



Record of Decision

Mertarvik Infrastructure Development Nelson Island, Alaska



**The Denali Commission
510 L Street, Suite 410
Anchorage, AK 99501**

April 2018

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Record of Decision

Mertarvik Infrastructure Development

Nelson Island, Alaska

SUMMARY: This document constitutes The Denali Commission's Record of Decision (ROD) for the Mertarvik Infrastructure Development Project, in compliance with agency implementing regulations at 45 CFR 900 for the National Environmental Policy Act of 1969, as amended. The Final Environmental Impact Statement (FEIS) that informs this decision provided an in-depth analysis of the alternatives considered to achieve the purpose and need for the Federal action. This ROD documents the Denali Commission's decision and rationale for supporting construction of all critical infrastructure elements required to support the long-term occupation of a new 605-acre village site that will accommodate the residents of the Village of Newtok, Alaska, in accordance with the Newtok Village Council's (NVC) proposed action as described and analyzed in the accompanying FEIS. Specific infrastructure elements potentially funded and/or constructed, and the fiscal year in which they will be funded and/or constructed, will ultimately be dependent upon the availability of funding, and will likely employ a phased approach over several years.

The Commission is not proposing to fund or construct the new Mertarvik Airport. The Federal Aviation Administration (FAA) was a Cooperating Agency in the development of the FEIS and is expected to issue a separate Record of Decision related to potentially funding the construction of the new airport runway, taxiway, apron and appurtenant airport facilities.

AGENCY: The Denali Commission

ACTION: Record of Decision

PUBLIC INVOLVEMENT:

The Denali Commission published the notice of intent (NOI) to prepare an EIS in the *Federal Register (FR)* on March 3, 2017. The notice of availability (NOA) of the Draft EIS (DEIS) was published in the *FR* on December 29, 2017. The NOA of the Final EIS (FEIS) was published in the *FR* on March 9, 2018. No decision was made until the latter of the following dates: (1) 90 days after publication of the NOA for the DEIS; (2) 30 days after publication of the NOA for the FEIS (40 CFR 1506.10(b)).

ADDITIONAL COPIES: Copies of the FEIS and ROD are available at the Commission's web site (<https://www.denali.gov/publications>). Copies will also be available at The Denali Commission, 510 L Street, Suite 410, Anchorage, AK 99501.

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Contents

1.	Introduction.....	1
2.	Background.....	1
2.1.	Purpose and Need for the Proposed Action.....	1
3.	Alternatives Considered.....	2
3.1.	Selected Alternative & Environmentally Preferred Alternative.....	2
3.2.	No Action Alternative	2
3.3.	Alternatives Previously Considered but Not Carried Forward.....	2
3.4.	Alternatives Carried Forward	3
3.4.1.	Goals	3
3.5.	Description of Selected Alternative.....	4
3.5.1.	Infrastructure Elements.....	4
3.5.2.	Sequence of Construction	8
3.6.	Comments on the Draft EIS (40 CFR 1503.4)	8
4.	Mitigation Measures (40 CFR 1505.2(c)).....	9
4.1.	Soils	11
4.2.	Water Quality	11
4.2.1.	Surface Water.....	11
4.2.2.	Groundwater	13
4.3.	Air Quality.....	14
4.4.	Natural Resources.....	15
4.4.1.	Threatened and Endangered Species	15
4.4.2.	Migratory Birds.....	17
4.4.3.	Wetlands	19
4.5.	Cultural Resources.....	21
5.	Mitigations Measures Not Adopted (40 CFR 1505.2(c))	21
6.	Mitigation Compliance Monitoring and Reporting (40 CFR 1505.2(c)).....	22
7.	Public Involvement (40 CFR 1506.6).....	22
7.1.	Public Scoping Period	22
7.2.	DEIS Preparation and Distribution.....	23
7.3.	FEIS Preparation and Distribution	23

8.	Decision Rationale.....	24
9.	The Denali Commission Decision (40 CFR 1505.2(a)).....	25
10.	Agency Action.....	25
11.	References.....	26

Acronyms and Abbreviations

AAC	Alaska Administrative Code
ADEC	Alaska Department of Environmental Conservation
ADFG	Alaska Department of Fish and Game
ADOTPF	Alaska Department of Transportation and Public Facilities
ALP	Airport Layout Plan
ANTHC	Alaska Native Tribal Health Consortium
APDES	Alaska Pollutant Discharge Elimination System
ATV	All-Terrain Vehicle
BMP	Best Management Practice
CCHRC	Cold Climate Housing Research Center
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CLP	Community Layout Plan
CRA	Certificate of Reasonable Assurance
CVRF	Coastal Villages Region Fund
CWA	Clean Water Act
DEIS	Draft Environmental Impact Statement
EIS	Environmental Impact Statement
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FEIS	Final Environmental Impact Statement
FEMA	Federal Emergency Management Agency
FONSI	Finding of No Significant Impact
FR	Federal Regulation
FRP	Facility Response Plan
GWR	Ground Water Rule
HUD	Department of Housing and Urban Development
MBTA	Migratory Bird Treaty Act
MEC	Mertarvik Evacuation Center
MHHW	Mean Higher High Water
MLLW	Mean Lower Low Water
MMPA	Marine Mammal Protection Act
MOA	Memorandum of Agreement
MSWLF	Municipal Solid Waste Landfill
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOA	Notice of Availability
NOI	Notice of Intent
NRHP	National Register of Historic Places
NTC	Newtok Traditional Council
NVC	Newtok Village Council
PSO	Protected Species Observers
ROD	Record of Decision

SCADA	Supervisory Control and Data Acquisition
SHPO	State Historic Preservation Officer
SPCC	Spill Prevention, Control and Countermeasures
SWPPP	Storm Water Pollution Prevention Plan
USACE	United States Army Corps of Engineers
USC	United States Code
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
VPSO	Village Public Safety Officer
WOTUS	Waters of the United States

Record of Decision

Mertarvik Infrastructure Development Nelson Island, Alaska

1. Introduction

This document constitutes The Denali Commission's (Commission) Record of Decision (ROD) for the Mertarvik Infrastructure Development Project. This ROD provides background on the selected alternative, summarizes the decision being made, summarizes the alternatives considered in reaching the decision, significant impacts (if any), discusses the mitigation measures to be implemented, summarizes the public participation process used in reaching the decision, and documents the Commission's decision.

2. Background

The Village of Newtok is an Alaska Native community of 374 residents (2016 Department of Labor estimate) located on the southwest coast of Alaska, on the banks of the tidally-influenced Ninglick River. A bend of the Ninglick River is rapidly eroding toward Newtok, with an average of nearly 70 feet of village land lost each year to a combination of river scour, permafrost thawing, and storm surge. The village has already lost its barge landing and landfill to erosion, will lose its drinking water source and begin to lose houses in 2018 and is expected to have its school and airport access threatened by 2020. Changes in local hydrology brought about by erosion have also increased vulnerability to flooding, limited boat and barge access in a community that is dependent on barge and air access for import of all supplies and materials, and impaired waste management practices at the village.

The Final Environmental Impact Statement (FEIS) assessed the potential environmental impacts of constructing critical infrastructure at a new community site at Mertarvik. Included in the analysis was a solid waste landfill; wastewater collection system and treatment lagoon; bulk fuel farm and fuel dispensing facility; power house and power distribution system; telecommunications building; water well field, treatment plant, storage tank, and distribution lines; housing; school; all associated connecting roads and trails; and a new airport runway, taxiway and apron.

2.1. Purpose and Need for the Proposed Action

The purpose of the Mertarvik Infrastructure Development project is to provide the people of Newtok with a place to live that allows them to keep their community and way of life within their traditional lands, while also providing the necessary infrastructure for a safe, sustainable, and healthy existence.

Few Alaska Native communities are as imminently threatened with displacement from coastal erosion as the village of Newtok. The rapidly advancing erosion of the Ninglick River shoreline

and increasingly severe flooding is expected to make Newtok's current location unsustainable for the community as early as 2020 and force the relocation of the village's residents.

3. Alternatives Considered

3.1. Selected Alternative & Environmentally Preferred Alternative

The selected alternative, also identified as the environmentally preferred alternative in accordance with 40 CFR 1505.2(b), involves funding and construction of critical infrastructure elements at Mertarvik in accordance with the Community Layout Plan (CLP) selected by the residents of the Village of Newtok and accepted by the Commission. The selected alternative is identified in the FEIS as CLP Alternative 2 and is discussed in Section 3.5 below.

3.2. No Action Alternative

Under the no action alternative, the comprehensive planned development of the new village infrastructure at Mertarvik would not occur, and the displaced residents would be left to determine their own individual course of action. It is likely that some portion of the Newtok community would settle at Mertarvik on their own and make use of the infrastructure already built. Non-Federal funding may be found for the piecemeal construction of additional homes and some utilities, but major infrastructure such as the airport and school would be difficult to fund in the absence of a comprehensive effort toward establishing a new community at Mertarvik.

At Newtok, the residents would gradually be displaced by the destruction of their homes, school, and other support facilities; by the increasing difficulty of life at Newtok; and would be forced to find new places to live as personal circumstances allowed. The Newtok community would be physically divided, and its goal of maintaining its strong identity and cultural foundation would become difficult or impossible.

As required by NEPA, the no action alternative was carried forward for analysis in the FEIS.

3.3. Alternatives Previously Considered but Not Carried Forward

The selected alternative has been shaped and constrained by a series of events, studies, and decisions occurring over the last four decades. The FEIS did not analyze previously eliminated alternatives because NEPA does not require the repetitive analysis of alternatives previously dismissed in a prior NEPA analysis unless they fall within the current scope of analysis and are "reasonable" alternatives. Therefore, many alternatives were dismissed at a lesser level of analysis than alternatives carried forward because they were clearly impractical, non-constructible, or did not provide valuable mitigation of potential impacts.

Alternatives that had been considered in the past, but fell outside the scope of analysis in the FEIS and were therefore not carried forward for further analysis include:

- Engineered solutions to stop or slow the erosion of the Ninglick River bank at Newtok, and allow the community to remain in place;
- The relocation of Newtok residents to other existing communities;

- Development of a new community site at a location other than Mertarvik;
- Community layout plans developed for Mertarvik prior to 2016.

Section 4.3 of the FEIS provided a comprehensive discussion of these alternatives, and since none of them were carried forward for analysis in the FEIS, they will not be further discussed here.

3.4. Alternatives Carried Forward

The three Mertarvik CLP alternatives developed in 2016-2017 by the Newtok Village Council (NVC) and the Commission were carried forward for analysis in the FEIS. All three of the CLP alternatives incorporated the Final Airport Layout Plan (ALP) conditionally approved by the FAA in 2014 as a major infrastructure element in the CLPs. The evaluation of airport location and layout alternatives was conducted by the FAA and Alaska Department of Transportation and Public Facilities (ADOTPF) prior to development of the CLPs, but was informed by the evolution of previous community layout plans (see section 4.5.2 of the FEIS for a detailed description of the ALP).

The three CLPs were developed in direct collaboration with the community of Newtok, over the course of 8 months in 2016-2017. The Commission and the Alaska Native Tribal Health Consortium (ANTHC) sought input from not only the NVC leadership, "...but also the elders, the hunters, the gatherers, and the future leaders studying at the Newtok Ayaprun School. The people that would serve the community of Mertarvik in the years to come were also represented: The Lower Kuskokwim School District, The Yukon Kuskokwim Health Corporation, the Association of Village Council Presidents, and many other partners. The layout further needed the technical guidance of the surveyors, architects, engineers, and builders that would be helping the community to design and construct the new community. And lastly, the layout required the consideration of the Federal and State agencies that would provide the funds needed to develop a healthy and sustainable Mertarvik" (ANTHC 2017a).

3.4.1. Goals

The Commission, working with the Newtok community, identified the following five goals for the CLP process (ANTHC 2017a):

1. Expedient Development. The most commonly voiced goal of the community was to make the development of Mertarvik proceed as quickly as possible. The erosion and public health crises in Newtok require immediate action to develop a new community and cannot wait for an ideal set of resources, design, and construction conditions.

2. Pioneering Approach. The residents of Newtok are committed to a "pioneering approach," a phased development in which community members would begin to move to and live in Mertarvik in advance of the complete build-out of the planned infrastructure.

3. Affordability of Construction. The cost of building an entire community is daunting; early estimates suggest that roughly \$120 million will be needed for development of all community infrastructure. Minimizing each component cost of the relocation was an important factor for the community.

4. Affordability of Operation. Minimizing operations and maintenance costs was a critical goal in the development of the layout plan. This includes minimizing fuel and electricity use, reducing road maintenance needs, providing easy access to cover for the landfill, and reducing labor requirements.

5. Subsistence Lifestyle. The community's strong cultural foundation and traditional subsistence lifestyle needed to be represented in the CLP; access to subsistence resources and a focus on infrastructure development that minimizes impacts on the local habitat were important considerations.

To increase community ownership of the CLP process, it was critical for the community to have a formal choice in the selection of the final CLP. Surveys of the community found roughly equal numbers of people preferring to be located near the water, versus higher up on the slope. On the other hand, an analysis of the topography at the Mertarvik community site suggested that the CLP could be focused either around the existing development at the MEC and barge landing, where grades average 10 percent to 13 percent, or shifted farther to the east where grade is a flatter 5 to 7 percent.

ANTHC, as a Federal assistance award recipient and non-profit tribal health organization with the responsibility and authority to provide health services for Alaska Native and American Indian people living in Alaska, worked with the Commission to develop three alternative CLPs that attempted to balance these two divergent options, while adhering to the five CLP goals. CLP Alternative 1 was set relatively close to the water, to the east of the Mertarvik Evacuation Center (MEC). CLP Alternative 2 was centered on the MEC, with an option available for community development to be weighted more heavily either downslope or upslope from the MEC. CLP Alternative 3 was set much higher on the slope than either CLP Alternative 1 or CLP Alternative 2, and had a more elongated configuration than the other alternatives.

3.5. Description of Selected Alternative

The Mertarvik Infrastructure Development Project CLP alternative selected was Alternative 2, with some minor modifications made after selection by the people of Newtok. The selected alternative was accepted unanimously by a quorum of the NVC, in a resolution dated June 22, 2017.

3.5.1. Infrastructure Elements

The individual structures and features that make up the selected alternative, such as homes, community buildings, and utilities, are listed in Table 1. The selected alternative also includes nearly 28,000 linear feet of gravel roads and 14,350 linear feet of designed and maintained

gravel trails. The roads are assumed to have 40-foot wide beds; the width of the trails will vary according to their expected use and the local topography.

The selected alternative was designed using lot sizes assigned for each structure and facility. Many of the infrastructure elements have not yet been fully designed, so their structural footprint in Table 1 is estimated based on their planned use and on similar structures existing in other rural Alaska communities.

Design work on the infrastructure elements continues, particularly for essential utilities. Design plans and studies completed for Mertarvik as of November 2017 include:

- *Mertarvik Bulk Fuel & Rural Power System Conceptual Design Report*, August 2017 (Cooper *et al* 2017).
- *Newtok-Mertarvik Relocation Energy Master Plan, Final*, May 2017 (Cooper *et al* 2017).
- *Mertarvik Housing Master Plan*, February 2017 (CCHRC 2017).
- *Mertarvik Multi-Purpose Building Retrofit Feasibility Study*, January 2016 (CCHRC 2016).

These design documents and others are available on the Newtok Planning Group website, <https://www.commerce.alaska.gov/web/dcra/PlanningLandManagement/NewtokPlanningGroup.aspx>, and were incorporated by reference in the FEIS.

Table 1. List of CLP Infrastructure Elements, with Lot and Estimated Footprint Areas.

Number	Infrastructure Element	Lot Size Provided (acres)	Estimated Structure Footprint (acres)
1	Community Equipment Shop & Dry Storage	2.375	0.33
2	Bulk Fuel Storage	3.75	1.75
3	Lift Station	0.25	0.125
4	Barge Unloading area & Boat Storage Fisheries Support Center	3.50	0.33
5	Corporation Office	0.75	0.125
6	Store & Fuel Station	0.50	0.125
7	Power Facility	0.50	0.33
8	Coastal Villages Region Fund (CVRF) Shop	- ^a	0.25
9	Construction Camp & Water Storage Tank	0.75	0.125
10	Tom’s Store	0.50	0.125
11	School	12.00	3.25
12	School Bulk Fuel Storage	- ^a	0.25
13	Washeteria	0.375	0.125
14	Church	0.375	0.10
15	Clinic	0.375	0.10
16	Elder Housing	0.375	0.125
17	Elder Housing	0.375	0.125
18	Tribal Office	0.375	0.125

19	Post Office	0.375	0.10
20	Fourplexes	0.375	0.125
21	Fourplexes	0.375	0.125
22	Teacher Housing	0.50	0.125
23	Village Public Safety Officer's (VPSO) Office, Garage, & Living Quarters	0.75	0.125
24	Telecommunications Building	1.25	0.25
25	Wastewater Treatment Lagoon	20.00	14.00
26	Water Treatment Plant & Water Storage Tank	14.00	1.25
27	Well Field	- ^a	0.10
28	Airport Runway, Taxiway, & Apron	495.00 ^b	58.6 ^{c,d}
29	Landfill	8	7
30	Single Family Homes, total (100 each new)	37.50	10.00
	Total Occupied Acreage	605	127

a. Infrastructure element not provided a separate lot.

b. 495-acre value refers to the total area that must be deeded to the State of Alaska for operation of the airport.

c. Acreage value for the airport footprint is from PDC Engineers 2017; other values from ANTHC 2017b.

d. This acreage does not include a crosswind runway.

The following sections provide descriptions of select infrastructure elements, with their likely characteristics, requirements, and construction considerations. These descriptions are based on geotechnical investigations, preliminary engineering reports, regulations, design standards, and/or typical design and construction practices with similar facilities constructed in other rural Alaska communities. While detailed design will continue, these efforts are unlikely to change the results of the analysis of impacts.

Solid Waste Landfill: The facility will be a Class III Municipal Solid Waste Landfill (MSWLF) designed and permitted in accordance with Alaska Department of Environmental Conservation (ADEC) Solid Waste Management regulations (18 AAC 60, as amended). The landfill will be sized for a 20-year design population of 518 people, based on a projected annual growth rate of approximately 6.5 percent; and a per capita waste generation rate of 7.5 lbs./day.

Wastewater Treatment Facility: The treatment facility will be a two-cell facultative wastewater lagoon, typical of wastewater treatment facilities used throughout rural Alaska. These lagoons are easy to operate and maintain, they handle a wide range of flows and provide for many years of accumulated sludge storage. The facility shall be designed, permitted, and constructed in accordance with ADEC Wastewater Disposal Regulations (18 AAC 72, as amended), and in accordance with ADEC "Lagoon Construction Guidelines."

Energy Systems: The *Mertarvik Bulk Fuel and Rural Power System Conceptual Design Report*, was written by Gray Stassel Engineering, Inc. and HDL Engineering Consultants and published in August 2017 (Cooper *et al* 2017). The following descriptions of bulk fuel and power generation systems have been excerpted from this report.

Bulk Fuel Storage and Dispensing Facilities: The new fuel storage tank farm will consist of two gravel containment cells lined with a fuel resistant liner. New single-wall, horizontal fuel tanks will be installed inside the containment including: (8) 27,000-gallon bulk tanks, (2) 20,000-gallon bulk tanks, (1) 12,000-gallon intermediate tank, and (1) 20,000/8,000-gallon dual compartment tank for a gross fuel capacity of 214,000 gallons of diesel fuel and 82,000 gallons of gasoline. The tank farm will also include two marine header fill points and associated piping; truck fill; retail sales dispensing tank and dispensers; and fuel conveyance piping between the tank farm, retail sale dispensing tank, and intermediate power plant tank.

Power House: The power plant will consist of a pre-fabricated module with a segregated generator room and control room/office. The module will include three new Tier-2 and Tier-3 marine diesel engine-generators, new automatic start/stop/paralleling switchgear, a new heat loop for generator heat recovery with community buildings, remote radiators with variable speed fan control, a fire suppression system, critical grade exhaust silencers and associated engine coolant piping and ventilation equipment. The power plant will connect to a new intermediate fuel storage tank via an automated fuel transfer pipeline; automated load balancing; new switchgear; and a supervisory control and data acquisition (SCADA) system.

Power Distribution System: The electrical distribution system will be 12.47/7.2 kV, 3-phase overhead construction to minimize line losses, and meet the long term needs of the community. Pole-mounted transformers will stepdown the 7200 V distribution voltage and provide 120/240 V single-phase power to residential services. For larger customers, 208 V and 480 V 3-phase power will be provided, as required.

Water Storage Tank: Based on a 20-year design population of 518 people, and daily per capita water consumption of 75 gallons, a conservatively sized water storage tank for Mertarvik will require a capacity of approximately 400,000 gallons. A tank of this size is estimated to have a 40 to 48-foot-diameter floor with a height of 32 to 40 feet. The water storage tank is expected to be an insulated, bolted steel ground tank, typical of water storage tanks throughout rural Alaska. The tank will be erected on a structural gravel pad adapted for the specific conditions at the Mertarvik site.

Water Distribution and Wastewater Collection Lines: Long-term development plans include installation of community water supply and wastewater collection systems. The water distribution system is expected to be a network of nominal 6 and 8-inch insulated and buried pressure pipes emanating from the water treatment plant site. Water distribution systems will be designed and permitted in accordance with ADEC Drinking Water regulations.

Community Roads: The selected alternative includes approximately 5.3 miles of roads, including town site subdivision roads (2.2 miles), the quarry/landfill road (1.8 miles), the airport road (1.0 mile), and the lagoon access road (0.3 mile).

Buildings and Foundations: Other structures included in the selected alternative are the school and teacher housing, water treatment plant, washeteria, clinic, post office, tribal and corporation offices, store, elder housing, and private residences.

3.5.2. Sequence of Construction

The Mertarvik Strategic Management Plan (Agnew::Beck Consulting 2012) envisioned the Mertarvik development and relocation of Newtok residents occurring in four phases:

- **Phase 1: *Uplluteng (Getting Ready)***. This phase includes all planning activities and initial infrastructure construction to-date, prior to active habitation of the site.
- **Phase 2: *Upagluteng (Pioneering)*** - (2017-2018). Seasonal habitation by approximately 25 to 100 people, living with limited community infrastructure.
- **Phase 3: *Nass'paluteng (Transition)*** - (2019-2022). A steady increase in population from roughly 100 to 200 people, with services and community infrastructure added and scaled up to accommodate the growth.
- **Phase 4: *Piciurluni (Final Move)*** - (2023-2027). The final relocation of all Newtok residents (approximately 350 people) into an essentially complete new community.

The stated goal was to have all Newtok residents relocated to the new site within 10 years. Certain population thresholds at Mertarvik may need to be demonstrated before some Federal and State agencies are able to provide key community services or invest in community facilities at Mertarvik, such as the airport, school, and Post Office. For example, the United States Postal Service (USPS) has a set threshold of 25 families or 75 persons before they will provide mail service to a community. Delay in the establishment of these facilities in Mertarvik may impact the beginning and duration of the transition period wherein residents make the move from Newtok to Mertarvik. The Mertarvik Strategic Management Plan recommended building roads and pads supporting individual pieces of infrastructure a year in advance of erecting those structures, where possible, and pacing critical service (power, water, sewer, etc.) development ahead of actual need. Implementation of the recommended construction sequence will be highly dependent on funding availability, and the sequence is likely to be subject to considerable adjustment.

The Newtok-Mertarvik Energy Master Plan (Cooper *et al*, 2017) presented a similar recommended construction timeline based on a phased buildup of energy infrastructure at Mertarvik paired with a draw-down of the Newtok power plant.

The two factors that have the greatest and as yet unknown potential to affect the schedule for the selected alternative are funding for each Federal agencies' required work and the effects of on-going and potentially accelerated erosion rates in Newtok.

3.6. Comments on the Draft EIS (40 CFR 1503.4)

Four letters/e-mails providing comments on the DEIS were received during the 45-day comment period (see Appendix A of the FEIS):

1. Alaska Native Tribal Health Consortium (ANTHC);
2. U.S. Department of the Interior, Office of Environmental Policy and Compliance;
3. U.S. Environmental Protection Agency, Region 10; and
4. Alaska State Historic Preservation Office, Office of History and Archaeology

The comments received consisted primarily of commendations, recommendations for minor corrections, or requests for clarifications. No errors in fact were identified, and no comments were received which modified the results of the environmental analyses undertaken or the conclusions reached. As a result, no revisions or clarifications were made to produce the FEIS beyond minor administrative clarifications.

4. Mitigation Measures (40 CFR 1505.2(c))

As required by the President's Council on Environmental Quality (CEQ) NEPA regulations, the Commission identified and adopted all practicable mitigation measures presented in the FEIS to avoid or minimize environmental harm accruing to construction of the infrastructure elements identified in the selected alternative.

From the earliest stages in the process of developing the selected alternative, environmental considerations were incorporated in order to avoid, minimize or compensate for anticipated environmental consequences. For example, each of the three alternate CLPs avoided all known cultural sites and provided watershed and wellhead protection for the Mertarvik spring. The new electrical generators to be installed will greatly reduce air emissions compared to the existing generators in use in the village of Newtok, and the wastewater collection, treatment and disposal system will greatly modernize the honey bucket collection system now in use at Newtok. As a result, no significant direct, indirect, or cumulative negative environmental impacts were identified as a result of the analyses performed in the FEIS. The complete language of the mitigation measures, as well as design modifications and terms and conditions, are provided in the FEIS.

Mitigation related to all construction activities analyzed in the EIS are comprised primarily of Best Management Practices (BMP) that are commonly utilized during construction in this area of Alaska. In addition, numerous permits will be required prior to construction and/or operation of various infrastructure elements of the selected alternative, each expected to identify conditions under which infrastructure element will be constructed and/or operated, as well as applicable monitoring and enforcement provisions (40 CFR 1505.2(c)).

Table 2 provides a list of recommended consultations and required permits and approvals from various regulatory agencies, and the anticipated time frames to complete each process. Also included are milestones when certain activities should be initiated. This table does not represent an exhaustive list of requirements but highlights the major milestones in the project implementation process.

Table 2. Permitting Considerations for Mertarvik Infrastructure Development Elements

Agency	Permit/Clearance/Consultation	When to Initiate	Approximate Timeline to Acquire Permit or Clearance
Federally Funded Actions			
NEPA	Environmental Assessment (EA)	Review need for NEPA compliance upon receipt of funding for a specific infrastructure element	90-160 days*
SHPO & Tribes	Initiation of Consultation	Once the planning of an infrastructure element has been initiated	30 days
	Finding of No Historic Properties Affected	Upon receiving concurrence of such from SHPO	30-120 days
State and Federally Funded Actions			
USFWS	Section 7 Consultation for Threatened and Endangered Species	Once the planning of an infrastructure element has been initiated	30-120 days**
	Consultation regarding clearing windows for nesting birds and emperor geese	For any proposed ground disturbing activities	14-30 days
NMFS	Consultation for Essential Fish Habitat (EFH)	For any in-water work in the Ninglick River	14-30 days
ADFG	Title 16 Fish Habitat Permit	For any work within Takikchak River	30-90 days
USACE	Clean Water Act Section 404 Permit	Once the planning of an infrastructure element has been initiated and fill in WOTUS is expected	120 days
ADEC	APDES Construction General Permit	1 month prior to construction, once 100% construction documents are complete	30 days***
Privately Funded Actions			
ADFG	Title 16 Fish Habitat Permit	For any work within Takikchak River	30-90 days
USACE	Clean Water Act Section 404 Permit (Individual or Nationwide)	Once the planning of an infrastructure element has been initiated and fill in WOTUS is expected	120 days
USFWS	Consultation regarding clearing windows for nesting birds and emperor geese	For any proposed ground disturbing activities	14-30 days
ADEC	APDES Construction General Permit	1 month prior to construction, once 100% construction documents are complete	30 days

* If required, initiation of the appropriate NEPA document will begin with informal agency scoping and data-gathering. The NEPA process will continue until a Categorical Exclusion, Finding of No Significant Impact (FONSI) or Record of Decision (ROD) is finalized.

+ Length of consultation will depend on determination of affect by regulatory agency.

** Includes review and approval of SWPPP, pre-construction site visit, and submittal of notice of intent.

4.1. Soils

Direct impacts would consist of placement of fill for building pads and road prisms, creating minor and highly localized areas of altered topography and surface soil geology. Construction in the area, particularly of building foundations and roads, will need to be adapted to the presence of permafrost, and minimize the potential for degrading permafrost and causing subsidence. Long term changes to the area permafrost profile as a result of filling and construction is a potential indirect effect. Because of the discontinuous nature of the permafrost in the area, and the highly variable depth to bedrock, further geotechnical investigation may be necessary before deciding the final siting of some structures.

- Grading within the footprint of the selected alternative will be minimized to only those areas where necessary to meet the construction and operational requirements of the Selected Alternative.

4.2. Water Quality

4.2.1. Surface Water

Temporary surface water quality impacts associated with construction of the proposed Mertarvik infrastructure include construction-related turbidity at the barge landing site during the contractor's mobilization and demobilization, run-off from the construction of haul roads to/from construction sites, and runoff of exposed soils from construction surfaces (e.g., roads, building pads). If gravel must be imported for fill via barge (considered very unlikely), barge operations may increase turbidity around the barge landing. While construction of infrastructure is not expected to directly impact streams or ponds, erosion of fill during and immediately after construction of infrastructure elements may increase suspended sediment levels in surface waters (i.e. precipitation and snow melt runoff) at and around infrastructure footprints, specifically, haul routes, stockpile and staging areas, equipment access routes, roadways, and building pads.

Most construction activities at Mertarvik will take place under the Alaska Construction General Permit for Storm Water Discharges from Large and Small Construction Activities (CGP); the current CGP became effective in February 2016. The 2016 CGP, administered under the Alaska Pollutant Discharge Elimination System (APDES), authorizes storm water discharges from large and small construction-related activities that result in a total land disturbance of equal to or greater than 1 acre, and where those storm water discharges enter waters of the U.S. The goal of the CGP is to minimize erosion and reduce or eliminate the discharge of pollutants, such as sediment carried in storm water runoff from construction sites through implementation of appropriate control measures. In order to ensure protection of water quality and human health, the permit describes control measures that must be used to manage storm water runoff during construction activities. While many individual elements of the CLP will involve less than 1 acre of disturbed land or exposed fill, the overall plan for Mertarvik meets the definition of a "common plan of development," in which "multiple separate and distinct construction activities may be taking place simultaneously or on different schedules, but under one master plan."

Development and implementation of a Storm Water Pollution Prevention Plan (SWPPP) is the key condition of the CGP. The SWPPP is generally prepared by the construction contractor; it is unclear at this time if multiple SWPPPs or one overarching SWPPP will be required for construction at Mertarvik. Other CGP requirements include submission of the SWPPP for review, filing of a Notice of Intent, regular site inspections, and revisions to the SWPPP whenever necessary to protect water quality, or to reflect changes in site conditions. SWPPP BMPs may include:

- Construction of infrastructure features will follow the approved infrastructure element design and will implement all required BMPs to minimize effects. Such sediment management BMPs could include silt fences, coir logs, and berms around areas of disturbed soil or soil stockpiles;
- If construction leads to noticeable ponding or changes to surface runoff patterns that may lead to erosion, culverts, French drains, and rock-lined swales may be used to redirect and reduce the velocity of surface flow; and
- Specific sediment management BMPs to be utilized during the construction of particular infrastructure elements will be identified in the SWPPPs.

Recommended Measures:

In addition to the mitigation measures identified above, additional recommendations for reducing impacts to surface waters are provided below:

- The Takikchak River will be buffered by its distance from direct construction impacts. However, its relative proximity to the proposed Mertarvik community site is likely to subject it to greater use by the residents of Mertarvik along a greater extent of its length than it currently receives. ATV access to and across the river channel has the potential to cause breakdown and erosion of the river bank, with subsequent harm to water quality and the aquatic environment. To avoid impacting the five salmon species that utilize the Takikchak River (as well as other fish species), the residents of Mertarvik should work with the ADFG to establish a minimally damaging ATV crossing point at the Takikchak River under a stream crossing General Permit in accordance with Alaska law (AS 16.05.871). An established stream crossing point could be “hardened” by laying a pavement of heavy cobbles across the streambed and protecting the streambank approaches with gravel and/or half-buried transverse timbers.

The USEPA requires two sets of regulatory submittals for fuel facilities from which a discharge could impact navigable water or adjoining shorelines. The Spill Prevention Control and Countermeasures (SPCC) Plan identifies requirements for facilities that have a minimum aggregate storage capacity of 1,320 gallons. The SPCC Plan must address every container 55 gallons and larger and must be certified by a Professional Engineer. Facility Response Plans (FRPs) are required for facilities that are filled by marine vessels and which have a storage capacity of more than 42,000 gallons.

The U.S. Coast Guard’s “Facilities Transferring Oil or Hazardous Material in Bulk” regulations apply to fuel facilities capable of transferring fuel to or from a vessel with a capacity of 10,500

gallons or more. This regulation also requires a Facility Response Plan and additionally an Operations Manual. The FRP is similar to the USEPA FRP and outlines spill planning requirements for the Coast Guard regulated portion of the facility. The Operations Manual addresses the procedures and equipment required for receiving fuel at the facility. Additionally, the Coast Guard requires that a Letter of Intent to Operate be submitted to the captain of the port for approval prior to delivery of fuel.

- Fuel storage at the barge landing will be consolidated, with secondary containment and spill response equipment made readily available; and
- A SPCC plan, a FRP, and Operations Manual will be developed and implemented during construction and prior to the operations phase of the selected alternative. Adequately-sized secondary spill containment will be incorporated to ensure proper capture and control measures for potential spills.

As part of community road and trail design, a hydrologic analysis will be completed involving an evaluation of surface water movement based on climatological data and watershed characteristics. The hydrologic analysis will be used to locate and size culverts in a manner that will maintain natural drainage patterns to the extent practicable.

Prior to the start of any construction activities, a written construction management plan shall be developed to include the following practices:

- designated roads, trails and pads shall be used to access project areas.
- project construction boundaries shall be clearly marked to avoid any inadvertent encroachment on wetlands.
- topsoil will be segregated and preserved during excavations to minimize disturbance to and facilitate restoration of wetlands. Topsoil will be replaced in the uppermost portion of the trench, and seeding with a native seed mix will occur immediately following construction of each section of line.
- process for removal of all spoils, debris and other construction wastes from the active construction site for disposal at previously disturbed areas are designate uplands sites.
- provisions for management of all petroleum products and hazardous material in accordance with the state and federal regulations.
- storage of spill response equipment in all construction vehicles and at various staging areas for rapid access in case of an accidental spill or leakage.
- stockpile of excavated material within disturbed areas such as roadways and on existing pads to the greatest extent practicable; and the replacement of fill in trenches as soon as possible after completion of the excavation.

4.2.2. Groundwater

Potential direct or indirect threats to groundwater include releases of fuel or other contaminants from fuel storage tanks and associated pipelines, and leachate from the landfill and wastewater treatment lagoon. The groundwater that feeds Mertarvik Spring is potentially vulnerable to contamination. Little of the currently planned development lies upgradient of the spring, but a

large release of fuel or other contaminants from the airport or along the quarry road could potentially impact the quality and usability of water drawn from it. The likelihood and route of contaminants migrating into area aquifers would be strongly influenced by the presence or absence of permafrost and the relationship of groundwater to the subsurface basalt layers at any particular release site.

- The siting of each potential pollutant source will be guided by a source water assessment and the development of a wellhead protection program as required by the Safe Drinking Water Act's Ground Water Rule (GWR) (40 CFR Part 141, Subpart S), as implemented by the Alaska Department of Conservation;
- Operation of the new Class III Municipal Solid Waste Landfill (MSWLF) will be subject to Alaska Department of Environmental Conservation (ADEC) approval of its final design, and implementation of permit conditions to avoid adverse effects. Additionally, a Class III Landfill Operations Plan will also be required; and
- Operation of the new wastewater treatment system will be subject to ADEC approval of its final design, and implementation of the National Pollutant Discharge Elimination System (NPDES) wastewater discharge permit conditions governing the discharge of effluent into Baird Inlet in accordance with Section 402(b) of the Clean Water Act (33 USC 1342(b)). It is anticipated that the lagoon will be permitted under a general permit for small domestic lagoons that discharge to surface water. Effluent limits and monitoring requirements will be defined in the permit.

4.3. Air Quality

Air emissions sources at Mertarvik will include temporary construction-related emissions, emissions from completed stationary infrastructure sources (e.g., the power plant and heated structures), private mobile sources such as ATVs and snow machines, and non-point sources such as roadways. Construction-related emissions are expected to consist primarily of exhaust from heavy construction equipment, vehicles, and electric generators. Airborne particulates will be generated from the transport and placement of gravel fill extracted from the quarry, and from the transport and management of excavated soils, especially during airport construction. Temporary air quality impacts off-site include any aircraft or barge-related emissions related to shipping infrastructure material via aircraft or barge, or fill material via barge to the proposed construction site. Construction-related emissions will be generated through the life of the CLP construction at Mertarvik (currently projected to be completed in 2017), but will vary greatly from year to year depending on the level of construction activity. The construction-related emissions will also be highly seasonal, as most construction work will occur in ice-free months.

Best management practices to reduce impacts to air quality during construction include:

- The area of grading and vegetation removal will be limited to only the area required for construction and subsequent use by the community;

- Construction activities will utilize dust control palliatives (e.g., water or approved chemical products) to minimize the lofting of particulates from gravel surfaces and gravel-generations activities during construction;
- Speed limits will be established to minimize dust from ATV and mobile construction equipment traffic on gravel roads;
- Contracts will specify that any and all equipment used meet emissions requirements at the time the equipment was manufactured; and
- Recommend that any tampering with engines be prohibited and continued adherence to manufacturer's recommendations be required.

The principle stationary sources of air emissions at Mertarvik will be the interim and permanent diesel-electric power plants. This equipment will be operated in accordance with State of Alaska air quality regulations; consultation with the State Air Permitting Division will be needed to establish air quality permit requirements for the power plant. Because the local and regional air quality environment is in “attainment” status under the CAA, meaning no criteria pollutant levels have been exceeded, and as no increase in total community or airport emissions (beyond temporary construction emissions) is expected, neither an emissions inventory nor modeling of air quality impacts is necessary.

Recommended Measures:

In addition to the construction mitigation measures identified above, additional recommendations for reducing impacts to air quality after occupation of Mertarvik are provided below:

- Recommend that air quality be maintained within the established Mertarvik community through regular inspection and maintenance of the power plant and oil-fired heaters, encouraging the proper care of small engines, and the replacement of obsolete models.

4.4. Natural Resources

4.4.1. Threatened and Endangered Species

The USFWS concurred with the Commission’s determination that the proposed action may affect but is not likely to adversely affect spectacled eiders and Steller’s eiders in a letter dated June 20, 2017. No conservation recommendations were proffered. General measures to minimize the degradation of area wetlands and waterways, through sediment management and thoughtful layout of roads and wastewater management, will serve to avoid impacts to these Endangered Species Act (ESA) listed species.

The Commission made the determination to the USFWS that the proposed action and associated vessel activity will have no effect on northern sea otters or the short-tailed albatross; the USFWS did not challenge this determination.

The NMFS recommended the following general measures to minimize the risk and harm to protected marine species (ESA and MMPA):

- To reduce the risk of collisions with protected species, proposed action-related vessels will be limited to a speed of 8 knots, or the slowest speed above 8 knots consistent with safe navigation:
 - when within 3 nautical miles of any of the Steller sea lion haul outs or rookeries shown on Figure 38 of the FEIS;
 - when transiting the North Pacific right whale critical habitat areas shown on Figure 38 of the FEIS; and
 - when transiting the Cook Inlet beluga whale critical habitat areas;
- Vessel operators will strive not to approach within 100 yards of a marine mammal to the extent practicable, given navigational and safety constraints; and
- The contractor performing the work will prepare an Oil Spill Prevention and Control Plan describing steps to avoid and mitigate releases of hazardous substances.

The NMFS recommended special conservation measures to minimize the impacts of vessel strikes on Cook Inlet beluga whales and North Pacific right whales within their respective critical habitat:

- Exercise special caution in the vicinity of the Susitna Delta to minimize the impacts of vessels within this seasonally vital Cook Inlet beluga whale habitat. The Susitna Delta Exclusion Zone (Figure 42 of the FEIS) is defined as the union of the areas defined by:
 - a 10-mile (16 km) buffer of the Beluga River thalweg seaward of the mean lower low water (MLLW) line, a 10-mile (16 km) buffer of the Little Susitna River thalweg seaward of the MLLW line, and a 10-mile (16 km) seaward buffer of the MLLW line between the Beluga River and Little Susitna River; and
 - The buffer extends landward along the thalweg buffers to include intertidal area up to mean higher high water (MHHW). The seaward boundary has been simplified so that it is defined by lines connecting readily discernable landmarks.

For vessels operating in the Susitna Delta Exclusion Zone, the following should be implemented:

- All vessels operating within the designated Susitna Delta area should maintain a speed below 4 knots. Crews must note the numbers, date, time, coordinates, and proximity to vessels of any belugas observed during operations, and report these observations to NMFS;
- Protected Species Observers (PSOs) must be in place to monitor for ESA-listed species prior to and during all vessel movements when vessels are under power (propellers spinning) within the Susitna Delta Exclusion Zone. PSOs are not required to be observing when vessels are not under power (in gear);
- PSOs must be located in a position that affords a view of all waters within a 100-meter radius of all vessels under power (in gear);
- Exercise special caution in the vicinity of the Susitna Delta to minimize the impacts of vessels within this seasonally vital Cook Inlet beluga whale habitat;

- Vessel operators must avoid moving their vessels when PSOs are unable to adequately observe the 100-meter zone around vessels under power (in gear) due to darkness, fog, or other conditions, unless necessary for ensuring human safety; and
- If any vessels enter the Susitna Delta Exclusion Zone at any time, PSOs must record and email to NMFS: date, time, number, and geographic coordinates of ESA listed marine mammals observed during vessel movements, and descriptions of any deferred vessel movements or vessel re-directions.

The vessel operator should avoid transits within designated North Pacific right whale critical habitat (Figure 38 of the FEIS). If transit within North Pacific right whale critical habitat cannot be avoided, NMFS recommends a route along the western boundary of the critical habitat where historic and contemporary observations indicate that North Pacific right whales are not as concentrated as other areas in the critical habitat. In addition, if transit within North Pacific right whale critical habitat cannot be avoided, NMFS recommends that transit in right whale critical habitat be limited to between September and March, a time of year right whales may be at lower numbers in the Bering Sea.

If transiting in North Pacific right whale critical habitat, vessel operators are requested to exercise extreme caution and observe the 10-knot (18.52 km/h) vessel speed restriction. Operators transiting through North Pacific right whale critical habitat should have trained PSOs actively engaged in sighting marine mammals. PSOs would increase vigilance and allow for reasonable and practicable actions to avoid collisions with North Pacific right whales. Operators will maneuver vessels to keep 800 meters away from any observed North Pacific right whales while within their designated critical habitat, and avoid approaching whales head-on consistent with vessel safety. Vessels should take reasonable steps to alert other vessels in the vicinity of whale(s), and report of any dead or injured listed whales or pinnipeds.

The restrictions noted above are NMFS recommendations made prior to the conclusion of final project consultations. Mitigation measures required by NMFS will be established in a final ESA determination completed during the USACE Department of the Army (DA) section 404 permitting process as delineated below.

On behalf of the Commission, the USACE submitted an ESA determination letter to the NMFS dated 24 May 2017, in which the USACE determined that the proposed action activities may affect, but not likely to adversely affect, the ESA-listed marine species under NMFS jurisdiction identified in the letter. The NMFS declined to concur, stating that the proposed actions were too prospective at this time, that a NEPA analysis (e.g., the preparation of the FEIS) alone was insufficient to trigger an ESA Section 7 consultation, and that the NMFS would wait until brought into consultation by the USACE Regulatory Division as it processes individual Department of the Army (DA) permit requests pursuant to Section 404 of the Clean Water Act (CWA) and Section 10 of the Rivers and Harbors Act (RHA).

4.4.2. Migratory Birds

Development of new infrastructure at the Mertarvik site on Nelson Island would result in direct impacts to a very small proportion of the biological resources and habitat available in the area.

The risk of violations of the Migratory Bird Treaty Act (MBTA) will be minimized by the following:

- When practicable, vegetation clearing and ground-disturbing activities will be conducted outside the migratory bird nesting season (May 5 and July 25), to avoid destruction of active bird nests, eggs, or nestlings, thereby avoiding violations of the MBTA;
- Conduct fill-placement or ground-clearing activities prior to May 5 or after July 25, or performing preliminary vegetation-clearing outside the nesting period such that the future construction site no longer provides suitable nesting habitat;
- Excluding ground-nesting species from an imminent construction site, by laying tarps or other ground coverings at the site and/or placing deterrent devices (e.g., Mylar® flash-tape fastened to wooden stakes, etc.), prior to the start of and during the nesting season; and,
- Where the preemptive avoidance measures described above are not possible, the construction site will be surveyed for active nests prior to construction activities, and any nests found will be marked and protected until the young hatch and depart the nest. Additional consideration may be required in the fall to avoid impacts to emperor geese or other waterfowl that may feed on crowberry tundra habitat in the area. Consultation with USFWS will occur prior to construction to confirm construction windows.

Table 3 summarizes the migratory bird nesting periods, and type of construction that may be affected.

Table 3. Construction and Bird Nesting Windows for Mertarvik

Activity	Work Window											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Clearing, Site Preparation+												
Materials excavation, stockpiling within previously disturbed areas												
Construction of building pads, placement of fill*												
Utility installation, vertical construction												
Revegetation, restoration of disturbed areas												
Relocation of structures*												

Shaded areas depict time frames where no future work of that type should occur.



Orange indicates a work window to protect nesting birds

Gray indicates a potential work window to protect emperor geese during feeding

+Site preparation includes ground disturbing activities or disturbances.

*Construction of buildings pads/relocation of buildings could commence within no work window if site preparation has been previously completed and it is known that no nesting birds are present.

Recommended Measures:

All-terrain vehicle (ATV) traffic will increase in the community and will likely extend to areas well beyond the community, potentially leading to impacts to migratory birds ranging from severe (e.g. nest trampling) to moderate (e.g. habitat degradation) or minor (e.g. temporarily displacing from disturbance, noise or physical presence).

- Impacts from ATV's could be minimized by establishing designated trails in resilient habitat (i.e. firm level ground) from the community to popular locations such as subsistence sites or connections to other communities on Nelson Island.

4.4.3. Wetlands

Wetlands dominate the Mertarvik area, with uplands existing in fragments too small and discontinuous to be preferentially targeted for construction impacts. Impacts to wetlands were quantitated using the best available information, but the results provided in the FEIS were a rough order of magnitude and are subject to review during the Federal permitting process required under Section 404 of the CWA. The infrastructure elements that comprised the selected alternative have not yet been evaluated by the Regulatory Division of the USACE Alaska District, the enforcement agency for CWA Section 404 in Alaska, and the permitting authority for all placement of fill in wetlands. The USACE Regulatory Division has stated that it will not issue permits for the project as a whole as described in this FEIS because of the uncertain project timeline and insufficient details on construction methods and other potential site-specific impacts. The expectation is that entities involved in the proposed construction of various infrastructure elements that involve the placement of fill materials into waters of the U.S. (WOTUS) will apply for the DA permits required for their specific actions. The USACE Regulatory Division will then make its own independent evaluation of the environmental impacts and significance of the proposed discharge. The USACE permit review process includes the NEPA analysis process and includes public notice, consultations with resource agencies, consideration of comments received, written evaluation of environmental impacts, and compliance determinations with the CWA Section 404(b)(1) Guidelines. Once expected impacts to wetlands have been avoided and minimized to extent practicable, compensatory mitigation (restoration, creation, enhancement, preservation) may be developed and required by the USACE Regulatory Division. Under CWA Section 401, the ADEC will independently certify that the proposed construction of various components of the proposed infrastructure that involve the placement of fill materials into WOTUS complies with the State Water Quality Standards for actions within State waters and issue a Certificate of Reasonable Assurance (CRA).

The USACE Regulatory Division determined that it will evaluate impacts to wetlands and determine the appropriate level of mitigation as it receives permit applications for specific infrastructure element construction actions; therefore, the Commission did not attempt to prematurely propose wetland mitigation activities for infrastructure development within the FEIS given that further impact analysis will be conducted via more detailed future analysis. Mitigation proposals made at this time would be pre-decisional to the USACE Regulatory Division's permit evaluation process and its chosen approach to each permit application.

The USACE Regulatory Division may add special conditions to DA permits whenever such conditions are necessary to satisfy legal requirements or to otherwise satisfy the public interest requirement. These permit conditions will be directly related to the impacts of the proposal, appropriate to the scope and degree of those impacts, and reasonably enforceable. Unavoidable adverse impacts to waters of the United States that result from activities authorized under Section 404 of the Clean Water Act, and/or Sections 9 or 10 of the Rivers and Harbors Act may require compensatory mitigation

Special conditions will be identified during the subsequent NEPA reviews that will be undertaken prior to the issuance of individual DA permits by the USACE Regulatory Division in accordance with Section 404 of the Clean Water Act (CWA). The USACE Regulatory Division will utilize functional assessment methodologies fully consistent with the requirements of the USEPA's CWA Section 404(b)(1) Guidelines. All mitigation measures and conditions imposed through the issuance of individual permits will be fully implemented, thereby rendering impacts to wetlands as less than significant.

Typical permit conditions that may be incorporated into DA permits include the following:

- Requirement that temporary wetland impacts be restored to pre-existing contours, elevations, vegetation, habitat type and hydrology.
- Requirement for installation of silt curtain barriers with weighted skirts that extend to within a defined distance from the bottom around all in-water work areas. The turbidity barriers may be required to remain in place, monitored for effectiveness and maintained until the authorized work has been completed and all suspended and erodible materials have been stabilized.
- Requirement for installation of erosion control measures along the perimeter of all work areas to prevent displacement of fill material outside authorized work areas. Erosion control measures may be required to remain in place and be maintained until all authorized work is completed and the work areas is stabilized. Upon completion of the final grading of the land surface, slopes, land surfaces, and filled areas may have to be stabilized using sod, degradable mats, barriers, or a combination of similar stabilizing materials to prevent erosion.
- Requirement that only clean fill material be used, free from items such as trash, debris, automotive parts, asphalt, construction materials, concrete blocks with exposed reinforcement bars, and soils contaminated with any toxic substance, in toxic amounts in accordance with Section 307 of the Clean Water Act.
- Requirement that all excavated or dredged material being displaced be disposed of at a designated upland location.
- Requirement that all jurisdictional work in marine waters, including fills or structures, occur within a designated window of time, to prevent impacts to migrating salmon.
- Requirement that natural drainage patterns be maintained using appropriate ditching, culverts, storm drain systems, and other measures to ensure hydrology is not altered.
- Requirement that a project minimize alterations to water circulation patterns to the extent practicable. If it is determined by the USACE that the project negatively impacts the

hydrology within the wetland, there may be a requirement to take additional measures (i.e. install additional depressed road beds, culvert(s), or a similar water conduit) to re-establish the hydrology of the area to that of pre-construction conditions.

- Requirement that project boundaries be staked or flagged every 100 feet prior to construction to prevent inadvertent encroachment into adjacent wetlands.
- Requirement that all excavated material will be reused to the maximum extent possible. Fill will be placed as soon as possible after excavation to ensure that the substrate is not exposed for an extended period.

4.5. Cultural Resources

The Commission initiated Section 106 consultation in accordance with the National Historic Preservation Act (36 CFR 800.4(b)) in the spring of 2017. Development of the Mertarvik community will not result in any adverse effects on known historic properties or the Mertarvik Spring. The Mertarvik community layout plan purposefully avoided impacts to the clay pits (XBI-183) and the Mertarvik Spring.

- If future work at the Mertarvik community site cannot avoid XBI-183 or the Mertarvik Spring, consultation under Section 106 of the NHPA (36 CFR 800.2(a)(4)) will be reinitiated;
- If the community so desires, the Mertarvik Spring may require assessment as a potential Traditional Cultural Landscape (TCP) and a formal determination regarding its eligibility for listing on the National Register of Historic Places (NRHP). Per Appendix II of National Register Bulletin No. 38, a trained ethnographic specialist working in concert with the Newtok community could provide a recommendation on the status of Mertarvik Spring as a TCP and to evaluate it for eligibility for the NRHP;
- If future work encroaches on *Taqikcaq*, then XBI-156, XBI-157, and XBI-158 will require formal determinations regarding their eligibility for listing on the NRHP, and the project's effect on these sites will need to be assessed and consultation under Section 106 of the NHPA reinitiated;
- In accordance with 36 CFR 800.13(b), if, after conclusion of Section 106 consultation, should any unknown and/or additional cultural resources be discovered before or during construction, any act, action or activity that has the potential to affect the resource shall be stopped in order to evaluate the resource and reinitiate Section 106 consultation as required by law; and
- In accordance with 36 CFR 800.6, upon evaluation of the resource(s), mitigation may be required to resolve any adverse impacts.

5. Mitigations Measures Not Adopted (40 CFR 1505.2(c))

All mitigation measures identified in the FEIS and recommended by state and federal agencies have been adopted for the selected alternative.

6. Mitigation Compliance Monitoring and Reporting (40 CFR 1505.2(c))

No specific monitoring or reporting requirements were identified during the preparation of the FEIS, although it should be expected that monitoring and reporting requirements may be included as a permit condition as specific infrastructure elements are further designed and submitted for approval at state and federal levels. When applicable, those monitoring and reporting requirements will be incorporated into design, construction, operation and maintenance activities.

7. Public Involvement (40 CFR 1506.6)

Public participation was an integral component throughout the preparation of the EIS and it began early in the process of planning and developing the proposed action. The Commission facilitated public involvement to support the NEPA process according to CEQ Regulations (40 CFR 1506.6) and the Commission's codified procedures implementing CEQ's NEPA regulations (45 CFR 900). These regulations promote sound decision making by providing ample opportunities for the public to be involved in the NEPA process, and they formed the framework for public participation in development of the EIS.

7.1. Public Scoping Period

The Commission, in cooperation with the NVC, initiated preparation of the DEIS for the proposed action by publishing a notice of intent (NOI) to prepare an EIS in the *Federal Register* on March 3, 2017. The NOI invited individuals, organizations, and agencies to submit comments concerning the scope of the EIS. The comment period ended on April 3, 2017. In addition, two public scoping meetings were held for the proposed action. The first public meeting was held in the Village of Newtok on March 22, 2017 (see FEIS Section 3.2.2). Comments received were:

- Written Comment #1: "Thank you for being concerned about traditional sites."
- Written Comment #2: "Liked the things you guys thought and asked before making the place, thinking of the animals and the land resources. And asking about what the other people think."
- Transcribed Verbal Comment: "Question about contaminants from landfill reaching fish stream (Takichak River) to the east."

The other public scoping meeting was held at the Commission offices located in Anchorage, AK on March 29, 2017. Attendees at the meeting included representatives from the following state and federal agencies:

- Alaska ADOT&PF
- BIA, EDA, FAA, FEMA, IHS, HUD, USACE, USDA, and USEPA

The issues and concerns identified during public scoping helped determine the appropriate scope of environmental analysis to be addressed in the EIS.

One issue raised by several agencies regarded “connected actions.” The Commission determined that, with the exception of some actions regarding the deactivation of Newtok airport, decommissioning activities at Newtok were not a connected action (as defined by NEPA) to proposed infrastructure development at Mertarvik. As discussed in Section 5.23.4 of the FEIS, potential decommissioning activities at Newtok are not being triggered by the proposed development and are wholly independent of the larger effort to provide a new community site for the people of Newtok. The Commission consulted with CEQ regarding this determination that decommissioning of Newtok is not a connected action. Although it is not the role of CEQ to approve or endorse the Commission’s approach, the consultation did not identify any significant concerns or inherent conflicts with NEPA.

7.2. DEIS Preparation and Distribution

On December 29, 2017, the USEPA published the Notice of Availability (NOA) of the DEIS in the Federal Register. The NOA announced the public availability of the DEIS, with initiated the 45-day public review period in accordance with 40 CFR 1506.10(c). The DEIS was available on the Commission’s web site (<https://www.denali.gov/publications>), with distribution to all Federal, State, and tribal agencies that have jurisdiction by law or special expertise with respect to any environmental impact involved, authorized to develop and enforce environmental standards, and to any person, organization or agency requesting the entire DEIS in accordance with 40 CFR 1502.19. In recognition of the difficulties of receiving electronic copies in remote areas of Alaska, hard copies were sent to the Newtok Village Council, Newtok Native Corporation, Native Village of Tununak, Native Village of Nightmute, City of Toksook Bay, Nunakauyarmiut Tribe, and the Cheforak Traditional Council.

7.3. FEIS Preparation and Distribution

On March 9, 2018, the USEPA published the NOA for the FEIS in the Federal Register. The NOA announced the public availability of the FEIS, which initiated the 30-day period before which any ROD could be signed in accordance with 40 CFR 1506.10. Comments on the FEIS were received from the USEPA, the Alaska State Historic Preservation Office (SHPO), and the Federal Emergency Management Agency (FEMA).

In a letter dated 9 April 2018, USEPA repeated concerns about a lack of specificity in the FEIS regarding proposed mitigation for impacts to wetlands and regarding the methodologies used to

evaluate expected impacts to wetlands for the purposes of preparing the EIS. Additional discussion regarding potential mitigation of wetlands impacts has been included in Section 4.4.3 of this ROD.

On 2 April 2018, the Commission received a letter from the Alaska State Historic Preservation Office (SHPO) in response to a 23 February 2018 letter requesting concurrence under Section 106 of the National Historic Preservation Act (NHPA). In the letter, the SHPO concurred with the Commission's determination that the proposed community layout plan (excluding the proposed runway and apron) would result in no adverse effect to historic properties. The SHPO letter has been added to Appendix A of the FEIS.

A final letter was received from the Federal Emergency Management Agency (FEMA) dated 3 April 2018. In the letter, it was noted that an earlier FEMA communication had been omitted from the EIS communication record. On 31 March 2017, FEMA submitted a letter in response to the Commission's invitation to participate in the Mertarvik EIS process. The FEMA correspondence included an enclosure of previously developed scoping comments associated with a FEMA scope of work to relocated houses from Newtok to Mertarvik. This enclosure was inadvertently omitted from the Draft and Final EIS. This omission has been corrected by appending the referenced enclosure to Appendix A of the FEIS.

No substantive issues identified in the FEMA scoping Summary would have resulted in additional changes to the Final EIS. The substantive comments provided in that letter were raised during the Commission's scoping process. It was considered in the DEIS and is included in the administrative record.

In the 3 April 2018 letter, FEMA also expressed concern about not being afforded an opportunity to participate as a Cooperating Agency as desired. In its 31 March 2017 response to the Commission's invitation, FEMA did request participation as a Cooperating Agency. Based on an understanding that the FEMA nexus to Mertarvik development may have changed due to a change in its potential scope of work, on 21 May 2017, the Commission rewrote asking if the desire to participate as a Cooperating Agency remained. The Commission subsequently believed, now known to be incorrectly, that a non-response to the 21 May 2017 letter was not a representation by FEMA that it was no longer interested in cooperating agency status. As a result, FEMA was not engaged as a Cooperating Agency.

8. Decision Rationale

The selected alternative will assist in fulfilling the Commission's statutory missions and responsibilities, given full consideration to economic, environmental, and technical factors. The selected alternative will minimize adverse environmental impacts and provide the residents of the Village of Newtok with a safe place to live that allows them to maintain their community and cultural identity within their traditional lands, while creating the necessary infrastructure for a safe, stable, and healthy existence. The selected alternative will avoid the potential loss of life and/or the indefinite displacement of village residents associated with the rapid migration of the Ninglick River which continues to threaten the existing village.

9. The Denali Commission Decision (40 CFR 1505.2(a))

A new village site will be constructed at Mertarvik, on lands granted to the Newtok Native Corporation in a land exchange approved by the U.S. Congress (Public Law 108-129, Nov. 17, 2003). The FEIS that informs this decision provided an in-depth analysis of the environmental consequences of the alternatives developed to achieve the purpose and need for the Federal action. The Commission, after careful consideration of these potential environmental consequences, combined with input received from the public on the DEIS and FEIS, and interagency and tribal coordination, has decided to support, either directly or indirectly, the funding and construction of all infrastructure elements included in the selected alternative and described in Table 1 above, and repeated as Table 3 on page 56 of the FEIS. Specific infrastructure elements to be funded and/or constructed, and the fiscal year in which they will be funded and/or constructed, will ultimately be dependent upon the availability of funding, and will likely employ a phased approach over several years.

The U.S. Department of Transportation's Federal Aviation Administration (FAA) was a Cooperating Agency in the development of the FEIS and will issue a separate Record of Decision related to potentially funding the construction of the new airport runway, taxiway, apron and appurtenant airport facilities at Mertarvik.

The mitigation measures and BMP's identified in the FEIS and described in this ROD will be incorporated into all applicable infrastructure element designs and construction activities. The selected alternative meets the Commission's identified purpose and need. Consistent with applicable requirements, issuance of this ROD does not in and of itself authorize construction of the selected alternative to commence. Prior to the initiation of those activities, other required applicable permits and authorizations must be executed. (see Table 2 above).

10. Agency Action

I hereby approve the decision to support, either directly or indirectly, the construction of critical infrastructure elements in accordance with the Newtok Village Council's selected Community Layout Plan (CLP) 2, as described in the accompanying FEIS, subject to the conditions identified in this ROD, and by reference, in the FEIS. My decision constitutes the final decision of the Commission and is not subject to appeal. Any challenge to the Commission's decision must be brought in Federal District court.

Approved By:



Joel Neimeyer
Federal Co-Chair
The Denali Commission

4/19/18
Date

11. References

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Final Environmental Impact Statement

Mertarvik Infrastructure Development

Nelson Island, Alaska



Computer generated rendering of proposed Mertarvik community layout – ANTHC 2017

March 2018

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Final Environmental Impact Statement

Mertarvik Infrastructure Development Nelson Island, Alaska

Prepared for the
Denali Commission

by the
U.S. Army Corps of Engineers, Alaska District

with the
U.S. Department of Transportation Federal Aviation Administration
as a Cooperating Agency

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Final Environmental Impact Statement
Mertarvik Infrastructure Development
Nelson Island, Alaska

Cover Sheet

Lead Agency: The Denali Commission

Cooperating Agencies: U.S. Department of Transportation Federal Aviation Administration (FAA)

Title of Proposed Action and Location: Mertarvik Infrastructure Development, Nelson Island, Alaska

EIS Designation: Final Environmental Impact Statement

Affected Jurisdiction(s): Village of Newtok, Bethel Census Area

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Public Review Period: A Notice of Availability (NOI) was published in the Federal Register on December 29, 2017 (82 FR 61757), initiating the 45-day public review period of the draft EIS. The public review period ended on February 13, 2018. Comments received and responses to comments received are provided in Appendix E.

Abstract

This final Environmental Impact Statement evaluates the potential environmental effects associated with development of critical infrastructure and subsequent long-term occupation of a new village site designed to receive the residents of the village of Newtok, Alaska. The purpose of the proposed action is to provide the residents of Newtok a safe place to live that allows them to maintain their community, way of life, and cultural identity within their traditional lands. The proposed action is needed to avoid potential loss of life and/or the indefinite displacement of Newtok residents associated with the rapidly eroding Ninglick River shoreline that threatens critical village infrastructure.

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Executive Summary

The village of Newtok is an Alaska Native community of 374 residents (2016 Department of Labor estimate) located near the southwest coast of Alaska on the banks of the tidally influenced Ninglick River. A bend of the Ninglick River is rapidly eroding toward Newtok at an average rate of nearly 70 feet of per year. This erosion is a result of a combination of river scour, permafrost thawing, and storm surge. The village has lost its barge landing and landfill to the erosion, will begin to lose houses in 2017 or 2018, and is expected to have its school, water source, and airport access threatened by 2020. Changes in local hydrology brought about by the erosion have also increased vulnerability to severe flooding, limited boat and barge access, and impaired waste management practices at the village.

The purpose of the Mertarvik Infrastructure Development project is to provide the people of Newtok a place to live that allows them to keep their community and way of life within their traditional lands, while creating the necessary infrastructure for a safe, stable, and healthy existence.

The preferred alternative for this project has been shaped and constrained by a series of events, studies, and decisions occurring over at least four decades. This final Environmental Impact Statement (EIS) describes a number of alternatives in a historical context for the purpose of illustrating how the long-term evolution of the project led to the selection of a new village site to be constructed at Mertarvik on Nelson Island, a site granted to the village in a land exchange approved by the U.S. Congress (Public Law 108-129), and Alternative 2 of the three community layout plans evaluated, as the preferred alternative. The NEPA analysis in this EIS is confined to the no action alternative and the community layout plan alternatives developed and refined in 2016-2017 by the Newtok Village Council and the Denali Commission.

The constant factor in all these alternatives, including the no action alternative, is the present threat to Newtok from erosion and flooding, and the inevitable destruction of the current village site. Given that engineered solutions to control or moderate the erosion have been abandoned as impractical, there is no alternative that preserves a status quo at Newtok. The alternatives discussed in this EIS are all responses that have been proposed to an ongoing, unstoppable catastrophe for the community of Newtok.

The preferred community layout plan (CLP) includes as a major feature a replacement airport in addition to other necessary infrastructure to include a school, landfill, homes, powerplant, water treatment plant, washateria etc. It is anticipated that a phased approach will be used to construct the new community over the next several years. Some infrastructure has already been constructed at the site: barge landing, access road, evacuation center, and some pioneer homes.

This EIS evaluated the environmental impacts of each CLP alternative on the resources at the Mertarvik site in the table below. The environmental impacts of the three alternatives are essentially identical. No significant negative impacts were found under any alternative; each alternative provides beneficial effects for several resource categories, such as culture and public health. See section 5.1 for an explanation of the terms in the table.

Table i. Summary of Environmental Impacts by Resource Category

Resource Category	No Action Alternative	CLP 1 Alternative	CLP 2 Alternative (preferred)	CLP 3 Alternative
Geology, Soils, & Topography	No impact	MINOR impacts		
Hydrology & Hydraulics	No impact	MINOR impacts		
Floodplains	No impact	LESS THAN SIGNIFICANT impacts		
Surface Water	No impact	LESS THAN SIGNIFICANT impacts		
Groundwater	No impact	LESS THAN SIGNIFICANT impacts		
Air Quality	No impact	LESS THAN SIGNIFICANT impacts		
Climate & Climate Change	No impact	MINOR impacts		
Habitat	No impact	MINOR impacts		
ESA Species	No impact	LESS THAN SIGNIFICANT impacts		
MMPA Species	No impact	MINOR impacts		
Migratory Birds	No impact	MINOR impacts		
EFH & Anadromous Streams	No impact	MINOR impacts		
Wetlands & other Special Aquatic Sites	No impact	LESS THAN SIGNIFICANT impacts		
Protected Lands	No impact	MINOR impacts		
Cultural History & Cultural Resources	No impact	MINOR impacts		
Community & Culture	MAJOR impacts	MINOR impacts		
Socioeconomics	MAJOR impacts	MINOR impacts		
Subsistence Resources & Practices	MAJOR impacts	MINOR impacts		
Land Use & Compatibility	No impact	MINOR impacts		
Public Health & Safety	MAJOR impacts	MINOR impacts		
Public Services & Utilities	MAJOR impacts	MINOR impacts		
Noise	No impact	LESS THAN SIGNIFICANT impacts		
Visual Environment	No impact	MINOR impacts		

The Newtok Village Council, the governing body of Newtok Village, which is the federally recognized tribe for Newtok, and the residents of Newtok support development of infrastructure at Mertarvik as it provides a place where they can maintain their cultural identity and subsistence way of life within their traditional lands.

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Table of Contents

Executive Summary	i
Acronyms and Abbreviations	xiii
1. Introduction	1
1.2 Project Authority	1
1.2 Study Participants	2
1.3 Scope of Environmental Analysis	3
1.4 Incorporation of other NEPA and Related Documents by Reference	3
2. Purpose and Need for the Proposed Action	4
3. Public Participation and Scoping	9
3.1 Notice of Intent (NOI)	9
3.2 Scoping Process	10
3.2.1 Agency Kickoff Meeting	10
3.2.2 Village of Newtok Public Scoping Meeting	10
3.2.3 Anchorage Agency and Public Scoping Meeting	11
3.3 Scoping Issues Identified.....	13
3.4 Other Scoping Comments.....	14
3.5 Agency Consultation and Coordination	14
4. Alternatives	15
4.1 Proposed Action	15
4.2 The No Action Alternative	15
4.3 Alternatives Previously Considered but Not Carried Forward.....	16
4.3.1 Engineering Solutions to Maintain the Existing Community in Place	17
4.3.2 Relocation of Newtok Residents to Existing Communities.....	18
4.3.3 Previously Considered Sites for a New Community	20
4.3.4 Previously Developed Community Layouts for Mertarvik (2000 - 2011)	22
4.4 Alternatives Carried Forward	27
4.4.1 Goals	28
4.4.2 Constraints and Limitations	29
4.5 CLP Development Process	37

4.5.1	Formulation of CLP Alternatives.....	39
4.5.2	Development of the Airport Layout Plan.....	48
4.6	Preferred Alternative	51
4.6.1	Infrastructure Elements	52
4.6.2	Sequence of Construction	67
5.	Affected Environment and Environmental Consequences	71
5.1	Introduction	71
5.2	Geology, Soils, and Topography	74
5.2.1	Affected Environment.....	74
5.2.2	Environmental Impacts	78
5.2.3	Significance Determination	78
5.3	Hydrology, Hydraulics, and Floodplains.....	79
5.3.1	Affected Environment.....	79
5.3.2	Environmental Impacts	82
5.3.3	Significance Determination	84
5.4	Surface Water	85
5.4.1	Affected Environment.....	85
5.4.2	Environmental Impacts	88
5.4.3	Significance Determination	90
5.5	Groundwater	91
5.5.1	Affected Environment.....	91
5.5.2	Environmental Impacts	92
5.5.3	Significance Determination	92
5.6	Air Quality.....	93
5.6.1	Affected Environment.....	93
5.6.2	Environmental Impacts	93
5.6.3	Significance Determination	96
5.7	Climate and Climate Change.....	97
5.7.1	Affected Environment.....	97
5.7.2	Environmental Impacts	97
5.7.3	Significance Determination	99

5.8	Habitat	100
5.8.1	Affected Environment.....	100
5.8.2	Environmental Impacts	104
5.8.3	Significance Determination	106
5.9	Endangered and Threatened Species	106
5.9.1	Affected Environment.....	107
5.9.2	Environmental Impacts	119
5.9.3	Significance Determination	127
5.10	Migratory Birds	128
5.10.1	Affected Environment.....	129
5.10.2	Environmental Impacts	135
5.10.3	Significance Determination	136
5.11	Essential Fish Habitat and Anadromous Streams.....	136
5.11.1	Affected Environment.....	137
5.11.2	Environmental Impacts	137
5.11.3	Significance Determination	139
5.12	Wetlands and other Special Aquatic Sites.....	140
5.12.1	Affected Environment.....	140
5.12.2	Environmental Impacts	145
5.12.3	Significance Determination	152
5.13	Protected Lands	154
5.13.1	Affected Environment.....	154
5.13.2	Environmental Impacts	156
5.13.3	Significance Determination	157
5.14	Cultural History and Cultural Resources.....	157
5.14.1	Affected Environment.....	157
5.14.2	Environmental Impacts	160
5.14.3	Significance Determination	161
5.15	Community and Culture	162
5.15.1	Affected Environment.....	162
5.15.2	Environmental Impacts	164

5.15.3	Significance Determination	164
5.16	Socioeconomics	165
5.16.1	Affected Environment.....	165
5.16.2	Environmental Impacts	167
5.16.3	Significance Determination	168
5.17	Subsistence Resources and Practices.....	169
5.17.1	Affected Environment.....	169
5.17.2	Environmental Impacts	171
5.17.3	Significance Determination	172
5.18	Land Use and Compatibility.....	172
5.18.1	Affected Environment.....	172
5.18.2	Environmental Impacts	172
5.18.3	Significance Determination	173
5.19	Public Health and Safety	173
5.19.1	Affected Environment.....	173
5.19.2	Environmental Impacts	175
5.19.3	Significance Determination	175
5.20	Public Services and Utilities.....	175
5.20.1	Affected Environment.....	175
5.20.2	Environmental Impacts	176
5.20.3	Significance Determination	177
5.21	Noise.....	177
5.21.1	Affected Environment.....	177
5.21.2	Environmental Impacts	177
5.21.3	Significance Determination	179
5.22	Visual Environment.....	179
5.22.1	Affected Environment.....	179
5.22.2	Environmental Impacts	179
5.22.3	Significance Determination	180
5.23	Other Required Analyses.....	180

5.23.1	Relationship between the Short-Term Use of the Environment and the Maintenance and Enhancement of Long-Term Productivity	180
5.23.2	Irreversible and Irretrievable Commitment of Resources (40 CFR 1502.16)	181
5.23.3	Cumulative Effects.....	182
5.23.4	Connected Actions	185
5.23.5	Environmental Justice	191
5.23.6	Children’s Environmental Health and Safety Risks	193
5.23.7	U.S. DOT Act of 1966 (49 U.S.C. §303) - Section 4(f) Analysis	194
5.23.8	Incomplete or Unavailable Information (40 CFR §1502.22).....	196
5.23.9	Unresolved Issues	197
5.23.10	Mitigation and Permitting.....	197
5.24	Summary of Environmental Impacts	203
6.	Regulatory Compliance and Consistency with Plans and Policies	203
6.1	Regulatory Compliance	203
6.2	Status of Environmental Compliance (Compliance Table).....	205
7.	List of Preparers	209
8.	Distribution List.....	211
9.	References.....	218
10.	Index	231

Appendix A – Interagency Correspondence

Appendix B – Wetlands Delineation for the New Village of Newtok, Alaska

Appendix C – Wetlands Functional Assessment at Mertarvik

Appendix D – Newtok (Mertarvik) Airport Environmental Study (Excerpt)

Appendix E – Comments and Responses from Public Review

List of Figures

Figure 1. Location and vicinity map of the Mertarvik community site and village of Newtok, Alaska.	2
Figure 2. Breakdown of the Ninglick River bank at Newtok, October 2016 (photo courtesy of Lemay Engineering).....	5
Figure 3. Storm surge actively eroding the Ninglick River bank at Newtok, October 2016 (photo courtesy of Lemay Engineering).....	5
Figure 4. Historic shoreline positions and projected erosion limits as of 2003 (ASCG 2004, updated in 2007).	7

Figure 5. Comparison of projected erosion rates, with the shoreline position as of September 2016 (left, ASCG 2004; right, 2016 aerial photo courtesy of USGS)	8
Figure 6. Potential sites for a new village considered in a 1994 evaluation (updated from ASCG 2004).	21
Figure 7. Mertarvik community layout developed by ASCG (ASCG 2004).	22
Figure 8. Mertarvik community layout designed by VSWP (VSWP 2006; full-size graphic available at https://www.commerce.alaska.gov/web/Portals/4/pub/fig1.pdf).	23
Figure 9. Final 2008 CLP presentation graphic (full-size graphic available at https://www.commerce.alaska.gov/web/Portals/4/pub/2008_Newtok_CLP_FINAL.pdf).	25
Figure 10. Final 2011 CLP presentation graphic (full-size graphic available at https://www.commerce.alaska.gov/web/Portals/4/pub/Newtok_CLP_Update_Final.pdf).	26
Figure 11. Final 2015 CLP (full-size graphic available at https://www.commerce.alaska.gov/web/Portals/4/pub/Mertarvik_Final_CLP_5.12.2015.pdf)... ..	27
Figure 12. Mertarvik Pioneering Stage layout (ANTHC 2017a).....	29
Figure 13. USFWS map illustrating the 2003 exchange of lands between Newtok Native Corporation and the USFWS (annotated).....	31
Figure 14. A September 1 st , 2017 aerial photograph of the Mertarvik project site viewed from the northeast, with existing infrastructure identified in annotations.....	33
Figure 15. Comparison of the three 2017 CLP alternative footprints, relative to the Pioneer Area, and with the layout of Newtok shown for size comparison (ANTHC 2017a). The Pioneer Area represents infrastructure largely in place or started prior to 2017, and is not itself an alternative.	40
Figure 16. CLP Alternative 1 (ANTHC 2017a).....	41
Figure 17. CLP Alternative 2 (ANTHC 2017a).....	42
Figure 18. CLP Alternative 3 (ANTHC 2017a).....	43
Figure 19. Pros and Cons of CLP Alternative 1 (ANTHC 2017a).	44
Figure 20. Pros and Cons of CLP Alternative 2 (ANTHC 2017a).	45
Figure 21. Pros and Cons of CLP Alternative 3 (ANTHC 2017a).	46
Figure 22. Summary and Comparison of CLP Alternatives (ANTHC 2017a).....	47
Figure 23. Mertarvik Airport location and layout alternatives (PDC 2012).....	50
Figure 24. Preferred Mertarvik Airport Layout Plan (ALP) as approved by the FAA in 2014. The airport road and apron were later reconfigured to accommodate the 2017 CLPs.	51
Figure 25. Preferred Alternative - ANTHC CLP Alternative 2 (with post-selection revisions; ANTHC 2017b; airport road alignment updated by USACE 20 Nov 2017).....	53
Figure 26. Preferred Alternative - ANTHC CLP Alternative 2 with detail of community center (ANTHC 2017b; airport road alignment updated by USACE Nov 2017).....	54
Figure 27. Geologic map of Nelson Island and vicinity (Wilson <i>et al.</i> 2013).....	75
Figure 28. Mertarvik town site looking west in 2013, showing the upward slope of the land from the Ninglick River (right) towards the Nelson Island interior (left). The IRT construction camp is	

seen on the right, while the road to the quarry is visible on the far left (photo by Sally Cox, ADCCEA).....	75
Figure 29. Proposed Mertarvik CLP in relation to local topography, drainages, and surface and groundwater features discussed in this section (background map is USGS “Baird Inlet D-7”)...	76
Figure 30. Typical subsurface soil core sample showing presence of ice (USACE 2008).	77
Figure 31. Existing Mertarvik town site infrastructure and spring in relation to USGS hydrologic unit boundaries.....	81
Figure 32. Proposed Mertarvik CLP in relation to USGS hydrologic unit boundaries.	84
Figure 33. View of the Takikchak River roughly 0.8 mile upstream from its mouth, looking upstream, August 2005 (USACE 2005a).....	86
Figure 34. June 2005 view of Mertarvik spring, looking inland (south) with the active groundwater seep in the middle distance (USACE).	87
Figure 35. Short-tailed weasel photographed near Mertarvik in 2005 (USACE).....	102
Figure 36. Beaver dam on the Takikchak River, 2005 (USACE).	102
Figure 37. Spectacled eider critical habitat (adapted from USFWS 2001).....	110
Figure 38. Critical habitat and sanctuaries of selected marine mammal species in relation to a presumptive barge route between Anchorage and Mertarvik (prepared by NMFS/Protected Species Division, with USACE additions)	111
Figure 39. Critical habitat units of the northern sea otter, Southwestern Alaska DPS	112
Figure 40. Critical Habitat for Cook Inlet beluga whales (from NMFS 2106a).....	116
Figure 41. Proposed critical habitat for ringed seals (from 79 FR 73010).	118
Figure 42. Boundaries of the Susitna Delta Exclusion Zone.	125
Figure 43. Routes hiked (yellow lines) during the 2005 bird habitat surveys (USACE 2005b). The spring area was used as a base camp during the surveys; black lines represent roads of a proposed Mertarvik town site. The proposed runway location is shown in red.	130
Figure 44. Coastal wetlands at Mertarvik.	132
Figure 45. A screen shot from the ADFG Anadromous Waters Catalog online mapper, annotated to identify cataloged streams and waterbodies of north and east Nelson Island.	139
Figure 46. Categories of wetlands and uplands delineated in the Mertarvik area (USACE 2005d)	
Figure 47 shows the converse image, the wetland types within the construction footprint.	143
Figure 47. Direct impacts on wetlands by the proposed community layout at Mertarvik.....	144
Figure 48. Acreage of impacts on wetlands (by Cowardin subclass) associated with feature types.	154
Figure 49. Key to Cowardin Wetland Classifications Identified at Mertarvik.	154
Figure 50. Extent of the Yukon Delta NWR (dark red) within Alaska (USFWS 2017).	155
Figure 51. Mertarvik Spring.	160

List of Tables

Table 1. Populations and Housing Stock of Nelson Island Villages	19
Table 2. Timeline of the 2016-2017 Development CLP Process (ANTHC 2017c).	38
Table 3. List of CLP Infrastructure Elements, with Lot and Estimated Footprint Area.....	56
Table 4. ADEC Design Criteria for Wasterwater Treatment Systems	58
Table 5. Recommended Sequence of Construction at Mertarvik, per Cooper, et al, 2017b.....	70
Table 6. Summary of Impact Focus and Significance Criteria by Resource Category	73
Table 7. Summary Statistics for Water Years 2004-2005, Station 15304400 Takikchak River ..	86
Table 8. USGS Water Quality Measurements at Takikchak River, 2004-2005.	88
Table 9. USGS Water Quality Measurements at Mertarvik Spring, 2005.....	88
Table 10. Preliminary Potential-to-Emit Values.....	94
Table 11. ESA-Listed Species Potentially Affected by the Proposed Action.	107
Table 12. Humpback Whale DPS Distribution in Alaskan Waters	114
Table 13. Marine Mammal Hearing Groups and Level A Acoustic Thresholds	123
Table 14. General Bird Descriptions	130
Table 15. Bird Observations in Wetlands in June 2005.....	132
Table 16. Birds observed at the proposed Mertarvik town site coastal wetlands by the USFWS.	134
Table 17. Known cultural resources in general vicinity of the proposed action area.	159
Table 18. Construction and Bird Nesting Windows for Mertarvik	199
Table 19. Permitting Considerations for Mertarvik Infrastructure Development Projects.....	202
Table 20. Summary of Environmental Impacts by Resource Category.....	204
Table 21. Summary of Relevant Federal Statutory Authorities.....	205

Acronyms and Abbreviations

AAC	Alaska Administrative Code
ACM	Asbestos Containing Materials
AEA	Alaska Energy Authority
ADCRA	Alaska Division of Community and Regional Affairs
ADEC	Alaska Department of Environmental Conservation
ADCCED	Alaska Department of Commerce, Community, and Economic Development
ADEH	Alaska Division of Environmental Health
ADFG	Alaska Department of Fish and Game
ADNR	Alaska Department of Natural Resources
ADOTPF	Alaska Department of Transportation and Public Facilities
ANCSA	Alaska Native Claims Settlement Act
ANILCA	Alaska National Interest Lands Conservation Act
ANTHC	Alaska Native Tribal Health Consortium
APDES	Alaska Pollutant Discharge Elimination System
APE	Area of Potential Effect
AS	Alaska Statute
ASCG	Arctic Slope Consulting Group
ATV	All-Terrain Vehicle
AWQS	Alaska Water Quality Standards
bgs	Below Ground Surface
BIA	Bureau of Indian Affairs
BMP	Best Management Practice
BOD	Biological Oxygen Demand
BOD ₅	5-Day Biological Oxygen Demand
C	Celsius
CAA	Clean Air Act
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
cfs	Cubic Feet per Second
CCHRC	Cold Climate Housing Research Center
CGP	Construction General Permit
CH	Critical Habitat
CLP	Community Layout Plan
cm	Centimeter
CRA	Certificate of Reasonable Assurance
CWA	Clean Water Act
cy	Cubic Yards
dBA	A-Weighted Decibels
DNL	Day-Night-Level

DoD	Department of Defense
DPS	Distinct Population Segment
DWPP	Drinking Water Protection Program
EA	Environmental Assessment
EDA	Economic Development Agency
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
ELG	Effluent Limitation Guideline
EO	Executive Order
EPA	Environmental Protection Agency
EPCRA	Emergency Planning and Community Right to Know Act
ESA	Endangered Species Act
F	Fahrenheit
FAA	Federal Aviation Administration
FC	Full Compliance
FAR	Federal Aviation Regulation
FEIS	Final Environmental Impact Statement
FEMA	Federal Emergency Management Agency
FMP	Fishery Management Plan
FONSI	Finding of No Significant Impact
FR	Federal Regulation
FWCA	Fish and Wildlife Coordination Act
GMU	Game Management Unit
GPM	Gallons-Per-Minute
HUC	Hydrologic Unit Code
HUD	Department of Housing and Urban Development
IAW	In Accordance With
IRR	Indian Reservation Roads
IRT	Individual Readiness Training
kHz	Kilohertz
l	Liter
LKSD	Lower Kuskokwim School District
MBTA	Migratory Bird Treaty Act
MCL	Maximum Contaminant Levels
MEC	Mertarvik Evacuation Center
MGD	Million Gallons per Day
MOA	Memorandum of Agreement
MMPA	Marine Mammal Protection Act
MSGP	Multi-Sector General Permit
MSL	Mean Sea Level

m	Meter
mg	Milligrams
µg	Micrograms
µPa	Micropascals
µS	Microsiemens
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NFS	Non-Frost Susceptible
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent to Prepare an EIS
NOT	Notice of Termination
NO _x	Oxides of Nitrogen
NPDES	National Pollutant Discharge Elimination System
NPG	Newtok Planning Group
NPIAS	National Plan of Integrated Airport Systems
NRHP	National Register of Historic Places
NTC	Newtok Traditional Council
NVC	Newtok Village Council
NWR	National Wildlife Refuge
O ₃	Ozone
PC	Partial Compliance
PCE	Primary Constituent Element
PEM1	Palustrine Emergent Persistent (Wetland)
pH	Potential of Hydrogen
PL	Public Law
PM ₁₀	Particulate Matter less than 10 micrometers in diameter
PM _{2.5}	Particulate Matter less than 2.5 micrometers in diameter
PML	Palustrine Moss-Lichen (Wetland)
POTW	Publicly Owned Treatment Works
PSS	Palustrine Shrub-Scrub (Wetland)
PWS	Public Water System
PWSID	Public Water System Identification
RALO	Rural Alaska Landfill Operator
RSV	Respiratory Syncytial Virus
SDWA	Safe Drinking Water Act
SHPO	State Historic Preservation Officer
SMCL	Secondary Maximum Contaminant Levels
SPCC	Spill Prevention, Control and Countermeasures

SREB	Snow Removal Equipment Building
SWPPP	Storm Water Pollution Prevention Plan
TDS	Total Dissolved Solids
TBEL	Technology-Based Effluent Limits
TMDL	Total Maximum Daily Load
TSCA	Toxic Substances Control Act
TSS	Total Suspended Solids
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USC	United States Code
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VSWP	Village Safe Water Program
WBD	Watershed Boundary Dataset
WET	Whole Effluent Toxicity
WHP	Wellhead Protection
WOTUS	Waters of the United States
WQBEL	Water Quality-Based Effluent Limit

1. Introduction

The village of Newtok (Figure 1) is an Alaska Native community of 374 residents (2016 Department of Labor estimate) located on the southwest coast of Alaska, on the banks of the tidally influenced Ninglick River. A bend of the Ninglick River is rapidly eroding toward Newtok, with an average of nearly 70 feet of village land lost each year to a combination of river scour, permafrost thawing, and storm surge. The village has lost its barge landing and landfill to the erosion, will begin to lose houses in 2017 or 2018, and is expected to have its school, water source, and airport access threatened by 2020. Changes in local hydrology brought about by the erosion have also increased vulnerability to flooding, limited boat and barge access, and impaired waste management practices at the village.

This final Environmental Impact Statement assesses the potential environmental impacts of constructing critical infrastructure at a new community site at Mertarvik. This includes an airport; solid waste landfill; wastewater collection system and treatment lagoon; bulk fuel farm and fuel dispensing facility; power house and power distribution system; water treatment plant, storage tank, and distribution lines; housing; school; public buildings; and all associated connecting roads and trails. The proposed site, Mertarvik, is about 9 miles south of Newtok on the northeast shore of Nelson Island in Southwest Alaska, centered at roughly 60.82°N, 164.50°W (Figure 1). The name Mertarvik, in the Yup'ik language, means “getting water from the spring,” and refers to a freshwater spring in the area that has been traditionally valued as a source of drinking water. The Mertarvik site is on elevated land underlain by the Nelson Island basalt dome, and is expected to be far less susceptible to erosion and flooding than sites on the surrounding Yukon Delta alluvial plain.

1.2 Project Authority

The U.S. Congress established the Denali Commission through the Denali Commission Act of 1998, as amended, as an independent Federal Agency designed to provide critical utilities, infrastructure, and economic support throughout Alaska. With the creation of the Denali Commission, the U.S. Congress acknowledged the need for increased inter-agency cooperation and focus on Alaska's remote communities.

This EIS has been developed in accordance with (IAW) the National Environmental Policy Act of 1969 (NEPA; United States Code [USC] 4321), the implementing regulations issued by the President's Council on Environmental Quality (CEQ) (40 Code of Federal Regulations [CFR] Parts 1500-1508), and the Denali Commission's policies and procedures for compliance with the National Environmental Policy Act (NEPA) of 1969, as amended (45 CFR §900).

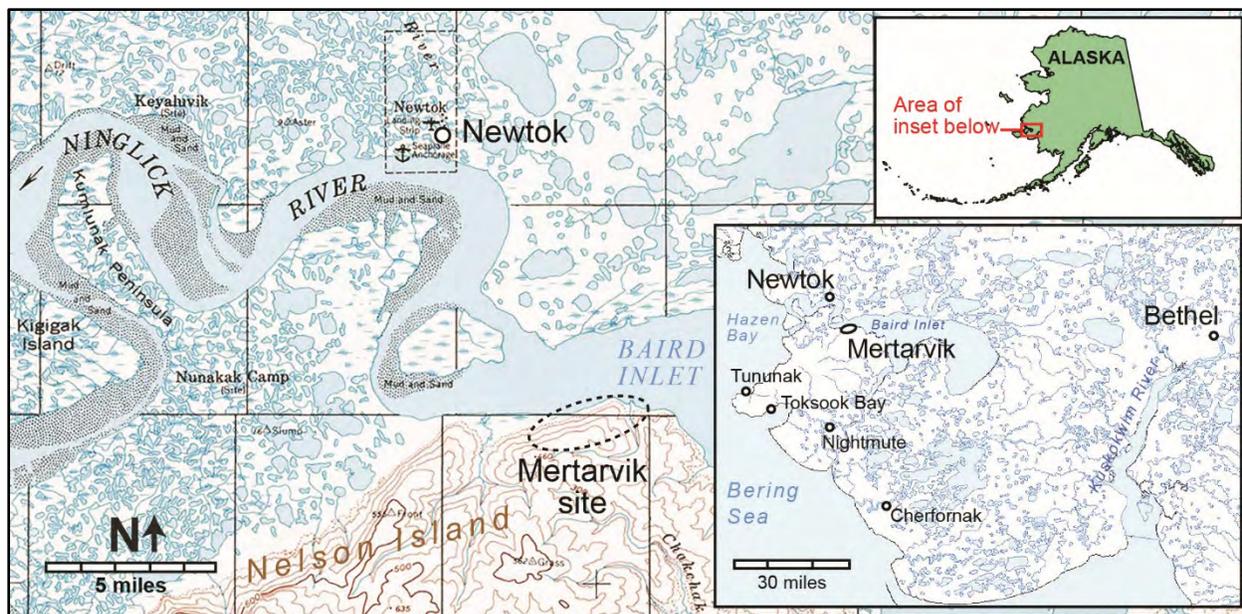


Figure 1. Location and vicinity map of the Mertarvik community site and village of Newtok, Alaska.

The Denali Commission identified funding in FY 2016 to undertake environmental review work at Mertarvik. These funds became available in mid-August 2016. The Commissioners did not specify that the Denali Commission would do this work, but allowed that other Federal agencies could do the work on behalf of the Commission (ADCRA 2017g).

1.2 Study Participants

The Denali Commission is the lead Federal agency for this proposed action. This EIS was prepared primarily by the staff of the Environmental Resources Section, Civil Project Management Branch, U.S. Army Corps of Engineers (USACE), Alaska District, on behalf of and funded by the Denali Commission.

The Denali Commission sent letters of invitation to two agencies that expressed interest in being Cooperating Agencies in the EIS—the Federal Aviation Administration (FAA) and U.S. Fish and Wildlife Service (USFWS)—on March 2, 2017 and March 6, 2017, respectively. Both agencies contributed significant content and/or guidance. The USFWS opted to serve as a consulting agency (the Commission’s original intent), after learning at the March 29, 2017, scoping meeting that issues of particular interest to the Service (including potential land exchanges, the airport hub concept, the small boat harbor, and Newtok decommissioning) were to be excluded from the consideration in the EIS. The USFWS wrote a letter to the Denali Commission in May 2017 accepting the Commission’s original invitation to be a consulting rather than a cooperating agency. The Denali Commission also sent letters to several other agencies on March 17, 2017, inviting them to be participating agencies. Several Federal, State and tribal agencies participated in the alternatives development process by providing informal recommendations to the Denali

Commission, including the Council on Environmental Quality (CEQ), U.S. Environmental Protection Agency (USEPA), FAA, U.S. National Marine Fisheries Service (NMFS), U.S. Department of Housing and Urban Development (HUD), Federal Emergency Management Agency (FEMA), Alaska Department of Fish and Game (ADFG), Alaska Department of Environmental Conservation (ADEC), Alaska Native Tribal Health Consortium (ANTHC), and the Newtok Village Council (NVC).

1.3 Scope of Environmental Analysis

NEPA requires Federal agencies to solicit public input on proposed actions, consider the potential impacts to the natural and human environment from their proposed actions as part of their decision-making process, and to fully disclose the potential impacts in a document that is circulated for public review. The NEPA process is intended to support public officials in making decisions based on an informed understanding of the potential environmental consequences and to take appropriate actions that protect, restore, and enhance the environment (40 CFR §1500.1). NEPA therefore facilitates the incorporation of environmental considerations into the decision-making processes of Federal agencies that have the ability to react to potential environmental consequences prior to taking action.

The scope of this EIS is primarily limited to the construction of new community infrastructure (e.g., homes, school, airport, community service facilities, power and water supply, etc.) at Mertarvik, as defined in the community layout plan (CLP) developed in 2016-2017 by the NVC and supported by the Denali Commission. The proposed Mertarvik Airport layout and alignment was developed by the Alaska Department of Transportation and Public Facilities (ADOTPF) and conditionally approved by the FAA, in coordination with the CLP preparation.

This EIS does not present or analyze alternatives for decommissioning activities (e.g., the dismantling of homes, fuel systems, and other structures, securing potential sources of contamination, etc.) at the existing Newtok village site, except where such an analysis is required by the FAA (a Cooperating Agency in the preparation of this EIS) under its internal policies for development of new/replacement airports. Decommissioning is discussed in the context of “connected actions” under NEPA in section 5.23.4. No statutory or regulatory trigger has been identified that requires decommissioning at Newtok in response to the proposed development at Mertarvik, and the development is not an interdependent part of a larger action that would depend upon decommissioning as a necessary component. Therefore, analysis of possible future decommissioning activities at Newtok does not lay within the scope of this EIS.

1.4 Incorporation of other NEPA and Related Documents by Reference

The preparation of this EIS was aided greatly by the long-term efforts of the State of Alaska Division of Community and Regional Affairs (ADCRA) and the Newtok Planning Group (NPG). The NPG was formed in 2006 to coordinate the efforts of State and Federal agencies and non-

governmental organizations assisting with the Newtok relocation process. As part of this coordination, the NPG created a website that collects, organizes, and archives the many various studies, reports, histories, NEPA documents, community layout plans, memoranda, and resolutions that have been generated over several decades in support of the relocation project: <https://www.commerce.alaska.gov/web/dcra/PlanningLandManagement/NewtokPlanningGroup.aspx>. This EIS cites extensively the project documents archived on the NPG website, as well as original Newtok histories and other content provided there.

Listing all the previous studies that have informed this EIS would be unwieldy and provide little context. Much of Section 4 (Alternatives) is devoted to identifying, describing, and summarizing the previous studies and reports that have influenced and led to the proposed action. When referenced, the results and analyses of these various studies are incorporated by such reference IAW 40 CFR §1502.21.

2. Purpose and Need for the Proposed Action

The purpose of the Mertarvik Infrastructure Development project is to provide the people of Newtok with a place to live that allows them to keep their community and way of life within their traditional lands, while also providing the necessary infrastructure for a safe, sustainable, and healthy existence.

Few Alaska Native communities are as imminently threatened with displacement from coastal erosion as the village of Newtok. The rapidly advancing erosion of the Ninglick River shoreline and increasingly severe flooding is expected to make Newtok's current location unsustainable for the community as early as 2020 and force the relocation of the village's residents.

Newtok is situated near an outside bend of the Ninglick River on low land surrounded by flat, marshy tundra. Soils in the area are typically silt, with a shallow active layer overlaying deep continuous permafrost. The permafrost is ice-rich, and summer heating of exposed soil at the river's edge results in a loss of soil structure and a high vulnerability to erosion by river current and wave action (Figure 2). Newtok is about 19 river-miles from the Bering Sea and experiences twice-daily tides that also contribute to the breakdown of the weakened river bank, as well as periods of increased wave action from storm-surges and high winds coming in from the ocean (Figure 3; ASCG 2004, Woodward-Clyde 1984).



Figure 2. Breakdown of the Ninglick River bank at Newtok, October 2016 (photo courtesy of Lemay Engineering)



Figure 3. Storm surge actively eroding the Ninglick River bank at Newtok, October 2016 (photo courtesy of Lemay Engineering)

Encroachment of the Ninglick River towards Newtok has been evident for many decades and under evaluation since at least the 1980s. Woodward-Clyde (1984) used field measurements and historic data to calculate that the river had been advancing on the village at rates of 42 to 113 feet each year. In 2003, the Arctic Slope Consulting Group (ASCG) worked with the Newtok Traditional Council (NTC) to update and expand upon the Woodward-Clyde study, calculating an annual average erosion rate of 68 feet per year, and creating a map showing historical and projecting future extents of erosion (Figure 4; ASCG 2004). Although the rate of erosion varies greatly from year to year, the projected erosion extent for 2017 shown on the 2004 map correlates well with the actual shoreline alignment observed in late 2016 (Figure 5). At this rate of erosion, the community, which already lost its former dumpsite in 1996 and was forced to shift its barge landing area inland, will start losing some homes by 2018 or 2019. The school building, a vital part of the village infrastructure that has helped supplement a failing village water system and supports other community services, is projected to be in jeopardy by 2020. The southern end of the airport runway will begin eroding around the same time, with the apron and the access road between the airport and village rendered unusable by about 2030 (Figure 5). Prior to the runway's erosion, the community will have already lost its only source of clean drinking water. The 2,180-foot-long State-owned gravel airstrip may remain usable for up to 20 more years, while its southern end gradually erodes away (a minimum of about 1,800 feet of runway is required for most airplanes servicing Newtok). The airfield is currently scheduled to be resurfaced with gravel in 2018, but that will be the last refurbishment of the airport to be conducted by the ADOTPF (Merritt 2017).

