control tower is responsible for air traffic operations within the Class D airspace surrounding this airfield. The Fairbanks TRACON provides ATC approach and departure services to the Fairbanks International Airport, as well as military aircraft operating out of Eielson AFB and Ladd AAF (Fort Wainwright). The Eielson AFB control tower is responsible for airfield operations within Class D airspace surrounding this airfield.

B.2 NOISE

B.2.1 Definition of Resource

Noise is considered to be unwanted sound that interferes with normal activities or otherwise diminishes the quality of the environment. Noise has the potential to impact several environmental resource areas. This noise section will describe baseline noise conditions and noise effects on human annoyance, health, and structures. Noise impacts on biological, land use, socioeconomics, and cultural resources are discussed in separate sections dealing with those environmental resources. The region of influence (ROI) for noise consists of lands beneath current and proposed airspace that would be affected by changing levels of aircraft and munitions noise.

Noise can be of several different types, each of which has its own characteristics. Continuous noise sources include machinery, such as an air-conditioning unit. Transient noise sources are those which move through the environment, either along established paths (e.g., highways or railroads) or randomly (e.g., training in an MOA). Some noise sources are impulsive (e.g., thunder clap or sonic boom). The response of a receptor (e.g., person, animal, or structure) to a noise depends on the characteristics of the noise itself, as well as the sensitivity of the receptor at the time the noise is heard.

The physical characteristics of noise, or sound, include its *intensity*, *frequency*, and *duration*.

Intensity. Sound consists of minute pressure waves that travel from the sound source to the ear. These waves can be compared to ripples spreading outward from a stone dropped in still water. Larger waves are interpreted by the ear as more-intense sounds. Sound intensities are expressed using the logarithmic unit, the decibel (dB). Using the dB scale, a sound level that is 3 dB louder than another will be perceived as being noticeably louder, while a sound that is 10 dB higher than another will be perceived as twice as loud. A whisper is typically 20 dB or lower, while a thunderclap can be 120 dB or louder.

Frequency. The frequency of a sound, as measured with the unit hertz (Hz), is the number of sound waves that pass a point in a second. A person with healthy hearing can detect sounds ranging from 20 to 15,000 Hz but detects sounds in the middle frequencies of this range most strongly. Sound measurements are refined using "A-weighting," which emphasizes frequencies best heard by the human ear. In this EIS, dBs are A-weighted unless otherwise noted. For impulsive sounds (e.g., sonic booms, thunder, clapping), which have the potential to induce vibrations in objects, either the "C-weighting" scale or un-weighted dB noise levels are used. The C-weighting scale does not de-emphasize high- and low-frequency sounds to the extent that A-weighting does. Impulsive noise peak decibel noise levels (dBP) are not frequency weighted (Figure B-2).

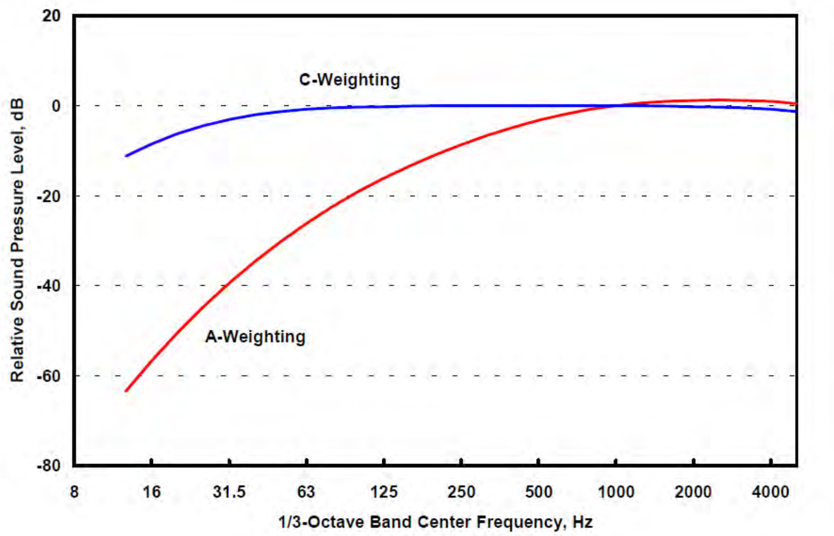

Figure B-2. A-Weighting and C-Weighting Scales
Source: Wyle Laboratories 2001

Duration. The duration of a noise event is the time between the point at which the sound is initially heard and the point at which it is no longer being heard. From the ground, the sound level of an aircraft flying overhead changes continuously, starting at the ambient (background) level, increasing to a maximum as the aircraft passes closest to the receiver, and then decreasing to ambient as the aircraft flies into the distance.

Noise analysts use several "metrics" to describe complex and variable sets of noise events. These metrics are designed to represent noise in such a way that noise impacts can be predicted and interpreted. Noise metrics used in this analysis include the following:

> **L_{max}** [Maximum Sound Level] is the highest sound level measured during an event, such as a single aircraft overflight.
>
> **SEL** [Sound Exposure Level] accounts for the maximum sound level and the length of time a sound lasts. SEL does not directly represent the sound level heard at any given time. Rather, it provides a measure of the total sound exposure for an entire event. For many types of noise impacts, SEL provides a better measure of intrusiveness of the sound than L_{max}. When military aircraft fly low and fast, the sound can rise from ambient to its maximum very quickly. This rapid onset rate carries a "surprise" effect that can make noise seem louder than its measured SEL would suggest. The calculation for SEL_r [Onset Rate-Adjusted Sound Exposure Level] has an additional noise penalty programmed into the calculation of up to 11 dB to account for this effect.

DNL [Day-Night Average Sound Level], mathematically denoted as L_{dn}, is a noise metric combining the levels and durations of noise events and the number of events over a 24-hour period. DNL also accounts for more-intrusive nighttime noise, adding a 10-dB penalty for sounds after 10 p.m. and before 7 a.m. The FAA has determined that DNL is the appropriate measure to account for total noise exposure around airfields and airports. Depending on the regularity of operations, DNL is computed either as an annual average or for operations representing an average busy day.

L_{dnmr} [Onset Rate-Adjusted Day-Night Average Sound Level], is the measure used for subsonic aircraft noise in such training airspace as MOAs and MTRs. L_{dnmr} accounts for the surprise effect on humans of aircraft overflights and the sudden onset of the aircraft noise event. The penalty ranges from 0 to 11 dB and is added to the normal SEL based on the altitude and airspeed of an approaching aircraft. **L_{dnmr}** is computed for the busiest month of the year to account for the variation in the seasonal use of some airspace areas. **L_{dnmr}** is interpreted by the same criteria as used for DNL.

CDNL [C-Weighted Day-Night Average Sound Level] is a day-night average sound level computed for areas subject to impulsive noise such as sonic booms. Areas subjected to supersonic noise are typically also subjected to subsonic noise, which is assessed based on the L_{dnmr} metric.

L_{pk} [peak noise level] is used to characterize the strength of impulsive noise such as sonic boom peak overpressure in pounds per square foot (psf). A decibel version of this, L_{pk}, is used when relating boom amplitude to human or animal response, although the direct physical pressure is most commonly used when assessing effects on structures. Because peak noise levels are influenced strongly by variable meteorological conditions, peak noise levels are generally specified as the level not exceeded for a certain percentage of the time. For example, noise generated by a certain munitions type may exceed 115 dBP at a certain location only in the 15 percent of days with most unfavorable meteorological conditions. The abbreviated version of the metric used to describe this situation is PK 15(met).

B.2.2 Regulatory Setting

The FAA has special expertise and authority in the area of aviation-related noise (e.g., 49 U.S.C. 47501–47507, Aviation Safety and Noise Abatement Act of 1979, as amended; 49 U.S.C. 44715, Noise Control Act of 1972). FAA Order 1050.1E, Section 14, available online at www.faa.gov, describes policies and procedures for assessing noise impacts of FAA actions, including approval of SUA, which are subject to NEPA. DNL is the FAA's primary metric for establishing the cumulative exposure of individuals to noise resulting from aviation activities. The FAA has defined a significant noise impact as one that would occur if analysis shows that the proposed action will cause noise-sensitive areas to experience an increase in noise of 1.5 dB DNL or more at or above 65 dB DNL noise exposure when compared to the No Action Alternative for the same timeframe. For example, the FAA would consider an increase from 63.5 dB DNL to 65 dB DNL a significant impact. The FAA's Office of Environment and Energy has approved the DoD computer models MRNMAP, PC BOOM, and BOOMAP for use in this noise analysis related to SUA.

The Air Force and Army seek to minimize impacts or annoyance of unwanted noise on communities surrounding installations and training areas and on those underlying training airspace. Programs established to minimize incompatibility between military training noise and adjacent communities are described very briefly below.

The Air Force's Air Installation Community Use Zone Program, described in AFI 32-7063 (Air Force 2005), establishes recommended time-averaged noise levels (i.e., DNL not to be exceeded) that are generally considered compatible with various land uses. This Air Force program considers residences and other noise-sensitive land uses to be compatible at noise levels less than 65 dB DNL.

The Army's Environmental Noise Management Program (ENMP), described in AR 200-1, establishes noise zones within which noise-sensitive land uses are not recommended (Army 2007b). In noise Zone II, noise-sensitive land uses are not recommended unless special measures are taken to reduce interior noise levels and, in noise Zone III, noise-sensitive land uses are never considered to be compatible (Table B–3). Loud individual noise events generated by large-caliber weapons have the potential to trigger annoyance. The likelihood of complaints being triggered by individual peak noise events of various levels is described in Table B–4. Noise-sensitive land uses are normally not recommended in locations exposed to between 115 and 130 dB Pk 15(met) and are never recommended at noise levels exceeding 130 dB Pk 15(met).

Table B–3. Noise Limits for Noise Zones

Noise Zone	Noise Limits		
	Aviation in dB DNL	Impulsive in dB CDNL	Small Arms in dBP PK 15(met)
I	<65	<62	<87
II	65–75	62–70	87–104
III	>75	>70	>104

Key: CDNL=C-weighted day-night average sound level; DNL=day-night average sound level; PK 15(met)=single event peak level exceeded by 15 percent of events.
Source: Adapted from Army 2007b (AR 200-1).

Table B–4. Risk of Noise Complaints by Level of Noise

Risk of Noise Complaints	Large Caliber Weapons Noise Level in dBP PK 15(met)
Low	<115
Medium	115–130
High	130–140
Risk of physiological damage to unprotected human ears and structural damage claims	>140

Key: PK 15(met)=single event peak level exceeded by 15 percent of events.
Source: Adapted from Army 2007b (AR 200-1).

Military weapons or equipment designed for combat use are exempt from the requirements of the Noise Control Act of 1972 (42 U.S.C. § 4902). However, construction equipment and other types of noncombat equipment are subject to noise-related guidelines as established in the Act.

B.2.3 General Description of Affected Environment

B.2.3.1 Existing Subsonic Noise Environment in JPARC SUA

Within MOAs and restricted airspace, subsonic training is dispersed and often occurs randomly. The Air Force has developed the MR_NMAP [MOA-Range NOISEMAP] computer program (Lucas and Calamia 1996) to calculate subsonic aircraft noise in these areas. These computer programs calculate projected noise based on aircraft type, flight characteristics, meteorological conditions, and training activities. The models are based on data collected under military airspace and represent the best data available for environmental evaluation. The model results are supported by measurements in several military airspace areas (Lucas et al. 1995). Noise levels (L_{dnmr}) in JPARC SUA are listed in Table B–5.

Ambient noise levels (i.e., noise levels when no military training activities are under way) have not been measured, but are expected to be in the range of 22 to 44 dB based on the findings of studies conducted in similar environments (Miller 2002, ANG 1997). For the purposes of this study, the ambient noise level in unpopulated portions of the ROI is assumed to be 35 dB DNL_{mr}. Aircraft noise levels that are less than ambient noise levels have a relatively minor effect on the overall noise environment and are listed in Table B–6 as "<35."

In general, there is a high correlation between the percentages of groups of people highly annoyed and the level of average noise exposure measured in DNL and L_{dnmr}. The correlation is lower for the annoyance of individuals. This is not surprising considering the varying personal factors that influence the manner in which individuals react to noise. The inherent variability between individuals makes it impossible to predict accurately how any specific individual will react to a given noise event. Nevertheless, findings substantiate that community annoyance with aircraft noise is represented quite reliably using DNL. A study by Schultz (1978) showed a consistent relationship between noise levels and annoyance. A more recent study (Fidell et al. 1991) reaffirmed and updated this relationship. The likelihood of annoyance is also predicted by impulsive noise levels, which are described by the metric CDNL. The relationship between DNL, CDNL, and annoyance is shown in Table B–6. Additional discussion of impulse noise levels can be found in Sections B.2.3.2 and B.2.3.4.

Table B–5. Average Noise Levels in JPARC SUA

Special Use Airspace Name	Noise Level (dB L_{dnmr})
Birch MOA	61
Blair ATCAA	<35
Buffalo MOA	55
Delta MOA/ATCAA	40
Eielson MOA/ATCAA	59
Fox 1 MOA/ATCAA	44
Fox 2 MOA/ATCAA	52
Fox 3 MOA/ATCAA	39
Paxon ATCAA	37
R-2202	55
R-2205	60
R-2211	66
Viper A MOA	47
Viper B MOA/ATCAA	47
Yukon 1 MOA/ATCAA	50
Yukon 2 MOA/ATCAA	49
Yukon 3A Low/High MOA/ATCAA	56
Yukon 3B MOA/ATCAA	44
Yukon 4 MOA/ATCAA	47
Yukon 5 MOA/ATCAA	<35

Note: Calculated using MRNMAP (Lucas and Calamia 1996)

Key: ATCAA=Air Traffic Control Assigned Airspace; dB=decibel; L_{dnmr}=onset rate-adjusted day-night average sound level; MOA=Military Operations Area; SUA=Special Use Airspace.

Table B–6. Percentage of Population Highly Annoyed by Elevated Noise Levels

L_{dnmr} (dB)	CDNL(dB)	Average Percentage of Highly Annoyed Population
55	52	3.3
60	57	6.5
65	61	12.3
70	65	22.1
75	69	36.5

Key: CDNL=C-weighted day-night average sound level; dB=decibel;; L_{dnmr}=onset rate-adjusted day-night average sound level.

Source: CHABA 1981, Fidell et al. 1991, Schultz 1978, Stusnick et al. 1992.

L_{dnmr} provides a total noise exposure, but may not provide an intuitive description of the noise environment. People often desire to know what the loudness of an individual aircraft will be; MR_NMAP and its supporting programs can provide the maximum sound level (L_{max}) and sound exposure level (SEL) that accounts for both the duration and the intensity of a noise event for individual aircraft at various distances and altitudes. Table B–7 presents L_{max} for aircraft typically using JPARC. Table B–8 presents SEL values for representative aircraft at various altitudes. L_{max} indicates the maximum noise level that would be heard by an individual as the aircraft flies overhead. SELs reflect the complete noise exposure as an aircraft flies by, accounting for both the level and duration of the sound.

Table B–7. Representative A-Weighted Instantaneous Maximum Sound Level in Decibels under the Flight Track for Aircraft at Various Altitudes[1]

Aircraft Type	Airspeed (knots)	Power Setting[2]	300 AGL	500 AGL	1,000 AGL	2,000 AGL	5,000 AGL	10,000 AGL	20,000 AGL
F-15C	520	81% NC	119	114	107	99	86	74	57
F-15E[3]	450	81 % NC	104	99	92	85	73	64	52
F-22	450	70% ETR	120	115	108	100	88	78	66
F-16C[3]	450	89% NC	115	110	102	95	83	73	60
F-18A	500	92% NC	120	116	108	99	85	71	54
B-1B	550	101% RPM	117	112	106	98	86	75	61
C-17	230	86 %NC	101	96	87	77	63	52	40
C-130J	235	530 MGT	101	96	88	80	68	57	46
KC-135R	300	89.6 %NF	N/A	N/A	N/A	N/A	N/A	59	47
Single-Engine, Variable-pitch Propeller-Driven Aircraft (generic)	160	70 %RPM	81	77	70	63	54	45	36

1 Level flight, steady, high-speed conditions. Standard acoustic atmospheric conditions used.
2 Engine power setting while in an MOA. The type of engine and aircraft determines the power setting.
3 Aircraft equipped with PW-229 engines.

Key: AGL=above ground level; ETR=engine thrust request; NC=percent core; MGT = Measured Gas Temperature; RPM=rotations per minute; NF = fan speed.

Table B–8. Sound Exposure Level in Decibels under the Flight Track for Aircraft at Various Altitudes[1]

Aircraft Type	Airspeed (knots)	300 AGL	500 AGL	1,000 AGL	2,000 AGL	5,000 AGL	10,000 AGL	20,000 AGL
F-15C	520	116	112	107	101	91	80	65
F-15E[3]	450	107	103	98	92	84	76	66
F-22	450	120	116	111	105	95	86.4	76
F-16C[3]	450	116	112	106	100	91	83	72
F-18A	500	118	114	108	101	89	77	62
B-1B	550	116	112	107	101	92	82	70
C-17	230	103	99	92	84	72	63	53
C-130J	235	104	100	94	88	78	69	60
KC-135R	300	N/A	N/A	N/A	N/A	N/A	70	60
Single-Engine, Variable-pitch Propeller-Driven Aircraft (generic)	160	87	84	79	74	67	61	53

1 Level flight, steady, high-speed conditions. Standard acoustic atmospheric conditions used.
2 Projected based on F-22 composite aircraft.
3 Aircraft equipped with PW-229 engines.
Key: AGL=above ground level.

B.2.3.2 Existing Supersonic Noise

Supersonic flight is primarily associated with air combat training. Supersonic activity is authorized in the Yukon and Fox, MOAs and their overlying ATCAAs, as well as Delta ATCAA and R-2202. Supersonic flight produces an air pressure wave that may reach the ground as a sonic boom. The amplitude of an individual sonic boom is measured by its peak overpressure (in psf) and depends on an aircraft's size, weight, geometry, Mach number, and flight altitude. Table B–9, shows sonic boom overpressures for F-15C, F-16, F-18, and F-22 aircraft in level flight at various altitudes. The biggest single condition affecting overpressure is altitude. Maneuvers can also affect boom peak overpressures, increasing or decreasing overpressures from those shown in Table B–9.

Table B–9. Sonic Boom Peak Overpressures for Aircraft at Mach 1.2 Level Flight (in pounds per square foot)

Aircraft	Altitude (feet)			
	10,000	20,000	30,000	40,000
F-15C	5.40	2.87	1.90	1.46
F-16	4.4	2.3	1.5	1.2
F-18	5.0	2.7	1.7	1.3
F-22	5.68	3.00	1.97	1.50

Source: Air Force 2006b.

Community effects from sonic booms, in the form of annoyance, correlate well with CDNL (CHABA 1981). CDNL and DNL, however, are subject to different interpretations. A given numerical value of CDNL generally represents more annoyance than the same numerical value of DNL (see Table B–6). The number of sonic booms per day and time-averaged supersonic noise level (CDNL) are presented in Table B–10 for each of the JPARC SUAs in which supersonic flight is permitted. Noise levels presented are the highest levels experienced in areas near the center of airspace unit. In areas not near the center of the airspace areas, noise levels would be lower.

Table B–10. Supersonic Noise Levels in JPARC SUAs

Special Use Airspace Name	Noise Level (dB CDNL)	Booms Per Day
Fox 1 MOA/ATCAA	56	1.7
Fox 2 MOA	56	1.7
Fox 3 MOA/ATCAA	61	4.6
Yukon 1 MOA/ATCAA	53	0.7
Yukon 2 MOA/ATCAA	52	0.6
Yukon 3A Low/High MOA	52	0.6
Yukon 3B MOA	51	0.5
Yukon 4 MOA/ATCAA	52	0.6
Yukon 5 MOA/ATCAA	51	0.5
Delta ATCAA	39	<0.1
R-2202	53	0.8

Note: As reported for FY 2010.
Key: ATCAA=Air Traffic Control Assigned Airspace; CDNL=C-weighted day-night average sound level; dB=decibel; MOA=Military Operations Area; SUA = Special Use Airspace.

