3.7 HAZARDOUS MATERIALS AND HAZARDOUS WASTE MANAGEMENT

The relevant aspects of hazardous materials/waste management include the applicable regulatory procedures for hazardous materials usage and hazardous waste generation, and management programs for existing hazardous waste-contaminated sites within areas potentially affected by the NMD program.

The hazardous materials and hazardous waste management section will provide an overview of hazardous materials management, including storage tanks, hazardous waste management, pollution prevention initiatives, Installation Restoration Program (IRP) sites, asbestos, polychlorinated biphenyls (PCBs), lead-based paint, radon, and pesticides. Hazardous materials and hazardous waste management activities are governed by specific environmental regulations. For the purposes of the following analysis, the terms hazardous materials or hazardous waste will mean those substances defined by both Federal and state regulations. In general, this includes substances that, because of their quantity, concentration, or physical, chemical, or infectious characteristics, may present substantial danger to public health or welfare or the environment when released into the environment. Hazardous waste is further defined in 40 CFR 261.3 as any solid waste that possesses any of the hazard characteristics of toxicity, ignitibility, corrosivity, or reactivity.

Solid waste is defined as any discarded material (in effect, abandoned, recycled, inherently waste-like, or no longer suitable for its intended purpose) that is not specifically excluded in 40 CFR 261.4. This definition can include materials that are both solid and liquid (but contained). Transportation of hazardous materials is regulated by the U.S. Department of Transportation regulations within 49 CFR.

3.7.1 ALASKA INSTALLATIONS

3.7.1.1 Clear AFS—Hazardous Materials and Hazardous Waste Management

The ROI for hazardous materials and hazardous waste management at Clear AFS includes the Clear AFS infrastructure and existing facilities, with some NMD facilities located in the base construction camp.

Hazardous Materials Management

Hazardous materials are regularly used and stored throughout Clear AFS. The most commonly utilized hazardous materials include paints, paint thinners and removers, adhesives, solvents, sodium dichromate, hydrostatic fluids, batteries, pesticides, petroleum, oil, and lubricants. Hazardous materials are controlled and managed through a pharmacy program (see Pollution Prevention section). Hazard Communication (HAZCOM) training is provided to all personnel whose jobs involve handling or managing hazardous materials. Material Safety Data Sheets for hazardous materials are maintained on file in the workplace where they are used or stored and in a central repository maintained on the Hazardous Material Information System.

There are 29 aboveground storage tanks, ranging in size from 189 to 113,562 liters (50 to 30,000 gallons), at Clear AFS. They serve as storage tanks for petroleum for building heat and vehicle fueling. (13 CWS/CC, 1999—Comments received by EDAW, Inc., regarding the NMD Deployment Preliminary Draft EIS) All underground storage tanks have been removed from Clear AFS (EDAW, Inc., 1998—Trip Report of visit to Alaska, July 20–31).

Clear AFS has developed a Spill Prevention and Response Plan which combines both a Spill Prevention Control and Countermeasures Plan that describes the procedure, methods, and equipment used to prevent spills, and an Oil and Hazardous Substances Pollution Contingency Plan that details procedures for releases, accidents, and spills involving these substances. The base also complies with the Emergency Planning and Community Right-to-Know Act (EPCRA) reporting requirements by submitting annual emergency response and extremely hazardous substances updates to local emergency management officials.

Hazardous Waste Management

Clear AFS is a large quantity generator of hazardous waste and is allowed to accumulate waste for up to 90 days. (13 CWS/CC, 1999—Comments received by EDAW, Inc., regarding the NMD Deployment Preliminary Draft EIS) Hazardous waste streams generated by operations at Clear AFS include waste paint, waste paint with methyl ethyl ketone, waste paint with lead and mercury, solvents, methyl ethyl ketone, batteries, waste oil with lead, waste oil with sulfide, waste oil with cadmium, waste oil with chromium, and spill residuals. In 1997, Clear AFS generated 4,977 kilograms (10,973 pounds) of hazardous waste (Department of the Air Force, 1998—Hazardous Waste Report for 1997).

Clear AFS operates one central accumulation point for storage of hazardous waste located in the composite area at Building 250 (U.S. Department of the Air Force, 1997—EA for Radar Upgrade, Clear AS). Waste from the six satellite accumulation points is forwarded to the central accumulation point. These satellite accumulation points are located at the Technical Site (Buildings 101 and 102), the Power Plant (Building 111), the Motor Pool (Building 196), the Civil Engineer Shop (Building 62), and the Auto Hobby Shop (Building 51). (Clear AS, 1998—Hazardous Waste Management Plan)

Clear AFS has developed a Hazardous Waste Management Plan that includes designation of responsible personnel, hazardous waste identification and management practices, training requirements, hazardous waste storage, accumulation point managers, and turn-in procedures.

Pollution Prevention

Clear AFS has developed a Pollution Prevention Management Plan, which aids in the elimination or reduction of hazardous substances, pollutants, and contaminants.

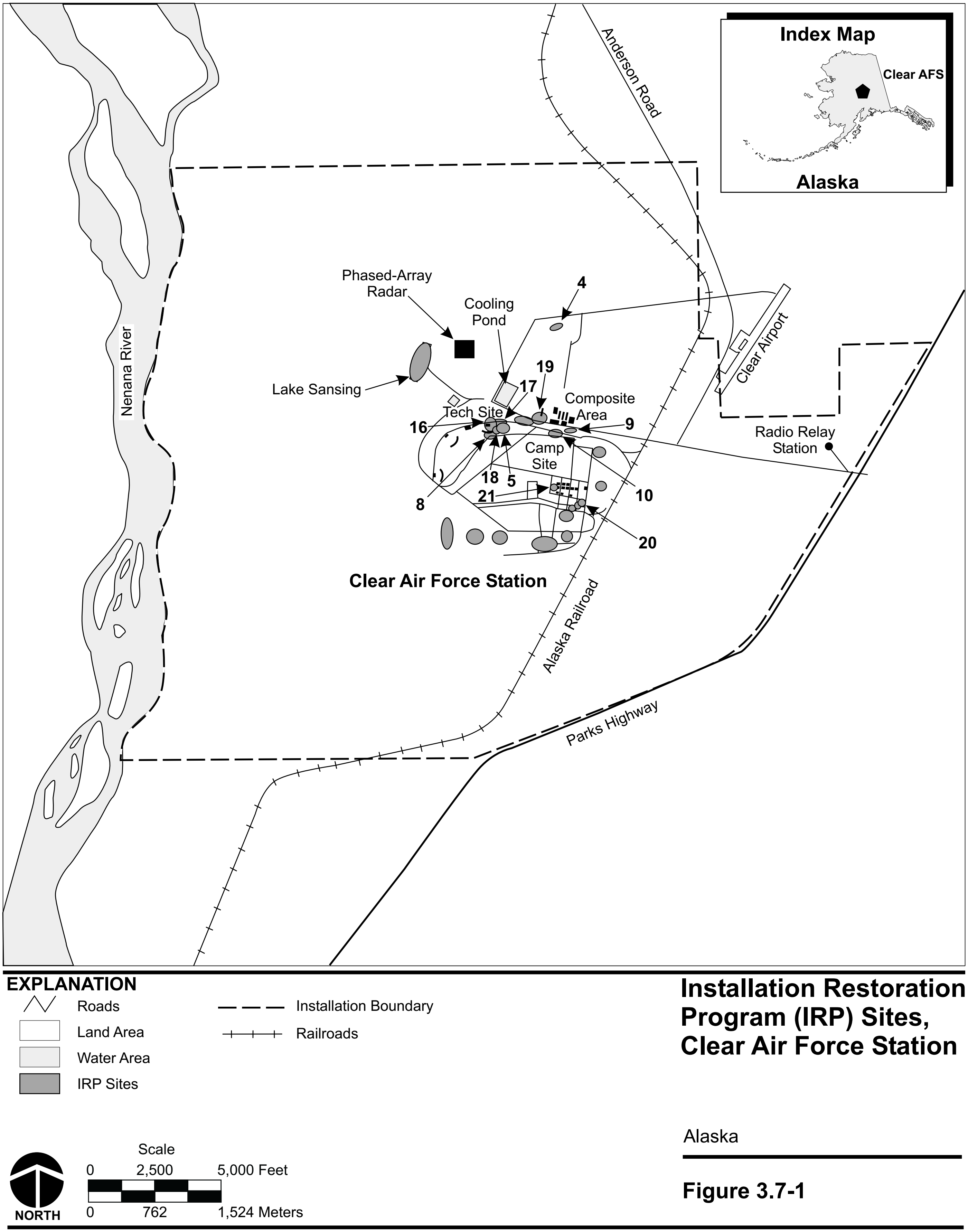
Clear AFS also administers a hazardous materials pharmacy program known as HAZMART to manage hazardous materials. This system tracks hazardous materials from the point at which they are brought onto the facility until they are brought back to the pharmacy either as an empty container or as excess material. This pollution prevention initiative is designed to control and reduce the amount of hazardous materials at the installation.

Recycling capabilities in Alaska are very limited. However, at Clear AFS used oil, asphalt, rags, and assorted paper are mixed with coal and burned in the power plant as a supplemental fuel source. Since 1992, an average of 22,525 liters (5,950 gallons) of waste oil, 665 kilograms (1,470 pounds) of asphalt, 2,655 kilograms (5,850 pounds) of rags, and 2,790 kilograms (6,150 pounds) of paper per year have been burned in the power plant. (U.S. Department of the Air Force, 1997—EA for Radar Upgrade Clear AS)

Installation Restoration Program

IRP investigations at Clear AFS since 1991 have identified 23 sites of potential contamination. Of these sites, 22 are considered closed sites, pending state written approval. Eleven of the identified sites are located on or near the proposed NMD sites (figure 3.7-1). Table 3.7-1 lists the types of contamination identified at these sites. Clear AFS is not on the National Priorities List site and does not have a Federal Facility Agreement.

During initial site investigations for construction at the phased array radar facility location in August 1996, several abandoned drums, old batteries, and other debris were found. The area has been identified as an area of concern, and further evaluation is in progress. (U.S. Department of the Air Force, 1997—EA Radar Upgrade Clear AS)



Installation Restoration Program (IRP) Sites, Clear Air Force Station

Alaska

Figure 3.7-1

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Table 3.7-1: IRP Sites at Clear AFS Near Potential NMD Sites

Site No.	Site Description/Location	Activities/Findings
4	Abandoned landfill	Wooden and metal debris
5	Coal stockpile for power plant	Soil and groundwater contamination
8	Underground storage tank location	Fuel spill
9	Previous underground storage tank location	Gasoline contamination
10	Radioactive material storage	Radioactive electronic tube burial
16	Power plant	PCB transformers
17	Power plant oil/water overflow	Surface soil contamination
18	Power plant thaw shed infiltration pond	Surface soil contamination
19	Vehicle maintenance drainage crib (Building 196)	Diesel and gasoline contamination
20	Building 85 (demolished)	Construction camp diesel generator leaks
21	Auto Service Grease Pad (Building 1)	Oil, fuel, and solvent spills

Source: U.S. Air Force, 1995 Environmental Restoration Program; Perry, 1999—Personal Communication; Perry, 1999—Facsimile communication.

Asbestos

Clear AFS has developed an Asbestos Management Plan and an Asbestos Operations Plan. The Asbestos Management Plan includes designated personnel responsible for asbestos management such as the Asbestos Program Officer and the Asbestos Operations Officer; descriptions of asbestos management activities including data collection and identification; and discussions of recordkeeping procedures such as the asbestos database management. The Asbestos Operations Plan is designed to implement the procedures discussed in the Asbestos Management Plan, and to establish procedures for asbestos abatement. The operations plan includes budgeting concerns, planning procedures, notification requirements, health and safety equipment requirements, and an overview of a small-scale removal.

An asbestos survey was conducted on all facilities on Clear AFS in 1986. All facilities contain asbestos except the main dormitory, which was remodeled (EDAW, Inc., 1998—Trip Report of visit to Alaska, July 20–31). Prior to any building modifications, all asbestos in the affected area is removed in accordance with Federal Regulations. Asbestos-containing material wastes are disposed of in the Clear AFS landfill, which is permitted to accept asbestos.

Asbestos management activities at Clear AFS are handled by the installation's Operation and Maintenance contractor. The contractor's civil engineering manager and environmental coordinator are designated as the Asbestos Program Officer and Asbestos Operations Officer, respectively. Up to 0.3 square meter (3 square feet) of asbestos-containing material can be handled by the installations' contractor. Asbestos repair or removal of more than 0.3 square meter (3 square feet) of asbestos-containing material will be handled by other contractors specializing in asbestos abatement.

Polychlorinated Biphenyls

The PCB program at Clear AFS is managed by a contractor under the direction of the Environmental Coordinator's office, with support from Civil Engineering, Technical Site, and logistics personnel. A sitewide PCB inventory was conducted in 1990, and all known PCB and PCB-contaminated equipment has either been removed or purged and refilled with non-PCB fluid. Radio frequency interference filters, small capacitors, and fluorescent light ballasts are the remaining potentially PCB-contaminated equipment on the installation. Removal of the suspected PCB-contaminated radio frequency interference filters is planned. As ballasts and small capacitors are replaced, they are stored in Building 252 for later disposal in accordance with applicable regulations. (U.S. Department of the Air Force, 1997—EA Radar Upgrade Clear AS)

Lead-based Paint

Most of the buildings on Clear AFS contain lead-based paint except for dormitories 203 and 204, which have been remodeled. Dormitory 202 is scheduled for renovation and will be free from lead-based paint in the near future (EDAW, Inc., 1998—Trip Report of visit to Alaska, July 20–31). Prior to any building modification, all lead-based paint in the affected area is removed in accordance with Federal regulations. Clear AFS has a comprehensive lead-based paint management plan (Novak, 1999—Comments received by EDAW, Inc. regarding the NMD Deployment Preliminary Draft EIS).

Radon

With guidance from the Bioenvironmental Engineer at Eielson AFB, Clear AFS has developed and administrated a radon assessment and mitigation program. Radon inspection surveys were performed for Clear AFS in 1995. Radon levels were found to be well below the current U.S. EPA guidelines of 4 picocuries per liter (Clear AS, 1995—Site Radon Inspection Report).

Pesticides

The use of pesticides at Clear AFS is only on an as-needed, seasonal basis. Applications are kept to a minimum, and are restricted to developed areas of the installation. When utilized, pesticides are pre-approved by the Federal Pesticides Working Group and applied by state-certified personnel. Aerial spraying is not conducted, nor are pesticides applied to any waters of the state (U.S. Department of the Air Force, 1998—Grounds Management and Urban Forest Management Plan).

3.7.1.2 Eareckson AS—Hazardous Materials and Hazardous Waste Management

The ROI for hazardous materials and hazardous waste management includes Eareckson AS for general operations. The XBR and support may require the use of base infrastructure and existing facilities.

Hazardous Materials Management

Eareckson AS routinely receives and stores small quantities of hazardous materials, including a variety of flammable and combustible liquids such as aviation fuels. Additional hazardous materials utilized by the base include acids, corrosives, compressed gases, hydraulic fluids, solvents, paints, paint thinners, and lubricants. Supplies, including petroleum products, arrive either by barge during the summer months or by aircraft year round. JP-8 and gasoline arrive by barge and are stored in bulk storage tanks since they are used in large quantities. Most other petroleum products and chemicals are used in much smaller quantities and typically arrive in 208-liter (55-gallon) drums or smaller containers (U.S. Department of the Air Force, 1997—Final Installation-Wide Baseline Survey). Hazardous materials are controlled and managed through a hazardous materials program.

Storage tanks and associated piping systems at Eareckson AS are used to store and distribute various petroleum products or wastes, and other miscellaneous products. There are 47 aboveground storage tanks and 17 underground storage tanks currently utilized at Eareckson AS. (Hostman, 1999—Comments received by EDAW, Inc., regarding NMD Deployment Preliminary Draft EIS). All aboveground storage tanks at Eareckson AS are currently being evaluated to determine whether they are needed to support operations under the existing Base Operation Support Contract. Unneeded tanks and their associated pipelines that are found to be in excess will be cleaned, closed, and removed.

Eareckson AS administers a Storm Water Pollution Prevention Plan (SWPPP) Management Program that was amended in July 1995 after the base restructuring. The plan includes site specific good housekeeping practices, facility surveys, satellite accumulation area inspections, vehicle inspections conducted daily by the operator, employee training, preventive maintenance, and spill prevention and response. Eareckson AS also maintains an Oil and Hazardous Substance Discharge Prevention and Contingency Plan that addresses spill prevention and preparedness. The base also complies with EPCRA reporting requirements by submitting annual emergency response and extremely hazardous substances updates to the local emergency management officials.

Hazardous Waste Management

Eareckson AS has implemented a Hazardous Waste Management Plan that sets forth the policies and procedures to be followed when handling hazardous wastes. Hazardous wastes generated at Eareckson AS include solvents, petroleum, oil and lubricants, fuel wastes, batteries, asbestos, PCBs, and wastes generated from site remediation (Piquniq Management Corporation, 1997—Hazardous Waste Management Plan). Eareckson AS is defined as a small quantity generator by the U.S. EPA and generates less than 100 kilograms (220 pounds) of hazardous waste per month.

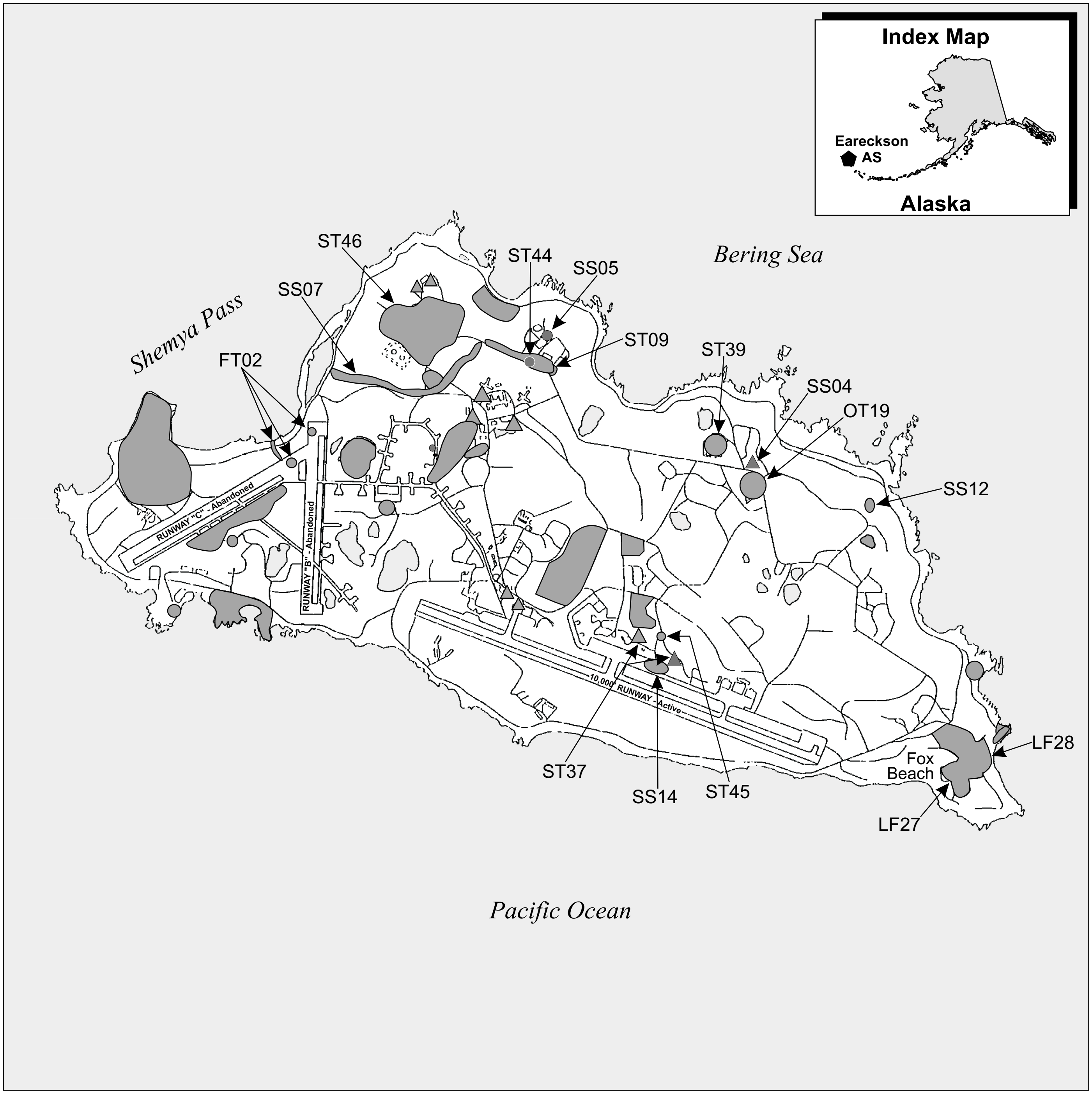
Hazardous wastes and waste petroleum products are accumulated at approximately 17 locations throughout the installation (U.S Department of the Air Force, 1997—Final Installation-Wide Baseline Survey). Eareckson AS is not permitted to dispose of hazardous wastes. All hazardous wastes with no energy recovery potential are sent to the Defense Reutilization and Marketing Office at Elmendorf AFB (Piquniq Management Corporation, 1997—Hazardous Waste Management Plan).

Pollution Prevention

The majority of waste streams at Eareckson AS are recycled or utilized for energy recovery. Used fuel, oil, oil filters, absorbent pads, and other petroleum contaminated waste solids are burned for energy recovery. Antifreeze is collected and recycled for reuse on the facility. Batteries are maintained for recycling through the Defense Reutilization and Marketing Office, and products such as transformer silicon oil are returned to the manufacturer for recycling. (Piquniq Management Corporation, 1997—Hazardous Waste Management Plan).

Installation Restoration Program

The Air Force began the IRP process at Eareckson AS in 1984. Fifty IRP sites at Eareckson AS have been identified. Major Preliminary Assessment activities were conducted at the installation during 1984, 1988, 1992, 1993, and 1994. Additional information was gathered from site inspections, remedial investigations, and feasibility studies conducted at the 50 sites. Figure 3.7–2 shows the 50 sites. Restoration activities were conducted at many of the Eareckson AS sites prior to the Preliminary Assessment conducted from 1992 to 1994. (U.S



EXPLANATION

- Roads
- Land Area
- Water Area
- IRP Sites
- No Further Action Decision Sites

Scale

0 1,738 3,475 Feet

0 530 1,059 Meters

NORTH

Installation Restoration Program (IRP) Sites, Eareckson Air Station

Alaska

Figure 3.7-2

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Department of the Air Force, 1997—Final Installation-Wide Baseline Survey)

There are ordnance concerns for Eareckson AS at three locations administered by the IRP. The OT29 Ammunition Disposal at 50 Caliber Beach was the dumping ground for mass quantities of munitions after the end of World War II. The OT19 Hospital Lake and OT49 Upper Lake have also been identified as having known or suspected quantities of munitions. The OT19 Hospital Lake is also a potential, but unconfirmed, medical/biohazardous waste site. (U.S. Department of the Air Force, 1997—Final Installation-Wide Baseline Survey)

Table 3.7-2 lists the most significant IRP sites near the potential XBR site and potential support facilities. Figure 3.7-2 also shows these sites.

Table 3.7-2: IRP Sites at Eareckson AS Near Potential NMD Sites

Site No.	Site Description/Location	Activities/Findings
SS04	Old Hospital Site	Identified World Was II-era metals and PCBs
SS05	Old COBRA DANE	Identified transformer oil, waste oil, and diesel fuel
SS07	West End Oil/Water Separator	Identified waste oil and POLs
SS12	Old White Alice Site	Identified POL and PCBs
ST09	Power Plant Spills	Identified POL, waste oil, and PCBs
ST46	Abandoned Tank Farm	No previous investigation; suspected diesel fuel
OT19	Hospital Lake	Identified ordnance, ammunition, metals, nitrates, and nitrites; suspected medical/biohazardous waste
FT02	Aircraft Mock-up/Abandoned Drums/Fire Training Area	Identified waste oil, diesel, JP-4, and 208-liter (55-gallon) drums
LF27	Base Sanitary Landfill	Identified miscellaneous debris and rubbish
LF28	Scrap Metal Landfill	Identified metal debris
SS23	Past Drum Storage Area	Identified POLs, petroleum wastes, and solvents
ST39	USTs 110-1 through 110-4	Suspected diesel fuel
ST44	UST 3051-1	Suspected waste oil

Source: U.S. Department of the Air Force, 1997—Final Installation-Wide Baseline Survey
Notes: PCB = polychlorinated biphenyls; POL = petroleum, oil, lubricant; UST = underground storage tank

Asbestos

A comprehensive asbestos survey for Eareckson AS was completed in 1992. Based on the results of the basewide asbestos survey, asbestos-containing material is assumed or confirmed to be present in 48 facilities. In compliance with standard Air Force regulations, any friable asbestos-containing material must be removed if it is likely to release airborne fibers and can not be reliably maintained, repaired, or isolated. All asbestos-containing material identified as non-friable does not present a health hazard at this time as long as the material is not disturbed. The base asbestos manager is contacted at all times before any demolition or renovation occurs in order to take proper action and prevent material from becoming airborne. No immediate health hazard exists in those facilities in which the asbestos has been determined to be non-friable. However, the condition of asbestos in several buildings is unknown and needs to be investigated further (U.S. Department of the Air Force, 1997—Final Installation-Wide Baseline Survey).

Polychlorinated Biphenyls

All electrical equipment containing PCBs at Eareckson AS has been replaced, and PCB-containing transformers have been fully cleansed of the PCB-containing fluids. Eareckson AS is considered PCB free (EDAW, Inc., 1998—Trip Report of visit to Shemya, Alaska, April 24–May 1).

Lead-based Paint

No facilities at Eareckson AS have been tested for lead-based paint. It should be assumed that most facilities constructed before the implementation of the DOD ban on the use of lead-based paint in 1978 are likely to contain one or more coats of such paint, and are a probable concern. Sixty-nine existing facilities at the site were constructed before 1978. (U.S. Department of the Air Force, 1997—Final Installation-Wide Baseline Survey).

Radon

Radon testing was conducted at Eareckson AS in May 1988. Of the 12 samples taken, 10 were below the U.S. EPA guidelines of 4 picocuries per liter, and 2 were below detection levels (U.S. Department of the Air Force, 1997—Final Installation-Wide Baseline Survey). Hence, radon is not a concern at Eareckson AS.

Pesticides

The use of pesticides in and around Eareckson AS has not been limited to specific sites. The low levels of pesticides detected in sampling media throughout the installation are consistent with the controlled application of pesticide for insect control (U.S. Department of the Air Force, 1997—Final Installation-Wide Baseline Survey).

3.7.1.3 Eielson AFB—Hazardous Materials and Hazardous Waste Management

The ROI for hazardous materials and waste management includes Eielson AFB for general operations and those areas where potential NMD construction activities would occur within the base boundary.

Hazardous Materials Management

Eielson AFB receives, stores, and utilizes large quantities of hazardous materials, including a variety of flammable and combustible liquids such as jet fuel. Hazardous materials used include antifreeze, lead-acid batteries, nickel-cadmium batteries, plating solution, epoxy primer, cleaning solvents, and photo processing chemicals. Petroleum products used and stored on the base include aviation gasoline, motor gasoline, diesel, JP-4, and JP-8 (Eielson AFB, 1997—Hazardous Material and Waste Management Plan). Hazardous materials are issued and managed through Eielson AFB Hazardous Material Pharmacy (see Pollution Prevention section).

Eielson AFB has the capacity to store approximately 114 million liters (30 million gallons) of fuel/petroleum. Typically, the majority of the stored fuel is JP-8. JP-8 is received through a pipeline from the Mapco Refinery in North Pole, Alaska. The other stored petroleum products are brought to Eielson AFB by truck, rail, or aircraft. Approximately 126 aboveground and 50 underground storage tanks are located at Eielson AFB (Pacific Air Forces, 1998—Draft General Plan Eielson AFB). All tanks have been inspected for compliance with secondary containment and overfill protection requirements. All required tanks have been or are designated to be upgraded (U.S. Air Force, 1997—Oil and Hazardous Substance Discharge Prevention and Contingency Plan, Eielson AFB, Alaska).

An Oil and Hazardous Substance Discharge Prevention and Contingency Plan was completed for Eielson AFB in November 1997. The plan includes a response action plan, prevention plan, supplemental information, and a contingency plan for oil and hazardous substance discharge prevention. The plan provides instruction for spill prevention and proper direction for containment, notification, safety, and cleanup if a spill does occur. The base also complies with EPCRA reporting requirements by submitting annual emergency response and extremely hazardous substances updates to the local emergency management officials.

Hazardous Waste Management

Eielson AFB maintains a current hazardous material and hazardous waste management plan. The plan details the procedures necessary for maintaining compliance with Air Force, Federal, and state regulations when handling hazardous waste. Hazardous wastes are initially collected at approximately 45 satellite accumulation points, and then transferred to one 90-day accumulation point (Siftare, 1999—Comments received by EDAW, Inc., regarding the NMD Deployment Coordinating Draft EIS). All wastes from the accumulation points are sent to the Hazardous Waste Facility for recycling or disposal off-base. The staff at that facility ensures all hazardous waste is processed off-base within 90 days.

Common hazardous wastes generated at Eielson AFB are absorbent with oils, absorbent with fuels, absorbent with antifreeze, used antifreeze, battery rinsate, carbon remover, fuel filters, paint remover, oil/water separator sludge, paint booth air filters, phenol, photo chemicals, paint, potassium hydroxide, sodium hydroxide, and sulfuric acid. Eielson AFB is a large quantity generator under the Resource Conservation and Recovery Act (RCRA). In 1997, Eielson AFB generated 61,990 kilograms (136,665 pounds) of hazardous waste (Eielson AFB, 1997—Hazardous Waste Disposal Report).

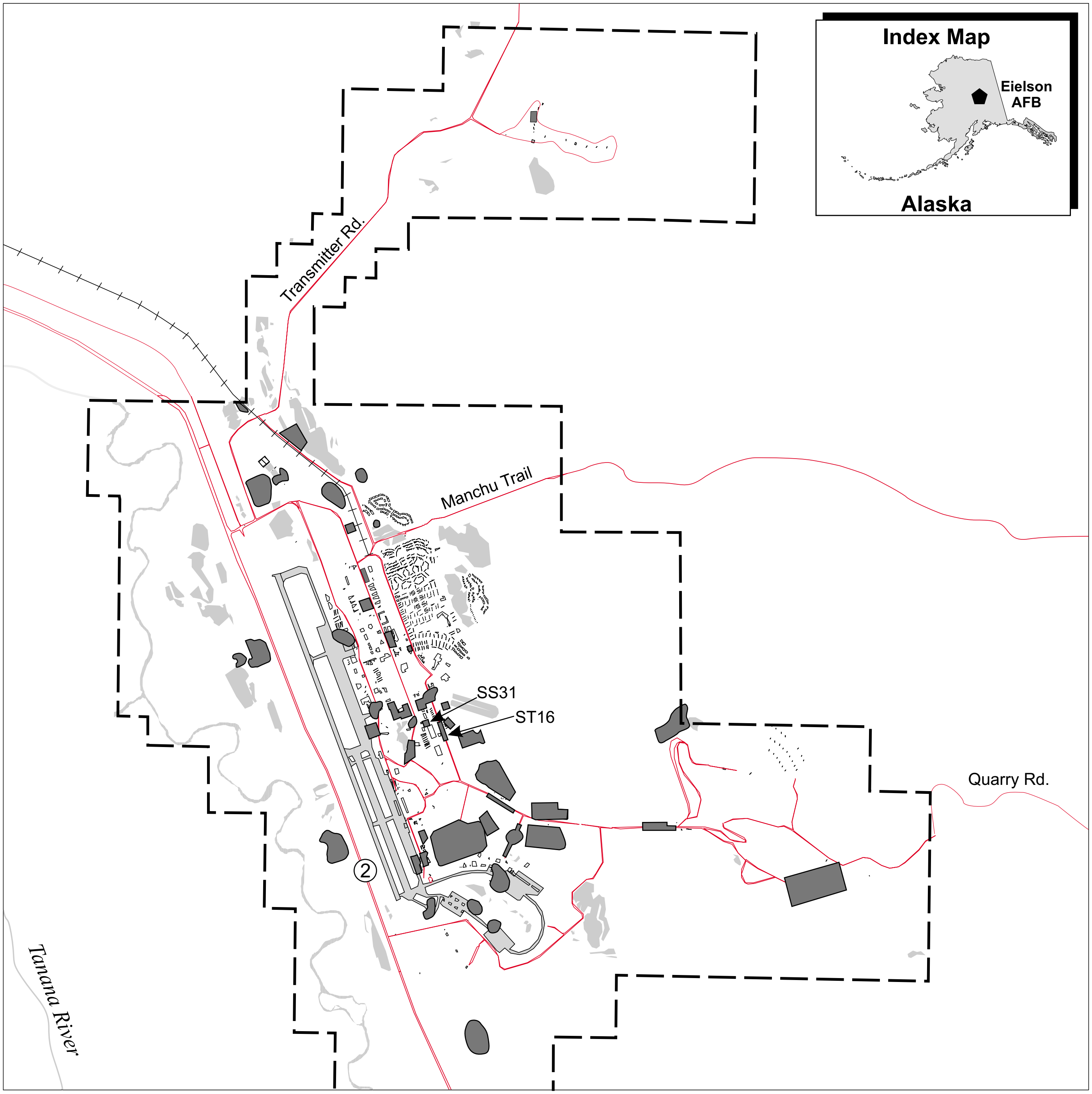
Pollution Prevention

Eielson AFB has implemented several waste reduction practices to limit the amount of hazardous waste produced on-base. These practices include product substitution, recycling, waste oil burning, and a Hazardous Material Pharmacy. The pharmacy is a pollution prevention initiative used throughout the Air Force, designed to reduce the amount of hazardous materials stored at various facilities. Eielson AFB also has an active recycling program for non-hazardous waste that includes paper, cardboard, plastics, glass, and aluminum. (Pacific Air Forces, 1998—Draft General Plan Eielson AFB)

Installation Restoration Program

In November 1989, Eielson AFB was listed on the National Priorities List of Federal Superfund sites by the U.S. EPA. The IRP implementation for Eielson AFB began in 1982. The initial records search identified 43 potential disposal or spill areas at Eielson AFB and recommended that confirmation studies be conducted on the basis of high migration potential (see figure 3.7-3).

On May 21, 1991, the U.S Air Force, the U.S. EPA, and the Alaska Department of Environmental Conservation signed the Federal Facility Agreement for Eielson AFB. The Federal Facility Agreement listed 64 potential source areas. The agreement established a procedure and



EXPLANATION
- Roads
- Water Area
- IRP Sites
- Railroads
- Installation Boundary
- Building

Scale
0 .6 1.2 Miles
0 1.3 2.6 Kilometers

NORTH

hw_eafb_001

Installation Restoration Program (IRP) Sites, Eielson Air Force Base

Alaska

Figure 3.7-3

schedule for developing, implementing, and monitoring appropriate response actions at the base in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the National Contingency Plan, Superfund guidance and policy, RCRA guidance and policy, and applicable Alaska State law. Under terms of the Federal Facility Agreement, the environmental impacts associated with the past and present on-base activities would be investigated, and remedial action taken to protect public health and welfare, and the environment. Only two sites are located near potential NMD required

facilities at Eielson AFB: SS31, a former PCB storage facility, and ST16, location of a fuel line spill. Both of these sites are currently in a no further action status. (U.S. Department of the Air Force, 1998—Draft 1997 Sitewide Monitoring Program Report)

Asbestos

An Asbestos Management and Operations Plan has been completed, in accordance with Air Force policy. The plan is reviewed annually and revised as necessary. The plan was developed in accordance with Air Force regulations to reduce exposure to occupants and workers on-base and to ensure compliance with all Federal, state, and local laws concerning asbestos management (Eielson AFB, 1997—Asbestos Management and Operations Plan).

An asbestos survey was conducted on facilities at Eielson AFB, with most buildings being found to contain asbestos. Asbestos-containing material is generated during remediation or demolition activities. Facilities that are to be renovated or demolished are surveyed for asbestos-containing material prior to construction activities, and remediated when necessary.

Polychlorinated Biphenyls

All electrical equipment at Eielson AFB containing PCBs has been replaced, and PCB-containing transformers have been fully cleansed of the PCB-containing fluid. (Department of the Air Force, 1997—Memorandum for PCB-Free Status)

Lead-based Paint

A draft Eielson AFB Lead-based Paint in Facilities Management Plan has been completed, in accordance with Air Force policy. The plan is reviewed annually and revised as necessary. The plan objective will help eliminate or reduce risks for lead-based paint exposure on Eielson AFB.

Several lead-based paint surveys have been performed at Eielson AFB. Although there has not been an extensive base-wide survey performed, it is expected that all pre-1980 buildings contain lead-based paint. Eielson AFB samples paint before any building remodeling or demolition and removes any identified lead-based paint in accordance with applicable regulations.

Radon

A year-long Radon Assessment and Mitigation Program Assessment Survey has been conducted for Eielson AFB. The survey was performed from October 1990 through December 1991 in all base housing units, transient living facilities, clinic, and child care center. None of the 1,247 radon samples exceeded the 4 picocuries per liter limit, with 2.4 picocuries per liter being the highest level measured (Eielson AFB, 1992—Memorandum, Results of Radon Assessment and Mitigation Program) Radon is not a concern at Eielson AFB.

Pesticides

There are no non-point source pollution problems associated with pesticides and fertilizers on Eielson managed lands. The management of pesticides at Eielson AFB is the responsibility of the Pest Management Section of the Civil Engineer Squadron. All pesticides are approved by the Federal Working Group before application. All fertilizers are applied under the direction of personnel of the Maintenance Engineering Section of the Civil Engineer Squadron. Pesticides and fertilizer are not applied into any watercourses, and aerial spraying in not used as a method of application. (Pacific Air Forces, 1998—Draft General Plan Eielson AFB)

3.7.1.4 Fort Greely—Hazardous Materials and Hazardous Waste Management

The ROI for hazardous materials and hazardous waste management includes the Fort Greely infrastructure and existing facilities within the main base cantonment. Additional facilities could be constructed within the base cantonment area.

Hazardous Materials Management

Fort Greely has several facilities that use or store hazardous materials. A Hazardous Waste and Hazardous Materials Standard Operating Procedure Manual was created for Fort Greely in September of 1995, which complies with all applicable state and Federal regulations. The Plan established standard operating procedures for the correct management, storage, and generation of hazardous materials and hazardous waste. Hazardous material inventories are reviewed and updated twice a year if necessary (Department of the Army, 1995—Standard Operating Procedure Hazardous Material and Hazardous Waste Management).

Hazardous materials stored within the cantonment area include fuels and pesticides. Hazardous materials are also used in a variety of processes performed at the installation, including vehicle, boat, and aviation repair;

power and heat generation; wastewater treatment; photo processing; and building maintenance (U.S. Department of the Army, 1997—Preliminary Draft EA for the Disposal and Reuse of Surplus Property at Fort Greely, Alaska).

Fort Greely has 53 aboveground storage tanks with capacities ranging from 946 to 2,384,809 liters (250 to 630,000 gallons), 4 of which are in the cantonment area. The tanks and their supports are periodically inspected using visual inspection, hydrostatic inspection, or a system of nondestructive shell thickness testing. There are 23 underground storage tanks at Fort Greely, 9 in the cantonment area, with capacities ranging from 1,136 to 189,270 liters (300 to 50,000 gallons). (U.S. Army Alaska, 1998—Oil Discharge Prevention and Contingency Plan) Underground storage tanks located within the cantonment area that meet state regulations will be removed unless identified to support specific reuse activities. Underground storage tanks that do not meet current regulations will be deactivated and removed before disposal by deed. The aboveground storage tanks within the cantonment area will be emptied, purged of fumes, and secured at the area's closure.

Fort Greely administers an Oil Discharge Prevention and Contingency Plan, which leads personnel through the step-by-step procedures necessary to safely detect, contain, and clean up all oil spill discharges on post. Also, an SWPPP for Fort Greely was completed in May 1996. The plan includes site-specific good housekeeping practices, facility surveys, satellite accumulation area inspections, employee training, record keeping and internal reporting, comprehensive site compliance evaluation, and sediment and erosion control. The base also complies with EPCRA reporting requirements by submitting annual emergency response and extremely hazardous substances updates to the local emergency management officials.

Hazardous Waste Management

Fort Greely is registered by the U.S. EPA as a large quantity generator. Hazardous wastes generated at the installation are associated with equipment maintenance. Other wastes generated by the facility include silver nitrates, boiler treatment compound, medical waste, paint, pesticides, aerosol canisters, batteries, used acetone and paint thinner, and sewage sludge. The wastes are accumulated in 208-liter (55-gallon) drums at satellite accumulation points before disposal. Currently, a temporary unnumbered building near T100 serves as the centralized hazardous waste collection site (Spiers, 1999—Electronic communication). Hazardous wastes management is performed in accordance with the installation's Hazardous Waste and Hazardous Materials Standard Operating Procedures Manual (U.S. Department of the Army, 1997—Preliminary Draft EA for the Disposal and Reuse of Surplus Property at Fort Greely). In 1998, Fort Greely generated 59,787 kilograms (131,808 pounds) of hazardous waste (U.S. Army, 1998—The 1998 Hazardous Waste Report, Fort Greely).

Pollution Prevention

Fort Greely has developed and implemented a Pollution Prevention Plan. This plan aids in the elimination or reduction of hazardous substances, pollutants, and contaminants. Recycling activities at Fort Greely include fuels, batteries, and brass shell casings.

Installation Restoration Program

No sites on Fort Greely have been listed on the CERCLA National Priorities List. In addition, there are no Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) sites and no leaking underground storage tank sites on the installation. (U.S. Army Corps of Engineers, 1997—Environmental Baseline Survey Report, Fort Greely Alaska)

Three buildings within the cantonment area are on the State Priorities List. These include Building 612, where waste drains to the sanitary sewer; Building 601, where transformers, solvents, and herbicides have been stored in the Resource and Utilities yard north of the building; and Building 605, which includes a maintenance shop, paint bay, and battery storage facility. (U.S. Army Corps of Engineers, 1997—Environmental Baseline Survey Report, Fort Greely Alaska) All three of these buildings are potential support facilities for NMD.

There are 24 solid waste management units within the installation area. There are two non-solid waste management units, the site south of Building 626, where waste solvents have been dumped, and the nuclear waste pipeline and dilution well. There are 12 potentially contaminated areas within the cantonment area. In addition, there are seven sources of potential contamination on properties adjoining the cantonment area. (U.S. Army Corps of Engineers, 1997—Environmental Baseline Survey Report, Fort Greely Alaska)

Environmental cleanup at Fort Greely has been addressed under both the IRP and the BRAC Environmental Cleanup Program. Numerous sites have been investigated and remediated under these programs. Investigations are now complete at all known sites. Cleanup of the nuclear waste line from the past activities of the SM-1A nuclear reactor is nearing completion, and other cleanup actions at Building 110 and the old firefighter training pits are underway. Building 101, on retained property, and several other sites, on surplus property, are scheduled for cleanup, pending funding. (Spiers, 1999—Electronic Communication, Nov 22)

Asbestos

A limited asbestos survey of family housing unit basements was conducted at Fort Greely in 1998. Most of the buildings surveyed were found to contain asbestos in pipe fittings and pipe insulation (U.S. Army, 1998—Fort Greely Family Housing Asbestos Survey). The main post Fire Station, Building 504, was also tested in 1988 and found to contain asbestos in the pipe insulation. Buildings within the installation have been evaluated for the potential presence of asbestos-containing materials based on the results of this surveys and date of construction. Buildings constructed before 1985, which have not been surveyed, have been identified as at risk for the presence of asbestos-containing material. Most of the family housing and Fire Station 504 are proposed NMD support facilities.

Polychlorinated Biphenyls

A PCB survey was conducted at Fort Greely in 1993, during which all transformers were sampled. The 1993 survey identified 16 transformers that contained PCB concentrations between 50 and 499 ppm. All PCB-containing transformers were removed from the installation in 1994 (U.S. Army Corps of Engineers, 1997—Environmental Baseline Survey Report, Fort Greely Alaska).

Lead-based Paint

A lead-based paint survey was performed for the family housing, medical center, and transient quarters at Fort Greely in 1997. All buildings surveyed were found to contain lead-based paint. (U.S. Army Corps of Engineers, 1997—Lead-Based Paint Survey, Fort Greely) Buildings not surveyed but constructed before 1978 are believed to be at risk for the presence of lead-based paint.

Radon

Radon surveys were conducted in various buildings within the cantonment area from 1990 through 1993. Buildings within the cantonment area have been evaluated for the presence of radon based on the results of those surveys. Some buildings were found to have radon concentrations equal to or greater than the current U.S. EPA guidelines of 4 picocuries per liter. Family housing units with radon levels greater than or equal to 4 picocuries per liter have been mitigated. All buildings not surveyed were designated as potentially containing radon, and buildings found to contain radon concentrations below 4 picocuries per liter were not given a radon designation. (U.S. Department of the Army, 1997—Preliminary Draft EA for Disposal and Reuse of Surplus Property at Fort Greely)

Pesticides

Fort Greely has completed and implemented an Integrated Pest Management Plan. The goal of this plan is to minimize the adverse environmental impact of pesticide use while achieving an acceptable level of control and cost-effectiveness. The use of pesticides has fallen significantly in recent years; however, the Army's goal is to reduce pesticide use by 50 percent by the year 2000. All chemicals used on Fort Greely are U.S. EPA approved and are applied by personnel who are DOD management certified. (U.S. Army Alaska, 1997—Draft Integrated Natural Resources Management Plan)

Vegetation control is required at Fort Greely on the airfield, road shoulders of main roads, outside storage areas, and other places where weeds grow in concrete and asphalt cracks.

Mosquitoes, biting gnats, and flies are important pests during warm months. The Alaska Preventative Medicine Branch, and the Pest Controller are responsible for mosquito surveillance and determination of the need for control. Control includes elimination of mosquito breeding areas and use of pesticides when needed. Ultra Low Volume insecticide treatment with Pyrenone is the recommended treatment. Flies are normally treated using sanitation practices. (U.S. Army Alaska, 1997—Draft Integrated Natural Resources Management Plan)

3.7.1.5 Yukon Training Area (Fort Wainwright)—Hazardous Materials and Hazardous Waste Management

The ROI for hazardous materials and hazardous waste management is the Yukon Training Area Winter Camp area. This site has no present existing structures for support of the NMD activities. Therefore, there are no issues with asbestos, PCBs, or lead-based paint associated with the proposed site. The Yukon Training Area may require the use of Fort Wainwright and Eielson AFB infrastructure and existing facilities. Support facilities could be constructed on both the Yukon Training Area and Eielson AFB.

Hazardous Materials Management

The Yukon Training Area uses little or no hazardous materials in its present status. The hazardous materials utilized consist of motor fuel, oil, lubricants, and similar materials associated with trucks and equipment used for training. Any hazardous materials that are used are supplied through the Fort Wainwright hazardous materials management program.

Hazardous Waste Management

Only small amounts of hazardous waste are generated at the Yukon Training Area, due to the few activities and lack of any maintenance or other facilities that typically generate hazardous waste. Any hazardous waste that is generated would be handled and disposed of according to the Fort Wainwright Hazardous Waste Management Plan. In 1997, Fort Wainwright generated a total of 177,396 kilograms (391,093 pounds) of hazardous waste (Johnson, D., 1998—Electronic communication, December 14).

Installation Restoration Program

No investigations have been performed for the Yukon Training Area; however, because of the limited amount of military activities at the proposed NMD sites, no contamination is expected (Alaska July Trip Report). There is a low potential for unexploded ordnance in the area, due to the long history of military training. Most of the ordnance consists of small arms ammunition and 40-millimeter practice grenades.

Radon

According to the Generalized Geologic Radon Potential of the United States Map by the USGS, the majority of Interior Alaska is classified as an area of moderate and/or variable radon concentration levels. Extreme northern areas and southern areas of the state are classified as low geological radon potential areas. Radon concentrations in the vicinity of the Yukon Training Area could range from 2 to 4 picocuries per liter. (U.S. Geological Survey, 1995—Radon Potential of the United States)

The site within the Yukon Training Area being considered for NMD activities is relatively close to Eielson AFB. Therefore, the radon levels at the proposed NMD site are expected to be similar to those experienced on Eielson AFB. As mentioned in section 3.7.1.3, radon levels at Eielson AFB are well below the U.S. EPA guideline of 4 picocuries per liter. Radon is not expected to be a concern in the Yukon Training Area.

Pesticides

No pesticides are used in the proposed NMD areas.

3.7.2 NORTH DAKOTA INSTALLATIONS

3.7.2.1 Cavalier AFS—Hazardous Materials and Hazardous Waste Management

The relevant aspects of hazardous materials/waste management include the applicable regulatory procedures for hazardous materials usage and hazardous waste generation, and management programs for existing hazardous waste-contaminated sites within areas potentially affected by the NMD program. The ROI for hazardous materials and hazardous waste management includes Cavalier AFS for general operations and those areas where potential NMD construction activities would occur within the base boundary.

Hazardous Materials Management

Cavalier AFS receives, stores, and utilizes small quantities of hazardous materials. The most commonly utilized hazardous materials include diesel fuel, gasoline, lubricating oil, thinners, kerosene, solvents, and sulfuric acid. Cavalier AFS is currently in the process of starting its own hazardous material HAZMART management system. In the meantime, hazardous materials are issued and managed through Grand Forks AFB Hazardous Materials HAZMART (see section 3.7.2.2). Hazardous materials used and storage on Cavalier AFS are concentrated in the Perimeter Acquisition Radar building, the Power Plant, and the Industrial Buildings area. Expended hazardous materials are transported to the Defense Reutilization and Marketing Office at Minot AFB for disposal or re-use. All areas that contain hazardous materials have appropriate Material Safety Data Sheets.

Petroleum, oils, and lubricants at Cavalier AFS are stored in both aboveground storage tanks and underground storage tanks. A total of four underground storage tanks are located at Cavalier AFS. Two of the underground storage tanks have permanent leak detection. All four underground storage tanks are equipped with a spill and overfill protection system and a cathodic protection system. (Department of the Air Force, 1995—Underground Storage Tank Status Report)

A total of 19 aboveground storage tanks are located at Cavalier AFS. The aboveground storage tanks are inspected regularly by maintenance personnel for possible breach in containment (Cavalier AS, 1996—Environmental Protection Plan Part 6).

The base Spill Prevention and Response Plan provides guidance for the storage and handling of hazardous substances at Cavalier AFS. The plan also provides contingency plans identifying key personnel, responsibilities, and facility-specific procedures to follow in the event of a hazardous substance spill. The base also complies with EPCRA reporting requirements by submitting annual emergency response and extremely hazardous substances updates to local emergency management officials.

Hazardous Waste Management

A Hazardous Waste Management Plan for Cavalier AFS was completed in July 1998. The Hazardous Waste Management Plan requires that all hazardous waste must be stored, handled, and disposed of in accordance with applicable regulations. The plan requires an establishment of hazardous waste accumulation points, maintenance of written manifests of hazardous waste, and proper disposal of hazardous waste through proper military and contractor personnel. Hazardous waste streams generated by facility operations at Cavalier AFS include Safety Kleen solvents, paint waste, mineral spirits, chlorine, sulfuric acid, mercury, and batteries. In 1997 Cavalier AFS generated 1,522 kilograms (3,357 pounds) of hazardous waste (Department of the Air Force, 1998—1997 Biennial Hazardous Waste Report).

Cavalier AFS is registered with the U.S. EPA as a conditionally exempt small quantity generator (Kotchman, 1999—Comments received by EDAW, Inc. regarding the NMD Deployment Coordinating Draft EIS, Jan 27). Hazardous waste is stored at a 180-day central accumulation point and four satellite accumulation points in several types of storage containers ranging from 3.8-liter (1-gallon) cans to 208-liter (55-gallon) drums. Cavalier AFS is not a transport, storage, or disposal facility, and no hazardous waste treatment of disposal is performed at Cavalier AFS. The Defense Reutilization and Marketing Office or their contractor will transport hazardous wastes from Cavalier AFS to a permitted hazardous waste facility at the Defense Reutilization and Marketing Office at Minot AFB (Cavalier AS, 1996—Environmental Protection Plan Part 5).

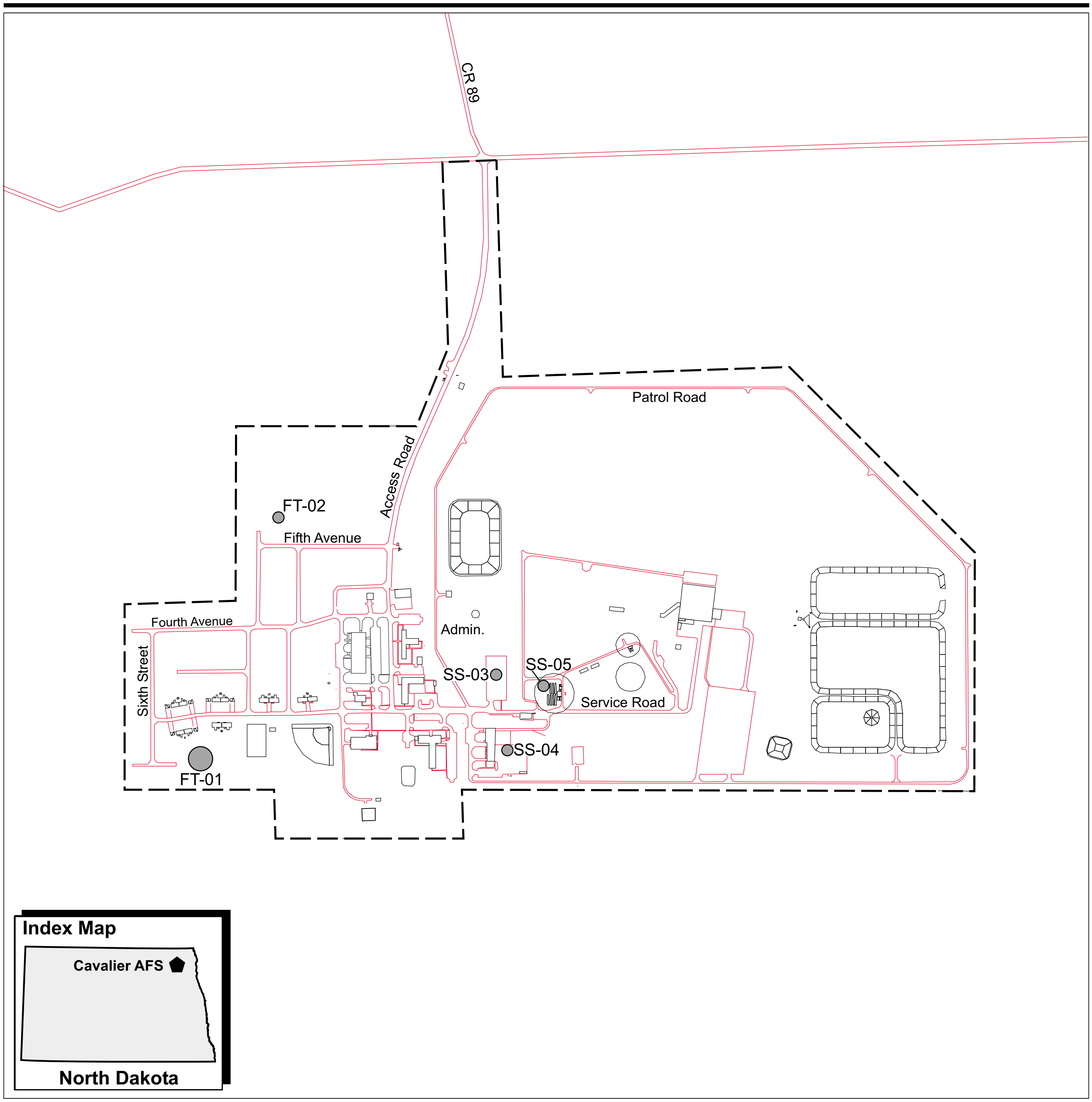
Pollution Prevention

A Pollution Prevention Plan was included as part of the Hazardous Waste Management Plan and was completed December 31, 1996 for Cavalier AFS. The plan includes reduction or elimination of hazardous substances, pollutants, or contaminants. Pollution that cannot be recycled will be treated in an environmentally safe manner (Cavalier AS, 1996—Environmental Protection Plan Part 5).

The refuse contractor for Cavalier AFS maintains recycling bins in the Perimeter Acquisition Radar building parking lot for glass, paper, cardboard, metal, and plastics. Under a local initiative, Cavalier AFS also segregates and recycles computer, bond, and newspapers. (U.S. Air Force Space Command—Comprehensive Planning Framework, Cavalier AS)

Installation Restoration Program

Five IRP sites have been identified at Cavalier AFS (figure 3.7-4). Four of these sites have been officially closed by the North Dakota Department of Health. Site FT-01, an old burn pit, may have contained diesel fuel, waste oils (potentially containing PCBs), and solvents. Current plans for the site are long-term monitoring. Cavalier AFS performs semi-annual groundwater sampling at site FT-01 as required by the North Dakota Department of Health. (U.S. Air Force Space Command, undated—Comprehensive Planning Framework, Cavalier AS)



EXPLANATION

Installation Boundary

Closed Site

IRP Sites

CR = County Road
ND = North Dakota Road

Scale 1:11,000

0 459 917 Feet

0 140 280 Meters

NORTH

Installation Restoration Program (IRP) Sites, Cavalier Air Force Station

North Dakota

Figure 3.7-4

hw_cas_001

Asbestos

An Asbestos Management Operating Plan for Cavalier AFS was implemented in July 1998. Grand Forks AFB provides an Asbestos Management Team with trained and certified asbestos personnel to Cavalier AFS. The asbestos plan requires that contractors provide certified personnel if needed. The Asbestos Management Operating Plan includes copies of work orders, notification records, bulk and air sampling results, asbestos registry, training and certification records, and disposal documents.

At Cavalier AFS, asbestos-containing material is generated during remediation operations conducted for building renovations or demolition. Facilities that are to be renovated or demolished are surveyed for asbestos-containing material prior to construction activities, and remediated when necessary. The removal of asbestos-containing material from facilities generates a waste that can be landfilled at several local permitted municipal waste disposal facilities.

Facilities on Cavalier AFS were surveyed in June 1989 for asbestos-containing material. Most of the Perimeter Acquisition Radar building is believed to have asbestos matting between the sheet metal walls. Asbestos is also present in some utility ducts and in the insulation for pipes and heating ducts. Additionally, many of the floor tiles and mastic in facilities on Cavalier AFS contain asbestos, but are in good condition. (U.S. Air Force Space Command, undated—Comprehensive Planning Framework, Cavalier AS)

Polychlorinated Biphenyls

Cavalier AFS uses a variety of electronic and communications equipment that contain PCBs. Most of these items are located in the Perimeter Acquisition Radar facility. The station maintains a record of all PCB-containing equipment and has tested suspect equipment for PCB levels. (U.S. Air Force Space Command, undated—Comprehensive Planning Framework, Cavalier AS) An ongoing project to replace the PCB materials in electrical transformers and major equipment has been completed (Fors, 1999—Electronic communication).

Lead-based Paint

A lead-based paint survey began at Cavalier AFS in 1996 and was completed in 1998 (Kotchman, 1999—Comments received by EDAW, Inc. regarding the NMD Deployment Preliminary Draft EIS, April 30). The 1996 testing was concentrated in public and community areas accessible to children, for whom exposure to lead poses the greatest threat. Lead-based paint was noted in the Fitness Center, Bachelors Enlisted Quarters, and some playground equipment (U.S. Air Force Space Command, undated—Comprehensive Planning Framework, Cavalier AS). The 1998 survey work involved evaluating the non-public areas of Cavalier AFS. Because Cavalier AFS was built before 1980, there is the potential that all buildings may contain lead-based paint. Cavalier AFS samples paint before any building remodeling and demolition and removes any identified lead-based paint in accordance with applicable regulations.

Radon

Cavalier AFS does not currently have a Radon Assessment and Mitigation Program. Radon sampling performed in March 1996 indicated that levels were below 4 picocuries and no further sampling was required. (U.S. Air Force Space Command, undated—Comprehensive Planning Framework, Cavalier AS)

Pesticides

Pest management support for Cavalier AFS is provided by Grand Forks AFB personnel under the 1994 Support Agreement. Herbicides are applied by state certified contractor personnel to control broadleaf weeds, grassy weeds, and several varieties of noxious weeds. (U.S. Air Force Space Command, undated—Comprehensive Planning Framework, Cavalier AS)

3.7.2.2 Grand Forks AFB—Hazardous Materials and Hazardous Waste Management

The relevant aspects of hazardous materials/waste management include the applicable regulatory procedures for hazardous materials usage and hazardous waste generation, and management programs for existing hazardous waste-contaminated sites within areas potentially affected by the NMD program. The ROI for hazardous materials and hazardous waste management includes Grand Forks AFB for general operations and those areas where potential NMD construction activities could occur.

Hazardous Materials Management

Grand Forks AFB receives, stores, and utilizes large quantities of hazardous materials. The most commonly utilized hazardous materials include aviation and motor fuels, various grades of petroleum products, lubricants, hydraulic fluids, solvents, paints, thinners, and compressed gases. Most hazardous materials are delivered to the base hazardous materials HAZMART (see Pollution Prevention section). Hazardous materials are distributed from this system, using base personnel as transporters. All base hazardous materials are tracked through this system.

A total of 74 regulated and non-regulated underground storage tanks and 55 aboveground storage tanks are present at Grand Forks AFB (U.S.

Department of the Air Force, 1997—Grand Forks AFB General Plan). Underground and aboveground storage tanks are checked on a routine basis. Compliance activities are being conducted in accordance with the North Dakota Underground Storage Tank Program (U.S. Department of the Air Force, 1997—Integrated Natural Resources Management Plan, Grand Forks AFB).

All personnel who work with hazardous materials have initial and updated training in Hazard Communication, which enables them to identify the hazards of the material. Material Safety Data Sheets are provided with materials or can be obtained from the Pharmacy or the Bioenvironmental Engineering Services office. Spill response is conducted by the Base Fire Protection Flight, and inspection of facilities is conducted by the Fire Protection Flight, Safety, and Bioenvironmental Engineering Services.

Grand Forks AFB maintains an Oil and Hazardous Substance Spill Prevention and Response Plan, which is in the process of being updated. The plan provides guidance and assigns responsibilities to prevent and respond to oil and hazardous substance discharges on-base and in the missile field (U.S. Department of the Air Force, 1999—Final EIS, Minuteman III Missile System Dismantlement). The base also complies with EPCRA reporting requirements by submitting annual emergency response and extremely hazardous substances updates to the local emergency management officials.

Hazardous Waste Management

Hazardous waste streams generated by facility operations at Grand Forks AFB include bead blast media, solvents, paint and paint-related material, shelf life expired materials, contaminated soil, and spill residue. The largest waste volumes generated in 1997 were off-spec paint (2,837 kilograms [6,255 pounds]), Safety Kleen solvent (1,836 kilograms [4,047 pounds]), paint related material (tape, paper, protective suits) (1,788 kilograms [3,941 pounds]), and sodium chromate solution (1,548 kilograms [3,412 pounds]). The total waste generated from the facility in 1997 was 18,834.7 kilograms (41,523.4 pounds) (Department of the Air Force, 1998—1997 Hazardous Waste Report, Grand Forks AFB). The missile fields generate batteries, battery acid, paint and solvent wastes, and sodium chromate solution and rags (U.S. Department of the Air Force, 1999—Final EIS, Minuteman III Missile System Dismantlement). All wastes are handled in accordance with applicable regulations.

Grand Forks AFB is a large quantity generator under RCRA. Grand Forks AFB operates a North Dakota Department of Health permitted treatment, storage, and disposal facility. Hazardous waste is stored at the 23 satellite accumulation points until 208 liters (55 gallons) of hazardous waste, or 0.9 liter (1 quart) of acutely hazardous waste is generated. After this amount of waste is generated at the satellite accumulation point, it is transferred to one of the 90-day accumulation points. At this location waste is prepared for shipment before transfer to the main treatment, storage, and disposal facility. This facility has a capacity of 9,993 liters (2,640 gallons) or forty-eight 208-liter (55-gallon drums); approximately 14,574 liters (3,850 gallons) is processed through this facility annually. From this facility, the waste is disposed of by a state approved contractor to an off-base U.S. EPA permitted facility. (U.S. Department of the Air Force, 1997—Grand Forks AFB General Plan)

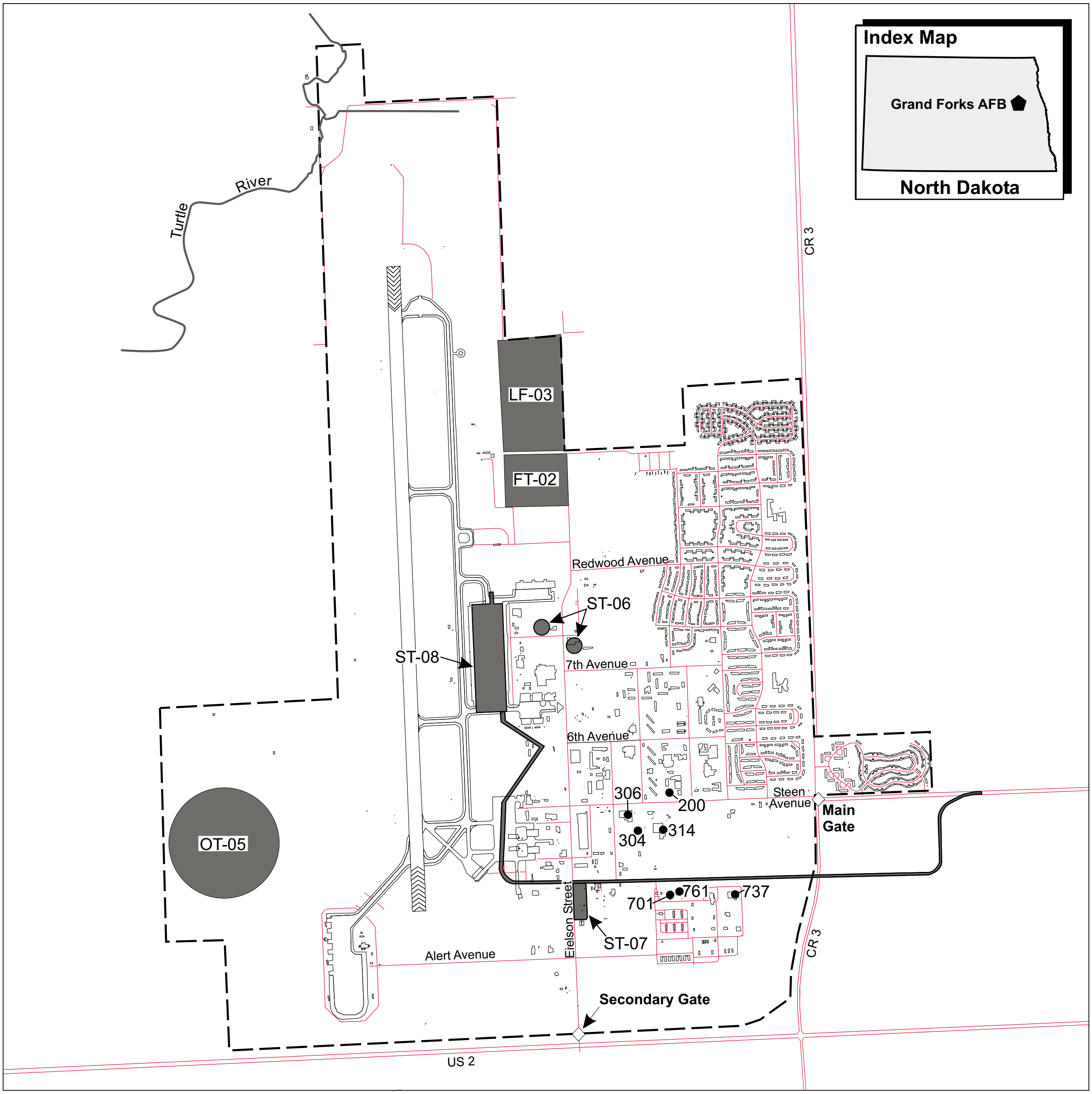
Emergency response equipment is maintained in accessible areas throughout Grand Forks AFB. Spill response kits and fire extinguishers are available at all 90-day hazardous materials storage areas and at the Defense Reutilization and Marketing Office. The Grand Forks AFB Fire Department maintains fire response, discharge control, and containment equipment. (U.S. Department of the Air Force, 1997—Integrated Natural Resources Management Plan)

Pollution Prevention

Grand Forks AFB has a Pollution Prevention Plan. The Pollution Prevention Plan includes the reduction or elimination of hazardous substances, pollutants, and contaminants. Pollution that cannot be recycled will be treated in an environmentally safe manner. Grand Forks AFB also administers a pharmacy program that controls and reduces the use of hazardous materials through a HAZMART system. The pharmacy is a pollution prevention initiative used throughout the Air Force, designed to reduce the amount of hazardous materials stored at various facilities. Hazardous materials are dispensed and tracked from the base HAZMART, which gathers the information necessary to optimize the use of hazardous materials and reduce waste, and provides the information needed for EPCRA reporting. Grand Forks AFB also has an active recycling program that includes paper, cardboard, aluminum, scrap metal, plastics, and glass. (U.S. Department of the Air Force, 1999—Final EIS, Minuteman III Missile System Dismantlement)

Installation Restoration Program

Grand Forks AFB administers an IRP under CERCLA guidance. There are currently seven IRP sites at Grand Forks AFB. They are the Fire Training Area/Old Sanitary Landfill Area (FT-02); New Sanitary Landfill Area (LF-03); Building 306 (ST-04); Explosive Ordnance Detonation Area (OT-05); Refueling Ramps and Pads (ST-08); Base Tanks Area (ST-06); and Petroleum, Oil, and Lubricant Off-loading Area (ST-07) (figure 3.7-5). Grand Forks AFB is not on the National Priorities List. (Grand Forks AFB, 1995—Management Action Plan)



EXPLANATION

- Installation Boundary
- IRP Sites
- Gate
- Solid Waste Management Unit

CR = County Road
US = U.S. Highway

Scale 1:40,000

0 1,667 3,333 Feet

0 508 1,016 Meters

NORTH

Installation Restoration Program (IRP) and Solid Waste Management Unit Sites, Grand Forks Air Force Base

North Dakota

Figure 3.7-5

hw_gfafb_001

In 1993, the North Dakota Department of Health added 48 new suspected areas of concern to the Base IRP. All areas, including the seven existing IRP sites, were grouped together and reclassified as 20 solid waste management units. All solid waste management units are subject to RCRA Corrective Action and are regulated by the base's RCRA Part B Permit. The existing IRP sites are also regulated by CERCLA and/or the North Dakota Underground Storage Tank Program. (U.S. Department of the Air Force, 1997—Grand Forks AFB General Plan)

The IRP sites near potential NMD deployment areas are the former explosive and ordnance detonation area OT-5 (which was closed under RCRA/CERCLA regulations and is at a low risk level) and the base underground storage tank ST-06, which was closed under The North Dakota Underground Storage Tanks Program. Another site is Site ST-07, which is a benzene groundwater plume under the Petroleum, Oil, and Lubricant Off Loading Area. The plume, which is just west of the Munitions Storage Area, is apparently moving in a westerly direction. Remedial action is in progress under RCRA/CERCLA regulations. Solid Waste Management Unit sites near potential NMD deployment areas include those associated with oil/water separators (Buildings 304, 314, and 701) and underground waste storage tanks (Buildings 200, 306, 737, and 761) that contained waste oil, hydraulic oil, solvents, contaminated fuel, and diesel fuel. Grand Forks AFB is recommending no further action required at Buildings 200, 306, 314, and 737. (Grand Forks AFB, 1995—Management Action Plan)

Asbestos. The base maintains trained and certified asbestos abatement personnel, and requires that contractors provide certified personnel if needed. Up to 0.28 square meter (3 square feet) of asbestos-containing material may be disturbed by non-certified contractors. (U.S. Department of the Air Force, 1999—Final EIS, Minuteman III Missile System Dismantlement)

At Grand Forks AFB, asbestos-containing material is generated during remediation operations for building renovations or demolition. The removal of asbestos-containing material from facilities generates a waste that is landfilled at the Grand Forks Municipal Landfill. Facilities on Grand Forks AFB were surveyed in 1993-94 for asbestos-containing material. Facilities that are to be renovated or demolished are surveyed for asbestos-containing material prior to construction activities, and remediated when necessary. The Environmental Engineers Flight, Civil Engineer Operations, and Bioenvironmental Engineering Services manage most aspects of asbestos remediation. The base maintains an Asbestos Management and Operation Plan that includes asbestos work orders, notification records, bulk and air sampling results, asbestos registry, training and certification records, and disposal documents. (U.S. Department of the Air Force, 1999—Final EIS, Minuteman III Missile System Dismantlement).

Polychlorinated Biphenyls

Personnel from the Environmental Engineers Flight, Missile Maintenance, and the Exterior Electric offices manage PCBs. Documents and files are maintained at Grand Forks AFB, including PCB documentation for the past 3 years. All known PCB-containing transformers, hydraulic systems, heat transfer components, and other PCB items have been removed from Grand Forks AFB. (U.S. Department of the Air Force, 1999—Final EIS, Minuteman III Missile System Dismantlement)

Lead-based Paint

Grand Forks personnel manage lead-based paint identification and abatement in accordance with all Air Force guidance, and have designated the Environmental Engineers Flight, Base Housing Office, and Medical Group as being responsible for lead-based paint management.

A visual inspection of pre-1980 buildings (those which are most likely to contain lead-based paint) has been conducted at Grand Forks AFB. The inspection included all housing and community buildings, but not industrial facilities of shops. Because most of Grand Forks AFB was built before 1980, there is the potential that most buildings may contain lead-based paint. Buildings that are to be demolished or remodeled are checked for lead-based paint. If lead-based paint is found, the paint is removed in accordance with Federal Regulations. (U.S. Department of the Air Force, 1999—Final EIS, Minuteman III Missile System Dismantlement)

Radon

A radon survey of base housing was completed in 1989 and was aimed at pinpointing potential sources of radon emissions. This study classified Grand Forks AFB housing as being a moderate risk facility requiring further sampling. Mitigation efforts occurred in 1991. Radon surveys and further mitigation efforts are continuing as part of an active program. Radon assessment surveys for evaluating radon emissions at administrative areas on-base are programmed and will be conducted when funding becomes available. (U.S. Department of the Air Force, 1997—Grand Forks AFB General Plan)

Pesticides

The management of pesticides at Grand Forks AFB is accomplished by the Pest Management staff, who maintain the grounds and buildings on the base, and by the golf course staff, who maintain the golf course. The base pesticide facility is a state-of-the-art facility, and Pest Management personnel are certified as pesticide applicators. The base also contracts for some pesticide applications. The Air Force has set a goal for the reduction of pesticides by the year 2000, which is being aggressively pursued by the Pest Management Shop (U.S. Department of the Air Force, 1999—Final EIS, Minuteman III Missile System Dismantlement).

3.7.2.3 Missile Site Radar—Hazardous Materials and Hazardous Waste Management

The relevant aspects of hazardous materials/waste management include the applicable regulatory procedures for hazardous materials usage and hazardous waste generation, and management programs for existing hazardous waste-contaminated sites within areas potentially affected by the NMD program. The ROI for hazardous materials and hazardous waste management includes Missile Site Radar for general operations and those areas where potential NMD construction activities could occur.

Hazardous Materials Management

The Missile Site Radar is an inactive site that receives routine maintenance by a small caretaker staff. Hazardous materials used as part of the maintenance activities include paint solvents, thinners, and starter fluids. Only very small quantities of these materials are stored onsite.

Between June and September 1991, the E.P.I.C. Company, under contract to the U.S. Army Corps of Engineers, completed underground storage tank closures at the Missile Site Radar. All but one petroleum underground storage tank underwent closure according to North Dakota requirements in place at the time of removal. One 264,980-liter (70,000-gallon) concrete underground storage tank located adjacent to the Missile Site Radar Power Plant was closed in place. (U.S. Army Corps of Engineers, 1991—Underground Storage Tank Closure Report, SRMSC)

Hazardous Waste Management

The Missile Site Radar is in caretaker status, and little or no hazardous waste is being generated. Any hazardous waste generated as part of maintenance activities is disposed of offsite in accordance with applicable regulations.

Pollution Prevention

Because the site is currently inactive, there are no pollution prevention initiatives.

Installation Restoration Program

According to the U.S. Army Center for Health Promotion and Preventive Medicine report (1995) for the SRMSC, the areas described in the following paragraphs are, or will potentially be, IRP sites.

At the Missile Site Radar facility, a preliminary investigation revealed that a pipe tunnel contains trace amounts of diesel fuel. The fuel has not leaked or migrated to the soil or groundwater outside the tunnel. Only very low concentrations of total petroleum hydrocarbons (less than state action level) were detected sporadically in the borehole soil samples, and the analytical results of the groundwater samples did not indicate contamination.

Wastewater pond sediment samples from the center stabilization pond contained concentrations of total petroleum hydrocarbons that are above state action levels. If the ponds are drained and backfilled, the remaining sediments in each of the ponds would need to be sampled and analyzed for petroleum before backfilling.

The former Missile Site Radar Control Building Fire Water Storage Pond has contaminated soil and groundwater in the immediate vicinity. The concentrations of petroleum hydrocarbons exceed the state action levels. The groundwater samples contained two volatile organic compounds, triclorofluoromethane and trichloroethane, that are constituents of solvents and coolants.

Seven of the eight electric vaults and signals at the Missile Site Radar missile field contain substantial concentrations of total petroleum hydrocarbons, as well as an oily layer.

In 1995, an inspection of water in nine of the Spartan missile silos was conducted. Results of the investigation showed elevated concentrations of chromium and also detected beryllium, cadmium, iron, mercury, manganese, nickel, lead, antimony, and zinc (U.S. Army Space and Missile Defense Command, 1999—Expanded Preliminary Assessment).

Asbestos

An Asbestos Survey Report and Asbestos Management Plan for the Missile Site Radar was implemented on September 18, 1995. The Missile Site Radar facility is part of the complex and was included in this plan. The Asbestos Management Operation Plan includes work orders, notification records, bulk and air sampling results, asbestos registry, training and certification records, and disposal documents.

At the Missile Site Radar, asbestos-containing material is generated during remediation operations for building renovations or demolition. The removal of asbestos-containing material from facilities generates a waste that can be landfilled at several local permitted municipal waste disposal facilities. Facilities on the Missile Site Radar were surveyed in September 1991, October 1991, and September 1995 for asbestos-containing material. A total of 58 buildings were inspected, with 428 samples obtained. The majority of positive materials identified for asbestos were floor tiles. Additional items that contained asbestos include linoleum, transite panels, ceiling panels, wall panels, roofing material, caulk, conduit putty, and gaskets. Facilities that are to be renovated or demolished are surveyed for asbestos-containing material prior to construction activities, and remediated when necessary. (U.S. Army Space and Strategic Command, 1995—Asbestos Survey Report and Management Plan)

Polychlorinated Biphenyls

In 1990 a PCB survey was conducted at the Missile Site Radar facility and associated Remote Site Launch Sites and resulted in the identification of 74 transformers. Of the 74 transformers identified and tested, only 7 indicated the presence of PCBs. All known transformers and other items containing PCBs were removed from the Missile Site Radar facility. In 1992, an inspection of the Missile Site Radar Facility identified PCB containing equipment that could have gone unnoticed during the 1991 inspection. Therefore, in September 1993, suspect PCB containing materials was investigated. Results indicated that out of 37 potential PCB containing items it was unlikely that any of the items contained regulated levels of PCBs. (U.S. Army Space and Strategic Defense Command, 1994—Engineering Report, SRMSC)

Lead-based Paint

The Missile Site Radar facility was constructed before 1980. Therefore, there is the potential that most buildings and silos may contain lead-based paint. Buildings that are to be demolished or remodeled are checked for lead-based paint. If lead-based paint is found, the paint is removed in accordance with Federal regulations.

Radon

According to Radon Potential of the Upper Midwest map by the U.S. Geological Survey (1993), all of North Dakota is classified as an area of high radon concentration level. A radon survey completed for the Missile Site Radar found Building 348, now demolished, and Building 360 to have radon levels above 4 picocuries per liter. All other facilities surveyed were below 4 picocuries per liter (Greenwood, 1999—Comments received by EDAW, Inc., regarding the NMD Deployment Coordinating Draft DEIS).

Pesticides

The Missile Site Radar facility does not use any insecticides or pesticides. Herbicides have been used periodically to control weed growth in pavements and for spot control of noxious weeds such as leafy spurge.

Herbicides that have been used in the past include 2-4D Amine, Banvel, and Promoton. (Greenwood, 2000—Electronic communication)

3.7.2.4 Remote Sprint Launch Site 1—Hazardous Materials and Hazardous Waste Management

The relevant aspects of hazardous materials/waste management include the applicable regulatory procedures for hazardous materials usage and hazardous waste generation, and management programs for existing hazardous waste-contaminated sites within areas potentially affected by the NMD program. The ROI for hazardous materials and hazardous waste management includes Remote Sprint Launch Site 1 for general operations and those areas where potential NMD construction activities could occur.

Hazardous Materials Management

Remote Sprint Launch Site 1 is an inactive site that receives routine maintenance by a small caretaker staff that operates from the Missile Site Radar. Hazardous materials used as part of the maintenance activities include paint solvents, thinners, and starter fluids.

All underground storage tanks have been removed from the Remote Sprint Launch Sites (U.S. Army Corps of Engineers, 1991—Underground Storage Tank Closure Report, SRMSC).

Hazardous Waste Management

Remote Sprint Launch Site 1 is in caretaker status, and little or no hazardous waste is being generated. Any hazardous waste generated as part of maintenance activities is disposed of offsite in accordance with applicable regulations.

Pollution Prevention

Because the site is currently inactive, there are no pollution prevention initiatives.

Installation Restoration Program

There are no known hazardous waste contaminated sites at Remote Sprint Launch Site 1. Water removed from the Remote Launch Operations Building in 1991 did not indicate the presence of any contaminates. No further investigation is planned for these facilities. Water may exist in some of the Sprint Silos. Current plans are for a representative number of silos to be investigated. If water is present, it would be sampled and analyzed. If any contamination is discovered, consultation with the appropriate agencies would occur to determine future investigation and potential remediation (U.S. Army Space and Missile Defense Command, 1999—Expanded Preliminary Assessment).

Asbestos

An Asbestos Survey Report and Asbestos Management Plan for the SRMSC was implemented on September 18, 1995. The Remote Sprint Launch Site 1 facility is part of the complex and was included in this plan. The Asbestos Management Operation Plan includes work orders, notification records, bulk and air sampling results, asbestos registry, training and certification records, and disposal documents.

The removal of asbestos-containing material from facilities generates a waste that can be landfilled at several local permitted municipal waste disposal facilities. Facilities at the Remote Sprint Launch Site were surveyed in September 1995 for asbestos-containing material. The majority of positive materials identified for asbestos were black mastic and gaskets. Additional items that contained asbestos include ceiling panels, conduit putty, and window caulking. Facilities that are to be renovated or demolished are surveyed for asbestos-containing material prior to construction activities, and remediated when necessary. (U.S. Army Space and Strategic Defense Command, 1995—Asbestos Survey Report and Management Plan)

Polychlorinated Biphenyls

In 1991, a PCB survey was conducted at the Missile Site Radar and Remote Site Launch Sites and resulted in the identification of 74 transformers. Of the 74 transformers identified and tested, only 7 indicated the presence of PCBs. All known transformers and other items containing PCBs were removed from the Missile Site Radar and Remote Sprint Launch Sites. In 1992, an inspection of the SRMSC identified PCB containing equipment that could have gone unnoticed during the 1991 inspection. Therefore, in September of 1993 suspect PCB-containing materials were investigated. Results did not identify any potential PCB items within the Remote Sprint Launch Sites (U.S. Army Space and Strategic Defense Command, 1994—Engineering Report, SRMSC).

Lead-based Paint

Remote Sprint Launch Site 1 was constructed before 1980. Therefore, there is the potential that most buildings and missile silos may contain lead-based paint. Buildings that are to be demolished or remodeled are checked for lead-based paint. If lead-based paint is found, the paint is removed in accordance with Federal Regulations.

Radon

According to Radon Potential of the Upper Midwest map by the USGS (1993), all of North Dakota is classified as an area of high radon concentration level. Remote Sprint Launch Site 1 could possibly be located in areas that have concentrations over the U.S. EPA threshold of 4 picocuries. The U.S. EPA recommends that any buildings built in areas higher than 4 picocuries should be tested, and the appropriate precautions taken if deemed necessary. Construction of new facilities may require the addition of radon mitigation measures.