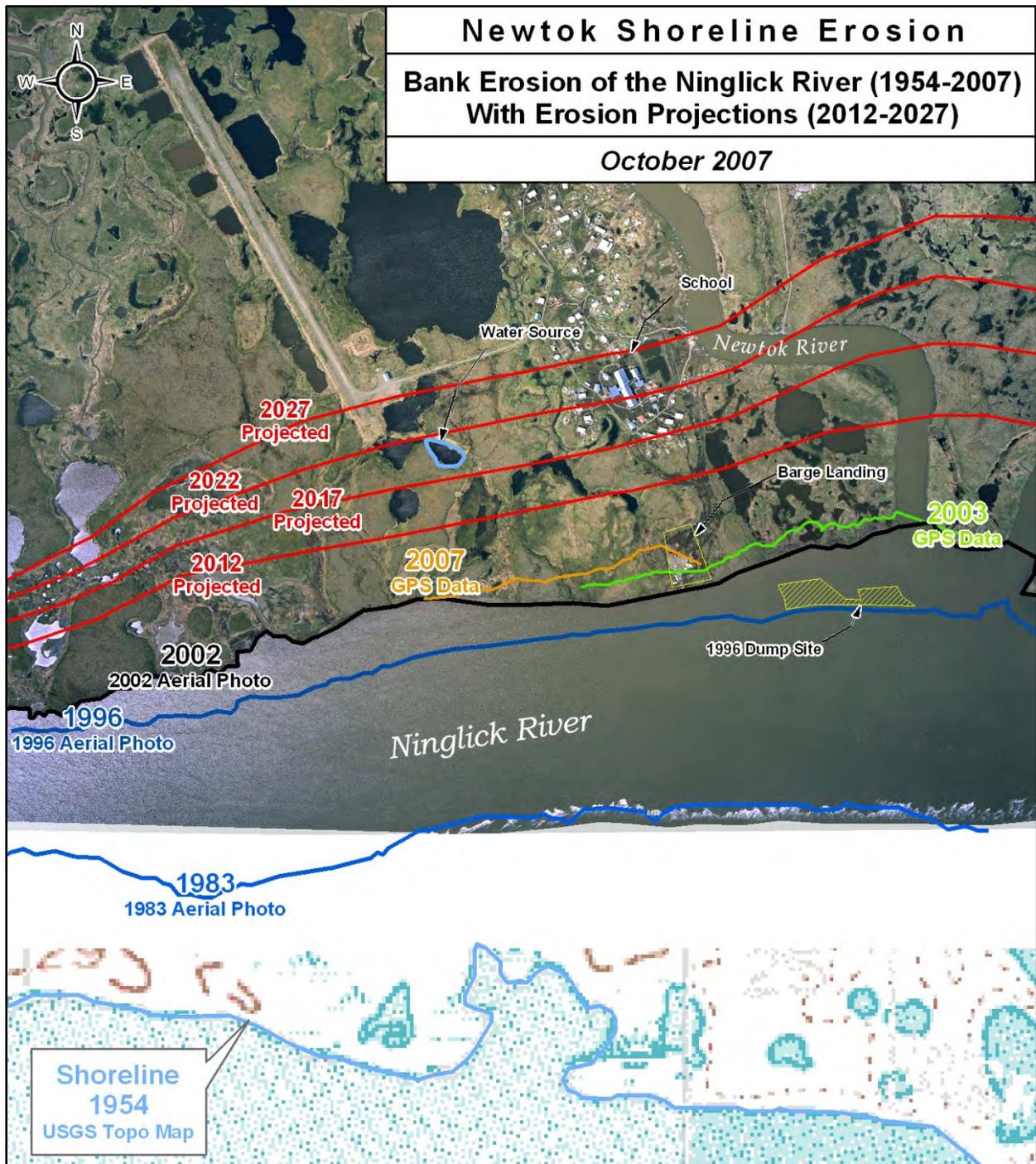


Figure 4. Historic shoreline positions and projected erosion limits as of 2003 (ASCG 2004, updated in 2007).

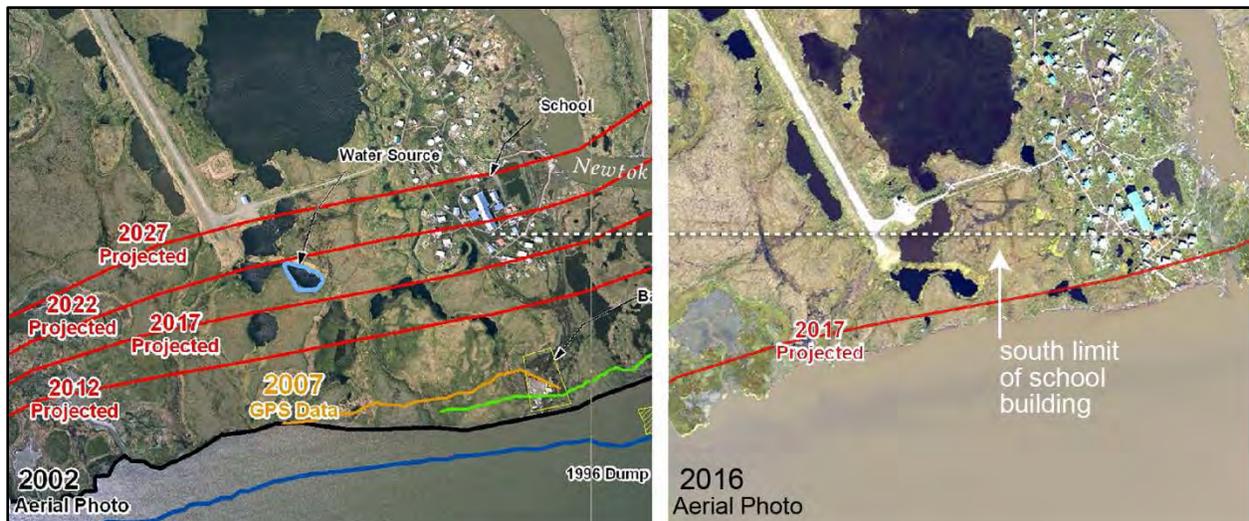


Figure 5. Comparison of projected erosion rates, with the shoreline position as of September 2016 (left, ASCG 2004; right, 2016 aerial photo courtesy of USGS)

Engineered solutions to protect the village in place, or to slow the pace of erosion, have been previously examined. A 1987 attempt to harden the riverbank with an experimental seawall of canvas bags filled with cement failed when the seawall was undercut and washed away. Engineered alternatives that would redirect the river flow away from Newtok using spur dikes or a cut-off channel have also been considered (section 4.3.1).

In addition to the physical destruction of the Newtok village site, the progressive erosion of the Ninglick River bank also contributes to flooding of the village and to the silting-in of the Newtok River. The Newtok River once flowed along the east and north sides of the village; the hydraulic “capture” of the Newtok River by the advancing Ninglick River in 1996 quickly resulted in the loss of the land buffer between the village and the Ninglick River and turned the Newtok River from a flowing stream into a tidal slough directly connecting the village with the Ninglick River. Newtok subsequently became more vulnerable to storm surges and subject to more frequent and severe flooding.

The change to the hydraulics of the Newtok River has since led to a host of difficulties affecting the quality of life in the village. Human waste is no longer carried away by the Newtok River, and contaminated water from the stagnant slough can be forced into the village during storms, creating public health concerns. The Newtok River has become progressively shallower due to accumulating sediment and is impassible to nearly all watercraft at low tide.

The village barge landing on the Ninglick River was lost to erosion in 2006. Barges delivering fuel and other supplies then landed at the village via the Newtok River channel for a time, but the shoaling of the Newtok River has made barge access to the village increasingly limited, and barges now unload at improvised landings on the eroding Ninglick River shoreline. This

diminished capacity to land barges makes projects to mitigate the effects of erosion and flooding, or to maintain Newtok's existing infrastructure, much more difficult and expensive, and further degrades the quality of life at Newtok (ADCRA 2017h).

3. Public Participation and Scoping

Public participation is an integral component in the preparation of an EIS and begins early in the process of planning and developing the proposed action. The Denali Commission implements public involvement to support the NEPA process according to guidelines established by the CEQ and the Denali Commission's procedures specified in 45 CFR §900. These guidelines promote sound decision making by providing opportunities for the public to be involved in the NEPA process, and they form the framework for public participation in the environmental impact analysis process. The Denali Commission encourages all persons having an interest in the proposed action to participate.

The process begins by the Denali Commission issuing a Notice of Intent to Prepare an EIS. Subsequent opportunities for public participation included the following:

- A public scoping process to assist in identifying alternatives and determining the scope of the analysis
- A 45-day public review period for the draft EIS
- Publication of the final EIS (FEIS) at least 30 days before making a final decision and issuing the Record of Decision (ROD).

Scoping assists in identifying the key concerns to be addressed during the analysis and preparation of the EIS, and concludes with a ROD.

3.1 Notice of Intent (NOI)

Pursuant to CEQ Regulations, the Denali Commission, in cooperation with the Newtok Village Council (NVC), initiated preparation of this EIS for the proposed action by publishing a notice of intent (NOI) to prepare an EIS in the Federal Register (FR) on March 3, 2017 (<https://www.gpo.gov/fdsys/pkg/FR-2017-03-03/pdf/2017-04119.pdf>). The NOI invited individuals, organizations, and agencies to submit comments concerning the scope of the EIS. The comment period ended on April 3, 2017, with comments received only from the U.S. Environmental Protection Agency (USEPA) in a letter dated April 4, 2017 (see Appendix A). The Denali Commission considered those comments in defining the scope of the analysis performed and documented in the EIS.

3.2 Scoping Process

Scoping is a process for determining the range of issues to be addressed in an EIS and for identifying significant issues associated with the alternatives (40 CFR §1501.7). The objectives of the scoping process are to notify those interested – e.g., other Federal, district, and local agencies, tribes, and other groups – about the alternatives being considered; solicit comments about environmental issues, alternatives, and other items of interest; and consider those comments in the preparation of the EIS. The Denali Commission actively solicited input and comment on the EIS process from individuals, organizations, and agencies that previously have taken active interest in Denali Commission projects.

An agency kick-off meeting and two open house agency and public scoping meetings were held with displays, a presentation, and time for public comments and questions to be considered in the planning of the proposed action and preparation of the EIS

3.2.1 Agency Kickoff Meeting

An EIS Kickoff Meeting was held on February 7, 2017 from 1 to 4 p.m. at the Denali Commission office at 510 L Street, Anchorage, AK. An email invitation was sent by the Commission on January 30, 2017 to a comprehensive list of Federal, State, local, and Native organization stakeholders. A teleconference line was made available. The meeting was attended by 29 individuals representing 16 Federal, State and tribal agencies and one organization. The purpose of the meeting was to identify agencies and organizations interested in the proposed action, identify significant environmental issues and compliance requirements likely to be addressed in the EIS (to be confirmed through the public scoping process), and determine roles and responsibilities. Alternatives, initial designs, concerns, constraints, and considerations were openly shared, and constructive comments received that gave direction to the EIS development team.

3.2.2 Village of Newtok Public Scoping Meeting

The Newtok public scoping meeting was held on March 22, 2017, between 6 and 8 p.m. in the Newtok School gymnasium. The meeting was well attended, with 39 residents participating; several additional people joined the meeting after it started or left before the presentation ended. The presenters informed the audience that questions and comments were welcome during or after the meeting and of the availability of forms for providing written comments. The NEPA scoping function of this meeting was combined with a presentation of the preferred Mertarvik community layout plan (CLP) alternative selected earlier in March by the NVC. Unlike many NEPA public scoping meetings, the audience of Newtok residents was mostly already familiar with the proposed action.

The meeting format revolved around PowerPoint® presentations, with tribal administrator Tom John providing an oral translation into Yup'ik. The Denali Commission gave an introductory

presentation on the project status and purpose of the meeting. The USACE Alaska District presented the NEPA scoping portion of the meeting, outlining the NEPA process, the project schedule, and the community input that was sought on environmental resources of concern and impacts of the proposed action. The ANTHC provided a brief update on the preferred CLP alternative. A USACE Alaska District biologist and archaeologist concluded the presentation with brief descriptions of past ecological and cultural resource surveys performed at the Mertarvik community site, with the intention of stimulating conversations about subsistence and cultural sites of concern.

The audience had few questions or comments during the meeting. Several attendees made general comments that they were eager for the relocation project to move forward. Two written comments and one verbal comment transcribed to a comment form are provided below. Individual discussions before and after the meeting between presenters and Newtok residents yielded more specific information about land use issues at Mertarvik and resources of concern. In particular, the USACE Alaska District archaeologist learned about potential grave sites, previously not identified as such, which are reportedly visible from the existing houses constructed by the Bureau of Indian Affairs (BIA) at Mertarvik.

- Written Comment #1: “Thank you for being concerned about traditional sites.”
- Written Comment #2: “Liked the things you guys thought and asked before making the place, thinking of the animals and the land resources. And asking about what the other people think.”
- Transcribed Verbal Comment: “Question about contaminants from landfill reaching fish stream (Takichak River) to the east.”

The public scoping meeting in Newtok was documented using two digital voice recorders; the digital sound files are stored with the Denali Commission. In the absence of extensive public verbal commentary or discussion at the meeting, the Denali Commission decided to not have written transcripts of the meeting prepared at this time.

3.2.3 Anchorage Agency and Public Scoping Meeting

The Anchorage agency and public scoping meeting was held on March 29, 2017, at the Denali Commission offices at 510 L Street in Anchorage, from 1:30 to 4 p.m. The Denali Commission and USACE presented updated information on the proposed action and the scoping process to date. A primary objective of the meeting was to validate the scope of the proposed action, and to obtain feedback on the EIS work plan that had been shared with the participating and cooperating agencies.

The preferred CLP alternative (selected by the village of Newtok) was presented, along with a proposed outline of the EIS topics and the following list of items that would not be included in the EIS analysis:

- Decommissioning activities at Newtok;
- The conceptual small boat harbor and waterfront development;
- The concept of upgrading the Mertarvik airport to a regional hub; and
- A prospective exchange of additional lands with the USFWS.

Decommissioning activities would include such actions as dismantling homes, fuel systems, and other structures and equipment, reusing or properly disposing of the demolition materials, securing hazardous materials and other potential sources of contamination, and mitigating environmental contamination, before the advancing erosion washes these structures, equipment, and materials into the Ninglick River. The Denali Commission has determined that, with the exception of some actions regarding the deactivation of Newtok airport, decommissioning activities at Newtok are not a “connected action” (as defined by the NEPA) to infrastructure construction at Mertarvik; this is explored further in section 5.23.4. These potential decommissioning activities pose a negligible risk of significant negative impacts to the environment and can be implemented without an EIS-level of analysis under the NEPA. The Commission has also identified several existing studies and plans that address decommissioning at Newtok:

- The Mertarvik Energy Master Plan (Cooper, *et al.* 2017b) discusses the draw-down of energy needs at Newtok at each phase of the proposed action, and describes recommended decommissioning steps for fuel storage, power supply, and electrical distribution equipment at Newtok at each phase.
- The Alaska Department of Commerce, Community, and Economic Development (ADCCED) funded a three-part environmental site inventory and assessment at Newtok, including an inventory of hazardous substances and contaminant sources, development of alternatives and preliminary costs for remediation, and a cleanup strategy (Hobbit 2015, 2016a, 2016b).
- Under the Waste Erosion Assessment and Review (WEAR) program, the ADEC Solid Waste Division has developed Detailed Action Plans (DAPs) for two sites at Newtok: the backhaul staging area (ADEC 2015a), and the Ungusraq Power Company (UPC) generator building (ADEC 2015b). The plans include recommendations for removing structures and debris, assessing soil contamination, and remediating contaminated soils if necessary.

Following the agency scoping meeting, the Denali Commission invited individual participating agencies by letter to identify any regulatory or policy requirements that might cause actions to be “connected” to the proposed activity. The USFWS provided a letter (dated June 26, 2017, see Appendix A) discussing resources that may be damaged if contaminants are released from Newtok, and several nexuses between decommissioning and legal authorities, but acknowledged that the USFWS does not expect to conduct any decommissioning activities. No such requirements were identified by other agencies either. Therefore, the Commission was unable to identify any agency specific regulatory requirements connecting decommissioning with the proposed construction of infrastructure in Mertarvik.

The other three bulleted items above were considered too speculative and/or at too different a phase of planning to be included with the CLP infrastructure for analysis within this EIS. FAA eliminated the airport alternative related to the concept of Mertarvik Airport becoming a regional hub as unreasonable and speculative because a regional hub already exists, and there is neither the demand nor justification of establishing another. Additionally, it is not an alternative to the proposed airport as it requires the proposed airport in an expanded format to address additional flights and greater cargo and passenger handling. It would result in additional impacts for a speculative concept; therefore, it is an unreasonable alternative under NEPA.

3.3 Scoping Issues Identified

The Denali Commission received letters from several agencies following the agency and public scoping meeting:

- FEMA provided a letter dated March 31, 2017, requesting to join the project as a cooperating agency, and reiterating that the EIS “should include a description of anticipated decommissioning activities, to include demolition, dismantling, and disposal of infrastructure and housing; environmental remediation; and land restoration.” FEMA also requested that scoping comments developed as part of an EA for a proposed FEMA action for relocation of existing homes from Newtok to Mertarvik be incorporated into the scoping comments received for the EIS. FEMA also requested an evaluation of the scope of environmental issues to include effects on floodplains and subsistence resources. In a follow-up letter, the Denali Commission invited FEMA to be a cooperating agency; however, FEMA did not respond.
- USDA provided a letter dated April 6, 2017, in which they offered to be a “consult agency” [*sic*], and will review and provide comments on the EIS only. The letter also stated that they believed the decommissioning of Newtok was a connected action and should be evaluated in the EIS, and that the review of alternative facilities and alternative locations for each facility must be outlined in detail in the EIS document.” This would

include the overall footprint of the community and the opportunity to utilize smaller lots to help reduce the impact to environmental resources.

- USEPA provided an 8-page letter dated April 4, 2017 with general and regionally specific advice on scoping and topics for the EIS to include air and water quality, wetlands, range of alternatives, effects of climate change, effects on aquatic resources, wastewater treatment and drinking supply, solid waste management, fuel storage, and mitigation measures among others. In the letter, the USEPA recommends that “decommissioning be discussed in the EIS as a likely connected action,” but that the discussion could be “reasonably limited to discussing anticipated Federal and State requirements for decommissioning of infrastructure at Newtok,” and other approaches short of a full NEPA analysis.
- The U.S. Department of Housing and Urban Development (HUD) sent a letter dated April 3, 2017, accepting the Commissions invitation to be a cooperating agency; however, HUD had been invited to be a participating agency, only.

These letters are included in Appendix A, Correspondence.

3.4 Other Scoping Comments

- FAA – Expressed a desire that the Purpose and Need be structured more like a generic EIS than a Federal civil works project. They also expressed a desire that lighting be addressed as potential light pollution.
- Newtok Resident – Concern expressed regarding the potential impact of the proposed Class II Municipal Solid Waste Landfill on the water quality of the Takikchak River.

3.5 Agency Consultation and Coordination

Agency coordination is a general term referring to the process whereby government agencies are afforded an opportunity to review and comment on the proposed action at various points in the analysis and at key milestones. This environmental study has been coordinated with agencies having direct or indirect jurisdiction over features in the proposed action area or an expected interest in the environmental study. The agencies that regularly attended these meetings were:

Federal Agencies

- U.S. Army Corps of Engineers (USACE)
- U.S. Bureau of Indian Affairs (BIA)
- U.S. Council on Environmental Quality (CEQ)
- U.S. Department of Agriculture (DOA)

- U.S. Department of Energy (DOE)
- U.S. Department of Health and Human Services, Indian Health Service (IHS)
- U.S. Department of Housing and Urban Development (HUD)
- U.S. Department of Interior (DOI)
- U.S. Economic Development Administration (USEDA)
- U.S. Environmental Protection Agency (USEPA)
- U.S. Department of Transportation, Federal Aviation Administration (FAA)
- U.S. Federal Emergency Management Agency (FEMA)
- U.S. Fish and Wildlife Service (USFWS)
- U.S. National Marine Fisheries Service (NMFS)

State Agencies

- Alaska Department of Commerce, Community and Economic Development (ADCCED)
- Alaska Department of Environmental Conservation (ADEC)
- Alaska Department of Military and Veterans Affairs (ADMVA)
- Alaska Department of Transportation and Public Facilities (ADOTPF)
- Alaska Division of Homeland Security and Emergency Management (ADHS&EM)
- Alaska Housing Finance Corporation (AHFC)

Native Organizations and Tribes

- Alaska Native Tribal Health Consortium (ANTHC)
- Newtok Village Council
- Native Village of Nightmute
- Nunakauyarmiut Tribe (Toksook Bay)
- Native Village of Tununak

Engineering Consultant

- DOWL LLC

4. Alternatives

4.1 Proposed Action

The proposed action is to construct the infrastructure at Mertarvik IAW the CLP chosen by the residents of Newtok and accepted by the Denali Commission. Please see section 4.6 for the specifics of the proposed action, CLP Alternative 2.

4.2 The No Action Alternative

Under the no action alternative, the comprehensive planned development of new village infrastructure at Mertarvik described above would not occur, and the expected environmental and human impacts, negative or beneficial, discussed in Chapter 5 would not happen. It is likely

that some portion of the Newtok community may settle at Mertarvik on their own, and make use of the infrastructure already built. Non-Federal funding may be found for the piece-meal construction of additional homes and some utilities, but major infrastructure such as the airport and school would be difficult to fund in the absence of a comprehensive effort toward establishing a new community at Mertarvik.

At Newtok, the residents would gradually be displaced by the destruction of their homes, school, and other support facilities, by the increasing difficulty of life at Newtok, and be forced to find new places to live as personal circumstances allowed. The Newtok community would be physically divided, and its goal of maintaining its strong identity and cultural foundation would become difficult or impossible.

As required by the NEPA, the no action alternative is carried forward for further analysis in this EIS.

4.3 Alternatives Previously Considered but Not Carried Forward

This project has been shaped and constrained by a series of events, studies, and decisions occurring over at least four decades. This section describes a number of alternatives in a historical context for the purpose of illustrating how the long-term evolution of the project led to the selection of a new village site to be constructed on Nelson Island, and Alternative 2 of the three community layout plans, as the preferred alternative. This EIS does not attempt to analyze all previously defined potential alternatives to the currently proposed action nor alternatives to components of that action identified over the last four decades because NEPA does not require the repetitive analysis of alternatives previously dismissed in a prior NEPA analysis or related action unless they fall within the current scope of analysis and are “reasonable” alternatives. The NEPA alternatives analysis process involves analysis of alternatives and/or components of alternatives to the level of complexity required to determine its ability to ameliorate potential negative impacts of the alternative or component of an alternative in relation to other alternatives being analyzed to the same level of detail. Therefore, many alternatives are dismissed at a lesser level of analysis than alternatives carried forward for complete analyses because they are clearly impractical, non-constructable, do not provide valuable mitigation of potential impacts, *etc.*

Alternatives that were considered in the past, but fall outside the current scope of analysis of this EIS and are not carried forward for further analysis are described in the following sections, and include:

- Engineered solutions to stop or slow the erosion of the Ninglick River bank at Newtok, and allow the community to remain in place;
- The relocation of Newtok residents to other existing communities;
- Development of a new community site at a location other than Mertarvik;
- Community layout plans developed for Mertarvik prior to 2016.

4.3.1 Engineering Solutions to Maintain the Existing Community in Place

Maintaining the Newtok community at its current location would require providing protection for homes and infrastructure from the progressive erosion and flooding. Woodward-Clyde, in a 1984 study for the City of Newtok (Woodward-Clyde 1984), examined several engineering solutions. These included hardening the river bank with stone rip-rap or soil/cement-filled geofabric bags, construction of stone spur dikes to deflect and slow river flow along the river bank, and dredging a cut-off channel to divert a portion of the river flow away from the Newtok shoreline.

Any earth- or rock-work project at Newtok would encounter difficulties with the availability and quality of materials in the area. Woodward-Clyde considered the relatively low-cost option of using local soils amended with Portland cement to fill geofabric bags and create a revetment along the river bank. However, the 1984 study judged that the very high silt content of the local soil (90-95%) would not allow the Portland cement to set properly, greatly reducing the strength and rigidity of the soil-filled bag revetment, and leaving it vulnerable to wave and ice action. In 1987, the village, with the assistance of the Corps, attempted a version of this concept using an experimental system of bags filled with cement and polystyrene to build a seawall; this attempt proved to be ineffective and the bags eventually washed away (ASCG 2004). Rock for a revetment or spur dikes is available from several locations along Nelson Island and Kuskokwim Bay. The closest and therefore most-economical rock was identified at two Nelson Island sites, but the Woodward-Clyde report estimated that more than 50 percent of the highly weathered basalt available at the most accessible site would have to be wasted in the course of quarrying rock of a size and quality suitable for a revetment or spur dike (Woodward-Clyde 1984).

The Woodward-Clyde report concluded that spur dikes would be the most cost-effective structural answer to slowing or stopping the erosion and was the only alternative they carried forward for more detailed analysis. The recommended spur dikes would be rock structures built perpendicular to the river bank, about 6 feet in height and extending 150 feet onshore and roughly 250 feet out into the river along the riverbed. The spur dikes would function by diverting the river current and some wave energy away from the bank, and providing an area of calm water where sediment would accumulate. The spur dikes would not reduce the thawing of soil along the river bank, but the most positive outcome anticipated was that by reducing the erosive forces along the bank, a stable, vegetation-insulated shoreline might eventually result. Woodward-Clyde recommended 70 such dikes be built 300 feet apart along 4 miles of river bank, with construction phased over 9 years, although the project could be scaled to construct fewer dikes with correspondingly lower effectiveness (Woodward-Clyde 1984).

At the request of Newtok residents, Woodward-Clyde also looked at the possibility of a cut-off channel to help protect the village. They estimated that a cut-off channel with an adequate cross-sectional area would require excavating 28 million cubic yards of native soil, much of which would be frozen. A cut-off channel would be expected to slow rather than prevent the erosion of

the river bank, as it would reduce river flow at the village but have little effect on storm surge, tidal action, or the thawing of the river bank soils (Woodward-Clyde 1984).

Ultimately, Woodward-Clyde concluded, in a cover letter for their November 29, 1984 report addendum, that relocating the village would be less expensive than any effective structural solution. In August 2003, ASCG staff, as part of their study for Newtok, met with members of URS Corporation (formerly Woodward-Clyde) who had worked on the 1983-1984 study, and reviewed the conclusions of the 1984 report. The consensus of that 2003 review was that there are no permanent engineering solutions to the erosion problem, only temporary measures that may slow the advancing river, but at a much higher cost in the long run than relocating the village (ASCG 2004).

These engineering alternatives to protect the current Newtok location from erosion are not carried forward for analysis in this EIS due to the conclusion that the projects would not solve the problem but only delay the destruction of Newtok.

4.3.2 Relocation of Newtok Residents to Existing Communities

This alternative would involve an organized relocation of Newtok residents to one or more existing communities. The basic options consist of moving the population of Newtok to:

- Nearby Nelson Island villages;
- Bethel or other larger communities.

The people of Newtok have close ties to the other villages surrounding Nelson Island: Nightmute, Toksook Bay, and Tununuk (Figure 1 inset). These Yup'ik villages share similar customs and lifestyles with those of Newtok. However, these villages have small populations comparable to that of Newtok (Table 1) and combining the populations of two villages would not only alter the culture of the village of Newtok but also that of the village accepting the Newtok residents. Absorbing all or portions of Newtok's population would significantly increase the populations of these villages and the demands the resulting population would have on the village's resources. This would have the potential to place an increased strain on the housing supply, school, and utility services of the host villages, and on local subsistence resources (ASCG 2004). New homes and enlarged infrastructure would need to be built to accommodate the increased population, requiring construction space that is often limited in Alaska coastal villages, and additional funding. Table 1 illustrates the high occupancy rate of existing housing in these villages as of 2010, and the low level of vacant housing typically available.

Table 1. Populations and Housing Stock of Nelson Island Villages

Village	2010 Population	2010 Housing Units, Total/Vacant
Newtok	354	72/2
Nightmute	280	61/2
Tununuk	327	90/6
Toksook Bay	590	135/10

2010 U.S. Census data, via ADCRA 2017j.

The Cold Climate Housing Research Center (CCHRC) conducted a housing needs assessment in May 2016, interviewing 55 of 66 households in Newtok. The assessment concluded that the majority of households in Newtok are severely overcrowded, under the criteria used by the U.S. Department of Housing and Urban Development (HUD), and up to 105 homes would be needed by the current population of Newtok to provide healthy, comfortable living arrangements (CCHRC 2016). Similar assessments have not been done for the other Nelson Island villages, but it is probable that the relocation of Newtok residents to those villages would lead to continued overcrowding for the Newtok people, while exacerbating any overcrowding at the host villages.

Because of the difficulties that relocating to an existing village would create both for the people of Newtok and the host villages, Newtok residents do not believe that relocation to another village is a viable option. The people of Newtok share a strong bond with each other and feel that relocation to an existing community would result in the end of their identity as a village and a unique culture, and would pose an unacceptable threat to their traditions and values (ASCG 2004).

Relocation to a larger established community such as Bethel or even Anchorage would pose an even greater perceived threat to Newtok's identity and values. While a larger community would have greater capability to provide housing and services to a relocated population, Newtok residents feel that it would be difficult to assimilate into a much bigger community, and that they would lose their close ties with one another and with their traditions. Bethel, with a 2010 population of 6,080, is perceived as having social problems similar to those found in big cities; for instance, importation of alcohol is banned in Newtok, but allowed in Bethel, an issue of great concern to Newtok residents (ASCG 2004).

Overall, relocating Newtok's residents to another existing community would not meet the purpose and need of the people of Newtok to keep their community and its unique culture intact. Alternatives involving the relocation of Newtok residents to an existing community are therefore not carried forward for analysis in this EIS.

4.3.3 Previously Considered Sites for a New Community

The idea of developing a new village site to which Newtok residents could relocate is not new. In 1994, the Newtok Traditional Council (NTC) identified and evaluated six potential new village sites; their selection criteria included:

- Soil foundation suitable for village development;
- Safe from erosion;
- Suitable land for an airport;
- Good barge access; and
- Access to subsistence hunting, fishing and gathering.

The six alternative sites identified that met these criteria are listed below and shown in Figure 6:

1. Tunuirun;
2. Kaikilirmiut;
3. Narukachuk;
4. Puklanarivik;
5. Tagkanirluta; and
6. Takikchak (essentially the same vicinity as the Mertarvik site, located on the north shore of Nelson Island between the Takikchak River and Baird Inlet).

By 2003, after an extensive engineering and cost analysis combined with Newtok resident surveys, all but the Takikchak/Mertarvik site had been discarded (ASCG 2004). The Mertarvik site was unique among the alternatives in making use of elevated, erosion-resistant lands on the Nelson Island basalt dome (described further in section 5.2), and is also relatively close to Newtok. The other sites considered were all on the low-lying alluvial plain, and presumably also vulnerable to rising sea levels and resulting flooding and erosion, potentially limiting their long-term viability. Several of the sites, such as Kaikilirmiut and Puklanarivik, were more remote and isolated than Newtok, and situated far up narrow, shallow waterways that could pose limitations for essential barge traffic. Kaikilirmiut also features an extensive archaeological site with many graves; some village elders opposed a move to Kaikilirmiut out of respect for the dead, and the numerous cultural resources would make development of the site more difficult. The Mertarvik site, however, was on lands that were then owned by the USFWS and part of the Yukon Delta National Wildlife Refuge. The Newtok Native Corporation approached their Alaska Congressional Delegation and the Washington DC staff of the USFWS for assistance in drafting legislation that would result in an exchange of lands between the parties.

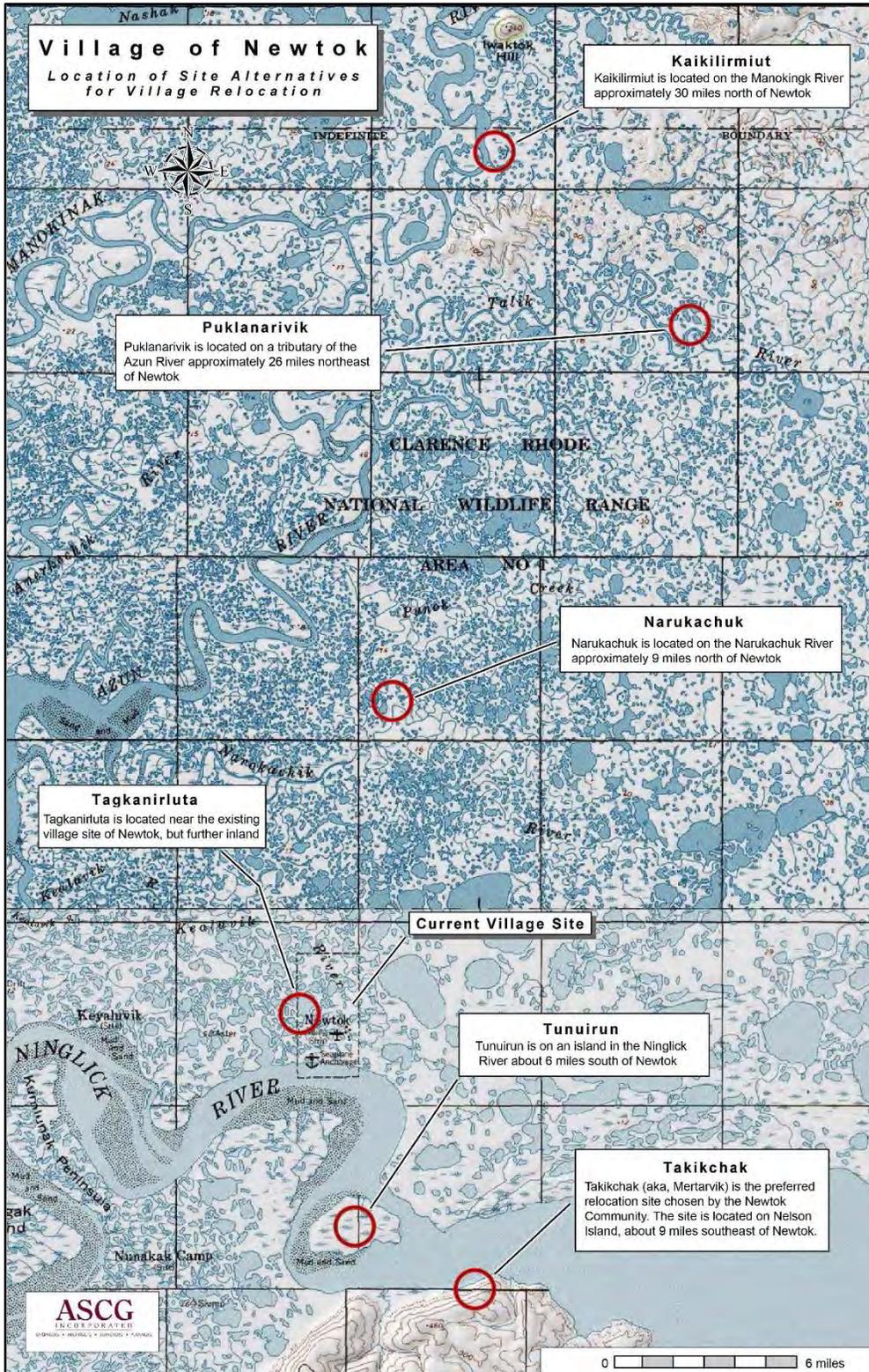


Figure 6. Potential sites for a new village considered in a 1994 evaluation (updated from ASCG 2004).

4.3.4 Previously Developed Community Layouts for Mertarvik (2000 - 2011)

The proposed physical layout for a new community at Mertarvik has evolved over the years as the result of a series of planning efforts. Most of these were developed only to a conceptual level, and may best be thought of as a continuum of efforts culminating in the 2017 community layout plan (CLP) alternatives, rather than as distinct alternatives that were abandoned.

In 2000, while the land exchange with the USFWS was still under negotiation, the NTC hired ASCG to assist in the development of relocation plans using funding obtained from the USACE and the Bureau of Indian Affairs (BIA). ASCG created a site layout and transportation plan, which was finalized in 2004 (ASCG 2004). The ASCG community layout was designed without detailed geographical information on the Mertarvik site, as such had yet to be generated. The 2004 plan (Figure 7) placed the community on sloping land relatively close to the Ninglick River in a simple linear layout, and provided road access to the Takikchak River to the west, assuming that the river would be the water source for the new village. The airport was sited on higher, more level ground south of the village site.

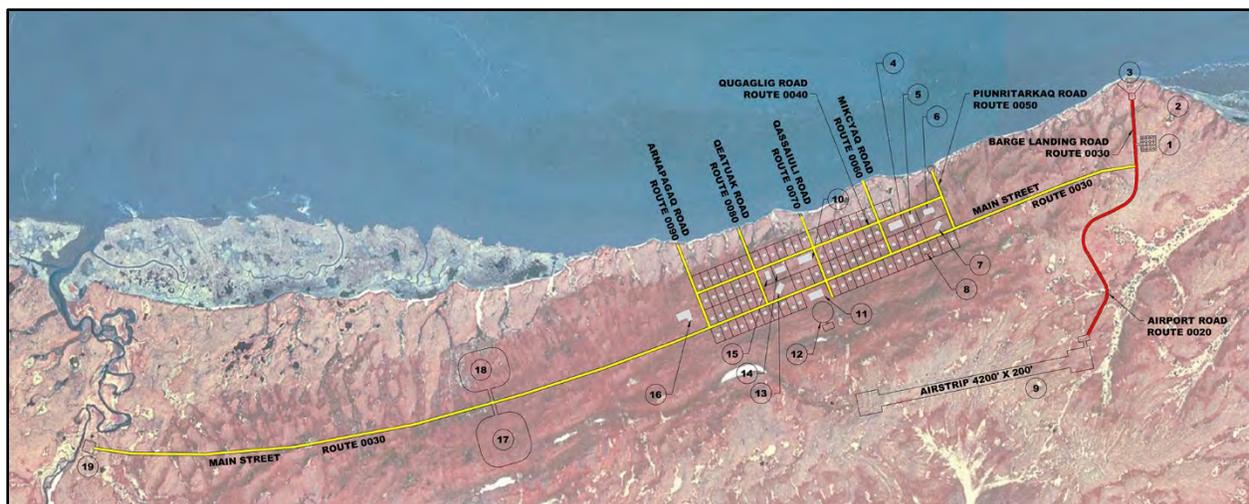


Figure 7. Mertarvik community layout developed by ASCG (ASCG 2004).

In 2006, the Alaska Department of Environmental Conservation's (ADEC) Village Safe Water Program (VSWP) initiated a new CLP process, incorporating new information on topography, geology, wetlands, and potential airport layouts, information that had been obtained since the initial ASCG effort. This was the first of several CLPs developed through the coordination with the Newtok Planning Group. The Alaska Division of Community and Regional Affairs (ADCRA) formed the NPG in May 2006, in response to requests from Newtok for assistance in coordinating the village relocation effort. The ADCRA is a division of the Alaska Department of Commerce, Community, and Economic Development (ADCCED), which is directed by two Alaska Administrative Orders (AO 231 and AO 239) "to act as the state coordinating agency to coordinate with the other state and federal agencies to propose long-term solutions to the ongoing erosion issues in... affected coastal communities" (ADCRA 2017i).

The VSWP, in collaboration with the Newtok community, prepared two basic configurations for the 2006 CLP: a conventional grid layout similar to the 2004 CLP, and an innovative “boomerang” layout that featured centrally located community buildings surrounded by family housing (Figure 8).

Both 2006 configurations moved the center of the village southward from a pronounced slope to more level ground about 0.6 mile south of the shoreline; this would reduce the amount of excavation and filling that would be required to prepare construction sites, and moved the center of the village farther from coastal hazards. Siting village homes and community buildings on higher ground would allow gravity to be used to move waste through a sanitary sewer system, minimizing costly lift stations and force mains. The plan included recirculating water loops to supply continuously running domestic water to homes and community buildings, reducing the risk of frozen pipes. The “boomerang” configuration aided the incorporation of more cost-effective utility systems by providing a more compact community layout with more centralized community infrastructure (ADCRA 2017h). Water would be supplied from a groundwater well installed in the watershed above Mertarvik spring, which VSWP intended to investigate the following year (NPG 2006, Golder 2007, Golder 2008).

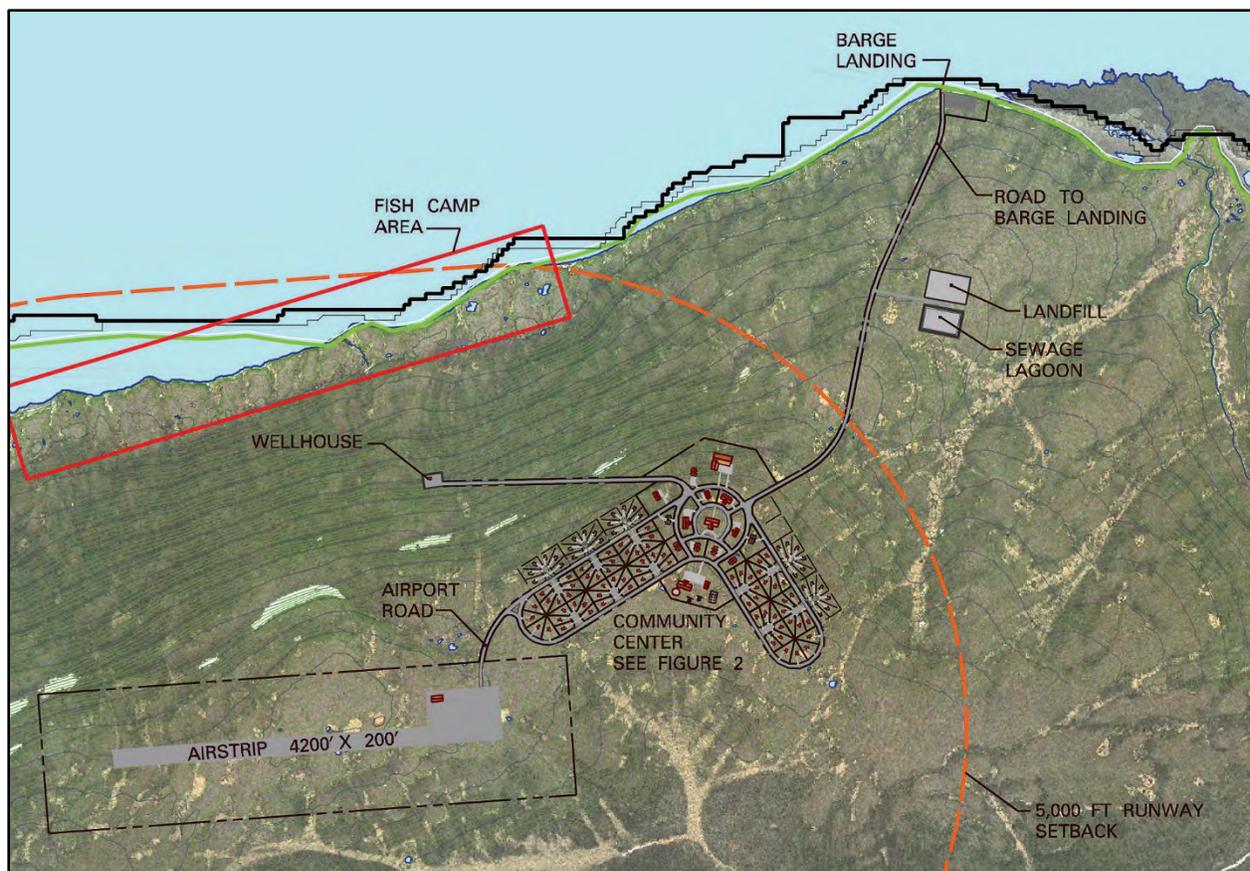


Figure 8. Mertarvik community layout designed by VSWP (VSWP 2006; full-size graphic available at <https://www.commerce.alaska.gov/web/Portals/4/pub/fig1.pdf>).

In 2008, Newtok was awarded a grant through the ADCRA to further develop the 2006 VSWP CLP. The community hired HDR Alaska to continue work on a new CLP. The 2008 CLP process began with the identification of agency requirements by members of the NPG, followed by an initial community planning workshop to identify Newtok's goals and objectives. The planning requirements included in this process were to:

- Centrally locate community facilities;
- Accommodate alternative energy sources;
- Locate the washateria and water treatment plant near the power plant to recover waste heat;
- Accommodate 63 single-family housing units with room for expansion;
- Provide access to the barge landing, airport, gravel source, and fish camp (ADCRA 2017h).

Also in 2008, work began on the design and construction of a barge landing at Mertarvik. An early 2008 change in the proposed location of the barge landing affected the 2008 CLP and all subsequent layouts. The northernmost point at Mertarvik was originally envisioned for the barge landing (Figure 7, Figure 8). However, after reviewing maps, photographs, and boring logs, and interviewing local residents and barge operators, the Alaska Department of Transportation and Public Facilities (ADOTPF), working under a Memorandum of Agreement (MOA) with the ADCCED, decided to shift the barge landing to a bight 4,400 feet to the west of the point (Figure 9). This new location avoided boulders and shallow bedrock present at the point, provided submerged lands and adjacent uplands that were easier to develop for the barge landing and connecting road, and was more sheltered from the river current. The move was approved by the USACE and the Newtok leadership.

The 2008 CLP process resulted in three alternatives. The community voted to select one as the preferred alternative, which was subsequently modified slightly based on community comments to become the final CLP (Figure 9; ADCRA 2017h).

The proposed positioning of the center of the village on the crest of the slope (Figure 7, Figure 8) led to concerns about the long walking distance between the village and subsistence resources, and about exposure to high winds and dust. The village location in the 2008 CLP also threatened to conflict with the optimal alignment in development for the replacement airport. Newtok passed a resolution in April 2009 to move the center of the village farther down the slope. Newtok retained HDR Alaska to develop a revised version of the 2008 CLP that took into account these concerns and restrictions, as well as new geotechnical information, while maintaining the objectives of the 2008 CLP. HDR developed two alternatives, the preferred choice of which, with further community input and modification, became the final 2011 CLP (Figure 10; ADCRA 2017h).

In 2015, the Newtok Village Council (NVC) pursued a grant application to the Federal Emergency Management Agency (FEMA) to relocate 12 homes from Newtok to Mertarvik. VSWP offered to take the 2011 CLP to a preliminary paper plat level to include with the grant application to show where the relocated homes would go. Modifications were made to lot and road alignments, and lots were added for future development, but the general design of the 2011 layout, selected by the residents of the village of Newtok, was retained (Figure 11; ADCRA 2017h). This conceptual plan became the basis of the CLPs and design work funded by the Denali Commission in 2016 and 2017 (Section 4.5).



Figure 9. Final 2008 CLP presentation graphic (full-size graphic available at https://www.commerce.alaska.gov/web/Portals/4/pub/2008_Newtok_CLP_FINAL.pdf).



Figure 10. Final 2011 CLP presentation graphic (full-size graphic available at https://www.commerce.alaska.gov/web/Portals/4/pub/Newtok_CLP_Update_Final.pdf).

The 2017 Mertarvik CLPs were developed in direct collaboration with the community of Newtok, over the course of 8 months in 2016-2017. The Commission and the ANTHC sought input from not only the Newtok Village leadership, "...but also the elders, the hunters, the gatherers, and the future leaders studying at the Newtok Ayaprun School. The people that would serve the community of Mertarvik in the years to come also needed to be represented: The Lower Kuskokwim School District, The Yukon Kuskokwim Health Corporation, the Association of Village Council Presidents, and many other partners. The layout further needed the technical guidance of the surveyors, architects, engineers, and builders that would be helping the community to design and construct the new community. And lastly, the layout required the consideration of the Federal and State agencies that would provide the funds needed to develop a healthy and sustainable Mertarvik" (ANTHC 2017c).

4.4.1 Goals

The Commission, working with the Newtok community, identified the following five goals for the CLP process (ANTHC 2017c):

- 1. Expedient Development.** The most commonly voiced goal of the community was to make the development of Mertarvik proceed as quickly as possible. The erosion and public health crises in Newtok require immediate action to develop a new community and cannot wait for an ideal set of resources, design, and construction conditions. Expedient development may include starting home construction where permitting is already acquired, developing low cost projects that are achievable with current community resources, or building certain infrastructure needed in Mertarvik before ideal conditions exist.
- 2. Pioneering Approach.** The residents of Newtok are committed to a "pioneering approach," a phased development in which community members would begin to move to and live in Mertarvik in advance of the complete build-out of the planned infrastructure. This Pioneering Phase was an element of a Strategic Management Plan prepared in 2012 (Agnew::Beck Consulting 2012). The early inhabitants of Mertarvik would have access to limited services. A conceptual schematic of the Pioneer Phase layout, with its core of existing basic infrastructure, is shown in Figure 12.
- 3. Affordability of Construction.** The cost of building an entire community is daunting; early estimates suggest that roughly \$120 million will be needed for development of the entire proposed community infrastructure. Minimizing each component cost of the relocation was an important factor for the community.

4. Affordability of Operation. Minimizing operations and maintenance costs was a critical goal in the development of the layout plan. This includes minimizing fuel and electricity use, reducing road maintenance needs, providing easy access to cover for the landfill, and reducing labor requirements.

5. Subsistence Lifestyle. The community's strong cultural foundation and traditional subsistence lifestyle needed to be represented in the CLP; access to subsistence resources and a focus on infrastructure development that minimizes impacts on the local habitat were important considerations.

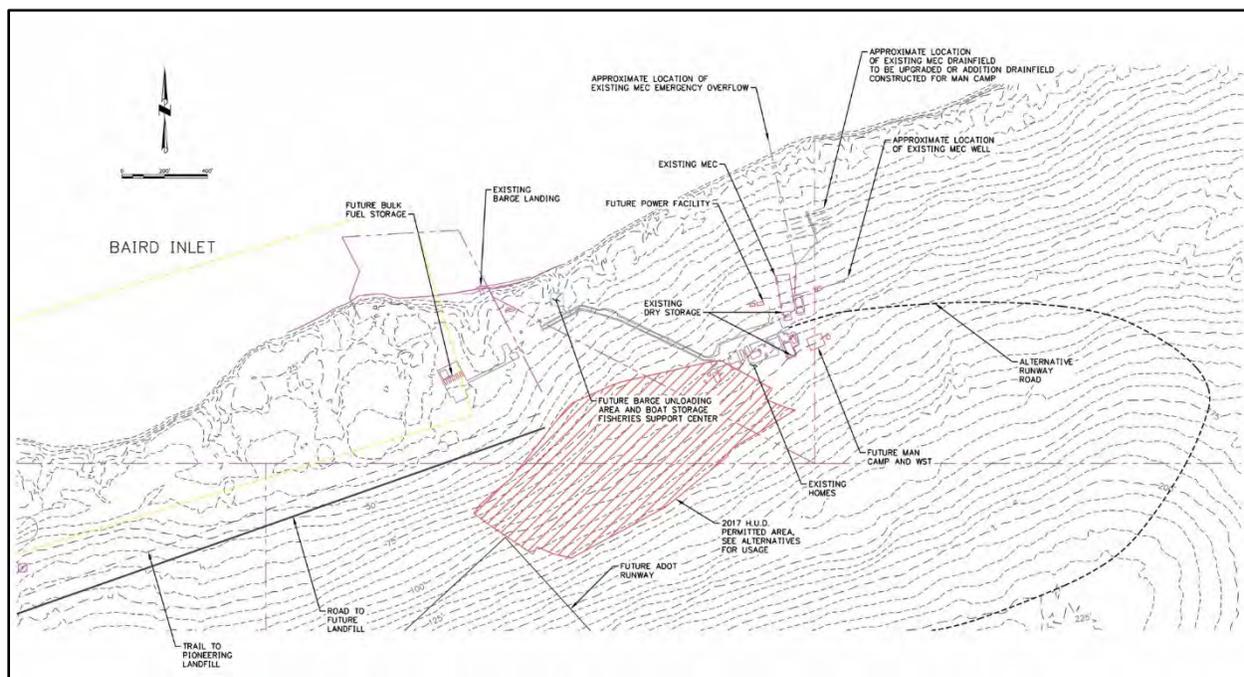


Figure 12. Mertarvik Pioneering Stage layout (ANTHC 2017a).

4.4.2 Constraints and Limitations

As has been described previously, the currently proposed infrastructure development activity is the culmination of numerous previous decisions, on-going construction projects, and other “facts on the ground” that have shaped and constrained the alternatives available for the proposed action, but are beyond the scope of this NEPA analysis.

- **Community Location Determined by Previous Decisions and Existing Factors**

The Mertarvik area of northern Nelson Island was selected in 1994 by the residents of the Newtok as a preferred location for a new village site (section 4.3.3). On November 17, 2003, in recognition of the needs and desires of the residents of the village of Newtok and in recognition of the imminent threat to the continued existence of their community as a whole, the U.S. Congress authorized Public Law 108-129, resulting in an exchange of lands between the Newtok

Native Corporation and the Department of the Interior (DOI). The Act established the acreages to be exchanged, based on a 1.1 to 1 formula in which Newtok received 10,943 acres of USFWS land in the Yukon Delta National Wildlife Refuge in exchange for 12,101 acres of Newtok Native Corporation land (Figure 13) that had been previously conveyed to the Newtok Native Corporation under the Alaska Native Claims Settlement Act (43 USC §1601 *et seq.*). The disparate exchange rate was due in part to the fact that Newtok received the surface and subsurface estates of the gained lands, while the USFWS received only the surface estate.

The choice of a new community location on Nelson Island has also been constrained by geography and access considerations. Although all of the 10,943 acres transferred from the USFWS would be potentially available for development, in practice the new community will need ready access to a waterway, both for subsistence and for a barge landing to bring in supplies and equipment. A limited portion of the transferred land fronts onto the Ninglick River or Baird Inlet (Figure 13). Baird Inlet is not well characterized bathymetrically, but aerial photographs show broad areas of shallows and mud flats paralleling the Baird Inlet shoreline to the east of Mertarvik. Similar shallows exist to the west, where a large zone of estuarine wetlands spreads along the shore from the mouth of the Takikchak River. Reliable access to Nelson Island's north shore by heavy barges, without extensive dredging, exists only along a span of shoreline about 1.5 miles wide, where the Ninglick River main channel approaches relatively close to the shoreline. For this reason, nearly all studies and plans for a new community site since 2000 have focused on this relatively small portion of the Nelson Island shoreline between the Takikchak River and the entrance to Baird Inlet.

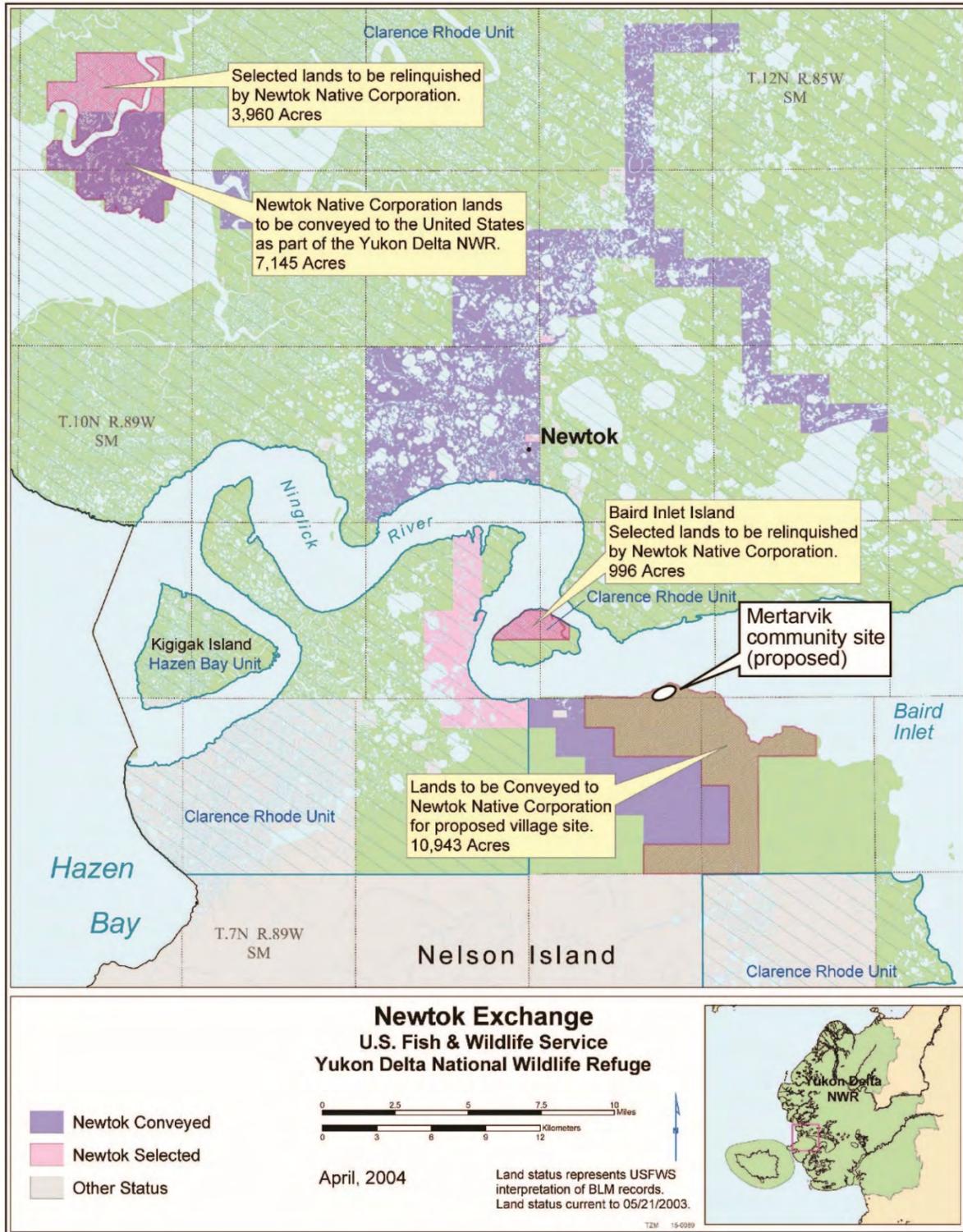


Figure 13. USFWS map illustrating the 2003 exchange of lands between Newtok Native Corporation and the USFWS (annotated).

- **Infrastructure Already Completed at Mertarvik**

While planning of the overall Mertarvik community layout was underway, several pieces of infrastructure have been constructed at Mertarvik to prepare for emergency evacuations in the event of natural disasters and further construction efforts. These existing efforts furthered the investment in and commitment to the Mertarvik location, and also became “anchors” that some of the 2017 CLP were designed around. These features also represent part of the Pioneering Phase development discussed elsewhere. The following infrastructure has already been started or completed at Mertarvik:

Barge Landing

In 2006, the ADCCED applied for and was awarded an Economic Development Administration Investment Assistance Grant for a barge landing and staging area at Mertarvik on behalf of the NTC. The U.S. Department of Commerce, Economic Development Administration (EDA) was the Federal funding agency for the proposed action (ADCRA 2017c).

The Mertarvik Barge Landing Facility was the first piece of major infrastructure to be installed at Mertarvik. ADCCED partnered with the ADOTPF to see this project through from planning and design to actual construction. ADOTPF provided the State of Alaska with monies to match the EDA grant for this approximately \$2 million project. The project was completed in 2009. The barge landing facility consists of a 16-foot-wide by 230-foot-long barge ramp/access road, and 65-foot by 130-foot upland multi-use staging area (Figure 14). The project location is within a bight (or cove) on the north side of Nelson Island (ADCRA 17c).

During construction, it was discovered that only shallow draft vessels would be able to use the barge landing ramp as planned due to sediment conditions that made full installation of the concrete plank ramp extremely difficult. As a result, the completed landing ramp length was approximately 50 feet shorter than the original designed length, translating into reduced water depths for most barge operations.

A second barge landing was constructed 500 feet to the west, where the mean lower low water line is closer to the toe of the bluff, allowing barges to land over the range of tides in the Ninglick River. Access to the site required the construction of approximately 500 feet of new access road and 35 feet of new landing area. The deep draft barge landing and gravel road connecting it to the initial barge landing facility was completed in the summer of 2010 (ADCRA 2017c).

The barge landing and staging area will be critical to the future development of Mertarvik, as it allows for the delivery of construction equipment and bulk materials to the site. The barge landing and staging area is also essential for the relocation of structures that may be suitable to

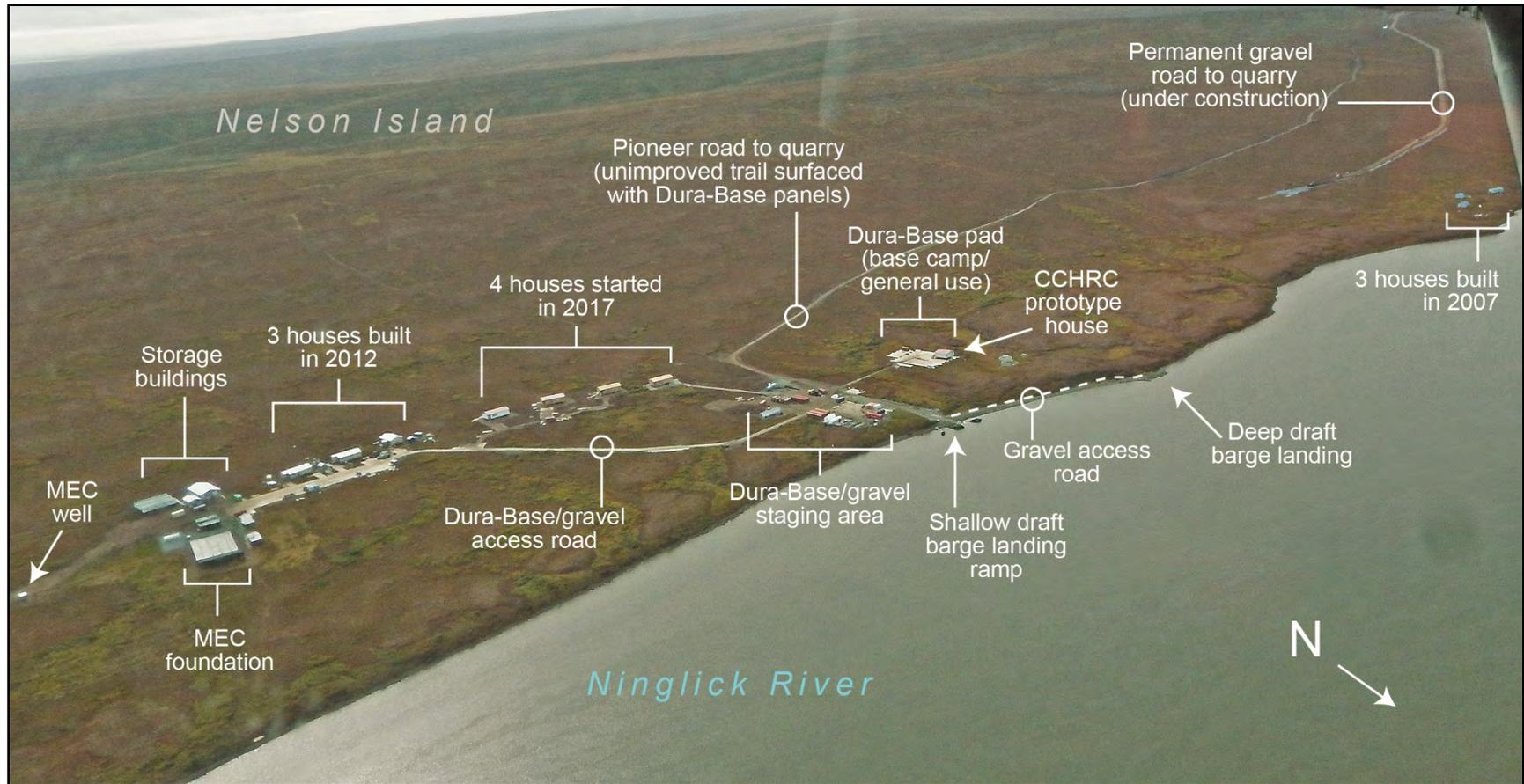


Figure 14. A September 1st, 2017 aerial photograph of the Mertarvik project site viewed from the northeast, with existing infrastructure identified in annotations.

move from the old village to Mertarvik. Despite some limitations of the existing barge landings, the goal of “expedient development” did not allow for the permitting, design, and construction of a new barge landing, and so the existing barge landing became an “anchor point” for subsequent layout design. With significant bulk fuel needs for construction activities and the pioneering community, and technical limitations on fuel transfer from the barge, the bulk fuel farm in turn was recommended for development near the barge landing.

Mertarvik Access Road

The Mertarvik Access Road, leading from the barge landing facility to the evacuation shelter, was constructed in 2010-2011 through the collaborative efforts of the State of Alaska Department of Transportation and Public Facilities (ADOTPF), USACE, the Bureau of Indian Affairs (BIA), and the military Innovative Readiness Training (IRT) Program (ADCRA 17e).

The road was built with gravel topped by polyethylene road mats, a technology used by oil companies on Alaska's North Slope for road development on tundra. The 1,000-pound, 8 by 14-foot polyethylene mats interlock to form a strong, stable and uniform surface over tundra which can support pioneer infrastructure development by trucks, tractors, and loaders. The mats can also be reused and picked up and placed somewhere else, so they are considered an ideal technology for a newly developing village. These mats were also used to create working and living surfaces on top of the tundra, and to allow heavy equipment to travel along an unimproved trail leading to the quarry site (Figure 14; ADCRA 2017e).

Funding for the Mertarvik Access Road was provided by State of Alaska capital budget funds appropriated to ADOTPF, combined with BIA Indian Reservation Roads (IRR) Program funds. The ADOTPF funded the USACE to design the road. ADOTPF provided construction management for the road, which was built by IRT Marine Reserve Engineers and Navy Reserve Seabees.

After development of the new village is complete, the polyethylene mat road will support travel by foot or by all-terrain vehicles in the summer and by snow machine in the winter.

Rock Quarry

The rock quarry at “Hill 460” was investigated in 2008 and opened for production in 2011; it and the quarry access road will be vital to construction efforts at Mertarvik, particularly for the airport. The existing quarry was another “anchor point” affecting subsequent layout design.

The 2011 environmental assessment (USACE 2011) evaluating the development of the quarry (among other early construction tasks) described an estimated 15.2 acres to be cleared of overburden and quarried, plus a 6.5-acre equipment staging area and a 10-acre gravel processing and storage area (for a total of 31.7 acres).

Mertarvik Evacuation Center (MEC)

In 2008 the NTC received a community planning grant through the Alaska Climate Change Impact Mitigation Program for the conceptual design of the MEC. In fiscal year 2011, the NTC was awarded a \$4 million grant by the Alaska legislature for the design and construction of the MEC, the design of which would be based on the conceptual design prepared by the Cold Climate Housing Research Center (CCHRC, ADCRA 2017d).

The design was completed in February 2011, and work on the piling-supported foundation for the 6,200-square-foot MEC structure was completed in the summer of 2011 (ADCRA 2017d), with further work by the community members to finish building the MEC in coming years

The MEC was envisioned by the NPG as providing the community with a large multi-purpose structure to be built early in the community development process. The MEC would serve in the near-term as emergency refuge for Newtok residents in the event of severe flooding, as a construction and relocation support facility during the community build-out, and as a community center for the completed community. This concept tended to keep the center-of-gravity of the various planned community layouts near the MEC.

The MEC groundwater supply well was also drilled and installed in 2011, about 230 feet east of the MEC foundation. A private organization funded construction of a small well house in 2016 and the installation of a hand-pump and portable water treatment system to facilitate the interim use of the well (Meeks 2017).

Pioneer Home Construction

Eleven housing structures currently exist or have been started at Mertarvik, eight of which are within the currently proposed village layout. The first three houses built in the Mertarvik area were acquired through the Bureau of Indian Affairs (BIA) Housing Improvement Program (HIP) grants and were constructed in 2007 (DCRA. 2017e). These houses were built along the shore near Mertarvik spring, which is well to the west of the CLPs developed in 2016-2017. During the Newtok Scoping Meeting, some local residents reported that these houses are used occasionally but not occupied full time. These three structures would need to be relocated to sites within the current village layout and renovated before they can be a sustainable part of the new community.

Another three houses were built by Newtok community members in the summer of 2012, using Structural Insulated Panel (SIP) home packages. These houses were purchased by the community using grants from the Association of Village Council Presidents (AVCP) Regional Housing Authority, through HUD's Native American Housing Assistance and Self Determination Act (NAHASDA) Program. These houses are located within the current village layout, near the MEC foundation (Figure 14), and are currently occupied.

A single prototype house designed by the Cold Climate Housing Research Center (CCHRC) and funded by a BIA HIP grant was assembled by a local crew in the summer of 2016 (ADCRA 2017f). The house is both extremely energy efficient and moveable. It has a skiddable foundation and can be towed across the ice or tundra when needed. It also contains its own small water-treatment plant and a generator, which can be used before public utilities are available at the new site. This house is currently set up on the large general use pad near the barge landing (Figure 14), and is used by construction and survey crews working at the site.

Four more houses were started in 2017 by the AVCP and are expected to be completed in 2018, and one more home is funded to be started in 2018.

- **Airport Alignment Requirements**

In the absence of connectivity to a road network to the rest of the state of Alaska, and the seasonality of water access, the proposed airport is the largest and one of the most critical pieces of infrastructure for the community. The alignment and layout for the airport is far less flexible than the layout of the community, and so the 2014 conditional approval by the FAA of an Airport Layout Plan (ALP) for Mertarvik established certain limitations for the general Mertarvik CLP. For example, the FAA approval is subject to the condition that a 5,000-foot minimum separation be maintained between the airport and the both the landfill and the wastewater treatment lagoon (FAA 2014), which has the effect of requiring those community features to be set well to the east or west of the community center. The airport also requires a broad runway protection zone in which no development may occur, and obstacle clearance restrictions limit where tall structures such as water storage tanks and wind turbines can be placed on the upper slope.

- **Construction Planning**

The formulation of CLP alternatives began after funding and environmental permitting had been acquired for the development of the rock quarry road, construction camp, and the construction planned for 2017. These permits were not possible to adjust significantly before construction activities would begin, and so the proposed 2017 construction was incorporated into each CLP alternative.

- **Site Conditions**

The need for Newtok residents to be relatively close to the water and subsistence resources, and away from the preferred airport site, confined the area available for the community layout to a broad slope with a grade ranging from 5 percent to 14 percent. This slope provides a significant challenge for the layout and construction of structures and roads; the CLP goals of minimizing construction and operation costs will require minimizing the amount of cutting and filling needed to create buildable foundations and roadbeds. The slope provides both challenges and opportunities for the management of water supply and wastewater.

- **Environmental Resources**

The NEPA process for this EIS was started roughly around the same time as NVC's preliminary selection of the preferred CLP alternative: February 2017. NVC's and the Commission's alternatives formulation, however, was informed by the multitude of previous environmental studies in the proposed action area, such as the USACE 2008 and 2011 environmental assessments (EAs), and the 2016 HUD environmental review. The Commission was aware of cultural sites and high-value wetland areas (estuarine wetlands along the coast to the west of the project area; see Appendix C) identified in those previous assessments, and avoided those resources in all of its CLP alternatives. Archaeologists and biologists with the USACE performed a cursory review of the CLP alternatives in February and March 2017, and provisionally agreed that the CLP alternatives did not appear to directly impact any known high-value resources, and that none of the three CLP alternatives were conspicuously more environmentally damaging or advantageous than the others.

4.5 CLP Development Process

The development of the preferred CLP required input from a diverse array of stakeholders. The wants and desires of the community, the technical feasibility of design and construction, the fundability and regulatory approval of funding agencies, were all major components of the planning process. With such a diverse group, a strict process of development was required to ensure an appropriate CLP was developed. The most critical element of the process was to maintain full engagement and ownership from the residents of Newtok as the array of local, regional, state, and national partners of the community each provided their sometimes-competing preferences and requirements. Inclusion in the development process was focused on the organizations working actively and directly on the relocation of Newtok to Mertarvik (Table 2). It should be noted that many more partners were consulted directly and/or considered indirectly during this process. Those most heavily engaged have active funding or design and construction efforts underway (ANTHC 2017a).

In general, ANTHC first sought guidance and input from the Newtok Village Council, then expanded the outreach and collection of data to the community at large. After collecting data and guidance from the community, ANTHC advanced progress on development of the CLPs, then sought technical and non-technical feedback from external partners working on the Mertarvik relocation effort. ANTHC then made refinements to the CLPs, and presented the progress to the Newtok Village Council. The cycle repeated with iterative improvements to the community layout as additional data, input, and approval from the community was acquired (ANTHC 2017a).

Table 2. Timeline of the 2016-2017 Development CLP Process (ANTHC 2017c).

Date	Description and Notes
11/01/2016- 11/15/2016	ANTHC Reviewed existing efforts, including VSWP “Community Plat”, and all content on Newtok Planning Group Website.
11/15/2016- 11/16/2016	Newtok Site Visit #1 to introduce team and initiate outreach for ideas, stories, history, concerns, and questions. Participated in a Council meeting, community meeting, and a traditional potluck.
11/17/2016- 11/30/2017	ANTHC developed pre-conceptual layout plats to guide discussion and ideation development. Identified gaps in existing data, developed list of stakeholders and defined stakeholder input requirements. Organized community development factors for consideration around “sectors” of the community (energy, transportation, utilities, etc.)
12/1/2016- 12/12/2016	ANTHC met with Newtok technical partners to define data needs, and to define requirements and preferences for infrastructure from technical/funding standpoints.
12/13/2016- 12/14/2016	Newtok Site Visit #2 to engage with students and provide outreach presentations. Participated in a community meeting where pre-conceptual layouts were presented to generate feedback. Also participated in a community potluck.
12/15/2016- 1/10/2017	Synthesized stakeholder requirements and preferences to identify infrastructure development synergies and conflicts. Developed conceptual maps for 4 CLP preferences.
1/11/2017- 1/13/2017	Newtok Site Visit #3 to conduct in-home interviews with community residents. Participated in NVC Council meeting and a community meeting. Performed door-to-door interviews to engage with residents to share and collect data to further define community preferences and requirements.
1/14/2017- 1/17/2017	ANTHC developed 4 alternative CLPs with variable attributes: <ol style="list-style-type: none"> 1. Community Center to East of MEC, Close to Water 2. Community Center around MEC, Close to Water 3. Community Center around MEC, High on Hillside 4. Community Center to East of MEC, High on Hillside
1/16/2017 - 1/22/2017	Conducted an ANTHC Internal Technical Review (ITR) with participation by a variety of senior engineers across multiple disciplines.
1/23/2017- 1/29/2017	Conducted External Design Reviews of CLP alternatives with various technical and funding agency stakeholders.
1/30/2017- 2/26/2017	Refined CLP alternatives based upon review feedback from partners. Developed a pro’s and con’s comparison across CLPs. Performed an analysis of a variety of opportunities by sector across 3 alternatives. Developed video, 3D, graphic, and map tools to communicate alternatives to community.
2/27/2017- 3/01/2017	Newtok Site Visit #4 to participate in NVC Council meeting, a community meeting, and a community potluck. Collected community feedback on CLP preferences and gather additional improvement recommendations.
3/2/2017- 3/10/2017	Conducted an ANTHC Internal Review of the preferred alternative – Alternative 2 – and update the alternative to reflect community preferences.
3/17/2017	The NVC signed resolution selecting CLP Alternative 2 with the 65% design completed.
3/17/2017- 3/21/2017	Identified data gaps and further refined needs and requirements to advance 65% CLP to 95%. Provided 65% documents for use in advancement of geotechnical investigations and EIS development.
3/22/2017- 3/23/2017	Newtok Site Visit #5 for EIS Public Scoping Meeting, and to provide a community update on the preferred CLP and status of the EIS.

Date	Description and Notes
3/24/2017- 5/11/2017	Sought additional stakeholder feedback and analysis. Identified and completed filling of data gaps identified previously. Defined proposed roads, etc. with technical partners. Developed Community Questionnaire #2.
5/11/2017- 5/15/2017-	Development of 95% CLP Design Review
5/16/2017- 5/18/2017	Newtok Site Visit #6 to participate in NVC Council meeting and a community meeting to present the 95% CLP. Conducted in-home survey interviews, and participated in a community BBQ in collaboration with the school.
5/19/2017- 6/1/2017	External Review of 95% CLP, incorporating survey results.
6/1/2017- 6/5/2017	Implemented improvements to the Final CLP
6/5/2017	100% CLP provided to NVC for their final review
6/5/2017- 6/22/2017	Development of 65% CLP Report
6/22/2017	Newtok Site Visit #7 to participate in NVC Council meeting and a community meeting to present 100% CLP to the resident of the village of Newtok.

4.5.1 Formulation of CLP Alternatives

To increase community ownership of the CLP process, it was critical for the community to have a formal choice in the selection of the final CLP. Surveys of the community found roughly equal numbers of people preferring to be located near the water, versus higher up on the slope. On the other hand, an analysis of the topography at the Mertarvik community site suggested that the CLP could be focused either around the existing development at the MEC and barge landing, where grades average 10 percent to 13 percent, or shifted farther to the east where grade is a flatter 5 to 7 percent.

ANTHC, as a Federal assistance award recipient and non-profit Tribal health organization with the responsibility and authority to provide health services for Alaska Native and American Indian people living in Alaska, worked with the Commission to develop three alternative CLPs that attempted to balance these two divergent options, while adhering to the five CLP goals. Alternative 1 was set relatively close to the water, to the east of the MEC (Figure 15, Figure 16). Alternative 2 was centered on the MEC, with an option available for community development to be weighted more heavily either downslope or upslope from the MEC (Figure 15, Figure 17). Alternative 3 was set much higher on the slope than either Alternative 1 or Alternative 2, and had a more elongated configuration than the other alternatives (Figure 15, Figure 18). ANTHC prepared lists of advantages and disadvantages in various formats for presentation to the community, as well as tools to help evaluate the “pros and cons” of the alternatives. The pros and cons presented for each CLP alternative are shown in Figure 19, Figure 20, and Figure 21, with a summary in Figure 22 (ANTHC 2017a).

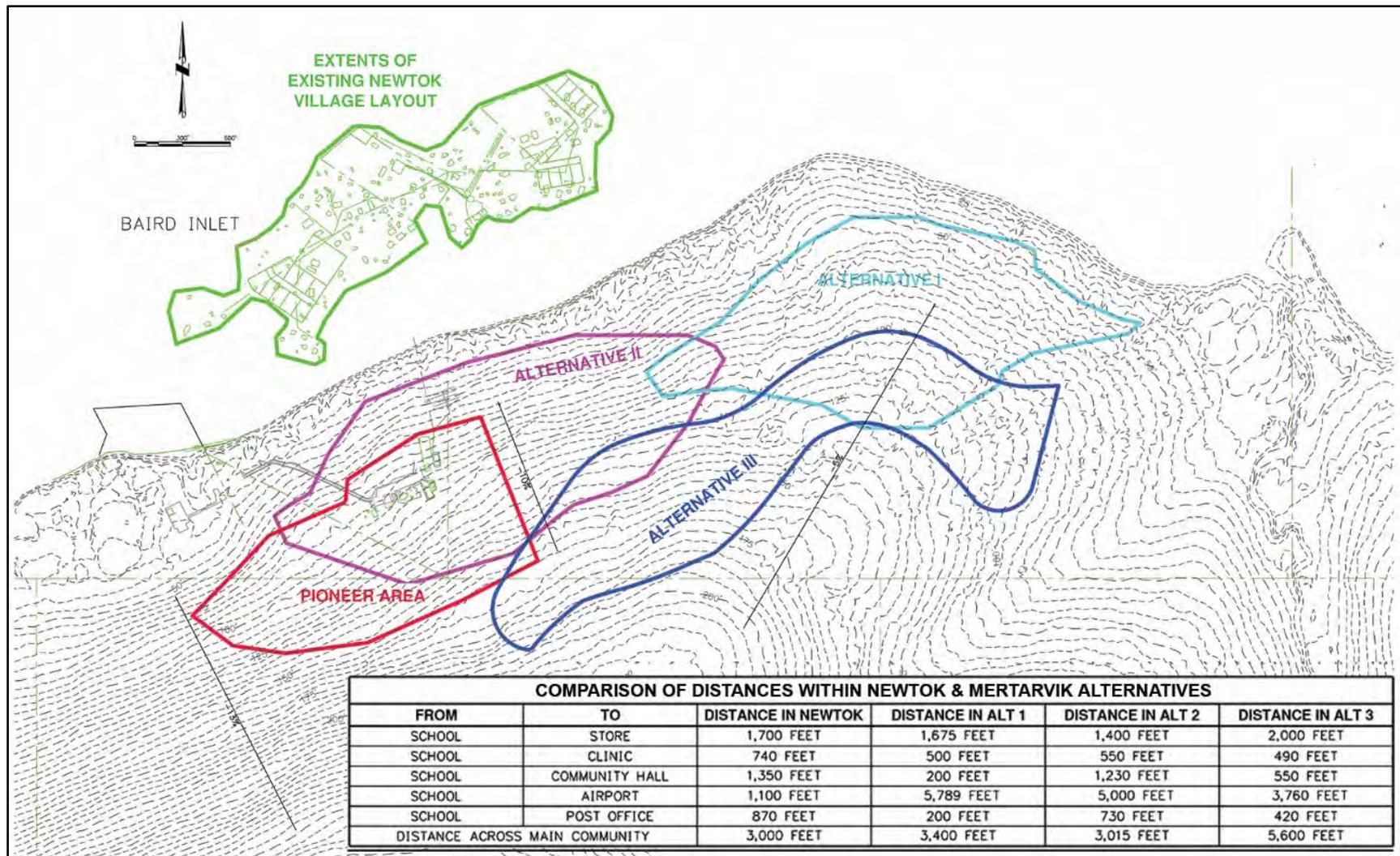


Figure 15. Comparison of the three 2017 CLP alternative footprints, relative to the Pioneer Area, and with the layout of Newtok shown for size comparison (ANTHC 2017a). The Pioneer Area represents infrastructure largely in place or started prior to 2017, and is not itself an alternative.

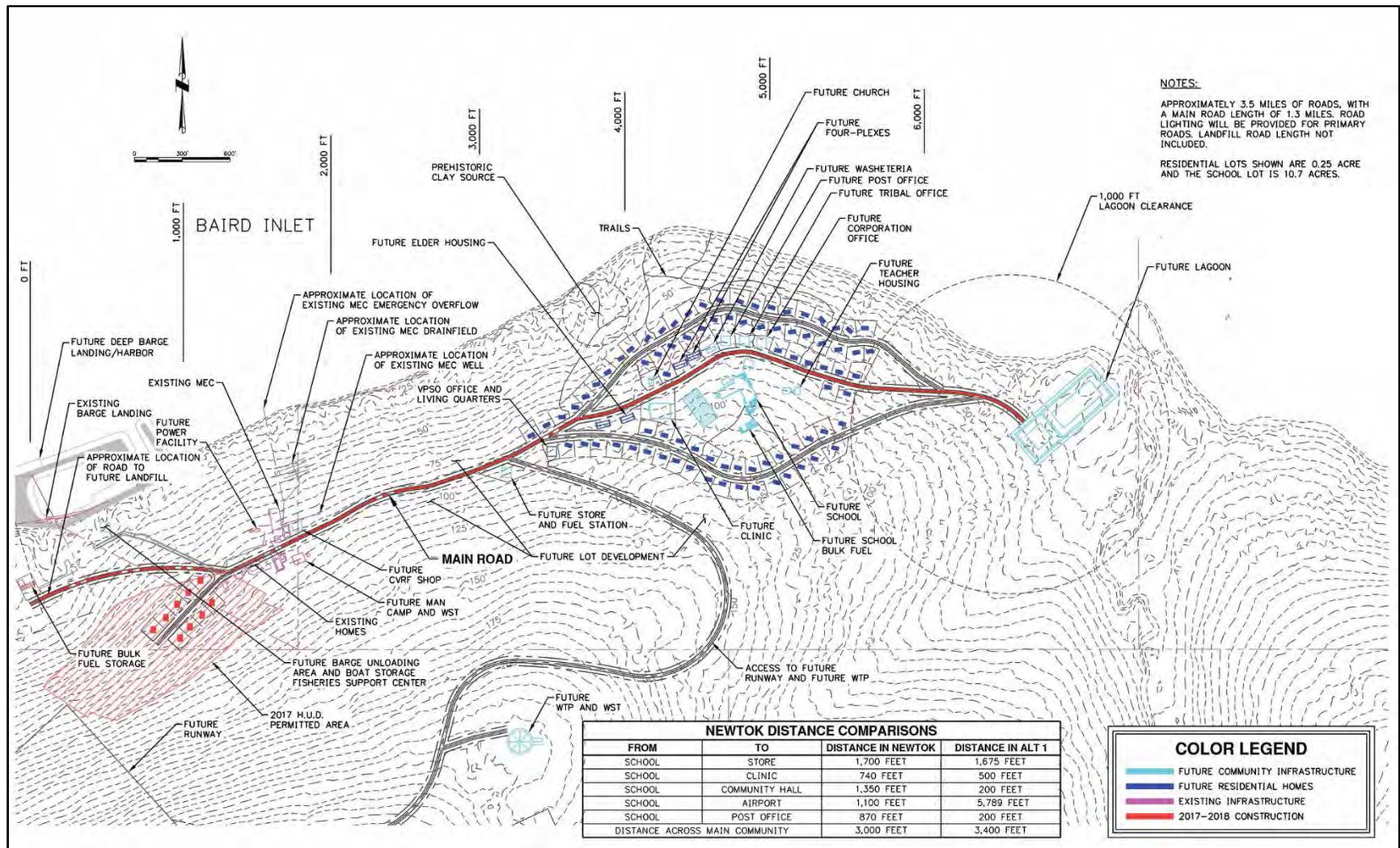


Figure 16. CLP Alternative 1 (ANTHC 2017a).

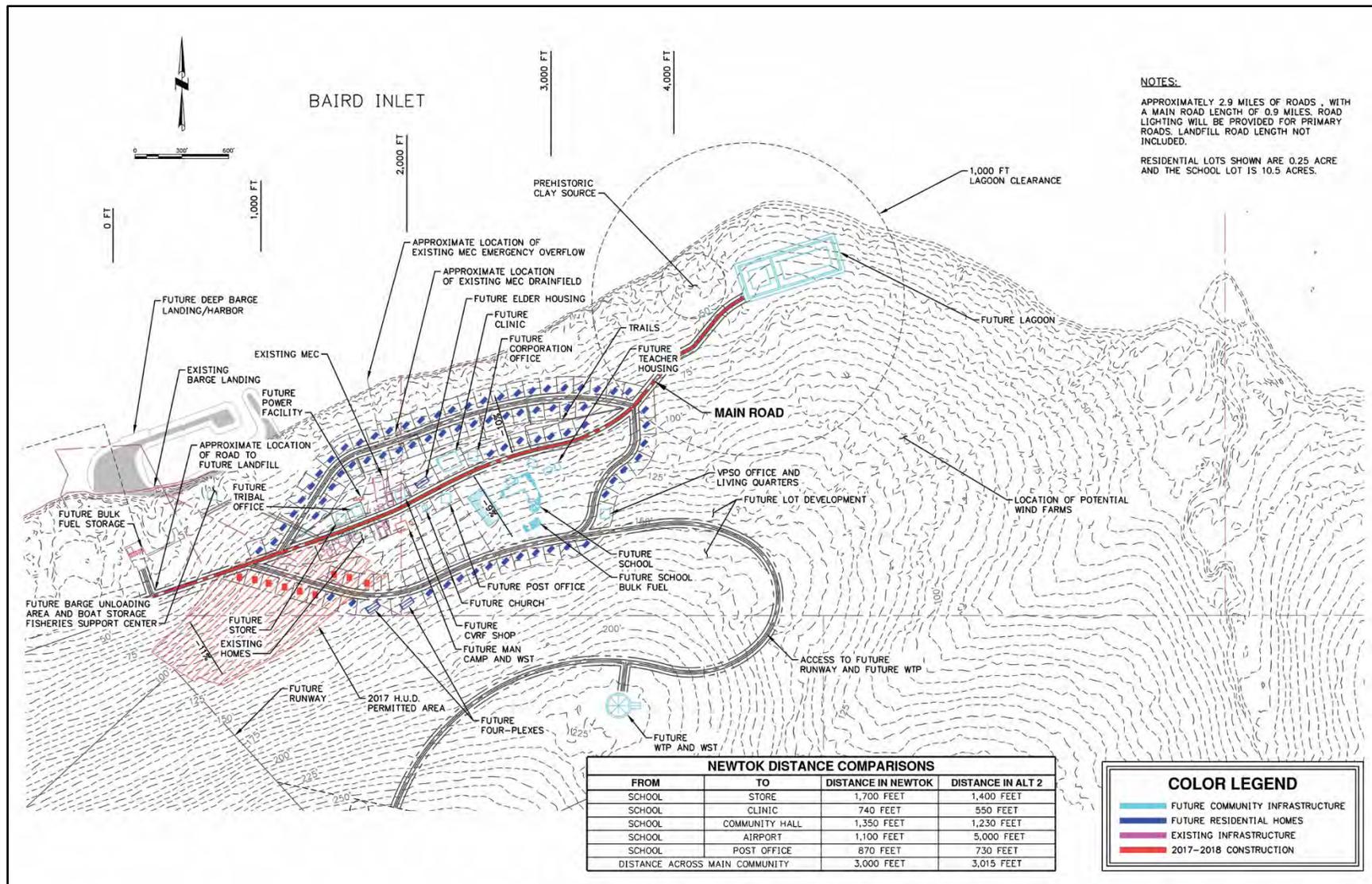


Figure 17. CLP Alternative 2 (ANTHC 2017a).

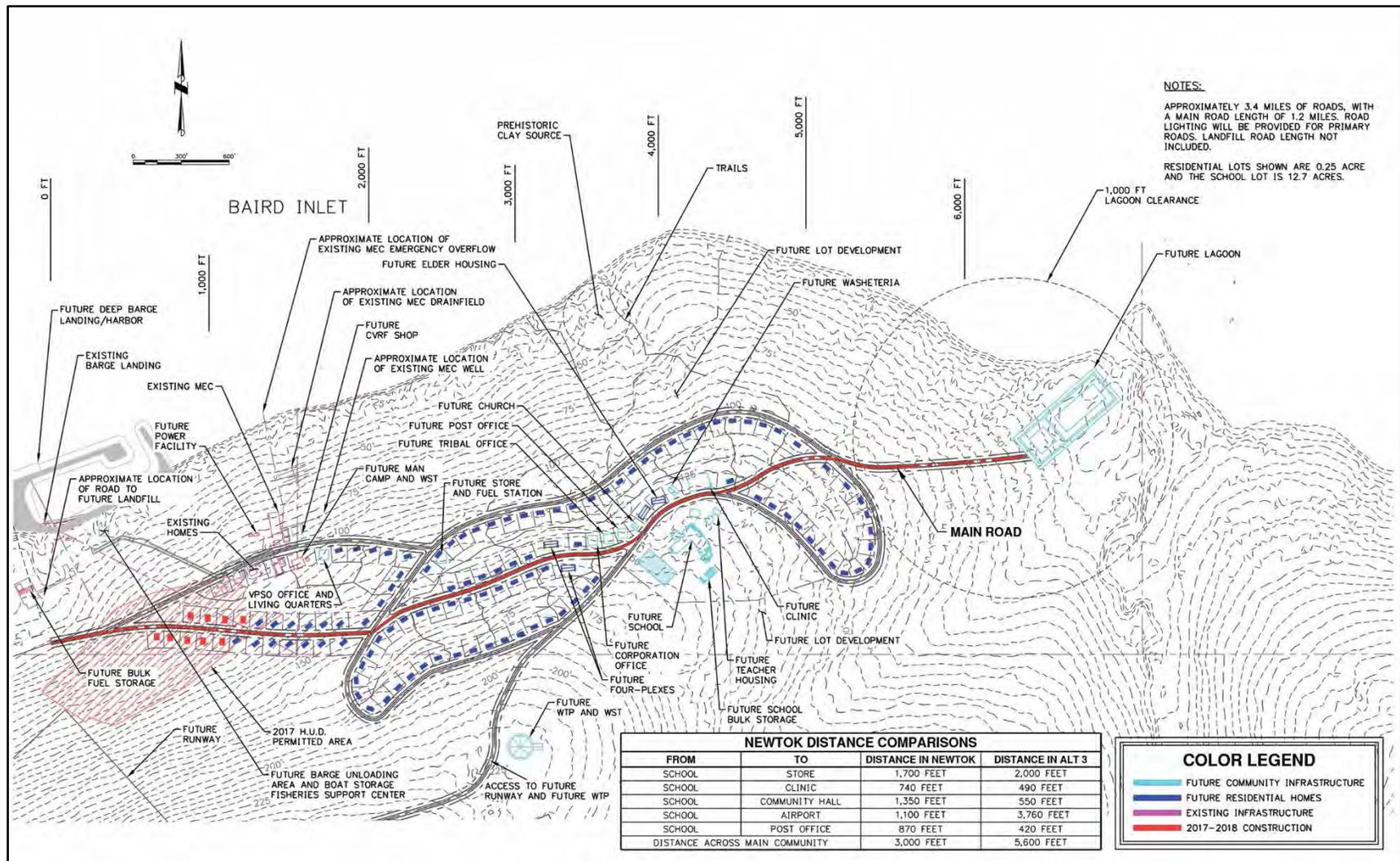


Figure 18. CLP Alternative 3 (ANTHC 2017a).

SITE PLAN 1 OPTION CONSIDERATIONS:									
Cultural integration – land use, historical access to subsistence use areas, residential interviews									
Technical aspects – cost feasibility, access and placement, sustainability, operations and maintenance									
Pioneering Phase into Mertarvik site									
	<u>Water</u>	<u>Sewer</u>	<u>Transportation</u>	<u>Power - Energy</u>	<u>Housing</u>	<u>School</u>	<u>Landfill</u>	<u>Other Infrastructure</u>	<u>Funding - Permitting</u>
Pro's	Limited/No Circulation – No pumps needed	Potential to utilize gravity for pipes	Limited Roads –more cost effective	Power plant located far from Mertarvik	Utilized land contour for privacy	Centrally located	Far from town	Centrally Located	Pioneer Phase can build with current permit
	Buried Pipes plausible	Lagoon located down wind	Relatively flat for reduced elevation change at new site	Short fuel pumping Linear layout for distribution	Flat Land more suitable for pads More cost effective	Sufficient Space 10.6 acres	Nearby "Shop" for landfill equipment	MEC central for Pioneer Phase	Linear Layout vs. Steep - more cost effective
	Linear layout Room for expansion	1000' buffer from city center	Room to expand	Potential for underground power lines	Potential to grow	Gravity water and sewer	Safer from animals at landfill	Separation from "Industrial" facilities from main town site	
	Pioneer Phase area can access MEC water and drain field		Room for developed trail system	Phased users (school, clinic, MEC, man camp) can move with growth and repurpose	More space than Newtok Trail system to beach	Flatter land – more cost effective	Can reuse overburden from quarry to develop landfill		
			Barge landing very isolated						
Con's	Far From Existing West Well (other side of airport)		Pioneering phase further away from Mertarvik	Power plant near Pioneer Phase	Potential Relocation of first homes required	Potential for shadowing and snow drifting	Far from town	Boat winter storage is further away	
	Drill more water wells		Barge landing far from town	Far from Mertarvik Far for local distribution of fuel, minimized heat recovery	Potential for "2 village" thought and siting	Need for mitigating potential fuel spills in delivery		MEC reuse will be far from Mertarvik (2000')	
			Potential for localized ponding	Need to mitigate potential fuel spills		Fuel storage is far away			
LAYOUT PLAN 1 ANALYSIS:									
Flatter slopes for housing pads, yet sloped enough for gravity W&S, leaves room for growth, leaves "industrial" section near power and barge landing, in general cheap construction, and maintains mostly centralized community facilities. Does however create "2" villages spaced about half mile apart, and minimizes waste heat utilization while maximizing fuel spill risk.									

Figure 19. Pros and Cons of CLP Alternative 1 (ANTHC 2017a).

SITE PLAN 2 OPTION CONSIDERATIONS:									
Cultural integration – land use, historical access to subsistence use areas, residential interviews									
Technical aspects – cost feasibility, access and placement, sustainability, operations and maintenance									
	<u>Water</u>	<u>Sewer</u>	<u>Transportation</u>	<u>Power - Energy</u>	<u>Housing</u>	<u>School</u>	<u>Landfill</u>	<u>Other Infrastructure</u>	<u>Funding - Permitting</u>
Pro's	Limited/No Circulation Required	Lagoon downwind from site layout	Multiple but minimal Roads	Short fuel pumping Reduced bulk fuel storage	Centrally located	Central	Far from town	Centrally Located	Can build Pioneer homes for permeneance
	Buried Pipes plausible	Lagoon far from town	Can "reuse" road built during 2017 construction	Potential for underground power lines	Wouldn't need to move Pioneer homes	Possible gravity to sewage lagoon for independent system	Nearby "Shop"	MEC closeby	Won't need to move Pioneer homes
	Potential for gravity	Room for expansion	Close to airport	More waste heat use	Easy access to Beach		Safer from animals		
				Fuel dispensing more efficient			Can reuse gravel to create landfill		
Con's	Far From Existing West Well	Lift Station likely required, additional O/M	Longer roads – more expensive Trucks drive through town	Close to town Noise, smell factors	Steep Slope 10% grade More expensive pads	Less space available than ideal	Far from town	No Separation from "Industrial" facilities from main town site	More expensive to develop
	Roads longer to create gravity	May need heated force main	Steeper elevation changes		Closer together Potential for snow drifting	Steeper slope – more expensive construction			
	Abandon MEC well likely necessary	Required abandonment of MEC septic	Close to airport , Potential for localized ponding		Closer to airport				
			10% grade Steep = more expensive						
LAYOUT PLAN 2 ANALYSIS:									
Layout 2 exists closer to existing development, and allows for maximal utilization of heat recovery and keeps the community closer together. The site is expensive to construct based upon the steep hillside and may present technical challenges, as well as increasing O/M costs for potential water and sewer. The site minimizes fuel transfer requirements and distances to travel for self-haul services and beach access.									

Figure 20. Pros and Cons of CLP Alternative 2 (ANTHC 2017a).