Aircraft exceeding Mach 1 always create a sonic boom, although not all supersonic flight activities will cause a boom at the ground. As altitude increases, air temperature decreases, and the resulting layers of temperature change cause booms to be turned upward as they travel toward the ground. Depending on the altitude of the aircraft and the Mach number, many sonic booms are bent upward sufficiently that they never reach the ground. This same phenomenon, referred to as "cutoff," acts to limit the width (area covered) of the sonic booms that reach the ground (Plotkin et al. 1989).

When a sonic boom reaches the ground, it impacts an area that is referred to as a "footprint" or (for sustained supersonic flight) a "carpet." The size of the footprint depends on the supersonic flight path and on atmospheric conditions. Sonic booms are loudest near the center of the footprint, with a sharp "bang-bang" sound. Near the edges, they are weak and have a rumbling sound like distant thunder.

Sonic booms from air combat training activity have an elliptical pattern. Aircraft will set up at positions in excess of 100 NM apart before proceeding toward each other for an engagement. The airspace used tends to be aligned, connecting the setup points in an elliptical shape. Aircraft will fly supersonic at various times during an engagement exercise. Supersonic events can occur as the aircraft accelerate toward each other, during dives in the engagement itself, and during disengagement.

A variety of aircraft conducting training perform flight activities that include supersonic events. For most aircraft, these events occur during air-to-air combat, often at high altitudes. Long-term sonic boom measurement projects have been conducted in four airspaces: White Sands, New Mexico (Plotkin et al. 1989); the eastern portion of the Goldwater Range, Arizona (Plotkin et al. 1992); the Elgin MOA at Nellis AFB, Nevada (Frampton et al. 1993); and the western portion of the Goldwater Range, Arizona (Page et al. 1994). These studies included analysis of schedule and air combat maneuvering instrumentation data, and they supported development of the 1992 BOOMAP model (Plotkin et al. 1992). The current version of BOOMAP (Frampton et al. 1993; Plotkin 1996) incorporates results from all four studies. Because BOOMAP is directly based on long-term measurements, it implicitly accounts for maneuvers, statistical variations in operations, atmospheric effects, and other factors.

B.2.3.3 Airports and Military Airfields

Noise around the primary military and civilian airfields in the affected area is typically dominated by aircraft noise. Civilian aircraft operating in the region are predominantly small propeller-driven aircraft. Jet aircraft are generally limited to larger airfields, such as the Fairbanks International Airport. Military aircraft include fourth and fifth generation fighter aircraft, fixed-wing cargo and attack aircraft, and rotary-wing aircraft.

B.2.3.4 Training Areas and Firing Ranges

Noise levels associated with large munitions training (i.e., 20 mm rounds and larger) under representative baseline conditions were calculated using the BNOISE2 program (Hottman et al. 1986). Determination of noise generated by vehicles in the training ranges was based on field measurements, as reported in the 2004 EIS for Transformation of U.S. Army Alaska (USARAK 2004). Ground vehicle noise is less intense than munitions noise, which occurs in the same areas, and was not considered in detail (see Table 3-106 and the table in Appendix E, *Noise*, entitled "Peak Noise Level Associated With Munitions Noise Events").

Fort Wainwright and the Tanana Flats Training Area. Fort Wainwright (FWA) and the Tanana Flats Training Area (TFTA) were calculated as part of a *2006 Joint Land Use Study* (ASCG Incorporated of Alaska [ASCG] 2006). Air-to-ground and ground-to-ground munitions use in the Blair Lakes Impact Area is limited to inert munitions. Other noise sources at FWA and in TFTA include military vehicle maneuvers.

Donnelly Training Area. The Oklahoma Impact area in the Donnelly Training Area (DTA) is a primary location for air-to-ground and ground-to-ground high-explosives munitions training in the JPARC. Peak noise levels (PK 15(met)) generated by the largest of the high-explosives munitions used in the DTA under representative baseline conditions exceed 115 dBP PK 15(met) in areas outside range boundaries. Persons in areas affected by these high-intensity noise events may be startled or annoyed by the noise. Time-averaged noise levels exceeding 62 CDNL and peak noise levels exceeding 130 dBP PK 15(met) do not occur in areas outside of the boundaries of the range (see Figures 3-20 and 3-21).

Yukon Training Area. Air-to-ground and ground-to-ground munitions training occurs in the Yukon Training Area (YTA), but neither time-averaged noise levels exceeding 62 dB CDNL nor peak noise levels exceeding 115 dBP PK 15(met) extend beyond the boundaries of DoD-owned land (see Figures 3-33 and 3-34).

Other Noise Sources. Noise is also caused by vehicles and equipment, either on a regular, intermittent, or temporary basis, within both military lands and public and private lands. Noise sources are generally more prevalent in built-up areas, at construction sites, or industrial areas or production sites (e.g., oil and gas wells). Vehicles, snowmobiles, and all-terrain vehicles (ATVs) also generate noise, mostly dispersed and intermittent throughout the area comprising JPARC air and land assets.

B.2.3.5 Noise Management and Noise-Sensitive Areas

For areas not in the vicinity of airfields, special consideration is given to the evaluation of noise impacts on noise-sensitive areas such as national parks, national wildlife refuges, and historic sites, including traditional cultural properties. An area is defined by the FAA as noise-sensitive if noise interferes with normal activities associated with the area's use. Examples of noise-sensitive areas include residential, educational, health, and religious structures and sites, as well as parks, recreation areas (including areas with wilderness characteristics), wildlife refuges, and cultural and historic sites where a quiet setting is a generally recognized feature or attribute.

Direct negative effects of noise in noise-sensitive areas are variable, ranging from health effects or annoyance in persons (e.g., interference with communication or sleep) to measureable population declines in animals (particularly mammals during critical life stages such as calving and breeding). Indirectly, this can translate into changes in the suitability or desirability of an area for ongoing or planned uses, a degrading of the value of an area, or a reduction or loss of important biological resources.

From the military planning perspective, sources of noise are usually from aircraft, particularly around airfields, and from low-flying (and usually high-speed) aircraft in military training airspace. Variables include the type of aircraft, altitude, speed, and power level. Incompatibility is relative to the context, that is, the surrounding noise environment, the type of land use, and people's expectations. Another source of noise is from firing ranges, where impulsive noise can produce loud individual sound levels, depending on the distance to the receptor and the types of weapons and munitions fired.

Achieving sustainable compatibility between military operations and the surrounding environment can depend on the use of selected measures to attenuate or reduce noise. Typical abatement measures include the following:

- Avoidance of receptor by specified vertical and lateral distances
- Adjustments to operations such as power levels and hours of operation
- Land buffering (using land to maintain distance between noise source and receptor)
- Selective alignment of flight tracks, patterns, and approach axes to limit exposure to sensitive areas
- Noise deflection (through sound barriers, deflectors, or berms)
- Use of vegetation (natural or planted) or sound-absorbing materials

Defining noise-sensitive areas is a collaborative process focused at identifying locations of affected resources or persons, the degree of sensitivity, and particular concerns (e.g., seasonal or daily variations in sensitivity). Identifying some of these areas up front when planning new airspace and land assets allows the proponent to anticipate and address limitations and likely public opposition early in the process. For the purpose of broad-scale evaluation, the following are considered noise-sensitive areas:

- Urban or developed areas
- Native villages
- Subsistence resource areas (pending acquisition of data on locations)
- Isolated dwellings/homesteads (identified through flyovers and aerial photography)
- Sensitive habitats (e.g., moose, caribou, and Dall sheep rutting, calving, and wintering areas)
- Waterfowl nesting and molting areas (seasons)
- Eagle and other raptor nests
- Wilderness areas/Wild and Scenic Rivers
- National parks/monuments
- Special recreation areas (data incomplete)
- National/state wildlife/bird refuges, conservation areas, and management areas

Figure B-3 shows noise-sensitive areas in the EIS study area. The locations and degree of sensitivity are subject to review and refinement and are only useful at a preliminary planning or screening level. Residential areas, communities, national parks, and other managed areas are continuous in their sensitivity, although some areas may have specific conditions that are seasonal. Biological constraints tend to be seasonal or dependent on the reproductive cycle.

National parks, which have explicit overflight altitude restrictions, are typical of Federally protected, thus noise-sensitive, regions within the study area. Bureau of Land Management (BLM) conservation areas underlie the Yukon MOA complex, Denali National Park underlies part of the Susitna MOA, and several Wild and Scenic River corridors lie to the east of the Fox MOAs. Furthermore, several Alaska Native villages are arrayed along the west and north fringes of the planning area, though few are in the environs of existing military airspace. Mixed developed land use and residential populations around Fairbanks, Anchorage, Wasilla, Palmer, and Delta Junction and along the U.S. Highway 3 corridor also have varying degrees of sensitivity to noise.

B.3 SAFETY

B.3.1 Definition of Resource

Safety refers to the aspects of military training activities that potentially pose a risk to health, safety, and well-being of the general public and military personnel. The following types of safety risks are considered in the EIS.

Flight safety considers aircraft flight risks, including the risks of accidents and mishaps from various causes (e.g., malfunction, bird-aircraft collision), midair collision, and interruption of airborne emergency services. Of particular concern is the safe interface between military and nonparticipating aircraft in SUA areas and uncontrolled airspace.

Ground safety considers potential to pose hazards to the general public and military personnel. The scope of ground safety includes safety and control, unexploded ordnance (UXO) and munitions safety, public access control, and fires and emergency response.

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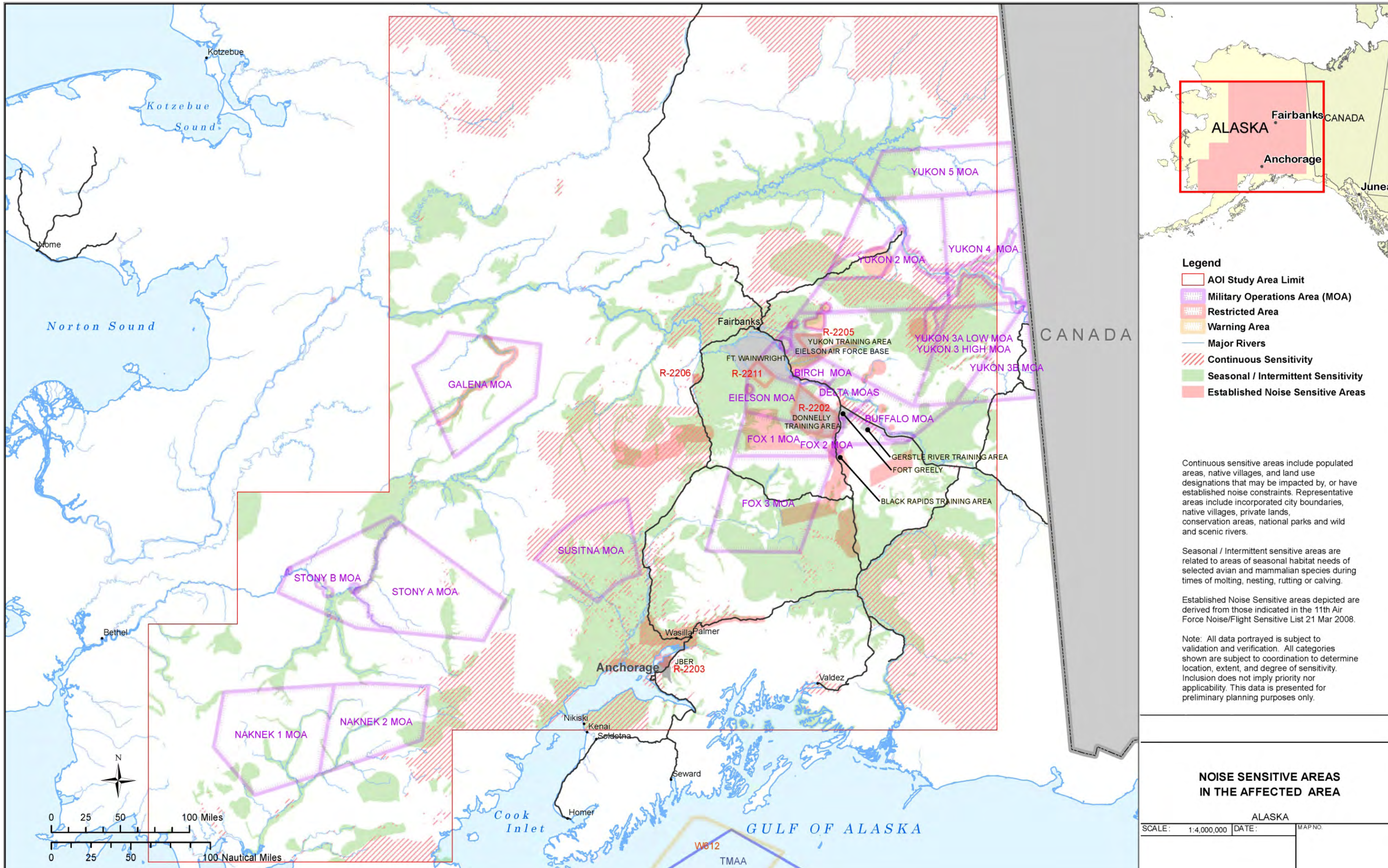

Figure B-3. Noise Sensitive Areas in the Affected Area

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B.3.2 Regulatory Setting

B.3.2.1 Flight Safety

Safety of flight is the core basis for all programs, procedures, and practices that govern how an aircraft is operated in any airspace environment under all flight conditions. It also constitutes one of the greatest areas of concern when any new action or activity is being considered that could be viewed as having a consequential effect on aviation activities within that environment. Given its critical importance, the FAA, DoD, and other agencies have established and mandated strict adherence to rules and regulations aimed at ensuring a safe operational environment is maintained for all airspace users.

The regulatory setting for safety compliance in Alaska includes AFI 91-202, *The US Air Force Mishap Prevention Program* (Air Force 2011a), AR 95-1, *Aviation Flight Regulations* (Army 2008a), and the respective 11th AF and USARAK supplements to those directives. These directives prescribe general flight regulations, requirements, and operating procedures governing the command, control, and operation of flight activities within Alaska. Aircrew members continually receive extensive training and safety briefings on these requirements.

Most public scoping concerns centered on the potential for aircraft mishaps, inadequate communications capabilities for staying informed on SUA use, and safety risks from low-altitude, high-speed flight activities. The aforementioned directives and other safety program initiatives provide the regulatory framework for those actions the Air Force and Army must take in preventing any unsafe conditions that can contribute to such public concerns.

B.3.2.2 Ground Safety

This section provides an overview of the ground safety resource area.

B.3.2.2.1 Range Safety and Control

Range Safety and Control addresses established procedures designed to minimize potential safety impacts to military personnel and the general public. Range safety and control is the responsibility of the USARAK Range Management Office (RMO). All training activities must be coordinated in advance through the RMO. During training activities, the RMO Office clears the affected training area by closing range gates and blocking passable trails. The airspace to be utilized is also surveyed visually and electronically to ensure that unauthorized aircraft or vehicles are not in the affected area during training. If any unauthorized personnel, vehicles, or aircraft are detected, the training activity is temporarily halted until the area is cleared and secured.

A key part of these procedures includes development of weapon safety footprints, also referred to as surface danger zones (SDZs) by the Army. SDZs are employed for land-based training where live ordnance is used. These SDZs act as overlays that restrict activities that could normally occur within and adjacent to test or training areas. If any unauthorized personnel or vehicles are detected within the area during training, all activity is temporarily halted until the area is cleared and secured.

B.3.2.2.2 Unexploded Ordnance and Munitions Safety

The potential exists to find UXO within JPARC range lands from historic training activities. These include impact areas and SDZs where ordnance might have been deliberately employed or accidentally dropped, or where ordnance might have landed after ricocheting. UXO could pose a danger to personnel when they enter potentially hazardous areas to set up targets or instrumentation in support of training activities. UXO may also be encountered during range or road construction activities.

JPARC has strict safety policies and procedures in place to minimize the risk posed by UXO to personnel. As necessary, at the earliest time after the project planning phase, personnel perform a UXO site survey to determine the extent of the ordnance contamination to aid in the design of the range and minimize intrusive work in portions of the range which are highly contaminated with ordnance and to determine the correct ordnance response actions (USARAK 2010). If UXO contamination is encountered during construction or training activities, work within the immediate area ceases and Range Control notifies the appropriate Explosive Ordnance Disposal (EOD) team.

Current practices require the ranges to be cleared of munitions debris on a regular basis. Equipment such as metal detectors, robots, and protective "bomb suits" may be employed to find and deal with UXOs. Once a potentially dangerous item is found, EOD personnel may remove the item to another location for disposal or may destroy the item in-place (a small amount of plastic explosive is placed next to the item and detonated from a safe distance). EOD will then verify that no dangerous components remain on the range.

These procedures are designed to limit, to the extent practical, the potential for explosives mishaps and the damaging effects of such to personnel, operational capability, property, and the environment and to enhance the ability to prevent or respond to a release or substantial threat of a release of munitions constituents from an operational range to off-range areas.

B.3.2.2.3 Public Access and Control

A number of standard safety procedures exist on JPARC ranges to ensure limited public access to affected areas during training activities. These procedures require every practical effort to keep the designated areas clear of all nonparticipating vehicles and personnel. These procedures may include roadblocks, as well as notifications to the public, by newspaper or other means, of potential training activities and road closures.

Public access into training areas is allowed subject to safety restrictions and military security, when access does not impair the military mission, as determined by the Installation Commander. Public access into firing ranges, surface danger zones, and non-dudded impact areas is normally not allowed due to conflicts with the military mission. However, there are times during the year when public use does not conflict with military training and public access is allowed into these areas. Finally, public access into dudded impact areas is prohibited because of the hazard of unexploded ordnance (USARAK 2010).

B.3.2.2.4 Fires and Emergency Response

Wildfire management on USARAK lands is required by the Sikes Act and AR 200-1, as well as Public Law 106-65, the Military Lands Withdrawal Act. Additional direction regarding fire management comes from USARAK's Integrated Wildland Fire Management Plan (IWFMP) and the Memorandum of Understanding between BLM and USARAK concerning the Management of Certain Public Lands Withdrawn for Military Use and the Interdepartmental Support Agreements WC1SH3-95089-502 and 140138-95089-905 between USARAK and BLM. The IWFMP directly supports USARAK missions, is consistent with emergency operations plans, and is integrated into the Integrated Natural Resource Management Plan (INRMP), the USARAK's fire and emergency services plan, and the Integrated Cultural Resource Management Plan (ICRMP). The goal of the IWFMP is to establish fire management procedures and protocols to provide USARAK the capability to complete its mission to maintain combat readiness and fulfill resource management intent (USARAK 2010).

Three primary management actions are used by USARAK to prevent wildfires. First, a fire danger rating system is used to reduce the likelihood of a fire by limiting military activities. Certain military activities are restricted when thresholds of wildfire risk are reached, such as limiting or eliminating the use of pyrotechnic devices or ordnance during periods of high fire potential. During dry periods, specific targets and ranges with a high fire risk are continuously evaluated for the safety of planned operations. Second, wildfire danger is reduced through the removal of accumulated fuels (e.g., prescribed burning and/or construction and maintenance of fire or fuel breaks). Third, an Initial Attack Response Team remains available during military training activities during high and extreme fire danger to provide a rapid initial response to wildfires in the area (USARAK 2010).