Pesticides

No insecticides or rodenticides are used at Remote Sprint Launch Site 1. (Greenwood, 2000—Electronic communication)

3.7.2.5 Remote Sprint Launch Site 2—Hazardous Materials and Hazardous Waste Management

The relevant aspects of hazardous materials/waste management include the applicable regulatory procedures for hazardous materials usage and hazardous waste generation, and management programs for existing hazardous waste-contaminated sites within areas potentially affected by the NMD program. The ROI for hazardous materials and hazardous waste management includes Remote Sprint Launch Site 2 for general operations and those areas where potential NMD construction activities could occur. The Remote Sprint Launch Sites (1, 2, and 4) were built of similar design and construction material. The relevant aspects of hazardous materials and hazardous waste management for Remote Sprint Launch Site 2 is similar to that described for Remote Sprint Launch Site 1, except that some additional soil contamination investigations may be required for the evaporation ponds.

3.7.2.6 Remote Sprint Launch Site 4—Hazardous Materials and Hazardous Waste Management

The relevant aspects of hazardous materials/waste management include the applicable regulatory procedures for hazardous materials usage and hazardous waste generation, and management programs for existing hazardous waste-contaminated sites within areas potentially affected by the NMD program. The ROI for hazardous materials and hazardous waste management includes Remote Sprint Launch Site 4 for general operations and those areas where potential NMD construction activities could occur. The Remote Sprint Launch Sites (1, 2, and 4) were built of similar design and construction material. The relevant aspects of hazardous materials and hazardous waste management for Remote Sprint Launch Site 4 is similar to that described for Remote Sprint Launch Site 1.

3.8 HEALTH AND SAFETY/ELECTROMAGNETIC RADIATION

The discussion of human health and safety includes both workers (e.g., military and other government personnel, and contractor personnel) and the general public. Safety issues include injuries that may result from one-time accidents. Health issues result from activities where people may be impacted over a long-period of time rather than immediately. The affected environment for health and safety will include those areas that have the potential to be affected by the increased risk of proposed program activities based on the NMD element being deployed at a given location. This discussion will include existing hazards such as airfield safety zones, hazardous military operations (i.e., aircraft operations, military ground training), fire, unexploded ordnance, and explosive safety zones. In addition, existing safety procedures will be described. Issues related to the use of hazardous materials and generation of hazardous waste will be addressed under the hazardous materials and hazardous waste section of this EIS.

Issues related to existing non-ionizing radiation will be addressed for those locations where XBRs could be deployed. These sites include Eareckson AS, Alaska, Cavalier AFS, Missile Site Radar, and Remote Sprint Launch Sites 1, 2, and 4, North Dakota. A general description of EMR is provided below. Specific information about the existing EMR and equipment that may be affected at these locations is described under each site. Appendix E provides more detail on EMR.

Electromagnetic Radiation Environment

EMR is generated during the operation of such items as microwave ovens, cellular phones, radios, televisions, and radars. By definition, EMR is waves of energy with both electric and magnetic components at right angles to one another. The vibration or acceleration of an electric charge produces these components.

EMR is usually classified as one of two types: ionizing radiation or non-ionizing radiation. Non-ionizing radiation is produced by a wide variety of equipment such as cellular phones, ham radios, and radars. X-rays, cosmic rays, and gamma rays produce ionizing radiation.

Exposure to each of these types of radiation causes different effects in both humans and equipment. Human exposure to high levels of non-ionizing radiation primarily causes heat generation in body tissue. Human exposure to high levels of ionizing radiation causes cell tissue damage. For equipment, high levels of EMR can also cause the inadvertent detonation of ordnance or can simply cause static in radios or televisions. EMR normally causes problems to equipment either by electromagnetic induction or degradation. Electromagnetic induction occurs when a conductor is moved through a magnetic field or whenever the magnetic field near a conductor is changing. Degradation occurs if undesired pulses from the system emitting the radiation either reduce the sensitivity of the receiving equipment or in some way impair the process involved in detecting the desired signal (Newhouse, 1984—Radar EMC Analysis Handbook).

Standards have been approved by the DOD, American National Standards Institute (ANSI), and the Institute of Electrical and Electronic Engineers (IEEE) to help identify these interference and radiation hazards. These standards also offer some mitigation techniques, such as maintaining safe distance separations and lowering the power levels of transmitters that generate high levels of EMR.

Defining the Electromagnetic Environment

Operation of a radar will certainly change the electromagnetic environment. The electromagnetic environment is made up of both civilian and government communications-electronics equipment. Civilian use of the electromagnetic spectrum is governed by the Federal Communications Commission (FCC). Government use of the spectrum is controlled by the National Telecommunications and Information Administration. Radiation hazards consist of human exposure, electroexplosive devices, and fuel exposure to EMR.

Communications–Electronics Frequency Related Interference

Communications–Electronics In-Band Radio Frequency Interference. In-band frequency interference addressed in this EIS is for the X-Band (8,000 to 12,000 megahertz). The X-Band is the band in which the proposed XBR will operate. In-band radio frequency interference occurs when two pieces of communications-electronics equipment are operating within the same frequency band. Therefore, equipment whose frequencies fall within the same bands will most likely be affected. Some examples of in-band communications-electronics equipment include airborne weather radars, fire control radars, and bomb/navigation radars. Several methods such as software controls can be used to reduce radio frequency interference caused by radars.

Communications–Electronics Adjacent Band Interference. Adjacent band radio frequency interference is similar to in-band radio frequency interference. The adjacent bands include all frequencies that are within approximately 5 percent of the operating frequency of the EMR source. The same standard methods to avoid interference that are used for in-band interference can be applied to adjacent band interference.

Communications–Electronics Harmonic Band Radio Frequency Interference. Harmonic band interference refers to interference produced in harmonically related receivers or interference caused by sub-harmonically related transmitters. Harmonic frequencies include those frequencies that are integer multiples of the operating frequencies. Sub-harmonic frequencies are those frequencies that are simple fractions of the operating frequencies. The likelihood and severity of radio frequency interference in the harmonically related bands is based upon the effective radiated power of the interfering source. Radio frequency interference in the harmonically related bands can be reduced by using software controls.

Communications–Electronics Non-frequency Related Interference

High Power Effects. The EMR fields associated with very high power emitters have produced interference in electronic devices that has not been predictable by the classical analysis processes; i.e., processes that predict spurious and intermodulation responses. This interference has been classified as high power effects (Franks, 1973—High Power Effects Susceptibility Criteria). High power effects typically occur in receivers that are located in proximity to high power transmitters and may be the result of either antenna-coupled signals or equipment case penetration. The accepted levels for high power effects are 40 dBm per square meter for military equipment and 30 dBm per square meter for civilian equipment (Franks, 1973—High Power Effects Susceptibility Criteria). At power density levels below these thresholds, it can be reasonably assumed that high power effects are not likely to occur. At power density levels above these thresholds, it cannot be stated with certainty that high power effects will occur, only that it is possible. High power effect is inherently a non-linear effect and is, therefore, difficult to predict.

Radio Frequency Interference to Avionics. Another form of non-frequency related interference affects aircraft and avionics. Aircraft may fly through the main beam of a radar, and therefore would be exposed to high EMR levels. These levels of EMR could impact the communications and navigation equipment on the aircraft. The fly-by-wire control systems may also be impacted by these high levels of EMR.

Both the DOD and the FAA have developed standards to protect aircraft and avionics from experiencing radio frequency interference. Military Standard 464, "Electromagnetic Environmental Effects Requirements for Systems" (Department of Defense, 1997—Electromagnetic Environmental Effects) identifies the operational environment that military aircraft are likely to experience and thus should be protected to those levels. At X-Band, the thresholds identified are 3,500 volts per meter (peak power) and 1,270 volts per meter (average power). An FAA standard, Notice 8110.71 "Guidance for the Certification of Aircraft Operating in High Intensity Radiated Fields" (Federal Aviation Administration, 1998—Notice 8110.71) also identifies the operational environment that aircraft are likely to experience. The FAA thresholds for operating in high intensity radiated field environments are 3,000 volts per meter (peak power) and 300 volts per meter (average power).

Radiation Hazards

Operation of radars may generate levels of EMR that are above the standards set to prevent harm to humans. Radars may also generate EMR that is great enough to cause the inadvertent detonation of ordnance or the inadvertent ignition of fuels.

Human Exposure. The EMR that is generated by radars, microwave ovens, cellular phones, etc. is non-ionizing radiation that is absorbed into the human body in the form of heat. This causes the temperature of the body to rise. At low intensities, the heat that is induced by EMR can be accommodated by the thermoregulatory capabilities of the individuals exposed. Thus, any effects produced would generally be reversible. At high intensities, the body's ability to regulate temperature through blood flow and sweat may be exceeded, which could lead to cell tissue damage (Hanscom AFB, 1991—EA HAVE STARE Radar).

All current standards are based upon a 1982 report published by ANSI. The results of that report state that laboratory animals may be affected by specific absorption rates above 4 watts per kilogram, if maintained for protracted periods of time. Therefore, ANSI adopted a 10-fold safety margin specifying a maximum absorption rate of 0.4 watt per kilogram averaged over the whole body and 8 watts per kilogram in any one gram of tissue (IEEE, Inc., 1982—American National Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields).

In 1991, the IEEE published a revision to the 1982 ANSI report. This revision has since been adopted by the DOD as the standard for protecting personnel from radiation hazards (Department of Defense, 1996—Protection of DoD Personnel from Exposure to Radiofrequency Radiation and Military Exempt Lasers). The revision defined personnel exposure limits as a function of frequency in controlled and uncontrolled environments. Controlled environments represent areas that may be occupied by personnel who accept potential exposure as a contingent of employment or duties, by individuals who knowingly enter areas where such levels are to be expected, and by personnel passing through such areas. Uncontrolled environments generally represent living quarters, workplaces, or public access areas where personnel would not expect to encounter higher levels of radio frequency energy. In the X-Band frequency range, the more stringent personnel exposure limits are in uncontrolled environments. (See table 3.8-1.) These personnel exposure limits range from 5.33 to 8 milliwatts per square centimeter for an average time of 11.25 minutes to 7.5 minutes respectively (IEEE, Inc., 1999—American National Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields).

Table 3.8-1: IEEE Personnel Exposure Limits for Uncontrolled Environments

Frequency Range (in megahertz)	Power Density (in milliwatts per square centimeter)	Average Time (minutes)
0.003 to 0.1	100	6
0.1 to 1.34	100	6
1.34 to 3.0	$180/f^2$	$f^2/0.3$
3 to 30	$180/f^2$	30
30 to 100	0.2	30
100 to 300	0.2	30
300 to 3,000	f/1,500	30
3,000 to 15,000	f/1,500	90,000/f
15,000 to 300,000	10	616,000/f

Source: IEEE, Inc., 1999—American National Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields.
Note: f = frequency in megahertz

People with pacemakers may also be affected by the EMR generated by radars. According to the Air Force Occupational Safety and Health Standard 161-9, significant disruption of normal pacemaker function requires radio frequency radiation signals having a primary frequency between 100 and 5,000 megahertz, pulsewidths greater than 10 microseconds, and electric field strengths greater than 200 volts per meter (Department of the Air Force, 1987—Exposure to Radio Frequency Radiation). The disruption of pacemakers via radio frequency radiation has also been studied extensively at the Georgia Technical Research Institute, and similar results have been found. The disruption of pacemakers has not been studied in the X-Band frequency range because the potential for interference in the X-Band was so low that it did not mandate further testing.

Public concerns have also arisen regarding exposure to potential radiation hazards from electric and magnetic fields caused by power lines. However, a 1997 report from the National Academy of Sciences that examined over 500 studies performed over 17 years found that there is no conclusive evidence that electromagnetic fields play a role in the development of cancer, reproductive and developmental abnormalities, or learning and behavioral problems (National Academy of Sciences, 1997—Possible Health Effects of Exposure to Residential Electric and Magnetic Fields). Researchers have studied the potential effects on human cells and tissue from electric and magnetic fields, and have found that only at levels between 1,000 and 100,000 times stronger than typical fields found in residential areas have cells shown any reaction to electric and magnetic fields exposure. Therefore, the effects from power line generated electric and magnetic fields were given no further consideration in this study.

Electroexplosive Devices. An electroexplosive device is defined as a single unit, device, or subassembly in which electrical energy is used to initiate an enclosed explosive, propellant, or pyrotechnic material. Some applications of electroexplosive devices are detonators, squibs, blasting caps, and igniters. An electroexplosive device typically consists of a primary charge, a booster charge, and a heat sensitive bead. The heat sensitive bead is similar to a match head, and it is ignited when a current runs across two wires that are connected to the bead, thus constituting a bridge. The bead ignites and sets off the primary charge, which initiates the main charge. The current that ignites the bead can be induced by energy from EMR. Thus, high levels of EMR can inadvertently initiate the device. Energy from EMR may also cause the electroexplosive device to become inactive or dud whenever the induced current is insufficient to initiate the device.

The military standards applied to electroexplosive devices take into consideration three different phases in which electroexplosive devices can be initiated: (1) handling/loading, (2) presence, and (3) shipping. The handling/loading phase occurs whenever the electroexplosive device is in an exposed condition, i.e. not installed or packaged. This is the worst case scenario. The presence phase occurs when the electroexplosive device has been installed in a weapon, such as when a round of ammunition has been loaded in a gun or a missile has been loaded aboard a plane. The shipping phase occurs whenever the electroexplosive device is stored in a shipping container or package. The military standards associated with radiation hazards to electroexplosive devices are listed in table 3.8-2.

Table 3.8-2: Electroexplosive Standards

Military Standard	Date	Threshold at X-Band in volts per meter	Phase
Air Force Manual 91-201	May 1996	200	Handling/Loading
Military Standard 464	March 1997	1,270	Presence/Shipping

Source: Department of Defense, 1996—DODI 6055.11—Protection of DOD Personnel from Exposure to Radio Frequency Radiation.

Fuels. High levels of EMR may cause the accidental ignition of fuel vapors by radio frequency induced arcs during fuel handling operations. The probability of accidental ignition has been reduced in recent years through various mitigation techniques such as pressurized fueling systems on aircraft and the use of less volatile fuels. However, the risk is still present during the handling of more volatile fuels such as motor vehicle and aviation gasolines. Air Force Technical Order 31 Z-10-4 requires a threshold of 5,000 milliwatts per square centimeter to prevent the inadvertent ignition of fuels (Department of the Air Force, 1989—Electromagnetic Radiation Hazards).

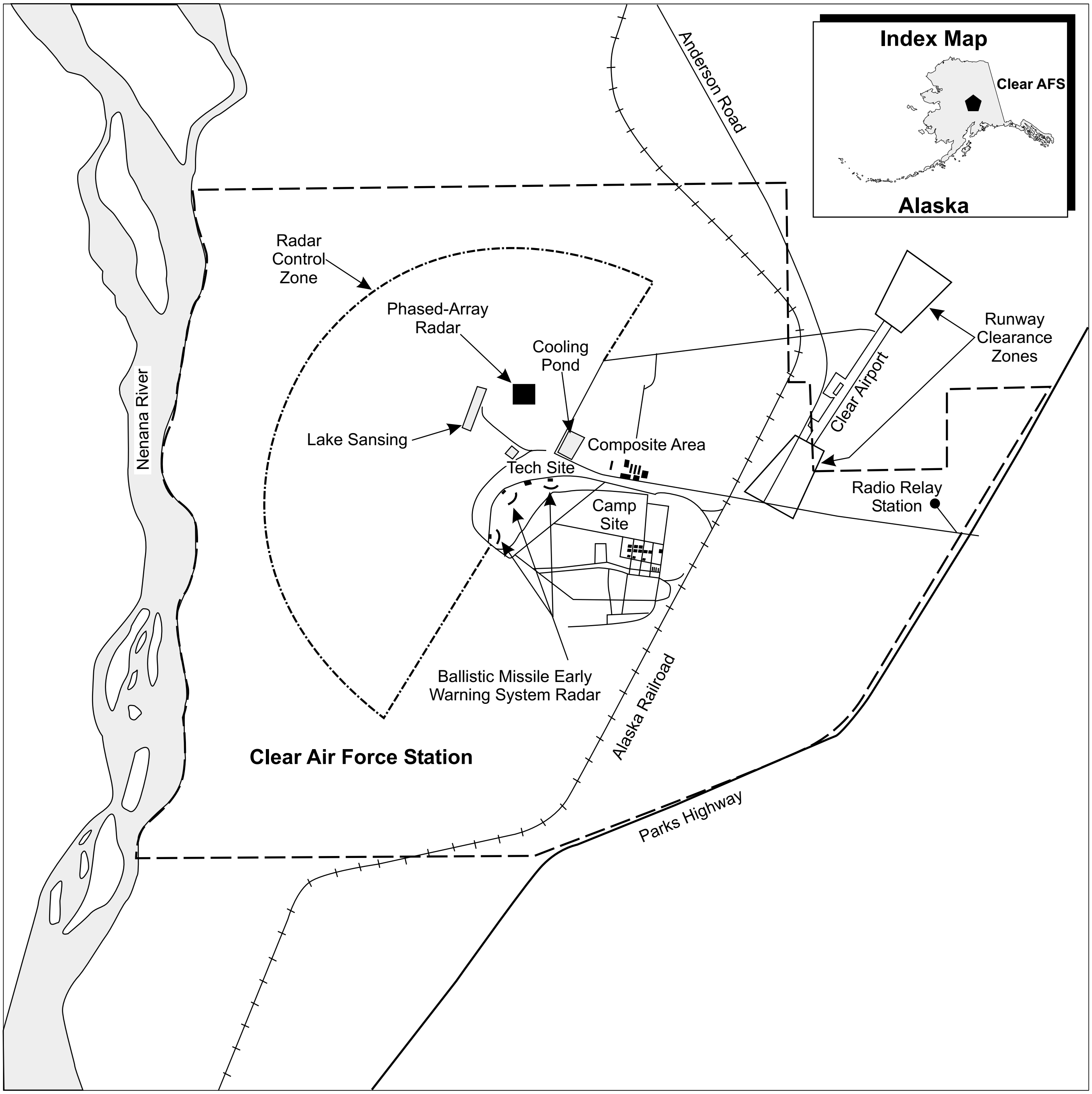
3.8.1 ALASKA INSTALLATIONS

3.8.1.1 Clear AFS—Health and Safety

This section describes the health and safety concerns for the affected base property at Clear AFS and the surrounding area. The ROI for health and safety includes the base and adjacent properties that could be affected by the deployment of a GBI or BMC2 at Clear AFS. The area potentially affected off-base would be the properties immediately adjacent to the base and the transportation network for hazardous materials. For a general description of the health and safety resource area, see section 3.8.

The Air Force has developed standards that dictate the amount of fire equipment that must be present based on the types of total square footage of base structures and housing. The Clear AFS fire department meets these standards, maintaining one structural pumper, a smaller fire fighting vehicle, and an emergency command vehicle. One centrally located facility houses the equipment. The positioning of this facility also meets the Air Force time and distance requirements for facility response. The base contractor has a Health and Safety Plan and there is a full-time emergency medical technician on the base.

Base health and safety issues at Clear AFS include EMR associated with operation of the Ballistic Missile Early Warning System radar and runway approach clearance zones at the end of the Clear Airport public airstrip. To ensure operational safety around the Ballistic Missile Early Warning System radar, a 1,524-meter (5,000-foot) control zone is maintained for structures emanating in a northwesterly direction from the radar (figure 3.8-1) (Clear AFS, 1993—Comprehensive Planning Framework). Radiation exposure measurement taken in surveys identified areas in which the power density levels exceeded the permissible exposure level of 4 milliwatts per square centimeter. These areas are within the base Technical Site where the radar facilities are located. All areas in which radiation levels above the permissible exposure level were measured have been posted with warning signs, and access is strictly controlled during radar operation. The base also maintains a Radiation Protection Program, which is implemented by the Radiation Protection Officer. This program is intended to identify, monitor, and control areas and sources of potentially hazardous radiation, and to provide training for personnel



EXPLANATION

Roads

Water Area

Installation Boundary

Railroads

Ballistic Missile System
Radar Control Zone

Scale
0 2,500 5,000 Feet
0 762 1,524 Meters

NORTH

Existing Health and Safety Issues, Clear Air Force Station

Alaska

Figure 3.8-1

hs_clas_001

working at the site with respect to such hazards (U.S. Department of the Air Force, 1997—EA for Radar Upgrade at Clear Air Station, Alaska).

Currently, a new solid state phased-array radar is being installed at Clear AFS to replace the existing Ballistic Missile Early Warning System radar. The new radar is expected to be operational in the fall of 2000. Ground-level measurements taken at a distance of 305 meters (1,000 feet) from a similar radar as the proposed phased-array averaged 0.005 milliwatt per square centimeter, well below the permissible exposure levels of 4 milliwatts per square centimeter. In addition, the phased-array radar is not expected to be a threat to fuel-handling operations or to ground-based electroexplosive devices (U.S. Department of the Air Force, 1997—EA for Radar Upgrade at Clear Air Station, Alaska).

Clear Airport is a small public airstrip northeast of the base. The runway approach clearance zones on the southern end of the runway are on Clear AFS boundary (Clear AFS, 1993—Comprehensive Planning Framework). The airstrip is primarily used by small private planes and has no scheduled commercial service.

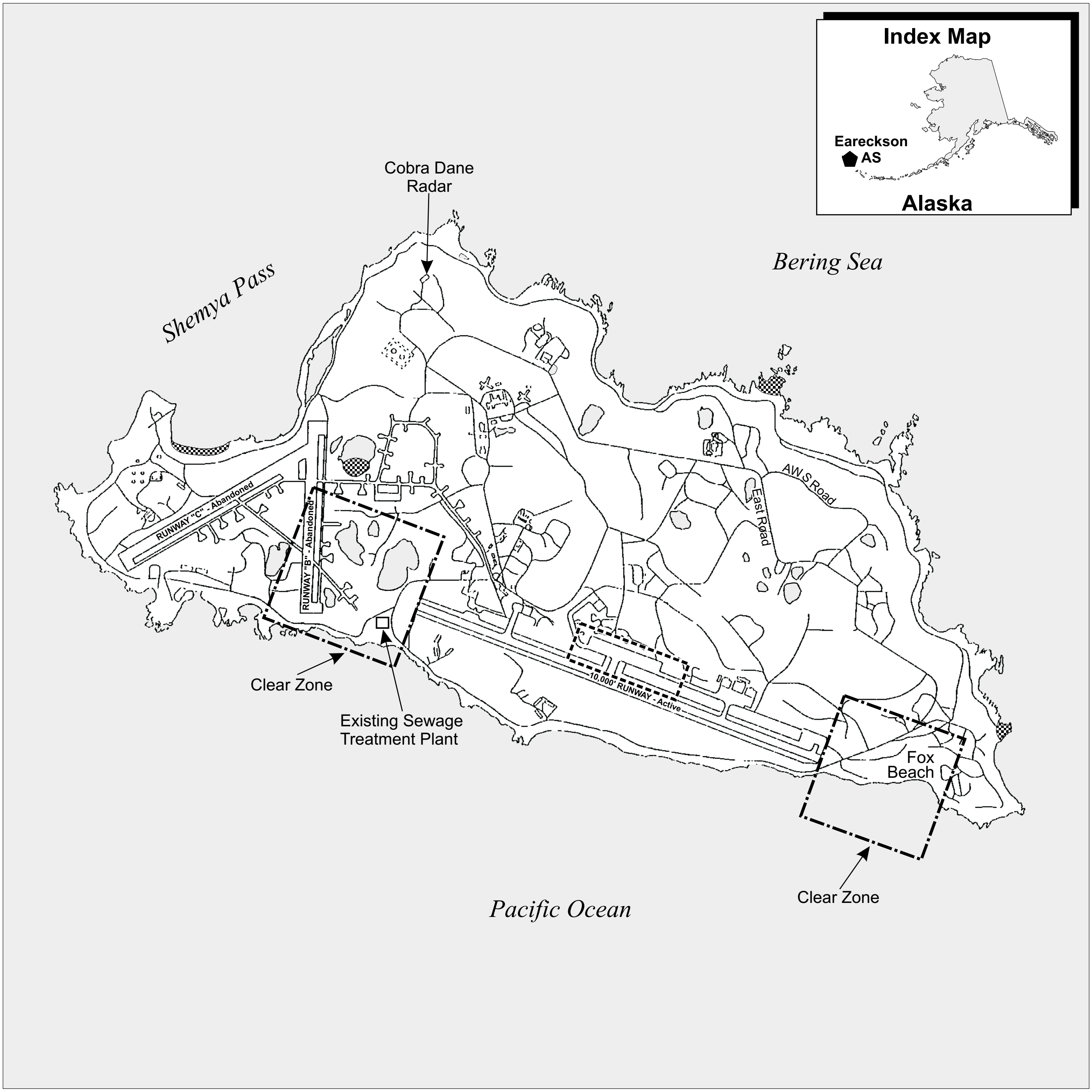
3.8.1.2 Eareckson AS—Health and Safety

This section describes the health and safety concerns for the affected base property at Eareckson AS and the surrounding area. The ROI for health and safety includes the base and adjacent public that could be affected by the deployment of an XBR. The ROI for EMR human health effects is the base and adjacent property. This ROI is based on the area where potential effects to human health are expected to occur (out to 150 meters [492 feet]). The ROI for certain electronic equipment and aircraft (see below) includes an area up to 350 kilometers (217 miles). For a general description of the health and safety resource area, see section 3.8.

On-base Safety

The Air Force has developed standards that dictate the amount of fire equipment that must be present based on the types of aircraft and total square footage of base structures and housing. The Eareckson AS fire department meets these standards, maintaining four crash fire trucks, three structural pumpers, and one spill response truck. One centrally located facility houses the equipment. The positioning of this facility also meets the Air Force time and distance requirements for facility response.

The threats to human safety from aircraft accidents at Eareckson AS have been addressed by the establishment of safety zones around the airfield. In order to minimize the risk at each end of the runway, a Clear Zone and Approach Zones have been designated. These zones have been established to limit development around the airfield on the island (figure 3.8-2).



EXPLANATION

- Roads
- Land Area
- Water Area
- Unexploded Ordnance
- Explosive Safety Quantity Distance (ESQD)
- Runway Clear Zone Boundary

Scale

0 1,738 3,475 Feet

0 530 1,059 Meters

NORTH

Existing Health and Safety Issues, Eareckson Air Station

Alaska

Figure 3.8-2

hs_eas_001

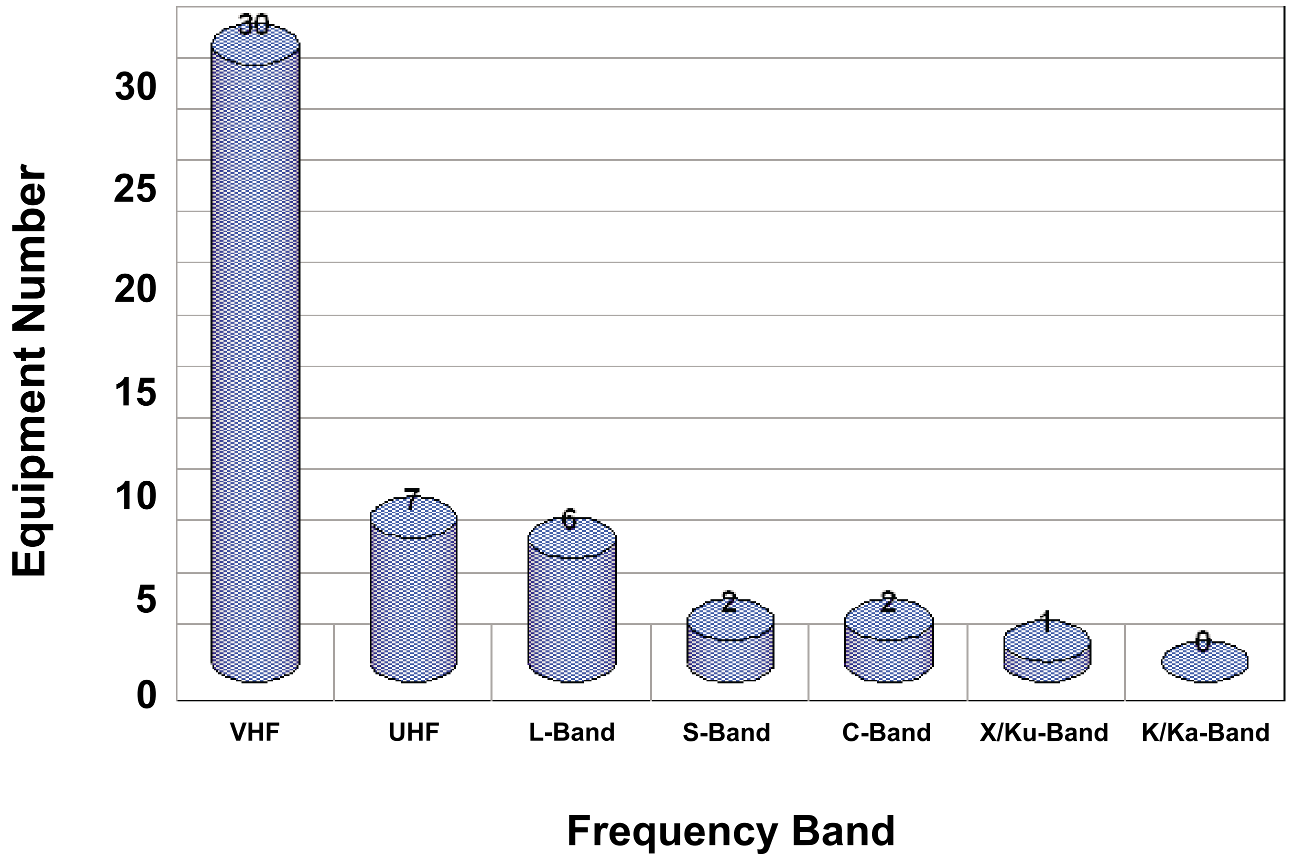
Other base safety issues include ESQDs associated with aircraft loading and unloading areas, unexploded ordnance areas, World War II bunkers, and the weather. Although no ordnance is stored on the base, the Air Force still maintains ESQDs along the aircraft flight line for aircraft using the airfield. There are presently four designated areas on the island that have known unexploded ordnance. These areas are clearly marked with "Danger Unexploded Ordnance" signs. Each person working on the island is informed of these areas. As a result of past construction on the island, there are many areas, which may have underground structures, which could pose a health hazard if not identified prior to construction activities. Periods of hazardous weather conditions (usually high winds) occur at Eareckson AS, and individuals are warned to take precautions during these conditions. The base safety office may limit outside access during these conditions. The base contractor has a Health and Safety Plan, and there is a full-time emergency medical technician on the island.

Electromagnetic Radiation Environment

For purposes of this study, the electromagnetic environment around the Eareckson AS site includes all ground-based systems within a 30-kilometer (19-mile) radius for out-of-band systems and within a 350-kilometer (217-mile) radius for in-band, adjacent band, and harmonically-related bands. The out-of-band communications-electronics environment around the Eareckson AS site was found to include 48 systems ranging in frequencies from 221 kilohertz to 10,525 megahertz. The distribution of these systems over the electromagnetic spectrum, VHF–K-Band, is shown in figure 3.8-3. These systems were categorized into potential receiving of frequency-related interference or non-frequency related interference.

Communications–Electronics Frequency Related Interference. The existing ground-based communications-electronics environment around the Eareckson AS site includes no in-band systems. The airborne electromagnetic environment includes three types of in-band systems: fire control, bomb/navigation, and weather radars. Weather radars are utilized on both civilian and military aircraft. Section 3.3.1.1 provides an overview of the airspace and airports in the Eareckson AS ROI.

Communications–Electronics Non-frequency Related Interference. The out-of-band electromagnetic environment (within 30 kilometers [19 miles]) at the Eareckson AS site includes 48 ground-based systems. The majority of the systems (37 of 48 systems) are used for UHF and VHF land-mobile radios. Also included are one airport surveillance radar, one early warning radar, one air traffic control radar beacon, one VHF omni-directional range/tactical air navigation aid, one Identify Friend or Foe (IFF) system, and six fixed/mobile-broadcasting satellites. Although no airborne systems are registered with the National Telecommunications and Information



Equipment Distribution at Eareckson Air Station

Figure 3.8-3

Administration (NTIA) or FCC for this area, it is anticipated that various avionics equipment (tactical air navigation, IFF systems, glideslopes, beacons, etc.) will be present as aircraft travel in and out of the area.

Additionally, the COBRA DANE Early Warning Radar is on Eareckson AS and can adversely affect electroexplosive devices aboard aircraft. A separation distance of 6 kilometers (4 miles) is recommended for electroexplosive devices aboard aircraft, in the presence phase, and 1.20 kilometers (0.75 mile) for electroexplosive devices on the ground, in the handling/loading phase.

Radiation Hazards. Based upon the presence of high-power emitters within a 30-kilometer (19-mile) radius of Eareckson AS, the existing electromagnetic environment could present substantial levels of radiation hazards to personnel and electroexplosive devices. No hazard to fuels is expected.

The COBRA DANE Radar, AN/FPS-108, presents the highest probability for radiation hazards. COBRA DANE is an early-warning phased-array radar that provides tactical warning and attack assessment of sea-launched and intercontinental ballistic missiles launched against the continental United States.

The COBRA DANE operates in the L-Band frequency range (1,000 to 2,000 megahertz). The beam from the COBRA DANE is continually scanning, and therefore will interact with the surrounding environment. However, due to the location and orientation of the COBRA DANE antenna on top of a cliff facing the open ocean, the interaction with the environment is limited to sidelobe and backlobe interactions.

According to IEEE C95.1, personnel exposure limits for uncontrolled environments in the 1,000 to 2,000 megahertz frequency range are between 0.78 and 0.92 milliwatt per square centimeter for an average time of 30 minutes. The COBRA DANE Radar can exceed the IEEE standard for distances out to approximately 100 meters (328 feet). The area around the face of the COBRA DANE is an enclosed area within government-controlled land that is fenced to assure no unauthorized access occurs within the hazardous area.

3.8.1.3 Eielson AFB—Health and Safety

This section describes the health and safety concerns for the affected base property at Eielson AFB and the surrounding area. The ROI for health and safety includes the base and adjacent properties that could be affected by the deployment of a GBI or BMC2 at Eielson AFB. The area potentially affected off-base would be the properties immediately adjacent to the base and the transportation network for hazardous materials. For a general description of the health and safety resource area, see section 3.8.

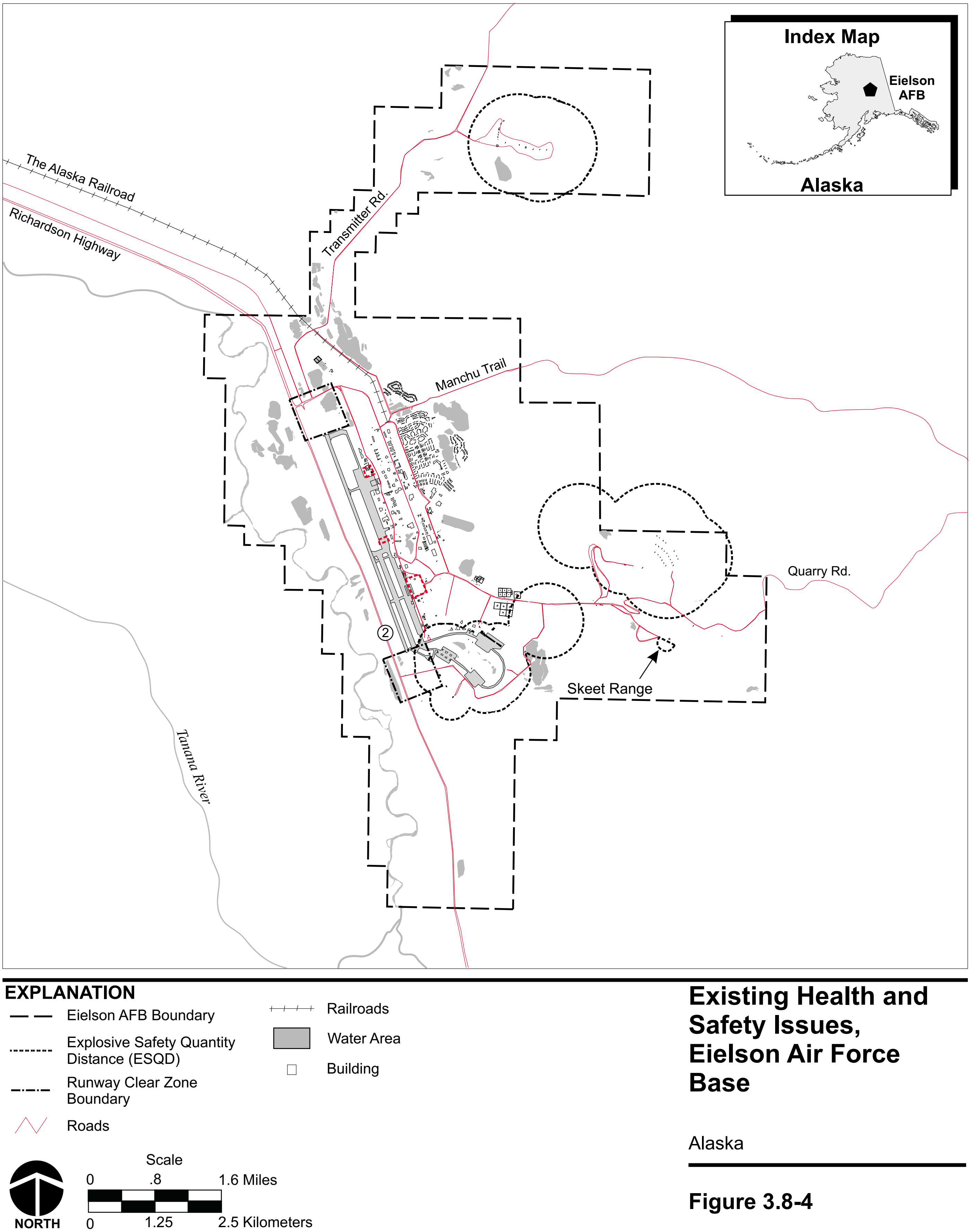
The Eielson AFB Safety Office reviews base safety issues. Other offices, such as the Bioenvironmental Engineering Office, also ensure safe operations by providing services such as sampling of indoor air, water, and unknown material or waste. To assist in emergency response, Eielson AFB maintains mutual aid agreements with the Bureau of Land Management to fight range fires and 10 local fire departments within the surrounding area. The Bureau of Land Management has the primary responsibility of fighting fires in the forested area of Eielson AFB with assistance from the base fire department. The base maintains firebreaks around hazardous areas such as ammunition storage areas and fuel storage areas (Pacific Air Forces, 1998—Draft General Plan, Eielson AFB).

The Air Force has developed standards that dictate the amount of fire/crash equipment and staffing that must be present based on the number and types of aircraft stationed on-base, and the types and total square footage of base structures and housing. The Eielson AFB fire department meets these standards, maintaining five crash trucks, three structural trucks, two water trucks, two ramp vehicles, two command vehicles, and one hazardous material truck. The base currently has 74 personnel to administer and manage the program for both the flightline and the base facilities. Two fire stations, one along the flightline and the second in the base housing area, provide the base fire protection needs. The positioning of these facilities meets the Air Force time and distance requirements for facility response.

The threats to human safety from aircraft accidents at Eielson AFB are summarized in the Air Installation Compatible Use Zone (AICUZ) Report. The AICUZ guidelines are based on the type of aircraft at the base and the nature of operations conducted. In order to minimize the risk to the public at each end of the runway, a Clear Zone and two Accident Potential Zones have been designated. The Clear Zone, the area where aircraft mishaps are most likely to occur, is contained within the base boundaries (figure 3.8-4).

Other on-base safety restrictions include ESQDs associated with the Railroad Unloading Dock, munitions storage at Engineer Hill and Quarry Hill, A-10 aircraft weather shelters, weapon unloading and loading areas, small arms munitions impact areas, and the chaff flare facility located near the northern end of the runway. There are no EMR safety zones on Eielson AFB (Pacific Air Forces, 1998—Draft General Plan, Eielson AFB).

To service the base aircraft, large amounts of jet fuel are stored on-base along with hydrazine, which is associated with the F-16 emergency power unit. The base has both standard and emergency operation procedures for the handling of both of these fuels.



Existing Health and Safety Issues, Eielson Air Force Base

Alaska

Figure 3.8-4

hs_eafb_001

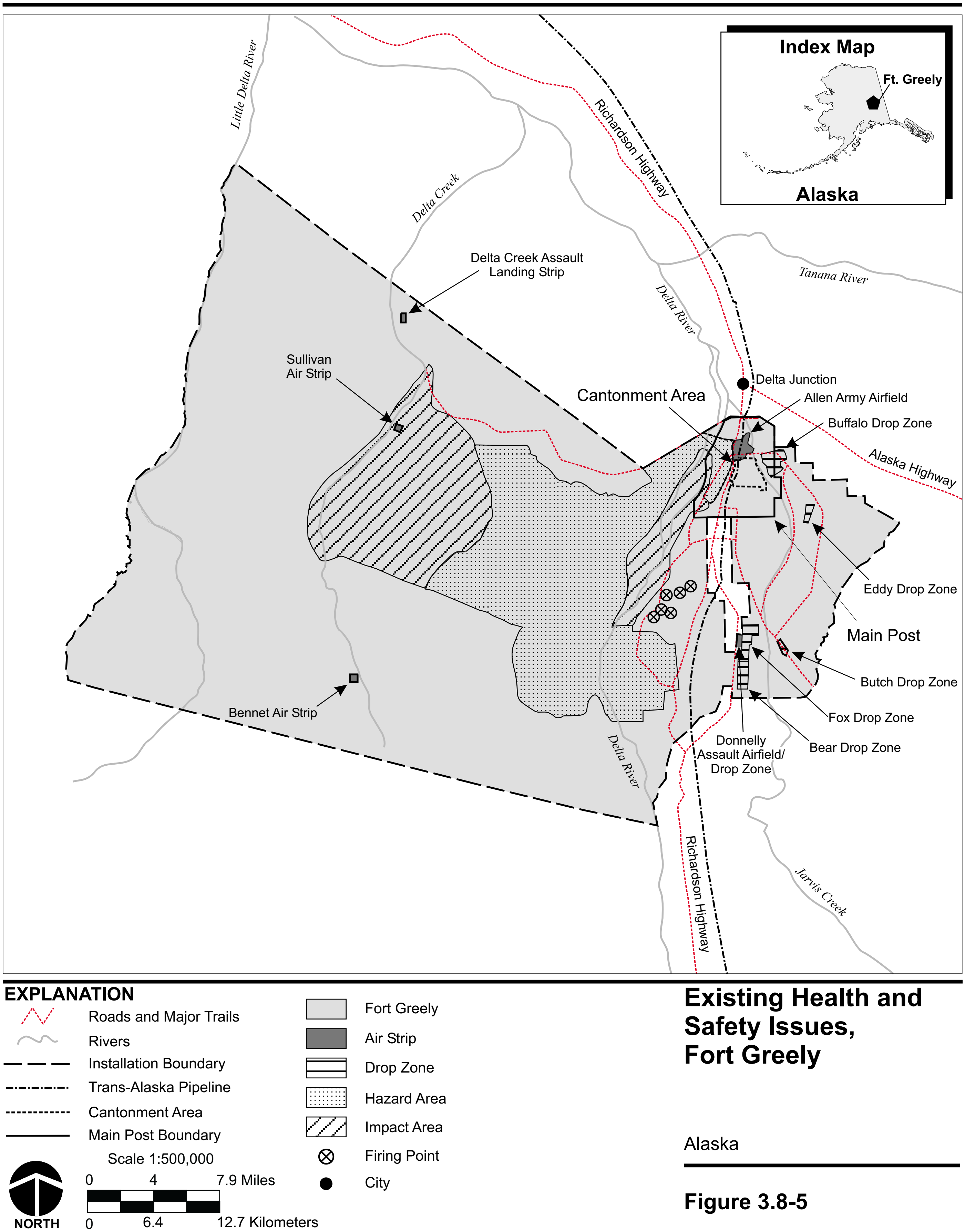
3.8.1.4 Fort Greely—Health and Safety

This section describes the health and safety concerns for the affected base property at Fort Greely and the surrounding area. The ROI for health and safety includes the base and adjacent properties that could be affected by the deployment of a GBI or BMC2 at Fort Greely. The area potentially affected off-base would be the properties immediately adjacent to the base and the transportation network for hazardous materials. For a general description of the health and safety resource area, see section 3.8.

The Fort Greely cantonment is being realigned; therefore, some of the operations in this area have ceased. The base still maintains maintenance personnel and fire fighting support for the cantonment area. The Fort Greely fire department maintains four crash/pumper trucks, three brush trucks, one small pumper truck, and a command vehicle. The base currently has 11 personnel to administer and manage the fire department. To assist in emergency response, Fort Greely maintains mutual aid agreements with most of the small communities within a 161-kilometer (100-mile) radius of the base. The Bureau of Land Management has the primary responsibility of fighting fires in the forested area of Fort Greely with assistance from the post fire department.

Fort Greely has an airfield; however, this field is only minimally used for training. The Clear Zones for the airfield are contained within the base boundaries (Department of the Army, 1983—The Master Plan of Fort Greely).

Health and safety issues at Fort Greely are associated with both Army and Air Force activities and range fires. The Army trains at Fort Greely throughout the year with exercises including the deployment of troops, weapons firing, and infantry tactical maneuvers. The Fort Greely Training Area is also used as a test site for weapons and equipment, including experimental designs, under conditions of extreme cold. Weapons are fired from the east side of the Delta River towards weapon impact areas (figure 3.8-5). Weapons include rockets, mortars, small arms, and artillery. Access to the weapon impact areas on Fort Greely is restricted because of the potential of unexploded ordnance (U.S. Army Alaska, 1997—Draft Integrated Natural Resources Management Plan). Because of the long history of military training on Fort Greely there is still a low potential for unexploded ordnance in areas outside of the weapon impact areas. Most of this ordnance consists of small arms ammunition and 40-millimeter practice grenades. The Fort Greely East Training Area is used primarily as a nonfiring maneuver area. The Cold Regions Test Center utilizes this same area for experimental airdrops, airborne training, and testing of clothing, vehicles, and equipment (U.S. Army Alaska, 1997—Draft Integrated Natural Resources Management Plan).



Existing Health and Safety Issues, Fort Greely

Alaska

Figure 3.8-5

The Air Force uses the airspace above Fort Greely and the weapons impact areas for training activities. The type of aircraft operations include close air support, aerial gunnery, rockets, bombing, training flights, and test flights. These activities are conducted within the restricted airspace or along military training routes above Fort Greely. The Air Force has safety procedures in place for the aircraft activities above Fort Greely.

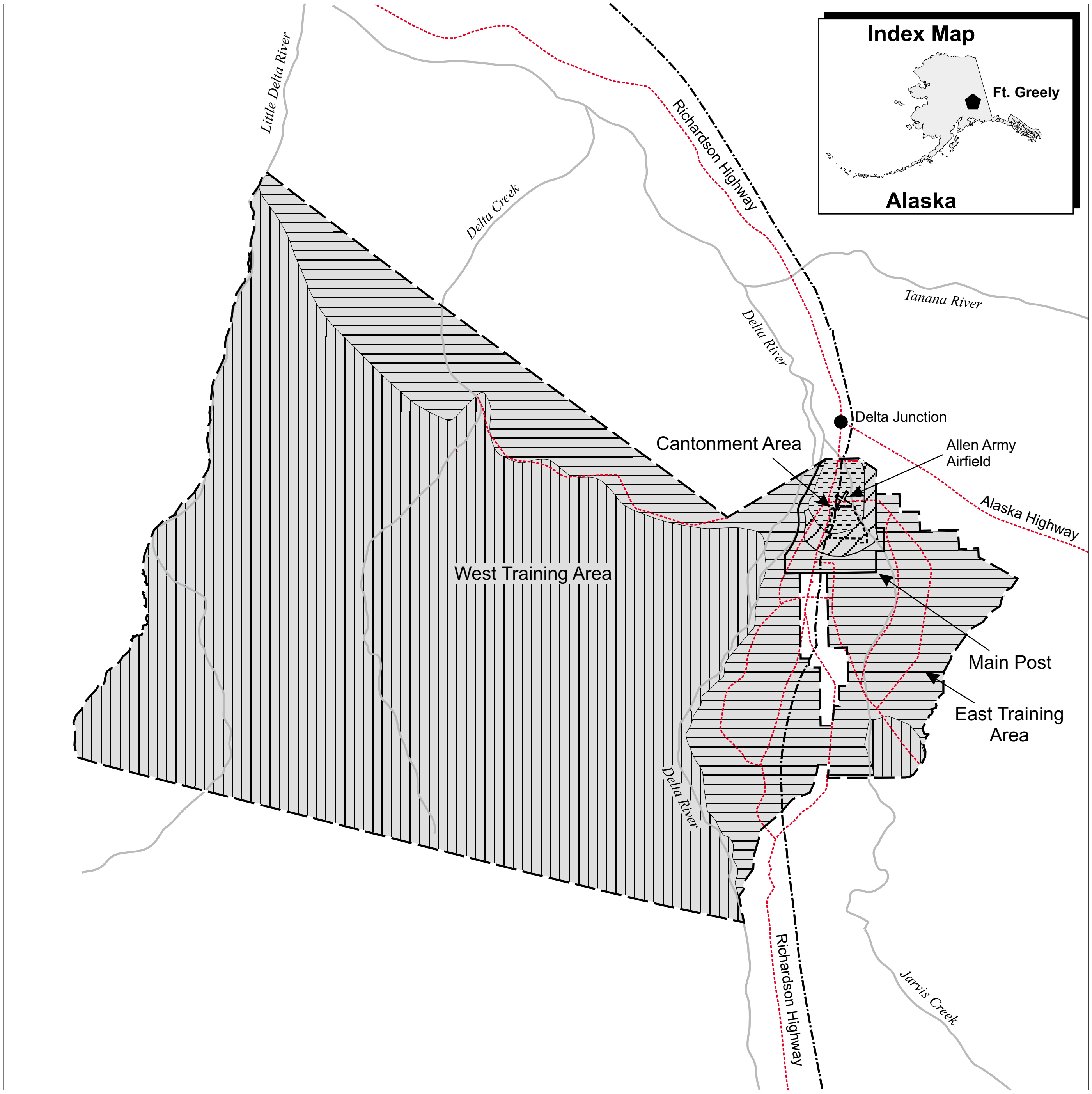
Under a Memorandum of Understanding, the Bureau of Land Management Alaska Fire Service is responsible for fire detection and suppression on withdrawn lands. The Alaska Fire Service has a reciprocal Fire Protection Agreement with the State of Alaska, Department of Natural Resources, Division of Forestry. The Alaska Wildland Fire Management Plan establishes four fire protection options (Bureau of Land Management, 1998—Draft Alaska Wildland Fire Management Plan). Land managers may select among these options, based on the evaluation of their individual legal mandates, policies, regulations, resource management, objectives and local conditions. The fire protection status options are:

- Critical Protection—Lands receive maximum detection coverage and are of highest priorities for attack response (figure 3.8-6).
- Full Protection—Areas receive maximum detection coverage and immediate and aggressive initial attack response.
- Modified Protection—A level of protection is provided between Full and Limited.
- Limited Protection—Areas where the values at risk do not warrant the expense or suppression and are areas where natural fire is important to ecosystem sustainability.
- Restricted—Includes Weapon Impact Areas and other places where no “on the ground” fire fighting can be accomplished due to the danger of unexploded ordnance.

Nineteen fires of 40 hectares (100 acres) or more occurred on Fort Greely from 1954–1997. Two were in the East Training Area and occurred in 1954 and 1987. The remaining 17 fires were in the Fort Greely West Training Area. Ten of the above fires were caused by incendiary devices, and five by lightning. Information on the remaining four is not available. The U.S. Army Alaska requires a 15-meter (50-foot) firebreak around all facilities.

3.8.1.5 Yukon Training Area (Fort Wainwright)—Health and Safety

This section describes the health and safety concerns for the affected base property at the Yukon Training Area and the surrounding area. The ROI for health and safety includes the base and adjacent properties that could be affected by the deployment of a GBI or BMC2 at the Yukon Training Area. The area potentially affected off-base would be the



EXPLANATION

- Roads and Major Trails
- Rivers
- Installation Boundary
- Trans-Alaska Pipeline
- Cantonment Area
- Main Post Boundary
- Fort Greely
- Critical Protection
- Full Protection
- Modified Action
- Limited Action
- City

NORTH

Scale 1:500,000

0 4 7.9 Miles

0 6.4 12.7 Kilometers

Fire Protection Status, Fort Greely

Alaska

Figure 3.8-6

hs_fge_002

properties immediately adjacent to the base and the transportation network for hazardous materials. For a general description of the health and safety resource area, see section 3.8.

Health and safety issues at the Yukon Training Area are associated with both Army and Air Force activities and range fires. The Army trains at the Yukon Training Area throughout the year with exercises including the deployment of troops, weapons firing, and infantry tactical maneuvers. Weapons are fired from firing points into the Stuart Creek Impact Area (figure 3.8-7). Weapons include rockets, mortars, small arms, and artillery. Access to the weapon impact areas on the Yukon Training Area is restricted because of the potential of unexploded ordnance. Because of the long history of military training on the Yukon Training Area, there is still a low potential for unexploded ordnance in areas outside of the weapon impact areas. Most of the ordnance consists of small arms ammunition and 40-millimeter practice grenades. In addition to the Stuart Creek Impact Area, there are two small arms range in the maneuver area.

The Air Force uses the airspace above the Yukon Training Area and the Stuart Creek Impact Area for training activities. The type of aircraft operations include close air support, aerial gunnery, rockets, bombing, training flights, and test flights. These activities are conducted within the restricted airspace or along military training routes above the Yukon Training Area. The Air Force has safety procedures in place for the aircraft activities above the Yukon Training Area.

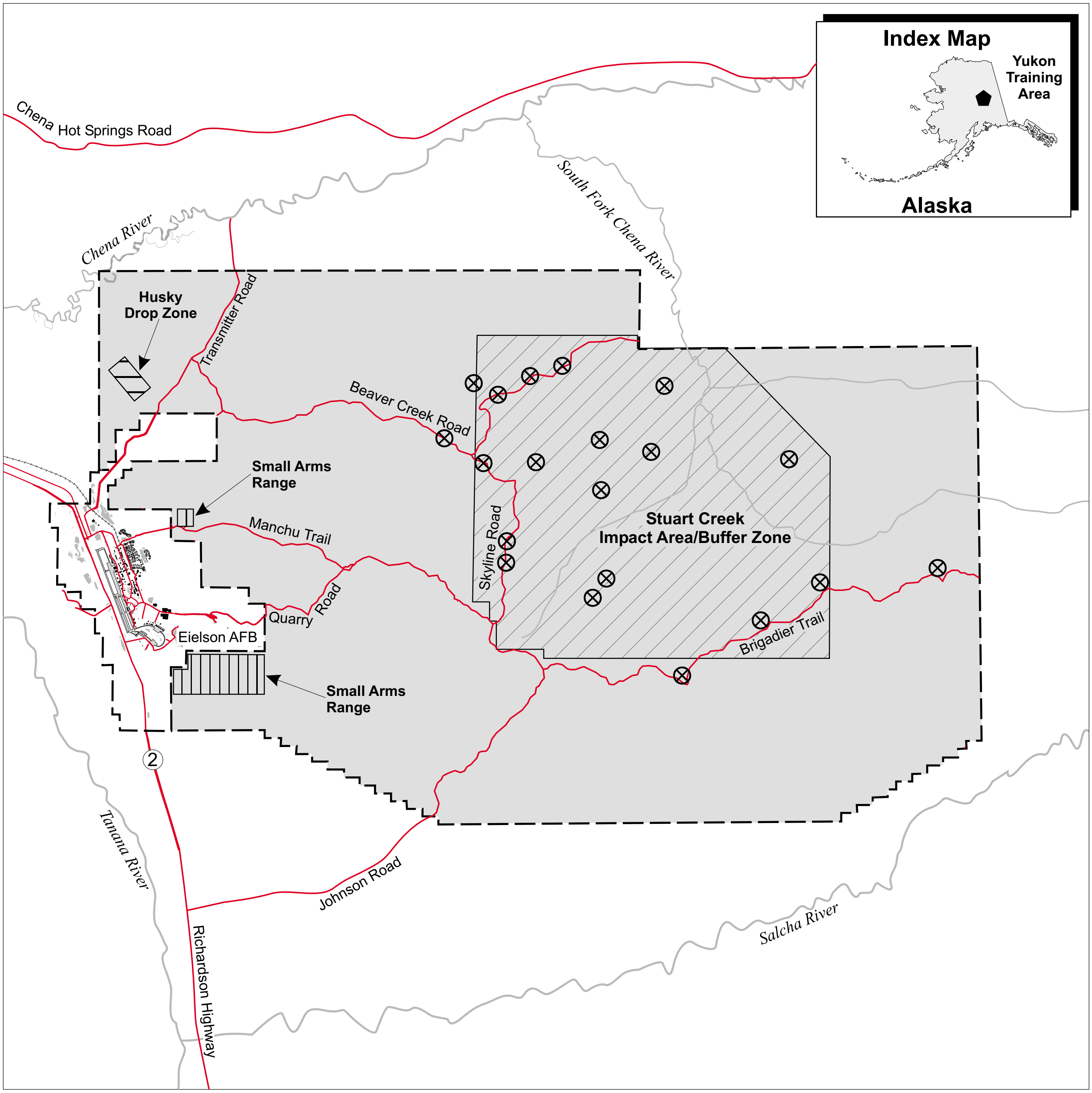
Range fire fighting practices for the Yukon Training Area are similar to those described for Fort Greely (section 3.8.1.4). Figure 3.8-8 provides the fire protection status options for the Yukon Training Area.

Eleven fires of 40 hectares (100 acres) or more occurred on the Yukon Training Area from 1954-1997. Nine of these fires were caused by incendiary devices within the Stuart Creek Impact Area and Buffer Zone. Two fires occurred within the northern portion of the maneuver area. The cause of one fire is unknown and the other was caused by lightning. Firebreaks are maintained around critical facilities at the Yukon Training Area.

3.8.2 NORTH DAKOTA INSTALLATIONS

3.8.2.1 Cavalier AFS—Health and Safety

This section describes the health and safety concerns for the affected base property at Cavalier AFS and the surrounding area. The ROI for health and safety includes the base and adjacent public that could be affected by the deployment of an XBR. The ROI for EMR human health effects is the base and adjacent property. This ROI is based on the area where potential effects to human health are expected to occur (out to



EXPLANATION

Roads

Rivers

Water Area

Installation Boundary

Yukon Training Area

Drop Zone

Small Arms Range

Impact Area/Buffer Zone

Firing Point

NORTH

Scale 1:300,000

0 2.4 4.7 Miles

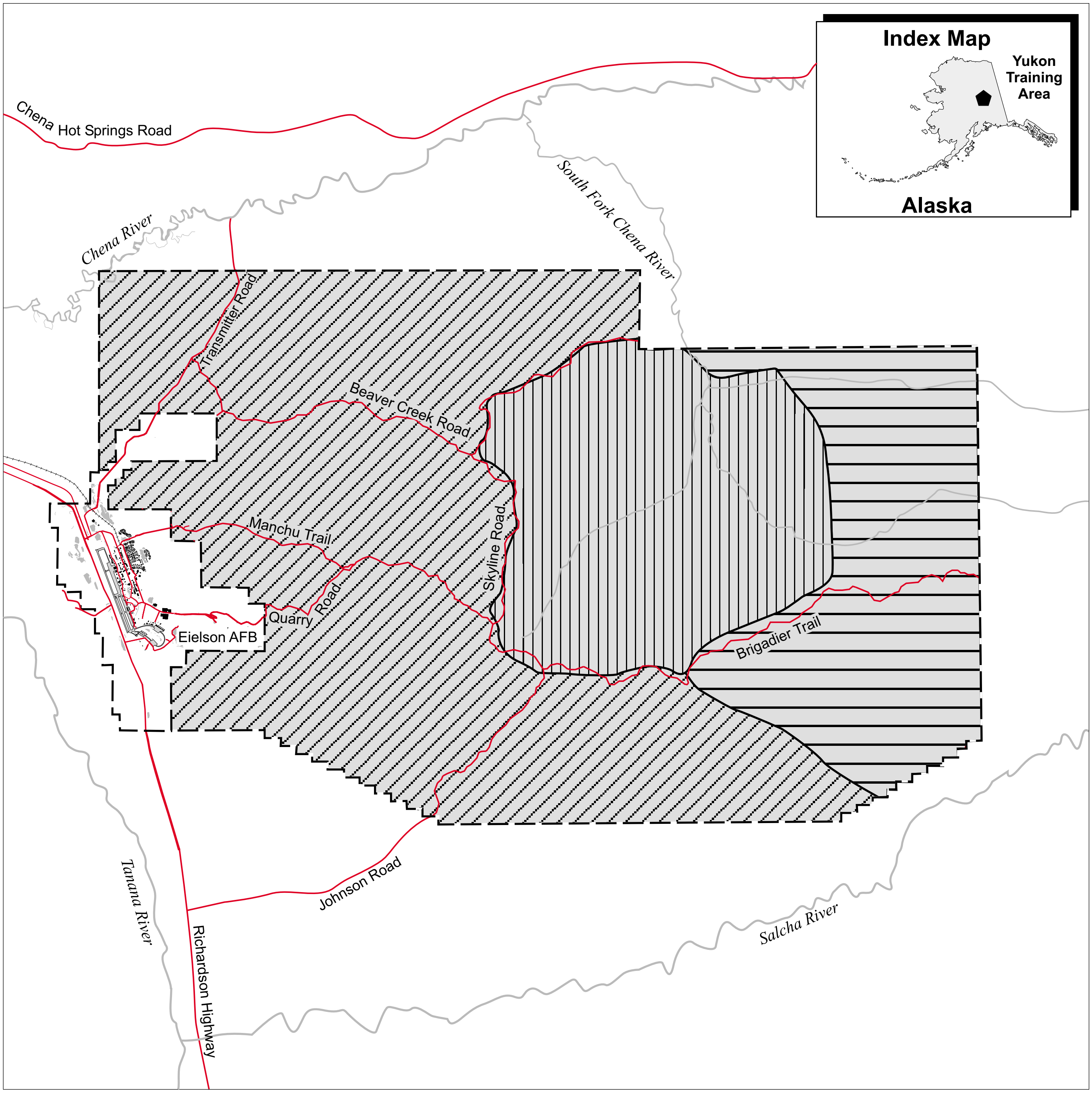
0 3.8 7.6 Kilometers

hs_yukon_002

Existing Health and Safety Issues, Yukon Training Area

Alaska

Figure 3.8-7



EXPLANATION

- Roads
- Rivers
- Water Area
- Installation Boundary
- Yukon Training Area
- Full Protection
- Modified Action
- Limited Action

Scale 1:300,000

0 2.4 4.7 Miles

0 3.8 7.6 Kilometers

NORTH

Fire Protection Status, Yukon Training Area

Alaska

Figure 3.8-8

hs_yukon_001

150 meters [492 feet]). The ROI for certain electronic equipment and aircraft (see below) includes a radius up to 350 kilometers (217 miles). For a general description of the health and safety resource area, see section 3.8.

On-base Safety

The Air Force has developed standards that dictate the amount of fire equipment and staffing that must be present based on the types and total square footage of base structures and housing. The Cavalier AFS fire department meets these standards, maintaining two pumper trucks. The base currently has 18 personnel to administer and manage the program for base facilities. One centrally located facility houses the equipment.

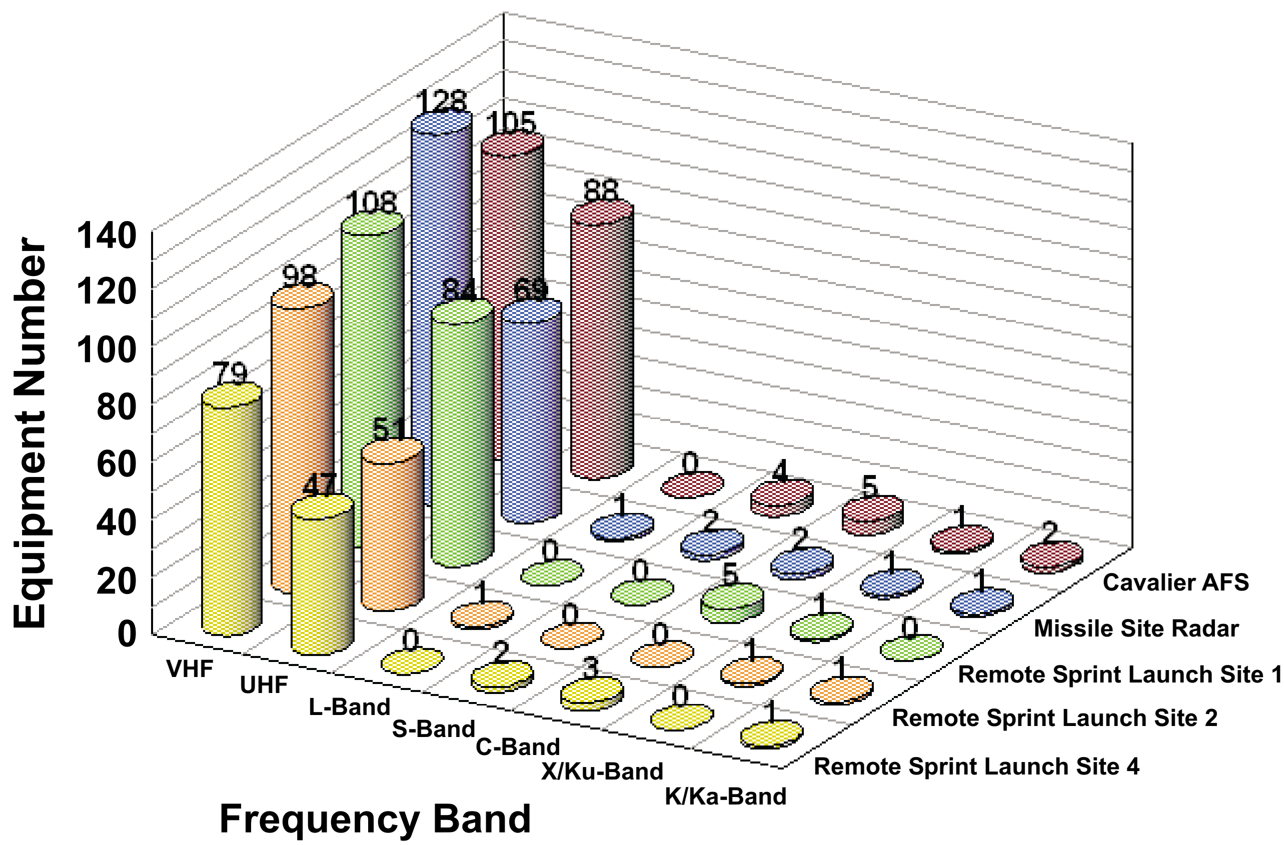
The positioning of this facility also meets the Air Force time and distance requirements for facility response. The Cavalier AFS Fire Protection Contractor established mutual aid agreements with six neighboring communities to ensure emergency response is available for the site and local towns.

Electromagnetic Radiation Environment

For purposes of this study, the electromagnetic environment around the Cavalier AFS site includes all ground-based systems within a 30-kilometer (19-mile) radius for out-of-band systems and within a 350-kilometer (217-mile) radius for in-band, adjacent band, and harmonically-related bands. The out-of-band communications-electronics environment around the Cavalier AFS site was found to include 205 systems ranging in frequencies from 48 to 24,150 megahertz. The distribution of these systems over the electromagnetic spectrum, VHF–K-Band, is shown in figure 3.8-9. These systems were categorized into potential sensitive receptors of frequency-related interference or non-frequency related interference.

Communications—Electronics Frequency Related Interference. The existing ground-based communications-electronics environment around the Cavalier AFS site includes two in-band systems: a precision approach radar in Minot, North Dakota, and a weather radar in Park Rapids, Minnesota. The airborne electromagnetic environment includes three types of in-band systems: fire control, bomb/navigation, and weather radars. Weather radars are utilized on both civilian and military aircraft. Section 3.3.2.1 provides an overview of the airspace and airports in the Cavalier AFS ROI.

Communications—Electronics Non-frequency Related Interference. The out-of-band electromagnetic environment (within 30 kilometers [19 miles]) at the Cavalier AFS site includes 205 ground-based systems. The majority of the systems (193 systems) are land-mobile UHF and VHF



EXPLANATION

Note: Number of equipment found within 50 kilometers (31 miles) of site.

Equipment Distribution in Northeast North Dakota

Figure 3.8-9

radios. Also included are one speed gun, one satellite communications terminal, and ten fixed/mobile broadcasting satellites. Although no airborne systems are registered with the NTIA or FCC for this area, it is anticipated that various avionics equipment (tactical air navigation, IFF systems, glideslopes, beacons, etc.) will be present as aircraft travel in and out of the area.

Also, the Perimeter Acquisition Radar can adversely affect electroexplosive devices aboard aircraft. In 1974, tests were conducted where electroexplosive devices aboard a B-52H were flown through EMR fields from the Perimeter Acquisition Radar. Based on those tests, a 13-kilometer (8-mile) required separation distance was recommended for aircraft carrying electroexplosive devices (Hovan and Wirt, 1974—Response of Airborne Electroexplosive Devices to Safeguard Electromagnetic Radiation).

Radiation Hazards. The Perimeter Acquisition Radar, AN/FPQ-16, presents the highest probability for radiation hazards within the 30-kilometer (19-mile) ROI. The Perimeter Acquisition Radar is a phased-array radar that provides tactical warning and attack assessment of sea-launched and intercontinental ballistic missiles launched against the continental United States.

The Perimeter Acquisition Radar operates in the UHF band (420 to 450 megahertz). The beam from the Perimeter Acquisition Radar is continually scanning, and therefore interacts with the surrounding environment.

According to IEEE C95.1, personnel exposure limits for uncontrolled environments in the 420 to 450 megahertz frequency range are between 0.28 and 0.30 milliwatt per square centimeter for an average time of 30 minutes. The Perimeter Acquisition Radar can exceed the IEEE standard for distances out to approximately 120 meters (394 feet). The area around the Perimeter Acquisition Radar at this distance is an enclosed area within government-controlled land that is fenced to assure no unauthorized access occurs. No hazards to fuels in the area occur.

3.8.2.2 Grand Forks AFB—Health and Safety

This section describes the health and safety concerns for the affected base property at Grand Forks AFB and the surrounding area. The ROI for health and safety includes the base and adjacent properties that could be affected by the deployment of a GBI or BMC2 at Grand Forks AFB. The area potentially affected off-base would be the properties immediately adjacent to the base, and the transportation network for hazardous materials. For a general description of the health and safety resource area, see section 3.8.

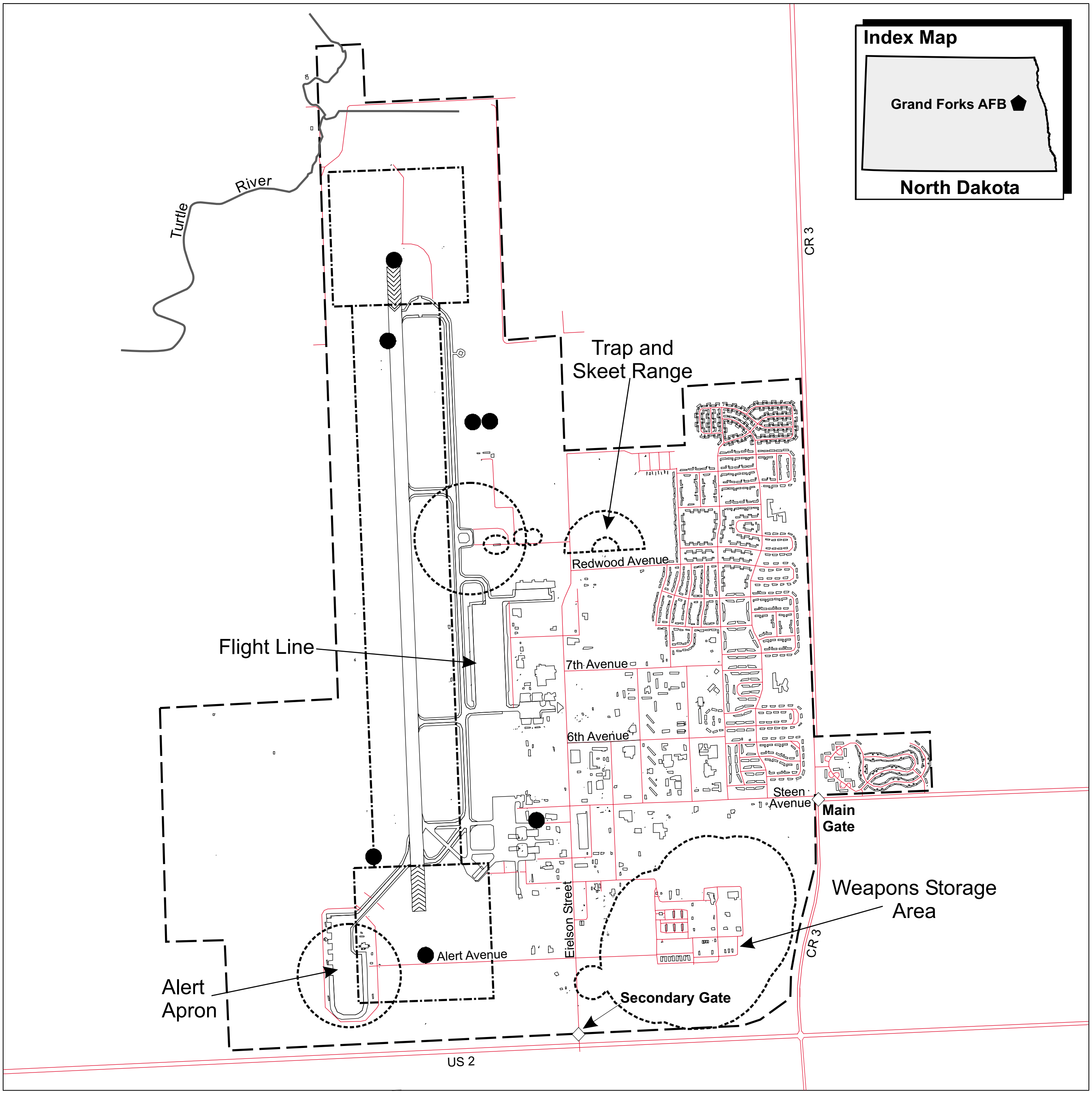
The Grand Forks Safety Office reviews base safety issues. Other offices, such as the Bioenvironmental Engineering Office, also ensure safe operations by providing services such as sampling of indoor air, water, and unknown material or waste. To assist in emergency response, Grand Forks AFB maintains mutual aid agreements with local fire departments in this area.

The Air Force has developed standards that dictate the amount of fire/crash equipment and staffing that must be present based on the number and types of aircraft stationed on-base, and the types and total square footage of base structures and housing. The Grand Forks AFB fire department meets these standards, maintaining nine trucks with both water and foam delivery capacities. The base currently has 62 personnel to administer and manage the program for both the flightline and the base facilities. One centrally located facility houses the equipment for both the flightline and the base structure fire protection needs. The positioning of this facility also meets the Air Force time and distance requirements for facility response.

The threats to human safety from aircraft accidents at Grand Forks AFB are summarized in the AICUZ Report. The AICUZ guidelines are based on the type of aircraft at the base and the nature of operations conducted. In order to minimize the risk to the public at each end of the runway, a Clear Zone and two Accident Potential Zones have been designated. The Clear Zone, the area where aircraft mishaps are most likely to occur, is contained within the base boundaries (figure 3.8-10). Other on-base safety restrictions include ESQDs associated with the Weapons Storage Area, alert apron, and flightline area and small arms range.

The base has six fixed-unit EMR sources that are monitored on a quarterly basis. The base radiation officer is responsible for the overall management of the EMR program. The program involves identifying, categorizing, and surveying all radio frequency emitters on the base to ensure personnel are adequately protected against unnecessary exposure to EMR (U.S. Department of the Air Force, 1997—Grand Forks AFB General Plan). Most of the EMR sources are associated with airfield navigational and weather radar systems.

Grand Forks AFB has a long history of transporting and handling missiles. The Air Force has instituted a rigorous training program for individuals who handled the various components of the Minuteman III missiles. The Air Force also has formal safety programs addressing missile logistics, which provide detailed safety requirements and mandatory reporting system for identifying and preventing safety-related problems. Missile facilities are regularly inspected to ensure compliance with safety criteria. Safety provisions are incorporated into all aspects of missile maintenance and transportation. Missile transport only occurs when weather



EXPLANATION

- Installation Boundary
- Explosive Safety Quantity Distance (ESQD)
- Runway Clear Zone Boundary
- Electromagnetic Radiation Source Points
- Gate

CR = County Road
ND = U.S. Highway

Scale 1:40,000

0 1,667 3,333 Feet

0 508 1,016 Meters

NORTH

hs_gfafb_001

Existing Health and Safety Issues, Grand Forks Air Force Base

North Dakota

Figure 3.8-10

conditions are good, and then only with a high level of security. A normal maintenance schedule involves removing between four and eight missiles a month for servicing at Grand Forks AFB. Prior to any missile movement, a maintenance vehicle traveled the route to check for road conditions. The Air Force has a long record of safe handling and maintenance of missiles. Approximately 804,700 kilometers (500,000 miles) have been driven by transporter-erectors carrying Minuteman missiles (I, II, and III) between the deployment bases and the launch facilities. In roughly 30 years, only six rollover accidents have occurred, with none involving propellant ignition. The Air Force Logistic Command studied the potential for transporting and disposing of missile motors from Malmstrom AFB, and found that no serious accident consequences involving transportation of the guidance system, reentry system, and the propulsion system rocket engine have occurred (Department of the Air Force, 1997—Grand Forks AFB General Plan).

3.8.2.3 Missile Site Radar—Health and Safety

This section describes the health and safety concerns for the affected base property at the Missile Site Radar and the surrounding area. The ROI for health and safety includes the base and adjacent public that could be affected by the deployment of a GBI, BMC2, or XBR. The ROI for the GBI and BMC2 is the base and the adjacent base property. The ROI for EMR human health effects is also the base and adjacent property. This ROI is based on the area where potential effects to human health are expected to occur (out to 150 meters [492 feet]). The ROI for certain electronic equipment and aircraft (see below) includes an area up to 350 kilometers (217 miles). For a general description of the health and safety resource area, see section 3.8.

On-base Safety

During a 3-month period in 1975, the Missile Site Radar was an active installation consisting of an operational radar and missile field of 30 launchers for Spartan long-range nuclear warhead missiles and 16 launchers for Sprint short-range nuclear missiles. During operations, no missile accidents occurred. All operational systems have been removed from the site. Associated with the deployment of this system, restrictive safety easements were obtained with surrounding property owners to limit future development. These easements are currently active. The Missile Site Radar is currently inactive, and access to the site is restricted to authorized personnel for occasional facility maintenance. The base maintenance contractor maintains a health and safety plan, which addresses worker safety in accordance with the Occupational Safety and Health Administration (OSHA) (Wheeler Contracting, Inc., 1996—Safety and Health Plan for the SRMSC). Because no activities occur at the site, there are no public health and safety issues to adjacent properties. To assist in emergency response at the site, mutual aid agreements are maintained with the fire departments in the towns of Langdon and Nekoma. The mutual aid agreements allow access by the fire departments to the site for responding to fires or accident/injury assistance (U.S. Army Space and Strategic Defense Command, 1994—Memorandum of Agreement between Langdon, North Dakota Fire District and U.S. Army Space and Strategic Defense Command; Memorandum of Agreement between Nekoma North Dakota Fire District and U.S. Army Space and Strategic Defense Command).

Electromagnetic Radiation Environment

For purposes of this study, the electromagnetic environment around the Missile Site Radar includes all ground-based systems within a 30-kilometer (19-mile) radius for out-of-band systems and within a 350-kilometer (217-mile) radius for in-band, adjacent band, and harmonically related bands. The out-of-band communications-electronics environment around the Missile Site Radar was found to include 204 systems ranging in frequencies from 43 to 24,150 megahertz. The distribution of these systems over the electromagnetic spectrum, VHF–K-Band, is shown in section 3.8.2.1, figure 3.8-9. These systems were categorized into potential sensitive receptors of frequency-related interference or non-frequency related interference.

Communications–Electronics Frequency Related Interference. The existing ground-based communications-electronics environment around the Missile Site Radar includes two in-band systems: a precision approach radar in Minot, North Dakota, and a weather radar in Park Rapids, Minnesota. The airborne electromagnetic environment includes three types of in-band systems: fire control, bomb/navigation, and weather radars. Weather radars are utilized on both civilian and military aircraft. Section 3.3.2.1 provides an overview of the airspace and airports in the Missile Site Radar ROI.

Communications–Electronics Non-frequency Related Interference. The out-of-band electromagnetic environment (within 30 kilometers [19 miles]) at the Missile Site Radar included 204 ground-based systems. The majority of the systems (191 systems) are land-mobile UHF and VHF radios. Also included are one FM radio station, one air navigation beacon, five pager/cellular phone towers, five satellite communications systems, and one speed gun. Although no airborne systems are registered with the NTIA or FCC for this area, it is anticipated that various avionics equipment (tactical air navigation, IFF systems, glideslopes, beacons, etc.) will be present as aircraft travel in and out of the area.

Radiation Hazards. Based upon the absence of high-power emitters within a 30-kilometer (19-mile) radius of the Missile Site Radar, the existing electromagnetic environment does not present substantial levels of radiation hazards to personnel, electroexplosive devices, or fuels.

3.8.2.4 Remote Sprint Launch Site 1—Health and Safety

This section describes the health and safety concerns for the affected base property at Remote Sprint Launch Site 1 and the surrounding area. The ROI for health and safety includes the base and adjacent public that could be affected by the deployment of an XBR. The ROI for EMR human health effects is the base and adjacent property. This ROI is based on the area where potential effects to human health are expected to occur (out to 150 meters [492 feet]). The ROI for certain electronic equipment and aircraft (see below) includes an area up to 350 kilometers (217 miles). For a general description of the health and safety resource area, see section 3.8.

On-base Safety

During a 3-month period in 1975, Remote Sprint Launch Site 1 was active and consisted of 12 launch stations. During operation, no missile accidents occurred. Remote Sprint Launch Site 1 is currently inactive, access to the site is restricted to authorized personnel for occasional facility maintenance. The base maintenance contractor maintains a health and safety plan, which addresses worker safety in accordance with OSHA (Wheeler Contracting, Inc., 1996—Safety and Health Plan for the SRMSC). Because no activities occur at the site, there are no public health and safety issues to adjacent properties.

Electromagnetic Radiation Environment

For purposes of this study, the electromagnetic environment around Remote Sprint Launch Site 1 includes all ground-based systems within a 30-kilometer (19-mile) radius for out-of-band systems and within a 350-kilometer (217-mile) radius for in-band, adjacent band, and harmonically-related bands. The out-of-band communications-electronics environment around Remote Sprint Launch Site 1 was found to include 198 systems ranging in frequencies from 43 to 12,290 megahertz. The distribution of these systems over the electromagnetic spectrum, VHF–K-Band, is shown in section 3.8.2.1, figure 3.8-9. These systems were categorized into potential victims of frequency-related interference or non-frequency related interference.

Communications–Electronics Frequency Related Interference. The existing ground-based communications-electronics environment around Remote Sprint Launch Site 1 includes two in-band systems: a precision approach radar in Minot, North Dakota, and a weather radar in Park Rapids, Minnesota. The airborne electromagnetic environment includes three types of in-band systems: fire control, bomb/navigation, and weather radars. Weather radars are utilized on both civilian and military aircraft. Section 3.3.2.1 provides an overview of the airspace and airports in the Remote Sprint Launch Site 1 ROI.

Communications–Electronics Non-frequency Related Interference. The out-of-band electromagnetic environment (within 30 kilometers [19 miles]) at Remote Sprint Launch Site 1 included 198 ground-based systems. The majority of the systems (184 systems) are land-mobile UHF and VHF radios. Also included are five satellite communications systems, one fixed broadcasting satellite, and eight pager/cellular phone towers. Although no airborne systems are registered with the NTIA or FCC for this area, it is anticipated that various avionics equipment (tactical air navigation, IFF systems, glideslopes, beacons, etc.) will be present as aircraft travel in and out of the area.

Radiation Hazards. Based upon the absence of high-power emitters within a 30-kilometer (19-mile) radius of Remote Sprint Launch Site 1, the existing electromagnetic environment does not present substantial levels of radiation hazards to personnel, electroexplosive devices, or fuels.

3.8.2.5 Remote Sprint Launch Site 2—Health and Safety

This section describes the health and safety concerns for the affected base property at Remote Sprint Launch Site 2 and the surrounding area. The ROI for health and safety includes the base and adjacent public that could be affected by the deployment of an XBR. The ROI for EMR human health effects is the base and adjacent property. This ROI is based on the area where potential effects to human health are expected to occur (out to 150 meters [492 feet]). The ROI for certain electronic equipment and aircraft (see below) includes an area up to 350 kilometers (217 miles). For a general description of the health and safety resource area, see section 3.8.