SITE PLAN 3 OPTION CONSIDERATIONS:									
Cultural integration – land use, historical access to subsistence use areas, residential interviews									
Technical aspects – cost feasibility, access and placement, sustainability, operations and maintenance									
	<u>Water</u>	<u>Sewer</u>	<u>Transportation</u>	<u>Power - Energy</u>	<u>Housing</u>	<u>School</u>	<u>Landfill</u>	<u>Other Infrastructure</u>	<u>Funding - Permitting</u>
Pro's	Limited/No Circulation Required	Pumping Only Required From MEC	Limited Roads	Power Plant located far from community center	Large Lots – plenty of space	Relatively Central	Far from town	Most community buildings Centrally Located	
	Buried Pipes plausible	Lagoon located down wind	Relatively flat for reduced elevation change, least expensive/challenging construction	Short fuel pumping	Flat Land more suitable for pads	Maximal Space 12.7 acres	Nearby "Shop"	Separation from "Industrial" facilities from main town site	
	Potential for gravity	Potential for majority gravity service	Room for developed trail system	Potential for underground power lines	Less potential for "2 village site" setting	Gravity service to potential lagoon	Safer from animals		
		Relatively inexpensive construction	Best "flow" of traffic		More spread out	Ease of access to airport	Can reuse gravel to create landfill		
		Low O/M Cost				Flattest possible location for ease of construction			
Con's	Far From Existing Community Well	Sewage Lagoon Relatively Close to Community	Barge landing far from town	Fuel distribution for community members far from community center	Potential relocation of first homes possible	Not as central to all	Far from town	Boat winter storage is further away	Phased construction may present challenges
	Drill more water wells needed	Lift station required for MEC-Center	Pioneering phase further away from Mertarvik	Waste Heat well utilized but not optimized	More spread out			Some community buildings separated	
			Additional culverts required, Potential for localized ponding						
<p>LAYOUT PLAN 3 ANALYSIS: Allows for a flatter slope for development and room to expand, provides centralized public buildings and road access to subsistence both east and west. This also allows for access to the watering spring on the west beach on the Pioneer Landfill road. In general likely the cheapest simplest construction option, and accommodates more space between homes while maintaining central facilities. Phasing construction may be a challenge, but mostly minimizes many of the challenges of layout 1.</p>									

Figure 21. Pros and Cons of CLP Alternative 3 (ANTHC 2017a).

SITE LAYOUT ANALYSIS, CONSIDERATIONS & RECOMMENDATIONS									
Cultural Factors: land use, historical access to subsistence use areas, residential input, lifestyle needs Technical Factors: cost feasibility, access and placement, sustainability, operations and maintenance Development Considerations: cost effectiveness, historical weather patterns (wind, snow drifting, rain), access to major infrastructure, safety, food security, health									
	LAYOUT OPTION 1			LAYOUT OPTION 2			LAYOUT OPTION 3		
PRO'S	Flatter Ground More Cost Effective	Room to Grow	Potential for Buried W&S	Sewage Lagoon Far Away	Room to Grow	Potential for Buried W&S	Flatter Ground	Room to Grow	Potential for Buried W&S
	School Central	Power Plant far from town	Ability to use MEC system during Pioneer Phase	Landfill Far Away Close to Shop	School Central	Public Buildings Central	Fewer Roads Developed Trails	Landfill Far Away Close to Shop	Ability to use MEC system during Pioneer Phase
	Landfill Far Away Close to Shop	Access to Beach	Airport Far Away	Access to Beach	Short Distance for Fuel Pumping	Smaller Footprint	Less Crowded	School Mostly Central	Power Plant far from town
	Less Crowded			Ability to use MEC system during Pioneer Phase			Best Traffic Management		
CON'S	MEC is more isolated and far away	Boat Storage Far Away	Most roads, though flat	Steeper Slopes Up to 10% grade	Airport close Beach far	More expensive foundations for most facilities	Lift Station near MEC for pioneering homes	Landfill Far Away Far From Beach	Barge Landing Far Away
	Barge Landing Further Away	Airport Far Away	Landfill Far Away	Far from West Well	Abandon MEC W&S system	Homes on slope – potential for more drifts	Sewage Lagoon closer to town	Far from West Well	Boat Storage Far Away
	Far from West Well	Sewage Lagoon Closer	Potential for 2 village areas	More crowded	Landfill Far Away				
AGENCY COMMENTS	HUD, DC, BIA, AEA: 1. The HUD permitted area is much larger for non-housing facilities 2. Concerns for the location of the bulk fuel and power plant. 3. Concerns for subsistence living—are any of the proposed locations on specific subsistence resource lands? 4. Recommended placing pull outs or rest areas for foot traffic, specifically elders, along the road/trails. 5. Recommended placing lighting on the road. 6. Recommend Adding proposed harbor to layout 7. Request LF of road and proposed quantity of housing lots 8. AEA recommends site 2, HUD, BIA, DC no stated preference, all plausible.			SOA DCRA: 1. Best to consider phasing approach of construction in all layouts 2. Recommended color coding phases during eventual recommendation 3. Recommended improve ability of community to visualize layouts 4. Ensure SHPO concerns are highlighted on maps. 5. Cost Estimate for construction of each alternative recommended 6. Layout 2 is preference, though all are possible.			Technical Consultants (Kinney, GEI, LCG, HDL, DOWL, CCHRC) 1. Alt 1: Future airport access is less direct 2. Alt 2: More feasible than 1 for construction 3. Alt 3: Best for topo. Delete road leg to sewage lagoon 4. Considerations: Drainage, Heavy Vehicle Access, specifically for airport construction and Intersection Grades 5. Alt 3. Is best aesthetic option 6. Alt 2 is best for minimizing fuel spill risk and power considerations 7. LCG, Kinney, GEI preference for Layout 3, HDL, CCHRC preference for site 2. DOWL no stated preference		

Figure 22. Summary and Comparison of CLP Alternatives (ANTHC 2017a).

4.5.2 Development of the Airport Layout Plan

The ADOTPF has been studying prospective sites at the Mertarvik community site since at least 2007, when they identified six potential locations for the new airport in a 2007 reconnaissance study conducted for the ADOTPF by PDC Engineers Inc. (PDC 2008). According to the ADOTPF's March 2008 reconnaissance report (incorporated here by reference), three sites (Alternatives 2, 5, and 6) were eliminated based on information received from pilots, the public, and a site visit. Some of the reasons given for eliminating these alternatives are: (1) pilots expressed a concern with the nearby hills for Alternatives 2 and 5; (2) land acquisition for Alternative 2 would be more difficult because of Native allotments; (3) Alternative 5 would require property from the Yukon Delta National Wildlife Refuge for the runway, taxiway, and apron, and land from the Newtok Native Corporation for an access road to the community (4) the location for Alternative 5 is farther from the community site than any of the other alternatives; (6) the topography of the site for Alternative 6 would require either deep fills at each end of the runway or cutting out the hill near the center portion of the runway to obtain the line of sight requirements and clearance of the FAR Part 77 primary surface; and (7) the Alternative 6 location has limited flat terrain for apron and aviation support areas and would require deep fills.

The remaining three potential sites, designated Alternatives 1, 3, and 4, in the 2008 report, were then evaluated based on the following eight criteria:

- Orientation for wind;
- Proximity to the community;
- Airspace penetrations;
- Environmental impacts;
- Bird and wildlife hazards;
- Topography and soils;
- Site development and maintenance costs; and
- Proximity to material sources and the new barge landing.

The general results of the evaluation were as follows. The sites ranged from 0.25 mile to 2 miles from the planned village site and were between 1 and 3 miles from both the planned barge landing and the most likely material source. All three sites allowed some flexibility of runway orientation to maximize wind coverage, although it was not known at that time whether any could achieve 95 percent wind coverage, and only Alternative 1 appeared able to accommodate a crosswind runway. Based on the level of mapping detail available (4-foot contours for Alternative 1 and 50-foot contours for Alternatives 3 and 4), the sites appeared to be in rolling hills (Alternative 1) or flat terrain with possible rolling hills (Alternatives 3 and 4), with no airspace penetrations identified. All three sites appeared to have similar soil conditions, with preliminary investigation indicating that the foundation soils are moderately stable where unfrozen, relatively ice-poor where frozen, and only marginally susceptible to detrimental effects

from seasonal frost. Overall environmental impacts for all three sites appeared to be minimal, although all three would have unavoidable wetland impacts.

Airport layouts were then developed for the runway, apron, taxi way, and access route for the three identified alternative sites. Evaluation of the three alternatives was based on high-level information as compared with site-specific predesign-level information. At that level, all three sites were relatively similar, and because all three appeared viable, they were all carried forward for additional evaluation (Figure 23, PDC 2012).

In addition to the airport relocation reconnaissance study commissioned in 2007, ADOTPF commissioned a follow-up study for site selection and development of an airport layout plan in December 2009. The culmination of these two studies resulted in the December 2012 Mertarvik Airport Site Selection Study report, also prepared by PDC Engineers Inc. The 2012 report recommended the selection of Site 1 for future construction of an airport. Engineering studies determined that Alternative 1 would be the easiest to access and the most cost-effective to construct, operate, and maintain. This site is the closest to the Mertarvik community site, an important factor during inclement weather (PDC 2012). However, the site is still far enough away to allow for community expansion well beyond the boundaries shown for development.

According to the 2012 report, additional engineering analysis determined that an “optimized” single runway (Alternative 1.1), oriented at 138° would be the preferred build alternative. At 100 feet wide and within a 300-foot safety area, this runway would provide sufficient wind coverage without the need for an additional crosswind runway. Initial construction would consist of a 75-foot-wide by 3,300-foot-long runway with a 150-foot by 3,900-foot safety area. Staged construction of Alternative 1.1 would allow for operation and use of the airstrip while allowing it to be gradually expanded to its ultimate size of 100 feet wide by 4,000 feet long with a 300-foot by 4,600-foot safety area.

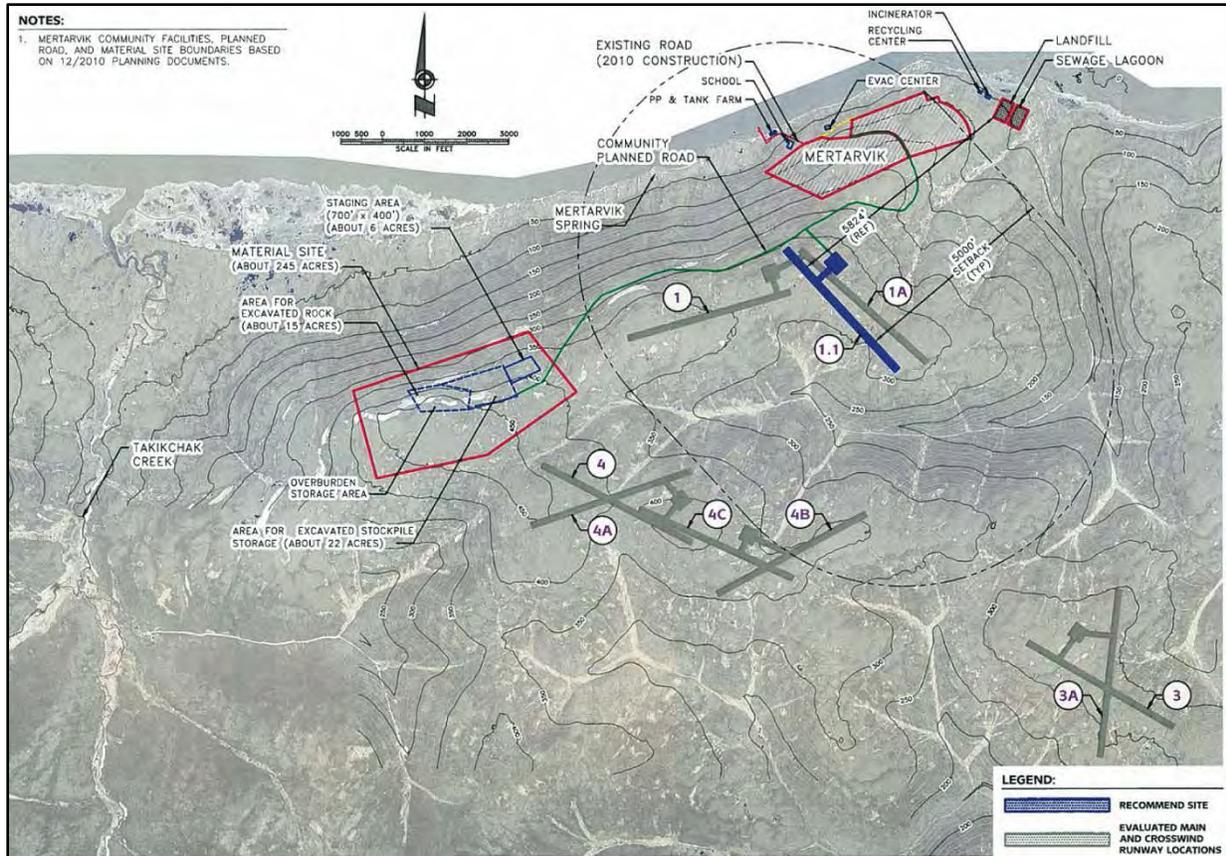


Figure 23. Mertarvik Airport location and layout alternatives (PDC 2012).

In a letter dated May 22, 2014, the FAA informed the ADOTPF that they had completed their review of the updated Airport Layout Plan (ALP) for the Newtok Airport and Mertarvik, Alaska (Figure 24). The ALP design was conditionally approved subject to the condition that the proposed Class III Municipal Solid Waste Landfill and wastewater treatment lagoon at Mertarvik maintain a minimum separation requirement of 5,000 feet from the airport.

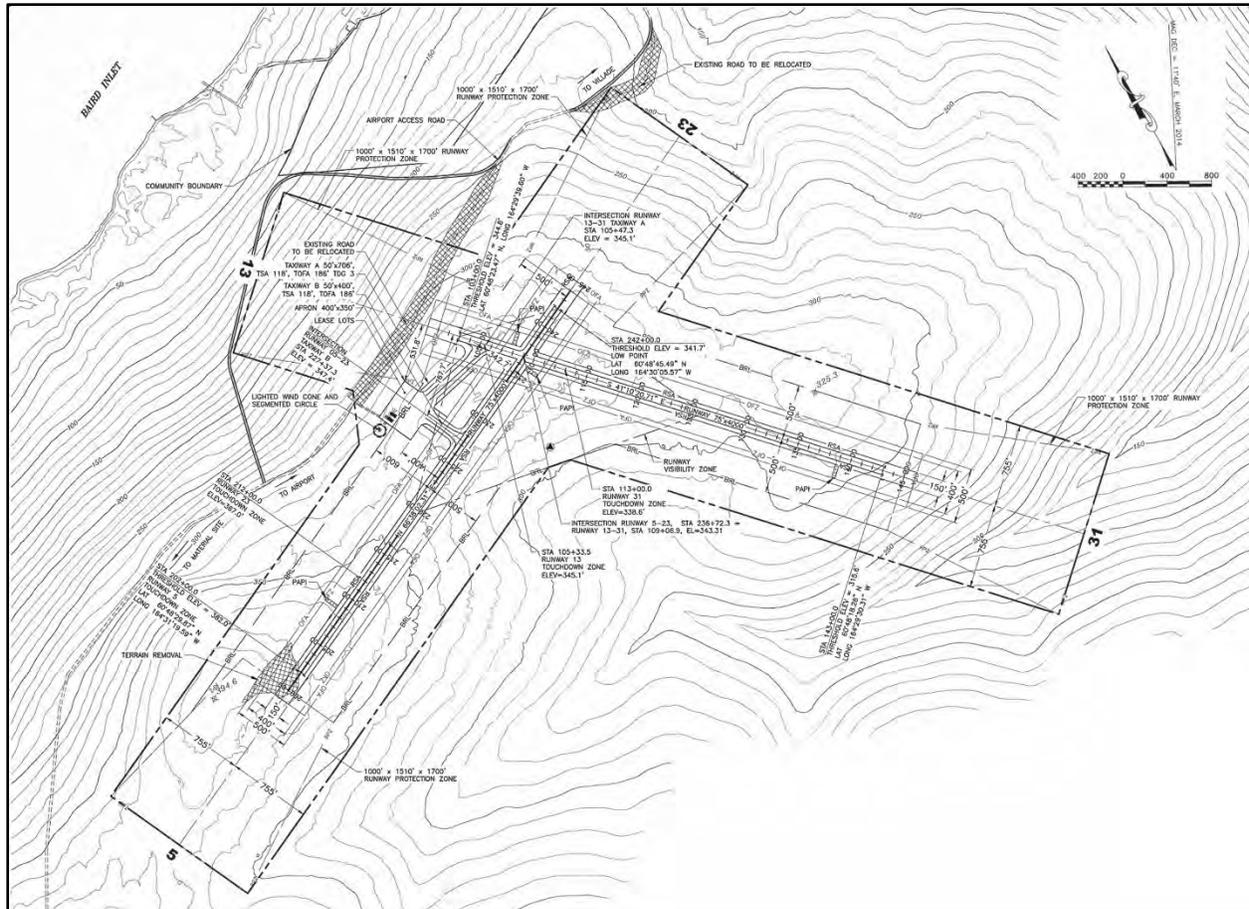


Figure 24. Preferred Mertarvik Airport Layout Plan (ALP) as approved by the FAA in 2014. The airport road and apron were later reconfigured to accommodate the 2017 CLPs.

In the collaboration between the Commission and the FAA that occurred during the scoping and preparation of this EIS, minor adjustments were made to both the airport layout and to the community site layout. The airfield apron was flipped to the east side of the north-south runway and reshaped to fit within the airport protection boundary, and the airport road route was modified to better reflect the approach from the village center. The proposed locations of some community infrastructure were shifted to ensure that they did not intrude upon FAA restricted areas or other requirements.

4.6 Preferred Alternative

The preferred Mertarvik Infrastructure Development alternative, and proposed action, is CLP Alternative 2, with some minor modifications made after selection by the people of Newtok. Figure 25 and Figure 26 show the final selected CLP as of June 2, 2017. The preferred alternative was accepted unanimously by a quorum of the Newtok Village Council, in a resolution dated June 22, 2017.

The FAA's preferred alternative is construction of the replacement airport at Mertarvik as proposed and further defined in section 4.5.1. FAA's preferred alternative is, of course, a component of the overall preferred alternative and is the same for all CLP alternatives. FAA's preferred alternative is a component of the larger preferred alternative because the agency's authority and role encompass only the airport component of the project.

4.6.1 Infrastructure Elements

The preferred alternative is shown in Figure 25, Figure 26, and Figure 26a. The individual structures and features that make up the CLP, such as homes, community buildings, and utilities, are annotated on Figure 26, and listed in Table 3. The preferred alternative also includes nearly 28,000 linear feet of gravel roads, and 14,350 linear feet of designed and maintained gravel trails (Figure 25, Figure 26). The roads are assumed to have 40-foot wide beds; the width of the trails will vary according to their expected use and the local topography.

The preferred CLP was designed using lot sizes assigned for each structure and facility. Many of the proposed infrastructure elements have not yet been designed, so their structural footprint in Table 3 is estimated based on their planned use and on similar structures existing in other rural Alaska communities.

Design work on the CLP infrastructure elements is underway, particularly for essential utilities. Design plans and studies completed for Mertarvik as of November 2017 include:

- *Mertarvik Bulk Fuel & Rural Power System Conceptual Design Report*, August 2017 (Cooper, et al 2017a).
- *Newtok-Mertarvik Relocation Energy Master Plan, Final*, May 2017 (Cooper, et al 2017a).
- *Mertarvik Housing Master Plan*, February 2017 (CCHRC 2017).
- *Mertarvik Multi-Purpose Building Retrofit Feasibility Study*, January 2016 (CCHRC 2016).

These design documents and others are available at the Newtok Planning Group website, <https://www.commerce.alaska.gov/web/dcra/PlanningLandManagement/NewtokPlanningGroup.aspx>, and are incorporated by reference in this EIS.

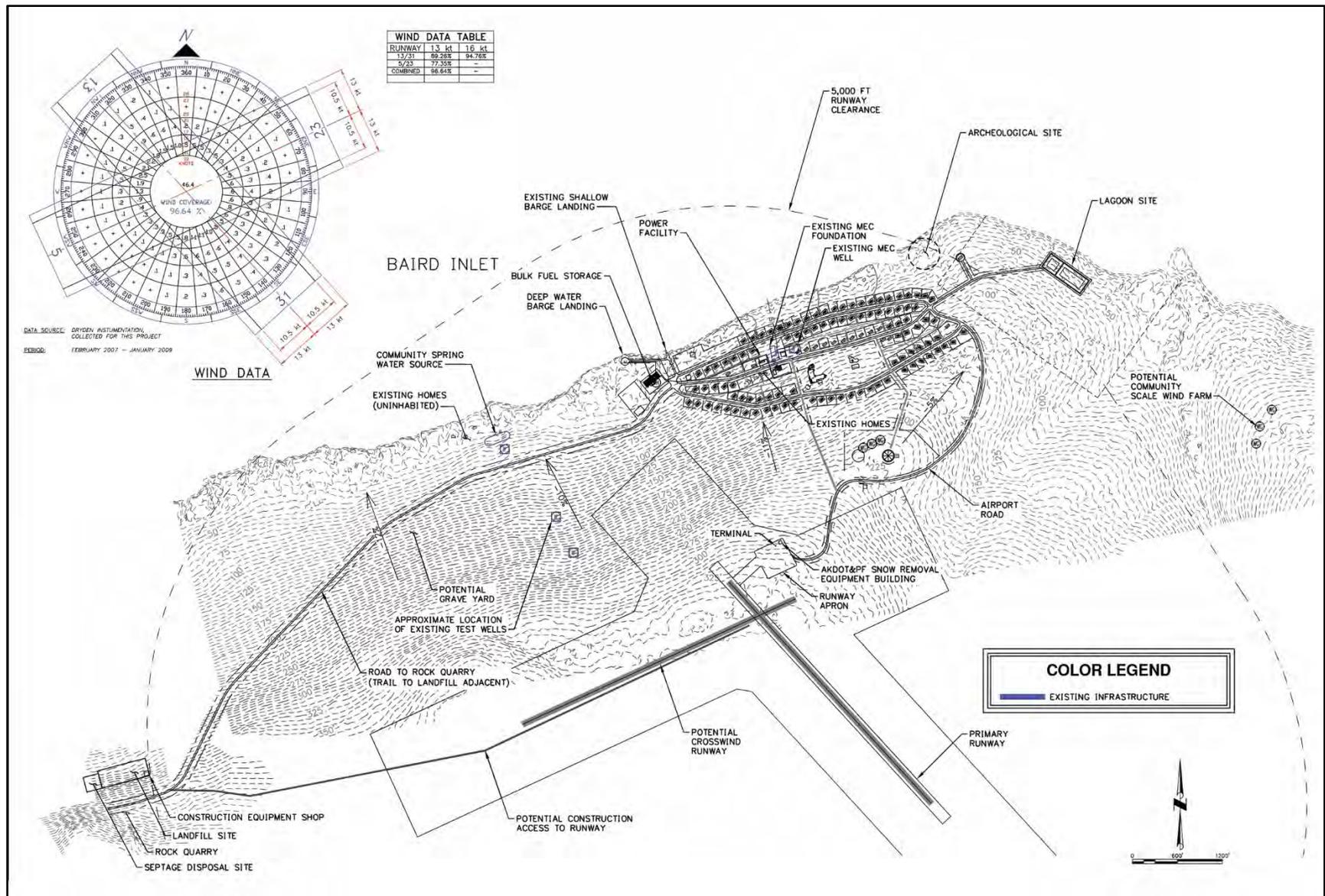


Figure 25. Preferred Alternative - ANTHC CLP Alternative 2 (with post-selection revisions; ANTHC 2017b; airport road alignment updated by USACE 20 Nov 2017)

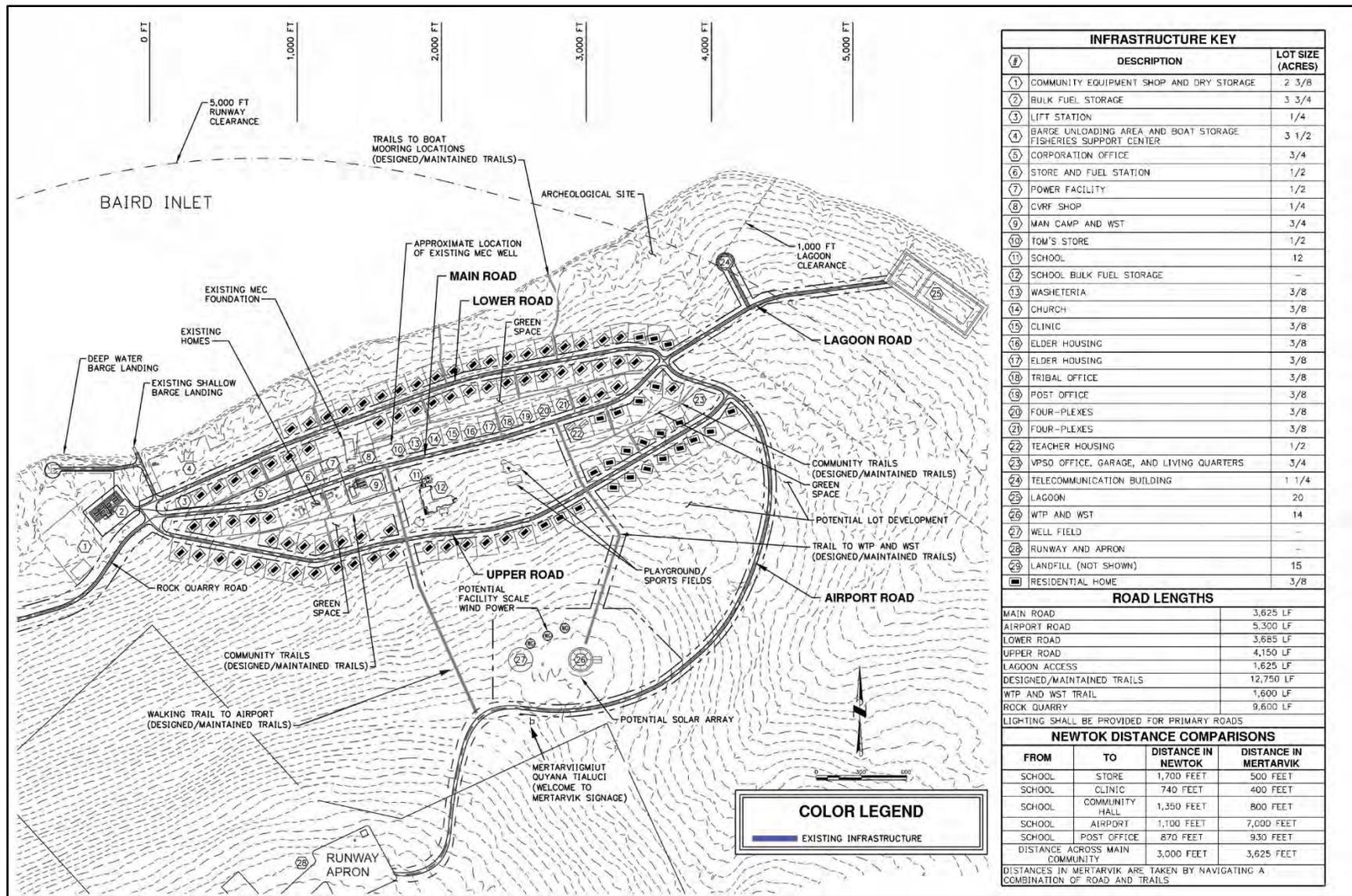


Figure 26. Preferred Alternative - ANTHC CLP Alternative 2 with detail of community center (ANTHC 2017b; airport road alignment updated by USACE Nov 2017)

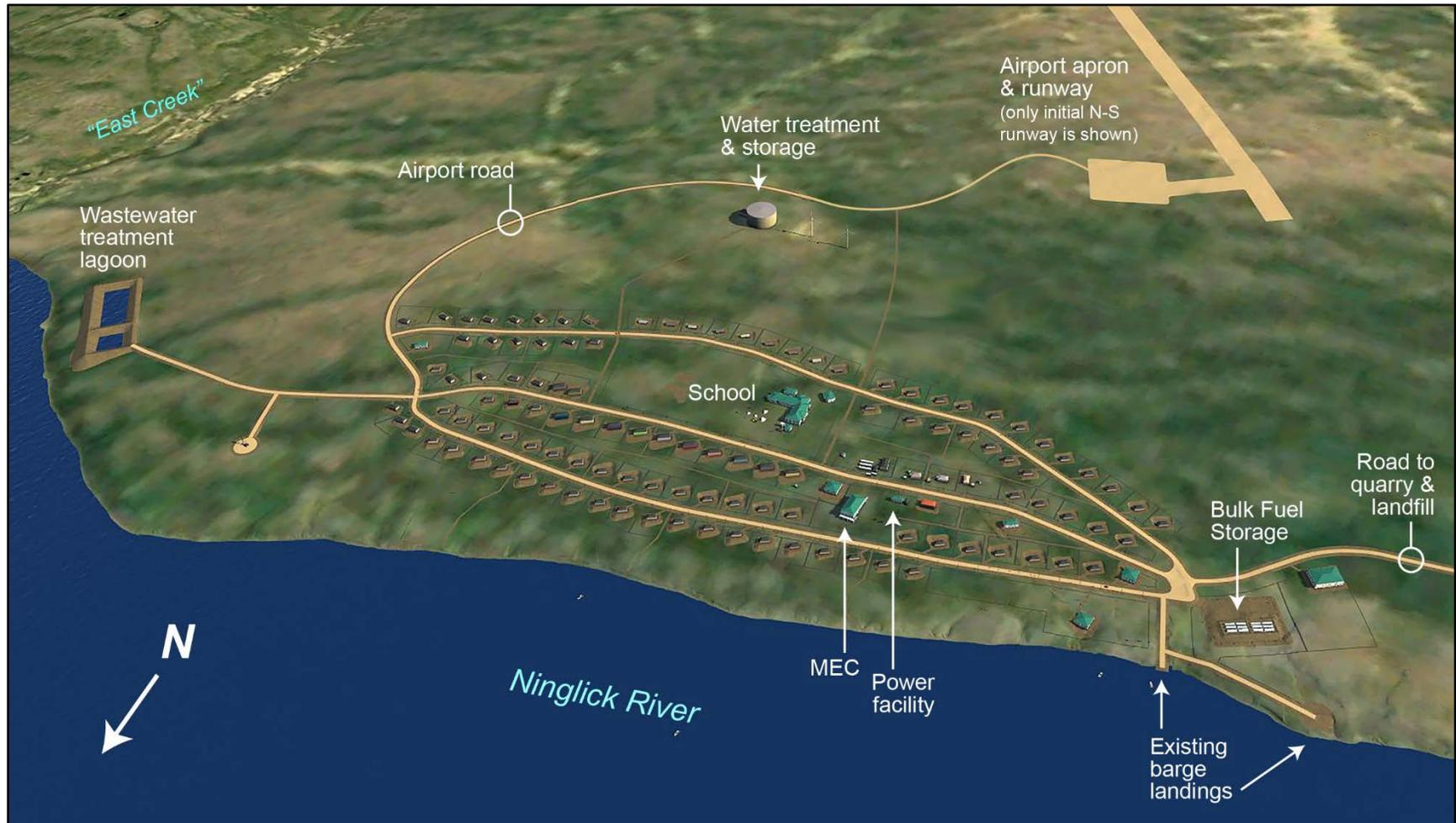


Figure 26a. Computer-generated rendering of the preferred alternative, annotated with major infrastructure elements; refer to Figure 26 and its Infrastructure Key (ANTHC 2017).

Table 3. List of CLP Infrastructure Elements, with Lot and Estimated Footprint Area

Infrastructure Key (matches Figure 26)	Infrastructure Element	Lot Size Provided (acres)	Estimated Structure Footprint (acres)
1	Community Equipment Shop & Dry Storage	2.375	0.33
2	Bulk Fuel Storage	3.75	1.75
3	Lift Station	0.25	0.125
4	Barge Unloading area & Boat Storage Fisheries Support Center	3.50	0.33
5	Corporation Office	0.75	0.125
6	Store & Fuel Station	0.50	0.125
7	Power Facility	0.50	0.33
8	CVRF Shop	- ^a	0.25
9	Construction Camp & Water Storage Tank	0.75	0.125
10	Tom's Store	0.50	0.125
11	School	12.00	3.25
12	School Bulk Fuel Storage	- ^a	0.25
13	Washateria	0.375	0.125
14	Church	0.375	0.10
15	Clinic	0.375	0.10
16	Elder Housing	0.375	0.125
17	Elder Housing	0.375	0.125
18	Tribal Office	0.375	0.125
19	Post Office	0.375	0.10
20	Fourplexes	0.375	0.125
21	Fourplexes	0.375	0.125
22	Teacher Housing	0.50	0.125
23	VPSO Office, Garage, & Living Quarters	0.75	0.125
24	Telecommunications Building	1.25	0.25
25	Wastewater Treatment Lagoon	20.00	14.00
26	Water Treatment Plant & Water Storage Tank	14.00	1.25
27	Well Field	- ^a	0.10
28	Airport Runway, Taxiway, & Apron	495.00 ^b	58.6 ^{c,d}
-	Landfills (municipal solid waste & construction monofill)	15	12
-	Single Family Homes, total (100 each new)	37.50	10.00
	Total Occupied Acreage	612	132

a. Infrastructure element not provided a separate lot.

b. 495-acre value refers to the total area that must be deeded to the State of Alaska for operation of the airport.

c. Acreage value for the airport footprint is from PDC Engineers 2017; other values from ANTHC 2017b.

d. This acreage does not include a crosswind runway.

The following sections provide descriptions of select infrastructure elements, with their likely characteristics, requirements, and construction considerations. These descriptions are based on geotechnical investigations, preliminary engineering reports, regulations, design standards, and/or typical design and construction practices with similar facilities constructed in other rural Alaska communities.

Solid Waste Landfill: The proposed facility will be a Class III Municipal Solid Waste Landfill (MSWLF) designed and permitted IAW Alaska Department of Environmental Conservation (ADEC) Solid Waste Management regulations, 18 AAC 60, as amended through November 7, 2017. The landfill will be sized with a 20-year design population of 518 people, based on a projected annual growth rate of approximately 6.5 percent; and a per capita waste generation rate of 7.5 lbs/day.

The proposed landfill site is located north of the existing rock quarry. The quarry road will double as an access route from the town center to the landfill. The selected location satisfies Federal Aviation Administration (FAA) airport separation requirements. The location near the quarry also has the added advantage of ready access to cover material. Geotechnical investigations of the site, consisting of 9 borings, did not encounter any frozen materials to the extent of the borings which were terminated at approximately 16-feet below ground surface. Subsurface conditions generally consist of organic material to 2.5 feet, overlying silty gravel with sand. Groundwater was not observed in the test holes at the time of drilling in July 2017 (Golder 2017).

The proposed landfill will be developed as a trench and fill type facility, consisting of an unlined active waste disposal cell, a cold storage building, a carrion waste disposal cell, a septage disposal site, two incinerators, and a designated area for stock-piling salvageable items. Disposal trenches will be excavated on as-needed basis, with each cell approximately 8 feet wide, up to 100 feet long, and 5 to 8 feet deep. The facility will be equipped with an incinerator to reduce the volume of inert waste prior to disposal. Ash will be placed into the active disposal cell and compacted with other municipal solid waste. The entire landfill area will be fenced to prevent waste from migrating from the designated site and in order prevent unauthorized access. The facility footprint, including active operating areas and sufficient land for trench development throughout the design life of the facility, is approximately 7 acres. In addition, a construction monofill adjacent to the municipal landfill is being considered, to receive construction waste from Mertarvik, and potentially accept non-hazardous demolition debris from Newtok. If both landfills are constructed, the area occupied by landfills would increase to approximately 12 acres.

Hazardous materials will not be accepted at the landfill. Hazardous materials will be separated, containerized, and stored for future backhaul from Mertarvik to an approved offsite disposal

facility. Hazardous material storage containers will be located at a site near the barge landing to facilitate future shipment from Mertarvik.

Construction of the facility will require limited cut and fill methods to establish working surfaces and pads for salvageable material storage area and for the cold storage container. Primary disposal trenches shall be directly excavated to the size and depths noted above. Excavated materials shall be stockpiled adjacent to the trenches and used for routine cover operations as solid waste is compacted into the trenches. Excavated materials will be stockpiled in a manner to prevent surface water runoff into active trenches.

Wastewater Treatment Facility: The proposed treatment facility will be a two-cell facultative wastewater lagoon, typical of wastewater treatment facilities used throughout rural Alaska. These lagoons are easy to operate and maintain, they handle a wide range of flows and provide for many years of accumulated sludge storage. The facility shall be designed, permitted, and constructed IAW ADEC Wastewater Disposal Regulations, 18 AAC 72, as amended through November 7, 2017, and IAW ADEC “Lagoon Construction Guidelines,” as revised July 18, 2013. Typical design criteria from these documents are summarized in Table 4.

Table 4. ADEC Design Criteria for Wastewater Treatment Systems

Parameter	Value	Units
Minimum Design Service Life	20	years
Total BOD Loading	20	lbs./acre/day
BOD Strength	0.17	lbs./person/day
BOD Removal	85%	minimum
SS Removal	85%	minimum
No. of Cells	2	minimum
Minimum Freeboard	3	feet
Primary Cell Maximum Depth	10	feet
Primary Cell Retention	40-60	days
Secondary Cell Depth	5	feet
Secondary Cell Retention	240-365	days
Minimum Cell Sludge Storage	2	feet

Based on these criteria, a 20-year design population of 518 people, and an average per capita wastewater generation rate of 75 gallons/day, a conservatively designed wastewater treatment lagoon system is expected to have two cells with a total surface area of 9 to 10 acres. Adding an estimate for earthen berms required to form the lagoon ponds, the entire facility will have an estimated footprint of approximately 14 acres.

Treated effluent from the lagoon will be seasonally discharged into the Baird Inlet. Permitting authority for wastewater discharges in Alaska is administered by ADEC under the Alaska Pollutant Discharge Elimination System (APDES). The APDES program issues both individual and general permits. It is anticipated that the Mertarvik lagoon will be permitted under a general

permit for small domestic lagoons that discharge to surface water. Effluent limits and monitoring requirements will be defined in the permit.

Six test holes were drilled at the lagoon site to a depth of 16 feet to evaluate subsurface conditions. Conditions at the lagoon site generally consist of organic material up to five feet thick, overlying a mixture of silt and silty sand. Gravel was observed intermixed with the silt and sand in several boreholes. Permafrost was observed on one of 6 boreholes. Bedrock was encountered in one borehole at a depth of 5 feet, but not observed in the other holes. Groundwater was not observed at the time of drilling in any of the boreholes advanced at the site (Golder 2017).

Construction of the lagoon will involve cut and fill construction methods, including the removal of 2 to 3 feet of surface organic material from the entire 14-acre site and the subsequent placement of suitable material for the construction of earthen containment berms. Berms will be constructed to a height of 10 to 15 feet with 3:1 side slopes. Fill material will be sourced from within the footprint of the excavations and/or imported from the existing rock quarry.

The proposed lagoon location satisfies FAA airport separation requirements. The location is also predominantly downwind of proposed housing and public facilities.

Energy Systems: The *Mertarvik Bulk Fuel and Rural Power System Conceptual Design Report*, was written by Gray Stassel Engineering, Inc. and HDL Engineering Consultants and published in August 2017 (Cooper et al 2017). The following descriptions of bulk fuel and power generation systems are excerpted from this report.

Bulk Fuel Storage and Dispensing Facilities: The new fuel storage tank farm will consist of two gravel containment cells lined with a fuel resistant liner. New single-wall, horizontal fuel tanks will be installed inside the containment including: (8) 27,000-gallon bulk tanks, (2) 20,000-gallon bulk tanks, (1) 12,000-gallon intermediate tank, and (1) 20,000/8,000-gallon dual compartment tank for a gross fuel capacity of 214,000 gallons of diesel fuel and 82,000 gallons of gasoline. The tank farm will also include two marine header fill points and associated piping; truck fill; retail sales dispensing tank and dispensers; and fuel conveyance piping between the tank farm, retail sale dispensing tank, and power plan intermediate tank.

The tank farm will be constructed on an approximately 300-foot wide by 200-foot long gravel pad. An approximately 65-foot wide by 225-foot long gravel fuel containment berm with a fuel resistant liner will be installed to separate the containment into two cells to meet code requirements. A drive-through fuel transfer spill containment will be installed adjacent to the tank farm for truck fill operations. A 6-foot chain link fence with a barbed wire top will surround the tank farm pad to secure the area.

Subsurface conditions at the tank farm site were evaluated via six test holes drilled near the proposed site. The site is generally underlain by tundra/peat, then ice rich fine grained soils to an average depth of 18 to 22 feet. The foundation for the tank farm is anticipated to include a passive refrigeration system with thermosiphons and flat-loop evaporators. The thermosiphons will be required to provide a stable foundation over the permafrost (Golder 2017).

Tank farm foundation construction will include excavation and removal of surface organic material, installation of fuel resistant geomembrane liner, installation of thermosiphons, placement and compaction of select local fill material for pad construction, and installation of gravel or timber containment dikes.

The construction of a gravel “working” pad and driveway around the tank farm and truck fill containment foundation area is recommended to support tank farm construction and maintenance operations. Construction of the working pad area will include the installation of a geotextile separation fabric over the existing organic layer that is covered with a 3-foot minimum layer of non-frost susceptible (NFS) structural fill material.

Power House: The power plant will consist of a pre-fabricated module with a segregated generator room and control room/office. The module will include three new Tier-2 and Tier-3 marine diesel engine-generators, new automatic start/stop/paralleling switchgear, a new heat loop for generator heat recovery with community buildings, remote radiators with variable speed fan control, a fire suppression system, critical grade exhaust silencers and associated engine coolant piping and ventilation equipment. The power plant will connect to a new intermediate fuel storage tank via an automated fuel transfer pipeline; automated load balancing; new switchgear; and a supervisory control and data acquisition (SCADA) system.

The power plant will be equipped with critical grade mufflers to minimize exhaust noise. The power plant structure will be insulated and ventilation ducts will be sound lined to minimize noise transmission from the plant to the surrounding environment.

The facility will initially be equipped with two 67 kW and one 100 kW generators to meet the projected electric loads during development of Mertarvik. The final generator configuration will include two 210 kW and one 100 kW marine generators. The power plant will provide recovered heat to serve the nearby community buildings.

The proposed power plant design includes an intermediate tank adjacent to the power plant with sufficient capacity to meet the long-term power generation fuel needs. The future peak monthly fuel consumption is estimated to be 8,500 gallons per month. A 10,000-gallon intermediate tank will provide adequate fuel storage for a full month of operation.

The intermediate tank will be set up for both truck fill and for fuel transfer from the tank farm. The tank fill line will be equipped with an overflow protection valve. The intermediate tank will be equipped with a fuel transfer meter to record all fuel transfers from the tank farm to the power plant intermediate tank. The intermediate tank will have one outlet connection for the power plant that will be equipped with a normally closed actuated ball valve that opens when the day tank is filling. The day tank will be equipped with a fuel transfer meter to record all fuel use.

It is anticipated that the new module and intermediate fuel tank will be supported on concrete grade beams imbedded in a structural gravel pad. Grade beams will be provided with adjustable connections to account for minor settlement. Gravel pad construction will include excavation and removal of surface organic material and placement and compaction of select local fill material over a geotextile separation fabric. In the event that the structural gravel pad is less than 6 feet thick, then at least 2 inches of rigid insulation will be placed in the pad below the concrete grade beams.

The existing Newtok power system is owned and operated by Ungusraq Power Company (UPC). The UPC operates under Regulatory Commission of Alaska (RCA) Certificate of Public Convenience and Necessity (CPCN) Number 375. This certificate enables and requires UPC to provide power to Newtok residents within its service territory. In order to expand its service territory to include Mertarvik, UPC must file an Application for an Amended Certificate with RCA. An application must be reviewed by the RCA within 180 days by statute and therefore should be submitted at least 6 months in advance of need.

Power Distribution System: The electrical distribution system will be 12.47/7.2 kV, 3-phase overhead construction to minimize line losses, and meet the long term needs of the community. Pole-mounted transformers will stepdown the 7200 V distribution voltage and provide 120/240 V single-phase power to residential services. For larger customers, 208 V and 480 V 3-phase power will be provided, as required.

Construction will be IAW Rural Utility Service Bulletin 1728F-804, Specifications and Drawings for 12.47/7.2 kV Line Construction. In general, the system will be three-phase, four-wire. Single-phase taps will be provided where serving individual locations or for limited loads. The primary overhead conductor used will be No. 2 AWG Aluminum Conductor Steel Reinforced (ACSR), with 7/1 stranding.

Where the electrical distribution system is required to be installed underground, such as at or around the airport, it will be constructed IAW Rural Utility Service Bulletin 1728F-806, Specifications and Drawings for Underground Electric Distribution.

In general, construction will consist of the installation of 40-foot power poles, located within proposed road rights-of-way. The type of pole foundations, direct buried or pile, will be determined based site-specific conditions at the specific installation location.

Water Storage Tank: The Cold Regions Utilities Monograph, Third Edition, recommends that rural water storage tanks be designed with a minimum of 10 days of emergency storage. Based on a 20-year design population of 518 people, and daily per capita water consumption of 75 gallons, a conservatively sized water storage tank for Mertarvik will have a capacity of approximately 400,000 gallons. A tank of this size is estimated to have a 40 to 48-foot-diameter floor with a height of 32 to 40 feet. It is expected that the water storage tank will be an insulated, bolted steel ground tank, typical of water storage tanks throughout rural Alaska. The tank will be erected on a structural gravel pad that is adapted for the specific conditions at the Mertarvik site.

Based on one borehole that was drilled at the proposed tank site, subsurface conditions consist of an organic mat overlying unfrozen silty sand, overlying frozen silty gravel with sand. Volcanic ash was intermixed with the silty gravel with sand at approximately 20 feet. The frozen soil encountered near the surface is assumed to be seasonal frost, while the deeper frozen soil is assumed to be permafrost. Visible ice content by volume was estimated to range from 5 to 20 percent. Weathered bedrock was encountered at 35 feet below ground surface. Groundwater was not observed at the time of drilling (Golder 2017).

It is expected that the water storage tank will be installed on a foundation system that is designed to maintain frozen subsurface conditions in order to eliminate detrimental thaw consolidation of subsurface soils. The foundation for the water storage tank is anticipated to include a passive refrigeration system with thermosiphons and flat-loop evaporators installed within a structural gravel pad. The pad will be approximately 60 to 70 feet in diameter at the top, with 2:1 side slopes, and ground level footprint of approximately 80 feet in diameter. In general, pad construction will include excavation and removal of surface organic material, installation of thermosiphons, and placement and compaction of select local fill material over a geotextile separation fabric and rigid board insulation.

Water Distribution and Wastewater Collection Lines: Long-term development plans include the installation of community water supply and wastewater collection systems. The proposed water distribution system is expected to be a network of nominal 6 and 8-inch insulated and buried pressure pipes emanating from the water treatment plant site. Water distribution systems will be designed and permitted IAW ADEC Drinking Water regulations, 18 AAC 80, amended as of November 7, 2017.

The wastewater collection system is expected to be a network of nominal 8-inch insulated gravity sewer lines and 4-foot diameter manholes terminating at the wastewater treatment

lagoon. Manholes will be located at a maximum spacing of 300 feet and at all bends in the collection system. A single lift station, with an estimated footprint of approximately 900 square feet, is expected at the west end of the townsite. The station will pump through a pressure force main which discharges into the gravity collection system near the school. The wastewater collection system will be designed and permitted IAW ADEC Wastewater Disposal regulations, 18 AAC 72, amended as of November 7, 2017.

Water distribution and wastewater collection system piping will be installed within the rights-of-way established for town site roads. Subsurface conditions observed in the boreholes along the proposed roads were highly variable. Soils generally consisted of organic material up to 3 feet thick, with an average thickness of approximately 1 foot, overlying a mixture of silt, sandy silt, silty sand, and silty gravel. The lithology and thickness of the soil layers were generally not consistent between boreholes. Permafrost was observed in two boreholes: Borehole G17-T02 and G17-T03. The permafrost did not extend to the bottom of either borehole. No visible ice was observed within the frozen samples. Small zones of near surface relic seasonal frost were observed in nine of the boreholes. Groundwater was not observed at the time of drilling (Golder 2017).

Initial estimates of seasonal frost penetration indicate that in areas void of permafrost or organic soils at the surface range from 6 to 9 feet. Therefore, it is expected that pipelines will be buried to a depth of 8 to 10 feet in order to protect pipelines from freezing temperatures and reduce system heating costs.

Generally, construction will consist of trench excavation within designated road rights-of-way to a depth of 8 to 10 feet. Pipelines will be bedded in select granular material. A geotextile pipe wrap may be utilized to provide separation between the granular bedding materials and in situ fine grained soils.

Community Roads: The preferred CLP includes approximately 5.3 miles of roads. This total includes townsite subdivision roads (2.2 miles), the quarry/landfill road (1.8 miles), the airport road (1.0 mile), and the lagoon access road (0.3 mile).

Subsurface conditions observed in the boreholes advanced along the proposed townsite roads were highly variable. The soil generally consisted of organic material up to 3 feet thick, with an average thickness of approximately 1 foot, overlying a mixture of silt, sandy silt, silty sand, and silty gravel. The lithology and thickness of the soil layers were generally not consistent between boreholes. Permafrost was observed in two boreholes: Borehole G17-T02 and G17-T03. The permafrost did not extend to the bottom of either borehole. No visible ice was observed within the frozen samples. Groundwater was not observed at the time of drilling (Golder 2017).

It is anticipated that typical road sections will be designed and constructed to maintain frozen ground where it exists. In general, roads will be constructed without removing the tundra or surface organic mat. Vegetation will be trimmed to create a relatively smooth tundra surface prior to placement of a geotextile directly on the tundra surface. Select structural fill will be placed and compacted on top of the fabric. Culverts will be installed as required in order to maintain existing surface drainage patterns.

Typical townsite road sections will be approximately 11 feet wide at the driving surface with a height of 4 to 5 feet above existing grade and 3:1 side slopes. The width of the road at ground surface will vary depending on the slope of the terrain but is expected to average about 40 feet. The quarry road will be constructed in a similar manner but will have a surface width of 16 feet. The quarry road will be constructed to a greater width in order to accommodate movement of heavy construction equipment between the quarry and the townsite during the development of Mertarvik.

Buildings and Foundations: Other structures included in the preferred CLP are the school and teacher housing, water treatment plant, washateria, clinic, post office, tribal and corporation offices, store, elder housing, and private residences. The variable nature of the subsurface conditions across the site indicates the potential for differential settlement at some locations if the permafrost thaws as a result of site development and as a result of seasonal frost jacking. Understanding site specific conditions will be necessary to inform geotechnical recommendations and design of the foundation systems for these facilities.

Preliminary geotechnical analysis (Golder 2017) has identified several options for foundation systems that may be utilized depending on the requirements of the structure and site-specific conditions. These options are reproduced below.

Maintaining frozen soils in existing permafrost areas: Based on the long-term warming trends predicted in the region, it is anticipated that the permafrost in the community will continue to degrade with time. By maintaining permafrost, long-term thaw settlement can be reduced over the design life of the facility. Depending on the development, maintaining permafrost can be done by passive and/or active cooling techniques paired with elevating heated structures to allow blow through space between the ground and structures, and by utilizing rigid insulation in pad or embankment sections.

Utilizing rigid insulation in areas with frost susceptible subgrade soils: In areas without permafrost, placing rigid insulation under and around heated and unheated foundations, roads, or pads can limit the amount of seasonal frost that penetrates into the frost susceptible subgrade soils. This will reduce the amount of differential movement that the foundations will experience seasonally.

Excavating and replacing frost susceptible soil: Replacing frost susceptible soil with NFS structural fill within the zone of frost penetration can limit the amount of seasonal movement that will occur. However, deeper excavations may be required with this option, and depending on the season, dewatering may be required. Achieving adequate compaction of the NFS structural fill may also be a concern if excess water is present.

Supporting developments on deep foundations: Deep foundations, including driven piles and helical piles, can be designed so that degradation of frozen soils or seasonal movement of soils does not impact the structure.

Supporting developments on adjustable foundations: Adjustable foundations, such as triodetic foundations, can have a high tolerance to settlement and can be utilized to decrease the impacts of differential movement of structures. However, long-term maintenance and re-leveling efforts are typically required with this solution.

Airport: FAA's process for the design of airports includes incorporation of primary (the main) and crosswind runways, if needed, to maximize the frequency within which aircraft can take-off and land as wind direction varies. In 2014, FAA conditionally approved an ALP for Mertarvik Airport that includes both a primary and crosswind runway. The proposed primary runway at Mertarvik provides an 89.26 percent probability that aircraft can take-off and land safely in relation to the typical prevailing wind direction year round. The proposed crosswind runway increases that probability (i.e., improves the margin of safety) to 96.64 percent of time aircraft can take-off and land based on prevailing wind direction. Therefore, FAA incorporates crosswind runways in airport designs as needed to maximize the safety of flight operations. However, the crosswind runways included in the designs of most remote Alaska community airports are almost never constructed because of a lack of air carrier demand that would justify the additional cost of construction, operation, and maintenance. This EIS therefore provides an analysis of the expected impacts (e.g., wetland acres impacted, water quality, etc.) associated with the construction and operation of the primary runway only. The reader is asked to note that the crosswind runway appears in the document in several figures and is occasionally referenced because it was a component of historic planning and analyses for the currently proposed airport. At this time, however, there is no reasonable expectation that the air carrier demand at the Mertarvik Airport will warrant the construction of the crosswind runway; therefore, this project feature is not expected to be constructed at this time.

The Mertarvik airport would accommodate small, wheeled aircraft (Critical Aircraft - Beech 1900, the most demanding aircraft expected to make regular use of the airport—500 or more annual operations). Anticipated near-term construction would include the primary (13 – 31) runway, an apron and taxiway. This proposed construction would provide an airport comparable

to that at the existing village of Newtok and facilitate flight operations under 89.6 percent of normal wind conditions.

An access road from the community would also need to be constructed for the airport. The proposed airport would be comprised of the following components.

- Runway – Gravel surfaced 75 feet wide and 4,000 feet long
- Runway Safety Areas – 150 feet wide, 4,600 feet long, centered on the runway centerlines
- Runway Object Free Areas – 500 feet wide, 4,600 feet long, centered on the runway centerlines
- Runway Protection Zones – 1,000 feet x 1,510 feet x 1,700 feet, located at each end of each runway.
- Taxiway A – Gravel surfaced, 380 feet long and 50 feet wide
- Aircraft Apron – Gravel surfaced, 350 feet by 400 feet
- Navigational Aids – Lighted Wind Cone and Segmented Circle
- Visual Approach Aid – Precision Approach Path Indicator, Runway Edge Identifier Lights
- Runway Lights – Medium Intensity Runway Lights
- Perimeter Fence – None currently proposed
- Support Facilities – Weather Station and Communications TBD
- Access Road – 2 lane gravel
- Snow Removal Equipment Building(s) – 2, dimensions TBD
- Overhead Utility Lines – Expected to be routed along the access road
- Lease Lots (on Apron) – Unknown number, size and probable use at this time
- Timing of Construction – 2020-2021 (approximately May to October for most construction work, although preparatory work such as quarrying and positioning material may take place throughout the year)
- Fill Material Haul Route – Would cross airport property en route to the runway and apron from the quarry NW of the proposed airport.

Construction of the runway, taxiway, apron, and access road involve cut and fill construction methods, meaning removal of existing surfaces and placement of suitable fill at least 5 feet thick to form operational surfaces and preclude permafrost degradation. All final surfaces would be graveled and compacted as needed to meet operational requirements. Fill material will be sourced from within the footprint of the airport excavations, where possible, to re-use excavated material, from the community's materials source and/or barged in from an as yet undetermined materials source, if needed. There is, however, no proposal at this time to create a new materials source outside the Mertarvik community site to supply materials for the proposed action, or an indication that it would be required, based on estimated quantities of fill to be needed.

4.6.2 Sequence of Construction

The Mertarvik Strategic Management Plan (Agnew::Beck Consulting 2012) envisioned the Mertarvik development and relocation of Newtok residents as occurring in four phases:

- Phase 1: *Uplluteng* (Getting Ready). This phase includes all planning activities and initial infrastructure construction to-date, prior to active habitation of the site.
- Phase 2: *Upagluteng* (Pioneering). Seasonal habitation by approximately 25 to 100 people, living with limited community infrastructure.
- Phase 3: *Nass'paluteng* (Transition). A steady increase in population from roughly 100 to 200 people, with services and community infrastructure added and scaled up to accommodate the growth.
- Phase 4: *Piciurluni* (Final Move). The final relocation of all Newtok residents (approximately 350 people) into an essentially complete new community.

The draft CLP report (ANTHC 2017c) reflects this phased approach in its Design and Construction Phasing Recommendations. The ultimate goal is to have all Newtok residents relocated to the new site in 10 years. Certain population thresholds at Mertarvik may need to be demonstrated before some Federal and State agencies are able to provide key community services or invest in community facilities at Mertarvik, such as the airport, school, and Post Office. For example, the United States Postal Service (USPS) has a set threshold of 25 families or 75 persons before they will provide mail service to a community. Delay in the establishment of these facilities in Mertarvik may impact the beginning and duration of the transition period wherein residents make the move from Newtok to Mertarvik. The report recommends building roads and pads supporting individual pieces of infrastructure a year in advance of erecting those structures, where possible, and pacing critical service (power, water, sewer, etc.) development ahead of actual need. The report's recommended construction sequence is outlined below; the actual implementation will be highly dependent on funding availability, and the sequence is likely to be subject to considerable adjustment.

Phase 2, *Upaluteng* (2017-2018)

2018

- Construct five additional houses to bring the total of usable homes to 13, housing families with an estimated 20 students.
- Develop 2,000 linear feet of roadways to connect houses and pioneering community infrastructure.
- Continue construction of MEC facilities to allow for use as an emergency shelter and pioneering schoolhouse.

- Complete development of the MEC well for year-round self-haul water supply.
- Construct a preliminary power plant and electric distribution.
- Construct an initial landfill cell with fencing and a burn unit to accommodate trash from pioneering community.
- Develop temporary septic disposal system.

Phase 3, *Nass'paluteng* (2019-2022)

2019

- Construct 10 additional houses, with the goal of providing sufficient housing to accommodate enough students to trigger the need for a new school, and to shelter residents whose Newtok homes are at greatest risk from erosion.
- Begin design and development of a water source sufficient to replace the MEC well for full community service.
- Construct roadways sufficient to support construction activities 2019-2020. Construct 2,000 linear feet of trails for access to the MEC and to the beach for subsistence activities.
- Begin airport construction, to include expansion of borrow source, construction of an access road between the quarry and the airport site, and removal of overburden from the runway footprint.
- Develop community equipment shop to store and repair construction and maintenance equipment.

2020

- Construct an estimated additional 10 homes.
- Expand the landfill to accommodate the growing population, continued construction activities, and the future new school.
- Construct airport access road, the road from the school to the sewage lagoon site. Continue constructing trails between housing and community facilities.
- Continue airport construction.
- Upgrade bulk fuel storage to allow for increased fuel usage.
- Construct Phase 1 of the Fisheries Support Center (boat haul-out, repair, and storage facility located near the shallow barge landing).

2021

- Construct an estimated additional 10 homes.
- Construct the water storage tank and water treatment plant, including its access trail.
- Construct the sewage lagoon starter cell.
- Build upper residential road to accommodate upcoming home development.
- Complete airport, including surfacing and construction of airport structures.

- Construct school foundation and building shell; school construction needs to be completed by 2022, as part or all of the Newtok Ayaprun School building may need to be shut down as the erosion threat progresses.
- Upgrade power plant significantly to accommodate additional electrical requirements from the airport, school, and health clinic.
- Construct village store.

2022

- Continue construction of as many houses as funding allows, to accommodate a large shift in population from Newtok to Mertarvik once the Newtok school is shut down.
- Develop a water system capable of producing water year-round sufficient to supply the community, including the school and health clinic, with roughly 3,000 feet of water main.
- Develop a sewer system capable of providing the school, clinic, and MEC with sewer discharge to the starter cell lagoon constructed in 2021. System would be capable of connecting additional gravity services located along the main road.
- Complete the new full-sized school, focusing on vertical and interior construction, including construction of teacher housing sufficient to house teachers for the new facility.
- Construction of new health clinic.
- Development of heat recovery systems at the school and other non-residential facilities nearby, and facility scale solar and wind energy generation to support other high energy users.
- Construct small vehicle repair shop.

Phase 4, *Piciurlluni* (2023-2027)

2023

- Construct an additional 20 housing units.
- Expand water and sewage services, and enlarge sewage lagoon to accommodate the entire community.
- Complete 2,000 feet of roadway, and 2,000 feet of pedestrian trails.
- Renovate the MEC to serve as a community cultural and recreation center.

2024

- Construct an additional four houses and tie into existing water and sewer service.
- Develop a lift station and sewer force main connecting from the intersection of the main and lower roads to the gravity sewer main located at the school.
- Develop a high-penetration wind energy system.
- Construct a church.

2025

- Construct four additional houses.
- Continue to extend water and sewer services.
- Construct housing and facilities for a Village Public Safety Officer (VSPO).

2026

- Construct four additional houses.
- Continue to extend water and sewer services.
- Construct corporate offices for the Newtok Native Corporation.

2027

- Construct four additional houses.
- Continue to extend water and sewer services.

The Newtok-Mertarvik Energy Master Plan (Cooper, *et al*, 2017) presents a similar recommended construction timeline, summarized in Table 5, based on a phased buildup of energy infrastructure at Mertarvik paired with a draw-down of the Newtok power plant.

Table 5. Recommended Sequence of Construction at Mertarvik, per Cooper, et al, 2017b.

Phase	Estimated Completion	Mertarvik Year-Round Residents	Homes and Facilities Constructed
1	completed 2006-2016	0	7 homes completed Shallow and deep-water barge landings MEC foundation, well, and septic system 4 storage buildings Pioneer roads and trails Quarry opened
2A	Fall 2017	0	20-person construction camp Temporary cafeteria and washateria for construction camp 7 houses completed, 4 homes started
2B	Fall 2018	Up to 35	17 houses completed Construct temporary school in MEC
3A	Fall 2019	Up to 100	27 houses completed Construct wastewater treatment lagoon Construct Class Municipal Solid Waste Landfill Construct temporary public facilities in MEC (i.e. washateria, clinic, classroom, post office, city office)
3B	Fall 2020	Up to 200	42 houses completed Construct airport
4	Fall 2021	Up to 400	103 houses completed Construct new school/relocate existing school from Newtok Construct new clinic Construct remaining community buildings Construct piped water and sewer system Construct water treatment building Construct sewage treatment facility

For airport construction, the ADOTPF estimates that planning, design, and permitting will continue from 2017 through 2019, with construction in the ice-free portions (approximately May to October or less per year) of 2020 and 2021. The two factors that have the greatest and as yet unknown potential to affect the schedule for the subsequent post EIS selected alternative are funding for each Federal agencies' required work and the effects on-going and potentially accelerated erosion rates.

FAA's analysis of airport-related impacts is based on the construction of the runway, related taxiway, and apron as shown on Figure 25.

The airport schedule of construction includes the temporary construction impacts (stockpiling, staging, reclamation of temporary impacts, etc.) as needed.

Temporary impacts would result from construction of the haul road from the materials source. Permanent impacts would result from construction of the airport access road, runway, taxiway, apron, building(s), navigational aids, and lighting needed for the runway.

5. Affected Environment and Environmental Consequences

5.1 Introduction

This chapter provides the alternatives analysis portion of the EIS, describing what is known about the existing environment and the resources therein, and then assessing the potential consequences of the alternatives (brought forward from Chapter 4) upon that environment. Categories of resources within the affected environment (e.g., surface water, cultural resources, etc.) have been identified for analysis in the following sections of this chapter, and are summarized in Table 5 below. These resource categories were selected based on feedback obtained during public and agency scoping meetings, statutorily-required analyses (e.g., the Endangered Species Act, the National Historic Preservation Act, Section 4(f) Analyses), and NEPA policy requirements of the FAA.

The application of NEPA analysis to these alternatives presents some unusual twists, in that the existing human population that would be affected by the proposed actions (the populace of Newtok) does not currently live in the affected physical environment (Mertarvik), but is planning to live there in the future. The affected population is also the primary beneficiary of the proposed action, and has been an active participant in the scoping and development of the proposed action. Therefore, in the following sections, the analysis of effects of the proposed action on resources in the physical setting (e.g., land, water, wildlife, cultural sites, etc.) will focus on the Mertarvik community site, while some analyses of effects on the human environment (e.g., culture, public health, infrastructure, etc.) will use the current conditions experienced by the people of Newtok as the baseline for the affected environment (a.k.a., the "existing population"), or both. The differing foci of analysis for each resource category are summarized in Table 5.

Regulations for implementing the NEPA require that the EIS “succinctly describe the environment of the area(s) to be affected or created by the alternatives under consideration” (40 CFR §1502.15). Depending on the resource considered, the potentially affected environment for this EIS may be limited to part or all of the proposed Mertarvik village site; the Newtok village site; may extend off-site to Nelson Island, Baird Inlet, the Yukon Delta National Wildlife Refuge, Bristol Bay, and even Cook Inlet, Gulf of Alaska, and Bering Sea. The area of effect addressed for each resource category is discussed in the subsequent sections.

NEPA regulations on EIS preparation state that the EIS should, “(b)ased on the information and analysis presented in the sections on the Affected Environment and the Environmental Consequences... present the environmental impacts of the proposal and the alternatives in comparative form, thus sharply defining the issues and providing a clear basis for choice among options by the decision maker and the public” (40 CFR § 1502.14). However, as will be demonstrated in the following sections, the three CLP construction alternatives brought forward for analysis differ very little in their respective environmental impacts, offering no clear environmental basis for choosing one over the other. This is due to the fact that, (a) the three CLP alternatives are essentially different configurations of the same suite of necessary village infrastructure elements, (b) the general area previously chosen for the new community (and where all three CLP alternatives are set) is relatively homogeneous in terms of habitat, hydrology, soil types, and similar attributes, and (c), the development of the three CLP alternatives was informed by previous investigations of the Mertarvik area for sensitive resources such as cultural sites and high-value wetlands; all three CLP alternatives were designed to avoid known sensitive resources.

In the absence of a useful comparative basis upon which to assess the impacts of the alternatives, this EIS evaluates the *significance* of impacts on each resource category. In the following sections of this chapter, this EIS makes determinations of significance using the following criteria, in order of precedence:

1. FAA significance thresholds established in the FAA Order 1050.1 Desk Reference (FAA 2015), where such thresholds are available for and relevant to a given resource category. For some resource categories (e.g., air quality) the FAA establishes significance thresholds, where quantitative data are not available for the Mertarvik site. In such instances, the FAA threshold will be discussed in terms of the best available qualitative information.

2. Where an FAA significance threshold is not available or applicable, the significance of an impact will be described as *Major* or *Minor*, based on best professional judgment and knowledge of similar past effects on similar resources.

Minor: For the resource, expected environmental impacts are not detectable or are so small that they will not noticeably alter or lead to the alteration of any important attribute of the resource. Noticeable impacts may be minor if they are highly localized, upon a resource that is widespread and abundant within the project vicinity.

Major: For the resource, environmental effects are clearly noticeable and/or are sufficient to alter important attributes of the resource.

Impacts that can be characterized as Minor are here defined as being below a threshold of significance; impacts which exceed a characterization of Minor and must be regarded as Major, are likewise considered as being above a threshold of significance.

The evaluation of impact significance described above is applied only to adverse or negative impacts, as is the convention in NEPA analyses. Since the intent of the proposed action is to preserve and improve the human condition of the people of Newtok, the overall project impact will be positive for many human environment resource categories. Where an overall beneficial effect is expected, this is described in each resource category section, along with the significance determination. For example, the project is expected to have strongly positive effects on the resource category “Community and Culture” (section 5.15), but the magnitude of impact is designated as “Minor,” as the expected adverse impacts do not meet the significance threshold described above.

Table 6 summarizes the focus of impact analysis and significance criterion used for each resource category in the following sections of this chapter.

Table 6. Summary of Impact Focus and Significance Criteria by Resource Category

Section	Resource Category	Focus of Impact Analysis	Significance Criterion Used
5.2	Geology, Soils, Topography	Mertarvik site	Minor/Major
5.3	Hydrology, Hydraulics, & Floodplains	Mertarvik site	Minor/Major [FAA for floodplains]
5.4	Surface Water	Mertarvik site	FAA
5.5	Groundwater	Mertarvik site	FAA
5.6	Air Quality	Mertarvik site	FAA
5.7	Climate & Climate Change	Mertarvik site	Minor/Major
5.8	Habitat	Mertarvik site	Minor/Major
5.9	Endangered & Threatened Species	Mertarvik site	FAA
5.10	Migratory Birds	Mertarvik site	Minor/Major
5.11	Essential Fish Habitat & Anadromous Streams	Mertarvik site	Minor/Major
5.12	Wetlands & other Special Aquatic Sites	Mertarvik site	FAA

Section	Resource Category	Focus of Impact Analysis	Significance Criterion Used
5.13	Protected Lands	Mertarvik site	Minor/Major
5.14	Cultural History & Cultural Resources	Mertarvik site	Minor/Major
5.15	Community & Culture	Existing population	Minor/Major
5.16	Socioeconomics	Existing population	Minor/Major
5.17	Subsistence Resources	Existing population	Minor/Major
5.18	Land Use & Compatibility	Mertarvik site	Minor/Major
5.19	Public Health & Safety	Existing population	Minor/Major
5.20	Public Services & Utilities	Existing population	Minor/Major
5.21	Noise	Mertarvik site & Existing population	FAA
5.22	Visual Environment	Mertarvik site & Existing population	Minor/Major

The No Action alternative will generally have no impact on physical resources (sections 5.2 through 5.14) at Mertarvik, but is found to have significant impacts on some cultural and public welfare resource categories (e.g., Community and Culture).

Table 3 (section 4.6.1) provides the assigned lot sizes and estimated structural footprints for each infrastructure element. In many cases, building construction will require placement of a gravel pad that may be considerably larger in area than the structure's footprint. While not all of a given lot will be directly impacted by construction, in some quantitative analyses of effects (e.g., wetlands) we make the conservative assumption that the entire area of a lot will be altered or impacted in some way. More detailed estimates of structural footprints are available for the airport, in an environmental study prepared for ADOTPF (PDC Engineers 2017). This study (excerpts of which are provided in Appendix D) included an updated wetland impact evaluation focused on just the proposed airport and associated features, incorporating more detailed assumptions about overburden disposal, embankments and construction work areas.

5.2 Geology, Soils, and Topography

5.2.1 Affected Environment

All three CLP alternatives have been developed within the same overall Mertarvik community area and are expected to have similar direct, indirect, and cumulative impacts on geology, soils and topography in the Mertarvik region. As a result, the anticipated impacts of each CLP alternative are indistinguishable from each other in this resource area and will be discussed collectively.

Nelson Island is on the southwest Alaska coast, bordered by the Ninglick River to the north, Baird Inlet to the northeast, and the Kolavinarak River to the east and south; the west end of Nelson Island extends into the Bering Sea (Figure 27). The island features a large expanse of

volcanically formed uplands, surrounded by the flat coastal alluvial plain of the Yukon-Kuskokwim (Y-K) Delta. These uplands consist of multiple Quaternary basalt flows overlaying Cretaceous sedimentary rock. The terrain of the Nelson Island uplands consists primarily of rolling hills and gentle to moderate slopes, with elevations ranging from a few tens of feet to as much as 1,480 feet above mean sea level (MSL) along some ridges. The proposed Mertarvik village site is located near the northeast corner of the island, on a northwest-facing slope overlooking the Ninglick River near where it joins Baird Inlet. The slope rises roughly 350 feet above MSL over a horizontal distance of about 0.6 mile, from the shoreline to where the slope transitions to flatter terrain inland where the new airport would be built (Figure 28, Figure 29; R&M 2009, USACE 2008).

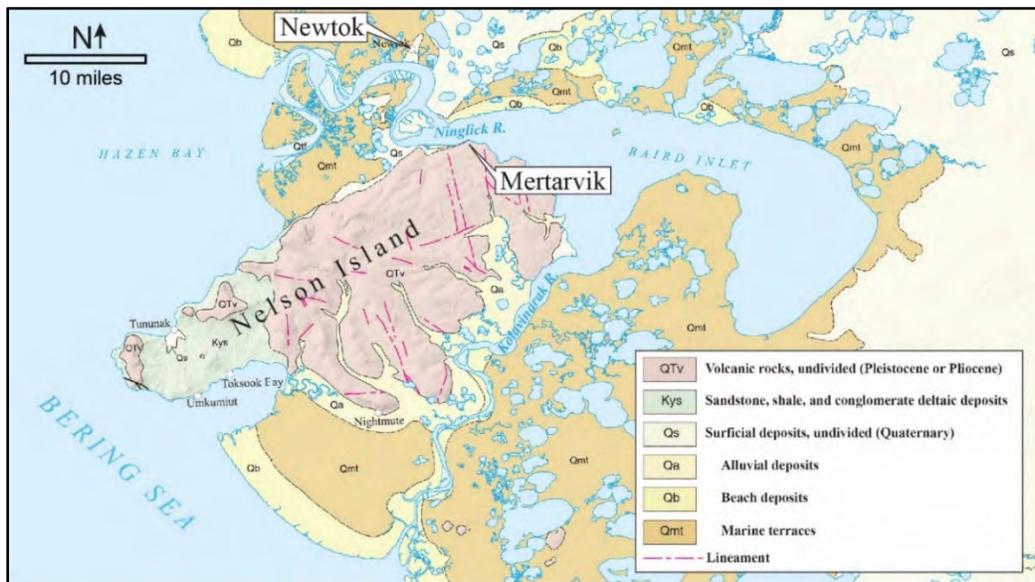


Figure 27. Geologic map of Nelson Island and vicinity (Wilson *et al.* 2013).



Figure 28. Mertarvik town site looking west in 2013, showing the upward slope of the land from the Ninglick River (right) towards the Nelson Island interior (left). The IRT construction camp is seen on the right, while the road to the quarry is visible on the far left (photo by Sally Cox, ADCCEA).

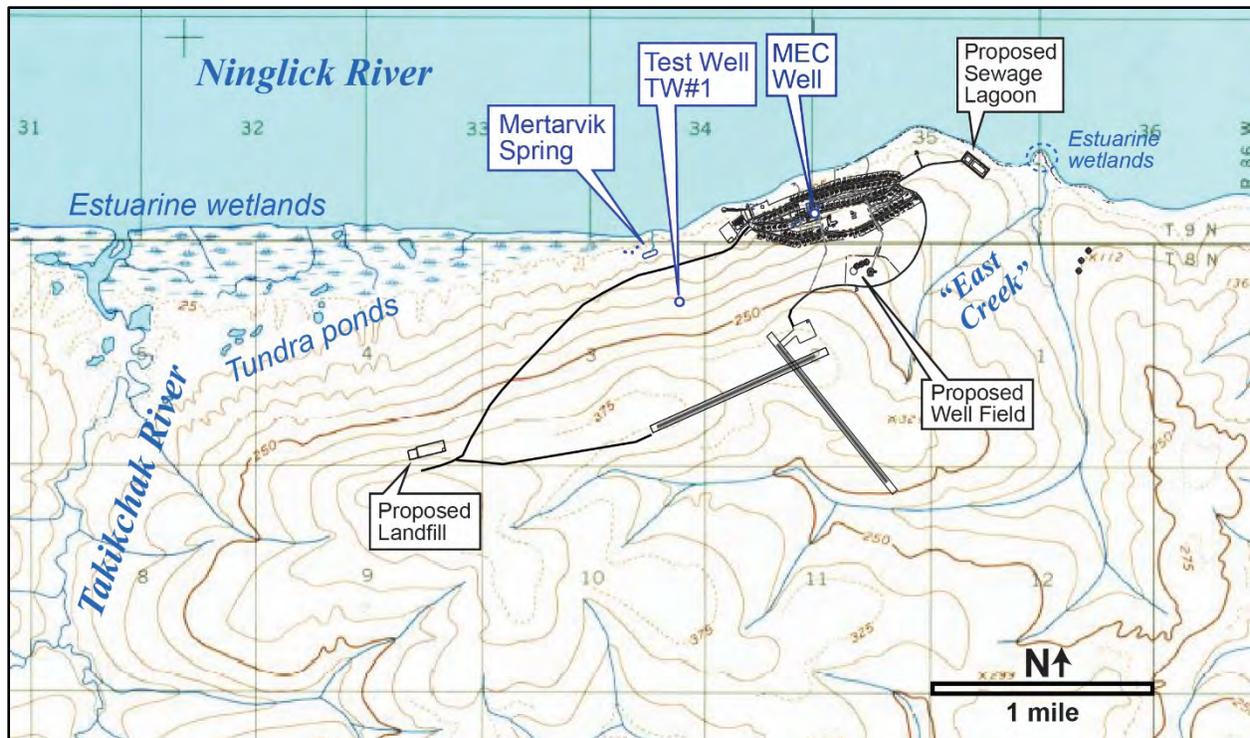


Figure 29. Proposed Mertarvik CLP in relation to local topography, drainages, and surface and groundwater features discussed in this section (background map is USGS “Baird Inlet D-7”).

Through 2017, four subsurface geotechnical investigations had been performed in the Mertarvik area. The USACE Alaska District Geotechnical branch drilled 35 exploratory boreholes in 2007 and 2008, extending from the shoreline to the crest of the slope (USACE 2008). Those borings found relatively uniform soils created by the weathering of the underlying basalt bedrock. A layer of peat and tundra vegetation varying from 1 to 2 feet in thickness was noted at the surface, overlaying silts mixed with organic material and variable amounts of sand, gravel, or cobbles. The organics in the soil decreased with depth, while rock fragments increased as the bedrock surface was approached. Depths to bedrock ranged from 4 feet to greater than 31.5 feet below the ground surface.

A geotechnical investigation conducted in June, July and October 2017 drilled 41 geotechnical boreholes and dug eight test pits located in specific areas of the preferred CLP footprint where data gaps existed (Golder 2017). Boring target depths ranged from 15 to 40 feet below ground surface (bgs); test pits were advanced to 12 and 16 feet bgs.

The 2007-2008 investigations found discontinuous permafrost (Figure 30), in greatly varying condition across the Mertarvik community site. The USACE investigations encountered frozen soil in 19 of 35 borings. In general, the permafrost was either present to within 2 to 3 feet of the ground surface or has degraded to below the bedrock surface; the permafrost also appeared to be degraded at locations along drainage pathways and in areas where water may pond. In some

locations, the degraded permafrost was marked by thaw features where the ground surface had subsided several feet (USACE 2008). The sporadic nature of the permafrost at Mertarvik was also apparent during the excavation of test pits for septic system percolation tests at the MEC site in 2011; two of four test pits encountered frozen soil (Longtin 2011). In thawed areas, soils were generally wet. Most of the soils were frost susceptible with a frost classification of F4 (“especially high frost-susceptibility;” USACE 1984), although some soil samples near the bedrock surface, where gravel from weathered bedrock was present, had a lower frost classification of F2



Figure 30. Typical subsurface soil core sample showing presence of ice (USACE 2008).

A geotechnical investigation performed in October-November 2008 on behalf of the ADOTPF (R&M 2009) concentrated on two previously considered airport locations that were well south of the selected alignment, and on a potential material borrow source roughly 2 miles to the southwest of the selected Mertarvik community site. The findings of this investigation were generally similar to those of the USACE investigations described above. The borrow site at “Hill 460” features an outcropping of basalt bedrock. Eight borings drilled in the area revealed bedrock at depths of 6 feet to greater than 20 feet bgs; permafrost was encountered in four of the eight borings, starting at depths ranging from 3 to 6.5 feet bgs. A rock quarry was opened at Hill 460 in July 2011.

The 2017 geotechnical investigation found similar soil conditions as encountered in the previous investigations. Permafrost was observed in 14 of the 41 borings, and relic near-surface seasonal frost was found in several other borings. Bedrock, ranging in depth from 5 to 40 feet bgs was encountered in 19 boreholes and two test pits. Groundwater was not observed during the drilling of any of the 2017 borings, although groundwater was seen flowing through the sidewall of one of the test pits (Golder 2017).

The deeper subsurface soils and stratigraphy at Mertarvik are known directly from only two well borings (Figure 30) as of the end of 2016. The MEC supply well drilled in June 2011 logged sands and gravels from the ground surface (at an elevation of roughly 77 feet above MSL) to about 45 feet bgs, where boulders and weathered bedrock were encountered (Denali Drilling 2011). The drillers logged more sand and gravel between 50 and 60 feet bgs, then rock from 60 to 80 feet bgs, and groundwater appearing in a layer of gray silt from 80 to 125 feet bgs. The boring for Test Well 1 (TW#1), drilled in 2007 upslope of Mertarvik Spring, was started at an elevation of about 135 feet above MSL. That boring logged 21.5 feet of silt and organic overburden, then five separate layers of hard gray rock (thought to be individual basalt flows), interlayered with silt, to a depth of 104.5 feet bgs (Golder 2009).

Mertarvik is in an area of low seismicity. Nelson Island and the Y-K Delta are generally devoid of Quaternary faults (active faults that have evidence of surface deformation occurring in the last 1.6 million years); the closest such recognized faults are 150 to 200 miles from Mertarvik (Koehler 2013). A search of the U.S. Geological Survey (USGS) earthquake database listed eight earthquakes of magnitude 2.5 or greater occurring between 1950 and 2017 within about 250 miles of Mertarvik. These earthquakes ranged in magnitude from 2.7 to 4.7, with the strongest being one of a pair that occurred about 77 miles southeast of Mertarvik in February and March 2013 (USGS 2017).

5.2.2 Environmental Impacts

All three CLP alternatives have been developed within the same overall Mertarvik community area and are expected to have minimal direct or indirect impacts on the geology and topography in the Mertarvik region. As a result, the anticipated impacts of each CLP alternative are indistinguishable from each other in this resource area. Direct impacts would consist of placement of fill for building pads, road prisms, and airport runways and aprons, creating minor and highly localized areas of altered topography and surface soil geology. Construction in the area, particularly of building foundations and roads, will need to be adapted to the presence of permafrost, and minimize the potential for degrading permafrost and causing subsidence. Long term changes to the area permafrost profile as a result of filling and construction across the project site is a potential indirect effect. Because of the discontinuous nature of the permafrost, and the highly variable depth to bedrock, further geotechnical investigation may be necessary before deciding the final siting of some structures.

5.2.3 Significance Determination

No FAA significance threshold is available for this resource category.

The Denali Commission has determined that the environmental impacts on geology, soils, or topography associated with the implementation of any of the three CLP alternatives, as proposed, will not noticeably alter any important attribute of the resources. The impacts are considered

Minor, and therefore not exceed the significance threshold for this resource category defined in section 5.1 (MINOR).

The no action alternative would have no impact on the geology, soils, and topography of Mertarvik.

5.3 Hydrology, Hydraulics, and Floodplains

5.3.1 Affected Environment

All three CLP alternatives have been developed within the same overall Mertarvik community area and are expected to have similar direct, indirect and cumulative impacts on hydrology, hydraulics and floodplains in the Mertarvik region. As a result, the anticipated impacts of each CLP alternative are indistinguishable from each other in this resource area and will be discussed collectively.

The United States is divided and sub-divided into successively smaller hydrologic units, which are classified into four levels: regions, sub-regions, accounting units, and cataloging units. The Watershed Boundary Dataset (WBD) maps the full areal extent of surface water drainage for the U.S. using a hierarchical system of nesting hydrologic units at various scales, each with an assigned hydrologic unit code (HUC). HUCs are delineated and georeferenced to USGS 1:24,000 scale topographic base maps according to compilation criteria monitored by the national Subcommittee on Spatial Water Data. The hydrologic unit hierarchy is indicated by the number of digits in groups of two (such as HUC 2, HUC 4, and HUC 6) within the HUC code. In EnviroAtlas, HUC 4 represents the subregion level, delineating large river basins. HUC 8 maps the subbasin level, analogous to medium-sized river basins; and HUC 12 is a more local sub-watershed level that captures tributary systems (about 90,000 nationwide used by EnviroAtlas to portray national metrics for the conterminous U.S.). The Mertarvik community site lies within the HUC 12, hydrologic units of Baird Inlet, 190305024809, and Ninglick River-Frontal Hazen Bay, 190305024905.

The Baird Inlet hydrologic unit extends about 40 miles longitudinally and has a maximum lateral extent of about 23 miles, covers 334,506 acres, and is composed of the lands forming the margin of Baird Inlet, falling from an elevation of about 320 feet above MSL to sea level at a fairly consistent slope of about 15 percent in the project area. Numerous small streams and drainages are interspersed across the hydrologic unit, all draining into Baird Inlet.

The Ninglick River-Frontal Hazen Bay hydrologic unit extends about 17 miles longitudinally and has a maximum lateral extent of about 14 miles, covers 107,044 acres, and is composed of the lowlands bordering the Ninglick River from its confluence with Baird Inlet to the marine waters of Hazen Bay, a length of about 26 river miles. The majority of the hydrologic unit is very low elevation, about 25 feet above MSL, with the notable exception of the southeastern corner

rising steeply to 375 feet above MSL. The portion of the Mertarvik community site extending into the Ninglick River-Frontal Hazen Bay hydrologic unit would occupy this southeastern corner of the unit. A traditionally significant source of drinking water from a spring is located in this unit as well, immediately to the east of the three homes in vicinity of 60.8190 °N, 164.5261 °W (Figure 31).

The Mertarvik community site is set on a slope of 5 percent to 14 percent; except for the barge landing and other features that must be placed along the shore, the proposed construction will be at elevations ranging from 25 feet to over 300 feet above MSL. The site has not yet been officially evaluated for flood risk, but it is not in a floodplain and appears to be at a low risk of inundation.

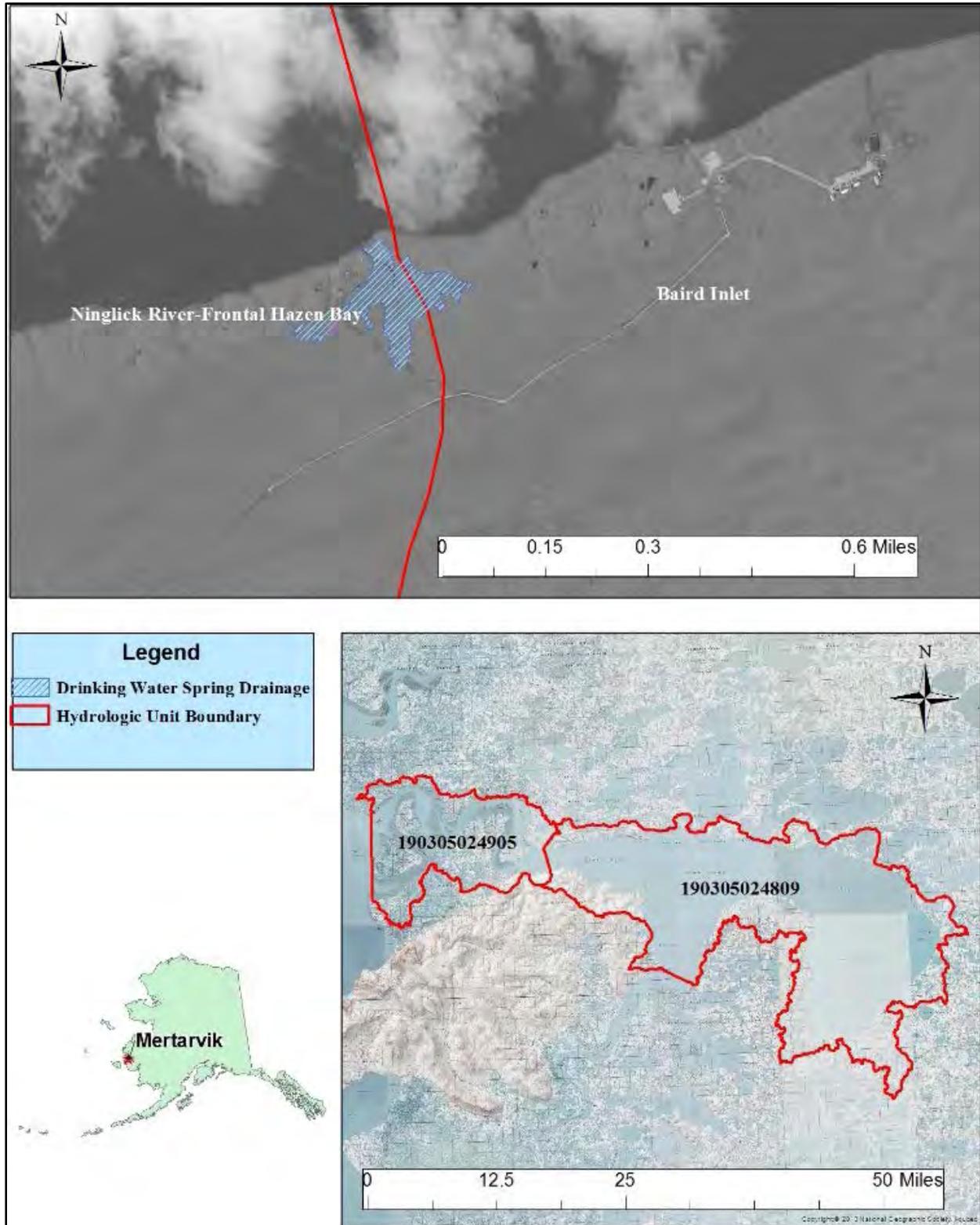


Figure 31. Existing Mertarvik town site infrastructure and spring in relation to USGS hydrologic unit boundaries.

5.3.2 Environmental Impacts

All three CLP alternatives have been developed within the same overall Mertarvik community area and are expected to have minimal direct or indirect impacts on the hydrology, hydraulics, or floodplains in the Mertarvik region. As a result, the anticipated impacts of each CLP alternative are indistinguishable from each other in this resource area. Full infrastructure build-out of the Mertarvik community site would include about 28,000 linear feet of road, 13,175 feet of trails, several water storage tanks and a well field impacting about 0.98 acre, a 12-acre Class III Municipal Solid Waste Landfill, 14-acre wastewater treatment lagoon, and a 58.6-acre aircraft runway and apron. Approximately 10.83 acres could be impacted by the construction of 99 homes, a school, playground, sports field, various offices, a church, fourplexes, a washateria, and other facilities. The residential lots in Mertarvik will all be about 0.375 acre, and the building pads for the homes will be 0.08 acre. Some of the homes in Mertarvik may be constructed on multipoint foundations placed directly on the tundra, others may be constructed on adjustable piles in direct contact with the ground without requiring the placement of any fill. The school would impact about 0.66 acre, the offices would impact about 0.04 acre each, and the playground could require 0.27 acre of fill.

Airport construction also includes surficial disposal of excess overburden excavated from the runway and taxiway footprints to allow formation of a thaw stable base that would preclude degradation of discontinuous permafrost known to occur in the area. This disposal method is expected to involve spreading of a thin layer of mineral soils over approximately 50 acres of existing tundra surface. Specifically, on top of the existing plant material covering existing soils. Spreading in this fashion is intended to allow rapid growth of plant materials through the thin mineral soil layer spread to dispose of excess overburden.

The project area is a mosaic of wetland, upland, and barren rock habitats underlain by discontinuous permafrost, promoting shallow subsurface flow through predominantly wetland land cover. The primary direct impacts to the hydrology in the project area would be the placement of gravel in wetlands. Roads and fill pads alter the way water flows through wetlands and can promote desiccation down-gradient and ponding above-gradient of the fill due to the interruption of shallow subsurface flow through wetlands. Ponding above permafrost soils can contribute to thermokarst, also referred to as thermal erosion, by the increased absorption potential of solar radiation by standing water. Desiccation alters the hydrologic regime of the impacted areas and can cause a transformation in the vegetation community, preventing hydrophytic vegetation from retaining dominance, and potentially changing areas of wetlands into uplands.

Existing disruption to hydrology in the Mertarvik community site area is marginal; the few buildings and permanent roads that have been constructed do not impede any mapped streams, but the fill associated with roads and buildings disrupt shallow subsurface flow through the

wetlands present on the site. The Ninglick River-Frontal Hazen Bay unit contains three pile-supported houses connected to the road leading to the larger settlement by an unimproved trail. The houses in that unit are down-gradient of the delineated spring sub-watershed, minimizing their impacts to hydrology. The road extending about 1,500 feet into the Ninglick River-Frontal Hazen Bay unit is constructed of fill placed on top of the tundra, contributing to very little impact on hydrology. The Baird Inlet unit contains more development: three houses, four storage huts, the pile supported foundation of the MEC, about 4,000 feet of gravel/modular road, about 1.6 acres of gravel/modular pad for storage and staging of materials, and about 0.5 acre of additional gravel fill around the margins of the buildings. The estimated total gravel area of gravel fill placed in the existing Mertarvik community site is 3.6 acres in a hydrologic unit encompassing 334,506 acres.

No planned construction in Mertarvik would take place below the ordinary high water mark of a mapped stream, removing the need to provide hydraulic conductivity for linear drainage features. The primary hydraulic concern is alteration to the sheet flow through wetlands.

Building pads would impact a total of 10.83 acres of wetlands contained within the Baird Inlet hydrologic unit. The building pads would not have a significant impact on hydrology because they would not extend to the aquitard created by permanently frozen soil and also do not present a continuous barrier to shallow subsurface sheet flow (Figure 32).

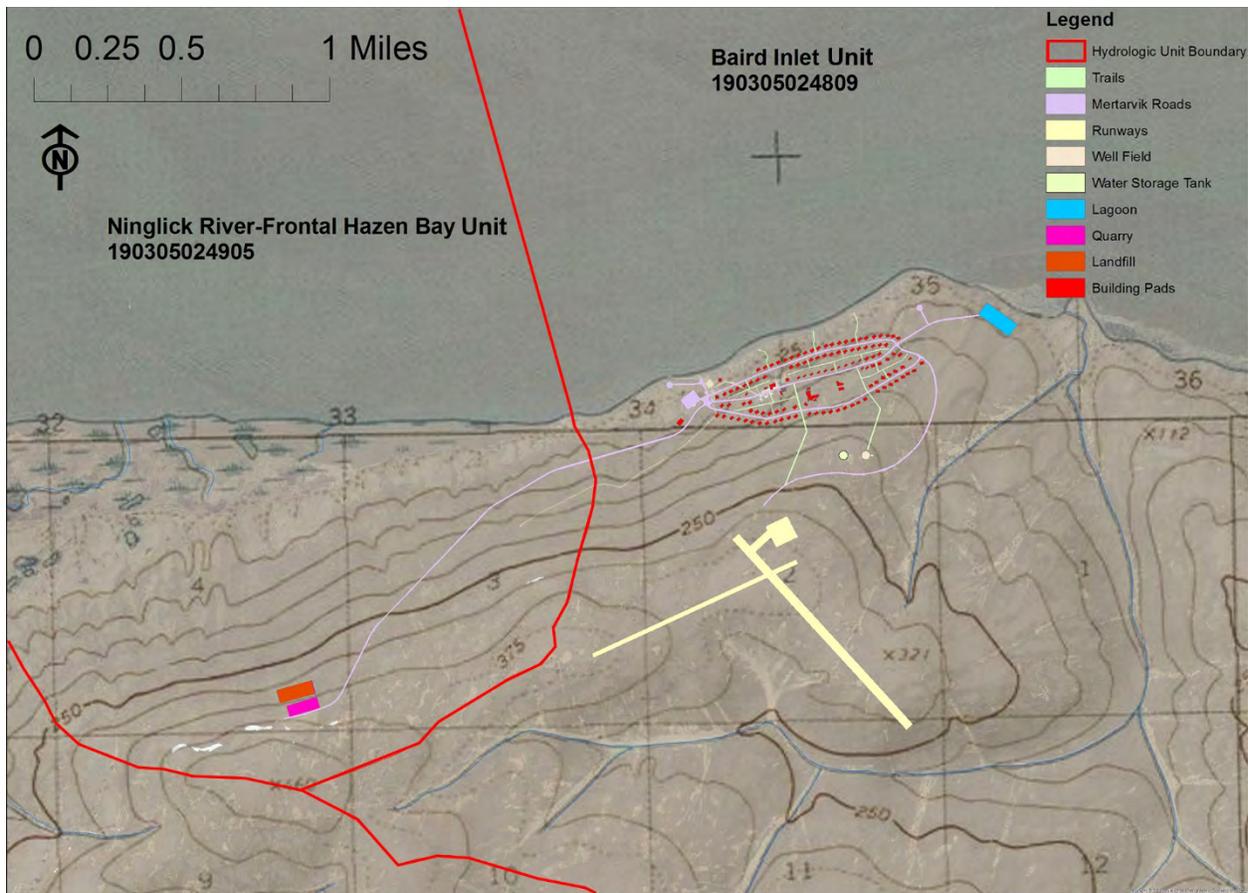


Figure 32. Proposed Mertarvik CLP in relation to USGS hydrologic unit boundaries.

5.3.3 Significance Determination

The FAA has not established significance thresholds for hydrology or hydraulics, but has established a significance threshold for floodplains: “The action would cause notable adverse impacts on natural and beneficial floodplain values” (FAA 2015). Since none of the alternatives impact floodplains (as none exist in the project area), none of the alternatives would exceed this threshold (LESS THAN SIGNIFICANT).

The Denali Commission has determined that the environmental impacts on hydrology and hydraulics associated with the implementation of any of the three CLP alternatives, as proposed, will not noticeably alter any important attribute of these resources. The impacts are considered minor, and therefore do not exceed the significance threshold for this resource category defined in section 5.1 (MINOR).

The no action alternative would have no impact on hydrology, hydraulics, or floodplains.

5.4 Surface Water

5.4.1 Affected Environment

All three CLP alternatives have been developed within the same overall Mertarvik community area and are expected to have similar direct, indirect and cumulative impacts on surface water in the Mertarvik region. As a result, the anticipated impacts of each CLP alternative are indistinguishable from each other in this resource area and will be discussed collectively.

There are no permanent waterbodies or streams within the proposed construction footprint of any of the three CLP alternatives. The major surface water features within the general project area, other than the Ninglick River, are the Takikchak River, Mertarvik spring, and a handful of small tundra ponds near the mouth of the Takikchak River. A drainage called “East Creek” on some maps runs along the east and south footprint of the proposed Mertarvik community site, before discharging into Baird Inlet (Figure 29); this drainage is believed to be seasonal or intermittent.

The Takikchak River (Figure 33) discharges into the Ninglick River about 2.8 miles west of the barge landing and approaches no closer than 1.25 miles to the westernmost part of the proposed development, the quarry, and proposed Class III Municipal Solid Waste Landfill near Hill 460 (Figure 29). The Takikchak River drains an area of 19.56 square miles and is a complex stream-system of meanders, side-channels, riffle complexes, deep pools, and beaver ponds. The river is tidally influenced within roughly 0.4 mile upstream of its mouth (USACE 2005a). The USGS collected water flow data for 2004 and 2005 using a water-stage recorder and crest-stage gage installed on the Takikchak River about 1 mile upstream from its mouth (USGS 2006). Table 7 summarizes some of the values generated during 2004 and 2005.