B.3.3 General Description of Affected Environment

B.3.3.1 Flight Safety

B.3.3.1.1 Aircraft Mishaps

The increased potential for aircraft mishaps was one of the primary concerns expressed during public scoping. Both military and civilian aircraft mishaps may be caused by such conditions as inclement weather, mechanical failure, pilot error, collisions with other aircraft, structures or terrain, and bird/wildlife strikes. Mishaps are categorized by the DoD Services as Class A, B, C, D, and E. The Army also tracks incidents involving aircraft turbine engine damage as Class F. Class A mishaps result in a loss of life, permanent total disability, a total cost in excess of $2 million, or destruction of an aircraft. Class B mishaps result in total costs of more than $500,000, but less than $2 million, or result in permanent partial disability or inpatient hospitalization of three or more personnel. Class C mishaps involve reportable damage of more than $50,000 but less than $500,000; an injury resulting in any loss of time from work beyond the day or shift on which it occurred, or occupational illness that causes loss of time from work at any time; or an occupational injury or illness resulting in permanent change of job. Class D mishaps are minor, up to less than $50,000 while a Class E is less than $2,000. A hazardous occurrence having a high potential for becoming a mishap is considered a High Accident Potential (HAP) event. Class C mishaps and HAP events are the most common occurrences, generally involving only minor damage and injuries while rarely affecting property or the public.

Class A mishap rates are calculated by the number of mishaps by aircraft type per 100,000 flying hours. This rate is based on historical data for mishaps at all military installations and under all flight conditions but does not include combat losses resulting from enemy action. Tracking mishaps in this manner provides a general basis for statistical prediction, although the actual causes of mishaps are due to many factors, not simply the amount of aircraft flying time.

The JPARC airspace proposals address flight safety relative to the potential for aircraft mishaps, near-miss and midair collisions, and bird-aircraft strikes. The aircraft mishap potential considers what increases in aircraft operations may occur within the existing and proposed airspace compared to current representative levels. The potential for near-miss/midair collisions considers those areas where both higher density military and VFR civil air traffic operations and interactions may occur. The potential for bird-aircraft strikes considers those areas and altitudes where the different species are known to be present relative to the areas/altitudes where military aircraft typically operate. The presence of the different wildlife species are addressed in the Biological and Flight Safety discussions.

B.3.3.1.2 Communications Capabilities

The availability of radio and radar capabilities within the affected airspace region is a key element to providing for the flight safety of all aircraft. Where feasible, pilots can contact ATC and other agencies to receive advisories on SUA use and other traffic information, as well as radar flight following. It is recognized that current radio and radar capabilities in the more remote areas of Alaska and at some lower altitudes do not always provide the communications coverage needed for these advisory services. As part of the overall JPARC communication system, the Air Force has initiated projects to expand communication within the airspace used for all training, including MFEs. These communication enhancements expand both radio and radar coverage in the existing airspace and those areas potentially affected by the proposed airspace actions. The Air Force is working with the FAA to provide enhanced radio coverage, which would benefit ATC services and airspace management for both military and civil aviation throughout those areas where military training activities are being conducted. Enhancements to both radio and radar coverage will improve both the military and FAA ability to communicate airspace activities and will improve safety, efficiency, and emergency coverage of the area.

B.3.3.1.3 Outreach Initiatives

The 11th AF and USARAK have been proactive in providing the civil aviation community with information on military use of the Alaska training airspace. One of the most successful initiatives is publication of the SUAIS brochure which is distributed in hard copy and electronically via the JBER website. This brochure serves both pilots and residents in providing information on where low-flying military aircraft and jet noise may occur. It also includes maps showing the layout of the SUA and those VFR corridors that general aviation aircraft may use to transit the MOA complex when this airspace is active. The primary function of the SUAIS is to provide civilian pilots with information regarding Air Force flight operations in the MOAs and restricted airspace within central Alaska so they may better plan their flights through and around the SUA. The service provides real-time information when these airspace areas are open during military flying windows. When these areas are inactive, or outside the flying windows, it provides information on the next day's schedule. The SUAIS also provides information on Army artillery firing and known helicopter operations. It provides telephone and radio frequency contact information for the Eielson Range Control facility where this real-time information can be obtained. As noted in the brochure, air evacuation, Life Flight, firefighting, and other emergency aircraft will always have priority over military training. The SUAIS brochure is provided for information purposes only and recommends that pilots contact the nearest Flight Service Station for the latest Notice to Airmen information on the SUA status. Contact information is also provided for filing noise complaints.

The 3rd Wing and the 354th Fighter Wing have each published a Mid-air Collision Avoidance (MACA) program to help inform the civil aviation community of the aircraft types and missions flown; the airspace areas used; flight procedures; and contacts for obtaining information on airspace status, reporting hazards, and requesting general information. These MACA pamphlets, along with the SUAIS brochure, are a valuable tool in communicating where, when, and how military flight training activities are conducted with the objective of helping to achieve the highest level of flight safety possible throughout the JPARC regions.

B.3.3.2 Wildlife Strike Hazard

Bird-aircraft strikes constitute a safety concern because they can result in damage to aircraft or injury to the aircrew or local human populations if an aircraft crashes. Aircraft may encounter birds at altitudes up to 30,000 MSL or higher. However, most birds fly close to the ground. More than 97 percent of reported bird strikes occur below 3,000 feet AGL. Approximately 30 percent of bird strikes happen in the airport environment, and almost 55 percent occur during low-altitude flight training (AFSC 2010).

Migratory waterfowl (e.g., ducks, geese, and swans) are the most hazardous birds to low-flying aircraft because of their size and their propensity for migrating in large flocks at a variety of elevations and times of day. Waterfowl vary considerably in size, from 1 to 2 pounds for ducks, 5 to 8 pounds for geese, and up to 20 pounds for most swans. There are two normal migratory seasons, fall and spring. Waterfowl are usually only a hazard during migratory seasons. These birds typically migrate at night and generally fly between 1,000 to 2,500 feet AGL during migration.

In addition to waterfowl, raptors, shorebirds, gulls, songbirds, and other birds also pose a hazard. In considering severity, the results of bird-aircraft strikes in restricted areas show that strikes involving raptors result in the majority of Class A and Class B mishaps related to bird-aircraft strikes. Raptors (eagles and hawks) and waterfowl pose a concern. Migration periods for waterfowl and raptors are from August to October and from April to May. In general, flights above 1,500 feet AGL would be above most migrating and wintering raptors.

Songbirds are small birds, usually less than one pound. During nocturnal migration periods, they navigate along major rivers, typically between 500 to 3,000 feet AGL. The potential for bird-aircraft strikes is greatest in areas used as migration corridors (flyways) or where birds congregate for foraging or resting (e.g., open water bodies, rivers, and wetlands). While any bird-aircraft strike has the potential to be serious, many result in little or no damage to the aircraft, and only a minute portion result in a Class A mishap. During the years 1985 to 2009, the Air Force Bird-Aircraft Strike Hazard (BASH) Team documented 86,189 bird strikes worldwide. Of these, 31 resulted in Class A mishaps where the aircraft was destroyed, constituting approximately 0.04 percent of all reported bird-aircraft strikes (AFSC 2010).

Special briefings are provided to pilots whenever the potential exists for greater bird-strike sightings within the airspace.

B.3.3.3 Ground Safety

B.3.3.3.1 Fire Management

The BLM Alaska Fire Service (AFS) located at Fort Wainwright, Alaska, provides wildland fire suppression services for all U.S. Department of the Interior (DOI) and Native Corporation Lands in Alaska. In addition to suppressing wildland fires, AFS has other statewide responsibilities, including: interpretation of fire management policy; oversight of the BLM Alaska Aviation program; planning, implementing, and monitoring fuels management projects; disposing of hazardous materials; and operating and maintaining advanced communication and computer systems such as the Alaska Lightning Detection System. AFS operates on an interagency basis - cooperators include the BLM, State of Alaska Department of Natural Resources, U.S. Forest Service (USFS), National Park Service (NPS), Bureau of Indian Affairs, U.S. Fish and Wildlife Service (USFWS), and the U.S. Military in Alaska.

Fire management in the DTA-East is set forth in Section 3.2.3 of the BAX/CACTF EIS (USARAK 2006a).

B.4 AIR QUALITY

B.4.1 Definition of Resource

Air quality is determined by the size and topography of the air basin, the local and regional meteorological influences, and the type and concentration of pollutants in the atmosphere, which are generally expressed in units of parts per million (ppm) or micrograms per cubic meter. One of the criteria for determining significance is a pollutant's measured concentration in comparison with a national and/or state ambient air quality standard. These standards represent the maximum allowable atmospheric concentrations that may occur and still protect public health and welfare, while ensuring a reasonable margin of safety for the more sensitive individuals in the population.

B.4.2 Regulatory Setting

The Clean Air Act (CAA) (U.S.C. 42, Chapter 85, as amended in 1990) is the law that defines the responsibilities of the U.S. Environmental Protection Agency (EPA) for protecting and improving the nation's air quality and the ozone layer. National standards established by the EPA are termed the National Ambient Air Quality Standards (NAAQS). They represent the maximum acceptable concentrations that generally may not be exceeded more than once per year, except for the annual standards, which may never be exceeded. The CAA and its subsequent amendments delegate the enforcement of these standards to the states, which may adopt the NAAQS as state standards or establish more stringent acceptable pollutant concentration levels if they deem them necessary.

The Alaska Department of Environmental Conservation (ADEC) has adopted the NAAQS and has established additional state ambient air quality standards for purposes of regulating air quality in Alaska. The state standards are codified in Alaska Administrative Code (AAC), specifically, 18 AAC 50, *Air Quality Control* (ADEC 2011a). Table B–11 summarizes the national and state ambient air quality standards that apply to the areas potentially affected by the proposed actions in Alaska.

Ozone concentrations are the highest during the warmer months of the year and coincide with the period of maximum solar radiation. Maximum ozone concentrations tend to be homogeneously spread throughout a region, since it often takes several hours to convert precursor emissions to ozone in the atmosphere. Inert pollutants, such as carbon monoxide, tend to have the highest concentrations during the colder months of the year, when light winds and nighttime/early morning surface-based temperature inversions inhibit atmospheric dispersion. Maximum inert pollutant concentrations are usually found near an emission source.

National Emissions Standards for Hazardous Air Pollutants. EPA has set National Emissions Standards for Hazardous Air Pollutants (NESHAPs) for emissions of hazardous air pollutants (HAPs) (also known as air toxics) not covered by NAAQS that may cause an increase in fatalities or in serious, irreversible, or incapacitating illness (40 CFR 61). EPA currently lists 188 compounds to be controlled as HAPs, most of which are volatile organic compounds (VOCs). The CAA, Section 112, requires the control of HAPs from specific area and major source categories. An area source is defined as a stationary source that emits less than 10 tons per year (tpy) of any single HAP and less than 25 tpy of all HAPs. A major source emits more than 10 tpy of any single HAP and over 25 tpy of all HAPs. In 1999, EPA provided further guidance as to which provisions, including NESHAPs, of the CAA are delegated to ADEC (EPA 1999a). Provisions of 40 CFR 61 applicable to ADEC are listed in 18 AAC 50 (ADEC 2011a).

Prevention of Significant Deterioration. Section 162 of the CAA established the goal of prevention of significant deterioration (PSD) of air quality in all international parks, national parks exceeding 6,000 acres in size, and national wilderness areas exceeding 5,000 acres (if these areas were in existence on or before August 7, 1977). Such areas were defined as mandatory Class I areas, while all other attainment or unclassifiable areas were defined as Class II areas. Under CAA Section 164, states or tribal nations, in addition to the Federal government, have the authority to redesignate certain areas as (nonmandatory) PSD Class I areas, e.g., a national park or national wilderness area established after August 7, 1977, whose area exceeds 10,000 acres. Class I areas are areas where any appreciable deterioration of air quality is considered significant. Class II areas are those where moderate, well-controlled growth could be permitted. The PSD requirements affect construction of new major stationary sources in the Class I, II, and III areas; they are, in fact, a preconstruction permitting system. For example, a proposed action that would increase any pollutant level by more than 1 $\mu g/m^3$ within a Class I area would produce a significant amount of emissions, as defined in Section 40 CFR 52.21(b)(23)(iii) of the PSD regulation.

Table B–11. National and State Ambient Air Quality Standards

Pollutant	Averaging Time	Alaska AAQS	National AAQS	
			Primary	Secondary
Carbon Monoxide	8-hour[1]	9 ppm (10 mg/m^3)	9 ppm (10 mg/m^3)	None
	1-hour[1]	35 ppm (40 mg/m^3)	35 ppm (40 mg/m^3)	
Nitrogen Dioxide	Annual (arithmetic average)	53 ppb[2] (100 µg/m^3)	53 ppb[3] (100 µg/m^3)	Same as Primary
	1-hour[3]	None	100 ppb	None
Particulate Matter (PM_{10})	24-hour[4]	150 µg/m^3	150 µg/m^3	Same as Primary
Particulate Matter ($PM_{2.5}$)	Annual[5] (arithmetic average)	15.0 µg/m^3	15.0 µg/m^3	Same as Primary
	24-hour[6]	35 µg/m^3	35 µg/m^3	Same as Primary
Ozone	8-hour[7]	0.075 ppm	0.075 ppm (2008 std)	Same as Primary
	1-hour[8]	None	0.12 ppm	Same as Primary
Lead	Rolling 3-month average	0.15 µg/m^3 [9]	0.15 µg/m^3 [9]	Same as Primary
Sulfur Dioxide	Annual[10] (arithmetic average)	0.03 ppm (80.0 µg/m^3)	None	None
	24-hour[1, 10]	0.14 ppm (365 µg/m^3)	None	None
	3-hour	0.5 ppm 1300 µg /m^3 [11]	None	0.5 ppm (1300 µg /m^3)
	1-hour[10]	75 ppb[11]	75 ppb[12]	None
Reduced sulfur compounds measured as sulfur dioxide	30-minute[1]	50 µg/m^3	None	None
Ammonia	8-hour[1]	2.1 mg/m^3	None	None

[1] Not to be exceeded more than once per year.
[2] The official level of the annual nitrogen dioxide standard is 0.053 ppm, equal to 53 ppb.
[3] To attain this standard, the 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 100 ppb (effective January 22, 2010).
[4] Not to be exceeded more than once per year on average over 3 years.
[5] To attain this standard, the 3-year average of the weighted annual mean PM2.5 concentrations from single or multiple community-oriented monitors must not exceed 15.0 µg/m3.
[6] To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 µg/m3.
[7] To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.075 ppm.
[8] (a) EPA revoked the 1-hour ozone standard in all areas, although some areas have continuing obligations under that standard ("anti-backsliding"). (b) The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is less than 1.
[9] Final rule signed on October 15, 2008.
[10] Final rule signed June 2, 2010. The 1971 annual and 24-hour SO_2 standards were revoked on June 2, 2010 when the 1-hour standard was put into effect. However, these standards remain in effect until one year after an area is designated for the 2010 standard, except in areas designated nonattainment for the 1971 standards.
[11] 30-minute average of 50 micrograms per cubic meter not to be exceeded more than once each year.
[12] (a) Final rule signed on June 2, 2010. To attain this standard, the 3-year average of the 99th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 75 ppb.

Key: AAQS=Ambient Air Quality Standards; EPA=Environmental Protection Agency; ppm=parts per million; ppb=parts per billion; mg/m^3=milligrams per cubic meter; µg/m^3=micrograms per cubic meter; $PM_{2.5}$=particulate matter with an aerodynamic diameter less than or equal to 2.5 micrometers; PM_{10}=particulate matter with an aerodynamic diameter less than or equal to 10 micrometers; std=standard.

Source: EPA 2010a; ADEC 2011a.

Within the area potentially affected by the proposed actions, Denali Wilderness Area is the closest PSD Class I area. The border of the proposed Fox MOA expansion is approximately 15 miles from the Denali Wilderness Area. The remainder of the affected area is classified as PSD Class II, and has substantially less-stringent criteria for air quality than PSD Class I areas.

Visibility. CAA Section 169A established the additional goal of prevention of further visibility impairment in Class I areas. Visibility impairment is defined as a reduction in the visual range and atmospheric discoloration. Determination of the significance of an activity on visibility in a Class I area is typically associated with evaluation of stationary-source contributions. EPA implemented a Regional Haze rule for Class I areas that calls for states to establish goals and emission reduction strategies for improving visibility in all mandatory Class I national parks and wilderness areas, addressing contributions from mobile sources and pollution transported from other states or regions (EPA 1999b).

General Conformity. CAA Section 176(c), General Conformity Rule, requires that Federal agency actions be consistent with the CAA and any approved state implementation plan (SIP), which are required to help a nonattainment region achieve attainment of the NAAQS. To implement this mandate, EPA promulgated the General Conformity Rule for general Federal actions in the November 30, 1993 *Federal Register* (58 FR 63214–63259), effective January 31, 1994 (EPA 1993). In 2006, EPA revised the General Conformity Rule to include *de minimis* emission levels for $PM_{2.5}$ and its precursors (EPA 2006).

On April 5, 2010, EPA finalized revisions to the General Conformity Rule that improve on the methods Federal agencies can use to demonstrate conformity (75 FR 17253–17279) (EPA 2010b). These revisions took effect on July 6, 2010. Federal activities must not do the following:

(a) Cause or contribute to any new violation of a NAAQS

(b) Increase the frequency or severity of any existing violation of a NAAQS

(c) Delay timely attainment of any standard, interim emission reductions, or milestones in conformity with a SIP's purpose of eliminating or reducing the severity and number of NAAQS violations or achieving attainment of NAAQS.

The General Conformity Rule applies only to nonattainment and maintenance areas. If the emissions from a Federal action proposed in a nonattainment or maintenance area exceed annual *de minimis* thresholds (typically, 100 tons per year) identified in the rule, a formal conformity determination is required of that action. The *de minimis* thresholds are more restrictive as the severity of the nonattainment status of the region increases.

Climate Change and Greenhouse Gases. Greenhouse gases (GHGs) are gases that trap heat in the atmosphere. These emissions are generated by both natural processes and human activities. The accumulation of GHGs in the atmosphere regulates the earth's temperature.

The U.S. Global Change Research Program report *Global Climate Change Impacts in the United States* (USGCRP 2009) states the following:

> Observations show that warming of the climate is unequivocal. The global warming observed over the past 50 years is due primarily to human-induced emissions of heat-trapping gases. These emissions come mainly from the burning of fossil fuels (coal, oil, and gas), with important contributions from the clearing of forests, agricultural practices, and other activities.
>
> Warming over this century is projected to be considerably greater than over the last century. The global average temperature since 1900 has risen by about 1.5 degrees Fahrenheit (°F). By 2100, it is projected to rise another 2 to 11.5°F. The U.S. average temperature has risen by a comparable amount and is very likely to rise more than the global average over this century, with some variation from place to place. Several factors will determine future temperature increases. Increases at the lower end of this range are more likely if global heat-trapping gas emissions are cut substantially. If emissions continue to rise at or near current rates, temperature increases are more likely to be near the upper end of the range. Volcanic eruptions or other natural variations could temporarily counteract

some of the human-induced warming, slowing the rise in global temperature, but these effects would only last a few years.

Reducing emissions of carbon dioxide would lessen warming over this century and beyond. Sizable early cuts in emissions would significantly reduce the pace and the overall amount of climate change. Earlier cuts in emissions would have a greater effect in reducing climate change than comparable reductions made later. In addition, reducing emissions of some shorter-lived heat-trapping gases, such as methane, and some types of particles, such as soot, would begin to reduce warming within weeks to decades.