On-base Safety

On-base safety for Remote Sprint Launch Site 2 is similar to that described for Remote Sprint Launch Site 1.

Electromagnetic Radiation Environment

For purposes of this study, the electromagnetic environment around Remote Sprint Launch Site 2 includes all ground-based systems within a 30-kilometer (19-mile) radius for out-of-band systems and within a 350-kilometer (217-mile) radius for in-band, adjacent band, and harmonically-related bands. The communications-electronics environment around Remote Sprint Launch Site 2 was found to include 152 systems ranging in frequencies from 31 to 24,150 megahertz. The distribution of these systems over the electromagnetic spectrum, VHF–K-Band, is shown in section 3.8.2.1, figure 3.8-9. These systems were categorized into potential victims of frequency-related interference or non-frequency related interference.

Communications–Electronics Frequency Related Interference. The existing ground-based communications-electronics environment around Remote Sprint Launch Site 2 includes two in-band systems: a precision approach radar in Minot, North Dakota, and a weather radar in Park Rapids, Minnesota. The airborne electromagnetic environment includes three types of in-band systems: fire control, bomb/navigation, and weather radars. Weather radars are utilized on both civilian and military aircraft. Section 3.3.2.1 provides an overview of the airspace and airports in the Remote Sprint Launch Site 2 ROI.

Communications–Electronics Non-frequency Related Interference. The out-of-band electromagnetic environment (within 30 kilometers [19 miles]) at Remote Sprint Launch Site 2 includes 152 ground-based systems. The majority of the systems (142 systems) are land-mobile UHF and VHF radios. Also included are one air navigational aid, one speed gun, six pager/cellular phone towers, one satellite communications system, and one fixed broadcasting satellite. Although no airborne systems are registered with the NTIA or FCC for this area, it is anticipated that various avionics equipment (tactical air navigation, IFF systems, glideslopes, beacons, etc.) will be present as aircraft travel in and out of the area.

Radiation Hazards. Based upon the absence of high-power emitters within a 30-kilometer (19-mile) radius of Remote Sprint Launch Site 2, the existing electromagnetic environment does not present substantial levels of radiation hazards to personnel, electroexplosive devices, or fuels.

3.8.2.6 Remote Sprint Launch Site 4—Health and Safety

This section describes the health and safety concerns for the affected base property at Remote Sprint Launch Site 4 and the surrounding area. The ROI for health and safety includes the base and adjacent public that could be affected by the deployment of an XBR. The ROI for EMR human health effects is the base and adjacent property. This ROI is based on the area where potential effects to human health are expected to occur (out to 150 meters [492 feet]). The ROI for certain electronic equipment and aircraft (see below) includes an area up to 350 kilometers (217 miles). For a general description of the health and safety resource area, see section 3.8.

On-base Safety

On-base safety for Remote Sprint Launch Site 4 is similar to that described for Remote Sprint Launch Site 1.

Electromagnetic Radiation Environment

For purposes of this study, the electromagnetic environment around Remote Sprint Launch Site 4 includes all ground-based systems within a 30-kilometer (19-mile) radius for out-of-band systems and within a 350-kilometer (217-mile) radius for in-band, adjacent band, and harmonically-related bands. The communications-electronics environment around Remote Sprint Launch Site 4 was found to include 132 systems ranging in frequencies from 43 to 24,150 megahertz. The distribution of these systems over the electromagnetic spectrum, VHF–K-Band, is shown in section 3.8.2.1, figure 3.8-9. These systems were categorized into potential victims of frequency-related interference or non-frequency related interference.

Communications-Electronics Frequency Related Interference. The existing ground-based communications-electronics environment around Remote Sprint Launch Site 4 includes two in-band systems: a precision approach radar in Minot, North Dakota, and a weather radar in Park Rapids, Minnesota. The airborne electromagnetic environment includes three types of in-band systems: fire control, bomb/navigation, and weather radars. Weather radars are utilized on both civilian and military aircraft. Section 3.3.2.1 provides an overview of the airspace and airports in the Remote Sprint Launch Site 4 ROI.

Communications–Electronics Non-frequency Related Interference. The out-of-band electromagnetic environment (within 30 kilometers [19 miles]) at Remote Sprint Launch Site 4 includes 132 ground-based systems. The majority of the systems (112 systems) are land-mobile UHF and VHF radios. Also included are one speed gun, twelve satellite communications systems, and seven pager/cellular phone towers. Although no airborne systems are registered with the NTIA or FCC for this area, it is anticipated that various avionics equipment (tactical air navigation, IFF systems, glideslopes, beacons, etc.) will be present as aircraft travel in and out of the area.

Radiation Hazards. Based upon the absence of high-power emitters within a 30-kilometer (19-mile) radius of Remote Sprint Launch Site 4, the existing electromagnetic environment does not present substantial levels of radiation hazards to personnel, electroexplosive devices, or fuels.

3.9 LAND USE AND AESTHETICS

Land use can be defined as the human use of land resources for various purposes including economic production, natural resources protection, or institutional uses. Land uses are frequently regulated by management plans, policies, ordinances, and regulations that determine the types of uses that are allowable or protect specially designated or environmentally sensitive uses. Potential issues typically stem from encroachment of one land use or activity on another, or an incompatibility between adjacent land uses that leads to encroachment.

Visual resources include the natural and man-made features that give a particular environment its aesthetic quality. The analysis considers visual resource sensitivity, which is the degree of public interest in a visual resource and concern over adverse changes in the quality of the resource.

3.9.1 ALASKA INSTALLATIONS

This brief introduction is provided to describe the land uses in the potentially affected areas in the Alaska region. Almost all of the land within the ROIs is relatively undisturbed and is very sparsely populated. With the exception of the Yukon Training Area and Eielson AFB in the Fairbanks North Star Borough, there are virtually no forms of comprehensive zoning. The controls that do exist are fairly lenient. All of the potential sites are located on Federal land and are not subject to local land use controls, but do try to be consistent with the regulations that do exist to avoid conflict.

3.9.1.1 Clear AFS—Land Use

This section describes the land uses and aesthetics for the affected base property at Clear AFS. The ROI for land use includes those areas potentially affected by deployment of the GBI or BMC2 at Clear AFS. This area includes the base and areas immediately adjacent to the base. The ROI for aesthetics includes the base and adjacent areas within the viewshed.

Regional Land Use

Clear AFS is located in Interior Alaska in the northeast corner of the Denali Borough. The regional land use ROI includes the installation property and surrounding adjacent land uses.

The Denali Borough is the zoning and development authority in the region. However, almost the entire zone is virtually zoned as unrestricted use, which allows almost any type of development unless individual communities vote to have further zoning or land use regulations (Denali

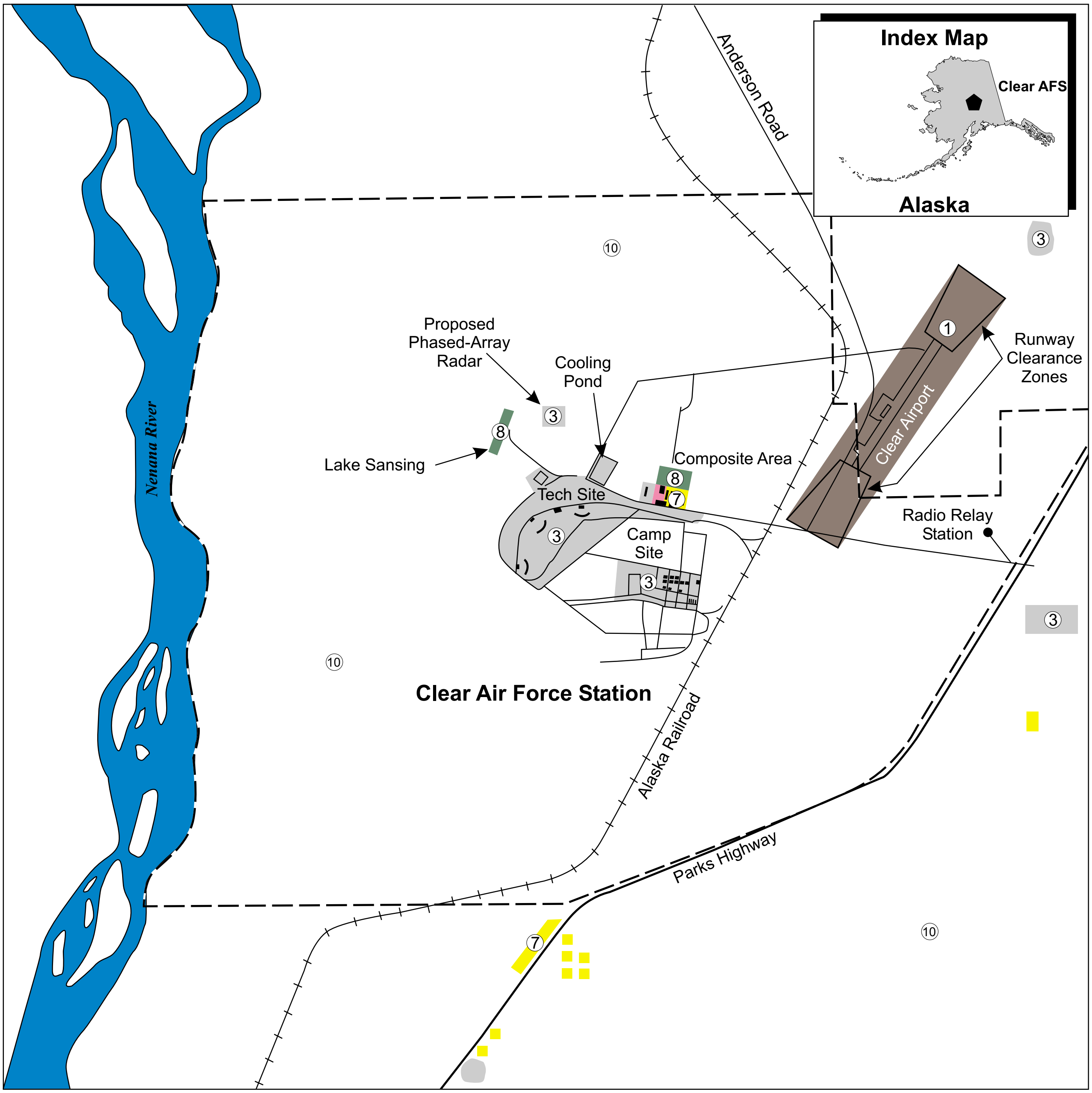
Borough, 1997—Denali Borough Comprehensive Land Use Plan). Since Clear AFS is a Federal property, it does not fall under the jurisdiction of the local planning authorities. The area around Clear AFS is sparsely populated and consists of undisturbed forestland. The nearest inhabited structure is just to the south of the base, and the community of Anderson is 8 kilometers (5 miles) to the north (U.S. Department of the Interior, 1998—Northern Intertie Project, Final EIS). The city of Anderson operates a small airport on the adjacent property to the west. None of the land uses in the area are incompatible with adjoining land uses of Clear AFS.

Clear AFS Land Use

Clear AFS consists of 4,670 hectares (11,542 acres) with approximately 142 hectares (350 acres) of the installation being developed and the remainder being mostly forested land that is relatively undisturbed. Of the total acreage at Clear AFS, 4,666 hectares (11,530 acres) are withdrawn from the public domain from the Department of the Interior, Bureau of Land Management, and 4.7 hectares (11.5 acres) are by easement from the State of Alaska (Gori, 1999—Comments received by EDAW, Inc., regarding NMD Deployment Coordinating Draft DEIS)

The mission facilities of Clear AFS are divided into three main areas and are centrally located on the installation as shown in figure 3.9-1. The Composite Area contains the headquarters, housing, recreation, community service, and administrative facilities and is just inside the main gate to the north. The Technical Site (also known as the Operations Area) is located to west of the Composite Area and contains the Ballistic Missile Early Warning System radar and related equipment as well as the power plant. Just north of the Technical Site is the construction site of the Solid State Phased-Array Radar that is to replace the existing Ballistic Missile Early Warning System radar. The new Solid State Phased-Array Radar will affect less than 2 hectares (5 acres) (U.S. Department of the Air Force, 1997—EA for Radar Upgrade at Clear AS). The third area is the Camp Area, which is located to the south of the Composite Area. This area is composed of civil engineering maintenance shops, security police offices, a fire station, and transient lodging. The remainder of the installation is open space consisting of mostly undisturbed forest that is at times used by military personnel for recreation activities and hunting. (Clear AS, 1993—Comprehensive Planning Framework)

The base is used by the stationed personnel for various recreational activities. Hunting and fishing are the most common activities. There is also hiking, cross-country skiing, running, picnicking, snowshoeing, snowmobiling, and off-road vehicle use. Use is limited to military personnel, and there is no subsistence hunting or fishing occurring on-base.



EXPLANATION

1 Airfield	6 Commercial*	Roads	
2 Aviation Support*	7 Residential	Installation Boundary	
3 Industrial	8 Recreation	Railroads	
4 Institutional (Medical/Educational)*	9 Agriculture*	Ballistic Missile System Radar Control Zone	
5 Administrative	10 Open Space		
	Water Area		

*Standard land use designation not applicable to this figure

Scale
0 2,368 4,735 Feet
0 722 1,443 Meters
NORTH

Existing Land Use, Clear Air Force Station

Alaska

Figure 3.9-1

lu_clas_002

Aesthetics

The ROI for aesthetics at Clear AFS includes the general visual environment surrounding the station and areas visible from offsite locations.

The visual environment of Clear AFS is characterized by the relatively flat terrain that primarily consists of undisturbed forests, woodlands, and meadows. The topography is generally flat, with the elevation of Clear AFS ranging from about 165 meters (540 feet) in the northern portion to about 198 meters (650 feet) above sea level in the southern portion of base (U.S. Department of the Air Force, 1997—EA for Radar Upgrade at Clear AS). The most significant man-made features are the Ballistic Missile Early Warning System radar and the Tracking Radar. The three Ballistic Missile Early Warning System radars are approximately 50 meters (165 feet) tall. The Tracking Radar, which is dome-shaped, is approximately 43 meters (140 feet) in diameter. The Ballistic Missile Early Warning System radar is not visible from surrounding highways or recreation areas because of the flatness of the land and the heavy forest cover; thus, the site and surrounding area have a low visual sensitivity. (U.S. Department of the Air Force, 1997—Supplemental EA for Radar Upgrade, Clear AS)

3.9.1.2 Eareckson AS—Land Use

This section describes the land uses and aesthetics for the affected base property at Eareckson AS. The ROI for land use includes those areas potentially affected by deployment of the XBR at this site. This area includes the base and areas up to 30 kilometers (19 miles) from the site to include areas where certain sensitive electronics may be susceptible to temporary interference by use of the XBR. The ROI for aesthetics includes the base and adjacent areas within the viewshed.

Regional Land Use

Eareckson AS is located on Shemya Island near the end of the Aleutian Island chain. The regional land use ROI includes the area within a 30-kilometer (19-mile) radius from the Eareckson AS site in the Aleutians West Census Area.

The Aleutians West Census Area is unincorporated and has no official zoning ordinances. However, all development will require review for consistency with the standards of the Alaska Coastal Management Program. See the Coastal Zone Management section below for further details.

The area around Shemya is virtually all open ocean, with the uninhabited islands of Nizki about 3 kilometers (2 miles) to the west and Alaid 8 kilometers (5 miles) to the west on the other side of Nizki. All of the land uses in the area are compatible with the adjoining areas of Eareckson AS.

Eareckson AS Land Use

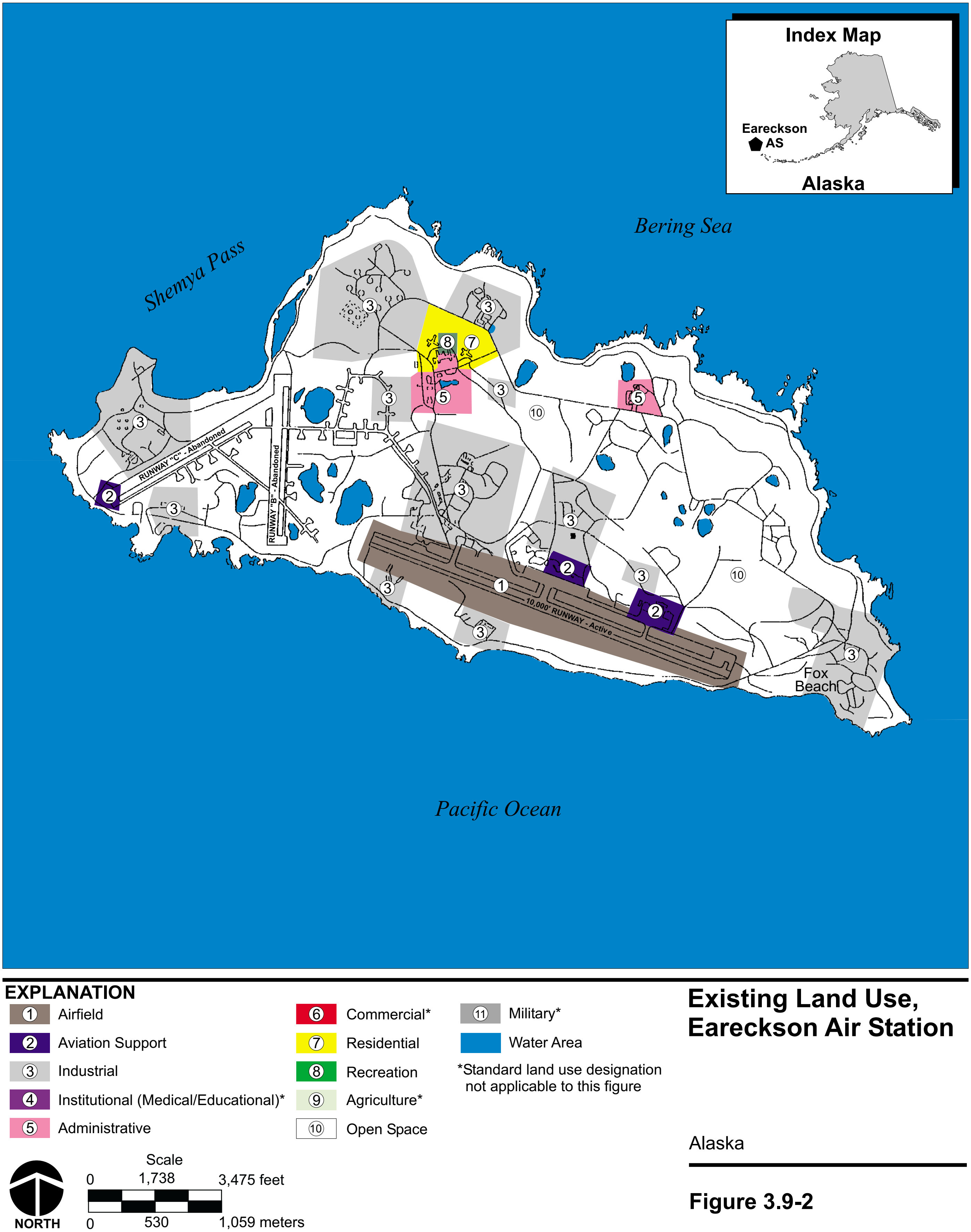
Eareckson AS consists of 1,425 hectares (3,520 acres), which is the entire island of Shemya. The island is located wholly within the Alaska Maritime National Wildlife Refuge (U.S. Department of the Air Force, 1997—Final Installation-Wide Environmental Baseline Survey, Eareckson AS). The Alaska Maritime National Wildlife Refuge is administered by the USFWS. The purposes of the Alaska Maritime National Wildlife Refuge include (1) conserving wildlife and wildlife habitat in their natural diversity, (2) fulfilling international treaty obligations of the United States with respect to fish and wildlife, (3) providing for a subsistence opportunity by local residents, (4) providing a national and international program of scientific research on marine resources, and (5) ensuring water quality and quantity within the refuge.

The southern portion of the air station is dominated by an airfield and airfield support, which consists of support buildings and one active runway. Administrative buildings are scattered throughout the northern portion of the station. Housing is in the north central section of the base, and community and service facilities are in close proximity to the housing and administrative facilities. Industrial sites are scattered throughout the air station, with the remainder of the land being open space. These land uses are shown in figure 3.9-2. Facilities associated with the airfield, the

COBRA DANE Radar, and some housing and administrative accommodations are all of the facilities that are currently in use. The remainder of the facilities is currently inactive.

Coastal Zone Management

All of the communities within the Aleutians West Coastal Resource Service Area (AWCRSA) are coastal, and essentially all developable land within the AWCRSA is located in the "zone of direct influence" of the coastal environment. All major development in the AWCRSA will require review for consistency with the standards of the Alaska Coastal Management Program and the policies of the AWCRSA coastal program. (Aleutians West Coastal Resource Service Area, 1991—Coastal Management Plan)



Existing Land Use, Eareckson Air Station

Alaska

Figure 3.9-2

Federal lands are excluded from Alaska's coastal zone boundaries. Activities on these lands do, however, require preparation of a Coastal Zone Consistency Determination in accordance with the Coastal Zone Management Act of 1972. Any activities on Federal lands and waters that affect any land or water use or natural resource of the AWCRSA coastal zone must be consistent, to the maximum extent practicable, with the enforceable policies of the AWCRSA coastal management program. (Aleutians West Coastal Resource Service Area, 1991—Coastal Management Plan)

Aesthetics

The ROI for aesthetics at Eareckson AS includes the general visual environment surrounding the station and areas visible from offsite locations.

The visual environment is characterized by Shemya Island's presence in a broad span of open ocean. The topography of the island is gently rolling, with elevations at sea level on the southern or Pacific side and sloping upward to 73 meters (240 feet) on the north or Bering Sea side (U.S. Department of the Air Force, 1997—Final Installation-Wide Environmental Baseline Survey, Eareckson AS). The visual environment on-base is fairly developed and typical of a military installation with a mixture of airfields, housing, industrial, and administrative facilities. Since access to Eareckson AS is restricted, and due to the remoteness of the island, viewpoints are extremely limited. This limits views to occasional aircraft and boat traffic. Overall, the station has a very low visual sensitivity.

3.9.1.3 Eielson AFB—Land Use

This section describes the land uses and aesthetics for Eielson AFB and adjacent property. The ROI for land use includes those areas potentially affected by the use of facilities and infrastructure at Eielson AFB for the deployment of GBI or BMC2 on the Yukon Training Area just outside the Eielson base boundary. The ROI for aesthetics includes the base and the surrounding areas in the viewshed.

Regional Land Use

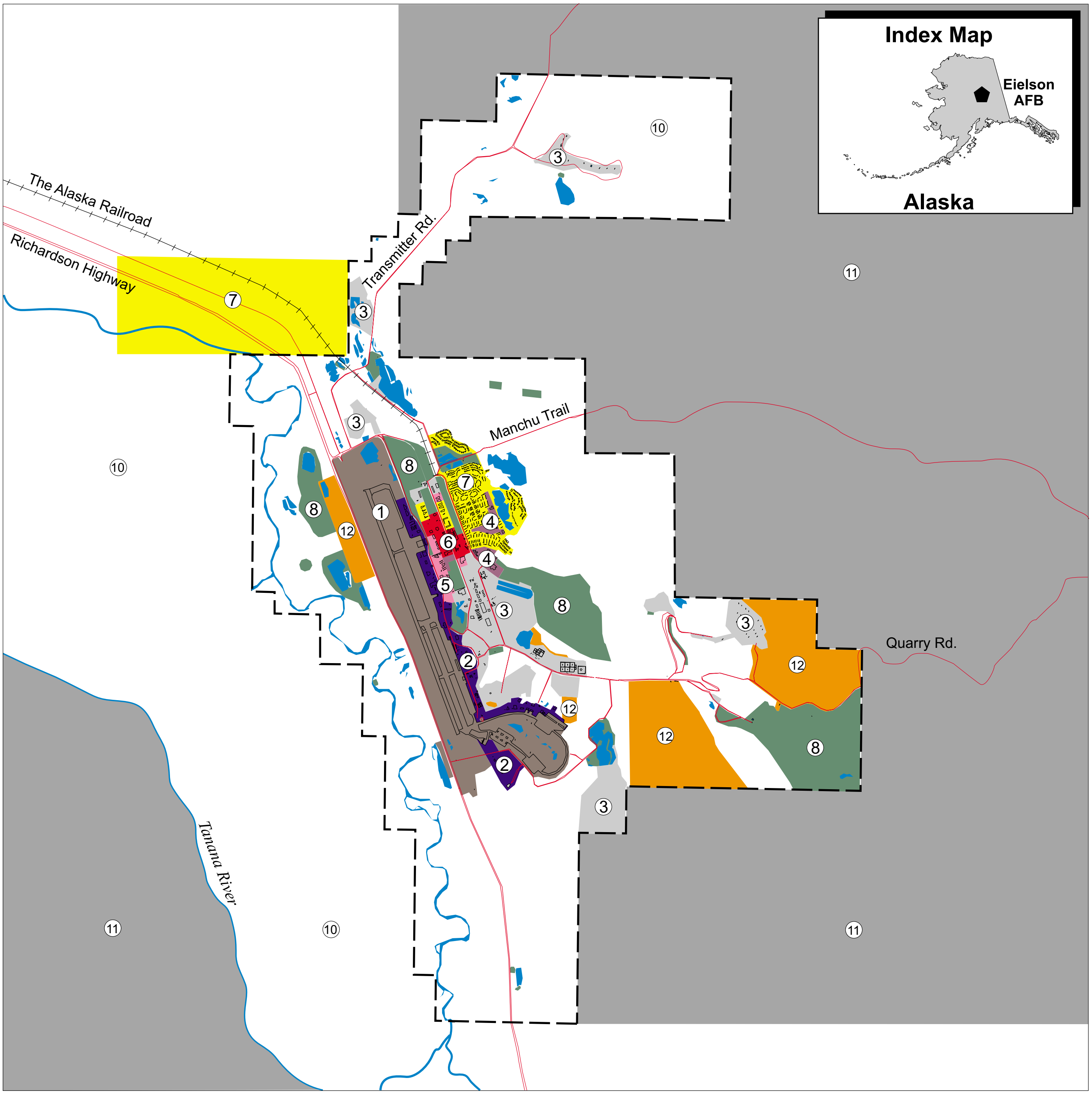
Eielson AFB is southeast of Fairbanks in the Fairbanks North Star Borough. The regional land use ROI for Eielson AFB includes the base and the adjacent surrounding land uses.

The Fairbanks North Star Borough provides the framework for the community to make land use and future development decisions. Planning within the base boundary is not under the borough's jurisdiction because it is Federal property; however, coordination between the base and borough often occurs. This coordination helps to prevent land use and noise conflicts between the base and surrounding communities. Eielson AFB is located in a relatively undeveloped, sparsely populated area. Two communities are located in close proximity to the base. The community of Moose Creek abuts the northwest boundary of Eielson AFB, consisting of residential and commercial land uses. The community of Salcha is located a few miles south of the base with residential areas with a density of less than one unit per acre (U.S. Department of the Air Force, 1992—AICUZ Study, Eielson AFB). A mixture of commercial, light industrial, and residential areas has been developed along the Richardson Highway, between the base and the North Pole. The remainder of the base is surrounded on the north, east, and west by undeveloped military reservation land. There have been no conflicts with the surrounding land uses, and the only incompatible land uses exist northwest of Eielson AFB in the community of Moose Creek and along the Richardson Highway that runs through the base parallel to the runways. Moose Creek currently has some residential and commercial uses within the Accident Potential Zone at the end of Runway 13. Also, parts of the Richardson Highway fall into the Clear Zones and the Accident Potential Zones of runways 13 and 31 (U.S. Department of the Air Force, 1992—AICUZ Study, Eielson AFB).

Eielson AFB Land Use

Eielson AFB main base encompasses approximately 8,021 hectares (19,820 acres) (Gori, 1999—Comments received by EDAW, Inc., regarding the NMD Deployment Coordinating Draft DEIS). It manages another 15,098 hectares (37,309 acres) at four other offsite locations. The land uses at Eielson AFB consist of the airfield, airfield operations, industrial, administration, community facilities, medical facilities, housing, recreational, and open space areas, as depicted in figure 3.9-3.

The airfield land use is the dominant land use category on the base, and consists of the runway, taxiways, and parking/maintenance/arming aprons. Airfield operations are located adjacent to the airfield to the east along Flightline Avenue and essentially coexist with the airfield operations. The main industrial area is located in the central section of the base just west of the airfield operations area. Other industrial areas are scattered in the eastern section of the base and on Engineer Hill.



EXPLANATION

Symbol	Land Use
1	Airfield
2	Aviation Support
3	Industrial
4	Institutional (Medical/Educational)
5	Administrative
6	Commercial
7	Residential
8	Recreation
9	Agriculture*
10	Open Space
11	Military
12	Training Area
	Water Area
	Roads
	Railroads
	Installation Boundary
	Building

*Standard land use designation not applicable to this figure

NORTH

Scale

0 .8 1.6 Miles

0 1.25 2.5 Kilometers

Existing Land Use, Eielson Air Force Base

Alaska

Figure 3.9-3

lu_eafb_002

Administration facilities are located in the central section of the main cantonment area between Central Avenue and Flightline Avenue. Housing land use areas are located in the northeast portion of the cantonment area. Community facilities are situated between the administrative areas and the housing. Medical facilities are just to the south of the Community Area. Outdoor recreation is scattered throughout the remainder of the base. The rest of the base is made up of open space, with portions of the open space being used for training activities. (Pacific Air Forces, 1998—Draft General Plan, Eielson AFB)

Eielson AFB is used by military personnel and the general public for various recreational activities. These activities include hunting, fishing, trapping, camping, picnicking, jogging, cycling, cross-country skiing, dog-mushing, snowmobiling, archery, and firing ranges. Some facilities and recreation areas on-base are governed by Air Force Instruction 34-101, *Service Programs and Use Eligibility*, and are limited to military personnel, retired military, DOD civilians, and their bona fide guests.

Aesthetics

The aesthetics ROI for Eielson AFB includes the general visual environment surrounding the base and areas visible from offsite locations.

The visual environment around Eielson AFB is characterized by the relatively flat wetlands-type terrain that is dominant in the area. The airfield and supporting facilities are the prominent man-made features on Eielson. Approximately 89 percent of the base is flat alluvial floodplain with elevations ranging from 158 meters (520 feet) to 168 meters (550 feet). The remaining 11 percent of the base consists of rolling hills with elevations up to 343 meters (1,125 feet) (Eielson Air Force Base, 1998—Integrated Natural Resources Management Plan). Parts of Eielson AFB are visible from the Richardson Highway, which bisects the base just southwest of the airfield, and from the community of Moose Creek. The remainder of the base provides very limited views due to the flatness of the land, restricted access, and dense vegetation. The character of the base is typical of most military installations, and because the terrain is relatively flat it does not provide for any prominent vistas; therefore, Eielson AFB has a relatively low visual sensitivity.

3.9.1.4 Fort Greely—Land Use

This section gives a description of the land uses and aesthetics for the affected base property at Fort Greely and the adjacent property. The ROI for land uses includes those areas potentially affected by deployment of the GBI or BMC2 at Fort Greely. The ROI for aesthetics includes the base and the surrounding areas in the viewshed.

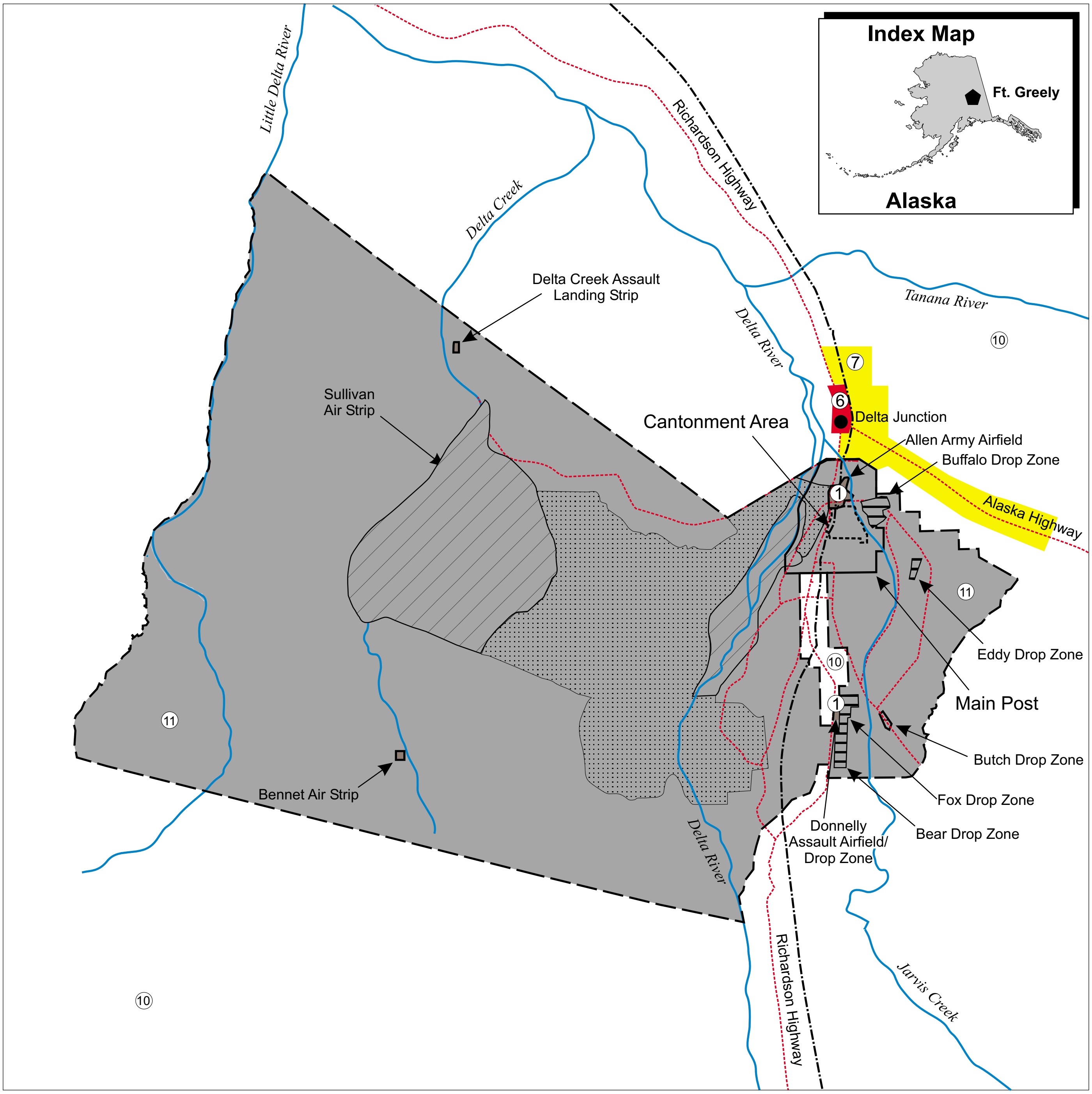
Regional Land Use

Fort Greely is located southeast of Fairbanks and just south of the community of Delta Junction in an unincorporated borough. The ROI for land use includes all of Fort Greely and the surrounding adjacent land uses.

Since the post is not located in a municipality or a borough, there are no local zoning or land use policies. There are also no state plans or guidelines for the area. Therefore, existing land uses do not conflict with any Federal, state, or local land use plans or policies. The land around Fort Greely is primarily agricultural, undeveloped open space, forests, tundra, or wetlands and is sparsely populated, with the closest inhabited structure being in Delta Junction. Most development occurs on the Richardson Highway north towards Fairbanks, and some small settlements are found along the highways at Big Delta, Richardson, Alrich, and Birch Lake. The Trans-Alaskan Oil Pipeline does bisect Fort Greely, with a pumping station located 4 kilometers (2.5 miles) southwest of the cantonment area. There is also a large private tract of land that separates the maneuver area and the drop zone area of Fort Greely. This 65-hectare (160-acre) tract was excluded from the area originally withdrawn. No land uses in the area are incompatible with the adjoining land uses of Fort Greely. (U.S. Army Alaska, 1997— Draft Integrated Natural Resources Management Plan)

Fort Greely Land Use

Fort Greely consists of about 267,519 hectares (661,051 acres), most of which was withdrawn land from the Bureau of Land Management by public land order or public law. The land uses of Fort Greely are shown in figure 3.9-4. Fort Greely consists of the Main Post, two large training areas (Fort Greely West Training Area and Fort Greely East Training Area), and three outlying sites in the area, Gerstle River Test Site (7,689 hectares, 19,000 acres), Black Rapids Training Site (1,125 hectares, 2,779 acres), and Whistler Creek Rock Climbing Area (214 hectares, 530 acres). (U.S. Army Alaska, 1997—Draft Integrated Natural Resources Management Plan)



EXPLANATION

Roads and Major Trails
Rivers
Installation Boundary
Trans-Alaska Pipeline
Cantonment Area
Main Post Boundary
City

Scale 1:500,000

0 4 7.9 Miles

0 6.4 12.7 Kilometers

NORTH

1 Airfield
2 Aviation Support*
3 Industrial*
4 Institutional*
5 Administrative*
6 Commercial
7 Residential

8 Recreation*
9 Agriculture*
10 Open Space
11 Military
Drop Zone
Hazard Area
Impact Area

*Standard land use designation not applicable to this figure

Existing Land Use, Fort Greely

Alaska

Figure 3.9-4

lu_fge_002

The potential NMD site would be located in what is known as the Main Post Area, just outside the cantonment area. The Main Post area consists of approximately 5,810 hectares (14,357 acres) and serves as the center for most of the day-to-day activities at Fort Greely. The cantonment area consists of family and troop housing, medical facilities, administrative buildings, community services, industrial areas, recreation areas, open space, and the Allen Army Airfield. (U.S. Army Alaska, 1997—Draft Integrated Natural Resources Management Plan) This portion of Fort Greely is operating on a skeleton crew, and very few facilities are being utilized. A total of 741 hectares (1,830 acres) within the cantonment area is subject to BRAC realignment action, which is scheduled to be completed in July 2001. A prison is currently being considered as a potential reuse of a portion of the cantonment area. (Gori, 1999—Comments received by EDAW, Inc., regarding the NMD Deployment Coordinating Draft DEIS)

The Fort Greely West Training Area consists of 231,479 hectares (571,995 acres), currently withdrawn from the public domain by Public Law 99-606. The withdrawal terminates in 2001. The Department of the Army has published a Legislative EIS to renew its use of the Fort Greely West Training Area (formerly known as the Fort Greely Maneuver Area). (Gori, 1999—Comments received by EDAW, Inc., regarding the NMD Deployment Coordinating Draft DEIS) This area is used as a test site for weapons and equipment (U.S. Army Alaska, 1997—Draft Integrated Natural Resources Management Plan) and is used to test experimental designs under extreme weather conditions. This testing of weapons and equipment includes all types of bombing and gunnery exercises in the impact areas. Large impact areas and buffer zones are required, since equipment and weapons with unknown or unreliable firing characteristics are being tested. Vehicle testing is also conducted on the maneuver area. This portion of Fort Greely contains very few man-made facilities. (U.S. Department of the Army, 1980—EIS concerning Proposed Land Withdrawal for the 172nd Infantry Brigade at Fort Greely)

The area to the south and east of the potential NMD site is known as the Fort Greely East Training Area. This area of Fort Greely consists of 20,943 hectares (51,750 acres) and is located east of the West Training Area (U.S. Army Alaska, 1997—Draft Integrated Natural Resources Management Plan). This land was withdrawn from the public domain by Public Law 99-606. The withdrawal terminates in 2001. The Department of the Army has published a Legislative EIS to renew its use of the Fort Greely East Training Area (formerly known as the Fort Greely Air Drop Zone). This area is primarily used as a non-firing maneuver area. (Gori, 1999—Comments received by EDAW, Inc., regarding the NMD Deployment Coordinating Draft DEIS) Other activities include experimental air drops, airborne training, and testing of clothing, vehicles, and equipment. The principal facilities within this area are 53-kilometer

(33-mile) and 18-kilometer (11-mile) vehicle test loops used to test vehicles in extreme weather conditions and varying snow depths. Other vehicles are tested during all seasons and on different types of terrain. Other than these test loops, there are very few man-made structures. When portions of the range are not in use for the testing of materials, infantry, artillery, and engineer units use the area for non-firing marches, troop maneuvers, artillery unit training, and small arms training (with blank ammunition). (U.S. Department of the Army, 1980—EIS concerning Proposed Land Withdrawal for the 172nd Infantry Brigade at Fort Greely)

Fort Greely with its abundance of open space is used by the military and the public for a wide range of recreation activities. Portions of the base may be closed at times for military missions, and impact areas are always closed for safety considerations. Otherwise, most of the remainder of the base can be used for recreation after obtaining permission from Fort Greely. The most common recreation activities on the base are hunting, fishing, and trapping. Other activities include off-road vehicle use, hiking, backpacking, camping, boating, bicycling, wildlife watching, and skiing. The use of Fort Greely for subsistence is minimal.

Aesthetics

The ROI for aesthetics at Fort Greely includes the general visual environment surrounding the base and areas visible from offsite locations.

The visual environment varies from rolling, plateau terrain in the West Training Area to relatively flat terrain at the Fort Greely East Training Area portion of the base. The East Training Area and northern sections of the West Training Area are nearly level and are covered with black spruce, deciduous trees and shrubs, and muskeg. The southern part of the West Training Area consists of rolling plateaus mixed with kettle lakes. This area also has dense vegetation mixed with bogs, tundra, gorges, and rock outcroppings (U.S. Department of the Interior and U.S. Department of Defense, 1994—Fort Greely Proposed Resource Management Plan, Final EIS). The elevations range from 366 meters (1,200 feet) in the East Training Area and Cantonment Area to approximately 1,829 meters (6,000 feet) above sea level in the southwestern portion of the West Training Area (U.S. Army Alaska, 1997—Draft Integrated Natural Resources Management Plan). The dominant visual features around Fort Greely include views of Mt. Hayes and the Alaska Range and the Trans-Alaska pipeline. Most views onto the base from the Richardson Highway are screened by timber. Due to the thickness of cover and sparse population of the region, Fort Greely has a relatively low visual sensitivity.

3.9.1.5 Yukon Training Area (Fort Wainwright)—Land Use

This section describes the land uses and aesthetics for the affected base property at the Yukon Training Area (Fort Wainwright) and adjacent property. The ROI for land use includes those areas potentially affected by deployment of the GBI or BMC2 at the Yukon Training Area. The ROI for aesthetics includes the training area and the surrounding areas in the viewshed.

Regional Land Use

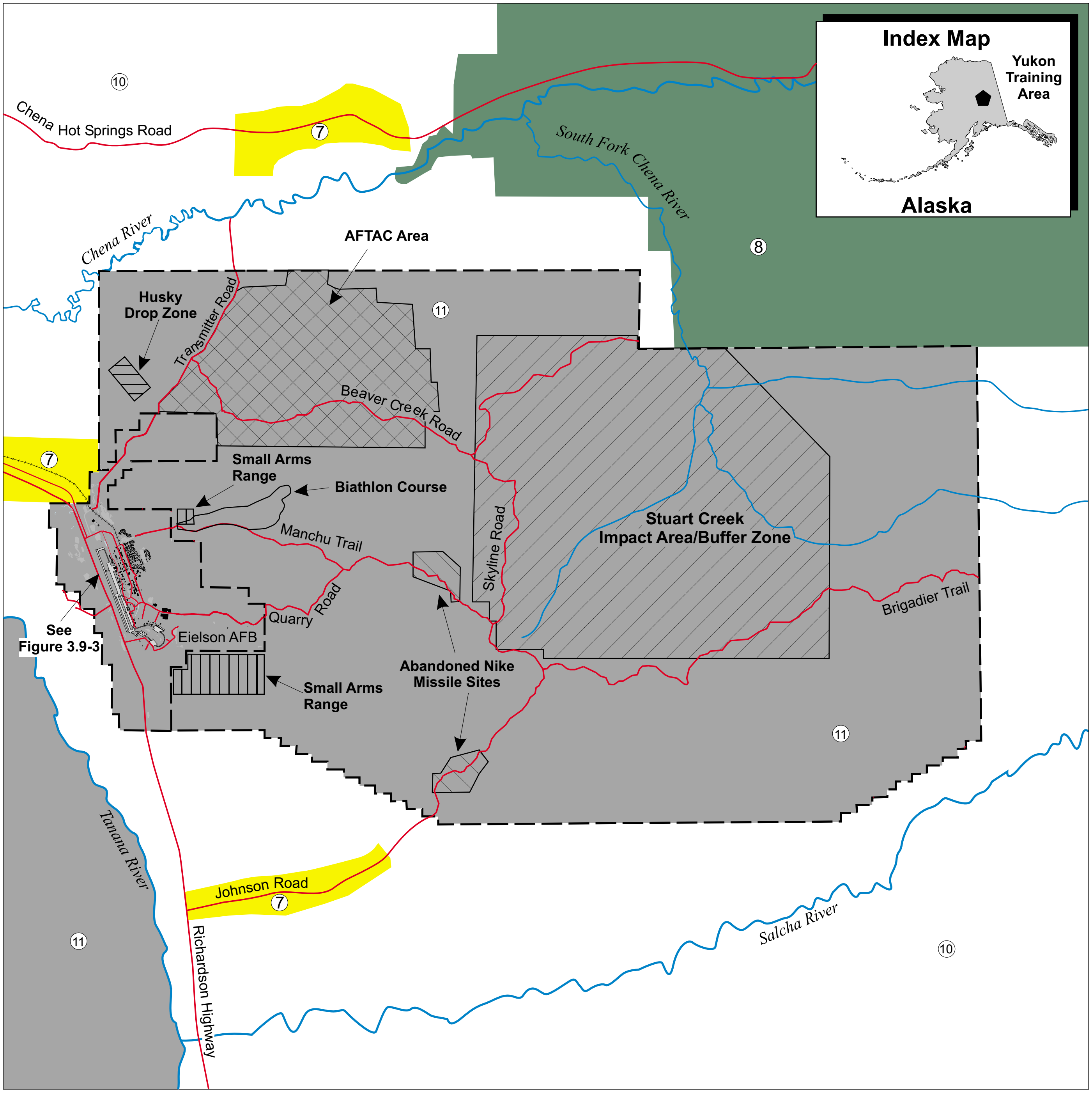
The Yukon Training Area is located in the Fairbanks North Star Borough southeast of Fairbanks and adjacent to Eielson AFB. Although the Yukon Training Area is part of Fort Wainwright, it is located about 24 kilometers (15 miles) southeast of the main post. The regional land use ROI includes the maneuver area and surrounding adjacent land uses.

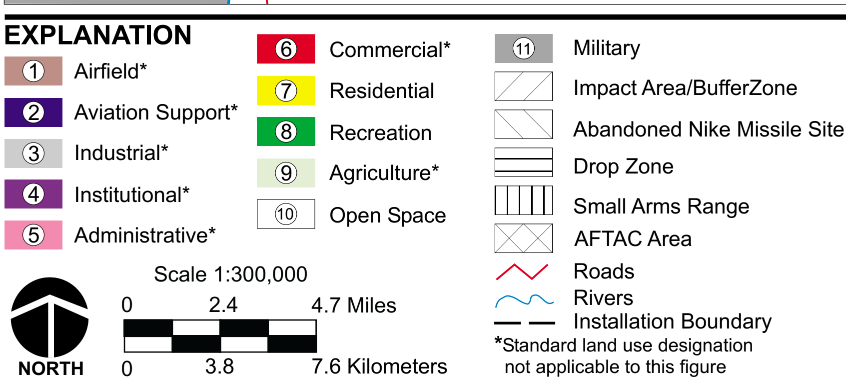
The Fairbanks North Star Borough is the planning and zoning authority for the region around the Yukon Training Area. Since the Yukon Training Area is federally owned, it does not fall under the jurisdiction of the Fairbanks North Star Borough. The land around the training area is zoned as agriculture, forest land, open space/natural areas, reserve areas (hunting, trapping, fishing, mining, recreation, and agriculture), and remote settlement areas (Fairbanks North Star Borough, 1997—Comprehensive Plan). The land surrounding the Yukon Training Area, with the exception of Eielson AFB, is sparsely populated. The closest inhabited structure is in the community of Moose Creek just outside the northwest boundary of Eielson AFB. None of the land uses in the area are incompatible with the adjoining land uses of the Yukon Training Area.

Yukon Training Area (Fort Wainwright) Land Use

The site consists of 100,362 hectares (248,000 acres) and is utilized by all branches of the armed forces. It is jointly managed by the Bureau of Land Management and the U.S. Army. This training area is currently withdrawn by Public Law 99-606. The withdrawal terminates in 2001. The Department of the Army has published a Legislative EIS to renew its use of the Fort Wainwright Yukon Training Area (formerly known as the Fort Wainwright Yukon Maneuver Area). (Gori, 1999—Comments received by EDAW, Inc., regarding the NMD Deployment Coordinating Draft DEIS)

The Yukon Training Area is relatively undeveloped, undisturbed, and has very few man-made structures. It is roughly broken down into three main areas as shown in figure 3.9-5. One area is a 16-square-kilometer (6-square-mile) tract called the Stuart Creek Impact Area, which is located in the north central portion of the maneuver area. This area is used by the Air Force and Army for the firing of live and/or practice





Existing Land Use, Yukon Training Area

Alaska

Figure 3.9-5

munitions (U.S. Department of the Interior, and U.S. Department of Defense, 1994—Fort Wainwright Yukon Maneuver Area, Proposed Resource Management Plan, Final EIS). The Air Force Technical Applications Center site is another area within the Yukon Training Area. It is located in the northwest corner of the maneuver area just east of Transmitter Road and north of Beaver Creek Road. The Air Force Technical Applications Center site consists of 8,802 hectares (21,750 acres) jointly utilized by the Army and the Air Force Technical Applications Center. Approximately 971 hectares (2,400 acres) within this large parcel are used exclusively by the Air Force (Department of the Army, 1989—Permit of usage of the Air Force Technical Applications Center site). The Air Force Technical Applications Center site is used for operation of a seismographic system that detects seismic disturbances and detonations of nuclear weapons worldwide. The remainder of the Yukon Training Area is designated as training areas for mortar, artillery, and maneuver exercises. Within these training areas are two Nike sites (Bravo and Charlie), which are abandoned nuclear defense facilities of the Nike Hercules missile system. (U.S. Army Corps of Engineers, 1994—Field Report/Site Assessment for Yukon Maneuver Area, Nike Sites B & C, Fort Wainwright, Alaska)

The Yukon Training Area with its abundance of open space is used by the military and the public for a wide range of recreation activities. Portions of the base may be closed at times for military missions and impacts areas, and the Air Force Technical Applications Center area is always closed for safety considerations and military operations. Otherwise, most of the remainder of the base can be used for recreation after obtaining permission from Fort Wainwright or Eielson AFB. The most common recreation activities on the base are hunting, fishing, and trapping. Other activities include off-road vehicle use, hiking, backpacking, camping, snowmobiling, wildlife watching, and skiing.

Aesthetics

The ROI for aesthetics at the Yukon Training Area includes the general visual environment surrounding the maneuver area and areas visible from offsite locations.

The visual environment around the Yukon Training Area is best described by the rolling terrain that primarily consists of undisturbed forests and woodlands. There are some scattered wetlands, relatively flat areas, and some parts that have been disturbed by training activities. The topography varies from rolling to hilly with elevations ranging from 168 meters (550 feet) to 995 meters (3,265 feet) above sea level (U.S. Department of the Army, 1979—Draft EIS concerning Proposed Land Withdrawal for the 172th Infantry Brigade at Fort Wainwright). Due to the terrain and remoteness of the Yukon Training Area, views of the Yukon Training Area are extremely limited. Some roads into the area are not monitored, and the public could gain access into portions of the Yukon Training Area, but due to the thickness of cover and lack of prominent vistas, the Yukon Training Area has a low visual sensitivity.

3.9.2 NORTH DAKOTA INSTALLATIONS

A brief introduction is included to generally describe the land uses in the northeastern North Dakota region. Most of the land within all of the ROIs is almost extensively used for agricultural purposes with some scattered residential, commercial, and industrial areas usually located around small communities or towns. The area around all of the proposed sites is very sparsely populated. No form of comprehensive zoning or planning exists for most counties in the region. However, most of the counties in this region do have some land use controls that regulate development around highways for health and safety concerns and for the preservation of agricultural lands but leave planning and economic development to regional planning councils. All of the potential sites are located on Federal property and are not subject to local land use controls, but all try to be as consistent as possible with these land use controls.

3.9.2.1 Cavalier AFS—Land Use

This section describes the land uses and aesthetics for the affected base property at Cavalier AFS and surrounding area. The ROI for land use includes the base, adjacent land areas potentially affected by construction and deployment of the XBR, and areas up to 30 kilometers (19 miles) from the site to include areas where certain sensitive electronics may be susceptible to temporary interference with use of the XBR. The ROI will include those land uses that may contain sensitive electronics such as residential, commercial, industrial, and institutional (such as medical and educational). The ROI for aesthetics includes the base and adjacent off-base properties within the viewshed.

Regional Land Use

Cavalier AFS is located in the northeast corner of North Dakota on the western edge of Pembina County in the Beaulieu Township. The regional land use ROI includes the area within a 30-kilometer (19-mile) radius from the Cavalier AFS site in Pembina County.

Beaulieu Township has no zoning ordinances; therefore, development in the area is reviewed by Pembina County and the Red River Regional Planning Council to ensure compliance with the overall development guidelines. All of Pembina County's regulations deal with development around highways for health and safety concerns and for the preservation of agricultural lands. Red River Regional Planning Council is the planning and economic development authority for the four-county region of Grand Forks, Nelson, Pembina, and Walsh counties (Wangler, 1998—Personal communication). However, since Cavalier AFS is a Federal property it does not fall within the zoning and planning regulations of the council. As shown in table 3.9-1, the area is sparsely populated. The small towns within the ROI generally contain residential, commercial, industrial, and institutional land uses that support the surrounding area. The remainder of the area outside of these towns consists of pasture land, cultivated cropland, wooded areas, and some small bodies of water scattered throughout the area. A small logging operation is adjacent to the north of Cavalier AFS, and a few farmsteads are in the area, with the closest inhabited structure being less than 0.8 kilometer (0.5 mile) away from the site. All of the land uses in the area are compatible with adjoining areas of Cavalier AFS.

Table 3.9-1: Urban/Populated Areas within 30 Kilometers (19 Miles) of the Cavalier AFS Site

Urban/Populated Area	Population	Occupied Housing Units	Distance[1] kilometers (miles)
Akra	*	*	15 (9)
Backoo	*	*	19 (12)
Cavalier	1,508	631	23 (14)
Concrete	20	6	3 (2)
Crystal	201	80	23 (14)
Easby	*	*	26 (16)
Edinburg	292	127	24 (15)
Gardar	*	*	15 (9)
Hallson	*	*	6 (4)
Hensel	*	*	18 (11)
Leroy	*	*	24 (15
Leyden	*	*	18 (11)
Milton	141	62	15 (9)
Mountain	130	44	5 (3)
Olga	*	*	13 (8)
Osnabrock	198	72	19 (12)
Svold	*	*	11 (7)
Union	*	*	19 (12)
Vang	*	*	26 (16)
Walhalla	1,131	454	21 (13)

Source: U.S. Department of Commerce, 1998—U.S. Census Bureau.
[1] Distance is in air miles
* Unincorporated communities, no population data available

Cavalier AFS Land Use

The general land use is described by the eight land use categories shown in figure 3.9-6. The station property totals 112 hectares (278 acres). The base is broken down into the airfield, industrial, administrative, commercial, residential, public recreation, and open space land use categories. (U.S. Air Force Space Command, undated—Comprehensive Planning Framework)

The eastern half of the site is dominated by mission-oriented industrial land uses consisting of the power plant, radar, and sewage and water treatment facilities. The western portion of the site is dominated by residential, administrative, industrial, and public facility/recreational uses with the remainder of the base being open land use (U.S. Air Force Space Command, undated—Comprehensive Planning Framework). There is also a small airfield at the southern end of the station that consists of a helicopter pad and clear lanes for landing and takeoff.

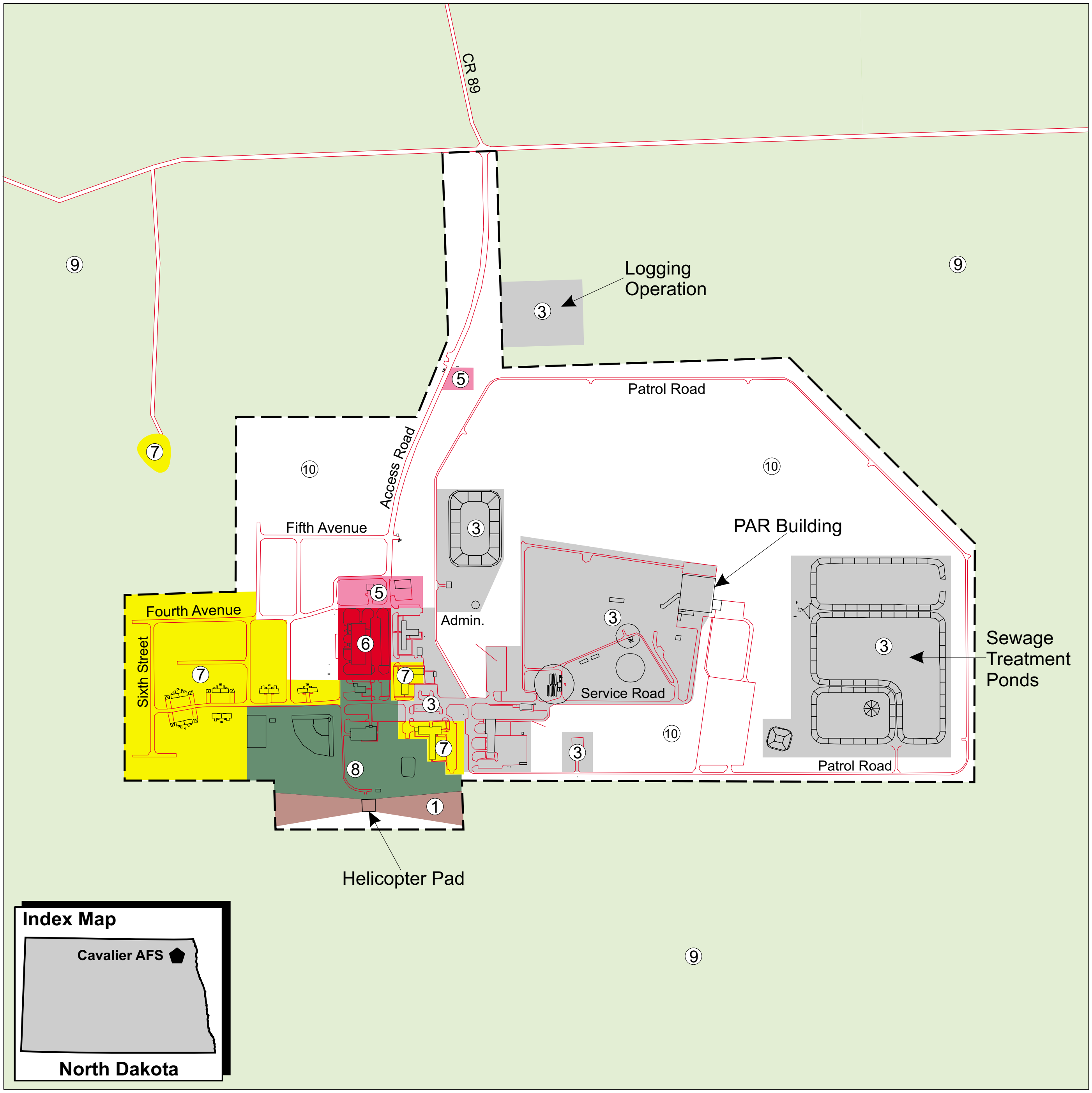
Aesthetics

The ROI for aesthetics at Cavalier AFS includes the general visual environment surrounding the station and the areas visible from offsite locations.

The visual environment is distinguished by the open plains surrounding the site, which are predominately used for agriculture and are the most significant feature of the natural environment. The topography of the site is generally flat at Cavalier AFS, with the site being at about 358 meters (1,175 feet) above sea level. The most significant man-made feature is the Perimeter Acquisition Radar building. This facility stands approximately 37 meters (121.5 feet) tall. (U.S. Army Strategic Defense Command, 1991—Preliminary Building Availability Conditions Survey–SRMSC) Public access to the site is prohibited; therefore, views are limited to passing traffic on ND 5 to the north, ND 32 to the east, and to adjacent land owners. The site has a relatively low visual sensitivity because the flatness of the land limits any prominent vistas.

3.9.2.2 Grand Forks AFB—Land Use

This section describes the land uses and aesthetics for the base property and the surrounding areas of Grand Forks AFB. The ROI for land use and aesthetics includes the base and adjacent properties that could be affected by construction activities and deployment of a GBI or BMC2 at Grand Forks AFB. The area potentially affected off-base would be the properties immediately adjacent to the base.



EXPLANATION

1 Airfield	6 Commercial
2 Aviation Support*	7 Residential
3 Industrial	8 Recreation
4 Institutional (Medical/Educational)*	9 Agriculture
5 Administrative	10 Open Space

Roads
Installation Boundary
CR = County Road
PAR = Perimeter Acquisition Radar

*Standard land use designation not applicable to this figure

Scale 1:11,000
0 459 917 Feet
0 140 280 Meters
NORTH

Existing Land Use, Cavalier Air Force Station

North Dakota

Figure 3.9-6

lu_cas_002

Regional Land Use

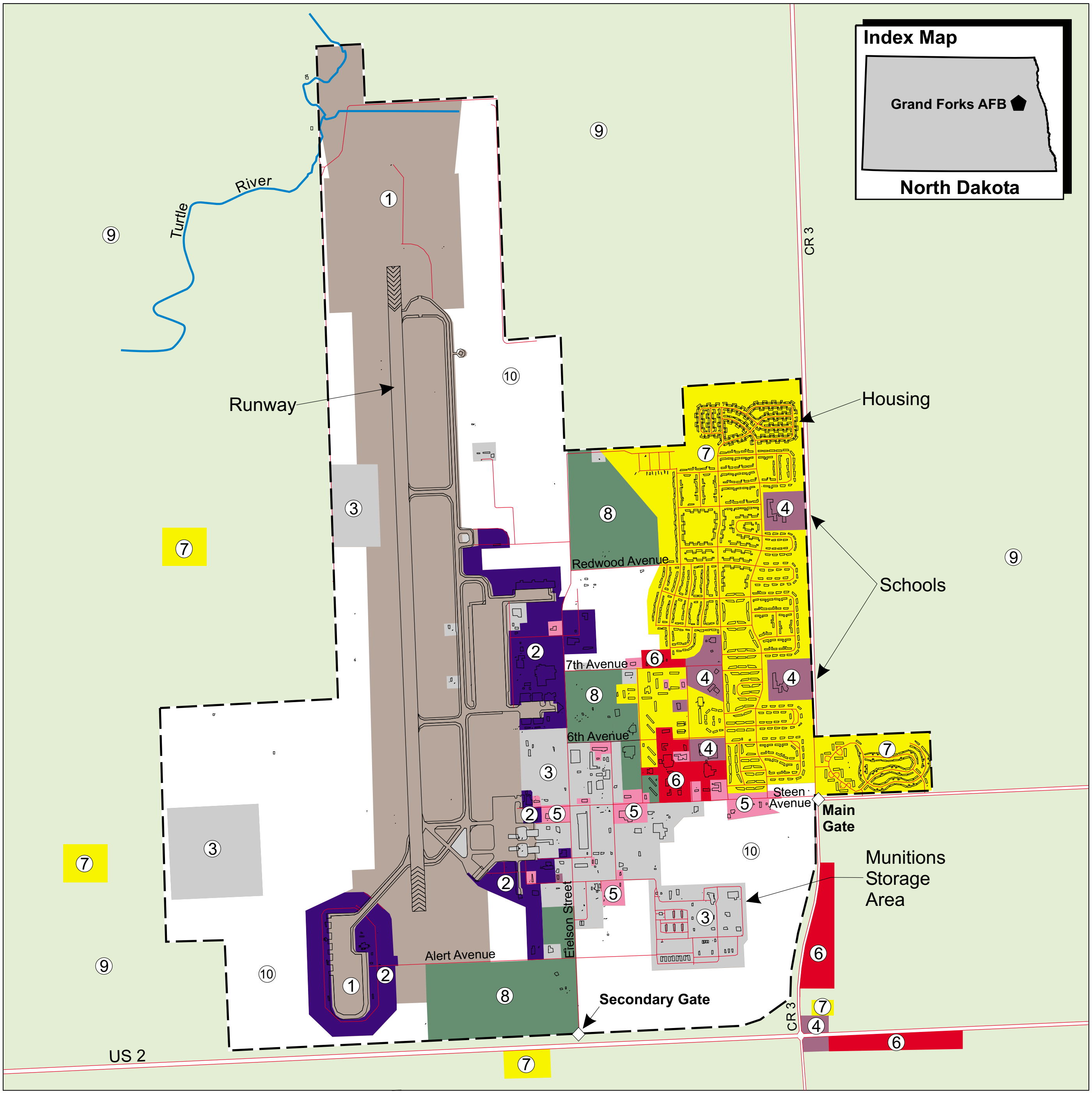
The regional land use that could be affected by NMD deployment includes those properties immediately adjacent to the base in Grand Forks County. The land in the region is approximately 96 percent agricultural, 2 percent developed, and 2 percent woodlands, water bodies, and wetlands.

Development within Grand Forks County is reviewed by the Grand Forks County Planning and Zoning Commission to ensure conformity with the county's zoning and subdivision regulations. Because Grand Forks AFB is Federal property, it does not fall within the zoning and planning regulations of the county. Grand Forks County adopted zoning within the Grand Forks AFB vicinity based on the Air Force mission. Two zones were created to prevent land uses that may encroach upon the base’s mission. Zone I was established immediately around the base. Permitted uses are single family residences with a minimum lot size of 1 hectare (2.5 acres), agriculture, and "usual and ordinary farm buildings." Zone II extends outward from Zone I, permitting uses in Zone I plus additional uses such as duplexes, churches, motels, places of business, and mobile home courts (U.S. Department of the Air Force, 1995—AICUZ Study, Grand Forks AFB). The actual land use immediately adjacent to the base is agricultural, with the nearest inhabited structure being 0.8 kilometer (0.5 mile) from the base. A small commercial area and the town of Emerado are located southeast of the base. No land uses in the area are incompatible with adjoining areas of Grand Forks AFB (U.S. Department of the Air Force, 1997—Grand Forks AFB General Plan).

Grand Forks AFB Land Use

Grand Forks AFB encompasses an area of 1,954 hectares (4,830 acres) (U.S. Department of the Air Force, 1997—Integrated Natural Resource Management Plan). Land uses at Grand Forks AFB, as categorized in the Grand Forks Air Force Base General Plan include administrative, aircraft operations and maintenance, airfield, community, housing, industrial, medical, open space, recreation, and water (figure 3.9-7).

The airfield land use is the dominant category on the base, and is focused on the runway. The aircraft operations and maintenance land use is interdependent with the airfield land use and is just east of the runway. The industrial areas include the base civil engineering complex on Seventh Avenue, the supply and transportation complex on Eielson Street, and the Munitions Storage Area. The administrative land use areas are spread along Steen Avenue, with two smaller areas physically separated from it. Community facilities such as the Base Exchange and Commissary are on Holzapple Street, the schools in the family housing area, and several commercial areas and community support areas are



EXPLANATION

1 Airfield
2 Aviation Support
3 Industrial
4 Institutional (Medical/Educational)
5 Administrative
6 Commercial
7 Residential
8 Recreation
9 Agriculture
10 Open Space

Roads
Installation Boundary
Gate
CR = County Road
ND = U.S. Highway

Scale 1:40,000

0 1,667 3,333 Feet

0 508 1,016 Meters

NORTH

Existing Land Use, Grand Forks Air Force Base

North Dakota

Figure 3.9-7

lu_gfafb_002

adjacent to the unaccompanied housing. The medical land use includes medical activity such as the dental clinic and hospital. Family housing land uses are found in attached and detached residential units located in the Main, Dakota, and Sunflake family housing areas and a mobile home park. Single personnel housing for enlisted members is in the central base area. Although pockets of outdoor recreation areas for children exist in the family housing area, the concentration of outdoor recreation land use is with the ball park complex and golf course area. Open space on the base is west of County Road 3 up to the main gate and north of the central core of the main base area (U.S. Department of the Air Force, 1997—Grand Forks AFB General Plan).

Aesthetics

The ROI for aesthetics at Grand Forks AFB includes the general visual environment surrounding the station and the areas visible from off-base areas.

The visual environment in the vicinity of Grand Forks AFB is characterized by the agricultural land that surrounds the base. The topography of the land is generally flat, with elevations ranging from 268 meters to 280 meters (880 feet to 920 feet) above sea level, averaging about 271 meters (890 feet) above sea level (U.S. Department of the Air Force, 1997—Integrated Natural Resource Management Plan). Grand Forks AFB is fairly developed and typical of a military installation with a mixture of airfield, industrial, administrative, and housing facilities. The most significant aspect of the natural environment is the flatness of the land and the abundance of agricultural land surrounding the base. The most significant man-made features are the airfield and the adjacent support facilities. These features are surrounded by open land, which consists of some woodlands, wetlands that include the lagoons for wastewater treatment, and some agricultural outleased land. Since public access to the base is prohibited, viewpoints are primarily limited to traffic on U.S. Highway 2 to the south of Grand Forks AFB, CR 3B to the east, and to adjacent land owners who use the land for agricultural purposes. The area has a low visual sensitivity because the flatness of the area does not allow for any prominent vistas.

3.9.2.3 Missile Site Radar—Land Use

This section describes the land uses and aesthetics for the affected base property at the SRMSC Missile Site Radar and the surrounding area. The ROI for land use includes the base and those adjacent areas potentially affected by the construction and deployment of the GBI or XBR at this site and areas up to 30 kilometers (19 miles) from the site to include areas where certain sensitive electronics may be susceptible to temporary interference with use of the XBR. The ROI will include those land uses that may contain sensitive electronics such as residential, commercial, industrial, and institutional (such as medical and educational). The ROI for aesthetics includes the base and adjacent off-base properties within the viewshed.

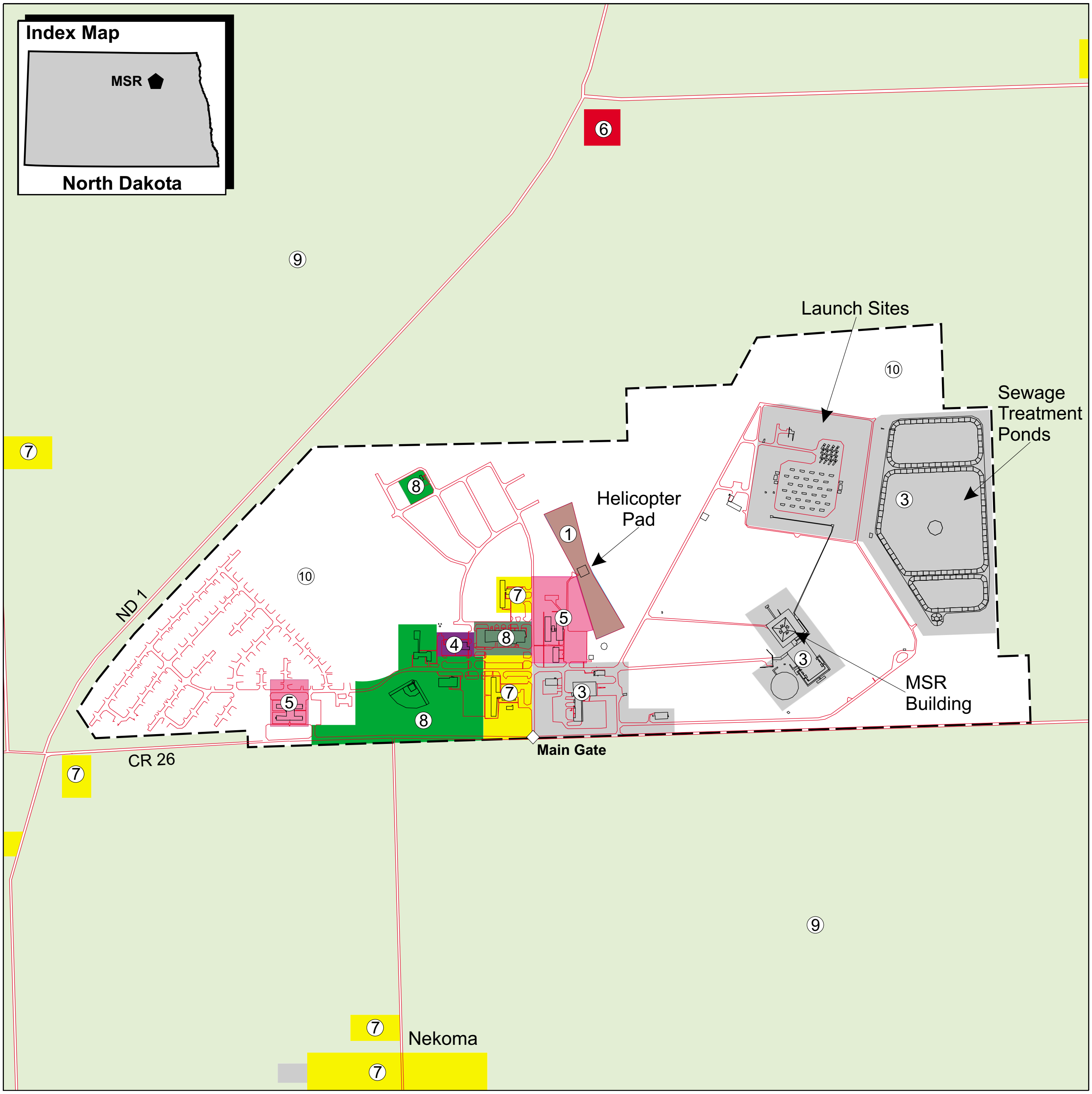
Regional Land Use

The Missile Site Radar is located in the Nekoma Township just north of the town of Nekoma in Cavalier County. The regional land use ROI includes the area within a 30-kilometer (19-mile) radius from the Missile Site Radar.

Nekoma Township has no zoning ordinances; therefore, development in the area is reviewed by Cavalier County and the North Central Planning Council to ensure compliance with overall development guidelines (Dufman, 1998—Personal communication). The Council is the planning and economic development authority for a six-county region that includes Cavalier, Ramsey, Benson, Eddy, Towner, and Rolette counties. However, Missile Site Radar is a Federal property and does not fall within the zoning and planning regulations of the Council or the county. As shown in table 3.9-2, the area is sparsely populated. The small towns within the ROI can be expected to contain residential, commercial, industrial, and institutional land uses that support the surrounding area. The remaining land outside these small towns is almost exclusively used for agricultural purposes with the majority being used for cropland, with small bodies of water and wooded areas scattered throughout. There are a few farmsteads and the town of Nekoma within close proximity to the site. The closest inhabited structure is approximately 0.8 kilometer (0.5 mile) away. All of the land uses in the area are compatible with adjoining areas of the Missile Site Radar.

Missile Site Radar Land Use

The general land use of the 175-hectare (432-acre) site is depicted in figure 3.9-8. The eastern half of the site is dominated by mission-oriented land uses consisting of launch silos, a power plant, a radar, and sewage and water treatment facilities. The western portion of the site is dominated by mostly open space. In the central section there are administrative, residential, and some industrial buildings remaining. There are also some indoor and outdoor recreation facilities located in the central portion of the base (U.S. Army Corps of Engineers, 1974—Analysis of Existing Facilities at SRMSC). Some existing permanent safety restrictive easements are in place that extend outside the Missile Site Radar boundary. These easements limit uses to only those of an agricultural nature. No permanent habitable structures are permitted in this easement. Currently, no structures are located within these easements. The entire site is currently inactive, but is being maintained in a caretaker status.



EXPLANATION

① Airfield
② Aviation Support*
③ Industrial
④ Institutional (Medical/Educational)
⑤ Administrative
⑥ Commercial*
⑦ Residential
⑧ Recreation
⑨ Agriculture
⑩ Open Space

Roads
Installation Boundary
Gate
CR = County Road
ND = North Dakota Highway

*Standard land use designation not applicable to this figure

Scale 1:15,000
0 625 1,250 Feet
0 191 381 Meters
NORTH

Existing Land Use, Missile Site Radar

North Dakota

Figure 3.9-8

lu_msr_002

Table 3.9-2: Urban/Populated Areas within 30 Kilometers (19 Miles) of the Missile Site Radar

Urban/Populated Area	Population	Occupied Housing Units	Distance[1] kilometers (miles)
Adams	225	121	29 (18)
Alsen	118	60	26 (16)
Derrick	*	*	19 (12)
Easby	*	*	16 (10)
Edmore	329	135	21 (13)
Fairdale	80	34	15 (9)
Hampden	94	52	23 (14)
Langdon	2,241	960	19 (12)
Loma	19	12	13 (8)
Milton	141	62	24 (15)
Nekoma	61	30	2 (1)
Osnabrock	198	72	18 (11)
Weaver	*	*	27 (17)

Source: U.S. Department of Commerce, 1998—U.S. Census Bureau.
(1) Distance in air miles
* Unincorporated communities, no population data available

Aesthetics

The ROI for aesthetics at the Missile Site Radar includes the general visual environment surrounding the site and the areas visible from offsite locations.

The visual environment is characterized by the open plains surrounding the site that are used for agriculture. The agricultural land is the most significant feature of the natural environment. The topography of the land is relatively flat, with the Missile Site Radar being at about 497 meters (1,630 feet) above sea level (U.S. Army Corps of Engineers, 1974—Analysis of Existing Facilities at SRMSC). The most significant man-made feature is the Missile Site Radar building. This facility looks similar to a pyramid and stands approximately 23 meters (75 feet) tall. Public access to the site is prohibited; therefore, views are limited to traffic on Highway 1 to the west, CR 26 to the south, and CR 66 to the north, and to adjacent land owners and to the town of Nekoma to the south. The site and the surrounding area have a low visual sensitivity because the flatness of the land does not provide for any prominent vistas.

3.9.2.4 Remote Sprint Launch Site 1—Land Use

This section describes the land uses and aesthetics for the affected base property at the SRMSC Remote Sprint Launch Site 1 and surrounding area. The ROI for land use includes the base, adjacent areas potentially affected by construction and deployment of the XBR, and areas up to 30 kilometers (19 miles) from the site to include property where certain sensitive electronics may be susceptible to temporary interference with use of the XBR. The ROI will include those land uses that may contain sensitive electronics such as residential, commercial, industrial, and institutional (such as medical and educational). The ROI for aesthetics includes the base and adjacent off-base properties within the viewshed.

Regional Land Use

The regional land use includes the area within a 30-kilometer (19-mile) radius from Remote Sprint Launch Site 1. The site is located in Northfield Township east of the town of Hampden in Ramsey County and is 1.2 kilometers (0.75 mile) south of Cavalier County.

Northfield Township has no zoning ordinances; therefore, development in the area is reviewed by Ramsey County and the North Central Planning Council to ensure compliance with overall development guidelines. The Council is the planning and economic development authority for a six-county region that includes Cavalier, Ramsey, Benson, Eddy, Towner, and Rolette counties (Anderson, 1998—Personal communication, February 23). However, Remote Sprint Launch Site 1 is a Federal property and does not fall within the jurisdiction of the county or the North Central Planning Council. As shown in table 3.9-3, the area is sparsely populated, with the closest inhabited structure being about 2.4 kilometers (1.5 miles) northeast of the site. The small towns within the ROI generally contain residential, commercial, industrial, and institutional land uses that support the surrounding area. The remaining land outside these small towns is almost exclusively used for agricultural purposes, mostly cropland, with some wooded areas and small bodies of water distributed throughout. None of the land uses in the area are incompatible with adjoining land uses of Remote Sprint Launch Site 1.

Remote Sprint Launch Site 1 Land Use

The general land use of the 17-hectare (41-acre) site is military (U.S. Army Strategic Defense Command, 1991—Preliminary Building Availability Conditions Survey, SRMSC). The site consists of abandoned anti-missile launch silos that are located near the center of the site, launch support buildings located to the west of the launch silos, and sewage treatment ponds in the eastern portion of the site. A perimeter fence surrounds the facility. A security fence also surrounds the sewage treatment ponds, as shown in figure 3.9-9. Remote Sprint Launch Site 1 is currently inactive, but is maintained in a caretaker status.

Table 3.9-3: Urban/Populated Areas within 30 Kilometers (19 Miles) of Remote Sprint Launch Site 1

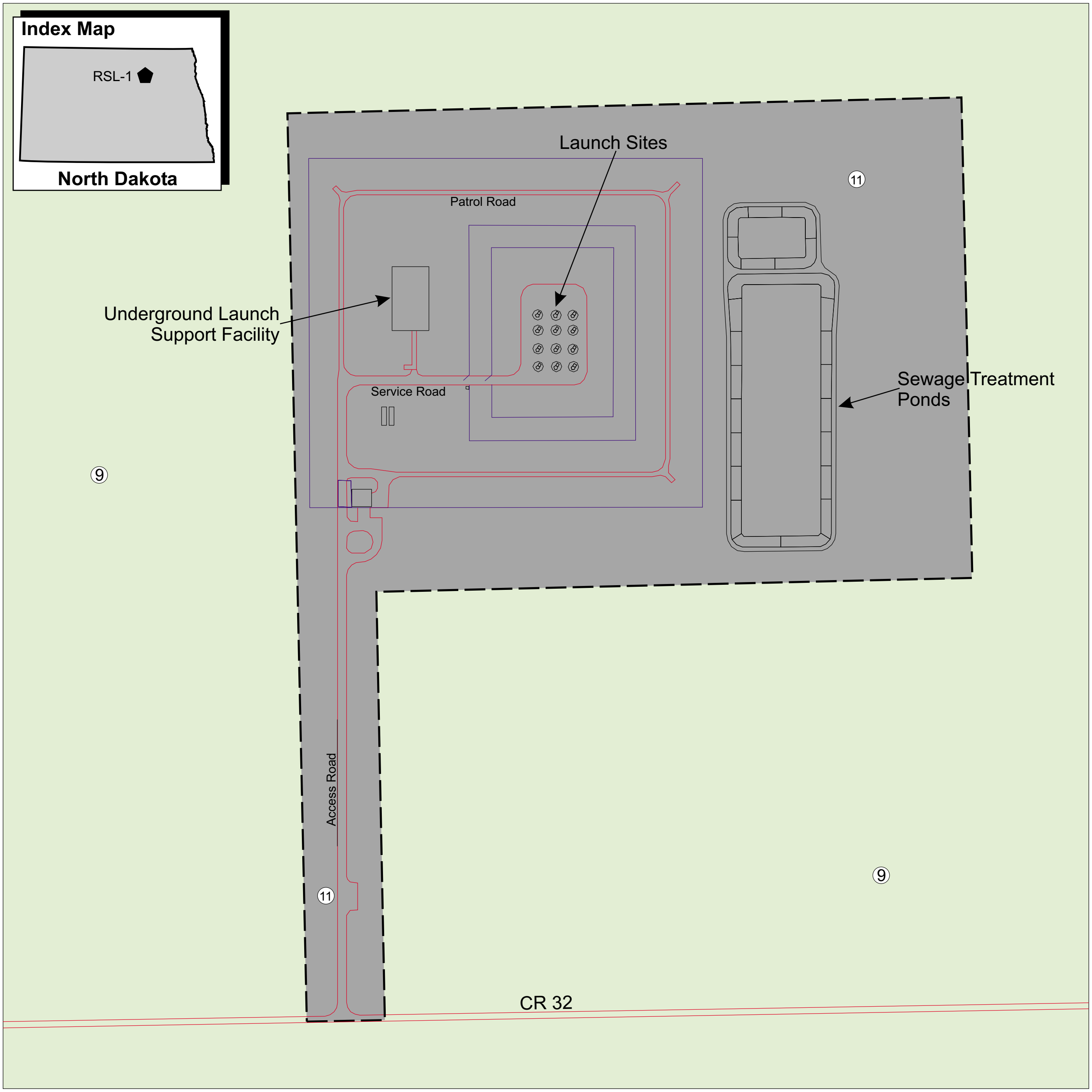
Urban/Populated Area	Population	Occupied Housing Units	Distance[1] kilometers (miles)
Alsen	118	60	15 (9)
Calio	30	16	29 (18)
Derrick	*	*	6 (4)
Edmore	329	135	16 (10)
Fairdale	80	34	27 (17)
Garske	*	*	29 (18)
Hampden	94	52	5 (3)
Langdon	2,241	960	30 (19)
Lawton	63	30	30 (19)
Loma	19	12	11 (7)
Munich	341	122	24 (15)
Nekoma	61	30	16 (10)
Saint Joe	*	*	26 (16)
Starkweather	180	68	24 (15)
Weaver	*	*	8 (5)

Source: U.S. Department of Commerce, 1998—U.S. Census Bureau.
[1] Distance in air miles
* Unincorporated communities, No Population Data Available

Aesthetics

The ROI for aesthetics at Remote Sprint Launch Site 1 includes the general visual environment surrounding the site and the areas visible from offsite locations.