Figure 33. View of the Takikchak River roughly 0.8 mile upstream from its mouth, looking upstream, August 2005 (USACE 2005a).

Table 7. Summary Statistics for Water Years 2004-2005, Station 15304400 Takikchak River

Statistic	Value (cfs)	Date
Annual mean flow	28.2	2004-2005
Maximum peak flow	334	May 25, 2005
Highest daily mean flow	194	May 26, 2005
Lowest daily mean flow	8.0	April 16, 2005

Mertarvik spring (Figure 28, Figure 34) has historically been a valued source of safe, fresh drinking water for the residents of the village of Newtok. Golder investigated the spring as part of their 2007 geophysical and hydrology survey at Mertarvik (Golder 2007). As they described it, “the spring flow originates/daylights about 400 feet to 500 feet from Baird Inlet as a series of major and minor seeps near the elevation of 30 feet above MSL across an area that is approximately 175 feet wide. A few of the major seeps appear to be discharging at a relatively high rate of 0.5 cubic feet per second (cfs), but no measurements were made. These major and minor seeps eventually join in a ponded area, resulting from local topography and a beaver dam that is currently breached. The flow becomes a single channel a short distance below the beaver dam breach before it reaches Baird Inlet.” Additional measurements made in June 2007 estimated a total outflow from the spring ranging from 4.2 to 5.8 cfs, with an average of 5.1 cfs. Golder calculated that precipitation recharge of the relatively small surface catchment area above

the spring (0.37 square mile) could not account for the generous year-around flow from the spring, and so concluded it must be fed primarily by groundwater (Golder 2007).



Figure 34. June 2005 view of Mertarvik spring, looking inland (south) with the active groundwater seep in the middle distance (USACE).

Limited water quality data are available for surface water at the Takikchak River and Mertarvik spring; no water quality data appears to be available for the Ninglick River near Mertarvik. No waterbodies in the area around Mertarvik are on the State of Alaska Impaired Waterbodies 303(d) List.

The USGS collected and analyzed four rounds of water samples from the Takikchak River between October 2004 and September 2005, from a station about 1 mile upstream from its mouth. The USGS tested the water samples for standard water quality physical parameters, as well as a wide range of metals and organic compounds, and total coliform bacteria. Table 8 presents a few of the results; the complete report is available online (USGS 2005a).

The results of the USGS analyses indicate Takikchak River water to be of very high quality at the time sampled. Dissolved metal concentrations were all below drinking water standards, and no organic contaminants were detected. The Takikchak River is well oxygenated, with low dissolved matter or suspended sediment. The “total coliform” test reported by the USGS detects a wider range of bacteria than the “fecal coliform” standard on which the water quality

regulations are based (ADEC 2017), and are not entirely comparable. The presence of coliform bacteria is expected, given the known use of the Takikchak River by beavers, waterfowl, and other wildlife (section 5.10).

Table 8. USGS Water Quality Measurements at Takikchak River, 2004-2005.

	pH	DO, mg/l	Cond., µS/cm	TDS, mg/l	Suspended Sediment, mg/l	Iron (filtered), µg/l	Total Coliform, colony/100ml
Oct 2004	7.2	12.6	80	66	2	27	27
Mar 2005	7.2	14.9	87	71	2	7	< 1
May 2005	7.1	--	42	38	9	55	118
Sep 2005	7.5	12.6	75	69	3	28	56
<i>Standard</i>	6.5-8.5 ^a	7 ^b	--	1,000 ^a	--	1,000 ^c	200 ^d

DO: Dissolved Oxygen.

Cond.: Specific Conductance

TDS: Total Dissolved Solids (reported in USGS 2005 as "Residue on evap. at 180degC water filtered").

a: ADEC 2017, water quality standard for "Growth and Propagation of Fish, Shellfish, Other Aquatic Life, and Wildlife."

b: ADEC 2017, "D.O. must be greater than 7 mg/l in waters used by anadromous or resident fish".

c: ADEC 2008, Aquatic Life for Fresh Water, Chronic.

d: ADEC 2007, Fecal coliform for fresh water, non-drinking, culinary, or food processing uses, 30-day geometric mean.

It is unknown whether the Takikchak River has been tested for *Giardia* or *Cryptosporidium* parasites.

The USGS also tested water flowing from Mertarvik spring in May and September 2005 (USGS 2005b) for a small number of field parameters (Table 9).

Table 9. USGS Water Quality Measurements at Mertarvik Spring, 2005.

	pH	DO, mg/l	Cond., µS/cm	Temperature, °C
May 2005	7.2	--	98	1.8
Sep 2005	7.5	13.6	98	1.7

DO: Dissolved Oxygen.

Cond.: Specific Conductance, or conductivity

The conductivity measured in the spring water is comparable to that of the Takikchak River, suggesting it may have a similar level of TDS.

5.4.2 Environmental Impacts

Temporary surface water quality impacts associated with construction of the proposed Mertarvik infrastructure include construction-related turbidity at the barge landing site during the contractor's mobilization and demobilization, run-off from the construction of haul roads to/from construction sites, and runoff from exposed soils from construction surfaces (e.g., airport runways, roads, building pads). If gravel must be imported for fill via barge (considered very unlikely), barge operations may increase turbidity around the barge landing. While construction

of infrastructure is not expected to directly impact streams or ponds, erosion of fill during and immediately after construction of infrastructure elements may increase suspended sediment levels in surface waters (i.e. precipitation and snow melt runoff) at and around infrastructure footprints, specifically, haul routes, stockpile and staging areas, equipment access routes, roadways, building pads, and airport runway, taxiway, and apron.

Operational surfaces will be constructed via placement of fill on the tundra surface, versus cut and fill construction, and because fills are designed and expected to stabilize shortly after construction, suspended sediment effects to temporary surface flows are expected to be negligible. Further, the lack of defined surface flow pathways (i.e. streams) and tundra vegetation in relation to the limited quantities of water running off over the tundra in the Mertarvik area would result in suspended sediments rapidly settling out. Therefore, temporary water quality impacts are not expected to be significant as the potential effects are temporary and highly localized. Furthermore, construction of infrastructure features will follow project design and will implement required BMPs to minimize effects. Such sediment management BMPs could include silt fences, coir logs, and berms around areas of disturbed soil or soil stockpiles. If construction leads to noticeable ponding or changes to surface runoff patterns that may lead to erosion, culverts, French drains, and rock-lined swales might be used to redirect and reduce the velocity of surface flow. The specific sediment management BMPs to be used in the construction of particular features will be developed in the Storm Water Pollution Prevention Plans (SWPPPs) that will be required under Alaska water quality regulations prior to construction (section 5.23.9).

The Takikchak River will be buffered by its distance (Figure 33) from direct construction impacts. However, its relative proximity to the proposed Mertarvik community site is likely to subject it to greater use by the residents of Mertarvik along a greater extent of its length than it currently receives, though an increase in traditional subsistence uses of the river is unlikely to cause significant adverse physical effects to the river course. ATV access to and across the river channel has the potential to cause breakdown and erosion of the river bank, with subsequent harm to water quality and the aquatic environment. To avoid impacting the five salmon species that utilize the Takikchak River (as well as other fish species), the residents of Mertarvik should work with the ADFG to establish a minimally damaging ATV crossing point at the Takikchak River under a stream crossing General Permit IAW Alaska law (AS 16.05.871). An established stream crossing point could be “hardened” by laying a pavement of heavy cobbles across the streambed, and protecting the streambank approaches with gravel and/or half-buried transverse timbers. At the public scoping meeting in Newtok, concern was expressed that pollutants from the proposed landfill could impact the river. The design of the landfill is currently underway, with final design to be approved and a permit to operate (with environmental conditions to avoid adverse effects) issued by the Alaska Department of Environmental Conservation (ADEC). Similarly, the wastewater treatment system will be subject to ADEC approval of its final design and to a permit governing its discharge of effluent into Baird Inlet.

Limited information exists regarding the “East Creek” drainage (Figure 29). It is believed to be intermittent, and no important uses or resources associated with it have been identified by Newtok residents. The waste water treatment lagoon is the only proposed infrastructure element that approaches the East Creek drainage, but contour maps suggest that any accidental release from the lagoon would tend to migrate directly toward Baird Inlet rather than into East Creek. The lagoon will be designed and constructed to minimize the risk of any such discharge, and sediment control best management practices will reduce temporary construction impacts to less-than-significant levels.

Indirect surface water quality impacts associated with long-term use of the Mertarvik area and the operation and maintenance of infrastructure features include the same effects as noted above, however in this case, resulting from operational surface maintenance activities and operations displacing small quantities of fill material onto the tundra. The largest operational surface will be the Mertarvik Airport, and experience indicates that these impacts will be minimal based on similar effects occurring at similarly-constructed airports in similar landscape positions within the Kuskokwim River Valley, for example Nightmute, Eek, Akiak, and Tuntutuliak.

5.4.3 Significance Determination

Under the FAA significance criteria for surface waters (FAA 2015), a significant impact exists if the action would:

1. Exceed water quality standards established by Federal, state, local, and tribal regulatory agencies; or
2. Contaminate public drinking water supply such that public health may be adversely affected.

Additional factors provided by FAA guidance include consideration of whether the action has the potential to:

- Adversely affect natural and beneficial water resource values to a degree that substantially diminishes or destroys such values;
- Adversely affect surface waters such that the beneficial uses and values of such waters are appreciably diminished or can no longer be maintained and such impairment cannot be avoided or satisfactorily mitigated; or
- Present difficulties based on water quality impacts when obtaining a permit or authorization.

Denali Commission has determined that no significance threshold or additional factor for surface water listed above would be exceeded by any of the three CLP alternatives, as proposed (LESS THAN SIGNIFICANT).

The no action alternative would have no impact on surface water at Mertarvik.

5.5 Groundwater

5.5.1 Affected Environment

All three CLP alternatives have been developed within the same overall Mertarvik community area and are expected to have similar direct, indirect and cumulative impacts on groundwater in the Mertarvik region. As a result, the anticipated impacts of each CLP alternative are indistinguishable from each other in this resource area and will be discussed collectively. Shallow groundwater in the Mertarvik area is thought to flow in discontinuous zones along the porous surfaces of multiple basalt layers, seasonally perched over permafrost and denser soils. Shallow subsurface geotechnical investigations observed groundwater in only one boring, at a depth of 5 feet bgs (USACE 2008; R&M 2009). Little to no empirical information exists as to how such flows contribute to the Mertarvik Spring. The Golder geotechnical studies (Golder 2007, Golder 2008) in the area upgradient of the spring were performed in order to develop a water supply for the community that was located farther to the west than the preferred CLP; there are no current plans to develop a water supply in that area, and TW#1 will not be used as a supply well at this time.

More substantial groundwater is found at depth along the upper surface of the subsurface basalt flows, either in layers of sand and gravel or in the porous vesicular outer layer of the basalt itself (Deick 2017, pers. Comm.). The groundwater supply well installed to support the MEC in 2011 was screened from 106 to 116 feet bgs and had a static water level of 67.7 feet bgs (Denali Drilling 2011). That well was subjected to a 24-hour pump test in June 2011, at 15 gallons-per-minute (GPM). The static level was drawn down to 74 feet bgs, but reportedly recovered quickly (Longin 2011). TW#1 was screened between 103.5 and 108.5 feet bgs, with a static level of 101 feet bgs. TW#1 was subjected to only a 2-hour pump test at 15 GPM, with no draw-down observed (Golder 2008).

The location and availability of groundwater at Mertarvik is known from only these two wells, neither of which will be used to supply drinking water to the completed community. TW#1 is too far to the west of the selected current town site (Figure 29) to be a practical supply well, and the MEC well will become unsuitable as a primary potable water supply as the Mertarvik community site is built up around it. The current plan calls for a new well field to be developed upslope from the Mertarvik community site. No deep borings had been drilled in that area as of the writing of this EIS, but groundwater is presumed to be readily available in this area, based on general understanding of the local geology and hydrology.

Groundwater quality data is available from one sample taken from TW#1 in October 2007 (Golder 2008). The sample was analyzed for metallic and inorganic primary and secondary chemical contaminants regulated in drinking water IAW Title 18, Chapter 60 of the Alaska Administrative Code (18 AAC 60) and in 40 CFR §141.62(b) and 40 CFR §143.3. The full analytical results are reported in Golder 2008; the concentrations of metals and other inorganic

constituents reporting in the sample were all below drinking water maximum contaminant levels (MCLs) and secondary MCLs (SMCLs), except for iron. The concentration of iron in the sample slightly exceeded the SMCL (357 $\mu\text{g/l}$, versus the SMCL for iron of 300 $\mu\text{g/l}$).

The USEPA does not enforce SMCLs, as they are established as guidelines to assist public water systems in managing their drinking water for cosmetic (skin or tooth discoloration) or aesthetic (taste, odor, color) effects, rather than MCLs that pose a toxicity concern or that may affect the functioning of plumbing and boilers. The MEC well had not yet been sampled and tested for water quality as of mid-2017. Given the current lack of sources of contamination at Mertarvik, there is little reason to believe that its water quality differs significantly from the water tested at TW#1. The MEC is currently equipped for limited use, with a hand-pump and portable water treatment system (Meeks 2017).

5.5.2 Environmental Impacts

Potential direct or indirect threats to groundwater would be the same for each of the three CLP alternatives: releases of fuel or other contaminants from fuel storage tanks and associated pipelines, and leachate from the landfill and wastewater treatment lagoon. The groundwater that feeds Mertarvik Spring is potentially vulnerable to contamination. Little of the currently planned development lies upgradient of the spring, but a large release of fuel or other contaminants from the airport or along the quarry road could potentially impact the quality and usability of water drawn from it. The likelihood and route of contaminants migrating into area aquifers would be strongly influenced by the presence or absence of permafrost and the relationship of groundwater to the subsurface basalt layers at any particular release site. The siting of each of these pollutant sources will be guided by a source water assessment and development of a wellhead protection program required by the Safe Drinking Water Act's Ground Water Rule (GWR) (40 CFR Part 141, Subpart S), as implemented by the Alaska Department of Conservation. A Spill Prevention Control and Countermeasures (SPCC) Plan and Facility Response Plan (FRP) will be required for the Mertarvik fuel storage facilities; the plans include procedures for responding to and containing the release of fuel into the environment (Cooper, *et al* 2017a).

5.5.3 Significance Determination

Under the FAA significance criteria for groundwater (FAA 2015), a significant impact exists if the action would:

1. Exceed groundwater quality standards established by Federal, state, local, and tribal regulatory agencies; or
2. Contaminate an aquifer used for public water supply such that public health may be adversely affected.

Additional factors provided by FAA guidance include consideration of whether the action has the potential to:

- Adversely affect natural and beneficial groundwater values to a degree that substantially diminishes or destroys such values;
- Adversely affect groundwater quantities such that the beneficial uses and values of such groundwater are appreciably diminished or can no longer be maintained and such impairment cannot be avoided or satisfactorily mitigated; or
- Present difficulties based on water quality impacts when obtaining a permit or authorization.

The Denali Commission has determined that none of the three CLP alternatives, as proposed, would exceed the significance threshold or additional factors listed above (LESS THAN SIGNIFICANT).

The no action alternative would have no impact on groundwater at Mertarvik.

5.6 Air Quality

5.6.1 Affected Environment

All three CLP alternatives have been developed within the same overall Mertarvik community area and are expected to have similar direct, indirect and cumulative impacts on air quality in the Mertarvik region. As a result, the anticipated impacts of each CLP alternative are indistinguishable from each other in this resource area and will be discussed collectively.

The Mertarvik site presumably enjoys very good air quality due to the absence of significant air pollutant sources. There is no established ambient air quality monitoring program at Mertarvik, however, and little existing data to compare with the National Ambient Air Quality Standards (NAAQS) established under the Clean Air Act (CAA). These air quality standards include ambient air concentration limits on the “criteria pollutants” carbon monoxide (CO), ozone (O₃), sulfur dioxide (SO₂), nitrogen oxides (NO_x), lead (Pb), and particulate matter (PM₁₀, PM_{2.5}). State of Alaska air quality control regulations are promulgated in 18 AAC 50.

5.6.2 Environmental Impacts

Air emissions sources at Mertarvik will include temporary construction-related emissions, emissions from completed stationary infrastructure sources (e.g., the power plant and heated structures), private mobile sources such as ATVs and snowmachines, and non-point sources such as roadways.

Construction-related emissions are expected to consist primarily of exhaust from heavy construction equipment, vehicles, and electric generators. Airborne particulates will be generated from the transport and placement of gravel fill extracted from the quarry, and from the transport and management of excavated soils, especially during airport construction. Temporary air quality impacts off-site include any aircraft or barge-related emissions related to shipping infrastructure

material via aircraft or barge, or fill material via barge to the proposed construction site. Construction-related emissions will be generated through the life of the CLP construction at Mertarvik (currently projected to be completed in 2017), but will vary greatly from year to year depending on the level of construction activity. The construction-related emissions will also be highly seasonal, as most construction work will occur in ice-free months.

The principle stationary source of air emissions within the CLP will be the interim (Phases 2-3) and permanent (Phase 4) diesel-electric power plants. Table 10 provides the results from preliminary calculations of power plant “potential-to-emit” (PTE) values, compared with recent data from the existing Newtok power plant (Stassel 2017). Estimates of Phase 4 PTE values for other stationary and mobile sources are also presented (Stassel 2018).

Table 10. Preliminary Potential-to-Emit Values

Emission Source	Fuel Use gal/year	kWh/ year	PM tons/year	NO _x tons/year	CO tons/year	SO ₂ tons/year
Existing Newtok power plant (FY 2016)	41,839 diesel	476,848	0.70	9.89	6.10	na
Mertarvik Phase 2B power plant	11,000 diesel	111,000	0.04	0.87	0.61	na
Mertarvik Phase 3A power plant	16,000 diesel	176,000	0.06	1.40	0.97	na
Mertarvik Phase 3B power plant	21,000 diesel	262,500	0.09	2.08	1.45	na
Mertarvik Phase 4 power plant	82,000 diesel	1,066,000	0.35	8.5	5.9	< 0.01
Mertarvik Phase 4 home, structure heating	70,830 diesel	--	< 0.02	0.64	354	< 0.01
Mertarvik Phase 4 mobile heavy equipment	7,870 diesel	--	< 0.04	0.81	0.56	< 0.01
Mertarvik Phase 4 ATV, snowmachine	61,000 gasoline	--	< 0.1	3.1	4.1	< 0.02
Mertarvik Phase 4 Total PTE	--	--	0.51	13.05	364.56	< 0.05

na: not available.

diesel: assumes ultra low sulfur (15ppm) diesel.

gasoline: assumes unleaded, 30ppm sulfur gasoline.

power plant emissions assume 8760 hours/year operation.

The preliminary PTE estimates for the Mertarvik Phase 4 power plant suggest that the new power plant would emit levels of air contaminants comparable to the existing power plant at Newtok, even while generating more than twice the electric power; the interim power plants at Newtok would emit still less. The PTE estimates also suggest that the interim and permanent power plants at Mertarvik may fall below the emissions thresholds requiring an air quality Title V operations permit (100 tons a year for any pollutant). Review and refinement of the

preliminary PTEs, and consultation with the ADEC Air Permitting Division, would be needed to establish air quality permit requirements for the power plant (Dunn 2018).

The operation of ATVs and other motorized wheeled vehicles on Mertarvik roads represent a source of air emissions that exist only in a limited way at Newtok. Statewide, dust lofted from unpaved roads is a significant source of airborne particulates, and a potential health and quality of life issue. The roads and trails at Mertarvik will be constructed of crushed rock gravel laid over the existing tundra, rather than graded into native soil; this will in itself reduce the lofting of dust, although some fine particles may exist in the crushed rock material (ADOTRDTT, *et al*, 2015).

Direct long-term air quality impacts associated with the development and utilization of airport infrastructure at Mertarvik includes the transfer of those same operations emissions from Newtok to Mertarvik (e.g., aircraft landing at Mertarvik instead of Newtok). As proposed, there is no expectation that replacement services at Mertarvik will increase existing emissions at Newtok as there are no known expected increases in such services and should, in fact, decrease as the population transfers to Mertarvik. For example, flight operations type, frequency, fleet mix, cargo, or passenger transportation requirements are expected to be divided between the two locations. If some services are simultaneously provided at both Newtok and Mertarvik, there is the potential to temporarily increase emissions. The emissions are expected to be quite minimal since current operations would not be doubled, but rather distributed. As erosion begins to claim the runway, the existing Newtok Airport will be restricted to serving smaller and smaller aircraft that typically emit fewer emissions than multi-engine aircraft until these intermittent operations cease entirely.

All airport emission sources are expected to meet Federal and State emissions regulations. While both locations are temporarily in operation simultaneously, emissions would occur at both locations. However, no entity has proposed to fly in more than minimal quantities of supplies and materials for construction at Mertarvik, so no known quantifiable increase in aircraft or barge operations, and therefore emissions, is known at this time.

Indirect air quality impacts include a dust shadow effect on the surrounding tundra wherever fills are placed and maintained, and emissions from vehicles and all-terrain vehicles (ATV's). Specifically, vehicle use and maintenance of the haul road and access road, vehicle and aircraft use of airport operational surfaces, regular maintenance activities, and commerce would generate dust and, in some cases, displace minor amounts of gravel fill to the adjacent tundra. Wind erosion of all fill placements would likewise impact adjacent tundra, and to a lesser degree, air quality in the community overall. These impacts are expected to be minor since wind erosion of fill surfaces has not typically resulted in the deposition of measurable quantities of fill to adjacent tundra in Alaska.

Best management practices to reduce impacts to air quality during construction include requiring construction equipment to be kept in good repair, the use of dust control palliatives (e.g., water or approved chemical products) to minimize the lofting of particulates from gravel surfaces and gravel-generation activities, and speed limits on mobile construction equipment. Air quality can be maintained within the established Mertarvik community through regular inspection and maintenance of the power plant and oil-fired heaters, and encouraging the proper care of small engines, and the replacement of obsolete models. Community speed limits on roads and trails will reduce the quantity of dust lofted into the air (ADOTRDTT, *et al*, 2015).

Because the local and regional air quality environment is in “attainment” status under the CAA, meaning no criteria pollutant levels have been exceeded, and as no increase in total community or airport emissions (beyond temporary construction emissions) is expected, neither an emissions inventory nor modeling of air quality impacts is necessary. Should further agency and public comment demonstrate a need for a more detailed assessment, the Denali Commission and/or FAA will determine the level of detail and include it in the Final EIS or a supplemental NEPA analyses prior to construction of specific elements of the proposed action (project).

Temporary air quality impacts are expected to be minor as regulatory and contractual requirements will specify that any and all equipment used must meet emissions requirements at the time the equipment was manufactured, and best management practices (BMP), such as dust control, will be used to minimize air quality impacts. Additionally, there is no expectation that local or regional air quality will degrade in the foreseeable future. Nor is there any expectation of more than minimal, if any at all, community population growth as a result of infrastructure development.

5.6.3 Significance Determination

Under the FAA significance criteria for air quality (FAA 2015), a significant impact exists if the action “would cause pollutant concentrations to exceed one or more of the National Ambient Air Quality Standards (NAAQS), as established by the Environmental Protection Agency under the Clean Air Act, for any of the time periods analyzed, or to increase the frequency or severity of any such existing violations.”

Under any of the three CLP alternatives, the new power generation and heating equipment installed at Mertarvik is expected to be cleaner and more efficient than the equipment at Newtok that will be gradually phased out. The new emissions sources installed at Mertarvik will be subject to current Federal and State emissions sources. Considering the 9-mile distance between the two sites, the temporary simultaneous operation of emissions sources at Newtok and Mertarvik is unlikely to create an additive exceedance of any air quality standard. Particulate emissions at Mertarvik caused by construction equipment and vehicles can be minimized through best management practices and the adoption of local traffic ordinances.

The Denali Commission has determined that none of the three CLP alternatives, as proposed, would exceed the significance threshold for air quality defined above (LESS THAN SIGNIFICANT).

The no action alternative would have no impact on air quality at Mertarvik.

5.7 Climate and Climate Change

5.7.1 Affected Environment

Little direct climatological data is available for Nelson Island. In general, Newtok and the proposed Mertarvik site experience similar weather, within a transitional climate zone that shares characteristics of subarctic, arctic, and maritime climates. Winters are long and cold; summers are short and mild. Average summer temperatures range from 40 °F to 60 °F; average winter temperatures range from 0 °F to 20 °F. Extreme temperatures in winter can go as low as -48 °F and in summer as high as 87 °F. Annual precipitation is 16 inches, with 53 inches of snowfall (ADCRA 2017j).

“Climate” is defined as average weather patterns over a period of time—from a few decades to thousands of years. Significant, lasting change to existing weather patterns is commonly called “climate change.” The term “greenhouse gases” refers to a variety of gases in the earth’s atmosphere that react with sunlight in a way that influence global air temperature. Greenhouse gases are defined as including carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. The emissions discussed below refer in part to these greenhouse gas and other combustion engine emissions.

5.7.2 Environmental Impacts

All three CLP alternatives have been developed within the same overall Mertarvik community area and are expected to have similar direct, indirect and cumulative impacts on climate and climate change in the Mertarvik region. As a result, the anticipated impacts of each CLP alternative are indistinguishable from each other in this resource area and will be discussed collectively.

The destructive erosion of the Ninglick River bank at Newtok is the result of a combination of processes: the physics of a meandering stream system, the thawing and breakdown of seasonally frozen soils and permafrost, tidal action, and surge generated by storms in the Bering Sea. Climatological conditions attributed to anthropogenic climate change may exacerbate some of these processes and accelerate the erosion, though not in a manner that can be quantified at this time. Longer and warmer summers would extend the existing thaw season, leaving weakened soils exposed to erosion for a longer period each year. Likewise, a shorter season of heavy ice-cover on the Ninglick River would extend the period of active erosion each year. Stronger and

more frequent storms, as well as sea level rise, would increase the damaging effects of storm surge and the frequency of severe flooding (State of Alaska 2017).

In terms of climate resilience, the proposed Mertarvik town site offers many advantages over the existing Newtok location. There is no evidence of erosion of the Mertarvik shoreline such as is occurring at Newtok. The proposed center of the Mertarvik community will be built at elevations of roughly 50 to 175 feet above MSL, offering much greater insurance against potential future sea level rise than Newtok's elevation of 20 feet above MSL or less. Mertarvik's position 9 miles farther upriver from the mouth of the Ninglick River than Newtok, and the presence of an additional 90-degree bend in the river, should provide some relative protection from storm surge. The basaltic bedrock and soils originating from weathered basalt at Mertarvik offer a construction base more robust and stable than does the frozen silt of Newtok. Discontinuous permafrost exists at Mertarvik, but if it were to degrade in response to a warming climate, the result would be localized subsidence limited by the relatively shallow bedrock.

All three of the CLP alternatives provide essentially equivalent levels of climate resilience. In Alternatives 1 and 3, the center of the community is positioned at a higher elevation than in Alternative 2, but it is unclear if this would confer any real advantages. Some coastal infrastructure, such as the barge landings and fuel unloading headers and piping, will need to be located at the shoreline by necessity, and the three CLP alternatives do not offer different positioning for these coastal facilities.

The three CLP alternatives would generate equivalent emissions of greenhouse gases, in both the short-term during construction and in the long term, because under the three alternatives, the same facilities would be constructed and the same equipment would be installed. In the long term, the completed community at Mertarvik should generate less greenhouse gas and particulates than is currently emitted at Newtok for a comparable delivery of heat and electricity, as the power equipment installed at Mertarvik would be much newer and more fuel-efficient. All three CLP alternatives also make provisions for future installation of solar and wind power generation. In the short term, during the construction and transition phase, greenhouse gas emissions may be temporarily elevated above current levels due to emissions from construction equipment at Mertarvik, and the need to generate power at Newtok and Mertarvik simultaneously.

Emissions at Mertarvik are replacing emissions at Newtok with the exception of temporary construction-related emissions and the potential temporary and as yet unknown change in operations between the two village sites (energy production, flight operations, heating) while both locations are operational. The emissions related to construction would be a temporary, incremental localized increase. The remaining potential change in aircraft emissions occurring if an air carrier decides to temporarily serve both communities at one time. The increased

emissions would be limited to those emissions released during the approximately 11-mile flight between the communities and the additional take-off and landing for those flights that would stop at both communities.

With respect to flight operations, it is currently unknown whether commercial carriers would temporarily serve both airports, or alternate service between the two airports, as the projections for community construction and relocation are largely conceptual at this point. Therefore, it can only be noted that if an increase in the frequency or duration of ground or air operations occurs as a result of both airports operating simultaneously, an incremental increase in localized emissions would temporarily result.

As previously noted, the overall effect is expected to be a short term slight increase in emissions due to infrastructure construction and some duplication of flights with two airports and a long-term no change in emissions as the operations at Mertarvik Airport are expected to replace the operations at Newtok Airport. Temporarily, due to construction, a localized and de minimis increase in emissions would result. No information is available that indicates that the potential for a temporary increase in emissions or the change in location of emissions would be significant.

5.7.3 Significance Determination

The CEQ has stated that “it is not currently useful for the NEPA analysis to attempt to link specific climatological changes, or the environmental impacts thereof, to the particular project or emissions, as such direct linkage is difficult to isolate and to understand”, and therefore the FAA does not provide a significance threshold for climate change (FAA 2015).

The Denali Commission has determined that the environmental impacts on climate and climate change associated with the implementation of any of the three CLP alternatives, as proposed, will not noticeably alter the climate, and not reach the threshold of significance as defined in section 5.1 (MINOR).

The no action alternative would have no impact on climate or climate change at Mertarvik, but offers no climate resilience. The land base under the Newtok Village and therefore the Newtok Village itself, is expected to succumb to erosion as continued sea level rise, storm erosion, riverine erosion and permafrost melting occurs.

5.8 Habitat

5.8.1 Affected Environment

5.8.1.1 Regional Setting

Newtok and Mertarvik are both within the Yukon-Kuskokwim (Y-K) Delta ecoregion. This region spans almost 19 million acres of Southwest Alaska and is dominated by a flat coastal plain of marshes, wet meadows, and meandering streams, punctuated by isolated volcanic features such as basalt domes and small cinder cones. Wet tundra communities on the coastal plain consist of sedge mats, mosses, and low-growing shrubs. Uplands created by peat mounds, sand deposits, and volcanic soils support dwarf scrub communities of birch and other shrubs. Willow thickets form along rivers and on better-drained slopes, while alders, birch, and stunted spruce grow along major streams (ADFG 2015).

The region's lakes, streams, and wetlands support abundant populations of waterfowl and shorebirds; more than 20 species of waterfowl and 10 species of shorebirds are known to breed here. The Y-K Delta supports the breeding of half of the world's Pacific Black Brant, the majority of the world's emperor geese, all of North America's cackling Canada geese, and high densities of nesting tundra swans, long-tailed ducks, common eiders, and spectacled eiders. Large runs of anadromous fishes, including arctic lamprey, Dolly Varden, whitefish, and all five species of Pacific salmon migrate up the Yukon and Kuskokwim Rivers and other major drainages. Northern pike, arctic grayling, whitefish, sticklebacks, and rainbow trout are resident in many streams. Coastal waters of the ecoregion provide feeding habitat for beluga and minke whales, walrus, and bearded, spotted, ribbon, and ringed seals. Terrestrial mammals include river otters, brown bears, moose, and wolves (ADFG 2015).

5.8.1.2 Local Setting

On Nelson Island, terrestrial mammals are relatively low in diversity and consist of arctic fox (*Vulpes lagopus*), red fox (*Vulpes vulpes*), beaver (*Castor canadensis*), moose (*Alces alces*), introduced muskoxen (*Ovibos moschatus*), an occasional brown bear (*Ursus arctos*), and several species of small mammals

Brown bears are found mainly in the mountains east of the Y-K Delta lowlands and near the major rivers. Lowland habitats of the delta have very few brown bears (Seavoy 2003). Brown bears are also known to feed on sea mammal carcasses washed ashore in some areas of the Bering Sea coast, south of Nelson Island (Gray and Harbanuk 2005). Brown bears could swim to Nelson Island, but Newtok residents say they are rare in the project vicinity (D. Charles, personal communication, November 2007).

Nelson Island is home to 200 to 300 muskoxen (Perry 2005) and are occasionally seen near the project site (D. Charles personal communication, November 2007). The muskoxen inhabiting Nelson Island are descendants of the 34 muskox captured in East Greenland in 1930 and

transferred to Nunivak Island to re-establish the previously extirpated Alaska stock of muskox. USACE Alaska District geotechnical engineers saw two small groups of muskoxen, six to seven animals in each group, near the project site during September 2007 (G. Carpenter, personal communication, November 2007).

Moose are rare on Nelson Island (D. Charles, personal communication, November 2007). USACE geotechnical engineers did not observe any moose during their field work at the project site (G. Carpenter, personal communication, November 2007). USACE Alaska District biologists conducting fisheries studies in nearby Takikchak River during September 2007, and bird and vegetation studies on the project site during June and August 2007 did not observe any moose or any indication of their presence (C. Hoffman, personal communication; E. Campellone, personal communication, November 2007).

Small mammals, including voles, shrews, lemmings, short-tailed weasels (*Mustela ermine*; Figure 35), and mink, range across much of Nelson Island, and could be present throughout the project area. USFWS biologists noted an abundance of voles and lemmings during an August 2006 field study of the area (USFWS 2006).

Traditional ecological knowledge says that the numbers of beavers on Nelson Island have increased significantly since the 1970s (Anderson et. al. 2004, Gray and Harbanuk 2005), and Newtok residents say they are seen in the Takikchak River drainage (D. Charles, personal communication). USACE Alaska District biologists saw beavers in the Takikchak River drainage during site visits (Figure 36), and USFWS biologists also noted beavers during an August 2006 field study of the area (C. Hoffman and E. Campellone, personal communications, November 2007; USFWS 2006).



Figure 35. Short-tailed weasel photographed near Mertarvik in 2005 (USACE).



Figure 36. Beaver dam on the Takikchak River, 2005 (USACE).

Reindeer (*Rangifer tarandus*) were introduced to Nelson Island in 1934, but there are no reindeer on the island today. There are also no caribou on Nelson Island. Caribou range to north, east, and southeast of Nelson Island, but their range does not extend to the island. The Mulchatna herd, which ranges south of the Kuskokwim River, possibly comes closest to Nelson Island (Seavoy 2005).

Nelson Island and the proposed Mertarvik site are at the western edge of Baird Inlet, a large brackish estuary connected to the Bering Sea by the Ninglick and Kolavinarak Rivers. Steller sea lions (*Eumetopias jubatus*) and beluga whales (*Delphinapterus leucas*) of the eastern Bering Sea stock may occasionally ascend the Ninglick River to Baird Inlet, but this would not be a common occurrence. The nearest sea lion rookery is at Cape Newenham, approximately 175 miles southeast of the project site.

Spotted seal (*Phoca largha*), a species closely related to the common harbor seal, is the marine mammal most likely to be seen in the Ninglick River and Baird Inlet. Several spotted seals were seen in the vicinity of the proposed barge landing by USACE Alaska District geotechnical engineers during geophysical studies of the project site in September 2007 (G. Carpenter personal communication).

The bird species found in the Nelson Island and Baird Inlet area are overwhelmingly migratory, using the habitat in the area only in the summer and autumn for nesting and feeding; migratory birds are described further in section 5.10 below. Few birds remain in the local area through the winter, limited primarily to the common raven (*Corvus corax*), one to two species of ptarmigan (*Lagopus* spp.), and potentially snowy owl (*Bubo scandiacus*) and gyrfalcon (*Falco rusticolus*). Information on fish species in local drainages is provided in section 5.11 below.

Vegetation in the Mertarvik area is dominated by wetland plant communities. Open low mesic shrub; birch-ericaceous shrub is the most abundant vegetation community in the central Mertarvik project area (“ericaceous” refers to plants such as blueberry and lingonberry that prefer acidic, infertile soils; “mesic” refers to soils with moderate moisture levels, i.e., neither very wet nor very dry). Species such as dwarf birch (*Betula nana*), Labrador tea (*Rhododendron tomentosum*), reindeer lichen (*Cladina arbuscula*), cloudberry (*Rubus chamaemorus*), water sedge (*Carex aquatilis*), and cottongrass (*Eriophorum* spp.) compose the vegetation community. Shrubs at least 8 inches tall compose 25 to 75 percent of the cover. These communities can develop on sites with a wide variety of moisture, temperature, and soil conditions. Acidic mineral soils with a well decomposed organic layer 2 to 12 inches thick are characteristic. Permafrost is usually present at least 20 inches below the surface. Open low mesic shrub-ericaceous shrub communities are generally quite stable, provided moisture regime is consistent, which can be influenced by permafrost degradation. The vegetation grades into crowberry dwarf shrub tundra as topographic gradient increases moving to the west of the main CLP area. This increased grade likely results in shallower soils, and the area is likely more protected from the wind and sheet flow is more constrained. Crowberry dwarf shrub tundra is dominated by crowberry (*Empetrum nigrum*), with other ericaceous shrubs like lingonberry (*Vaccinium vitis-idaea*), alpine blueberry (*Vaccinium uliginosum*), bearberry (*Arctostaphylos alpine*), mountain heather (*Cassiope mertensiana*) and herbaceous plants like club moss (*Lycopodium* spp.) and sedges (*Carex* spp.).

Mesic graminoid herbaceous (i.e., grasses and grass-like plants) communities dominate the area proposed for the runway, with tussock tundra forming the largest component in the Southern Hypoarctic tundra subzone (Yurtsev 1994). Tussock cottongrass (*Eriophorum vaginatum*) is the primary tussock-former in these communities, with low shrubs such as dwarf birch, Labrador tea, cloudberry, and bearberry occupying the interstices between tussocks. Reindeer lichens and moss are usually present as well. Mesic graminoid herbaceous plant communities are generally very successional stable and often represent climax vegetation; in the project area, they occur on north-facing slopes where permafrost is closer to the surface. Soils are acidic and contain poorly decomposed organic material. Deeper permafrost tables enable the development of bluejoint-herb communities dominated by bluejoint grass (*Calamagrostis canadensis*), and interspersed with herbaceous species like horsetail (*Equisetum* spp.), Arctic sweet coltsfoot (*Petasites frigidus*), and fireweed (*Chamerion angustifolium*).

5.8.2 Environmental Impacts

All three CLP alternatives have been developed within the same overall Mertarvik community area and are expected to have similar direct, indirect and cumulative impacts on natural resources in the Mertarvik region. As a result, the anticipated impacts of each CLP alternative are indistinguishable from each other in this resource area and will be discussed collectively.

The development of new infrastructure at the Mertarvik site on Nelson Island would result in direct impacts to a very small proportion of the biological resources and habitat available in the area. A detailed quantitative assessment of impacts to wetland and upland habitat is provided in section 5.12. The collective footprint of the proposed permanent fill and temporary construction areas for all proposed Mertarvik infrastructure has not yet been finally mapped or delineated in detail regarding the types of habitats; therefore, the specific acreage of wetland versus terrestrial habitat provided herein is only a close approximation. The assumption is that the temporary construction footprint will impact an area 50 percent beyond the permanently filled footprint. Therefore, temporary construction impacts are expected to impact roughly 99 acres of combined wetland and terrestrial habitat, while permanent fill is expected to impact about 66 acres of wetland and terrestrial habitat combined. These acreage estimates are considered generous (by 5 to 10 percent) to ensure potential impacts are adequately addressed. Further design work will refine acreage estimates.

Terrestrial mammals, like muskox and moose, may avoid the area immediately surrounding the project area due to the elevated noise and activity, but abundant replacement habitat is available on Nelson Island. The construction of a Class III Municipal Solid Waste Landfill may have the effect of attracting foxes and bears, so a fence should be constructed around the landfill to avoid creating a hazard to human health or an increase in fox population, endangering native birds and their nests. Dust from road construction and use would settle on vegetation downwind of the fill and reduce primary productivity, but the decline would not likely be measurable.

Newtok residents have stated that they do not believe that living at Mertarvik instead of Newtok will substantially change their hunting and subsistence practices. The Mertarvik site is already part of their traditional subsistence area, although berries are the only resource obtained from the immediate site footprint. The subsistence pressure on game, fish, and plant species in the area should therefore not change significantly as a result of the change in the community's area of habitation.

Terrestrial Habitats

The construction of various Mertarvik infrastructure elements is expected to disturb or temporarily destroy vegetative cover impacted by the operation of heavy equipment through or over it. Areas impacted by stockpiles may also see temporary loss of vegetation. No proposed construction work outside fill footprints is expected to permanently remove vegetative cover. Areas temporarily disturbed are expected to re-vegetate with native vegetation within 1 to 5 years. The contractors utilized will be required to clean their heavy equipment before arrival on site to preclude the introduction of invasive species.

Direct impacts include a permanent loss of an estimated 66 acres of tundra wetland, "upland" tundra, and barren rock habitat.

Indirect impacts are expected to be dust shadow impacts potentially reducing vegetative growth as dust erodes by various means off placed fills and modification of surface hydrology flow patterns due to fill intercepting or re-directing flows.

The construction, operation and maintenance of various Mertarvik infrastructure elements would cumulatively result in a minor loss of terrestrial habitat within the community boundary, but a minor loss within the overall Nelson Island region. There would also likely be an increased level of disturbance for species utilizing remaining terrestrial habitats in the immediate vicinity of the community to an extent that most animals would relocate away from the disturbance.

Aquatic Habitats

Aquatic habitats, where temporary fills are stockpiled or staged (if any), are expected to have had liners placed on the ground surface prior to stockpiling or staging. Therefore, removal of those liners should facilitate natural restoration within the same or less time as areas impacted by wheeled and tracked equipment. If vegetative restoration is required, it is expected that organics removed from areas in which terrain must be removed for safe flight operations will be used to facilitate natural re-vegetation.

Indirect impacts are expected to be increased turbidity resulting from precipitation or snow melt erosion of fill materials. As well as modification to wetland hydrology as fills intercept and/or re-direct surface flows. The result is expected to be minor to moderate changes in wetland

hydrology, vegetation and possibly wetland type in the immediate vicinity (several hundred yards) of the placed fills.

5.8.3 Significance Determination

No FAA significance threshold is available for impacts to “habitat”, as a resource category. The FAA does have a resources category of “biological resources”; the FAA provides non-threshold factors for this resource category that may be applied to the general biological settings described in this section. The FAA guidance (FAA 2015) recommends evaluating the proposed actions for the potential to cause:

- A long-term or permanent loss of unlisted plant or wildlife species, i.e., extirpation of the species from a large project area (e.g., a new commercial service airport);
- Substantial loss, reduction, degradation, disturbance, or fragmentation of native species’ habitats or their populations; or
- Adverse impacts on a species’ reproductive success rates, natural mortality rates, non-natural mortality (e.g., road kills and hunting), or ability to sustain the minimum population levels required for population maintenance.

None of the CLP alternatives are expected to create impacts similar to those listed above. The Denali Commission has determined that the environmental impacts on habitat with the implementation of any of the three CLP alternatives will not noticeably alter any important attribute of the resource, and not reach the threshold of significance as defined in section 5.1 (MINOR).

The no action alternative would have no impact on biological resources in general at Mertarvik. Impacts on wildlife and habitat would decrease as subsistence use of the area may diminish as most of the residents of Newtok are forced to leave the general area.

5.9 Endangered and Threatened Species

This section discusses species provided with protected status under the Endangered Species Act (ESA) and the Marine Mammal Protection Act (MMPA). All three CLP alternatives have been developed within the same overall Mertarvik community area and are expected to have similar direct, indirect and cumulative impacts on protected species in the Mertarvik region. As a result, the anticipated impacts of each CLP alternative are indistinguishable from each other in this resource area and will be discussed collectively.

5.9.1 Affected Environment

Endangered Species Act

Jurisdiction under the Endangered Species Act (ESA) is divided by species between the USFWS and the NMFS. Through informal consultation with the USFWS and the NMFS (USACE 2017a, USACE 2017b), the USACE identified the ESA-listed species (Table 11) that may be present in the area of the proposed action, or potentially affected by project-related activities, such as ocean transport of project materials.

Table 11. ESA-Listed Species Potentially Affected by the Proposed Action.

Species	Listed Population	ESA Status	Agency Jurisdiction
Spectacled eider, <i>Somateria fischeri</i>	All	Threatened	USFWS
Steller's eider, <i>Polysticta stelleri</i>	All	Threatened	USFWS
Northern sea otter, <i>Enhydra lutris kenyoni</i>	Southwestern Alaska DPS	Threatened	USFWS
Short tailed albatross, <i>Phoebastria albatrus</i>	All	Endangered	USFWS
Steller sea lion, <i>Eumetopias jubatus</i>	Western DPS	Endangered	NMFS
Ringed seal, <i>Pusa hispida</i>	Arctic DPS	Threatened (under appeal)	NMFS
Bearded seal, <i>Erignathus barbatus</i>	Beringia DPS	Threatened	NMFS
Humpback whale, <i>Megaptera novaeangliae</i>	W. Pacific DPS	Endangered	NMFS
	Mexico DPS	Threatened	NMFS
N. Pacific right whale, <i>Eubalaena japonica</i>	All	Endangered	NMFS
Sperm whale, <i>Physeter macrocephalus</i>	All	Endangered	NMFS
Fin whale, <i>Balaenoptera physalus</i>	All	Endangered	NMFS
Blue whale, <i>Balaenoptera musculus</i>	All	Endangered	NMFS
Western No. Pacific gray whale, <i>Eschrichtius robustus</i>	All	Endangered	NMFS
Beluga whale, <i>Delphinapterus leucas</i>	Cook Inlet DPS	Endangered	NMFS

DPS: Distinct Population Segment

The ADFG is also responsible for determining and maintaining a list of endangered species in Alaska under state law (AS 16.20.190). The State of Alaska endangered species list currently includes:

- Short tailed albatross (*Phoebastria albatrus*)
- Eskimo curlew (*Numenius borealis*)
- Blue whale (*Balaenoptera musculus*)
- Humpback whale (*Megaptera novaeangliae*)
- Right whale (*Eubalaena japonica*)

Of the species listed above and in Table 10, only the spectacled and Steller's eiders and the Eskimo curlew have the potential to be within the Mertarvik site itself. Increased barge traffic delivering construction materials and equipment to Mertarvik along a presumptive shipping route from Anchorage (Figure 38) may potentially impact marine species under both USFWS and NMFS jurisdictions.

Spectacled and Steller's Eiders

The spectacled eider is a sea duck that nests along the arctic coasts of Alaska and Russia, and on the Y-K Delta. Molting areas exist in Norton Sound and Ledyard Bay in Alaska. In the winter, the entire global population of spectacled eiders gathers in persistent gaps in the sea ice in the Bering Sea south of St. Lawrence Island.

Steller's eider is the smallest of the eider species. It currently nests almost exclusively in northeastern Siberia, with less than 1 percent of the population breeding in North America. Alaska's breeding population nests primarily on the Arctic Coastal Plain, with very small numbers found nesting on the Y-K Delta. Most of the world's Steller's eider population winters in the Aleutian Islands and along the Alaska Peninsula. See section 5.9 for additional discussion on spectacled and Steller's eiders.

The USACE Alaska District has been coordinating with the USFWS regarding relocating the village of Newtok to Mertarvik since 2005. In June 2005, at USACE' request, the USFWS conducted a survey to help with assessing the potential impacts to threatened and endangered species at the prospective relocation site. The USFWS concluded in its field report (USFWS 2006) that, although ESA-listed spectacled and Steller eiders have nested in the area, none were nesting at the Mertarvik site at the time of the survey. The USFWS field report stated that "ideal nesting habitat for spectacled and Steller's eiders is a complex of sedge-grass meadows, pond shorelines, peninsulas and islands... On nesting grounds, they feed by dabbling in shallow freshwater or brackish ponds, or on flooded tundra." This type of habitat does not exist in the area expected to be impacted by the construction of the preferred Mertarvik CLP alternative, although it may exist near the mouth of the Takikchak River. Spectacled eiders do breed along the western Alaska coast, and designated critical habitat (CH; Figure 37) for this species exists roughly 6 miles from the Mertarvik site; this suggests that they may be present in wetlands or open water near the Mertarvik site.

The threatened Steller's eider was once locally common in portions of the Y-K Delta, but nesting by Steller's eider in western Alaska is now extremely rare; their Alaskan breeding range is primarily confined to the Arctic Coastal Plain (USFWS 2011). Steller's eiders could potentially be found in the vicinity of Mertarvik, but these would most likely be transient, migrating between the North Slope breeding range and their wintering and molting areas along the Alaska Peninsula.

Eskimo Curlew

The Eskimo curlew is considered to likely be extinct, although it retains its "endangered" listing under the ESA and State of Alaska designation; its last confirmed sighting was in 1987, in Nebraska. This far-ranging species nested on arctic tundra in Alaska and Canada, then migrated as far as South America for the winter. Its historical range potentially extended into the northern Y-K Delta (ADFG 2017), but the species was not included in informal consultation with the USFWS, and was therefore not included in Table 11 for consideration in this EIS.

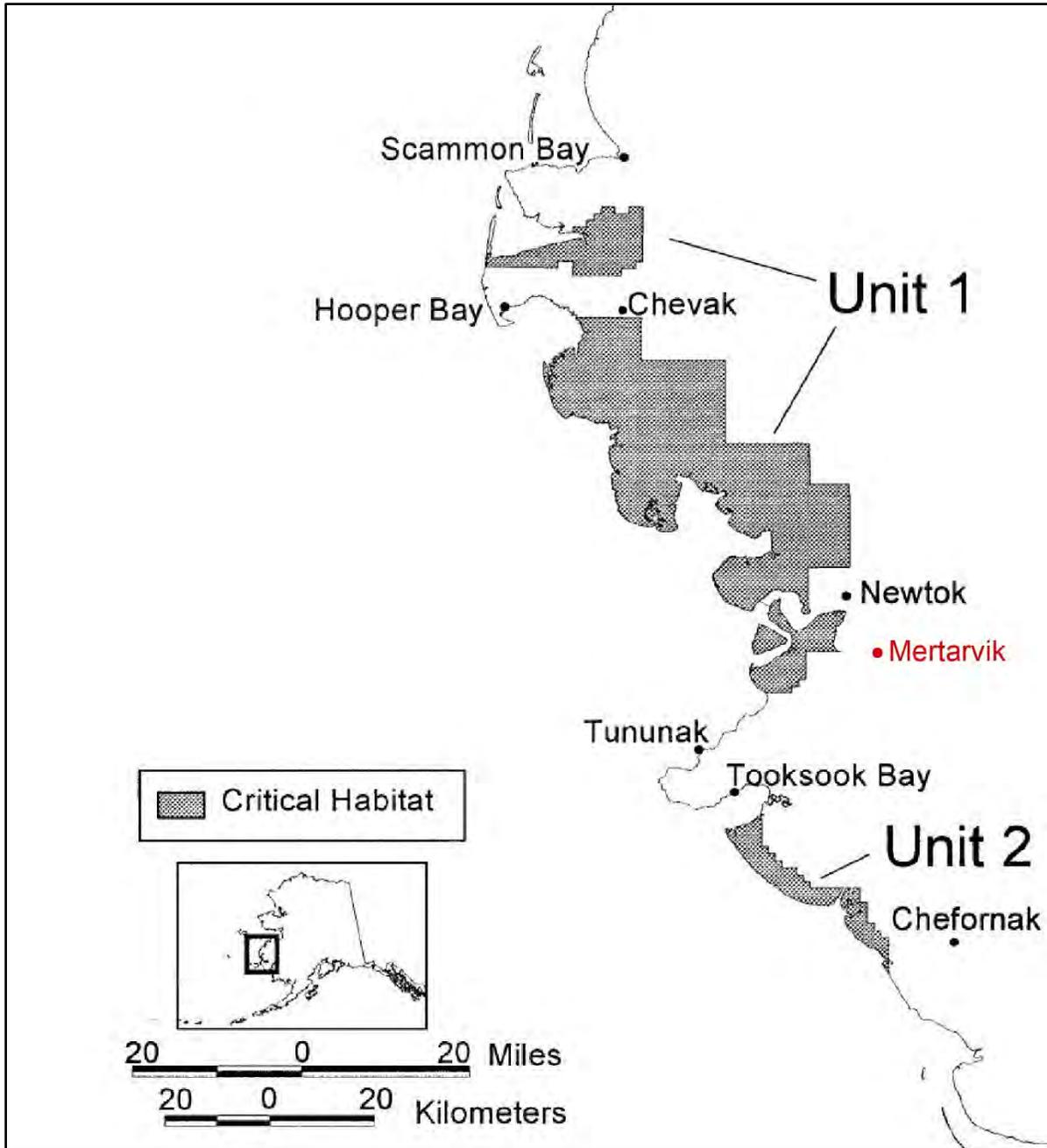


Figure 37. Spectacled eider critical habitat (adapted from USFWS 2001)

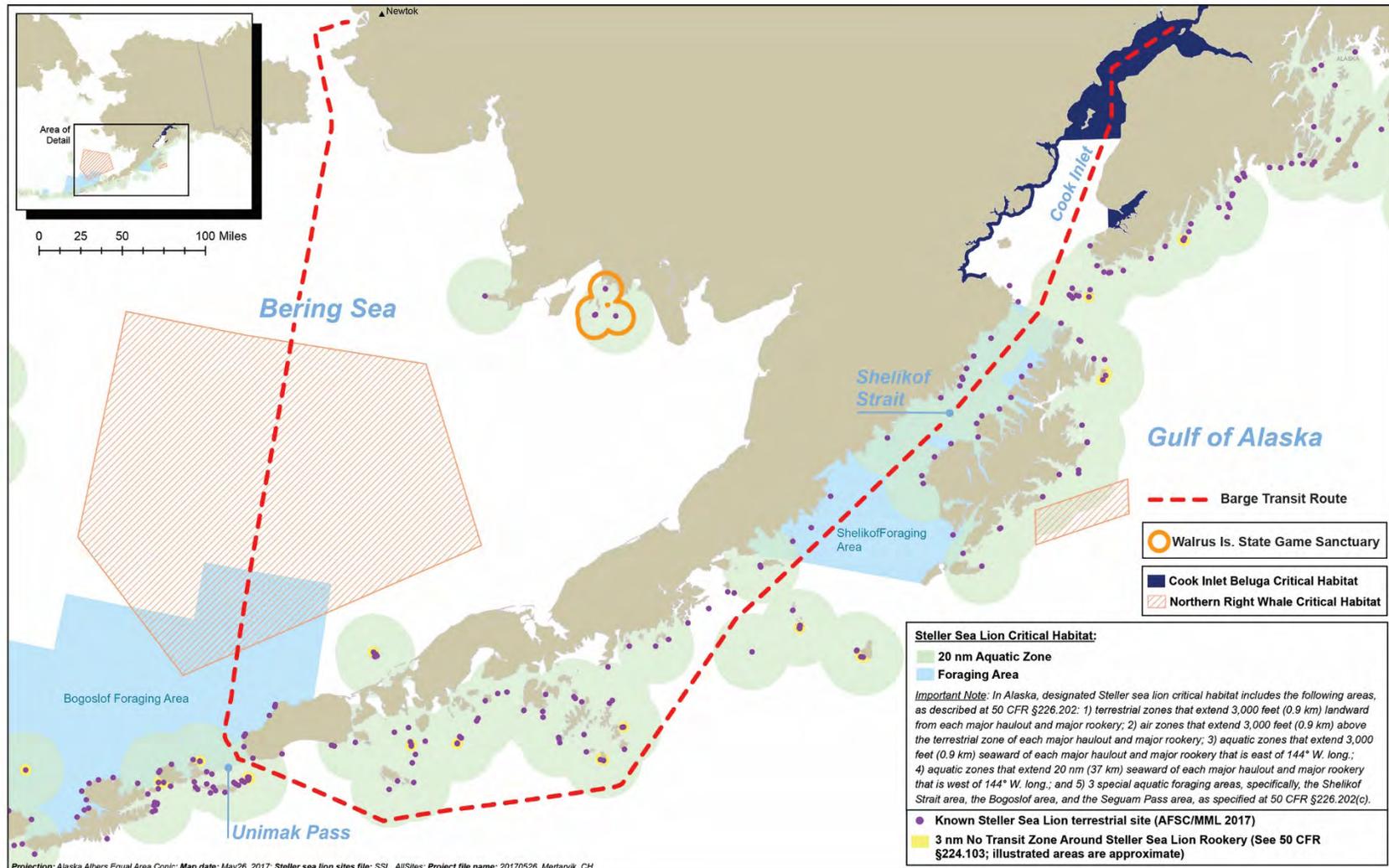


Figure 38. Critical habitat and sanctuaries of selected marine mammal species in relation to a presumptive barge route between Anchorage and Mertarvik (prepared by NMFS/Protected Species Division, with USACE additions)

Northern Sea Otter

Northern sea otters are found throughout the Aleutian Islands, along both the Bering Sea and Gulf of Alaska coasts of the Alaska Peninsula, and along much of the Alaska mainland Pacific coast. Figure 39 shows the critical habitat (CH) units designated for the threatened Southwest Alaska Distinct Population Segment (DPS). No sea otters are expected in coastal waters near the Y-K Delta, although the barge route would pass sea otter habitat along the Alaska Peninsula. Northern sea otters are primarily nearshore animals; the CH description (USFWS 2013) includes as a primary constituent element (PCE) “Nearshore waters that may provide protection or escape from marine predators, which are those within 100 m (328.1 ft.) from the mean high tide line.”

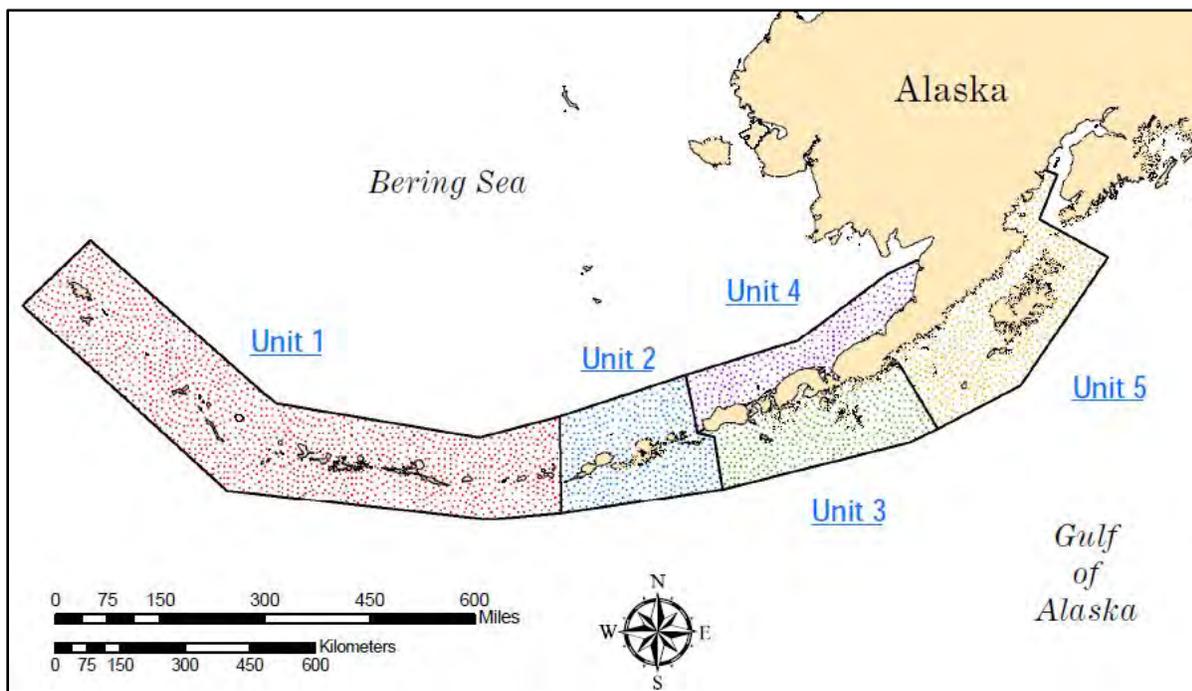


Figure 39. Critical habitat units of the northern sea otter, Southwestern Alaska DPS

Short-Tailed Albatross

Short-tailed albatross range across much of the North Pacific Ocean as adults and sub-adults, but tend to concentrate along the break of the continental shelf, where upwelling and high primary productivity result in abundant food resources. The major threats to short-tailed albatross are large-scale fishing operations within the species' characteristic feeding areas and impacts to their limited breeding sites near Japan (USFWS 2008). The barge route could potentially take ocean-going barges close to areas where short-tailed albatross concentrate to feed. There is no designated CH for this species.

Steller Sea Lion

The Steller sea lion was listed as a threatened species under the ESA in November 1990 (55 FR 49204). In 1997, NMFS reclassified Steller sea lions into two DPSs based on genetic studies and other information (62 FR 24345); at that time, the eastern DPS was listed as threatened and the western DPS was listed as endangered.

Steller sea lions prefer the colder temperate to sub-arctic waters of the North Pacific Ocean. Haul outs and rookeries usually consist of beaches (gravel, rocky or sand), ledges, and rocky reefs. In the Bering Sea and Okhotsk Sea, sea lions may also haul out on sea ice, but this is considered atypical behavior. Critical habitat (CH) for Steller sea lions was designated in 1993 and is described in 50 CFR §226.202. Critical habitat in Alaska west of 144°W longitude consists of:

- a) Aquatic zones that extend 20 nautical miles (nm), or 37 km, seaward of each major haul out and major rookery (as listed in Tables 1 and 2 to 50 CFR §226).
- b) Terrestrial zones that extend 3,000 feet (0.9 km) landward from each major haul out and major rookery.
- c) Air zones that extend 3,000 feet (0.9 km) above the terrestrial zone of each major haul out and major rookery in Alaska.
- d) Three special aquatic foraging areas: the Shelikof Strait area, the Bogoslof area, and the Segum Pass area, as specified at 50 CFR §226.202(c).

A barge traveling from Anchorage to Mertarvik would pass through the 20-nm aquatic zones of numerous CH haul outs and rookeries (Figure 38), especially within Shelikof Strait and Unimak Pass, and also through the Shelikof Strait and Bogoslof special aquatic foraging areas.

North Pacific Right Whale

The North Pacific right whale is among the rarest of the great whale species. It was originally listed as the “northern right whale” under the Endangered Species Conservation Act, and continued to be listed as endangered following the passage of the ESA in 1973. The listing was later divided into two separate endangered species: North Pacific right whales and North Atlantic right whales.

North Pacific right whales are found from Baja California to the Bering Sea with the highest concentrations in the Bering Sea, Gulf of Alaska, Okhotsk Sea, Kuril Islands, and Kamchatka area. They are primarily found in coastal or shelf waters. Seasonal distribution of this species is poorly understood (NMFS 2013). In the spring through the fall their movements follow the distribution of prey, primarily high densities of zooplankton. In the winter, pregnant females move to shallow waters in low latitudes to calve; the winter habitat of the rest of the population is unknown.

Two areas of CH were designated for North Pacific right whales in 2008 (73 FR 19000). One of these is in the Gulf of Alaska south of Kodiak Island; the other is within Bristol Bay north of the Alaska Peninsula and eastern Aleutian Islands (Figure 38). Either of these critical habitat areas could potentially be along the route of proposed action -related shipping, although barges are more likely to travel the more direct route through the relatively sheltered waters of Shelikof Strait rather than run south of Kodiak Island.

Humpback Whales

Humpback whales were originally listed as endangered with the passage of the ESA in 1973. The NMFS has recently reviewed the listing status of humpback whales; guidance from the NMFS on humpback whales occurring in Alaskan waters (NMFS 2016) discusses three DPS:

1. Western North Pacific DPS (ESA endangered);
2. Mexico DPS (ESA threatened); and
3. Hawaii DPS (not listed under the ESA).

Whales from these three DPSs overlap to some extent in feeding grounds off Alaska. An individual humpback whale encountered in the Bering Sea has an 86.5 percent probability from being from the unlisted Hawaii DPS, an 11.3 percent chance of being from the threatened Mexico DPS, and a 4.4 percent chance of being from the endangered Western North Pacific DPS (Table 12). No CH is designated in Alaskan waters for humpback whales.

Table 12. Humpback Whale DPS Distribution in Alaskan Waters

Summer Feeding Areas	Hawaii DPS (not listed)	Mexico DPS (threatened)	Western North Pacific DPS (endangered)
Aleutian Islands, Bering, Chukchi, and Beaufort Seas	86.5%	11.3%	4.4%
Gulf of Alaska	89.0%	10.5%	0.5%

Sperm Whales and Fin Whales

Sperm whales and fin whales are deep-water oceanic species that range throughout the North Pacific Ocean and would be encountered only incidentally by proposed action-related vessels. Sperm whales tend to inhabit areas with a water depth of 1,968 feet (600 m) or more, and are uncommon in waters less than 984 feet (300 m) deep. Female sperm whales are generally found in deep waters (at least 3,280 feet, or 1000 m) of low latitudes (less than 40°, except in the North Pacific where they are found as high as 50°). These conditions generally correspond to sea surface temperatures greater than 15 °C, and while female sperm whales are sometimes seen near oceanic islands, they are typically far from land. There is no critical habitat designated for sperm whales or fin whales.

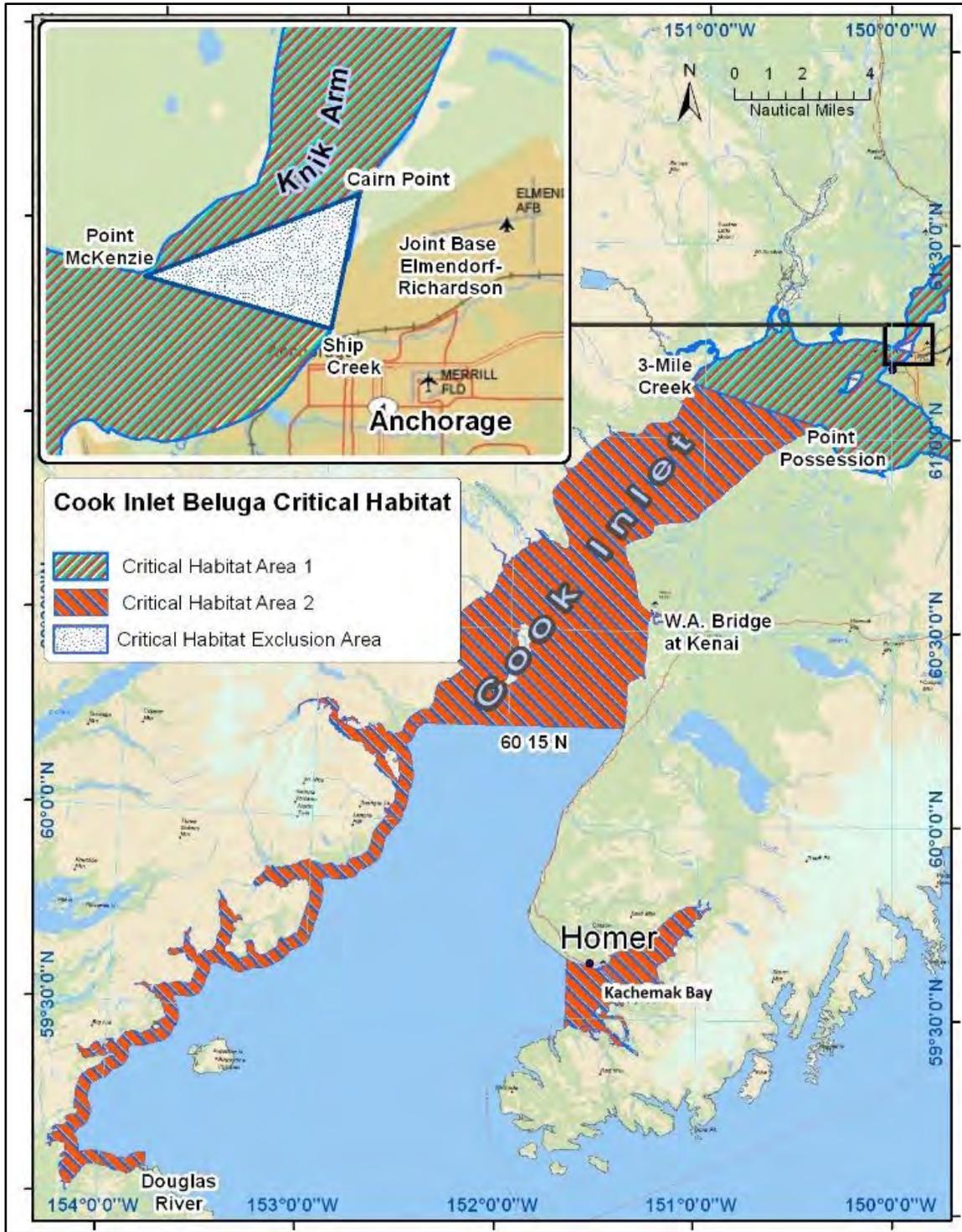
Gray Whales

Gray whales occur in two isolated geographic distributions within the North Pacific Ocean: the Eastern North Pacific stock, found along the west coast of North America, and the Western North Pacific or "Korean" stock, found along the coast of eastern Asia. A small number of endangered Western North Pacific DPS of gray whales may make their way to the coastal waters of North America during the summer and autumn feeding season, mixing with the unlisted Eastern Pacific population (Moore and Weller 2013).

Most of the Eastern North Pacific stock spends the summer feeding in the northern Bering and Chukchi Seas, but gray whales have also been reported feeding along the Pacific coast during the summer, in waters off Southeast Alaska, British Columbia, Washington, Oregon, and California. In the fall, gray whales migrate from their summer feeding grounds, heading south along the coast of North America to spend the winter in their breeding and calving areas off the coast of Baja California, Mexico. Calves are born in shallow lagoons and bays from early January to mid-February. From mid-February to May, the Eastern North Pacific stock of gray whales can be seen migrating northward with newborn calves along the West Coast of the U.S. No critical habitat is designated for this species.

Beluga Whales

Beluga whales are generally found in shallow coastal waters, often in water barely deep enough to cover their bodies, but are also seen in deep waters. They seem well adapted to both a cold ocean habitat and a warmer freshwater habitat. Belugas can be found swimming among icebergs and ice floes in the waters of the Arctic and subarctic, where water temperatures may be as low as 32° F (0° C). They can also be found in estuaries and river basins. The Cook Inlet DPS of beluga whales could be encountered anywhere in Cook Inlet year round, although they tend to concentrate at the northern end of Cook Inlet during the summer months, then disperse more widely through the inlet during autumn, winter, and spring (NMFS 2016a). CH designated for Cook Inlet belugas is shown on Figure 33 and Figure 40; a special exclusion zone is discussed further below.



Ringed Seals and Bearded Seals

Ringed seals and bearded seals are ice seals, residing in arctic waters and are commonly associated with ice floes and pack ice. The bulk of the population move southward or northward in close association with the seasonal advancing and retreating of sea ice.

The ringed seal is found in the Northern Hemisphere with a circumpolar distribution ranging from 35°N to the North Pole. There is only one recognized stock of ringed seals in U.S. waters: the Alaska stock.

Bearded seals are found in the Northern Hemisphere with a circumpolar distribution that does not extend farther north than 80°N and inhabit waters less than 650 feet (200 m) deep. The Alaska stock of bearded seal is the only stock found in U.S. waters.

Arctic ringed seals and Beringia DPS bearded seals were listed as endangered on December 28, 2012; but the District Court of Alaska issued a decision vacating the listing. In October 2016, the Ninth Circuit Court of Appeals found that in light of the NMFS's robust rulemaking process, and pursuant to a highly deferential standard of review, the NMFS's final rule listing the Beringia distinct population segment of bearded seals as threatened was not arbitrary or capricious, and its listing was supported by substantial evidence (*Alaska Oil and Gas Association vs Pritzker*, 2016). The NMFS has also appealed the District Court of Alaska's decision to vacate the listing of Arctic ringed seals; the court's decision is pending at the time of this analysis. Critical habitat was proposed in conjunction with the listing of ringed seals in December 2014; the rule has not been finalized due to legal challenge to the listing of ringed seals as endangered (79 FR 73010, Figure 41).

Marine Mammal Protection Act

The Marine Mammal Protection Act (MMPA) provides protection for all whales, dolphins, porpoises, seals, sea lions, and sea otters, regardless of a species' listing under the ESA. All of the ESA species in Table 11, excluding the birds, are also protected under the MMPA.

Non-ESA marine mammals that could potentially be impacted by proposed action-related activities, primarily by the transit of project barges, include (NMFS 2017a):

- Pacific Walrus (*Odobenus rosmarus divergens*)
- Northern fur seal (*Callorhinus ursinus*)
- Ribbon seal (*Histiophoca fasciata*)
- Spotted seal (*Phoca vitulina largha*)
- Harbor seal (*Phoca vitulina*)
- Harbor porpoise (*Phocoena phocoena*)
- Dall's porpoise (*Phocoenoides dalli*)
- Pacific white-sided dolphin (*Lagenorhynchus obliquidens*)

- Stejneger's beaked whale (*Mesoplodon stejnegeri*)
- Cuvier's beaked whale (*Ziphius cavirostris*)
- Killer whale (*Orcinus orca*)
- Minke whale (*Balaenoptera acutorostrata*)

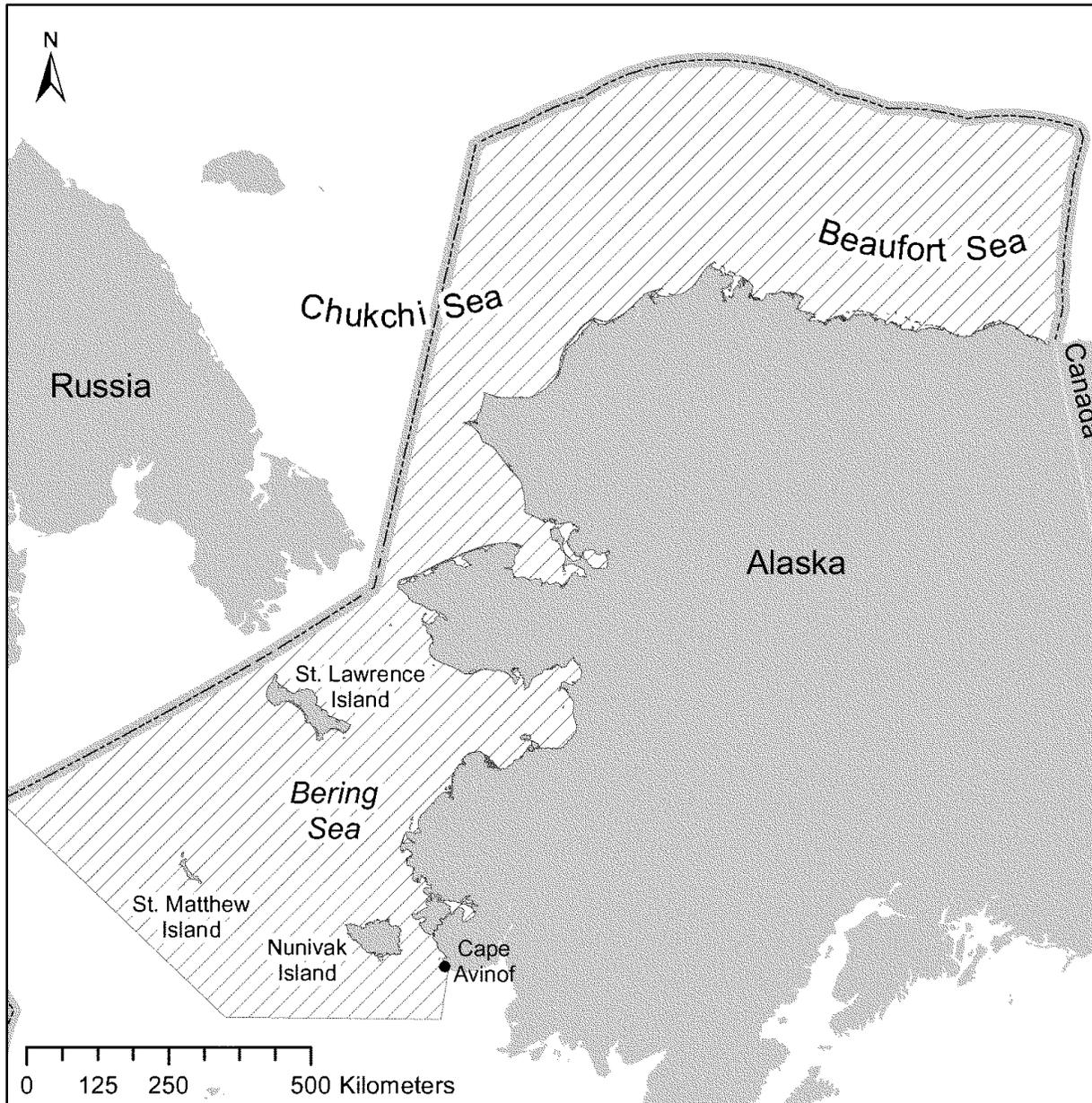


Figure 41. Proposed critical habitat for ringed seals (from 79 FR 73010).

The Pacific walrus was an ESA candidate species until 4 October 2017, when the USFWS determined that the species does not, at this time, require protection under the ESA (USFWS 2017c). The Pacific walrus currently has no status under the ESA, but is protected under the

MMPA. The Alaskan population spends the winter on the Bering Sea pack ice before separating in the spring. Females with young migrate northward from the Bering Sea into the Chukchi Sea, following the receding ice pack. Most males concentrate in Bristol Bay in the ice-free months, congregating at shore haul-outs when not foraging for food. By late fall, the females and their offspring are moving south back into the Bering Sea, migrating ahead of the advancing sea ice, while the males that summered in Bristol Bay move north to join the returning population in waters near St. Lawrence Island (ADFG 2017d). The barge route (Figure 38) does not approach the Bristol Bay haul-outs and feeding areas, but may cross paths with walrus migrating to and from the winter gathering area in the Bering Sea.

The Walrus Islands State Game Sanctuary (Figure 38) protects a group of seven small craggy islands and their adjacent waters in northern Bristol Bay, approximately 65 miles southwest of Dillingham. The sanctuary includes Round Island, Summit Island, Crooked Island, High Island, Black Rock and The Twins (ADFG 2017d). There is no CH designated under the ESA for this candidate species.

5.9.2 Environmental Impacts

All three CLP alternatives have been developed within the same overall Mertarvik community area and are expected to have similar direct, indirect and cumulative impacts on endangered and threatened species in the Mertarvik region. As a result, the anticipated impacts of each CLP alternative are indistinguishable from each other in this resource area and will be discussed collectively.

Spectacled Eider

Spectacled eiders breed along the western Alaska coast, and the proximity of designated CH for this species to Mertarvik suggests that they may be present in wetlands or open water near the Mertarvik community site, although breeding near the site is unlikely. The estuarine wetlands near the mouth of the Takikchak River and adjacent tundra ponds several miles to the west of the Mertarvik site (Figure 29) probably contain suitable nesting habitat for eiders, although none were found in the USFWS 2005 survey of those wetlands. The long-term nest population study (Fischer et al. 2017) shows the overall estimates of spectacled eider nests in 2005 was 9 percent above the long-term mean (1985-2016) and the 2005 results together with the relatively higher population estimates for the other areas on the Yukon River Delta during that same year leads to the conclusion that wetlands near Mertarvik do not support eider nesting (USFWS 2017b).

Spectacled eiders are unlikely to be directly impacted by the proposed action, but the presence of construction activity, human habitation, aircraft flight routes, and increased human access to the Takikchak River, may displace some individual eiders from nearby wetlands, and cause them to find other nesting and feeding habitat in the abundant surrounding wetlands. There is currently no flight seeing tourism service operating out of Newtok, nor is FAA aware of any proposed for

Mertarvik. The USFWS concurred with the Denali Commission's (through the USACE Alaska District as their agent) determination (USACE 2017a) that the proposed action may affect, but is not likely to adversely affect spectacled eiders in a letter dated June 20, 2017 (USFWS 2017b).

Steller's Eider

Steller's eiders could potentially be found in the vicinity of Mertarvik, but only as occasional individuals migrating between the North Slope breeding range and their wintering and molting areas along the Alaska Peninsula. Migrating Steller's eiders typically follow the Bering Sea coastline, and are unlikely to venture as far inland as Mertarvik and Baird Inlet. The rare transient individuals may be displaced or prevented by human activity from resting on the Ninglick River near the Mertarvik site. Take for hunting is analyzed annually under a separate consultation for subsistence hunting regulations (USFWS 2017b).

The USFWS concurred with the Denali Commission's effects determination (through the USACE Alaska District as their agent)(USACE 2017a) that the proposed action may affect, but is not likely to adversely affect Steller's eiders in a letter dated June 20, 2017 (USFWS 2017b).

Northern Sea Otter

Northern sea otters are largely confined to nearshore waters. The CH designated for northern sea otters (USFWS 2009) includes as a PCE "Nearshore waters that may provide protection or escape from marine predators, which are those within 100 m (328.1 ft.) from the mean high tide line." An ocean-going barge and tug or landing craft is unlikely to intentionally approach within 100 meters of the Kodiak Island or Alaska Peninsula coastline and thus enter sea otter CH. Slow-moving barges (typically less than 9 knots) would not present a ship-strike hazard to northern sea otters. The Denali Commission made the determination to the USFWS (USACE 2017a) that the proposed action and associated vessel activity will have no effect on northern sea otters; the USFWS has not challenged this determination.

Short-Tailed Albatross

The short-tailed albatross is threatened primarily by large-scale fishing operations within the species' characteristic feeding areas and impacts to their limited breeding sites near Japan (USFWS 2008b). The barge route would potentially take ocean-going barges close to areas where short-tailed albatross concentrate to feed, but the risk of proposed action-related vessels encountering and adversely impacting members of this rare and widely-dispersed species during simple transits to and from the proposed action site is sufficiently low to be discountable. The Denali Commission made the determination to the USFWS (USACE 2017a) that the proposed action and associated vessel activity will have no effect on the short-tailed albatross; the USFWS has not challenged this determination.

Steller Sea Lion

Steller sea lions may be present in any part of their range throughout the year, although most adult Steller sea lions occupy rookeries during the pupping and breeding season, which extends from late May to early July (NMFS 2008). Rookeries in the Western DPS range are protected by a 3-nm “no transit zone” (50 CFR §224.103) in addition to the CH designations discussed previously. Project-related vessels would pass through the 20-nm nautical zone of numerous CH rookeries and haul outs, and through the Shelikof and Bogoslof Foraging Areas, but would not approach within 3 nm of any of the rookeries or haul outs shown on Figure 38.

Whales, Dolphins and Porpoises

Whales, dolphins, porpoises, seals, and sea lions in the open ocean face common threats from human activity:

- Ship strikes
- Direct impacts from human fishing (e.g., entanglement in fishing gear)
- Indirect impacts from human fishing (e.g., competition for food resources)
- Contaminants and pollutants
- Habitat degradation caused by human activities and disturbance
- Hunting and predation

Proposed action-related vessels could potentially pose threats to marine mammals through ship strikes and disturbance from noise. The effects of proposed action-related vessels would be a minor incremental increase over the effects of very similar vessels that travel between communities on the Gulf of Alaska and Bering Sea every year. The probability of strike events depends on the frequency, speed, and route of the marine vessels, as well as distribution of marine mammals in the area. An analysis of ship strikes in Alaskan waters (Neilson et al, 2012) found that whale mortalities are more likely when large vessels travel at speeds greater than 12 knots. Another study (Vanderlaan and Taggart 2007) used observations to develop a model of the probability of lethal injury based upon vessel speed, projecting that the chance of lethal injury to a whale struck by a vessel is approximately 80 percent at vessel speeds over 15 knots, but approximately 20 percent at 8.6 knots. The relatively low speed of a typical ocean-going barge and tug (typically no more than 9 knots), together with a barge’s blunt prow and shallow draft, make it far less likely to strike and inflict injury upon a marine mammal than larger, faster ocean-going vessels such as cruise ships and cargo ships. The limited maneuverability and long stopping-distance of a barge and tug would make it difficult for the vessels to avoid an observed marine mammal, and in many circumstances unsafe for them to attempt to do so. Conversely, however, the vessels’ low speed and consistent course would enable marine mammals to avoid the path of the barge and tug well before there was a danger of collision.

Pacific walrus would be at risk of encountering proposed action-related vessels only during the male walrus's spring and fall migrations to and from Bristol Bay. Project vessels would be operating during summer months when sea ice is absent from the Bering Sea; the vessels would, in general, be unlikely to encounter Pacific walrus in the open Bering Sea and will have no need to approach walrus concentrations areas in Bristol Bay (Figure 38).

Since 1997, NMFS has used generic sound exposure thresholds to determine whether an activity produces underwater sounds that might result in impacts to marine mammals (70 FR 1871). The NMFS recently developed comprehensive guidance on sound levels likely to cause injury to marine mammals through onset of permanent and temporary threshold shifts (PTS and TTS; Level A harassment; 81 FR 51693). The NMFS is in the process of developing guidance for behavioral disruption (Level B harassment). However, until such guidance is available, NMFS uses the following conservative thresholds of underwater sound pressure levels (measured in micropascals, or μPa), expressed in root mean square (rms), from broadband sounds that cause behavioral disturbance, and referred to as Level B harassment under section 3(18)(A)(ii) of the Marine Mammal Protection Act (MMPA; NMFS 2017):

Under the PTS/TTS Technical Guidance (NMFS 2016), the NMFS uses the following thresholds for underwater sounds that cause injury, referred to as Level A harassment under section 3(18)(A)(i) of the MMPA. These acoustic thresholds are presented using dual metrics of cumulative sound exposure level (LE) and peak sound level (PK) for impulsive sounds and LE for non-impulsive sounds:

- impulsive sound: 160 dB re 1 $\mu\text{Pa}_{\text{rms}}$
- continuous sound: 120 dB re 1 $\mu\text{Pa}_{\text{rms}}$

Tugboats may generate significant underwater noise, especially when maneuvering or holding a barge in position against a dock or the shore. During a 2001 acoustic survey of Cook Inlet (Blackwell and Greene 2002), the highest level underwater broad-frequency noise recorded (149 decibels (dB) re 1 μPa , at a distance of 102 meters) was generated by a tugboat docking a gravel barge. The same tug/barge combination generated a maximum level of 125 dB re 1 μPa , at a distance of 190 meters, when in transit. The underwater noise level generated by a tugboat can vary greatly with the size/horsepower of the tugboat engine and whether noise-reducing features, such as propeller cowlings, are present. Diesel-powered tugs typically generate underwater noise at relatively low frequencies, roughly in the 0.02 to 1 kHz range (USACE 1998).

At 0.02 to 1 kHz, the typical frequency range of underwater noise generated by a tugboat engine (USACE 1998) places it at the lower end of the generalized hearing range of low frequency (LF) cetaceans, and below or at the very lower limit of the hearing range of other marine mammals (Table 13). The noise generated by the tugboat engine is assumed to be non-

impulsive/continuous; no source of impulsive noise from the tug and barge is anticipated other than brief, incidental sounds from docking or landing. The 125 dB re $1\mu\text{Pa}$, at a distance of 190 meters, of a tug and barge in transit (Blackwell and Greene 2002) falls well below the Level A harassment (injury) acoustic thresholds for non-impulsive noise shown in Table 13, but slightly exceeds the 120 dB re $1\mu\text{Pa}_{\text{rms}}$ default conservative threshold for a Level B disturbance from continuous noise. There is the potential for LF cetaceans within a few hundred meters of proposed action-related vessels in transit to experience a Level B disturbance (behavioral disruption) due to underwater noise; other marine mammals would likely be insufficiently sensitive to the low-frequency engine noise to experience a disturbance.

Table 13. Marine Mammal Hearing Groups and Level A Acoustic Thresholds

Hearing Group	Relevant ESA Species	Generalized Hearing Range	PTS Onset Acoustic Thresholds	
			Impulsive	Non-Impulsive
Low-Frequency Cetaceans (LF)	Humpback whale NP right whale NWP gray whale Blue whale Fin whale	0.007 to 35 kHz	$L_{\text{pk,flat}}$: 219 dB $L_{\text{E,LF,24h}}$: 183 dB	$L_{\text{E,LF,24h}}$: 199 dB
Mid-Frequency Cetaceans (MF)	Sperm whale Beluga whale	0.15 to 160 kHz	$L_{\text{pk,flat}}$: 230 dB $L_{\text{E,MF,24h}}$: 185 dB	$L_{\text{E,MF,24h}}$: 198 dB
High-Frequency Cetaceans (HF)	<i>Porpoises (non-ESA)</i>	0.275 to 160 kHz	$L_{\text{pk,flat}}$: 202 dB $L_{\text{E,HF,24h}}$: 155 dB	$L_{\text{E,MF,24h}}$: 198 dB
Phocid Pinnipeds (PW)	Ringed seal Bearded seal Harbor seal	0.05 to 86 kHz	$L_{\text{pk,flat}}$: 218 dB $L_{\text{E,PW,24h}}$: 185 dB	$L_{\text{E,PW,24h}}$: 201 dB
Otariid Pinnipeds (OW)	Steller sea lion	0.06 to 39 kHz	$L_{\text{pk,flat}}$: 232 dB $L_{\text{E,OW,24h}}$: 203 dB	$L_{\text{E,OW,24h}}$: 219 dB

PTS: Permanent Threshold Shift: a permanent reduction in the ability to hear.

kHz: kilohertz (sound frequency)

dB: Decibels, unweighted (sound intensity)

L_{pk} : Peak sound level; "flat" = unweighted within the generalized hearing range.

L_{E} : Cumulative sound level; "24h" = 24-hour cumulative period.

LF, MF, HF, PW, OW: defined in "Hearing Group" column

(Adapted from NMFS 2016b)

For air-transmitted noise, NMFS uses the following threshold for in-air sound pressure levels from broadband sounds that cause Level B behavioral disturbance under section 3(18)(A)(ii) of the MMPA (NMFS 2017):

- 90 dB re $20\mu\text{Pa}_{\text{rms}}$ for harbor seals
- 100 dB re $20\mu\text{Pa}_{\text{rms}}$ for non-harbor seal pinnipeds

Air-transmitted noise levels generated by tugboat diesel engines are comparable to those of large construction equipment, generally 70 to 100 A-weighted decibels (dBA) within 50 feet of the

engine (Navy 1987; USACE 2011; Dyer and Lundgard 1983). Thornton (1975) measured in-air barge noise at levels between 88 and 93 dBA in the aft deck of two barges. These levels fall below the level B disturbance threshold for pinnipeds (excluding harbor seals). Except when traveling the Ninglick River, proposed action-related vessels would rarely be closer than several nautical miles from shore. The USACE considers the effects of air-transmitted noise on marine mammals to be discountable.

5.9.2.1 Proposed Avoidance and Minimization Measures

For spectacled and Steller's eiders, no conservation recommendations were proffered by the USFWS (USFWS 2017b), and no species-specific avoidance or minimization measures are proposed here. General measures to minimize the degradation of area wetlands and waterways, through sediment management and thoughtful layout of roads and wastewater management, will serve to avoid impacts to these ESA species.

The NMFS has recommended the following general measures to minimize the risk and harm to protected marine species (ESA and MMPA):

- To reduce the risk of collisions with protected species, proposed action-related vessels will be limited to a speed of 8 knots, or the slowest speed above 8 knots consistent with safe navigation:
 - when within 3 nautical miles of any of the Steller sea lion haul outs or rookeries shown on Figure 38;
 - when transiting the North Pacific right whale CH areas shown on Figure 38; and
 - when transiting the Cook Inlet beluga whale CH areas.
- Vessel operators will strive not to approach within 100 yards of a marine mammal to the extent practicable, given navigational and safety constraints.
- The contractor performing the work will prepare an Oil Spill Prevention and Control Plan describing steps to avoid and mitigate releases of hazardous substances.

Cook Inlet Beluga Whales

The NMFS has recommended special conservation measures to minimize the impacts of vessel strikes on Cook Inlet beluga whales and North Pacific right whales within their respective CH (Gill 2017a):

Exercise special caution in the vicinity of the Susitna Delta to minimize the impacts of vessels within this seasonally vital Cook Inlet beluga whale habitat. The Susitna Delta Exclusion Zone (Figure 42) is defined as the union of the areas defined by:

- a 10-mile (16 km) buffer of the Beluga River thalweg seaward of the mean lower low water (MLLW) line,

- a 10-mile (16 km) buffer of the Little Susitna River thalweg seaward of the MLLW line, and,
- a 10-mile (16 km) seaward buffer of the MLLW line between the Beluga River and Little Susitna River.
- The buffer extends landward along the thalweg buffers to include intertidal area up to mean higher high water (MHHW). The seaward boundary has been simplified so that it is defined by lines connecting readily discernable landmarks.

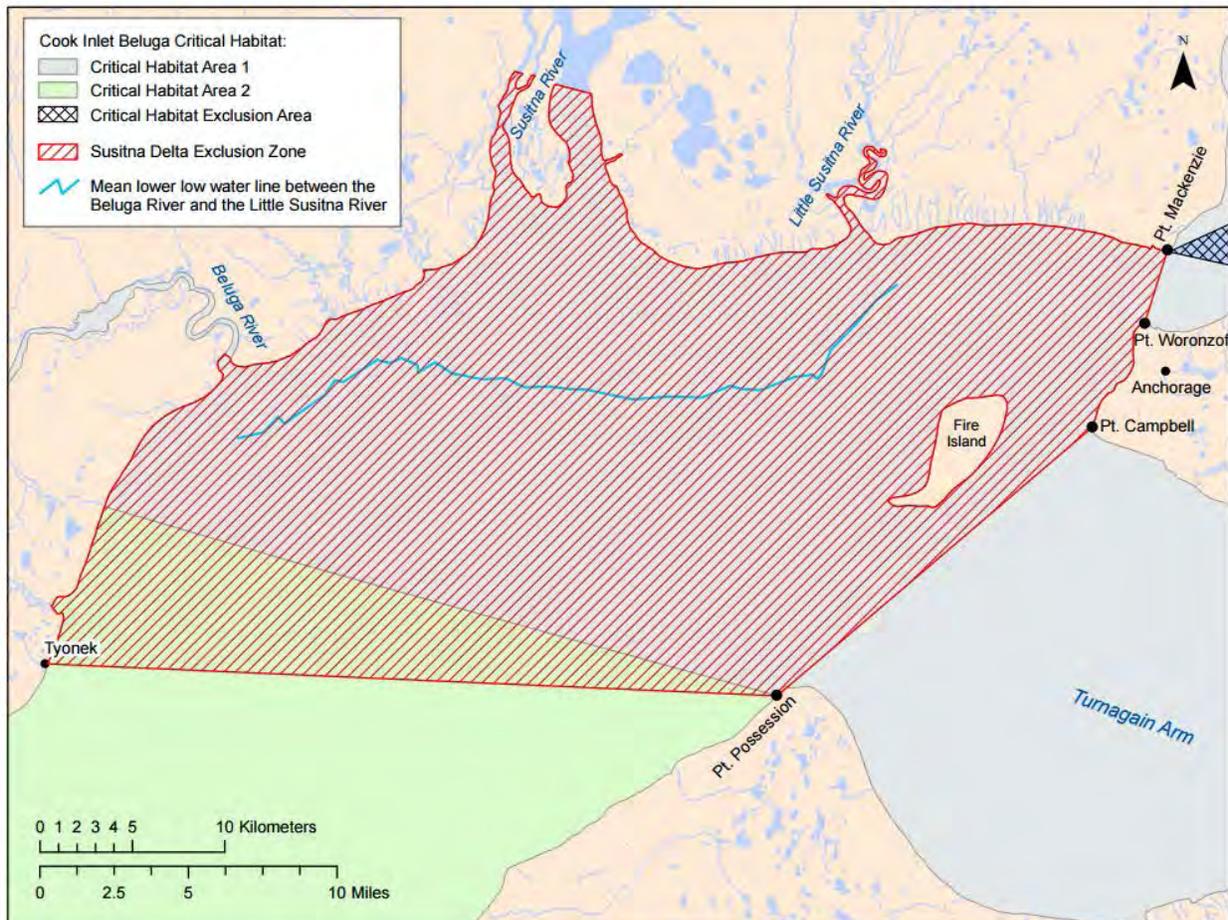


Figure 42. Boundaries of the Susitna Delta Exclusion Zone.

For vessels operating in the Susitna Delta Exclusion Zone, the following should be implemented:

- All vessels operating within the designated Susitna Delta area should maintain a speed below 4 knots. Crews must note the numbers, date, time, coordinates, and proximity to vessels of any belugas observed during operations, and report these observations to NMFS.
- Protected species observers (PSOs) must be in place to monitor for ESA-listed species prior to and during all vessel movements when vessels are under power (propellers

spinning) within the Susitna Delta Exclusion Zone. PSOs are not required to be observing when vessels are not under power (in gear).

- PSOs must be located in a position that affords a view of all waters within a 100-meter radius of all vessels under power (in gear).
- Exercise special caution in the vicinity of the Susitna Delta to minimize the impacts of vessels within this seasonally vital Cook Inlet beluga whale habitat.
- Vessel operators must avoid moving their vessels when PSOs are unable to adequately observe the 100-meter zone around vessels under power (in gear) due to darkness, fog, or other conditions, unless necessary for ensuring human safety.
- If any vessels enter the Susitna Delta Exclusion Zone at any time, PSOs must record and email to NMFS: date, time, number, and geographic coordinates of ESA listed marine mammals observed during vessel movements, and descriptions of any deferred vessel movements or vessel re-directions.

North Pacific Right Whale

The vessel operator should avoid transits within designated North Pacific right whale CH (Figure 38). If transit within North Pacific right whale CH cannot be avoided, NMFS recommends a route along the western boundary of the CH where historic and contemporary observations indicate that North Pacific right whales are not as concentrated as other areas in the CH. In addition, if transit within North Pacific right whale CH cannot be avoided, NMFS recommends that transit in right whale CH be limited to between September and March, a time of year right whales may be at lower numbers in the Bering Sea.

If transiting in North Pacific right whale CH, vessel operators are requested to exercise extreme caution and observe the 10-knot (18.52 km/h) vessel speed restriction. Operators transiting through North Pacific right whale CH should have trained Protected Species Observers (PSOs) actively engaged in sighting marine mammals. PSOs would increase vigilance and allow for reasonable and practicable actions to avoid collisions with North Pacific right whales. Operators will maneuver vessels to keep 800 meters away from any observed North Pacific right whales while within their designated CH, and avoid approaching whales head-on consistent with vessel safety. Vessels should take reasonable steps to alert other vessels in the vicinity of whale(s), and report of any dead or injured listed whales or pinnipeds.

The USACE submitted an ESA determination letter to the NMFS dated 24 May 2017 (USACE 2017b), in which the USACE determined that the proposed action activities may affect, but not likely to adversely affect, the ESA-listed marine species under NMFS jurisdiction identified in the letter. The NMFS declined to concur, stating that the proposed actions were too prospective at this time, that a NEPA analysis (i.e., this EIS) alone was insufficient to trigger an ESA Section 7 consultation, and that the NMFS would wait until brought into consultation by the USACE Regulatory Division as it processes individual Clean Water Act permit requests (Gill 2017a).