Climate-related changes have already been observed globally and in the United States. These include increases in air and water temperatures, reduced frost days, increased frequency and intensity of heavy downpours, a rise in sea level, and reduced snow cover, glaciers, permafrost, and sea ice. A longer ice-free period on lakes and rivers, lengthening of the growing season, and increased water vapor in the atmosphere have also been observed. Over the past 30 years, temperatures have risen faster in winter than in any other season, with average winter temperatures in the Midwest and northern Great Plains increasing more than 7 ºF. Some of the changes have been faster than previous assessments had suggested.

These climate-related changes are expected to continue while new ones develop. Likely future changes for the United States and surrounding coastal waters include more intense hurricanes with related increases in wind, rain, and storm surges (but not necessarily an increase in the number of these storms that make landfall), as well as drier conditions in the Southwest and Caribbean. These changes will affect human health, water supply, agriculture, coastal areas, and many other aspects of society and the natural environment.

GHGs include water vapor, carbon dioxide, methane, nitrous oxide, ozone, and several hydrocarbons (HCs) and chlorofluorocarbons (CFCs). Each GHG has an estimated global warming potential (GWP), which is a function of its atmospheric lifetime and its ability to absorb and radiate infrared energy emitted from the Earth's surface. The GWP of a particular gas provides a relative basis for calculating its carbon dioxide equivalent or the amount of carbon dioxide that emissions of that gas would be equal to. Carbon dioxide has a GWP of 1, and is, therefore, the standard by which all other GHGs are measured.

The following is a summary of the Federal and DoD air quality rules and regulations that may apply to emission sources associated with the proposed action and alternatives.

EPA issued the *Final Mandatory Reporting of Greenhouse Gases Rule* on October 30, 2009 (EPA 2009a). This rule does not apply to mobile sources of GHGs and would not apply to the JPARC airspace training activities, but would apply to installations and ground-based maneuvers. Executive Order (EO) 13423, *Strengthening Federal Environmental, Energy, and Transportation Management*, was signed by President Bush on January 24, 2007. The EO instructs Federal agencies to conduct their environmental, transportation, and energy-related activities in an environmentally, economically, and fiscally sound, integrated, continuously improving, efficient, and sustainable manner. The EO requires Federal agencies to meet specific goals to improve energy efficiency and reduce GHG emissions by annual energy usage reductions of 3 percent through the end of fiscal year 2015, or by 30 percent by the end of fiscal year 2015, relative to the baseline energy use of the agency in fiscal year 2003. According to EO 13423 § 8(c), military tactical equipment and vehicles may be exempted from this EO. In general, EO 13423 applies to activities and operations at the installation rather than to aircraft training activities. Thus, the JPARC training airspace is exempt from EO 13423, but installations and ground-based maneuvers in training areas related to the proposed actions are not exempt.

In addition to EO 13423, on October 5, 2009, President Obama signed EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance*, to establish an integrated strategy toward sustainability in the Federal Government and to make reduction of GHGs a priority for Federal agencies. Under this EO, the Air Force will be reporting a comprehensive inventory of GHG emissions, including such emissions associated with the areas potentially affected by the proposed actions, annually beginning in the first fiscal year of training activities. The emissions reported will include all “Scope 1” emissions, which are all direct emissions of GHGs owned or controlled by the agency; all “Scope 2” emissions, which are all indirect emissions of GHGs from electricity, steam, or heat purchased by the agency; and all “Scope 3” emissions, which includes supply chain, business travel, and employee commuting emissions. The comprehensive GHG emissions inventories will, among other things, include emissions from aircraft operations; tactical and highway vehicles; and non-road engines and equipment. While GHG emissions from aircraft and tactical vehicles and equipment were required to report annually beginning with fiscal year 2010, these combat and combat support systems are not subject to the EO’s GHG emissions reduction target. EO 13514 § 19(h) identifies an exemption for non-road vehicles and equipment, including aircraft, that are used in combat support or training for such operations. However these exemptions do not apply when it comes to NEPA regulations, which require that the GHG emissions from these operations be assessed.

On February 18, 2010, the CEQ released its Draft NEPA Guidance on Consideration of the Effects of Climate Change and Greenhouse Gas Emissions (CEQ 2010), which suggests that proposed actions that would be reasonably anticipated to emit 25,000 metric tons or more per year CO_2e should be evaluated by quantitative and qualitative assessments. This is not a threshold of significance but a minimum level that would require consideration in NEPA documentation. The purpose of quantitative analysis of CO_2e emissions in this EIS is for its potential usefulness in making reasoned choices among alternatives.

The potential effects of GHG emissions from the Proposed Action are by nature global. "Given the global nature of climate change and the current state of the science, it is not useful at this time to attempt to link the emissions quantified for local actions to any specific climatological change or resulting environmental impact. Nonetheless, the GHG emissions from the project alternatives have been quantified to the extent feasible in this EIS for information and comparison purposes.

State Regulations. The State of Alaska Air Quality Control Regulation (18 AAC 50) (ADEC 2011a) establishes statewide ambient air quality standards, designations, classifications, and controls in accordance with the CAA. Regulation 18 AAC 50 also establishes a state air quality control plan and identifies other Federal standards adopted by reference.

Regulation 18 AAC 50 was recently modified to incorporate a new GHG permitting threshold of 3,750 tons per year of carbon dioxide equivalent (18 AAC 50.326[e]). This permitting requirement applies to any new or existing stationary sources in the state, but would not apply to emissions from mobile sources such as military aircraft training operations.

Air Force Regulations. AFI 32-7040, *Air Quality Compliance and Resource Management* (Air Force 2007d), which implements Air Force Policy Directive 32-70, *Environmental Quality* (Air Force 1994a), provides details on the Air Force Air Quality Compliance and Resource Management Program and explains how to assess, attain, and sustain compliance with the Clean Air Act; other Federal, state, and local environmental regulations; Final Governing Standards or the Overseas Environmental Baseline Guidance Document; applicable international agreements; and related DoD and Air Force directives.

Army Regulations. AR 200-1, *Environmental Protection and Enhancement* (Army 2007b), regulates how military or civilian personnel, tenants on post, and contractors at Army facilities manage environmental assets such as air quality. It includes, but is not limited to, policies covering the following actions: achieve and maintain air quality standards to protect human health and the environment; comply with Federal, state, and local air quality regulations, permit requirements, and Overseas Governing Standards; identify and implement cost-effective pollution prevention measures that will reduce toxic or criteria emissions; and eliminate ozone-depleting substances.

B.4.3 General Description of Affected Environment

Regional Air Quality. Federal regulations at 40 CFR 81 delineate certain air quality control regions (AQCRs) originally designated based on population and topographic criteria closely approximating those of each air basin. The potential influence of emissions on air quality would typically be confined to the air basin in which the emissions occur. The State of Alaska is divided into four AQCRs: (1) the Cook Inlet Intrastate AQCR, (2) the Northern Alaska Intrastate AQCR, (3) the South-Central Alaska Intrastate AQCR, and (4) the Southeast Alaska Intrastate AQCR.

Portions of Fairbanks North Star Borough (Cities of Fairbanks and North Pole) have been designated as nonattainment areas for the $PM_{2.5}$ NAAQS and as maintenance areas for the carbon monoxide NAAQS (as shown in Figure B-4). The Fairbanks and North Pole urban areas were redesignated from nonattainment status to attainment for the carbon monoxide NAAQS in 2004. As such, both areas are subject to maintenance plan requirements for carbon monoxide as required under 42 U.S.C. 7505a, and as adopted by reference in 18 AAC 50.030 as part of the Alaska state air quality control plan. In these localities temperature inversions often exacerbate air quality issues during winter months.

The proposed actions could impact visibility in pristine PSD Class I areas near the project region. The PSD Class I areas of concern are the Denali Wilderness Area in south-central Alaska and the Tuxedni Wilderness Area in southern Alaska. The closest portion of the Denali Wilderness Area is approximately 15 miles from the Fox 3 MOA, and most of the proposed actions would occur within the surrounding area. The Tuxedni Wilderness Area is approximately 300 miles from the Fox 3 MOA. The proposed live-fire exercises of AIM-9 and AIM-120 missiles over the Gulf of Alaska would occur approximately 115 miles from the Tuxedni Wilderness Area.

Regional Air Emissions. Most of the proposed actions covered in this EIS take place in six adjacent Boroughs and Census Areas: Fairbanks North Star, Denali, Southeast Fairbanks, Matanuska-Susitna, Yukon-Koyukuk, and Valdez-Cordova. Table B–12 summarizes the estimated 2008 annual emissions for the affected Boroughs and Census Areas (EPA 2010c). The area with the highest overall emissions was Matanuska-Susitna Borough and Yukon-Koyukuk Census Area and Denali Boroughs had the lowest emissions in the affected region.

Regional Climate. Meteorological data collected around Eielson AFB was used to describe the climate of the JPARC project area which is primarily located in the area surrounding the base. The meteorological data used in this report was obtained from the Western Regional Climate Center (WRCC).

Temperature. Alaska is divided into five different climate zones, and most of JPARC is located in the Interior or Interior Basin Zone. The Interior region has the widest range of temperature: from 80°F during the summer to below minus 50°F during the winter months (WRCC 2010).

Precipitation. Average annual precipitation for Alaska is 22.5 inches. Annual precipitation in the state peaks in the summer months (July through September) due to monsoonal flow. The peak monthly average rainfall of 2.88 inches occurs in August and September. Spring is the driest season, as the lowest monthly average of 1.04 inches occurs in April (WRCC 2010).

Table B–12. Annual Emissions for Alaskan Boroughs and Census Areas Affected by the Proposed Action (Calendar Year 2008)

Sector	Air Pollutant Emissions (tons per year)					
	CO	NO_x	PM_{10}	$PM_{2.5}$	SO_2	VOCs
Fairbanks North Star Borough						
Stationary Sources	6,970	1,417	15,946	1,876	1,498	1,333
Mobile Sources	14,548	1,351	103	85	63	2,421
Total	21,517	2,768	16,050	1,962	1,561	3,754
Denali Borough						
Stationary Sources	433	79	982	117	32	52
Mobile Sources	1,102	342	14	13	4	244
Total	1,534	421	997	130	35	295
Southeast Fairbanks Southeast Fairbanks Census Area						
Stationary Sources	133	92	2,915	322	60	112
Mobile Sources	2,601	198	14	11	5	386
Total	2,734	290	2,929	332	65	498
Matanuska-Susitna Borough						
Stationary Sources	1,105	247	16,728	1,898	131	1,151
Mobile Sources	21,792	2,386	121	97	40	3,083
Total	22,898	2,632	16,849	1,994	171	4,234
Valdez-Cordova Census Area						
Stationary Sources	237	124	3,357	407	121	510
Mobile Sources	5,933	9,627	396	375	982	894
Total	6,170	9,751	3,753	782	1,103	1,405
Yukon-Koyukuk Census Area						
Stationary Sources	191	363	3,194	361	66	121
Mobile Sources	3,676	382	26	19	19	568
Total	3,867	745	3,220	380	85	688

Key: CO=carbon monoxide; NO_x=nitrogen oxides; $PM_{2.5}$=particulate matter with an aerodynamic diameter less than or equal to 2.5 micrometers; PM_{10}= particulate matter with an aerodynamic diameter less than or equal to 10 micrometers; SO_2=sulfur dioxide; VOC=volatile organic compound.

Source: EPA 2010c.

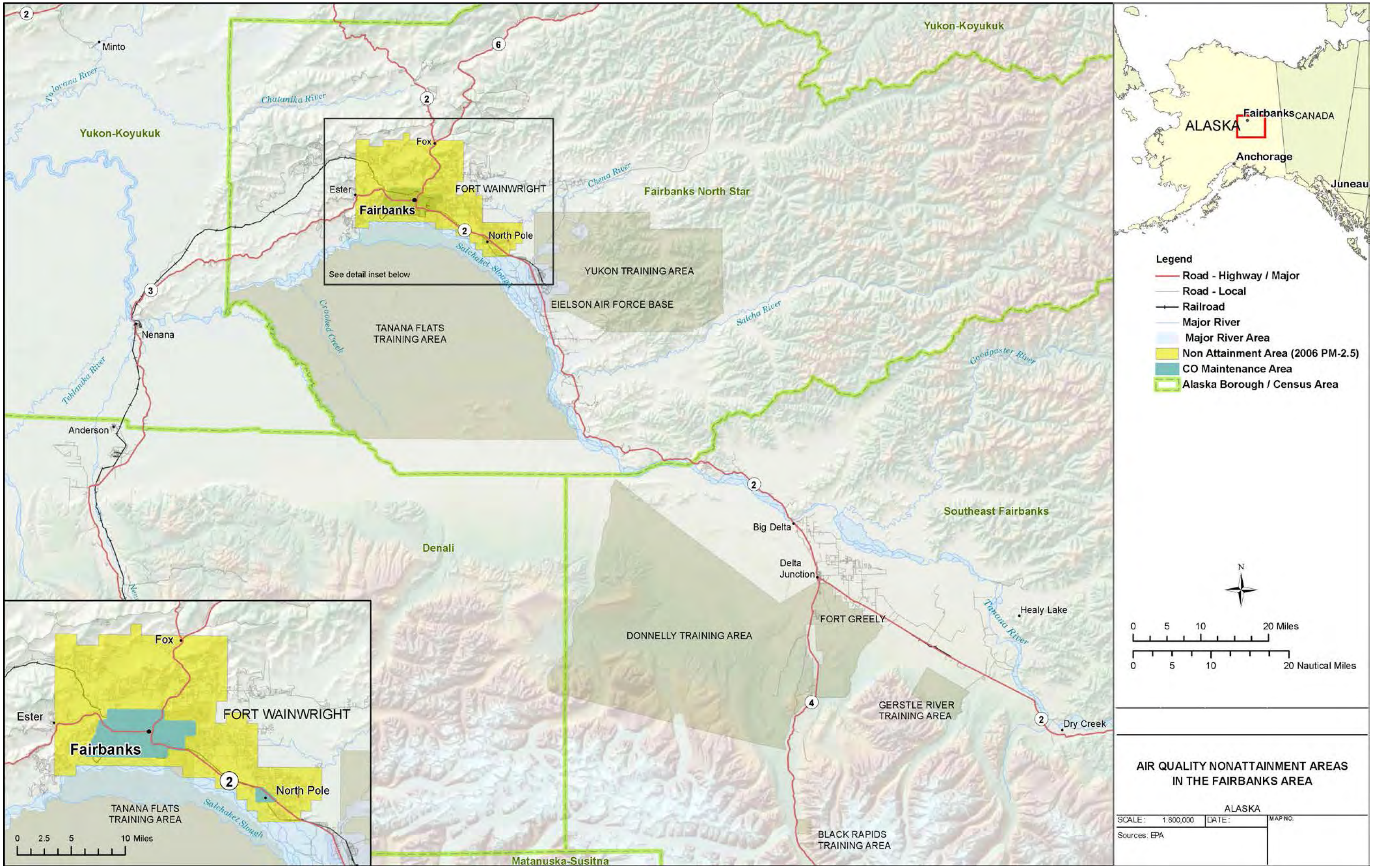

Figure B-4. Locations of CO Maintenance and PM2.5 Nonattainment Areas

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Prevailing Winds. The annual average windspeed at Eielson AFB is 5.4 mph. April through July experience the strongest winds, with a monthly average speed of 6.8 mph during this period. Prevailing winds are from the south during the year.

Volcanoes. There are more than 40 active volcanoes in Alaska, with much of the volcanic activity concentrated in the Aleutian Islands and the mountainous region just to the west of Cook Inlet. Mount Spurr, the northernmost historically active volcano in Alaska, is approximately 75 miles west of Anchorage. Aside from the potential effects of a volcanic eruption on the surrounding landscape, ash clouds can have wide-reaching impacts on climate and air quality.

Wildfires. There is potential for naturally occurring wildfires in Alaska which can be substantial both esthetically and from a health standpoint. Forest wildfires emit visible pollution in the form of smoke, soot, and ash. Additionally, such fires emit carbon monoxide, nitrogen oxides, and hydrocarbons. Smoke from fires can hurt the eyes, irritate the respiratory system, and worsen chronic heart and lung diseases. Additional information regarding wildfire smoke can be found at the ADEC's website: http://dec.alaska.gov/air/smoke_qa.htm.

B.4.4 Applicability of Conformity Regulation

Of the areas potentially affected by the proposed action, the Fairbanks and North Pole urban areas are classified as maintenance areas for the carbon monoxide NAAQS, and portions of Fairbanks North Star Borough was recently designated as a nonattainment area for the $PM_{2.5}$ NAAQS. Moreover, to the south, Anchorage is a nonattainment area of the PM_{10} NAAQS and is a maintenance area for the carbon monoxide NAAQS. The affected region is in attainment of the remaining NAAQS.

Therefore, the requirements of EPA's General Conformity Rule are applicable to carbon monoxide and $PM_{2.5}$ emissions from proposed actions within the nonattainment or maintenance areas of the affected region.

The applicable *de minimis* conformity thresholds for these areas are 100 tons per year of carbon monoxide and $PM_{2.5}$. If the emissions from the proposed action exceed any of the applicable *de minimis* thresholds, the Air Force must demonstrate that these emissions would conform to the SIP through application of one or more of the criteria for determining conformity of general Federal actions prescribed in 40 CFR 93.158, under the procedures prescribed in 40 CFR 93.159. In such cases, if the emissions are found to conform to the approved SIP, then impacts from the proposed actions would be less than significant. For actions that are proposed to occur in attainment areas, the analysis used the PSD threshold for new major sources of 250 tpy of each pollutant as an indicator of significance or nonsignificance of projected air quality impacts.

B.4.5 Overall Methodology

The project air quality analysis estimated the magnitude of increased emissions from the proposed enhancement and modernization actions in various sections of JPARC. The estimation of proposed operational emissions was based on the net change in emissions between existing JPARC operations and proposed JPARC operations.

Appendix F of this EIS documents the calculations used to estimate proposed emissions for each specific action.

Construction: There will potentially be construction activity associated with the Enhanced Ground Maneuver Space, TFTA Roadway Access, Immediate Staging Bases, and Joint Air–Ground Integration Complex actions, all of which will be analyzed programmatically. These construction activities will not take place in any nonattainment or maintenance zones. The air quality analysis of the impacts of these actions will be performed qualitatively, as the predicted emissions will be minor and intermittent in nature.

Operations: Air quality impacts associated with the proposed action alternatives would occur from (1) combustive emissions due to the use of fossil fuel–powered equipment and (2) fugitive dust emissions (PM_{10}/$PM_{2.5}$) due to the operation of vehicles and equipment on exposed soil. Combustive emission sources associated with proposed operations would include (1) aircraft during military-mode operations below 3,000 feet AGL, (2) tactical vehicles, (3) tactical support equipment, and (4) ordnance use. Combustive emissions from proposed aircraft training operations were only assessed for aircraft training activities below 3,000 feet AGL, as this is the typical depth of the atmospheric mixing layer where the release of aircraft emissions would affect ground-level pollutant concentrations. Aircraft emissions above the mixing layer generally would not appreciably affect ground-level air quality.

Operational data used to calculate proposed increased aircraft emissions at each area are consistent with those evaluated in the project noise analyses. When available, the operational characteristics of proposed aircraft flight operations were based on information provided by the Air Force. These data include flight durations, annual number of sorties, and altitude profiles for each aircraft involved in the proposed action. UAV operational information and emission factors were obtained from *Environmental Assessment for Routine and Recurring Unmanned Aerial Vehicle Flight Operations at Edwards AFB, CA* (Tetra Tech 2006). The remainder of the data for the flight profiles was gathered in the Air Force Center for Engineering and the Environment (AFCEE) *Air Emissions Factor Guide to Air Force Mobile Sources* (AFCEE 2009), which include aircraft modes of operation, engine power settings, and fuel usage. Emission factors used to calculate combustive emissions from proposed munitions sources were obtained from Section 15 of EPA's AP-42, *Compilation of Air Pollutant Emission Factors* (EPA 2009b).