The visual environment is characterized by the open plains surrounding the site that are used for agriculture. The agricultural land is the most significant feature of the natural environment. The topography of the land is relatively flat, with Remote Sprint Launch Site 1 being at about 474 meters (1,555 feet) above sea level. (U.S. Army Corps of Engineers, 1974—Analysis of Existing Facilities at SRMSC) The most significant man-made features are the launch silos, launch support buildings, and the sewage treatment lagoons. Public access to the site is prohibited; therefore, views are limited to traffic on CR 32 to the south and to adjacent land owners. The site and the surrounding area have a



EXPLANATION

1 Airfield*	6 Commercial*
2 Aviation Support*	7 Residential*
3 Industrial*	8 Recreation*
4 Institutional (Medical/Educational)*	9 Agriculture
5 Administrative*	10 Open Space*

11 Military

Roads

Installation Boundary

*Standard land use designation not applicable to this figure

NORTH

Scale 1:4,000

0 167 333 Feet

0 51 101 Meters

Existing Land Use, Remote Sprint Launch Site 1

North Dakota

Figure 3.9-9

lu_rsl1_002

low visual sensitivity because the flatness of the land does not provide for any prominent vistas.

3.9.2.5 Remote Sprint Launch Site 2—Land Use

This section describes the land uses and aesthetics for the affected base property at the SRMSC Remote Sprint Launch Site 2. The ROI for land use includes the base, adjacent areas potentially affected by construction and deployment of an XBR, and properties up to 30 kilometers (19 miles) from the site to include areas where certain sensitive electronics may be susceptible to temporary interference with use of the XBR. The ROI will include those land uses which may contain sensitive electronics such as residential, commercial, industrial, and institutional (such as medical and educational). The ROI for aesthetics includes the base and adjacent off-base properties within the viewshed.

Regional Land Use

The Remote Sprint Launch Site 2 is located in Langdon Township northeast of the town of Dresden. The regional land use ROI includes the area within a 30-kilometer (19-mile) radius from Remote Sprint Launch Site 2.

Langdon Township has zoning regulations for the town of Langdon and for areas outside the incorporated areas. These regulations deal with flood zones, building and tree setbacks, and agricultural uses. Non-conforming uses are reviewed by the Township Board (Borgan, 1999—Personal communication). Cavalier County falls under the jurisdiction of the North Central Planning Council. The Council is the planning and economic development authority for a six-county region that includes Cavalier, Ramsey, Benson, Eddy, Towner, and Rolette counties. However, since Remote Sprint Launch Site 2 is a Federal property, it does not fall within the zoning and planning regulations of the Council or the county. As shown in table 3.9-4, the area is sparsely populated, with the closest inhabited structure being 1.1 kilometers (0.7 mile) away. The remaining land outside the towns is almost exclusively used for agricultural purposes with the majority being used for cropland, with small bodies of water and wooded areas scattered throughout. All of the land uses in the area are compatible with adjoining areas of Remote Sprint Launch Site 2.

Remote Sprint Launch Site 2 Land Use

The general land use of the 15-hectare (36-acre) site is military, consisting of abandoned anti-missile launch silos located in the central portion of the site, launch support buildings in the southern portion, and sewage treatment ponds located on the eastern side of the site (U.S. Army Strategic Defense Command, 1991—Preliminary Building

Availability and Conditions Survey, SRMSC). A perimeter fence surrounds the facility. There is also a security fence around the sewage treatment ponds. See figure 3.9-10. The entire site is currently inactive, but is maintained under a caretaker status.

Table 3.9-4: Urban/Populated Areas within 30 Kilometers (19 Miles) of Remote Sprint Launch Site 2

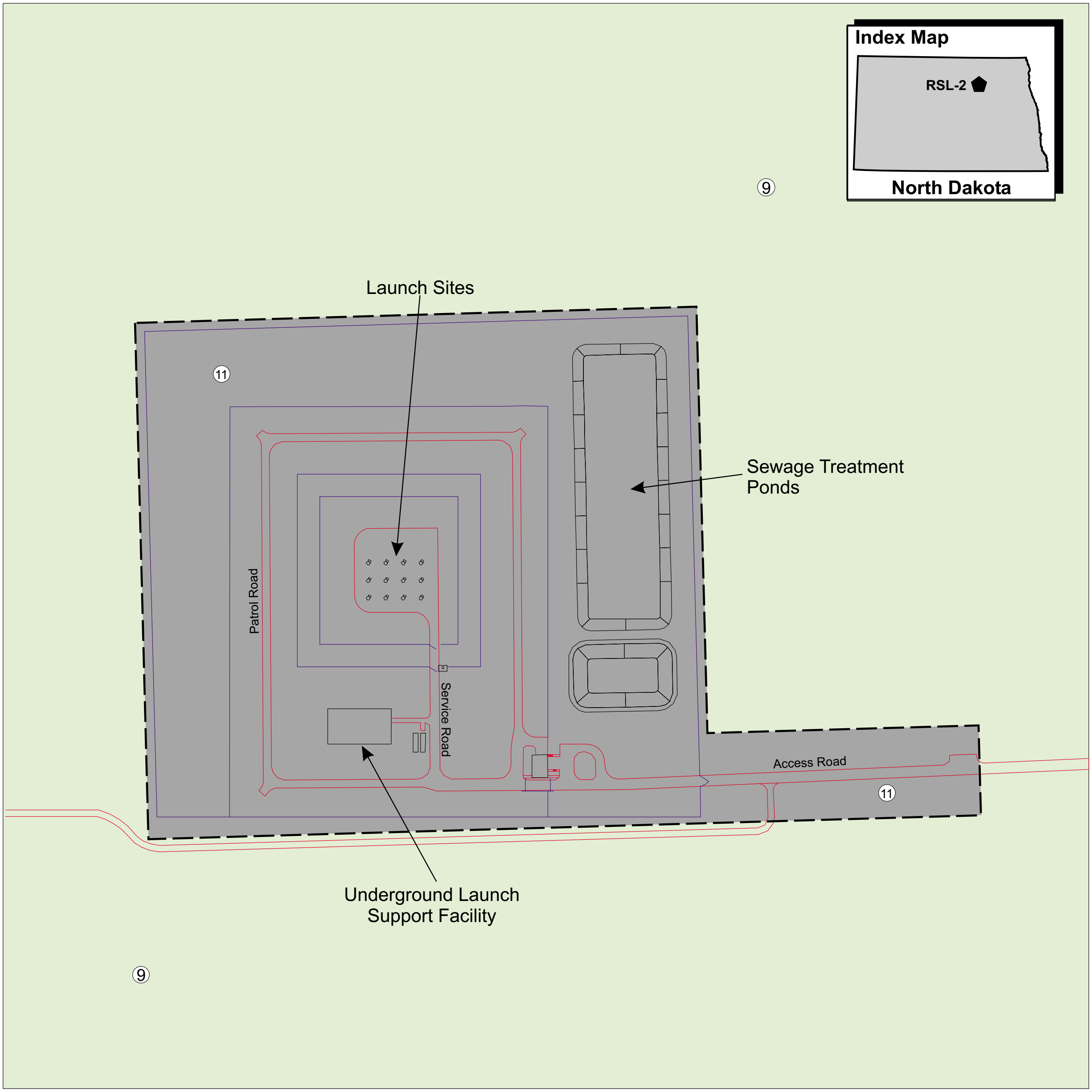
Urban/Populated Area	Population	Occupied Housing Units	Distance[1] kilometers (miles)
Dresden	*	*	4 (3)
Easby	*	*	21 (13)
Hannah	59	25	23 (14)
Langdon	2,241	960	11 (7)
Loma	19	12	24 (15)
Maida	*	*	18 (11)
Mount Carmel	*	*	10 (6)
Olga	*	*	30 (19)
Osnabrock	198	72	29 (18)
Snowflake/Windygates	1,850[2]	620[2]	19 (12)
Vang	*	*	23 (14)
Wales	44	20	15 (9)

Source: U.S. Department of Commerce, 1998—U.S. Census Bureau; Statistics Canada, 1999—Welcome to Statistics Canada.
(1) Distance in air miles
(2) Canadian towns that fall within the Pembina Municipality (County), which is the smallest breakdown of the Canadian Census
* Unincorporated communities, no population data available

Aesthetics

The ROI for aesthetics at Remote Sprint Launch Site 2 includes the general visual environment surrounding the site and the areas visible from offsite locations.

The visual environment is characterized by the open plains surrounding the site that are used for agriculture, and the agricultural land is the most significant feature of the natural environment. The topography of the land is relatively flat, with Remote Sprint Launch Site 2 being at about 489 meters (1,603 feet) above sea level. The most significant man-made features are the launch silos, launch support buildings, and the sewage treatment lagoons. Public access to the site is prohibited; therefore, views are limited to traffic on an unnamed county road that serves as the access road off of Highway 1 to the site and to adjacent land owners.



EXPLANATION

1 Airfield*
2 Aviation Support*
3 Industrial*
4 Institutional (Medical/Educational)*
5 Administrative*
6 Commercial*
7 Residential*
8 Recreation*
9 Agriculture
10 Open Space*
11 Military
Roads
Installation Boundary

*Standard land use designation not applicable to this figure

Scale 1:4,000

0 167 333 Feet

0 51 101 Meters

NORTH

Existing Land Use, Remote Sprint Launch Site 2

North Dakota

Figure 3.9-10

lu_rsl2_002

The site and the surrounding area have a low visual sensitivity because the flatness of the land does not provide for any prominent vistas.

3.9.2.6 Remote Sprint Launch Site 4—Land Use

This section describes the land uses and aesthetics for the affected base property at the SRMSC Remote Sprint Launch Site 4. The ROI for land use includes the base, adjacent off-base property potentially affected by construction and deployment of the XBR, and areas up to 30 kilometers (19 miles) from the site to include areas where certain sensitive electronics may be susceptible to temporary interference with use of the XBR. The ROI will include those land uses that may contain sensitive electronics such as residential, commercial, industrial, and institutional (such as medical and educational). The ROI for aesthetics includes the base and adjacent off-base properties within the viewshed.

Regional Land Use

Remote Sprint Launch Site 4 is located in Kinloss Township southwest of the town of Fairdale in Walsh County. The regional land use ROI includes the area within a 30-kilometer (19-mile) radius from Remote Sprint Launch Site 4.

Kinloss Township does not have any zoning ordinances; therefore, development in the area is reviewed by Walsh County and the Red River Regional Planning Council to ensure compliance with overall development guidelines. The Council is the planning and economic development authority for a four-county region that includes Grand Forks, Pembina, Walsh, and Nelson counties (Wangler, 1998—Personal communication). However, since Remote Sprint Launch Site 4 is a Federal property, it does not fall within the zoning and planning regulations of the Council or the county. As shown in table 3.9-5, the area is sparsely populated, with the closest inhabited structure being about 3.2 kilometers (2 miles) away in Fairdale. The small towns within the ROI generally contain residential, commercial, industrial, and institutional land uses that support the surrounding area. The remaining land outside these small towns is almost exclusively used for agricultural purposes, with the majority being used for cropland, with small bodies of water and wooded areas scattered throughout the area. All of the land uses in the area are compatible with adjoining areas of Remote Sprint Launch Site 4.

Remote Sprint Launch Site 4 Land Use

The general land use of the 20-hectare (50-acre) site is military, consisting of abandoned anti-missile launch silos located in the center of the site, launch support buildings located adjacent to the silos to the east, and a sewage treatment pond located at the southern portion of the site (U.S. Army Strategic Defense Command, 1991—Preliminary Building

Availability and Conditions Survey, SRMSC). The facility is surrounded by a perimeter fence. There is also a security fence around the sewage treatment ponds. See figure 3.9-11. The entire site is currently inactive, but is maintained in a caretaker status.

Table 3.9-5: Urban/Populated Areas within 30 Kilometers (19 Miles) of Remote Sprint Launch Site 4

Urban/Populated Area	Population	Occupied Housing Units	Distance[1] kilometers (miles)
Adams	225	121	15 (9)
Brocket	96	40	30 (19)
Derrick	*	*	23 (14)
Easby	*	*	26 (16)
Edinburg	292	127	30 (19)
Edmore	329	135	16 (10)
Fairdale	80	34	3 (2)
Lawton	63	30	21 (13)
Loma	19	12	27 (17)
Milton	141	62	23 (14)
Nekoma	61	30	15 (9)
Osnabrock	198	72	23 (14)
Union	*	*	24 (15)

Source: U.S. Department of Commerce, 1998—U.S. Census Bureau.

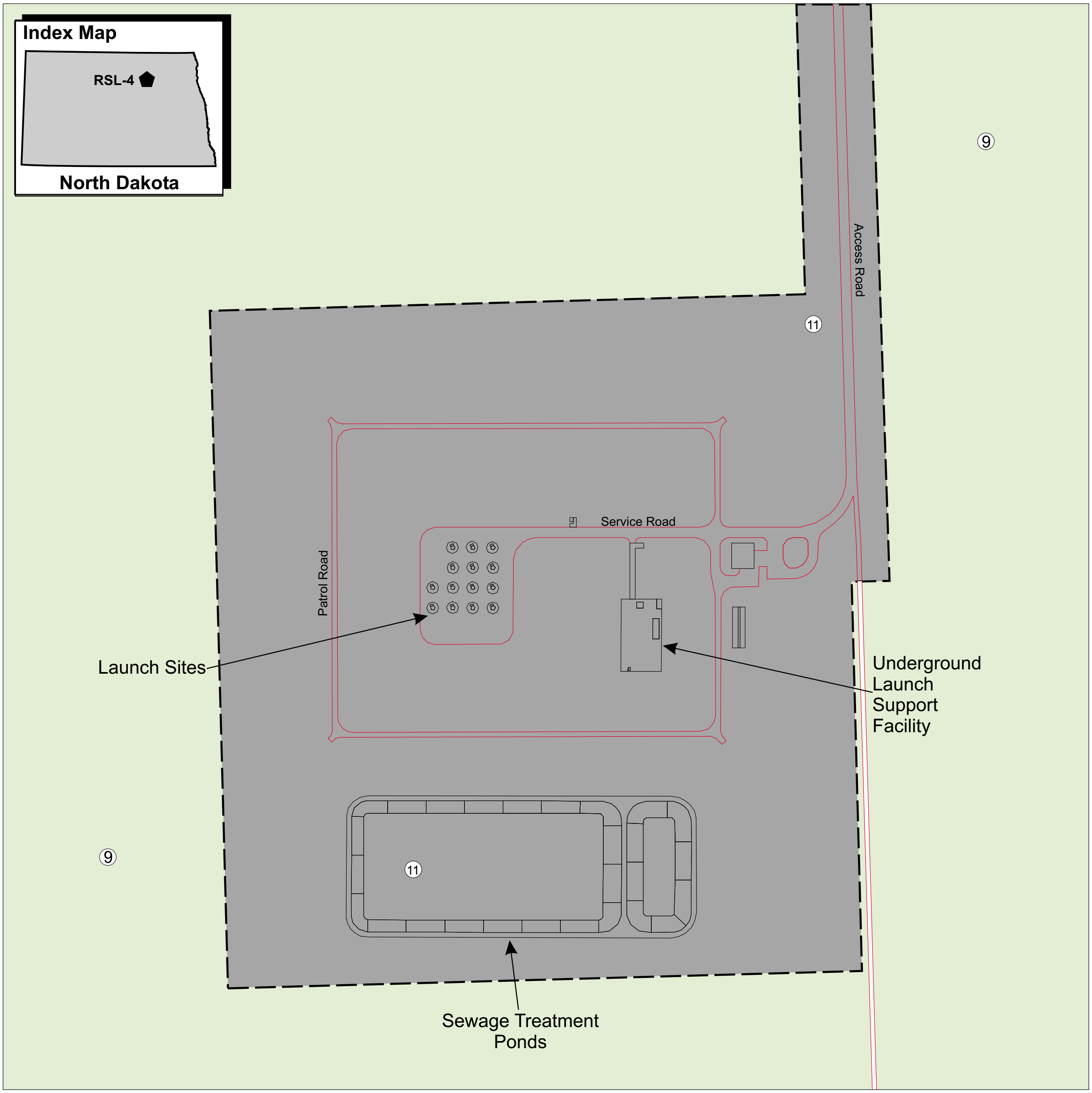
(1) Distance in air miles

* Unincorporated communities, no population data available

Aesthetics

The ROI for aesthetics at Remote Sprint Launch Site 4 includes the general visual environment surrounding the site and the areas visible from offsite locations.

The visual environment is characterized by the open plains surrounding the site that are used for agriculture. The agricultural land is the most significant feature of the natural environment. The topography of the land is relatively flat, with Remote Sprint Launch Site 4 being at about 489 meters (1,603 feet) above sea level. The most significant man-made features are the launch silos, launch support buildings, and the sewage treatment lagoons. Public access to the site is prohibited; therefore, views are limited to traffic on CR 22 to the east and CR 9 to the north and to adjacent land owners. The site and the surrounding area have a low visual sensitivity because the flatness of the land does not provide for any prominent vistas.



EXPLANATION

- 1 Airfield*
- 2 Aviation Support*
- 3 Industrial*
- 4 Institutional (Medical/Educational)*
- 5 Administrative*
- 6 Commercial*
- 7 Residential*
- 8 Recreation*
- 9 Agriculture
- 10 Open Space*
- 11 Military
- Roads
- Installation Boundary

*Standard land use designation not applicable to this figure

Scale 1:3,500

0 146 292 Feet

0 45 89 Meters

NORTH

Existing Land Use, Remote Sprint Launch Site 4

North Dakota

Figure 3.9-11

lu_rsl4_002

3.10 NOISE

Noise is usually described as unwanted sound. Characteristics of sound include amplitude, frequency, and duration. Sound can vary over an extremely large range of amplitudes. The decibel (dB) is the accepted standard unit for the measure of the amplitude of sound because it accounts for the large variations in amplitude and reflects the way people perceive changes in sound amplitude. Sound pressure levels (SPL) are easily measured, but the variability is subjective, and physical response to sound complicates the analysis of its impact on people. People judge the relative magnitude of sound sensation by subjective terms such as "loudness" or "noisiness." Table 3.10-1 presents the perceived change in loudness due to changes in SPL.

Table 3.10-1: Perceived Changes in Loudness due to Changes in Sound Pressure Level

Change in Sound Pressure Level (decibels)	Perceived Loudness
3	Just noticeable
5	Clearly noticeable
10	Doubling or halving

Source: Cowan, 1994—Handbook of Environmental Acoustics.

Sound also varies with frequency or pitch. When describing sound and its effect on a human population, A-weighted sound levels, measured in A-weighted decibels (dBA), are typically used to account for the response of the human ear. The term "A-weighted" refers to a filtering of the sound signal to emphasize frequencies in the middle of the audible spectrum and to de-emphasize low and high frequencies in a manner corresponding to the way the human ear perceives sound. The ANSI (1983) has established this filtering network. The A-weighted noise level has been found to correlate well with people's judgments of noisiness of different sounds and has been used for many years as a measure of community noise. Typical A-weighted SPLs for some common noise sources are given in table 3.10-2.

Noise is usually defined as sound that is undesirable because it interferes with speech communication and hearing, is intense enough to damage hearing, or is otherwise annoying. Noise levels often change with time; therefore, to compare levels over different time periods, several descriptors have been developed that take into account this time-varying nature. These descriptors are used to assess and correlate the various effects of noise on humans and animals, including land-use compatibility, sleep interference, annoyance, hearing loss, speech interference, and startle effects.

Table 3.10-2: Noise Levels of Common Sources

Source	Noise Level (in A-weighted decibels)	Comment
Air raid siren	120	At 15.2 meters (50 feet) (threshold of pain)
Rock concerts	110	
Airplane, 747	102.5	At 304.8 meters (1,000 feet)
Jackhammer	96	At 3.0 meters (10 feet)
Power lawn mower	96	At 0.9 meters (3 feet)
Football game	88	Crowd size: 65,000
Freight train at full speed	88 to 85	At 9 meters (30 feet)
Portable hair dryer	86 to 77	At 0.3 meters (1 foot)
Vacuum cleaner	85 to 78	At 1.5 meters (5 feet)
Long range airplane	80 to 70	Inside
Conversation	60	
Typical suburban background	50	
Bird calls	44	
Quiet urban nighttime	42	
Quiet suburban nighttime	36	
Library	34	
Bedroom at night	30	
Audiometric (hearing testing) booth	10	Threshold of hearing without hearing loss

Source: Cowan, 1994—Handbook of Environmental Acoustics.

The primary environmental noise descriptor used in environmental noise assessments is the A-weighted Day-Night Equivalent Sound Level (which is abbreviated DNL and symbolized as L_{dn}). The DNL was developed to evaluate the total daily community noise environment. The DNL is the average A-weighted acoustical energy during a 24-hour period, with 10 dBA added to all signals recorded within the hours of 10:00 p.m. and 7:00 a.m. This 10 dBA is a penalty that accounts for the extra sensitivity people have to noise during typical sleeping hours.

Almost all Federal agencies having non-occupational noise regulations use DNL as their principal noise descriptor for community assessments. These agencies include the FAA, the Federal Transit Administration, the U.S. EPA, the Department of Housing and Urban Development, the Department of Veterans Affairs, and the DOD. In addition, ANSI standards S12.9-1988, *American National Standard Quantities and Procedures for Description and Measurement of Environmental Sounds*, Part 1 (1988), and S12.40-1990, *American National Standard Sound Level Descriptors for Determination of Compatible Land Use* (1990), both identify DNL as the descriptor of choice for long-term environmental assessment measurements.

The Federal Interagency Committee on Urban Noise developed land-use compatibility guidelines for noise in terms of DNL (U.S. Department of Commerce, 1980—Guidelines for Considering Noise in Land Use Planning and Control). Table 3.10-3 provides the U.S. Army's DNL ranges for compatibility with noise sensitive land uses.

Table 3.10-3: Land Use Compatibility for Noise

Noise Zone	Compatibility with Noise Sensitive Land Uses	Percent of Population Highly Annoyed	A-weighted Day-Night Sound Level (DNL)
I	Acceptable	Less than 15	Less than 65 dBA
II	Normally unacceptable	15 to 39	65 to 75 dBA
III	Unacceptable	More than 39	Greater than 75 dBA

Source: U.S. Department of the Army, 1990—Environmental Quality, Environmental Protection and Enhancement.

Other common environmental noise descriptors that are sometimes used to supplement the DNL in environmental noise assessments are the Continuous Equivalent Sound Level (L_{eq}), the Maximum Instantaneous SPL (L_{max}), and the Sound Exposure Level (SEL).

The L_{eq} is the continuous equivalent sound level, defined as the single SPL that, if constant over the stated measurement period, would contain the same sound energy as the actual monitored sound that is fluctuating in level over the measurement period. The L_{eq} must have a designated time period; for example, an L_{eq} for 30 minutes would be denoted as $L_{eq(30\ min)}$.

The L_{max} is simply the highest SPL measured during a noise event.

The total energy of a single discrete event, such as an aircraft flyover or train passby, is represented by the SEL. The SEL is based on A-weighted sound levels that compress the total energy for the event into a 1-second time duration. Since most discrete events occur for longer than 1 second, the SEL will be higher than values associated with any other rating method (including L_{max}) for a specific event. The SEL is the noise descriptor most commonly used to assess sleep disturbance.

The Federal Highway Administration has established criteria for characterizing motor vehicle noise on roads constructed with Federal funds. Because they represent established criteria for analyzing traffic noise levels, they will be used in analyzing baseline conditions. Based on these criteria (see table 3.10-4), an exterior $L_{eq(1\ hour)}$ of 67 dBA is the standard typically used to evaluate outdoor noise levels along roadways, and, therefore, this value will be used to characterize noise levels along roadways adjacent to and in the areas surrounding proposed NMD activities.

Table 3.10-4: Federal Highway Administration Noise Abatement Criteria

Activity Category	$L_{eq(1\ hour)}$ (dBA)	Area Description
A	57 (exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose (Such areas could include amphitheaters, particular parts or portions of parks, open spaces, or historic districts which are dedicated or recognized by appropriate local officials for activities requiring special qualities or serenity and quiet)
B	67 (exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals
C	72 (exterior)	Developed lands, properties, or activities not included in categories A or B
D	---	Undeveloped lands (For requirements on undeveloped lands see paragraphs 11a and c of Federal Aid Highway Program Manual, Volume 7, Chapter 7, Section 3)
E	52 (interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums

Source: 23 CFR Part 772.

Note: dBA = decibel A-weighted, L_{eq} = equivalent sound level

Under OSHA regulations (29 CFR 1910.95), which are designed to ensure safe and healthy working conditions, workers exposed to 8-hour time-weighted average SPLs of 85 dBA and 90 dBA are required to be monitored and to be provided with hearing protection, respectively. While this standard is for workers, it is used as a reasonable guidance in assessing the potential impact to people in general.

The ROI for noise includes those areas potentially affected by proposed NMD activities that might experience DNLs greater than or equal to 65 dBA, those areas potentially affected by proposed NMD activities that potentially might experience short-term noise events (of less than 8 hours) with noise levels greater than or equal to 85 dBA, and those areas along roadways potentially affected by proposed NMD activities that potentially might experience a $L_{eq(1\ hour)}$ greater than or equal to 67 dBA.

3.10.1 ALASKA INSTALLATIONS

3.10.1.1 Clear AFS—Noise

The area surrounding Clear AFS is sparsely populated and, thus, would be expected to have a background noise level of DNL less than or equal to 55 dBA (see table 3.10-5). Furthermore, no major sources of noise are known to exist around the NMD site at Clear AFS (EDAW, Inc., 1998—Trip report of visit to Alaska, July 20–31), thus traffic is expected to be the main source of noise at Clear AFS and vicinity.

Table 3.10-5: Noise Levels Expected in Various Areas

Customary Qualitative Description of the Area	Typical Range of Background Noise Levels (Day-Night Level in dBA)	Average Background Noise Level (Day-Night Level in dBA)	Average Census Tract Population Density (Number of People Per Square Mile)
Quiet Suburban Residential	48—52	50	630
Normal Suburban Residential	53—57	21	2,000
Urban Residential	58—62	28	6,300
Noisy Urban Residential	63—67	65	20,000
Very Noisy Urban Residential	68—72	70	63,000

Source: U.S. EPA, 1974—Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety.

Note: dBA = decibel A-weighted, L_{eq} = equivalent sound level

The main highway in the vicinity of Clear AFS is the George Parks Highway. The summer average daily traffic count for the George Parks Highway in the vicinity of Clear AFS is 2,011 (Alaska Department of Transportation and Public Facilities, 1997—Annual Traffic Volume Report). Traffic noise levels of $L_{eq(1\ hour)}$ equals 72 dBA, $L_{eq(1\ hour)}$ equals 67 dBA, and $L_{eq(1\ hour)}$ equals 57 dBA are estimated to occur at approximately 14 meters (46 feet), 31 meters (101 feet), and 143 meters (469 feet) from the highway, respectively. For the purpose of analysis, the speed of the traffic was assumed to be 105 kilometers (65 miles) per hour.

No noise sensitive receptors are known to exist in the vicinity of the NMD site at Clear AFS (EDAW, Inc., 1998—Trip Report of visit to Alaska, July 20–31).

3.10.1.2 Eareckson AS—Noise

Eareckson AS is located on Shemya Island, which has no population other than personnel associated with the air station, and based on table 3.10-5, would be expected to have a background noise level of DNL less than or equal to 55 dBA.

Shemya Island is very quiet due to the prevailing winds, and aircraft noise is only heard when standing next to the airfield (EDAW, Inc., 1998—Trip Report of visit to Shemya, Alaska, April 24–May 1).

The closest civilian community is Atka, which is approximately 604 kilometers (375 miles) from Shemya Island.

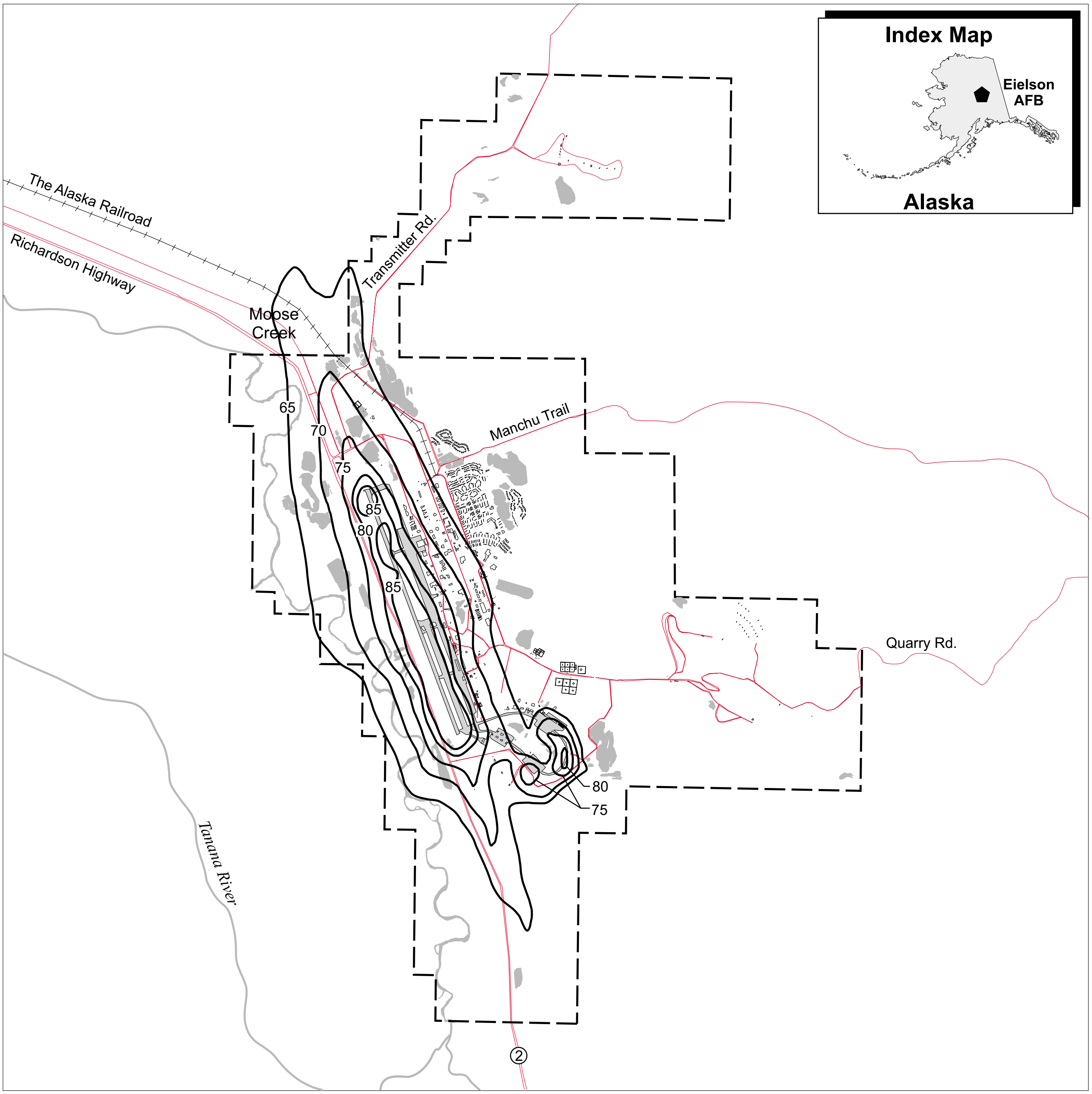
3.10.1.3 Eielson AFB—Noise

The area surrounding Eielson AFB is sparsely populated, and thus, based on table 3.10-5, would be expected to have a background noise level of DNL less than or equal to 55 dBA.

Aircraft noise at Eielson AFB occurs during aircraft engine warm-up, maintenance and testing, taxiing, takeoffs, approaches, and landings. Noise contours for aircraft operations were modeled for the *Eielson AFB Air Installation Compatible Use Zone (AICUZ) Study* (U.S. Department of the Air Force, 1992) and updated in 1996 (Eielson AFB, 1998—Integrated Natural Resources Management Plan).

As shown in figure 3.10-1, the contour with a DNL value of 65 dBA was estimated to occur outside the base boundaries on land off the northern end of Runway 31. The community of Moose Creek, which has low density housing, does fall within this contour. The highest DNLs occur on the runway and taxiways and were measured at 85 dBA. The loudest noise contours were estimated to have a DNL value of 85 dBA and to surround the majority of the airfield's primary surface. (Eielson AFB, 1998—Integrated Natural Resources Management Plan)

The main highway in the vicinity of Eielson AFB is the Richardson Highway. The Richardson Highway, a four-lane divided highway, provides access to the base through the Hursey Gate. This gate is the only operational gate at Eielson allowing access to and from the installation (Pacific Air Forces, 1998—Draft General Plan, Eielson AFB). The summer average daily traffic count for the Richardson Highway in the vicinity of the base is 10,461 (Alaska Department of Transportation and Public Facilities, 1997—Annual Traffic Volume Report). Assuming an even division of the traffic (i.e., 5,230 on each side of the divided highway), traffic noise levels of $L_{eq(1\ hour)}$ equals 72 dBA, $L_{eq(1\ hour)}$ equals 67 dBA, and $L_{eq(1\ hour)}$ equals 57 dBA are estimated to occur at approximately



EXPLANATION

Roads

Water Area

Railroads

Installation Boundary

Noise Contour: Day Night Level (decibel A-weighted)

Scale

0 .8 1.6 Miles

0 1.25 2.5 Kilometers

NORTH

Noise Zones, Eielson Air Force Base

Alaska

Figure 3.10-1

ns_eafb_001

15 meters (49 feet), 32 meters (105 feet), and 150 meters (492 feet) from the highway, respectively. For the purpose of analysis, the traffic speed was assumed to be 89 kilometers (55 miles) per hour.

Other than the community of Moose Creek, no noise sensitive receptors are known to exist in the vicinity of Eielson AFB.

3.10.1.4 Fort Greely—Noise

The area surrounding Fort Greely is sparsely populated, and thus, based on table 3.10-5, would be expected to have a background noise level of DNL less than or equal to 55 dBA. However, under certain conditions, a low level droning noise from a nearby Alaska pipeline pumping station can be heard (EDAW, Inc., 1998—Trip Report of visit to Alaska, July 20–31). This noise comes from the pumping stations' jet turbine engines and was estimated to be approximately 55 dBA.

The principal sources of noise at Fort Greely are vehicular traffic and military activities, including aircraft overflight and firing of large and small caliber weapons. Frequency and duration of noise from military activities varies as a factor of the irregular training schedules. (U.S. Department of the Army, 1997—EA, Construct Munitions Storage Facility, Cold Regions Test Center, Bolio Lake, Fort Greely, Alaska)

While intermittent, noise from military activity at Fort Greely can be fairly loud. Some representative examples include weapons testing, helicopters, and maintenance equipment. Noise from weapons testing typically ranges from 112 to 190 dBA. The noise levels on the ground from a helicopter at 460 meters (1,500 feet) and 76 meters (250 feet) of altitude are 79 dBA and 95 dBA, respectively. Maintenance equipment, such as the tracked vehicles used for trail maintenance, can generate noise levels up to 105 dBA. (U.S. Department of the Army, 1980—Final EIS Concerning Proposed Land Withdrawal for the 172nd Infantry Brigade (Alaska) at Fort Greely)

The main highways in the vicinity of Fort Greely are the Richardson Highway and the Alaska Highway. Estimated traffic noise levels for these two segments of highway are shown in table 3.10-6.

No noise sensitive receptors are known to exist in the vicinity of Fort Greely.

3.10.1.5 Yukon Training Area (Fort Wainwright)—Noise

The area surrounding the Yukon Training Area is sparsely populated, and thus, based on table 3.10-5, would be expected to have a background noise level of DNL less than or equal to 55 dBA.

Table 3.10-6: Estimated Traffic Noise Levels for the Fort Greely Area[1]

Segment of Highway	Average Annual Daily Traffic Count[2]	Distance at which $L_{eq(1\ hour)}$ = 72 dBA occurs in meters (feet)	Distance at which $L_{eq(1\ hour)}$ = 67 dBA occurs in meters (feet)	Distance at which $L_{eq(1\ hour)}$ = 57 dBA occurs in meters (feet)
Richardson Highway in the vicinity of Fort Greely	1,750	9 (29)	19 (62)	87 (284)
Alaska Highway at the Richardson Highway Junction	3,350	10 (33)	22 (72)	101 (334)

(1) Based on the methodology of the U.S. Federal Highway Administration (1978) and assuming a traffic speed of 89 kilometers (55 miles) per hour for the Richardson Highway, 72 kilometers (45 miles) per hour for the Alaska Highway.

(2) Alaska Department of Transportation and Public Facilities, 1997—Annual Traffic Volume Report.

Note: dBA = decibel A-weighted, L_{eq} = equivalent sound level

Sources of noise in the Yukon Training Area include subsonic overflights of aircraft (U.S. Department of the Air Force, 1995—Final EIS, Alaska Military Operations Areas). Noise from intermittent ground-based military activities, similar to those described in section 3.10.1.4 for Fort Greely, is also expected to occur. However, while the Yukon Training Area is expected to experience intermittent loud noises from both airborne and ground-based military activities, it is expected to have an average background noise of DNL less than 55 dBA (U.S. Department of the Air Force, 1995—Final EIS, Alaska Military Operations Areas).

The main highway in the vicinity of the Yukon Training Area is the Richardson Highway. Traffic noise from the Richardson Highway is discussed above in association with Eielson AFB in section 3.10.1.3.

No noise sensitive receptors are known to exist in the vicinity of the Yukon Training Area (EDAW, Inc., 1998—Trip Report of visit to Alaska, July 20–31).

3.10.2 NORTH DAKOTA INSTALLATIONS

3.10.2.1 Cavalier AFS—Noise

The area surrounding Cavalier AFS is sparsely populated and thus, based on table 3.10-5, would be expected to have a background noise level of DNL less than or equal to 55 dBA. Furthermore, no major sources of noise are known to exist on Cavalier AFS (EDAW, Inc., 1998—Trip Report of visit to North Dakota, June 16–18); thus, traffic is expected to be the main source of noise at Cavalier AFS and vicinity.

The main highways in the vicinity of Cavalier AFS are State Highways ND 5 and 32 and County Road 89. Estimated traffic noise levels for these three segments of highway are shown in table 3.10-7. The areas near Cavalier AFS with the highest traffic volumes are the cities of Cavalier, Walhalla, and Langdon. Table 3.10-8 shows the estimated traffic noise levels for the main road segments in these cities.

Table 3.10-7: Estimated Traffic Noise Levels for the Cavalier AFS Area(1)

Segment of Highway	Average Annual Daily Traffic Count (2)	Distance at which $L_{eq(1\ hour)}$ = 72 dBA occurs in meters (feet)	Distance at which $L_{eq(1\ hour)}$ = 67 dBA occurs in meters (feet)	Distance at which $L_{eq(1\ hour)}$ = 57 dBA occurs in meters (feet)
ND 5 in the vicinity of Cavalier AFS	1,000	5 (16)	11 (36)	50 (164)
ND 32 in the vicinity of Cavalier AFS	550	3 (10)	7 (23)	33 (108)
CR 89 at the ND 5 junction	300	2 (6)	4 (13)	17 (56)

(1) Based on the methodology of the U.S. Federal Highway Administration (1978) and assuming a traffic speed of 105 kilometer (65 miles) per hour for ND 5 and ND 32, a traffic speed of 89 kilometers (55 miles) per hour for CR 89.

(2) North Dakota Department of Transportation, 1996—Traffic Volume Map, Pembina County.

Note: dBA = decibel A-weighted, L_{eq} = equivalent sound level

Table 3.10-8: Estimated Traffic Noise Levels for Cities Near Cavalier AFS(1)

Segment of Highway	Average Annual Daily Traffic Count(2)	Distance at which $L_{eq(1\ hour)}$ = 72 dBA occurs in meters (feet)	Distance at which $L_{eq(1\ hour)}$ = 67 dBA occurs in meters (feet)	Distance at which $L_{eq(1\ hour)}$ = 57 dBA occurs in meters (feet)
ND 5 in the city of Cavalier	3,500	7 (23)	15 (49)	70 (230)
ND 32 in the city of Walhalla	1,400	4 (13)	8 (26)	38 (125)
ND 5 in the city of Langdon	1,325	4 (13)	8 (26)	37 (121)

(1) Based on the methodology of the U.S. Federal Highway Administration (1978) and assuming a traffic speed of 72 kilometers per hour (45 miles per hour).

(2) North Dakota Department of Transportation, 1996—Traffic Volume Map, Pembina County.

Note: dBA = decibel A-weighted, L_{eq} = equivalent sound level

The only noise sensitive receptor noted in the vicinity of the Cavalier AFS within 305 meters (1,000 feet) is a farmhouse approximately 90 meters (300 feet) from the western edge of the site.

3.10.2.2 Grand Forks AFB—Noise

The area surrounding Grand Forks AFB has a population density representative of a lightly populated rural area, and thus, based on table 3.10-5, would be expected to have a background noise level of DNL less than or equal to 55 dBA.

Aircraft noise at Grand Forks AFB occurs during aircraft engine warm-up, maintenance and testing, taxiing, takeoffs, approaches, and landings. Noise contours for aircraft operations were modeled for the *Air Installation Compatible Use Zone (AICUZ) Study* (U.S. Air Force, 1995) for Grand Forks AFB. As can be seen from figure 3.10-2, contours with DNL values of both 65 and 70 dBA were estimated to occur outside the base boundaries on land northwest of the base. The DNL equals 65 dBA contour was also estimated to extent very slightly off the southern end of the base. As the land use in these areas was designated as "Open/Agricultural/Low Density," the study did not conclude that there were any land use incompatibility due to the estimated aircraft noise. The loudest on-base noise contours were estimated to have a DNL value of 89 dBA and to occur at the southern end of the runway. (U.S. Air Force, 1995—AICUZ Study, Grand Forks AFB)

The main highways in the vicinity of Grand Forks AFB are U.S. Highway 2 and County Road 3B. Estimated traffic noise levels for segments of these highways are shown in table 3.10-9.

Table 3.10-9: Estimated Traffic Noise Levels for the Grand Forks AFB Area[1]

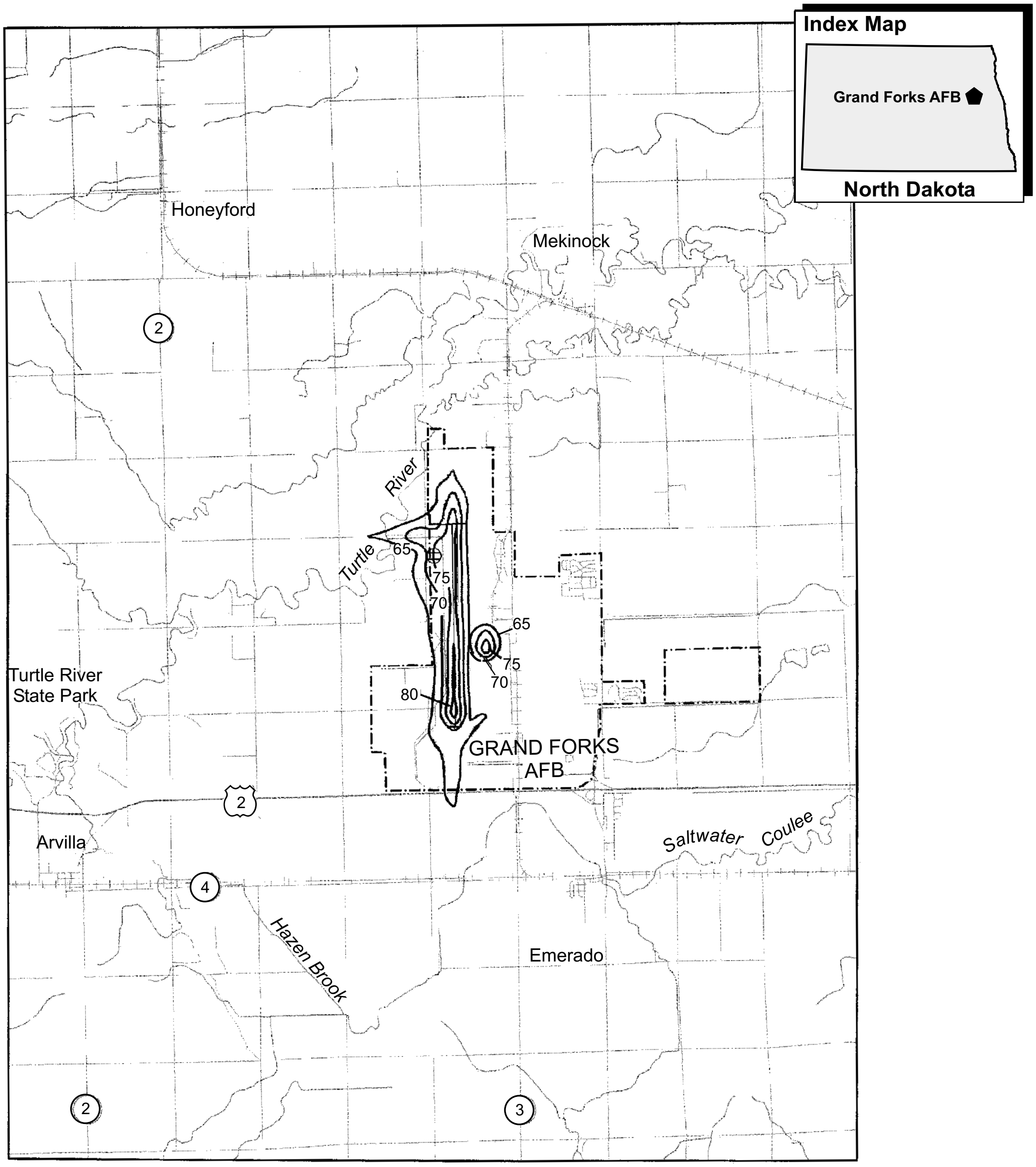
Segment of Highway	Average Annual Daily Traffic Count[2]	Distance at which $L_{eq(1\ hour)}$ = 72 dBA occurs in meters (feet)	Distance at which $L_{eq(1\ hour)}$ = 67 dBA occurs in meters (feet)	Distance at which $L_{eq(1\ hour)}$ = 57 dBA occurs in meters (feet)
CR 3B in the vicinity of Grand Forks AFB main gate	7,000	15 (49)	31 (102)	145 (478)
U.S. 2 in the vicinity of Grand Forks AFB main gate[3]	10,500	16 (52)	34 (112)	158 (518)
U.S. 2 in the vicinity of Grand Forks AFB secondary gate[3]	5,900	11 (35)	23 (76)	108 (353)

[1] Based on the methodology of the U.S. Federal Highway Administration (1978) and assuming a traffic speed of 105 kilometer (65 miles) per hour for U.S. 2, 89 kilometers (55 miles) per hour for CR 3B.

[2] North Dakota Department of Transportation, 1996—Traffic Volume Map, Grand Forks County.

[3] Traffic assumed divided evenly for divided highway, U.S. 2.

Note: dBA = decibel A-weighted, L_{eq} = equivalent sound level



EXPLANATION

–·–·– Installation Boundary

——— Noise Contour: Day-Night Equivalent Sound Level (A-weighted decibel)

Noise Zones, Grand Forks Air Force Base

Scale: 0 – .95 – 1.9 Miles; 0 – 1.5 – 3 Kilometers

NORTH

North Dakota

Figure 3.10-2

ns_gfafb_aicuz

A house is located approximately 0.5 kilometer (0.3 mile) west of the base's southwest boundary (U.S. Geological Survey, 1963—Arvilla Quadrangle, North Dakota). Two churches and a portion of Emerado incorporated land is located within approximately 0.5 kilometer (0.3 mile) of the base's southeast corner (U.S. Geological Survey, 1979—Emerado Quadrangle, North Dakota). No other specific noise sensitive receptors have been noted within approximately 0.8 kilometer (0.5 mile) of the base. Beyond this, there is a small trailer park southeast of the base and the community of Emerado south of the base.

3.10.2.3 Missile Site Radar—Noise

The area surrounding the Missile Site Radar is sparsely populated, and, based on table 3.10-5, would be expected to have a background noise level of DNL less than or equal to 55 dBA.

The main highways in the vicinity of Missile Site Radar are State Highways ND 1 and 66 and County Road 26. Estimated traffic noise levels for these segments of highway are shown in table 3.10-10.

Table 3.10-10: Estimated Traffic Noise Levels for the Missile Site Radar Area [1]

Segment of Highway	Average Annual Daily Traffic Count[2]	Distance at which $L_{eq(1\ hour)}$ = 72 dBA occurs in meters (feet)	Distance at which $L_{eq(1\ hour)}$ = 67 dBA occurs in meters (feet)	Distance at which $L_{eq(1\ hour)}$ = 57 dBA occurs in meters (feet)
ND 1 in the vicinity of Missile Site Radar	600	4 (12)	8 (26)	35 (115)
ND 66 in the vicinity of Missile Site Radar	280	2 (7)	5 (16)	21 (69)
CR 26 in the vicinity of Missile Site Radar	180	1 (4)	3 (10)	13 (43)

[1] Based on the methodology of the U.S. Federal Highway Administration (1978) and assuming a traffic speed of 105 kilometers (65 miles) per hour for ND 1 and ND 66, 89 kilometers (55 miles) per hour for CR 26.

[2] North Dakota Department of Transportation, 1996—Traffic Volume Map, Cavalier County.

dBA = decibel A-weighted, L_{eq} = equivalent sound level

The Missile Site Radar is located approximately 0.8 kilometer (0.5 mile) north of Nekoma. The closest residential units to the site are two residences within approximately 305 meters (1,000 feet) of the western side of the site.

3.10.2.4 Remote Sprint Launch Site 1—Noise

The area surrounding Remote Sprint Launch Site 1 is sparsely populated, and, based on table 3.10-5, would be expected to have a background noise level of DNL less than or equal to 55 dBA.

The main highways in the vicinity of Remote Sprint Launch Site 1 are State Highway ND 1 and County Roads 3 and 32. Estimated traffic noise levels for these segments of highway are shown in table 3.10-11.

Table 3.10-11: Estimated Traffic Noise Levels for the Remote Sprint Launch Site 1 Area[1]

Segment of Highway	Average Annual Daily Traffic Count[2]	Distance at which $L_{eq(1\ hour)}$ = 72 dBA occurs in meters (feet)	Distance at which $L_{eq(1\ hour)}$ = 67 dBA occurs in meters (feet)	Distance at which $L_{eq(1\ hour)}$ = 57 dBA occurs in meters (feet)
ND 1 in the vicinity of Remote Sprint Launch Site 1	510	3 (10)	7 (23)	32 (105)
CR 3 in the vicinity of Remote Sprint Launch Site 1	280	2 (7)	4 (13)	17 (56)
CR 32 in the vicinity of Remote Sprint Launch Site 1	65	1 (3)	1 (3)	7 (23)

[1] Based on the methodology of the U.S. Federal Highway Administration (1978) and assuming a traffic speed of 105 kilometers (65 miles) per hour for ND 1, a traffic speed of 89 kilometers (55 miles) per hour for CRs 3 and 32.

[2] North Dakota Department of Transportation, 1996—Traffic Volume Map, Ramsey County.

Note: dBA = decibel A-weighted, L_{eq} = equivalent sound level

The closest noise sensitive receptor to the site is a residential unit approximately 1.6 to 2.4 kilometers (1 to 1.5 miles) northeast of the site.

3.10.2.5 Remote Sprint Launch Site 2—Noise

The area surrounding Remote Sprint Launch Site 2 is sparsely populated, and based on table 3.10-5, would be expected to have a background noise level of DNL less than or equal to 55 dBA.

The main highways in the vicinity of Remote Sprint Launch Site 2 are State Highway ND 1 and County Road 55. Estimated traffic noise levels for these segments of highway are shown in table 3.10-12.

The closest noise sensitive receptor to the site is a residential unit approximately 1 kilometer (0.7 mile) east of the site.

Table 3.10-12: Estimated Traffic Noise Levels for the Remote Sprint Launch Site 2 Area[1]

Segment of Highway	Average Annual Daily Traffic Count[2]	Distance at which $L_{eq(1\ hour)}$ = 72 dBA occurs in meters (feet)	Distance at which $L_{eq(1\ hour)}$ = 67 dBA occurs in meters (feet)	Distance at which $L_{eq(1\ hour)}$ = 57 dBA occurs in meters (feet)
ND 1 in the vicinity of Remote Sprint Launch Site 2	575	4 (13)	7 (23)	34 (112)
CR 55 in the vicinity of Remote Sprint Launch Site 2	150	1 (3)	3 (10)	11 (36)

[1]Based on the methodology of the U.S. Federal Highway Administration (1978) and assuming a traffic speed of 105 kilometers (65 miles) per hour for ND 1, a traffic speed of 89 kilometers (55 miles) per hour for CR 55.

[2] North Dakota Department of Transportation, 1996—Traffic Volume Map, Cavalier County.

Note: dBA = decibel A-weighted, L_{eq} = equivalent sound level

3.10.2.6 Remote Sprint Launch Site 4—Noise

The area surrounding Remote Sprint Launch Site 4 is sparsely populated, and, based on table 3.10-5, would be expected to have a background noise level of DNL less than or equal to 55 dBA.

The main highways in the vicinity of Remote Sprint Launch Site 4 are State Highways ND 1 and 17 and County Roads 9 and 22. Estimated traffic noise levels for these segments of highway are shown in table 3.10-13.

Fairdale, approximately 3 kilometers (2 miles) from the site, is the location with the closest noise sensitive receptors.

Table 3.10-13: Estimated Traffic Noise Levels for the Remote Sprint Launch Site 4 Area[1]

Segment of Highway	Average Annual Daily Traffic Count[2]	Distance at which $L_{eq(1\ hour)}$ = 72 dBA occurs in meters (feet)	Distance at which $L_{eq(1\ hour)}$ = 67 dBA occurs in meters (feet)	Distance at which $L_{eq(1\ hour)}$ = 57 dBA occurs in meters (feet)
ND 1 in the vicinity of Remote Sprint Launch Site 4	490	3 (10)	7 (23)	31 (102)
ND 17 in the vicinity of Remote Sprint Launch Site 4	450	3 (10)	6 (20)	30 (98)
CR 9 in the vicinity of Remote Sprint Launch Site 4	170	1 (3)	3 (10)	12 (39)
CR 22 in the vicinity of Remote Sprint Launch Site 4	200	1 (3)	3 (10)	13 (43)

(1) Based on the methodology of the U.S. Federal Highway Administration (1978) and assuming a traffic speed of 105 kilometers (65 miles) per hour for NDs 1 and 7, a traffic speed of 89 kilometers (55 miles) per hour for CRs 9 and 22.
(2) North Dakota Department of Transportation, 1996—Traffic Volume Maps, Walsh and Ramsey Counties.
Note: dBA = decibel A-weighted, L_{eq} = equivalent sound level

3.11 SOCIOECONOMICS

Socioeconomics describes a community by examining its social and economic characteristics. Several demographic variables are analyzed in order to characterize the community, including population size, the means and amount of employment, and income creation. In addition, socioeconomics analyzes the fiscal condition of local government and the allocation of the assets of the community, such as its schools, housing, public services, and healthcare facilities.

3.11.1 ALASKA INSTALLATIONS

3.11.1.1 Clear AFS—Socioeconomics

Clear AFS is in Denali Borough in Interior Alaska. It is within the city boundary of Anderson, an Alaskan 2nd Class City, 126 kilometers (78 miles) southwest of Fairbanks and 459 kilometers (285 miles) north of Anchorage. The Air Force Station was founded in 1961 as a ballistic early warning site a year before Anderson was incorporated.

Clear AFS is in a sparsely populated region that, until the late 1960s, had a rudimentary road network. Over 90 percent of the residents of Anderson are employed by Clear AFS or other Federal and state entities. For the purposes of this analysis the economic ROI is considered to coincide mainly with the Denali Borough boundary within which several small centers of population exist. These include Anderson, Cantwell, Ferry, Healy, Lignite, and McKinley Park. In addition, the ROI includes Nenana, which is outside the Denali Borough, but which is close enough to Clear AFS to merit inclusion.

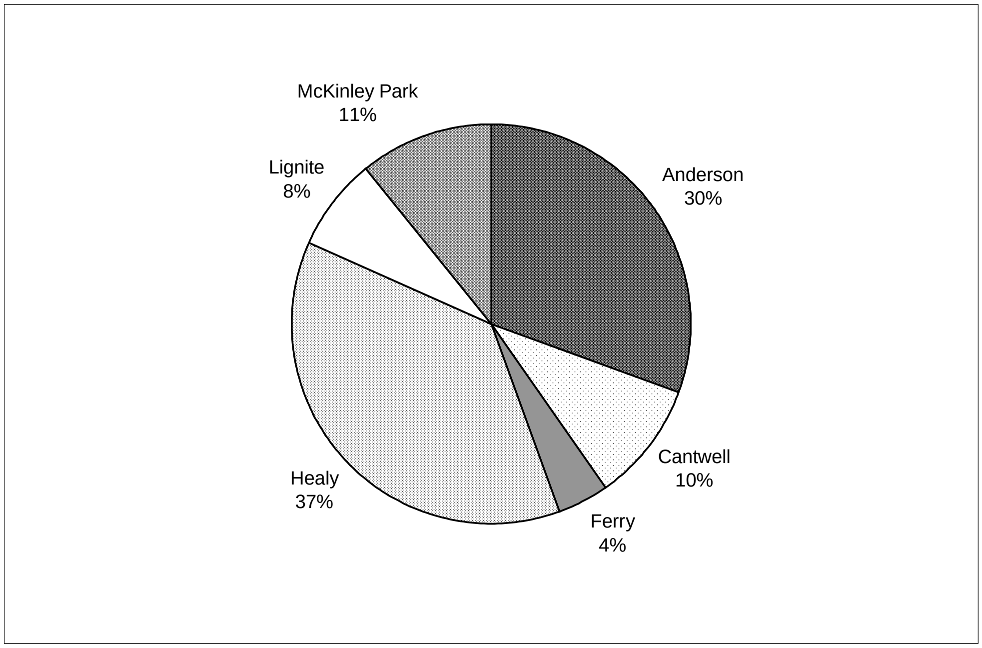
Population

Denali Borough was incorporated in 1990, when the U.S. Census of that year counted 1,764 residents. The certified 1997 population estimate for the borough shows an increase of 5.6 percent to 1,864 people. The population of Alaska grew by 10.7 percent during the same period.

An increasing proportion of the borough's citizens live within the six communities listed above; 88 percent in 1990, growing to 92 percent in 1997. Over two-thirds live in the cities of Anderson and Healy. Figure 3.11-1 illustrates the distribution of the 1997 population among the six communities that compose Denali Borough.

While Healy grew by 154 people between 1990 and 1997, Anderson lost 69 residents. Nenana grew from a population of 393 in 1990 to 435 in 1998.

Figure 3.11-1: Urban Distribution of the Population of Denali Borough



Source: Alaska Department of Community and Regional Affairs, 1998-Denali Borough, Community

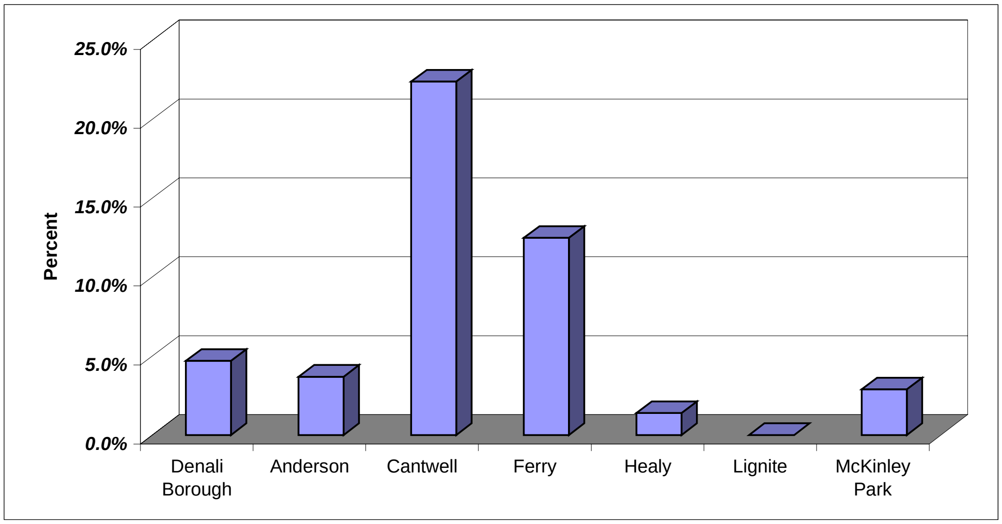
Alaska Natives comprised 4.7 percent of the population of Denali Borough in 1990. Figure 3.11-2 illustrates the varying densities of Alaska Natives among the communities of Denali Borough. The native population of Nenana represented over 47 percent of the town's population in 1990.

Employment

Denali Borough had 759 jobs in 1990, almost half of which were at, or dependent on, Clear AFS. The other main employers in the borough are the Usibelli Coal Mine, Golden Valley Electric Association and the local School District. Tourism-related industry also accounts for a significant proportion of local jobs. The community of McKinley Park, for instance, is at the entrance to Denali National Park, the home of Mount McKinley, the highest mountain in North America. The Park provided virtually all McKinley Park's 84 jobs in 1990.

Highway tourism, based on the George Parks Highway that links Anchorage to Fairbanks, is important to communities such as Cantwell, Healy, and Lignite.

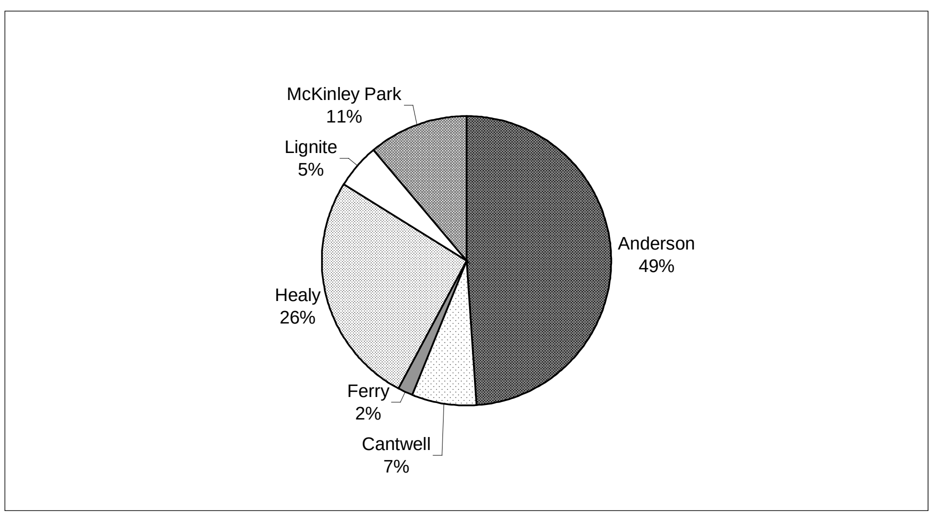
Figure 3.11-2: Alaska Natives as a Proportion of the Total Population in Denali Borough and its Communities, 1990



Source: Alaska Department of Community and Regional Affairs, 1998—Denali Borough, Community Information Summary.

The Usibelli Coal Mine is Alaska's largest coal mining operation and is located at Healy. It employs 145 people and supplies over 800,000 tons of coal a year to the local power company, the University of Alaska and the military. Coal is also exported to the Far East. Figure 3.11-3 illustrates the distribution of jobs in Denali Borough in 1990.

Figure 3.11-3: The 1990 Distribution of Jobs in Denali Borough



Source: Alaska Department of Community and Regional Affairs, 1998—Denali Borough, Community Information Summary.

In 1990, 127 people in Nenana's population were employed, with over one half occupying Federal, state, or local jobs. Other significant sources of employment included Yutana Barge Lines and various local tourist destinations. Unemployment in 1990 reached 17.5 percent.

The overall unemployment rate in Denali Borough was 10.1 percent in 1990, with 35.6 percent of the total population stating that they were economically inactive. These figures, however, masked extremes within the borough communities, where unemployment rates were as low as 3.9 percent in Healy and as high as 34.6 percent in Cantwell and 39.1 percent in Ferry. These extremes underline the statistical impact of very low regional population counts.

Retail Sales

Retailing in Denali Borough is carried out on a very limited basis, providing for basic needs. According to the 1992 Census of Retail Trade (U.S. Bureau of the Census, 1998), there were eight retailing establishments in the borough. In aggregate, they employed 20 people and had an annual turnover of about $3.2 million. They included a food store, two gas stations, three restaurant/bars and two miscellaneous stores. Fairbanks is the nearest variety retailing center to the ROI.

Nenana has a small amount of retailing that in 1990 employed 20 people, suggesting that it matches Denali Borough with respect to this activity.

Income

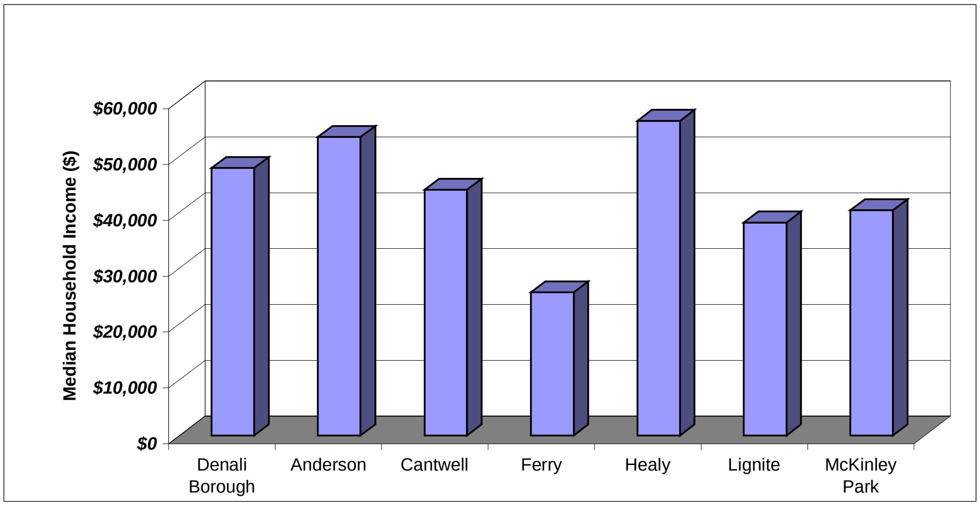
In 1990, Denali Borough had a median household income of $47,884; exactly half the households had an income higher than this figure, while half had household incomes lower. Ten percent of the residents of Denali Borough were living below the poverty level in 1990. Nenana had a median income of $27,292 and 10.4 percent of its population were below the poverty level in 1990. Figure 3.11-4 illustrates the range of median household income in Denali Borough.

Figure 3.11-5 shows the proportion of residents who have incomes below the poverty level in each community.

Housing, Education, and Health

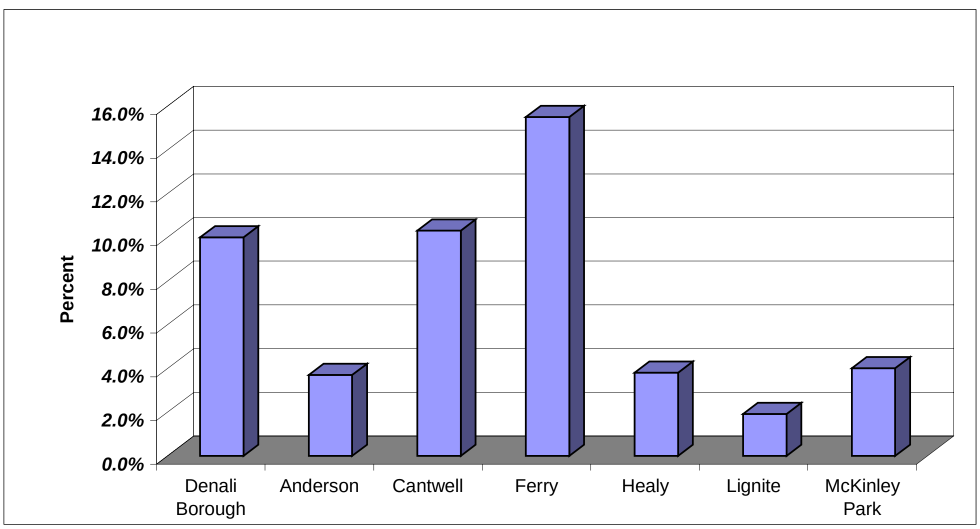
Denali Borough had 937 housing units, according to the 1990 Census. Of these, about 41 percent were vacant. While 75 percent of Denali Borough’s housing stock was located in its six constituent communities, over half the vacant homes were found outside these communities. Figure 3.11-6 shows the distribution of housing stock throughout Denali Borough and its communities.

Figure 3.11-4: Median Household Income in Denali Borough and its Communities, 1990



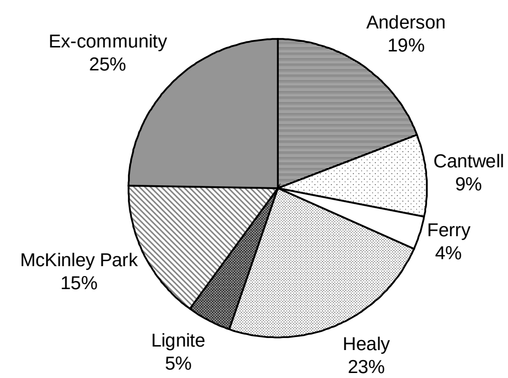
Source: Alaska Department of Community and Regional Affairs, 1998—Denali Borough, Community Information Summary.

Figure 3.11-5: The Proportion of Residents Earning Below Poverty Level Incomes in Denali Borough and its Communities, 1990



Source: Alaska Department of Community and Regional Affairs, 1998—Denali Borough, Community Information Summary.

Figure 3.11-6: The Distribution of the Housing Stock of Denali Borough, 1990



Source: Alaska Department of Community and Regional Affairs, 1998—Denali Borough, Community Information Summary.

Nenana had an additional 190 housing units in 1990. About 26 percent were vacant.

Figure 3.11-7 illustrates the extent to which vacant housing is more prevalent outside the established communities of Denali Borough.

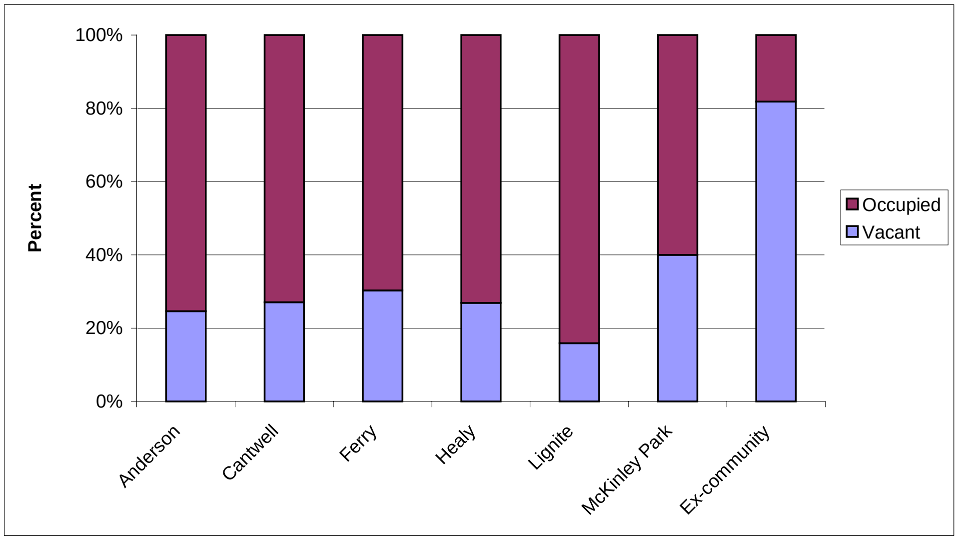
There are three schools in Denali Borough and two in Nenana. They have an aggregate roll of about 700 students. Denali Borough's schools are located in Anderson, Cantwell, and Healy.

Health care in Denali Borough and Nenana is provided at clinics or on an auxiliary basis by one or other of the emergency services. The nearest hospital to Denali Borough is in Fairbanks (see section 3.11.1.3). There are clinics at Nenana, Anderson, Cantwell, and Healy. Clear AFS has a clinic that serves the Anderson community.

Fiscal Conditions

In 1997, Denali Borough raised almost $2.8 million of operating revenues from various sources including taxes and external state funds. An important source of tax revenue was the 7 percent bed tax levied on temporary accommodation within the borough. About 55 percent of the operating revenue was applied to local education. The remaining 45 percent of revenues was split among government administration (10 percent), public safety (about 4 percent), public services (about 3 percent), and surplus funds (28 percent).

Figure 3.11-7: The Ratio of Vacant to Occupied Housing in the Communities of Denali Borough, 1990



Source: Alaska Department of Community and Regional Affairs, 1998—Denali Borough, Community Information Summary.

Nenana raised almost $3.1 million in operating revenues in 1997, over 70 percent of which was obtained from state and Federal sources. Nenana does not levy a bed tax. About 73 percent of revenues was spent on local education services.

3.11.1.2 Eareckson AS—Socioeconomics

Eareckson AS is an isolated self-contained military installation. It has no surrounding communities. There is, therefore, no socioeconomic environment at Eareckson AS affected by this action.

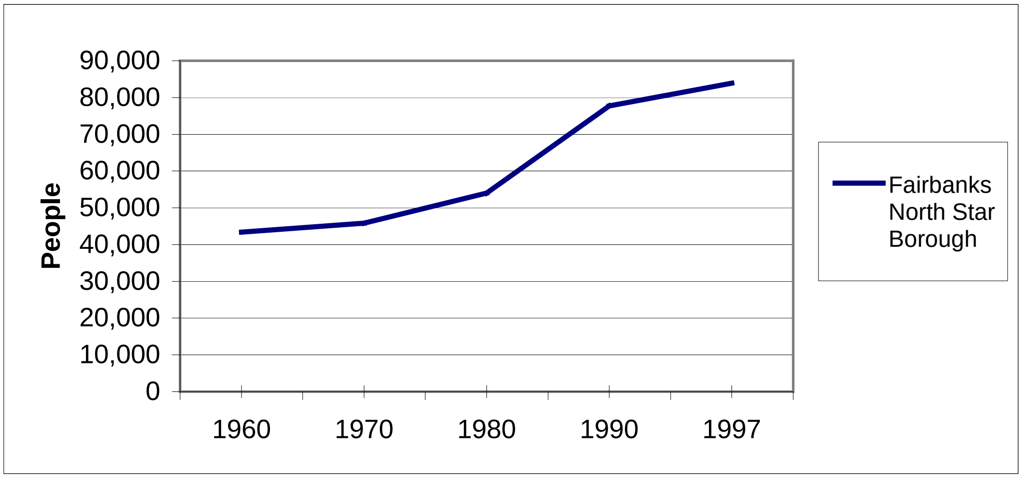
3.11.1.3 Eielson AFB—Socioeconomics

Eielson AFB is in Fairbanks North Star Borough, where it is an important component of the local economy. Though unincorporated, the community of Eielson AFB is one of the larger centers within a sparsely populated region. Fairbanks North Star Borough is in the heart of Interior Alaska and represents the second largest center of population in the state. For the purposes of this analysis, Fairbanks North Star Borough and its constituent communities form the ROI for Eielson AFB. The constituent communities of Fairbanks North Star Borough include College, Eielson AFB, Ester, Fairbanks, Fox, Moose Creek, North Pole, Pleasant Valley, Salcha, and Two Rivers.

Population

By Alaskan standards, Fairbanks has been a long-established center of population within the state. About 20 percent of Alaska's population lived in the borough in 1960. Figure 3.11-8 illustrates the growth in population of Fairbanks since 1960.

Figure 3.11-8: Population Change in Fairbanks North Star Borough 1960-1997



Source: Alaska Department of Community and Regional Affairs, 1998—Fairbanks North Star Borough, Community Information Summary.

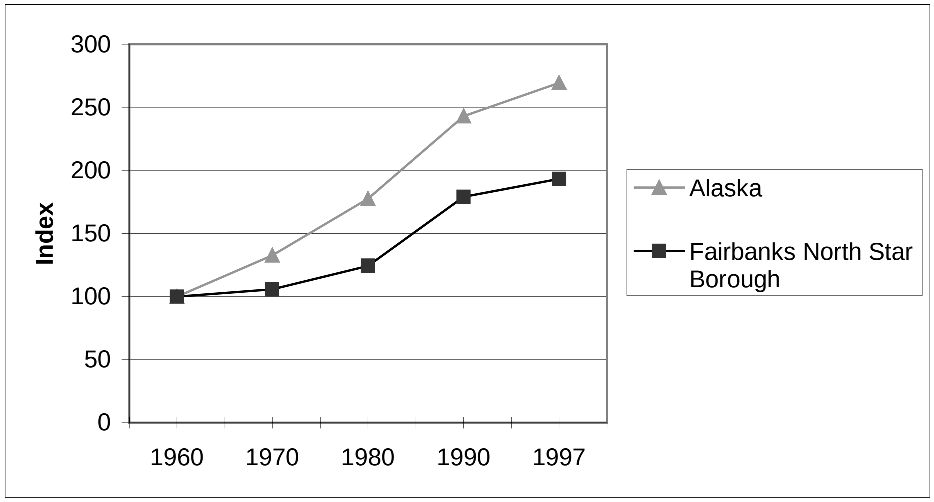
An index was created to illustrate the rate at which Alaska has grown in comparison to Fairbanks North Star Borough, since 1960. The index was set at 100 in 1960. By 1997 the rate of growth for Alaska had moved the index to over 250, compared to Fairbanks North Star Borough, which was a little below 200 (figure 3.11-9).

By 1997, about 13 percent of Alaska's population lived in Fairbanks North Star Borough.

The proportion of the borough's population living in the 10 communities listed above fell from 65.7 percent in 1990 to 63.6 percent in 1997. All of the 10 communities experienced an increase in population with the exception of Eielson AFB, which lost almost 6 percent of its population during that period. Figure 3.11-10 illustrates the distribution of population among the 10 communities.

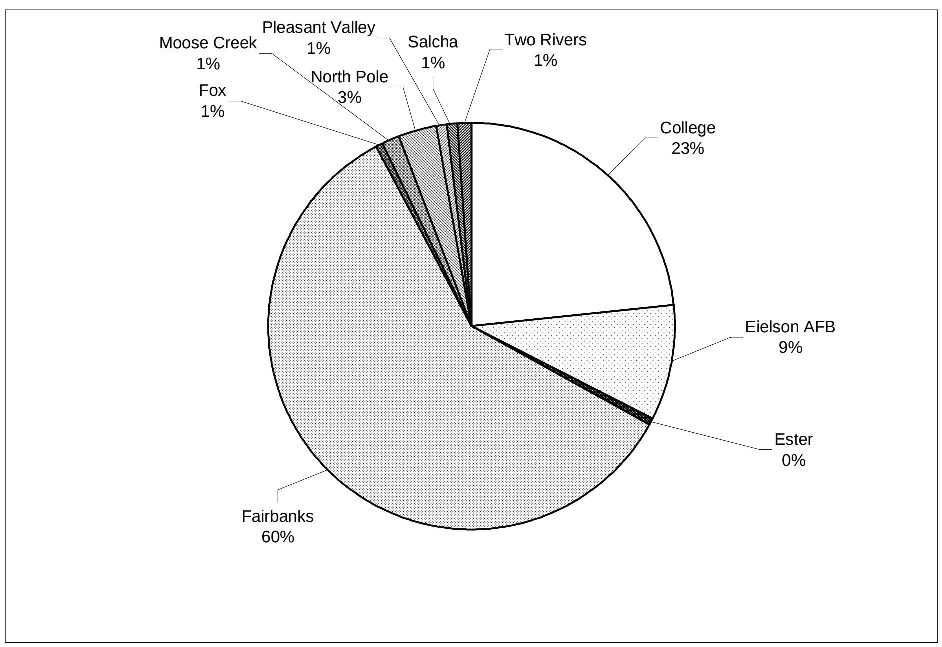
Fairbanks North Star Borough, with 6.9 percent of its population being Alaskan Natives, is considered primarily non-native. The largest concentration of Alaskan Natives is in Fairbanks, where 9.2 percent of its population have this ethnic origin.

Figure 3.11-9: Population Rate of Growth Index Comparing Alaska and Fairbanks North Star Borough 1960-1997



Source: Alaska Department of Community and Regional Affairs, 1998—Fairbanks North Star Borough, Community Information Summary.

Figure 3.11-10: Urban Distribution of the Population of Fairbanks North Star Borough



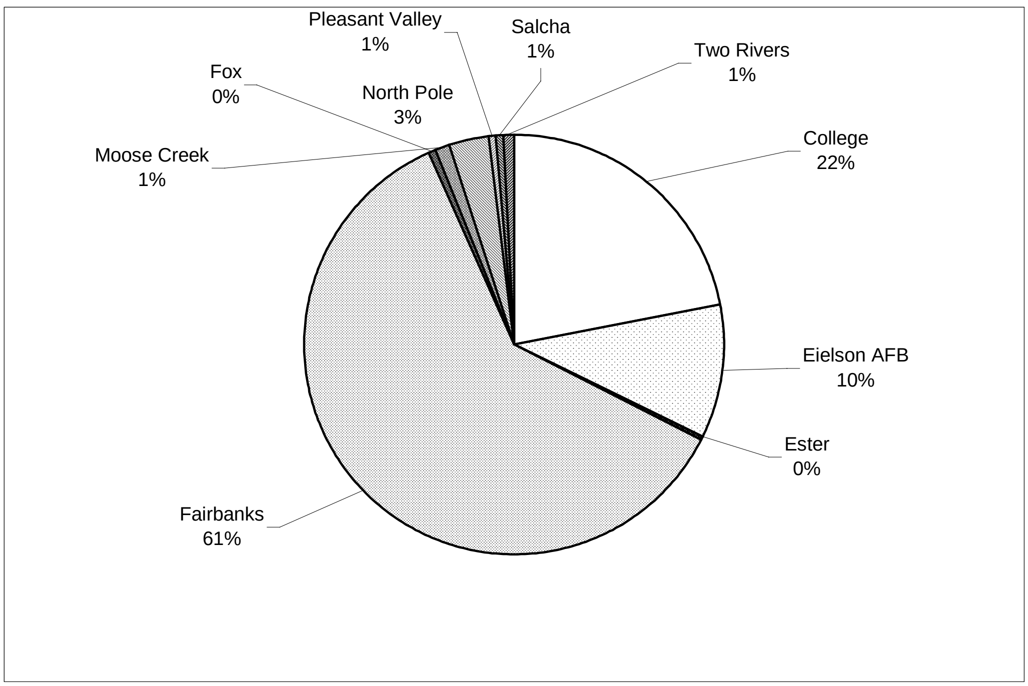
Source: Alaska Department of Community and Regional Affairs, 1998—Fairbanks North Star Borough, Community Information Summary.

Employment

Fairbanks is the largest employment center in Fairbanks North Star Borough, accounting for about 61 percent of the borough's 39,160 jobs in 1990. These jobs reflect the role of Fairbanks as the service center for Interior Alaska, with jobs being concentrated in the various arms of government, communication, transportation, manufacturing, financial, and medical services.

College, the borough's second community (though in reality a suburb of Fairbanks), mostly supplies the workforce for the nearby University of Alaska at Fairbanks. Eielson AFB is the third largest concentration of employment in the borough. About 50 percent of all the jobs in Fairbanks and its surrounding communities—including Eielson AFB—are in government services. Figure 3.11-11 shows the distribution of jobs throughout the borough.

Figure 3.11-11: Urban Distribution of Jobs in Fairbanks North Star Borough, 1990



Source: Alaska Department of Community and Regional Affairs, 1998—Fairbanks North Star Borough, Community Information Summary.

The overall unemployment rate in Fairbanks North Star Borough in 1990 was 10.2 percent. Almost 30 percent of the population claimed, at the time, to be economically inactive. Of the larger population centers, College had the lowest unemployment rate at 7.8 percent, while Eielson AFB had the highest at 13 percent.