5.9.3 Significance Determination

Under the FAA significance criteria for “biological resources” (FAA 2015), a significant impact would occur when “the U.S. Fish and Wildlife Service or the National Marine Fisheries Service determines that the action would be likely to jeopardize the continued existence of a Federally-listed threatened or endangered species, or would result in the destruction or adverse modification of federally-designated critical habitat.”

The FAA has not established a significance threshold for non-ESA species, but the FAA guidance recommends evaluating the proposed actions for the potential to cause “adverse impacts to special status species (e.g., state species of concern, species proposed for listing, migratory birds, bald and golden eagles) or their habitats.” Non-listed species protected under the MMPA may be regarded as “special status species”.

The Denali Commission has determined that none of the three CLP alternatives, as proposed, would exceed the significance threshold defined above for an ESA-listed species (LESS THAN SIGNIFICANT). While all of the CLP alternatives are likely to adversely affect individual migratory birds which occupy the Mertarvik townsite (disturbance, displacement), the spatial and population-level scale of those impacts is expected to be very small. None of the CLP alternatives are therefore expected to result in significant adverse impacts to non-ESA species, with the avoidance and minimization measures described in the previous section (MINOR).

Pursuant to Section 7 of the Endangered Species Act:

The Denali Commission has determined that the proposed action will not affect the following ESA-listed or candidate species or any designated critical habitat:

- Northern sea otter
- Short-tailed albatross

The Denali Commission has determined to the USFWS that the proposed action may affect, but is not likely to adversely affect, the following ESA-listed species or any designated critical habitat:

- Spectacled eider
- Steller’s eider

The USFWS concurred with the Denali Commission’s determination (through the USACE Alaska District as their agent; USACE 2017a) that the proposed action may affect, but is not likely to adversely affect spectacled or Steller’s eiders in a letter dated June 20, 2017 (USFWS 2017b). The FAA will conduct its own Section 7 ESA consultation with the USFWS for these ESA-listed species.

With the avoidance and minimization steps outlined in section 5.9.2.1, the Denali Commission has determined that the proposed action may affect, but is not likely to adversely affect, the following ESA-listed species or any designated critical habitat:

- Steller sea lion, Western Distinct Population Segment (DPS)
- Humpback whale, Western North Pacific DPS
- Humpback whale, Mexico DPS
- North Pacific right whale
- Gray whale, Western North Pacific population
- Sperm whale
- Beluga whale, Cook Inlet DPS
- Ringed seal
- Bearded seal

By a letter dated May 24, 2017, the USACE Alaska District, on behalf of the Denali Commission, requested ESA Section 7 concurrence from the NMFS on these determinations. NMFS responded by saying they were unable to concur with these determinations at this time, preferring to withhold such concurrence until such time as Department of the Army permit applications for each element of the preferred alternative has been received by the USACE Alaska District Regulatory Division, and more sufficient detail is provided on specifics as to the types and number of tugs and barges is known. On June 9, 2017, at the request of the NMFS, the USACE Alaska District withdrew its request to the NMFS for ESA Section 7 concurrence on the entire scope of the project.

The FAA will conduct its own Section 7 ESA consultation with the NMFS for these ESA-listed species.

The no action alternative would have no impact on ESA-listed species, or species protected under the MMPA.

5.10 Migratory Birds

The Migratory Bird Treaty Act of 1918 (MBTA, 16 USC §§1361-1407) implements the United States' commitment to four bilateral treaties, or conventions, for the protection of a shared migratory bird resource.

The MBTA protects over 800 species of birds within the United States. The list of migratory bird species protected by the MBTA appears in 50 CFR §10.13, and represents almost all avian families found in North America. In Alaska, all native birds except grouse and ptarmigan are protected under the MBTA; grouse and ptarmigan are protected and managed under State of Alaska regulations. Under the MBTA, it is illegal for anyone to take, possess, import, export,

transport, sell, purchase, barter, or offer for sale, any migratory bird, or the parts, nests, or eggs of such a bird except under the terms of a valid permit issued pursuant to Federal regulations.

Federal agencies are required to support the intent of the migratory bird conventions by integrating bird conservation principles, measures, and practices into agency activities and by avoiding or minimizing, to the extent practicable, adverse impacts on migratory birds when conducting agency actions (66 CFR §3853). In particular, Federal or Federally-funded construction work must avoid destroying the active nests of species protected under the MBTA.

5.10.1 Affected Environment

All three CLP alternatives have been developed within the same overall Mertarvik community area and are expected to have similar direct, indirect and cumulative impacts on migratory birds in the Mertarvik region. As a result, the anticipated impacts of each CLP alternative are indistinguishable from each other in this resource area and will be discussed collectively.

Foot surveys to evaluate migratory bird usage of the Mertarvik area were conducted in early June 2005 by a USACE biologist (USACE 2005b). These surveys broadly characterized species present, relative abundance, and habitat associations during the early portion of the egg-laying period for most birds. Approximate routes for the foot surveys are depicted in Figure 43. A summary of the observations is presented in Table 14.

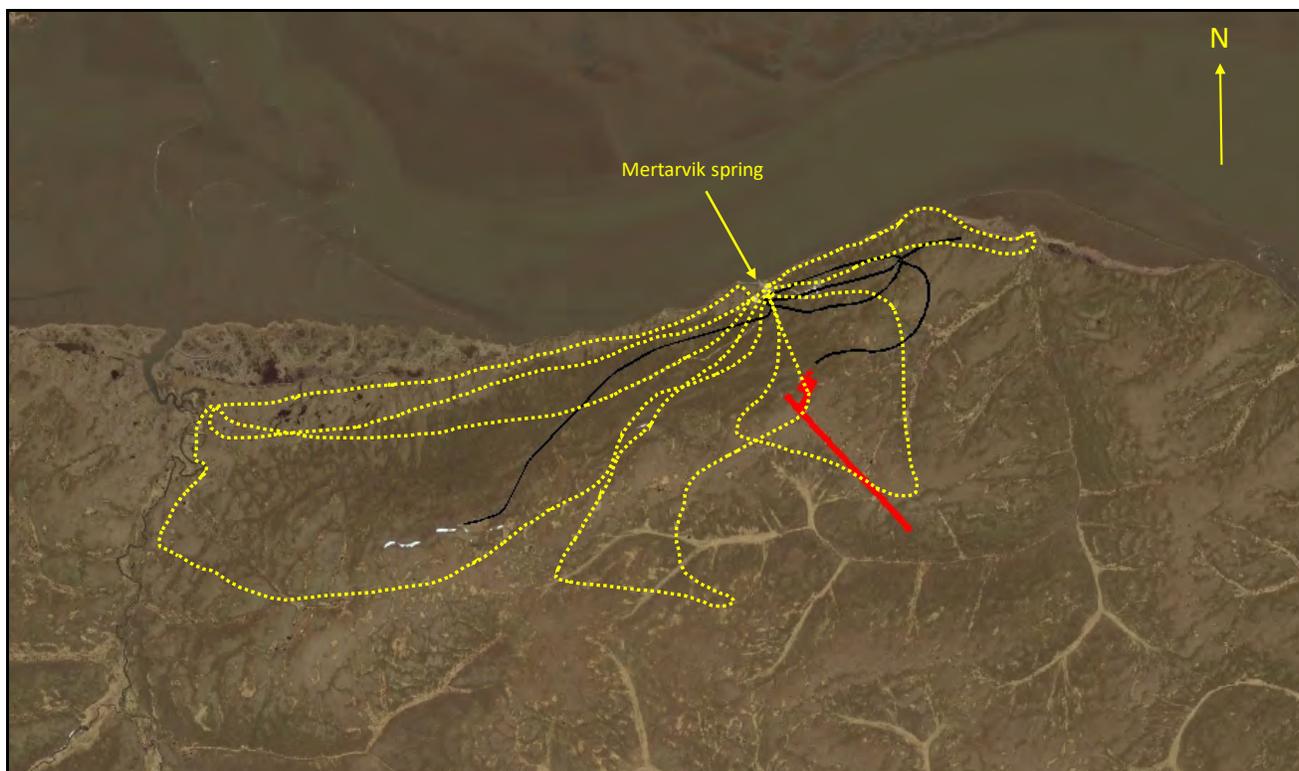


Figure 43. Routes hiked (yellow lines) during the 2005 bird habitat surveys (USACE 2005b). The spring area was used as a base camp during the surveys; black lines represent roads of a proposed Mertarvik town site. The proposed runway location is shown in red.

Table 14. General Bird Descriptions

Species	Description
Black Turnstone	Observed along the shore near our campsite on several occasions.
Bar-tailed Godwit	A male was observed several times a day foraging on the shore near the camp. A female was seen less frequently. A female on a nest with four eggs was found on the south side of the ridge, approximately 1.5 miles from camp.
Western Sandpiper	The most common shorebird observed near the relocation site.
Red-neckedP	Common. Often seen foraging on ponds and in pools on streams.
Short-eared Owl	Uncommon. One observed on higher ground about a mile south of camp. Remained in area, but no nest observed.
Parasitic Jaeger	Common. Several observed daily near camp and during hikes. Most abundant jaeger species.
Long-tailed Jaeger	Common. Several observed daily near camp and during hikes. A close second in abundance to parasitic jaeger.
Eastern Yellow Wagtail	Common. Several seen daily, often perched on willows.
Lapland Longspur	Abundant. Most common passerine, some nesting near camp. Often found concentrated on the few remaining snowdrifts on the hillside or along the steep banks near the coast where they forage for seed and insects.
Redpoll	Uncommon. A few seen during 8 days on site.
Willow Ptarmigan	Abundant. Males observed constantly, a few females were flushed from nests in dense willows. Males very vocal.

Species	Description
Northern Pintail	Common. Observed on the tundra and on ponds. Also seen in small numbers on the pool created by the fresh water spring next to camp.
Green-winged Teal	Common. Observed on ponds. Also seen in limited numbers on the pool created by the fresh water spring next to camp.
Emperor Goose	Common. Observed on the coastal wetlands and also along the shore at low tides. At low tides, they were commonly observed drinking freshwater runoff from melting snow or from the fresh water spring near camp. Local birds may have been non-breeders.
Long-tailed Duck	Uncommon. A few seen or heard offshore or on ponds in coastal wetlands.
Black Scoter	Uncommon. A few seen offshore and one pair seen on a pond perched on the hillside near the unnamed river.
Harlequin Duck	Uncommon. One male observed on a gravel bar in the unnamed river. Harlequins are considered uncommon in the Y-K Delta since the habitat is unsuitable, but areas of Nelson Island appear to provide some useable habitat due to the mountain streams.
Mew Gull	Abundant along the coast.
Glaucous Gull	Abundant along the coast,

Waterfowl occupying the coastal wetlands (Figure 44) between the proposed Mertarvik community site and the Takikchak River to the west were also surveyed. The vegetation was low and the survey should be considered complete for waterfowl, but it is likely that some shorebirds were missed due to the large distance surveyed. A complete list of waterfowl species observed during the foot survey is included in Table 15.



Figure 44. Coastal wetlands at Mertarvik.

Table 15. Bird Observations in Wetlands in June 2005.

Species	Number Observed
Northern Pintail	19
Green-winged Teal	18
Pacific Black Brant	3
Greater Scaup	13
Canada Goose	15
Cackling Goose	9
Emperor Goose	46
Mallard	3
Tundra Swan	2
American Wigeon	2
Northern Shoveler	19
Sandhill Crane	1
Long-tailed Duck	3
White-fronted Goose	11
Western Sandpiper	38
Dunlin	42
Red-necked Phalarope	33
Arctic Tern	3
Bar-tailed Godwit	2
Black Turnstone	7
Lapland Longspur	8
Savannah Sparrow	4

Species	Number Observed
Eastern Yellow Wagtail	9
Mew Gull	49

During the survey, most of the birds appeared to be foraging or resting. Most of these wetlands are very wet and probably subject to periodic inundation at the highest tides, and have been reported to support high densities of nesting waterfowl, shorebirds, and other waterbirds. Birds also likely use this area during pre- and post-nesting periods. A fox was seen in the wetlands during the survey where it was likely foraging for eggs and/or rodents.

During the spring of 2005, the USACE requested that the USFWS provide expertise in assessing impacts to threatened and endangered species at the Mertarvik site on Nelson Island. USFWS biologists initiated intensive ground surveys of the Mertarvik site and nearby wetlands in June 2005.

Spectacled (*Somateria fischeri*) and Steller's (*Polysticta stelleri*) eiders were listed as threatened under the Endangered Species Act of 1973 in 1993 and 1997, respectively. Both species nest or have historically nested within the wetlands of the Y-K Delta. Kigigak Island, 14 miles west of the Mertarvik site, has a spectacled eider nesting concentration and is within designated critical habitat for those species; this location is also one of the few sites in the Yukon/Kuskokwim Delta where Steller's eiders have nested in the 21st century. Baird Inlet Island, 4 miles west of Mertarvik, has a small spectacled eider nesting concentration (Wilson, 2016) and is not part of designated critical habitat for spectacled eiders.

Ideal nesting habitat for spectacled and Steller's eiders is a complex of sedge-grass meadows, pond shorelines, peninsulas, and islands (Dau 1974). On nesting grounds, they feed by dabbling in shallow freshwater or brackish ponds, or on flooded tundra (Dau 1974, Kistchinski and Flint 1974). Aerial photos at Mertarvik indicated approximately 430 acres of potential nesting habitat within the general area.

USFWS waterfowl experts Ellen Lance and Tim Bowman conducted a waterfowl nest survey of a 430-acre wetland complex near the proposed Mertarvik site on June 5, 2005. An initial reconnaissance of the area entailed walking the length of the wetland next to the uplands, followed by an intensive ground search through the marshy wetlands. Nearly all suitable nesting habitat within the proposed site at Mertarvik was searched. The wetland site surveyed consisted of a seawater-saturated brackish sedge meadow interspersed with tidal ponds. Lance and Bowman observed substantial numbers of waterfowl and shorebirds feeding and loafing in the wetland habitat (Table 16), but very few nests. Only two emperor goose nests (*Chen canagica*), two black turnstone nests (*Arenaria melanocephala*), and one mew gull (*Larus canus*) nest was found in the wetlands complex adjacent to the Mertarvik site. Nesting densities appeared far

lower than what is typically encountered in other coastal areas of the Y-K Delta (Fischer et al. 2005). Service biologists considered the wetland habitat complex largely unsuitable for nesting waterfowl or shorebirds.

Table 16. Birds observed at the proposed Mertarvik town site coastal wetlands by the USFWS.

SPECIES	COMMENTS
Loon (unidentified) <i>Gavia</i> sp.	On pond in wetland
Sandhill Crane (<i>Antigone canadensis</i>)	Flying over wetland
Tundra Swan (<i>Cygnus columbianus</i>)	Pairs and singles
Greater White-fronted Goose (<i>Anser albifrons</i>)	Many; loafing in wetland
Emperor Goose (<i>Anser canagica</i>)	Many; two nests found
Cackling Goose (<i>Branta hutchinsii</i>)	Many; loafing in wetland
Green-winged Teal (<i>Anas crecca</i>)	Many
American Wigeon (<i>Mareca americana</i>)	Few
Northern Pintail (<i>Anas acuta</i>)	Many
Northern Shoveler (<i>Spatula clypeata</i>)	Many
Greater Scaup (<i>Aythya marila</i>)	One pair
Red-breasted Merganser (<i>Mergus serrator</i>)	4 females, 1 male
Bar-tailed Godwit (<i>Limosa lapponica</i>)	Few
Red-necked Phalarope (<i>Phalaropus lobatus</i>)	Many
Wilson Snipe (<i>Gallinago delicata</i>)	Heard 1
Black Turnstone (<i>Arenaria melanocephala</i>)	Many; two nests found
Dunlin (<i>Calidris alpina</i>)	Few
Western Sandpiper (<i>Calidris mauri</i>)	Many; nesting in uplands, feeding in wetlands
Parasitic Jaeger (<i>Stercorarius parasiticus</i>)	Few, flying
Long-tailed Jaeger (<i>Stercorarius longicaudus</i>)	Few, flying
Mew Gull (<i>Larus canus</i>)	Many; one nest found
Glaucous Gull (<i>Larus hyperboreus</i>)	Few, flying
Arctic Tern (<i>Sterna paradisaea</i>)	Few, flying
Willow Ptarmigan (<i>Lagopus lagopus</i>)	Many; pairs, in uplands
Common Raven (<i>Corvus corax</i>)	1 flying
Eastern Yellow Wagtail (<i>Motacilla tschutschensis</i>)	Many; pairs, in uplands
Yellow Warbler (<i>Setophaga petechia</i>)	Uplands
Gray-cheeked Thrush (<i>Catharus minimus</i>)	2 singles
Savannah Sparrow (<i>Passerculus sandwichensis</i>)	Many
Golden-crowned Sparrow (<i>Zonotrichia atricapilla</i>)	Few, singing
American tree Sparrow (<i>Spizelloides arborea</i>)	Many
Common Redpoll (<i>Acanthis flammea</i>)	Few; feeding on surface of snow
Lapland Longspur (<i>Calcarius lapponicus</i>)	Many

5.10.2 Environmental Impacts

All three CLP alternatives have been developed within the same overall Mertarvik community area and are expected to have similar direct, indirect and cumulative impacts on migratory birds in the Mertarvik region. As a result, the anticipated impacts of each CLP alternative are indistinguishable from each other in this resource area and will be discussed collectively.

Potential impacts to migratory birds as a result of establishing a new community at Mertarvik involve both direct and indirect impacts. Direct impacts would occur from the conversion of bird nesting and foraging habitat to roads, buildings, and other community infrastructure. This loss would be permanent, but would only impact a small portion of the available bird habitat at the proposed Mertarvik site. The primary species that would be impacted, based on 2005 surveys, include Lapland longspurs and willow ptarmigan. These two species were observed nesting in the vicinity of the community site. A single bar-tailed godwit nest was observed on the high ground about 1.5 miles southwest of the proposed Mertarvik site in the same type of habitat that would be found at the proposed runway location. While the direct impacts of habitat loss have been minimized by the design of the preferred CLP alternative (see section 4.5), it is clearly impossible to relocate a community without having a new footprint that directly impacts habitat. However, vegetation clearing timing windows that have been prescribed by USFWS would be adhered to or adequate ground surveys would be conducted prior to construction to ensure that no established nests would be impacted during construction.

Indirect impacts are more varied and potentially impacts a much larger area, albeit to varying degrees. Disturbance from human activity (presence, noise) at the new community site would likely cause some birds to abandon this general area in favor of areas with less disturbance. While human activity would be constant in the new community, other areas in the vicinity could be impacted seasonally. For instance, emperor geese were observed foraging on the slopes of the small river valley approximately 3 miles to the west of the new community site. Human presence on foot or ATV would likely cause these geese to displace.

All-terrain vehicle (ATV) traffic will increase in the community and will likely extend to areas well beyond the community, potentially leading to impacts to migratory birds ranging from severe (e.g. nest trampling) to moderate (e.g. habitat degradation) or minor (e.g. temporarily displacing from disturbance, noise or physical presence). Impacts from ATV's could be minimized by establishing designated trails in resilient habitat (i.e. firm level ground) from the community to popular locations such as subsistence sites or connections to other communities on Nelson Island.

Hunting pressure for ptarmigan would likely increase in Mertarvik since it is heavily used ptarmigan habitat, and there is no ptarmigan habitat in Newtok. However, the waterfowl habitat near Mertarvik is poor compared to Newtok, so hunting pressure on waterfowl in Mertarvik would likely be less than is currently experienced in Newtok.

Potential impacts to Pacific Black Brant would likely remain unchanged as the community is developed at Mertarvik. Brant nest on Baird Inlet Island approximately 4 miles northwest of Mertarvik, but this nesting colony is still about the same distance as it is from Newtok. Changes in direct impacts are unlikely and increased impacts from aircraft overflight are unlikely. Aircraft flying over Baird Inlet Island would likely have the same altitude as they currently do when flying to or from Newtok, so the potential for change is unlikely. There is another brant colony on the Baird Peninsula that is much closer to Newtok than Mertarvik, and this area would gradually see less disturbance over the years as air traffic to Newtok diminishes.

The USFWS has identified the time period between May 5 and July 25 as when migratory birds are most likely to be nesting in “shrub or open” habitat in the Y-K Delta region (USFWS 2009); the entire Mertarvik project area falls within this description. The USFWS recommends that construction projects avoid clearing vegetation or placing fill within potential nesting habitat during this time period, as the surest means of avoiding the destruction of active bird nests, eggs, or nestlings, thereby avoiding violations of the Migratory Bird Treaty Act. At Mertarvik, the risk of MBTA violations can be minimized by conducting fill-placement or ground-clearing activities prior to May 5 or after July 25, or performing preliminary vegetation-clearing outside the nesting period such that the future construction site no longer provides suitable nesting habitat. If ground-clearing work outside of the nesting period is not feasible, ground-nesting species can be excluded from an imminent construction site by laying tarps or other ground coverings at the site and/or placing deterrent devices (e.g., Mylar® flash-tape fastened to wooden stakes, etc.), prior to the start of and during the nesting season. These avoidance measures are discussed further in section 5.27.1

5.10.3 Significance Determination

No FAA significance threshold is available for impacts to “migratory birds”, as a resource category. The FAA guidance (FAA 2015) recommends evaluating the proposed actions for the potential to cause “adverse impacts to special status species (e.g., state species of concern, species proposed for listing, migratory birds, bald and golden eagles) or their habitats.

The Denali Commission has determined that the environmental impacts on migratory birds associated with the implementation of any of the three CLP alternatives, as proposed, will not noticeably alter any attribute of this resource, and not reach the threshold of significance as defined in section 5.1 (MINOR).

The no action alternative would have no impact on migratory birds in the Mertarvik area.

5.11 Essential Fish Habitat and Anadromous Streams

Essential Fish Habitat (EFH) is defined by the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) as those waters and substrates necessary to fish for spawning,

breeding, feeding or growth to maturity. Section 305(b)(2) of the MSFCMA requires Federal action agencies to consult with the NMFS on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH.

Similarly, the State of Alaska's Anadromous Fish Act (AS 16.05.871-.901) requires that a government agency provide prior notification and obtain permit approval from the Alaska Department of Fish and Game (ADFG) before altering or affecting the natural flow or bed of a specified river, lake, or stream, or to use wheeled, tracked, or excavating equipment or log-dragging equipment in the bed of a specified river, lake, or stream.

5.11.1 Affected Environment

Nelson Island's encompassing waters, Baird Inlet, Ninglick River, Hazen Bay, Kangrilvar Bay, Kolavinarak River, and Etolin Strait, and several smaller streams, are designated as EFH under the North Pacific Fishery Management Council's fishery management plan for the salmon fisheries in the exclusive economic zone off Alaska. All five species of Pacific salmon, chinook (*Oncorhynchus tshawytscha*), chum (*O. keta*), coho (*O. kisutch*), pink (*O. gorbuscha*), and sockeye (*O. nerka*) are known to be present in these waters while exhibiting the marine juvenile, marine immature, or maturing adult life stages. No fish, juvenile or adult, were captured or seen in Mertarvik Spring.

The Ninglick and Takikchak Rivers are identified by ADFG in their "*Catalog of Waters Important for the Spawning, Rearing or Migration of Anadromous Fishes.*" The intertidal Ninglick River is identified in the ADFG catalog as supporting coho and pink salmon. Meanwhile, the fresh waters of the Takikchak River are identified within the ADFG catalog as supporting coho salmon (ADFG 2017). Complementary to the ADFG catalog, data collected during biological baseline assessments in 2005 by USACE Alaska District biologists in support of the MEC at the Mertarvik community site on Nelson Island, noted all five species of Pacific salmon present in Takikchak River (Hoffman 2005).

5.11.2 Environmental Impacts

All three CLP alternatives have been developed within the same overall Mertarvik community area and are expected to have similar direct, indirect and cumulative impacts on essential fish habitat and anadromous streams in the Mertarvik region. As a result, the anticipated impacts of each CLP alternative are indistinguishable from each other in this resource area and will be discussed collectively.

Any impacts to EFH and anadromous waters associated with the project would largely be a function of the activities of barge and smaller vessel traffic along the Ninglick River and at the Mertarvik barge landing area, importing construction equipment and supplies. USACE Alaska District evaluated the impact of typical barge and landing craft activities upon EFH at the

Mertarvik barge landing site (USACE 2008). The USACE determined that barge operations in support of the construction of the MEC would not result in significant long or short-term adverse impacts to EFH.

Since the barge landing area is now an improved structure, the possibility of EFH degradation by scour and short-lived potential increases in turbidity have been reduced to a negligible level. There will be no net loss of habitat or its quality, or change in its complexity. Underwater noise levels are not anticipated to rise above existing levels. Normal actions associated with barge and vessel traffic transiting the Ninglick River and landing at the Mertarvik barge landing area for the purposes of infrastructure development at Mertarvik do not pose a risk of short or long-term adverse effects to EFH or any of its constituent elements.

The approximate 2-mile distance between the proposed Mertarvik community site and the Takikchak River (Figure 45) is expected to keep impacts to the anadromous waters of the Takikchak River to a minimum. While no modification to fish-bearing waters is planned, increased ATV access to and across the river channel has the potential to cause breakdown and erosion of the river bank, with subsequent harm to water quality and the aquatic environment (see Section 5.4.2). To avoid impacting the five salmon species that utilize the Takikchak River (as well as other fish species), the residents of Mertarvik should work with the ADFG to establish a minimally-damaging ATV crossing point at the Takikchak River under a stream crossing General Permit IAW Alaska law (AS 16.05.871).

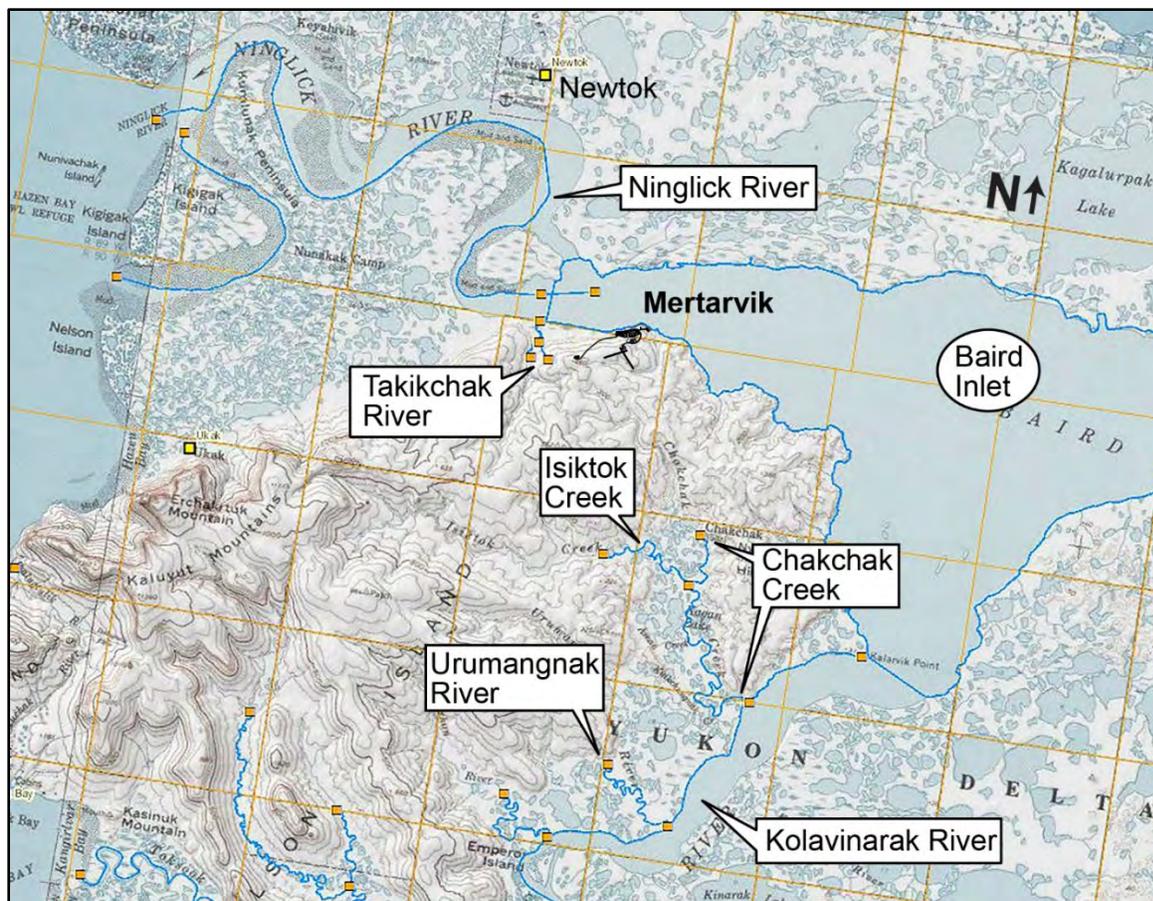


Figure 45. A screen shot from the ADFG Anadromous Waters Catalog online mapper, annotated to identify cataloged streams and waterbodies of north and east Nelson Island.

5.11.3 Significance Determination

No FAA significance threshold is available for impacts to EFH or anadromous streams as resource categories. For its resources category of “biological resources”, the FAA provides non-threshold factors for this resource category that may be applied to the resources described in this section. The FAA guidance (FAA 2015) recommends evaluating the proposed actions for the potential to cause:

- A long-term or permanent loss of unlisted plant or wildlife species, i.e., extirpation of the species from a large project area (e.g., a new commercial service airport);
- Substantial loss, reduction, degradation, disturbance, or fragmentation of native species’ habitats or their populations; or
- Adverse impacts on a species’ reproductive success rates, natural mortality rates, non-natural mortality (e.g., road kills and hunting), or ability to sustain the minimum population levels required for population maintenance.

None of the CLP alternatives are expected to create impacts similar to those listed above, with regards to EFH and anadromous streams. The Denali Commission has determined that the environmental impacts on EFH and anadromous streams with the implementation of any of the three CLP alternatives will not noticeably alter any important attribute of the resource, and not reach the threshold of significance as defined in section 5.1 (MINOR).

Pursuant to the Magnuson-Stevens Fishery Conservation and Management Act, the Denali Commission has also determined that none of the CLP alternatives will have an effect on Essential Fish Habitat.

The no action alternative would have no impact on EFH or anadromous streams in the Mertarvik area.

5.12 Wetlands and other Special Aquatic Sites

5.12.1 Affected Environment

Special aquatic sites, identified as part of the Clean Water Act (subpart E, 40 CFR §230) are waters of the U.S. (WOTUS), large or small, possessing special ecological characteristics of productivity, habitat, wildlife protection, or other important and easily disrupted ecological values. These areas are generally recognized as significantly influencing or positively contributing to the general overall environmental health or vitality of the entire ecosystem of a region. The following ecosystems are considered to be special aquatic sites:

- Wetlands
- Coral reefs
- Sanctuaries and refuges
- Mud flats
- Vegetated shallows
- Riffle and pool complexes

Wetlands are the only special aquatic sites found in the immediate project area, although mud flats are present in the adjacent Ninglick River and Baird Inlet, and waters of the Yukon Delta National Wildlife Refuge are nearby. Wetlands are defined as those areas inundated by surface or groundwater at a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation adapted for life in saturated soil conditions. In order for an area to meet the joint USACE-EPA definition of wetland, the area must meet the three parameters of appropriate hydrology, soils, and vegetation. Mud flats are defined in 40 CFR 230.42 as broad, flat areas along the sea coast and coastal rivers that are exposed at low tides and inundated at high tides. The substrate of mud flats contains organic material and particles smaller in size than sand, and wind and wave action may re-suspend those fine sediments.

Wetlands perform a variety of important biological, chemical, physical, and hydraulic functions and are considered some of the most valuable ecosystems on earth. These functions include habitat for innumerable species at various life stages, nutrient assimilation, water purification and storage, storm energy attenuation, and countless other valuable ecosystem services. These functions are valuable to people and can be measured in terms of flood risk reduction, revenues generated by hunting and fishing, reduced costs of water treatment, and other metrics.

Wetlands occur more frequently at higher latitudes, largely because the cooler climate provides less opportunity for evaporation, which is part of the reason 43 percent of Alaska's surface area is covered by wetlands (Hall et al. 1994). A wetland delineation conducted in 2005 indicated that the area of the proposed action is approximately 93 percent wetlands; predominantly palustrine scrub-shrub (58percent of the study area), followed by palustrine emergent/scrub-shrub covering 16 percent of the study area, palustrine emergent comprising 12 percent of the study area, and estuarine wetlands contributing 8 percent to the total study area (USACE 2005d). This distribution of wetland areas is consistent with the rest of the Y-K Delta region: a vast area of about 50,000 square miles underlain by permafrost between the Yukon River in the north and Kuskokwim River in the south, dominated by wetlands, lakes, and slow, meandering rivers.

The wetlands in the area of the proposed action are WOTUS due to their surface and shallow subsurface hydraulic connection to the tidally influenced Ninglick River, thus, placing the wetlands under the jurisdiction of the USACE through its authority under Section 404 of the Clean Water Act (CWA). Proposals to place dredged or fill material into wetlands under the jurisdiction of the USACE require authorization from the District Engineer. The 2005 Wetland Delineation report is in Appendix C, Wetlands Delineation for the New Village of Newtok, Alaska.

Seven categories of wetlands were identified during the 2005 delineation (USACE 2005d), and each is described below, in descending order of total area (Figure 46). The level of detail in Figure 46 is necessarily constrained by page-size; more detailed wetland delineation maps are available in Appendix C and Appendix D.

Palustrine scrub-shrub Wetlands (1,841 acres)

The palustrine scrub-shrub wetlands represent about 58 percent of the delineated area and were separated into the following subclasses depending on the habitat of the dominant species: palustrine scrub-shrub evergreen wetlands dominated by crowberry tundra and birch-ericaceous shrub communities (937 acres), palustrine scrub-shrub/moss peat wetlands where sphagnum and low growing shrubs are the main component of the vegetation community (580 acres), and palustrine scrub-shrub broad leaved-deciduous dominated by willow (*Salix pulchra*) (324 acres). Palustrine scrub-shrub evergreen wetlands were found within the proposed Mertarvik community site. The palustrine scrub-shrub/moss peat wetlands are located at a slightly higher elevation,

usually on mounds of about 1 foot in height. Palustrine scrub-shrub broad-leaved deciduous wetlands are well spread out in the general sampled area along several drainage ways and depressions.

Palustrine Emergent Persistent Scrub-shrub Wetlands (495 acres)

Palustrine emergent persistent/scrub-shrub wetlands represent approximately 16 percent of the total delineated area. They were divided into two groups: palustrine emergent persistent/scrub-shrub evergreen/moss (255 acres) and palustrine emergent persistent/scrub-shrub broad-leaved deciduous (240 acres). Palustrine emergent persistent/scrub-shrub/moss are wetlands located at the foot hills, with a similar component of low growing evergreen species as the palustrine scrub-shrub evergreen wetlands (top plateau), but with a conspicuous cover of tussock cottongrass (*Eriophorum vaginatum*). These wetlands also have a large component of rust-color sphagnum, which gives this community a rusty color and a deep 16-foot peat layer. Palustrine emergent persistent/scrub-shrub deciduous wetlands are dominated by bluejoint grass but have about 25 percent of willow cover. The vegetation community seems to be an intermediate state between willow-dominated communities and bluejoint grass meadows. They are found along drainage ways, depressions and slopes and have a large component of wildflowers, herbs, and ferns.

Palustrine Emergent Persistent Wetlands (370 acres)

Palustrine emergent persistent wetlands represent about 12 percent of the total delineated area. They are usually located in drainage ways and in depressions where snow persists until late spring. The communities are typically dominated by bluejoint grass with few herbs and almost no willows. Herbs within these communities include *Petasites frigidus*, *Equisetum* sp., *Athyrium filix-femina*, dwarf dogwood (*Cornus suecica*), and *Angelica lucida*. They are well-distributed within the delineated area but are usually common near willow thickets. Palustrine emergent persistent wetlands also include wet sedge meadow tundra dominated by *Carex aquatilis*, *Potentilla palustris* and green sphagnum. Wet sedge meadow tundra is usually found in areas with standing water along drainages that cross the bottom hills, lake fringes, and crisscross the top plateau tundra.

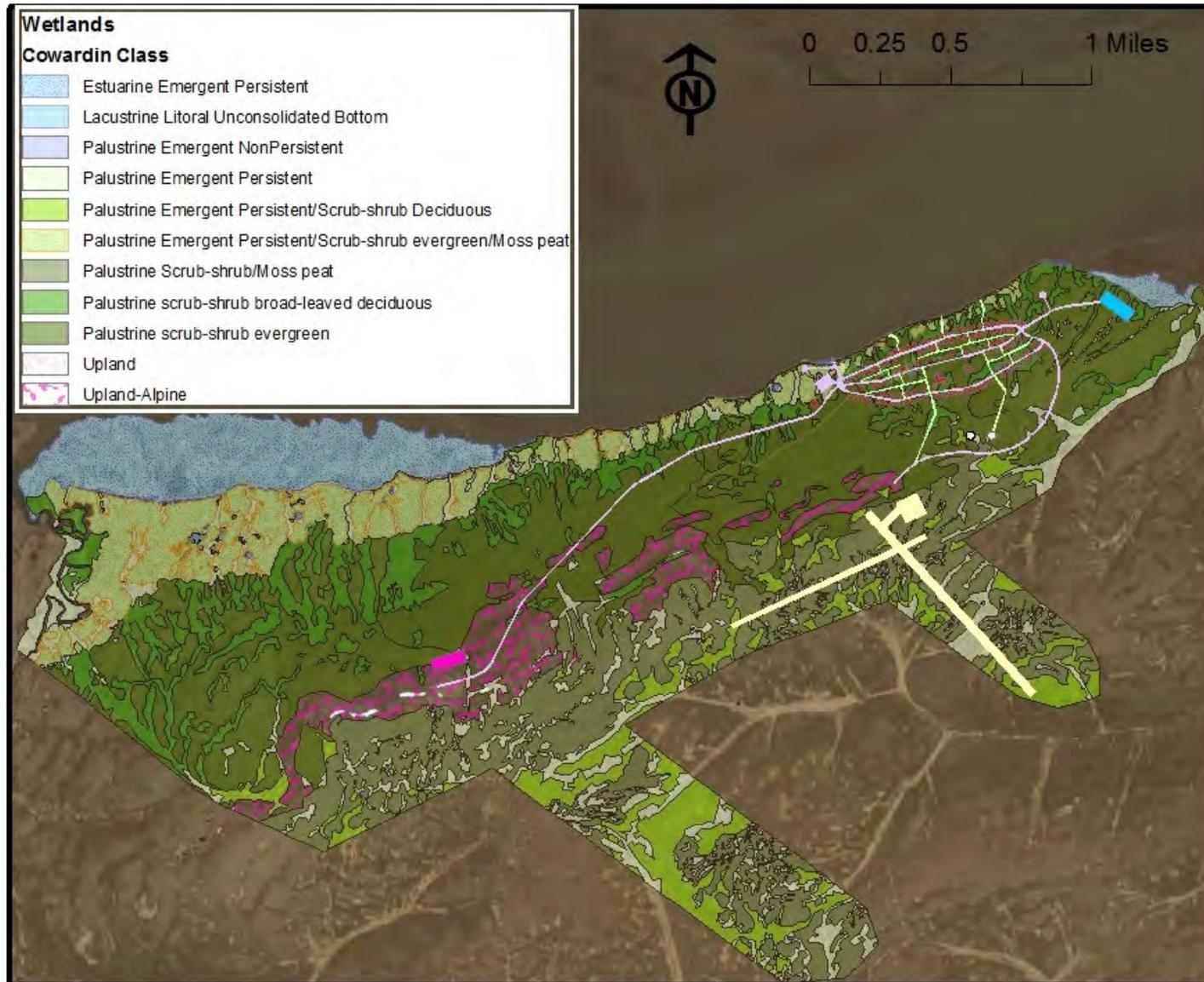


Figure 46. Categories of wetlands and uplands delineated in the Mertarvik area (USACE 2005d) Figure 47 shows the converse image, the wetland types within the construction footprint.

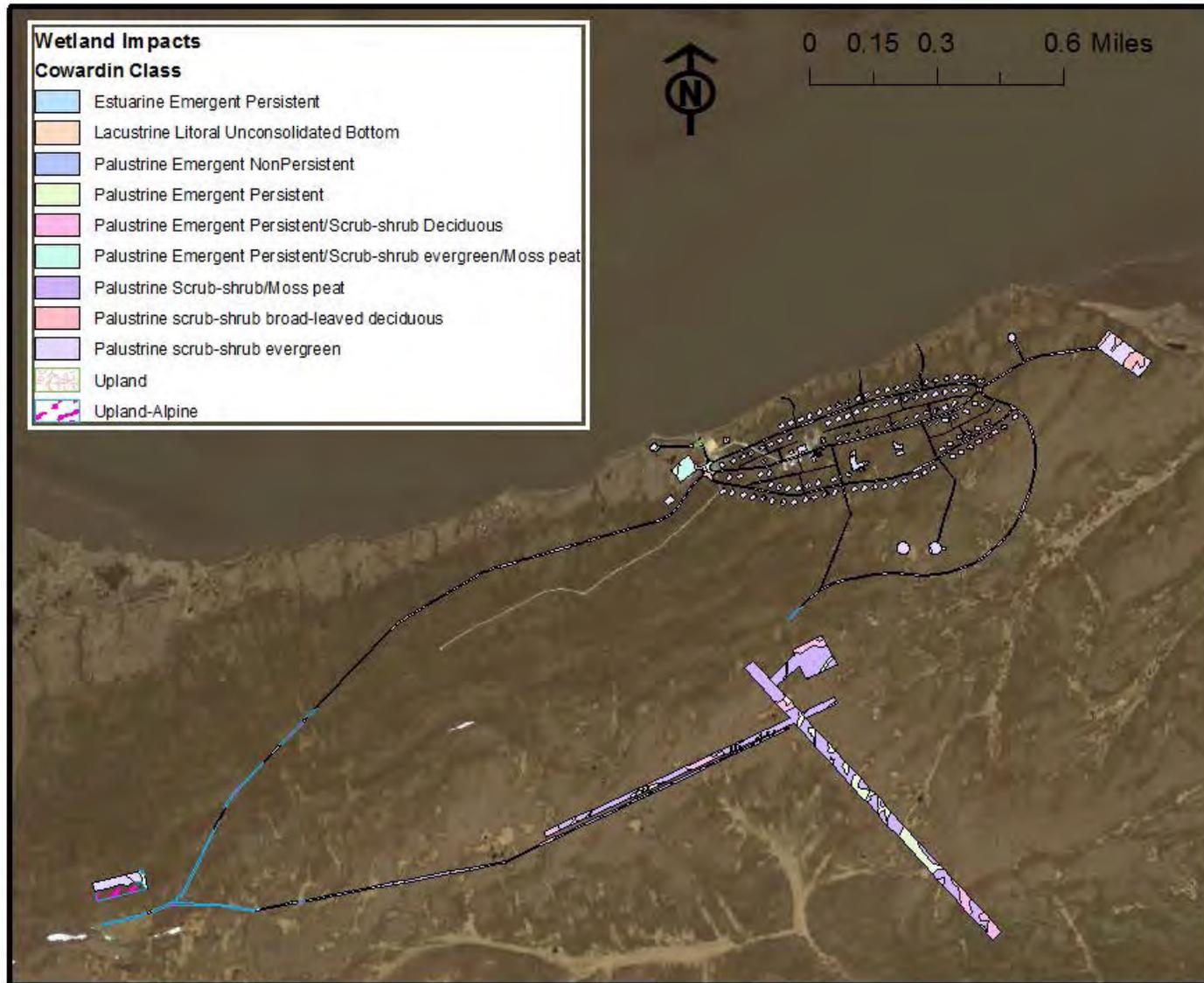


Figure 47. Direct impacts on wetlands by the proposed community layout at Mertarvik.

Estuarine Emergent Persistent Wetlands (250 acres)

Estuarine emergent persistent wetlands represent approximately 8 percent of the total delineated area. They are found in tidally influenced mudflats. Dominant species are tolerant to brackish water conditions, forming monotypic stands of Lyngbye's sedge (*Carex lyngbyei*) communities or forming patches between tidally deposited mineral silts and clays as in the case of *Puccinellia phryganodes* and *Plantago maritima*. Bluejoint grass and beach rye grass (*Leymus arenarius*) are found at the inland fringes of these estuarine wetlands. About 236 acres are at the mouth of the Takikchak River and 14 acres at the mouth of the east drainage area.

Lacustrine Littoral Unconsolidated Bottom Wetlands (5 acres)

Lacustrine littoral unconsolidated bottom wetlands represent less than 1 percent of the total delineated area. These standing water habitats are usually at the bottom hills and, to a lesser degree, at the top of a plateau. They are formed in topographic depressions where snow pack and rainfall permanently accumulate, forming shallow fresh water ponds. With silty organic unconsolidated bottoms, these ponds only provide habitat for aquatic vegetation at their fringes, where light penetrates deep enough.

Palustrine Emergent Non-persistent Wetlands (0.42 acres)

Palustrine emergent non-persistent wetlands represent less than 1 percent of the total delineated area. These wetlands are usually found in small areas but are common along the fringes of small ponds, so they are difficult to delineate on a large-scale map. The dominant submerged species is common maretail (*Hippuris vulgaris*).

Uplands (221 acres)

Uplands represent about 7 percent of the total delineated area. They are mainly located on the windswept north facing slopes and at the sloped outskirts of the bottom hills, and exist in small, discontinuous fragments. At the upper slopes, the prostrate vegetation is characterized by the presence of alpine species (arctic willow (*Salix arctica*), dwarf azalea (*Azalea rutherfordiana*), alpine smartweed (*Polygonum viviparum*), net-vein willow (*Salix reticulata*), etc.) and a thick root mat. Bearberry (*Arctostaphylos alpine*) is abundant as well. Soils are shallow and gravelly with an abundance of basalt outcrops. Lichens such as *Cetraria cucullata*, *Cladonia rangifera*, *Cladonia* sp., *Thamnolia vermicularis*, and fruticose lichens dominate most of the ground cover, and crustose lichens are abundant in the basalt outcrops. The outskirts of the lower hills were also considered uplands because they did not meet hydric soil indicators.

5.12.2 Environmental Impacts

The selection of any of the proposed alternatives has the potential to impact wetlands, a special aquatic site category. Where the activity associated with a discharge that is proposed for a special aquatic site does not require access or proximity to or siting within the special aquatic site in question to fulfill its basic purpose (i.e., is not "water dependent"), practicable alternatives that

do not involve special aquatic sites are presumed to be available, unless clearly demonstrated otherwise. In addition, where a discharge is proposed for a special aquatic site, all practicable alternatives to the proposed discharge that do not involve a discharge into a special aquatic site are presumed to have less adverse impact on the aquatic ecosystem, unless clearly demonstrated otherwise.

As described in the previous section, wetlands dominate the Mertarvik area, with uplands existing in fragments too small and discontinuous to be preferentially targeted for construction impacts. All three CLP alternatives have been developed within the same overall Mertarvik community area and are expected to have similar direct, indirect and cumulative impacts on wetlands and other special aquatic sites in the Mertarvik region. As a result, the anticipated impacts of each CLP alternative are indistinguishable from each other in this resource area and will be discussed collectively.

Impacts to wetlands have been quantitated using the best available information. Figures 46, 47, and 48 were generated using ArcGIS to superimpose the preferred CLP footprint onto the 2005 wetlands delineation data. The overlapping area, plus a conservative buffer area, was used to estimate the acreage of direct impacts to wetlands from all infrastructure elements other than airport features. For the airport, a November 2017 environmental study prepared for ADOTPF (PDC Engineers 2017) included an updated wetland impact evaluation focused on just the proposed airport, incorporating more detailed assumptions about overburden disposal, embankments and construction work areas. Relevant excerpts from the airport environmental study are provided in Appendix D.

Thus, the acreages discussed below are estimated values drawn from two different studies. These numbers are very much subject to change as the designs of the different infrastructure features are developed and refined, and should be regarded as illustrating the general magnitude of effects, rather than firm statements of impacts. As such, where there is overlap between the two sets of acreage values (e.g., the airport access road), we have expended limited effort in parsing out the different impacts, instead allowing some minor redundancy, and therefore additional conservatism, to exist in the numbers. As is described at the end of this section, the impacts to wetlands from individual infrastructure features will be assessed again, in greater detail, when CWA Section 404 discharge permits are applied for prior to construction.

Section 4.6.1 and Table 3 describe footprint areas for the completed CLP infrastructure elements. About 24,700 linear feet of road, 13,135 linear feet of trails, about 0.49 acre of the Class III Municipal Solid Waste Landfill, the entire 14-acre wastewater treatment lagoon, the entire 0.98-acre well field and water storage tank, and all 10.83 acres of building pads would be constructed in wetlands. Roads totaling 24,700 feet long and 30 feet wide would result in wetland impacts of 20.86 acres, with an additional 3.4 acres of upland impacts (Figure 47, Figure 48 and Figure 49).

The landfill footprint used in this wetlands analysis was estimated to occupy 0.97 acre, of which 0.49 acre is palustrine scrub-shrub (PSS7) wetlands. Subsequent landfill designs call for up to 12 acres of constructed facilities within a 15-acre lot. The landfill was intentionally sited in a relatively large area of contiguous uplands (figure 46), and the ultimate landfill layout may be able to be constructed entirely in uplands. However, the original estimated loss of 0.49 acre of wetlands at the landfill is retained for this analysis.

Early assumptions as to the location of the quarry and its likely direction of expansion resulted in a calculation in this wetlands analysis that a small quantity of wetlands would be disturbed: 1.56 acres palustrine scrub-shrub evergreen (PSS7), and 0.23 acres palustrine emergent persistent (PEM1), for a total of 1.79 acres wetlands. However, consultation with the engineers preparing the quarry development plan confirm that the total expansion of the quarry should not exceed the approximately 32 acres described in the 2011 EA (USACE 2011) or expand beyond the quarry boundary established in the existing CWA Section 404 permit for previous construction at Mertarvik (Voorhees 2018). Any expansion of the quarry beyond these limits would be accompanied by a review of the 404 permit, but is likely extend into uplands. The original estimated loss of 1.79 acres wetlands to the quarry, however, is retained in this wetlands analysis for non-airport construction. The ADOTPF initial studies of the airport construction makes estimates of demands of material from the quarry that may require expansion of the quarry boundaries; the ADOTPF studies are described below and in Appendix D.

When material extraction from the quarry is complete, the excavation may naturally be converted to open water habitat as it fills with groundwater and precipitation. This would have the effect of creating open-water habitat, which is less abundant in the immediate area of the proposed action than the palustrine wetlands that would be lost. This open water habitat would likely be greater than 6 feet deep and could retain an ice-free profundal zone that could provide overwintering habitat for fish.

The well field, water storage tanks, and wastewater treatment lagoon would impact a total of 4.98 acres of wetlands: 3.48 acres of palustrine scrub-shrub evergreen (PSS7) wetlands, 1.46 acres of palustrine scrub-shrub broad leafed deciduous (PSS1), and 0.04 acres of palustrine emergent persistent (PEM1) wetlands would be lost.

Approximately 42,635 feet of road and trail would be constructed in conjunction with infrastructure development and construction access; most of that length would be constructed perpendicular to the direction of flow. If the road fill is placed to permafrost depth, it could interrupt the movement of water downslope, instigating ponding up-gradient of the linear feature, and desiccation down-gradient of the road. However, roads will be constructed without removing the tundra or surface organic mat, and with little or no excavation. Vegetation will be trimmed to create a relatively smooth tundra surface prior to placement of a geotextile directly on the tundra

surface. Select structural fill will be placed and compacted on top of the fabric; placement of fill to permafrost depth is unlikely to be required. Culverts will be installed as required in order to maintain existing surface drainage patterns.

Of the 20.86 acres of wetland impacts from infrastructure road construction, 13.45 acres would be constructed in palustrine scrub- shrub evergreen (PSS7) wetlands, 3.4 acres would be constructed in palustrine broad leafed deciduous (PSS1), and 2.71 acres would be constructed in palustrine emergent persistent/palustrine shrub-scrub/palustrine moss-lichen wetlands (PEM1/PSS/PML). The remaining 1.1.3 acres of wetland impacts would be distributed across palustrine emergent persistent (PEM1), palustrine scrub-shrub (PSS), and palustrine moss-lichen (PML) communities. Uplands (UPL) totaling 1.7 acres would also be impacted. The construction access road would be 4,800 feet long and impact a total of 2.5 acres of wetlands; 1.78 acres of palustrine scrub-shrub/moss lichen wetlands, 0.48 acres of palustrine emergent persistent/scrub-shrub wetlands, and 0.24 acres of palustrine emergent persistent wetlands. Upland areas totaling 0.79 acres would also be impacted by the construction of the airfield access road. Trail construction would impact a total of 2.32 acres of wetlands: 1.62 acres of palustrine scrub-shrub evergreen (PSS7), and 0.64 acres of palustrine scrub-shrub broad leafed deciduous (PSS1); the remaining 0.07 acres of wetland impacts would be spread across palustrine emergent persistent, palustrine scrub-shrub, and palustrine moss-lichen wetlands. Uplands totaling 0.03 acres would also be impacted.

Building pads would impact a total of 10.83 acres of wetlands. Palustrine scrub-shrub evergreen (PSS7) wetlands would lose 7.94 acres, palustrine scrub-shrub broad leafed deciduous (PSS1) wetlands would lose 2.84 acres, and palustrine emergent persistent (PEM1) and palustrine emergent persistent/palustrine scrub-shrub/palustrine moss-lichen (PEM1/PSS/PML) wetland communities would lose 0.02 acres each.

From the buildout of non-airport infrastructure, the total area of impacts to wetlands is estimated to be about 45 acres distributed across two each sixth-level hydrologic units (HUC 6) with a combined area of 441,550 acres. Palustrine scrub-shrub evergreen (PSS7) wetlands would experience the greatest loss, a total of 28.68 acres for the entire proposed action. Palustrine scrub-shrub/palustrine moss lichen (PSS/PML) communities would lose 1.98 acres, palustrine scrub-shrub broad leafed deciduous communities would lose 8.71 acres, palustrine emergent persistent (PEM1) communities would lose 1.53 acres; 4.61 acres of palustrine emergent persistent/palustrine scrub-shrub (PEM1/PSS) would be filled, and 2.77 acres of palustrine emergent persistent/palustrine scrub-shrub/palustrine moss-lichen (PEM1/PSS/PML) would be impacted. Upland impacts could be as great as 6.13 acres. Some wetlands surrounding the fill could experience greater construction-caused desiccation down-gradient of roads, but due to the scale of the impacts and abundance of similar wetlands in the watershed, infrastructure development at Mertarvik would not have a significant cumulative impact on wetlands.

Total buildout of the airport, which includes the runway, possible crosswind runway, apron, taxiway, access road, temporary haul road, and expanded quarry was estimated in the ADOTPF environmental study (PDC Engineers 2017; Appendix D) to impact 232 acres. For this analysis, the crosswind runway has been excluded; when the crosswind runway is excluded, the following acreage is estimated for the wetland categories:

- Palustrine Scrub-Shrub/Moss Peat (PSS/ML1) – 131.32 acres
- Palustrine Emergent Persistent (PEM1) – 36.7 acres
- Palustrine Emergent Persistent/Scrub-Shrub Deciduous (PEM1/SS6) – 20.4 acres
- Palustrine scrub-Shrub evergreen (PSS7) - 14.80
- Lacustrine Littoral Unconsolidated Bottom - 0.27 acres

The ADOT's current airport construction proposal includes surficial disposal of excess overburden excavated from the runway and taxiway footprints. The proposed disposal method would spread the overburden as a layer of mineral soils 2 to 3 feet thick over approximately 35 acres of existing wetlands. Natural revegetation of this fill material would require years and result in upland habitat. This mechanism of disposal would also result in permanent modifications to the hydrology of additional acres of abutting wetlands, making some drier and some wetter, modifying these wetlands in an, as yet, unquantifiable fashion. While this is ADOT's current proposal, FAA will require ADOT to further refine its proposed airport design to minimize fill in wetlands to the maximum extent practicable to meet FAA's legal requirements under the Clean Water Act, Executive Order 11990 and FAA's environmental policies.

Design modifications to minimize wetland impacts may, at a minimum, require the material, if disposed of on the airport, to be disposed of to a much greater depth, albeit not so deep that it would conflict with safe and efficient use of the airport. More viable and less impactful options include trucking the overburden for use in any of the following "beneficial" ways: to be stored at the landfill for future use as a landfill cap, used as road-bed material and/or berm material for the sewage lagoon or another, as of yet, unidentified use. If the material is unsuitable for such beneficial uses, then it could also be permanently disposed of in the quarry. This design refinement will be required of ADOT and approved by FAA before ADOT submits its Section 404 permit application to the USACE Regulatory Program for authorization to place fill in wetlands. At the time this EIS was drafted, ADOT required additional time to determine the viability of the "beneficial uses" of this "excessed" overburden material due to the extent of existing geotechnical analyses of these soils and the problematic nature of working with these materials in sometimes below freezing conditions.

Therefore, the wetland impacts disclosed above are expected to substantially exceed what would occur if the airport were constructed. After ADOT submits a CWA Section 404 application to the USACE, the USACE will also review it to determine if the proposed airport design reasonably

minimizes impacts to waters of the U.S. through avoidance and minimization. If appropriate, USACE will require mitigation for any wetland impacts that cannot be avoided.

FAA cannot provide a more refined definition of design, avoidance, and minimization requirements at this time because USACE will not make these decisions until they have a permit application in hand. Once ADOT has submitted a Clean Water Act Section 404 permit application, USACE can perform a detailed review and impact analyses via their own NEPA, CWA, and other related environmental law review processes.

Additionally, both FAA and USACE would require the same avoidance, minimization and/or mitigation of wetland impacts for any excess overburden disposed of off airport property.

USACE will also require via the requirements of Section 404(b)1 Guidelines of the CWA, the selection of the Least Environmentally Damaging Practicable Alternative (LEDPA). This is the alternative that minimizes impacts in light of cost, existing technology, and logistics. It is typically a combination of the NEPA “reasonable” and CWA “practicable” alternatives.

A functional assessment was performed to quantify the functions provided by the six Cowardin classes of wetlands that would be impacted by the construction at Mertarvik, using a combination of the Alaska Regulatory Best Professional Judgment Characterization (ARBPJC) methodology, and the the North Slope Rapid Assessment Methodology (NSRAM). The ARBPJC, presented in Regulatory Guidance Letter (RGL) 09-01, is a functional assessment that quantifies the functions provided by various aquatic resources according to a suite of sub-indices such as flood flow alteration, wildlife habitat value, and production of organic matter. It does not have a means of incrementally reducing function to reflect impacts other than complete destruction (i.e., reduction of function to zero). Wetland delineation data forms completed for the 2005 delineation were evaluated to complete the ARBPJC and quantify the function of various wetland types found in the project area. The ARBPJC was selected because the 2005 wetland delineation data forms provided adequate information to complete the assessment when combined with remotely available data.

The NSRAM is a conditional assessment method to quantify the level of impact in an area, without considering the relative value of specific aquatic resources. The NSRAM was developed by the Engineer Research and Development Center (ERDC) for the Alaska District for the purpose of rapidly assessing wetlands within the North Slope region of Alaska. Potential applications of the NSRAM include: assist with permit review, analyze project alternatives, minimize impacts, assess unavoidable impacts, aid in determining mitigation requirements, and monitor the success of compensatory mitigation. Additional potential uses include evaluation of restoration projects, assessment potential violations, and other efforts related to the management of wetlands within the North Slope region. The NSRAM was selected because it is a rapid

conditional assessment methodology that can be conducted remotely and is approved by the Alaska District as an “appropriate function or condition assessment” (33 CFR 332.3).

The combination of the NSRAM and ARBPJC was used to quantify the existing function and predict post-project function in order to develop a loss metric; i.e., the difference between the pre-project and post-project functional capacity would represent the loss of function if the project were constructed IAW the full community layout plan. Some of the areas that would be impacted by the construction of the full CLP have been previously impacted by development and trails. Various wetland community types within the project footprint provide differing values based on their physical, biological, and chemical properties. The combination of the two metrics provides a functional capacity unit, which captures the functional variability between discrete wetland community types, as well as existing and expected conditional degradation from the proposed infrastructure development project. The functional assessment multipliers for each Cowardin class were applied to the acreage of impact associated with each infrastructure feature. The product was multiplied by the pre- and post-project conditional assessment in order to generate a functional differential between pre- and post-project conditions, expressed as a functional capacity unit. The pre- and post-project conditions were quantified using the NSRAM. The combination of functional and conditional assessments allows for the estimation of the loss of wetland functions as a result of the proposed project. The functional assessment report is included in this EIS as Appendix C and reflects the potential loss of 6.2 functional capacity units as a result of the project. This functional assessment was based on electronic drawings of the CLP provided by the ANTHC, and does not include the construction design data developed more recently for the airport features (PDC Engineering 2017). The functional assessment in Appendix C no longer precisely quantifies the functional degradation related to full build-out of the Mertarvik Infrastructure project, but is expected to be representative of the types of impacts across various wetland subclasses. No implication of compensatory mitigation was included in the assessment.

The proposed action has not yet been evaluated by the Regulatory Division of the USACE Alaska District, the enforcement agency for section 404 of the CWA in Alaska, and permitting authority for the placement of fill in wetlands. The Regulatory Division has stated that it will not issue permits for the project as whole as described in this EIS because of the uncertain project timeline and insufficient details on construction methods and other potential site-specific impacts (Wynn 2017). The expectation is that entities involved in the proposed construction of various components of the proposed infrastructure that involve the placement of fill materials into WOTUS will apply for the DA permits required for their specific actions. The USACE Regulatory Division will make its own independent evaluation of the environmental impacts and significance of the proposed discharge. The USACE permit review process is the NEPA analysis process and includes public notice, consultations with resource agencies, consideration of comments received, written evaluation of environmental impacts, and compliance determinations

with the CWA Section 404(b)(1) Guidelines. Once expected impacts to wetlands have been avoided and minimized to extent practicable, compensatory mitigation (restoration, creation, enhancement, preservation) may be developed and required by the USACE Regulatory Division. Under section 401 of the CWA, the ADEC will independently certify that the proposed construction of various components of the proposed infrastructure that involve the placement of fill materials into WOTUS complies with the State Water Quality Standards for actions within State waters and issue a Certificate of Reasonable Assurance (CRA).

The Regulatory Division has determined that it will evaluate impacts to wetlands and the appropriate level of mitigation as it receives permit applications for specific construction actions; therefore, the Denali Commission does not attempt to propose within this EIS wetland mitigation activities for the infrastructure development project as a whole. Mitigation proposals made at this time would be pre-decisional to the Regulatory Division's permit evaluation process and its chosen approach to the project.

The project will not discharge fill to mudflats or refuge waters, and the project will have no direct impact to these special aquatic sites. Barge landings at Mertarvik may disturb bottom sediments near the Ninglick River shoreline, but sediment re-suspension is a defining characteristic of mud flats, and barge activity should not cause a discernable increase in the sediment load of this naturally turbid river. The sediment control BMPs discussed in section 5.4.2 will keep quantities of terrestrial sediment runoff to negligible levels.

5.12.3 Significance Determination

Under the FAA significance criteria for wetlands (FAA 2015), a significant impact exists if the action would:

- Adversely affect a wetland's function to protect the quality or quantity of municipal water supplies, including surface waters and sole source and other aquifers;
- Substantially alter the hydrology needed to sustain the affected wetland system's values and functions or those of a wetland to which it is connected;
- Substantially reduce the affected wetland's ability to retain floodwaters or storm runoff, thereby threatening public health, safety or welfare (the term welfare includes cultural, recreational, and scientific resources or property important to the public);
- Adversely affect the maintenance of natural systems supporting wildlife and fish habitat or economically important timber, food, or fiber resources of the affected or surrounding wetlands;
- Promote development of secondary activities or services that would cause the circumstances listed above to occur; or
- Be inconsistent with applicable state wetland strategies.

The Denali Commission has determined that none of the three CLP alternatives, as proposed, would meet any of the significance criteria defined above for wetlands (LESS THAN SIGNIFICANT).

The no action alternative would have no impact on wetlands and other special aquatic sites in the Mertarvik area.

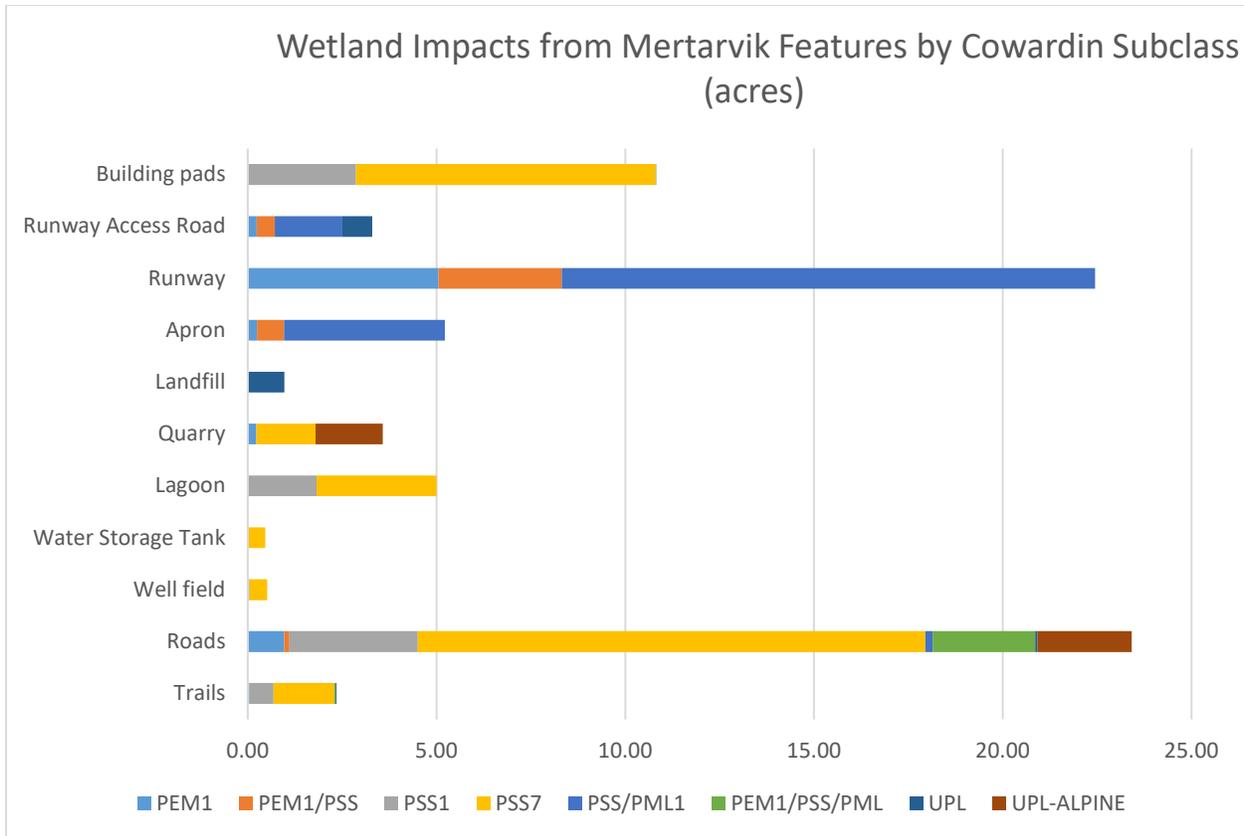


Figure 48. Acreage of impacts on wetlands (by Cowardin subclass) associated with feature types.

Symbol	Cowardin Subclass
PEM1	Palustrine Emergent Persistent
PEM1/PSS	Palustrine Emergent Persistent/Scrub-shrub
PSS1	Palustrine Scrub-shrub Broad-leaved Deciduous
PSS7	Palustrine Scrub-shrub Evergreen
PSS/PML1	Palustrine Scrub-shrub/Moss Lichen (Moss)
PEM1/PSS/PML	Palustrine Emergent Persistent/Scrub-shrub/Moss Lichen
UPL	Upland
UPL-ALPINE	Upland-Alpine

Figure 49. Key to Cowardin Wetland Classifications Identified at Mertarvik.

5.13 Protected Lands

5.13.1 Affected Environment

The only federally protected land in the area of the proposed action is the Yukon Delta National Wildlife Refuge (NWR), which surrounds the proposed Mertarvik community site. The refuge is one of the largest refuges in the nation, at 22 million acres, and is managed by the USFWS from the refuge headquarters office in Bethel, Alaska (Figure 50).

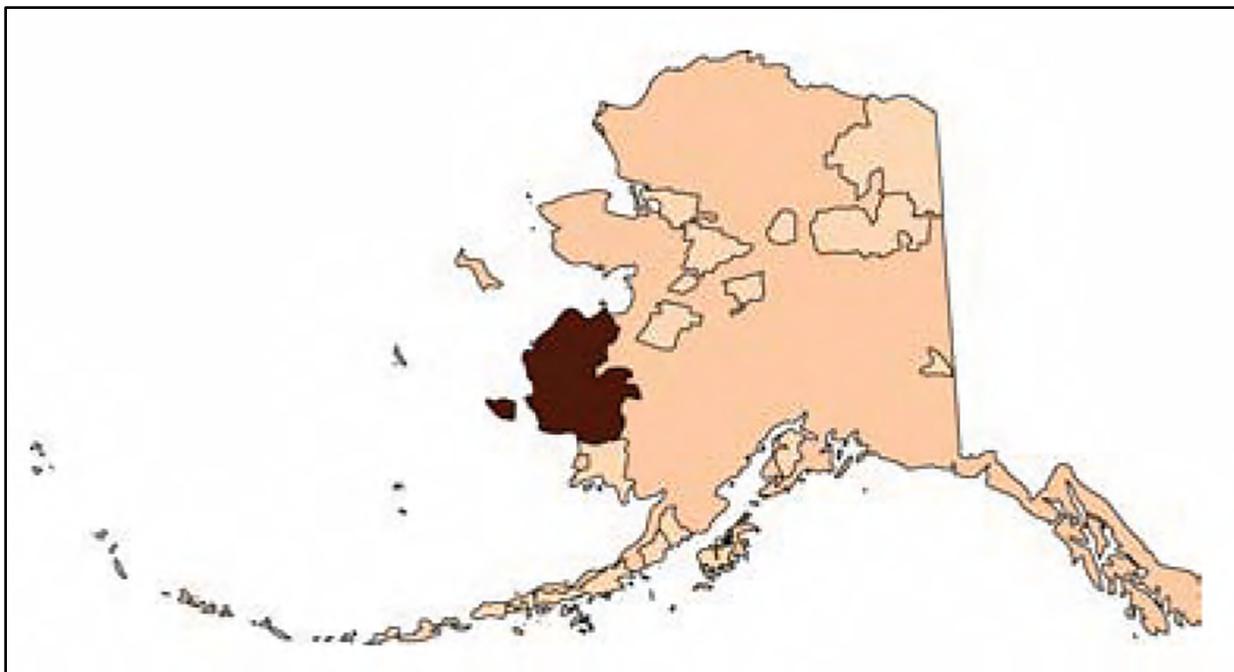


Figure 50. Extent of the Yukon Delta NWR (dark red) within Alaska (USFWS 2017).

The Yukon Delta NWR has expanded and evolved several times during its history. The first refuge lands were set aside by President Theodore Roosevelt in 1909 as a preserve and breeding ground for native birds, though later revoked by President Warren Harding in 1922 and not protected again until 1960 and 1961. In 1929, Nunivak Island was set aside as a refuge and breeding ground for wild birds, game, and furbearing animals. In 1930, the small islands and all lands under the waters surrounding Nunivak Island were added to the refuge. Additional lands were reserved in 1937 when Hazen Bay Migratory Waterfowl Refuge was established. The Kuskokwim National Wildlife Range, established in 1960, was enlarged in 1961, and its name changed to the Clarence Rhode National Wildlife Range. With enactment of the Alaska National Interest Lands Conservation Act (ANILCA) in 1980, these existing ranges and refuges were combined and enlarged to establish the Yukon Delta NWR. The ANILCA also established the Andreafsky and Nunivak Wilderness Areas and designated the Andreafsky River as a Wild and Scenic River. With the exception of several small additions to the refuge through land exchanges or purchases, all lands that now make up the refuge were in the public domain prior to refuge designation (USFWS 2017).

As described previously, the proposed Mertarvik community site is on land that was once part of the refuge, but was exchanged in 2003 to provide land for the relocation of the residents of Newtok. The USFWS transferred 10,943 acres of refuge land to the Newtok Native Corp in exchange for 12,101 acres of land from the NVC (Figure 13).

There are no State of Alaska-designated conservation areas, such as game refuges, wildlife sanctuaries, wildlife ranges, or critical habitat areas, in the vicinity of the proposed action (ADFG 2017b). The Mertarvik area is within ADFG Game Management Unit (GMU) 18. Hunts for black bear, brown bear, caribou, moose, muskox, wolf, and wolverine are permitted and managed within this GMU (ADFG 2017c).

The National Wild and Scenic Rivers System was created by Congress in 1968 (Public Law 90-542; 16 U.S.C. 1271 et seq.) to preserve certain rivers with outstanding natural, cultural, and recreational values in a free-flowing condition. The nearest designated Wild and Scenic River to Mertarvik is the Andrefsky River, roughly 95 miles to the north.

5.13.2 Environmental Impacts

All three CLP alternatives have been developed within the same overall Mertarvik community area and are expected to have similar direct, indirect and cumulative impacts on protected lands in the Mertarvik region. As a result, the anticipated impacts of each CLP alternative are indistinguishable from each other in this resource area and will be discussed collectively.

None of the CLP alternatives would directly impact Yukon Delta NWR lands or State of Alaska conservation areas, as none now exist in the immediate proposed action vicinity. The new boundaries of the refuge created in the Mertarvik area by the 2003 land transfer are set back several miles from where the community layout is planned, and the nearest refuge wilderness area is roughly 90 miles away on Nunivak Island; this distance attenuates the potential for indirect impacts on the refuge. Newtok residents have long used the Mertarvik area and the refuge lands for subsistence, and they assert that living at Mertarvik versus Newtok will not substantially alter their subsistence hunting and gathering patterns. Therefore, the establishment of a new community at Mertarvik should not result in significant new impacts on refuge wildlife resources. It is possible that the presence of a new community at Mertarvik, and increased overland travel on Nelson Island trails, may alter the distribution of large game animals, such as muskox and bear, but only in minor ways. The Andrefsky Wild and Scenic River is about 95 miles to the north of the project area, in a different watershed. The development at Mertarvik would have no direct or indirect impacts on that river.

The operations at the planned airport at Mertarvik will be replacement operations for those at Newtok Airport and exist in the same overall vicinity as the communities would only be 9 miles apart and aircraft accessing either over fly the same general area. Therefore, while flight patterns over a highly-localized part of the refuge (in the immediate vicinity of Newtok and the Mertarvik town site) may change, total flight operations overall are not expected to change. Also, as previously noted, some as yet unknown change in flight operations may occur temporarily while both airports are operational.

5.13.3 Significance Determination

The Denali Commission has determined that the environmental impacts on protected lands associated with the implementation of any of the three CLP alternatives, as proposed, will not noticeably alter any attribute of those resources (MINOR), and not reach the threshold of significance as defined in section 5.1.

The no action alternative would have no significant impact on protected lands in the Mertarvik vicinity.

5.14 Cultural History and Cultural Resources

5.14.1 Affected Environment

5.14.1.1 Cultural History

Local Cultural History

The cultural history of the Yukon-Kuskokwim (Y-K) Delta region has not been thoroughly studied by archaeologists or historians. The earliest known archaeological site in the region dates to approximately 3,000 years before present (BP), during the archaeological classificatory culture known as the Arctic Small Tool tradition (Okada 1975). Multiple sites dating to the Norton tradition, spanning from approximately 1,500–950 BP, have been identified in the Y-K Delta. Shaw (1983) identifies a significant change in artifact inventories from multiple sites around 950 BP; this cultural material appears to be associated with the Western Thule culture, a widespread cultural group who followed the people of the Arctic Small Tool tradition into the Bering Strait region around 1,000 BP, and then moved south into Norton territory shortly thereafter. The Western Thule are thought to be the direct ancestors of modern Yup'ik, Cup'ik, and Iñupiaq indigenous populations.

Regional Cultural History

The cultural history of the Mertarvik area is subsumed into the southwestern Alaska region. Shaw (1998) identifies the Y-K Delta, Nunivak Island, and northern Bristol Bay areas as a single region for the purposes of archaeological discussion. Dumond (1984) has divided the cultural history of southwestern Alaska into the Paleoarctic, Northern Archaic, Arctic Small Tool, Norton, and Thule traditions. Most of the data for this reconstruction come from areas to the south of the Y-K Delta, and may not accurately represent the Mertarvik area. The Paleoarctic tradition is marked by blade and core technology. Microblades, cores, and core tablets were recovered along with large blades, transverse burins, and scrapers. The radiocarbon data suggest that the Paleoarctic Tradition existed from approximately 10,000 to 8,000 BP. The Paleoarctic Tradition was followed by the Northern Archaic Tradition, which dates to approximately 6,000–3,000 BP. Chipped lanceolate projectile points or knives, heavy chopper-like semilunar scrapers, and small endscrapers are representative of this tradition. In southwestern Alaska, the Brooks River Beach Ridge phase from the upper Naknek River drainage is associated with the Northern Archaic. Based on recovered tool types, Dumond (1984) suggested that subsistence strategies

focused on land-based resources. The Arctic Small Tool Tradition appeared in the Naknek River drainage around 4,000 BP. The average tool assemblage consists of microblades, small burins, small bifacially chipped sideblades and endblades, unifacially flaked knives, triangular bifacial harpoon endblades, adze blades with polished bits, and an occasional lance or double-edged knife blade. Artifacts recovered from ancient village and camp sites indicate that some winter and most summer occupations focused on salmon and other riverine resources (Dumond 1984).

In southwestern Alaska, the Norton Tradition is represented by three phases that date between 2,300–950 BP. The earliest phase, the Smelt Creek phase, has plain and impressed fiber-tempered pottery, small non-stemmed projectile points, and large stemmed projectile points. The Brooks River Weir phase was derived from the Smelt Creek phase, with changes in the style of endblades, sideblades, and ground slate ulu forms. Pottery also changed shape, increased in size, and was more often check-stamped than plain. New styles of projectile points mark the third phase, the Brooks River Falls phase. During this time period, sideblades declined while ground slate ulus increased in popularity, and large, double-edged, ground slate knives and lance blades became common. The pottery became primarily plain and very thick (Dumond 1984).

The Western Thule Tradition dates from approximately 950–150 BP; the Thule people are thought to be the direct ancestors of modern Yup'ik, Cup'ik, and Iñupiaq peoples. Three distinct phases have been identified in southwestern Alaska – the Brooks River Camp, Brooks River Bluffs, and Pavik phases. Large barbed and stemmed ground slate lance and knife blades, and thick plain pottery dominate the Brooks River Camp phase. The Brooks River Bluffs phase shows fewer large lance blades; also, the style of projectile inset blades and adze blades changed and relatively thin plain pottery appeared. The last phase, the Pavik phase, contains Russian and American trade goods. Metal trade goods replaced most stone implements with the exception of ground slate inset blades. Across all three phases, osseous tools included non-toggling harpoon heads, occasional toggling harpoon heads, dart heads with inset tips, and other arrow forms designed for birds and land mammals. Settlements of significant size began to appear on the coast, and a dichotomy between interior and coastal subsistence focuses became apparent in the archaeological record during this time period (Dumond 1984).

5.14.1.2 Previous Archaeological Investigations at Mertarvik

USACE Alaska District and USFWS archaeologists surveyed the Mertarvik area, including the proposed Mertarvik site, in 2002 and 2005 (Grover 2007). These surveys identified several archaeological sites near the mouth of Takikchak River, mutually identified as part of an old winter camp and reindeer herding station called *Taqikcaq* (XBI-156, XIB-157, and XBI-158 (Table 17); XBI-156 includes two graves dating to the 1940s; these gravesites are marked with at least one wooden marker. XBI-157 contains five house depressions and an unidentified number of 55-gallon drums. XBI-158 contains two house depressions and 11 cultural depressions. These

three archaeological sites are located to the west of the proposed Mertarvik community site (Grover 2007).

The 2002 and 2005 archaeological surveys also identified a cultural site (XBI-183) near the proposed community site (Table 17). XBI-183 consists of six shallow pits, about 1 mile northeast of the barge landing site. The six circular pits are approximately 3 feet in diameter and 18 inches deep. Newtok residents identified the circular pits as areas where clay was excavated for making pottery. XBI-183 was determined to be eligible for the National Register of Historic Places (NRHP) under Criterion D (yielded or may yield important relevant information) on August 31, 2007 (Grover 2007; AHRS 2017). XBI-183 is located just northeast of the proposed community layout; it is identified as a place to avoid on the layout plan.

Table 17. Known cultural resources in general vicinity of the proposed action area.

AHRS #	Site Name	Description	NRHP Status	In APE
XBI-156	XBI-156	Old winter camp and summer herding station.	None	
XBI-157	XBI-157	5 depressions and 55-gallon drums.	None	
XBI-158	XBI-158	2 house depressions and 11 house pits.	None	
XBI-183	Clay Pits	6 pits for collecting clay.	Eligible	

Although not identified on the Alaska Heritage Resources Survey (AHRS), the Mertarvik Spring, located just west of the proposed community layout, may itself be considered a Traditional Cultural Property (Figure 51; Grover 2007). Traditional Cultural Properties (TCPs) are physical places that may be considered eligible for inclusion on the NRHP due to their association with cultural practices or beliefs of a living community that are (1) rooted in that community's history, and (2) are important in maintaining the continuing cultural identity of the community (National Register Bulletin No. 38). The three homes built in 2007 were constructed next to Mertarvik Spring, and it was identified as a potential water source. The proposed community layout does not incorporate these three uninhabited houses, and a well has already been excavated more than half a mile to the east in preparation for community development.



Figure 51. Mertarvik Spring.

5.14.2 Environmental Impacts

All three CLP alternatives have been developed within the same overall Mertarvik community area and are expected to have similar direct, indirect and cumulative impacts on cultural resources in the Mertarvik region. The initial design of these CLPs avoided known cultural resources. As a result, the anticipated impacts of each CLP alternative are indistinguishable from each other in this resource area and will be discussed collectively.

The development of the Mertarvik community will not result in any adverse effects on known historic properties or the Mertarvik Spring. Consultation under Section 106 of the National Historic Preservation Act of 1966 (NHPA) has been initiated IAW 36 CFR § 800.2(a)(4) (see Appendix A). The Mertarvik community layout plan purposefully avoids impacts to the clay pits (XBI-183) and the Mertarvik Spring.

If future work at the Mertarvik community site cannot avoid XBI-183 or the Mertarvik Spring, consultation under Section 106 of the NHPA [36 CFR § 800.2(a)(4)] will be reinitiated. If the community wishes it, the Mertarvik Spring may⁴ require assessment as a potential TCP and a formal determination regarding its eligibility for listing on the NRHP. Per Appendix II of National Register Bulletin No. 38, a trained ethnographic specialist working in concert with the Newtok community could provide a recommendation on the status of Mertarvik Spring as a TCP

and to evaluate it for eligibility for the NRHP. If future work encroaches on *Taqikcaq*, then XBI-156, XBI-157, and XBI-158 will require formal determinations regarding their eligibility for listing on the NRHP, and the project's effect on these sites will need to be assessed and consultation under Section 106 of the NHPA reinitiated.

5.14.2.1 Future Archaeological Investigations at Mertarvik

The previous archaeological surveys at Mertarvik investigated most of the area where the current CLP alternatives are sited, but did not extend as far south as some elements of the current CLPs. Areas requiring additional archaeological investigation include the proposed primary runway, crosswind runway (if ever constructed), and community scale wind farm. Any changes to funding, Federal agency involvement, or the current layout plan as proposed will require full consultation with the Alaska State Historic Preservation Officer (SHPO), the public, and any other interested parties under Section 106 of the NHPA [36 CFR § 800.2(a)(4)]. Denali Commission initiated informal Section 106 consultation [36 CFR § 800.4(b)] in the spring of 2017, and formal Section 106 consultation after the closure of DEIS comment period [36 CFR § 800.4(d)] (see Appendix A). The Denali Commission and the FAA are conducting separate consultations with the SHPO. FAA initiated formal Section 106 consultation [36 CFR § 800.4(b)] with the Alaska SHPO on November 21, 2017.

Per 36 CFR § 800.13(b), if, after conclusion of Section 106 consultation, should any unknown and/or additional cultural resources be discovered before or during construction, any act, action or activity that has the potential to affect the resource shall be stopped in order to evaluate the resource and reinitiate Section 106 consultation as required by law. Upon evaluation of the resource(s), mitigation may be required to resolve any adverse impacts [36 CFR § 800.6].

5.14.3 Significance Determination

The FAA has not established a significance threshold for cultural resources (FAA 2015). However, FAA has identified a factor to consider when evaluating the context and intensity of potential environmental impacts on historical, archaeological, and cultural resources (see Exhibit 4-1 of FAA Order 1050.1 f). This factor includes, but is not limited to, situations in which the proposed action or alternative(s) would result in a finding of *Adverse Effect* through the Section 106 process. Please note that this factor is not intended to be a threshold. When the DEIS was produced, FAA had found nothing to indicate that the construction and/or operation of the Mertarvik Airport would have an adverse effect to any known historic property or cultural resource. However, FAA's Section 106 NHPA consultation with the SHPO will not be completed until additional cultural resource surveys are conducted on the proposed airport property, sometime in the summer of 2018. FAA's decision to proceed with the proposed airport project would in part be predicated, and therefore dependent, on FAA being able to conclude Section 106 NHPA consultation.

The Denali Commission believes that the implementation of any of the three CLP alternatives will have no significant impact on historic properties. The CLP alternatives will not cause the loss or destruction of significant scientific, cultural, or historic resources [40 CFR § 1508.27(b)(8)], with the exclusion of any unknown cultural resources. The potential impacts are determined to not reach the threshold of significance as defined in section 5.1. (MINOR). Comments received during the public review and comment period were considered in the identification of historic properties and the assessment of effects under the NHPA (CEQ et al. 2013:28). Identification and evaluation culminated in an assessment of no adverse effect on historic properties under the NHPA [36 CFR § 800.4(d)].

The no action alternative would have no impact on cultural resources at Mertarvik.

5.15 Community and Culture

5.15.1 Affected Environment

The residents of the village of Newtok (in Yup'ik, *Niugtaq*, which translates to “rustling of grass”) and Nelson Island area are known as the *Qaluyaarmiut*, or “dip net people.” The *Qaluyaarmiut* have inhabited the region for at least the last 3,000 years. Today, they reside primarily in six villages: Newtok, to the north of Nelson Island across the Ninglick River, the Nelson Island communities of Tununak, Nightmute, Toksook Bay, and Chefnak and Kipnuk to the south. The residents of the six villages are closely connected and share many traditions that have been retained over generations, in part due to the isolation of the region and infrequent contact with people outside the area. As late as 1936, the *Qaluyaarmiut* maintained a traditional nomadic and subsistence lifestyle. Homes were typically small semi-subterranean sod houses; seal oil was used for cooking and heating. Mail service came only twice a year by dogsled from Bethel, and few outside goods beyond tea, flour, and hunting rifles were available. The Newtok site served primarily as the winter residence for the community. The village population would move by dog team in April, before ice break-up, to the summer fish camp at Nilikluguk on Nelson Island (about six miles from Tununak). At Nilikluguk, the community lived in tents all summer long. In early June, most of the men would travel to Bristol Bay to work in the canneries. The winter months were spent at the Newtok village site (ADCRA 2017a).

In 1934, a missionary named Father Deschout reestablished the Tununak mission and built a church. He remained on Nelson Island until 1962 and had a profound influence on the long term cultural integrity of the region. He spoke fluent Yup'ik and encouraged the people to retain certain traditions, such as winter dance festivals, which most other missionaries had strongly opposed. Father Deschout's respect for the Yup'ik language and lifestyle influenced the retention of *Qaluyaarmiut* traditions in the Nelson Island region (ADCRA 2017a).

The USGS first reported the village of Newtok in 1949, when the community moved from Old Kealavik (*Kayalivik* or *Keyaluvik*), a winter village located to the west of Newtok, to a site across

the Newtok River from the current village location. The Federal Bureau of Indian Affairs (BIA) selected the current Newtok site for an area school building over other settlements because it was the farthest point up the Ninglick River that a BIA barge could navigate to offload school building materials. The BIA school was built in 1958, and like many communities in rural Alaska, the village developed around the school (ADCRA 2017a).

The traditional seasonal settlement pattern was retained into the 1960s, with most of the community summering in fish camps on Nelson Island and wintering at Newtok. By the 1970s, Newtok residents began to be more sedentary; the development of the current village community with a school, health clinic, airstrip, and modern housing encouraged a year-round population at Newtok.

According to a Department of Labor estimate in 2016, Newtok had a population of 372. The 2010 U.S. Census reports 96 percent of the residents identifying as American Indian/Alaska Native. A total of 72 households in Newtok were occupied in 2010.

Newtok incorporated as a 2nd class city in 1976 and was dissolved in 1997. The Newtok Traditional Council (NTC) was responsible for all local government affairs, including relocation efforts, until August 2015 (Grover 2007). After a legal dispute between two groups of tribal members claiming to be the tribal governing body of the Tribe in the village, the Interior Board of Indian Appeals upheld a 2013 Bureau of Indian Affairs ruling and the NTC was replaced by the Newtok Village Council (NVC) in August 2015 (Enoch 2015). NVC is the governing body of Newtok Village recognized as such by the Secretary of the Interior and the State of Alaska (U.S. District Court 2015).

The physical community of Newtok currently consists of residential, community, and commercial buildings. A Housing Master Plan (CCHRC 2017) identified 78 homes in Newtok, but determined that only 12 of the 78 houses were suitable for relocation to Mertarvik.

The Newtok Ayaprun pre-kindergarten through 12th grade school building is owned by the Lower Kuskokwim School District (LKSD) and currently has an enrollment of 132 students (ADCRA 2017b). The school building is equipped with its own tank farm, water and wastewater treatment plant, and generator. Eight teacher housing units are located to the south of the school building. The teacher housing buildings are expected to be threatened by river bank erosion within the next few years. River bank erosion is anticipated to impact other school facilities by 2022 (FEMA 2015 in Cooper et. al 2017b). Other community buildings within the village include the BIA School building (school is no longer in use), village council office; community hall; health clinic; post office; church; National Guard old and new armory buildings; community water tank, and washateria. The Newtok Native Corporation owns a store and warehouse. Commercial buildings in Newtok include Tom's Store and the UPC generator

building, a storage facility, office, and tank farm. Phone service is provided by United Utilities, which operates a small office in the community.

The Mertarvik site on Nelson Island is part of the traditional lands of the people of Newtok. It has long been used for subsistence, but populated only intermittently by small groups. There are no existing roads or runways providing road or air access to Mertarvik. The area is primarily accessed by snow machine in winter, by small boats in the summer, or by helicopter or floatplane (Cooper et al. 2017b).

5.15.2 Environmental Impacts

All three CLP alternatives have been developed within the same overall Mertarvik community area and are expected to have similar direct, indirect and cumulative impacts on community and culture in the Mertarvik region.

Moving the community as a whole will keep families intact and provide continuity of cultural identity. Some residents feel that it will be hard to move because Newtok has been their home for a long time (Enoch 2015). Others state they will feel relieved when the move is over, as Mertarvik has beautiful scenery and is on higher ground where they won't have to worry about high floods and losing their village (Enoch 2015). It is expected that the future village will be much more sustainable (not in danger of erosion) and the community will not have to move again. The nearby Nelson Island tribes of Native Village of Nightmute, Nunakauyarmut Tribe (Toksook Bay) and Native Village of Tununak stated they do not anticipate any impacts to their communities as a result of Newtok's proposed move to Mertarvik. As of June 20, 2017, Village of Cheforak has not yet responded to the question (Andraschko MFR June 20, 2017).

5.15.3 Significance Determination

The FAA has not established a significance threshold for culture or community as resource categories (FAA 2015).

The Denali Commission has determined that the environmental impacts on the culture and community of the people of Newtok associated with the implementation of any of the three CLP alternatives, as proposed, will not noticeably alter any attribute of those resources, and not reach the threshold of significance as defined in section 5.1 (MINOR). The effects of the proposed actions are intended to preserve the culture and community of the people of Newtok, and are expected to have a significant beneficial impact on these resources.

The no action alternative would result in clearly noticeable and destabilizing effects on cultural identity and integrity, and is therefore considered to exceed the threshold of significance as defined in section 5.1 (MAJOR).

5.16 Socioeconomics

This section describes the baseline socioeconomic conditions in the area that could be affected by the proposed project and estimates potential socioeconomic effects that could result from proposed project implementation. Key socioeconomic resources addressed in this section include population, income, employment, demographics, education, housing, transportation, and licensed businesses. Newtok does not have taxation powers, so taxation revenues are not discussed.

5.16.1 Affected Environment

As is commonly found in rural Alaskan villages, the economy of the existing community at Newtok is a mix of subsistence, barter, and monetary exchange. The discussion below addresses primarily the monetary economy, as that is the only category for which clear quantitative data exist, but is not a full picture of how the affected population obtains the goods and services it requires. Subsistence is discussed in section 5.17.

Population: Newtok is an unincorporated census-designated place (CDP) in the Bethel Census Area. According to a Department of Labor estimate in 2016, Newtok had a population of 372. U.S. Census data show a steady increase in Newtok's population in recent decades, from 131 in 1980, 321 in 2000, and 354 in 2010 (ADCRA 2017j).

Demographics: The Newtok population is among the youngest in the state. In 2010, the median age was 21 years, compared to the statewide median age of 33.5 years. In comparison to the entire state, Newtok has proportionally more people under the age of 19 years (49.4%) and fewer people in the older age group of 65 and older (7.1%).

Education: The overall educational level of residents aged 25 to 65 years in the Bethel Census Area, of which Newtok is a part, is lower than that of the state as a whole. More of the region's residents have no high school degree, and fewer residents have college or professional degrees.

Employment and Income: In 2016, 169 (72%) of Newtok residents aged 16 or over were employed in some capacity, with total wages of \$2,239,206. About half of these workers were employed year-around, with the rest being seasonal. Jobs in local government (e.g., the Lower Kuskokwim School District, etc.) made up 67% of Newtok employment; no State of Alaska or Federal government positions are currently located in Newtok. According to the U.S. Census Bureau's 2010-2014 American Community Survey 5-Year Estimates, the per capita income in Newtok was \$9,257 annually, with a margin of error of \pm \$2,425. Based on income, 33.6 percent of Newtok residents are below the Federal poverty level.

The Alaska Permanent Fund dividend provides a substantial boost to village economies every year. The Alaska Permanent Fund was established by the Alaska legislature in 1976 to ensure that all Alaska residents benefited from oil production on state-owned lands. The dividend

program distributes an annual payout to every Alaska resident, regardless of age, an equal amount out of the appropriable earnings of the Permanent Fund (Goldsmith 2010a). This dividend has become particularly important in rural parts of the state, as rural households are cash poor, and subsistence harvests can fluctuate dramatically from year to year. Under these circumstances, the cash provided by the dividend is notable, not only because of its size, but also its predictability (Goldsmith 2010b). The program disbursed more than \$21 million to residents of the Y-K Delta region in 2012.

Some Newtok residents are shareholders of Calista Corporation, the ANCSA Regional Corporation representing Newtok and much of southwest Alaska. Dividends paid to shareholders or their descendants are another, if variable, source of cash income, and Calista Corporation's wide-ranging business operations may offer employment opportunities to Newtok residents, although not necessarily within Newtok itself.

Housing: In the 2010 census, there were a total of 72 housing units in Newtok, with 70 of those occupied. Of those occupied, 59 were owner-occupied, and 11 were renter-occupied. The average household size was 6 persons. There were 57 family households and 13 non-family households (ADCRA 2017j).

Transportation: Newtok is not connected to the rest of Alaska by road, and is primarily accessible by air or water. A state-owned gravel airstrip provides air access. Seaplane service is also an option when the Ninglick River or Baird Inlet are not frozen. Boats, skiffs, and snowmobiles are used for local transportation and subsistence activities. Winter snowmobile trails are marked to nearby villages of Chevak, Tununak, Toksook Bay, Nightmute, and Manaryarapiaq. Barges deliver cargo to Newtok during ice-free summer months. Four airlines (Arctic Transportation, Era Aviation, Grant Aviation, and Hageland Aviation Service) provide air service to Newtok. In 2016, these carriers transported a total of 1,702 passengers, and carried 125,213 lbs. of freight and 293,907 lbs. of mail through Newtok.

Licensed Businesses: In 2016, there were seven business licenses currently on file with the Alaska Department of Commerce (ADCRA 2017j):

1. Cuyayugaq's Fabric
2. Newtok Native Corporation
3. Newtok Traditional Council
4. Newtok Village
5. Simeon Fairbanks, Jr.
6. Toms Store, LLC
7. Ungusraq Power Company

5.16.2 Environmental Impacts

All three CLP alternatives have been developed within the same overall Mertarvik community area and are expected to have similar direct and indirect impacts on socioeconomics in the Mertarvik region. As a result, the anticipated impacts of each CLP alternative are indistinguishable from each other in this resource area and will be discussed collectively.

The criteria analyzed to assess the potential socioeconomic impacts of a proposed project typically include whether the project has the potential to:

- Divide or disrupt established communities;
- Cause extensive relocation due to a lack of replacement housing;
- Cause extensive relocation of community businesses;
- Disrupt local traffic patterns;
- Induce substantial economic growth, either directly or indirectly (adapted from FAA 2015).

Such criteria are not entirely applicable to the proposed project at Mertarvik. The proposed action is the construction of homes and infrastructure that are intended to essentially replace those at Newtok in danger of loss to erosion. A primary goal of the proposed action is to enable the community of Newtok to avoid being divided and disrupted by the ongoing erosion, by providing a new village setting for the community. Likewise, an extensive relocation of people and community businesses from Newtok to Mertarvik is a desired consequence of the proposed action, rather than an impact.

Significant temporary disruption of economic activity is likely as an indirect impact of the proposed action, during the period in which people and community activities are actively relocating to Mertarvik. Local government provides a majority of jobs in Newtok; those government entities would be expected to persist through the relocation, and be re-established at Mertarvik, so it is probable that they will maintain their paid positions. Some Newtok residents have been involved in previous construction activity at Mertarvik, and further temporary employment opportunities may be available during the proposed construction, perhaps offsetting economic losses from the disruption of other economic activity. Newtok residents have stated their concern that subsistence harvests may be temporarily reduced by the time demands that relocation will impose on individual families; food shortfalls may need to be alleviated by bringing in more food from outside the village, or sharing subsistence surpluses amongst families.