There are no expected changes to operations at the various bases or on MTRs related to JPARC. Thus, the project air quality analysis only quantified emissions from proposed aircraft, equipment, and ordnance usage within the ranges and MOAs affected by the proposed actions. Additionally, air quality impacts associated with proposed Army action alternatives would occur from (1) combustive emissions due to the use of fossil fuel–powered equipment and (2) fugitive dust emissions (PM_{10}/$PM_{2.5}$) due to the operation of vehicles and equipment on exposed soil. Combustive emission sources associated with proposed operations would include (1) helicopters; (2) aircraft; (3) tactical vehicles such as the Stryker; (4) tactical support equipment; and (5) ordnance use.

Emissions that occur within the affected airspaces have the potential to impair visibility within pristine PSD Class I areas. Visibility impairment could occur from projected primary emissions of nitrogen dioxide, sulfur dioxide, and PM_{10} or secondary formation of visibility-reducing particulate matter in the atmosphere due to precursor emissions of VOCs, nitrogen dioxide, or sulfur dioxide. Visibility impairment from primary nitrogen dioxide emissions could occur as a brown-colored haze in the lower layer of the atmosphere. This situation usually would occur during the colder months of the year, when a lack of sunlight prevents the conversion of this pollutant to nitrogen oxide and oxygen. Visibility impairment due to primary PM_{10} emissions would occur in the form of plume blight or atmospheric discoloration from contrails. Visibility impairment due to the secondary formation of nitrate or sulfate particulates in the atmosphere from emissions of nitrogen dioxide or sulfur dioxide would usually occur in the warmer months of the year. This effect would take the form of regional haze, which would reduce regional visual range. Therefore, due to the proximity of the pristine protected areas to proposed aircraft operations, this EIS provides a qualitative analysis of the potential for proposed emissions to affect visibility and air quality at the Denali and Tuxedni Wilderness Areas.

The potential effects of GHG emissions from the proposed action are by nature global. Given the global nature of climate change and the current state of the science, it is not useful at this time to attempt to link the emissions quantified for local actions to any specific climatological change or resulting environmental impact. Nonetheless, the GHG emissions from the project alternatives were quantified to the extent feasible in this EIS for information and comparison purposes.

B.5 PHYSICAL RESOURCES

B.5.1 Definition of Resource

Physical sciences include topography, geologic hazards, and soils, including permafrost. Topography comprises the physiographic or surface features of an area and is usually described with respect to elevation, slope, aspect, and landforms. Topography can provide both beneficial and hindering conditions for development and use. Geologic hazards include natural geologic features that can have a direct impact upon human activity and present a potential danger to life and property. Geologic hazards can include earthquakes, landslides, and volcanic activity.

The term “soils” refers to unconsolidated materials formed from the underlying bedrock or other parent material. Soils play a critical role in both the natural and human environment. Because soil cover supports surface vegetation and water retention, it indirectly influences groundwater recharge and controls the flow in rivers and streams. Soil properties have a direct influence on the suitability of earth-disturbing activities such as construction and off-road maneuvering.

B.5.2 Regulatory Setting

B.5.2.1 Clean Water Act

As authorized by the Clean Water Act, Section 402 (40 CFR 122), the National Pollutant Discharge Elimination System (NPDES) permit program controls water pollution by regulating point and nonpoint sources that discharge pollutants into waters of the United States. Point sources are discrete conveyances such as pipes or man-made ditches. Nonpoint source pollution can be caused by either rainfall or snowmelt moving over and through the ground. As the runoff moves, it picks up and carries away natural and man-made pollutants, finally depositing those pollutants into lakes, rivers, wetlands, coastal waters, and groundwater. NPDES regulations include measures to prevent such pollution, including erosion-induced sedimentation of water bodies. The NPDES permit program is administered by the State of Alaska through the ADEC.

B.5.2.2 Geologic Hazards

Federal standards, such as those promulgated through the National Earthquake Hazards Reduction Program, apply to new Federally owned, constructed, or assisted buildings. One such Federal standard, EO 12699, *Seismic Safety of Federal and Federally Assisted or Regulated New Building Construction*, was signed by President George H. W. Bush on January 5, 1990, to further the goals of PL 95-124, *Earthquake Hazards Reduction Act of 1977*, as amended. Guidelines and procedures for implementing the EO were prepared in 1992 by the Federal Interagency Committee on Seismic Safety in Construction. The guidelines establish minimum acceptable seismic safety standards, provide evaluation procedures for determining the adequacy of local building codes, and recommend implementation procedures. Each Federal agency is independently responsible for ensuring appropriate seismic design and construction standards are applied to new construction under its jurisdiction.

B.5.3 General Description of Affected Environment

B.5.3.1 Topography

Topography in the JPARC planning area is greatly varied, with elevation ranging from sea level at coastal areas of the Cook Inlet to 20,320 feet above sea level at Mount McKinley in the Alaska Range (see Figure B-5). Major physiographic divisions within the planning area include the Kenai-Chugach Mountains, Cook Inlet-Susitna Lowland, the Alaska Range, the Northern Foothills of the Alaska Range, the Tanana-Kuskokwim Lowland, the Kuskokwim Mountains, and the Yukon-Tanana Upland. Descriptions of each below are taken from *Physiographic Divisions of Alaska* (USGS 1965).

Kenai-Chugach Mountains. This physiographic division forms a barrier on the north coast of the Gulf of Alaska. Mountains have east-trending ridges that rise 7,000 to 13,000 feet above sea level. Lower segments are formed by larger mountains 5 to 10 miles across and 3,000 to 6,000 feet in elevation, separated by a system of trough valleys. The entire range is marked by glacial features, such as horns, arêtes, cirques, and rock basin lakes. Coastal areas to the south are punctuated by fjords and sounds.

Cook Inlet-Susitna Lowland. The Cook Inlet-Susitna Lowland is a glaciated, low-lying area containing ground moraine and stationary ice topography, drumlin fields, eskers, and outwash plains. Much of the lowland is less than 500 feet above sea level and has local relief of 50 to 250 feet. Upland areas near the adjoining mountain ranges rise to approximately 3,000 feet and isolated mountain ranges can rise to 4,800 feet.

Alaska Range. The southern part of the Alaska Range consists of multiple glaciated, north-trending ridges from 7,000 to 14,000 feet in elevation, between which lie broad glaciated valleys with floors of less than 3,000 feet. Local relief is usually between 4,000 and 9,000 feet. In the central and eastern parts of the Alaska Range, two of three parallel glaciated ridges of 6,000 to 9,000 feet in altitude are punctuated by snow-capped mountains at over 9,500 feet. Mount McKinley, the highest point in North America, is located in the Alaska Range.

Northern Foothills of the Alaska Range. The Northern Foothills consist of flat-topped, east-trending ridges 2,000 to 4,500 feet in altitude, 3 to 7 miles wide, and 5 to 20 miles long, separated by rolling lowlands 700 to 1,500 feet high and 2 to 10 miles wide. The foothills are currently without glaciers, but some valleys were widened from Alaska Range glaciers in the last few million years.

Tanana-Kuskokwim Lowland. This division is a broad depression bordering the Alaska Range to the north. Outwash plains radiating from the Alaska Range slope downward (north) 20 to 50 feet per mile to floodplains along streams. The floodplains are generally incised in areas where rivers are present approximately 50 to 200 feet below the level of the lowland.

Kuskokwim Mountains. The Kuskokwim Mountains Division is a succession of northeast-trending ridges with rounded to flat summits 1,500 to 2,000 feet high. Mountain ridges north of the Kuskokwim River rise to approximately 2,000 feet and are succeeded at intervals of 10 to 30 miles by isolated circular groups of glaciated mountains 3,000 to 4,400 feet in altitude. Valley floors in this physiographic division are approximately 1 to 5 miles in width.

Yukon-Tanana Upland. Notable features in the Yukon-Tanana Upland include rounded top ridges with gentle side slopes, which rise 3,000 to 5,000 feet in altitude, with some domes up to 6,800 feet high. Valleys are generally flat, floored by alluvium, and 0.25 to 0.50 miles wide.

B.5.3.1.1 Training Areas/Installations

Fort Wainwright, Eielson AFB, and TFTA are located in a broad depression known as the Tanana-Kuskokwim Lowland, with the Alaska Range bordering to the south and the Tanana River forming the northern boundary of TFTA and the western boundaries of Fort Wainwright and Eielson AFB. The airfield elevation on Fort Wainwright is 448 feet, and on Eielson AFB, 547 feet. Topography on TFTA slopes upward to the southeast with elevations increasing from just under 400 feet above sea level in the northwestern area of the installation closest to the Tanana River to just over 1,100 feet above sea level on the southern boundary. Topographic features of note on TFTA include the Clear Creek and Wood River Buttes, each at just under 1,000 feet in elevation. The highest points on TFTA are found on several small, unnamed peaks at just over 1,400 feet in the area surrounding Blair Lakes.

YTA is located in the Yukon-Tanana Uplands Division, with elevations rising 500 to 1,500 feet above the valley floors. Rounded ridges (elevations from 3,000 to 5,000 feet) with gentle side slopes and valley floors from 0.25 to 0.50 miles wide are common features. Low elevations are seen in the western portions of the training area closest to the course of the Tanana River and in the numerous river valleys spread throughout YTA.

DTA is within the Yukon-Tanana terrain, an area of highly varied topography. It is situated in the northern foothills of the Alaska Range and on alluvial plains just north of the foothills. Much of the area is generally level or gently sloping, with elevations ranging from 1,200 to 1,600 feet. In the southern portion of DTA, elevations range from 2,000 to 4,500 feet, where flat-topped, east-trending ridges are found. The highest elevations on DTA are in the southwestern areas, where elevations range from 4,000 to 6,200 feet. Prominent topographic features on DTA include Molybdenum Ridge (5,993 feet) and Donnelly Dome (3,910 feet). The Delta River flows through the eastern portion of DTA.

Gerstle River Training Area (GRTA) sits on the northeastern flank of Granite Mountain in a relatively flat area, with elevations ranging from 1,400 feet at the northern edge to approximately 2,000 feet at the southern edge. Sawmill Creek and several other unnamed creeks traverse GRTA before emptying into the Gerstle River, which eventually empties into the Delta River to the south.

The Black Rapids Training Area (BRTA) is located in the Alaska Range on the eastern edge of the Delta River. Elevations grade upward west to east, starting at approximately 2,000 feet at the banks of the Delta River and reaching over 5,000 feet at the eastern boundary. Several glacially-fed creeks flow through BRTA and empty into the Delta River.

JBER is located in an alluvial plain known as the Cook Inlet-Susitna Lowland, which is bordered on the east by the Chugach Mountains and on the north, south, and west by the Cook Inlet. The Chugach Mountains rise abruptly to over 5,000 feet where they face the Cook Inlet-Susitna Lowland. There is a large range in elevation on Joint Base Elmendorf-Richardson, ranging from sea level to approximately 5,300 feet at Tanaina Peak. Prominent topographic features on Joint Base Elmendorf-Richardson include Tanaina Peak, Temptation Peak, and Mount Gordon Lyon.

B.5.3.2 Geologic Hazards

Volcanoes. There are more than 40 active volcanoes in Alaska, with much of the volcanic activity located concentrated in the Aleutian Islands and the mountainous region just to the west of Cook Inlet. Mount Spurr, the northernmost historically active volcano in Alaska, is approximately 75 miles west of Anchorage. The Alaska Volcano Observatory of the U.S. Geological Survey (USGS) currently monitors 27 active volcanoes in Alaska daily. The observatory posts volcano alert levels and issues warning statements as necessary. As was the case with the eruption of Mount Redoubt in 2009, future volcanic activity would be preceded by ample warning and prediction of effects, allowing the general population and military installations to take appropriate action.

The historically active volcanoes are shown in Figure B-6. Table B–13 lists the volcanoes in proximity to the proposed action, including the year of the most recent eruption.

Aside from the potential effects of a volcanic eruption on the surrounding landscape (lava flow, pyroclastic flow, mudslides, and flooding), ash clouds can have wide-reaching impacts on aviation, health, and climate. See Section B.4, Air Quality, for information related to such ash clouds.

Table B–13. Historically Active Volcanoes Within Approximately 500 miles of Fairbanks and Anchorage, Combined

Volcano	Last Eruption
Spurr	1992
Reboubt	2009
Iliamna	1953
Augustine	2005
Wrangell	1930
Fourpeaked	2006
Katmai	1912
Novarupta	1912
Trident	1953
Ukinrek-Maars	1977
Aniakchak	1931
Veniaminof	2008

Source: USGS 2010.

Earthquakes and Faulting. Alaska spans approximately 3,000 miles of an active plate boundary between the North American and Pacific plates-and is the site of three of the ten largest earthquakes in the last 100 years. Two of these occurred in the Aleutian Islands, and the other, a magnitude 9.2 earthquake, occurred in 1964 approximately 80 miles east of Anchorage, resulting in widespread damage throughout the area. Each year, the Alaska Earthquake Information Center records and reports approximately 22,000 earthquakes statewide (AEIC 2011).

Three major faults exist in areas potentially affected by the proposed actions: the Kaltag, the Denali, and the Castle Mountain faults (Figure B-6). The east-west trending Kaltag Fault has been mapped for a distance of approximately 275 miles from the town of Unalakleet, on Norton Sound, to just east of the town of Tanana. Most recently, the fault is thought to be associated with a magnitude 6.0 earthquake, which occurred in February 2000, east of the town of Ruby (Galena 2007).

The Denali Fault extends east to west more than 1,200 miles through the interior of the state, passing through the Alaska Range and Denali National Park and on to the Bering Sea. In November 2002, a magnitude 7.9 earthquake occurred on the Denali Fault with an epicenter approximately 90 miles south of Fairbanks, causing thousands of landslides but little structural damage and no deaths. The Denali Fault is thought to be capable of producing a magnitude 8.0 earthquake (Galena 2007). Three earthquakes in excess of magnitude 7.0 have occurred within 50 miles of Fairbanks since 1952 (USARAK 2004).

The Castle Mountain Fault trends northeast to southwest for over 100 miles, extending from south of the Alaska Range to near Anchorage. This fault has been responsible for several earthquakes of magnitude 7.0 or greater in the last century (USGS 2003). The Anchorage area has experienced at least nine major earthquakes of magnitude 7.0 or greater in the last 90 years, including the 1964 earthquake, the largest in U.S. history.

In addition, several smaller faults, including the Mystic Mountain and Granite Mountain faults, are located in the areas potentially affected by the proposed actions.

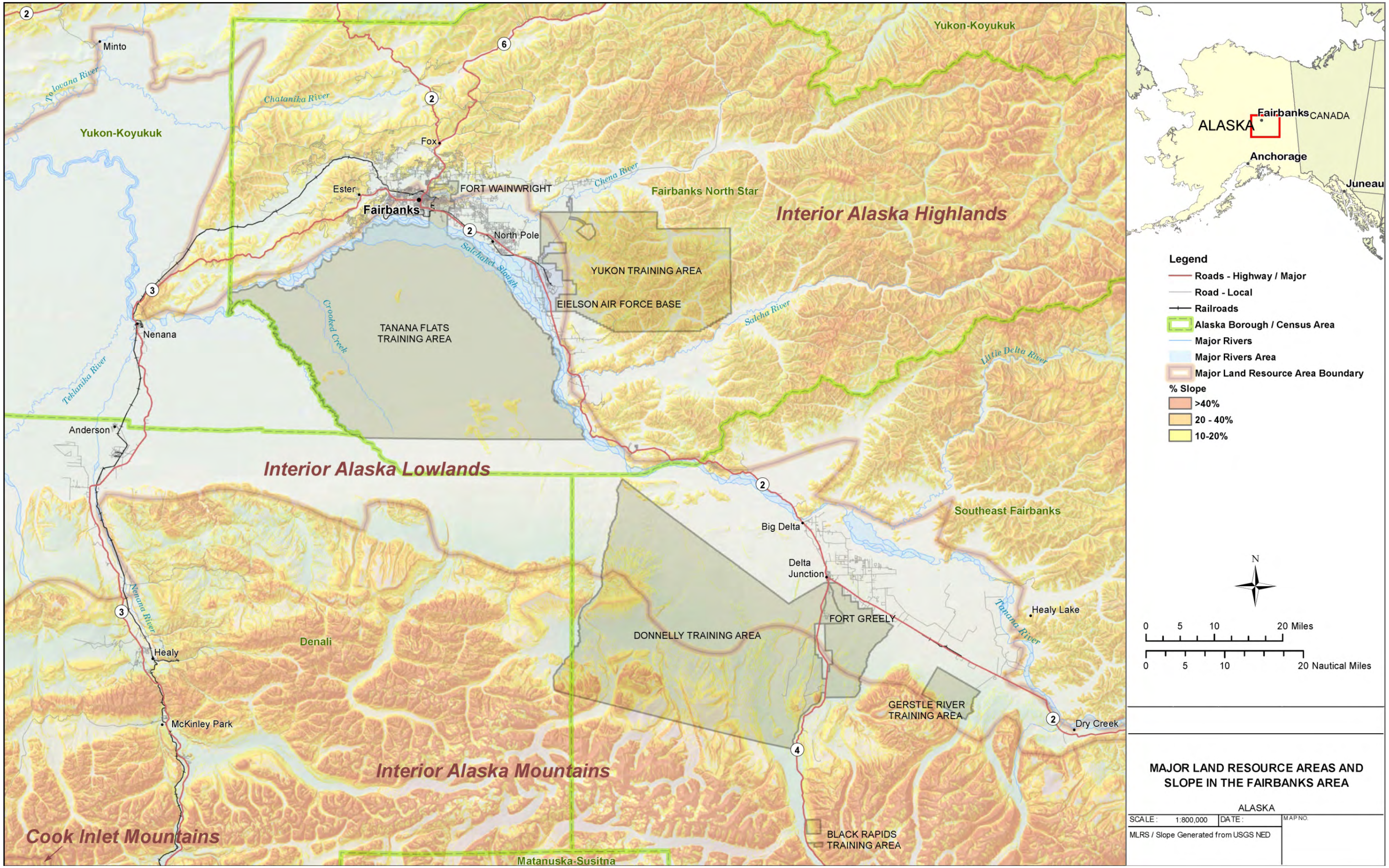

Figure B-5. Major Land Resource Areas and Slope in the Fairbanks Area

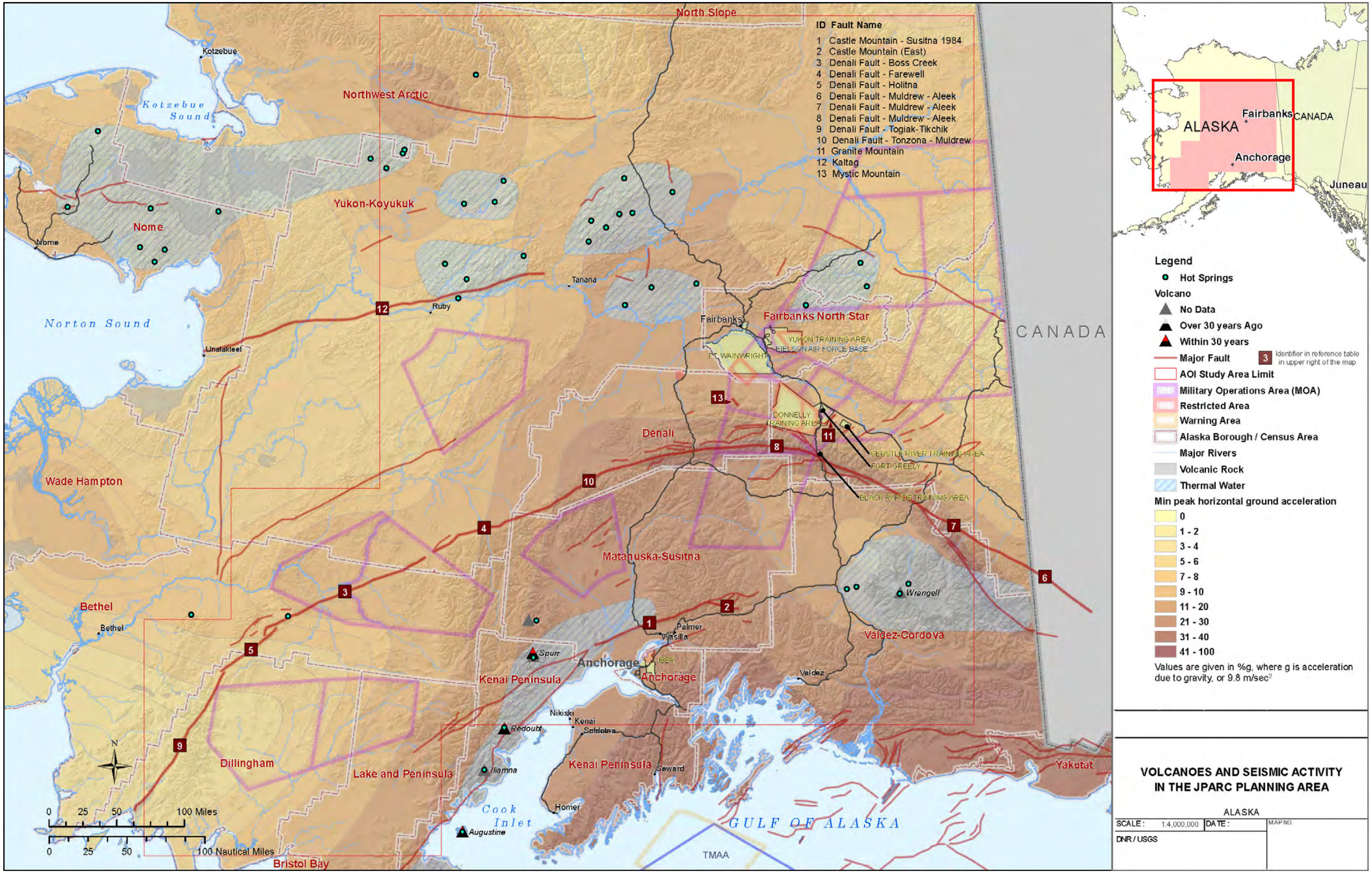

Figure B-6. Volcanoes and Seismic Activity in Central Alaska

B.5.3.3 Soils

Soils within areas potentially affected by the proposed actions are highly diverse; noticeable differences can occur even within short distances. Soils can be high in organic content, hydric, sandy, gravelly, or shallow over bedrock or permafrost. Soil types and characteristics can also vary greatly depending upon elevation, climate, and other regional (and local) conditions.