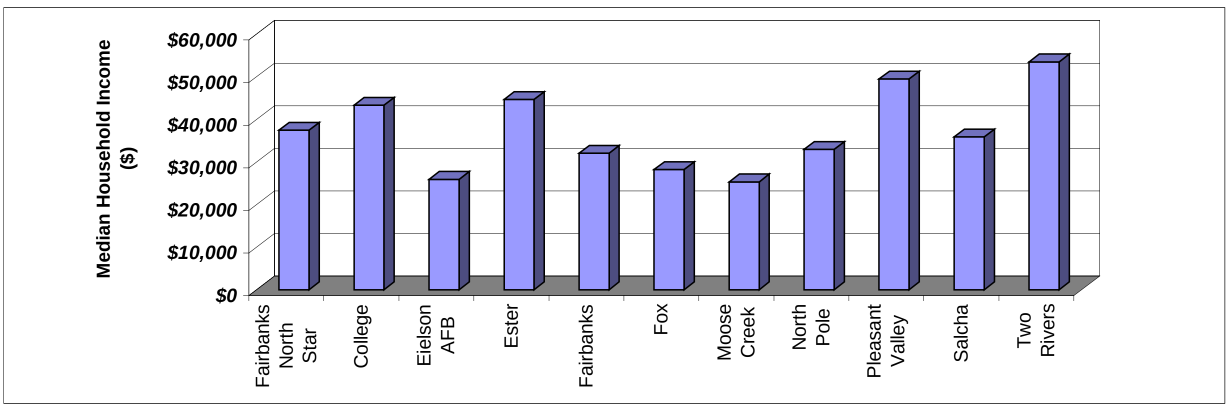
Retail Sales

Fairbanks North Star Borough is an important retail center in the state, accounting for about 14 percent of Alaska's annual retail sales and employing over 5,400 people. It is second only to Anchorage in this respect. Of the borough's 432 retail establishments in 1992 (U.S. Bureau of the Census, 1998—1992 Census of Retail Trade, Denali County Equivalent, Alaska), about 63 percent were located in Fairbanks. There were about $690 million of annual retail sales in Fairbanks North Star Borough in 1992.

Income

The median income of the borough was $37,468 in 1990. Figure 3.11-12 shows the variations in median household income among the various borough communities. Moose Creek had the lowest median household income in 1990, with Pleasant Valley having the lowest proportion of its population living beneath the poverty level (figure 3.11-13).

Figure 3.11-12: Median Household Income in Fairbanks North Star Borough and its Surrounding Communities, 1990

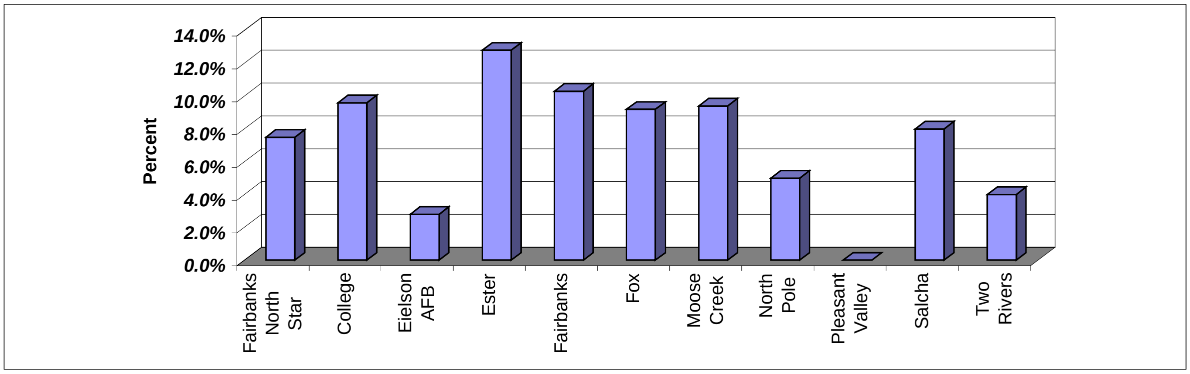


Source: Alaska Department of Community and Regional Affairs, 1998—Fairbanks North Star Borough, Community Information Summary.

Housing, Education, and Health

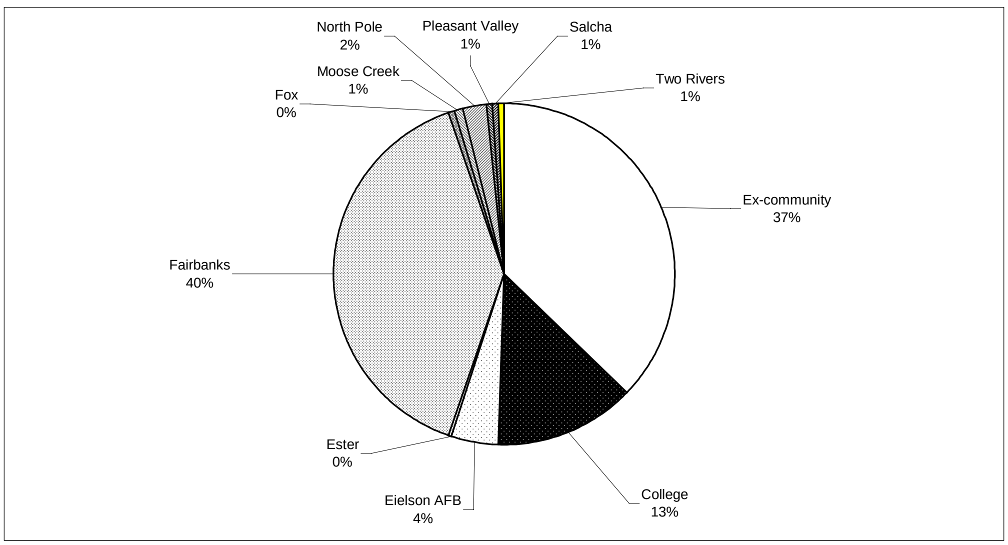
Fairbanks North Star Borough had 31,823 housing units, according to the 1990 census. About 16 percent, or 5,130, were vacant. Figure 3.11-14 illustrates the distribution of the borough's housing stock, with 37 percent being outside the 10 communities that compose the borough.

Figure 3.11-13: Proportion of Residents Living Beneath the Poverty Level, 1990



Source: Alaska Department of Community and Regional Affairs, 1998—Fairbanks North Star Borough, Community Information Summary.

Figure 3.11-14: The Distribution of the Housing Stock of Fairbanks North Star Borough, 1990



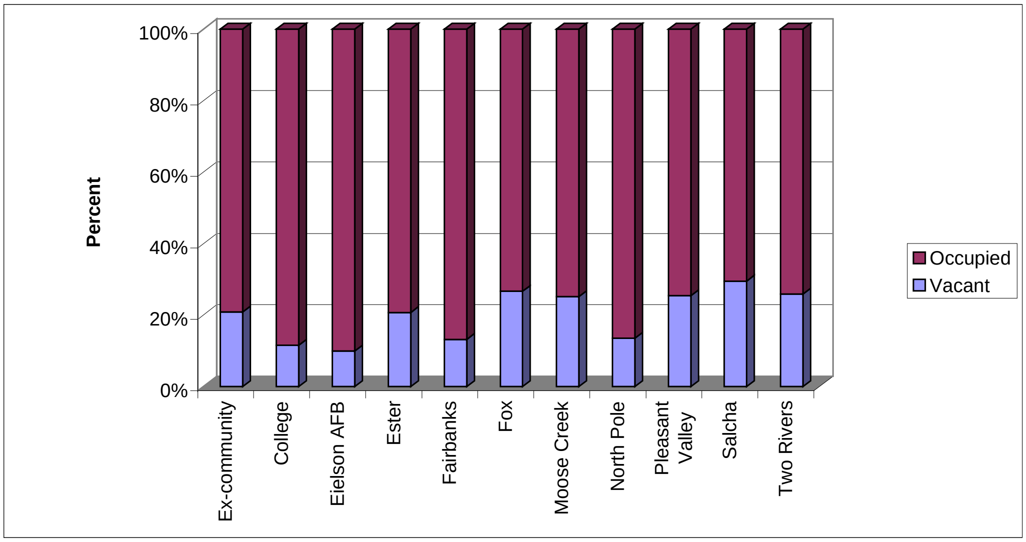
Source: Alaska Department of Community and Regional Affairs, 1998—Fairbanks North Star Borough, Community Information Summary.

The lowest housing vacancy rates in 1990 were in the largest communities of Fairbanks, College, and Eielson AFB (figure 3.11-15).

There are 32 schools of various sizes in Fairbanks North Star Borough. They had an aggregate student roll of 16,430 in 1997. About 65 percent of these students attended the 21 schools located in Fairbanks. Most of the remaining students in the borough attend school at either Eielson AFB or at the five schools located in North Pole. The schools in the Fairbanks North Star Borough currently have sufficient student capacity (C. Henry, 1999—comment provided at NMD Fairbanks Public Hearing).

Fairbanks, with its three hospitals, provides the majority of health care facilities in the borough. Currently, the Fairbanks Memorial Hospital is operating at approximately 54 percent of capacity. In addition, 11 new mental heath beds along with an expanded mental health unit were added in November 1999. This hospital serves as the major provider for Interior Alaska (R. Solie, 1999—written comment provided during NMD Draft EIS comment period). Its only other significant facility is located at Fort Wainwright, which operates Bassett Army Hospital. Eielson AFB operates a clinic to serve its immediate community.

Figure 3.11-15: The Ratio of Vacant to Occupied Housing in the Communities of Fairbanks North Star Borough, 1990



Source: Alaska Department of Community and Regional Affairs, 1998—Fairbanks North Star Borough, Community Information Summary.

Fiscal Conditions

In 1997, Fairbanks North Star Borough raised almost $185.1 million in operating revenues from various sources including an 8 percent bed tax. The largest borough expenditure was on education, which accounted for 60 percent of the total operating and capital budget.

The municipality of Fairbanks also collects and spends tax revenue. In 1996, this amounted to a little over $81 million collected and $60.65 million expended. Public services including electric, phone, and water utilities represented the largest expenditures, along with public safety. Fairbanks levies an 8 percent bed tax, a 5 percent alcohol tax, and an 8 percent tobacco tax.

3.11.1.4 Fort Greely—Socioeconomics

Fort Greely is in Interior Alaska, on the Richardson Highway. The nearest city to Fort Greely is Delta Junction, about 16 kilometers (10 miles) north of the base. The area is sparsely populated with an economy dependent on Fort Greely, state employment, some agriculture and Alyeska Pipeline Services.

For the purpose of this analysis, the ROI is assumed to include Fort Greely, Delta Junction, and Big Delta. Fort Greely was established in 1942 at the same time that the Alaska Highway was being constructed. The Fort started arctic training towards the end of the decade and in so doing became a major contributor to the local economy. In July 1995, the BRAC recommended realignment of Fort Greely with a scheduled completion by 2002.

At the time of the realignment announcement, there were about 750 jobs at Fort Greely, representing more than half the total employment for the area (Delta/Greely Community Coalition, 1998—Final Reuse Plan). At present, Fort Greely supports two tenants: the Cold Regions Test Center and the Northern Warfare Training Center.

A Reuse Plan, funded by Office of Economic Adjustment, Department of Defense, was produced in order to help the local community prepare for the realignment of Fort Greely. The Plan identifies two alternatives for the reuse of Fort Greely and builds on two previous planning studies. Alternative One (the preferred alternative) is characterized as a mixed use industrial complex anchored by military, institutional, and industrial uses. The latter uses are considered the most compatible with a continued military presence at Fort Greely. The institutional use would be a medium security correctional facility. The Reuse Plan estimates that the preferred alternative would generate between 490 and 600 jobs at Fort Greely.

The second alternative would represent a minimum threshold of post operations at Fort Greely, without a major institutional facility acting as an anchor. This alternative would generate 30 to 66 jobs.

Population

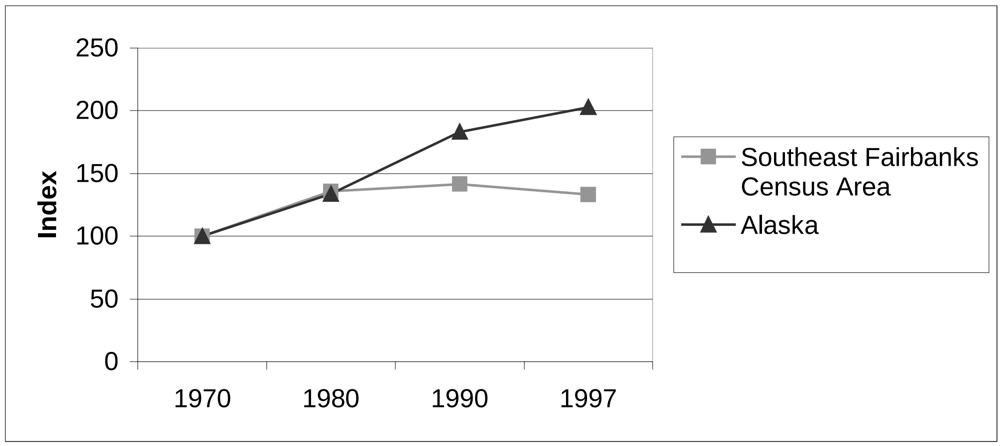
The ROI is part of a wider region known as the Southeast Fairbanks Census Area. In 1997, it was estimated that the Census Area had a population of 5,563. The population of the ROI at that time was 2,059, or 37 percent of the Census Area.

Figure 3.11-16 shows an index of growth that compares the Census Area with Alaska. Population growth in the Census Area was affected by the reduction in personnel at Fort Greely so that, unlike most of the rest of the state, its population fell to pre-1980 levels between 1990 and 1997.

The impact of the downsizing of Fort Greely on the region's population is further emphasized in figures 3.11-17 and 3.11-18. Fort Greely's share of the Census Area population clearly falls between 1990 and 1997.

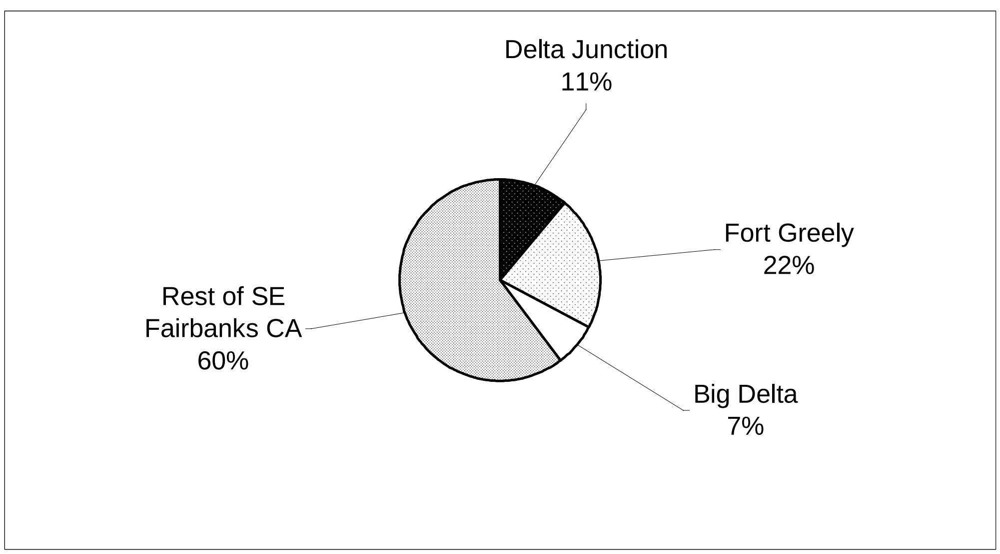
The Alaska Native population of the ROI in 1990 was relatively small, with Fort Greely having the lowest density of the three communities at 1 percent. Delta Junction and Big Delta had Alaska Native populations of 4.4 percent and 4 percent respectively.

Figure 3.11-16: Index of Population Growth, Alaska and Southeast Fairbanks Census Area, 1970-1997



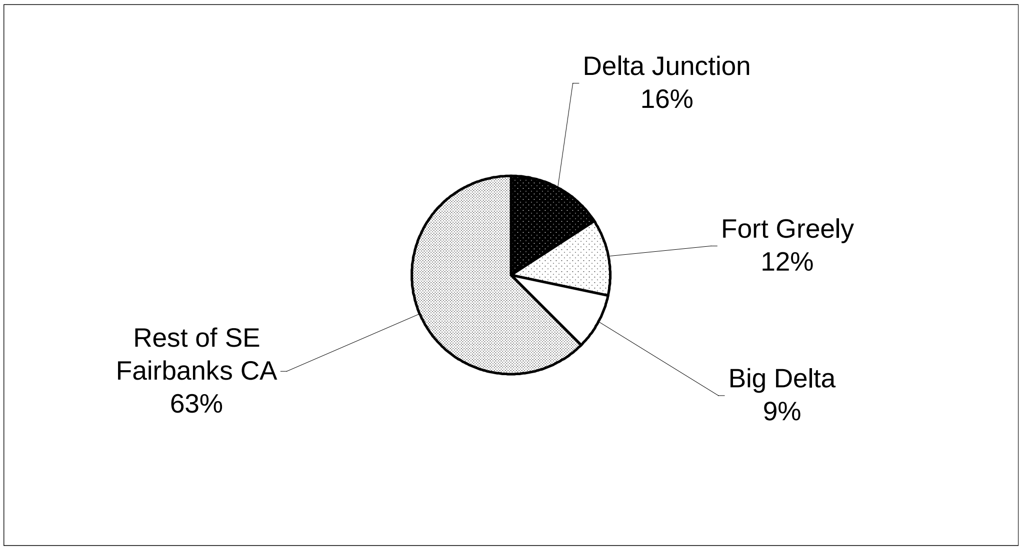
Source: Alaska Department of Labor, 1998—Alaska Population Overview

Figure 3.11-17: Distribution of the Population of Southeast Fairbanks Census Area, 1990



Sources: Alaska Department of Community and Regional Affairs, 1998—Fairbanks, Community Information Summary.; U.S. Bureau of the Census, 1995—Alaska Population.

Figure 3.11-18: Distribution of the Population of Southeast Fairbanks Census Area, 1997



Sources: Alaska Department of Community and Regional Affairs, 1998—Fairbanks, Community Information Summary; U.S. Bureau of the Census, 1995—Alaska Population.

Employment

Fort Greely is estimated to account for 50 percent of all the employment in its surrounding communities, emphasizing the lack of diversity in the economy of the ROI. The School District is the second largest government employer in the area, along with state and Federal highway maintenance services. The highway also provides some tourism-related employment during the summer months. Figure 3.11-19 shows the distribution of jobs among the three communities that compose the ROI.

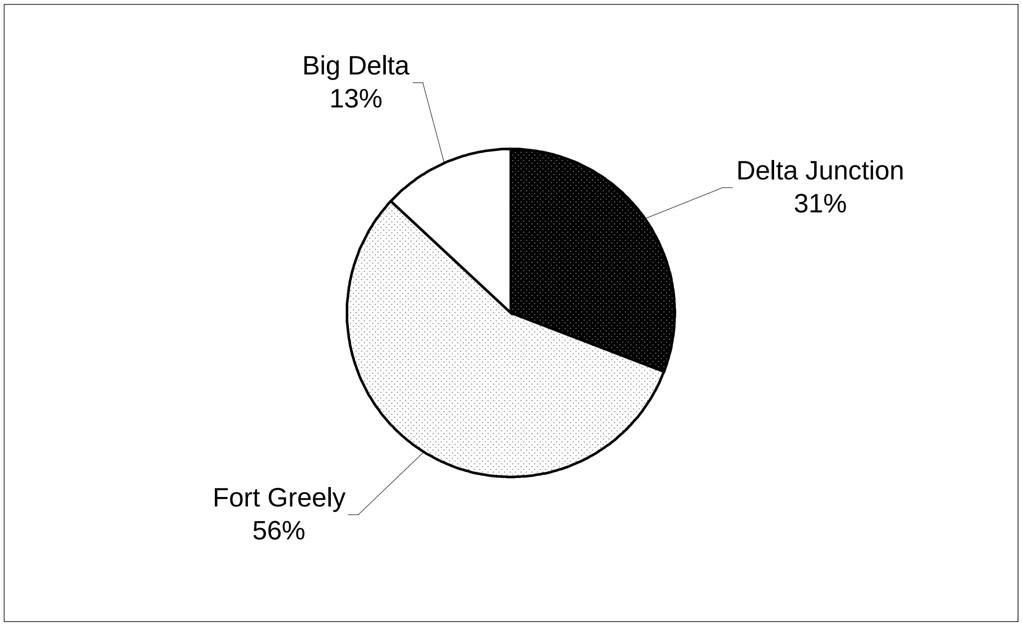
Unemployment in 1990 varied significantly among the three ROI communities. Figure 3.11-20 illustrates the difference.

In the case of Big Delta, its extremely low unemployment rate was paralleled by its comparatively high percentage of economically inactive residents; 54 percent of its 1990 population were characterized as such.

Retail Sales

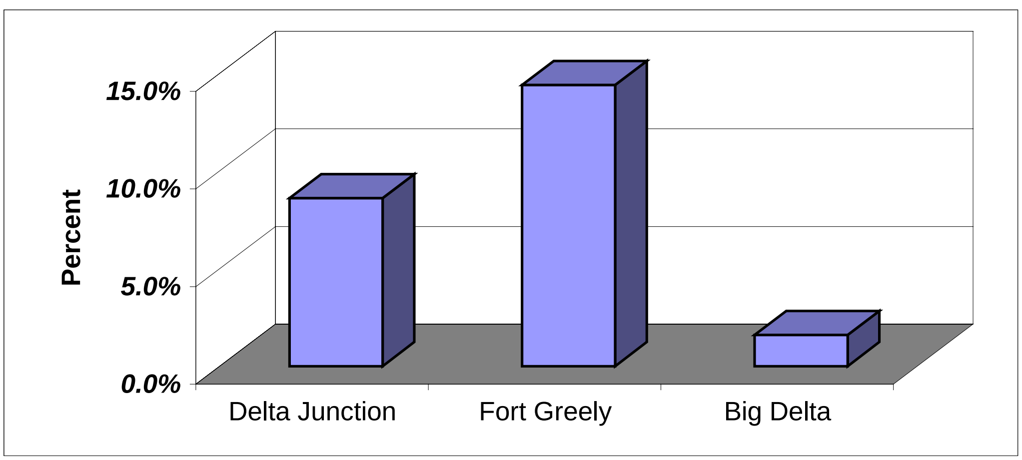
Retailing within the ROI is limited to small convenience stores, usually combined with a gas station, and tourism-related retailing, including bars and restaurants. The nearest variety retailing center to the ROI is Fairbanks.

Figure 3.11-19: Distribution of Jobs within the Urban Communities Surrounding Fort Greely, 1990



Source: Alaska Department of Community and Regional Affairs, 1998—Fort Greely, Delta Junction, and Big Delta, Community Information Summaries.

Figure 3.11-20: Unemployment Rates in the Communities Comprising the ROI, 1990

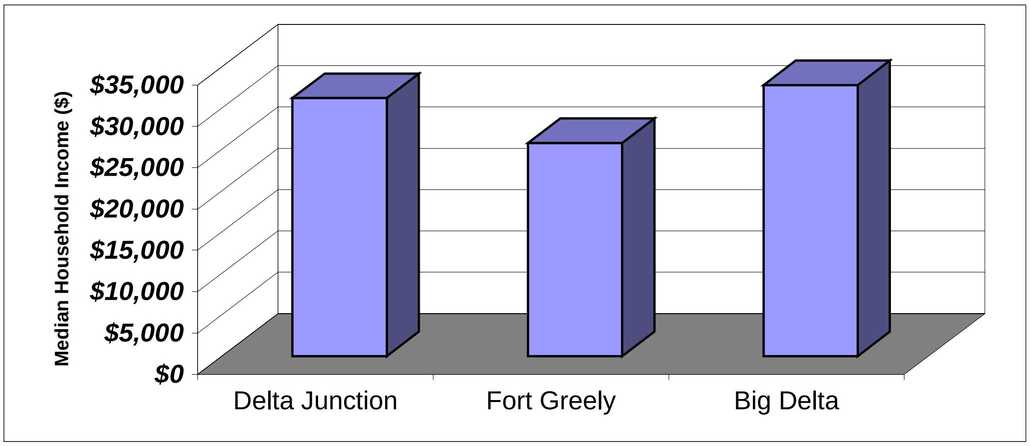


Alaska Department of Community and Regional Affairs, 1998—Fort Greely, Delta Junction, and Big Delta, Community Information Summaries.

Income

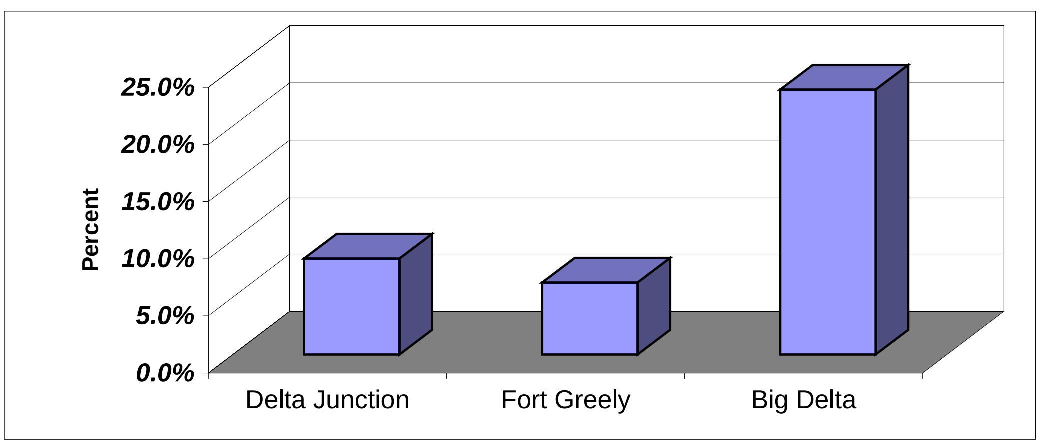
Big Delta had the highest median income among the three communities that are closest to Fort Greely. It also had the proportion of residents living below the poverty level. Figures 3.11-21 and 3.11-22 show median household income and the proportion of residents with household incomes below the poverty level.

Figure 3.11-21: Median Household Income in the Communities Surrounding Fort Greely, 1990



Source: Alaska Department of Community and Regional Affairs, 1998—Fort Greely, Delta Junction, and Big Delta, Community Information Summaries.

Figure 3.11-22: The Proportion of Residents Earning Below Poverty Level Incomes in the Communities Surrounding Fort Greely, 1990

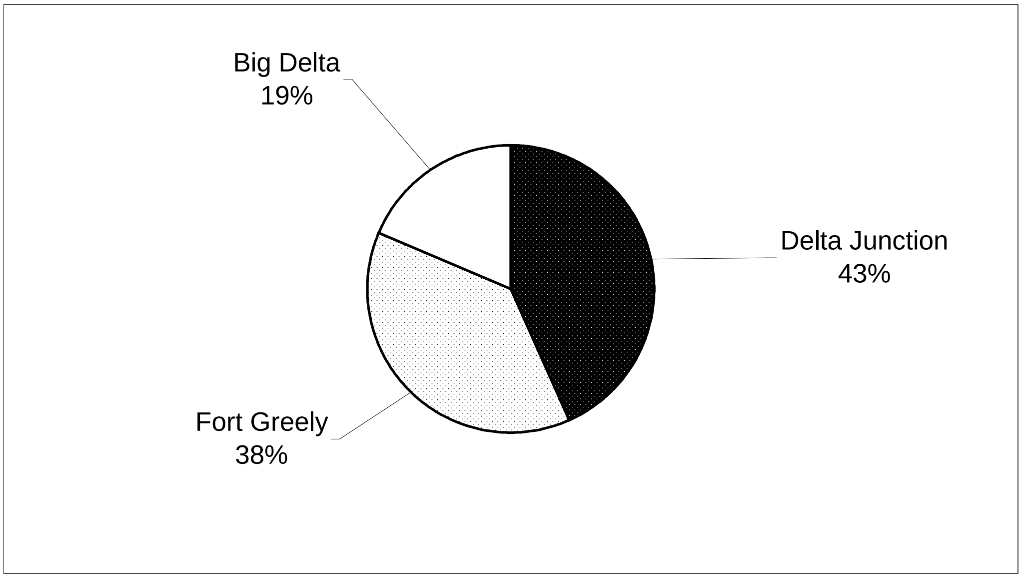


Source: Alaska Department of Community and Regional Affairs, 1998—Fort Greely, Delta Junction, and Big Delta, Community Information Summaries.

Housing, Education, and Health

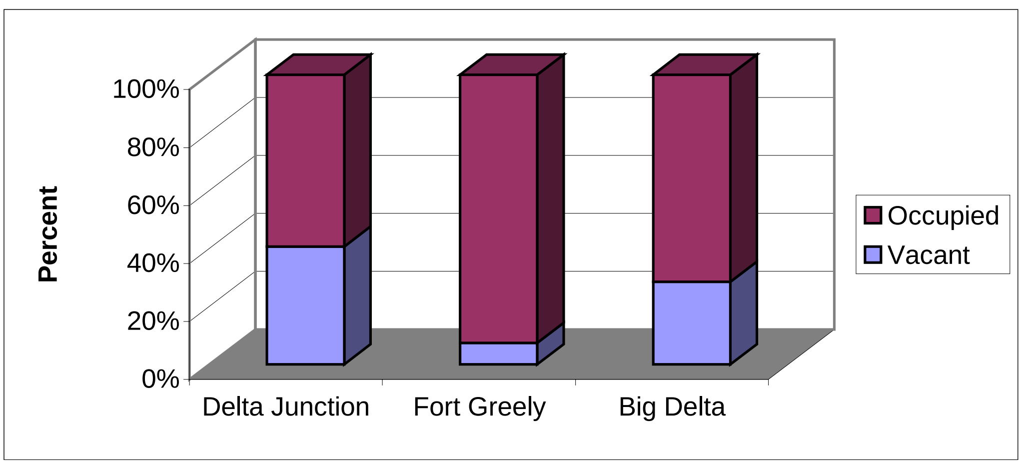
There were 956 homes in the three communities surrounding Fort Greely in 1990. A little over 25 percent were vacant. This aggregate figure, however, masks a significant variation in housing stock and vacancy rates among the three communities. Figures 3.11-23 and 3.11-24 illustrate the variations.

Figure 3.11-23: The Distribution of Housing Among the Communities Surrounding Fort Greely



Source: Alaska Department of Community and Regional Affairs, 1998—Fort Greely, Delta Junction, and Big Delta, Community Information Summaries.

Figure 3.11-24: The Ratio of Vacant to Occupied Housing in the Communities Surrounding Fort Greely, 1990



Source: Alaska Department of Community and Regional Affairs, 1998—Fort Greely, Delta Junction, and Big Delta, Community/Information Summaries.

There are five schools in the ROI—four in Delta Junction, with a student roll of 491, and one at Fort Greely, with 307 pupils.

Delta Junction has a family medical center, and Fort Greely has a clinic. The nearest hospital is 153 kilometers (95 miles) away at Fairbanks.

Fiscal Condition

Delta Junction raised $150,000 of revenue in 1997 from local service charges and external, state sources. It spent almost $184,000 in the same year, the majority on public safety, roads, parks, and recreation. Delta Junction does not levy a bed tax on temporary accommodation.

3.11.1.5 Yukon Training Area (Fort Wainwright)—Socioeconomics

The socioeconomic affected environment for the Yukon Training Area is the same as that of Eielson AFB, as outlined in 3.11.1.3.

3.11.2 NORTH DAKOTA INSTALLATIONS

3.11.2.1 Cavalier AFS—Socioeconomics

Cavalier AFS is in Pembina County, in northeastern North Dakota, adjacent to the Canadian border. Cavalier AFS is in a rural region with scattered urban centers of population, where individuals will, typically, travel long distances to their workplace. This analysis, therefore, has defined an economic region—or ROI—that includes Cavalier, Pembina, Ramsey, and Walsh counties. This area also coincides broadly with the northernmost part of the United States Red River Basin economic region. It represents the primary drive-to-work area for Cavalier AFS, though it is acknowledged that, in this part of the United States, some employees regularly drive to their workplace from farther afield. Figure 3.11-25 illustrates the inter-relationship of the four counties. It uses 1990 census data to create a matrix of those employees resident and working within their county, those working outside their county, and those living outside the ROI who travel to it for work.

The table shows that in the cases of Cavalier, Pembina, and Walsh counties, about the same number of workers traveled to work between the counties (612) as traveled to them from counties outside the ROI (613). Ramsey County attracted 342 workers from other counties, compared to the 40 workers it attracted from within the ROI.

Population

Like much of North Dakota, the ROI is a sparsely inhabited rural area which, since the 1950s, has experienced a chronic decline in population. The total 1996 population of the four counties ROI was 39,265. This equaled 6.1 percent of the population of North Dakota for the same year.

The largest centers of population in the ROI are Devils Lake in Ramsey County and Grafton in Walsh County. These cities had populations in 1995 of 7,687 and 5,323 respectively.

Figure 3.11-25: Commuting Patterns in the ROI

		Destination of worker					
		Cavalier	**Pembina**	**Ramsey**	**Walsh**	**Other counties**	**Total working outside county of residence**
Origin of worker	**Cavalier**	2049	153	24	24	0	**201**
	Pembina	17	3560	0	266	59	**342**
	Ramsey	26	0	5239	39	327	**5631**
	Walsh	21	131	16	5563	187	**355**
	Other counties	42	260	342	311		**955**
Total living outside their county of employment		**106**	**544**	**382**	**640**	**573**	**16411**

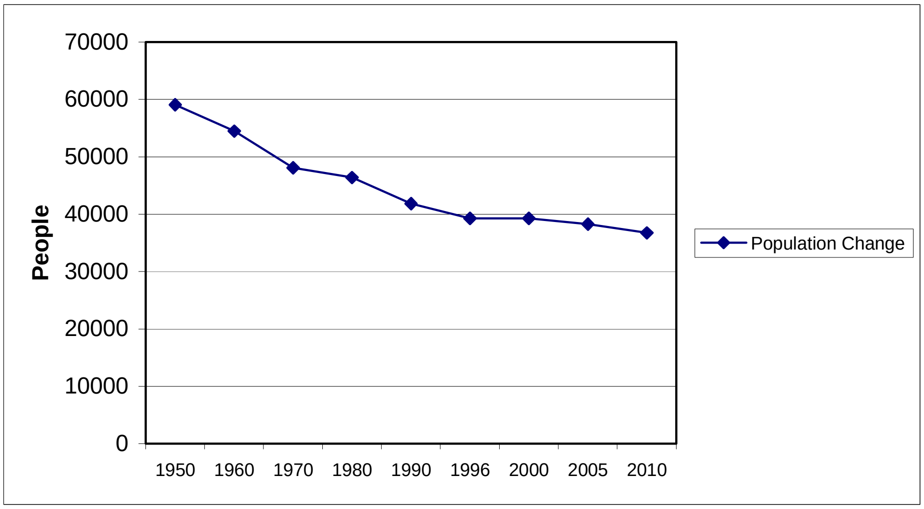
Source: Goodman, 1996—The Economic Health of North Dakota

The total population of North Dakota fell by 2.8 percent between the 1980 and 1990 censuses. The population for the state in 1996, however, showed a reversal of this trend, with a small but perceptible increase of a little over 4,700 people. This increase was the result of growth in the more urbanized counties of North Dakota.

In contrast, the counties in the predominantly rural ROI experienced a varied, but continuous and disproportionately rapid rate of decline between 1980 and 1997. Figure 3.11-26 illustrates the long-term trend in population decline in the ROI. The change in population of Cavalier County was the most precipitous, falling almost 33 percent between 1980 and 1997. Pembina and Walsh counties fell by just over 17.1 percent and 11 percent respectively, while Ramsey County declined by a little over 5 percent. The differing rates of population decline are illustrated by creating an index of population change. Figure 3.11-27 considers the state and each of the counties in the ROI, and takes 1980 as the common starting point, with an index of 100. The index clearly shows the faster population decline of Cavalier County, and the decline of the ROI as a whole, when compared to the State of North Dakota.

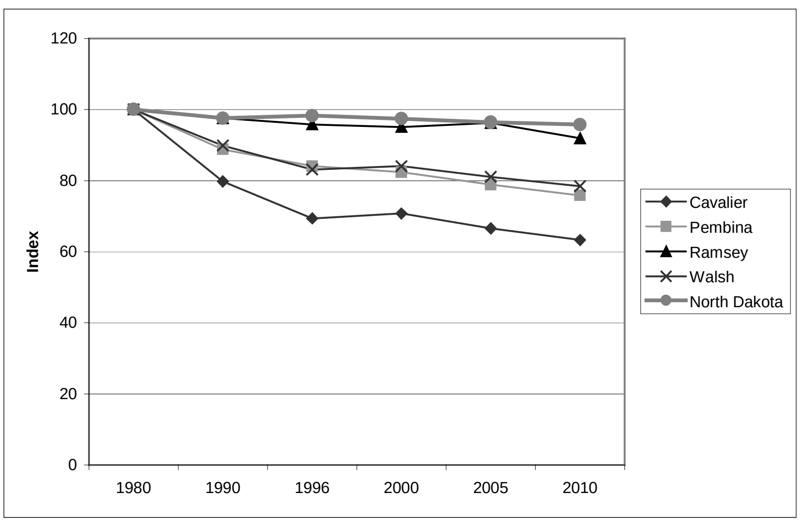
The 1990 Census showed that North Dakota had a population density of 3.6 people per square kilometer (9.3 people per square mile). See figure 3.11-28. The least dense county within the ROI was Cavalier County, with 1.6 people per square kilometer (4.1 people per square mile). Ramsey and Walsh counties had population densities a little above the state average, and Pembina slightly below. In 1990, the United States had a population density of 27.2 people per square kilometer (70.3 people per square mile).

Figure 3.11-26: Population Change in the Four-County ROI



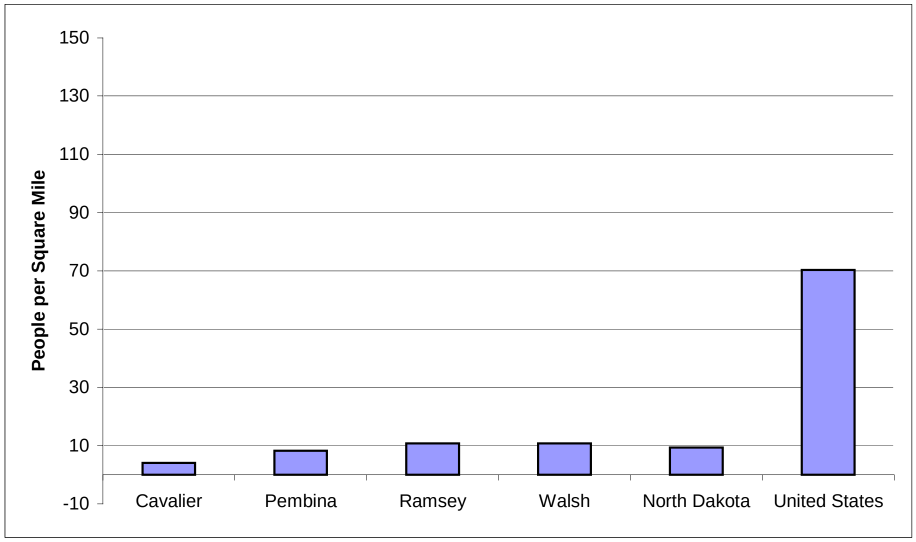
Sources: Coon and Leistritz, 1998—The State of North Dakota: Economic, Demographic, Public Service, and Fiscal Conditions; U.S. Bureau of the Census, 1998—North Dakota Population Estimates.

Figure 3.11-27: Population Index, Comparing the Four-County Region with North Dakota



Sources: Coon and Leistritz, 1998—The State of North Dakota: Economic, Demographic, Public Service, and Fiscal Conditions; U.S. Bureau of the Census, 1998—North Dakota Population Estimates.

Figure 3.11-28: 1990 Population Density



Source: U.S. Bureau of the Census, 1996—Land Area, Population, and Density for States and Counties.

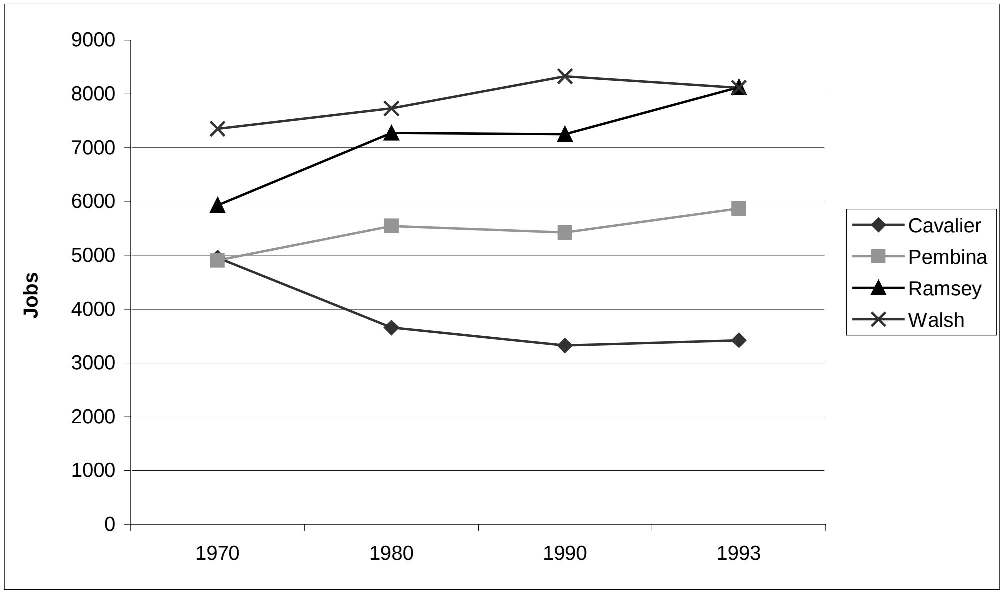
In 1994, the labor force resident in the ROI was 20,222. This represented 6 percent of North Dakota's labor force. Unemployment in the ROI was 5.6 percent or 1,143 persons, compared to 3.9 percent for North Dakota.

Employment

The number of jobs in the ROI rose from about 23,150 in 1970 to 25,534 in 1993, an increase of a little over 10 percent. Figure 3.11-29 shows, however, that this increase was neither consistent throughout the period nor experienced in equal measure in all of the counties that compose the ROI. Ramsey and Walsh counties accounted for the majority of jobs in the ROI, while Cavalier suffered the most significant level of decline. Figure 3.11-30, by indexing the job numbers, illustrates these differences further. Significantly, not one of the counties in the ROI was able to create jobs at the rate experienced in the state as a whole. In contrast, North Dakota's main urban centers of population were able to post year-on-year increases in jobs.

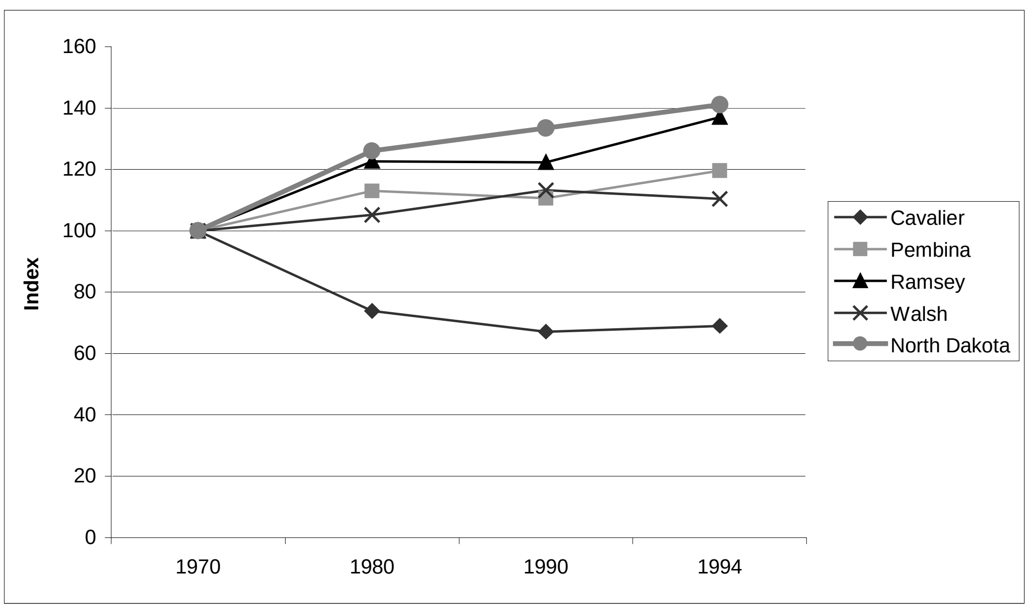
Apart from agriculture, the main sources of employment in the ROI were retailing and services. In recent years agriculture has been declining and retailing and services have been increasing.

Figure 3.11-29: Jobs in the ROI



Source: Goodman, 1996—The Economic Health of North Dakota

Figure 3.11-30: Index of Job Change in the ROI



Source: Goodman, 1996—The Economic Health of North Dakota

Despite its decline in recent decades, agriculture continues to maintain its role as a regional wealth-provider and economic engine. North Dakota is in the Northern Plains farm production region, as classified by the U.S. Department of Agriculture. The region is characterized by short growing seasons and the predominance of winter and spring wheat. In 1995, North Dakota ranked first among the top 10 wheat producing states, in terms of cash receipts for that commodity. Approximately 41,000 people were employed in agricultural production in North Dakota in 1993.

The counties of the ROI accounted for 16.7 percent of that state's farm earnings for 1990 (U.S. Bureau of the Census, 1995—County and City Data Book, 1994, North Dakota Counties). The dominance of agriculture within the ROI is further illustrated by the contribution of farm earnings to total earnings. In 1990, farm earnings were 12.4 percent of total earnings in North Dakota. The equivalent statistic for agriculture's contribution to earnings in Cavalier County was almost 52 percent, 34 percent for Pembina County, 20 percent for Ramsey County, and 28 percent for Walsh County.

The outlook for agriculture in the ROI is mixed. On the one hand, farms located in the Red River Valley have access to some of the most fertile land in the nation, allowing them to grow a diverse array of crops. Conversely, a greater need for mechanization, driven by diminishing Federal subsidies and increased competition, is accelerating the trend for larger farms with fewer owners. While productivity per farmed acre may be increasing in the ROI, the small, local communities that have always depended on the locally-spent farmer's dollar are suffering from a decline in retail sales. This in turn has led to migration from the countryside to the urban centers by younger people and those who have depended on a vibrant, locally-based farming community for their livelihood.

Income

Between 1970 and 1994, real per capita income in the ROI increased in line with that of North Dakota. Pembina County led the ROI in increased per capita income, as illustrated by figure 3.11-31. However, it is important to point out that North Dakota ranks 48th out of 50 states when comparing average weekly wage for covered employment (Department of Economic Development and Finance, 1998—North Dakota Details for Business and Industry). While wages form one component of per capita income, wage comparisons are a useful economic indicator. Only Pembina County, among those in the ROI, showed a higher than average wage rate for 1995 (North Dakota State Data Center, 1998—Average Wage per Job in North Dakota, 1991-1996).

Figure 3.11-31: Per Capita Income, 1970-1994

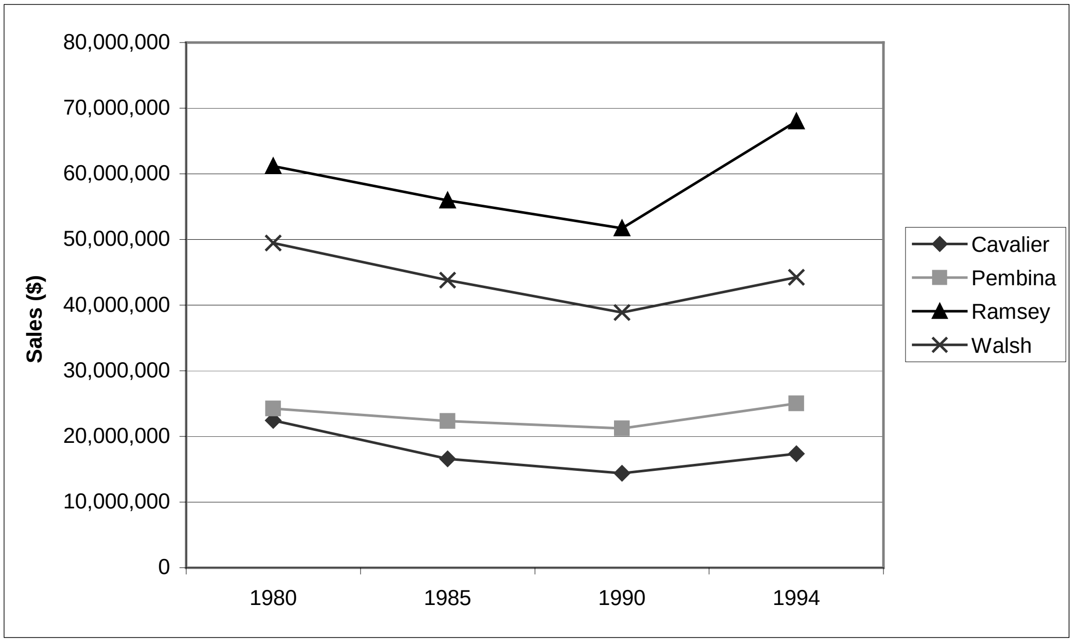
Source: Goodman, 1996—The Economic Health of North Dakota

Retail Sales

In a sparsely populated rural area like the ROI, retailing is a fundamental building block of the local community, providing jobs, wealth, and a vital service to those unable or unwilling to travel long distances to shop. The ROI has experienced a trend consistent with other parts of North Dakota; a decline in its retail centers, as people have migrated from the countryside to the cities. Devils Lake is the only surviving significant comparative retail center in the ROI, with the smaller communities of Langdon and Cavalier able to offer only limited shopping facilities. Figure 3.11-32 illustrates the change in real retail expenditure in the ROI since 1980. Figure 3.11-33 indexes retail sales in order to compare changes with the state trend. Retail sales levels in the ROI have recovered since the recession of the early 1990s, but to varying extents. Figure 3.11-33 shows that only Ramsey County, in which Devils Lake is situated, shows sales growth greater than the state average.

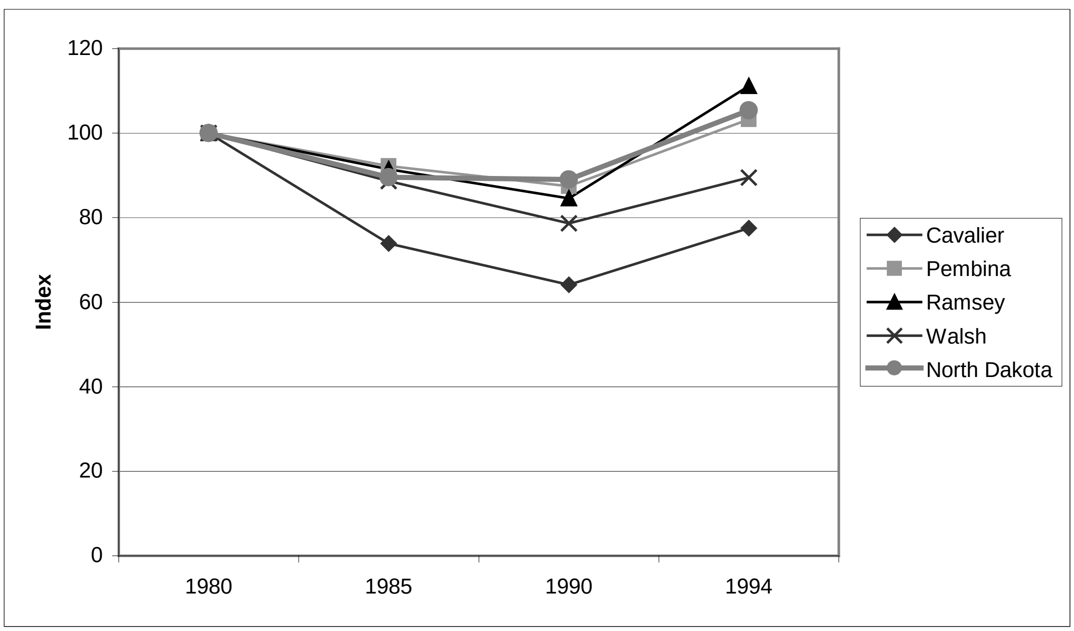
While the town of Devils Lake appears to exhibit healthy retail sales increases, a significant proportion of recent growth has been attributed to the indirect effects of the substantial flood remediation program being carried out around the lake itself. The importance of Devils Lake to retailing in Ramsey County and the ROI is further illustrated by figure 3.11-34. Per capita retail sales are higher in Ramsey County than in the state as a whole.

Figure 3.11-32: Retail Sales in the ROI, 1980-1994



Source: Goodman, 1996—The Economic Health of North Dakota

Figure 3.11-33: Index of Change in Real Retail Sales in the ROI, 1980-1994



Source: Goodman, 1996-The Economic Health of North Dakota

Figure 3.11-34: Per Capita Retail Sales in the ROI, 1980-1994

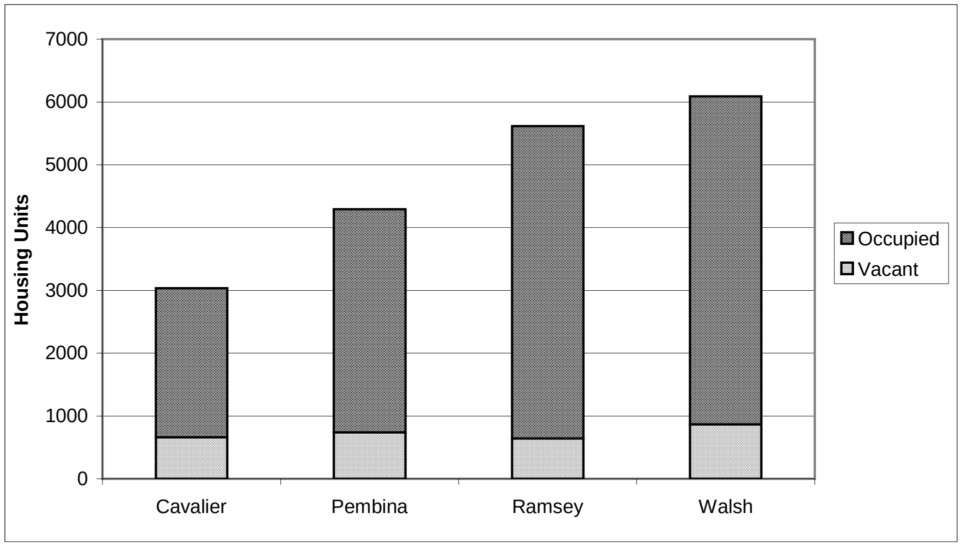
Source: Goodman, 1996—The Economic Health of North Dakota

Housing, Education, and Health

The ROI experienced a substantial investment in housing, education, and healthcare facilities in preparation for the Anti-Ballistic Missile program of the early 1970s. Temporary and permanent housing was installed in the communities surrounding Cavalier AFS during that period. While much of the temporary accommodation has been cleared, trailer courts, concrete pads, and capped services still exist in Langdon. At least one local manufacturer of assembled homes has increased its production capabilities since the anti-ballistic missile program and is able to meet the small local demand for housing construction with relative ease. In addition, the ROI's stock of vacant housing has increased over the last 2 decades as a result of the population migrating to major urban centers such as Grand Forks and Fargo. The four-county ROI had a stock of slightly over 19,000 housing units in 1990. Almost 3,000 were vacant. This represented a vacancy rate of about 15 percent, compared to the North Dakota rate of 12.8 percent. This is illustrated in figure 3.11-35.

The Langdon public school district covers about 1,683 square kilometers (650 square miles) and includes facilities designed for a relatively large number of pupils. The schools in Langdon, which serve grades K-12, have a current roll of 650 pupils and capacity for approximately 1,000. Revenue per pupil in 1997 was $4,666, compared to a state average of $4,833 per pupil.

Figure 3.11-35: Housing Vacancy Rates in the ROI in 1990



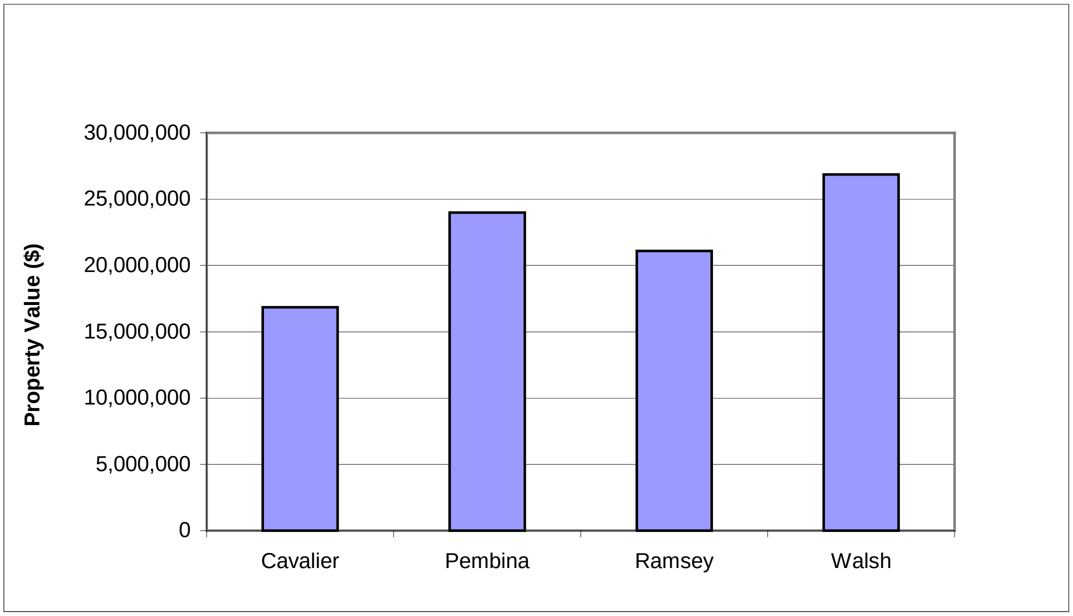
Source: Coon and Leistritz, 1998—The State of North Dakota: Economic, Demographic, Public Service, and Fiscal Conditions

The local health facilities within the ROI support a provider ratio of 1 to 1,500 people. Federal standards call for a ratio of 1 to 3,500. The Langdon hospital is funded by its own foundation and was characterized as well equipped for a rural facility. Langdon Hospital is about a 2-hour drive from more extensive medical facilities in Grand Forks.

Fiscal Conditions

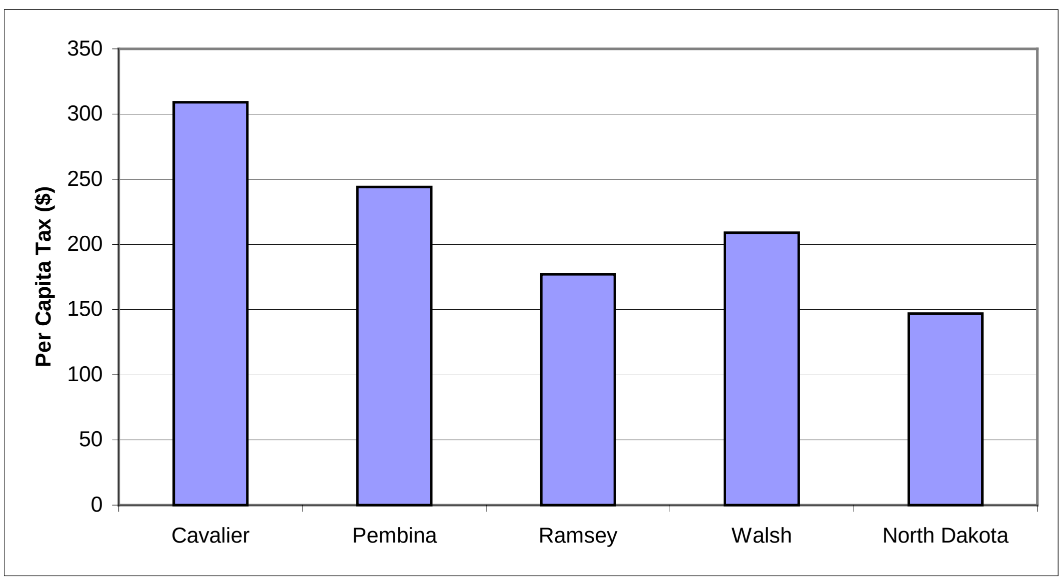
The North Dakota system of local government has been described as complicated because it comprises "townships within counties, cities within counties, and special districts overlaying townships, cities and counties" (Coon and Leistritz, 1998—The State of North Dakota: Economic, Demographic, Public Service and Fiscal Conditions). Figure 3.11-36 shows the taxable value of each of the four counties in the ROI. The 1996 taxable value of property in the ROI was $88,786,232, or 8 percent, of the state's total taxable value for that year. Local government expenditure per head varied throughout the ROI, with Cavalier County having the highest taxable value per capita (see figure 3.11-37), but the lowest per capita local government expenditure (see figure 3.11-38). These factors correlate strongly with Cavalier County being the smallest and fastest shrinking in terms of population and having the highest proportion of taxable value in agricultural land (see figure 3.11-39).

Figure 3.11-36: Total Taxable Property Value in the ROI 1996



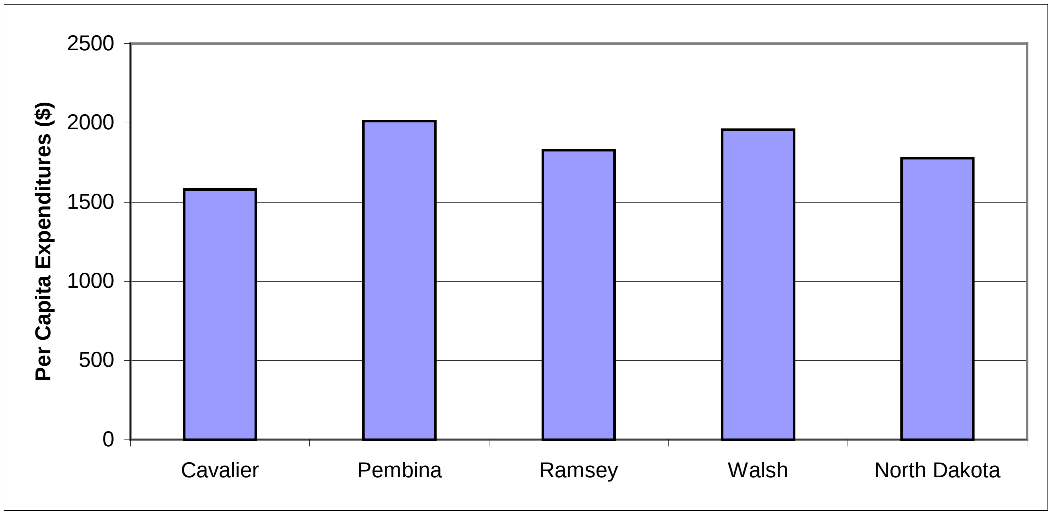
Source: Coon and Leistritz, 1998—The State of North Dakota: Economic, Demographic, Public Service, and Fiscal Conditions.

Figure 3.11-37: Per Capita Local Property Tax 1996



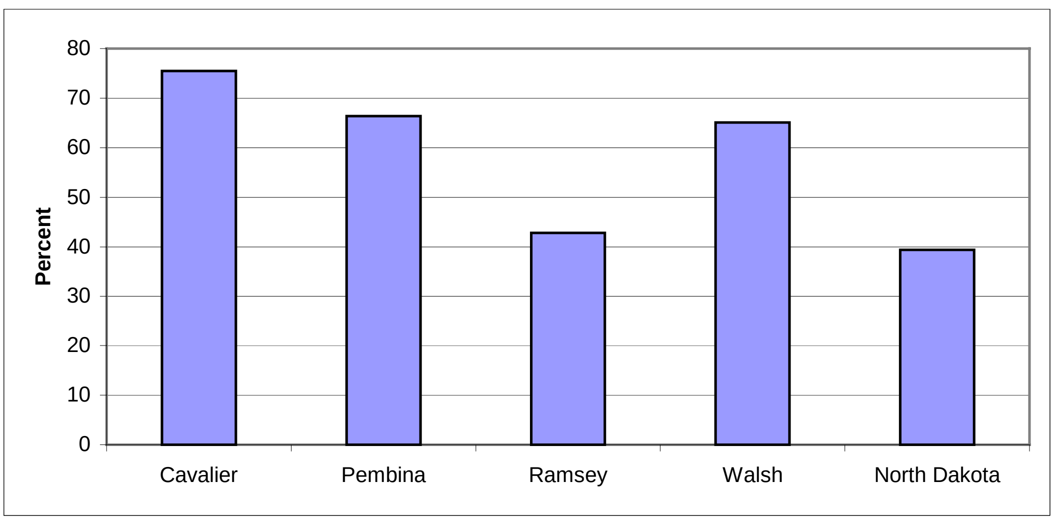
Source: Coon and Leistritz, 1998—The State of North Dakota: Economic, Demographic, Public Service, and Fiscal Conditions.

Figure 3.11-38: Per Capita Local Government Expenditure 1992



Source: Coon and Leistritz, 1998—The State of North Dakota: Economic, Demographic, Public Service, and Fiscal Conditions.

Figure 3.11-39: Agriculture Land as a Percent of Total Taxable Value 1996



Source: Coon and Leistritz, 1998—The State of North Dakota: Economic, Demographic, Public Service, and Fiscal Conditions.

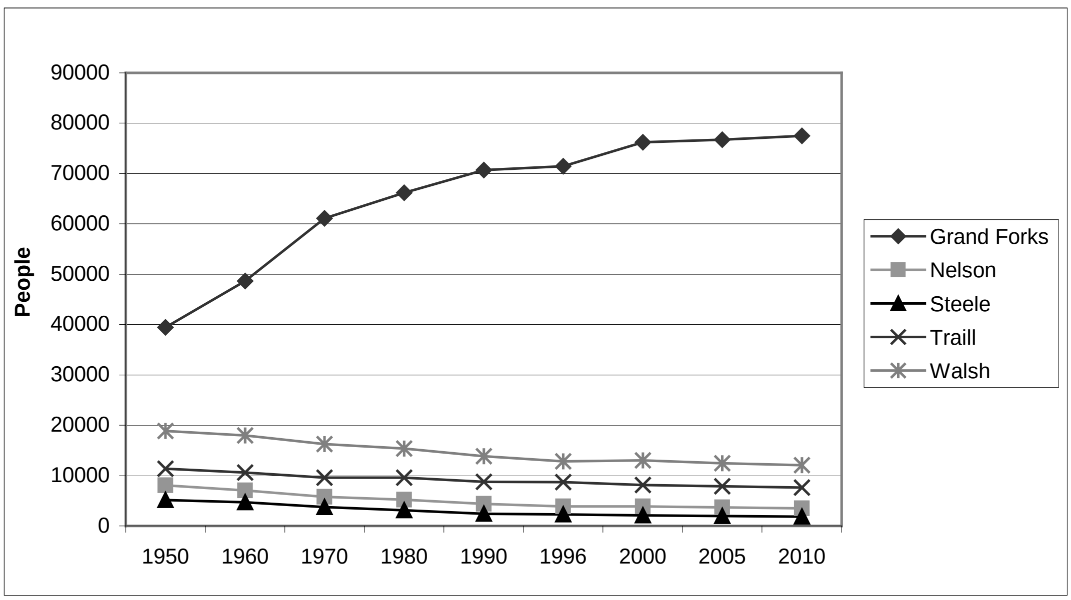
3.11.2.2 Grand Forks AFB—Socioeconomics

Grand Forks AFB is about 24 kilometers (15 miles) west of the city of Grand Forks, in Grand Forks County, situated in the Red River Basin in northeast North Dakota. While the region as a whole is rural in character, the city of Grand Forks is a relatively important urban population center that dominates the local economy. For the purposes of this analysis, a wider economic region has been defined to include Grand Forks, Nelson, Steele, Traill, and Walsh counties in the state of North Dakota. This ROI is the main drive-to-work area for Grand Forks AFB, though it is recognized that some base employees will travel from further afield.

Population

The total estimated 1996 population of the five county ROI was 99,197. This was equivalent to 15.4 percent of the 1996 estimated population of North Dakota. The largest center of population in the ROI is Grand Forks, in Grand Forks County, which in 1996 had an estimated population of 50,675, or over half that of the ROI. The overwhelming influence of Grand Forks as the major urban population center within the ROI is illustrated in figure 3.11-40.

Figure 3.11-40: Population Change in the Five-County ROI

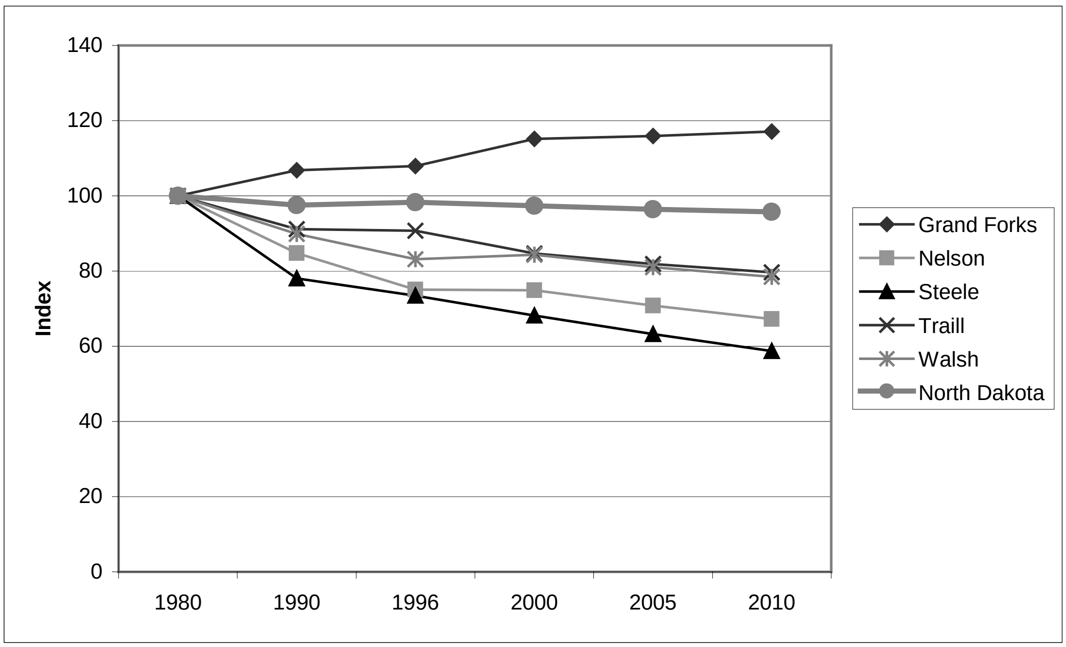


Sources: Goodman, 1996—The Economic Health of North Dakota; U.S. Bureau of the Census, 1998—North Dakota Population Estimates.

With the significant exception of Grand Forks County, the North Dakota counties in the predominantly rural ROI experienced a varied, but continuous and disproportionate rate of decline between 1980 and 1997. In contrast, Grand Forks County had the third largest growth in population in North Dakota between 1980 and 1990. Demographic forecasts for Grand Forks County to 2010 show an average annual increase in population of just over 400 persons. The historic changes in the populations of Nelson and Steele counties were the greatest, both falling about 27 percent between 1980 and 1997. Traill and Walsh counties declined by just over 10 percent and 11 percent respectively. These rates of decline are forecast to level off over the next 15 years.

Figure 3.11-41 is a 1980-based index of the population of the counties within the ROI and the State of North Dakota. The disproportionately rapid rate of growth of Grand Forks County when compared to North Dakota is clearly illustrated. In contrast, the decline of the other remaining counties within the ROI is also evident. The ROI, therefore, is subject to two significant trends—a chronic decline in its rural population, and the corollary, a growth or stabilization of the population in its main urban center.

Figure 3.11-41: Index of Population Change, Comparing the Five-County Region with North Dakota

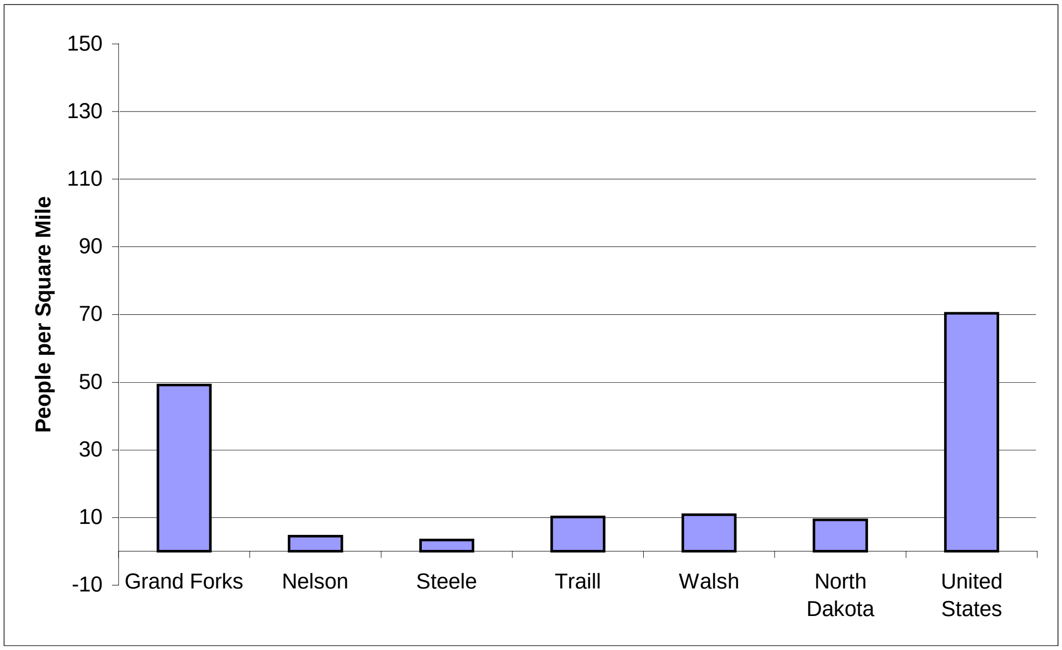


Source: Goodman, 1996—The Economic Health of North Dakota; U.S. Bureau of the Census, 1998—North Dakota Population Estimates.

The 1990 Census revealed that North Dakota had a population density of 3.6 people per square kilometer (9.3 people per square mile) as shown in figure 3.11-42. The least dense county within the ROI is Steele County, with 1.3 people per square kilometer (3.4 persons per square mile), while Traill and Walsh counties had population densities a little above the state average, and Nelson County slightly below. Grand Forks County had a population density of 19 people per square kilometer (49.2 people per square mile), substantially higher than the state average, but still significantly lower than the average population density of the United

States, which in 1990 was 27.1 people per square kilometer (70.3 people per square mile).

Figure 3.11-42: 1990 Population Density



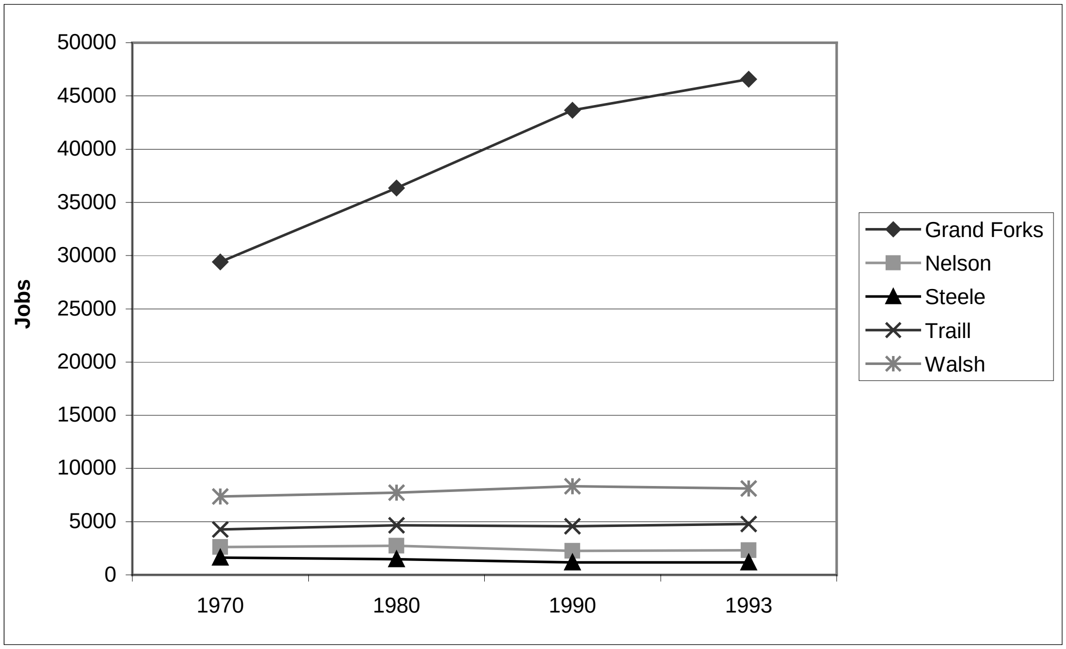
Source: U.S. Bureau of the Census, 1996—Land Area, Population, and Density for States and Counties.

Employment

The total employment for the ROI in 1993 was 62,952. Grand Forks County had the largest number of employees, with 46,567 representing about 74 percent of the ROI's jobs. Figure 3.11-43 illustrates the dominance of Grand Forks, since 1970, as a center of employment, as well as the extent of its growth. Figure 3.11-44, an index of employment, shows that the rate of growth of employment in Grand Forks County was slightly faster than the state's. Employment growth was relatively flat, or declined, in the remaining counties of the ROI.

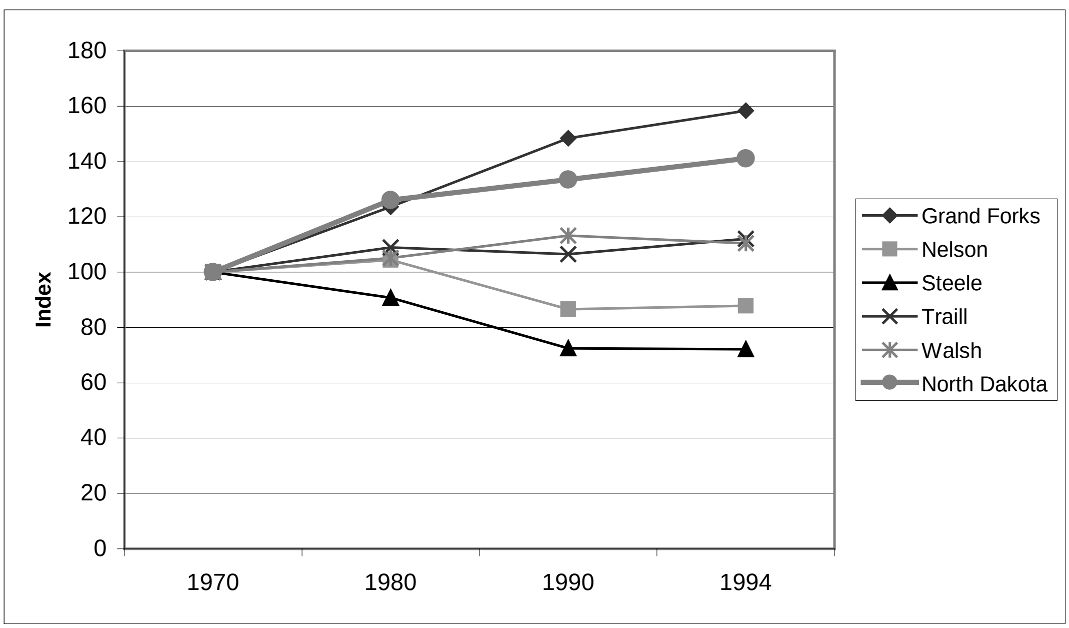
The three most important employment sources in the ROI have been Government, Services, and Retail & Wholesale. Grand Forks AFB has been the main Federal employer in the region. In 1972, military employment accounted for about 23 percent of all the nonfarm jobs in Grand Forks County. As the local economy and population of Grand Forks has expanded and defense cutbacks have reduced military jobs, this proportion of nonfarm employment has fallen to about 12 percent. Nevertheless, military jobs amounted to over 5,400 in Grand Forks County in 1993.

Figure 3.11-43: Jobs in the ROI



Source: Goodman, 1996—The Economic Health of North Dakota

Figure 3.11-44: Index of Job Change in the ROI



Source: Goodman, 1996—The Economic Health of North Dakota

The dominance of Services and Retail & Wholesale jobs typifies the role of Grand Forks as a regional center providing its surrounding communities with a wide range of shopping and professional and technical services.

Although the ROI includes four rural counties, agriculture in 1993 accounted for fewer than 10 percent of its jobs, further underlining the dominance of Grand Forks in the local economy. The trends affecting farming in North Dakota are likely to lead to a further decline in the importance of the agriculture sector in the ROI. Farms in North Dakota and the ROI have been falling in number but increasing in size and in their requirement for costly capital equipment, as world agricultural markets have become more competitive and the Federal government's subsidy of farming has been reduced.

The Impact of the Grand Forks Flood on Employment and Wages

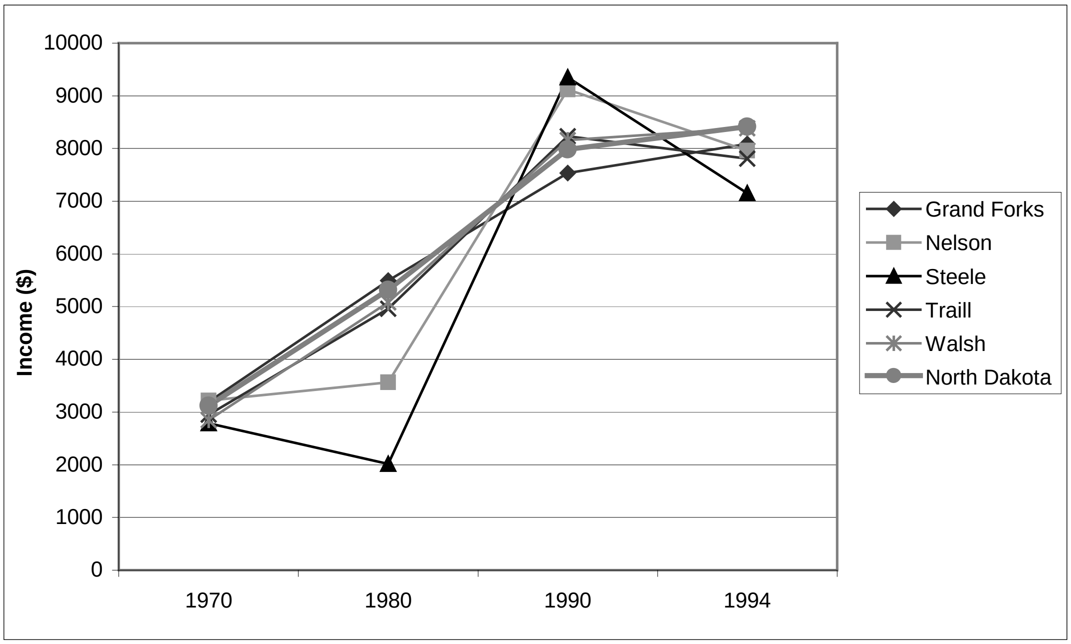
A study by the North Dakota Job Service opens by stating that "The Red River flood of 1997 had a significant and widespread impact upon Grand Forks County, and in particular the city of Grand Forks, in terms of employment and wage levels" (Job Service North Dakota, 1998—Grand Forks County Impact of Spring Flood Second Quarter 1997). The study goes on to point out that actual employment and wages in the county fell short of forecasts by 10.7 percent and 8.1 percent, respectively.

The flood's impact on each of the industrial sectors that composed the local economy varied substantially. The local construction industry experienced above-forecast wage rates and an influx of employees from other industries who were seeking higher wages. It is expected that these trends will continue for several years, as rebuilding projects end and new ones begin. Employment in the retail trade and service industries was between 14.7 percent and 15.9 percent lower than forecast. Lower paid jobs within these sectors have not been refilled, particularly in the eating and drinking sectors. The local wholesale sector suffered losses in wages and employment because its customers—the retailers—were hardest hit by the flood. Many manufacturing firms were located in flooded areas and as a result lost output, released employees, and lowered wages.

Income

Figure 3.11-45 shows the change in real per capita income in the ROI and in North Dakota. With the exception of Nelson and Steele counties, real per capita income in the ROI followed the state trend, increasing rapidly between 1970 and 1990 and then less rapidly between 1990 and 1994. Nelson and Steele counties are the smallest within the ROI and have experienced the most rapid population decline since the 1950s. It is likely, therefore, that the apparent volatility of real per capita income is a reflection of this declining and aging population, rather than an increasing level of average wealth.