The proposed action will ultimately provide water and air transport infrastructure at Mertarvik that is equal or superior to what exists at Newtok. However, there are numerous unknowns as to how transportation of people and goods will be managed during the relocation period, and the

potential disruptions may be regarded as temporary indirect impacts to economic activity. It is expected that both the Newtok and Mertarvik airports will be operational simultaneously for several years. Construction of the NPIAS airport at Mertarvik may result in commercial air traffic diverting scheduled flights to Mertarvik; however, that decision is the air carriers' decision, and not within the FAA's control. The rate at which Newtok residents relocate to Mertarvik, and the rate of deterioration of the Newtok airport, will also affect service to the respective airports.

Most bulk goods, including many food items, are transported to Newtok by barge. As the Mertarvik population grows, and the shoaling of the Newtok River makes barge deliveries at Newtok more difficult, commercial barges may prefer or need to land at Mertarvik. Goods delivered to Mertarvik would then need to be lightered to Newtok to supply the people awaiting relocation. Whether lightering is performed by the commercial carrier or the community, this service would add to fuel and labor costs.

The proposed activity may indirectly induce some degree of economic growth, relative to the economic activity currently existing at Newtok. Simply having a location not in imminent danger of being washed away will greatly improve the community's position in attracting additional government projects and private investment. The additional "elbow room" available at Mertarvik, along with improved power and water supply, may encourage the development of small businesses, such as small engine and boat repair; the attendant zoning and land-use issues are matters for the community and its leadership to decide, and lay outside the scope of this analysis.

5.16.3 Significance Determination

The FAA has not established a significance threshold for socioeconomics as a resource category (FAA 2015). However, factors recommended by the FAA for consideration during assessments of socioeconomic impacts were used in the preceding section.

The Denali Commission has determined that the impacts on the socioeconomic environment of the people of Newtok associated with the implementation of any of the three CLP alternatives, as proposed, will not noticeably alter any attribute of this resource, and not reach the threshold of significance as defined in section 5.1 (MINOR). The proposed action is expected to provide marked economic benefits and improved economic stability to the existing population in the long term, after indirect short-term disruptions during the transitional phase.

The no action alternative would result in clearly noticeable and continued destabilizing effects on the community at Newtok via continued erosion and flooding. This is therefore considered to have significant impacts (MAJOR) to socioeconomics arising, in part, due to a loss of homes, businesses, related jobs and civil infrastructure in addition to the extreme costs per resident to

relocate if all costs are borne per individual. Even if individuals do not relocate to Mertarvik, they will still need to allocate time and resources that would have gone into subsistence living towards resolving impacts of erosion and flooding. Currently, this includes repairs of utilities and homes, adequately disposing of trash and human waste and suffering decreased health from below standard living conditions.

5.17 Subsistence Resources and Practices

5.17.1 Affected Environment

Newtok is a traditional Yup'ik village with an active subsistence lifestyle and economy. Relative isolation from outside influences has enabled the area to retain its traditions and customs, more so than other parts of Alaska. While subsistence traditions are a foundation for many local Alaskan village economies, no monetary value can be reasonably assigned to the value of these resources. Subsistence is essential to residents' diets and physical health because of the high cost of food in village stores, limited cash economy, and the deleterious effects of modern processed foods on a population that until recently relied almost exclusively on wild-caught and gathered foodstuffs. Therefore, the value of subsistence is more than a replacement cost of food. Subsistence constitutes a way of life, intricately connected to culture and traditions, maintains physical health and community and cultural structure.

Although Newtok and Nelson Island are not part of the Yukon Delta National Wildlife Refuge (a 22-million-acre expanse of public land), they are within the external borders of the refuge, which is a 26-million-acre expanse of both private and public land that encompasses the Bering Sea coast and the Y-K Delta. The area has an abundance of water and wetland types that provides some of the richest waterfowl habitat in North America. Half of the waterfowl of Alaska are produced in the refuge; it is this biological wealth that is thought to be the reason why the ancestors of the *Qaluyaarmiut* originally settled in the area. The area's modern-day residents, including Newtok, continue to rely directly on the abundance of fishes, mammals, and fowl of the region for most of their food supply (ADCRA 2017a).

The availability of subsistence resources has historically determined where the *Qaluyaarmiut* lived during different times of the year. As recently as the 1960s, the current Newtok village site served primarily as a winter residence for the community. The village population would move by dog team in April, before ice break-up, to the summer fish camp at Nilikluguk on Nelson Island (about 6 miles from Tununak). The community spent the summer months at Nilikluguk and then moved back to the Newtok village site during the winter months.

The Nilikluguk fish camp was abandoned around 1968, after massive landslides buried the camp area and altered the shoreline enough to affect the seasonal movement of herring along this portion of the Nelson Island coast. Newtok villagers still use the area for spring sea bird and seal hunting (ADCRA 2017a). Currently, modern means of travel such as boats and snow machines

allow residents to access subsistence sites and return home daily, making Newtok a year-round home (ADCRA 2017a and b).

Yup'ik people along the coast continue to practice a mixed subsistence economy with the adaptation of efficient modern equipment such as snow machines or all-terrain vehicles (ATVs) to patterns of traditional use (Frink 2009). Herring remains a large part of subsistence during the summer months and requires time for processing and drying (Knudson and Frink 2010). Traditionally, the coastal communities in Bristol Bay, the Yukon Delta, and on Nunivak Island focused on sea mammal hunting, with seals being especially important. Some inland resources were harvested; caribou and salmon were significant resources to the people at the mouths of rivers and some bays (VanStone 1984a). Riverine communities on the lower Yukon River, the lower and central Kuskokwim River, and the Togiak and Nushagak Rivers focused on fish supplemented by caribou (VanStone 1984a). Occasionally, members of these communities traveled to the coast to hunt sea mammals. The dialectical differences between the riverine and coastal communities were small and did not impede the movement of people between the two groups; people exchanged goods and established relationships that encouraged this movement (VanStone 1984a, 1984b).

Current seasonal subsistence harvests described by Newtok residents (John and Carl 2017) include:

Spring

- Eggs, waterfowl, seals and other marine mammals (occasionally beluga whale).
- Pike fishing in early spring.
- Muskox, under an ADFG permit system that rotates between villages (March only).

Summer

- Salmon.
- Berries, from June into autumn (crowberry, salmonberry, lingonberry, trailing raspberry).
- Greens.
- Kelp (collected along the Nelson Island seaward coast).
- Moose (August).

Autumn

- Seals (bearded, ringed, harbor, sea lion).
- Blackfish (September).
- Whitefish (by set-net in August-September).
- Goose grass.

Winter

- Pike (jigged from frozen ponds and streams).

The majority of these subsistence resources are aquatic. The Mertarvik hillside is within Newtok's traditional subsistence range, but is currently used primarily for gathering berries and greens. Salmon are caught at the Takikchak River to the west of the Mertarvik development site, and waterfowl may be taken from the estuarine wetlands at the mouth of the Takikchak River.

5.17.2 Environmental Impacts

All three CLP alternatives have been developed within the same overall Mertarvik community area and are expected to have similar direct, indirect and cumulative impacts on subsistence resources in the Mertarvik region. As a result, the anticipated impacts of each CLP alternative are indistinguishable from each other in this resource area and will be discussed collectively.

Land-based construction impacts at Mertarvik are expected to limit the potential for residents to hunt birds or mammals within and adjacent to the new community site. Berry picking or other harvest of vegetative materials is also expected to be reduced as construction progresses through the new community area. There may be exceptions during periods where construction ceases and new construction begins, however the likelihood that resources (berries, birds, fish, etc.) would be present and in a condition suitable for harvest during these timeframes is doubtful, and once the community is established, these effects will become permanent.

While delivery of construction equipment and building materials may affect fishing at the barge landing site temporarily, the impact is expected to be minor, since the barge landing is not expected to be a heavily-used fishing site from land or water.

Elimination of firearms-based hunting, for all practical purposes, within the newly developed community area is the most substantial anticipated effect on subsistence. However, given the small total acreage, landscape position, and types and quality of habitats affected, the effect is expected to be minimal. For example, if a hunter was using a rifle to hunt from what will be the new airport, nearly 160 degrees of a 360-degree circle would be unsafe directions to shoot as the shooter would be shooting over the community. If boat traffic on the river is considered, the unsafe-to-shoot arc expands to approximately 190 degrees. Subsistence hunting for birds with a shotgun would be affected to a lesser degree due to the shorter range when shot is used. In either case, the habitats affected by infrastructure construction are not expected to be high productivity tundra bird habitat. No permanent impacts to subsistence fishing are expected.

The indirect effect of infrastructure development is a shift of subsistence hunting away from the Mertarvik town site to less anthropogenic-affected environments, with the possible exceptions of berry picking and shoreline based fishing, both of which may increase due simply to the

proximity of the relocated village. The consensus amongst Newtok residents appears to be that the move from Newtok to Mertarvik would have little or no impact on subsistence practices, and that the loss of berry and green resources to the direct impacts of development at Mertarvik would not be significant (John and Carl 2017). The major concern voiced by Newtok residents was that the time demands of construction labor and preparing to relocate families would temporarily interfere with subsistence practices, and result in less food being gathered by the community.

5.17.3 Significance Determination

The FAA has not established a significance threshold for subsistence as a resource category (FAA 2015).

The Denali Commission has determined that the environmental impacts on subsistence resources and practices associated with the implementation of any of the three CLP alternatives, as proposed, will not noticeably alter any attribute of those resources, and not reach the threshold of significance as defined in section 5.1 (MINOR).

The no action alternative would have no impact on subsistence resources at Mertarvik, but would have a significant impact on subsistence practices for members of the existing population forced to move away from the Newtok area by erosion and flooding (MAJOR).

5.18 Land Use and Compatibility

5.18.1 Affected Environment

The land that would be affected by the proposed action would be the area of northeast Nelson Island where the CLP alternatives are sited, described in more detail in previous chapters of this section. The land has no current permanent inhabitants, and is undeveloped except for initial infrastructure constructed in support of Newtok village relocation efforts, described in section 4.3.2.

5.18.2 Environmental Impacts

As discussed previously, the U.S. Congress via Public Law 108-129, authorized the transfer of 10,943 acres of formerly USFWS land to the Newtok Native Corporation to be used for relocating the community of Newtok. Therefore, the land uses proposed under the CLP alternatives, including airport construction and operations, are the planned and intended uses.

The CLP alternatives represent the comprehensive planning and development of an entire community, and were thus able to identify and avoid potential land use conflicts before construction begins. For example, the design of the community incorporated FAA's requirements that landfills and sewage treatment ponds be constructed at least 5,000 feet from closest end of a runway airport, and the community layout was adjusted accordingly.

There are no expected impacts on land use and compatibility at the village of Newtok, as that community will be abandoning the location. Future land use will be dependent upon the rate of erosion and resulting land use opportunities.

5.18.3 Significance Determination

The FAA has not established a significance threshold for land use as a resource category (FAA 2015).

The Denali Commission has determined that the environmental impacts on land use at Mertarvik associated with the implementation of any of the three CLP alternatives, as proposed, will not noticeably alter any attribute of those resources, and not reach the threshold of significance as defined in section 5.1 (MINOR).

The no action alternative would have no impact on land use.

5.19 Public Health and Safety

5.19.1 Affected Environment

The public health and safety of the people of Newtok has suffered from the impairment of services such as water supply and waste management caused by flooding and loss of infrastructure. These health concerns have been compounded by some reluctance on the part of Federal and State agencies to invest in improvements of infrastructure at Newtok, when much of the infrastructure is expected to be destroyed in a matter of years.

Public health professionals conducting an assessment of public health conditions in Newtok in 2016 found that sanitation conditions, which include inadequate potable water for drinking and hygiene, high levels of contamination from honey bucket waste, and household overcrowding, were “grossly inadequate to protect public health.” The team concluded that existing conditions “appear(ed) to result from an initial lack of infrastructure development and failure to properly maintain existing infrastructure (Eichelberger 2016).

Newtok does not have piped potable water service. Newtok residents obtain water from the village water treatment plant, and/or the school, and haul it in containers to their homes. The source of water for the village water treatment system is a pond near the south end of the airstrip; this pond will be lost to the advancing Ninglick River around 2020. Residents also collect rainwater from the roofs of buildings, and from pond water and ice when no other sources are available. A limited number of residents, mostly school employees, have access to the school showers and laundry facilities. Most other households use compact, portable clothes washers for which additional water must be hauled (Eichelberger 2016).

Newtok runs out of treated water every spring because the storage capacity of the water treatment plant tank is too small to last the entire winter. Each summer (June, July, and August), before Newtok's surface drinking water source freezes, the water plant operator must pump and treat raw water until the storage tank is full. Mechanical failures and lack of funding for maintenance also contribute to shortages. The World Health Organization (WHO) defines sustained household water security in terms of quantity (13.2 gallons per person per day (gal/p/d)) and access: either 1 in-home tap or the ability to acquire water in fewer than 5 minutes. By contrast, "water insecurity" refers to inadequate access to clean water for all domestic needs. The WHO has identified a lower threshold for water insecurity resulting in high health concern as 5.28 gal/p/d. In Newtok, under normal circumstances, respondents reported an average daily consumption of treated water (hailed from either the water treatment plant or the school) of 1.36-2.31 gal/p/d. This rate is far below the WHO minimum standard for water security of 13.2 gal/p/d, and is less than half the WHO threshold for determining severe water insecurity. These conditions have serious implications for community health, particularly elders (who are at higher risk of infection due to their age) and children, for whom the health consequences of inadequate water security can last beyond one infection (Eichelberger 2016).

There is no piped sewage system in Newtok, and the majority of households use "honey buckets," 5-gallon buckets topped with a toilet lid and lined with a trash bag. Newtok does not have a designated place to contain raw sewage, except for a sewage lagoon designated only for the school's use. Instead, residents empty their honey buckets into the Ninglick River, which used to be located a significant distance from the nearest home. The Ninglick River has increasingly encroached on the community and captured the Newtok River, resulting in the community to be surrounded on two sides by raw human waste, and the contaminated shoreline is advancing upon homes and the village water supply pond. Raw sewage is visible next to the boats residents use for subsistence, including fishing, hunting, and hauling drinking water from alternative sources. These conditions contribute to cross-contamination in the community, especially during storms and floods, when waste can be carried directly into the community (Eichelberger 2016).

Inadequate sanitation and overcrowding of housing can lead to respiratory infection as well as water-borne illness. Between 1994 and 2004, 29 percent of infants were hospitalized with lower respiratory tract infections, including pneumonia and respiratory syncytial virus (RSV), attributing Newtok with one of the highest rate of lower respiratory tract infections in the state (ADCRA 2017a).

The erosion and flooding can also create direct physical hazards for the people of Newtok. A storm in September 2005 caused extensive flooding in and around Newtok, turning the village into an island for several days, isolating several houses, and making movement around the village very hazardous. While the rate of erosion along the Ninglick River bank has been steady

over a matter of years, a single autumn storm can erode the river bank inland many feet overnight (ADCRA 2017a).

5.19.2 Environmental Impacts

Any of the three CLP alternatives, once complete, would provide a significant improvement in health and safety to the people of Newtok, compared to current conditions at Newtok village. Public health and safety will greatly improve once Mertarvik has completed build-out of its infrastructure. The Mertarvik site promises abundant safe water from groundwater sources, if developed properly. The CLP includes a sewage lagoon adequate for the entire community, and ultimately a piped sanitary sewer system. During the construction and transition phase, public health and safety will likewise transition from being non-existent to being fully provided and upgraded from previous conditions at Newtok. In the interim, the same living conditions that exist at Newtok will exist at Mertarvik until the proposed infrastructure is developed. No other adverse environmental effects are expected.

5.19.3 Significance Determination

No FAA significance threshold exists for public health and safety (FAA 2015).

The Denali Commission has determined that the impacts on public health and safety associated with the implementation of any of the three CLP alternatives, as proposed, will not noticeably alter any attribute of those resources, and not reach the threshold of significance as defined in section 5.1 (MINOR). The effects of the proposed actions are intended to improve the health and safety of the people of Newtok, and are expected to have a significant beneficial impact on these resources.

The no action alternative would result in a significant adverse impact on public health and safety of the existing population, and is therefore considered to exceed the threshold of significance as defined in section 5.1 (MAJOR). Some residents would still relocate to the Mertarvik site, regardless of the availability of infrastructure, and would subsequently live in underserved conditions, while others would have little choice but to continue to live at Newtok in substandard conditions, exposed to human waste and inadequate water supplies.

5.20 Public Services and Utilities

5.20.1 Affected Environment

As described elsewhere in this document, the public services and utilities available for the existing population at Newtok are generally substandard, and suffer from the direct effects of erosion and flooding as well as deferred maintenance. Newtok's stated intent to relocate, combined with the imminent threat of flooding and erosion, has rendered Newtok ineligible for capital funding for improvements to existing infrastructure (e.g. barge landing, water, sewer, bulk fuel tanks and power plant) to meet needs at the current village. Deferred maintenance and

investment in Newtok's public infrastructure and facilities has adversely impacted the community's quality of life (ADCRA 2017b).

The condition of the existing Newtok power plant, power distribution system, fuel pipelines, and existing tank farms was evaluated recently (Cooper et al 2017b). The majority of the existing tanks and equipment are at or near the end of their useful life and only five tanks were identified for potential reuse in the new bulk fuel facilities in Mertarvik. Several power distribution poles are expected to be undercut by erosion in 2 to 3 years. The existing power system at Newtok is insufficient for current needs. Due to limitations with transformer sizing and electrical distribution capacity, residents customarily coordinate with their neighbors to avoid simultaneously using high-demand electrical devices, such as electric clothes dryers, to prevent tripping a transformer fuse or knocking the power plant offline. The power plant is designed to provide recovered heat to the adjacent water plant, and is currently the sole source of heat for the water plant. During a recent power outage that lasted several days, the water plant froze due to lack of recovered heat). The Newtok Ayaprun School generates its own prime power. The school power plant consists of two generators in a 40-foot insulated shipping container, which in 2016 was located about 350 feet from the eroding shoreline (Cooper et al. 2017b).

Deficiencies in drinking water and waste management at Newtok were described in the preceding section. The old landfill at Newtok was lost to erosion in 1996. The current unpermitted landfill is across the Newtok River from the village, and is accessible only by boat at high tide. During low tide periods, household garbage and other solid waste is stacked up in Newtok awaiting transportation (ADCRA 2017b).

Newtok lost its barge landing on the Ninglick River in 2005. Barge deliveries to the village are now restricted to improvised landings on the Newtok River; however, the altered hydrology of the Newtok River has severely limited when barge deliveries can be made. In August 2006, a fuel barge was grounded in the Newtok River for three days, and fuel has had to be flown into the village at considerable expense when delivery could not be made by barge. The impaired barge service to the community makes many goods and services more expensive and difficult to provide, such as food, fuel, and replacement parts for failing community utilities (ADCRA 2017b).

5.20.2 Environmental Impacts

The power, water, wastewater, and solid waste management utilities that are planned under any of the three CLP alternatives will represent a significant improvement in the services experienced by the existing population. Section 4.6.1 provides available details on the proposed Mertarvik solid waste landfill (to be designed and permitted IAW State regulations), wastewater treatment facility (which the Newtok community has never had), energy generation and distribution systems, water storage tank, water distribution and wastewater collection lines, and

roads. The shoreline and existing barge landings at Mertarvik are far less vulnerable to erosion than at Newtok. Planned marine header fill points will allow bulk fuel to be piped directly to a contained tank farm. The potable water at Mertarvik will be supplied from groundwater, in contrast to the current inadequate and vulnerable supply of treated surface water and collected precipitation (section 5.19.1).

5.20.3 Significance Determination

No FAA significance threshold exists for public services and utilities (FAA 2015).

The Denali Commission has determined that the impacts on public services and utilities associated with the implementation of any of the three CLP alternatives, as proposed, will not noticeably alter any attribute of those resources, and not reach the threshold of significance as defined in section 5.1 (MINOR). The effects of the proposed actions are intended to improve the health and safety of the people of Newtok, and are expected to have a significant beneficial impact on these resources.

The no action alternative would result in a significant adverse impact on the public services and utilities available to the existing population, and is therefore considered to exceed the threshold of significance as defined in section 5.1 (MAJOR). The existing utilities and services at Newtok will continue to deteriorate, with little expectation of financing for substantive upgrades.

5.21 Noise

5.21.1 Affected Environment

The affected noise environment in Mertarvik is the same as described in the community and culture section 5.15. Issues related to the noise environment were not identified as a concern during the scoping process, nor has the issue arisen in the months since scoping was initiated. As a result, this section is limited to a discussion of noise as it pertains to the FAA and their internal policies.

5.21.2 Environmental Impacts

FAA's analysis of potential noise impacts is guided by FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures*; 14 CFR §150, *Airport Noise Compatibility Planning*; and NEPA requirements.

A noise study completed for a similarly sized airport to be constructed within the city of Angoon, Alaska, with a similar critical aircraft, demonstrated no significant noise impacts to the community outside airport boundaries. The demonstration of the impact of aircraft operational noise on the relocated community is contained in the Angoon Airport Final EIS (September 2016). Because Angoon is a similar sized airport utilizing similar aircraft and frequency of operations, FAA has determined that the noise study for Angoon is an appropriate reference for

the proposed Mertarvik Airport. The primary difference between the two airports in relation to noise effects is that the proposed Angoon Airport will be located in the middle of the community at the same elevation, while the proposed Mertarvik town site airport would be located adjacent to the community and not less than 200 feet above the community.

The Angoon Airport noise study demonstrated that the 65 DNL remains within the airport boundary with the exception of extending a short distance beyond each end of the runway. The 65 DNL means the annual average Day-Night level of noise measured in dB would not exceed 65 dB. The 65-dB limit is a research-based limit beyond which many humans experience some level of annoyance. The proposed runway orientations at Mertarvik versus the community's location would result in the 65 DNL noise contour that extends past the runway ends impacting an area immediately north-northwest or south-southeast of the community depending on the runway alignment referenced. Because the 65 DNL does not typically exceed the toe of fill of the runway except slightly on either end, noise effects are expected to be compatible with all human activities.

Temporary airport construction noise, which includes the hauling of material from the quarry, is expected to be very similar to the construction noise the community will experience over a 5- to 7-year time frame as the overall community is relocated/constructed. The majority of airport construction noise related to operation of heavy equipment at the airport is expected to have only a minor to moderate disturbance effect on the community and then primarily only if the wind is carrying the noise to the community. This is largely because of the airport's landscape position above the community and the fact that the airport's primary runway would be constructed before a majority of the community has moved to the Mertarvik site.

Direct noise impacts of aircraft operation at Mertarvik for a Beech 1900 (the airports critical design aircraft) are expected to fall with the 66.5 to 77 Day-Night-Level (DNL) decibel range measured at the engine noise source. These are the same decibel levels that the community experiences at Newtok. However, at Newtok the airport is located at the same elevation as the airport versus Mertarvik's location, which varies between approximately 200 and 300 feet higher than the community. Additionally, the change in configuration (i.e. runway position) of the airport at Mertarvik versus Newtok and resulting change in flight patterns would mean that the changes in flight pattern configuration, proximity, and sound variability due to weather and seasonal changes would likely result in sometimes lessened, and sometimes heightened, perception of airborne and ground based aircraft noise. However, given that there is no expectation that existing commercial flight operations frequency and timing will change after the community is completed in relation to frequency and timing currently at Newtok, no potentially significant noise impact is expected from aircraft operations.

The most prevalent indirect impacts of noise range from disturbance to irritation for both humans and animals. Given that no change, as noted above, is expected to occur in relation to the volume or timing of flights or class of aircraft utilizing the airport, negative noise impacts are expected to be very similar to Newtok level impacts. And, given the change in proximity of housing to the airport and the fact that homes will be newer and better insulated, fewer village residents are expected to be affected by aircraft operational noise impacts.

5.21.3 Significance Determination

The FAA's significance threshold for airport-caused noise is an action "that would increase noise by DNL (Day-Night Average Sound Level) 1.5 dB or more for a noise-sensitive area that is exposed to noise at or above the DNL 65 dB noise exposure level, or that will be exposed at or above the DNL 65dB level due to a DNL 1.5dB or greater increase, when compared to the no action alternative for the same timeframe." While no quantitative noise information exists for this project, studies at a similar rural Alaska airport indicate that this noise threshold would not be reached within the proposed residential and community areas of Mertarvik, therefore any impacts would be LESS THAN SIGNIFICANT.

The no action alternative would have no impact on the noise environment at Mertarvik.

5.22 Visual Environment

The affected environment for effects on the visual environment in Mertarvik is the same as described in the community and culture section 5.15. Issues related the visual environment were not identified as a concern during the scoping process, nor has the issue arisen in the months since scoping was initiated. As a result, this section is limited to a discussion of visual effects as it pertains to the FAA and their internal policies.

5.22.1 Affected Environment

No airport or other permanent exterior light sources yet exist at Mertarvik,

5.22.2 Environmental Impacts

The proposed airport is essentially on a plateau approximately 200 to 300 feet above the proposed community. Airport lighting is expected to include ground based medium intensity runway lighting, taxiway lighting, a pole mounted lighted wind sock, and sodium vapor lights on the two snow removal equipment buildings (SREB). Runway lighting is expected to be pilot activated.

Temporary construction effects include construction light emissions at the Mertarvik Airport. However, given that the length of daylight during the majority of the ice-free construction season exceeds 12 hours per day automatic lighting on equipment is expected to have no discernable visual effect. Given that the SREB sodium vapor lights are expected to be on the front of the

building, which will be facing away from the community, only a light halo effect around the building is expected to be seen. Because the remainder of the lighting is ground-based, it is not expected to be seen from the downslope position of the community.

Indirect impacts include a diminution of the night sky (moonlight and starlight) in the vicinity of the airport when observed from off airport property. However, given the positioning of the lighting as noted above, it is expected to be a minimal and largely seasonal effect given the daylight length during summer versus winter at this latitude.

5.22.3 Significance Determination

The FAA has not established a significance threshold for visual effects (FAA 2015). The FAA has identified factors to consider when evaluating potential impacts on the visual environment. These include:

- The degree to which the action would have the potential to create annoyance or interfere with normal activities from light emissions; and
- The degree to which the action would have the potential to affect the visual character of the area due to the light emissions, including the importance, uniqueness, and aesthetic value of the affected visual resources.
- The degree to which the action would have the potential to affect the nature of the visual character of the area, including the importance, uniqueness, and aesthetic value of the affected visual resources;
- The degree to which the action would have the potential to contrast with the visual resources and/or visual character in the study area; and
- The degree to which the action would have the potential to block or obstruct the views of visual resources.

The Denali Commission has determined that the environmental impacts on the visual environment of the people of Newtok associated with the implementation of any of the three CLP alternatives, as proposed, will not noticeably alter any attribute of this resource. The construction and lighting proposed for Mertarvik are not expected to reach the threshold of significance as defined in section 5.1 (MINOR).

The no action alternative would have no impact on the visual environment at Mertarvik.

5.23 Other Required Analyses

5.23.1 Relationship between the Short-Term Use of the Environment and the Maintenance and Enhancement of Long-Term Productivity

NEPA regulations require, as part of the EIS environmental consequences analyses (40 CFR 1502.16), an “evaluation of the short-term uses of man’s environment and the maintenance and enhancement of long-term productivity.”

The proposed action would result in short-term uses of the environment during construction. Construction of the proposed action would require staging areas, stockpiling areas and roadway construction. Additional short-term impacts would be air quality degradation from increased emissions from construction vehicles and activities, noise impacts, other socioeconomic and community impacts from construction vehicles (possible roadway obstructions), and waste and debris generated from construction.

The proposed action is undertaken with consideration of the current and future requirements of the future residents of Mertarvik. The projected benefits from the property to be developed for use by the displaced residents of Newtok provided by the proposed action outweigh the local short-term impacts and use of resources. The proposed action is consistent with the maintenance and enhancement of long-term productivity for the proposed action area and region.

The no action alternative would not have short-term uses of the environment that would result in impacts above those that can be expected when the village of Newtok finally succumbs to the erosive forces of the Ninglick River.

5.23.2 Irreversible and Irretrievable Commitment of Resources (40 CFR 1502.16)

Implementation of any one of the three CLP alternatives involves a commitment of a range of natural, physical, human, and fiscal resources. The land used in the development of infrastructure at Mertarvik is considered an irreversible commitment during the time period that the land is used, likely for many generations. However, if a greater need arises for the use of the land, the land can be converted to another use, assuming an alternate location for the residents of Mertarvik is identified and developed for such use. There is no reason, however, to believe that such a conversion would ever be necessary or desirable.

Fossil fuels, labor, and construction materials such as cement, aggregate and bituminous material would be expended during construction. The gravel extracted and committed for use as fill and surface material, and the habitats permanently covered by those fills, are resources effectively and irretrievably lost.

Additionally, human labor and natural resources would be used in the fabrication and preparation of construction materials and facilities. These materials are generally not retrievable; however, they are also not in short supply and their use would not have an adverse effect upon the continued availability of these resources.

The commitment of these resources is based on the concept that the U.S. Government, the State of Alaska, and the residents of the village of Newtok, would greatly benefit by the proposed action, providing residents of the village with a safe place to which to relocate, one which allows them to maintain their community and way of life intact within their traditional lands on a

Congressionally-approved site located on the northeast end of Nelson Island prior, while also providing the necessary infrastructure for a stable and healthy existence. The benefits from the proposed action are expected to greatly outweigh the opportunity cost incurred from the commitment of these resources.

5.23.3 Cumulative Effects

Consideration of cumulative effects consists of an assessment of the total effect on a resource or ecosystem from past, present, and reasonably foreseeable future actions that alter the quantity, quality, or context of those resources within a broad geographic scope. Under the CEQ regulations, cumulative effects are defined as:

“...the impact on the environment which results from the incremental impact of the actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time” (40 CFR §1508.7).”

A cumulative-effects analysis considers the aggregate effects of direct and indirect impacts – from Federal, non-Federal, public, or private actions – on the quality or quantity of a resource. The intent of the cumulative effects analysis is to determine the magnitude and significance of cumulative effects, both beneficial and adverse, and to determine the contribution of the proposed action to those aggregate effects.

Past, present and future actions at the village of Newtok should also be considered in the context of cumulative effects. Past actions at Newtok include the establishment, existence and effects of human occupation and development of the site over a period of many decades, including the construction and operation of the existing Newtok Airport. Present actions at Newtok include the effects of continued occupation and use of the village by its residents. Reasonably foreseeable future actions at Newtok, including the activities associated with the actual evacuation to Mertarvik, also include deactivation of the airport and removal of man-made airport infrastructure, with the exception of past “fills” in WOTUS (e.g. the runway, taxiway and apron).

The year 2003 was defined as the start of the timeframe for consideration of past actions, which is the year in which the U.S. Congress authorized (PL 108-129) resulting in an exchange of lands between the Newtok Native Corporation and the Department of the Interior. The environmental effects of all past development actions undertaken by Federal agencies at Mertarvik since 2003 have been evaluated under NEPA, determined to be less than significant, and culminated in the preparation of Environmental Assessments (EA) and Findings of No Significant Impact (FONSI).

The Mertarvik town site is largely undeveloped. Development in the area since 2003 consists of:

- In 2007, the first three of what are now seven homes were constructed at Mertarvik using BIA Housing Improvement Program (HIP) grants.
- In 2009, the barge landing facility was completed by the ADCCED and ADOTPF, consisting of a 16-foot-wide by 230-foot-long barge ramp/access road, and 65-foot by 130-foot staging area.
- In July 2009, U.S. Navy and Marine Corps personnel established a base camp to support future DoD Innovative Readiness Training (IRT) program activities.
- In June 2010, the IRT program returned to build a small boat landing, and an access road from the barge landing area to the future Mertarvik community site.
- In subsequent summers, the IRT program helped prepare the Mertarvik town site for the MEC, and opened the quarry at Hill 460. The access road was constructed of gravel topped with 8-foot by 14-foot polyethylene mats (Dura-Base®); these mats were also used to create working and living surfaces on top of the tundra, and to allow heavy equipment to travel along an unimproved trail leading to the quarry site.
- In the summer of 2011, the 12,500-square-foot piling-supported foundation for the MEC was completed.
- Also in 2011, the MEC groundwater supply well was drilled and installed about 230 feet east of the MEC foundation.
- In the summer of 2012, three additional homes were built by Newtok community members using grants from the Association of Village Council Presidents (AVCP) Regional Housing Authority, through HUD's Native American Housing Assistance and Self Determination Act (NAHASDA) Program.
- In 2016, the Lions Club funded construction of a small well house, and the installation of a hand-pump and portable water treatment system, to facilitate the interim use of the well.
- Also in 2016, the seventh house was assembled on the Dura-Base® pad laid down for the IRT base camp in 2011. The house is a prototype designed by the Cold Climate Housing Research Center (CCHRC), funded by a BIA HIP grant.

The year 2027 has been defined as the limit of the future timeframe for reasonably foreseeable future actions, as that is the final year of the construction sequence projected in section 4.6.2. The school at Newtok and roughly a dozen homes will have been lost by then, and other critical infrastructure necessary to support a community at Newtok, such as the power plant, clinic, and airport access road and apron, will be immediately threatened. The actual build-out period for construction of the proposed action is still unknown, and is dependent upon the availability of federal, state or tribal funding, and in some cases, the identification of the action agency responsible to undertaking various elements of the build-out.

At Newtok, people walk to nearby areas to pick berries and gather other foods and materials, but rely on boats in the open-water season and snowmachine in the winter to get to more distant resources. Development of a new community at Mertarvik will result in a shift of the current usage of resources at Newtok to the equivalent usage of resources in the Mertarvik area. Boats would still be used to reach fish camps and other areas traditionally used for subsistence gathering. People from Mertarvik would be able to walk to good berry picking areas on Nelson Island that are now reached only by boat, so use of those areas would likely increase. Other subsistence uses on that part of Nelson Island also would likely increase. There would be more fishing pressure on local streams, more hunting for local waterfowl, for ptarmigan and other birds, and more local hunting and trapping of smaller mammals. Hunting for large mammals would change less. Hunters from Newtok boat or snowmachine to customary places for large game and marine mammals and would continue this tradition. Boating access to those resources would change little, but people at Mertarvik would have better land access to large land mammals on Nelson Island. There would be more opportunity for hunting access by all-terrain vehicles (ATV's) and potential for increased pressure on Nelson Island game. The harvest of wildlife across Alaska is regulated to meet management goals, and harvest regulations would help ensure viable populations were maintained. As the usage of resources at Newtok diminish, the usage of those resources will increase at Mertarvik.

The surrounding wetland habitat limits off-road use of ATV's at the existing Newtok community during summer. Snowmachines generally are more efficient and much faster in the winter. ATV use would increase on the high ground of northern Nelson Island and people would be able to range much farther than they can with ATV's at Newtok. Extensive ATV trails could be developed the Mertarvik site as a result of the Nelson Island terrain being higher and dryer than that surrounding Newtok. ATV use on the refuge could be restricted by the responsible Federal agency (U.S. Fish and Wildlife Service). Wetland habitat surrounding Mertarvik may be damaged from increased ATV off-road use, while areas that are currently impacted by those same activities around Newtok will become revegetated or reclaimed through natural processes.

Some of the structures and abandoned equipment at Newtok will remain after the community relocates to Mertarvik, and some of these areas, such as the landfill, wastewater treatment lagoon, airport runway, and other non-movable structures, could contribute to pollution of the Baird Inlet area as erosion allows the Ninglick River to move through the old village site. Some residents may choose to remain at the original town site and continue to use some of these facilities until forced to leave by erosion. Cleanup and environmental restoration of the village of Newtok would rest with the community and with federal and state agencies. No cleanup plans for Newtok have been developed. There is not enough information about who would move, what would remain, ownership, and other issues to formulate a cleanup plan at this time.

On a watershed, regional or state level, the long-term cumulative effects associated with the daily activities of the current residents of Newtok (e.g., greenhouse gas emissions), while improved due to upgraded facilities and utility services, should be insignificantly different from the cumulative effects associated with the daily activities of those same residents inhabiting the new village site at Mertarvik. For example, the cumulative effects associated with the operation of an airport to serve the community will be much the same, whether the active airport is located at Newtok or a few miles upstream at Mertarvik.

For a period of several years, the Newtok and Mertarvik airports may be in service simultaneously, although the FAA will remove its support of the Newtok airport once the Mertarvik airport is operational. However, demand for passenger and air cargo services to Newtok can be expected to decline as the Newtok population moves to Mertarvik. No long-term cumulative increase in air traffic or air services is anticipated.

As noted above in this section, cumulative impacts may occur to some resource categories if the proposed project proceeds. However, there are no known significant cumulative impacts.

5.23.4 Connected Actions

While NEPA was enacted to disclose and evaluate potential effects of federal actions, one category of effect that extends beyond federal actions is the connected action. If there are connected actions that fall within the above definition but are not federal actions, then those actions need to be evaluated.

Connected actions in NEPA analyses are defined under 40 CFR §1508.25(a)(1) as actions that:

- Automatically trigger other actions which may require environmental impact statements;
- Cannot or will not proceed unless other actions are taken previously or simultaneously; or
- Are interdependent parts of a larger action and depend on the larger action for their justification.

Several agencies stated during the scoping process that efforts to decommission infrastructure at Newtok should be discussed (as opposed to being analyzed) as connected actions to the infrastructure development at Mertarvik. Decommissioning activities include such actions as dismantling homes, fuel systems, and other structures and equipment, reusing or properly disposing of the demolition materials, securing potential sources of contamination, and mitigating environmental contamination, before the advancing erosion washes these structures, equipment, and materials into the Ninglick River.

Potential decommissioning activities at Newtok are not connected to the proposed infrastructure development action at Mertarvik in that they:

- Are not being triggered by the proposed development, but rather, by the inevitable destruction of Newtok - the desirability of removing sources of contamination and debris from Newtok would exist regardless of whether construction occurs at Mertarvik;
- Are not logistically or temporally linked to the process of developing Mertarvik, which can and will proceed regardless of the potential of any future decommissioning activities at Newtok; and
- Are wholly independent of the larger effort to relocate the village of Newtok to Mertarvik; the relocation is not dependent upon decommissioning activities, and does not depend on decommissioning activities as justification for the relocation.

As described in section 3.2.3, the Denali Commission has limited the scope of the proposed action in this EIS to the development of new village infrastructure at Mertarvik, giving priority to promoting a solution to the human emergency faced by the Newtok community. That is not to say that decommissioning is unimportant. Section 3.2.3 references several existing Newtok decommissioning studies prepared by State of Alaska and Federal agencies. The recommendations made in these studies could be implemented with minimal analysis under the NEPA, and do not require inclusion in this EIS in order to proceed.

Although the actions are not connected, the proposed development at Mertarvik may nonetheless affect the timing and prioritization of proposed decommissioning activities at Newtok. For example, if the development proceeds as envisioned, and relocation can occur at a planned and orderly pace, then there will be more time to effectively plan and conduct decommissioning and salvage activities. Conversely, an uncertain or delayed relocation may result in more abandonment of structures, and lost opportunities for decommissioning. The decommissioning of fuel and power distribution equipment will need to be coordinated closely with the sequence of building abandonment at Newtok to ensure that those services continue to homes and structures that require them.

5.23.4.1 Potential Effects of FAA's Removal of the Newtok Airport from the National Plan of Integrated Airport Systems as a Result of the Construction of a Replacement Airport at the Mertarvik Town Site and Potential Effects of the State of Alaska's Deactivation of the Newtok Airport

Regarding the development of the airport at the Mertarvik town site, the FAA determined that there were two connected actions that warranted disclosure and assessment of potential effects. Those two potential actions are FAA's removal of Newtok Airport from the National Plan of Integrated Airport Systems (NPIAS) if a replacement airport is constructed at Mertarvik and ADOT's eventual deactivation of Newtok Airport after the replacement airport at Mertarvik is constructed.

The NPIAS is composed of commercial service airports, all reliever airports and selected general aviation airports vital to safe aviation within the United States. The NPIAS also contains an inventory of short and long-range development projects and their estimated costs at these airports. The projects are eligible for Federal funds, on a cost shared basis, if approved and selected by FAA.

Regarding the State of Alaska's expected connected action, deactivation (i.e. closure) of the Newtok Airport at an unknown future date, this action is expected largely because demand for passenger and cargo services will substantially drop as existing Newtok residents move to the new community location followed by erosion of the airport. The Newtok Airport would no longer meet the requirements for inclusion in the NPIAS and would therefore be ineligible for Airport Improvement Program funding from FAA. Therefore, the State of Alaska has noted that they expect the existing Newtok Airport to eventually be deactivated for these reasons (M. Merritt, June 16, 2017, email).

The preceding therefore defines the analysis of the potential effects of the ultimate deactivation (closure) of the Newtok Airport by the ADOTPF based on those three primary elements in the following order of importance. First, the primary driver for future closure is the on-going erosion, which will ultimately shorten the runway beyond a usable length. This erosion is the same driver for the construction of the Mertarvik Airport and the community's need to relocate. Second, the specific timeframe for closure is unknown and in part relates to the rate at which community residents move to the Mertarvik Town site. Third, the construction and operation of an airport at Mertarvik to serve a relocated community is expected to result in at first a diminution of the need for the Newtok Airport and then closure due to a perpetual reduction in need. This is coupled with increasing maintenance costs for the State and/or unsuitability due to the rate at which the runway will erode and the lack of FAA funding to off-set costs of maintenance.

Given that both of the connected actions described above potentially affects only a few of the total number of resource categories previously analyzed for other impacts, the following effects breakdown addresses only those resource categories per connected action that would have known effects. And, because the affects per resource category are virtually identical per connected action the effects analyses for both connected actions are combined below within each defined resource category except as noted.

Air Quality - Newtok

Removal of the Newtok airport from the NPIAS approximately when the Mertarvik airport becomes operational would result in a reduction in the number of flights to the existing Newtok Airport. This would result in lower aircraft emissions at the Newtok Airport and less dust generation as most air operations move to the replacement airport.

Indirect air quality impacts expected to result from the deactivation of Newtok Airport are a cessation of emissions and dust generation related to airport use. None of the impacts are of such a scale that they would result in either a significant positive or negative impact.

Water Quality – Newtok

Indirect water quality impacts of the removal of Newtok Airport from the NPIAS include a reduction in the quantity of runway and apron fill materials being transferred to the adjacent tundra due to reduced aircraft operations and therefore a reduction of the quantity of suspended sediment in surface waters during snow melt and precipitation run-off.

Indirect water quality impacts expected to result from the deactivation of the Newtok Airport include a cessation of negative water quality impacts related to operation of the airport and related aircraft use (e.g. transfer of sediments to aquatic environments and/or water impacting runway or apron fills). Therefore, a reduction in the quantity of suspended sediment in surface waters would occur. None of the impacts are of such a scale that they would result in either a significant positive or negative impact.

Socioeconomics – Newtok

The indirect impact of removal of the Newtok Airport from the NPIAS is expected to be a loss of scheduled commercial passenger and cargo traffic to and from the Newtok Airport at some future date. At this time FAA cannot effectively estimate how near or far term that date may be.

Whether the service reduction will occur at a single point in time or as a gradual reduction while both airports temporarily operate simultaneously is also not known. Additionally, commercial service may be precluded by on-going erosion prior to the removal of the airport from the NPIAS being an issue. This means, however, that the Newtok Airport would cease to be functional due to loss of adequate operating surface, which would immediately result in removal from the NPIAS anyway.

ADOT contracts with one local resident to maintain Newtok Airport and has an employee that manages this and numerous similar airports. Similar arrangements would be made for Mertarvik which could include both airports temporarily under a single contract. Therefore, while FAA cannot determine whether the same individuals would be employed at Newtok versus Mertarvik, the same number of people would likely be employed at both airports

As previously noted, upon removal of Newtok Airport from the NPIAS the FAA would no longer issue grants for the Newtok airport and ADOT would be required to provide all needed funding. Removal of Newtok from the NPIAS and the shift of scheduled commercial air traffic to the Mertarvik Airport are also expected to indirectly impact remaining residents by strengthening the inducement to move to the Mertarvik Town site. This is expected to primarily result from the additional year-round time and effort required to travel by boat or snow machine

to the Mertarvik town site to retrieve supplies and materials or people delivered by commercial air traffic.

Deactivation of the Newtok Airport will also either lead to decreased flights/increased costs of travel to Newtok or required investment by the State to maintain the airport in a sufficient status that commercial air carriers serve both airports. The long-term potential for that is highly unlikely as more people move to Mertarvik. Therefore, people residing in Newtok are expected to experience decreased levels of air service including reduced importation of goods by air. It is also expected that the costs of goods in Newtok would increase as the village moves to Mertarvik and commercial flight operations transition to Mertarvik. There is also expected to be a period of time each spring and fall when either thin ice prevents travel by snow machine or flowing broken ice prevents travel by boat which will adversely affect residents still in Newtok.

The negative impacts of both connected actions; Removal of Newtok Airport from the NPIAS and the State of Alaska's Deactivation of Newtok Airport are expected to be minor.

Subsistence Resources – Newtok

The primary indirect effect of both removal of Newtok from the NPIAS and eventual deactivation is a small but increased cost in money and time to obtain these subsistence supplies and materials due to the travel time and gasoline and oil expended to retrieve them from flights into Mertarvik Airport. As operations decrease at the Newtok site, animal use of the airport may increase bringing these animals closer to the residential areas. This would have a positive temporary impact if these animal species are of use to the residents of Newtok. However, hunting in the area of the airport is discouraged so any benefit may be small.

Environmental Justice and Children's Health and Safety – Newtok

Environmental Justice in Minority and Low Income Populations: Both minority and low income populations exist at Newtok.

Factors considered in the analysis of potential Environmental Justice (EJ) effects include potential human health, cultural resources and historic properties, community disruption, subsistence, economic and cumulative effects. Included in this analysis are potential impacts (noted in the next paragraph) to Children's Health and Safety; Executive Order 13045 Protection of Children from Environmental Health Risks and Safety Risks. The specific factors considered from the Executive Order are; air quality, water quality, physical dangers of construction and access to medical services outside the community.

Regarding children's safety, if removal from the NPIAS results in air ambulance services requiring patient pickup at Mertarvik versus Newtok, adults and children would experience potential effects of boat or snow machine transport to an air ambulance at Mertarvik. However,

as long as the runway is operationally safe for the class of air ambulance attempting to use it this potential effect is only expected when weather conditions would preclude safe operations at Newtok but permit them at Mertarvik.

Indirect EJ impacts potentially resulting from deactivation include a temporary exacerbation of economic impacts related to time and costs of retrieving goods flown into Mertarvik Airport versus Newtok Airport. Because deactivation of Newtok Airport potentially requires remaining Newtok residents to travel to the Mertarvik Town site for goods and materials economic costs of remaining in Newtok may increase for remaining Newtok residents. The impact of both connected actions would be minor.

Regarding children's safety, if deactivation results in air ambulance services requiring patient pickup at Mertarvik versus Newtok adults and children would experience potential effects of boat or snow machine transport to an air ambulance at Mertarvik.

As noted in the previous Subsistence section deactivation at Newtok may indirectly increase subsistence costs and lessen time available for subsistence due to time spent traveling to and from Mertarvik to retrieve subsistence supplies and materials (i.e. air cargo).

The impacts of both connected actions; Removal of Newtok Airport from the NPIAS and the State of Alaska's Deactivation of Newtok Airport are expected to be minor. The potential exception is evacuation of injured children from Newtok via air ambulance after the airport is deactivated. At this time a rotor wing air ambulance can access Newtok with or without an airport weather depending. Given that residents are expected to move to Mertarvik (particularly children needing to attend school) the timeframe during which children might be without air ambulance access is expected to be small and diminish over time as all children move to Mertarvik.

Biological Resources – Newtok

Special Status Species – Newtok

Removal from the NPIAS conceivably has the potential to indirectly result in fewer disturbances to eiders transiting the Newtok area if that transit would have coincided with an historic flight arrival and departure time that might have disturbed the bird. There is no conceivable adverse impact to any eider from the effects of removing the Newtok Airport from the NPIAS.

Deactivation conceivably has the potential to indirectly result in fewer disturbances to eiders transiting the Newtok area if that transit would have coincided with an historic flight arrival and departure time that might have disturbed the bird. While this effect could be minimal for an individual bird it is negligible to the species. Neither connected action would have a significant impact on biological resources.

Noise – Newtok

The direct noise impact of Newtok Airport's removal from the NPIAS on Newtok noise levels, assuming commercial carriers switch to using Mertarvik Airport only, would be a reduction in commercial aircraft related noise.

The indirect impact of Newtok Airport deactivation on Newtok noise levels would be a reduction in aircraft related noise. Neither connected action would have a significant positive or negative impact on noise.

Climate Change and Greenhouse Gas Emissions

Removal of Newtok Airport from the NPIAS would result in a reduction of airport/aircraft related emissions at Newtok. However, as the existence of these greenhouse gas emissions to climate change is not considered significant nor is their reduction. See Chapter 4 Mertarvik Airport Climate Change and Greenhouse Gas Emissions analysis for FAA's analysis of these effects.

Deactivation of Newtok Airport would result in a reduction of airport/aircraft related emissions at Newtok. However, the existence of these emissions is not considered significant nor is their reduction. None of the impacts of either connected action would have a significant positive or negative impact.

5.23.5 Environmental Justice

Executive Order (E.O.) 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," directs Federal agencies to identify and address any disproportionately high and adverse human health or environmental effects of their actions on low-income, minority, and tribal populations, to the greatest extent practicable and permitted by law.

An environmental justice (EJ) analysis typically includes the following elements (USEPA 2017):

- a) Identification of any minority and/or low-income status communities in the project area;
- b) Identification of any adverse environmental or human health impacts anticipated from the project; and
- c) Determination of whether those impacts would disproportionately affect minority and/or low-income communities.

5.23.5.1 Identification of Minority or Low-income populations

The site proposed for construction of the community at Mertarvik currently has no permanent human population. The expectation of this project is that as homes and community services are constructed at Mertarvik, the current residents of Newtok will relocate to Mertarvik over a span of several years. Therefore the village of Newtok is considered the affected population for the sake of this Environmental Justice Analysis.

The existing population of Newtok includes both minority and low-income components. As of the 2010 U.S. Census, Newtok was about 96 percent “American Indian and Alaska Native alone or in combination.” Both Alaska Native and tribal populations are treated as minorities under this E.O. Income data from the U.S. Census Bureau's 2009-2013 American Community Survey show an estimated 30.10 percent (+/- 11.40%) of Newtok residents, regardless of minority status, have incomes below the Federal poverty level (ADCRA 2017j). Based on these percentages, the entire population of Newtok is considered to be minority, low-income, or both, for the purposes of this EJ analysis.

5.23.5.2 Identification of Adverse Impacts

The previous sections 5.2 through 5.22 analyzed potential project impacts on a range of resource categories, and identified no adverse effects that rise to a level of significance. For some categories most directly impacting the concerns of the affected EJ community, such as “Community and Culture” and “Public Health and Safety,” the proposed action is intended to impact the population in strongly positive ways, enabling the Native village to maintain its cultural identity and carry on traditional practices in a safe and sustainable setting. The potential impacts on another resource category of particular concern to this community, subsistence, were found to be minor (section 5.17.3). Newtok residents have stated that they do not expect the proposed project to cause long-term changes to their subsistence practices.

There will be some inevitable disparity in the distribution of community services during the transition period. Families that move to Mertarvik during the early “Pioneer” phase will do so with the understanding that some services, such as power and water, will be limited while the community infrastructure is under construction. Towards the end of the transition period, residents in Newtok awaiting relocation will likely experience reduced services as infrastructure at Newtok is decommissioned or abandoned. The order in which Newtok residents relocate to Mertarvik is a matter for the community and its leadership to decide.

5.23.5.3 Determination

The Denali Commission has determined that there will be no disproportionate adverse impacts on minority or low-income communities as a result of the proposed action. This decision was informed by the following considerations:

- A substantial majority of the affected population, the village of Newtok, is minority, low-income, or both; this entire population is regarded as an EJ community for the purposes of the EJ analysis.
- The residents of Newtok have been active participants in the design and approval of the proposed action.
- Upon completion, the proposed action will provide adequate housing and services to the entire population of Newtok at the new Mertarvik village site.

- All three Mertarvik CLP alternatives feature a relatively compact and centralized layout of homes, designed to maximize the efficiency of utility distribution, and also to ensure convenient access to community services for all.
- All proposed residential sites included in the proposed alternative are considered to be equally desirable based on access to services and public facilities.
- Potential nuisances such as the waste water lagoon, the landfill, and the airport have been designed within the CLP to be an adequate distance from any homes, and are unlikely to disproportionately affect any segment of the Mertarvik community.
- The priority by which individuals and families are relocated from Newtok and the allocation of housing at Mertarvik are matters for the community and its leadership to decide, and are outside the scope of this EJ analysis.

5.23.6 Children's Environmental Health and Safety Risks

E.O. 13045, "Protection of Children from Environmental Health Risks and Safety Risks," applies to economically significant rules under E.O. 12866 that concern an environmental health or safety risk that EPA has reason to believe may disproportionately affect children. FAA guidance (FAA 2015) extends this analysis to individual Federal actions.

Under all alternatives except the no action, construction activities overall would produce a temporary increase in CO₂ emissions for the duration of community relocation efforts. These temporary emissions are expected to be negligible in quantity compared to regional, U.S. and world greenhouse gas emissions.

Operation of major infrastructure such as the proposed airport, power generation plant, etc. at Mertarvik is also expected to have negligible impacts as the new modern infrastructure would be providing largely the same services (e.g. air transport, electricity, respectively) as older less emissions efficient equipment at Newtok. The exception being the fleet of aircraft serving either community location as they are expected to be the same aircraft making up the same air fleet mix. Because each piece of permanent emission emitting infrastructure has not been identified for Mertarvik, it is not possible at this time to quantitatively compare and contrast current versus potential future emissions.

The FAA has not established a significance threshold pertaining to impacts to children's environmental health and safety. However, the FAA recommends consideration of whether the proposed action or alternatives would have the potential to lead to a disproportionate health or safety risks to children. Under all alternatives except the no action, the proposed community at Mertarvik would have more modern infrastructure with newer and more technologically robust measures to protect children from injury and or exposure to harm. For example housing construction requirements that meet current building codes with related modern safety features, for example smoke alarms, anti-siphon valves, etc. The proposed community at Mertarvik would

have more clearly defined and modern mechanisms and processes for restricting access to and disposing of potentially hazardous materials children might be exposed to.

The Denali Commission has determined that there will be no disproportionate health or safety risk to children as a result of the proposed action.

5.23.7 U.S. DOT Act of 1966 (49 U.S.C. §303) - Section 4(f) Analysis

Section 4(f) of the U.S. Department of Transportation (DOT) Act of 1966 (49 U.S.C. §303) (Section 4(f)) protects significant publicly owned parks, recreation areas, wildlife and waterfowl refuges, and public and private historic sites. The Act applies only to DOT agency's projects. The construction of the airport is the only potential DOT transportation project occurring at the Mertarvik town site.

The process the FAA follows per Section 4(f) is comprised of the following steps as needed.

1. Determine if properties potentially qualifying as significant 4(f) resources might be affected;
2. Conduct an initial assessment to determine if a physical or constructive use might occur; therefore, determining if a detailed analysis of potential 4(f) impacts is required;
3. Determine if a potential physical use of a significant 4(f) resource may result from implementation of any alternative;
4. Determine if a potential temporary occupancy might result from implementation of any alternative and therefore physical use of a significant 4(f) resource;
5. Determine if a constructive use may result from implementation of any alternative;
6. Determine if resources protected under Section 106 of the National Historic Preservation Act may be impacted (a potential 4(f) impact);
7. Determine if a 6(f)¹ impact may occur, (Note: if no "use" would occur i.e. physical, constructive, impacts to listed or eligible NHPA Section 106 resources or conversion of 6(f) assisted properties then the analyses ends at this point);
8. If potential physical use(s) may occur then make a *de Minimis* determination, if applicable,
9. Conduct a formal Section 4(f) evaluation and make a formal finding if impacts may occur and are not *de Minimis*,
10. Make a significance determination,
11. Define appropriate mitigation, and
12. Make a conclusory statement defining the agency's formal finding.

¹ 6(f) requirements relate to the potential conversion of land use of Land and Water Conservation Fund (16 U.S.C. §4801-8(f)) assisted properties.

As noted above, the process only proceeds to a formal evaluation and finding if a physical or constructive use may occur to a significant Section 4(f) or Section 106 NHPA listed or eligible resource.

In order for Section 4(f) to apply the DOT action must result in either a physical or constructive use of the significant resource. A physical use is defined as an action or alternative that would involve an actual physical taking of a Section 4(f) property through purchase of land, a permanent easement, physical occupation of a portion or all of the property, or alteration of structures or facilities on the property. The concept of constructive use notes that; “a project that does not physically use land in a park, for example, may still, by means of noise, air pollution, water pollution, or other impacts, dissipate its aesthetic value, harm its wildlife, restrict its access, and take it in every practical sense.” Constructive use is defined as occurring; “when the impacts of a project on a Section 4(f) property are so severe that the activities, features, or attributes that qualify the property for protection under Section 4(f) are substantially impaired.” Because the U.S. Congress authorized the transfer of 10,943 acres of USFWS Yukon-Delta National Wildlife Refuge (NWR) lands to the Newtok Native Corporation to create the Mertarvik town site in 2003, the construction and operation of Mertarvik Airport is not a physical use of a 4(f) property. Specifically, the former lands of the Yukon Delta National Wildlife Refuge are now the property of the Newtok Native Corporation and no longer meet the definition of a 4(f) resource. Therefore, there are no potential physical use impacts to analyze.

Constructive use as noted above, requires substantial impairment of the protected activities, features, or attributes of the Section 4(f) property. This means that the value of the Section 4(f) property, in terms of its prior significance and enjoyment, is substantially reduced or lost. The only potential constructive use impact category defined in the Act that potentially applies to airport impacts on adjacent Yukon Delta National Wildlife Refuge lands is aircraft noise. As stated by the USFWS response, noise from the construction and use of the airport was reviewed to evaluate potential impacts to waterfowl, focusing on the black brant. The USFWS concluded that the conservation of black brant would not be negatively impacted. Therefore, the USFWS concurred with FAA’s determination that there was no 4(f) constructive use based on the lack of negative impact to black brant.

The designated wilderness within the refuge is substantially north of Newtok (approximately 95 miles away) and would not be affected by the proposed project. The nearby refuge area experiences common use by the native population including noise generating machines such as snowmobiles, airplanes and motor boats as well as rifle and shotgun use.

No resources potentially eligible for listing or listed as defined under Section 106 of the National Historic Preservation Act would experience a physical or constructive use.

There are also no resources falling under 6f of the Land and Water Conservation Fund that would be affected.

Therefore, based on the limited and localized impact of aircraft noise as it currently exists and the expectation that there will be no substantial change in aircraft operations, the FAA believes that the limited flight operations at Newtok and the proposed replacement flight operations at Mertarvik will not result in a substantial impairment of any attributes of the refuge. Therefore, no constructive use under Section 4(f) of the Act would result from the proposed action.

Section 4(f) requires DOT entities to coordinate their 4(f) analyses with the agency responsible for managing the potentially affected 4(f) resource, in this case the U.S. Fish and Wildlife Service and the Yukon Delta National Wildlife Refuge, respectively. FAA initiated that coordination on September 25, 2017. On November 8, 2017, via formal letter, the USFWS concurred with FAA's 4(f) conclusion that there are no physical or constructive uses of Yukon Delta National Wildlife Refuge lands as a result of constructing and operating the airport as currently proposed (see letter in Appendix A Correspondence). The USFWS concurrence with FAA's 4(f) determination was based on the USFWS's conclusion that construction and operation of the airport would not negatively impact the refuge's conservation of wildlife, notably black brant.

5.23.8 Incomplete or Unavailable Information (40 CFR §1502.22)

There is no incomplete or unavailable information of reasonably foreseeable significant impacts that would be relevant to making a reasoned choice among the alternatives identified in this EIS; the cost of obtaining any additional information relevant to reasonably foreseeable significant adverse impacts on the human environment is not an issue.

As previously discussed in this EIS, the primary issue that remains as yet undetermined is when the various elements of the community infrastructure will be constructed (based on availability of Federal, State and tribal funding), and therefore when the related potential effects disclosed in this EIS would occur, and which federal, state or tribal agency will develop the various elements of the proposed action. While the erosion forcing the community's certain relocation continues unabated, and the limited relocation of a small number of pioneering residents and related infrastructure construction has been completed (barge landing, evacuation center, housing) or is ongoing, no funding exists on State or Federal level to accomplish more than a very small portion of the community's relocation effort.

While the composition of the future Mertarvik community is sufficiently well established to plat community and estimate infrastructure impact areas (section 4.5.1), design details for many infrastructure elements are still undergoing development. Future design and decisions that have potential environmental impacts not addressed in this EIS might require supplemental

environmental analysis under NEPA, in the form of an Environmental Assessment (EA) and Finding of No Significant Impact (FONSI), or an agency-specific environmental review process.

Therefore, while the potential effects of the proposed action are valid, the actual timing of the occurrence of the majority of effects, and who will take lead in constructing the various elements of the plan, is unknown at this time. However, since these unknowns do not affect the level of significance of the expected impacts, they are likewise not considered significant.

5.23.9 Unresolved Issues

Aside from those stated in section 5.23.7 above, there are no known unresolved issues or conflicts within the scope of the proposed project. The Denali Commission acknowledges agency concerns that responsibilities and a plan-of-action for decommissioning at Newtok have not been resolved, but, as demonstrated in this document, the decommissioning is not a connected action to the proposed infrastructure development project at Mertarvik, and lies outside the scope of this EIS.

5.23.10 Mitigation and Permitting

5.23.10.1 Mitigation

Mitigation has been defined by the CEQ to include:

- Avoiding an impact by not taking an action or parts of an action;
- Minimizing impacts by limiting the degree or magnitude of the action;
- Rectifying an impact by repairing, rehabilitating, or restoring the affected environment;
- Reducing impact over time by preservation and maintenance operations; and
- Compensating for the impact by replacing or providing substitute resources or environments (40 CFR §1508.20).

These elements are listed and represent a sequence of steps that are generally taken in the planning of a project. Thus, compensation is to be used only as a last resort after opportunities to avoid, minimize, rectify, and reduce impacts have been exhausted.

From the earliest stages in the process of developing the proposed action, environmental considerations were incorporated in order to avoid, minimize or compensate for anticipated environmental consequences. Mitigation related to all construction activities at the Mertarvik town site, including airport construction, is expected to be comprised primarily of Best Management Practices commonly utilized during construction in this area of Alaska in relation to air and water quality impacts. For example, each of the three ANTHC CLPs avoided known cultural sites and provided watershed and wellhead protection for the Mertarvik spring. Land was set aside to provide a buffer along the Takikchak River and the wetlands near its confluence with the Ninglick River. Water and sewage systems were designed to minimize impacts to the

environment, BMPs will be utilized to control fugitive dust emissions during construction, and speed limits will be established to reduce dust from ATV traffic on gravel roads. The new electrical generators to be installed will greatly reduce air emissions compared to the existing generators in use in the village of Newtok, and the wastewater collection, treatment and disposal system will modernize the honey bucket collection system now in use at Newtok. Fuel storage at the barge landing will be consolidated, with secondary containment and spill response equipment made readily available. The consolidation of all boat traffic to the barge landing areas will also minimize coastal bluff breakdown and the risk of fuel spills, as compared to having individual launch sites along the Ninglick River.

The potential BMPs to protect surface water discussed in section 5.4.2 would also serve to avoid and minimize indirect impacts to wetlands. The Regulatory Division has determined that it will evaluate impacts to wetlands and the appropriate level of mitigation as it receives permit applications for specific construction actions; therefore, the Denali Commission does not attempt to propose within this EIS wetland mitigation activities for the infrastructure development project as a whole. Compensatory mitigation proposals made at this time would be pre-decisional to the Regulatory Division's permit evaluation process and its chosen approach to the project.

Compliance with the 404(b)(1) guidelines requires a determination of practicability, meaning that the mitigation is capable of being performed and/or reasonable opportunities are available. Compensatory mitigation opportunities can be challenging in Alaska, particularly in more remote areas where there are few historical impacts to be restored, little threat of development to justify preservation as an appropriate compensation mechanism, and pristine wetlands are abundant. The Regulatory Division considers these factors during the permitting process and evaluates each proposal individually. The timing of project components will have an effect on the practicability of mitigation and influence the Regulatory Division's mitigation determination regarding individual project components, when the complete applications for those components are evaluated.

Environmental construction timing windows for this project relate to migratory birds. The USFWS has identified the time period between May 5 and July 25 as when migratory birds are most likely to be nesting in "shrub or open" habitat in the Y-K Delta region (USFWS 2009); the entire Mertarvik project area falls within this description. The USFWS recommends that construction projects avoid clearing vegetation or placing fill within potential nesting habitat during this time period, as the surest means of avoiding the destruction of active bird nests, eggs, or nestlings, thereby avoiding violations of the Migratory Bird Treaty Act. Table 18 summarizes the migratory bird nesting periods, and type of construction that may be affected.

At Mertarvik, the risk of MBTA violations can be minimized by:

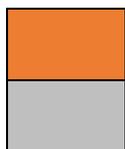
- a. Conducting fill-placement or ground-clearing activities prior to May 5 or after July 25, or performing preliminary vegetation-clearing outside the nesting period such that the future construction site no longer provides suitable nesting habitat;
- b. Excluding ground-nesting species from an imminent construction site, by laying tarps or other ground coverings at the site and/or placing deterrent devices (e.g., Mylar® flash-tape fastened to wooden stakes, etc.), prior to the start of and during the nesting season.

Where the preemptive avoidance measures described above are not possible, the construction site should be surveyed for active nests prior to construction activities, and any nests found must be marked and protected until the young hatch and depart the nest. Additional consideration may be required in the fall to avoid impacts to emperor geese or other waterfowl that may feed on crowberry tundra habitat in the area. Consultation with USFWS should occur prior to construction to determine confirm construction windows.

Table 18. Construction and Bird Nesting Windows for Mertarvik

Activity	Work Window											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Clearing, Site Preparation+												
Materials excavation, stockpiling within previously disturbed areas												
Construction of building pads, placement of fill*												
Utility installation, vertical construction												
Revegetation, restoration of disturbed areas												
Relocation of structures*												

Shaded areas depict time frames where no future work of that type should occur.



Orange indicates a work window to protect nesting birds

Gray indicates a potential work window to protect emperor geese during an important feeding time period

+Site preparation includes ground disturbing activities or disturbances.

*Construction of buildings pads/relocation of buildings could commence within no work window if site preparation has been previously completed and it is known that no nesting birds are present.

Specific to the existing Newtok Airport, mitigation is expected to be limited to the use of air and water quality Best Management Practices during the removal of manufactured infrastructure. Because the existing village site is expected to largely erode into the river over the next 20 years,

there is no mitigation value to removing the existing runway, taxiway and apron and then reclaiming the habitat to off-set habitat losses at the Mertarvik town site. Nor is there mitigation value in reclaiming the gravel or fill material in place at the existing village airport in the form of the runway, taxiway and apron because there is a viable materials source at the Mertarvik town site. Specifically, the negative ecological impact of the excavation and transport of the existing airport fill material for re-use for the replacement airport would not be off-set by positive ecological impacts if the existing airport was reclaimed due to the short duration of its existence due to erosion.

5.23.10.2 Permitting

Many of the community facilities planned for Mertarvik will require State and Federal permits and regulatory submittals for their construction and operation:

Discharges to Wetlands. USACE Regulatory Division is authorized by Congress to regulate activities that may impact wetlands and Waters of the United States. Before a permit is issued, the USACE must receive a complete application including location maps, site plans, and cross-section drawings. A project description, fill quantities and a mitigation statement are also required describing how the applicant proposes to avoid, minimize, and compensate for unavoidable adverse impacts to wetlands and waters of the United States. Unavoidable adverse impacts to waters of the United States that result from activities authorized under Section 404 of the Clean Water Act (33 U.S.C. 1344), and/or Sections 9 or 10 of the Rivers and Harbors Act (33 U.S.C. §§ 401, 403) may require compensatory mitigation. The USACE Regulatory Program is responsible for identifying the requirement for compensatory mitigation on a case by case basis during permit review. The USACE implementing regulations and subsequent guidance to the field up to and including the 2008 Mitigation Rule require flexibility in determining requirements for compensatory mitigation.

The level of detail present during the writing of the EIS is not sufficient to be considered a complete application and therefore cannot be used to determine compensatory mitigation requirements. Upon receipt of a complete application for a Department of the Army Permit, the Regulatory Division will evaluate the existing level of impact in the watershed of the proposed activity, the scale of impacts of the proposed activity, availability of appropriate mitigation opportunities, and other factors during the evaluation of the proposed action. The Regulatory Division cannot authorize permits that are determined to be contrary to the public interest, when considered with applied mitigation. No Department of the Army permit can be granted if the proposed activity is found to be contrary to the Section 404(b)(1) guidelines.

Storm Water and Sediment Management. Most construction activities at Mertarvik will take place under the Alaska Construction General Permit for Storm Water Discharges from Large and Small Construction Activities (CGP); the current CGP became effective in February 2016. The 2016 CGP, administered under the Alaska Pollutant Discharge Elimination System (APDES),

authorizes storm water discharges from large and small construction-related activities that result in a total land disturbance of equal to or greater than 1 acre, and where those storm water discharges enter waters of the U.S. The goal of the CGP is to minimize erosion and reduce or eliminate the discharge of pollutants, such as sediment carried in storm water runoff from construction sites through implementation of appropriate control measures. In order to ensure protection of water quality and human health, the permit describes control measures that must be used to manage storm water runoff during construction activities. (ADEC 2017c). While many individual elements of the CLP will involve less than 1 acre of disturbed land or exposed fill, the overall plan for Mertarvik meets the definition of a “common plan of development,” in which “multiple separate and distinct construction activities may be taking place simultaneously or on different schedules, but under one master plan” (ADEC 2015c).

Development and implementation of a Storm Water Pollution Prevention Plan (SWPPP) is the key condition of the CGP. The SWPPP is generally prepared by the construction contractor; it is unclear at this time if multiple SWPPPs or one overarching SWPPP will be required for construction at Mertarvik. Other CGP requirements include submission of the SWPPP for review, filing of a Notice of Intent, regular site inspections, and revisions to the SWPPP whenever necessary to protect water quality, or to reflect changes in site conditions (ADEC 2017c).

Fuel Storage. The USEPA requires two sets of regulatory submittals for fuel facilities from which a discharge could impact navigable water or adjoining shorelines. The Spill Prevention Control and Countermeasures (SPCC) Plan identifies requirements for facilities that have a minimum aggregate storage capacity of 1,320 gallons. The SPCC Plan must address every container 55 gallons and larger, and must be certified by a Professional Engineer. Facility Response Plans (FRPs) are required for facilities that are filled by marine vessels and which have a storage capacity of more than 42,000 gallons (Cooper, *et al* 2017a).

The U.S. Coast Guard’s “Facilities Transferring Oil or Hazardous Material in Bulk” regulations apply to fuel facilities capable of transferring fuel to or from a vessel with a capacity of 10,500 gallons or more. This regulation requires a Facility Response Plan and an Operations Manual. The FRP is similar to the USEPA FRP and outlines spill planning requirements for the Coast Guard regulated portion of the facility. The Operations Manual addresses the procedures and equipment required for receiving fuel at the facility. Additionally, the Coast Guard requires that a Letter of Intent to Operate be submitted to the captain of the port for approval prior to delivery of fuel (Cooper, *et al* 2017a).

Landfill. The proposed landfill will require a Class III Community Municipal Solid Waste Landfill (MSWLF) permit from the ADEC Division of Solid Waste, as well a Class III Landfill Operations Plan. The EPA recommends that Alaska Native communities develop an integrated

waste management plan (IWMP) to ensure proper disposal practices, reduce disposal costs, and encourage recycling (USEPA 2009), but such plans are not required by regulation.

Wastewater Treatment. Treated effluent from the lagoon will be seasonally discharged into Baird Inlet. Permitting authority for wastewater discharges in Alaska is also administered by the APDES, which issues both individual and general permits. It is anticipated that the Mertarvik lagoon will be permitted under a general permit for small domestic lagoons that discharge to surface water. Effluent limits and monitoring requirements will be defined in the permit.

Air Quality. The ADEC Air Permit Program is divided into two categories: Title I and Title V permits. The Title I program regulates the construction of new stationary sources of air emissions; air construction permits specify what construction is allowed, what emission limits must be met, and often how the source can be operated. To ensure that sources follow the permit requirements, permits also contain monitoring, record keeping, and reporting requirements. The Title V program issues operating permits to air pollution sources after the source has begun to operate.

The principle stationary sources of emissions at Mertarvik potentially subject to permitting will be the interim and permanent diesel-electric power plants. The need for an air emission permit will be determined by an ADEC-approved potential-to-emit (PTE) assessment. The preliminary PTE values discussed in section 5.6.2 suggest that the interim and permanent power plants may emit below Title I and Title V minor permit thresholds, and not require permits. However, the PTE calculations and assumptions will need to be verified by the ADEC prior to determining what air quality permitting will be required (Dunn 2018).

Table 19 lists recommended consultations and required permits and clearances from different regulatory agencies and the associated anticipated time frames to complete each process. Also included are milestones during project progress when certain activities should be initiated. This table does not represent an exhaustive list of requirements but highlights the major milestones in the process.

Table 19. Permitting Considerations for Mertarvik Infrastructure Development Projects

Agency	Permit/Clearance/Consultation	When to Initiate	Approximate Timeline to Acquire Permit or Clearance
Federally Funded Actions			
NEPA	Environmental Assessment (EA)	Review need upon receipt of funding for a specific element of the proposed action	90-160 days*
SHPO & Tribes	Initiation of Consultation	Once the planning of an element of the proposed action has been initiated	30 days
	Finding of No Historic Properties Affected	Upon receiving concurrence of such from SHPO	30-120 days

Agency	Permit/Clearance/Consultation	When to Initiate	Approximate Timeline to Acquire Permit or Clearance
State and Federally Funded Actions			
USFWS	Section 7 Consultation for Threatened and Endangered Species	Once the planning of an element of the proposed action has been initiated	30-120 days**
	Consultation regarding clearing windows for nesting birds and emperor geese	For any proposed ground disturbing activities	14-30 days
NMFS	Consultation for Essential Fish Habitat (EFH)	For any in-water work in the Ninglick River	14-30 days
ADFG	Title 16 Fish Habitat Permit	For any work within Takikchak River	30-90 days
USACE	Clean Water Act Section 404 Permit	Once the planning of an element of the proposed action has been initiated and fill in WOTUS is expected	120 days
ADEC	APDES Construction General Permit	1 month prior to construction, once 100% construction documents are complete	30 days***
ADEC	Air Quality Permit	Upon development of PTEs	30-90 days
ADEC	Class III Landfill Permit	Upon development of landfill design	30 days
ADEC	Wastewater Discharge Permit	Prior to construction of sewage lagoon	30 days
Privately Funded Actions			
ADFG	Title 16 Fish Habitat Permit	For any work within Takikchak River	30-90 days
USACE	Clean Water Act Section 404 Permit (Individual or Nationwide)	Once the planning of an element of the proposed action has been initiated and fill in WOTUS is expected	120 days
USFWS	Consultation regarding clearing windows for nesting birds and emperor geese	For any proposed ground disturbing activities	14-30 days
ADEC	APDES Construction General Permit	1 month prior to construction, once 100% construction documents are complete	30 days

* Initiation of NEPA document will begin with informal agency scoping and data-gathering. The NEPA process will continue throughout the entire proposed action until a Finding of No Significant Impact (FONSI) or Record of Decision (ROD) is obtained.

+ Length of consultation will depend on determination of affect by regulatory agency.

** Includes review and approval of SWPPP, pre-construction site visit, and submittal of notice of intent.

5.24 Summary of Environmental Impacts

Table 20 below summarizes the impacts determined for the resource categories addressed in sections 5.2 through 5.22. No significant direct, indirect, or cumulative negative environmental impacts were identified as a result of the analyses performed in Chapter 5 of this EIS.

6. Regulatory Compliance and Consistency with Plans and Policies

6.1 Regulatory Compliance

This EIS has been coordinated with all relevant Federal and state agencies, including the President’s Council on Environmental Quality (CEQ), U.S. Environmental Protection Agency (USEPA), U.S. Fish and Wildlife Service (USFWS), and Alaska Department of Environmental Conservation (ADEC). Information on this coordination is provided in the EIS and is summarized in Table 21.

Table 20. Summary of Environmental Impacts by Resource Category

Resource Category	No Action Alternative	CLP 1 Alternative	CLP 2 Alternative (preferred)	CLP 3 Alternative
Geology, Soils, & Topography	No impact	MINOR impacts		
Hydrology & Hydraulics	No impact	MINOR impacts		
Floodplains	No impact	LESS THAN SIGNIFICANT impacts		
Surface Water	No impact	LESS THAN SIGNIFICANT impacts		
Groundwater	No impact	LESS THAN SIGNIFICANT impacts		
Air Quality	No impact	LESS THAN SIGNIFICANT impacts		
Climate & Climate Change	No impact	MINOR impacts		
Resource Category	No Action Alternative	CLP 1 Alternative	CLP 2 Alternative (preferred)	CLP 3 Alternative
Habitat	No impact	MINOR impacts		
ESA Species	No impact	LESS THAN SIGNIFICANT impacts		
MMPA Species	No impact	MINOR impacts		
Migratory Birds	No impact	MINOR impacts		
EFH & Anadromous Streams	No impact	MINOR impacts		
Wetlands & other Special Aquatic Sites	No impact	LESS THAN SIGNIFICANT impacts		
Protected Lands	No impact	MINOR impacts		
Cultural History & Cultural Resources	No impact	MINOR impacts		
Community & Culture	MAJOR impacts	MINOR impacts		
Socioeconomics	MAJOR impacts	MINOR impacts		
Subsistence Resources & Practices	MAJOR impacts	MINOR impacts		
Land Use & Compatibility	No impact	MINOR impacts		
Public Health & Safety	MAJOR impacts	MINOR impacts		
Public Services & Utilities	MAJOR impacts	MINOR impacts		
Noise	No impact	LESS THAN SIGNIFICANT impacts		
Visual Environment	No impact	MINOR impacts		

6.2 Status of Environmental Compliance (Compliance Table)

Table 21. Summary of Relevant Federal Statutory Authorities

Federal Statutory Authority	Compliance Status FC-full compliance PC-partial compliance	Comment
Clean Air Act (CAA), as amended	<p style="text-align: center;">FC</p> Confirmed with State of Alaska, Air Quality Program that area of the proposed action is not or near a “non-attainment” or “maintenance” area of Class I area.	Section 176(c) requires that Federal agencies assure that their activities are in conformance with Federally-approved state implementation plans for geographic areas designated as “non-attainment” and “maintenance” areas under the CAA.
Clean Water Act (CWA) of 1977, as amended (Sections 401 and 404)	<p style="text-align: center;">PC</p> Department of the Army permits under Section 404 will be applied for as elements of the proposed action are undertaken by various federal, state and tribal agencies.	The specific sections of the CWA that apply to the proposed action are Section 404, addressing discharges to WOTUS, and Section 401, which requires certification that the permitted action complies with the State Water Quality Standards for actions within State waters.
Coastal Barrier Resources Act of 1982	<p style="text-align: center;">Not Applicable</p> There are currently no coastal barriers designated under this law in the State of Alaska. No such coastal barrier landforms, designated or otherwise, exist in the Mertarvik town site area.	The Coastal Barrier Resources Act designated various undeveloped coastal barriers, which were illustrated by a set of maps adopted by law, and were made ineligible for both direct and indirect federal expenditures believed to encourage development of fragile, high-risk, and ecologically sensitive coastal barriers.
Coastal Zone Management Act (CZMA) of 1982	<p style="text-align: center;">Not Applicable</p> Denali Commission will continue to coordinate with State of Alaska environmental resource agencies to ensure compliance with state statutes.	The State of Alaska withdrew from the voluntary National Coastal Zone Management Program on July 1, 2011. Therefore, within the State of Alaska, the Federal consistency requirements under the Coastal Zone Management Act do not apply to Federal agencies.
Endangered Species Act (ESA) of 1973, as amended	<p style="text-align: center;">PC</p> Letters of coordination sent to the USFWS and NMFS and follow-up discussions about implementing mitigation measures have occurred with NMFS. See Appendix A - Agency Coordination.	The Denali Commission is required to coordinate with both the USFWS and NMFS to identify what ESA-listed species under those agencies respective jurisdictions may be present in the proposed action's area.

Federal Statutory Authority	Compliance Status FC-full compliance PC-partial compliance	Comment
Fish and Wildlife Coordination Act (FWCA), as amended	<p style="text-align: center;">FC</p> No waters of any stream or other body of water are foreseen to be proposed, permitted, or licensed to be impounded, diverted or otherwise controlled or modified.	The FWCA requires the Denali Commission to consult with the USFWS whenever the waters of any stream or other body of water are proposed to be impounded, diverted, or otherwise modified.
Marine Mammal Protection Act	<p style="text-align: center;">PC</p> Letters of coordination sent to the USFWS and NMFS. See Appendix A - Agency Correspondence.	The Corps is required to coordinate with the USFWS and NMFS on potential impacts to species covered by this act and must address these agencies' concerns and recommendations.
Marine Protection, Research, and Sanctuaries Act of 1972	<p style="text-align: center;">FC</p> No ocean dumping of dredged material is part of the proposed action.	The Act regulates the dumping of materials into ocean waters and prevents, or restricts, dumping of materials that would degrade or endanger human health, welfare, or amenities, or the marine environment, ecological systems, or economic potentialities. The Act provides for a permitting process to control the ocean dumping of dredged material.
Migratory Bird Treaty Act of 1918, with amendments	<p style="text-align: center;">PC</p> Construction and activity windows have been identified and will be respected during construction planning. These windows will be verified during the construction planning of specific project activities associated with the proposed action, and should be able to avoid the taking of migratory birds.	It is unlawful, except as permitted by regulations, "to pursue, hunt, take, capture, kill...any migratory bird, any part, nest or egg," or any product of any bird species protected by the Act. The Denali Commission is required to avoid a taking under this act during construction of a project.

Federal Statutory Authority	Compliance Status FC-full compliance PC-partial compliance	Comment
Magnuson-Stevens Fishery Conservation and Management Act	<p style="text-align: center;">PC</p> <p>Nelson Island's encompassing waters are designated as EFH. The impact of typical barge and landing craft activities upon EFH at the Mertarvik barge landing site have been evaluated in previous NEPA documents, and determined that barge operations would not result in significant long or short-term adverse impacts to EFH. Each element of the proposed action will be re-coordinated with NMFS to confirm no changes have occurred in this assessment.</p>	Federal action agencies that carry out activities that may adversely impact EFH are required to consult with the NMFS regarding potential adverse effects of their actions on EFH.
National Environmental Policy Act of 1969, as amended	<p style="text-align: center;">PC</p> <p>The Denali Commission completed this EIS in compliance with NEPA. This effort is on-going. Full compliance will be attained upon completion of the public review process and/or further coordination with responsible agencies</p>	This Act requires that environmental consequences and proposed action alternatives be considered before a decision is made to implement a Federally-proposed action.
National Historic Preservation Act of 1966, as amended	<p style="text-align: center;">PC</p> <p>Initial coordination with the State Historic Preservation Officer was initiated in mid-2017, but the SHPO has deferred formal consultation until after it has reviewed the EIS. The Denali Commission and the FAA will complete separate consultations with the Alaska SHPO.</p>	Federal agencies are required to identify cultural or historic resources that may be affected by a proposed action and to consult with the State Historic Preservation Officer when a Federal action may affect cultural resources.
Executive Order 11990 - Protection of Wetlands	<p style="text-align: center;">PC</p>	To the extent possible, Federal agencies should avoid, to the long and short term, adverse impacts associated with the destruction or modification of wetlands and avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative.

Federal Statutory Authority	Compliance Status FC-full compliance PC-partial compliance	Comment
Executive Order 13112 – Invasive Species	<p align="center">FC</p> <p>The Denali Commission will require its contractor to implement measures to prevent the introduction of invasive species.</p>	Each Federal agency whose actions may affect the status of invasive species shall, to the extent practicable and permitted by law, prevent the introduction of invasive species.
Executive Order 12898 – Environmental Justice in Minority Populations and Low-income populations.	<p align="center">FC</p> <p>The proposed action has been developed specifically to provide the residents of Newtok with a safe place to which to relocate, allowing them to maintain their community and way of life intact within their traditional lands, while also providing the necessary infrastructure for a stable and healthy existence.</p>	Each Federal agency shall conduct its programs, policies, and activities that substantially affect human health or the environment, in a manner that ensures that such activities do not have the effect of excluding persons from participation in, denying persons the benefits of, or subjecting persons to discrimination.
Executive Order 13175 - Tribal Consultation	<p align="center">FC</p> <p>This EO is not truly relevant to the proposed action, as the project is essentially that of the Tribal entity (NVC), with the DC acting as a facilitator. Neighboring villages were contacted as part of scoping, but did not identify impacts that would merit formal consultation under this EO.</p>	Requires federal agencies to consult, on a government-to-government basis, with federally-recognized Indian tribes (to include Alaska Native tribes and communities) when developing federal policies with tribal implications. The purpose is to "have an accountable process to ensure meaningful and timely input by tribal officials in the development of regulatory policies that have tribal implications."
State of Alaska, Department of Fish and Game Fish Habitat Permit, AS 16.05.841-871.	<p align="center">FC</p> <p>No fish habitat permits under AS 16.05.871-.901 are expected to be required for the proposed action, as no modification to fish-bearing waters is planned.</p>	ADFG protects freshwater anadromous fish habitat and the free passage of anadromous and resident fish in fresh water bodies. Any activity or project below the ordinary high-water mark of an anadromous stream requires a Fish Habitat Permit.
State of Alaska, Department of Fish and Game Special Area Permit, AS 16.20.	<p align="center">FC</p>	ADFG manages/permits activities that occur in legislatively designated special areas.

Federal Statutory Authority	Compliance Status FC-full compliance PC-partial compliance	Comment
State of Alaska, Department of Environmental Conservation, Clean Water Act, Section 401, 18 AAC 70.	PC Section 401 certification will accompany and Department of the Army permit issued under the Clean Water Act.	Any activity that might result in a discharge into WOTUS must obtain a water quality certificate from ADEC stating that the discharge will comply with the CWA, Alaska Water Quality Standards (18 AAC 70), and other applicable State laws.
State of Alaska, Department of Environmental Conservation, Solid Waste Program (18 AAC 60.300 and 18 AAC 60.211)	PC A permit will be obtained prior to the opening of the Mertarvik Class III Municipal Solid Waste Landfill.	This program issues permits for the disposal of solid waste, contaminated soil and the terrestrial placement of (contaminated and uncontaminated) dredged material.

PC = Partial Compliance, FC = Full Compliance

Note: This list is not exhaustive.

7. List of Preparers

Denali Commission

CAPT Donald Antrobus, P.E., Program Manager, U.S. Public Health Service

U.S. Army Corps of Engineers

Amanda Andraschko, Tribal Liaison, Programs and Project Management Division

- B.S. Sociology (emphasis Anthropology), Montana State University Bozeman, 1997
- M.A. Applied Cultural Anthropology, University of Alaska Anchorage, 2005
- 15 years of experience in tribal liaison and government-to-government relationships

Responsibility: Community and culture, environmental justice, government to government

Jan Deick, Geologist, Planning Section

- B.S. Geology, University of Minnesota Duluth, 1983
- M.S. Hydrology, University of Idaho Moscow, 1986
- 31 years of experience in hydrogeology, environmental science, contaminated site assessment and remediation, and water resource management (drinking water)

Responsibilities: Geology, soils and topography; hydrology, hydraulics and floodplains, surface water resources, groundwater resources, and water quality.

Matthew Ferguson, Fishery Biologist, Environmental Resources Section

- B.S. Biology, Drury University, 2013
- M.S. Environmental Management, Webster University, 2014
- 3 years of experience environmental science and management

Responsibilities: Hydraulics & hydrology, wetlands and other aquatic sites, biology, threatened and endangered species, and anadromous streams.

Christopher Floyd, NEPA Planner, Environmental Resources Section

- B.S. Biochemistry, Mississippi State University, 1986
- M.S. Biochemistry & Molecular Biology, Mississippi State University, 1988
- 28 years of experience in environmental chemistry and health, environmental impact assessment, and environmental compliance.

Responsibilities: NEPA management, coordination with Denali Commission and Cooperating Agencies, water quality, resource agency consultations.

Christopher Hoffman, Fishery Biologist, Environmental Resources Section

- B.A. Biology, Canisius College, Buffalo, NY, 1994
- Graduate Level Studies, Biology, University of Alaska Anchorage, 2003-2008
- 18 years of experience in biological and ecological sciences, mathematical modeling and biostatistics.

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Kelly Eldridge, Archaeologist, Environmental Resources Section

- B.A. Anthropology, Grinnell College, 2007
- M.A. Anthropology, University of Alaska Anchorage, 2012
- Ph.D. Candidate, Anthropology, University of California, Davis, 2016
- 10 years of experience in cultural resource management

Responsibilities: Cultural history and cultural resources, subsistence

Forrest Kranda, Archaeologist, Environmental Resources Section

- B.A. Anthropology, California State University Fullerton, 2011
- M.A. Anthropology, University of Alaska Anchorage, (in progress)
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Michael Noah, Marine Biologist, Environmental Resources Section

- B.S. Marine Biology, California State University Long Beach, 1982
- M.S. Biology, California State University Long Beach, 1984
- 35 years of experience in environmental program and project management, environmental impact assessment and mitigation in marine and coastal environments, and environmental compliance

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- B.A. Environmental Population and Organismic Biology, University of Colorado, 2005
- 14 years of experience in fisheries and aquatic ecology

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- B.A. Communications, University of the Pacific, 1979
- 39 years of experience in technical editing of environmental compliance documents, scientific reports, and coordination letters.

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Alaska Native Tribal Health Consortium

Gavin Dixon, Senior Project Manager, Rural Energy Initiative

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Keith Gordon, Environmental Protection Specialist

- B.S. Fisheries and Wildlife Biology, Iowa State University, 1984
- 32 years of NEPA experience

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8. Distribution List

This EIS is being distributed to all Federal, State, and tribal agencies that have jurisdiction by law or special expertise with respect to any environmental impact involved, authorized to develop and enforce environmental standards, and to any person, organization or agency requesting the entire EIS IAW 40 CFR §1502.19.

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10. Index

Agency coordination, 14

airport, 1, 3, 6, 12, 19, 22, 24, 34, 36, 48, 49, 50, 65, 66, 67, 70, 71, 75, 77, 78, 92, 94, 95, 172, 173, 174, 177, 179, 191, 193

Airport Layout Plan ALP), 36, 50, 213

Alaska Native Tribal Health Consortium, xiii, 3, 15, 27, 202, 208, 211

Alternatives, 4, 10, 15, 16, 19, 27, 39, 47, 48, 97

ANTHC, xiii, 3, 11, 15, 27, 28, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 53, 54, 192, 208, 211

bearded seals, 116

Beluga whales, 114

Blue whale, 106, 122

Class III Municipal Solid Waste Landfill, 50, 82, 85, 103, 144, 200

Community Layout Plan (CLP), xiii, 3, 10, 11, 12, 16, 22, 23, 24, 25, 27, 28, 29, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 51, 53, 54, 74, 76, 78, 79, 82, 84, 85, 90, 91, 92, 93, 96, 97, 98, 103, 105, 107, 118, 129, 133, 134, 135, 136, 138, 144, 151, 152, 155, 158, 161, 162, 165, 166, 167, 169, 171, 174

construction, 3, 15, 17, 18, 23, 24, 28, 32, 34, 35, 36, 37, 49, 65, 70, 71, 74, 75, 80, 82, 83, 85, 88, 89, 93, 94, 95, 97, 103, 104, 107, 118, 123, 134, 136, 147, 155, 165, 169, 172, 174, 175, 176, 177, 178, 180, 191, 192, 193, 194, 197, 198

critical habitat (CH), xiii, 107, 109, 111, 112, 113, 114, 117, 118, 119, 120, 123, 124, 126, 127, 132, 151

Cultural Resources, ii, 152, 195, 214

cultural sites, 37, 71, 192

cumulative impacts, 74, 79, 85, 90, 93, 96, 103, 105, 118, 129, 133, 136, 144, 151, 155, 158, 161, 165

Cuvier's beaked whale, 117

Dall's porpoise, 116

decommissioning, 3, 12, 13, 14, 180

dolphins, 116, 120

electricity, 29, 97

Endangered and Threatened Species, xiv, 105, 118, 132, 197

energy, 12, 17, 24, 35, 38, 70, 139

Eskimo curlew, 106, 107, 108

Essential Fish Habitat, xiv, 135, 194, 202

Federal Aviation Administration, ii, i, xiv, 2, 15, 202, 204, 213, 214, 218

fin whales, 113

fish, 11, 24, 88, 102, 103, 135, 136, 137, 145, 157, 163, 164, 178, 199, 215

fishes, 99, 163

Gray whales, 114

Harbor porpoise, 116

Harbor seal, 116, 122

Humpback whale, 106, 122, 127

Humpback whales, 113

Killer whale, 117

land use, 11, 166, 167

landfill, 1, 11, 29, 36, 89, 92, 103, 178

Marine Mammal Protection Act, xiv, 105, 116, 121, 197

migratory birds, 101, 128, 129, 133, 134, 135, 138, 197

Minke whale, 117

MMPA, ii, xiv, 105, 116, 121, 123, 195

NEPA, xv, 1, 3, 9, 10, 11, 14, 16, 37, 71, 94, 126, 172, 177, 179, 191, 194, 198, 201

Newtok Planning Group (NPG) , xv, 3, 22, 38, 209, 210, 216

Newtok Village Council, xv, 3, 9, 15, 25, 37, 51, 157, 207

no action alternative, 15, 79, 90, 95, 98, 105, 135, 138, 148, 152, 156, 159, 163, 166, 167, 169, 171, 173, 175
noise, 103, 120, 121, 122, 123, 134, 137, 171, 172, 173, 175
North Pacific right whale, 112, 123, 126, 128
Northern fur seal, 116
Northern Sea Otter, 111, 119, 218
Northern sea otters, 111, 119
Notice of Intent (NOI), xv, 9
NVC, xv, 3, 9, 10, 25, 27, 38, 39, 150, 157
Pacific walrus, 118, 121
Pacific Walrus, 211
Pacific white-sided dolphin, 117
porpoises, 116, 120
Preferred Alternative, 53, 54
Proposed Action, i, 4, 106
Public participation, 9
relocation, 3, 4, 11, 13, 18, 19, 22, 27, 28, 32, 35, 37, 49, 107, 130, 150, 155, 157, 166, 180, 190, 193, 212, 213
resources of concern, 11
Ribbon seal, 116
Right whale, 106
Ringed seals, 116
salmon, 99, 136, 153, 164
scoping, 9, 10, 11, 13, 71, 89, 171, 173, 179, 194
seals, 99, 101, 116, 117, 120, 123, 164
Sequence of Construction, 67
Short tailed albatross, 106
short-tailed albatross, 111, 119
Short-tailed albatross, 111, 127
spectacled eider, 107, 118, 119, 132, 212, 215
Spectacled eiders, 107, 118
Sperm whales, 113
Spotted seal, 101, 116
Stejneger's beaked whale, 117
Steller sea lion, 106, 112, 122, 123, 127
Steller Sea Lion, 112, 120, 216
Steller's eider, 106, 107, 108, 127
Steller's eiders, 107, 108, 119, 123, 127, 132
subsistence, 11, 13, 18, 20, 24, 29, 36, 89, 103, 105, 119, 128, 134, 151, 152, 153, 156, 163, 164, 166, 178, 201
Takikchak Creek, 14, 99, 153, 194
uplands, 24, 74, 82, 132, 133, 141, 143, 145
wastewater treatment lagoon, 36, 50, 70, 82, 92, 144, 145, 179
water quality, 13, 14, 87, 88, 89, 92, 192, 193, 200, 201
wetlands, 13, 22, 30, 37, 82, 83, 99, 107, 118, 119, 123, 130, 131, 132, 133, 139, 140, 141, 142, 143, 144, 145, 148, 149, 165, 192, 198, 201, 214
Whales, 113, 114, 120, 124

Appendix A
Correspondence



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10**

1200 Sixth Avenue, Suite 155
Seattle, WA 98101-3140

OFFICE OF
ENVIRONMENTAL REVIEW
AND ASSESSMENT

April 9, 2018

Captain Donald Antrobus, P.E.
Denali Commission
510 L Street, Suite 410
Anchorage, AK 99501

Dear Captain Antrobus:

In accordance with the National Environmental Policy Act, Section 309 of the Clean Air Act, and the Council on Environmental Quality regulations implementing NEPA (40 CFR 1500-1508), the U.S. Environmental Protection Agency has reviewed the Final Environmental Impact Statement published by the Denali Commission for the Mertarvik Infrastructure Development Project (CEQ No. 20180035; EPA Region 10 Project No. 17-0012-COE).

The EIS assesses the potential environmental impacts of reconstructing all required infrastructure to relocate the community of Newtok, imminently threatened by erosion and flooding, to the new village site of Mertarvik. The Mertarvik site on Nelson Island was transferred to the Newtok Native Corporation from the U.S. Fish and Wildlife Service in 2003 and is the closest high ground which avoids damage from both flooding and erosion. The proposed village infrastructure includes an airport; solid waste landfill; wastewater collection system and treatment lagoon; bulk fuel farm and fuel dispensing facility; power house and power distribution system; water treatment plant, storage tank and distribution lines; barge landing; housing; school; public buildings; and all associated subdivision and connecting roads.

The EPA is supporting the Denali Commission in the EIS development effort, subject to available resources. The EPA has participated in agency meetings, provided scoping comments on April 4, 2017, a review of the preliminary Draft EIS on August 16, 2017, and comments on the DEIS on February 12, 2018. We appreciate the improvements to the Final EIS to address previous recommendations made by the EPA and other agencies. Improvements include additional analysis and disclosure of potential air quality impacts, additional discussion of measures to reduce potential impacts to surface water quality, and the addition of clarifying information in response to our concerns regarding potential impacts to wetlands.

As discussed in the FEIS, the wetlands in the project area have been determined to be waters of the U.S. due to surface and shallow subsurface connection to the tidally influenced Ninglick River. Therefore, the discharge of dredged or fill material and subsequent impacts to the wetlands will require a Clean Water Act Section 404 permit from the U.S. Army Corps of Engineers. The EPA remains concerned about the project's impacts to approximately 277 acres of wetlands and aquatic resources, based on conservative estimates. We support the Federal Aviation Administration's stated intent to further refine the Mertarvik airport construction proposal to minimize wetland impacts, including exploring options for beneficial use of the excess overburden material currently proposed for surficial disposal in existing wetlands, before proceeding with the CWA Section 404 permitting process for the airport.