The Natural Resources Conversation Service (NRCS) of the U.S. Department of Agriculture (USDA) has divided the United States into Major Land Resource Areas (MLRAs), geographically associated land units organized by patterns in topography, water resources, soils, geology, resources and resource uses, and soil and water conservation treatment needs (USDA 2006). MLRAs that appear in the area potentially affected by the proposed actions are shown in Figure B-7. Characteristics of each of these MLRAs as they pertain to elevation and soil characteristics (dominant features and concerns, if any) are summarized in Table B–14.

The NRCS uses soil associations or soil taxonomic class to categorize soils at larger scales, usually comprised two or more types of component soils, grouped by similar characteristics and properties (e.g., slope, temperature, moisture, chemistry). In the area potentially affected by the proposed action there are approximately 24 soil associations, the majority of which are categorized as Typic Histoturbels. Specific characteristics of such soils will vary by location and local condition;[1] therefore, only general observations are made about potential limitations to use and development of the soils in Table B–14. More detailed analysis of soil types and limitations are provided in Chapter 3 for specific proposals.

Hydric Soils. Hydric soils are defined as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic (oxygen-free) conditions in the upper part of the soil. Hydric soils are one of the three critical indicators, as defined by the U.S. Army Corps of Engineers, for the presence of wetlands (Wetlands are discussed in further detail in Section B.8, Biological Resources) (USACE 1987). Hydric soils are generally saturated and thawed in interior Alaska during May and from late July through September. Hydric soils most commonly occur in groundwater discharge zones, in depressions and flats, and also extensively across hill slopes in areas where restrictive layers (permafrost, glacial till) in the soil hold water above the regional water table (USDA 2005).

B.5.3.4 Permafrost

A defining, and often limiting, feature of soils in Alaska is permafrost, which can be found in varying depth and thickness under approximately 85 percent of the state's land area. Permafrost is broadly defined as soil, silt, or rock that has remained below freezing for two or more years. Although a thin layer of permafrost closest to the surface can thaw during warmer summer months, most of the permafrost remains frozen unless the local climate changes or melting is facilitated by the disturbance of overlying vegetation (which acts as an insulator). Depth from the surface to permafrost can vary from less than 1 foot up to 1,000 feet. Generally speaking, permafrost in Alaska is continuous north of the Brooks Range, found at varying depths and thickness in interior and western Alaska, and occurs only sporadically in south-central and southeastern portions of the state. Permafrost may occur in any area where the average annual temperature is below freezing. Since the surface of permafrost is generally impermeable, water flow in the area of permafrost can be restricted, leading to areas of surface saturation in the summer months.

1 At scales of less than 1:24,000, the NRCS uses the soil map unit as the organizing scheme for the description of soil properties. Soil map units provide more detailed soil analyses than the more general soil association, which can contain multiple soil map units.

Permafrost presents challenges to ground-based maneuvering as well as construction activities. Special consideration must be given to the design and maintenance of man-made structures, usually involving the creation of a gravel bed (or other material) to create an insulating layer below the structure to prevent melting of the active permafrost layer (USGS 1969).

Much of the permafrost in Alaska is covered by some variety of vegetation. If vegetation is removed through wildfire or human activity, this insulating layer is lost and permafrost can begin to melt. In finer-grained soils, this melting can result in soil saturation and a subsequent loss of soil stability. If the soil contains large blocks, wedges, or lenses of ice, voids will appear in the soil as the permafrost around it thaws. Landscape that results from the melting of permafrost, called thermokarst, presents serious challenges to all types of land use (USDA 2004). Surface expressions of thermokarst include such features as mounds (pingos), sinkholes, pits, polygons, subsidence, and circular lowlands. Permafrost conditions are present in the area affected by the JPARC proposals, as shown in Figure B-8.

B.6 WATER RESOURCES

B.6.1 Definition of Resource

Water resources include surface water, groundwater, floodplains, and features determined to be waters of the United States, including wetlands. Surface water resources—lakes, rivers, and streams—are important for a variety of reasons, including economic, ecological, recreational, and human health. Groundwater includes the subsurface hydrologic resources of the physical environment, and its properties are often described in terms of depth to an aquifer or the water table, water quality, and surrounding geologic composition.

B.6.2 Regulatory Setting

The Clean Water Act (CWA) of 1977 (33 U.S.C. 1251 et seq.), as amended, requires that individual states develop programs to monitor and report on the quality of surface and groundwater and prepare a report summarizing the status of its water quality. The process for developing information on the quality of water resources is contained in several sections of the CWA. Most notable are Section 305(b), which requires that the quality of all waterbodies be characterized, and Section 303(d), which requires that states list any water bodies that do not meet water quality standards. EPA has recommended that the Section 305(b) report and the Section 303(d) list of impaired waters be integrated into a single, comprehensive monitoring and assessment report, the Integrated Water Quality Monitoring and Assessment Report (Integrated Report). The State of Alaska Water Quality Standards are documented in the Alaska Administrative Code (18 AAC 70) (ADEC 2009a) and in an annual report (ADEC 2010a).

The CWA and the EPA Storm Water General Permit regulate pollutant discharges. As authorized by the CWA, the NPDES permit program controls water pollution by regulating point sources that discharge pollutants into waters of the United States. Point sources are discrete conveyances such as pipes or man-made ditches. The NPDES permit program is administered by the State of Alaska through the ADEC.

EO 11988, *Floodplain Management*, requires Federal agencies to take action to reduce the risk of flood damage; minimize the impacts of floods on human safety, health, and welfare; and restore and preserve the natural and beneficial values served by floodplains. Federal agencies are directed to consider the proximity of their actions to or within floodplains. Floodplains are defined in the EO as “the lowland and relatively flat areas adjoining inland and coastal waters including flood-prone areas of offshore islands, including at a minimum, the areas subject to a one percent or greater chance of flooding in any given year.”

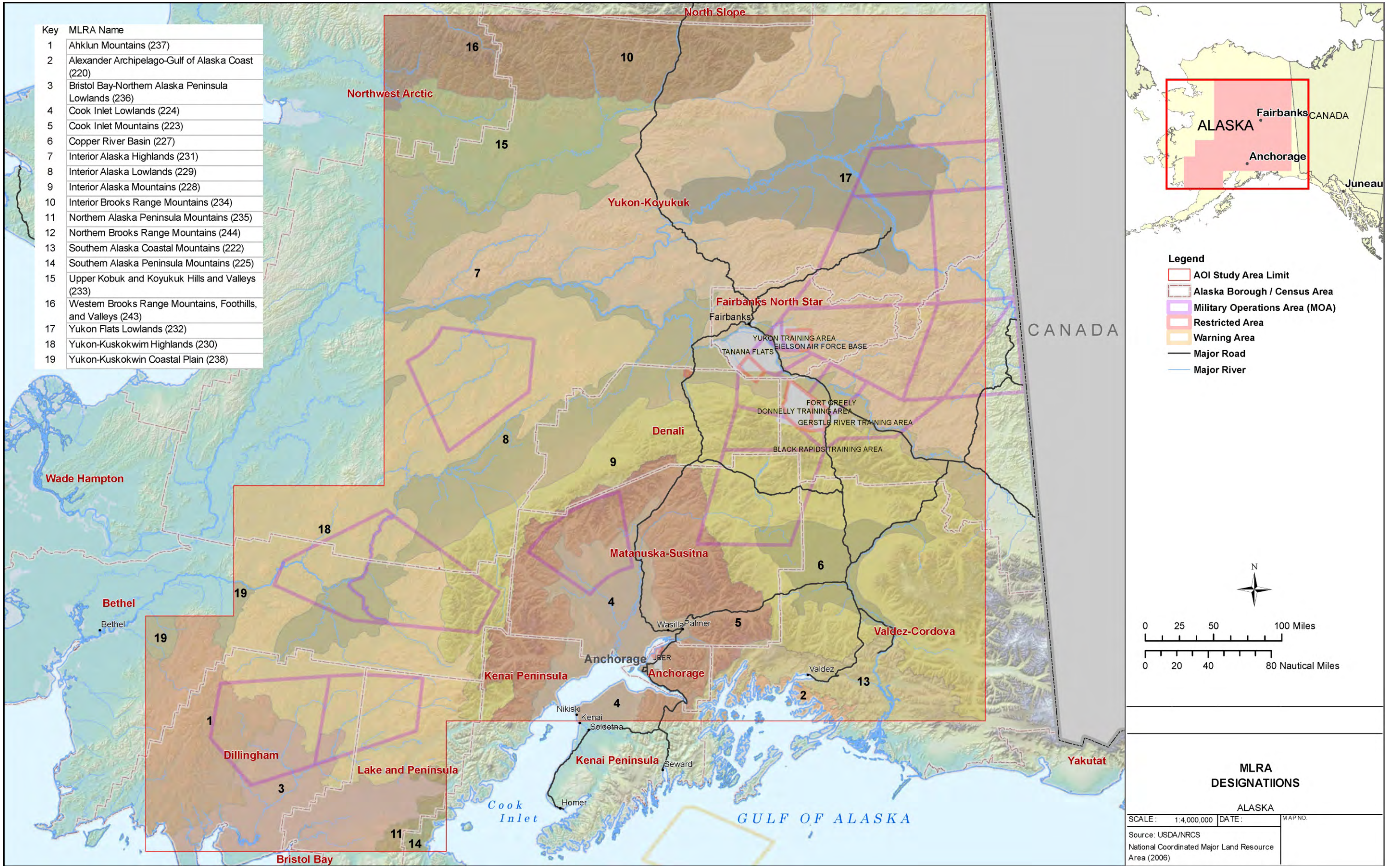

Figure B-7. MLRA Designations

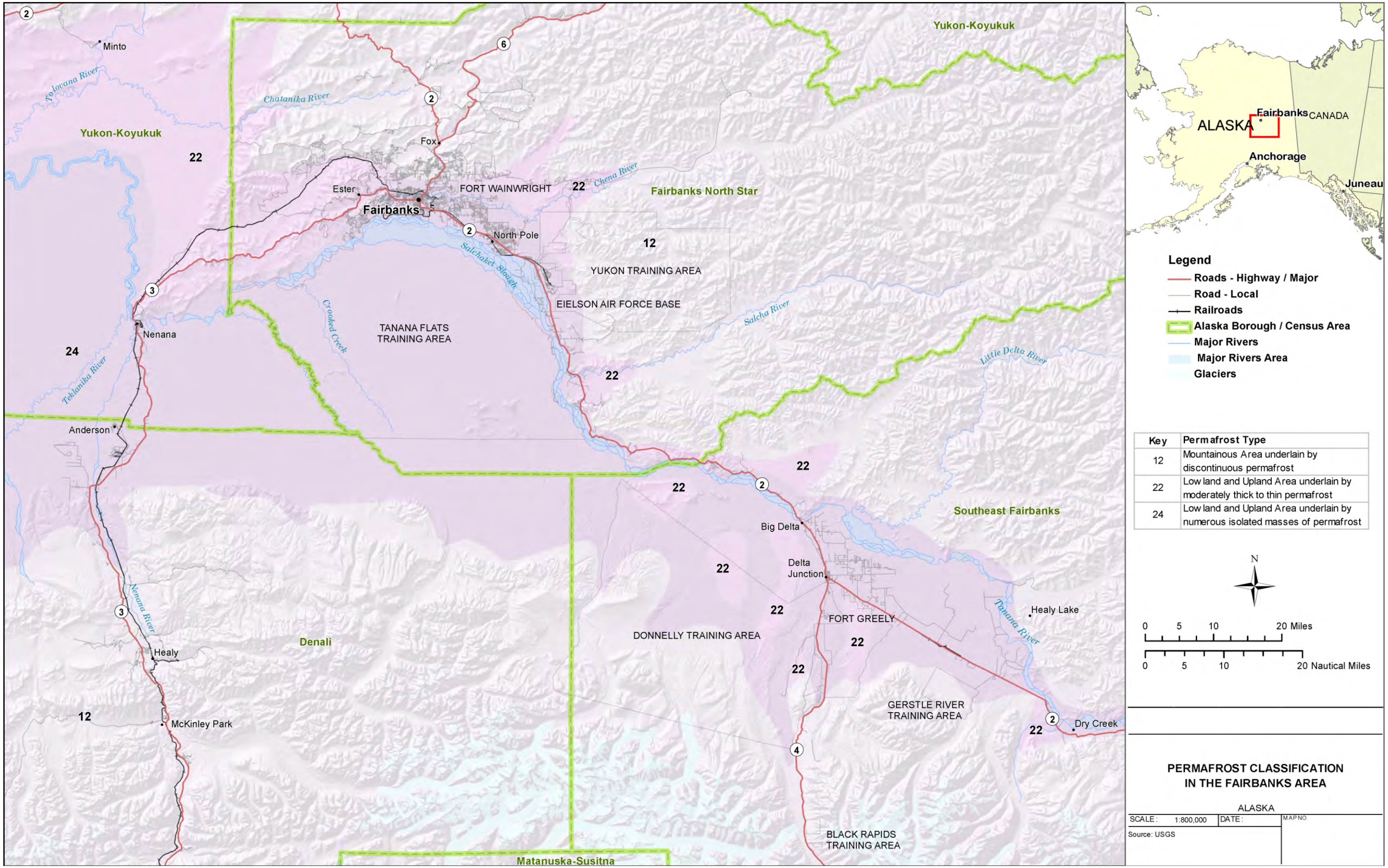

Figure B-8. Permafrost Classification in Fairbanks Area

Table B–14. Characteristics of MLRAs found within the Area Potentially Affected by the Proposed Actions

MLRA (number)	Elevation (ft)	Permafrost in MLRA	General Description of Soils
Alexander Archipelago – Gulf of Alaska Coast (220)	Sea level to 4,665	This MLRA is outside of permafrost region and is generally free of permafrost.	Major soil resource concerns are water erosion and mass wasting. Mass wasting induced by earthquakes and erosion can take the form of creep, earthflow, rockfall, slump, debris avalanche, and debris flow. Undercutting or overloading slopes, vibrations from earthquakes, and increased soil moisture content can trigger mass movements. Mass wasting can be a natural phenomenon or the result of human activities, such as logging and road construction. Miscellaneous (nonsoil) areas make up about 23 percent of this MLRA. The most common miscellaneous areas are chutes, rock outcrop, rubble land, beaches, riverwash, and water (glaciers make up less than 1 percent of the total areas and are limited to the higher elevations; lakes make up less than 2 percent of the area). Most glacial deposits have been eroded away or buried by mountain colluvium and alluvium, which cover about 90 percent of the present landscape.
Southern Alaska Coastal Mountains (222)	Sea level to 18,008	This MLRA is generally underlain by isolated masses of permafrost. The southern portions of this MLRA are outside of permafrost region and generally free of permafrost.	There are no major resource concerns related to soils in the area. Miscellaneous (nonsoil) areas make up more than 90 percent of this MLRA. The most common miscellaneous areas are rock outcrop, rubble land, chutes, and glaciers (glaciers and ice fields make up about 54 percent of the total area; lakes make up less than 1 percent). Most glacial deposits have eroded away or have been buried by colluvium and slope alluvium, which covers more than 90 percent of the present unglaciated landscape.
Cook Inlet Mountains (223)	2,500 to 20,320	This MLRA is generally underlain by isolated masses of permafrost or areas of discontinuous permafrost. The southern portion of this MLRA is outside of permafrost region and is generally free of permafrost.	There are no major resource concerns related to soils in the area. Miscellaneous (nonsoil) areas make up about 70 percent of this MLRA. The most common miscellaneous areas are rock outcrop, rubble land, and glaciers (glaciers and ice fields make up about 15 percent of the total MLRA area; lakes make up about 2 percent of the area). Colluvial and alluvial deposits cover about 65 percent of the present landscape.
Cook Inlet Lowlands (224)	Sea level to 4,396	This MLRA is generally underlain by isolated masses of permafrost or areas of discontinuous permafrost. The southern portion of this MLRA is outside of permafrost region and is generally free of permafrost.	Major resource concerns are water erosion and water quality. Off-road vehicle use is an increasing problem throughout much of the MLRA, contributing locally to the destruction of the existing vegetation and causing surface compaction, erosion (sheet and rill, concentrated flow, and gully), damage to stream channels and fisheries, and changes in access and land use. Conservation practices that minimize ground disturbance and maintain an adequate plant cover are needed. Conservation practices on forestland generally include forest stand improvement; proper construction of roads, landings, and stream crossings; and road closures. Critical-area stabilization is important in many areas disturbed or damaged by off-road vehicles. Miscellaneous (nonsoil) areas make up about 15 percent of this MLRA. The most common miscellaneous areas are beaches, riverwash, and water.