Figure 3.11-45: Per Capita Income, 1970-1994



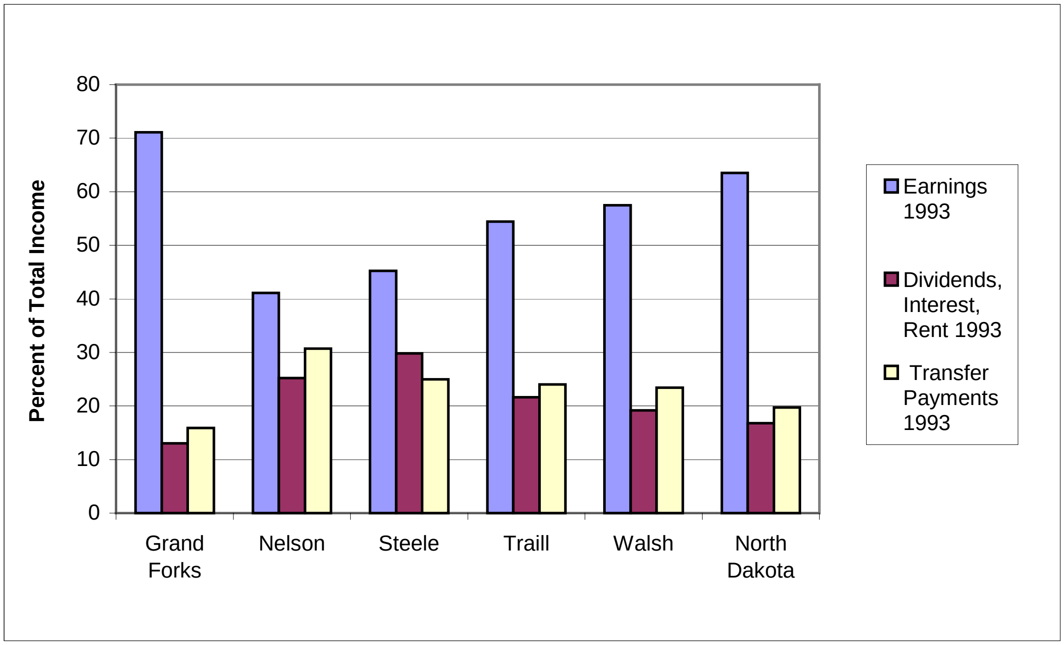
Source: Goodman, 1996—The Economic Health of North Dakota

Figure 3.11-46 shows the components of Total Personal Income (TPI) for each of the counties within the ROI in 1993. Grand Forks County has the largest proportion of its TPI in the form of wages, unlike Nelson Steele, and Traill. Nelson and Steele counties have the highest proportion of transfer payments as a component of their TPI, supporting the contention that wealth in these counties is concentrating among a smaller number of older people.

Retail Sales

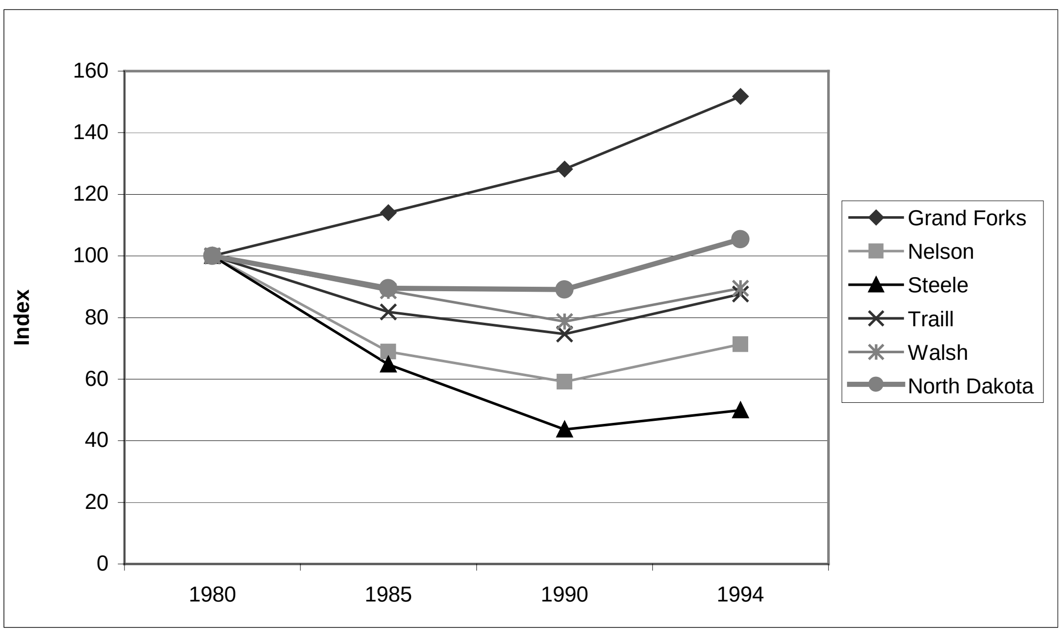
Figure 3.11-47 and figure 3.11-48 illustrate the dominance of Grand Forks as a retailing center within the ROI. While Walsh County reported real sales of a little over $44 million in 1994, Grand Forks County had sales of almost $370 million, or 13.5 percent of all of North Dakota's retail sales for that year. The index of real retail sales shows clearly the year-on-year growth generated by Grand Forks, compared to a much smaller growth rate for the state and a decline in the other counties within the ROI. Nelson and Steele experienced the most precipitous falls in real retail sales during the period, once again highlighting the sharp contrast between the expanding urban population centers of North Dakota and the chronic decline being experienced in rural areas and their communities.

Figure 3.11-46: The Components of Total Personal Income



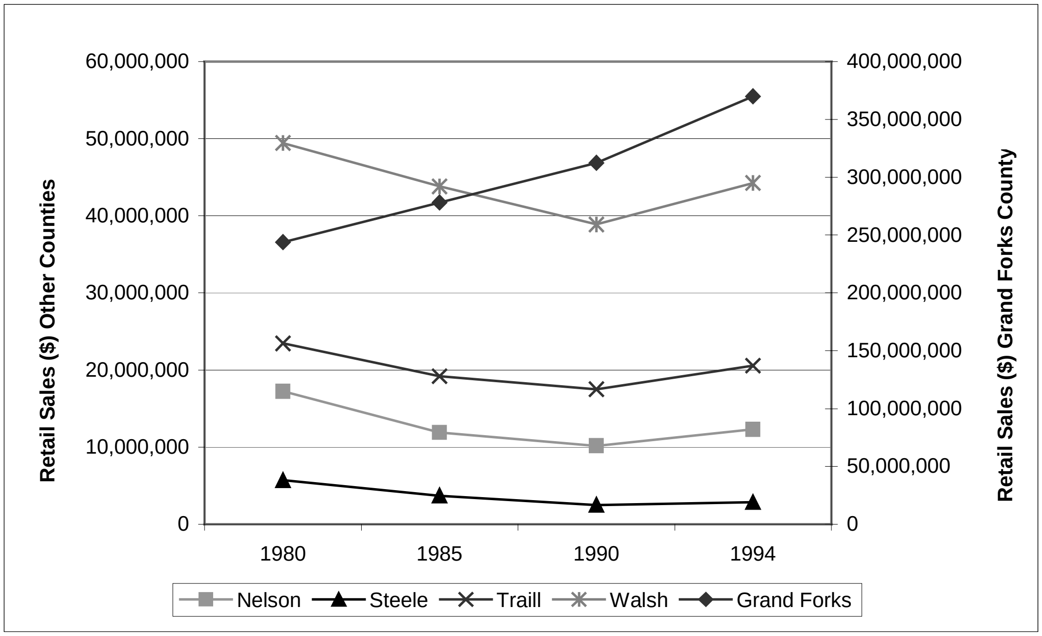
Source: Goodman, 1996—The Economic Health of North Dakota

Figure 3.11-47: Index of the Change in Retail Sales in the ROI, 1980-1994



Source: Goodman, 1996—The Economic Health of North Dakota

Figure 3.11-48: Retail Sales in the ROI, 1980-1994



Source: Goodman, 1996—The Economic Health of North Dakota

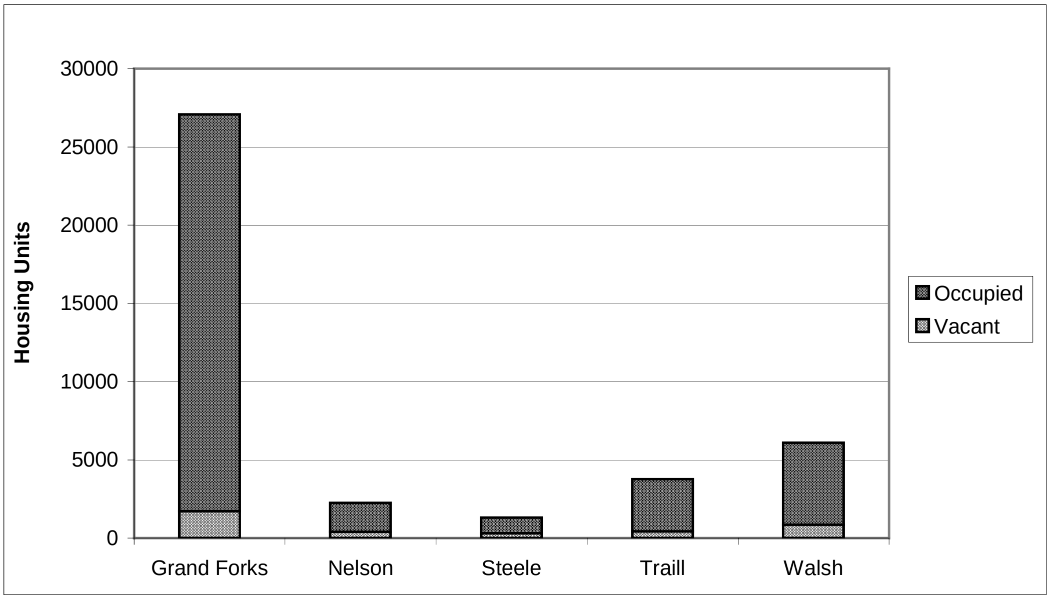
Housing, Education and Health

Housing construction in Grand Forks has been subject to several peaks and troughs since 1970. While single family homes constituted the main body of the housing stock before that date, apartments and condominiums have become increasingly prevalent in recent years. Much of this latter trend has been attributed to the accommodation demands of Grand Forks AFB between 1970 and 1980.

There were 40,520 housing units in the ROI in 1990. The overall percentage vacancy rate was 9.4 percent, or 3,793 units. Figure 3.11-49 illustrates the dominance of Grand Forks in the ROI's housing market.

The full impact of the Grand Forks flood on the population and housing of Grand Forks has yet to be determined. Many basement apartments have been removed from the housing stock because of flood damage, and many more are occupied by the transient population of construction workers. The immediate 4 percent drop in the post-flood school rolls (as a result of people moving away from the area) suggests that the supply of housing units in Grand Forks will exceed demand for several years to come. The true extent of permanent out-migration, however, will not be known until the transient construction workers leave the area at the close of their contracts.

Figure 3.11-49: Housing Vacancy Rates in the ROI in 1990



Source: Coon and Leistritz, 1998—The State of North Dakota: Economic, Demographic, Public Service, and Fiscal Conditions.

Housing in other parts of the ROI is subject to the trend common throughout rural North Dakota—the migration of people away from the countryside is leaving under-populated communities in which vacant property is readily available.

The Metro Forks Community Profile (Metropolitan Planning Organization, 1996) identified 13 elementary schools, 4 junior high schools, and 3 high schools with a combined enrollment of 9,670 pupils. In addition, Grand Forks AFB provided on-base tertiary education facilities for about 1,070 students per term at Lake Region Junior College, Park College, Embry Riddle Aeronautical University, and Central Michigan University.

The Red River flood closed 17 of Grand Forks' schools, with 7 requiring substantial refurbishment. It is expected that all will be reopened.

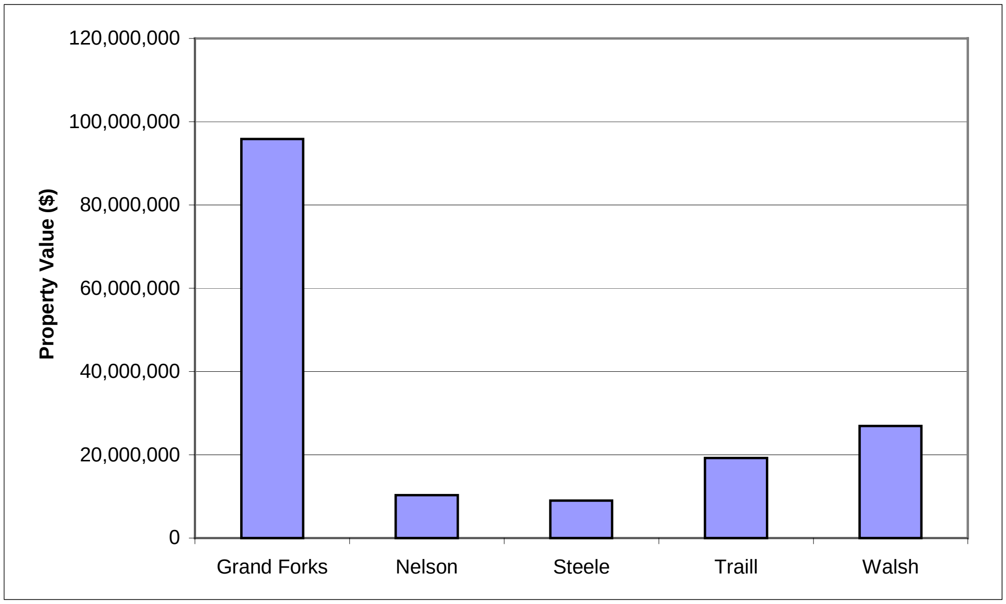
Schools in the remainder of the ROI have been experiencing falling rolls and are therefore operating at below capacity.

Health services in the ROI are centered in Grand Forks, which has five clinics and two hospitals. There were 305 hospital beds, 140 medical doctors, and 8 independent medical practices serving the wider Grand Forks region of 300,000 residents in December 1996 (Grand Forks Chamber of Commerce, 1996—Forks Facts). This region covered all of the ROI.

Fiscal Conditions

Figure 3.11-50 shows the taxable value of each of the five counties in the ROI. The 1996 taxable value of property in the ROI was $161,132,417, or 14.5 percent of the State of North Dakota's total taxable value of property for that year. Nelson and Steele counties had the highest per capita local property taxes as well as the highest expenditure per head as shown in figures 3.11-51 and 3.11-52. This phenomenon was a function of their decline in population and their high proportion of agricultural land illustrated in figure 3.11-53.

Figure 3.11-50: Total Taxable Property Value in the ROI 1996



Source: Coon and Leistritz, 1998—The State of North Dakota: Economic, Demographic, Public Service, and Fiscal Conditions.

3.11.2.3 Missile Site Radar—Socioeconomics

The socioeconomic affected environment for Missile Site Radar is the same as that described for Cavalier AFS in section 3.11.2.1.

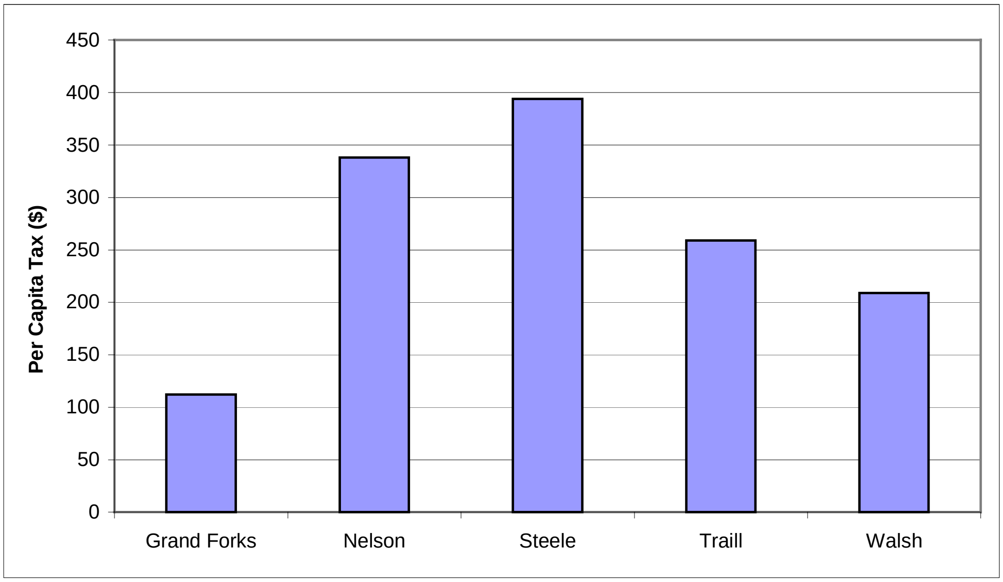
3.11.2.4 Remote Sprint Launch Site 1—Socioeconomics

The socioeconomic affected environment for Remote Sprint Launch Site 1 is the same as that described for Cavalier AFS in section 3.11.2.1.

3.11.2.5 Remote Sprint Launch Site 2—Socioeconomics

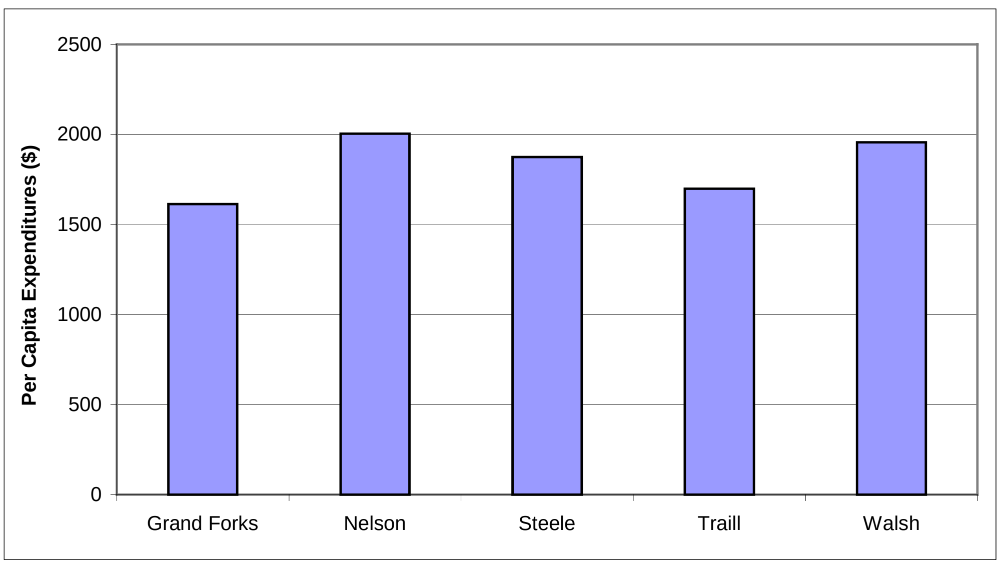
The socioeconomic affected environment for Remote Sprint Launch Site 2 is the same as that described for Cavalier AFS in section 3.11.2.1.

Figure 3.11-51: Per Capita Local Property Tax 1996



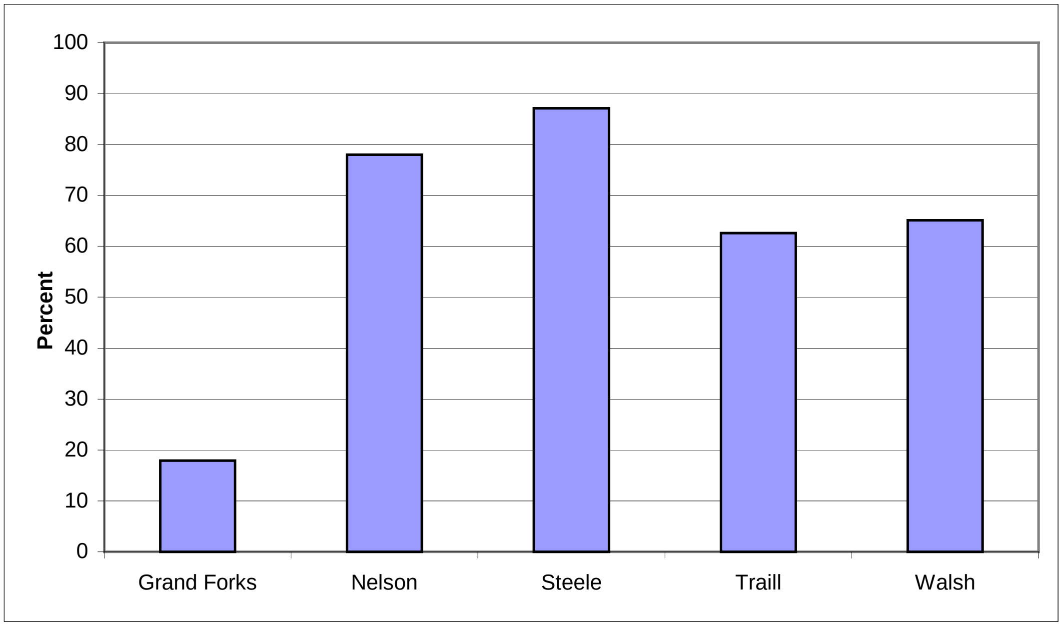
Source: Coon and Leistritz, 1998—The State of North Dakota: Economic, Demographic, Public Service, and Fiscal Conditions.

Figure 3.11-52: Per Capita Local Government Expenditure 1992



Source: Coon and Leistritz, 1998—The State of North Dakota: Economic, Demographic, Public Service, and Fiscal Conditions.

Figure 3.11-53: Agriculture Land as a Percent of Total Taxable Value 1996



Source: Coon and Leistritz, 1998—The State of North Dakota: Economic, Demographic, Public Service, and Fiscal Conditions.

3.11.2.6 Remote Sprint Launch Site 4—Socioeconomics

The socioeconomic affected environment for Remote Sprint Launch Site 4 is the same as that described for Cavalier AFS in section 3.11.2.1.

3.12 TRANSPORTATION

The evaluation of existing roadway and airport conditions is based on capacity, which reflects the ability of a given roadway or airport to accommodate vehicular demand and volume.

Traffic volumes are typically reported in Annual Average Daily Traffic (AADT) counts, which is the total volume of vehicles per day averaged for an entire year. These counts are provided upon request from the Department of Transportation. A comparison of a roadway's volume to its capacity is expressed in terms of levels of service (LOS). There are six levels of service, ranging from A to F, with LOS A representing the best operating conditions and LOS F the worst (table 3.12-1).

Table 3.12-1: Roadway Levels of Service

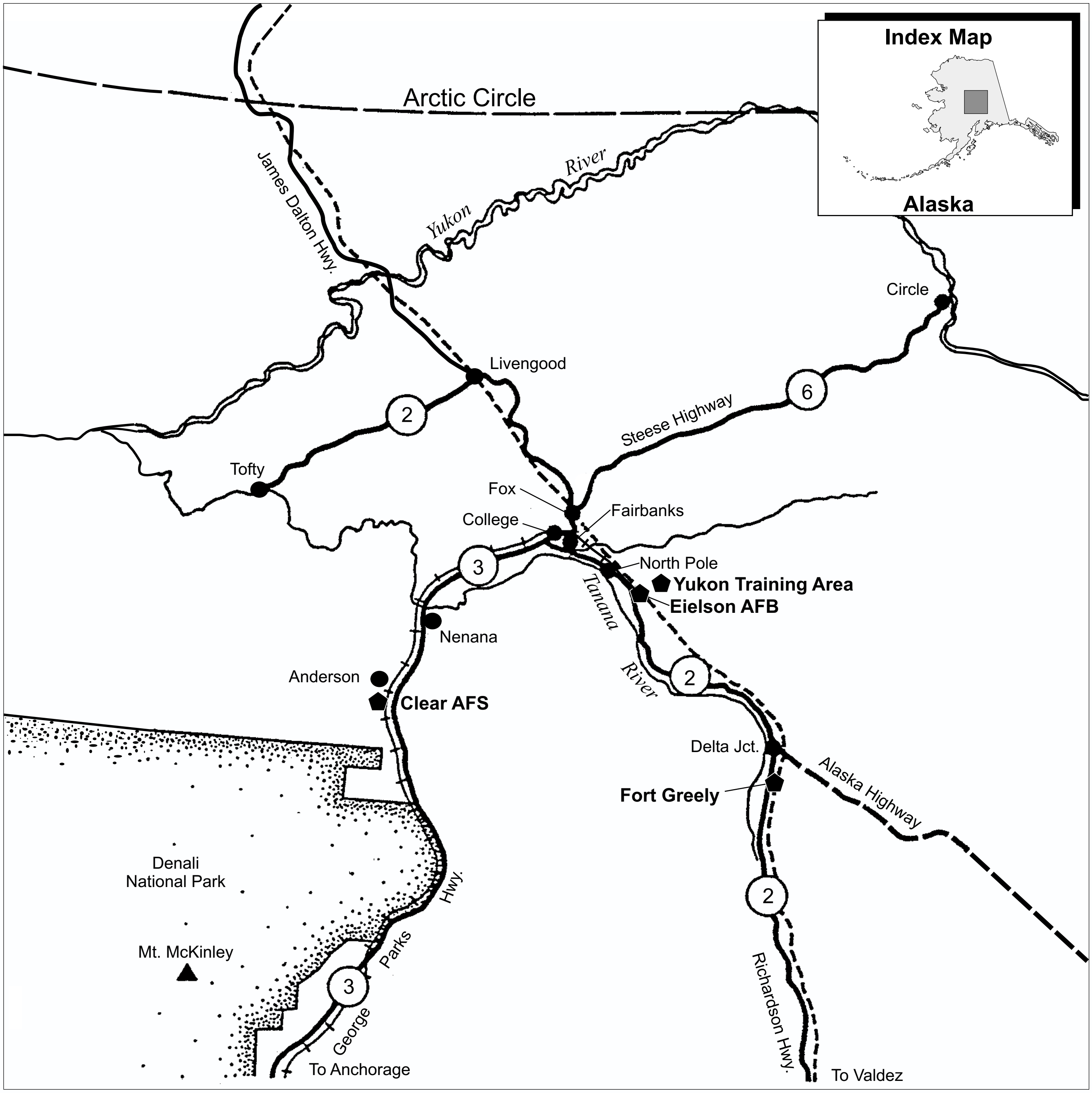
Level of Service	Description
A	Primarily free flow operations with users almost completely unhindered in their ability to maneuver within the traffic stream
B	Reasonably free flow operations with users' ability to maneuver within the traffic stream only slightly restricted
C	Stable flow with users' freedom to maneuver within the traffic stream noticeably restricted; noticeable increase in driver tension
D	High density, but stable flow; speed and freedom to maneuver are more noticeably limited; reduced level of driver comfort and convenience
E	Unstable flow; operating conditions at capacity, reduced speeds, maneuverability extremely limited, and extremely poor level of driver comfort and convenience
F	Breakdown in vehicular flow with traffic demand exceeding capacity; unstable stop-and-go traffic

Source: Compiled from National Research Council, 1994—Highway Capacity Manual.

3.12.1 ALASKA INSTALLATIONS

Roadway travel in Alaska is limited, with the only highways being in the southeastern quarter of the state. Due to the limited amount of roadways, the traffic volume in sparsely populated areas tends to be greater than experienced in the lower 48 states. The summer months experience the highest amount of traffic, due to tourism and good weather. When available, the summer average daily traffic counts were used to determine the level of service. Figure 3.12-1 shows the highways within central Alaska.

Given the vast area of Alaska and limited road network, aircraft provide an alternate means of transportation. This section addresses airports potentially used by the NMD program. Issues related to airspace use around potential NMD locations are discussed in section 3.3, Airspace.



EXPLANATION

- TransAlaska Pipeline
- Alaska Railroad
- City
- Military Installation

NORTH

Not to Scale

Central Alaska Highways

Alaska

Figure 3.12-1

tp_fair_001

A discussion of the transportation resource area and the methodology involved is found in section 3.12.

3.12.1.1 Clear AFS—Transportation

Ground Transportation

The ROI for the transportation analysis includes the George Parks Highway in the vicinity of Clear AFS and the on-base roads expected to be the roadway route used for construction and operation activities.

Clear AFS is located in Interior Alaska approximately 126 kilometers (78 miles) southwest of Fairbanks, near the community of Anderson. The main base road provides access from the George Parks Highway to the base main gate. The only off-base paved public road of any distinction in the area is Anderson Road, which provides access to the community of Anderson and to Clear Airport. The George Parks Highway is the primary road in the area, running north–south and connecting Anchorage and Fairbanks.

The area surrounding Clear AFS is relatively remote, with a moderate traffic volume. The summer average daily traffic for the George Parks Highway in the vicinity of Clear AFS is 2,011 (Alaska Department of Transportation and Public Facilities, 1997—Annual Traffic Volume Report). The highway operates at LOS B (see table 3.12-2). Vehicular traffic on Clear AFS is accommodated by a 14-kilometer (8.7-mile) network of primary and secondary roads, with 5.5 kilometers (3.4 miles) of paved roads and 8.5 kilometers (5.3 miles) of unpaved roads (Clear AFS, 1993—Comprehensive Planning Framework). There is no traffic volume information for Anderson Road or the main gate to Clear AFS.

Table 3.12-2: Peak-Hour Traffic Volumes and Levels of Service

Roadway	Location	Annual Average Daily Traffic(1)	Capacity(2) Peak Hour Volume	Traffic(2) Peak Hour Volume	Level of Service
Alaska Highway	Delta Junction	3,350	1,763	372	B
George Parks Highway	Anderson Road	2,011(3)	1,526	231	B
Richardson Highway	Eielson AFB	10,461(3)	2,200	214	A
Richardson Highway	Fort Greely	1,750	1,763	204	B

(1) Source: Alaska Department of Transportation and Public Facilities, 1997—Annual Traffic Volume Report.
(2) For four-lane roadways, volumes and capacity are one-way, per lane.
(3) Summer average daily traffic numbers
Notes: Calculations performed using the National Research Council, 1994—Highway Capacity Manual.

Air Transportation

The ROI for the air transportation analysis includes the airports in the vicinity of Clear AFS. There is no runway at Clear AFS. The nearest airfield is Clear Airport, which is operated by the State of Alaska and is located just outside the base boundary. The airfield provides an alternate means of transportation to and from Clear AFS and the community of Anderson. It serves a vital role as a means of medivac service and is used by private pilots in the area. According to the FAA master record, annual operations at this facility total 2,000. The majority of these involve private aircraft. At least 14 based aircraft are reported at the airport. In addition, it was reported that approximately 2,500 helicopter operations associated with forest fire fighting have occurred on five different occasions over the past 10 years. The Clear Airport runway is paved and is approximately 1,219 meters (4,000 feet) in length and 30 meters (100 feet) wide (Alaska Department of Transportation and Public Facilities, 1993—EA for Clear Airport Improvements).

3.12.1.2 Eielson AFB—Transportation

Ground Transportation

The ROI for the transportation analysis includes the Richardson Highway in the vicinity of the base and the on-base roads expected to be the roadway route used for construction and operation activities.

Eielson AFB is located approximately 37 kilometers (23 miles) southeast of Fairbanks near the community of Moose Creek. The Richardson Highway, a four-lane divided highway, provides access to the base through the Hursey Gate. This gate is the only operational gate at Eielson allowing access to and from the installation (Pacific Air Forces, 1998—Draft General Plan, Eielson AFB).

The Richardson Highway is the primary road in the area and spans southeast Alaska, connecting Fairbanks with Valdez. The installation has a network of roads and streets, which for the most part are laid-out on a north–south grid (Pacific Air Forces, 1998—Draft General Plan, Eielson AFB). Most roads are two-lanes and paved; however, some are gravel.

The area surrounding Eielson AFB is sparsely populated with a moderate traffic volume. The summer average daily traffic for the Richardson Highway in the vicinity of the base is 10,461 (Alaska Department of Transportation and Public Facilities, 1997—Annual Traffic Volume Report). The highway operates at LOS A (see table 3.12-2). There is no traffic volume information for the Hursey Gate, but it usually has no traffic problems (EDAW, Inc., 1998—Trip Report of visit to Alaska, July 20–31).

Air Transportation

The ROI for the air transportation analysis includes the Eielson AFB airport. Eielson AFB is home to the 354th Fighter Wing. The 354th equips and trains its 18th Fighter Squadron of F-16s, and the wing's 355th Fighter Squadron flies the A-10 and OA-10 aircraft. The runway is 4,420 meters (14,500 feet) in length and supports all aircraft in the Air Force inventory. Air traffic is all military-related, with no civilian aircraft using the facility. Approximately 59,000 aircraft operations occur per year at Eielson AFB.

3.12.1.3 Fort Greely—Transportation

Ground Transportation

The ROI for the transportation analysis includes the Richardson Highway in the vicinity of Fort Greely, the Alaska Highway at Delta Junction, and Fort Greely installations roads. These roadways are expected to be used for construction and operation activities.

Fort Greely is located approximately 172 kilometers (107 miles) southeast of Fairbanks and just south of the community of Delta Junction. The Richardson Highway provides access to the base. The primary roads in the area are the Richardson Highway, which runs north–south connecting Fairbanks and Valdez, and the Alaska Highway, which runs east–west connecting Delta Junction with the Canadian-American border. Fort Greely is located approximately 10 kilometers (6 miles) south of the junction of these two highways.

Fort Greely consists of the Main Post, two large training areas (Fort Greely Maneuver Area and Fort Greely Air Drop Zone), and three outlying areas (Gerstle River Test Site, Black Rapids Training Site, and Whistler Creek Rock Climbing Area). Roads serving the Main Post are generally paved and in good condition. Range roads are generally graded and in fair condition, with the exception of a few unmaintained roads. (U.S. Army Alaska, 1997—Draft Integrated Natural Resources Management Plan)

The area surrounding Fort Greely is sparsely populated with a moderate traffic flow. The Richardson Highway in the vicinity of Fort Greely experiences an AADT of 1,750. The Alaska Highway at the Richardson Highway junction has an AADT of 3,350 (Alaska Department of Transportation and Public Facilities, 1997—Annual Traffic Volume Report). Both of these roads are two-lane in this area and operate at LOS B (see table 3.12-2). There is no traffic information for Fort Greely installation roadways.

Currently, Fort Greely is undergoing realignment, which is scheduled for completion by July 2001. This realignment will decrease personnel at Fort Greely from approximately 750 in 1997 to 66 by 2001. Likewise, traffic volume in the area will also decrease.

Air Transportation

The ROI for the air transportation analysis includes the Fort Greely airport. Allen Army Airfield at Fort Greely provides general aviation support for the U.S. Army Garrison, Post Headquarters, Cold Regions Test Center, the Northern Warfare Training Center, and U.S. Army Alaska. The Aviation Detachment at Allen Army Airfield also provides support for visiting DOD units during training exercises. Allen Army Airfield has three runways. All of these runways are operational, although one is not plowed in the winter. The northeast/southwest runway is 2,286 meters (7,500 feet) in length, and the northwest/southeast runway is 1,859 meters (6,100 feet) in length. The airfield can support C5/C41 aircraft in the winter and C130 aircraft at all times of the year. Air traffic is mostly military-related, with approximately 6,000 operations per year.

3.12.1.4 Yukon Training Area (Fort Wainwright)—Transportation

Ground Transportation

The ROI for the transportation analysis includes the Richardson Highway in the vicinity of the Eielson AFB and roadways within the Yukon Training Area that are expected to be used for construction and operation activities.

The Yukon Training Area is located approximately 40 kilometers (25 miles) southeast of Fairbanks. Although the Yukon Training Area is part of Fort Wainwright, it is located about 24 kilometers (15 miles) southeast of the main post. Access into the area is gained from the Richardson Highway at two points: through the main gate of Eielson AFB and via Johnson Road, which intersects the highway about 16 kilometers (10 miles) south of the Eielson AFB Hursey Gate. The Yukon Training Area consists of a network of unpaved roads and trails. There is no traffic information for the Yukon Training Area roadways.

More information concerning the traffic volume of the Richardson Highway and roadways associated with Eielson AFB can be found in section 3.12.1.2.

Air Transportation

There are no airport facilities on the Yukon Training Area. The Army uses Fort Wainwright in Fairbanks for their aviation support needs.

3.12.2 NORTH DAKOTA

The existing roadways system in northeastern North Dakota includes Federal, state, and county roads. Because the topography of the area is basically flat, the road network is essentially orthogonal in north–south and east–west directions. Most of this area of North Dakota is rural, and traffic volume is relatively low. Roadway capacity is not an issue in this region of the state. Figure 3.12-2 shows the roadways within northeast North Dakota.

This section addresses the airports potentially used by the NMD program. Issues related to airspace use around potential NMD locations are discussed in section 3.3, Airspace.

A discussion of the transportation resource area and the methodology involved is found in section 3.12.

3.12.2.1 Cavalier AFS—Transportation

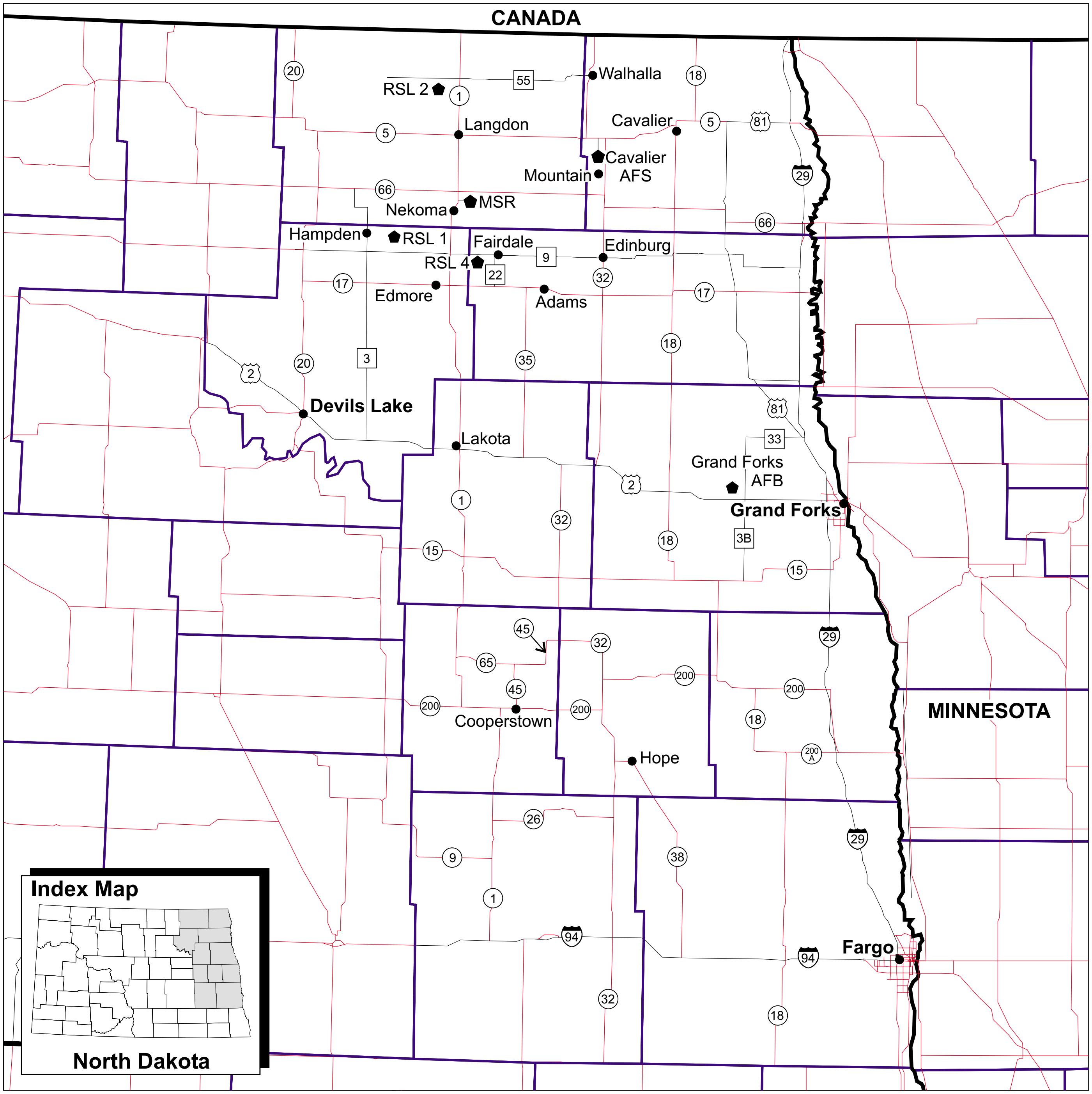
Ground Transportation

The ROI for the transportation analysis includes the installation roadways and roadways in the surrounding area of Cavalier AFS that are expected to be utilized for construction and operation activities.

Cavalier AFS is located on the western edge of Pembina County, North Dakota, approximately 23 kilometers (14 miles) southwest of the town of Cavalier. Cavalier AFS is served by ND 5, 4 kilometers (2.5 miles) north of the station. CR 89 provides access to the station through the traffic checkpoint/entry gate. (U.S. Air Force Space Command—Comprehensive Planning Framework, Cavalier AS) The primary road network of the area consists mainly of state highways and county roads, which are all two-lane roads.

ND 5 runs east–west connecting the towns of Cavalier and Langdon. ND 32 runs north–south connecting Walhalla and the Canadian border to the communities of Mountain and Edinburg (see figure 3.12-2).

The area surrounding Cavalier AFS is sparsely populated, and traffic volume is low. ND 5 in the vicinity of the station has an AADT of 1,000, and ND 32 has an AADT of 550 (North Dakota Department of Transportation, 1996—Traffic Volume Map, Pembina County). The traffic volume of CR 89 at the ND 5 junction is AADT 300 (North Dakota Department of Transportation, 1996—Traffic Volume Map, Pembina County). The areas with the highest traffic volume are the cities of Cavalier (ND 5), Walhalla (ND 32), and Langdon (ND 5), which experience an AADT of 3,500, 1,400, and 1,325, respectively (North Dakota Department of Transportation, 1996-Traffic Volume Map, Cavalier and Pembina County). As shown in table 3.12-3, all of these roadways



EXPLANATION

- Roads
- Interstate Roads
- U.S. Highways
- State Highways
- County Roads
- City
- Military Installation

Scale 1:1,500,000

0 12 24 Miles

0 19 39 Meters

NORTH

Major Roadways in Northeast North Dakota

North Dakota

Figure 3.12-2

tp_mmf_002

Table 3.12-3: Peak-Hour Traffic Volumes and Levels of Service

Roadway	Location	Annual Average Daily Traffic[1]	Capacity[2] Peak Hour Volume	Traffic[2] Peak Hour Volume	Level of Service
CR 3	Remote Sprint Launch Site 1	280	2,660	31	A
CR 3B	Grand Forks AFB main gate	7,000	2,580	778	C
CR 9	Remote Sprint Launch Site 4	170	2,660	19	A
CR 22	Remote Sprint Launch Site 4	200	2,660	22	A
CR 26	Missile Site Radar	180	2,660	20	A
CR 32	Remote Sprint Launch Site 1	65	2,660	8	A
CR 55	Remote Sprint Launch Site 2	150	2,660	17	A
CR 89	ND 5 junction Cavalier AFS	300	2,660	33	A
ND 1	Missile Site Radar	600	2,660	67	A
ND 1	Remote Sprint Launch Site 1	510	2,660	57	A
ND 1	Remote Sprint Launch Site 2	575	2,660	64	A
ND 1	Remote Sprint Launch Site 4	490	2,660	54	A
ND 5	Cavalier	3,500	2,580	389	B
ND 5	Cavalier AFS	1,000	2,660	111	A
ND 5	Langdon	1,325	2,580	148	A
ND 17	Remote Sprint Launch Site 4	450	2,660	50	A
ND 32	Cavalier AFS	550	2,660	61	A
ND 32	Walhalla	1,400	2,580	156	A
ND 66	Missile Site Radar	280	2,660	31	A
U.S. 2[2]	CR 3B (main entrance)	10,500	2,200	315	A
U.S. 2[2]	Secondary gate	5,900	2,200	177	A

[1] Source: North Dakota Department of Transportation, 1996—Traffic Volume Map, Cavalier, Grand Forks, Pembina, Ramsey, and Walsh Counties.
[2] For 4-lane roadways, traffic volumes and capacity are one-way, per lane.

Notes: Calculations performed using the National Research Council, 1994—Highway Capacity Manual.
Level terrain, 5 percent truck traffic, 50/50 directional split, and peak hour factor of 0.9 were used in all capacity calculations.
CR = County Road, ND = North Dakota

operate at LOS A, except ND 5 in the city limits of Cavalier, which operates at LOS B.

Air Transportation

General aviation support for Cavalier AFS is provided by Grand Forks AFB, discussed in section 3.12.2.2.

3.12.2.2 Grand Forks AFB—Transportation

Ground Transportation

The ROI for the transportation analysis includes the on-base roadways and roadways in the surrounding area of Grand Forks AFB that are expected to be utilized for construction and operation activities.

The area surrounding Grand Forks AFB is served by a network of U.S., state, and county roads. The main gate is located off of CR 3B (two-lane), approximately 1.6 kilometers (1 mile north) of U.S. 2, while the secondary gate is located off of U.S. 2 (four-lane), approximately 1.2 kilometers (0.75 mile) west of CR 3B (see figure 3.12-2). Traffic counts for these gates are no longer compiled by the base (U.S. Department of the Air Force, 1999—Final EIS, Minuteman III Missile System Dismantlement). U.S. 2 in the vicinity of the base has an AADT count of 10,500 vehicles, while CR 3B between U.S. 2 and the main gate has an AADT of 7,000 vehicles (North Dakota Department of Transportation, 1996—Traffic Volume Map, Grand Forks County). Both of these roadways operate at LOS A.

Air Transportation

The ROI for the air transportation analysis includes the Grand Forks AFB airport. Grand Forks AFB is host to the 319th Air Refueling Wing and the 321st Missile Group. The runway is approximately 3,764 meters (12,350 feet) in length and is capable of accommodating most aircraft in the Air Force inventory. Air traffic is all military-related, with no civilian aircraft using the facility. At Grand Forks AFB, approximately 35,000 aircraft operations occur per year.

3.12.2.3 Missile Site Radar—Transportation

Ground Transportation

The ROI for the transportation analysis includes the roadways adjacent and in the surrounding area of the Missile Site Radar that are expected to be utilized for construction and operation activities.

The Missile Site Radar is located in Cavalier County, North Dakota, approximately 21 kilometers (13 miles) south of the town of Langdon, and just north of the town of Nekoma. The Missile Site Radar is accessed by CR 26 via ND 1. The network of roadways in the vicinity of the site consists of state highways and county roads. ND 1 is the primary road in the area, running north–south and connecting the town of Langdon to Lakota. ND 66 runs east–west, and is approximately 5 kilometers (3 miles) north of the site (see figure 3.12-2).

Currently, the Missile Site Radar is inactive and the only traffic to the site is from maintenance personnel. The area surrounding the Missile Site Radar is remote, and traffic volume is low. ND 1 in the vicinity of the site has an AADT of 600, and ND 66 has an AADT of 280 (North Dakota Department of Transportation, 1996—Traffic Volume Map, Cavalier County). CR 26 experiences an AADT of 180 (North Dakota Department of Transportation, 1996—Traffic Volume Map, Cavalier County). All of these roads are two-lane and operate at LOS A (see table 3.12-3).

Air Transportation

The Missile Site Radar is in caretaker status with minimal activities; there are no airport facilities at this location.

3.12.2.4 Remote Sprint Launch Site 1—Transportation

Ground Transportation

The ROI for the transportation analysis includes the roadways adjacent and in the surrounding area of Remote Sprint Launch 1 that are expected to be utilized for construction and operation activities.

Remote Sprint Launch Site 1 is located in northern Ramsey County, approximately 5 kilometers (3 miles) east of the town of Hampden. The site is served north–south by CR 3, connecting the towns of Hampden and Devils Lake, and east–west by CR 32. CR 32 provides access to Remote Sprint Launch 1. The primary roads in the area consist of ND 1, which connects Remote Sprint Launch 1 to Langdon and Lakota, CR 3, and CR 32 (see figure 3.12-2).

Currently, Remote Sprint Launch Site 1 is inactive, and the only traffic to the site is occasional maintenance visits. The traffic volumes on the area roadways are low with ND 1, CR 3, and CR 32 experiencing AADT values of 510, 280, and 65, respectively (North Dakota Department of Transportation, 1996—Traffic Volume Map, Ramsey County). All of these roadways are two-lane and operate at LOS A (table 3.12-3).

Air Transportation

Remote Sprint Launch Site 1 is in caretaker status with no activities; there are no airport facilities at this location.

3.12.2.5 Remote Sprint Launch Site 2—Transportation

Ground Transportation

The ROI for the transportation analysis includes the roadways adjacent and in the surrounding area of Remote Sprint Launch 2 that are expected to be utilized for construction and operation activities.

Remote Sprint Launch Site 2 is located in Cavalier County, North Dakota, approximately 13 kilometers (8 miles) north–northwest of the town of Langdon and 18 kilometers (11 miles) south of the Canadian border. Remote Sprint Launch Site 2 is served by ND 1, which runs north–south connecting Langdon and the Canadian border. CR 55 is located approximately 5 kilometers (3 miles) north of the site, and runs east–west connecting the site to the town of Walhalla. An unnamed county road provides access to the site via ND 1 (see figure 3.12-2).

Remote Sprint Launch Site 2 is currently inactive, and the only traffic to the site is for occasional maintenance visits. The site is located in a remote area, and traffic volume is low. ND 1 in the vicinity of the site has an AADT of 575, and CR 55 has an AADT of 150 (North Dakota Department of Transportation, 1996—Traffic Volume Map, Cavalier County). Both of these roadways are two-lane and operate at LOS A. Traffic volume data for the unnamed county road providing access to the site is not available.

Air Transportation

Remote Sprint Launch Site 2 is in caretaker status with no activities; there are no airport facilities at this location.

3.12.2.6 Remote Sprint Launch Site 4—Transportation

Ground Transportation

The ROI for the transportation analysis includes the roadways adjacent and in the surrounding area of Remote Sprint Launch 4 that are expected to be utilized for construction and operation activities.

Remote Sprint Launch Site 4 is located in the northwest corner of Walsh County, North Dakota, approximately 3 kilometers (2 miles) southwest of the town of Fairdale. The site is served north–south by CR 22 and east–west by CR 9. An unnamed county road provides access to Remote Sprint Launch Site 4. The primary roads in the area are ND 17 connecting the towns of Edmore and Adams, and ND 1 connecting the towns of Langdon and Lakota (see figure 3.12-2).

Remote Sprint Launch Site 4 is currently inactive, and the only traffic to the site is for occasional maintenance visits. The area surrounding the site is sparsely populated, and the traffic volume is low. CR 22 in the vicinity of the site has an AADT of 200, and CR 9 has an AADT of 170 (North Dakota Department of Transportation, 1996—Traffic Volume Map, Walsh County). ND 17 has an AADT value of 450 (North Dakota Department of Transportation, 1996—Traffic Volume Map, Walsh County), and ND 1 has an AADT of 490 (North Dakota Department of Transportation, 1996—Traffic Volume Map, Ramsey County). All of these roadways are two-lane and operate at LOS A (see table 3.12-3). There is no traffic count data available for the unnamed CR providing access to the site.

Air Transportation

Remote Sprint Launch Site 4 is in caretaker status with no activities; there are no airport facilities at this location.

3.13 UTILITIES

The major attributes of utility systems are processing, distribution, and storage capacities and related factors, such as average daily consumption and peak demand, required in making a determination of adequacy of such systems to provide services in the future.

The utility systems addressed in this analysis include the facilities and infrastructure used for:

- Potable water pumping, treatment, storage, and distribution
- Wastewater collection and treatment
- Solid waste collection and disposal
- Energy generation and distribution, including the provision of electricity and natural gas

3.13.1 ALASKA INSTALLATIONS

3.13.1.1 Clear AFS—Utilities

This section describes the utilities in the vicinity of Clear AFS. The ROI for utilities is made up of the service areas of each utility provider servicing the air station and local community.

Water Supply

On-base. Clear AFS obtains its water from wells with a total capacity of 55.15 million liters per day (14.57 million gallons per day), and average daily water consumption for industrial and domestic use was 35.5 million liters per day (9.37 million gallons per day) in fiscal year 1995 (U.S. Department of the Air Force, 1997—EA for Radar Upgrade, Clear AS). Chlorination is provided for the potable water. (Clear AFS, 1993—Comprehensive Planning Framework)

Five wells in the Technical Site supply water for the power plant turbine condenser cooling, demineralization, and plant cooling. These wells have a combined capacity of 18.7 million liters per day (4.95 million gallons per day). Average daily consumption in 1995 was 11 million liters per day (2.8 million gallons per day). Industrial water is cycled through a 62.1-million-liter (16.4-million-gallon) cooling pond. Excess water is discharged to Lake Sansing. Two of the industrial wells at the power plant can also be used to supply potable water for domestic purposes. (U.S. Department of the Air Force, 1997—EA for Radar Upgrade, Clear AS)

Seven wells in the Technical Site supply water to the radar facilities for cooling and to heat exchangers that cool radar equipment located in

Buildings 101 and 102. These wells have a combined capacity of 24.2 million liters per day (6.38 million gallons per day). The heat exchanger system contains a chromate solution that is circulated through a closed-loop system to cool critical radar electronic components. (U.S. Department of the Air Force, 1997—Supplemental EA for Radar Upgrade, Clear AS)

Water for domestic purposes is supplied from three wells with a total capacity of 12.3 million liters per day (3.24 million gallons per day). Water consumption for domestic purposes averaged 0.64 million liters per day (0.17 million gallons per day) in 1995. Water used for human consumption, food preparation, and fire protection is chlorinated. (U.S. Department of the Air Force, 1997—EA for Radar Upgrade, Clear AS)

Off-base. Cities potentially impacted by activities at Clear AFS include Anderson, Cantwell, Ferry, Healy, Lignite, McKinley Park, and Nenana. All these cities are located in Denali Borough. In all of these cities except for Nenana, the large majority of homes have individual wells, septic systems, and plumbing. (Alaska Department of Community and Regional Affairs, 1998—DCRA Community Database)

The Nenana water system is approximately 20 years old. It has two wells able to be used as potable water sources. The primary well is 61 meters (200 feet) deep and has a pumping capacity of 0.545 million liters per day (0.144 million gallons per day). The secondary well is 21 meters (70 feet) deep and is rarely used. The system has a storage capacity of approximately 1.6 million liters (0.42 million gallons), and average usage is approximately 0.136 million liters per day (0.036 million gallons per day). (Knight, 1998—Personal communication)

Approximately 75 percent of the city is served by the current system, and a study is underway to upgrade the design to incorporate approximately 90 percent of the community. Those not on the city water system have their own private wells. (Knight, 1998—Personal communication)

Wastewater

On-base. Based on potable water pumping records from January 1996 to February 1997, the average daily domestic wastewater flow for Clear AFS is 0.87 million liters per day (0.23 million gallons per day) (Hardy, 1998—Personal communication). Sanitary sewage from all Camp facilities with water service except Buildings 26 and 51 and the Composite Area is conveyed by gravity flow to an Imhoff tank, which functions much like a septic tank. Sanitary sewage from the Composite Area is conveyed to the Imhoff tank via a lift station. The Imhoff tank is cleaned by moving accumulated sludge into a drying bed and then transferring the dried sludge to the base landfill. The effluent from the

Imhoff tank drains into a leach field. (Clear AFS, 1993—Comprehensive Planning Framework)

The new leach field that currently accepts the effluent from the Imhoff tank was designed using performance data from the previous two leach fields. The new leach field has an area of approximately 2.4 thousand square meters (26 thousand square feet) and is estimated to be able to accept the current load of 0.87 million liters per day (0.23 million gallons per day) for from 10 to 20 years. (Meyer, 2000—Comments received by EDAW, Inc., regarding the NMD Deployment coordinating Final EIS)

Sanitary sewage from the Technical Area flows into septic tanks with leaching wells or pits. Each of three Scanner buildings, the two Tracker buildings, and the Power Plant has its own septic tank and leaching well or pit. (Clear AFS, 1993—Comprehensive Planning Framework)

Cooling water from the Clear AFS Power Plant is discharged to a ditch at a point 15 meters (50 feet) from where the ditch flow enters Lake Sansing. This discharge is covered by State of Alaska Wastewater Disposal Permit number 9531-DB004. The permit requires the discharge to be no more than 23 million liters per day (6.2 million gallons per day). (Alaska Department of Environmental Conservation, 1998—Wastewater Disposal Permit)

Off-base. Wastewater treatment for the city of Anderson consists of a sewage lagoon. The system has a capacity of approximately 2.2 million liters per year (0.6 million gallons) with an average use of 1.5 million liters per year (0.4 million gallons). Wastewater treatment for the city of Nenana consists of a piped gravity system that collects the sewage and a secondary rotating biological contactor treatment plant. Approximately 75 percent of the city homes are connected to the sewer system, and a study is underway to determine an efficient method of connecting up to 90 percent of the community. No allowance is made for industrial waste treatment. The current system has a treatment capacity of approximately 0.227 million liters (0.06 million gallons) per day and is generally operated at or near capacity. (Knight, 1998—Personal communication)

Solid Waste

On-base. The annual solid waste production on Clear AFS is approximately 5,168 cubic meters (6,760 cubic yards) or about 1,533 metric tons (1,690 tons). The break down of the waste stream is 20 percent municipal waste, 16 percent construction waste, and 64 percent fly ash. The waste is collected from containers throughout Clear AFS and taken to the Clear AFS landfill on a daily basis. The fly ash from the power plant is used as cover at the landfill. (Clear AS, 1998—Draft Solid Waste Management Plan)

The Clear AFS landfill began operations in 1975. The total capacity of the landfill is estimated to be 191 thousand cubic meters (250 thousand cubic yards). Therefore, given the current waste to cover ratio, the total non-cover (i.e., non-fly ash) waste capacity of the landfill is 63.1 thousand cubic meters (82.5 thousand cubic yards). Using current rates, the landfill is estimated to be full sometime between 2008 and 2013. (Clear AS, 1998—Draft Solid Waste Management Plan) Current plans are to close the Clear AFS landfill in 2002 or 2003 and utilize the Denali Borough landfill, which was recently opened.

Off-base. The Nenana landfill was closed in July 1998. Solid waste in Nenana and the area surrounding Clear AFS is collected by a private firm and delivered to the Denali Borough landfill.

Energy

Electricity—On-base. Electricity is generated onsite at the Clear AFS Power Plant by three General Electric, Class A, 7.5 megawatt generators. Each turbine generator is powered by steam from three coal-fired boilers. The combined electrical generating capacity of the three generators is 22.5 megawatts. Average demand is 9 megawatts, for an annual consumption of 78.8 million kilowatt-hours. An emergency General Motors, Class C, 1,400 horsepower, 1 megawatt diesel generator is also available. The Clear AFS electrical system is not connected to the public grid. (Clear AFS, 1993—Comprehensive Planning Framework; Graves, 1998—Personal communication)

Electricity—Off-base. The Golden Valley Electric Association is a non-profit, member-owned cooperative that provides electrical service to the Fairbanks North Star Borough, the Denali Borough, unincorporated areas between these two boroughs, and along the Richardson Highway to Fort Greely. Clear AFS, Eielson AFB, Fort Wainwright, Fort Greely, Fort Knox Gold Mine, the University of Alaska Fairbanks, and the communities of Fairbanks, North Pole, Nenana, Delta Junction, and Healy are all located in Golden Valley Electric Association's service area. Golden Valley Electric Association provides electricity to approximately 90,000 people via over 36,000 service locations (Golden Valley Electric Association, 1998—History; U.S. Department of the Interior, 1998—Northern Intertie Project, Final EIS)

The Golden Valley Electric Association has a generating capability of 224 megawatts of power, with an additional 70 megawatts available through the existing Fairbanks/Anchorage intertie (Golden Valley Electric Association, 1998—History). In 1996, they had a peak demand of 134.1 megawatts and total energy sales of 653 million kilowatt-hours (U.S. Department of the Interior, 1998—Northern Intertie Project, Final EIS). In 1997 their peak demand was 163 megawatts (Golden Valley Electric Association, 1998—History).

3.13.1.2 Eareckson AS—Utilities

This section describes the utilities in the vicinity of Eareckson AS. The ROI for utilities is made up of the utilities servicing the air station.

Water Supply

On-base. Eareckson AS's potable water system has 25 thousand meters (82 thousand feet) of water lines and a capacity to produce 1.5 million liters per day (0.39 million gallons per day). On average there is a total base usage of 0.22 million liters per day (0.059 million gallons per day). (Domahoski, 1998—Personal communication)

Wastewater

On-base. Eareckson AS's sanitary sewage system has 24 thousand meters (79 thousand feet) of sewer lines and the capacity to treat 0.95 million liters per day (0.25 million gallons per day) of wastewater. On average there is a total base demand for treatment of 0.26 million liters per day (0.07 million gallons per day). The treatment plant provides secondary treatment before ocean out fall. (Domahoski, 1998—Personal communication)

Solid Waste

On-base. The Air Force at Eareckson AS adopted a regulation in 1991 that established policies and procedures for segregation of solid, nonhazardous waste into two main categories and several subcategories. Junk metal and aluminum cans are categorized as recyclable and are retrograded off of the island. Large items such as automobiles, couches, and washing machines are also removed from the island. Heavy plastic, polyvinyl chloride, and all other municipal wastes are also disposed of in the Eareckson AS landfill. (U.S. Air Force, 1994—Landfill Operations Plan Eareckson AFS)

The Eareckson AS landfill is located on the southeast point of the island and has been in operation since 1944 (U.S. Air Force, 1994—Landfill Closure Plan, Eareckson AFS). The landfill is currently operated under State of Alaska Solid Waste Disposal Permit number 9425-BA009, which permits the disposal of municipal solid waste at the landfill (Alaska Department of Environmental Conservation, 1994—Eareckson AFS Landfill, Shemya, Alaska, Solid Waste Disposal Facility Permit). The Eareckson AS landfill permit expired December 1, 1999 but is under administrative extension until the State of Alaska can complete its review of the permit renewal package. The permit is expected to be renewed as currently written. (Hostman, 2000—Personal communication) It is expected that the landfill will reach capacity in approximately 15 years.

Energy

Electricity—On-base. Eareckson AS has six 3-megawatt diesel generators, only two of which are operating at any one time. Under most conditions, the two generators are run at 55 percent of their capacity, for a total of 3.3 megawatts. Eareckson's has an annual usage of 28 million kilowatt-hours. (Domahoski, 1998—Personal communication)

By running all six generators simultaneously, a total power output of 18 megawatts can be achieved, and thus a capacity for an annual production of more than 150 million kilowatt-hours of electricity. (Domahoski, 1998—Personal communication)

3.13.1.3 Eielson AFB—Utilities

This section describes the utilities in the vicinity of Eielson AFB. The ROI for utilities is made up of the service areas of each utility provider servicing the base and local community.

Water Supply

On-base. Currently, five wells directly serve the Eielson AFB water treatment and distribution system. Three of these wells are used to supply raw water directly to the base's water treatment plant. The other two wells are standby wells designated to deliver untreated water directly to the distribution system if necessary. In the event that the water treatment plant requires bypassing, its three wells can be used to individually supply water to the distribution system. Chlorinating of raw well water is possible for these three wells any time they are bypassing the plant. (Eielson AFB, 1998—Infrastructure Management Plan)

A new water treatment plant has been in operation since April 1998. The water treatment plant has a capacity to treat up to 11 million liters per day (3 million gallons per day). With the new treatment plant, Eielson AFB's system now has a storage capacity of 4 million liters (1 million gallons). Average water demand at Eielson AFB is approximately 4 million liters per day (1 million gallons per day). Peak demand, which occurs during summer, can exceed 8 million liters per day (2 million gallons per day).

Off-base. Cities potentially impacted by activities at Eielson AFB include Ester, Fairbanks, Fox, Harding Lake, Moose Creek, North Pole, Pleasant Valley, Salcha, and Two Rivers. All these cities are located in Fairbanks North Star Borough. In all of these cities except for Fairbanks and North Pole, the large majority of homes have individual wells, septic systems, and plumbing. (Alaska Department of Community and Regional Affairs, 1998—DCRA Community Database)

The water supply at Fairbanks is pumped from four wells. Two have a pumping capacity of 13 thousand liters per minute (3,400 gallons per minute) and the other two have a capacity of 9,800 liters per minute (2,600 gallons per minute). The system has a storage capacity of approximately 19 million liters (5 million gallons). On average, the city uses 11 to 13 million liters per day (3 to 3.3 million gallons per day). Less than 1 percent of the city is still on private wells. There are no plans to expand the water service beyond its current level. (Rogers, 1998—Facsimile communication)

The water supply at North Pole is provided through two ground wells (55 meters and 49 meters [180 feet and 160 feet] deep respectively). There are three water reservoirs with a storage capacity of approximately 3.8 million liters (1 million gallons) and a current recharge rate of up to approximately 2.3 million liters per day (0.6 million gallons per day). The plant is almost 13 years old, and is expandable. However, since current usage is limited to approximately 0.8 million liters per day (0.2 million gallons per day), no plans have been made to expand water service beyond the current amount. It is estimated that no more than 33 percent of the city is serviced by both the water and wastewater systems. (Johnson, R., 1998—Personal communication, Nov 23)

Wastewater

On-base. The wastewater received at the Eielson AFB sewage treatment plant includes sewage from the base collection system and septic tank wastes delivered by trucks. The treatment process includes pre-treatment, primary treatment, and secondary treatment. Final disposition is by percolation into an abandoned gravel pit where additional biostabilization occurs in summer months. (Eielson AFB, 1998—Infrastructure Management Plan)

The sewage treatment plant, which was originally constructed in 1952, has had extensive repairs and upgrades in the last 5 years. Consequently, it is in excellent condition. The plant treats an average of 4 million liters per day (1 million gallons per day) and currently has a maximum permitted allowance of 6.0 million liters per day (1.6 million gallons per day). (Eielson AFB, 1998—Infrastructure Management Plan)

Off-base. The wastewater treatment facility at Fairbanks is a borough-wide service system that includes the city of Fairbanks, Fort Wainwright, College Utilities, and the University of Alaska Fairbanks. It is a pure oxygen activated sludge system with secondary clarifiers, aerobic digestors, and bar screens. It was completed in 1977. (Rogers, 1998—Facsimile communication)

The Fairbanks wastewater treatment system serves approximately 55 to 65 thousand people and has the capability to treat up to approximately

30 million liters per day (8 million gallons per day). On average, the system operates at approximately two-thirds capacity and treats approximately 20 million liters per day (5.4 million gallons per day). Less than 1 percent of the population in Fairbanks is still on septic systems, and no plans have been made to expand the current system. (Rogers, 1998—Facsimile communication)

The wastewater treatment at North Pole consists of a city-owned aerated lagoon system. The system is less than 10 years old and has the capacity to treat approximately 1.9 million liters per day (0.5 million gallons per day). Current usage averages approximately 0.8 to 1 million liters per day (0.2 to 0.3 million gallons per day). (Lewis, 1998—Personal communication)

Solid Waste

On-base. In 1998 Eielson AFB will produce an estimated 4.0 thousand metric tons (4.4 thousand tons) of solid waste. Of that, an estimated 3.0 thousand metric tons (3.3 tons) will be transferred to the Fairbanks North Star Borough landfill, 0.76 thousand metric tons (0.83 tons) of combustible waste will be used as fuel at the Eielson AFB Refuse Derived Fuel facility, and the rest will be recycled or composted. (Eielson AFB, 1998—Recyclable Materials, Capture Rates)

Off-base. The Fairbanks North Star Borough Landfill has been in operation for approximately 30 years. The newest cell is currently under construction and is anticipated to be in operation within the next year. The landfill can accept asbestos-contaminated waste, household hazardous waste, and waste from conditionally exempt small quantity hazardous waste generators. No other hazardous or radioactive waste can be accepted at the landfill. (Jordan, 1998—Personal communication)

It is estimated that the landfill accepts approximately 73 thousand metric tons (80 thousand tons) of waste annually, the majority of which comes from the Fairbanks North Star Borough (which includes both North Pole and Fairbanks). However, they do occasionally accept waste from other boroughs. (Jordan, 1998—Personal communication)

Energy

Electricity and Steam—On-base. The Central Heat & Power Plant is the most critical facility on Eielson AFB, as it is the base's primary source for heating and electric power. Operating continuously, year round, it has an annual production of approximately 860 million kilograms (1.9 billion pounds) of steam and 89 million kilowatt-hours of electricity. With arctic temperatures dipping as low as -51°C (-60°F), reliable steam heat is critical to operations at Eielson AFB. (Eielson AFB, 1998—Infrastructure Management Plan)

Electrical power on Eielson AFB is generated by a series of steam turbine generators in the Central Heat & Power Plant. The base is electrically self-sufficient, except for Charlie Battery, Pedro Dome, Birch Lake, and Flag Hill. All of these areas receive their electricity from Golden Valley Electric Association. (Eielson AFB, 1998—Infrastructure Management Plan)

The Central Heat & Power Plant is equipped with five steam turbine generators capable of producing 25 megawatts of electricity. Eielson AFB also has a contract with Golden Valley Electric Association that allows the base to access 10 megawatts of power whenever needed. (Eielson AFB, 1998—Infrastructure Management Plan)

Power demand varies seasonally. Average summer demand is approximately 10 megawatts. Winter demands range from 11 megawatts to 14 megawatts, with peak demands of approximately 17 megawatts. In fiscal year 1997, Eielson AFB purchased 13.3 million kilowatt-hours of electricity from Golden Valley Electric Association and produced approximately 89 million kilowatt-hours themselves. (Eielson AFB, 1998—Infrastructure Management Plan)

The Central Heat & Power Plant has six spreader-stoker, traveling grate, coal-fired boilers. Each of the boilers has a maximum rating of 54 thousand kilograms (120 thousand pounds) of steam per hour. The normal operating range for the boilers is between 27 thousand and 32 thousand kilograms (60 thousand and 70 thousand pounds) of steam per hour. During the summer months, only two boilers are needed for electrical generation. During winter operations, four to five boilers are required to meet the heating load. (Eielson AFB, 1998—Infrastructure Management Plan)

Electricity—Off-base. The Golden Valley Electric Association is a non-profit, member-owned cooperative that provides electrical service to the Fairbanks North Star Borough, the Denali Borough, unincorporated areas between these two boroughs, and along the Richardson Highway to Fort Greely. The Golden Valley Electric Association is described in section 3.13.1.1.

3.13.1.4 Fort Greely—Utilities

Water

On-base. The water supply at Fort Greely is currently managed from Building 606, the power plant. Two groundwater wells are utilized to supply all of the existing building facilities and fire hydrants within the main cantonment. These two wells have a combined capacity of 4.2 million liters per day (1.1 million gallons per day). A 712-thousand-liter (188-thousand-gallon) storage tank is located in Building 606 and feeds two 76-thousand-liter (20-thousand-gallon) pressure tanks that pump into a piped water system. The only water treatment performed is the addition of chlorine and fluorine. The existing base water system, when all buildings were in use, consumed roughly 1.19 million liters per day (0.315 million gallons per day). (Delta/Greely Community Coalition, 1998—Final Reuse Plan, Fort Greely, Alaska; U.S. Army Corps of Engineers, 1997—Environmental Baseline Survey Report for Fort Greely, Alaska)

Off-base. Households in the Delta Junction area maintain individual wells with depths ranging from 46 meters (150 feet) to 110 meters (350 feet). A community water purification plant is not feasible due to the dispersed nature of the area's populace and businesses. (Alaska Department of Community and Regional Affairs, 1998—DCRA Community Database)

Wastewater

On-base. The sewage system at Fort Greely conveys wastewater to an Imhoff tank inside Building 633. Sludge from the bottom of this tank is pumped to sludge drying beds. Once the sludge is dried, it is hauled to the landfill. Effluent from the Imhoff tank is conveyed to the sewage lagoon. The lagoon is aerated for further treatment. Effluent leaving the sewage lagoon is chlorinated and discharged to Jarvis Creek. (U.S. Army Corps of Engineers, 1997—Environmental Baseline Survey Report for Fort Greely, Alaska)

This system has a capacity of 1.7 million liters per day (0.46 million gallons per day). (Delta/Greely Community Coalition, 1998—Final Reuse Plan, Fort Greely, Alaska) Wastewater usage, when all buildings were in use, was less than 1.2 million liters per day (0.32 million gallons per day).

Wastewater from buildings in the Old Post and Mid Post area is discharged to either a septic tank or a leach field (U.S. Army Corps of Engineers, 1997—Environmental Baseline Survey Report for Fort Greely, Alaska).

Off-base. Businesses and residences are dispersed over a large area, so a community wastewater treatment system is not practical. Instead, each household maintains a septic system. (Alaska Department of Community and Regional Affairs, 1998—DCRA Community Database)

Solid Waste

On-base. The base landfill is a class 2 facility that is currently permitted to receive both sewage sludge and asbestos materials. The current facility is not lined, but does have groundwater monitoring tubes. Cells at this facility are about 18 meters (60 feet) by 61 meters (200 feet) by 6 meters (20 feet) deep and generally last 1.5 years under current conditions. The current ADEC solid waste disposal permit comes up for renewal May 1, 1999. No determination has yet been made to close the existing landfill at Fort Greely because of BRAC. (Delta/Greely Community Coalition, 1998—Final Reuse Plan, Fort Greely, Alaska)

Off-base. The city-owned landfill in the Delta Junction area is leased to a private collection company, Delta Sanitation. The current landfill started as a pit with an area of 37 square meters (400 square feet) and a depth of 4.6 meters (15 feet) that was dug in 1984. Delta Sanitation collects up to approximately 76 cubic meters (100 cubic yards) of municipal waste per week from Delta Junction and the outlying areas. This waste is then burned in large "burn boxes" (large incinerators). The resulting ash is then dumped into the landfill pit. Large household waste is also disposed of at the landfill pit. The pit is currently one-third full and has capacity for another 12 to 15 years of use at the current rate. There is no provision for asbestos-contaminated materials or hazardous waste of any sort. There is limited capacity for clean construction waste. (Peters, 1998—Personal communication)

The Alaska Department of Environmental Control, in coordination with the city council and Delta Sanitation, is in the process of determining what changes will be required to the current solid waste disposal program. No specific changes have been determined, and no specific date of change has been established. However, since the waste disposal program now in effect is not standardized, it is likely that changes of some sort will be instituted. (Peters, 1998—Personal communication)

Energy

Electricity and Steam—On-base. Electrical power requirements at Fort Greely are currently met through a combination of power supplied from Fort Wainwright and on-post generators run by Fort Greely personnel. The electrical power from Fort Wainwright is "wheeled" over the commercial electrical grid that exists between the two bases and is eventually supplied to Fort Greely through an existing 2.9-megawatt substation. The U.S. Army Alaska pays Golden Valley Electrical Association (which is described in section 3.13.1.1) for the use of its grid. The average electrical power demand at Fort Greely was approximately 1.835 megawatts when all buildings were in use. However, peak demands of up to 3.3 megawatts sometimes occurred during the winter. When the demand at Fort Greely exceeded the capacity of the substation, the additional power requirements were met by the three on-post diesel-powered generators, which together can generate up to 0.95 megawatt. (U.S. Department of the Army, 1997—Preliminary Draft EA for the Disposal and Reuse of Surplus Property at Fort Greely, Alaska)

Electricity—Off-base. The Golden Valley Electric Association is a non-profit, member-owned cooperative that provides electrical service to the Fairbanks North Star Borough, the Denali Borough, unincorporated areas between these two boroughs, and along the Richardson Highway to Fort Greely. The Golden Valley Electric Association is described in section 3.1.3.1.1.

3.13.1.5 Yukon Training Area (Fort Wainwright)—Utilities

There are no utilities at the current proposed NMD site on the Yukon Training Area. Potential support facilities for this site could be located on Eielson AFB, as described in section 3.13.1.3.

3.13.2 NORTH DAKOTA INSTALLATIONS

3.13.2.1 Cavalier AFS—Utilities

This section describes the utilities in the vicinity of Cavalier AFS. The ROI for utilities is made up of the service areas of each utility provider servicing the air station and local community.

Water Supply

On-base. Cavalier AFS receives its water from the North Valley Water Association. Under this arrangement, the North Valley Water Association is under contract to supply Cavalier AFS with up to 1.09 million liters per day (0.29 million gallons per day) of water (Johnson, G., 1998—Personal communication, July 9). Current demand is using approximately 0.45 million liters per day (0.12 million gallons per day). Up to 0.4 million liters per day (0.1 million gallons per day) of this amount is used in the tower and heat sink evaporative cooling system. (U.S. Air Force Space Command, undated—Comprehensive Planning Framework, Cavalier AS)

Off-base. North Valley Water Association, Inc. gets their water from wells approximately 10 kilometers (6 miles) west of Cavalier AFS. In 1997, they sold approximately 624 million liters (165 million gallons) of water. They expect this to increase to 1.00 to 1.14 billion liters (265 to 300 million gallons) per year in the next few years. They have a total storage capacity of 5.7 million liters (1.5 million gallons) of water, which is stored in a number of reservoirs. They have two treatment plants, and the one that will be providing water to Cavalier AFS has a capacity of 9.5 million liters per day (2.5 million gallons per day). Their service area includes almost all of Pembina County and some of Cavalier County. They have approximately 1,300 customers, 8 of which are bulk wholesalers. These eight are cities and Cavalier AFS. (Johnson, G., 1998—Personal communication, July 9)

Wastewater

On-base. Cavalier AFS's sanitary sewer system is composed of waste water treatment lagoons. The wastewater treatment lagoons consist of two cells with a total capacity of approximately 83.3 million liters (22.0 million gallons) (U.S. Air Force Space Command, undated—Comprehensive Planning Framework, Cavalier AS). There is also a third cell that is not currently in use, and that would need repairs to be used (Greenwood, 1998—Electronic communication, June 8).

Site operations currently require full time use of the primary cell and periodic use of the secondary cell. The secondary cell is never used to capacity. Capacity significantly exceeds current requirements. (Greenwood, 1998—Electronic communication, June 8)

Off-base. The city of Cavalier's wastewater treatment plant consists of three 3.34-hectare (8.25-acre) lagoons. Based on the system's pumping capacity, it has a capacity of 2.7 million liters per day (0.72 million gallons per day). The current average usage is 0.662 million liters per day (0.175 million gallons per day). This system serves the city of Cavalier. (Sagert, 1998—Personal communication) Most of the area surrounding Cavalier AFS is rural, and most households are not connected to public sewage systems.

Solid Waste

On-base. Cavalier AFS's solid waste is disposed of through a contractor to the city of Grand Forks landfill. For fiscal year 1998, Cavalier AFS typically disposed of less than 5 cubic meters (6 cubic yards) of solid waste per month. (Fors, 1998—Personal communication, July 14)

The refuse contractor for Cavalier AFS maintains recycling bins in the Perimeter Acquisition Radar building parking lot for glass, paper, cardboard, metal, and plastics. Under a local initiative, Cavalier AFS also segregates and recycles computer, bond, and newspapers even though they are not revenue-generating recyclables. (U.S. Air Force Space Command, undated—Comprehensive Planning Framework, Cavalier AS)

Off-base. The city of Grand Forks landfill was scheduled to close in the fall of 1999. Due to the floods in the spring of 1998, there is an extension of operations through the fall of 2000. Even after that time, it is planned that the current landfill will be used as an inert landfill, and thus will be able to accept demolition and construction wastes. (Kingery, 1998—Personal communication)

Under normal conditions, the current landfill can receive 318 metric tons (350 tons) per day of municipal solid waste. Inert waste is not included in that amount. As much construction waste as there is room for can be accepted, and it is reported on a quarterly basis. (Kingery, 1998—Personal communication)

A new municipal waste landfill for Grand Forks is planned. Four potential sites are currently being considered. The intent is to purchase a parcel of approximately 260 hectares (640 acres) in size and for construction to begin in the spring of 1999. The new landfill has been designed to be able to accept up to 454 metric tons (500 tons) per day of municipal solid waste and have a life span of 40 years. (Kingery, 1998—Personal communication)

Energy

Electricity—On-base

Commercial Power. Electricity is provided to Cavalier AFS by Minnkota Power Cooperative, Inc., and Nodak Electric Cooperative, Inc. (U.S. Air Force Space Command, undated—Comprehensive Planning Framework, Cavalier AS; Greenwood, 1998—Electronic communication). Peak power demand for Cavalier AFS is approximately 7 megawatts, and annual energy use is approximately 47 million kilowatt-hours (Greenwood, 1998—Electronic communication, June 8).

Backup Power. Cavalier AFS is capable of generating primary power for the entire installation using the generators in the underground power plant facility (Building 820), and these generators supply primary power to critical operations when commercial service is interrupted (U.S. Air Force Space Command, undated—Comprehensive Planning Framework, Cavalier AS).

The onsite power plant has a total capacity of 15 megawatts (Greenwood, 1998—Electronic communication, June 8).

Electricity—Off-base. Nodak Electric Cooperative is one of 12 member-owner cooperative and 12 municipal utilities that are served by the Minnkota Power Cooperative, Inc. (Minnkota Power Cooperative, Inc., 1998—Homepage). Nodak Electric Cooperative provides electricity to a portion of the northwestern part of North Dakota, and serves approximately 12,000 people (Rodgers, 1998—Personal communication). Nodak's peak demand is approximately 130 megawatts, and in 1997 it purchased approximately 561 million kilowatt-hours of electricity from Minnkota (Rodgers, 1998—Personal communication).

The Minnkota Power Cooperative is a regional generation and transmission company that obtains its electricity from the power plants of the Milton R. Young Station. (Minnkota Power Cooperative, Inc., 1998—Homepage)

Natural Gas

On-base. The natural gas system for Cavalier AFS was constructed as a cooperative effort among Cavalier AFS and five local communities. Under the SAFEGUARD program, and with the combined efforts of the local communities, Montana–Dakota Utilities Company (MDU) constructed approximately 110 kilometers (70 miles) of 15- and 20-centimeter (6- and 8-inch) lines to connect the installation, and the local communities, to the existing natural gas system near Devils Lake, North Dakota. (U.S. Air Force Space Command, undated—Comprehensive Planning Framework, Cavalier AS)

Natural gas is used for heating as well as to drive the power plant generators. Annual use is approximately 3 million cubic meters (107 million cubic feet). (Greenwood, 1998—Electronic communication, June 8)

Off-base. MDU distributes natural gas and propane and operates electric power generation, transmission, and distribution facilities in North Dakota, South Dakota, Montana, and Wyoming. MDU's pipeline supplier, Williston Basin Interstate Pipeline Company, owns three large storage fields. Combined, the three storage fields have a capacity of almost 5.7 billion cubic meters (200 billion cubic feet) of natural gas. As the average home in MDU's service area uses 3.1 thousand cubic meters (110 thousand cubic feet) of gas a year, this storage capacity equals the annual needs of 1.8 million homes. Since summer gas demand is only about one-fourth of the daily amount produced from wells and processing plants, MDU diverts the remainder into the storage fields for use during the winter. During the winter, on a peak usage day, roughly two-thirds of MDU's gas supply comes from the Williston Basin's storage fields. (Montana–Dakota Utilities Company, 1998—Utility Operations)

3.13.2.2 Grand Forks AFB—Utilities

This section describes the utilities in the vicinity of Grand Forks AFB. Section 3.13 contains an overview of the utilities resource.

Water Supply

On-base. Grand Forks AFB obtains water for domestic and industrial uses from the city of Grand Forks and Grand Forks–Traill Water Users, Inc., and during the 12-month period from May 1997 to May 1998 the base used 2.13 billion liters (562 million gallons) of water (Arp, 1998—Personal communication, July 8 and Aug 27), or an average of 5.83 million liters per day (1.54 million gallons per day). The city of Grand Forks is the primary supplier, typically providing approximately 75 percent of the water used, with approximately 25 percent provided by the base's secondary source, Grand Forks—Traill Users, Inc. (U.S.

Department of the Air Force, 1997—Grand Forks AFB General Plan). However, during the recent floods Grand Forks—Traill Water Users supplied all the base's water for 44 days, due to the city of Grand Forks' water system being disabled.