We appreciate that the FEIS provides additional explanation of the specific methodologies used in the Wetlands Functional Assessment contained in Appendix C. We reviewed this information and are concerned the approach used does not accurately estimate the impacts to the functional capacity of wetlands in the project area. While we do not consider the inaccurate estimates to necessitate a correction to the FEIS prior to the Denali Commission proceeding to a Record of Decision for the Mertarvik Infrastructure Development Project, we do not recommend relying upon the current Wetlands Functional Assessment for future site-specific decisions.

The potential wetland impacts associated with Metarvik infrastructure development were assessed using a combination of the North Slope Rapid Assessment Methodology and the Alaska Regulatory Best Professional Judgment Characterization methods. Our review of the Wetlands Functional Assessment finds the “functional capacity units” derived by combining these two assessment methods substantially underestimates the wetland impacts that would result from the proposed discharges.

We recommend the assessment scores from the NSRAM be used to quantify the total functional losses from all proposed discharges associated with each action alternative. Appendix C currently conflates the assessment of direct and secondary impacts, and as a result, it fails to fully quantify the functional wetlands losses associated with the direct as well as the secondary impacts of the proposed discharges. In addition, the approach used to generate the ARBPJC “functional scores” severed the relationship between inputs and outputs, and the use of those “functional scores” as functional multipliers has also contributed to the underestimation of wetlands impacts.

We would not support the use of the modified NSRAM assessment scores when reviewing the CWA Section 404 permit for any infrastructure components related to the Mertarvik project. In particular, we recommend the currently derived “functional capacity units” not be used as a measure of impact or to quantify the required amount of compensatory mitigation.

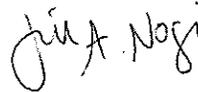
The EPA recommends at this time that a working group, including technical staff from both the EPA and the U.S. Army Corps of Engineers, be created to review the data inputs and results described in Appendix C. We believe an update to Appendix C would not change the NEPA analysis for the Mertarvik Infrastructure Development Project as a whole. We are sharing our concerns in this letter because we strongly recommend that the accurate evaluation of wetland impacts will be important for subsequent tiered NEPA analyses and CWA Section 404 permit reviews for the individual infrastructure components related to the Mertarvik Project.

In addition, in our comments on the DEIS, the EPA recommended the FEIS include more detail regarding the types of mitigation that could be employed during project implementation, to meet the requirements of NEPA to discuss the “means to mitigate adverse environmental impacts” [40 C.F.R. 1502.16(h)] and to support resource impact significance determinations which rely upon the use of best management practices to reduce impacts. We appreciate that additional discussion has been incorporated into Section 5.23.10.1 of the FEIS to further disclose the potential mitigation measures for certain resources. We recommend at this point that any appropriate measures which are within the authority of the Denali Commission to implement or require be disclosed in the ROD as a component of the selected alternative.

We also continue to recommend that a first-tier analysis of this type include analysis of specific measures which may be used in future proposals for specific infrastructure development projects that will utilize this EIS. Doing so will help fulfill the NEPA analysis requirements for those second-tier projects, ensure sufficient consideration of mitigation measures to reduce potential impacts and further the goal of expediting the NEPA process for the village relocation project as a whole. If the Denali Commission conducts similar first-tier NEPA analyses for other village relocation projects in the future, we suggest considering a mitigation table format such as that included in the I-70 Mountain Corridor Programmatic EIS (Colorado Department of Transportation, 2011, <https://codot.gov/projects/i-70-old-mountaincorridor/final-peis>; see section 3.19).

We appreciate the opportunity to review the FEIS for the Mertarvik Infrastructure Development Project, and look forward to continuing to work with you as individual CWA permitting actions move forward. Should you have any questions regarding our comments, or to set up a meeting to further discuss the Wetlands Functional Assessment, please contact Molly Vaughan of my staff at (907) 271-1215 or vaughan.molly@epa.gov, or feel free to contact me at (206) 553-1841 or nogi.jill@epa.gov.

Sincerely,



Jill A. Nogi, Manager
Environmental Review and Sediment Management Unit



U.S. Department of Homeland Security
FEMA Region 10
130 – 228th Street, SW
Bothell, Washington 98021

FEMA

April 3, 2018

Denali Commission
Attn: CAPT Donald Antrobus, PE
510 L Street, Suite 410
Anchorage, Alaska 99501

Re: Invitation to comment on Mertarvik Infrastructure Development Project – Final Environmental Impact Statement (FEIS)

Dear Captain Antrobus:

The U.S. Department of Homeland Security's Federal Emergency Management Agency (FEMA) received your Notice of Availability (NOA) letter, dated March 1, 2018 notifying FEMA that the Denali Commission will accept any comments on the FEIS by April 9, 2018. Although the Denali Commission did not consider FEMA to be a Cooperating Agency in the development of this FEIS, FEMA anticipates that this FEIS will be helpful in addressing some, if not most, of our National Environmental Policy Act and other environmental/historic preservation requirements for currently proposed or future funded actions by FEMA at Mertarvik.

In reviewing the FEIS, the following comments are provided:

On Page 2: The document does not accurately reflect that FEMA expressed interest in being a cooperating agency though mentioned multiple times to the Denali Commission prior to sending any official invitations.

On Page 3: The document does not provide sufficient analysis on the connected actions of decommissioning that will occur as a result of the transition to Mertarvik. For any present or future FEMA funded projects for Newtok/Mertarvik, FEMA will need to consider and address this deficiency, if necessary. The document should clearly state that it does not address any activities (decommissioning or otherwise) associated with the village of Newtok beyond what was stated with Federal Aviation Administration's internal review for the airport.

On Page 13: The first bullet paragraph is inaccurately stated. FEMA's letter dated March 31, 2017, requests Cooperating Agency status. The Denali Commission response to that request was for FEMA to reconsider the request to be a Cooperating Agency given the limited analysis to be provided for decommissioning activities in Newtok. Even though FEMA did not respond to that reconsideration, the Denali Commission made an assumption that FEMA did not want to be a Cooperating Agency anymore and consequently no longer corresponded with FEMA during development of the draft Environmental Impact Statement.

On page 14: FEMA's scoping letter that was referenced and attached in the FEMA letter to the Denali Commission, dated March 31, 2017, was not provided in the Correspondence Appendix. The FEIS does not address how the Denali Commission incorporated FEMA's scoping comments as it implies.

CAPT. Donald Antrobus

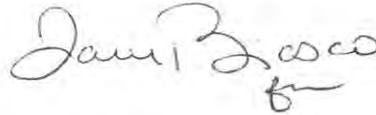
April 3, 2018

Page 2

At a minimum, the Denali Commission should reference the scoping letter and include it in the Appendix as it contains recommended resources and concerns FEMA believes should be addressed in the EIS.

Thank you for the notification of the FEIS NOA. Please feel free to contact Mark Eberlein, our Regional Environmental Officer, at mark.eberlein@fema.dhs.gov or 425-487-4735, if you have any questions.

Sincerely,

A handwritten signature in black ink that reads "Mark Carey" with a stylized flourish at the end.

Mark Carey
Mitigation Division Director

Enclosure

cc: Robert Forgit, FEMA, Alaska Area Office Manager
Portia Ross, Acting FEMA Environmental Officer
Kevin Reeve, AK DHS&EM, State Hazard Mitigation Officer



THE STATE
of **ALASKA**
GOVERNOR BILL WALKER

Department of Natural Resources

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April 2, 2018

File No.: 3130-1R COE / 2018-00272

Kelly Eldridge
US Army Corps of Engineers
Alaska District – Environmental Resources Division
PO Box 6898
JBER, AK 99506-0898

SUBJECT: Mertarvik Community Plan

Dear Ms. Eldridge,

The Alaska State Historic Preservation Office (AK SHPO) received your request for concurrence on March 2, 2018 concerning the subject project (dated February 28, 2018). The Native Village of Newtok proposes to relocate to Nelson Island and establish a community at Mertarvik with the support of the Denali Commission's Mertarvik Infrastructure Development project. The US Corps of Engineers (USACE) prepared an Environmental Impact Statement (EIS) for the Community Preferred Alternative of the community layout plan (excluding the proposed runway and apron).

Following our review of the provided information, we concur that the proposed community layout plan (excluding the proposed runway and apron) will not impact any known cultural resources, and that activities within the plan's footprint will result in **no adverse effect** to historic properties, with the stipulation that known cultural resources will be avoided during the development of Mertarvik.

Following finalization of the plan and completion of the EIS, our office offers the following comments for your consideration concerning the subject project.

- This concurrence letter extends only to the plan and should not be construed as the end of consultation for the project. The current undertaking does not include within the Area of Potential Effects (APE) lay-down areas, construction camps, or indirect effects of the proposed project. Additional consultation will be required prior to initiating construction for elements depicted on the community layout plan.
- Grover 2007 recommended interviews and a cultural resources survey to assess potential impacts to historic properties in Newtok that may result from demolition and relocation of structures and environmental restoration as a result of the community's relocation to Mertarvik. AK SHPO concurs with Grover's recommendation and believes that impacts to the current community should be addressed.

As stipulated in 36 CFR 800.3, other consulting parties such as the local government and Tribes are required to be notified of the undertaking. Additional information provided by the local government, Tribes, or other consulting parties may cause our office to re-evaluate our comments and recommendations. Please note that our response does not end the 30-day review period provided to other consulting parties.

Should unidentified archaeological resources be discovered in the course of the project, work must be interrupted until the resources have been evaluated in terms of the National Register of Historic Places eligibility criteria (36 CFR 60.4), in consultation with our office.

Thank you for the opportunity to comment. Please contact Sarah Meitl at 907-269-8720 or sarah.meitl@alaska.gov, if you have any questions or if we can be of further assistance.

Sincerely,



Deputy Judith E. Bittner
State Historic Preservation Officer

JEB:sjm

ecc: Kelly Eldridge (kelly.a.eldridge@usace.army.mil)



DEPARTMENT OF THE ARMY
ALASKA DISTRICT, U.S. ARMY CORPS OF ENGINEERS
P.O. BOX 6898
JBER, AK 99506-0898

Ms. Judith Bittner
State Historic Preservation Officer
Office of History and Archaeology
550 West 7th Avenue, Suite 1310
Anchorage, AK 99501-3565

28 Feb 2018

Dear Ms. Bittner:

The U.S. Army Corps of Engineers (USACE), has prepared an Environmental Impact Statement (EIS) for the development of the Denali Commission's community layout design for Mertarvik (Sections 34–36, T9N, R86W, and Sections 1–3, T8N, R87W, USGS Quad Baird Inlet D-7, Seward Meridian, Figure 1), located along the Ninglick River on Nelson Island, approximately 9 miles southeast of Newtok, Alaska. In compliance with Section 106 of the National Historic Preservation Act of 1966 [36 CFR § 800.3(b)], a notice of availability of the draft EIS for public review was sent to your office on December 30, 2017. The USACE received comments from your office on January 9, 2018. In compliance with 36 CFR § 800.2(a)(4), the purpose of this letter is to notify you of a proposed Federal undertaking and to seek your concurrence on an assessment of effect.

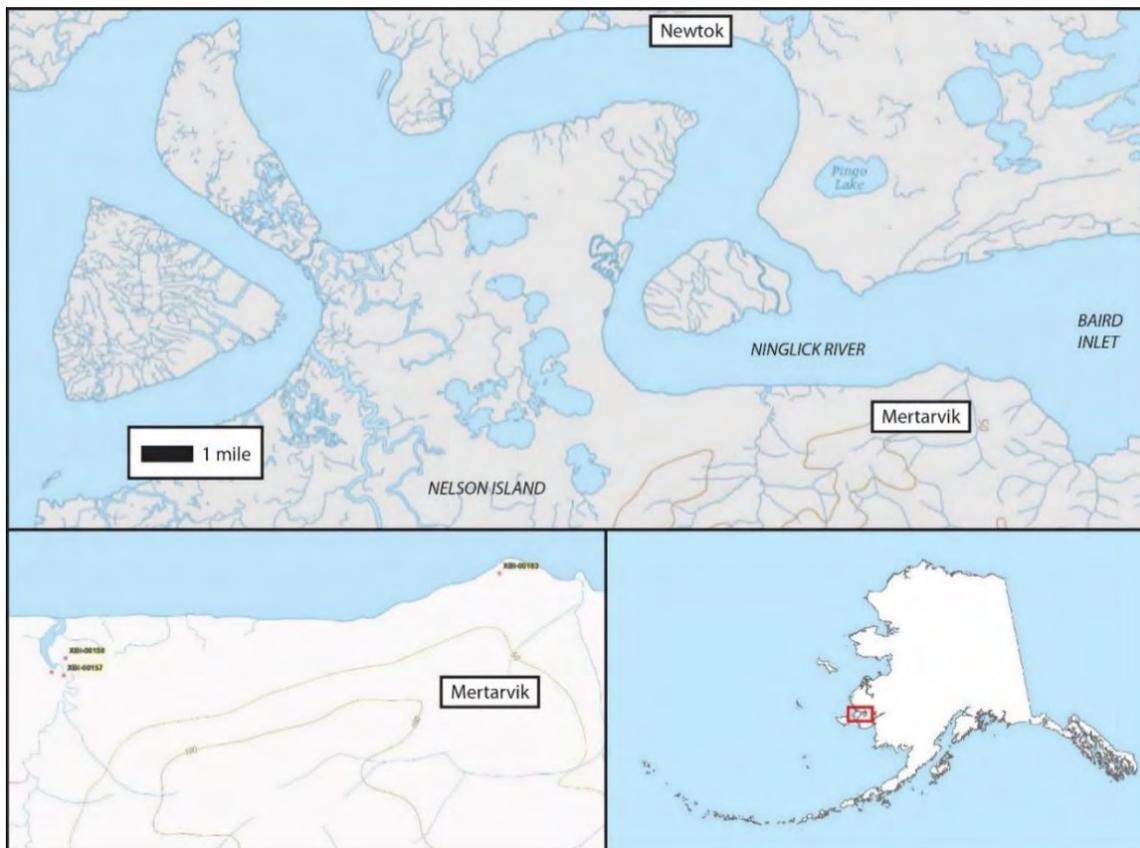


Figure 1. Project Area overview.

Context

The cultural history of Nelson Island is subsumed into the southwestern Alaska region. Shaw (1998) identifies the Yukon-Kuskokwim Delta, Nunivak Island, and northern Bristol Bay areas as a single region for the purposes of archaeological discussion. Dumond (1984) divides the cultural history of southwestern Alaska into the Paleoarctic, Northern Archaic, Arctic Small Tool, Norton, and Thule traditions. The earliest known sites in southwestern Alaska date to the Northern Archaic tradition, around 5,000 years ago. The Arctic Small Tool tradition appeared not long after (Dumond 1984, 2005). Relatively little archaeological research has been conducted on or near Nelson Island. In the 1970s, Okada (1975; Okada et al. 1982) mapped and tested multiple sites on Nelson Island, including a multicomponent site near the Tununak airport with a basal cultural layer dating to approximately 3,000 years ago. In the 1980s, Shaw excavated an unnamed site just south of Nelson Island, but the data remain unreported.

Nelson Island and the nearby surrounding area is the traditional territory of the Qaluyaarmiut, a Central Yup'ik-speaking people whose modern communities include the Native Villages of Tununak, Newtok, Chefornak, Toksook Bay, Kipnuk, Nightmute, and Umkumiut (NIC 2018). The earliest written documentation of the Qaluyaarmiut comes from Edward Nelson's 1878 ethnological survey (Nelson 1899; Fienup-Riordan 1983). Although they had been part of the international trade system for more than 100 years prior, direct impacts by the United States were not felt among the Qaluyaarmiut until 1925, when the government built a school at Tununak. In 1934, reindeer were introduced to Nelson Island (USFWS 1988). Newtok, the closest village to Mertarvik, was established in 1949 when the community of Old Kealavik moved to the site to be closer to a government furnished school, which was completed in 1958.

Project Description

The purpose of the Denali Commission's Mertarvik Infrastructure Development project is to provide the people of the Native Village of Newtok with a place to live that allows them to keep their community and way of life within their traditional lands, while also providing the necessary infrastructure for a safe, sustainable, and healthy existence. The current community of Newtok is experiencing accelerating erosion and flooding; its location is unsustainable. In 1994, the Newtok Native Corporation swapped approximately 10,000 acres of land with the U.S. Fish & Wildlife Service (Yukon Delta National Wildlife Refuge) in order to acquire ownership of the Mertarvik area on Nelson Island. In preparation for future development, the Denali Commission has, in consultation with Newtok, developed a community layout plan for the new village of Mertarvik (Figure 2).

Some infrastructure has already been built at Mertarvik (Figure 3). This includes ten houses (three built in 2007, three built in 2012, and four built in 2017), a well and foundation for the Mertarvik Evacuation Center, storage buildings, a shallow draft barge landing ramp and associated staging area, and unimproved access roads. Most of the proposed community would be constructed to the east of the shallow draft barge landing.

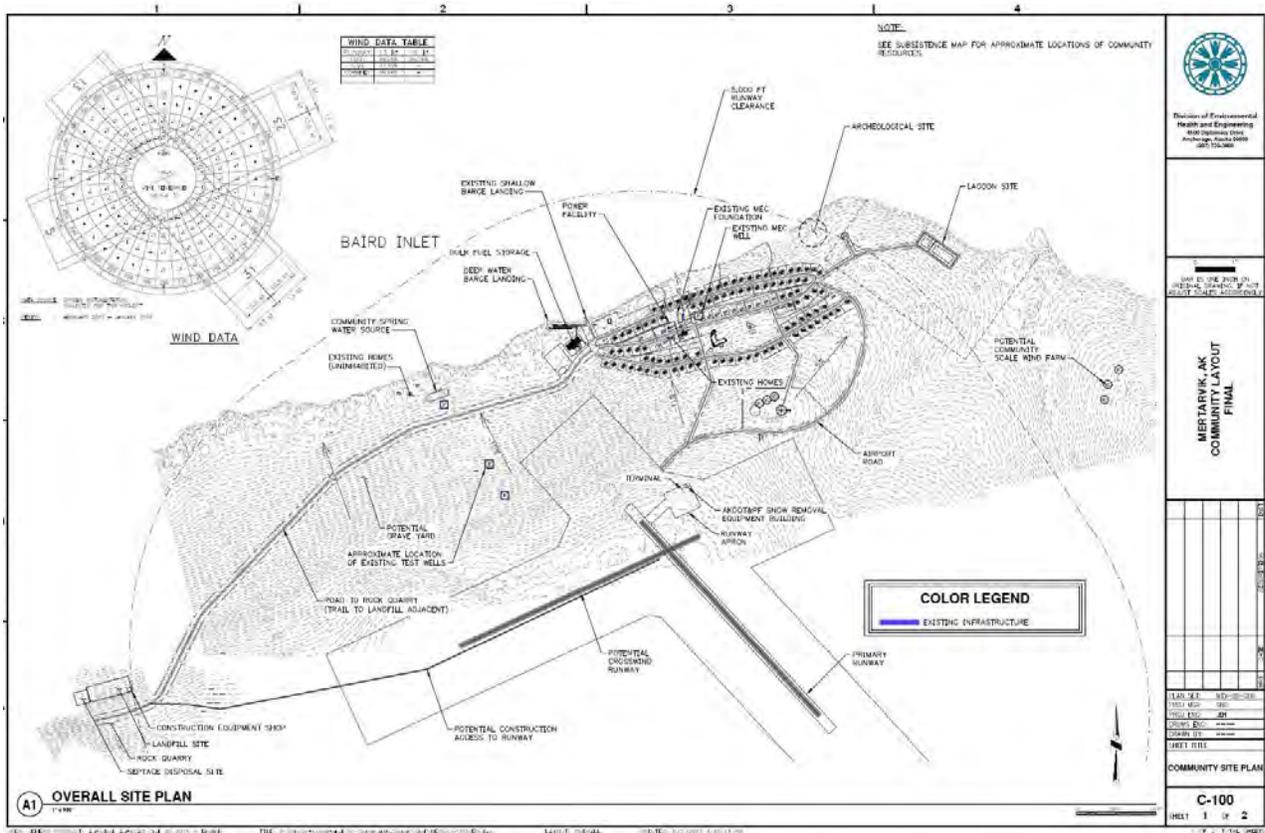


Figure 2. Community Preferred Alternative for the Mertarvik community layout plan. Note that circled “archeological site” is XBI-183.



Figure 3. View of Mertarvik on September 1, 2017, looking southwest.

Assessment of Effect

The area of potential effect (APE) for this undertaking is the footprint of the Community Preferred Alternative for the Mertarvik community layout plan (see Figure 2), with the exception of the proposed runways and runway apron. The Federal Aviation Administration (FAA) is coordinating the proposed runways and apron with your office separate from this effort due to the need for a cultural resources survey of that area (FAA 2017). The APE coordinated herein was surveyed by the USACE in 2002 and 2005 (Grover 2007).

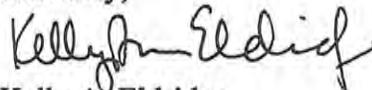
Table 1. Sites identified in the vicinity of the APE.

AHRS No.	Site Name	NRHP Status	In APE
XBI-156	Old winter camp and summer herding station	None	No
XBI-157	5 depressions and 55-gallon drums	None	No
XBI-158	2 house depressions and 11 house pits	None	No
XBI-183	Clay pits	Eligible	No

There are three sites (XBI-156, XBI-157, XBI-158) clustered near the mouth of Takichak River, approximately 2.5 miles west of the proposed community. This area, traditionally called Mertarvik or Taqikcaq, was used by Nelson Island reindeer herders. Elder Michael John noted that Waska, an important reindeer herder, built a small frame house there soon after reindeer were introduced to Nelson Island (Rearden and Fienup-Riordan 2011:357). The clay pits (XBI-183) are just northeast of the proposed community; the area is labeled on the community layout plan as a location to avoid (see Figure 2). On March 22, 2017, during a public scoping meeting in Newtok, the USACE was informed of possible gravesites near the three uninhabited houses built in 2007. The community layout plan avoids the location of these homes and the nearby Mertarvik Spring.

The development of the Community Preferred Alternative for the Mertarvik community layout plan (not including the proposed runway and runway apron) will not impact any known cultural resources in the area. Following 36 CFR § 800.4(d)(1), the USACE seeks your concurrence on the determination that this undertaking will result in **no adverse effect** on historic properties. If there is any alteration to the footprint of the proposed community layout plan prior to its construction, the lead Federal agency will reinitiate consultation under Section 106 of the NHPA. If you have any questions about this project, please contact Kelly Eldridge by phone at 907-753-2672, or by email at kelly.a.eldridge@usace.army.mil.

Sincerely,



Kelly A. Eldridge

Archaeologist

Environmental Resources Section

Cc:

Paul Charles, President, Newtok Village Council

Jimmy Charles, Jr., President, Newtok Native Corporation

Wayne Don, Chair, Calista Corporation
Marcella White, Unit 8, Association of Village Council Presidents
Don Antrobus, Captain, Denali Commission
Keith Gordon, Federal Aviation Administration

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United States Department of the Interior

OFFICE OF THE SECRETARY
Office of Environmental Policy and Compliance
1689 C Street, Suite 119
Anchorage, Alaska 99501-5126

VIA ELECTRONIC MAIL, NO HARD COPY TO FOLLOW

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PEP/ANC

November 8, 2017

Byron K. Huffman
U. S. Department of Transportation
Federal Aviation Administration
Alaskan Region, Airports Division (AAL-600)
222 West 7th Ave, Mailstop #14
Anchorage, Alaska 99513-7587

Subject: Draft Section 4(f) Analysis for the Mertarvik Community Infrastructure Development Project

Dear Mr. Huffman:

The U.S. Department of the Interior (Department) has reviewed the Federal Aviation Administration's (FAA) draft analysis for the Mertarvik Community Infrastructure Development Project, pursuant to Section 4(f) of the U.S. Department of Transportation Act of 1966 (49 U.S.C. § 303). We thank you for your letter, dated September 25, 2017, requesting that the Department's U.S. Fish and Wildlife Service (Service) review the draft, which requires analysis of potential impacts on significant 4(f) resources such as wildlife and waterfowl resources on the Yukon Delta National Wildlife Refuge. The Denali Commission of Alaska, through an environmental impact statement (EIS), is analyzing the potential environmental impacts of moving the Alaska Native Village of Newtok to a congressionally designated site called Mertarvik, located on higher elevation across the Ninglick River.

The new location at Mertarvik includes a new airport runway, and the FAA is conducting a 4(f) analysis because the airport borders the refuge. While the Service has provided, and will continue to provide, technical assistance for analysis in the EIS, our comments below specifically address resources to be considered in the 4(f) analysis.

The Alaska National Interest Lands Conservation Act identifies the conservation of black brant (*Branta bernicla nigricans*) among the purposes of Yukon Delta National Wildlife Refuge. There are two important brant colonies between the existing Newtok runway and the proposed Mertarvik runway. The Department recommends the FAA include analysis of black brant behavioral response to flights from the proposed runway in the 4(f) analysis using the detailed technical analysis the Service provided to the FAA on October 16, 2017. The Service

recommended the FAA consider black brant response behavior with regard to flight patterns, varying types of aircraft (i.e., helicopter, fixed wing, and commercial), flight height, and flight direction in close proximity to the nesting colonies.

After reviewing available literature and subsequent discussion with the FAA and the Service's species experts, the Service determined that impacts on the black brant colonies from the proposed Runway 1/1A or Runway 3/3A in Mertarvik, which is slightly further from the colonies, would be similar to impacts from the existing Newtok airport. Therefore, the Department concurs with the FAA's determination that there would be no substantial impairment of 4(f) resources because there would be "no substantial change in aircraft operations from the limited flight operations at Newtok and the proposed replacement flight operations at Mertarvik."

Thank you for requesting our comments and recommendations on the draft analysis. If you have any questions, please contact Ms. Jennifer Spegon at (907) 271-2768 or jennifer_j_spegon@fws.gov, or Mr. Brian McCaffery at (907) 330-7514 or brian_mccaffery@fws.gov.

Sincerely,

A handwritten signature in blue ink that reads "Philip C. Johnson". The signature is fluid and cursive, with a long horizontal flourish at the end.

Philip Johnson
Regional Environmental Officer - Alaska



U.S. Department
of Transportation

AIRPORTS DIVISION

FAA Alaskan Region
222 W. 7th Avenue, Box 14
Anchorage, Alaska
99513-7587

**Federal Aviation
Administration**

October 2, 2017

Mr. Paul Charles, President
P.O. Box 5545
Newtok, AK 99559

Dear President Charles,

Mertarvik Airport Construction
Mertarvik Town site, Alaska
Government-to-Government Consultation Initiation

The Federal Aviation Administration (FAA) is a Cooperating Agency involved in the Environmental Impact Statement (EIS) production related to the proposed Newtok Village relocation to the Mertarvik Town site. The Draft EIS will be published for public review and comment this month. Therefore, FAA would like to invite the Native Village of Newtok to participate in Government-To-Government Consultation if there are any issues the Native Village would like to address.

Purpose of Government-to-Government Consultation

The primary purpose of government-to-government consultation as described in Federal Executive Order 13175 "Consultation and Coordination with Indian Tribal Governments" and FAA's Order 1210.20 "American Indian and Alaska Native Tribal Consultation Policy and Procedures" is to ensure that Federally Recognized Tribes are given the opportunity to provide meaningful and timely input regarding proposed FAA actions that uniquely or significantly affect Tribes.

Consultation Initiation

With this letter, the FAA is offering to consult on concerns that uniquely or significantly affect your Tribe related to the potential actions described below. Early identification of Tribal concerns will allow the FAA and the airport owner and operator to consider ways to avoid and minimize potential impacts to Tribal resources and/or cultural practices as project planning and alternatives are further developed and refined; if they indeed are. We would be pleased to discuss details of the proposed project and its potential impacts with you.

Project Information

The purpose of the proposed airport project is to construct a replacement airport for the Newtok, Alaska airport at the Mertarvik town site.

Updated October 2, 2017

The Newtok Replacement Airport would be located within Sections 1, 2, 3, 10, 11, 12, Township 8 North, Range 87 West, on USGS Quad Map Baird Inlet D-8, Seward Meridian, at Latitude 60° 48' 47.93" N, Longitude -164°30' 23.39" W, at Mertarvik Town site, Alaska.

The proposed work would include the construction of a replacement airport as noted in the current Newtok Village Community Layout Plan. Construction is expected to begin in 2020 and 2021.

Confidentiality

We understand that you may have concerns regarding the confidentiality of information on areas or resources of religious, traditional, and cultural importance to the Tribe. We would be happy to discuss these concerns and develop procedures to ensure the confidentiality of such information is maintained.

FAA Contact Information

If you wish to provide comments related to this proposed project, please contact **Leslie Grey, Regional Tribal Consultation Official**, at the address above, at 907-271-5438, or by e-mail at AKAirportEnv@faa.gov.

Project Consultation Options Form

Your timely response will greatly assist us in incorporating your concerns into project planning. For that purpose, we respectfully request that you complete the enclosed Project Consultation Options form and forward it to the FAA within thirty (30) days of your receipt of this correspondence.

Sincerely,



Leslie A. Grey
Regional Tribal Consultation Official

Enclosures:

Tribal Consultation Options form

Tribal Government to Government Consultation Response Form

Newtok Village

~~P.O. Box 5545~~ P.O. BOX 5596
Newtok, AK 99559 -5596

Project Name: Mertarvik Airport Construction

Please check a response, provide contact information, sign and mail, email or fax this form to FAA.

The Newtok Village, a federally recognized tribe, would like to consult with the FAA in a government-to-government relationship for this proposed project.

The Newtok Village has no interest associated with this proposed project and further consultation is not required.

President - Paul Charles

Tribal Leader (Please print)



Tribal Leader (Signature)

(907) 237-6763

Telephone

10/26/17

Date

If you have decided to consult, please identify a Tribal Representative for the consultation.

Romy Cadiente - Tribal Relocation Coordinator

Name of Formal Tribal Representative (Please print)



Name of Formal Tribal Representative (Signature)

Bunjing2@gmail.com

(907) 237-6095

Telephone

10/26/17

Date

Tribal Contact information:

Phone: (907) 237-2202

Fax:

e-mail: Newtokvillagecouncil.member@gmail.com

Other: (please describe) Project Manager: Adison Smith
(907)562-2000

Please mail, email, or fax Response Form

FAA Airports Division, ATTN: Leslie Grey

222 W. 7th Avenue, Box 14,

Anchorage, AK 99513-7587

Fax: 907-271-2851

Email: AKAirportEnv@faa.gov



DEPARTMENT OF THE ARMY
ALASKA DISTRICT, U.S. ARMY CORPS OF ENGINEERS
REGULATORY DIVISION
P.O. BOX 6898
JBER, ALASKA 99506-0898

Regulatory Division
POA-2017-445

8 September 2017

Denali Commission
Attention: Don Antrobus
510 L Street, Suite 410
Anchorage, Alaska 99501

Dear Mr. Antrobus:

The Regulatory Division of the U.S. Army Corps of Engineers Alaska District (USACE) has reviewed the Denali Commission's Mertarvik Infrastructure preliminary Draft Environmental Impact Statement (pDEIS) on Nelson Island, Alaska. Our review was conducted pursuant to our statutory authorities under Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act to provide guidance on regulatory program requirements relative to proposed construction activities subject to our jurisdiction under law. We appreciate the opportunity to comment.

The Corps' evaluation of a Section 10 and/or a Section 404 permit application involves multiple analyses, including (1) evaluating the proposal's impacts in accordance with the National Environmental Policy Act (NEPA) (33 CFR part 325), (2) determining whether the proposal is contrary to the public interest (33 CFR 320.4), and (3) in the case of a Section 404 permit, determining whether the proposal complies with the Section 404(b)(1) Guidelines (Guidelines) (40 CFR part 230).

We understand the Denali Commission does not intend to directly fund or construct any particular element of the proposed action, and therefore, would not be the applicant for any forthcoming Department of the Army (DA) permits necessary to discharge dredged and/or fill material in waters of the United States (U.S.), including wetlands (WOUS). Other entities proposing construction that involves the discharge of fill materials into WOUS would be required to apply for DA permits for their specific actions. The USACE will make its own independent evaluation(s) under NEPA and our statutory authorities of proposed infrastructure projects on a case-by-case basis, including the significance of the proposed discharge and appropriate and practicable mitigation.

We may incorporate or tier off the Denali Commission's Final EIS in future DA Decision Documents, as applicable, to ensure compliance with NEPA, related Federal laws, and Regulatory Program requirements. At this time, the pDEIS does not contain sufficient site specific detail to fully describe anticipated impacts to WOUS or document compliance with applicable laws and regulations. We have determined that additional information (project descriptions, drawings, impact analyses, consultations, etc.) would be required to support decision making for the proposed activities subject to our regulatory jurisdiction. If the necessary information is not contained in the FEIS, supplemental information, consultations, and/or analyses would be required during subsequent DA permit application evaluation process(es) to meet regulatory legal obligations under the Clean Water Act (CWA). Applicants will be required to provide any supplemental information and/or analysis (e.g., field delineations, assessments of aquatic resources, etc.).

Federal regulations prohibit the DA from issuing federal permit(s) without evidence of compliance with the Endangered Species Act, the National Historic Preservation Act, and Section 401 of the CWA has been achieved as applicable. Additionally, documentation of conformity with the Clean Air Act and consultation requirements under the Magnuson-Stevens Fishery Conservation and Management Act, as amended by the Sustainable Fisheries Act of 1996, as applicable, will also be necessary prior to permit issuance.

Additional documentation and analysis of potentially practicable alternatives for the proposed infrastructure projects will be required to demonstrate compliance with our general requirement under 33 CFR 320.4(r) to avoid and minimize significant public interest impacts and/or with the CWA 404(b)(1) Guidelines (Guidelines), which prohibit the issuance of a DA permit for an action if a less environmentally damaging practicable alternative is available. In general, the CWA requires that all appropriate and practicable actions to avoid, minimize, and compensate for losses to aquatic resources are employed. Federal regulations require the applicant to provide all documentation necessary to demonstrate compliance with the Guidelines. An analysis of the practicability of potentially less environmentally damaging alternatives is an integral part of this demonstration.

Compensatory mitigation for some or all of the anticipated unavoidable losses of aquatic resources may be required. Compensatory mitigation plans must be finalized prior to issuance of standard DA permits. Potential compensatory mitigation may include: 1) purchasing credits from an approved mitigation bank in the project's service area; 2) payment of an in-lieu fee from an approved in-lieu fee program in the project's service area; 3) permittee responsible mitigation; or 4) a combination of these.

Please contact Mr. Jason Brewer by e-mail at Jason.d.brewer@usace.army.mil, by phone at (907) 753-2823, toll free within Alaska at (800) 478-2712, or by mail at the address above, for clarification or discussion of the comments provided. For additional information about of Regulatory Program, please visit our website at www.poa.usace.army.mil/Missions/Regulatory.

Sincerely,

Ryan H. Winn
Chief, North Section



United States Department of the Interior

FISH AND WILDLIFE SERVICE
1011 E. Tudor Rd.
Anchorage, Alaska 99503



IN REPLY REFER TO:
FWS/R7/NWRS717-0056

Donald Antrobus, PE
CAPT U.S. Public Health Service
Environmentally Threatened Communities Program Manager
Denali Commission
510 L St. # 410
Anchorage, Alaska 99501

Dear Mr. Antrobus:

In his May 19, 2017 memo, Joel Neimeyer, Federal Co-Chair of the Denali Commission, asked that “agencies that expect to conduct decommissioning activities in the future should provide information on their responsibility to decommission components of the Newtok village site to the Denali commission... no later than June 9, 2017.” The U.S. Fish and Wildlife Service (Service) does not expect to *conduct* any such decommissioning activities. Because Newtok lies within Yukon Delta National Wildlife Refuge, however, we have both specific legal responsibilities and concerns about the time-table and process of decommissioning. This correspondence will address those legal authorities, the resources of concern, and the threats to those resources derived from the time-table for and/or the process of decommissioning. In addition, we include some requests and recommendations at the very end. We hope these comments will inform the current EIS as well as future planning and implementation of decommissioning activities.

Legal authorities

The village of Newtok occupies 22(g) lands—i.e., lands selected by the village from within a pre-ANILCA refuge (in this case, the Clarence Rhode National Wildlife Range). Even after the Native Corporation receives their patent to those lands, ANCSA stipulates that “such lands remain subject to the laws and regulations governing use and development of such Refuge.” Among the implications of 22(g) is that proposed activities on those lands require a compatibility determination from the refuge manager. In the case of Newtok, prior to the onset of decommissioning, proposed activities would need to be determined as compatible. In other words, activities on 22(g) lands must “not materially interfere with or detract from the fulfillment of refuge purposes on adjacent refuge lands.” Such a compatibility determination can include, if necessary, stipulations to ensure compatibility.

Other authorities that provide a nexus for Service involvement in decommissioning include ANILCA, the Endangered Species Act, the Migratory Bird Treaty Act, and the Fish and Wildlife Coordination Act. For example, the refuge’s four ANILCA purposes include i) conserving fish and wildlife populations and habitat in their natural diversity, ii) fulfilling international treaty

obligations, iii) providing opportunity for continued subsistence uses, and iv) ensuring water quality and necessary water quantity within the refuge. All four of these purposes could come into play relative to decommissioning activities at Newtok. In addition, relative to the Endangered Species Act, even though Newtok itself does not lie within designated critical habitat for the spectacled eider, it is both directly across the Ninglick River from, and upstream of, such critical habitat. As a result, decommissioning activities with a Federal nexus (e.g., funding, permitting, or implementing) would require Section 7 consultation with our regional endangered species permitting personnel.

Resources of Concern

The focus of this section will be the outstanding diversity and abundance of bird resources in the vicinity of Newtok. We note, however, that this is not an exhaustive summary of important resources. Subsistence users from Newtok harvest species other than those mentioned here. Similarly, the water quality of the Ninglick River and associated wetlands is essential for maintaining both the natural diversity of fish and wildlife and opportunities for healthy subsistence harvest and consumption.

The area surrounding Newtok can readily be considered the historical and biological heart of the Yukon Delta National Wildlife Refuge. In 1937, President Franklin Roosevelt established the Hazen Bay Migratory Waterfowl Refuge on Kigigak Island at the mouth of the Ninglick River, just 17 km from present-day Newtok. A significant additional portion of the Delta's central coastal zone, including the area around Newtok, was protected in 1960 when the Kuskokwim National Wildlife Range was established. In 1961, this area was expanded and re-named the Clarence Rhode National Wildlife Range. These various areas were afforded protection because early explorers and biologists were astounded by the diversity and abundance of waterbirds in this region.

In subsequent decades, quantitative surveys have confirmed the richness of the area's avifauna. The following four bullets summarize these findings:

- 1) Wetlands along the Ninglick River below Mertarvik support three of the five large colonies of breeding Pacific black brant on the Yukon-Kuskokwim Delta (Wilson 2016). As such, they have significance, not only for the refuge, but also for the Pacific Flyway (please see the 7 June e-mail from Brian McCaffery (FWS) to Chris Floyd for more details about the size and importance of these colonies).
- 2) Aerial goose surveys have been conducted in the coastal zone of the Yukon-Kuskokwim Delta (YKD) for 32 consecutive years by Service personnel (Swaim et al. 2016). Geese, tundra swans and sandhill cranes have been a focus of that survey. Spatial analyses of those data indicate that the lower Ninglick River area is not just of great importance to colonial black brant, but also to all three of the non-colonial species of geese nesting on the outer YKD, to include cackling geese, emperor geese, and Pacific white-fronted geese. All three occur in the vicinity of Newtok at high densities. The outer Delta supports the majority of the global breeding populations of cacklers and emperors, and the Ninglick River area is particularly important to both. Although there are several extensive areas of high density

cackler habitat between the Askinuk Mountains and Nelson Island, the largest contiguous patch of such habitat is on the Naskonat Peninsula and adjacent wetlands immediately north of Newtok. In a relative sense, that same area (including Kigigak Island) is even more important for emperor geese, comprising the single largest expanse of high density breeding habitat; the next largest is southeast of Kokechik Bay, 80 km away.

- 3) Platte and Stehn (2009) summarized a quarter century of aerial surveys for other waterbirds along the outer coast of the YKD. They present data on 19; for 14 of them, they present a detailed synopsis of population size, trend, and distribution. Although all of the species can be found in the wetlands adjacent to and downstream of Newtok, 9 of the 14 were particularly abundant and occurred in their highest density categories there. These species included northern pintails, greater scaup, spectacled eiders, common eiders, Sabine's gulls, mew gulls, glaucous gulls, arctic terns, and red-throated loons. In fact, the spectacled eider population on the Naskonat Peninsula along the north bank of the Ninglick River has grown over the last few decades to become the largest locus of high density on the YKD.
- 4) The region also supports very high densities of breeding shorebirds. The wetlands at the mouth of the Ninglick River were part of an 853 km² study area in which the density of breeding shorebirds was 416/km². That is the highest reported shorebird breeding density in North America and is among the highest in the world (McCaffery et al. 2012).

Potential Threats to Resources

Fish and wildlife resources, subsistence opportunity, and water quality along the lower Ninglick River could all potentially be compromised by the continuing erosion and eventual abandonment of Newtok. The Newtok Environmental Site Inventory and Assessment, completed a year ago by Hobbit Environmental Consulting (Hobbit) for the Alaska Department of Commerce, Community and Economic Development, makes a compelling case regarding the potential threats in Newtok and the need to make progress on dealing with those threats in a timely manner. Specifically, they identify potential or confirmed threats and their sources in Newtok: "The hazardous material inventory identified 22 potential sources of concern. These locations include the landfill, waste staging areas, above ground storage tank farms, individual above ground storage tanks, the sewage lagoon, buildings (community and private) and electrical transformers" (Hobbit 2015).

Even in a less dynamic environment, the materials and substances identified by Hobbit would be at risk of making their way into valuable fish and wildlife habitat. Around Newtok, however, those risks are magnified in four ways. First, Newtok is situated along a tidal river. As a result, any dangerous materials that end up in the Ninglick River would not just jeopardize habitats downstream toward the Bering Sea. Instead, depending on the timing and magnitude of tidal flux, they could be swept upriver, past the new village site at Mertarvik and into Baird Inlet, dramatically expanding the spatial scale of impact. Second, the whole rationale behind the move to Mertarvik is the rapid erosion of the river bank on the south side of the village. As Hobbit pointed out in their reports, that rate of erosion threatens to tap some potential sources of contamination and pollution and carry them into the river before steps have been taken to mitigate that risk. Third, Newtok lies in a zone of regular coastal flooding. Among the six largest storms affecting the YKD since 1913, three occurred in recent years—2004, 2005, and 2011 (Terenzi et al. 2014).

In addition, a storm surge in 2006 reached over 27.4 km inland, almost as far as during the 2005 and 2011 storms (30.3 and 32.3 km inland, respectively). Such surges can transport dangerous materials not just up and down drainages and rivers, but also across vast, temporarily inundated expanses of rich but flat coastal meadows of inestimable value to wildlife. Fourth, Newtok itself is situated amid a mosaic of low wetlands and slightly elevated peatland plateaus which have been lifted as a result of permafrost aggradation. Much of the construction and development in the village is situated on these plateaus. Elders and scientists have already documented such plateaus subsiding elsewhere on the outer YKD due to permafrost degradation. The impacts of such degradation on the structural integrity of buildings, berms, piping, etc., as well as changes in local hydrology resulting from subsidence are difficult to predict accurately. In any case, elevated rates of permafrost subsidence have negative implications for our collective ability to prevent contamination and hazardous substances from spreading beyond the confines of the village.

In addition to the physical threats resulting from a delayed, incomplete, or inadequate decommissioning of the village, there may be administrative or bureaucratic threats as well. Although there may be plans in place of which we are not aware, we found some of the statements in the Hobbit reports, as well as comments in Mr. Neimeyer's memo, of concern to us.

In total, Hobbit's three reports do not present a clean-up plan, but rather a path forward to *begin* formal sampling and planning for clean-up. They noted repeatedly that no actual material, soil, or water sampling had been done, and that no hazardous wastes had been definitively identified via formal testing. In addition, despite recommending some specific approaches and providing cost estimates for developing and concluding a clean-up (with the latter estimates ranging between roughly 10 and 20 million dollars), they are not the responsible party for moving this process forward. Indeed, their use of the passive voice in the reports (particularly Part III) is striking. Hobbit suggested that several tasks "must" or "should" be accomplished within a certain time-frame or in a particular sequence, but the responsible parties for implementing those actions were not indicated. Even when the agency or bureau responsible for regulating or overseeing certain activities was identified, no mention was made of *who* would be regulated or overseen (i.e., who would actually be taking the lead on accomplishing the various tasks).

This "vacuum at the top" was made abundantly clear in Mr. Neimeyer's memo when he stated, "Decommissioning scope, timing, and funding are speculative at this point, and [t]here is no federal agency with the express authority to decommission a town site." Given the estimated rate of erosion (and the potential for storm surges to accelerate erosion beyond the recent projections), this level of uncertainty is problematic. Of course, even the pace of erosion may be uncertain. At least as recently as one year ago, the Hobbit report was still using a projection that is now a decade old. If at all possible, it would be helpful to include in the EIS a revised and updated shoreline erosion projection.

Although not stated explicitly in Mr. Neimeyer's memo, the Denali Commission seems to have concluded (in consultation with CEQ) that the development of Mertarvik and the decommissioning of Newtok are *not* connected actions in the context of NEPA. If that inference is correct, it would be helpful to have the Denali Commission spell that out explicitly for the cooperating and consulting agencies.

We are pleased to see that the future decommissioning will be considered “reasonably foreseeable” and that the information solicited in Mr. Neimeyer’s memo will be incorporated into the cumulative effects analysis for this current EIS. We do have some reservations, however, concerning the conclusion that “details on the scope, timing, and funding of decommissioning are unknown and cannot be analyzed in a meaningful way.” The Hobbit reports seem to provide information on all three topics: 1) scope—in terms of the range of materials, substances, and sites which would need to be addressed, 2) timing—at least in terms of the sequence in which various activities should occur, and 3) funding—in terms of the amounts (if not the sources) needed to accomplish the various tasks. They also identify, at least in part, those activities which may or may not be accomplished given the projected rate of erosion at the site. In conjunction with the information solicited by Mr. Neimeyer from the agencies with potential responsibility for components of decommission, we believe that your team could use this information to include in the EIS what would functionally be a gap analysis calibrated by the most recent erosion model.

In its essence, that analysis could identify which elements of a clean-up or decommission would need to be completed in what order and by what estimated dates (i.e., to keep ahead of erosion) and which agencies would be responsible for developing, funding, and implementing those plans. The gaps would then represent 1) tasks, timetables and/or funding for which nobody was taking explicit responsibility, as well as 2) those tasks for which a particular agency has responsibility, but for which planning and/or funding may already be lagging.

We believe that, even though such an analysis would not be able to include the level of detail that the EIS will consider for the primary proposal, a decommissioning analysis could still be “meaningful” and would indeed be extremely important for estimating cumulative impacts. In fact, there should be sufficient information about decommissioning for both agencies and the general public to find, or determine if there even is, an answer to the question, “What is the process, and who are the responsible parties, for planning, funding, and implementing a decommissioning effort at Newtok before erosion and/or storm surges render such efforts irrelevant?”

Thank you for the opportunity to share these observations and concerns with you.

Sincerely,



Mitch Ellis
Chief of Refuges, Acting



United States Department of the Interior

U.S. FISH AND WILDLIFE SERVICE
Anchorage Fish and Wildlife Field Office
4700 BLM Road
Anchorage, Alaska 99507



In Reply Refer To:
FWS/AFES/AFWFO

June 20, 2017

EMAILED TO:

Mr. Chris Floyd
U.S. Army Corps of Engineers
Post Office Box 6898
Joint Base Elmendorf-Richardson, Alaska 99506

Subject: Newtok Village Relocation Mertarvik, Alaska (*Consultation 07CAAN00-2017-I-0221*)

Dear Mr. Floyd:

Thank you for requesting section 7 consultation with the U.S. Fish and Wildlife Service (Service), pursuant to the Endangered Species Act of 1973 (16 U.S.C. 1531 et seq., as amended; ESA) by correspondence received May 24, 2017. The United States Army Corps of Engineers (Corps) is re-initiating consultation 71450-2008-I-0064 for the relocation of a community from Newtok to Mertarvik on Nelson Island, Alaska. The Corps has determined the action may affect, but is not likely to adversely affect, the federally threatened spectacled eider (*Somateria fischeri*).

The existing community of Newtok is near sea level approximately 19 miles from the Bering Sea, on the Ninglick River. Melting permafrost, ice-jams, and shoreline sloughing along the river is causing flooding and erosional threats to structures in the community of Newtok. Mertarvik is located about 9 miles further inland, upstream on the Ninglick River, on higher ground. The initial consultation in 2008 was for an emergency evacuation center for up to 100 residents, which included construction of a barge landing, all weather access road, utilities, water and sewage at Mertarvik. The Service concurred with the Corps determination that the initial action may affect, but was not likely to adversely affect spectacled eider, January 9, 2008.

Currently the Corps is conducting an environmental impact analysis with the community as they plan for the permanent relocation of their residence to Mertarvik. Additional construction would take place over a 10-year period. The Mertarvik community would expand to include the

multiple residential homes with additional access roads, utilities, and other various community structures.

Spectacled eiders usually nest within 9 miles of the coast. In 2005, the Service conducted field surveys for spectacled eider on the 432-acre wetland complex near the Metarvik site (Bowman and Lance 2005). No eiders were found in the area in 2005, which was a relatively good year for spectacled eider nesting. The long-term nest population study (Fischer et al. 2017), shows the overall estimates of spectacled eider nests in 2005 was 9 percent above the long-term mean (1985-2016) and the 2005 results together with the relatively higher population estimates for the other areas on the Yukon River Delta during that same year leads to the conclusion that wetlands near Mertarvik do not support eider nesting (Brian McCaffery, pers. comm., 2017, email to the Corps).

Relocating additional residents to the Metarvik area could result in additional pressure from hunting and egg gathering, but the community is moving further away from preferred spectacled eider nesting habitat, away from the coast. Take for hunting is analyzed annually under a separate consultation for subsistence hunting regulations (USFWS 2017).

Given the area does not currently support spectacled eider nesting, and hunting is considered under an annual consultation, the Service concurs with the Corps' determination that proposed activities may affect but are not likely to adversely affect spectacled eider. Our concurrence relates only to federally listed or proposed species and/or designated or proposed critical habitat under our jurisdiction. It does not address species under the jurisdiction of National Marine Fisheries Service, or responsibilities under the Migratory Bird Treaty Act, Marine Mammal Protection Act, Clean Water Act, Fish and Wildlife Coordination Act, National Environmental Policy Act, Bald and Golden Eagle Protection Act, or other legislation.

Based on this concurrence, requirements of section 7 of the ESA have been satisfied. Obligations under section 7 of the ESA must be reconsidered if new information reveals project impacts that may affect listed species or critical habitat in a manner not previously considered, if this action is subsequently modified in a manner which was not considered in this assessment, or if a new species is listed or critical habitat is designated that may be affected by the proposed action.

Thank you for your cooperation in meeting our joint responsibilities under the ESA. For more information or if you have any questions please contact Ms. Jennifer Spegon at 907-271-2768 or at jennifer_j_spegon@fws.gov and refer to consultation number 2017-I-0221.

Sincerely,



Douglass M. Cooper
Branch Chief, Ecological Services

Literature Cited

Bowman, T., and E. Lance. 2006. Field reconnaissance of Takikchak, preferred town site for the relocation of Newtok Village. Report to the Army Corps of Engineers.

Fischer, J. B., Williams, A.R., and R.A. Stehn. 2017. Nest population size and potential production of geese and spectacled eiders on the Yukon-Kuskokwim Delta, Alaska. 1985-2016. Unpublished Report. U.S. Fish and Wildlife Service, Anchorage, Alaska.

[USFWS] U.S. Fish and Wildlife Service. 2008. Consultation number 71450-2008-I-0064. Emergency evacuation center, Mertarvik, Nelson Island.

[USFWS] U.S. Fish and Wildlife Service. 2017. Annual intra-service biological opinion for hunting regulations, Fairbanks Fish and Wildlife Service and Migratory Birds. March 13, 2017.

From: [McCaffery, Brian](#)
To: [Don Antrobus](#)
Subject: FWS comments about decommissioning
Date: Monday, June 12, 2017 3:42:13 PM

Dear Don,

I had an appointment scheduled with my division chief today to review our agency's draft response regarding decommissioning. Unfortunately, he had to cancel because he was unexpectedly called out of town. As a result, the formal review of our draft comments will take more time than anticipated.

In the interim, as per your request last Friday, I can provide this list of topics considered in the draft. I anticipate at least some subset of them being included in the final version from our Chief of Refuges. As currently structured, the draft identifies legal authorities, summarizes some of the most important refuge resources potentially impacted by decommissioning activities, and identifies potential threats to those resources related to decommissioning.

1) Although FWS is unlikely to be formally involved in any active decommissioning activities, there are several legal authorities under which we operate which will require our involvement as other agencies develop plans for decommissioning.

2) Refuge lands in the immediate vicinity of Newtok support a) three of the YKD's five large brant colonies, 2) very high density populations of 3 other species of nesting geese, 3) very high density populations of 9 other broadly distributed waterbirds, including the threatened spectacled eider, and 4) among the world's highest densities of breeding shorebirds.

3) Threats to these resource are both physical and administrative. The three Hobbit reports clearly summarize a host of potential threats to refuge resources. Several particular aspects of Newtok's location increase the potential pollution/ contamination risks (i.e., physical threats) resulting from inappropriate, inadequate, or ill-timed decommissioning/cleanup activities. These aspects include a) Newtok's location on a tidal river with regular current flow both upriver and downriver from the village, b) the ongoing rapid erosion at the site, c) Newtok's vulnerability to extreme storm-surge and flooding events, and d) the risk of permafrost degradation.

Administrative threats were actually summarized by Mr. Neimeyer when he noted in his letter that "Decommissioning scope, timing, and funding are speculative at this point, and [t]here is no federal agency with the express authority to decommission a town site." Ideally, that magnitude of uncertainty could be reduced by an analysis in the EIS which integrates the information in the Hobbit reports with agency-specific responses to Mr. Neimeyer's letter in May. In addition, such an analysis would be significantly enhanced if an updated erosion forecast could be included as well.

I hope this gives you a sense of our comments and concerns. I will try to get our formal comments to you as soon as possible. Thanks again for your patience.

Cheers,

Brian

--

Brian J. McCaffery
U. S. Fish and Wildlife Service

Natural Resources Planner
National Wildlife Refuge System - Region 7
Division of Natural Resources
Branch of Conservation Planning and Policy

information on the tugs and barges expected to be used over the life of the project, and because you regard a concurrence prior to the draft EIS public review process to be pre-decisional.

The expectation is that marine impacts from future construction activities at Mertarvik will be addressed through the Corps Regulatory Division permitting process.

The Corps Civil Works branch may approach you about a programmatic LOC in the future.

At this time, we welcome the NMFS' input on our list (below) of ESA and MMPA species, and conservation recommendations that can be provided for these species at this time.

Chris Floyd
Environmental Resources Section
Program Management - Civil Works Branch
Alaska District
US Army Corps of Engineers
907-753-2700 <tel:907-753-2700>

ESA
Steller sea lion, Western Distinct Population Segment (DPS)
Humpback whale, Western North Pacific DPS
Humpback whale, Mexico DPS
North Pacific right whale
Gray whale, Western North Pacific population
Sperm whale
Blue whale
Beluga whale, Cook Inlet DPS
Ringed seal
Bearded seal

MMPA
Northern fur seal
Ribbon seal
Spotted seal
Beluga whale (non-ESA populations)
Gray whale (non-ESA populations)
Harbor porpoise
Killer whale
Minke whale



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May 21, 2017

Mark Carey
Mitigation Division Director
Federal Emergency Management Agency
130-228th Street, SW
Bothel, Washington 98021-8627

Dear Mr. Carey:

Re: Cooperating Agency Request for Mertarvik Infrastructure Development Project -
Environmental Impact Statement (EIS)

This letter is in response to our phone call conversation of May 18, 2017 and your letter dated March 31, 2017, requesting participation in the EIS as a Cooperating Agency. In addition to the request for Cooperating Agency status, your letter provided the following comments regarding alternatives and issues that should be included in the EIS:

- Evaluate the scope of environmental issues to include effects on floodplains and subsistence resources.
- Incorporate previous FEMA Environmental Assessment scoping comments into the EIS scoping process.
- Include a description of anticipated decommissioning activities in Newtok to include demolition, dismantling, and disposal of infrastructure and housing, environmental remediation; and land restoration.

As the lead agency, the Commission has defined the proposed federal action to include the construction of all infrastructure required at the new village site of Mertarvik. The Commission will address your comments in the first two bullets above within the evaluation of the proposed actions. As to decommissioning in Newtok, I will point you to the enclosed memorandum dated May 19, 2017 that I signed. The subject document outlines the extent the Commission will address on decommissioning.

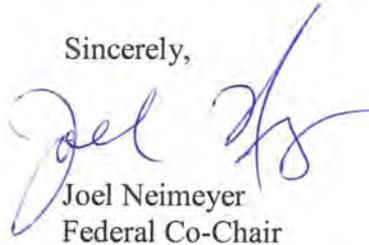
From our discussion, I understand that the Commission's intended EIS work (with limited decommissioning analysis) may be insufficient for FEMA's environmental review required for acquisition and demolition of 13 homes in Newtok. If further NEPA analysis on decommissioning (beyond the scope the Commission will undertake) is required for the acquisition and demolition of these homes, then FEMA will need to conduct that work.

To the question of FEMA serving as a Cooperating Agency or as a Participant Agency, we

welcome FEMA in either capacity. However, the Commission's recent decision on decommissioning, may lead you to another position on what capacity FEMA prefers. Please let me know if you still want FEMA to be a Cooperating Agency and we will take the necessary steps to accommodate this request.

I will be out of the office until June 1, 2017 but upon my return I will be happy to discuss with you the points in this letter. My direct line is 907-271-1440. In the event you or other FEMA staff wish to discuss this or other EIS matters in the near term, please contact CAPT Don Antrobus, P.E., Village Infrastructure Protection Program Coordinator at (907) 271-3500.

Sincerely,



Joel Neimeyer
Federal Co-Chair

Enclosure



Denali Commission
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To: Participant and Cooperating Agencies
From: Federal Co-Chair, Denali Commission
Subject: Mertarvik Infrastructure Development Project – Decommissioning of Newtok
Date: May 19, 2017

This is an update to all agencies working with the Denali Commission (Commission) on the Environmental Impact Statement (EIS) for the development of Mertarvik.

During the March 29th agency scoping meeting, and in subsequent correspondence, several agencies asked if the decommissioning of Newtok should be a component of the EIS. In evaluating this issue, the Commission considered the following:

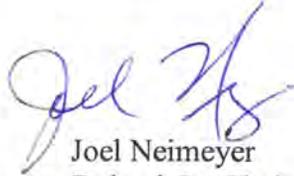
- Decommissioning Newtok infrastructure is not necessary to construct infrastructure at the new townsite,
- Some Newtok infrastructure must be maintained for an indefinite period to support individuals that may still reside in Newtok,
- The Village of Newtok has not expressed a desire to decommission the Newtok townsite,
- Decommissioning scope, timing, and funding are speculative at this point, and
- There is no federal agency with the express authority to decommission a townsite.

After consulting with the Council on Environmental Quality (CEQ), the Commission has decided to proceed as follows.

1. Future decommissioning of Newtok is reasonably foreseeable and we will include a general discussion on future decommissioning of Newtok in the EIS. The discussion will summarize the general range of decommissioning activities that might occur in Newtok. However, details on the scope, timing, and funding of decommissioning are unknown and cannot be analyzed in a meaningful way at this time except as outlined in Paragraph No. 2 below.
2. Federal Aviation Administration (FAA) and State of Alaska Department of Transportation and Public Facilities (DOT&PF) intend to include closure of the Newtok airport as part of the Mertarvik airport construction project. Accordingly, FAA will complete an analysis related to decommissioning the Newtok airport, and said analysis will be included in an appendix to the Mertarvik EIS.
3. Other agencies that expect to conduct decommissioning activities in the future should provide information on their responsibility to decommission components of the Newtok village site to the Denali Commission to support the cumulative effects analysis in the EIS. This information is needed as soon as possible but no later than June 9, 2017. Site-specific analysis of future decommissioning plans and activities will need to be addressed by the responsible Federal agency plan at that time.

4. We will maintain our EIS schedule. The Commission believes the erosion rates in Newtok border on an emergency situation.

Participant and Cooperating Agencies are encouraged to call me or my staff on this or any other matter related to the Mertarvik EIS document. My direct line is 907-271-1440, or you can contact CAPT Don Antrobus at 907-271-3500.



Joel Neimeyer
Federal Co-Chair
Denali Commission

cc: Ted Boling, Associate Director for NEPA, CEQ
Dianne Soderlund, Director, Region X, EPA
Joel Clement, Director, Office of Policy Analysis, DOI
Paul Charles, Tribal Chairman, Newtok Village Council



Rural Development

April 6, 2017

Alaska State Office
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Voice: (907) 761-7705
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Joel Neimeyer
Federal Co-Chair
Denali Commission
510 L Street, Suite 410
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RE: Invitation to participate in Mertarvik Infrastructure Development Project – Environmental Impact Statement (EIS)

Dear Mr. Neimeyer:

Thank you for the opportunity to participate in the EIS being prepared for the relocation of Newtok to Mertarvik. At this time, the United States Department of Agriculture, Rural Development (RD) does not have any applications on hand from entities involved with Newtok or Mertarvik. As such, it is difficult for RD to evaluate a document when specific actions by the agency are unknown.

As defined by the Collaboration in National Environmental Policy Act handbook prepared by the Council on Environmental Quality, we will participate as a *consult* level agency only. This level will provide us the opportunity to review and provide informational purpose comments only. As a *consult* agency, we will not be entering into a Memorandum of Understanding or any other document as a cooperating agency.

For possible future funding requests submitted to RD, the Agency may adopt the EIS prepared by the Denali Commission if the proposed actions and site conditions addressed in the environmental document are substantially the same as those associated with the proposal being considered by the Agency. The Agency will consider age, location, and other reasonable factors in determining the usefulness of the Denali Commission's documents. The Agency will complete an independent evaluation of the environmental document to ensure it meets the requirements of 7CFR1970.

Based on the initial scoping meetings, RD would like to provide some initial comments. RD feels that the decommissioning of the Newtok facilities is a connected action and should be evaluated in the EIS. The review of alternative facilities and alternative locations for each facility must be outlined in detail in the EIS document. This would include the overall footprint of the community and the opportunity to utilize smaller lots to help reduce the impact to environmental resources.

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The point's of contact at our agency will be Tim Krug, State Environmental Coordinator, and Tasha Deardorff, Assistant State Environmental Coordinator. Please contact them for any comments or questions regarding RD environmental process.

Sincerely,

A handwritten signature in cursive script that reads "Renee Johnson". The signature is written in black ink and is positioned above the printed name.

RENEE JOHNSON
Acting State Director

cc: Christopher Floyd
NEPA Coordinator
USACE



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10**

1200 Sixth Avenue, Suite 900
Seattle, WA 98101-3140

OFFICE OF
ENVIRONMENTAL REVIEW
AND ASSESSMENT

April 4, 2017

Christopher Floyd
NEPA Coordinator
U.S. Army Corps of Engineers
Alaska District, CEPOA-PM-C-ER
P.O. Box 6898
Joint Base Elmendorf-Richardson, Alaska 99506-0898

Dear Mr. Floyd:

The U.S. Environmental Protection Agency has reviewed the Federal Register Notice of Intent (NOI) issued by the Denali Commission in cooperation with the U.S. Army Corps of Engineers to prepare an Environmental Impact Statement (EIS) to study the Mertarvik Community Infrastructure Development Project (EPA Region 10 Project Number 17-0012-COE). Our review was conducted in accordance with our responsibilities under the National Environmental Policy Act, the Council on Environmental Quality regulations for implementing NEPA, and Section 309 of the Clean Air Act. Section 309 specifically directs EPA to review and comment in writing on the environmental impacts associated with all major federal actions.

The EPA is also supporting the Denali Commission in the EIS development effort as a participating agency, subject to available resources. We appreciate the opportunity to provide early input in the analysis of the Mertarvik Project, and we look forward to working together toward the successful and expeditious completion of the EIS.

Project Background

The village of Newtok is located on the west coast of Alaska on the banks of a tidally influenced slough of the Ninglik River. The Ninglik River is rapidly eroding toward the village of Newtok, and it is anticipated that the village has approximately four (4) years before critical village infrastructure will be threatened and/or destroyed. Changes in river channels have also increased the frequency and severity of flooding in the village. The Mertarvik site on Nelson Island is a 10,943-acre site transferred to the Newtok Native Corporation from the U.S. Fish and Wildlife Service in 2003, and is the closest high ground that avoids damages from both flooding and erosion. The EIS will assess the potential environmental impacts of reconstructing all required infrastructure to relocate the threatened community of Newtok to the new village site of Mertarvik. This includes an airport; solid waste landfill; wastewater collection system and treatment lagoon; bulk fuel farm and fuel dispensing facility; power house and power distribution system; water treatment plant, storage tank and distribution lines; barge landing; housing; school; public buildings; and all associated subdivision and connecting roads.

Purpose and Need

The EIS should include a clear and concise statement of the underlying purpose and need for the proposed project, consistent with the implementing regulations for NEPA (see 40 CFR 1502.13). The

Purpose is the problem to be solved, the “what” of the proposal. The purpose statement should address specific goals and objectives of the proposed action and/or be expressed as expected positive outcome(s). The *Need* is the “why” of the proposal. The *Need* should address the broader social need to which the agency is responding by establishing evidence that an opportunity or a problem exists, or will exist. The statement of purpose and need helps the lead agency to select the range of alternatives to be evaluated in the EIS.

According to the NOI, the purpose and need for the EIS is “to identify a practicable and environmentally responsible solution to protect the village of Newtok from both flooding and erosion damages and loss of life.” As written, this purpose and need statement appears to focus on protection of the existing village location, and does not logically lead to consideration of relocating the community. We suggest that the purpose and need in the EIS be revised to focus on protecting the citizens of the community, as well as on developing a long-term, resilient solution. This will help the Denali Commission to ensure that the proposed action fits with the purpose and need for the project.

Range of Alternatives

According to NEPA the range of reasonable alternatives should respond to the purpose and need for the project and to issues identified during the scoping process. This ensures that the EIS provides the public and the decision-maker with information that sharply defines the issues and identifies a clear basis for choice. We support the Denali Commission’s intention, as described in the NOI, to analyze “structural alternatives” with possible improvements to the existing Newtok Village that would allow residents to stay in their current location, as well as a no action alternative. In addition, we recommend that the EIS analyze sub-alternatives to the proposed action, where adequate information exists to assess the relative impacts of options for development of individual infrastructure components. For example, sub-alternatives may include alternative airport locations, barge landing configurations, or wastewater treatment methods.

Affected Environment

According to the National Climate Assessment (NCA), Alaska’s climate has warmed twice as fast as the rest of the nation, bringing widespread impacts including receding sea ice, melting glaciers, thawing permafrost, rising ocean temperatures and ocean acidification. The NCA also indicates climate change in Alaska will strongly affect Native communities. We recommend that the description of the affected environment include projected future changes that may affect the proposal. We recommend this include consideration of future climate scenarios, such as those provided by the NCA. See <http://nca2014.globalchange.gov/>. If projected changes could exacerbate environmental impacts of the project, these likely changes should also be considered as part of the NEPA analysis.

Aquatic Resources, Wetlands and Riparian Areas

The EIS should describe aquatic habitats in the affected environment (e.g., habitat type, plant and animal species, functional values, and integrity) and the environmental consequences of the proposed alternatives on these resources. Impacts to aquatic resources should be evaluated in terms of the areal (acreage) or linear extent to be impacted and by the functions they perform.

If a Clean Water Act Section 404 permit is required, the EPA will review the project for compliance with the *Federal Guidelines for Specification of Disposal Sites for Dredged or Fill Materials* (40 CFR

230), promulgated pursuant to Section 404(b)(1) of the CWA ("404(b)(1) Guidelines"). Among other restrictions on discharge, the 404(b)(1) Guidelines require that:

- any permitted discharge into waters of the U.S. must be the least environmentally damaging practicable alternative (LEDPA) available to achieve the project purpose; and
- appropriate and practicable steps be taken, in sequence, to: (1) avoid, (2) minimize, and then (3) compensate for impacts to aquatic resources.

For wetlands and other special aquatic sites, the Guidelines establish a presumption that upland alternatives are available for non-water dependent activities.

Where such information is available for individual infrastructure components, the EIS should discuss how planning efforts and alternative selection conform with Section 404(b)(1) guidelines sequencing and criteria. In other words, the lead agency must show that they have avoided impacts to wetlands and other special aquatic sites to the maximum extent practicable. The EIS should include an evaluation of the project alternatives in this context in order to demonstrate the project's compliance with the 404(b)(1) Guidelines, including how alternatives would avoid wetlands and aquatic resource impacts from fill placement, water impoundment, construction, and other activities before proceeding to minimization/mitigation measures.

Given the characteristics of the Mertarvik site, alternatives may not be available that fully avoid impacts to wetlands and aquatic resources. For unavoidable potential impacts, the EIS should include information regarding means to further minimize impacts. For any remaining potential impacts, the NEPA document should include information regarding a compensatory mitigation plan that is in compliance with the *Compensatory Mitigation for Losses of Aquatic Resources; Final Rule* (40 CFR 230, Subpart J, commonly referred to as the Final Mitigation Rule). The regulations establish performance standards and criteria for the use of permittee-responsible compensatory mitigation, mitigation banks, and in-lieu programs to improve the quality and success of compensatory mitigation projects for activities authorized by Corps permits. Restoration of the existing townsite at Newtok may provide a potential opportunity for compensatory mitigation.

Pursuant to 40 CFR 230.94(c), CWA 404 permit applicants who propose to offset their own impacts must prepare and submit mitigation plans containing the items described in paragraphs § 230.94(c)(2) through (c)(14). The level of detail of the mitigation plan should be commensurate with the scale and scope of the impacts. Applicants who intend to fulfill their compensatory mitigation obligations by securing credits from approved mitigation banks or in-lieu fee programs need only provide the items described in paragraphs (c)(5) and (c)(6), as well as the name of the specific mitigation bank or in-lieu fee program to be used.

If available, compensatory mitigation plans developed to offset the aquatic resource impacts of individual infrastructure components should be included in the EIS. Please note that 404-proposed mitigation is separate from, and may be in addition to, NEPA mitigation.

Water Quality and Stormwater Discharge

Surface disturbance associated with development of infrastructure and roads, as well as ongoing use of roads and disturbed areas, facilitates sediment transport to water bodies and increases habitat fragmentation and wildlife disturbance, as well as invasive plant infestations. Roads may also interrupt the subsurface flow of water. We recommend that the EIS include information about the extent of

proposed surface disturbance and predicted impacts to water quality. Under the CWA, any construction activity that disturbs one or more acres also requires an Alaska Pollutant Discharge Elimination System storm water permit for discharges to waters of the U.S. The EIS should document the project's consistency with applicable storm water permitting requirements and should discuss specific mitigation measures, which may be necessary or beneficial in reducing adverse impacts to water quality. We also recommend that all roads be designed with appropriate Best Management Practices for ongoing prevention of sediment runoff concerns.

Wastewater Treatment and Drinking Water Supply

Lack of in-home water and sewer service can result in severe gastrointestinal tract and skin infections and respiratory illnesses, including invasive pneumococcal disease. Development of a long-term and affordable solution to provide drinking water supply and safely treat and dispose of wastewater is critical to the health and success of the future Mertarvik community. The proposed action includes a wastewater collection system and wastewater treatment lagoon, as well as a drinking water treatment plant, water storage tank, and water distribution lines. Due to the potential cost of the proposed systems, it is possible that the community of Newtok would be forced to relocate to the new Mertarvik townsite before funding was available to install these treatment systems. This could result in unsafe living conditions for residents. Consequently, we recommend that the EIS also analyze alternative wastewater and drinking water options, including individual or multiple-unit septic tank and drain field systems and individual water wells. This alternative allows for the provision of water and sewer service as individual or small groups of homes are located in Mertarvik, whereas piped systems will require a critical mass of homes to operate the system and provide enough heat to prevent the systems from freezing.

Public water systems are required to be in compliance with State of Alaska drinking water standards, in accordance with the Safe Drinking Water Act. The Alaska Department of Environmental Conservation (ADEC) Drinking Water Program conducts Source Water Assessments for public drinking water systems, to help communities ensure the safety of their water supply by delineating the area contributing water to their system, conducting an inventory of potential contamination sources, and determining the susceptibility of the water supply to those sources (see http://dec.alaska.gov/eh/dw/DWP/source_water.html). We recommend that a Source Water Assessment be conducted as part of the planning process for the Mertarvik community, to ensure that safe drinking water is an integral part of community design and future growth.

Solid Waste Management

An Integrated Waste Management Plan (IWMP) is a document that outlines how the tribe will reduce, manage, and dispose of its waste. It serves as a roadmap for developing an effective waste management program. A successful IWMP helps to lower total operating costs, increases efficiency, reduces open dumping, and improves protection of human health and the environment. The five critical elements of an IWMP include:

- Description of the community service area;
- Description of the tribe's waste management program structure and administration;
- Description of the tribe's current and proposed waste management practices;
- Description of the funding, sustainability, and the long-term goals of the tribe's waste management program; and,
- Demonstration of approval by the Tribal Council.

We recommend that an IWMP be developed for Mertarvik, and included in the EIS. The EPA, Indian Health Service, and other organizations provide training and technical assistance to tribal governments developing plans. Additional information can be found at:

https://yosemite.epa.gov/r10/tribal.nsf/Programs/tswm_plans or <https://www.epa.gov/tribal-lands/developing-tribal-integrated-waste-management-plans>. Further, previous EPA grant funds to Newtok and the Nelson Island Consortium (for the benefit of Newtok) have supported the development of several plans which will be helpful as new plans are developed for Mertarvik. They can be found at the Nelson Island Consortium website, <http://nelsonislandconsortium.org/>.

Municipal landfills in Alaska are permitted by the ADEC Solid Waste Program (see <http://dec.alaska.gov/eh/sw/>). ADEC also provides technical assistance to tribal governments and communities in developing IWMPs and Landfill Operations Plans. We recommend contacting Stephen Price, Rural Solid Waste Specialist, with questions (907-269-7467 or stephen.price@alaska.gov). We also encourage future landfill operators or administrators to attend Rural Alaska Landfill Operator (RALO) training. Information on RALO training is available on the ADEC Solid Waste Program website as well.

Fuel Storage

During storage and transport, oil is sometimes spilled onto land or into waterways, endangering human health and environmental quality. Every effort must be made to prevent oil spills and to clean them up promptly once they occur. The Spill Prevention, Control and Countermeasure (SPCC) rule helps facilities prevent a discharge of oil into navigable water or adjoining shorelines. (see <https://www.epa.gov/oil-spills-prevention-and-preparedness-regulations/overview-spill-prevention-control-and> and https://dec.alaska.gov/spar/PPR/ast_reg.htm) An SPCC plan will likely be required for the proposed bulk fuel farm and fuel dispensing facility. A facility is covered by the SPCC rule if it has an aggregate aboveground oil storage capacity greater than 1,320 U.S. gallons and there is a reasonable expectation of an oil discharge into or upon navigable waters of the U.S. or adjoining shorelines. A Facility Response Plan (FRP) is a plan for responding, to the maximum extent practicable, to a worst case discharge, and to a substantial threat of such a discharge, of oil. It also includes responding to small and medium discharges as appropriate. If the total oil storage capacity is equal to or greater than 42,000 gallons and the facility transfers oil from a vessel, an FRP may be required (see <https://www.epa.gov/sites/production/files/2014-04/documents/frpguide.pdf>). We recommend that the EIS discuss how the Denali Commission and the future Mertarvik community will prevent a release of oil from the proposed facility, and include a draft SPCC plan and FRP, if required, as an appendix to the EIS.

Air Quality

The EPA recommends that the Draft EIS evaluate how project activities could affect air quality and what measures may be needed to mitigate significant impacts. Activities with a potential for air quality impacts include construction and operation of the airport, roads, and other infrastructure. We recommend that the Draft EIS characterize existing air quality conditions to set the context for evaluating project impacts, including identification of sensitive receptors in the vicinity (such as communities, federal Class I Areas and Sensitive Class II Areas). To address potential air quality impacts, consider whether the direct, indirect, or cumulative impacts of project-related air emissions would result in any adverse impact on air quality or air quality related values.

Reducing Road Dust

Particle pollution, especially fine particles, contains microscopic solids or liquid droplets that are so small that they can get deep into the lungs and cause serious health problems. Numerous scientific studies have linked particle pollution exposure to a variety of problems, including: premature death in people with heart or lung disease, nonfatal heart attacks, irregular heartbeat, aggravated asthma, decreased lung function, and increased respiratory symptoms, such as irritation of the airways, and coughing or difficulty breathing. People with heart or lung diseases, children and older adults are the most likely to be affected by particle pollution exposure. However, even if you are healthy, you may experience temporary symptoms from exposure to elevated levels of particle pollution.

Dust from roadways can be a big source of particle pollution in rural communities. In addition to human health effects, dust blown from the roadway can settle onto vegetation or waterbodies, impairing their health as well. Proper road design and construction, including location, drainage and surfacing, can greatly reduce dust emissions from roads (see http://www7.nau.edu/itep/main/ntaa/docs/tribal-air-resources/FAQRuralDust_150226.pdf). Appropriate maintenance and use can also have a big impact. For example, slowing down from 40 miles per hour (mph) to 20 mph can reduce road dust by up to 20% (see https://dec.alaska.gov/air/anpms/Dust/Dust_docs/Road%20Design%20Resources.pdf). We recommend that the EIS discuss measures that will be employed to reduce road dust. By considering this issue during design of the future Mertarvik townsite, consideration can be given to designing roadways to reduce vehicle traffic and vehicle speeds in town.

Indoor Air Quality

High levels of particulate matter, volatile organic compounds (VOCs) and carbon monoxide (CO) are frequently found in homes in rural Alaska, due to poor ventilation and improperly functioning wood-burning and/or diesel-fired stoves. Poor ventilation can also result in moisture and mold concerns. (see <https://anthc.org/what-we-do/community-environment-and-health/healthy-homes/> and <http://www.epa.gov/iaq/>). We recommend that the EIS discuss how new homes in Mertarvik will be designed to reduce these concerns.

Smart Growth and Green Building

Use of smart growth-based principles can help the future community of Mertarvik ensure that land use and infrastructure decisions are guided by culturally sensitive, historically significant, and environmentally sustainable principles. Design and location principles appropriate for Mertarvik may include building compactly and putting a mix of uses close together, creating walkable streets, improving quality of life, and ensuring that new infrastructure is sustainable and resilient to both current and future climate change impacts and natural disasters. Use of such principles in community design can also benefit the community through reduced costs associated with fuel usage, as well as improved air quality as discussed above. (See <https://www.epa.gov/smartgrowth/smart-growth-small-towns-and-rural-communities>.) The Alaska Native Tribal Health Consortium has been working with the Denali Commission and the Newtok Village Council in the development of three different community layouts incorporating some of these principals. Additional smart growth-based design principals can be considered in the final community layout.

Construction of new housing can provide an opportunity to design buildings that utilize green building techniques, reduce waste generation, and minimize energy consumption. The EPA defines Green

building as “the practice of creating structures and using processes that are environmentally responsible and resource-efficient throughout a building’s life-cycle from siting to design, construction, operation, maintenance, renovation and deconstruction¹.” We recommend that the EIS consider discussing a strategy to support low impact building and operation. The EPA’s tribal green building website can be found at: <https://www.epa.gov/green-building-tools-tribes>.

The Cold Climate Housing Research Center (CCHRC) is an industry-based, nonprofit corporation created to facilitate the development, use, and testing of energy-efficient, durable, healthy, and cost-effective building technologies for people living in circumpolar regions around the globe (see <http://www.cchrc.org/>). We understand that CCHRC has been working with the Newtok Village Council on housing design for Mertarvik, and encourage continued efforts to ensure that Mertarvik housing is appropriately designed for cold climates, to reduce pollution and improve health.

Decommissioning of Newtok

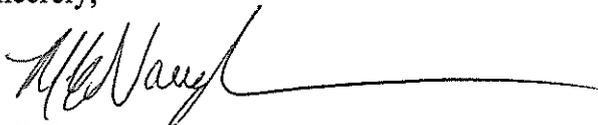
As part of determining the scope of a proposed action, the lead agency must determine whether there are connected actions that should be evaluated in the same NEPA document, including actions outside of the jurisdiction of the lead agency. Closely related actions are connected if they:

- Automatically trigger other actions which may require environmental impact statements;
- Cannot or will not proceed unless other actions are taken previously or simultaneously; or
- Are interdependent parts of a larger action and depend on the larger action for their justification (40 C.F.R. 1508.25(a)(1)).

Proposed infrastructure development activities at the Mertarvik site are likely to trigger decommissioning activities at the existing Newtok townsite, particularly where those decommissioning activities are a requirement of federal activities or federal funding (e.g., airport construction or housing buy-outs). Consequently, we recommend that decommissioning be discussed in the EIS as a likely connected action. Such a discussion could reasonably be limited to discussing anticipated federal or state requirements for decommissioning of infrastructure at Newtok; disclosing any information known about how and when such decommissioning might occur; and describing any remaining infrastructure for which decommissioning plans are unknown, in accordance with NEPA regulations regarding incomplete or unavailable information (40 C.F.R. 1502.22)

Thank you for this opportunity to provide scoping comments. We look forward to continuing to work with the Denali Commission and other cooperating and participating agencies in development of the EIS. If you have any questions, please contact me at (907) 271-1215 or by electronic mail at vaughan.molly@epa.gov.

Sincerely,



Molly Vaughan
Environmental Review and Sediment Management Unit

¹ USEPA. 2010. <http://www.epa.gov/greenbuilding.pubs.about.htm>



U.S. Department of Housing and Urban Development
Region X – Anchorage Field Office
Office of the Field Office Director
3000 C Street, Suite 401
Anchorage, AK 99503
<http://www.hud.gov/local/index.cfm?state=ak>
<http://www.hud.gov>
<http://espanol.hud.gov/index.html>

April 03, 2017

Joel Neimeyer
Federal Co-Chair
Denali Commission
510 L Street, Suite 410
Anchorage, AK 99501

Dear Mr. Neimeyer:

Thank you for your Invitation to Participate in Mertarvik Infrastructure Development Project-Environmental Impact Statement letter dated March 17, 2017. Due to our engagement with the community of Newtok in providing funding to build homes in Mertarvik, the U.S Department of Housing and Urban Development, Anchorage Field Office accepts your invitation as a cooperating agency per 40 CFR 1501.6.

Anchorage Field Office staff available to support this project are as follows:

Bill Zachares, 907-677-9860, bill.zachares@hud.gov
Andy Concepcion, 907-677-9880, andy.concepcion@hud.gov
Shawn Duthie, 907-677-9877, shawn.h.duthie@hud.gov
Ann Gravier, 907-677-9833, ann.y.gravier@hud.gov

If you have need for any further assistance, please don't hesitate to contact me or Bill Zachares, Administrator, Alaska Office of Native American Programs.

Sincerely,

A handwritten signature in blue ink that reads "Colleen Bickford".

Colleen Bickford
Anchorage Field Office Director
U.S. Department of Housing and Urban Development



FEMA

March 31, 2017

Mr. Joel Neimeyer
Denali Commission
510 L Street, Suite 410
Anchorage, Alaska 99501

Re: Invitation to Participate in Mertarvik Infrastructure Development Project – Environmental Impact Statement (EIS)

Dear Mr. Neimeyer:

Thank you for your letter of March 17, 2017, to Mr. Robert Forgit inviting the U.S. Department of Homeland Security's Federal Emergency Management Agency (FEMA) to participate in the Denali Commission's EIS for the Newtok Village Council's proposed relocation. Since 2015, FEMA has worked with the Alaska Division of Homeland Security and Emergency Management (AK DHS&EM) and Newtok Village Council on grant applications that mitigate erosion and flooding hazards to housing in Newtok. AK DHS&EM is the grant recipient and administers the Hazard Mitigation Grant Program on behalf of FEMA. The Newtok Village Council is the sub-recipient. Given the timing, nature, and connectivity of the Newtok Village Council's FEMA grant application to this EIS effort, in accordance with the Council on Environmental Quality's regulations (40 CFR Part 1501.6), FEMA respectfully request participation as a Cooperating Agency.

The Newtok Village Council's initial grant application in 2015 was to relocate 12 homes from Newtok to Mertarvik. Once the project was determined eligible for funding, FEMA initiated its National Environmental Policy Act (NEPA) review process for that action, which must be completed before grant award, and included a formal scoping effort for a planned Environmental Assessment in the spring of 2016. On October 26, 2016, the Newtok Village Council notified AK DHS&EM that its preferred project was a buyout of homes in lieu of relocation and requested AK DHS&EM change the grant scope. On February 1, 2017, the Newtok Village Council submitted a revised grant application to AK DHS&EM for acquisition and demolition of 13 homes, with about a \$3,000, 000-project cost. Currently, we are working with AK DHS&EM to resolve some details in the grant application, some of which are pertinent to FEMA's NEPA determination.

After reviewing the Notice of Intent for the EIS, FEMA provides the following initial comments regarding alternatives and issues that should be included in the scope of the EIS:

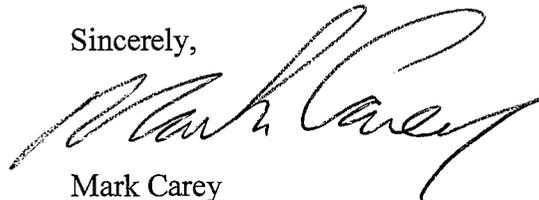
- The scope of the Proposed Action Alternative should include a description of anticipated decommissioning activities in Newtok; to include demolition, dismantling, and disposal of infrastructure and housing; environmental remediation; and land restoration. These activities are a connected action to the relocation. Articulate any unknowns. Outline a description of the Mertarvik development and Newtok decommissioning schedule, to include potential interim or temporary measures in light of the urgency for action.

- Evaluate the scope of environmental issues to include effects on floodplains and subsistence resources.
- Attached is a copy of FEMA's May 6, 2016, Scoping Summary that outlines public and agency comments received a year ago. FEMA requests that these scoping comments be incorporated into the EIS scoping process and addressed accordingly. Addressing FEMA's scoping effort into the EIS will ensure that FEMA's NEPA requirements would be fulfilled in a timely manner concurrent with the other funding agencies involved.

Since FEMA has a substantial funding stake in this project, we are prepared to assist the lead agency in the preparation of this EIS as best we can with our limited resources. Ms. Science Kilner, Deputy Regional Environmental Officer, will serve as the primary point of contact to coordinate FEMA's participation. Ms. Kilner worked with AK DHS&EM and the Newtok Village Council on prior and pending grant applications, and thus is familiar with the proposed relocation. Mr. Mark Eberlein, Regional Environmental Officer, will be the alternate point of contact. If you have any questions please contact Ms. Kilner at (425) 487-4713 or science.kilner@fema.dhs.gov or Mr. Eberlein at (425) 487-4735 or mark.eberlein@fema.dhs.gov.

Thank you for the opportunity to participate in this EIS and for taking the lead on this important collaborative federal/State/Tribal project. FEMA looks forward to working with the Denali Commission, US Army Corps of Engineers, Newtok Village Council, and other federal and state stakeholders towards a successful outcome.

Sincerely,



Mark Carey
Mitigation Division Director

Enclosure

cc: Robert Forgit, FEMA, Alaska Area Office Manager
Katherine Zeringue, FEMA Environmental Officer
Kevin Reeve, AK DHS&EM, State Hazard Mitigation Officer



Environmental Assessment Scoping Summary
Newtok Relocation Project – Pioneering Phase
Newtok Village Council

May 6, 2016



FEMA

U.S. Department of Homeland Security
FEMA Region X
130 228th Street SW
Bothell, WA 98021-9796

Introduction

The Federal Emergency Management Agency (FEMA) has a pending Hazard Mitigation Grant Program (HMGP) funding request from the Newtok Village Council (NVC) through the Alaska Department of Homeland Security and Emergency Management (DHA&EM), which administers HMGP for FEMA. The NVC has applied for funds to relocate 12 residential structures from Newtok to Mertarvik, consistent with its *Strategic Management Plan - Newtok to Mertarvik* (Plan) and specifically the ‘Pioneering Phase’ therein. Additionally, the NVC has Bureau of Indian Affairs (BIA) Tribal Transportation Program funds available to build some roads in Mertarvik which would also support the pioneering elements. The NVC also anticipates funds from the U.S. Department of Housing and Urban Development’s (HUD) Office of Native American Programs Imminent Threat Grant Program that would support additional critical infrastructure for occupancy of the 12 homes once relocated to Mertarvik. The proposed or pending federal actions require review per the National Environmental Policy Act (NEPA) of 1969 and related environmental and historic preservation statutes and executive orders; as implemented by each respective agency’s NEPA implementing regulations.

This report includes a summary of formal scoping activities completed for the proposed Newtok Relocation Project per NEPA and consistent with the Council on Environmental Quality’s (CEQ) NEPA regulations, 40 Code of Federal Regulations Part 1501.7, *Scoping*. The purpose of ‘scoping’ is to inform the scope, focus, and content of an Environmental Assessment (EA). FEMA’s NEPA scoping informally started in October 2015, after the project was determined programmatically eligible for funding; and included gathering available information about Newtok and Mertarvik, including prior federal environmental review and initiation of coordination with federal and state resource agencies and stakeholders.

The proposed action, for NEPA purposes, includes elements of the NVC’s Plan pioneering phase. This includes FEMA-funded relocation of 12 homes from Newtok to Mertarvik and BIA-funded road construction in Mertarvik. HUD funds may be available to provide needed interim utilities to support occupancy of the homes once in Mertarvik. Furthermore, there may be other ‘connected actions’ funded or planned by non-federal entities that will require outlining in the EA. Early coordination was done with BIA to collaborate on an EA that would satisfy both agency’s NEPA requirements, as well as with HUD in anticipation of their funding; with detailed discussion deferred to the outcome scoping and pending other NVC funding actions.

Much of the planning and details associated with this formal scoping effort were FEMA-coordinated because its proposed action, relocating 12 homes, has the most significant public interest and need for feedback. Additionally, during a FEMA site visit to Newtok on November 12, 2015 the NVC requested FEMA participate in a public meeting to explain the EA process to its residents, in the interest of transparency and community decision-making. The scoping effort was fully coordinated in advance with the NVC, DHS&EM), Alaska Department of Commerce, Community and Economic Development (DCCED), and BIA.

Public and Agency Scoping Notices

The notification of scoping efforts and the public comment period, March 25 to April 25, 2016 was done through published ads, web-posting, emails, and mailings as follows:

- Information about scoping was posted on DCCED's Newtok webpage on March 23, 2016: <https://www.commerce.alaska.gov/web/dcra/PlanningLandManagement/NewtokPlanningGroup.aspx> this included a Notice of Intent to Prepare an EA, scoping information, and comment sheet
- The Notice of Intent to Prepare EA was published in the March 23, 2016 issue of *The Delta Discovery* and in the March 24, 2016 issue of *The Tundra Drums*, which included the public meeting information and link to DCCED website for additional information
- Emails were sent on March 24, 2016 to 78 individuals making up a broad contact list for federal/state/regional/Tribal entities mostly associated with Newtok Planning Group, attached were the Notice of Intent, scoping information, and comment sheet, and an invitation to attend the April 11, 2016 agency meeting (contact list available on request)
- Direct mail was sent on March 24, 2016 to 40 individuals making up a select list (subset of emails) of federal/State/regional entity leadership, including the Notice of Intent, scoping information, and comment sheet (mailing list available on request)

Scoping Meetings

Two meetings were scheduled to provide information about the proposed project and invite comments, as follows.

Newtok Public Meeting:

- Held on April 5, 2016 from 7 to 9pm at the Newtok School gymnasium
- Meeting was well attended with 36 folks signing in and several others joining after meeting started. Participants included several homeowners of the 12 homes proposed to be relocated, NVC members, Newtok Corporation members, and Newtok residents
- Scoping information was made available as well as comment sheets, and posters were affixed on walls that had information about the proposed project including conceptual plans or community layout of Mertarvik
- Meeting format included a power point guided presentation (available upon request) to briefly explain the grant processes, the NEPA process and specifically scoping, the proposed project, and what feedback was sought
- After introductions by the NVC and Sally Cox, DCCED; presentations were done by Science Kilner, FEMA; Brent Nichols, DHS&EM; Andrea Meeks, CRW; and Romy Cadiente, Newtok Relocation Coordinator
- The Newtok School principal, Grant Kaskatok, translated the presentation in Yup'ik Eskimo
- Notes of the meeting were taken by Ramona VanCleve, FEMA, and others
- Chris Allard, Denali Commission, and Don Antrobus, ANTHC also attended
- Several participants asked questions and provided comments consistent with the intent of scoping, summary below

Anchorage Agency Meeting:

- Held on April 11, 2016 from 1 to 2pm at DCCED office, 550 W 7th Ave, Anchorage, a conference line was made available for folks to call in
- Meeting was well attended with 22 folks present in person and signed in (available on request), and several others joining the conference line
- Participants included NVC members and their attorney, Senator Murkowski’s Office, Denali Commission, DCCED, AK DCRA, DHS&EM, Governor’s Office, HUD, BIA, ANTHC, VSW, CEQ, CCHRC, TCC, AVCP
- Scoping information was made available as well as comment sheets
- Meeting format included a power point guided presentation, same as provided at public meeting (described above), after an introduction by Sally Cox, DCCED, the presentation was made by Science Kilner and Brent Nichols and Julie Stoneking, BIA, provided information on roads
- Notes of the meeting were taken
- Several participants asked questions and provided comments consistent with the intent of scoping, summary below

Summary of Comments

Written or verbal comments were provided by state agencies, one business, and individuals or households. The comments mainly expressed concerns about alternative details and community/social/public service plans at Mertarvik. When questions were asked about the process or project and answers were known by those presenting, they were provided to participants. The below table summarizes the scoping comments received and they are listed in no particular order.

Commenter	Method	Comment Summary
USACE AK District, Environmental Section	voice mail	<ul style="list-style-type: none">• Some prior environmental reviews completed for Mertarvik• planned EA should be comprehensive
USDA, Rural Development, Palmer AK	email	<ul style="list-style-type: none">• Supportive of project and combined EA effort• USDA can provide loans to NVC for future development in Mertarvik for full range of housing and infrastructure needs
AK Dept. of Environmental Conservation, Solid Waste Program	email	<ul style="list-style-type: none">• Recommendations provided for Mertarvik landfill facility• Newtok currently has no permitted landfill facility so no waste may be disposed of there
Gazewood & Weiner Attorneys at Law	letter via email	<ul style="list-style-type: none">• FEMA should limit the scope of its EA to its funded action, and not include BIA TTP funded roadwork in Mertarvik, which will have separate environmental review, information provided about BIA NEPA reviews

Commenter	Method	Comment Summary
		<ul style="list-style-type: none"> • Relocation efforts should be coordinated with past, ongoing and future environmental reviews by other agencies, referred to 2008 USACE EA completed for Mertarvik Evacuation Center • Concern over disruptions, extent and timing of environmental review relative to proposed summer 2016 work in Mertarvik • Is a EA level of review appropriate for relocations, referred to FEMA’s NEPA regulations for Categorical Exclusions • Alternatives may not be relevant • Encouraged buyout as the preferred option
Individual or Household		
<i>Purpose and Need</i>	verbal	<ul style="list-style-type: none"> • What is timing or schedule for relocations, 2016 or 2017, need to move is urgent • Ninglick River erosion severe, a lot concern over 4 structures closest to bank • Flooding along Newtok River (slough) and lake has been getting worse • Continued ground settling, land subsidence, is worsening flooding and erosion risks
<i>Proposed Action</i>		<ul style="list-style-type: none"> • Ground is very soft, there will need to be enough gravel to move and set up homes so they are stable • Will homes be able to be loaded onto a barge • Can homes be moved in the winter, over ice road • If relocation sites aren’t good will funding be lost • What are plans for more homes in Mertarvik • Concerns over damage to the homes during the move and whether repairs would be made • Could the homes be dismantled and reassembled
<i>Alternatives</i>		<ul style="list-style-type: none"> • Building a flood control/erosion wall or levee won’t work • Many questions about buy-out alternative and how this would work and impact relocations and substitutions • If buyout, demolition debris could be burned on-site instead of transporting to landfill (expensive barging and disposal costs) • If buyout, building materials could also be salvaged and reused since building materials are costly to ship in and scarce

Commenter	Method	Comment Summary
<i>Environmental/Natural/Cultural Resources</i>		<ul style="list-style-type: none"> • Impacts to fish need considered, salmon and seals • Ground is very soft, wetlands, will need to be enough gravel to move and set up homes
<i>Social/Community/Public Services</i>		<ul style="list-style-type: none"> • What are plans for health care or a medical facility/clinic in Mertarvik for pioneer residents • What are plans for transportation in and out of Mertarvik, by air or boat, to support pioneer residents • What are plans for education, will a school be built to support relocated families with children

Scoping Conclusions

The comments received during this scoping effort will be helpful to finalize the scope of the proposed action for an EA. They also help focus continued coordination and collaboration with federal funding agencies and stakeholders that have connected actions and concurrent NEPA requirements. Implementation details of the proposed action and the buyout alternative will need to be further explored/evaluated for presentation in a draft EA, and to the NVC to support decision-making. Additionally, given the urgency to take action and anticipated extent of time to further develop supporting infrastructure in Mertarvik, interim mitigation measures will need to be explored at least for the structures most at risk to riverine erosion. Given the interest over community, social, or public services and facilities in Mertarvik, the draft EA will need to articulate the NVC’s plans to address these critical elements that will be needed to support permanent occupancy of relocated ‘pioneer’ residents in Mertarvik.

Next Steps

The following includes tasks and coordination needed to draft the EA.