Table B-14. Characteristics of MLRAs found within the Area Potentially Affected by the Proposed Actions (*continued*)

MLRA (number)	Elevation (ft)	Permafrost in MLRA	General Description of Soils
Copper River Basin (227)	600 to 3,806	This area is in the zone of discontinuous permafrost, which can be moderately thick in some locations. Permafrost is commonly close to the surface in areas of the finer-textured sediments on plains, stream terraces, and the more gently sloping footslopes and hills. Isolated masses of ground ice occur in thick deposits of loess on terraces and the lower side slopes of hills. Permafrost generally does not occur on flood plains and in close proximity to lakes and other water bodies.	Major soil resource concerns are wind erosion and water erosion in areas where the native vegetation has been removed. Disturbance of the insulating organic material at the surface results in thawing of the upper soil layers. This thawing can result in ponding, soil subsidence, erosion, and disruption of surface drainage. All management activities should include protection of the organic surface material and the thermal balance of the soils. Miscellaneous (nonsoil) areas make up about 12 percent of this MLRA. The most common miscellaneous areas are riverwash and water (lakes make up about 10 percent of the area).
Interior Alaska Mountains (228)	1,500 to 20,320	This area is in the zone of discontinuous permafrost. Generally, permafrost is close to the surface only in areas of the finer-textured sediments on stream terraces and in swales on hills and footslopes. In the mountains, permafrost occurs only in gently sloping areas of rounded ridges, swales, and footslopes. Flood plains generally have no permafrost.	There are no major resource concerns related to soils in the area. Miscellaneous (nonsoil) areas make up about 58 percent of this MLRA. The most common miscellaneous areas are rock outcrop, rubble land, and glaciers (glaciers and permanent ice and snow make up about 15 percent of the area; lakes and ponds make up less than 1 percent of the area.) Mountain colluvium and alluvium cover about 60 percent of the present landscape.
Interior Alaska Lowlands (229)	100 to 1,900	This area is in the zone of discontinuous permafrost, which can be moderately thick in some locations. Permafrost commonly is close to the surface in areas of the finer-textured sediments on plains, stream terraces, and the more gently sloping footslopes and hills. Isolated masses of ground ice occur in thick deposits of loess on terraces and the lower side slopes of hills. Permafrost generally does not occur on flood plains and in areas near lakes and other water bodies.	Major soil resource concerns are wind erosion and water erosion in areas where the native vegetation has been removed. Most urban and rural developments are adjacent to rivers, in areas where flooding is a severe hazard. Flooding is associated with spring snowmelt and runoff from the adjacent mountains and ice jamming at river bends during periods of ice breakup. Conservation practices on forestland generally include timber stand improvement and proper construction of roads, landings, and stream crossings. Erosion and sediment control practices are important in the areas used for urban development. Miscellaneous (nonsoil) areas make up about 19 percent of this MLRA. The most common miscellaneous areas are riverwash and water (lakes make up about 10 percent of the area). Thick eolian (wind-carried) deposits, including loess and sand dunes, make up about 12 percent of the area.
Yukon-Kuskokwim Highlands (230)	30 to 4,508	This area is in the zone of discontinuous permafrost, can be moderately thick in some locations. Permafrost commonly is close to the surface in areas of the finer textured sediments throughout the MLRA. Isolated masses of ground ice occur in thick deposits of loess on terraces and the lower side slopes of hills. The prevalence of permafrost decreases to the southwest. Permafrost generally does not occur on flood plains or on south-facing slopes on steep mountains.	**Soils:** Major soil resource concerns are erosion of the shallow soils on uplands and disturbance of the fragile permafrost-affected soils. Disturbance of the insulating organic material at the surface results in thawing of the upper soil layers. This thawing can result in ponding, soil subsidence, erosion, and disruption of surface drainage. All management activities should include protection of the organic surface material and the thermal balance of the soils. Miscellaneous (nonsoil) areas make up about 10 percent of this MLRA. The most common miscellaneous areas are rock outcrop and rubble land (lakes make up about 7 percent of the area). In many valleys placer mine tailings are common.

Table B-14. Characteristics of MLRAs found within the Area Potentially Affected by the Proposed Actions (*continued*)

MLRA (number)	Elevation (ft)	Permafrost in MLRA	General Description of Soils
Interior Alaska Highlands (231)	400 to 6,583	This area is in the zone of discontinuous permafrost. Permafrost commonly is close to the surface in areas of the finer textured sediments throughout the MLRA. Isolated masses of ground ice occur in thick deposits of loess on terraces and the lower side slopes of hills. Permafrost generally does not occur on flood plains and south-facing slopes on steep mountains. Periglacial features, such as pingos, thermokarst pits and mounds, ice-wedge polygons, and earth hummocks, are on the lower slopes and in upland valleys, particularly in the Davidson Mountains, in the northwestern part of the area.	**Soils:** Major soil resource concerns are erosion of the shallow soils on uplands and disturbance of the fragile permafrost-affected soils. Disturbance of the insulating organic material at the surface results in thawing of the upper soil layers. This thawing can result in ponding, soil subsidence, erosion, and disruption of surface drainage. All management activities should include protection of the organic surface material and the thermal balance of the soils. Miscellaneous (nonsoil) areas make up about 2 percent of this MLRA. The most common miscellaneous areas are rock outcrop and rubble land (lakes make up less than 2 percent of the area). In many valleys placer mine tailings are common. Most of the landscape is mantled with bedrock colluvium and slope alluvium originating from the underlying bedrock.
Yukon Flats Lowlands (232)	300 to 1,000	This area is in the zone of discontinuous permafrost. Permafrost commonly is close to the surface in areas of the finer textured sediments on plains, stream terraces, and the more gently sloping footslopes and hills. Isolated masses of ground ice occur in thick deposits of loess on terraces and the lower side slopes of hills. Permafrost generally does not occur on flood plains and near lakes and other water bodies.	**Soils:** Major soil resource concern is flooding. Most communities are in areas on the banks of the major rivers and streams where flooding is a severe hazard. The flooding is associated with spring snowmelt and runoff from the adjacent mountains, with ice jamming on rivers during periods of breakup, and occasionally with high-intensity summer thunderstorms. On permafrost-affected soils, disturbance of the insulating organic material at the surface results in thawing of the upper soil layers. This thawing can result in ponding, soil subsidence, erosion, and disruption of surface drainage. All management activities should include protection of the organic surface material and the thermal balance of the soils. Miscellaneous (nonsoil) areas make up about 20 percent of this MLRA. The most common miscellaneous areas are riverwash and water (lakes make up approximately 20 percent of the area).
Bristol Bay-Northern Alaska Peninsula Mountains (236)	sea level to 2,500	This area is in the zone of discontinuous permafrost. Permafrost generally is at a considerable depth below the surface and occurs primarily in areas of the finer textured sediments on stream terraces, rolling uplands, and gently sloping footslopes. Isolated masses of ground ice occur in some areas of glacial drift and other unconsolidated materials. Permafrost generally does not occur on flood plains, near the coast, or in the southern part of the area.	**Soils:** Major soil resource concern is disturbance of the fragile permafrost-affected soils. Disturbance of the insulating organic material at the surface results in thawing of the upper soil layers. This thawing can result in ponding, soil subsidence, erosion, and disruption of surface drainage. All management activities should include protection of the organic surface material and the thermal balance of the soils. Miscellaneous (nonsoil) areas make up about 14 percent of this MLRA. The most common miscellaneous areas are water, riverwash (particularly in the southwestern part of the MLRA), and beaches (lakes make up about 10 percent of the area). Moraines, drift, and glaciofluvial deposits cover approximately 60 percent of the area. Much of the area has been mantled with a layer of silty volcanic ash and loess of varying thickness from regional volcanoes and unvegetated flood plains and outwash plains.

Table B-14. Characteristics of MLRAs found within the Area Potentially Affected by the Proposed Actions (*continued*)

MLRA (number)	Elevation (ft)	Permafrost in MLRA	General Description of Soils
Ahklun Mountains (237)	sea level to 4,658	This area is in the zone of discontinuous permafrost. Isolated masses of permafrost are in areas of deep, unconsolidated deposits in the mountains. On lowlands, permafrost occurs as isolated masses primarily in areas of the finer textured materials. It generally does not occur on flood plains and near the coast.	**Soils:** There are no major resource concerns related to soils in the area. Miscellaneous (nonsoil) areas make up about 25 percent of this MLRA. The most common miscellaneous areas are rock outcrop, rubble land, and beaches (lakes make up about 5 percent of the area). Colluvium and slope alluvium lie across about 40 percent of the area. Glacial moraines and drift still cover approximately 45 percent of the area, primarily on the lower mountain slopes, valley bottoms, and coastal plains.
Western Brooks Range Mountains, Foothills, and Valleys (243)	20 to 8,570	This area is in the zone of continuous permafrost. In the mountains, permafrost is most evident in unconsolidated materials. In the valleys, thick layers of permafrost occur in both fine textured and coarse textured materials. Depth to the base of the permafrost layer may be 1,000 feet (305 meters) or more. In close proximity to water bodies, it may be 600 feet (185 meters) or more. Periglacial features, such as pingos, thermokarst pits, thaw lakes, gelifluction lobes, and high- and low-center polygons, are common on stream terraces, on the lower mountain slopes, and in swales on foothills.	**Soils:** Major soil resource concern is disturbance of the fragile permafrost-affected soils. Disturbance of the insulating organic material at the surface results in thawing of the upper soil layers. This thawing can result in ponding, soil subsidence, erosion, and disruption of surface drainage. All management activities should include protection of the organic surface material and the thermal balance of the soils. Miscellaneous (nonsoil) areas make up about 27 percent of this MLRA. The most common miscellaneous areas are rock outcrop, rubble land, and water (lakes make up about 3 percent of the area). Mountain colluvium and alluvium, are found across about 60 percent of the present landscape. Slightly modified to highly modified glacial moraines, drift, and outwash deposits cover about 18 percent of the area.
Northern Brooks Range Mountains (244)	1,969 to 8,570	This area is in the zone of continuous permafrost. In the mountains, permafrost is most evident in areas of deep unconsolidated deposits. In valleys, thick layers of permafrost occur in both fine textured and coarse textured deposits. Periglacial features, including gelifluction lobes, polygons, and stripes, are common on stream terraces, on hills, and in gently sloping areas in the mountains.	**Soils:** Generally, no major resource concerns affect land use in this sparsely populated area. Because of the highways and pipeline that cross the area, however, disturbance of the fragile permafrost-affected soils is a concern. Disturbance of the insulating organic material at the surface results in thawing of the upper soil layers. This thawing can result in ponding, soil subsidence, erosion, and disruption of surface drainage. All management activities should include protection of the organic surface material and the thermal balance of the soils. Miscellaneous (nonsoil) areas make up about 75 percent of this MLRA. The most common miscellaneous areas are rubble land, chutes, rock outcrop, and small glaciers (lakes make up less than 2 percent of the area). Mountain colluvium and alluvium cover about 75 percent of the present landscape. Slightly modified to highly modified glacial moraines, drift, and outwash deposits cover about 20 percent of the area.

Source: USDA 2006.

Sections 401 and 404 of the CWA and EO 11990, *Protection of Wetlands*, regulate development activities in or near streams or wetlands or other features regulated as waters of the United States. Potential development actions that may affect streams and/or wetlands require a permit from the USACE for dredging and filling in wetlands. Both the USACE and the ADEC have regulatory authority over actions in wetlands and floodplains. Actions in wetlands and floodplains require coordination with USACE and ADEC which may result in mitigation requirements.

The study area includes airspace associated with coastal areas of Alaska. Any operations in or adjacent to coastal areas would also be subject to the Coastal Zone Management Act of 1972 (16 U.S.C. 1451 et seq.), as amended by the Coastal Zone Act Reauthorization Amendments of 1990 and PL 104-150, the Coastal Zone Protection Act of 1996. In addition, coastal activities may be subject to other specific regulations, including the Marine Protection, Research, and Sanctuaries Act (33 U.S.C. 1401 et seq.); the Marine Mammal Protection Act of 1972 (16 U.S.C. 1361 et seq.), as amended through 1997; and the Rivers and Harbors Act of 1899 (33 U.S.C. 403). The “Integrated Natural Resources Management” implementation of AFI 32-7064 (Air Force 2004a) directs that bases with coastal or marine properties must enter into an agreement with the Coastal American National Implementation Team to assist in the restoration and protection of coastal areas.

The State of Alaska, acting through the ADEC, also has authority to regulate statewide activities related to the management of surface and groundwater resources under the guidelines established by the abovementioned Federal regulations. The ADEC’s authority is derived from legislation enacted as Title 18, Environmental Conservation, AAC. Relevant state regulations include: 18 AAC 70, *Water Quality Standards* (ADEC 2009a); 18 AAC 72, *Wastewater Disposal* (ADEC 2009b); and 18 AAC 80, *Drinking Water* (ADEC 2010b).

B.6.3 General Description of Affected Environment

B.6.3.1 Water Quality and Quantity

The study area for the proposed actions include portions of four major surface water drainage basins in the State of Alaska and portions of the Pacific Ocean in the Gulf of Alaska (GOA). Major rivers in the study area include the Yukon, Koyukuk, Tanana, Porcupine, Kuskokwim, and Susitna. Much of the average annual precipitation, ranging from 8 inches in the northeastern portion of the study area to 200 inches in the southern mountains, falls as snow and accumulates throughout the winter months (USDA 2006). During winter months, many bodies of water freeze completely, allowing heavy equipment and vehicles to traverse otherwise impassable areas. Thawing of the accumulated snow often leads to the flooding of rivers and streams. This frequent flooding contributes to the braided morphology of many Alaskan rivers as they flow across rather flat alluvial floodplains. Major surface water features in the JPARC study area are shown in Figure B-9.

The ocean waters of the GOA are generally in pristine condition because of the low intensity of use in this remote area (EPA 2004). The GOA forms a large, semicircular bight opening southward into the North Pacific Ocean. The GOA is characterized by a broad and deep continental shelf containing numerous troughs, seamounts, and ridges. The region receives high amounts of freshwater input, experiences numerous storms, and exhibits highly variable environmental conditions.

Surface water quality in the State of Alaska is generally good. The ADEC lists only 28 bodies of water within the planning area as not meeting minimum Federal water quality 303(d) criteria (ADEC 2010a). Primary sources of contamination are from mining operations, urban runoff, road construction, and fuel spills.

B.6.3.2 Water Resource

Groundwater in Alaska is largely provided by unconsolidated aquifers of sand and gravel that were deposited as alluvium or glacial outwash. Groundwater is available in most areas of Alaska, except where permafrost is very deep in the northern part of the state. Groundwater is a source of drinking water for about 50 percent of the overall state population and for 90 percent of the rural residents (ADEC 2010a). Primary aquifers are the Cook Inlet aquifer system, which provides water for Anchorage and for smaller cities and towns, including Palmer, Kenai, and Soldotna; the Tanana Basin Aquifer, water-yielding unconsolidated deposits along the Tanana River and the flanks of the hills that surround the river basin; and River-Valley alluvial aquifers, deposits of sand and gravel that are present in the floodplains and terraces of the major river valleys. These aquifers are present in lowland areas, primarily in the floodplains of major rivers, but in some places they also underlie low, rolling hills developed on alluvial-fan deposits that separate the floodplains from nearby mountains. In some areas, such as near Anchorage and Fairbanks, the unconsolidated-deposit aquifers are thick and widespread; in other places, they are present as narrow bands of alluvium in, and adjacent to, river channels. Because Alaska's major population centers and most agricultural development are in lowland areas near rivers, unconsolidated-deposit aquifers are an important source of water for public supply, domestic and commercial uses, and agriculture (USGS 1999).

B.6.3.3 Floodplains

There is limited detailed mapping of the 100-year floodplain throughout the study area that could potentially be affected by the proposed actions. Geographic information system (GIS) data of the surface water features and topography can provide the approximate locations of floodplains. Flooding commonly occurs around rivers and streams, in areas of snow or ice accumulation and in low-lying coastal areas. Melt water from snow and glaciers often causes streams to overflow their banks during spring and summer months in Alaska. Ice jams, which are created when chunks of ice pile up and form a dam, may exacerbate flooding. Ice jams can occur at any location along any river, but are particularly common at and near the towns of Eagle, Circle, and Fort Yukon (NOAA 2006). Coastal flooding resulting from strong and sustained southerly winds is a common problem along the southern coast of Alaska; however, floodplains are generally present in areas of low elevation immediately surrounding most rivers and streams.

B.6.3.4 Wetlands

Wetlands are extremely common in Alaska; there are an estimated 174,683,900 acres of wetlands, accounting for approximately 42 percent of the total surface area (ADEC 2010a). In many areas, permafrost just beneath the surface of the ground traps water, leading to the formation of wetlands. Other wetlands form as a result of heavy rainfall, meltwater inputs, beavers, and tides. In addition to permafrost areas, extensive wetlands are typically associated with, or are adjacent to, water systems such as rivers where topographic lows cause groundwater to be closer to the surface; however, wetlands can also occur where a barrier prevents surface water from percolating or where there is a hydrologic connection to ground or surface water.

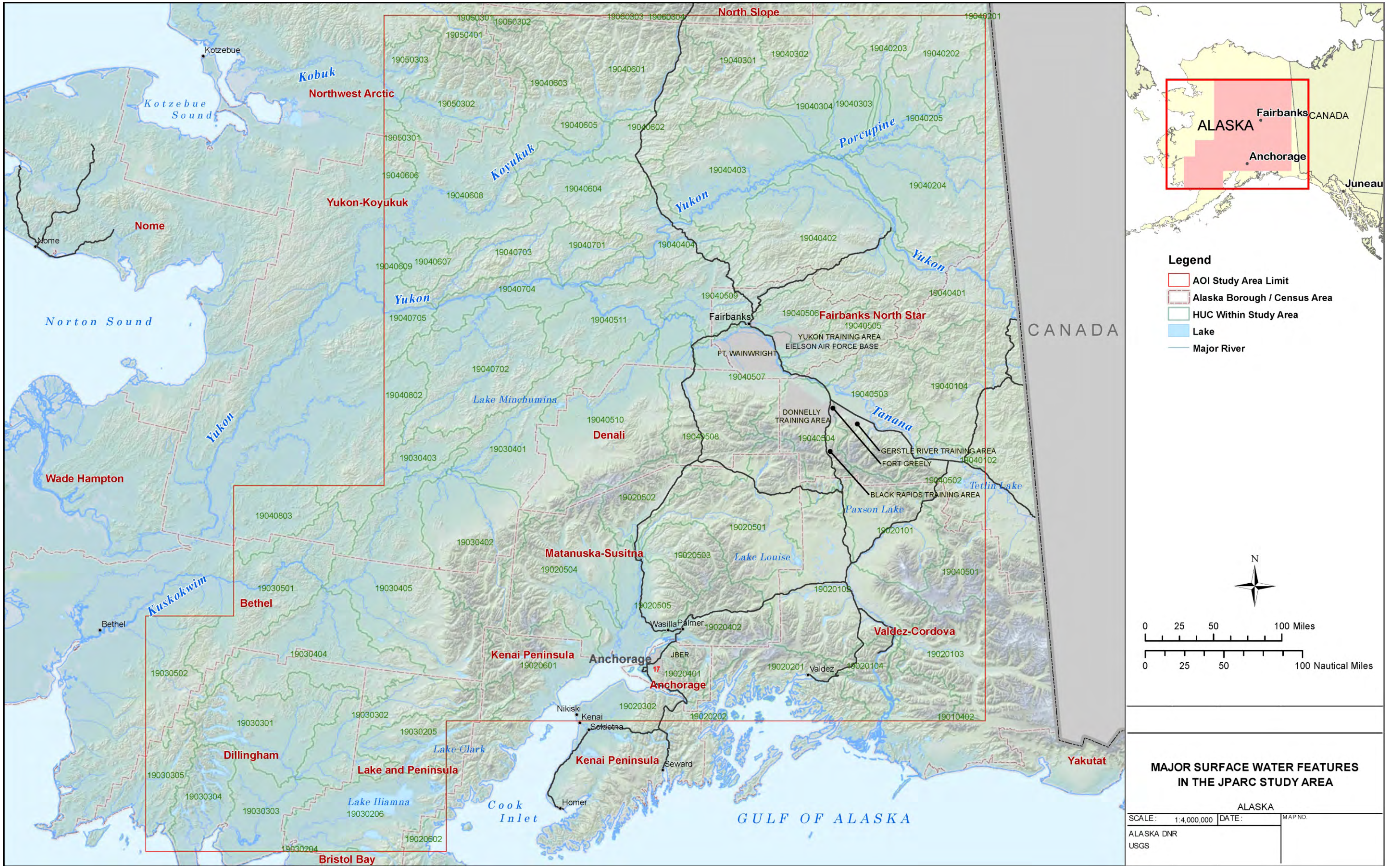

Figure B-9. Major Surface Water Features in Central Alaska

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B.7 HAZARDOUS MATERIALS AND WASTE

B.7.1 Definition of Resource

The terms "hazardous materials" and "hazardous waste" refer to substances defined as hazardous by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the Solid Waste Disposal Act (SWDA), as amended by the Resource Conservation and Recovery Act (RCRA) or the Toxic Substance Control Act (TSCA). In general, hazardous materials include substances that, based on quantity, concentration, or characteristics (physical, chemical, or infectious), may present substantial danger to public health or the environment when released into the environment. Hazardous wastes regulated under RCRA are defined as any solid, liquid, contained gaseous, or semisolid waste, or any combination of wastes that exhibit one or more of the hazardous characteristics of ignitability, corrosivity, toxicity, or reactivity, or are listed as a hazardous waste under 40 CFR 261.