The base provides no treatment of the water but maintains the base distribution system. Four elevated tanks provide a water storage capacity of 7.2 million liters (1.9 million gallons). In addition, there is a 1.34-million-liter (355-thousand-gallon) reinforced concrete ground tank. (U.S. Department of the Air Force, 1997—Grand Forks AFB General Plan)

Off-base. The city of Grand Forks obtains its water from two rivers, the Red River and the Red Lake River. They have a treatment capacity of 62.5 million liters per day (16.5 million gallons per day). In 1997 they produced an average of 30.2 million liters per day (7.97 million gallons per day) of water with a 15 percent loss. The city of Grand Forks has a storage capacity of 51.1 million liters (13.5 million gallons) of water within their system. (Sletten, 1998—Personal communication)

Traill Water Users, Inc. obtains its water from 13 wells that have a normal pumping capacity of 8 thousand liters (2 thousand gallons) per minute and an emergency capacity of 10 thousand liters (2.7 thousand gallons) per minute. Their treatment capacity is 6.51 million liters per day (1.72 million gallons per day) of soft water or 15 million liters per day (4 million gallons per day) of hard water. They have 2 million liters (0.5 million gallons) of storage at the wells and 5.7 million liters (1.5 million gallons) of storage in their service area. Their service area has no specific boundaries, but tends to be limited by the other rural water companies that are located to their north, south, and west. (Loeslie, 1998—Personal communication)

Traill Water Users, Inc. sold 1.64 billion liters (433 million gallons) of water in fiscal year 1997. In a typical year they sell approximately 320 million liters (85 million gallons) of water to Grand Forks AFB. (Loeslie, 1998—Personal communication)

Wastewater

On-base. The Grand Forks AFB sewage treatment system is operated by the base and is located on base property less than 2 kilometers (1 mile) east of the main base. The treatment system consists of six lift stations, four treatment cells, and one tertiary cell. The lift stations are for discharge into the primary lagoon cell. (U.S. Department of the Air Force, 1997—Grand Forks AFB General Plan)

The water is discharged in accordance with a National Pollutant Discharge Elimination System (NPDES) permit (Permit No. ND0020621) from the state of North Dakota. The discharge from the lagoon flows into a drainageway of Kelly's Slough. In 1997 Grand Forks AFB generated an average of 3.6 million liters per day (0.96 million gallons per day) of wastewater. The system's capacity is approximately 20 million liters per day (5 million gallons per day). (Arp, 1998—Personal communication, July 8 and August 27)

Off-base. The city of Grand Fork's wastewater treatment facility is a lagoon system. The system has a capacity of 39.7 million liters per day (10.5 million gallons per day). The average usage is 26 million liters per day (7 million gallons per day). A new activated sludge treatment facility is currently in planning. This system is expected to come online the early part of 2001 and have a capacity of 114 million liters per day (30 million gallons per day). (Goetz, 1998—Personal communication) Much of the area surrounding Grand Forks AFB is rural, and many households are not connected to public sewage systems. Of the 27,085 households counted within Grand Forks County in the 1990 census, 2,790 households (10.3 percent) were not connected to a public sewage system (U.S. Bureau of the Census, 1995—County & City Data Book 1994, Grand Forks AFB).

Solid Waste

On-base. Hardfill, construction debris, and inert waste generated by activities at Grand Forks AFB are disposed of at a special use landfill located on-base. The landfill is permitted by the North Dakota Department of Health as a "Special Use Disposal Site." All on-base municipal and industrial solid wastes are collected by a contractor and deposited in the Grand Forks County Landfill. (U.S. Department of the Air Force, 1997—Grand Forks AFB General Plan)

During the 12-month period from June 1997 to May 1998 approximately 3,056 metric tons (3,369 tons) of municipal solid waste were generated at Grand Forks AFB and subsequently removed to the Grand Forks County landfill (Braun, 1998—Personal communication).

The new on-base special use and inert solid waste landfill and land recycling farm is located near the OT-5 area (EDAW, Inc., 1998—Trip Report of Visit to North Dakota, June 16-18). The special-use on-base landfill (for construction debris only) occupies 2.6 hectares (6.5 acres) (Koop, 1998—Personal communication) and has a capacity of approximately 54 thousand cubic meters (70 thousand cubic yards) (Braun, 1998—Personal communication). The total area of the landfill/land treatment area is approximately 9.7 hectares (24 acres) (EDAW, Inc., 1998—Trip Report of visit to North Dakota, June 16–18).

Off-base. Section 3.13.2.1 contains a description of the city of Grand Forks landfill.

Energy

Electricity—On-base

Commercial Power. Electricity is provided to Grand Forks AFB by Nodak Electric Cooperative. In fiscal year 1997, Grand Forks AFB used 88.6 million kilowatt-hours of electricity. Grand Forks AFB's peak usage of electricity is in the winter due to large heating requirements because of the cold weather (Anderson, M. 1998—Personal communication).

Electrical power purchased from Nodak Electrical Cooperative arrives via two 69-kilovolt feeders. (U.S. Department of the Air Force, 1997—Grand Forks AFB General Plan)

Backup Power. To provide electrical power to critical facilities on-base in case of emergency, 25 backup generators are installed in or adjoining buildings housing airfield control and instrumentation, emergency organizations, and utility services. (U.S. Department of the Air Force, 1997—Grand Forks AFB General Plan)

Off-base. Nodak Electric Cooperative is one of 12 member-owner cooperative and 12 municipal utilities that are served by the Minnkota Power Cooperative, Inc. (Minnkota Power Cooperative, Inc., 1998—Homepage). Nodak Electric Cooperative and the Minnkota Power Cooperative are described in section 3.13.2.1.

Natural Gas

On-base. Grand Forks AFB purchases natural gas from Northern States Power Company, a local distributing company (Arp, 1998—Personal communication, July 8 and August 27). Annual gas usage at Grand Forks AFB was approximately 271.5 thousand decatherms at the main meter and 459.7 thousand decatherms at the central heating plant, for a total of 731.2 thousand decatherms (Arp, 1998—Personal communication, July 14). This is the amount of energy in approximately 1 billion cubic meters (38 billion cubic feet) of natural gas.

The on-base gas distribution system begins at the metering station near the main gate entrance (U.S. Department of the Air Force, 1997—Grand Forks AFB General Plan).

Off-base. Northern States Power Company, headquartered in Minneapolis, Minnesota, and its wholly owned subsidiary, Northern States Power Company–Wisconsin, operate generation, transmission, and distribution facilities providing electricity to about 1.4 million customers in Minnesota, Wisconsin, North Dakota, South Dakota, and Michigan. (Northern States Power Company, 1998—About NSP)

In North Dakota, Northern States Power Company provides natural gas to more than 30,000 customers in the communities of Buffalo, Casselton, Emerado, Fargo, Grand Forks, Horace, Mapleton, Oriska, Thompson, Tower City, and West Fargo (Northern States Power Company, 1999—Service Area in North Dakota). Northern States Power Company's 1997 annual sales for the Grand Forks area was 4.36 million decatherms (Arp, 1998—Personal communication, July 14), which is the amount of energy in approximately 117 million cubic meters (4.14 billion cubic feet) of natural gas.

3.13.2.3 Missile Site Radar—Utilities

This section describes the utilities in the vicinity of the Missile Site Radar. Section 3.13.2 contains an overview of the utilities resource.

Because the Missile Site Radar is in caretaker status, there is currently little to no utility usage at the site.

Water Supply

On-base. The original onsite water distribution system that served the site is still in place and substantially intact. This system is currently government owned, but privatization efforts are being made. The government owned, onsite pumphouse was refurbished and can pressurize the distribution system. The four pumps currently in the pumphouse are in good condition. Two of the pumps are electric motor driven and are rated at 810 liters (214 gallons) per minute. The other two pumps may be driven by either electric motor or internal combustion engine. They are rated at 3.7 thousand liters (1.0 thousand gallons) per minute with electric motor and 5.7 thousand liters (1.5 thousand gallons) per minute with engine drive. A 1.5-million-liter (400-thousand-gallon) reservoir is onsite that can be filled by the government-owned distribution system or a commercial water system connection. Missile Site Radar has recently switched the source of its water supply to Langdon Rural Water Users, a commercial water supplier. (Greenwood, 1998—Electronic communication, July 13)

Off-base. Langdon Rural Water Users is a rural water distributor that obtains all its water from the city of Langdon Water Department. Langdon Rural Water Users purchases only treated water. They provided 217 thousand liters (57.5 thousand gallons) of water to their customers in calendar year 1997. Langdon Rural Water Users services the rural areas around the city of Langdon, North Dakota. (Wenzel, 1998—Personal communication)

The Water Department of the city of Langdon obtains its raw water from Mount Carmel Dam and Mulberry Creek. They have a treatment capacity of 3.54 million liters (935 thousand gallons) per day and produced approximately 477 million liters (126 million gallons) of treated water in 1997. They have a storage capacity of approximately 4 million liters (1 million gallons). Their service area is the city of Langdon. (Anderson, R. 1998—Personal communication)

Wastewater

On-base. The onsite sewage treatment system consists of a two-cell evaporative sewage lagoon, sewage collection piping to existing facilities, and a lift station. Currently there is no measurable sewage discharge to the lagoon. The only use of the system during caretaker operation has been to manage groundwater on the site to keep lower levels of the facilities from flooding. The force main from the lift station to the lagoon currently requires repair and the lagoon, although functional, would require repairs if the site were reactivated. The lagoon capacity is approximately 130 million liters (34 million gallons). Pumping capacity of the lift station is nominally 1,900 liters (500 gallons) per minute at 26 meters (85 feet) total head. There are two pumps. (Greenwood, 1998—Electronic communication, July 13)

Off-base. Approximately 21 kilometers (13 miles) of wastewater collection sewers serve the city of Langdon. Six sanitary lift stations pump wastewater through forcemains to approximately 20.8 hectares (51.3 acres) of facultative treatment lagoons. The city of Langdon is nearing completion of a phased pump and control replacement project for each of the lift stations. The lagoons are typically discharged semi-annually to a stream that flows northwesterly away from the city. (Cavalier County Job Authority, 1998—Building Our County's Future)

Solid Waste

On-base. Current average solid waste generated at the Missile Site Radar is estimated at 3 cubic meters (4 cubic yards) per month. This is caretaker operation usage. Capacity is mainly limited by requirements. There is no government owned landfill. All waste is disposed of offsite in a commercial landfill. (Greenwood, 1998—Electronic communication, July 13)

Off-base. Section 3.13.2.1 contains a description of the city of Grand Forks landfill.

Energy

Electricity—On-base. Electricity is provided to the Missile Site Radar by Cavalier Rural Electric Cooperative, which is headquartered in Langdon, North Dakota. Consumption for fiscal year 1997 was 272.4 thousand kilowatt-hours, which represents use during caretaker operations. The existing service from Cavalier Rural Electric Cooperative provides single and 3-phase power. The onsite distribution serves all existing facilities in the non-tactical area and the radar building in the tactical area and is government owned. (Greenwood, 1998—Electronic communication, June 8)

Electricity—Off-base. Cavalier Rural Electric Cooperative provides electricity to Cavalier County and a portion of Ramsey County. It serves approximately 1,500 accounts, which includes approximately 1,200 families. Its latest peak and low demands were 8,242 kilowatt-hours in January and 3,468 kilowatt-hours in July. In 1997 Cavalier Rural Electric purchased approximately 37 million kilowatt-hours of electricity from Minnkota. (Otto, 1998—Personal communication)

Cavalier Rural Electric Cooperative, Inc. is one of 12 member-owner cooperative and 12 municipal utilities that are served by the Minnkota Power Cooperative, Inc. (Minnkota Power Cooperative, Inc., 1998—Homepage). Minnkota Power Cooperative is described in section 3.12.2.1.

Natural Gas—On-base. The original onsite, government owned natural gas distribution system is still in place. Leak tests are performed each year and indicate the system is tight. Cathodic protection on the system is due to be upgraded in 1998. Service is provided by Montana–Dakota Utilities. (Greenwood, 1998—Electronic communication, July 13)

Consumption of natural gas in fiscal year 1997 represents caretaker status, and was 794.3 decatherms (Greenwood, 1998—Electronic communication, July 13). This is the amount of energy in approximately 21.4 thousand cubic meters (756 thousand cubic feet) of natural gas.

Natural Gas—Off-base. Montana–Dakota Utilities is described in section 3.13.2.1.

3.13.2.4 Remote Sprint Launch Site 1—Utilities

This section describes the utilities in the vicinity of Remote Sprint Launch Site 1. Section 3.13.2 contains an overview of the utilities resource.

Water Supply

Potable water is not currently available at Remote Sprint Launch Site 1. When it was operational, it was necessary to haul in potable water. The underground water tanks are still in place, but the condition of the tanks and associated piping and pumping systems is assumed to be poor. (Greenwood, 1998—Electronic communication, July 13)

Wastewater

There is an existing 2-cell evaporative lagoon at each of the Remote Sprint Launch Sites, which are intact but not used. They could be made functional if necessary. (Greenwood, 1998—Electronic communication, July 13)

The system was designed for 100 percent loss of waste through evaporation and seepage of up to 7.6 thousand liters (2.0 thousand gallons) per day (U.S. Army Corp of Engineers, 1974—Analysis of Existing Facilities at SRMSC).

Solid Waste

On-base. There is currently no solid waste generated or collected at Remote Sprint Launch Site 1. If needed, refuse collection could be obtained by commercial contract with local service agencies. (Greenwood, 1998—Electronic communication, July 13)

Off-base. Section 3.13.2.1 contains a description of the city of Grand Forks landfill.

Energy

Electricity—On-base. Electricity is not currently available at Remote Sprint Launch Site 1. Commercial power could be provided to Remote Sprint Launch Site 1 from nearby sources if required. (Greenwood, 1998—Electronic communication, July 13)

Electricity—Off-base. Electricity in the areas surrounding the Remote Sprint Launch Sites is provided by Minnkota Power Cooperative, Inc. through one of its 12 member-owner cooperatives (Minnkota Power Cooperative, Inc., 1998—Homepage). Minnkota Power Cooperative is described in section 3.13.2.1.

Natural Gas—On-base. Natural gas service is not currently available at Remote Sprint Launch Site 1 (Greenwood, 1998—Electronic communication, July 13).

3.13.2.5 Remote Sprint Launch Site 2—Utilities

The utilities that service Remote Sprint Launch Site 2 are the same as described for Remote Sprint Launch Site 1.

3.13.2.6 Remote Sprint Launch Site 4—Utilities

The utilities that service Remote Sprint Launch Site 4 are the same as described for Remote Sprint Launch Site 1.

3.14 WATER RESOURCES

This section describes the existing water resource conditions at each of the proposed sites. Water resources include surface water, groundwater, water quality, and flood hazard areas. Marine water resources are also discussed for the proposed fiber optic cable lines in Alaska. See section 3.7, Hazardous Materials and Hazardous Waste Management, for existing water contamination, and section 3.13, Utilities, for a discussion of water-related utilities.

The Federal Water Control Amendments of 1972, commonly known as the Clean Water Act (CWA), established a national strategy to restore and maintain the chemical, physical, and biological integrity of the nation's water. Under the CWA, the U.S. EPA is the principal permitting and enforcement agency. The CWA functions primarily by requiring permits for activities that result in the discharge of water pollutants from both point sources (i.e., discharge pipes, ditches, etc.) and non-point sources (i.e., agricultural lands, construction sites, and dredge and fill operations).

The 1987 amendments to the CWA required the U.S. EPA to establish an NPDES permit program for storm water discharges associated with industrial activities. Industrial operations that result in the discharge of storm water are permitted under an individual or multi-sector industrial permit. The U.S. EPA renewed the NPDES Storm Water Construction General Permit on February 17, 1998 and amended the Multi-Sector Industrial Permit on September 30, 1998. The amended Multi-Sector permit covers those industries previously covered under the expired Baseline General Permit. A Notice of Intent to Obtain Coverage under an NPDES Storm Water Construction General Permit must be filed with the U.S. EPA or appropriate state agency for construction activities that result in the disturbance of 2 hectares (5 acres) or more in area. The preparation of an SWPPP is also required.

Section 404 of the CWA established the Federal program that regulates activities in the nation's wetlands. Specifically, Section 404 of the CWA established a program to regulate the discharge of dredged and fill material into waters of the United States, including wetlands. Refer to section 3.4, Biological Resources, for a discussion of wetlands.

Executive Order 11988, Floodplain Management, was established in 1977 "to avoid to the extent possible the long and short term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct or indirect support of floodplain development wherever there is a practicable alternative." All Federal and Federally supported activities are required to comply with Executive Order 11988.

3.14.1 ALASKA INSTALLATIONS

Storm water management activities within the State of Alaska are governed by Title 18 Environmental Conservation, Chapter 60, Article 2 of the Alaska Administrative Code in accordance with 40 CFR 122.26. Other applicable codes include Title 18 Environmental Conservation, Chapter 70 Water Quality Standards; Title 11 Natural Resources, Part 6 Lands, Chapter 93 Water Management; and Title 46 Water, Air, Energy, and Environmental Conservation. For construction projects, a copy of the Notice of Intent and SWPPP prepared for the U.S. EPA must be provided to the Alaska Department of Environmental Conservation.

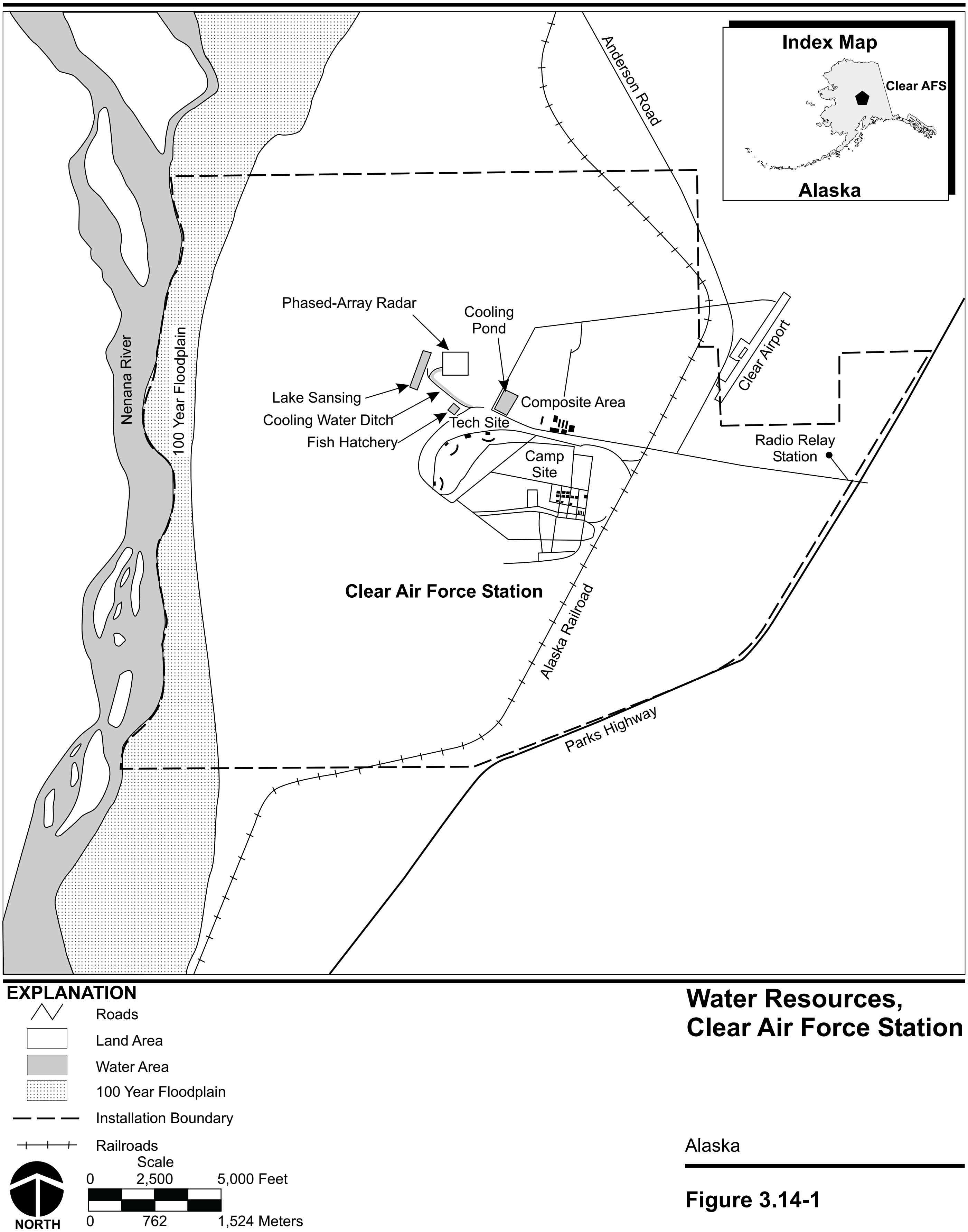
3.14.1.1 Clear AFS—Water Resources

The water resources ROI includes all surface water features, drainage areas, and underlying aquifers that could be affected by construction or operations. This area includes Clear AFS and an area within approximately 2 kilometers (1 mile) of the base boundary (figure 3.14-1).

Surface Water

Clear AFS is located in the Nenana River watershed, USGS Cataloging Unit 19040508 (U.S. EPA, 1998—Surf Your Watershed). Surface water flow on Clear AFS follows the topography in a northeasterly direction. Runoff follows several small creeks north of the station that flow into the Nenana River (U.S. Department of the Air Force, 1997—Supplemental EA for Radar Upgrade, Clear AS). Due to the low mean annual precipitation for the area of 33 centimeters (13 inches), very little overland flow occurs other than at spring breakup (Clear AS, 1998—Draft Solid Waste Management Plan). The 100-year floodplain of the Nenana River is restricted to the westernmost portion of the installation (U.S. Department of the Air Force, 1997—Supplemental EA for Radar Upgrade, Clear AS).

There are four primary bodies of water contained on or bordering Clear AFS. The largest of these bodies of water is the Nenana River, which runs along the entire west boundary of Clear AFS. The other water bodies, Lake Sansing, the power plant cooling ponds, and the radar cooling water reject ditch, are man-made. There are approximately 1.6 kilometers (1 mile) of relatively undisturbed wilderness between the Nenana River and any developed area on Clear AFS. Lake Sansing is a groundwater infiltration area (approximately 5 hectares [12 acres]) contained in an old gravel borrow pit, and is fed by the radar operations cooling pond overflow via the reject ditch and by rainfall. The cooling pond is an unlined reservoir (approximately 3 hectares [8 acres]) that receives water via underground pipe from the power plant. (U.S. Department of the Air Force, 1997—Supplemental EA for Radar Upgrade, Clear AS)



Water Resources, Clear Air Force Station

Alaska

Figure 3.14-1

wr_clas_001

On the developed section of the installation, manmade features have in many cases altered normal overland flow paths. In all cases, the storm water is redirected into manmade features or into the surrounding forest to infiltrate into the groundwater or to evaporate. (U.S. Department of the Air Force, 1997—Supplemental EA for Radar Upgrade, Clear AS)

Clear AFS does not discharge storm water into any waters of the United States, and is currently not required to have an NPDES Multi-Sector Industrial Storm Water Permit. However, Clear AFS has prepared an SWPPP to establish a system and guidelines to reduce or eliminate potential storm water pollution. (Clear AS, 1998—Draft Storm Water Pollution Prevention Plan)

Groundwater

The groundwater within the ROI occurs in an unconfined aquifer composed of unconsolidated sand and gravel. Depth to water ranges from approximately 17 to 20 meters (55 to 65 feet) below the surface, and tends to flow north at a gradient of about 1 meter (3 feet) per mile. The groundwater receives its recharge from the infiltration from the Nenana River, surface water features, and precipitation. The groundwater discharges about 8 kilometers (5 miles) north of Clear AFS into Julius Creek and Clear Creek. (Clear AS, 1998—Draft Solid Waste Management Plan)

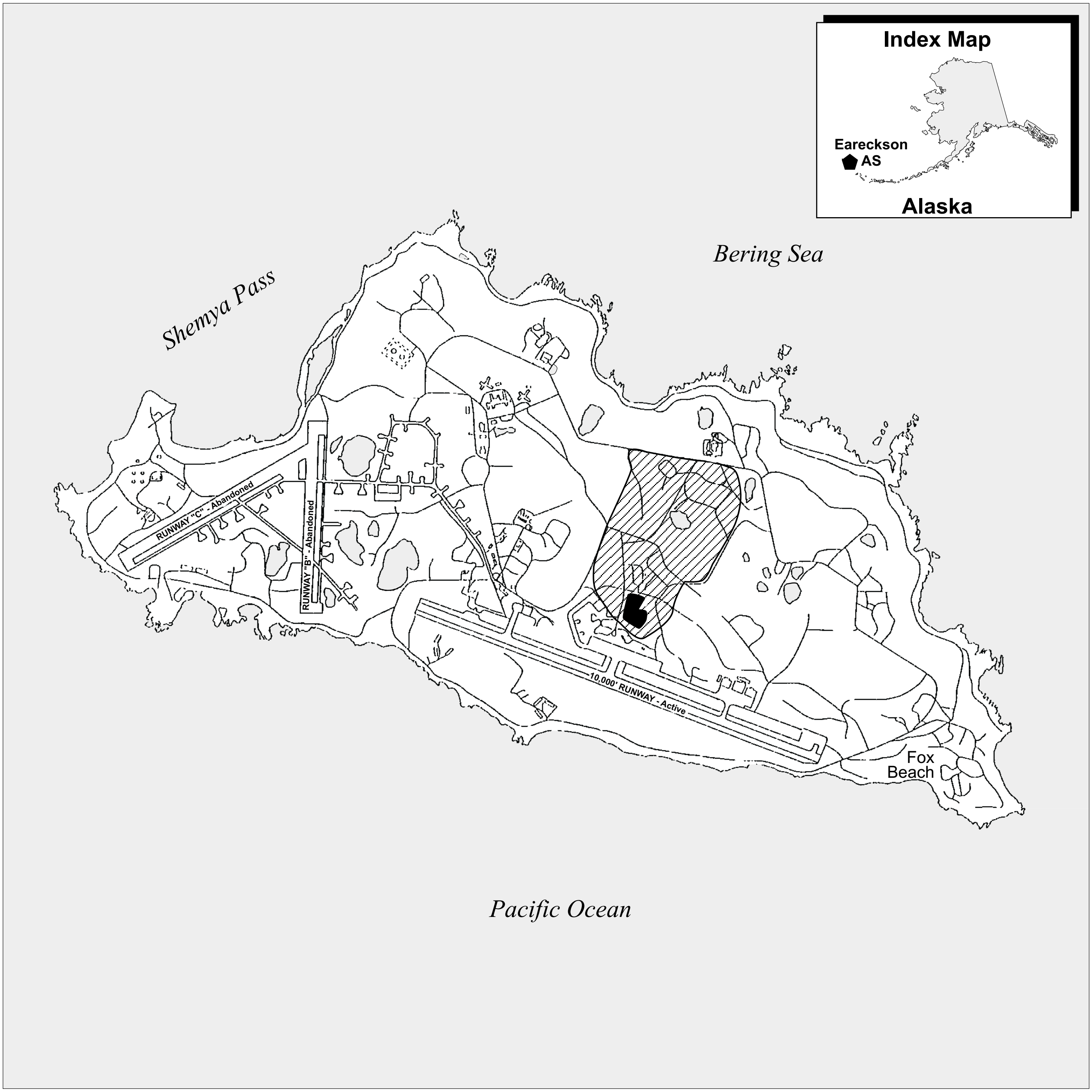
Water for domestic and industrial use at Clear AFS is obtained from 15 wells completed to depths of approximately 46 meters (150 feet) (U.S. Department of the Air Force, 1997—Supplemental EA for Radar Upgrade, Clear AS).

Water Quality

Water quality is subject to seasonal variations, but all within established U.S. EPA drinking water standards (water resources appendix). There are several water supply wells down gradient from the landfill that are checked for water quality on a regular basis. No contaminates were detected in monitoring wells installed around the site landfill during the previous monitoring of groundwater at the landfill. (Clear AS, 1998—Draft Solid Waste Management Plan)

3.14.1.2 Eareckson AS—Water Resources

The water resources ROI includes all surface water features, drainage areas, and underlying aquifers that could be affected by construction or operations. This area includes all of Shemya Island (figure 3.14-2).



EXPLANATION

Water Resources, Eareckson Air Station

Alaska

Figure 3.14-2

wr_eas_001

Surface Water

Eareckson AS is located in the Shemya Island watershed. Surface water flow on Eareckson AS follows the topography in a south–southwest direction, although the east and west halves of the island are distinct drainage systems. Drainage is generally poor in the interior of the island, resulting in standing water. There is no record of either rainfall induced or coastal flooding on Shemya Island. The small drainage area of the interior is not likely to result in flooding, and the coastline is sufficiently high such that 100-year storm waves would not top the beach crest. However, a tsunami line has been established at the 30-meter (100-foot) elevation mark (U.S. Department of the Air Force, 1997-Final Installation-Wide Environmental Baseline Survey; U.S. Air Force, 1995—Natural Resources Plan; U.S. Department of the Air Force, undated—EA Shemya Borrow Pit and Rock Quarry Plan).

Numerous lakes and ponds exist on the island, generally in the northern and western one thirds. Except for the western Lake Complex, most of the lakes and ponds have poorly defined drainage basins. Frost ponds, open pits, and standing water are a result of the poor drainage on the island. Many of the lakes and ponds are situated near surface water divides or high points, and a significant portion of the available precipitation is absorbed by surficial and near-surface deposits. The remaining water is discharged by streams or springs on the southern coastline. There is not a large runoff on the northern coast of the island due to the increasing northern elevation. (U.S. Department of the Air Force, undated—EA Shemya Borrow Pit and Rock Quarry Plan; U.S. Air Force, 1995—Eareckson AS, Draft Management Action Plan; U.S. Air Force, 1995—Natural Resources Plan)

A small watershed located in the eastern part of the island that covers an area of approximately 103 hectares (255 acres) is the recharge area for potable water at Eareckson AS (U.S. Air Force, 1994—Eareckson AFS Storm Water Pollution Prevention Plan). Within this area, surface water infiltrates into a shallow unconfined aquifer.

Storm water flows overland and through culverts, eventually reaching outfall locations at the ocean. Outfalls usually discharge storm water mixed with groundwater that seeps into the drainage channels. Eareckson AS has an NPDES Multi-Sector Industrial Storm Water Permit and SWPPP that document existing conditions and establish practices for prevention of storm water pollution. (U.S. Air Force, 1994—Eareckson AFS Storm Water Pollution Prevention Plan; Shoviak, 1999—Personal communication)

Groundwater

The varying lithology and structural influences found on the island create a relatively complex hydrogeological environment. Both confined and unconfined aquifers occur on the island, with some areas having multiple zones of saturation. Groundwater can be encountered either in the surface peat layer that occurs over much of the island, or in the unconsolidated sand and gravel that occurs primarily in the southern coastal area, or in the fractured bedrock in the central portion of the island. The general trend for the island is that groundwater depth increases with an increase in surface elevation. Depth to water varies from approximately 3 meters (10 feet) to more than 60 meters (200 feet) below ground surface. (U.S. Department of the Air Force, undated—EA Shemya Borrow Pit and Rock Quarry Plan; U.S. Air Force, 1995—Draft Management Action Plan)

Groundwater flow within the unconsolidated deposits closely follows the surface topography. Most water finds its way into the fractures in the bedrock where it is stored. General direction of water flow within the bedrock follows surface topography also, suggesting that gravity is more dominant than fracture flow. An east–west trending groundwater divide occurs somewhere within the northern one third of the island. To the south of this divide, groundwater flow is predominantly to the south/southwest. To the north of this divide, groundwater flow is predominantly to the north/northeast. All of the potential aquifers on the island are either quite thin, have low porosity, or have low permeability. (U.S. Department of the Air Force, undated—EA Shemya Borrow Pit and Rock Quarry Plan; U.S. Air Force, 1995—Draft Management Action Plan)

Potable water is collected through an infiltration gallery system installed in the 1950s. Four horizontal infiltration collectors are installed below the peat layer of the shallow unconfined aquifer. Groundwater from the peat layer enters the collectors and flows to a central holding tank. The water is pumped to the water treatment plant, where it is treated for domestic use, chlorinated, and then pumped into three water storage reservoirs for domestic and construction uses. Two wells provide up to 416 liters (110 gallons) per minute of water as a backup to the water gallery system. (U.S. Department of the Air Force, undated—EA Shemya Borrow Pit and Rock Quarry Plan)

Water Quality

Surface water and groundwater quality is generally good except in isolated areas of known contamination. Water pumped from the water gallery is treated in the water treatment plant before domestic use. Drinking water quality is subject to seasonal variations but is generally within established U.S. EPA drinking water standards (U.S. Department of the Air Force, undated—EA Shemya Borrow Pit and Rock Quarry Plan).

However, drinking water samples have exceeded the 1993 action levels for lead and copper (U.S. Department of the Air Force, 1997—Final Installation-Wide Environmental Baseline Survey).

3.14.1.3 Eielson AFB—Water Resources

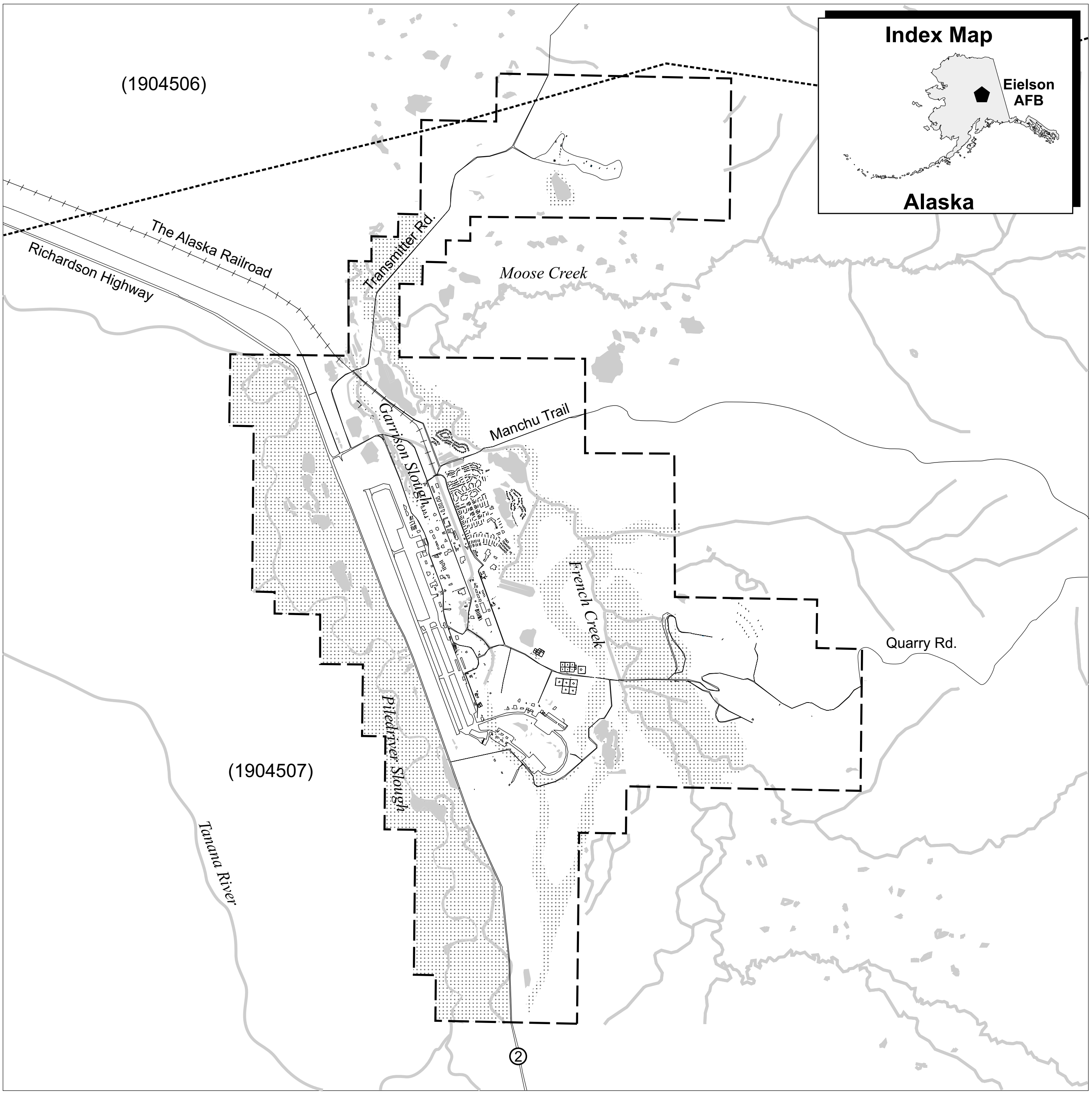
The water resources ROI includes all surface water features, drainage areas, and underlying aquifers that could be affected by construction or operations. The ROI includes all of Eielson AFB and a buffer area of approximately 3 kilometers (2 miles) that includes proposed action areas on the Yukon Training Area (figure 3.14-3).

Surface Water

The Eielson ROI is located primarily in the Tanana Flats watershed, USGS Cataloging Unit 19040507 and also extends into the Chena River watershed, USGS Cataloging Unit 19040506 (U.S. EPA, 1998—Surf Your Watershed). Surface water bodies near Eielson AFB include rivers, creeks, sloughs, lakes, and ponds. Surface drainage at Eielson AFB is generally north–northwest, parallel to the Tanana River. Several small sloughs or creeks pass through the ROI and discharge into the Tanana River. Moose Creek is the main receiving stream for small local drainages around the base. French Creek, along the eastern side of the base, discharges into Moose Creek. Garrison Slough also discharges into Moose Creek. Garrison Slough passes directly through the developed portion of the base and consists primarily of engineered drainage channels. Moose Creek discharges into Piledriver Slough just above the confluence with the Tanana River. With the exception of a short period during spring, the surface water elevation in Garrison Slough is lower than the groundwater elevations. This indicates the Garrison Slough is a gaining stream that receives its recharge from the groundwater during most of the year. (U.S. Air Force, 1995—Final Environmental Restoration Program, Eielson AFB, Operable Units 3, 4, and 5; U.S. Department of the Air Force, 1998—Draft 1997 Sitewide Monitoring Program Report)

Approximately 34 percent of Eielson AFB is within the 100-year floodplain (U.S. Air Force, 1997—EA Gravel Borrow Pit in the North Area of Eielson AFB). The Winter Camp site on the Yukon Training Area is not within a floodplain.

Eielson AFB operates under an NPDES Multi-Sector Industrial Storm Water Permit and SWPPP. The SWPPP identifies existing and potential sources of storm water pollution at Eielson AFB and defines Best Management Practices to reduce potential pollution and ensure compliance with permit requirements.



EXPLANATION

- Water Area
- 100 Year Floodplain
- Drainage
- Roads
- Watershed Boundary (EPA Watershed ID Number)
- Railroads
- Roads
- Installation Boundary
- Building

Scale 1:101,000

0 .8 1.6 Miles

0 1.25 2.5 Kilometers

NORTH

wr_eafb_002

Water Resources, Eielson Air Force Base

Alaska

Figure 3.14-3

Groundwater

Groundwater on the developed part of the base occurs at depths of 2 to 3 meters (6 to 10 feet) below ground surface. This is an unconfined aquifer associated with the Tanana River floodplain. The aquifer is 61 to 91 meters (200 to 300 feet) thick and overlies the Birch Creek Schist. Flow directions are usually to the north–northwest and parallel the flow of the Tanana River. Local variations in flow directions occur on Eielson AFB near surface water bodies, Power Plant pumping supply wells, and near melting piles of stored snow that create a source of recharge water during breakup.

Groundwater elevations in the unconfined aquifer are subject to seasonal fluctuations, with the highest elevation occurring during and immediately following snowpack melting. The lowest elevations are expected during the fall. During winter, a slow rise in water levels is normal. The magnitude of fluctuations varies from year to year, but generally is in the range of 0.5 to 0.6 meter (1.5 to 2.0 feet). (U.S. Air Force, 1995—Final Environmental Restoration Program, Eielson AFB, Operable Units 3, 4, and 5; U.S. Department of the Air Force, 1998—Draft 1997 Sitewide Monitoring Program Report)

Groundwater in the upland portion of the base occurs at depths of approximately 15 to 91 meters (50 to 300 feet) in a fractured bedrock aquifer. Downgradient flowpaths are not well defined in this aquifer. Groundwater flow in the bedrock aquifer is controlled largely by the heterogeneities in the bedrock such as fractures or relatively permeable lenses and layers. (U.S. Air Force, 1995—Final Environmental Restoration Program, Eielson AFB, Operable Units 3, 4, and 5)

Groundwater is the only source of potable water used at Eielson AFB. Additional private and agricultural wells are located within a 5-kilometer (3-mile) radius of the base. These wells are located downgradient, north–northwest, and to the west of the base. The community of Moose Creek depends upon a public water system (groundwater) and on private wells. Groundwater is also utilized for emergency and fire fighting purposes on Eielson AFB. (U.S. Air Force, 1995—Final Environmental Restoration Program, Eielson AFB, Operable Units 3, 4, and 5)

Water Quality

Groundwater is the principal source for industrial, domestic, agricultural, and fire-fighting purposes (U.S. Air Force, 1995—Final Environmental Restoration Program, Eielson AFB, Operable Units 3, 4, and 5). Background groundwater quality analyses have shown that the average iron and manganese concentrations typically exceed the secondary maximum contaminant levels for drinking water. Arsenic has been identified as a constituent of concern at Eielson AFB, and one background sample exceeded the primary drinking water standard of 50 micrograms per liter (U.S. Air Force, 1993—Environmental Restoration Program, Eielson AFB, Background Ground—Water Quality; U.S. Department of the Air Force, 1998—Draft 1997 Sitewide Monitoring Program Report).

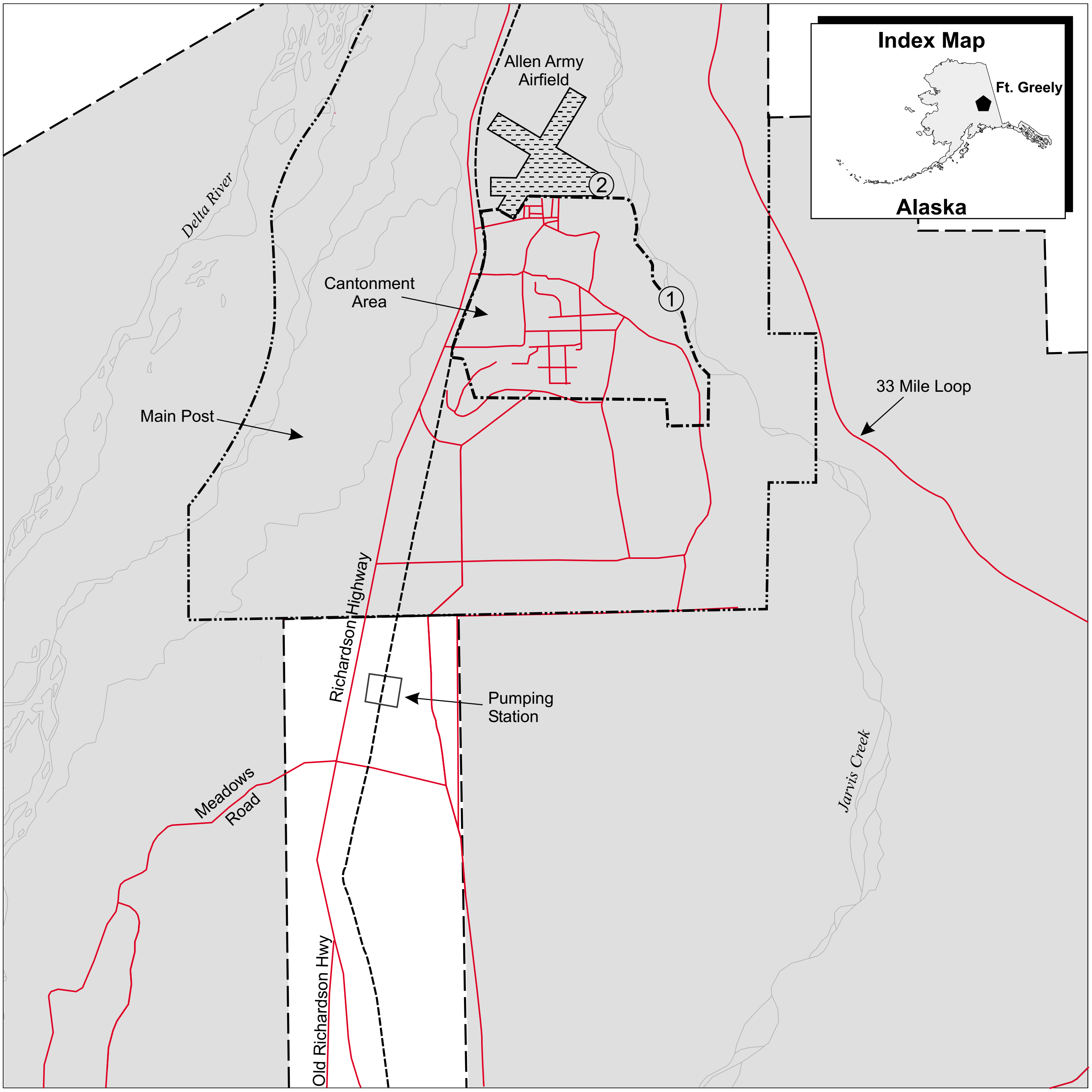
Surface water is not utilized for drinking water in the Eielson AFB area. (U.S. Air Force, 1995—Final Environmental Restoration Program, Eielson AFB, Operable Units 3, 4, and 5). Water sampling of Garrison Slough has identified volatile organic compounds at levels below the U.S. EPA drinking water maximum contaminant levels. Low levels of pesticides were detected in 1993; however, no pesticides were detected in 1994. (U.S. Department of the Air Force, 1998—Draft 1997 Sitewide Monitoring Program Report)

3.14.1.4 Fort Greely —Water Resources

The water resources ROI includes all surface water features, drainage areas, and underlying aquifers that could be affected by construction or operations. This includes the cantonment area and an adjacent area several miles south from the cantonment boundary (figure 3.14-4).

Surface Water

Fort Greely is in the Delta River watershed, USGS Cataloging Unit 19040504 (U.S. EPA, 1998—Surf Your Watershed). The Delta River to the west and Jarvis Creek immediately east are the two primary drainages for the Fort Greely ROI. Both are glacier-fed and silt-laden. The peak flow in these water systems is reached in late summer, when snow and ice melt is augmented by rainfall. Minimum flow occurs in winter when precipitation occurs as snow. (Alaskan Air Command, 1990—Installation Restoration Program, Site 3, Fort Wainwright Landfill) Other surface water bodies within the ROI are intermittent, unnamed creeks, and lakes. Jarvis Creek and Delta River are generally frozen solid during the winter, but discharges from springs at the mouth of the river have been measured at about 0.8 cubic meter (30 cubic feet) per second. Discharges measured on the Delta River 3 kilometers (1.8 miles) south of Big Delta range from nearly 283 cubic meters (10,000 cubic feet) per second in July to 0.7 cubic meter (24 cubic feet) per second in October. Similar discharge measurements for Jarvis Creek at the Richardson Highway range from 25 cubic meters (880 cubic feet) per second in July to no flow from November to March. (U.S. Army Corps of Engineers, 1996—Final Report, Postwide Site Investigation, Fort Greely)



EXPLANATION

- Fort Greely
- Roads
- Drainage
- Runways
- Installation Boundary
- Trans-Alaska Pipeline
- Main Post Boundary
- Cantonment Area Boundary
- ① Outfall 1 - Stormwater
- ② Outfall 2 - Stormwater

Scale 1:80,000

0 3,334 6,667 feet

0 1,016 2,032 meters

NORTH

wr_fge_001

Water Resources, Fort Greely

Alaska

Figure 3.14-4

Although floodplain boundaries have not been developed for the ROI, there is a low probability of flooding. High flows in the Delta River overflow to the west rather than toward the ROI. Jarvis Creek overflowed into an old channel during a 1967 flood. Since a barrier was placed at the overflow location, flooding along the old channel has not occurred. (U.S. Department of the Army, 1999—Alaska Army Lands Withdrawal Renewal Final Legislative EIS)

Due to the relatively flat terrain and permeable soils within the ROI, much of the storm water runoff infiltrates before it reaches a water body. Fort Greely operates under an NPDES Multi-Sector Industrial Storm Water Permit and SWPPP (Johnson, D., 1999—Personal communication, March 24). The SWPPP identifies two outfalls from the main cantonment area. One discharges into Jarvis Creek, and the other discharges within 183 to 213 meters (600 to 700 feet) of Jarvis Creek (U.S. Army Corps of Engineers, 1996—Final Report, Storm Water Pollution Prevention Plan, Fort Greely).

Groundwater

One unnamed water-bearing unit has been described in the ROI. This unit consists of a lower stratified gravel layer extending at least 52 meters (170 feet) below ground surface. One boring completed at Fort Greely penetrated the alluvium to depths of 122 meters (400 feet) below ground surface. The lower stratified gravel aquifer has been reported to be overlain by low-permeability lenses and seams that may result in the formation of perched water zones. Although the water table is usually reported to lie below the permafrost, the presence of perched water has been documented within the fort boundaries. (U.S. Army Corps of Engineers, 1996—Final Report, Postwide Site Investigation, Fort Greely)

The groundwater flows in a northeasterly direction at a gradient ranging from approximately 1.5 to 6 meters (5 to 21 feet) per mile. Groundwater in the area is recharged continuously by the Delta River and by infiltration of meltwater from the Alaska Range in the late spring and early summer. The depth to groundwater ranges from 53 meters (175 feet) to at least 91 meters (300 feet) below ground surface, and fluctuates in response to seasonal recharge. As of 1983, there were five usable wells, located near the north end of the existing post, with an estimated combined capacity in excess of 15 million liters (4 million gallons) per day. (U.S. Army Corps of Engineers, 1996—Final Report, Postwide Site Investigation, Fort Greely)

Water Quality

Surface water quality samples meet the primary drinking water standards; however, the concentrations of aluminum, iron, and manganese were higher than the secondary standards. Measurements of pH on Fort Greely were within the state standards. The average annual sediment yield for the Delta River is 420 metric tons per square kilometer (1,200 tons per square mile), most of which is transported during the summer. (U.S. Department of the Army, 1999—Alaska Army Lands Withdrawal Renewal Final Legislative EIS)

Groundwater quality in the vicinity of Fort Greely is considered good for a potable water supply (U.S. Army Corps of Engineers, 1996—Final Report, Postwide Site Investigation, Fort Greely). In a recent study, all of the water quality parameters were within the state drinking water standards (U.S. Department of the Army, 1999—Alaska Army Lands Withdrawal Renewal Final Legislative EIS).

3.14.1.5 Yukon Training Area (Fort Wainwright)—Water Resources

The water resources ROI is described under Eielson AFB, section 3.14.1.3, and includes all surface water features, drainage areas, and underlying aquifers that could be affected by construction or operations. The ROI includes all of Eielson AFB and a buffer area of several miles around the proposed GBI site.

Surface Water

See section 3.14.1.3. The Yukon Training Area operates under the Fort Wainwright NPDES Multi-Sector Storm Water Permit and SWPPP.

Groundwater

See section 3.14.1.3.

Water Quality

See section 3.14.1.3.

3.14.1.6 Alaska—Fiber Optic Cable Line—Water Resources

This section describes the water resources and water quality for the fiber optic cable line ROI. The potential fiber optic cable line would be installed to connect Eareckson AS to existing fiber optic cables at Seward or Whittier as shown in figure 2.4.5-1. The fiber optic cable line route would cross approximately 4,000 kilometers [2,500 miles)] of ocean floor. The route would start in either Whittier, in Prince William Sound, or Seward, adjacent to the Gulf of Alaska. It would then cross the Gulf of Alaska and the Bering Sea.

In addition to this route, a second redundant route may be required. The exact alignment of this route has not been identified but could be north of the Aleutian Islands or connect to existing fiber optic cable in the central Pacific. Provided below is a description of the known fiber optic cable route starting in either Whittier or Seward. Once the second route is identified, additional environmental analysis would be conducted.

Prince William Sound

Prince William Sound is a semi-enclosed 100-by-160-kilometer (60-by-100-mile) body of seawater in Southcentral Alaska that is bounded on the north and west by the south-central coastline and on the east and south by islands that separate it from the Gulf of Alaska. The greatest depths in Prince William Sound are close to 3,650 meters (12,000 feet) deep. The deepest water is found in a series of basins west of Naked Island. Typically, however, water depths throughout the sound range from 200 to 400 meters (650 feet to 1,300 feet). Hinchinbrook Entrance is 140 meters (460 feet) deep, and Montague Strait is 265 meters (875 feet) deep. Shallow sills at these entrances restrict the movement of water between the gulf and the sound.

Surficial sediments in much of Prince William Sound are fine glacial clay and silt overlaying graywacke or shale (Sharma, 1979—The Alaskan Shelf). Depth of the fine sediment layer is greater in the deeper areas further from the glacial sources of much of the sediment input. Soft sediments are composed of 30 to 40 percent silt and 60 to 70 percent clay. Graywacke, shale, and scattered igneous extrusions are exposed throughout the sound.

Prince William Sound tidal currents flood and ebb through the entrances to the sound. Predicted velocities are not available for any of these channels. However, the sound contains a large volume of water and is highly affected by tidal variations. Since shallow sills limit the flow into the passes, flood and ebb velocities can be assumed to be over 5 kilometers per hour (3 miles per hour) at maximum flow. Net circulation of seawater in the sound is in from the east and out to the south; waters enter through Hinchinbrook Entrance, flow to the southwest around Knight Island, and then flow out through the sound’s southwest passages.

Waves in Prince William Sound seldom reach heights over 2 meters (6 feet), and then only in the open areas of the eastern sound. Tidal range in the sound is typically 4 to 5 meters (12 to 15 feet).

The North Pacific Basin, including the Gulf of Alaska and Prince William Sound, is subject to tsunamis, or seismic ocean waves. Eighty percent of tsunamis reported between 1928 and 1963 occurred in this region. These are very long period waves generated by earthquakes. Underwater landslides set off by an earthquake may be the direct cause, as large volumes of water may be displaced very quickly by such events. The length between crests may be several hundred kilometers, and they travel at speeds up to 900 kilometers per hour (560 miles per hour). In the deep ocean the wave height may be under 1 meter (3.3 feet). The wavelength shortens and the height increases as a tsunami approaches shallow water. When it hits a coastline, a tsunami pushes a tremendous volume of water up the shoreline, which then drains back down rapidly. The tremendous volume washing up the shoreline at high speed, rather than wave height, does the damage. (U.S. Department of the Interior, 1974—The Western Gulf of Alaska)

Water temperatures in the sound range from just above freezing during the winter and spring to as high as 15°C (60°F) during August. Salinity of surface water in the sound ranges from 30.5 parts per thousand in late winter to a high of about 32.5 parts per thousand in the central sound in summer. Temperature and salinity variations are the result freshwater inputs from streams mixing with the offshore oceanic water mass entering through Hinchinbrook Entrance (Sharma, 1979—The Alaskan Shelf).

Information on turbidity is not available for the deep waters of Prince William Sound. However, turbidity values are generally low for most of the year, with the exception of spring, when plankton blooms. Turbidity is higher near the mainland shore.

Gulf of Alaska

The Gulf of Alaska is bounded on the north by the shoreline of south-central Alaska and extends from southeast Alaska westerly to Unimak Pass near the tip of the Alaska Peninsula (Sharma, 1979—The Alaskan Shelf). It is bounded on the south by the eastward flowing sub-arctic current in the North Pacific Ocean. It is the terminus of one of the world's largest storm tracks, resulting in weather conditions in the gulf that tend toward the extreme, especially during the winter.

The Gulf of Alaska has several bathymetric regions (Sharma, 1979—The Alaskan Shelf). The continental shelf east of Kodiak Island is a relatively shallow, flat shelf environment. The greatest depths in this area are about 275 meters (900 feet) deep. The shelf extends up to 250 kilometers (150 miles) offshore. To the south and west of Kodiak Island the continental shelf is narrower. This area is characterized by shoals, islands, and undersea canyons that break up the smooth shelf environment. Ocean depths of 3,700 meters (12,000 feet) can be found within 50 kilometers (30 miles) of the coast. Approximately 140 kilometers (85 miles) south of the shoreline at Nikolski, ocean depths drop to over 7,200 meters (23,500 feet).

Sediments underlying the Gulf of Alaska are a mixture of glacial fines, silt, sand, gravel, boulders, and rock outcrops (Sharma, 1979—The Alaskan Shelf). Nearshore areas are often covered with fine sediments overlying relict glacial moraines. Soft sediment depths are greater in depressions and valleys, and shallower along ridgelines. Fine sediments are common near the coast; currents flush the exposed ridges clear of the finer sediments. Further offshore, the seabed is dominated by relict glacial moraine.

As the eastward flowing Subarctic Current approaches the coastline of North America (the Alaska Current), it flows counterclockwise to the north and then runs westerly along the Alaska coastline (figure 3.14-5). The U.S. Department of the Interior (1974) reported a net velocity of 0.5 kilometer per hour (0.3 knot) across the central Gulf of Alaska.

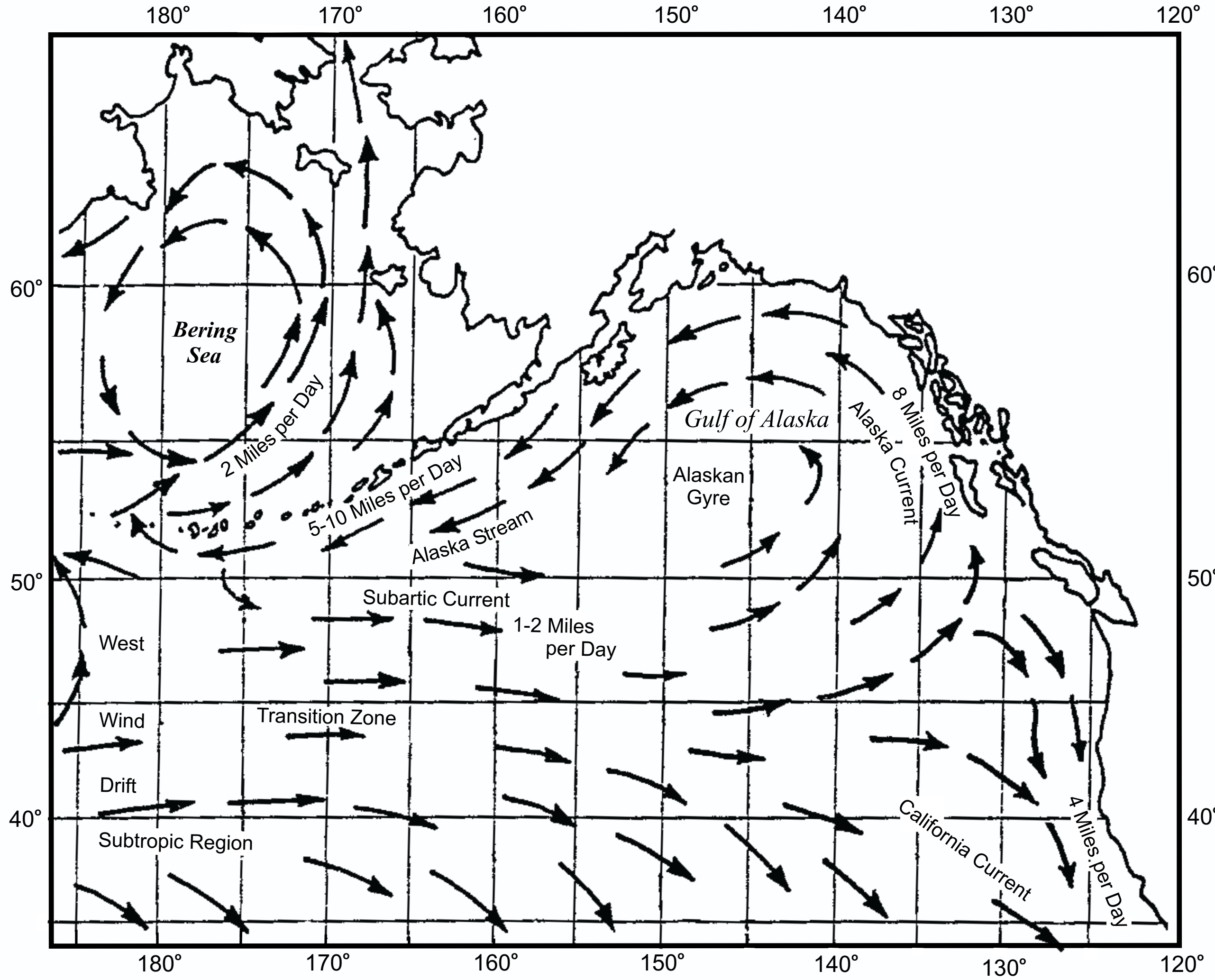
Tidal currents in the Gulf of Alaska run from zero at slack tide to as high as 16 kilometers per hour (9 knots) or even higher through the passes in the Aleutians Islands. Storm driven tides may even run over 20 kilometers per hour (11 knots).

The Alaska Current narrows and becomes the Alaska Stream as it moves west past Kodiak Island, the Alaska Peninsula, and along the Aleutian Range. Near 175 degrees west longitude, south of the Aleutian Chain, the Alaska Stream slows and splits. Part of the stream turns southerly and rejoins the eastbound Subarctic Current, and part, assisted by the Coriolis effect, flows north into the Bering Sea. Tidal activity is moderate in the Gulf of Alaska; the typical tidal range is about 2.75 meters (9 feet) at Kodiak.

During storms, seas in the Gulf of Alaska are heavy and chaotic. The chaotic wave action results from the short fetch in the gulf (the distance winds blow unobstructed over water). Maximum unsubstantiated wave height calculated for the Gulf of Alaska is 15 meters (50 feet) (U.S. Department of the Interior 1974—The Western Gulf of Alaska). Reliable estimates put maximum wave height closer to 9 meters (30 feet). Ocean swells in the open North Pacific have been measured at a height of 34 meters (110 feet) (Gross, 1987—Oceanography). The Gulf of Alaska is also subject to tsunamis.

Winter surface seawater temperatures in the Gulf of Alaska ranges from 0 to 1°C (32 to 34°F) near shore to offshore temperatures of 2.2 to 3.3°C (36 to 38°F). Offshore surface temperatures can reach 11 to 12°C (52 to 54 °F) during the summer. Water temperatures below 100 meters (330 feet) average 4 to 5°C (39 to 41°F) year-round.

Salinity at the surface over the continental shelf ranges from 32.0 to 32.2 parts per thousand in summer and 32.4 to 32.6 parts per thousand in winter. Bottom water over the continental shelf is close to 33.0 parts per thousand year-round. This is the same salinity as in the North Pacific, indicating uniformity of subsurface conditions in the Gulf of Alaska with the North Pacific. (U.S. Department of the Interior 1974—The Western Gulf of Alaska)



General Circulation, North Pacific Ocean

Alaska

Figure 3.14-5

Not to Scale

NORTH

wr_ak_foc_002

Turbidity information is unavailable for the deep waters of the Gulf of Alaska. However, turbidity values are generally low during winter. During summer, turbidity increases near the surface from plankton blooms. Nearshore turbidity increases from fine-grained glacial sediment as stream flows increase during summer.

Bering Sea

The Bering Sea is bounded by the Commander and Aleutian Islands on the south, by Western Alaska on the east, by the Bering Straits on the north, and by Russia on the west and northwest.

The Bering Sea is generally shallow, especially over the continental shelf in the eastern and northern portions of the sea. It is ice-free for about 6 months of the year; maximum winter ice typically covers approximately half to three-quarters of the Bering Sea (McRoy and Goering, 1974—The Influence of Ice on the Primary Productivity of the Bering Sea). The floor of the southwestern Bering Sea is typically a smooth abyssal plain surrounded by steep walls of the continental slope. The abyssal plain covers approximately 43 percent of the sea floor; the continental shelf covers approximately 43 percent of the bed; and the continental slope, nearly 13 percent of the floor. Depths of 1,900 meters (6,300 feet) are found within 32 kilometers (20 miles) of the eastern Aleutian coast. Depths above the abyssal plain generally range from 2,500 meters (8,200 feet) to 3,500 meters (11,500 feet). Bower's Ridge rises from the bed of abyssal plain and runs north and then west from a point two thirds out along the Aleutian Chain. The ridge rises to the surface at Semisopochnoi Island and is about 600 kilometers (375 miles) long.

The deeper portions of the Bering Sea have a thick layer of fine sediment that was deposited by the Kuskokwim and Yukon Rivers when they flowed south during the last ice age (Sharma, 1979—The Alaskan Shelf). Rocky substrates are found in the Aleutian Chain and along Bower's Ridge. The continental shelf in the Bering Sea varies from fine sediments near the rivers in Bristol Bay to coarse sand further offshore. There is little rocky substrate on the continental shelf within the Bering Sea.

The general circulation pattern in the Bering Sea flows in a counterclockwise direction (figure 3.14-5). Part of the water mass passes north through the Bering Straits, and the balance of the water mass flows west and back south, thus continuing the counterclockwise Bering Sea Gyre. The average velocity of the northward flowing current along the eastern boundary of the Bering Sea is 0.13 kilometer per hour (0.07 knots).

Over half of the Bering Sea is shallow, and the fetch is short. Storms create chaotic and heavy seas. Tidal activity along the southern edge of the Bering Sea is the same as that in the adjoining western Gulf of Alaska.

In the central Bering Sea, winter surface water temperatures range from 0 to 3°C (32 to 37°F). Surface water temperature in the northern Bering Sea is typically at the freezing point, and sea ice covers the northern two-thirds of the sea. For most of the Bering Sea, summer temperatures rise to 7 to 8°C (44 to 46°F).

Salinity in the Bering Sea is 33 to 34 parts per thousand (Favorite, 1974; —Flow Into the Bering Sea through the Aleutian Island Passes; McAlister and Favorite, 1977—Oceanography). Salinity drops near rivers such as the Yukon River and the rivers that drain into Bristol Bay.

Turbidity information is unavailable for the waters of the Bering Sea. However, turbidity values are generally low during winter. During summer, turbidity increases from plankton blooms in near-surface waters. Turbidity is higher near the shorelines and lower in the offshore areas. Turbidity is expected to be low in the deeper waters below the photic zone.

3.14.2 NORTH DAKOTA INSTALLATIONS

Potentially applicable North Dakota Administrative Code includes: Standards of Water Quality for the State of North Dakota (Chapters 33-16-02); North Dakota Century Code Section 61-28-01; The Department of Health and Consolidated Laboratories, North Dakota Title 33, Articles 16 and 17; and North Dakota Water Pollution Control Act (Title 61).

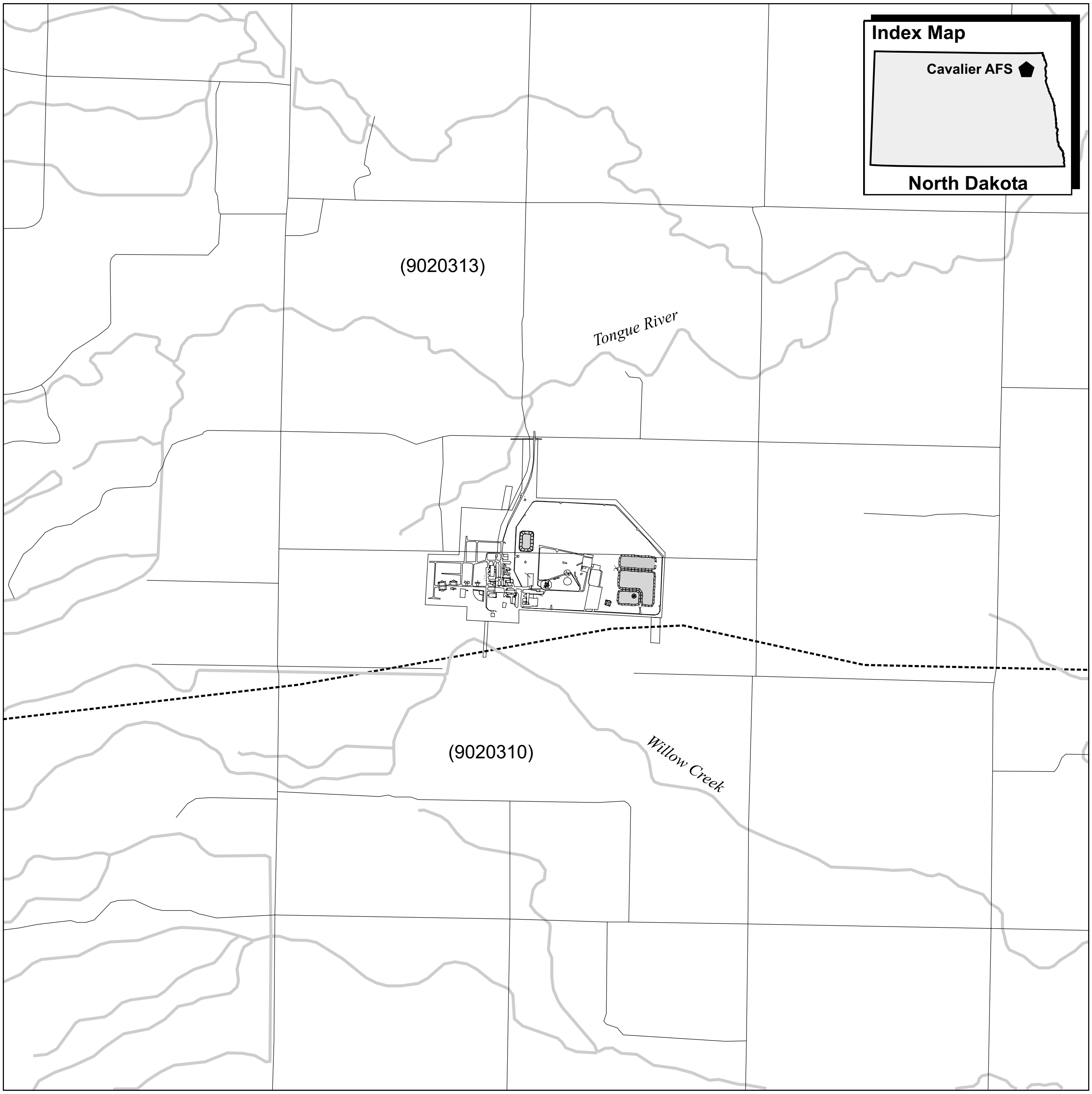
For construction projects, a Notice of Intent to Obtain Coverage under North Dakota Pollutant Discharge Elimination System General Permit for Storm Water Discharge Associated with Construction Activity must be filed with the North Dakota Department of Health, Division of Water Resources.

3.14.2.1 Cavalier AFS—Water Resources

The water resources ROI includes all surface water features, drainage areas, and underlying aquifers that could be affected by construction or operations. This area includes Cavalier AFS and an area within approximately 3 kilometers (2 miles) of the base boundary (figure 3.14-6).

Surface Water

The Cavalier AFS ROI includes the Pembina and Park watersheds, USGS Cataloging Units 09020313 and 09020310 (U.S. EPA, 1998—Surf Your Watershed). The Tongue River is located to the north of the Cavalier AFS and flows to the northeast and drains into the Pembina River. The Tongue River has an annual average discharge of 0.63 cubic meter (22.4 cubic feet) per second. The Pembina River drains into the Red River just south of Pembina. Runoff from the Cavalier AFS flows to the



EXPLANATION

Drainage

Roads

Watershed Boundary (EPA Watershed ID Number)

Scale 1:40,000

0 1,667 3,333 feet

0 508 1,016 meters

NORTH

Water Resources, Cavalier Air Force Station

North Dakota

Figure 3.14-6

wr_cas_001

south of the site into Willow Creek, a tributary of the Park River. The Park River travels southeast away from the Cavalier AFS and empties into the Red River. Cavalier AFS is not in a 100-year floodplain (Cavalier AFS, 1993—Natural Resources Management Plan).

Cavalier AFS operates under an NPDES General Permit for Storm Water Discharges Associated with Industrial Activities. The permit sets standards for pollutants in storm water discharges, and Cavalier AFS meets the requirements of its permits (U.S. Air Force Space Command, undated—Comprehensive Planning Framework).

Groundwater

Groundwater in the ROI is found in three major aquifers, the Pembina Delta Aquifer, Dakota Aquifer, and Icelandic Aquifer. The Pembina Delta Aquifer is approximately 3 kilometers (2 miles) north of Cavalier AFS and covers an area of 184 square kilometers (71 square miles). The Pembina Delta Aquifer is a glacial deposit consisting of clay, silt, sand, and gravel and is approximately 30 meters (100 feet) thick.

The Dakota Aquifer underlies Cavalier AFS. Groundwater in the Cavalier AFS area is found less than 3 meters (10 feet) below ground surface. Recharge for the Dakota Aquifer occurs through precipitation, infiltration, snowmelt, and prairie potholes (seasonal water bodies). The Dakota aquifer is an artesian aquifer and has a pump rate ranging from 4 liters (1 gallon) per minute to 378 liters (100 gallons) per minute.

Cavalier AFS receives its water from the North Valley Water Association, which taps the glacial drift Icelandic Aquifer 9.6 kilometers (6 miles) west of Cavalier AFS. North Valley is under contract to provide 1.09 million liters (0.29 million gallons) per day to Cavalier AFS. The Icelandic Aquifer, which serves the region around the city of Cavalier, has not shown any noticeable yield declines (Patch, 1998—Personal communication). The water usage for Cavalier AFS is approximately 0.45 million liters (0.12 million gallons) per day, of which 0.4 million liters (0.1 million gallons) per day is used for the existing radar cooling tower.

Water Quality

Groundwater and surface water vary in quality depending upon the geology, topography, and quantity of flow. Surface water quality is judged by rate of flow. Low flow rates usually result in higher dissolved mineral concentrations because of the longer exposure time to leachable minerals. Most streams in the area have a dissolved solids concentration of less than 500 milligrams per liter at high flow rate, which is marginally acceptable for irrigation uses. (North Dakota Geological Survey, 1973—Mineral and Water Resources of North Dakota)

Groundwater in the Pembina Delta Aquifer is considered very hard, with a high dissolved calcium and magnesium content. Iron in the groundwater often exceeds drinking water standards. The Pembina Delta Aquifer is utilized in the Cavalier AFS region for livestock, irrigation, and some domestic use. The groundwater from the Dakota and Icelandic aquifers is utilized for industrial, domestic, and rural resident purposes. The water is very hard with a calcium magnesium bicarbonate (North Dakota Geological Survey, 1973—Mineral and Water Resources of North Dakota).

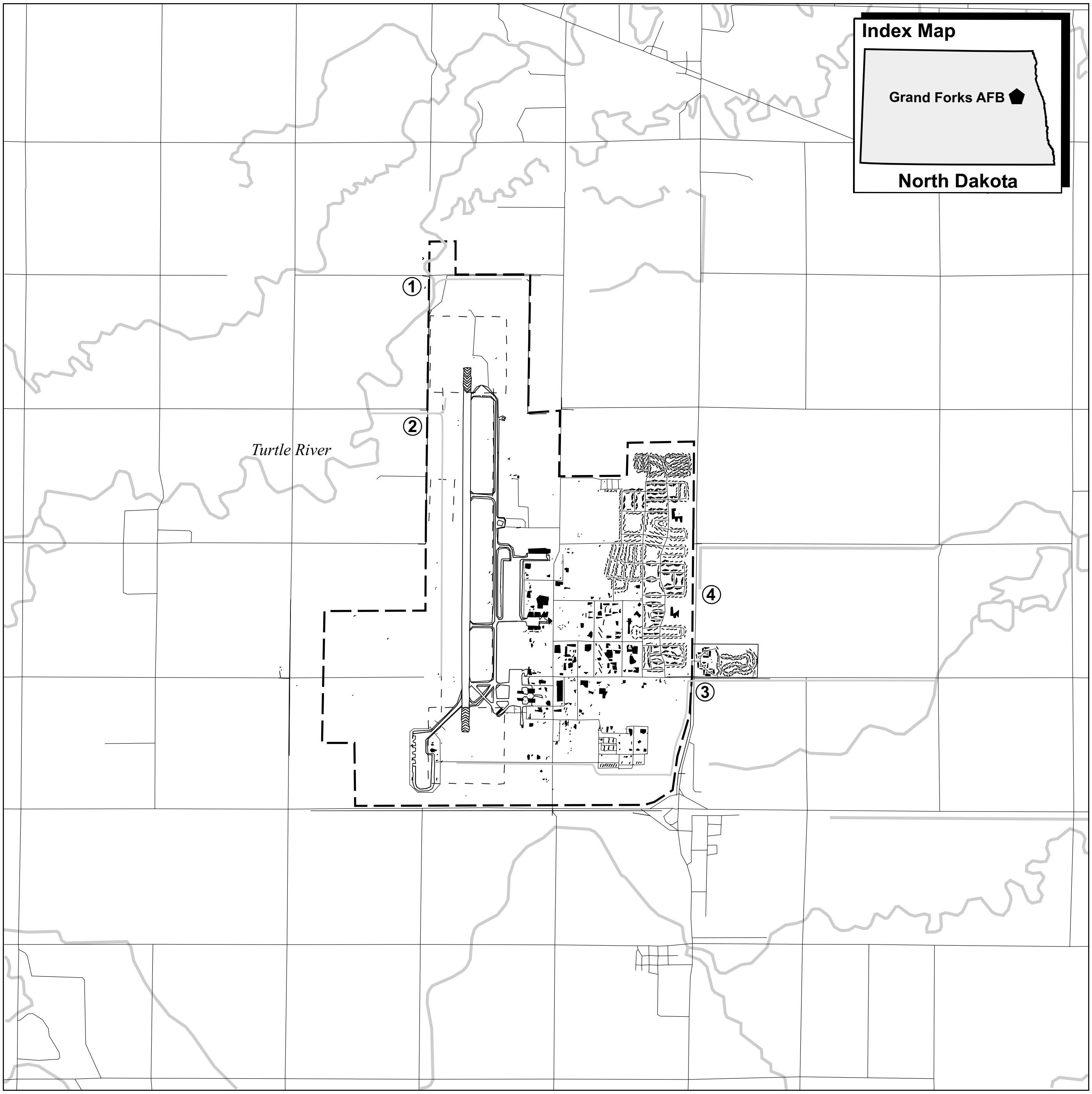
3.14.2.2 Grand Forks AFB—Water Resources

The water resources ROI includes all surface water features, drainage areas, and underlying aquifers that could be affected by construction or operations. This area includes Grand Forks AFB and an area within approximately 3 kilometers (2 miles) of the base boundary (figure 3.14-7).

Surface Water

The Grand Forks AFB ROI is in the Turtle River watershed, USGS Cataloging Unit 09020307 (U.S. EPA, 1998—Surf Your Watershed). The Turtle River and Kelly’s Slough are the major bodies of moving surface water in the Grand Forks AFB area. Kelly’s Slough, located approximately 3 kilometers (2 miles) east of Grand Forks AFB, flows in a north–northeast direction in a marshy floodplain with a poorly defined stream channel. Kelly’s Slough empties into the Turtle River to the east of the Grand Forks AFB. The Turtle River intersects Grand Forks AFB at the northwest corner and flows in a generally northeast direction to the Red River. There are no lakes or ponds in the Grand Forks AFB area (U.S. Department of the Air Force, 1997—Integrated Natural Resources Management Plan). Water for domestic and industrial use from the city of Grand Forks (75 percent of Grand Forks AFB total) is obtained from the Red River and the Red Lake River (U.S. Department of the Air Force, 1999—Final EIS, Minuteman III Missile System Dismantlement).

Prairie potholes tend to be seasonal water bodies closely associated with wetlands (See biological resources). Numerous prairie potholes exist throughout northeastern North Dakota, including several small prairie potholes that exist on Grand Forks AFB. Prairie potholes consist of surface water that generally is not large enough or deep enough to maintain fish populations. Prairie potholes are typically filled following the spring snowmelt, although many potholes are situated within a surficial aquifer and retain water throughout the year. Prairie potholes are prime waterfowl production areas, and also provide habitat for waterfowl and other species during migratory seasons (U.S. Department of the Air Force, 1999—Final EIS, Minuteman III Missile System Dismantlement).



EXPLANATION

Installation Boundary
Drainage
Roads

Stormwater Outfall
① Northwest Ditch
② West Ditch
③ South Ditch
④ North Ditch

Scale 1:70,000
0 .6 1.1 miles
0 .9 1.8 kilometers
NORTH

Water Resources, Grand Forks Air Force Base

North Dakota

Figure 3.14-7

wr_gfafb_001

Storm water runoff leaves the Grand Forks AFB from four identifiable drainage locations. Runoff flows to specific drainageways in the north (north ditch), northwest (northwest ditch), west (west ditch) and south (south ditch) at Grand Forks AFB. The northwest ditch collects runoff from the northern part of the base. The west ditch collects runoff from the west side of the base, to include the west runways. The south ditch collects runoff from the southern part of the base, to include the vehicle maintenance and fuel storage areas. The north ditch collects runoff from the northern part of the base, to include the hanger and aircraft maintenance areas. The northwest and west ditches drain into the Turtle River. The east and south ditches drain to Kelly's Slough. All drainage ultimately flows to the Red River. The base storm water runoff plan was approved by the North Dakota Department of Health and listed in the Grand Forks AFB storm water runoff permit. Under the base NPDES permit, storm water exiting west to Turtle Creek and east to Kelly's Slough are monitored twice annually. The base permit does not contain specific contaminant limits for discharges. Discharge points that service areas with higher risk of oil or fuel product spill flow through oil/water separators. (U.S. Department of the Air Force, 1997—Integrated Natural Resources Management Plan)

The 100-year floodplain on Grand Forks AFB is limited to an area of 76 meters (250 feet) on either side of Turtle Creek in the northwest corner of the base (about 19 hectares [46 acres]) (U.S. Department of the Air Force, 1997—Integrated Natural Resources Management Plan).

Groundwater

Water for domestic and industrial use from the Grand Forks–Traill Water Users, Inc. (25 percent of the Grand Forks AFB total) is obtained from 13 wells. Groundwater in the Grand Forks AFB ROI is found in the bedrock aquifers and the glacial drift aquifers. The Dakota Aquifer is the major bedrock aquifer. Limited quantities of water are also found in Pierre Shale. (U.S. Department of the Air Force, 1999—Final EIS, Minuteman III Missile System Dismantlement)

The Dakota Aquifer is in the Dakota Shale and Sandstone and is composed of quartzose, sandstone, and shale. Recharge of the Dakota Aquifer is to the west of the ROI (U.S. Department of the Air Force, 1999—Final EIS, Minuteman III Missile System Dismantlement). The primary use for water from the Dakota Aquifer is livestock watering. Many wells in this aquifer have experienced reduced flows due to regional decline caused by long-term groundwater withdrawals. These withdrawals have resulted in a 6-meter (20-foot) drop in the aquifer over the past several years. (U.S. Department of the Air Force, 1997—Integrated Natural Resources Management Plan)

The Pierre Aquifer consists of shale, marlstone, and claystone, and is found throughout much of the deployment area. Recharge occurs throughout much of the deployment area from precipitation, snowmelt, and prairie potholes. This aquifer is used by some farms and municipalities, but is not a major groundwater source in the region (U.S. Department of the Air Force, 1999—Final EIS, Minuteman III Missile System Dismantlement).

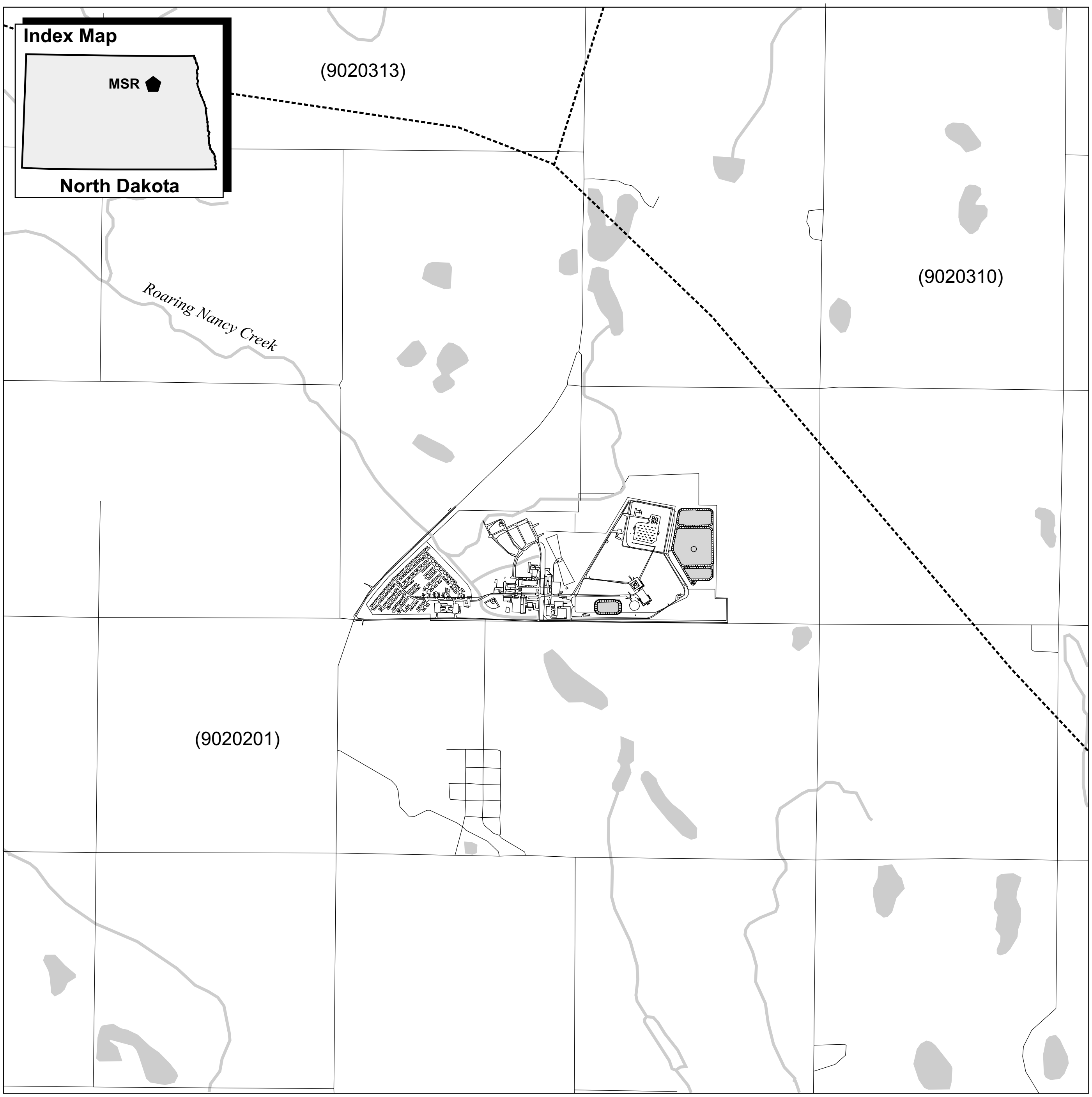
Water Quality

Groundwater and surface water vary in quality depending upon the geology, topography, water usage, and quantity of flow. Calcium magnesium bicarbonate is the prevalent dissolved constituent of concern in the ROI. High concentrations of sodium and magnesium are also found in the local area aquifers. Surface water quality is judged by rate of flow. Low flow rates usually result in higher dissolved mineral concentrations because of the longer exposure time to leachable minerals. Most streams in the area have a dissolved solids concentration of less than 500 milligrams per liter at high flow rates. These levels are considered acceptable for domestic use. Surface water salinity concentrations are typically too high during periods of low flow to be considered acceptable for possible potable domestic use (North Dakota Geological Survey, 1973—Mineral and Water Resources of North Dakota; U.S. Department of the Air Force, 1997—Integrated Natural Resources Management Plan). According to the National Water Quality Report, North Dakota reports that 78 percent of its surveyed river and streams have good water quality. The major sources of contaminated waters are agriculture, the removal of stream side vegetation, which increases siltation, and municipal sewage treatment plants. Natural conditions, such as low flows, also contribute to violations of standards. Good water quality is found in 95 percent of the lakes surveyed. The leading sources of pollution in lakes are agricultural activities, municipal sewage treatment, and urban runoff/storm sewers.

The Turtle River near Grand Forks AFB has a Class II stream designation from the North Dakota Department of Health, which means that it may be intermittent, but when flowing, it meets the chemical, physical, and bacteriologic requirements for municipal use. The designation also indicates that the river's water is of sufficient quality to use for irrigation, propagation of resident fish species, swimming, and other water-based recreation (U.S. Department of the Air Force, 1997—Integrated Natural Resources Management Plan).

3.14.2.3 Missile Site Radar—Water Resources

This section describes the water resources and water quality of the Missile Site Radar complex. The water resources ROI includes all waterways, potential drainage areas, still waters, and shallow and deep aquifers that could be affected by construction or operations (figure 3.14-8).



EXPLANATION

Water Area (Intermittent)

Drainage

Roads

Watershed Boundary (EPA Watershed ID Number)

Scale 1:40,000

0 1,667 3,333 feet

0 508 1,016 meters

NORTH

Water Resources, Missile Site Radar

North Dakota

Figure 3.14-8

wr_msr_001

Surface Water

The Missile Site Radar complex ROI is in the Devils Lake, Pembina, and Park watersheds, USGS Cataloging Units 09020201, 09020313, and 09020310 (U.S. EPA, 1998—Surf Your Watershed). There are no significant rivers or bodies of surface water in the ROI. The ROI is affected by the soils' ability to hold water (soils are clay and silt, low permeability). The Missile Site Radar is not within a 100-year floodplain (Greenwood, 1998—Electronic communication, June 5.)

Due to the slow infiltration rate, heavy rains often result in surface water being retained in depressions. The only natural surface water body on the site is a small intermittent stream, Roaring Nancy Creek, that crosses the western side of the site. This creek has been classified as a wetland by the Corps of Engineers. Storm water at the site flows through two drainage swales into the creek, and is carried northwest to a pond approximately 8 kilometers (5 miles) away (U.S. Army Center for Health Promotion and Preventive Medicine, 1995—Final Report, Site Inspection, SRMSC). Additionally, water from the site's sewage lagoons are periodically lowered by discharging to Roaring Nancy Creek when the lagoons fill from heavy rains. This discharge is regulated under an NPDES permit issued by the state of North Dakota. The permit requires periodic monitoring of surface water runoff.

Groundwater

Groundwater in the Missile Site Radar area is found in the Pierre Aquifer, which consists of fractured light to dark gray shale. Groundwater in the aquifer ranges in depth from 5 to 8 meters (15 to 25 feet) with pump rates ranging from 20 to 1,130 liters (5 to 300 gallons) per minute. Recharge for the Pierre Aquifer occurs through precipitation, snowmelt, and infiltration from prairie potholes (seasonal water bodies). The Pierre Aquifer is not a major groundwater source in the region.

The Missile Site Radar did receive its potable water from the municipal Fordville Well Field, in the south-central part of Walsh County. However, in 1996 the Missile Site Radar was connected to the town of Langdon's water supply, a surface water source northeast of Langdon (U.S. Army Center for Health Promotion and Preventive Medicine, 1995—Final Report, Site Inspection, SRMSC). The Missile Site Radar is still connected to the Fordville Well Field and occasionally uses the water for non-potable uses. Pump rates for the Fordville Well Field are up to 1,136 liters (300 gallons) per minute. Cavalier AFS, east of the Missile Site Radar, withdrew approximately 185,022 cubic meters (150-acre feet) per year before changing water supplies. In addition, other users in the region are withdrawing another 740,089 cubic meters (600-acre feet) from the Fordville Aquifer. No noticeable yield decline trends or changes in the aquifer have been noted from past use (Patch, 1998—Personal communication).

Water Quality

Groundwater and surface water vary in quality depending upon the geology, topography, water usage, and quantity of flow. Groundwater in the Missile Site Radar area has a high salinity content. Water in the Pierre Aquifer is considered toxic to plants because of the high sodium content. Sodium-bicarbonate-sulfate is the prevalent dissolved constituent of concern in the ROI. This groundwater is used for industrial and livestock purposes and often exceeds the drinking water standard for iron, chloride, and sulfate. Surface water low flow rates usually result in higher dissolved mineral concentrations because of the longer exposure time to leachable minerals. Most surface water in the area has a dissolved solids concentration of less than 500 milligrams per liter at high flow rate, which is marginally acceptable for irrigational uses (North Dakota Geological Survey, 1973—Mineral and Water Resources of North Dakota).

3.14.2.4 Remote Sprint Launch Site 1—Water Resources

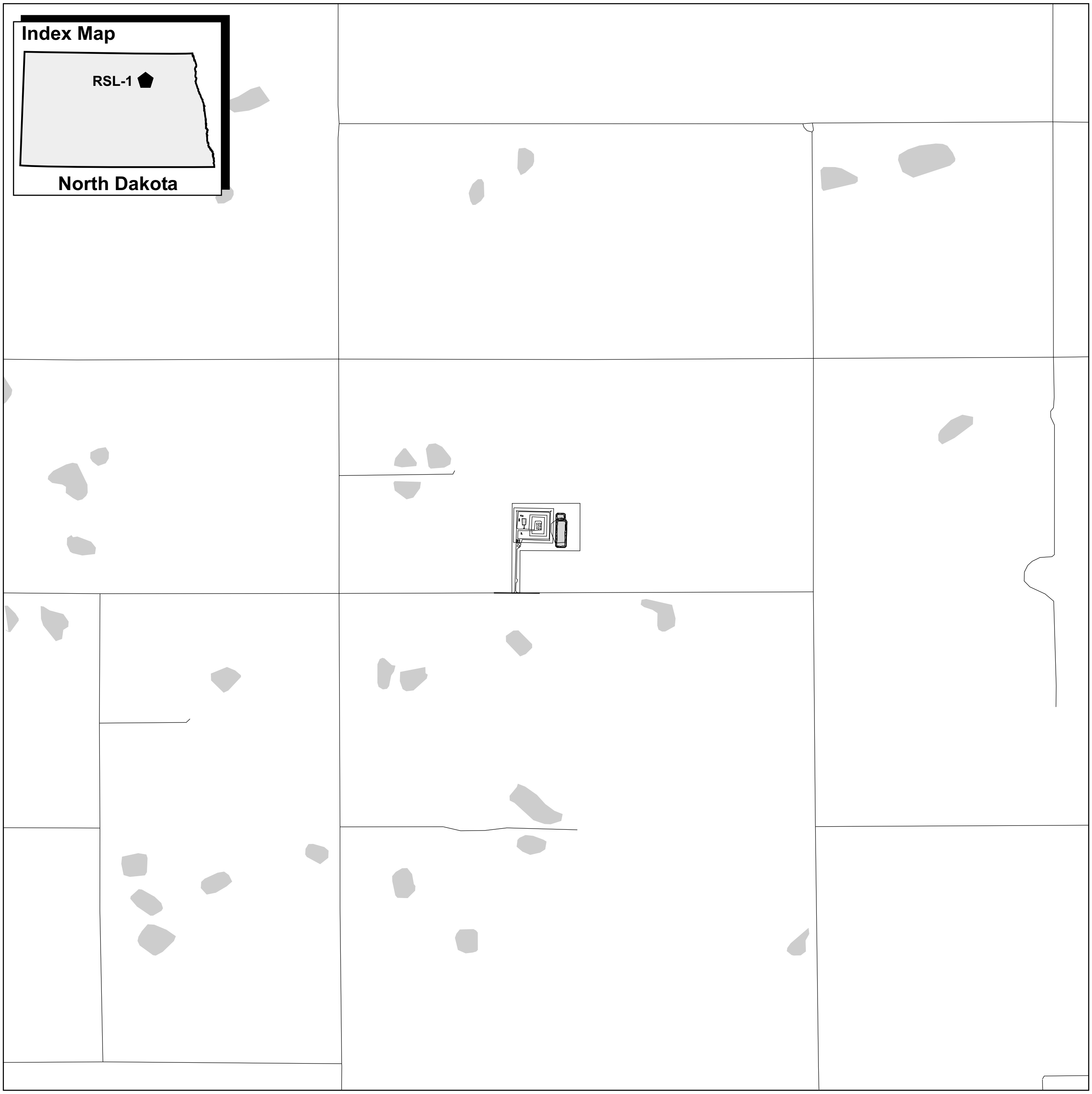
The water resources ROI includes all surface water features, drainage areas, and underlying aquifers that could be affected by construction or operations. This area includes an area within approximately 2 kilometers (1 mile) of Remote Sprint Launch Site 1 (figure 3.14-9).

Surface Water

The Remote Sprint Launch Site 1 ROI is in the Devils Lake watershed, USGS Cataloging Unit 09020201 (U.S. EPA, 1998—Surf Your Watershed). There are no major bodies of surface water in the Remote Sprint Launch Site 1 area. Storm water runoff from the Remote Sprint Launch Site 1 and area drains into local surface depressions. The runoff follows no specific drainage pattern. Remote Sprint Launch Site 1 is not situated in a floodplain region. The site is currently inactive and does not have a storm water permit.

Groundwater

The groundwater at this site is similar to that described for the Missile Site Radar. There are no groundwater wells at Remote Sprint Launch Site 1.



EXPLANATION

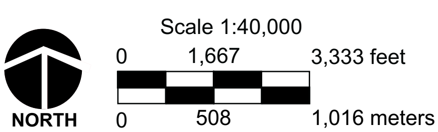
Water Area (Intermittent)

Roads

Water Resources, Remote Sprint Launch Site 1

North Dakota

Figure 3.14-9



wr_rsl1_001

3.14.2.5 Remote Sprint Launch Site 2—Water Resources

The water resources ROI includes all surface water features, drainage areas, and underlying aquifers that could be affected by construction or operations. This area includes an area within approximately 2 kilometers (1 mile) of Remote Sprint Launch Site 2 (figure 3.14-10).

Surface Water

The Remote Sprint Launch Site 2 ROI is in the Pembina River watershed, USGS Cataloging Unit 09020313 (U.S. EPA, 1998—Surf Your Watershed). Storm water runoff drains in two directions from Remote Sprint Launch Site 2. The northwest portion of the site drains to local surface depressions. The southwest portion drains to the southeast of the Remote Sprint Launch Site 2 area. Surface water runs into the Little South Pembina River approximately 1 kilometer (0.5 mile) to the south of the Remote Sprint Launch Site 2 area. The site is currently inactive and does not have a storm water permit.

Groundwater

The groundwater at this site is similar to that described for the Missile Site Radar. There are no groundwater wells at Remote Sprint Launch Site 2.

Water Quality

The surface and groundwater quality at this site is similar to that described for the Missile Site Radar.

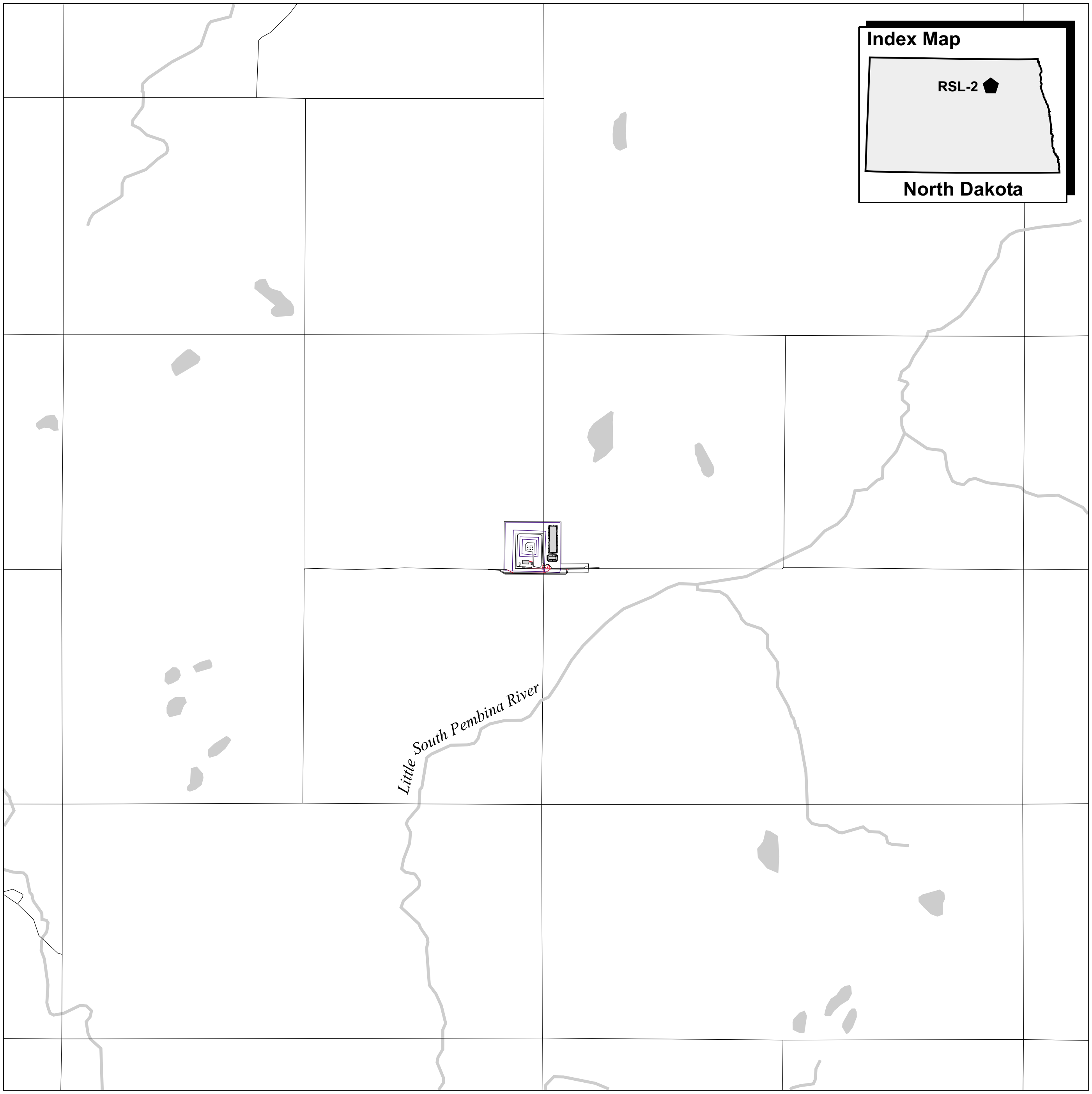
3.14.2.6 Remote Sprint Launch Site 4—Water Resources

The water resources ROI includes all surface water features, drainage areas, and underlying aquifers that could be affected by construction or operations. This area includes an area within approximately 2 kilometers (1 mile) of Remote Sprint Launch Site 4 (figure 3.14-11).

Surface Water

The Remote Sprint Launch Site 4 ROI is in the Devils Lake and forest watersheds, USGS Cataloging Units 09020201 and 09020308 (U.S. EPA, 1998—Surf Your Watershed).

Storm water runoff from Remote Sprint Launch Site 4 drains into intermittent tributaries of the Edmore Coulee. The Edmore Coulee flows into Sweetwater Lake. Remote Sprint Launch Site 4 is not situated in a floodplain region (North Dakota Parks and Recreation, 1987—North Dakota Rivers Study). The site is currently inactive and does not have a storm water permit.



EXPLANATION

Water Area (Intermittent)

Drainage

Roads

Scale 1:40,000

0 1,667 3,333 feet

0 508 1,016 meters

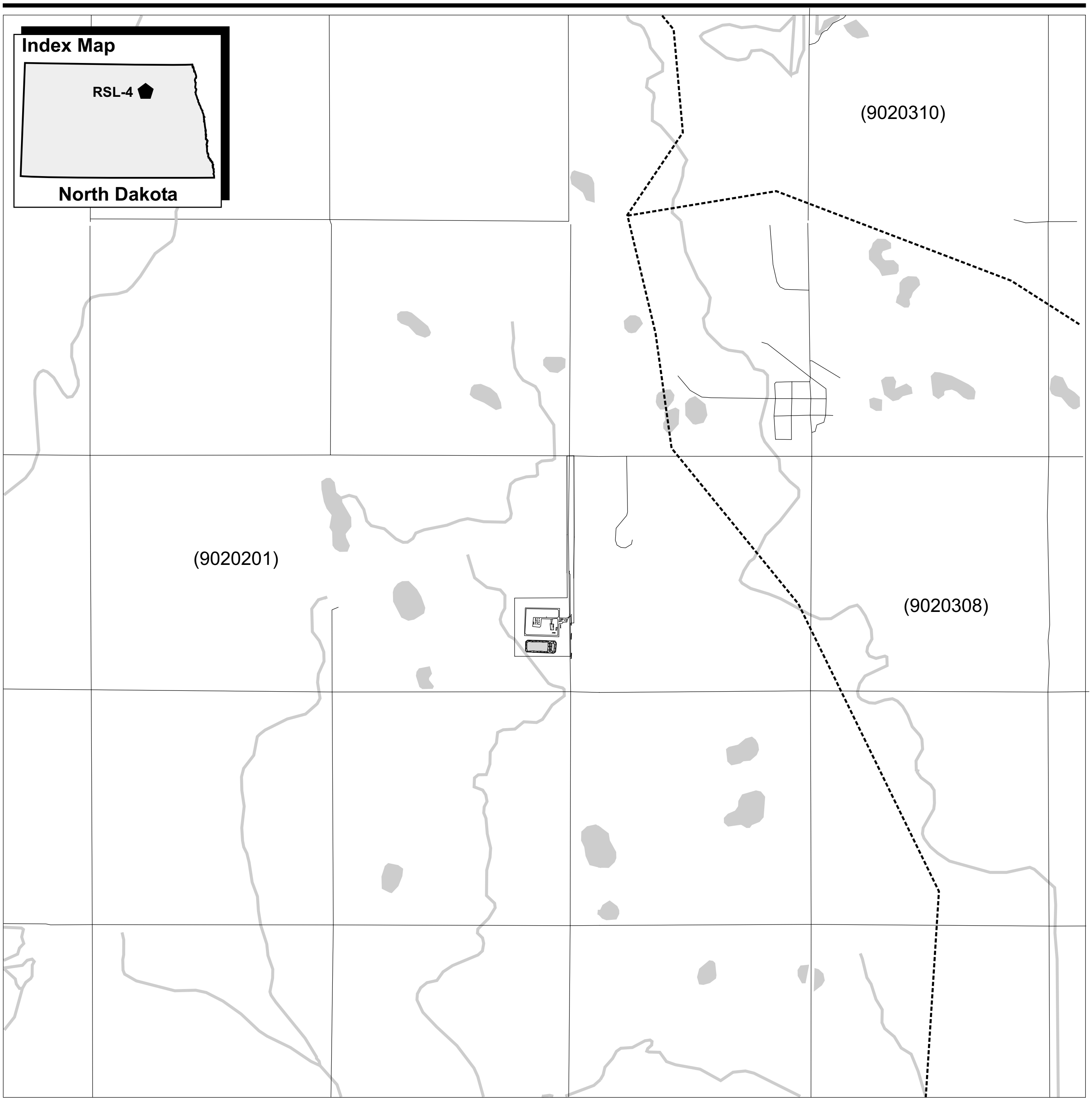
NORTH

Water Resources, Remote Sprint Launch Site 2

North Dakota

Figure 3.14-10

wr_rsl2_001



EXPLANATION

Water Area (Intermittent)

Drainage

Roads

Watershed Boundary (EPA Watershed ID Number)

Scale 1:40,000

0 1,667 3,333 feet

0 508 1,016 meters

NORTH

Water Resources, Remote Sprint Launch Site 4

North Dakota

Figure 3.14-11

wr_rsl4_001

Groundwater

The groundwater at this site is similar to that described for the Missile Site Radar. There are no groundwater wells at Remote Sprint Launch Site 4.

Water Quality

The surface and groundwater quality at this site is similar to that described for the Missile Site Radar.

3.14.2.7 North Dakota—Fiber Optic Cable Line—Water Resources

This section describes the water resources and water quality for the fiber optic cable line ROI. The ROI for water resources includes the waterways, potential drainage areas, still waters, and shallow and deep aquifers that could be affected by construction. The potential fiber optic cable line would be installed to connect the selected NMD sites in North Dakota.

Surface Water

It is anticipated that the fiber optic cable line would follow along existing utility and road corridors. Surface water along the route would be dependent on the specific route and terrain where the cable is installed. Surface water along the roadways and utility corridors could consist of both seasonal and year round streams, ponds, wetlands, and floodplains, although the cable would most likely be in proximity to the roadway and not within water areas. Stream flow rates and flooding for this region are highest during snowmelt and early summer conditions, coinciding with precipitation patterns.

Groundwater

The regional groundwater in the fiber optic cable line ROI is similar to that described above for the potential NMD North Dakota deployment sites.

Water Quality

Groundwater and surface water quality in the ROI would be similar to that described above for the potential NMD North Dakota deployment sites. In general, groundwater in North Dakota is hard and has chemical constituents that minimize potential use.

According to the National Water Quality Report, North Dakota reports that 78 percent of its surveyed river and streams have good water quality. The major sources of contaminated waters are agriculture, the removal of streamside vegetation, which increases siltation, and municipal sewage treatment plants. Natural conditions, such as low flows, also contribute to violations of standards. Good water quality is found in 95 percent of the lakes surveyed. The leading sources of pollution in lakes are agricultural activities, municipal sewage treatment, and urban runoff/storm sewers.

Most of the rivers in North Dakota have average dissolved solids of less than 500 milligrams per liter during medium to high flows, with water suitable for domestic use. During low flow periods, the rivers are generally too saline for domestic use.

3.15 ENVIRONMENTAL JUSTICE

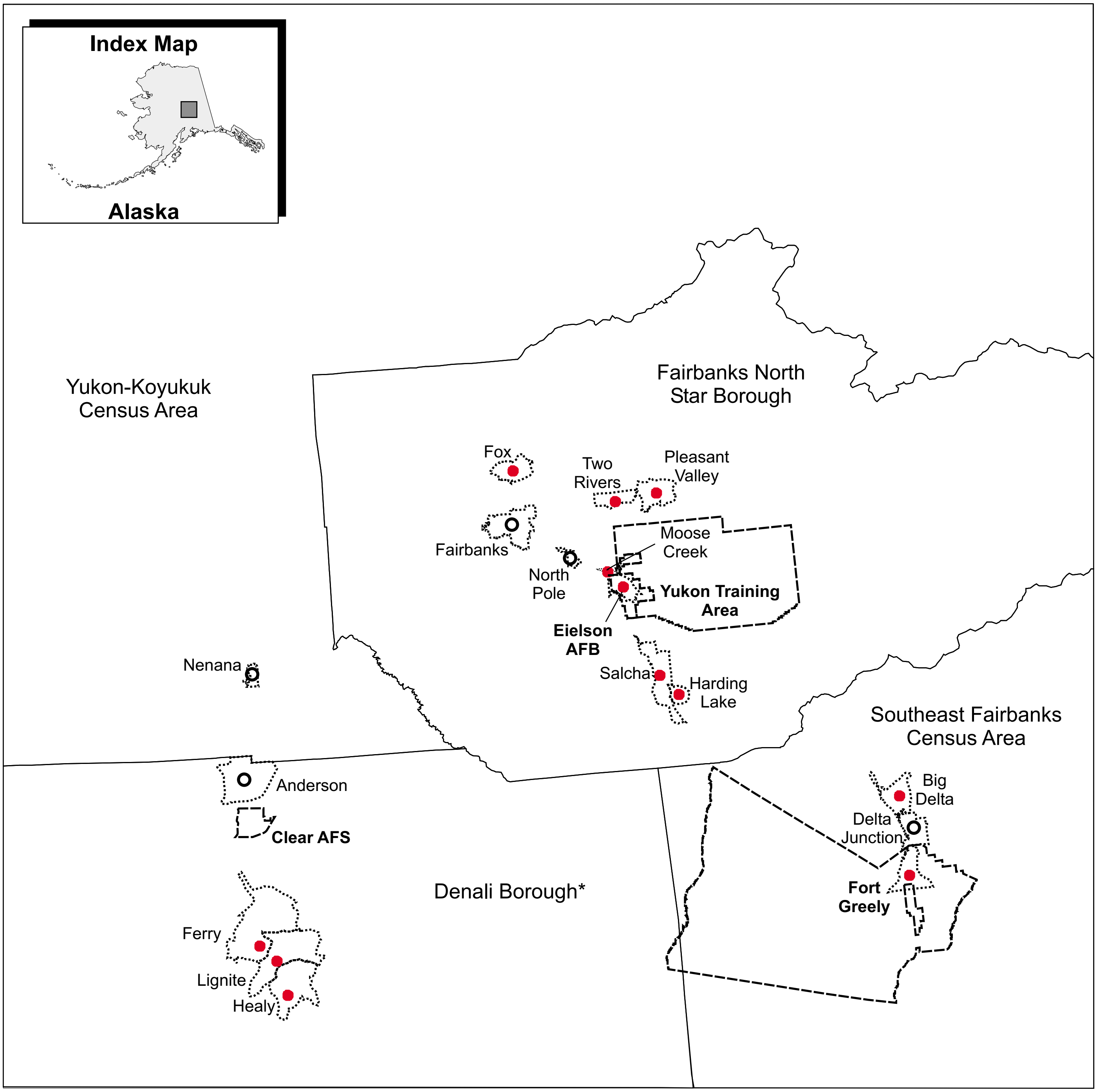
Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, was issued by the President on February 11, 1994. Objectives of the Executive Order as it pertains to this EIS include development of Federal agency implementation strategies, identification of minority and low-income populations where proposed Federal actions have disproportionately high and adverse human health and environmental effects, and participation of minority and low-income populations. Accompanying Executive Order 12898 was a Presidential Transmittal Memorandum, which referenced existing Federal statutes and regulations to be used in conjunction with Executive Order 12898. The memorandum addressed the use of the policies and procedures of NEPA. Specifically, the memorandum indicates that, "Each Federal agency shall analyze the environmental effects, including human health, economic and social effects, of Federal actions, including effects on minority communities and low-income communities, when such analysis is required by the NEPA 42 U.S.C. section 4321 et. seq." Although an environmental justice analysis is not mandated by NEPA, DOD has directed that NEPA will be used as the primary approach to implement the provision of the Executive Order.

Although Executive Order 12898 provides no guidelines as to how to determine concentrations of minority or low-income populations, the demographic analysis provides information on the approximate locations of minority and low-income populations potentially affected by the NMD program.

The 1990 Census of Population and Housing reports numbers of both minority and poverty residents. Minority populations included in the census are identified as Black; American Indian, Eskimo or Aleut; Asian or Pacific Islander; Hispanic; or other. Poverty status (used in this EIS to define low-income status) is reported as the number of families with income below poverty level ($12,764 for a family of four in 1989, as reported in the 1990 Census of Population and Housing).

3.15.1 ALASKA INSTALLATIONS

Most of the environmental effects from the Proposed Action would be expected to occur at one or more of the five installations that are being considered depending on the site(s) selected. Therefore, the ROI for environmental justice is the Census Area where each of the installations is located. Alaska's Census Areas are not broken down into tracts; however, there are cities and Census Designated Places (CDPs) breakdowns that help provide a better understanding of what is occurring in these census areas. The CDPs and cities that were in close proximity to the installations were investigated. The potential sites are located in four different census areas, as shown in figure 3.15-1.



EXPLANATION

- City
- Census Designated Place (CDP)
- CDP Boundary
- Installation Boundary
- Borough Boundary

Scale
0 12 24 Miles
0 19 38 Kilometers

NORTH

* Note in 1990 Denali Borough was part of Yukon-Koyukuk Census Area

Census Areas Within the Installation's Region of Influence

Alaska

Figure 3.15-1

ej_cdp_001

The Census Areas, as well as the CDPs and cities that are in close proximity to the potential sites, are shown in table 3.15-1. This table shows total population, percent minority, percent low-income, and what installation is located in that Census Area.

Table 3.15-1: Minority and Low Income Populations for Potential Sites in Alaska

	Population 1990	Percent Minority	Percent Low Income	Installation ROI
United States	248,709,873	24.24	13.12	
Alaska	550,043	26.03	9.00	
Aleutians West Census Area	9,478	35.63	8.95	Eareckson AS
Fairbanks North Star Borough	77,720	19.63	7.58	Eielson AFB, Yukon Training Area (Fort Wainwright)
Eielson CDP	5,251	21.22	2.87	
Fairbanks City	30,843	29.79	10.39	
Fox CDP	259	5.02	9.27	
Harding Lake CDP	25	0.00	0.00	
Moose Creek CDP	626	20.29	9.42	
North Pole City	1,456	16.14	5.09	
Pleasant Valley CDP	277	0.00	0.00	
Salcha CDP	303	9.90	8.08	
Two Rivers CDP	483	13.25	0.00	
Southeast Fairbanks Census Area	5,913	22.07	14.19	Fort Greely
Big Delta CDP	400	6.75	23.21	
Delta Junction City	651	9.37	8.45	
Fort Greely CDP	1,147	31.04	6.36	
Yukon-Koyukuk Census Area	8,478	58.47	26.05	Clear AFS
Anderson City	644	15.68	3.71	
Ferry CDP	58	17.24	15.52	
Healy CDP	494	5.06	3.85	
Lignite CDP	102	0.00	1.96	
Nenana City	377	46.95	10.40	

Source: U.S. Department of Commerce, 1998—The Official Statistics.
CDP = Census Designated Place

3.15.1.1 Clear AFS—Environmental Justice

Most environmental impacts resulting from the No-action Alternative and Proposed Action at the Clear AFS site are anticipated to occur in the Denali Borough (formerly the Yukon–Koyukuk Census Area), which is the ROI for the environmental justice analysis. This borough during the 1990 Census was the Yukon–Koyukuk Census Area. Since then it has been divided, and Clear AFS now falls into the Denali Borough. This study will refer to data from the 1990 Census and will refer to the ROI as the Yukon–Koyukuk Census Area. Based upon the 1990 Census of Population and Housing, the Yukon–Koyukuk Census Area had a population of 8,478. Of that total, 2,208 persons, or 26.05 percent, were low-income, and 4,957 persons, or 58.47 percent, were minority. However, this borough covers a broad area. In close proximity to Clear AFS there are several small communities and cities that more accurately reflect the populations of the area around Clear AFS. These are shown in table 3.15-1.

3.15.1.2 Eareckson AS—Environmental Justice

Most environmental impacts resulting from the No-action Alternative and Proposed Action at the Eareckson AS site are anticipated to occur in the Aleutians West Census Area, which is the ROI for the environmental justice analysis. Based upon the 1990 Census of Population and Housing, the Aleutians West Census Area had a population of 9,478. Of that total, 848 persons, or 8.95 percent, were low-income; 3,377 persons, or 35.63 percent, were minority. This is shown in table 3.15-1.

3.15.1.3 Eielson AFB—Environmental Justice

Most environmental impacts resulting from the No-action Alternative and Proposed Action at Eielson AFB are anticipated to occur in the Fairbanks North Star Borough, which is the ROI for the environmental justice analysis. Based upon the 1990 Census of Population and Housing, the Fairbanks North Star Borough had a population of 77,720. Of that total, 5,891 persons, or 7.58 percent, were low-income, and 15,256 persons, or 19.63 percent, were minority. However, this borough covers a broad area. In close proximity to Eielson AFB there are several small communities and cities that more accurately reflect the populations of the area around the base. These are shown in table 3.15-1.

3.15.1.4 Fort Greely—Environmental Justice

Most environmental impacts resulting from the No-action Alternative and Proposed Action at the Fort Greely site are anticipated to occur in Southeast Fairbanks Census Area, which is the ROI for the environmental justice analysis. Based upon the 1990 Census of Population and Housing, Southeast Fairbanks Census Area had a population of 5,913.

Of that total, 839 persons, or 14.19 percent, were low-income, and 1,305 persons, or 22.07 percent, were minority. However, this borough covers a broad area. In close proximity to Fort Greely there are several small communities and cities that more accurately reflect the populations of the area around Fort Greely. These are shown in table 3.15-1.

3.15.1.5 Yukon Training Area (Fort Wainwright)—Environmental Justice

The environmental justice ROI for the Yukon Training Area is similar to that described for Eielson AFB.

3.15.2 NORTH DAKOTA INSTALLATIONS

Most of the environmental effects from the Proposed Action would be expected to occur at one or more of the six installations that are being considered depending on the site(s) selected. The ROI for environmental justice is the county where each of the installations is located.

The information for these counties is shown in table 3.15-2. It includes total population, percent minority, percent low-income, and what installation is located in that county.

Table 3.15-2: Minority and Low Income Populations for Potential Sites in North Dakota

	Population 1990	Percent Minority	Percent Low Income	Installation ROI
United States	248,709,873	24.24	13.12	
North Dakota	638,800	5.69	14.38	
Cavalier County	6,064	0.76	14.07	Missile Site Radar, Remote Sprint Launch-2, Remote Sprint Launch-1, Cavalier AFS, Remote Sprint Launch-4
Grand Forks County	70,683	6.39	12.32	Grand Forks AFB
Pembina County	9,238	2.99	9.22	Cavalier AFS
Ramsey County	12,681	4.84	13.23	Remote Sprint Launch-1, Remote Sprint Launch-4, Missile Site Radar
Walsh County	13,840	3.73	13.38	Remote Sprint Launch-4, Missile Site Radar

Source: U.S. Department of Commerce, 1998—The Official Statistics.

3.15.2.1 Cavalier AFS—Environmental Justice

Most environmental impacts resulting from the No-action Alternative and Proposed Action at the Cavalier AFS site are anticipated to occur in Pembina and Cavalier counties, which is the ROI for the environmental justice analysis. Based upon the 1990 Census of Population and Housing, Pembina County had a population of 9,238. Of that total, 860 persons, or 9.22 percent, were low-income, and 276 persons, or 2.99 percent, were minority. Cavalier County had a population of 6,064, of which 853 persons, or 14.07 percent, were low-income, and 46 persons, or 0.76 percent, were minority.

3.15.2.2 Grand Forks AFB—Environmental Justice

Most environmental impacts from the No-action Alternative and Proposed Action would be expected to occur within Grand Forks County. Grand Forks County would be the ROI for the environmental justice analysis. Based upon the 1990 Census of Population and Housing, Grand Forks County had a population of 70,638. Of that total, 8,708 persons, or 12.32 percent, were low-income, and 4,517 persons, or 6.39 percent, were minority.

3.15.2.3 Missile Site Radar—Environmental Justice

Most environmental impacts resulting from the No-action Alternative and Proposed Action at the Missile Site Radar are anticipated to occur in Cavalier, Ramsey, and Walsh counties, which is the ROI for the environmental justice analysis. Based upon the 1990 Census of Population and Housing, Cavalier County had a population of 6,064. Of that total, 853 persons, or 14.07 percent, were low-income, and 46 persons, or 0.76 percent, were minority. Ramsey County had a population of 12,681, of which 1,678 persons, or 13.23 percent, were low-income, and 614 persons, or 4.84 percent, were minority. Walsh County had a population of 13,840, of which 1,852 persons, or 13.38 percent, were low-income, and 516 persons, or 3.73 percent, were minority.

3.15.2.4 Remote Sprint Launch Site 1—Environmental Justice

Most environmental impacts resulting from the No-action Alternative and Proposed Action at Remote Sprint Launch Site 1 are anticipated to occur in Cavalier and Ramsey counties, which is the ROI for the environmental justice analysis. Based upon the 1990 Census of Population and Housing, Cavalier County had a population of 6,064. Of that total, 853 persons, or 14.07 percent, were low-income, and 46 persons, or 0.76 percent, were minority. Ramsey County had a population of 12,681, of which 1,678 persons, or 13.23 percent, were low-income, and 614 persons, or 4.84 percent, were minority.

3.15.2.5 Remote Sprint Launch Site 2—Environmental Justice

Most environmental impacts resulting from the No-action Alternative and Proposed Action at the Remote Sprint Launch Site 2 are anticipated to occur in Cavalier County, which is the ROI for the environmental justice analysis. Based upon the 1990 Census of Population and Housing, Cavalier County had a population of 6,064. Of that total, 853 persons, or 14.07 percent, were low-income, and 46 persons, or 0.76 percent, were minority.

3.15.2.6 Remote Sprint Launch Site 4—Environmental Justice

Most environmental impacts resulting from the No-action Alternative and Proposed Action at the Remote Sprint Launch Site 4 are anticipated to occur in Cavalier, Ramsey, and Walsh counties, which is the ROI for the environmental justice analysis. Based upon the 1990 Census of Population and Housing, Cavalier County had a population of 6,064. Of that total, 853 persons, or 14.07 percent, were low-income, and 46 persons, or 0.76 percent, were minority. Ramsey County had a population of 12,681, of which 1,678 persons, or 13.23 percent, were low-income, and 614 persons, or 4.84 percent, were minority. Walsh County had a population of 13,840, of which 1,852 persons, or 13.38 percent, were low-income, and 516 persons, or 3.73 percent, were minority.

3.16 SUBSISTENCE

Many families living in rural areas of Alaska are partially or wholly dependent upon the harvesting of natural resources for food and other living necessities. In order to ensure the existence of these resources, the ANILCA was passed by Congress in 1980. It provides continued opportunity for customary and traditional uses of fish and wildlife resources for subsistence purposes. In accordance with ANILCA, the Federal Government manages these subsistence resources on Federal Public Lands (U.S. Department of the Air Force, 1995—Final EIS, Alaska Military Operations Area).

In anticipation of the passage of the ANILCA, the State of Alaska passed a subsistence law in 1978, which the Secretary of the Interior subsequently found to be consistent with the ANILCA. However, in 1989, the Supreme Court ruled that the rural preference in state statute was unconstitutional. Thus, all Alaskan residents may harvest subsistence resources on state lands as well as on some local and private lands. However, subsistence harvesting on Federal public lands under the Federal subsistence regulations is only permitted: (1) by residents of rural communities determined to have customary and traditional use of the resource, or (2) where no determination has been made, by all rural Alaska residents (residents of certain non-rural communities are specifically excluded) (U.S. Department of the Air Force, 1995—Final EIS, Alaska Military Operations Area).

In these rural communities, the harvesting of subsistence resources can be the primary means of support for a family unit. While food is the primary use of subsistence resources, there are many other uses for subsistence products such as clothing, food for work animals, fuel, home crafts, customary trade, ceremonial tools, as well as arts and crafts (Alaska Department of Fish and Game, 1999—Subsistence: Frequently Asked Questions). In addition to the material importance of subsistence hunting, it also plays a strong role in the social and cultural traditions of many native Alaskan communities (U.S. Department of the Air Force, 1995—Final EIS, Alaska Military Operations Area).

The importance of subsistence harvesting varies among individuals and communities depending on the local culture and customs. In order to evaluate the effects of the Proposed Action, the significant subsistence use areas must first be identified, after which the impacts on those resources can be identified.

Subsistence Areas

The native Athapaskans well into the 1900's historically used the areas that are currently within the central part of Alaska near Clear AFS, Eielson AFB, Yukon Training Area, and Fort Greely for subsistence. These areas are within the historic ranges of the Salcha, Goodpasor–Wood River, and Chena Bands of the lower Tanana Athapaskans and the Healy River–Joseph band of the Tanacross Athapaskans. In addition, the Southern portions of Fort Greely were likely used intermittently by Ahtna Athapaskans of the Copper River Drainage (U.S. Department of the Army, 1999—Alaska Army Lands Withdrawal Renewal Final Legislative EIS).

The Athapaskans of the interior regions depended upon the seasonal exploitation of mammals and fish for subsistence. Settlement patterns reflected subsistence constraints. Small temporary upland camps hunted caribou. During the summer months, the groups moved to fishing camps along the Tanana River and its major tributaries. While caribou was the most important food source, other large game such as moose and dall sheep were harvested as well. Smaller game included hares, marmots, ground squirrels, ptarmigan, ruffed grouse, sharp-tailed grouse, whitefish, and three varieties of salmon (U.S. Department of the Army, 1999—Alaska Army Lands Withdrawal Renewal Final Legislative EIS).

With the settlement of Euroamericans there were dramatic changes in the hunting and social practices of the native bands. With the onset of trapping and mining practices, subsistence activities were changed dramatically. The discovery of gold further altered the native way of life by drawing populations from traditionally semi-nomadic camps to developing towns such as Fairbanks. Although many smaller native villages still relied on local subsistence resources, the exploitation of large hunting ranges was no longer necessary. Today, subsistence resources within the ROI are still utilized in Nenana, Healy Lake, Delta Junction, Big Delta, and Dot Lake (U.S. Department of the Army, 1999—Alaska Army Lands Withdrawal Renewal Final Legislative EIS).

The Tanana River has continued to be a primary source for subsistence fishing throughout the year, with the highest concentration of harvesting occurring 32 kilometers (20 miles) downstream from Fairbanks. Commonly harvested fish include chinook, chum, and coho salmon; broad, humpback, and round whitefish; least cisco; sheefish; burbot; grayling; and northern pike.

3.16.1 CLEAR AFS

Clear AFS is located in part of the subsistence range used by the Nenana-Toklat band of the Lower Tanana Athapaskans in the nineteenth and twentieth centuries. During the 1930s and 1940s, development in the area led to a decline in the groups' reliance on subsistence resources. Most of these people were residing in Nenana by the 1940s. Use of the area for hunting and trapping still continues to the present (U.S. Department of the Interior, 1997—Northern Intertie Project Draft EIS).

Although subsistence hunting and fishing occurs in the vicinity of Clear AFS, only Air Force and civilian base personnel and people they sponsor can hunt on Clear AFS property, which could include some people that subsistence hunt and fish. However, this would include a very small percentage of the population at Clear AFS. Therefore, there is minimal subsistence activity occurring on the base.

3.16.2 EARECKSON AS

Under ANILCA, Eareckson AS is not considered to be a rural community because it is a restricted military installation. Therefore, it is exempt from subsistence considerations. However, this does not limit the surrounding areas of Shemya Island from subsistence use.

3.16.3 EIELSON AFB

Eielson AFB is part of the historic subsistence range of two lower Tanana bands: the Chena and the Salcha. The Chena band utilized the area within the Chena River drainage, while the Salcha utilized areas within the Salcha River drainage. Development in the region was devastating to these bands and by the 1960s virtually eliminated the historic subsistence ranges of these groups.

Eielson AFB is within the Fairbanks North Star Borough, which is not considered a rural area and, therefore, residents are not qualified as Federal subsistence users. However, Game Management Unit 20B has several seasons and bag limits for Federal subsistence hunters, all of which overlap entirely with current state bag limits and seasons. Subsistence users from outside the borough may utilize Eielson AFB for subsistence use. Such use is infrequent if it occurs. (U.S. Department of the Army, 1999—Alaska Army Lands Renewal Final Legislative EIS)

Approximately 2,200 fishing permits, 1,050 hunting permits, and 30 trapping permits are issued annually to mostly recreational users. These activities are allowed on-base in accordance with Federal and State of Alaska regulations, seasons, and bag limits (Eielson AFB, 1998—Integrated Natural Resources Management Plan). Almost all of these permit holders would fail to qualify as subsistence users, and almost all hunting, fishing, and trapping use is for recreational purposes (U.S. Department of the Army, 1999—Alaska Army Lands Withdrawal Renewal Final Legislative EIS).

3.16.4 FORT GREELY

The land on Fort Greely was once the subsistence ranges of two lower Tanana bands in the nineteenth and twentieth centuries. The land between the Little Delta River and Jarvis Creek is within the historic range of the Salcha band. However, ethnographic research has indicated that by the 1920s the Salcha had ceased to use Delta River and Delta

Creek drainages for subsistence. By 1962 there were no native settlements along the entire Tanana drainage from Healy Lake to Nenana (U.S. Department of the Army, 1999—Alaska Army Lands Withdrawal Renewal Final Legislative EIS).

The land east of Jarvis Creek is within the historic subsistence range of the Healy River–Joseph band. The remaining descendents of this band currently reside 48 kilometers (30 miles) east of Fort Greely near Healy Lake. While many members of this community are subsistence hunters, most residents do not travel as far as Fort Greely for subsistence harvesting (U.S. Department of the Army, 1999—Alaska Army Lands Withdrawal Renewal Final Legislative EIS).

The community of Dot Lake is about 96 kilometers (60 miles) west–southwest of Delta Junction along Highway 1. Dot Lake consists primarily of non-native households but also includes the native village of Dot Lake. The historic subsistence area of the village terminates at least 32 kilometers (20 miles) east of Fort Greely. Some residents of Dot Lake may travel the extra distance to harvest subsistence resources on Fort Greely (U.S. Department of the Army, 1999—Alaska Army Lands Withdrawal Renewal Final Legislative EIS).

Approximately 72 kilometers (45 miles) east-southeast of Delta Junction on the Alaska Highway is the non-native community of Dry Creek. According to the Alaska Department of Community and Regional Affairs, at least 15 adult residents rely on the exploitation of natural resources. A number of Dry Creek residents can be characterized as subsistence hunters/trappers. (U.S. Department of the Army, 1999—Alaska Army Lands Renewal Final Legislative EIS)

Currently, the use of subsistence resources on Fort Greely is minimal. Species harvested in the area around Fort Greely include moose, caribou, brown/grizzly bear, Dall sheep, fish, waterfowl, and small game.

From 1996 through 1998, an average of 620 permits were issued for nonmilitary range use on Fort Greely, which includes hunting, fishing, and trapping. It is estimated that approximately one-half of these permit holders are civilians, mostly residents of Delta Junction and Big Delta. A number of Big Delta and Delta Junction residents can be characterized as subsistence users, but due to the employment opportunities in and around the Fort Greely area, there is little dependency on subsistence harvesting in these communities. However, as a result of the stocked lakes on Fort Greely, a considerable number of permit holders are recreational anglers from the Fairbanks area. Due to the lack of specific use information regarding permit holders (who may be berry pickers, hikers, birders, bicyclists, etc.) it is impossible to specifically determine recent subsistence use of the installation. (U.S. Department of the Army, 1999—Alaska Army Lands Renewal Final Legislative EIS)

Subsistence users from other portions of the state may also travel to Fort Greely in time of game shortages in their region. However, this event does not occur on a regular basis, and the use of Fort Greely for subsistence purposes would remain relatively low.

3.16.5 YUKON TRAINING AREA (FORT WAINWRIGHT)

The Yukon Training Area is part of the historic subsistence range of the Chena band and the Salcha band. The Chena band utilized northern portions of the Yukon Training Area within the Chena River drainage, while the Salcha band utilized southern portions of the Yukon Training Area within the Salcha River drainage. Development in this region was devastating to these bands and by the 1960s virtually eliminated the historic subsistence ranges.

The Yukon Training Area is within the Fairbanks North Star Borough, which is not considered a rural area and, therefore, residents are not qualified as Federal subsistence users. However, Game Management Unit 20B has several seasons and bag limits for Federal subsistence hunters, all of which overlap entirely with current state bag limits and seasons. Subsistence users from outside the borough may utilize the Yukon Training Area for subsistence use. Such use is infrequent if it occurs. (U.S. Department of the Army, 1999—Alaska Army Lands Renewal Final Legislative EIS)

Between 1991 and 1997, an average of 2,449 hunting, fishing, and trapping permits were issued annually to mostly recreational users for all of Fort Wainwright and Eielson AFB combined (of which the Yukon Training Area is less than 30 percent). Almost all of these permit holders would fail to qualify as subsistence users, and almost all hunting, fishing, and trapping is for recreational purposes. (U.S. Department of the Army, 1999—Alaska Army Lands Renewal Final Legislative EIS)

3.16.6 WESTERN ALEUTIANS—FIBER OPTIC CABLE ALIGNMENT

This section describes the communities that would be potentially affected by the laying of a fiber optic cable line and other Western Aleutian communities between Whittier and Eareckson Air Station, Shemya Island. This section is based on existing demographic, subsistence, and commercial fishing information.

Based on the general alignment of the fiber optic cable line, listed below are the communities that could be potentially affected by the project. This list includes most of the coastal communities from Whittier to Shemya Island. Next, a brief community description is provided that includes a brief demographic profile and describes which of the communities participate in commercial and subsistence fishing. Based on Commercial Fisheries Entry Commission data, the type and magnitude of commercial fisheries in which residents of the communities participate is provided. Based on Alaska Department of Fish and Game Division of Subsistence data, the relative reliance on subsistence fishing is assessed.

This section is limited to local fishing effort; it does not include any discussion of non-resident fishers. The subsistence information in this report is from Alaska Department of Fish and Game Division of Subsistence Community Profile Data Base. Where there is more than 1 year of subsistence data available in the Community Profile Data Base, the "most representative year" for each community, rather than an average of subsistence data for all years, is used. This section only includes subsistence resource categories potentially affected by the project (e.g., salmon, non-salmon fish, marine mammals, and marine invertebrates). It does not include land mammals, birds and eggs, and vegetation. Non-salmon subsistence fish include such species as herring, smelt, cod, flounder, greenling, halibut, rock fish, sablefish, sculpin, sole, and skates. The Alaska Department of Fish and Game Community Profile Data Base did not include data for Cold Bay and Seward.

In addition to the fiber optic cable line addressed above, a second redundant line may be required to meet NMD reliability requirements. This line could be north of the Aleutian Islands or connect to existing fiber optic cable in the central Pacific. Once the exact alignment is identified, additional environmental analysis will be prepared.

3.16.6.1 Communities Potentially Affected by the Project

The 21 communities presented in table 3.16-1 are potentially impacted by the project because they are coastal communities whose residents participate in subsistence and commercial fishing in the vicinity of the fiber optic cable line route.

The following coastal communities in the general vicinity of the project are not included in this discussion for the reason listed next to the community.

- Karluk—located on the northwest side of Kodiak Island
- Larsen Bay—located on the northwest side of Kodiak Island
- Nelson Lagoon—located on the north side of the Alaska Peninsula
- Adak Station CDP—former U.S. Government facility
- Eareckson Air Station—U.S. Government facility
- Attu Coast Guard Station—U.S. Government facility
- Amchitka CDP—U.S. Government facility

Table 3.16-1: Coastal Communities from Whittier to Shemya Potentially Affected by the Project

	Community	Census Area
1.	Whittier	Valdez–Cordova
2.	Chenega Bay	Valdez–Cordova
3.	Seward	Kenai-Peninsula Borough/Seward Census Subarea
4.	Kodiak	Kodiak Island Borough
5.	Ouzinkie	Kodiak Island Borough
6.	Port Lions	Kodiak Island Borough
7.	Old Harbor	Kodiak Island Borough
8.	Akhiok	Kodiak Island Borough
9.	Chignik Bay	Lake and Peninsula Borough
10.	Chignik Lagoon	Lake and Peninsula Borough
11.	Chignik Lake	Lake and Peninsula Borough
12.	Perryville	Lake and Peninsula Borough
13.	Ivanof Bay	Lake and Peninsula Borough
14.	Sand Point	Aleutians East
15.	King Cove	Aleutians East
16.	Cold Bay	Aleutians East
17.	False Pass	Aleutians East
18.	Akutan	Aleutians East
19.	Unalaska	Aleutians West
20.	Nikolski	Aleutians West
21.	Atka	Aleutians West

To the extent that Karluk, Larsen Bay, and Nelson Lagoon fishers rely on areas in the vicinity of the project for commercial and subsistence fishing, they are also potentially affected by the project.

3.16.6.2 Community Descriptions

The region potentially affected by the project can be divided into the following subregions and corresponding communities:

- Prince William Sound (Whittier, Chenega Bay)
- Seward
- Kodiak (Kodiak, Ouzinkie, Port Lions, Old Harbor, Ahkiok)
- Alaska Peninsula (Chignik Bay, Chignik Lagoon, Chignik Lake, Perryville, Ivanof Bay)

- Aleutians (Sand Point, King Cove, Cold Bay, False Pass, Akutan, Unalaska, Nikolski, Atka)

Prince William Sound

Whittier, located in western Prince William Sound at the head of Passage Canal, is 121 kilometers (75 miles) southeast of Anchorage. The site was established as a port and railroad terminus by the U.S. Army for transport of petroleum and other supplies during World War II. Two large buildings, originally military housing, now are condominiums housing most of Whittier's 243 residents (table 3.16-2). The population is predominantly non-native. They participate in commercial and sport fishing as well as subsistence activities. The economy is supported by the shipping industry, local government, and tourism.

Chenega Bay is on Evans Island in southwestern Prince William Sound, 68 kilometers (42 miles) southeast of Whittier. The community was located originally on Chenega Island until the 1964 earthquake destroyed the village and many residents perished; the new location was settled in the mid-1980s. The population in 1990 was 94 people living in 34 households. Sixty-nine percent of residents were Alaska Native, mainly Aluutiq Eskimo. The local economy consists mainly of commercial fishing, oyster farming, and subsistence activities.

Seward

Because of its isolated location from most of the other communities, Seward does not easily fit into any of the other subregions. Seward is located on Resurrection Bay on the southeastern Kenai Peninsula. Seward is also linked to Anchorage by rail. The town, founded in 1902, developed around its ice-free harbor and railroad terminus. The 1990 population of 2,699 residents was 15 percent native. Seward's economy developed around being a transportation center and has diversified into tourism (including cruise ships and Kenai Fjords National Park boat tours), ship services, fish processing, coal export facility, a prison, the University of Alaska's Institute of Marine Sciences, and the new Alaska Sea Life Center. Residents participate in commercial fishing, sport fishing, and subsistence activities.

Kodiak

The Kodiak archipelago has been occupied by Sugpiaq Eskimos since 8,000 B.C. and was settled by Russian fur trappers in 1792. Russian colonization and the sea otter fur trade virtually decimated the Sugpiaq Eskimo population. The military established bases on Kodiak during World War II and has maintained a presence since then. All communities (six villages and the city of Kodiak) are incorporated within the Kodiak Island Borough. The economy of Kodiak and the smaller communities on Kodiak Island is based primarily on commercial fishing.

Table 3.16-2: Demographic Data for Selected Coastal Communities

Community	U.S. Census[1]		Alaska Department of Fish and Game Division of Subsistence Demographic Information[2]						Alaska Department of Community & Regional Affairs[3]
							Household Heads		
	1990 Population	Percent Native	Alaska Department of Fish and Game Study Year	Number of Households	Population	Percent Native	Percent Born Locally	Average Years Residency	Current Population
Akhiok	77	93.5	1992	24	80	88.8	81.6	25.2	84
Akutan	589	13.6	1990	31	102	85.4	69	28.5	414
Atka	98	92.8	1994	29	85	91.4	85.7	32.6	106
Chenega Bay	94	69.2	1993	28	101	73.9	55.3	7.2	95
Chignik Bay	188	45.2	1991	44	128	51.7	41.2	17.6	128
Chignik Lagoon	53	56.6	1989	15	41	65.9	65.4	28.4	80
Chignik Lake	133	91.8	1991	33	131	91.6	51.2	23.7	152
Cold Bay	148	5.4	nd	nd	nd	nd	nd	nd	146
False Pass	69	76.5	1988	22	59	84.1	64.5	22.4	79
Ivanof Bay	35	94.3	1989	7	32	96.9	57.1	14.5	28
King Cove	677	39.3	1992	158	560	69.5	55.1	22.5	897
Kodiak City	6,375	12.7	1993	1,994	6,058	9.4	8.4	14.8	6,869
Kodiak Road	3,220	11.5	1991	1,161	4,002	10.3	8.3	15.2	nd
Nikolski	35	82.8	1990	20	49	73.5	78.3	36.2	27
Old Harbor	284	88.7	1991	66	217	84.1	68.2	25.6	316
Ouzinkie	209	85.2	1993	71	234	84.6	69.8	19.9	259
Perryville	108	94.4	1989	31	116	94	78.6	36.9	101
Port Lions	222	67.6	1993	80	236	66.2	51.9	18	264
Sand Point	878	49.3	1992	204	606	67.6	52	23.6	808
Seward	2,699	15.2	nd	nd	nd	nd	nd	nd	2,914
Unalaska	3,089	8.4	1994	700	1,825	14.3	10.1	9.1	4,087
Whittier	243	12.4	1990	103	279	13.9	0.7	7.1	289
Total	19,523								

Sources:

[1] Alaska Department of Labor, 1991—Alaska Population Overview 1990 Census & Estimates.

[2] Alaska Department of Fish and Game, 1998—Community Profile Data Base.

[3] Alaska Department of Community and Regional Affairs, 1996—Alaska's Cities, Towns and Villages.

Note: There is significant variation in the population in some communities (e.g., Unalaska and Akutan) among the three sources of population data. This variation is likely due to the time of year for the enumeration was conducted; in some cases the enumeration may include cannery workers.

nd = no data

The city of Kodiak was Russian America's capital until it moved to Sitka around the time the United States purchased Alaska from Russia in 1867. Following Russian overharvesting of the sea otter, commercial fishing became the main economic activity in Kodiak, along with military activity during and after World War II. The 1964 earthquake devastated the city and fishing fleet. By 1968, Kodiak was the largest fishing port in the United States in terms of dollar value. Kodiak also has the largest U.S. Coast Guard Station. The community had a population of 6,365 in 1990 and was 13 percent native. A relatively large population of Asian/Pacific Island ancestry (20 percent) resides in Kodiak, due mainly to commercial fishing and processing. Commercial fishing and processing are the economic mainstay, and residents also participate in sport fishing and subsistence. Kodiak is the economic and transportation hub for the outlying villages of the Kodiak archipelago.

The communities of Akhiok, Old Harbor, Ouzinkie, and Port Lions are accessible from Kodiak only by air or water. The populations of these communities range from 84 (Akhiok) to 316 (Old Harbor) and are 85 percent or more native. The natives are mainly Sugpiaq Eskimos. Commercial fishing is the main source of cash income in these communities, and subsistence is another important activity economically as well as culturally.

Alaska Peninsula

The communities of Chignik, Chignik Lake, Chignik Lagoon, Perryville, and Ivanof Bay along the south side of the Alaska Peninsula are part of the Lake and Peninsula Borough. They are southwest of Kodiak and Anchorage, and access is by air or water. Ivanof Bay is the smallest community with a population of 28, and Chignik Lake is the largest with a population of 152. The communities are mostly native; Perryville, Ivanof Bay, and Chignik Lake are predominantly Aleut, whereas Chignik and Chignik Lagoon are Koniag. The populations of Chignik, Chignik Lake, and Chignik Lagoon increase substantially in the summer with the influx of seasonal fishers and cannery workers. Many Ivanof Bay, Perryville, and Chignik Lake residents leave their villages in the summer to fish elsewhere on the Peninsula. Commercial fishing is the economic mainstay of all five communities, and Chignik has two year-round fish processing plants. Subsistence is also an important element of the local economy and culture.

Aleutians

Sand Point, King Cove, Cold Bay, False Pass, and Akutan are within the Aleutians East Borough. Sand Point is in the Shumagin Islands, 917 kilometers (570 miles) from Anchorage. Its population is 808 and was 49 percent native (primarily Aleut) in 1990. The town was founded in 1898 as a cod fishing station, which brought many Scandinavian fishermen. The community is still centered around commercial fishing, with subsistence also culturally and economically important.

Cold Bay is at the western end of the Alaska Peninsula. The community was originally established as a strategic air base during World War II. Because of its airport, Cold Bay is a regional hub for air transportation on the Alaska Peninsula. It also services the fishing industry. Cold Bay's mostly non-native population numbers 146. Residents work mainly in transportation, government, and retail trade. Residents also participate in subsistence and sport fishing and hunting.

King Cove is also at the western end of the peninsula, 1,006 kilometers (625 miles) from Anchorage. The town grew up around the cannery that was built there in 1911. Like Sand Point, the community was settled originally by Aleuts, Scandinavians, and other Europeans. Presently, the population numbers 897, and in 1990 was 40 percent non-native. The economy is based on commercial fishing, with the cannery and with 75 residents holding commercial fishing permits. Subsistence is culturally and economically important as well.

False Pass is on Unimak Island, 1,040 kilometers (646 miles) from Anchorage. The town was settled by Aleuts from the surrounding area when a cannery was built there in 1917. The population of 79 is mostly Aleut. Commercial fishing is the mainstay of the economy, and subsistence hunting and fishing are significant as well.

Unalaska, on Unalaska Island (1,287 kilometers [800 miles] from Anchorage), is the largest community in the Aleutians. Its population is 4,087, and in 1990 was 62 percent Caucasian, 8 percent native, 18 percent Asian/Pacific Islanders, and 8 percent "other ethnic." This mixture is the result of a large scale, year-round fishing industry. The town has fish processing plants, a harbor suitable for large factory trawlers and cargo ships, fleet services, and is strategically located between Asia and North America. The harbor ranks first in the United States for seafood volume and value.

Akutan is located 56 kilometers (35 miles) east of Unalaska on Akutan Island. The site was originally a fur storage and trading port, then a cod fishing and processing plant. These economic activities attracted Aleuts to the community, which also served as a whaling station in the early 1900s. The present population is about 414, and in 1990 was 14 percent native. This number includes workers from the fish processing plants nearby. The largest ethnic group in 1990 was Asian/Pacific Islanders (42 percent). Commercial fishing is the backbone of the local economy.

Nikolski and Atka are small Aleut villages far out in the Aleutian Islands chain; Atka is 1,770 kilometers (1,100 miles) from Anchorage, and

Nikolski is a bit closer. Both communities have been occupied for thousands of years. Nikolski's population is 27; Atka's population numbers 106; and both are predominantly Aleut (83 and 92 percent, respectively). Nikolski was involved in sea otter hunting under Russian rule in the early 1800s, and fox farming in the early 1900s. Presently residents maintain sheep and cattle herds, work outside the village in fish processing, and conduct subsistence fishing and hunting to support themselves. Atka residents also depend primarily on subsistence, with additional employment in commercial fishing.

3.16.6.3 Commercial Fishing in Communities

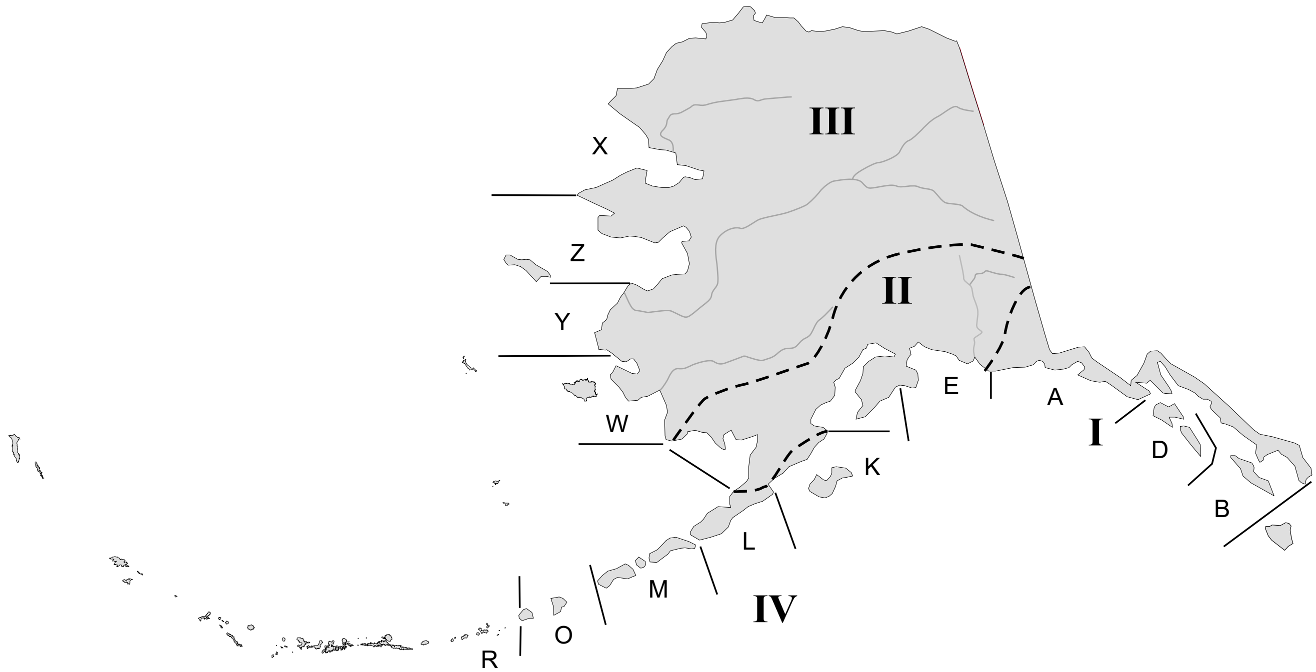
Residents of the study area communities participate in and rely on commercial fishing. It is the economic mainstay of these communities as well as an important component of residents' cultural identity. Important commercial species include salmon, crab (Dungeness, king, and Tanner), halibut, herring, saltwater finfish, and black cod. Alaska commercial fishing areas potentially affected by the project include the following (see figure 3.16-1):

- Prince William Sound (Area E)
- Kodiak (Area K)
- Chignik (Area L)
- Alaska Peninsula (Area M)
- Dutch Harbor (Area O)
- Adak and Western Aleutians (Area R)

Based on Commercial Fisheries Entry Commission commercial fishing data for 1996, table 3.16-3 provides information for each community on:

- The number of separate permit fisheries in which residents of each community participate
- The number of people who own permits
- The number of permits that are fished in each community
- The pounds harvested
- The estimated gross earnings
- The primary fisheries in which residents participate

As shown in table 3.16-3, in 1996, 957 individuals held 1,803 Alaska limited entry fishing permits and participated in 263 different fisheries. The 1996 harvest totaled over 148 million kilograms (326 million pounds), and the gross earnings were in excess of $133 million.



ALASKA COMMERCIAL FISHERIES REGIONS AND AREAS

REGION I: SOUTHEASTERN: Dixon Entrance to Cape Suckling

Areas: A. Juneau & Yakutat
B. Ketchikan
C. Petersburg
D. Sitka

REGION II: CENTRAL: State Third Judicial Division Northern Boundary to Cape Suckling to Cape Douglas to Cape Menshikof to Cape Newenham

Areas: E. Prince William Sound
H. Cook Inlet
T. Bristol Bay (salmon and herring catch; all fish and shellfish production)

REGION III: ARTIC-YUKON-KUSKOKWIM (AYK): North of State Third Judicial Division Northern Boundary which ends at the west Cape Newenham including Nunivak, St. Matthew, and St. Lawrence Islands

Areas: W. Kuskokwim
X. Kotzebue
Y. Yukon
Z. Norton Sound

REGION IV: WESTERN: Cape Douglas to Unimak Pass to Cape Newenham including Kodiak and Aleutian Islands

Areas: K. Kodiak
L. Chignik
M. Alaska Peninsula
O. Dutch Harbor
Q. Bering Sea
R. Adak & W. Aleutians
T. Bristol Bay (fish other than salmon and herring catch; and shellfish catch)

Commercial Fisheries Regions and Areas

Alaska

Figure 3.16-1

NORTH

Scale
0 193 385 miles
0 310 620 kilometers

sub_ak_foc_001

Table 3.16-3: Commercial Fisheries Participation and Harvest for Selected Coastal Communities, 1996

Community	Number of Fisheries[1]	Number of People	Number of Permits Fished	Kilograms (Pounds)	Estimated Gross Earnings	Primary Fisheries
Akhiok[2]	1	2	2	***	***	Salmon
Akutan[2]	2	6	6	2,910 (6,415)	$12,628	Halibut
Atka[2]	4	10	10	61,250 (135,034)	$206,059	Halibut and salmon
Chenega Bay	1	4	4	83,948 (185,074)	$121,889	Salmon
Chignik Bay[2]	4	15	21	1,023,509 (2,256,450)	$1,534,901	Salmon, halibut, herring
Chignik Lagoon	7	19	32	2,000,721 (4,410,835)	$3,001,436	Salmon, halibut, Dungeness crab, herring, misc. saltwater finfish
Chignik Lake[2]	3	7	9	298,488 (658,054)	$554,641	Salmon and herring
Cold Bay	1	1	1	***	***	Salmon
False Pass	5	12	17	512,777 (1,130,480)	$627,568	Salmon and halibut
Ivanof Bay	2	3	3	***	***	Salmon and halibut
King Cove	22	69	143	6,639,122 (14,636,759)	$4,433,123	Salmon, halibut, king and Tanner crab, misc. saltwater finfish
Kodiak City	53	490	955	103,598,800 (228,396,233)	$91,614,927	Salmon, halibut, king and Tanner crab, misc. saltwater finfish, herring, black cod
Nikolski	0	0	0	0	0	
Old Harbor	13	27	55	2,210,914 (4,874,231)	$2,906,064	Salmon, herring, misc. saltwater finfish, and halibut
Ouzinkie	8	23	30	345,586 (761,886)	$396,567	Salmon, halibut, misc. saltwater finfish, herring
Perryville[2]	2	8	9	357,729 (788,657)	$658,454	Salmon and herring
Port Lions	14	17	31	801,045 (1,766,001)	$1,038,479	Salmon; Dungeness, king and Tanner crab; halibut; misc. saltwater finfish; herring
Sand Point	33	109	227	22,757,630 (50,171,985)	$11,522,729	Salmon, halibut, herring, king and Tanner crab, misc. saltwater finfish

Table 3.16-3: Commercial Fisheries Participation and Harvest for Selected Coastal Communities, 1996 (Continued)

Community	Number of Fisheries[1]	Number of People	Number of Permits Fished	Pounds	Estimated Gross Earnings	Primary Fisheries
Seward	35	60	111	3,406,759 (7,510,618)	$5,891,727	Salmon, black cod, halibut, herring, king and Tanner crab, misc. saltwater finfish
Unalaska[3]	44	65	121	3,778,726 (8,330,664)	$8,792,148	Halibut; king, Dungeness and Tanner crab; misc. saltwater finfish; salmon; black cod
Whittier	9	10	16	80,582 (177,652)	$163,376	Black cod, halibut, salmon, shrimp
Totals	263	957	1,803	147,960,500 (326,197,028)	$133,476,716	

Source: Alaska Commercial Fisheries Entry Commission, 1996—Commercial Fishing Statistics, Reports and Listings.

(1) Number of fisheries refers to the number of different permit fisheries in which residents of the community participate (e.g., species x gear x area)

(2) Pounds and earnings are greater, but some data are not reported because there are too few fishers to make data public.

(3) Includes Dutch Harbor

*** pounds and earnings are not public because there are too few fishers.

3.16.6.4 Subsistence Harvests and Activities in Communities

In addition to commercial fishing, residents of the potentially affected communities participate in subsistence fishing, gathering of marine invertebrates, and hunting marine mammals. Table 3.16-4 provides the following subsistence information for 19 of the 21 communities (no subsistence data were available for Cold Bay or Seward):

- Date of Alaska Department of Fish and Game Division of Subsistence harvest survey
- Relevant resource categories (e.g., all resources, fish [salmon and non-salmon], marine mammals and marine invertebrates)
- Percentage of households that used, tried to harvest, harvested, received, or gave away the subsistence resource during the study year
- Estimated harvest presented as estimated number, total pounds harvested, pounds per capita harvested, and the percentage of the total harvest.

Table 3.16-4: Selected Subsistence Harvests and Subsistence Activities for Selected Coastal Communities

Alaska Department of Fish and Game Study Year	Resource	Percentage of Households					Estimated Harvest				
		Using	Trying to Harvest	Harvesting	Receiving	Giving	Estimated Number	Total Pounds[1]	Mean Household Harvest[1]	Per Capita Pounds[1]	Percent Total Harvest
Akhiok											
1992	All Resources	100	100	100	96	83		25,735	1,072	322	100
	Fish	100	96	96	67	71		17,909	746	224	70
	Salmon	100	96	96	63	71	2,510	15,961	665	200	62
	Non-Salmon Fish	88	75	67	46	42		1,948	81	24	8
	Marine Mammals	71	42	25	63	33	20	1,552	65	19	6
	Marine Invertebrates	100	88	88	83	54		3,371	140	42	13
Akutan											
1990	All Resources	100	96	96	100	92		47,397	1,529	466	100
	Fish	100	92	92	96	88		26,921	868	265	57
	Salmon	96	76	76	84	64	3,269	12,339	398	121	26
	Non-Salmon Fish	100	92	92	92	76		14,581	470	143	31
	Marine Mammals	92	48	44	84	40	142	10,767	347	106	23
	Marine Invertebrates	88	68	64	72	56		2,866	92	28	6
Atka											
1994	All Resources	100	100	100	100	79		37,307	1,286	439	100
	Fish	96	89	86	93	68		15,152	522	178	41
	Salmon	96	79	79	82	57	2,386	8,051	278	95	22
	Non-Salmon Fish	93	82	75	86	64		7,100	245	84	19
	Marine Mammals	93	61	57	93	57	120	12,797	441	151	34
	Marine Invertebrates	86	61	61	75	57		444	15	5	1
Chenega Bay											
1993	All Resources	100	96	96	100.0	91.3		27,809	993	275	100
	Fish	100	83	78	95.7	78.3		19,980	714	198	72
	Salmon	96	74	70	91.3	60.9	2,686	10,985	392	109	40
	Non-Salmon Fish	96	57	57	87.0	73.9		8,994	321	89	32
	Marine Mammals	57	44	44	56.5	43.5	85	3,528	126	35	13
	Marine Invertebrates	91	74	74	73.9	56.5		1,498	53	15	5
Chignik Bay											
1991	All Resources	100	93	90	100	73		45,610	1,037	357	100
	Fish	100	87	83	80	70		35,846	815	281	79
	Salmon	100	80	80	70	67	4,403	21,825	496	171	48
	Non-Salmon Fish	97	80	67	67	50		14,021	319	110	31
	Marine Mammals	33	13	13	20	17	6	329	7	3	1
	Marine Invertebrates	100	77	70	93	47		4,958	113	39	11
Chignik Lagoon											
1989	All Resources	100	87	80	93	73		8,669	578	211	100
	Fish	100	73	73	93	73		5,937	396	145	68
	Salmon	100	60	60	80	53	833	4,110	274	100	47
	Non-Salmon Fish	100	67	67	87	53		1,826	122	45	21
	Marine Mammals	13	7	7	7	0	2	0	0	0	0
	Marine Invertebrates	87	53	53	80	47		851	57	21	10

Table 3.16-4: Selected Subsistence Harvests and Subsistence Activities for Selected Coastal Communities (Continued)

Alaska Department of Fish and Game Study Year	Resource	Percentage of Households					Estimated Harvest				
		Using	Trying to Harvest	Harvesting	Receiving	Giving	Estimated Number	Total Pounds(1)	Mean Household Harvest(1)	Per Capita Pounds(1)	Percent Total Harvest
Chignik Lake											
1991	All Resources	100	100	100	100	92		57,783	1,751	442	100
	Fish	100	96	96	88	92		32,042	971	245	55
	Salmon	100	96	96	71	92	6,599	26,614	806	204	46
	Non-Salmon Fish	100	79	79	88	71		5,428	164	42	9
	Marine Mammals	71	25	21	63	29	10	539	16	4	1
	Marine Invertebrates	100	79	75	92	67		2,711	82	21	5
False Pass											
1988	All Resources	100	100	100	100	95		28,586	1,299	413	100
	Fish	100	80	80	95	90		17,573	799	254	61
	Salmon	100	65	65	80	60	2,998	13,385	608	193	47
	Non-Salmon Fish	95	70	70	75	75		4,188	190	60	15
	Marine Mammals	60	30	30	55	30		1,753	80	25	6
	Marine Invertebrates	100	80	80	90	70		1,610	73	23	6
Ivanof Bay											
1989	All Resources	100	100	100	100	100		15,677	2,240	490	100
	Fish	100	100	100	100	100		8,057	1,151	252	51
	Salmon	100	100	100	100	71	1,437	5,971	853	187	38
	Non-Salmon Fish	100	100	100	100	86		2,086	298	65	13
	Marine Mammals	86	71	57	71	57	14	878	125	27	6
	Marine Invertebrates	100	100	100	100	100		1,486	212	46	9
King Cove											
1992	All Resources	100	97	96	95	81		143,496	908	256	100
	Fish	97	87	85	75	51		100,569	637	179	70
	Salmon	96	84	83	52	40	17,136	76,647	485	137	53
	Non-Salmon Fish	89	68	67	68	43		23,921	151	43	17
	Marine Mammals	25	13	13	16	9		1,180	7	2	1
	Marine Invertebrates	95	57	57	85	43		9,700	61	17	7
Kodiak City											
1993	All Resources	99	91	88	97	84		915,070	459	151	100
	Fish	98	77	71	91	72		652,493	327	108	71
	Salmon	93	73	69	73	61	69,553	289,229	145	48	32
	Non-Salmon Fish	95	67	64	80	62		363,265	182	60	40
	Marine Mammals	2	1	1	2	1	38	0	0	0	0
	Marine Invertebrates	79	41	40	73	41		57,595	29	10	6
Kodiak Road											
1991	All Resources	96	97	96	92	78		672,909	580	168	100
	Fish	93	90	84	75	70		502,364	433	126	75
	Salmon	91	86	80	59	61	58,722	243,167	209	61	36
	Non-Salmon Fish	84	75	72	53	53		259,197	223	65	39
	Marine Invertebrates	82	47	45	74	36		54,540	47	14	8

Table 3.16-4: Selected Subsistence Harvests and Subsistence Activities for Selected Coastal Communities (Continued)

Alaska Department of Fish and Game Study Year	Resource	Percentage of Households						Estimated Harvest			
		Using	Trying to Harvest	Harvesting	Receiving	Giving	Estimated Number	Total Pounds(1)	Mean Household Harvest(1)	Per Capita Pounds(1)	Percent Total Harvest
Nikolski											
1990	All Resources	100	100	93	100	86		36,945	1,847	761	100
	Fish	100	93	86	86	79		18,629	931	384	50
	Salmon	100	93	86	64	79	1,903	7,819	391	161	21
	Non-Salmon Fish	100	93	86	86	71		10,810	541	223	29
	Marine Mammals	93	64	64	79	64	71	7,469	373	154	20
	Marine Invertebrates	93	71	57	79	43		203	10	4	1
Old Harbor											
1991	All Resources	100	100	100	98	95		84,781	1,285	391	100
	Fish	100	93	93	88	88		60,793	921	280	72
	Salmon	95	91	88	76	76	10,398	44,868	680	207	53
	Non-Salmon Fish	98	81	79	76	74		15,925	241	73	19
	Marine Mammals	62	14	14	55	33	68	6,009	91	28	7
	Marine Invertebrates	98	79	79	86	71		7,885	119	36	9
Ouzinkie											
1993	All Resources	98	92	92	95	85		51,091	720	218	100
	Fish	98	79	79	80	66		32,521	458	139	64
	Salmon	93	75	75	64	62	5,695	23,948	337	102	47
	Non-Salmon Fish	89	62	61	69	53		8,574	121	37	17
	Marine Mammals	41	26	26	26	26	55	3,510	49	15	7
	Marine Invertebrates	93	72	69	77	54		5,122	72	22	10
Perryville											
1989	All Resources	100	100	100	93	85		45,729	1,475	394	100
	Fish	100	93	93	89	67		31,506	1,016	272	69
	Salmon	100	89	89	82	63	5,206	23,451	756	202	51
	Non-Salmon Fish	96	78	74	89	63		8,055	260	69	18
	Marine Mammals	63	41	26	52	30	28	2,967	96	26	6
	Marine Invertebrates	96	89	85	74	63		2,373	77	20	5
Port Lions											
1993	All Resources	100	100	100	100	91		78,371	980	331	100
	Fish	100	87	87	89	76		52,339	654	221	67
	Salmon	100	82	82	62	69	8,991	37,280	466	158	48
	Non-Salmon Fish	96	69	69	82	49		15,059	188	64	19
	Marine Mammals	18	4	4	16	4	14	1,052	13	4	1
	Marine Invertebrates	93	89	87	71	53		7,149	89	30	9
Sand Point											
1992	All Resources	100	94	94	95	69		155,001	760	256	100
	Fish	100	82	79	83	56		116,054	569	191	75
	Salmon	99	76	72	74	47	19,441	83,320	408	137	54
	Non-Salmon Fish	97	74	72	64	39		32,734	160	54	21
	Marine Mammals	25	13	10	17	10		2,848	14	5	2
	Marine Invertebrates	90	64	64	79	39		10,796	53	18	7

Table 3.16-4: Selected Subsistence Harvests and Subsistence Activities for Selected Coastal Communities (Continued)

Alaska Department of Fish and Game Study Year	Resource	Percentage of Households						Estimated Harvest			
		Using	Trying to Harvest	Harvesting	Receiving	Giving	Estimated Number	Total Pounds(1)	Mean Household Harvest(1)	Per Capita Pounds(1)	Percent Total Harvest
Unalaska											
1994	All Resources	97	94	94	95	84		355,081	507	195	100
	Fish	97	79	79	84	73		245,876	351	135	69
	Salmon	92	69	67	71	53	26,963	98,192	140	54	28
	Non-Salmon Fish	95	67	67	76	59		147,684	211	81	42
	Marine Mammals	14	5	4	13	7	170	17,536	25	10	5
	Marine Invertebrates	87	30	30	85	36		50,138	72	27	14
Whittier											
1990	All Resources	94	79	77	87	66		22,308	217	80	100
	Fish	90	60	58	71	63		14,969	145	54	67
	Salmon	77	56	54	53	52	1,596	9,453	92	34	42
	Non-Salmon Fish	82	38	38	61	43		5,516	54	20	25
	Marine Mammals	8	1	1	7	1	7	265	3	1	1
	Marine Invertebrates	52	16	16	44	18		2,494	24	9	11
Total								**2,855,355**			

Source: Alaska Department of Fish and Game, 1998—Community Profile Database.

(1) Units in pounds, as originally provided in the source documentation. Conversion to metric units is omitted in this table for readability. Conversion to kilograms can be made by multiplying the number of pounds by 0.4535924.

The percentage of households that use subsistence resources is high in all communities, ranging from 94 percent in Whittier to 100 percent in 15 of the 20 communities for which data are available (table 3.16-4). Households that try to harvest subsistence foods (79 percent in Whittier to 100 percent in several communities) and do successfully harvest subsistence foods (77 percent in Whittier to 100 percent in several communities) is also high. Similarly, sharing subsistence foods (giving and receiving) was high in all communities, ranging from a low of 63 percent of the households in Whittier to 100 percent of the households in several communities.

The percentage of households that use, harvest, and share fish (both salmon and non-salmon) is higher than the percentage of households that use, harvest, and share marine mammals and marine invertebrates. This difference likely reflects resource availability and cultural preferences in the communities. Fish is the largest component of the subsistence harvest in all communities (table 3.16-4).

The per capita harvest in these communities ranges from 36 kilograms (80 pounds) in Whittier to 345 kilograms (761 pounds) per capita in Nikolski. The total subsistence harvest in the 19 communities (plus Kodiak Road) for the representative data year was 1.29 million kilograms (2.85 million pounds).