Issues associated with hazardous materials and waste typically center around waste streams; underground storage tanks (USTs); aboveground storage tanks (ASTs); and the storage, transport, use, and disposal of pesticides, fuels, lubricants, and other industrial substances. When such materials are improperly used in any way, they can threaten the health and well-being of wildlife species, habitats, and soil and water systems, as well as humans. In addition, the expenditure of live ammunition or detonations has the potential to release hazardous chemicals or other elements, such as heavy metals, into the environment.

B.7.2 Regulatory Setting

Federal, state, Air Force, and Army regulations determine requirements for hazardous materials and waste. These criteria differ based on the type and context of the material or waste in question.

Federal Regulations. The management of hazardous materials and hazardous waste is governed by specific Federal regulations and environmental statutes. The key regulatory requirements include the following:

> **Resource Conservation and Recovery Act of 1976 (42 U.S.C. 6901 et seq.).** RCRA is relevant to the management of hazardous waste from point of generation to its disposal. RCRA requirements include the tracking and storage of hazardous waste and the enforcement of safe management practices. The main focus of RCRA is to prevent the release of petroleum products and hazardous substances.
>
> **Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA) (42 U.S.C. 11001–11050).** EPCRA requires emergency planning for areas where hazardous materials are manufactured, handled, or stored, and provides citizens and local governments with information regarding potential hazards to their community.
>
> **Comprehensive Environmental Response, Compensation and Liability Act of 1980 (42 U.S.C. 9601 et seq.), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) (42 U.S.C. 9601–9675).** CERCLA (also known as Superfund) addresses the management of existing contaminated sites and acts as the governing regulation of remediation practices. CERCLA provides for oversight of remediation actions for contaminated or potentially contaminated sites by requiring investigation, assessment, and development of remediation programs to contain contamination. CERCLA requires removal of hazardous substances for emergency response and long-term monitoring of contamination levels at applicable sites. Section 105(a)(8)(B) of CERCLA, as amended, requires that the statutory criteria provided by the Hazard Ranking System be used to prepare a list of national priorities among the known releases or threatened releases of hazardous substances, pollutants, or contaminants throughout the United States. This list is known as the

National Priorities List (NPL). SARA amended CERCLA by including mandatory cleanup standards, settlement provisions, and guidelines for state and public participation.

Community Environmental Response Facilitation Act of 1992 (CERFA) (42 U.S.C. 9620). This act amended CERCLA, requiring agencies to identify real property where hazardous wastes were stored released or disposed of prior to the Federal Government terminating its activities on property it owns.

Toxic Substance Control Act of 1976 (15 U.S.C. 2601 et seq.). The TSCA enforces management of harmful or potentially harmful substances. It requires the testing of chemicals that could be harmful to humans or the environment, imposes limits on the availability of certain substances, and establishes guidelines and programs for the safe management of chemicals.

Asbestos Hazard Emergency Response Act (AHERA) (15 U.S.C. 2651). AHERA regulates hazardous forms of asbestos, including their inspection, transport, and disposal, as well as the post-remediation surveillance of asbestos-related activities.

Spill Prevention, Control, and Countermeasure (SPCC) Rule (40 CFR 112). The SPCC Rule regulates oil discharges through specific requirements for oil spill prevention, preparedness, and response. It provides for oversight of management practices and contamination response programs with a view to limiting contact with, and exposure of the environment, wildlife, and humans to, petroleum products.

EPA Regulation on Identification and Listing of Hazardous Waste (40 CFR 261). This regulation identifies solid wastes subject to regulation as hazardous and as subject to specific notification requirements under RCRA.

EPA Regulation on Standards for the Management of Used Oil (40 CFR 279). This regulation delineates requirements for storage, processing, transport, and disposal of oil that has been contaminated by physical or chemical impurities during use.

EPA Regulation on Designation, Reportable Quantities, and Notification (40 CFR 302). This regulation identifies reportable quantities of substances listed in CERCLA and sets forth notification requirements for releases of those substances. It also identifies reportable quantities for hazardous substances designated in the CWA.

Clean Water Act (40 CFR 122, Section 402). As authorized by the CWA, the NPDES permit program controls water pollution by regulating point and nonpoint sources that discharge pollutants into waters of the United States. Point sources are discrete conveyances such as pipes or man-made ditches. Nonpoint source pollution can be caused by either rainfall or snowmelt moving over and through the ground. As the runoff moves, it picks up and carries away natural and man-made pollutants, finally depositing those pollutants into lakes, rivers, wetlands, coastal waters, and groundwater. NPDES regulations include measures to prevent such pollution, including runoff of petroleum waste and hazardous waste into receiving water bodies. The NPDES permit program is administered by the State of Alaska through the ADEC.

Federal Insecticide, Fungicide, and Rodenticide Act (40 CFR Parts 150 – 189). FIFRA mandates that EPA regulate the use and sale of pesticides to protect human health and preserve the environment. EPA is specifically authorized to: 1) strengthen the registration process by shifting the burden of proof to the chemical manufacturer, 2) enforce compliance against banned and unregistered products, and 3) promulgate the regulatory framework missing from the original law, which simply established procedures for registering pesticides with the U.S. Department of Agriculture and established labeling procedures. FIFRA provides EPA with the authority to oversee the sale and use of pesticides; however, because FIFRA does not fully preempt state/tribal or local law, each state/tribe and local government may also regulate pesticide use.

State Regulations. The State of Alaska, acting through the ADEC, also has authority to regulate the handling, storage, transport, and disposal of hazardous materials and waste within the proposed action areas. The ADEC's authority is derived from legislation enacted as Title 18, Environmental Conservation, AAC. In addition to its Title 18 authority, the ADEC has oversight responsibility of DoD CERCLA sites. Applicable ADEC regulations include the following: 18 AAC 62, *Hazardous Waste* (ADEC 2003); 18 AAC 75, *Oil and Other Hazardous Substances Pollution Control* (ADEC 2008); 18 AAC 75.341, *Soil Cleanup Levels; Tables*; 18 AAC 75.445[k], *Best Available Technology Review*; and 18 AAC 78, *Underground Storage Tanks* (ADEC 2006).

Department of Defense. The DoD program for remediating contamination on military lands is the Installation Restoration Program (IRP). In 2012, the responsibilities of the IRP will transfer to the Military Munitions Response Program (MMRP), which is a subset of the Defense Environmental Restoration Program (DERP), and will be the primary program responsible for the restoration of DoD contaminated sites after 2012. The MMRP was established to better reflect the statutory goals established by the DoD in its Environmental Restoration Program. The MMRP will address potential explosives safety, as well as health and environmental issues caused by past DoD munitions-related activities. The scope of DERP includes cleanup and restoration of sites contaminated with toxic and hazardous substances, low-level radioactive materials, petroleum, oils, lubricants, and other pollutants and contaminants.

Another subset of the MMRP and DERP is the Formerly Used Defense Sites (FUDS) Program, which cleans up properties formerly owned, leased, possessed, or used by the military services, including Army, Navy, Air Force, or other DoD agencies. Under the FUDS Program, the DoD is authorized to clean up contamination, address military munitions, and to remove building/debris safety hazards caused by DoD on properties that were under the jurisdiction of the Secretary of Defense prior to October 17, 1986. The FUDS Program uses a cleanup process consistent with CERCLA and completes work on a prioritized basis, with the sites posing the highest risk being remediated first. The Army is the executive agent for the program and U.S. Army Corps of Engineers manages and directs the program administration.

Air Force Instructions. Several Air Force Instructions address the management and safe handling of hazardous waste and materials in accordance with applicable Federal and state regulations. These include the following:

- AFI 32-7086, *Hazardous Material Management* (Air Force 2004b). AFI 32-7086 provides guidance in managing the procurement and use of hazardous materials (1) to support Air Force missions; (2) to protect the safety and health of personnel on Air Force installations and communities surrounding Air Force installations by ensuring proper hazardous material management; (3) to minimize Air Force use of hazardous materials consistent with mission requirements; and (4) to maintain Air Force compliance with Federal and state environmental requirements for hazardous materials usage.
- AFI 32-7042, *Solid and Hazardous Waste Compliance* (Air Force 2009). AFI 32-7042 identifies compliance requirements for all solid and hazardous waste except radioactive waste.
- AFI 32-1052, *Facility Asbestos Management* (Air Force 1994b). AFI 32-1052 establishes requirements and assigns responsibilities to incorporate facility asbestos management principles and practices into all Air Force programs. It also establishes a program to ensure compliance with 40 CFR 61.14O, National Emission Standard for Asbestos, and 29 CFR 1926.58, Asbestos Construction Standards.

Army Regulations. AR 200-1, *Environmental Protection and Enhancement* (Army 2007b), regulates how military or civilian personnel, tenants on post, and contractors at Army facilities handle hazardous materials and manage regulated waste. AR 200-1 provides guidance on, but is not limited to, policies addressing the following areas: oil and hazardous substance spills, hazardous materials management, hazardous and solid-waste management, lead-based paint management, asbestos management, radon reduction program, and the IRP. Individual installations may apply regulations in addition to AR 200-1 that are not designed to supersede, but rather work as a compliment to, the policies and procedures established by it.

B.7.3 General Description of Affected Environment

B.7.3.1 Contaminated Sites

EPA lists six sites within the areas potentially affected by the proposed actions as CERCLA Superfund sites on the NPL (EPA 2011). Of these, four sites (Eielson AFB, Elmendorf AFB, Joint Base Elmendorf-Richardson, and Fort Wainwright) occur within JPARC military installations. These installations were placed on the NPL because of contamination found mainly within their cantonment areas. These sites will be discussed in further detail in Chapter 3.

There are 2,043 contaminated sites listed on the ADEC database within the areas potentially affected by the proposed actions. The locations of these sites are shown on Figure B-10. Of these, 489 sites occur on DoD lands within the proposed action areas and 25 on military training areas within the proposed action areas. Fourteen of the 25 sites have completed the remediation process; the other 11 are still open (ADEC 2011b).

The following summarizes contaminated sites in training areas included in the proposed actions.

Tanana Flats Training Area. TFTA, which occupies 653,746 acres of the Middle Tanana River Basin, is due south of Fort Wainwright and due west of Eielson AFB. Two contaminated sites within TFTA are listed in the ADEC contaminated site database: the Blair Lakes Training Area (discussed below) and a site near the southern border of TFTA.

Blair Lakes Training Area. The Blair Lakes Training Area, a 63,100-acre tract within TFTA, is used by the Air Force under a joint use arrangement. The Air Force's Land Use Permit provides exclusive use of a 33,963-acre portion of the tract, designated R-2211, and joint use of the remaining 29,137 acres. The training area is 26 miles southwest of Eielson AFB and 32 miles due south of Fairbanks. Five sites on the Blair Lakes Range were identified and addressed under the DoD IRP program in the early 1990s, and a ROD was signed in 1995. There are no active sites listed in the ADEC contaminated sites database. The Blair Lakes Training Area is bounded on the north, east, and west by TFTA, and on the south by MMRP site FTWW-008-R-01, a former bombing range.

Donnelly Training Area–East. DTA-East is not listed on the NPL; however, one site in DTA-East is listed on the ADEC contaminated sites database. There is also potential for the presence of UXO and associated hazardous waste residues, as the area was used as an Arctic training and test area by Fort Greely.

Donnelly Training Area–West. DTA-West is not listed on the NPL; however, four sites in the DTA-West are listed on the ADEC contaminated sites database. There is a potential for the presence of UXO and associated hazardous waste residues, as the area was used as an Arctic training and test area under Fort Greely.

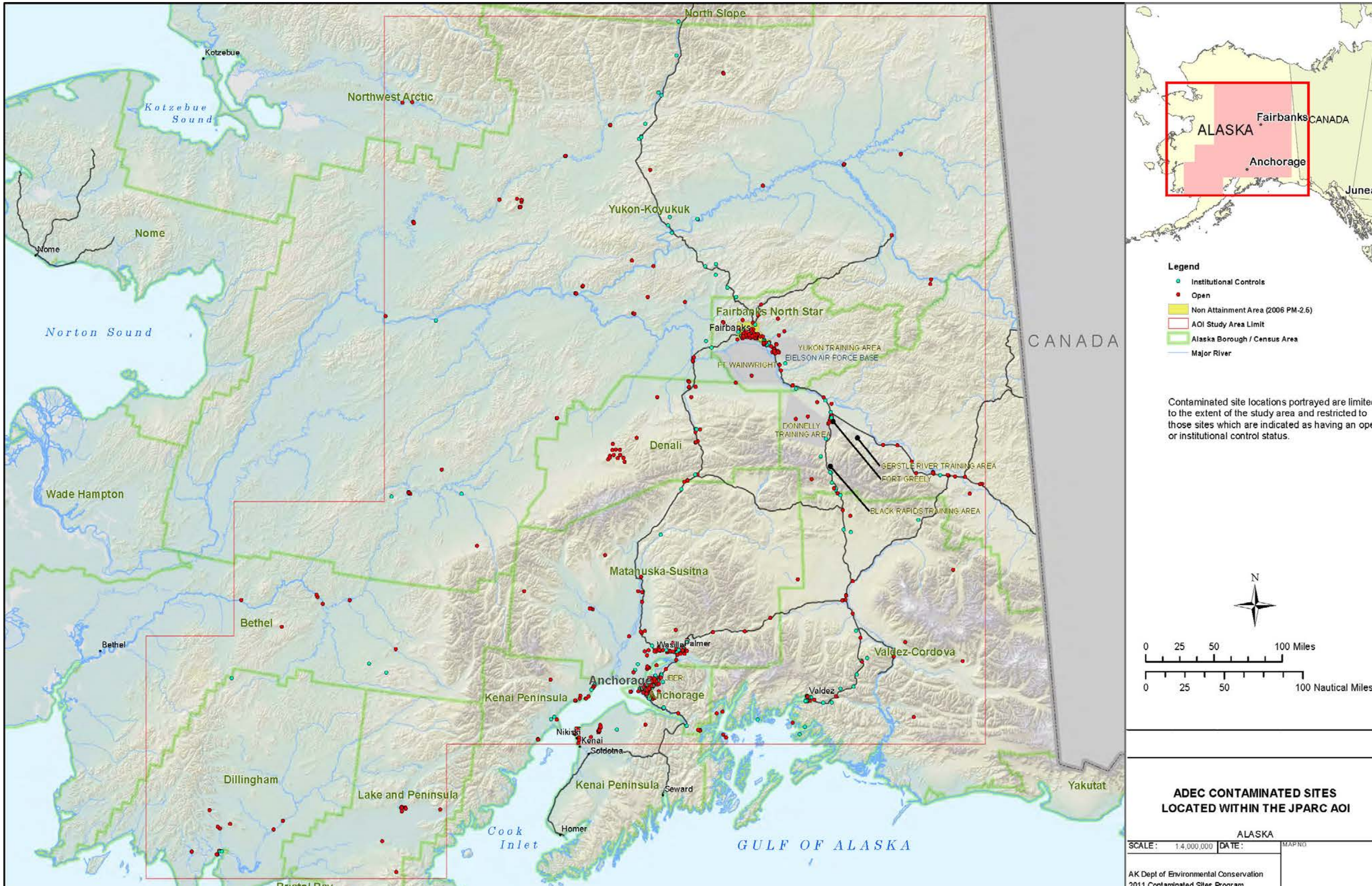

Figure B-10. Contaminated Sites in Central Alaska

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Yukon Training Area. YTA lies directly east of Eielson AFB and contains one site listed in the ADEC contaminated sites database.

Fort Greely. Fort Greely is a 6,805-acre installation east of DTA in the east-central portion of Alaska. There are 47 sites in Fort Greely listed on the ADEC database. Of these 47 sites, 38 are currently open and the remaining 9 are listed as closed with institutional controls (ADEC 2011b).

B.7.3.2 Munitions-Related Residue

CHAFF AND FLARE

Chaff and defensive flares are currently used by 11th AF crews in existing MOAs and ATCAAs and are managed as ordnance. Use is governed by detailed operating procedures to ensure safety. The Air Force restricts flare use in Alaskan airspace to altitudes above 5,000 feet AGL from June through September and to altitudes above 2,000 feet AGL for the rest of the year. These altitude restrictions substantially reduce any risk of a fire from training with defensive flares.

Chaff, which is ejected from an aircraft to reflect radar signals, consists of fibers of aluminum-coated silica thinner than human hair packed into approximately 4-ounce bundles. When ejected, chaff forms a brief electronic “cloud” that temporarily masks the aircraft from radar detection. Although the chaff may be ejected from the aircraft using a small pyrotechnic charge, the chaff itself is not explosive (Air Force 1997). Depending on the chaff used, plastic or nylon pieces, a felt piece, or 2- by 3-inch squares of parchment paper can fall to the ground with each released chaff bundle.

Each defensive flare consists of small pellets of highly flammable material that burn rapidly at extremely high temperature. Flares provide a heat source, other than the aircraft’s engine exhaust, to decoy heat-sensitive or heat-seeking targeting systems. The flare ignites upon ejection from the aircraft and burns completely within approximately 3.5 to 5 seconds, or approximately 400 to 500 feet from its release point (Air Force 1997).

MUNITIONS

The Air Force and Army currently conduct a number of training missions in impact areas that generate munitions-related residue. In general, munitions-related residue sources include practice bombs, expended artillery, small arms and mortar projectiles, bombs and missiles, rockets and rocket motors, grenades, incendiary devices, experimental items, demolition devices, and any other material fired on or upon a military range.

Munitions that fail to detonate properly (duds) and munitions that only partially detonate (low-order detonations) can result in the deposition of munitions residues (explosives and metals) at impact sites. Duds and low-order detonations have the potential to create environmental contamination by the leaching of explosive filler into soil, sediment, surface water, and groundwater.

The expenditure of live ammunition or detonations has the potential to release hazardous chemicals or other elements, such as heavy metals, into the environment. The existing condition is considered to be the baseline levels released into the environment from current training and testing missions in the impact areas.

B.8 BIOLOGICAL RESOURCES

B.8.1 Definition of Resource

Biological resources consist of native or naturalized plants and animals, along with their habitats, including wetlands. Although the existence and preservation of biological resources are intrinsically