- Scope of EA federal action, including connected actions, needs finalizing with NVC, BIA and HUD; and other stakeholder as necessary
- Details on roles (lead/cooperating federal agency), responsibilities, EA tasks, documentation, and EA schedule need to be defined initially amongst FEMA, BIA and HUD, and then coordinated with the NVC and others
- Information gaps need to be addressed to draft a meaningful EA, make findings of effect, determine mitigation measures, and further NEPA decision-making, including further public involvement; these includes provision of:
 - Finalized Mertarvik community survey/layout, housing master plan (at least for relocated homes and those that may be built with HUD loans)
 - Preliminary infrastructure design and engineering plans for the pioneering phase (community and quarry roads, utility retrofits for potable water, wastewater management, solid waste management, power and bulk fuel storage)

- Essential community/public/social service plans, including facilities, are needed for Mertarvik that detail how pioneers residents will be supported (education, health care, emergencies, transportation by air or boat, communication, supplies)
- Draft EA and complete necessary additional resource studies and agency consultations
- Complete public involvement to present and make available draft EA findings
- Finalize EA and agencies issue decision documents
- Federal funds released for use and implementation

APPENDIX B

Newtok Wetlands Delineation Report

Wetlands Delineation for the New Village of Newtok, Alaska

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Table of Contents

INTRODUCTION	1
METHODS	1
RESULTS	4
Wetland Delineation	4
Palustrine emergent persistent/scrub-shrub wetlands (495 acres)	4
Palustrine emergent persistent wetlands (370) acres	6
Estuarine emergent persistent wetlands (250) acres	6
Lacustrine littoral unconsolidated bottom wetlands (5 acres)	6
Palustrine emergent non-persistent wetlands (0.42 acres)	6
Uplands (221 acres)	6
Vegetation Types	7
Tussock tundra	7
Mesic shrub birch-ericaceous	9
Dwarf scrub-crowberry tundra.....	9
Low closed/open willow-shrub.....	9
Halophytic sedge/halophytic grass wet meadow	10
Bluejoint-herb-shrub complex	10
Bluejoint-herb community (sparse willows).....	10
Ericaceous dwarf scrub-bearberry (upland).....	11
Wet sedge meadow tundra	11
Willow tundra-vaccinium tundra	11
Willow tundra-vaccinium tundra	11
Mesic forbs-mixed herbs (upland)	11
Shallow Pond	11
Marestail	11
WETLAND FUNCTIONAL ASSESSMENT	12
Palustrine scrub-shrub broad-leaved evergreen (PSS3).....	13
Palustrine scrub-shrub broad-leaved evergreen/moss peat (PSS3/PML1)	13
Palustrine emergent persistent (PEM1)	14
Palustrine scrub-shrub broad-leaved deciduous (PSS1)	14
Palustrine emergent persistent/scrub-shrub broad-leaved evergreen/moss peat (PEM1/PSS3/PML1).....	14
Estuarine emergent persistent (brackish marsh) (E2EM1)	15
Palustrine emergent persistent/scrub-shrub broad-leaved deciduous (PEM1/PSS1)...	15
Lacustrine littoral unconsolidated bottom/palustrine emergent non-persistent (L2UB)/(PEM2).....	15
PERMITTING REQUIREMENTS	18
Types of Permits	18
Nationwide Permits.....	18
Regional General Permits	19
Individual Permits.....	19
Abbreviated Permitting Process.....	19
REFERENCES	20

List of Figures

Figure 1.	Vicinity Map of the Newtok Village Relocation Site	2
Figure 2.	Wetland Types in the Newtok Village Relocation Site	5
Figure 3.	Vegetation Map of the Newtok Village Relocation Site	8
Figure 4.	Higher Value Wetlands Within Newtok Village Relocation Site	17

List of Tables

Table 1.	Acreage of Wetland Types in the Newtok Village Relocation Site	7
Table 2.	Acreage of Vegetation Types in the Newtok Village Relocation Site	12

List of Appendices

Appendix A.	Photo Documentation of Survey Sites
Appendix B.	Wetland Determination Data Sheets

INTRODUCTION

The village of Newtok is located on the Ninglik River in the Yukon-Kuskokwim Delta region of western Alaska. The banks of the river have been eroding for many years. At the current rate of erosion, it has been projected that the river will reach homes in Newtok within 5 years. The Newtok Traditional Council plans to move the village approximately 9 miles southeast of Newtok on the north shore of Nelson Island (sections 1, 2, 3, 4, 9, and 10, T. 8 N., R. 87 W. and sections 34, 35, and 36, T. N., R. 87 W., (USGS, Baird Inlet D-7) (Figure 1). Newtok has a marine climate. Summer temperatures range from 42 to 59 °F and winter temperatures range from 2 to 19 °F. Average annual precipitation is 17 inches, with annual snowfall of 22 inches (ADCED 2002). The study area is within a discontinuous permafrost zone (Ferrians 1965).

As part of the environmental analysis and to assess permitting requirements, we performed both office research and fieldwork to determine the presence and location of wetland areas within the Newtok village relocation area. The study included classification and mapping of wetlands and vegetation using satellite imagery and aerial photography. An onsite wetland delineation was conducted in August of 2005 within a study area of about 3,182 acres.

This report includes a map of wetland and upland areas, a description and classification of wetlands and plant communities within the study area, photo documentation of sample sites (Appendix A), wetland determination data sheets (Appendix B), and a general wetlands functional assessment.

METHODS

Classification and mapping of wetland and vegetation types within the study area were determined in the field and office by using June 6, 2005, aerial photographs at a scale of 1:18,000 (1"=1500') and 1:9,600 (1"=800'), satellite imagery, and 1:62,500 USGS quadrangle maps. Wetland and vegetation community boundaries were delineated based on plant canopy, surface relief, color signature, and hydrological characteristics. Preliminary vegetation types were identified using Level III classifications described in the Alaska Vegetation Classification (Vioreck et al. 1992) and in Classification and Mapping of Tundra Near Hazen Bay (Tande & Jennings 1986). Wetland types were described according to the Classification of Wetlands and Deep Water Habitats of the United States (Cowardin et al. 1979). The wetland delineation was based on wetland sample point data, plant community verification points taken with GPS, and photo interpretation of orthomaps and satellite images. The photo interpretation was done using ArcMap 9.0.

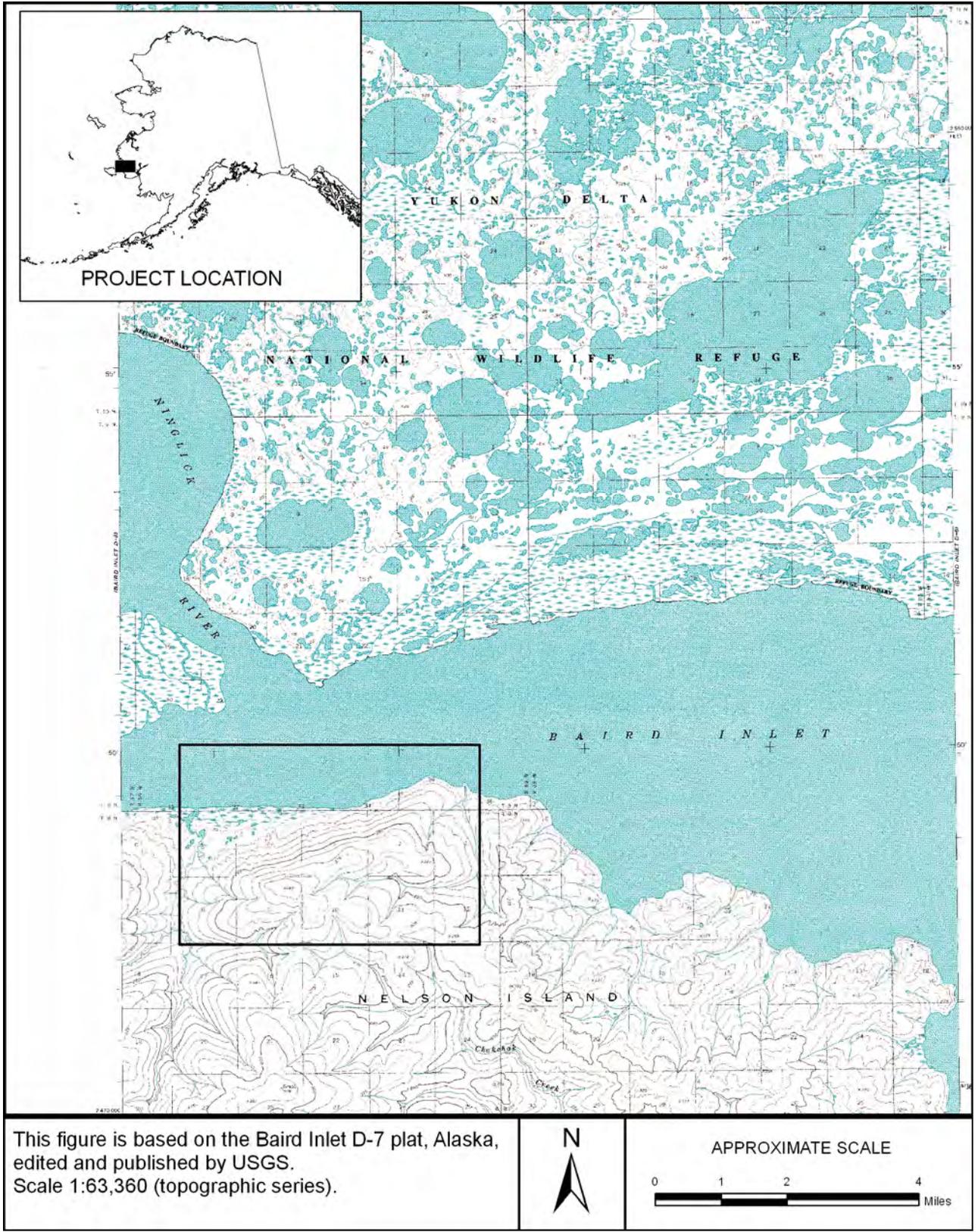


Figure 1: Wetland delineation general vicinity at the propose Newtok relocation site.

The field survey was conducted August 24-27, 2005. Prior to the field survey, with the use of satellite imagery (aerial photos were not yet available), we defined study boundaries and selected at least one sample point within different vegetation communities that could be defined within the image. Delineation sample points were established at 23 sites. Additional plant community verification points were collected at 31 sites. Delineation sample points and plant communities were recorded on GPS.

Wetland determinations were made using the three-parameter approach outlined in the 1987 U.S. Army Corps of Engineers Wetland Delineation Manual (1987 USACE). The USACE (Federal Register 1982) and the EPA (Federal Register 1980) jointly define wetlands as: those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands, in general, include swamps, marshes, bogs, and similar areas (USACE 1987).

At each delineation sample site, a USACE routine wetland determination data sheet from the 1987 manual was completed to characterize vegetation, soils, and hydrology. Digital photos of each sample site were recorded. Dominant plant species for each vegetation layer (tree, shrub, and/or herbaceous) were recorded. We visually estimated percent of live coverage within an approximate 30-foot radius of the soil pit. The wetland indicator status of the dominant species was determined by using the *National List of Plant Species that Occur in Wetlands: Alaska (Region A)* (Reed 1988).

Wetland hydrological indicators were assessed at each sample point, including the presence of standing water, soil saturation within 12 inches of the surface, and evidence of past inundation (watermarks, drift lines, etc.). At each soil pit of approximately 18 inches, hydric soil indicators were evaluated including low matrix chroma, mottling, concretions, and presence of thick organic layers. Soil colors were determined by using *Munsell Soil Color Charts* (2000).

Plant community verification points were determined based on plant species dominance. Locations of the delineation sample points and vegetation verification points were recorded using a handheld GPS – 12 Garmin and downloaded into a NAD 83 State Plane georeferenced orthomap purchased from Aeromap. Comparisons between field data and the orthomap were conducted to identify vegetation patterns in the map and to determine vegetation types. Vegetation types were then defined in polygon units using photo-interpretation techniques, wetland data forms, field notes, photographs, and GPS points. Photo interpretation was conducted according to grain, texture, and color patterns observed in the orthomap. In certain areas of the orthomap, patterns were difficult to determine and vegetation types hard to define. In such cases, a simple classification of the satellite image assisted in extrapolating from other vegetation types. A database was created to

include vegetation types, dominant habitat and species composition, and wetland types.

RESULTS

Wetland Delineation

Of the 3,182-acre study site, 2,961 acres were classified as wetlands and 221 acres (approximately 7% of total area) as uplands (Figure 2, Table 1). We identified six wetlands types, including ponds. The study area is predominantly composed of palustrine scrub-shrub wetlands (1,841 acres or 58% percent of the total area), followed by palustrine emergent/scrub-shrub wetlands (495 acres or 16%), and palustrine emergent wetlands (370 acres or 12%). Estuarine wetlands (marshes) represent 8% (250 acres) of the total 3,182 acres.

Palustrine scrub-shrub wetlands (1,841 acres)

The palustrine scrub-shrub wetlands represent about 58 % of the delineated area and were separated into the following subclasses depending on the habitat of the dominant species: palustrine scrub-shrub evergreen wetlands dominated by crowberry tundra and birch-ericaceous shrub communities (937 acres), palustrine scrub-shrub/moss peat wetlands where sphagnum and low growing shrubs are the main component of the vegetation community (580 acres), and palustrine scrub-shrub broad leaved-deciduous dominated by willow (*Salix pulcha*) (324 acres). Palustrine scrub-shrub evergreen wetlands were found within the proposed village townsite location. The palustrine scrub-shrub/moss peat wetlands are located at a slightly higher elevation, usually on mounds of about 1 foot in height. Palustrine scrub-shrub broad-leaved deciduous wetlands are well spread out in the general sampled area along several drainage ways and depressions.

Palustrine emergent persistent/scrub-shrub wetlands (495 acres)

Palustrine emergent persistent/scrub-shrub wetlands represent approximately 16% of the total delineated area. They were divided into two groups: palustrine emergent persistent/scrub-shrub evergreen/moss (255 acres) and palustrine emergent persistent/scrub-shrub broad-leaved deciduous (240 acres). Palustrine emergent persistent/scrub-shrub/moss are wetlands located at the foot hills, with a similar component of low growing evergreen species as the palustrine scrub-shrub evergreen wetlands (top plateau), but with a conspicuous cover of tussock cottongrass (*Eriophorum vaginatum*). These wetlands also have a large component of rust-color sphagnum, which gives this community a rusty color and a deep 16-foot peat layer. Palustrine emergent persistent/scrub-shrub deciduous wetlands are dominated by bluejoint grass, but have about 25% of willow cover. The vegetation community seems to be an intermediate state between willow-dominated communities and bluejoint grass meadows. They are found along drainage ways, depressions and slopes, and have a large component of wildflowers, herbs, and ferns.

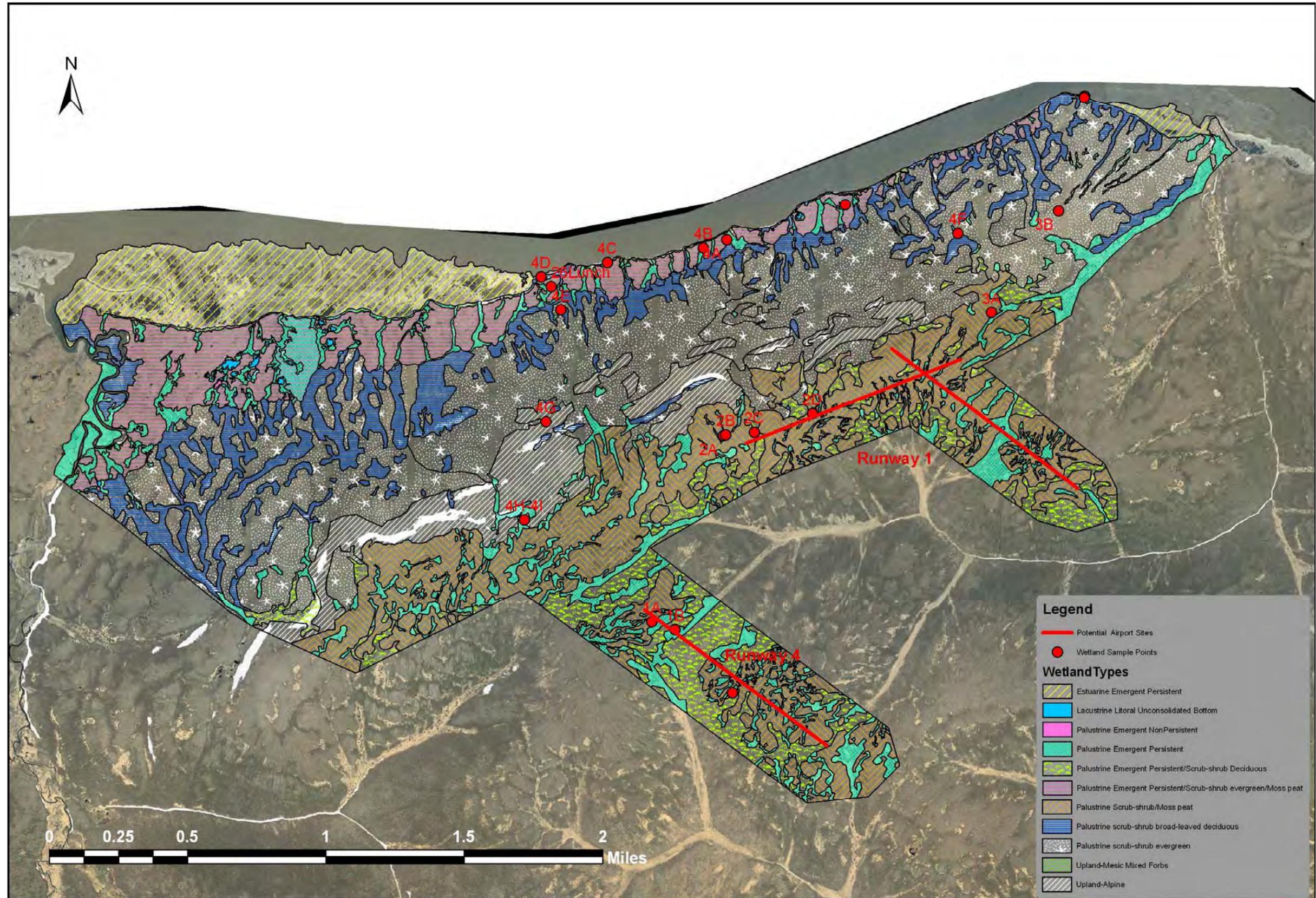


Figure 2: Wetland Types in the Newtok Relocation Site.

Palustrine emergent persistent wetlands (370) acres

Palustrine emergent persistent wetlands represent about 12% of the total delineated area. They are usually located in drainage ways and in depressions where snow persists until late spring. The communities are typically dominated by bluejoint grass with few herbs and almost no willows. Herbs within these communities include *Petasites frigidus*, *Equisetum sp.*, *Athyrium filix-femina*, dwarf dogwood (*Cornus suecica*), and *Angelica lucida*. They are well-distributed within the delineated area but are usually common near willow thickets. Palustrine emergent persistent wetlands also include wet sedge meadow tundra dominated by *Carex aquatilis*, *Potentilla palustris*, and green sphagnum. Wet sedge meadow tundra is usually found in areas with standing water along drainages that cross the bottom hills, lake fringes, and crisscross the top plateau tundra.

Estuarine emergent persistent wetlands (250) acres

Estuarine emergent persistent wetlands represent approximately 8% of the total delineated area. They are found in tidally influenced mudflats. Dominant species are tolerant to brackish water conditions, forming monotypic stands of Lyngby's sedge (*Carex lyngbyei*) communities or forming patches between tidally deposited mineral silts and clays as in the case of *Puccinellia phryganodes* and *Plantago maritima*. Bluejoint grass and beachrye grass (*Elymus arenarius*) are found at the inland fringes of these estuarine wetlands. About 236 acres are at the mouth of the Tackichak River and 14 acres at the mouth of the east drainage area in the vicinity of the proposed barge site.

Lacustrine littoral unconsolidated bottom wetlands (5 acres)

Lacustrine littoral unconsolidated bottom wetlands represent less than 1% of the total delineated area. These standing water habitats are usually at the bottom hills and, to a lesser degree, at the top plateau. They are formed in topographic depressions where snow pack and rainfall permanently accumulate, forming shallow fresh water ponds. With silty organic unconsolidated bottoms, these ponds only provide habitat for aquatic vegetation at their fringes, where light penetrates deep enough.

Palustrine emergent non-persistent wetlands (0.42 acres)

Palustrine emergent non-persistent wetlands represent less than 1% of the total delineated area. These wetlands are usually found in small areas but are common along the fringes of small ponds, so they are difficult to delineate on a large scale map. The dominant submerged species is common maretail (*Hippuris vulgaris*).

Uplands (221 acres)

Uplands represent about 7% of the total delineated area. They are mainly located on the windswept north facing slopes and at the sloped outskirts of the bottom hills. At the upper slopes, the prostate vegetation is characterized by the presence of alpine species (arctic willow, dwarf azalea, alpine smartweed, net-vein willow, etc.) and a thick root mat. Bearberry is abundant as well. Soils are shallow and gravelly with an abundance of basalt outcrops. Lichens such as *Cetraria cucullata*,

Cladonia rangifera, *Cladonia sp.*, *Thamnolia vermicularis*, and fruticose lichens dominate most of the ground cover, and crustose lichens are abundant in the basalt outcrops. The outskirts of the lower hills were also considered uplands because they did not meet hydric soil indicators.

Table 1. Wetland and upland acreage and their percentage of study area at the proposed Newtok relocation site (Figure 2).

Wetland Type	Subclass	Acres	% of Study Area
Palustrine Scrub-Shrub	Broad-leaved Evergreen (PSS3)	937	57.85
	Moss (PSS3/PML1)	580	
	Broad-leaved Deciduous (PSS1)	<u>324</u>	
		1,841	
Palustrine Emergent Persistent /Scrub-Shrub	Scrub Shrub Evergreen/Moss (PEM1/PSS3/PML1)	255	15.55
	Scrub Shrub Broad-lvd Deciduous (PEM1/PSS1)	<u>240</u>	
		495	
Palustrine Emergent Persistent	(PEM1)	370	11.63
Estuarine Emergent Persistent	(E2EM1)	250	7.86
Lacustrine Littoral Unconsolidated Bottom	(L2UB)	5	0.16
Palustrine Emergent Non-Persistent	(PEM2)	0.42	0.01
Upland	Alpine (UPL)	207	6.94
	Mesic Mixed Forbs	<u>14</u>	
		221	
Total Area		3,182.42	

Vegetation Types

Based on species dominance and comparisons with the Alaska vegetation classification (Vioreck et al. 1992) and the tundra vegetation study conducted near Hazen Bay (Tande & Jennings 1986), the vegetation at the Newtok relocation site was grouped into 12 vegetation types (Figure 3, Table 2).

Tussock tundra

Tussock tundra comprises 835 acres of the total delineated area (26%). Dominant species include *eriphorum vaginatum*, *Betula nana*, *ledum decumbens*, *vaccinium uliginosum*, *rubus chamaemorus*, *salix arctica*, *empetrum nigrum*, *cladonia sp.*, *arctostaphylos alpina*, and *sphagnum lenense*. At the bottom hills, tussock tundra vegetation has a large component of tufted cottongrass (*Eriophorum vaginatum*), which forms cottongrass tussocks. Low growing evergreen shrubs like Labrador

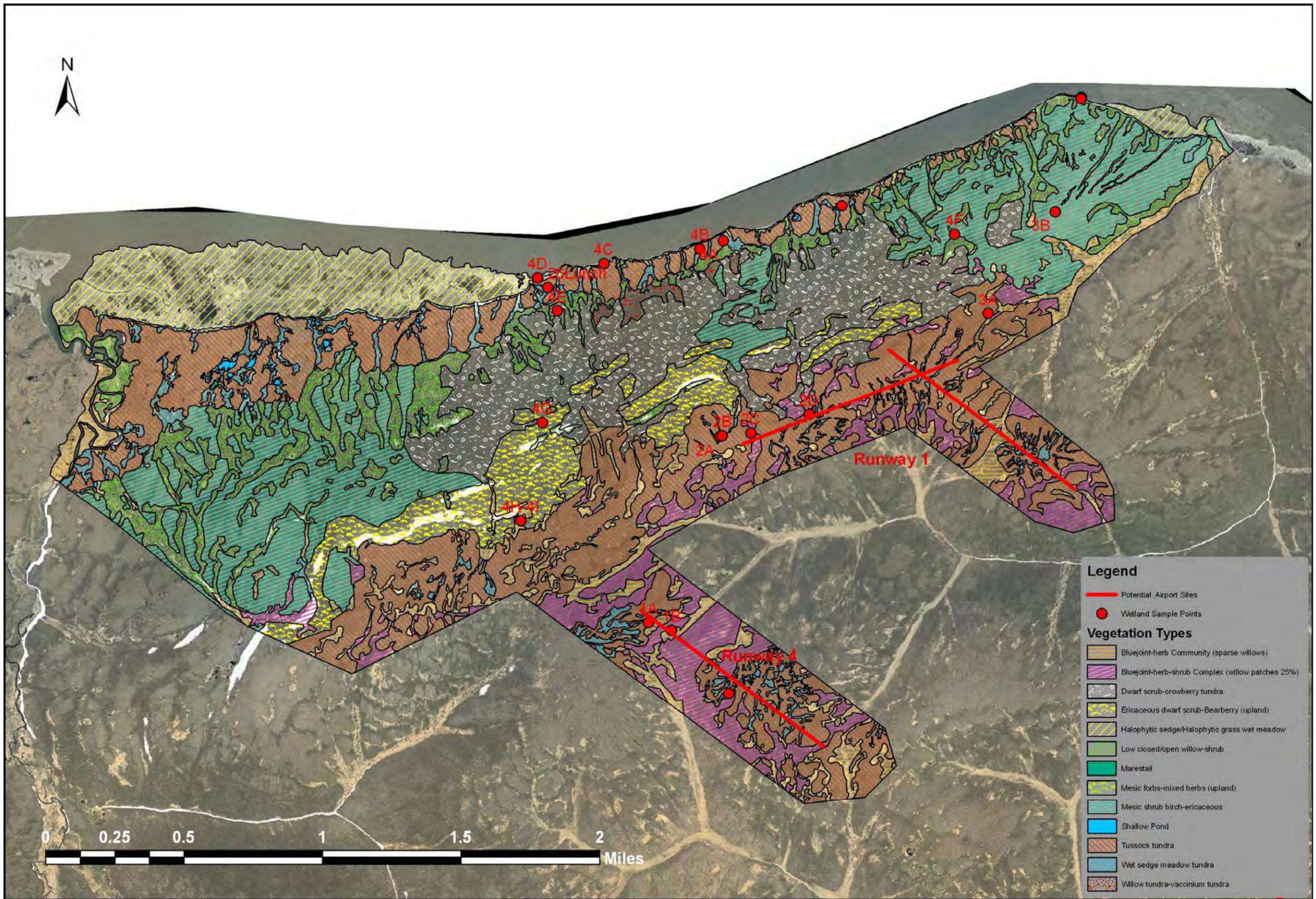


Figure 3: Vegetation Types in the Newtok Relocation Site.

tea (*Ledum decumbens*), crowberry (*Empetrum nigrum*), lowbush cranberry (*Vaccinium vitis-idaea*), and dwarf birch (*Betula nana*) are usually found growing in hollows between the cottongrass tussocks. Tussock tundra vegetation at the top hill plateau is found on mounds of about 1 foot in height. Tussock cottongrass is replaced by sedges like *Carex bigelowii* and *Eriophorum angusti*, or folium (rhizomatous species), but they do not have much cover when compared with the low growing shrubs. Mosses like *sphagnum lenense* (brownish-orange) and *Cladonia sp.* lichens can comprise more than 30% of the ground cover in localized areas. The abundance of mosses, lichens, and a thick root mat favors the formation of a deep peat layer of about 16 inches. Soils are usually saturated due to the presence of sphagnum that acts as a huge "sponge," and because of shallow permafrost conditions. The abundance of *sphagnum lenense* and evergreens is an indicator of the acidic, low nutrient, and excessive moisture conditions found in this vegetation type.

Mesic shrub birch-ericaceous

Open low mesic shrub birch-ericaceous shrub comprises 546 acres of the total delineated area (17%). Dominant species are dwarf shrubs like *betula nana*, *empetrum nigrum*, *vaccinium uliginosum*, *vaccinium vitis-idaea*, *ledum decumbens*, *Carex bigelowii*, *Festuca sp.*, *equisetum sp.*, *Rubus chamaemorus*, *Eriophorum vaginatum*, and *Carex aquatilis*. As in tussock tundra, this vegetation type is usually found in slopes averaging 12%, with a shallow permafrost or frozen soil at least during part of the growing season. Soils are usually poorly drained with a layer of gleyed silt between 16 inches and 2 feet deep, but without a deep sphagnum layer.

Dwarf scrub-crowberry tundra

Dwarf scrub-crowberry tundra comprises 391 acres of the total delineated area (12%). This vegetation community is dominated by *Empetrum nigrum* (70% cover), which is a low shrub that produce extensive blackberries. Co-dominant species are narrow-leaf Labrador tea, mountain cranberry, and dwarf birch. Other species present are lousewort (*Pedicularis langsдорffii*), sedges, arctic willow (*Salix arctica*), stiff clubmoss, stair-step moss (*Hylocomium splendens*), and sphagnum. In areas where strangmoors developed perpendicular to drainages, dwarf scrub-crowberry tundra typically covers the strangmoor ridges, and sphagnum and lichens cover strangmoor hollows. This vegetation type is usually found in slopes averaging 12%, but with shallow permafrost at least during part of the growing season. Soils are usually poorly drained with a layer of gleyed silt between 16 inches and 2 feet deep, but without a deep sphagnum layer.

Low closed/open willow-shrub

Low closed/open willow shrub comprises 310 acres of the total delineated area (10%). Dominant species include willows in the canopy (*Salix pulchra*, *Salix alaxensis*), with grasses dominating the undercanopy (*Calamagrostis canadensis* and *Festuca sp.*). A large diversity of forbs and small shrubs are part of the undercanopy, including *Cornus suecica*, *Spirea beauberdiana*, *Equisetum sp.*,

Athyrium filix-femina, *Polemonium sp.*, wild iris (*Iris setosa*), wild cucumber (*Streptopus amplexifolius*), burnet (*Sanguisorba officinalis*), blue Jacob's ladder (*Polemonium boreale*), twin flower (*Linnaea borealis*), nagoonberry (*Rubus arcticus*), *Pyrola sp.*, and fiddlehead ferns. Stiff club moss (*Lycopodium annotinum*) and several other mosses were also abundant, forming a continuous mat cover below the forb layer. Willow thickets grow along temporary drainages and in the lower reaches of the Tackitchak River. These communities usually prefer areas where snow accumulates until late in the spring or the floodplain. Willows form close-canopy communities of about 5 feet high along bottom hill drainages to stunted willow patches toward the upper slopes; alders are absent. Soils usually range from poorly to moderately drained in these areas.

Halophytic sedge/halophytic grass wet meadow

Halophytic sedge/halophytic grass wet meadow comprises 250 acres of the total delineated area (8%). Dominant species are tolerant to brackish waters with Lyngby's sedge (*Carex lyngbyaei*) forming dense monotypic stands of about 100% cover and halophytic herbs such as *Plantago maritima* and *Puccinellia phryganodes* forming patches between tidally deposited mineral silts and clays. Monotypic stands of Lyngby's sedge are found seaward, with bluejoint grass and beachrye grass (*Elymus arenarius*), growing more towards the inland.

Bluejoint-herb-shrub complex

Bluejoint-herb-shrub complex comprises 240 acres of the total delineated area (8%). The dominant species is bluejoint grass (*Calamagrostis canadensis*) with approximately 50 to 60% cover. Similar to the bluejoint-herb community, co-dominant species include *Equisetum silvaticum*, *Athyrium filix-femina*, dwarf dogwood (*Cornus suecica*), *Angelica lucida*, *Viola Landorfii*, *Pyrola sp.*, *Fritillaria camschatcensis*, *Spiraea beauverdiana*, *Polemonium sp.*, *Betula nana*, *Artemisia sp.*, *Epilobium angustifolium*, *Sanguisorba stipulata*, and *Heracleum lanatum*. This community has also a shrub component, formed mainly by willow patches, that reaches approximately 25% canopy cover. This vegetation community seems to be an intermediate stage between bluejoint-herb communities and willow communities. This community is usually found along drainages, topographic depressions, as well as in areas with moderate drainage conditions. Soils can vary from well to poorly drained; therefore, this complex seems to range from mesic to hydric soil conditions.

Bluejoint-herb community (sparse willows)

This vegetation type comprises 224 acres of the total delineated area (7%). The dominant species is bluejoint grass (*Calamagrostis canadensis*) with about 60% cover, forming almost pure grass meadows, but with a codominant herb/forb component. These species include *Equisetum silvaticum*, *Athyrium filix-femina*, *Cornus secica*, *Epilobium angustifolium*, *Sanguisorba stipulata*, and *Heracleum lanatum*. Sometimes a few stunted willow trees are found in the mix, but they do not seem to reach canopy covers above 10%. This community is usually found

along drainages and topographic depressions where snow accumulation continues into the spring. Soils vary from moderate to poorly drained.

Ericaceous dwarf scrub-bearberry (upland)

This plant community comprises 207 acres of the total delineated area (7%). Dominant dwarf shrubs include bearberry (10%), narrow-leaf Labrador tea (10%), *Salix arctica*, 3%, *Diapensia lapponica*, *Loiseleuria procumbens*, mountain cranberry, anemone (*Anemone Drummondii*) and lousewort. Lichens such as *Cetraria cucullata*, *Cladonia rangifera*, *Cladonia sp.*, *Thamnolia vermicularis*, and fruticose lichens dominate most of the ground cover.

Wet sedge meadow tundra

Wet sedge meadow tundra comprises 146 acres of the total delineated area (5%). Dominant species are water sedge, *Calamagrostis deschampsoides*, *Eriophorum russeolum* (abundant on the top plateau wet sedge meadows), and green sphagnum (*Sphagnum squarrosum*). Green sphagnum covers about 75% of the ground with *Vaccinium oxycoccos* commonly growing on top of the sphagnum cover.

Willow tundra-vaccinium tundra

Willow tundra-vaccinium tundra comprises 14 acres of the total delineated area (less than 1%). Dominant species within this low growing community are *Salix pulchra* and *Vaccinium uliginosum*. This is a rather uncommon community and is usually found near taller willow thickets at the bottom hills. Crowberry, Labrador tea, lycopodium, step moss, and other mosses and lichens are usually ground covers.

Mesic forbs-mixed herbs (upland)

This vegetation type comprises 14 acres of the total delineated area (less than 1%). Dominant species includes *Spiraea beauverdiana*, *Epilobium angustifolium*, *Cornus suecica*, *Athirium filix-femina*, *Polemonium acutiflorum*, *Senecio congestus*, *Achillea borealis*, *Dryopteris dilatata*, and feather mosses. This diverse vegetation community is dominated by a mix of grasses, herbs, shrubs, and scattered willow patches, and is usually found at the outskirts of the bottom hills facing the inlet on moderate to steep slopes. The landscape has undergone a process of erosion and deposition that has led to the remixing and rejuvenation of the soil, which is loamy and well to moderately-well drained.

Shallow Pond

Shallow ponds comprise only 5 acres of the total delineated area (less than 1%). They are characterized by fresh water inputs from rainfall and snowmelt, as well as mucky/silty bottoms.

Marestail

Units of this vegetation type are so small that, even when observed in the field, it was difficult to differentiate during the photo-interpretation. Dominant species is common marestail (*Hippuris vulgaris*), which occurs in monotypic, usually small

stands on fringes of shallow ponds located at the foothills. Usually these communities can not be mapped and merge into wet sedge meadow communities.

Table 2. Vegetation types located within the 3,182 acre study site.

Vegetation Types	Acres	Coverage	Vegetation Similarities to Viereck et al. 1992 and Tande & Jennings, 1986
Tussock tundra	835	26%	III.A.2.d.
Mesic shrub birch-ericaceous	546	17%	II.C.2.c.
Dwarf scrub-crowberry tundra	391	12%	II.D.2.c.
Low closed/open willow-shrub	310	10%	II.C.1.b., II.C.2.g.
Halophytic sedge/Halophytic grass wet meadow	250	8%	III.A.3.i. III.A.3.h.
Bluejoint-herb-shrub Complex (willow patches 25%)	240	8%	II.C.1.b., II.C.2.g., III.A.2.c., III.A.2.b.
Bluejoint-herb Community)	224	7%	III.A.2.b.
Ericaceous dwarf scrub-Bearberry (upland)	207	7%	II.D.2.a., II.D.3.a.
Wet sedge meadow tundra	146	5%	III.A.3.a.
Willow tundra-vaccinium tundra	14	0.4%	II.C.2.g., II.D.2.b.
Mesic forbs-mixed herbs (upland)	14	0.4%	III.B.2.a.
Shallow Pond	5	0.2%	
Marestail	0.42	0.01%	III.D.I.b.
Total Area	3182.42		

WETLAND FUNCTIONAL ASSESSMENT

The wetland function and value analysis conducted for the Newtok relocation site is based on bird, fish, and vegetation data collected in the field by U.S. Fish and Wildlife Service and Army Corps of Engineers biologists during the summer of 2005 (USACE 2005a, USACE 2005b, USFWS 2005). This is not a detailed analysis following a specific method, but rather a general assessment of the resource based on literature review (USACE 1995) and field data.

Palustrine scrub-shrub broad-leaved evergreen (PSS3)

Functions¹: These wetlands, consisting of dwarf scrub-crowberry tundra and mesic shrub-birch-ericaceous vegetation, have an important insulating function that protects the discontinuous permafrost from severe thermokarsting (surface depression). Frost heaving processes (lifting surface by the formation of ice as lenses) and frost boils formation can be aggravated by increased freeze/thaw or wet/dry cycles in areas with discontinuous permafrost where vegetation cover has been removed. Frost heaving can cause tilting of telephone poles, fence posts, and bent tree trunks. These wetlands also provide nesting habitat for parasitic and long-tail jaeger. The abundance of crowberry provides feeding habitat for Canada geese, emperor geese, willow ptarmigan, Lapland longspurs, and other bird species.

Values: permafrost protection, erosion protection, wildlife habitat.

Palustrine scrub-shrub broad-leaved evergreen/moss peat (PSS3/PML1)

Functions: This wetland type is typically located at the top hill plateau and consists of tussock tundra vegetation with a thick sphagnum layer that has a high capacity to store water from rainfall and melting snow. The "sponge" effect and large water holding capacity provided by these wetlands constitute an important value for long-term water storage and groundwater recharge. These wetlands are likely the main source of flow inputs to the stream located at the base of the hills of the proposed Newtok relocation site. This stream is fed by a continuous groundwater supply and maintains a free-of-ice flow throughout the year. These wetlands also provide feeding grounds to several bird species including waterfowl. A muskoxen herd of (306 animals documented in 2001), has been established in Nelson Island since 1967-1968 (ADFG 2003). In winter, muskoxen feeding grounds are circumscribed to areas with shallow snow accumulations. These wetlands found at the top plateau are exposed to western winds, removing the snow from mosses, lichens and sedges and may provide winter grazing habitat for musk oxen.

Values: water storage, regulation, and recharge; water quality; bird and mammal habitat.

¹ Functions are physical, chemical, and biological processes occurring in an ecosystem. Processes include movement of water through wetlands into streams or ocean; decay of organic matter; release of nitrogen, sulfur, and carbon into the atmosphere; removal of nutrients, sediment and organic matter from water moving into wetlands; and growth and development of all the organisms that require wetlands for life. Values are an estimate, usually subjective, of worth, merit, quality, or importance. Wetland "values" may derive from outputs that can be consumed directly, such as food, recreation, or timber; indirect uses that arise from the functions occurring within the ecosystem, such as water quality, flood control, biodiversity or conserved habitats; and from the knowledge that such habitats or species exist (known as existence value) (NCSU 1994).

Palustrine emergent persistent (PEM1)

Functions: These wetlands include bluejoint herb meadow and wet sedge meadow tundra. Bluejoint herb meadow is found in seasonally flooded drainage ways and depressions, whereas wet sedge meadow tundra is found in foothill drainages and at the top plateau forming channels that crisscross the tussock tundra mounds. These wetlands provide forage to muskoxen, especially in spring when it is most palatable and succulent. Bluejoint grass is an excellent permafrost protector as it often produces a thick "mulch" of litter that insulates the ground and maintains low soil temperatures. Foothill wet sedge wetlands provide feeding habitat for voles, muskoxen, and waterfowl. These wetlands also allow for spring snow melt runoff to move slowly along hill gradients.

Values: water storage and regulation, flood control, permafrost protection, bird and mammal habitat.

Palustrine scrub-shrub broad-leaved deciduous (PSS1)

Functions: These wetlands are represented mainly by willow thickets and willow-blueberry communities growing along seasonally flooded drainages, foothills, and depressions with large snow accumulation and in the lower reaches of the Takikchak River floodplain. Several bird species, including passerines and willow ptarmigan, use these wetlands as resting and breeding habitat. Willow communities at the foothills and close to fresh water ponds provide excellent cover and bird nesting habitat. A diverse understory layer with an abundance of forbs, grasses, and sedges provide seeds, insects, and pollen to passerine birds, willow ptarmigan, and insects. In winter, willow ptarmigan forage on buds and twigs of diamond-leaf willows. Willows, as the larger plants at the site, have larger transpiration rates that reduce water in the soil, allowing it to absorb additional precipitation and surface water flows.

Values: wildlife habitat, recharge groundwater, flood control, water quality.

Palustrine emergent persistent/scrub-shrub broad-leaved evergreen/moss peat (PEM1/PSS3/PML1)

Functions: These wetlands are typically found in foothill tussock tundra developed on low nutrient-acidic soils and shallow permafrost. The characteristic thick root mat and a sphagnum layer in these wetlands have a high capacity to store rainfall and may function in reducing peak water flows and slowing water discharges into Baird Inlet during the summer season (when the active layer is deeper). Flower buds of tufted cottongrass, an abundant species in these wetlands, are an excellent food source to willow ptarmigan and its root bulbs are a food source to voles. Black bellied plover and western sandpiper, among other shorebirds, use these wetlands as nesting grounds.

Values: water storage and regulation, erosion control, bird feeding and breeding habitat.

Estuarine emergent persistent (brackish marsh) (E2EM1)

Functions: Located at the mouth of the Takikchak River and the entrance of a seasonally flooded stream at the east side of the proposed relocation site, these wetlands function as fish rearing habitat, resting areas for migratory birds, and provide refuge from predators to wildlife and fish. Geese and shorebirds graze pure stands of Lyngby's sedge leaves early in the spring; seeds also provide a food source to birds. Another ecological function of these wetlands is the constant supply of organic matter at various degrees of decomposition into adjacent tidal mudflats. It is this large source of organic matter that sustains the rich assemblages of detritus filter feeders found within these mudflats. These rich assemblages provide food to birds (waterfowl and shorebirds) and fish, including anadromous species spawning in the Takikchak River. These wetlands also provide shoreline erosion protection by dissipating the tidal energy. The nature of Lyngby's sedge as a pioneer colonizer supports the stability of the wetlands.

Values: fish and wildlife habitat, detritus output for aquatic organisms, food chain support, and shoreline erosion protection.

Palustrine emergent persistent/scrub-shrub broad-leaved deciduous (PEM1/PSS1)

Functions: These wetlands are a complex of bluejoint-herb communities and willow communities found in slopes ranging from mesic to hydric conditions. Like wetlands dominated by pure stands of bluejoint grass, these wetlands also provide excellent insulating cover to soils. These wetlands are more diverse with a large variety of forbs, ferns, and mosses that provide feeding and nesting grounds for passerine birds and small mammals. They also provide spring feeding grounds to muskoxen when the grass is most palatable and succulent.

Values: Permafrost control, flood control, wildlife habitat.

Lacustrine littoral unconsolidated bottom/palustrine emergent non-persistent (L2UB)/(PEM2)

Functions: Both lacustrine littoral unconsolidated bottom and palustrine emergent non-persistent wetlands are found in depressions fed by large snow meltdowns as the main precipitation source. Waterfowl usually prefer nesting in tundra tussock vegetation located near these wetlands, because of the easy access to freshwater and freshwater invertebrates as food sources. Dabbling ducks usually feed on aquatic plants growing in the fringes of these freshwater ponds.

Values: water storage and regulation, food chain support, detritus output for aquatic organisms, wildlife habitat, groundwater recharge.

Although wetlands and vegetation in general have an important role in preventing permafrost subsidence and erosion, and maintaining water quality, higher value wetlands that may require greater protection within the Newtok Village relocation site include:

- Palustrine wetlands adjacent to the spring fed stream, which is proposed as the alternative source of water for the village during winter, and hydrologically connected wetlands above this stream (Figure 4). The hydrological connections to the wetlands above this stream have not been thoroughly identified.
- Palustrine wetlands in the vicinity of the Takikchak River floodplain and two small tributaries in the lower reaches of the river. The protection of these wetlands will help maintain water quality for the village's main water source and provide protection to important fish and wildlife habitat (Figure 4).
- Estuarine wetlands at the mouth of the Takikchak River. The protection of these wetlands will maintain habitat for several waterfowl, shorebird, and fish species and provide erosion protection (Figure 4).

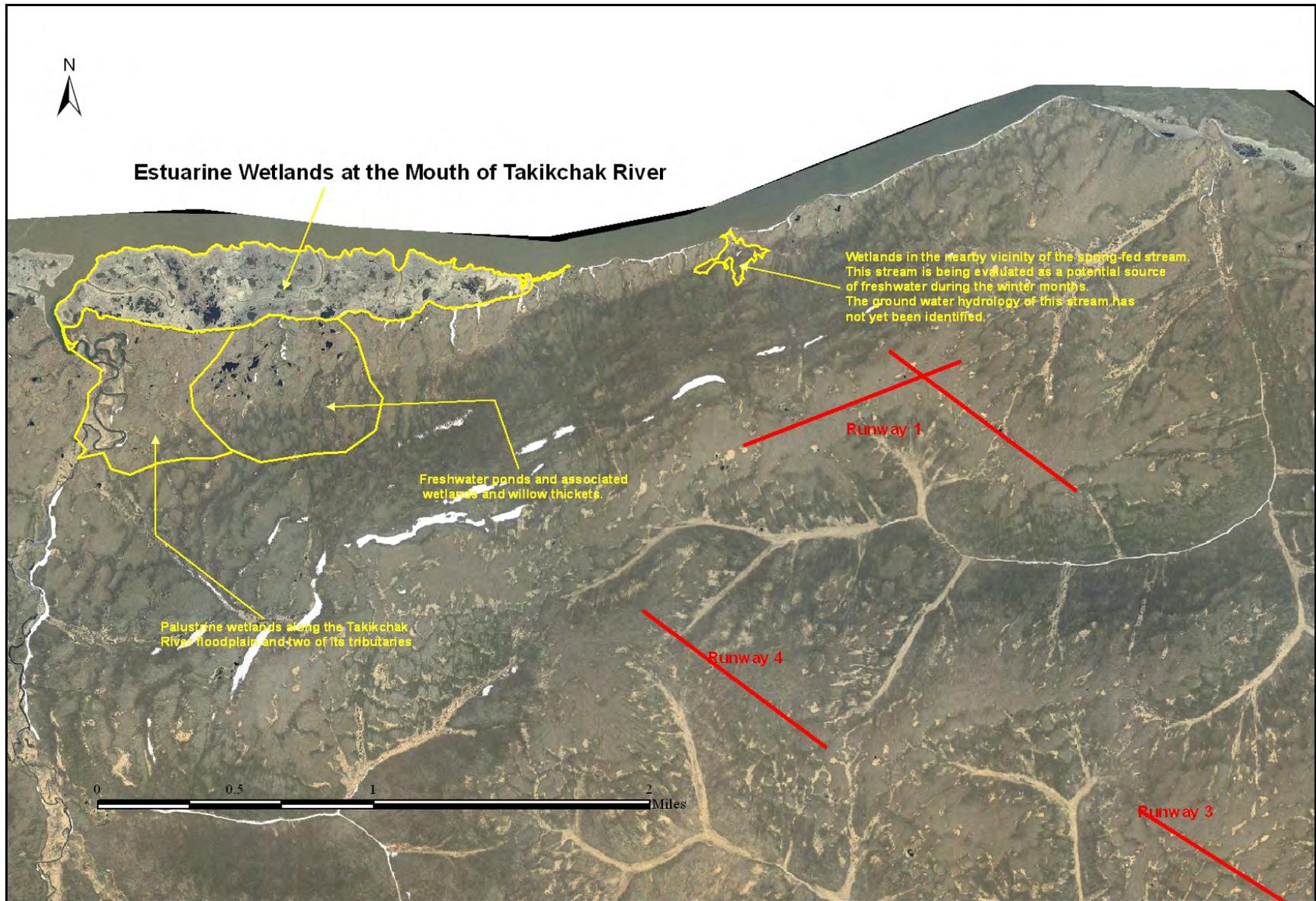


Figure 4: Higher Value Wetland Areas within the Newtok Village Relocation Site.

- Fresh water ponds and associated wetlands and willow thickets south of the estuarine wetlands. These areas provide important sources of freshwater and wildlife food sources such as aquatic algae and invertebrates and provide nesting habitat to waterfowl and other birds (Figure 4).

PERMITTING REQUIREMENTS

Most of the area in the proposed Newtok Village relocation site, including the proposed village townsite and airport alternatives, is within waters of the U.S., which include wetlands. Portions of the proposed barge landing facility are within wetlands and navigable waters of the U.S. Depending on the type of activity proposed, a Department of the Army (DA) permit may be required for many of the relocation projects.

Section 404 of the Clean Water Act requires that a DA permit be obtained for the placement or discharge of dredged and/or fill material into waters of the U.S., including wetlands (33 U.S.C. 1344). This jurisdiction includes placement of fill resulting from land clearing operations involving vegetation removal in wetlands with mechanized equipment and other soil disturbances.

Section 10 of the Rivers and Harbors Act of 1899 requires that a DA permit be obtained for structures or work in or affecting navigable waters of the U.S. (33 U.S.C. 403). Section 10 waters are those waters subject to the ebb and flow of the tide shoreward to the mean high water mark, and/or other waters identified by the Alaska District. Baird Inlet is a tidally influenced navigable water of the U.S. As funding becomes available for relocation projects in the Village of Newtok and plans become more finalized, the project managers will need to contact the Alaska District U.S. Army Corps of Engineers, Regulatory Branch, to determine if a permit is needed and if so, what type of permit the project will require. The Corps evaluates projects using the least extensive and time consuming review process, while still providing protection for the aquatic environment.

Preliminary information that the Corps needs from the applicant to begin the permit evaluation process includes a project description, defining project location on a vicinity map (such as a USGS quad), type and amount of fill required for the project, location of the material source, project dimensions, and project plans that include a plan view and cross section view. More information may be required depending on the project scope.

Types of Permits

Nationwide Permits

Nationwide Permits (NWP) are a form of General Permit issued by Corps Headquarters nationally. NWPs authorize specific activities in areas under Corps

Regulatory jurisdiction. These activities are minor in scope and must result in no more than minimal adverse impacts both individually and cumulatively. Individuals wishing to perform work under these NWP's must ensure that their project meets all applicable terms and conditions, including the regional conditions specific to Alaska.

Regional General Permits

Regional permits are issued by the Alaska District Engineer for a general category of activities when:

- the activities are similar in nature and cause minimal environmental impact (both individually and cumulatively), and
- the regional permit reduces duplication of regulatory control by State and Federal agencies.

The processing time for Nationwide and Regional General Permits is shorter than for Individual Permits. Examples of General Permits applicable to projects for the village relocation include GP 89-3N Residential and Other Community Projects and GP 96-07 Village Bulk Fuel Storage Facilities. If an activity is covered by a General Permit, an application for a DA permit is not required.

Individual Permits

Individual permits may be issued following a full public interest review (usually 30 days) of an individual application for a DA permit. A public notice is distributed to all known interested persons. A final decision on the application is made after evaluating all comments and information received.

The permit decision is generally based on the outcome of a public interest balancing process where the benefits of the project are balanced against the detriments. A permit will be granted unless the proposal is found to be contrary to the public interest. Processing time usually takes 60 to 120 days unless a public hearing is required or an Environmental Impact Statement must be prepared.

To apply for an individual permit, an application form must be completed. This application is available at the Alaska District, U.S. Army Corps of Engineers Regulatory Website: <http://www.poa.usace.army.mil/reg> or from any Regulatory office.

Abbreviated Permitting Process

This permitting procedure allows applications to be processed in a timely manner (15 days), allowing for a faster permitting timeline and enabling the applicant to start construction sooner. The Abbreviated or Alternative Permit Process (APP) that could apply to the Newtok relocation site is (APP) 93-1, which is a permitting process for the construction of sanitary sewage facilities within the State of Alaska.

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APPENDIX C

Wetlands Functional Assessment at Mertarvik

Mertarvik Functional Assessment

1.0 Methods

Rapid assessment was employed to quantify the condition of Mertarvik wetlands, adapting the North Slope Rapid Assessment Methodology (NSRAM) developed by the Engineer Research and Development Center (ERDC) for the Alaska District using ArcMap 10.4.1. Three wetland data (WD) points were established based on general areas of development; WD1 is in the center of the town site located at longitude -164.497955, latitude 60.821286; WD2 is near the vertex of the runways located at longitude -164.504164, latitude 60.810319; and WD3 is en route to the quarry and landfill located at longitude -164.521752, latitude 60.815969. WD3 was moved east to avoid capturing the large areas of uplands proximal to the quarry and landfill. Eighty-meter and 800-meter buffers were drawn around the wetland data points using ArcMap's buffer geoprocessing tool. (Figure 1)

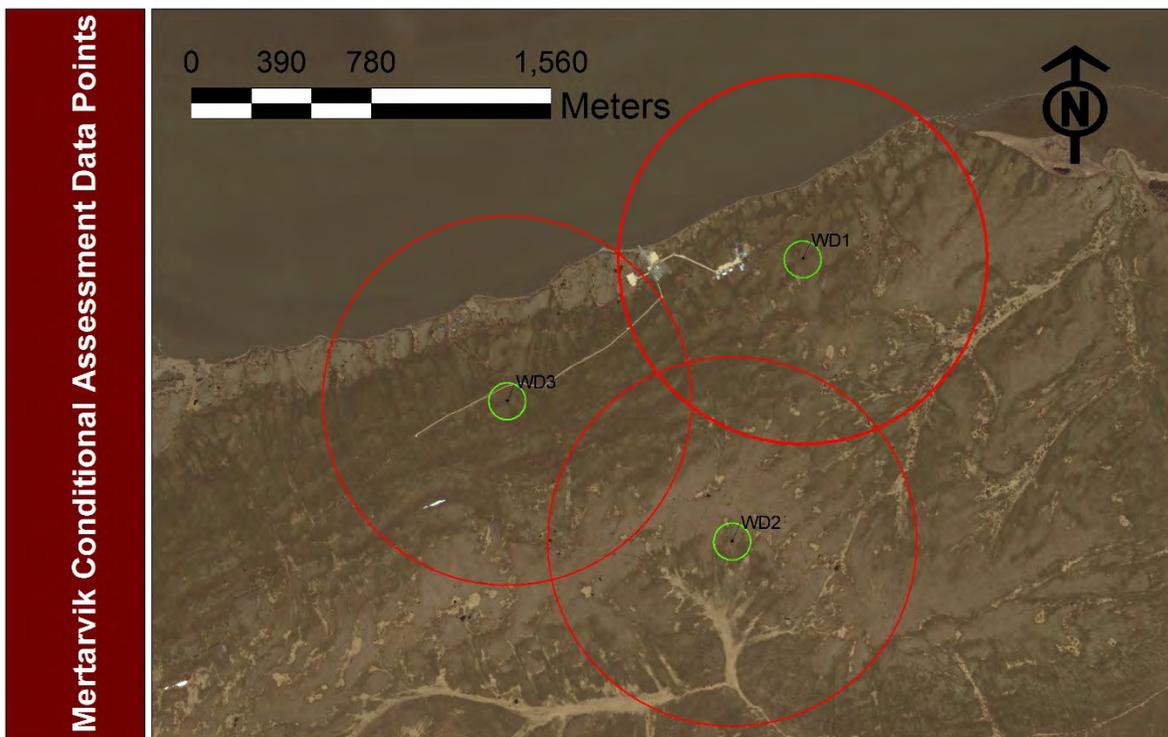


Figure 1. Mertarvik conditional assessment data points, 80m buffer (green), and 800m buffer (red).

The offsite protocols in accordance with the NSRAM were followed to develop numeric values for level of existing disturbance and post-project disturbance in order to quantify the conditional change due to construction of the Mertarvik Infrastructure Development project. All wetland

data points were evaluated as slope wetlands under the hydrogeomorphic classification system and assigned the foothills ecological region due to the geographic location and topographic setting. Open water of the Ninglick River and uplands were deducted from the area calculations of disturbance.

Existing impacts were calculated by analysis of imagery and survey data.

Geographical Information System (GIS) geometry supplied by the Alaska Native Tribal Health Consortium was applied to the wetland assessment areas to calculate the post project conditions. Best professional judgement was used to estimate post project effects of thermokarst and dust deposition.

2.0 Results

2.1 Wetland Assessment Area 1

Wetland assessment area #1 is situated in the center of the proposed town site development area. The area is fairly high gradient and the elevation changes from over 90 meters to 0 meter above sea level over about 1,100 horizontal meters. Some pioneering development exists within the assessment area: a few sheds, roads, evacuation center, barge landing, and staging areas. Trails throughout the assessment area are visible from aerial photography and about 25 percent of those trails contain anthropogenically derived surface water. (Figure 2)

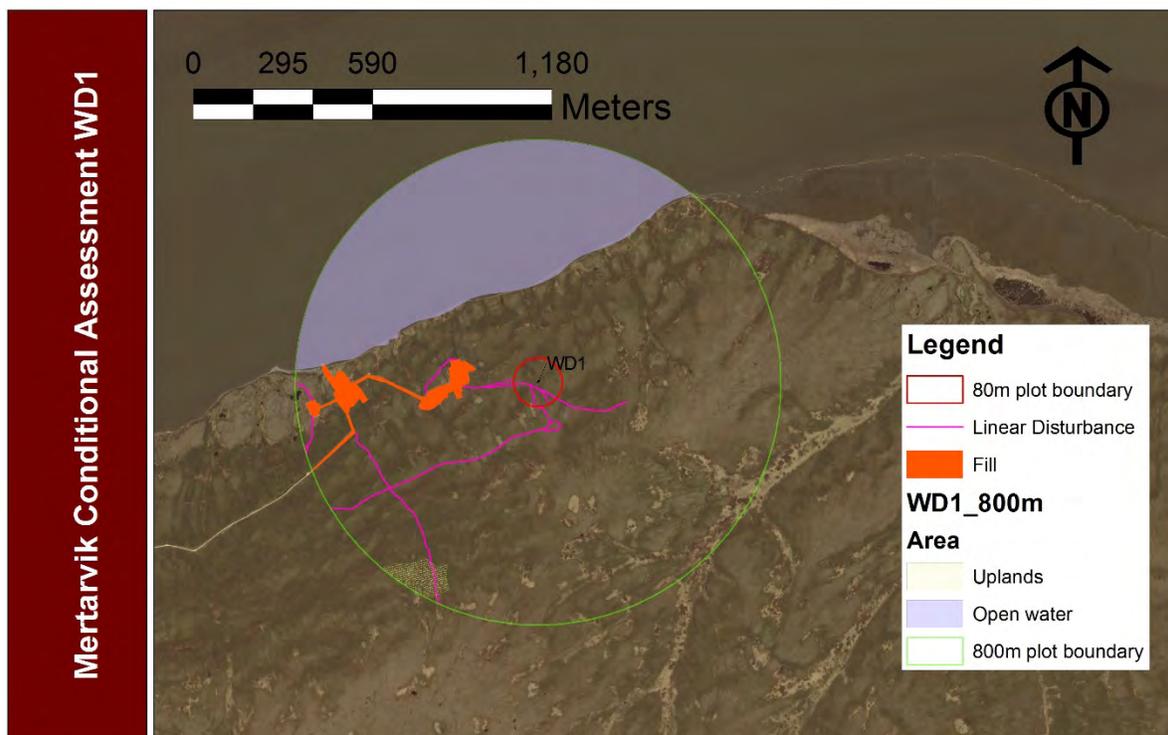


Figure 2. Wetland assessment area 1 pre-project condition

The majority of the development in this wetland assessment area is confined to the area west of plot center, but about 3,500 meters of trails visible from aerial photography intercross the 800-meter radius plot. Surface water is visible in about 25 percent of the trails. Within the 80-meter radius plot, 614 meters of linear disturbance averaging 4 meters wide was observed, creating 2456 m² of local landscape disturbance (LLD). Anthropogenically derived surface water (SW) was observed in about a quarter of the trail area for a total of 614m². No impediment to hydrology (IH) or evidence of dust accumulation (DD) was visible in the aerial photography. Within the 800 meter plot, 28,104m² of area disturbance and 2,857m of linear disturbance averaging 4m in width was measured. Total disturbance in the 800-meter plot (LD) was 40,596 m². Impediment to wildlife (IW) was present in two quadrants of the 800-meter plot and the plot center was 273 meters from plot center. No evidence of thermokarst was visible from aerial photography.

The relative conditional index for wetland assessment area is 0.85.

ALASKA NORTH SLOPE REGION RAPID WETLAND ASSESSMENT			
Section A: Offsite Data			
Site Name/Location: Mertarvik Infrastructure Development		Latitude/UTM Northing: 60.821286	
Date: 3/3/2017		Longitude/UTM Easting: -164.497955	
Arctic Region: Foothills		Coordinate System: NAD83 5008	
HGM Class: Slope		Imagery Source (Year): 6/3/2015	
Investigator(s):		M. Ferguson	
Determine values for variables 1-4 using an 80 meter radius plot.			
1	V _{11b}	Local Landscape Disturbance - percent of the plot (0 - 100) occupied by anthropogenic disturbance and/or man-made features.	5
		V _{11b} Subindex Score	0.88
2	V _{2b}	Anthropogenically Derived Surface Water - percent of the plot (0 - 100) occupied by surface water derive from human activities, including thermokarst if directly associated, and conspicuously linked.	1
		V _{2b} Subindex Score	0.54
3	V _{3b}	Impediment to Hydrology - number of quarter segments (0 - 4) assignable in any direction that have hydrologic impediments.	0
		V _{3b} Subindex Score	1.00
4	V _{4b}	Evidence of Dust - accumulation of sediment on vegetation, appearing as areas of discoloration.	No
Determine values for variables 5-8 using an 800 meter radius plot.			
5	V _{5b}	Landscape Disturbance - percent of the plot (0 - 100) occupied by anthropogenic disturbance and/or man-made features.	3
		V _{5b} Subindex Score	1.00
6	V _{6b}	Impediment to Wildlife - number of quarter segments (0 - 4) assignable in any direction with impediments to the free movement of wildlife.	2
		V _{6b} Subindex Score	0.50
7	V _{7b}	Distance to Roadway - minimum distance in meters (0 - 800) to a roadway of any size, class, or condition.	273
		V _{7b} Subindex Score	0.55
8	V ₈	Evidence of Thermokarst	No
		Habitat Score	0.72
		Hydrology Score	0.95
		Biogeochemical Cycling Score	0.88
Remarks: Majority of development confined to western extent of 800m plot. Numerous ATV trails meander through southern portion of 800m plot, anthropogenic surface water estimated to occupy 14 of trails. 614 meters of linear disturbance within 80m plot x 4m avg width=1064m² linear disturbance within 80m plot. 800m plot areal disturbance=28104m². 800m linear disturbance 2857m x 4m avg width=11428 Total disturbance=40536. 433168m² open water, 16700m² UPL, wetland terrestrial plot area: 1500417m².			
Off-Site Variable Subindex Scores			
V _{11b}	Local landscape disturbance	0.88	
V _{2b}	Anthropogenically derived surface water	0.54	
V _{3b}	Impediment to hydrology	1.00	
V _{4b}	Evidence of dust	No	
V _{5b}	Landscape disturbance	1.00	
V _{6b}	Impediment to wildlife	0.50	
V _{7b}	Distance to roadway	0.55	
V ₈	Evidence of thermokarst	No	
Assessment Scores			
		Habitat	0.72
		Hydrology	0.95
		Biogeochemical Cycling	0.88
		On-site Modifier Score	
		AVERAGE SCORE	0.85

Figure 3. Wetland assessment area 1 data form

2.1.1 Wetland assessment area 1 post project

This wetland assessment area would host the majority of the Mertarvik town site, to include the house pads, school, offices, considerable amount of roads, and all the trails (Figure 4). Construction of the school, playground, and a section of road would add 1,665 m² of impacts to the 80-meter plot, contributing to a total of 2,729 m² of local land disturbance. Anthropogenic surface water would likely increase by 1 percent as a result of the hydraulic impediment created by the road construction in the northern portion of the 80-meter plot. Construction of the road

in the northern portion of the 80-meter plot would also create a hydrologic impediment in two quarter sections of the 80-meter plot.

Landscape disturbance within the 800-meter plot would increase to 137,978 m². Roads, house pads, a school, playground, office buildings, and other features would create an impediment to wildlife in four quarter sections of the 800-meter plot and the road would be 50 meters from plot center.

The conditional multiplier for the post construction wetland assessment area 1 is 0.59, a difference of 0.26 from the pre-project condition of 0.85.

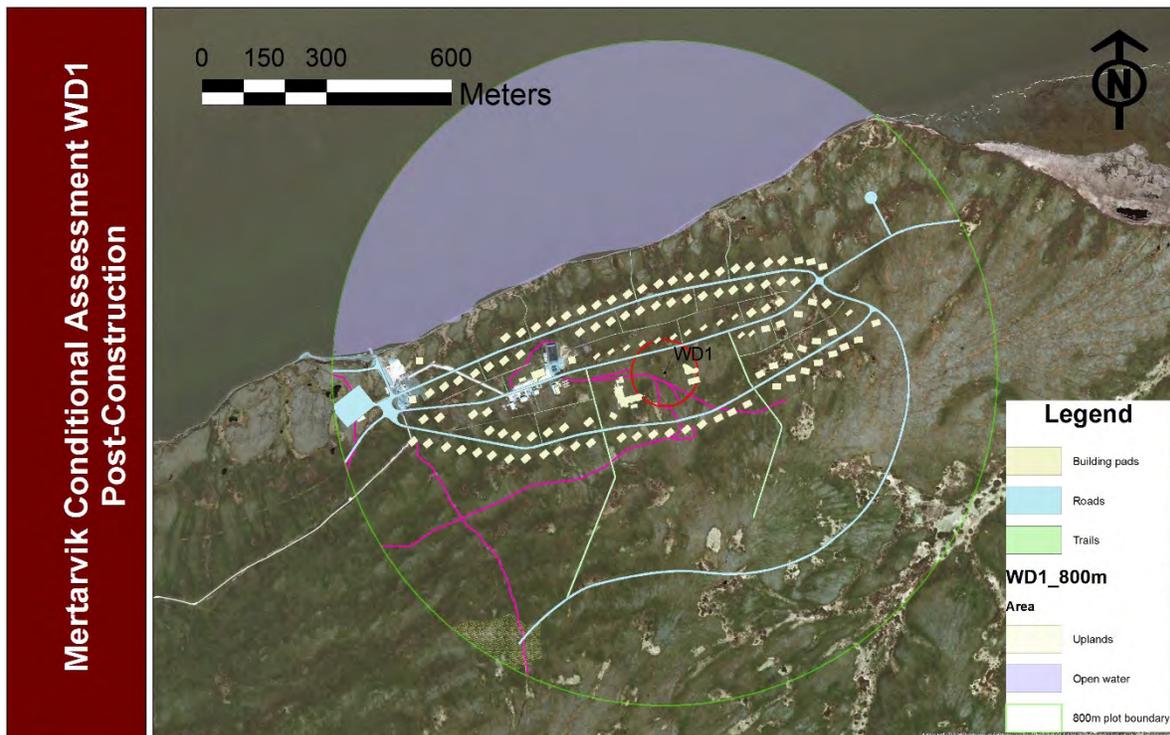


Figure 4. Wetland assessment area 1 post project condition

ALASKA NORTH SLOPE REGION RAPID WETLAND ASSESSMENT				
Section A: Offsite Data				
Site Name/Location: Mertarvik Infrastructure Development WAA1		Latitude/UTM Northing: 60.821286		
Date: 9/17/2017		Longitude/UTM Easting: -164.497955		
Project Purpose: Impact		Assessment Type: Post construction		
Arctic Region: Foothills		Coordinate System: NAD83 5008		
HGM Class: Slope		Imagery Source (Year): 6/3/2015		
Investigator(s):		M. Ferguson		
Determine values for variables 1-4 using an 80 meter radius plot.				
1	V _{LLD}	Local Landscape Disturbance - percent of the plot (0 - 100) occupied by anthropogenic disturbance and/or man-made features.	14	
			V_{LLD} Subindex Score	0.65
2	V _{SW}	Anthropogenically Derived Surface Water - percent of the plot (0 - 100) occupied by surface water derived from human activities, including thermokarst if directly associated, and conspicuously linked.	2	
			V_{SW} Subindex Score	0.88
3	V _{IH}	Impediment to Hydrology - number of quarter segments (0 - 4) assignable in any direction that have hydrologic impediments.	2	
			V_{IH} Subindex Score	0.50
4	V _{DD}	Evidence of Dust - accumulation of sediment on vegetation, appearing as areas of discoloration.	No	
Determine values for variables 5-8 using an 800 meter radius plot.				
5	V _{LD}	Landscape Disturbance - percent of the plot (0 - 100) occupied by anthropogenic disturbance and/or man-made features.	9	
			V_{LD} Subindex Score	0.91
6	V _{IW}	Impediment to Wildlife - number of quarter segments (0 - 4) assignable in any direction with impediments to the free movement of wildlife.	4	
			V_{IW} Subindex Score	0.00
7	V _{DR}	Distance to Roadway - minimum distance in meters (0 - 800) to a roadway of any size, class, or condition.	50	
			V_{DR} Subindex Score	0.10
8	V _{TK}	Evidence of Thermokarst	No	
			Habitat Score	0.39
			Hydrology Score	0.73
			Biogeochemical Cycling Score	0.65
Remarks: 1026m ² additional local land disturbance from school and playground+639m ² from road intercrossing 80m plot; total Vlld= 2729m ² /20106m ² =14%. Assume no additional anthropogenic surface water from areal disturbance because additional impacts would be non-linear; additional 1% anthropogenic surface water associated with road. Landscape disturbance from roads at 800m scale=44056m ² , trails=9517m ² , building pads=43809m ² . Total Vld=97382+40596m ² =137978m ² /1500417m ² =9%				
Off-Site Variable Subindex Scores				
V _{LLD}	Local landscape disturbance	0.65		
V _{SW}	Anthropogenically derived surface water	0.88		
V _{IH}	Impediment to hydrology	0.50		
V _{DD}	Evidence of dust	No		
V _{LD}	Landscape disturbance	0.91		
V _{IW}	Impediment to wildlife	0.00		
V _{DR}	Distance to roadway	0.10		
V _{TK}	Evidence of thermokarst	No		
Assessment Scores				
		Habitat	0.39	
		Hydrology	0.73	
		Biogeochemical Cycling	0.65	
		On-site Modifier Score		
		AVERAGE SCORE	0.59	

Figure 5. Wetland assessment area 1 post project data form

2.2 Wetland assessment area 2

Wetland assessment area 2 is centered on a ridgeline near the vertex of the proposed main runway and crosswind runway, at about 325m above sea level. The elevation increases to 106m in the west, but drops off in all other directions. The area is currently undeveloped, but a few trails intercross the 800m radius plot boundary (Figure 6).

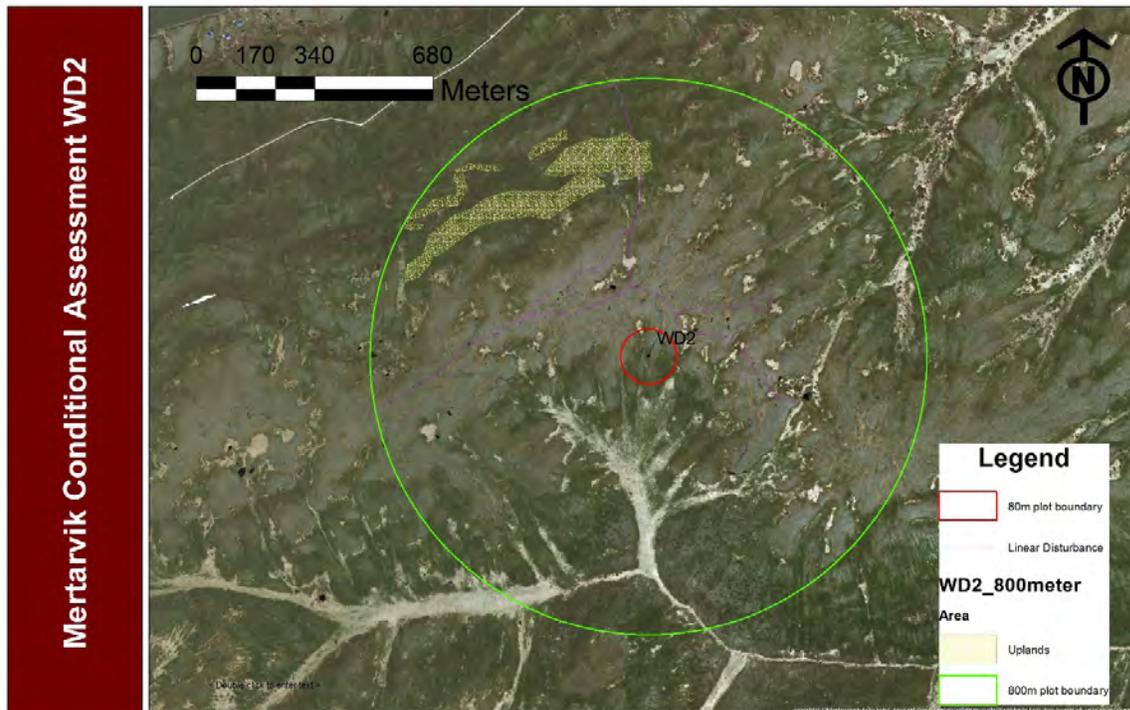


Figure 6. Wetland assessment area 2

This wetland assessment area is near the site of the proposed airport, which would consist of a main runway, crosswind runway, and apron. It is currently undeveloped, but about 2,900 meters of trails intercross the 800-meter plot. These trails are about 4 meters wide and create an areal disturbance of about 11,590 m² within the 800-meter radius plot (LD). There is no disturbance, anthropogenically derived surface water, evidence of dust, or impediment to hydrology within the 80-meter radius plot.

Upland area of 77,999 meters was deducted from the 2,010,285 m² 800-meter radius, leaving 1,932,286 m² of wetlands. A trail entered the 800-meter plot due north of plot center, passing within 203 meters of center, and exiting the plot to the west, but about 3,500 meters of trails visible from aerial photography intercross the 800-meter radius plot. Surface water is visible in about 25 percent of the trails. Within the 80-meter radius plot, 614 meters of linear disturbance averaging 4 meters wide was observed, creating 2456 m² of local landscape disturbance (LLD). Anthropogenically derived surface water (SW) was observed in about a quarter of the trail area, a total of 614 m². There was no impediment to hydrology (IH) or evidence of dust accumulation (DD) visible in the aerial photography. Within the 800-meter plot, 28,104 m² of area disturbance and 2,857 meters of linear disturbance averaging 4 meters in width was measured. Total disturbance in the 800-meter plot (LD) was 40,596 m². Impediment to wildlife (IW) was

present in two quadrants of the 800-meter plot and the plot center was 273 meters from plot center. There was no evidence of thermokarst visible from aerial photography.

The relative conditional index for wetland assessment area 2 is 0.97.

ALASKA NORTH SLOPE REGION RAPID WETLAND ASSESSMENT			
Section A: Offsite Data			
Site Name/Location:	Mertarvik Infrastructure Development	Latitude/UTM Northing:	60.810319
Date:	9/9/2017	Longitude/UTM Easting:	-164.504164
Arctic Region:	Foothills	Coordinate System:	NAD83 5008
HGM Class:	Slope	Imagery Source (Year):	6/3/2015
Investigator(s):	M. Ferguson		
Determine values for variables 1-4 using an 80 meter radius plot.			
1	V _{LLD}	Local Landscape Disturbance - percent of the plot (0 - 100) occupied by anthropogenic disturbance and/or man-made features.	0
		V _{LLD} Subindex Score	1.00
2	V _{SW}	Anthropogenically Derived Surface Water - percent of the plot (0 - 100) occupied by surface water derived from human activities, including thermokarst if directly associated, and conspicuously linked.	0
		V _{SW} Subindex Score	1.00
3	V _{IH}	Impediment to Hydrology - number of quarter segments (0 - 4) assignable in any direction that have hydrologic impediments.	0
		V _{IH} Subindex Score	1.00
4	V _{DD}	Evidence of Dust - accumulation of sediment on vegetation, appearing as areas of discoloration.	No
Determine values for variables 5-8 using an 800 meter radius plot.			
5	V _{LD}	Landscape Disturbance - percent of the plot (0 - 100) occupied by anthropogenic disturbance and/or man-made features.	1
		V _{LD} Subindex Score	1.00
6	V _{IW}	Impediment to Wildlife - number of quarter segments (0 - 4) assignable in any direction with impediments to the free movement of wildlife.	0
		V _{IW} Subindex Score	1.00
7	V _{DR}	Distance to Roadway - minimum distance in meters (0 - 800) to a roadway of any size, class, or condition.	406
		V _{DR} Subindex Score	0.81
8	V _{TK}	Evidence of Thermokarst	No
		Habitat Score	0.91
		Hydrology Score	1.00
		Biogeochemical Cycling Score	1.00
Remarks: 203m to 4wheeler trail NW of plot center; doubled distance to reduce weight in subindex valuation for low traffic. 800m plot 2897m linear disturbance * 4m width=11590m2. Three upland polygons combined area 77,999m2-2010285=1932286m2.			
Off-Site Variable Subindex Scores			
V _{LLD}	Local landscape disturbance	1.00	
V _{SW}	Anthropogenically derived surface water	1.00	
V _{IH}	Impediment to hydrology	1.00	
V _{DD}	Evidence of dust	No	
V _{LD}	Landscape disturbance	1.00	
V _{IW}	Impediment to wildlife	1.00	
V _{DR}	Distance to roadway	0.81	
V _{TK}	Evidence of thermokarst	No	
Assessment Scores			
	Habitat	0.91	
	Hydrology	1.00	
	Biogeochemical Cycling	1.00	
	On-site Modifier Score		
	AVERAGE SCORE	0.97	

Figure 7. Wetland assessment area 2 data form

2.2.1 Wetland Assessment Area 2 post-project

Wetland assessment area 2 was centered near the vertex of the proposed main and crosswind runways on the ridge top south of the Mertarvik townsite (Figure 8). No local landscape disturbance, anthropogenic surface water, or impediments to hydrology would occur within the 80-meter plot, but it is likely dust deposition would be observed due to the quantities of gravel required for the construction of the two runways.

Roads and runways would create 110,413 m² of landscape disturbance within the 800-meter plot, impede wildlife in three quarter segments, and would be constructed within 100 meters of the plot center.

The conditional multiplier for the post construction wetland assessment area 1 is 0.80, a difference of 0.17 from the pre-project condition of 0.97.

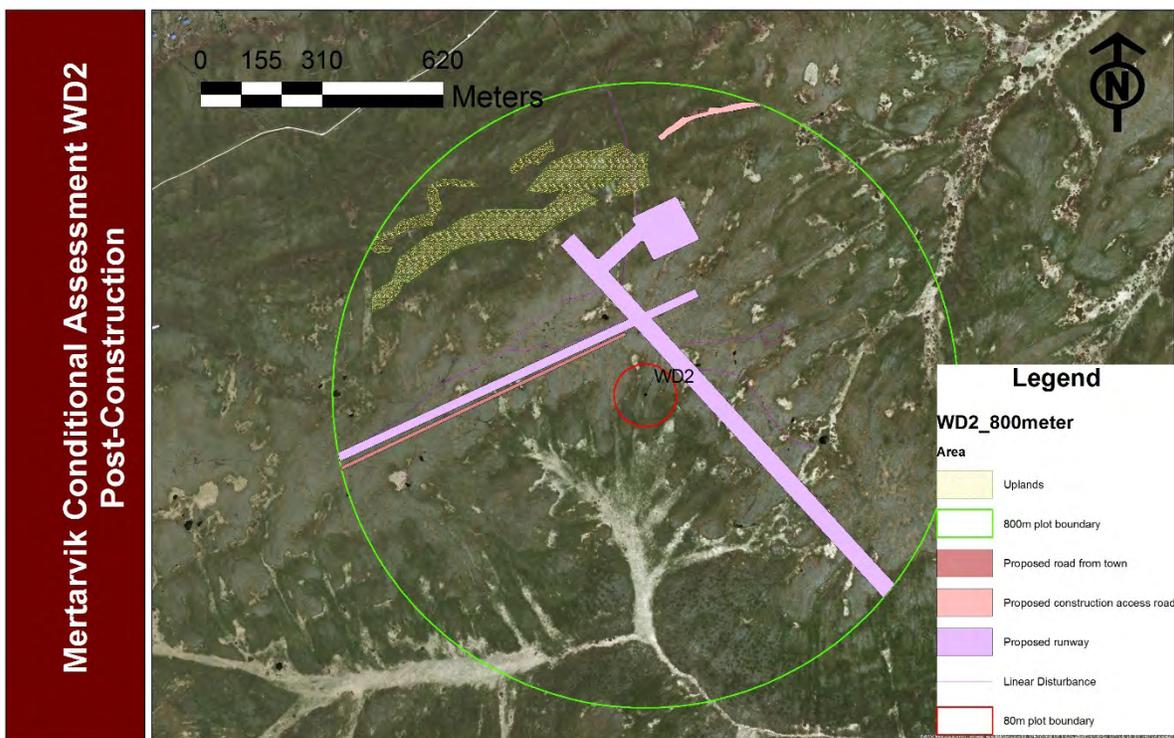


Figure 8. Wetland Assessment Area 2 post project condition

ALASKA NORTH SLOPE REGION RAPID WETLAND ASSESSMENT			
Section A: Offsite Data			
Site Name/Location:	Mertarvik Infrastructure Development WAA2	Latitude/UTM Northing:	60.810319
Date:	9/17/2017	Longitude/UTM Easting:	-164.504164
Project Purpose:	Impact	Assessment Type:	Post construction
Arctic Region:	Foothills	Coordinate System:	NAD83 5008
HGM Class:	Slope	Imagery Source (Year):	6/3/2015
Investigator(s):	M. Ferguson		
Determine values for variables 1-4 using an 80 meter radius plot.			
1	V _{LLD}	Local Landscape Disturbance - percent of the plot (0 - 100) occupied by anthropogenic disturbance and/or man-made features.	0
		V_{LLD} Subindex Score	1.00
2	V _{SW}	Anthropogenically Derived Surface Water - percent of the plot (0 - 100) occupied by surface water derived from human activities, including thermokarst if directly associated, and conspicuously linked.	0
		V_{SW} Subindex Score	1.00
3	V _{IH}	Impediment to Hydrology - number of quarter segments (0 - 4) assignable in any direction that have hydrologic impediments.	0
		V_{IH} Subindex Score	1.00
4	V _{DD}	Evidence of Dust - accumulation of sediment on vegetation, appearing as areas of discoloration.	Yes
Determine values for variables 5-8 using an 800 meter radius plot.			
5	V _{LD}	Landscape Disturbance - percent of the plot (0 - 100) occupied by anthropogenic disturbance and/or man-made features.	6
		V_{LD} Subindex Score	0.98
6	V _{IW}	Impediment to Wildlife - number of quarter segments (0 - 4) assignable in any direction with impediments to the free movement of wildlife.	3
		V_{IW} Subindex Score	0.25
7	V _{DR}	Distance to Roadway - minimum distance in meters (0 - 800) to a roadway of any size, class, or condition.	100
		V_{DR} Subindex Score	0.20
8	V _{TK}	Evidence of Thermokarst	No
		Habitat Score	0.59
		Hydrology Score	0.99
		Biogeochemical Cycling Score	0.80
Remarks: 100m to runway, 98886m2 runway footprint, 4168m2 access road, 7359m2 road from town. Total disturbance 110,413m2 within 800m radius. Three upland polygons combined area 77,999m2-2010285=1932286m2. Vld 110,413/1,932,286=5.7%. Dust deposition expected due to gravel quantities required for runway			
Off-Site Variable Subindex Scores			
V _{LLD}	Local landscape disturbance	1.00	
V _{SW}	Anthropogenically derived surface water	1.00	
V _{IH}	Impediment to hydrology	1.00	
V _{DD}	Evidence of dust	Yes	
V _{LD}	Landscape disturbance	0.98	
V _{IW}	Impediment to wildlife	0.25	
V _{DR}	Distance to roadway	0.20	
V _{TK}	Evidence of thermokarst	No	
Assessment Scores			
	Habitat	0.59	
	Hydrology	0.99	
	Biogeochemical Cycling	0.80	
	On-site Modifier Score		
	AVERAGE SCORE	0.80	

Figure 9. Wetland assessment area 2 post construction data form

2.3 Wetland assessment area 3

Wetland assessment area 3 is centered along the route from the townsite to the quarry and landfill. The plot center was shifted east to avoid capturing a large area of uplands in the vicinity of the quarry and landfill. The topography in the 800-meter plot slopes 375 meters in the southern extent of the 800-meter plot boundary to sea level in the north, over a distance of about 1,200 meters. A road extend from the townsite through the plot about 1,250 meters towards the quarry, then converts to a trail for the remaining 388 meters before exiting the plot. Several trail systems intercross the plot, primarily in the northern half. Three homes occupy about 240 m² along the bank of the Ninglick River in the northern half of the 800-meter plot and there is another 160 m² of disturbance in proximity to the houses. The barge terminal complex occupies 2,063 m² of the 800-meter plot. A total of 6,439 meters of roads and trails intercross the 800-meter plot area (Figure 10).

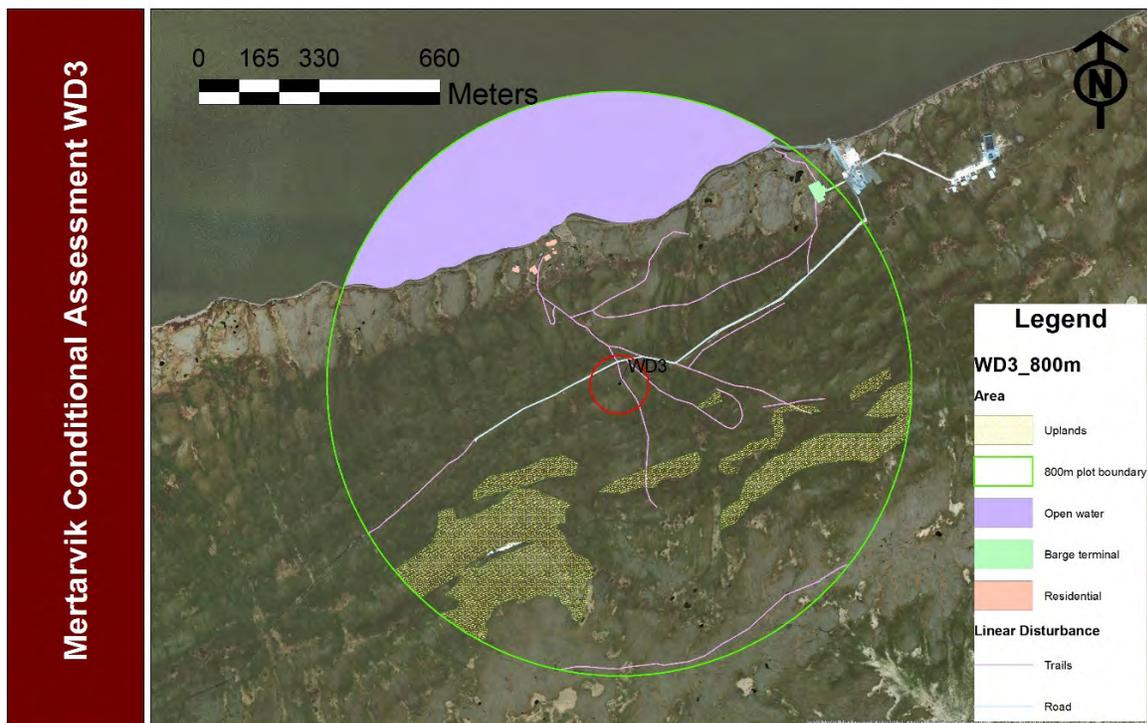


Figure 10. Wetland assessment area 3

This wetland assessment area includes the road and trail extending from the townsite to the quarry and landfill. Uplands covering 175,127 m² and 350,534 m² of open water fall within the 800-meter plot. Three houses and some attendant disturbance are in the northern portion of the assessment area. Approximately 6,439 meters of roads and trails cross the wetland assessment area; the trails and roads have a 4-meter average width of disturbance. Total disturbance from linear features is 1,432 m² inside the 80-meter plot and 25,756 m² inside the 800-meter plot.

Most of the wetland assessment area is currently undeveloped, but the trails and roads passing through the 80-meter plot result in 7 percent local land disturbance (LLD) and 2 percent anthropogenically derived surface water (SW). Hydrology is impeded by the road (IH) in two quadrants of the 80-meter plot, and there is no evidence of dust deposition (DD) visible in the aerial photography.

After removing the surface water of the Ninglick River and uplands from the area of the 800-meter plot, 1,484,339 m² of wetlands remain in the assessment area. The combined percentage of disturbance to the wetlands in the 800-meter plot is 2 percent; there is no impediment to the free movement of wildlife, the road is 55 meters from plot center, and no evidence of thermokarst is visible from aerial photography.

The relative conditional index for wetland assessment area 3 is 0.71

ALASKA NORTH SLOPE REGION RAPID WETLAND ASSESSMENT			
Section A: Offsite Data			
Site Name/Location:		Mertarvik Infrastructure Development	Latitude/UTM Northing: 60.815363
Date:		8/16/2016	Longitude/UTM Easting: -164.521752
Arctic Region:		Foothills	Coordinate System: NAD83 5008
HGM Class:		Slope	Imagery Source (Year): 8/3/2015
Investigator(s):		M. Ferguson	
Determine values for variables 1-4 using an 80 meter radius plot.			
1	V _{11a}	Local Landscape Disturbance - percent of the plot (0 - 100) occupied by anthropogenic disturbance and/or man-made features.	7
		V_{11a} Subindex Score	0.83
2	V _{2a}	Anthropogenically Derived Surface Water - percent of the plot (0 - 100) occupied by surface water derived from human activities, including thermokarst if directly associated, and conspicuously linked.	2
		V_{2a} Subindex Score	0.88
3	V _{3a}	Impediment to Hydrology - number of quarter segments (0 - 4) assignable in any direction that have hydrologic impediments.	2
		V_{3a} Subindex Score	0.50
4	V _{4a}	Evidence of Dust - accumulation of sediment on vegetation, appearing as areas of discoloration.	No
Determine values for variables 5-8 using an 800 meter radius plot.			
5	V _{5a}	Landscape Disturbance - percent of the plot (0 - 100) occupied by anthropogenic disturbance and/or man-made features.	2
		V_{5a} Subindex Score	1.00
6	V _{6a}	Impediment to Wildlife - number of quarter segments (0 - 4) assignable in any direction with impediments to the free movement of wildlife.	0
		V_{6a} Subindex Score	1.00
7	V _{7a}	Distance to Roadway - minimum distance in meters (0 - 800) to a roadway of any size, class, or condition.	55
		V_{7a} Subindex Score	0.11
8	V _{8a}	Evidence of Thermokarst	No
		Habitat Score	0.51
		Hydrology Score	0.79
		Biogeochemical Cycling Score	0.83
Remarks: Uplands cover 175127m² and open water occupies 350534m² of 800m plot. Trails and roads 4m x 6439=25756m² linear disturbance. 2463m² areal disturbance from houses and barge terminal. Road 55m from plot center.			
Off-Site Variable Subindex Scores			
V _{11a}	Local landscape disturbance	0.83	
V _{2a}	Anthropogenically derived surface water	0.88	
V _{3a}	Impediment to hydrology	0.50	
V _{4a}	Evidence of dust	No	
V _{5a}	Landscape disturbance	1.00	
V _{6a}	Impediment to wildlife	1.00	
V _{7a}	Distance to roadway	0.11	
V _{8a}	Evidence of thermokarst	No	
Assessment Scores			
		Habitat	0.51
		Hydrology	0.79
		Biogeochemical Cycling	0.83
		On-site Modifier Score	
		AVERAGE SCORE	0.71

Figure 11. Wetland assessment area 3 data form

2.3.1 Wetland Assessment Area 3 post-project

Wetland assessment area 3 is situated between the town site and the quarry (Figure 12). No additional features would be constructed within the 80-meter plot. Dust deposition is not expected to occur within the plot.

Landscape disturbance within the 800-meter plot would double to 4 percent as a result of the 26,074 m² associated with the construction of a road though the northern portion of the plot. Construction of the road would add impediment to the movement of wildlife through three quarter segments of the 800-meter plot. Thermokarst features are likely to develop

along the south margin of the road due to the impoundment potential created by its perpendicular to the gradient path across the entire 800-meter radius plot.

The conditional multiplier for the post construction wetland assessment area 3 is 0.64, a difference of 0.07 from the pre-project condition of 0.71.

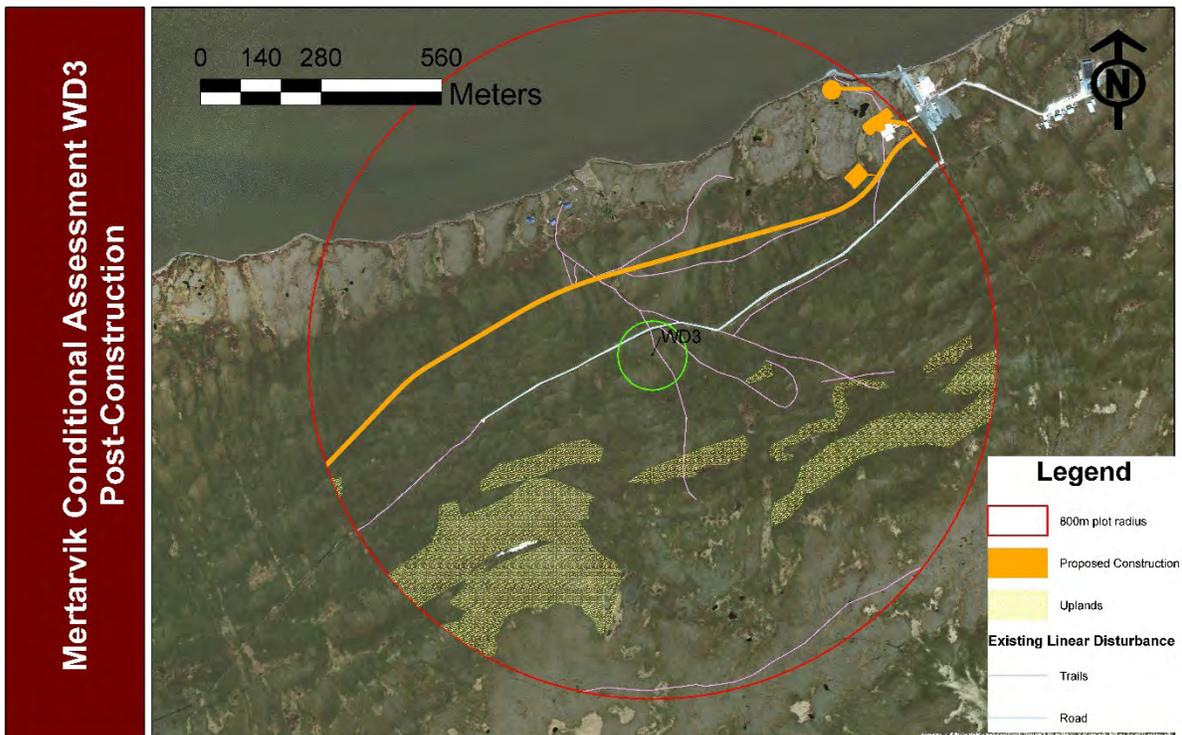


Figure 12. Wetland assessment area 3 post project condition

ALASKA NORTH SLOPE REGION RAPID WETLAND ASSESSMENT			
Section A: Offsite Data			
Site Name/Location:		Mertarvik Infrastructure Development WAA3	Latitude/UTM Northing: 60.815969
Date:		9/17/2017	Longitude/UTM Easting: -164.521752
Project Purpose:		Impact	Assessment Type: Post-construction
Arctic Region:		Foothills	Coordinate System: NAD83 5008
HGM Class:		Slope	Imagery Source (Year): 6/3/2015
Investigator(s):		M. Ferguson	
Determine values for variables 1-4 using an 80 meter radius plot.			
1	V _{LLD}	Local Landscape Disturbance - percent of the plot (0 - 100) occupied by anthropogenic disturbance and/or man-made features.	7
		V_{LLD} Subindex Score	0.83
2	V _{SW}	Anthropogenically Derived Surface Water - percent of the plot (0 - 100) occupied by surface water derived from human activities, including thermokarst if directly associated, and conspicuously linked.	2
		V_{SW} Subindex Score	0.88
3	V _{IH}	Impediment to Hydrology - number of quarter segments (0 - 4) assignable in any direction that have hydrologic impediments.	2
		V_{IH} Subindex Score	0.50
4	V _{DD}	Evidence of Dust - accumulation of sediment on vegetation, appearing as areas of discoloration.	No
Determine values for variables 5-8 using an 800 meter radius plot.			
5	V _{LD}	Landscape Disturbance - percent of the plot (0 - 100) occupied by anthropogenic disturbance and/or man-made features.	4
		V_{LD} Subindex Score	1.00
6	V _{IW}	Impediment to Wildlife - number of quarter segments (0 - 4) assignable in any direction with impediments to the free movement of wildlife.	3
		V_{IW} Subindex Score	0.25
7	V _{DR}	Distance to Roadway - minimum distance in meters (0 - 800) to a roadway of any size, class, or condition.	55
		V_{DR} Subindex Score	0.11
8	V _{TK}	Evidence of Thermokarst	Yes
		Habitat Score	0.51
		Hydrology Score	0.70
		Biogeochemical Cycling Score	0.70
Remarks: Road construction would add 26074m ² disturbance within the 800m plot radius. 54,393m ² /1484339m ² =3.6% VLD			
Off-Site Variable Subindex Scores			
V _{LLD}	Local landscape disturbance	0.83	
V _{SW}	Anthropogenically derived surface water	0.88	
V _{IH}	Impediment to hydrology	0.50	
V _{DD}	Evidence of dust	No	
V _{LD}	Landscape disturbance	1.00	
V _{IW}	Impediment to wildlife	0.25	
V _{DR}	Distance to roadway	0.11	
V _{TK}	Evidence of thermokarst	Yes	
Assessment Scores			
		Habitat	0.51
		Hydrology	0.70
		Biogeochemical Cycling	0.70
		On-site Modifier Score	
		AVERAGE SCORE	0.64

Figure 13. Wetland assessment area 3 post project data form

3.0 Functional Assessment

3.1 Methods

A functional assessment was performed to quantify the functions provided by the six Cowardin classes of wetlands that would be impacted by the construction of the Mertarvik Infrastructure Development Project. The Alaska Regulatory Best Professional Judgement Characterization (ARBPJC) methodology presented in Regulatory Guidance Letter (RGL) 09-01 was used, absent a more appropriate method. No implication of compensatory mitigation was included in the assessment. Data forms from the 2005 wetland delineation conducted by USACE Regulatory were used to complete the ARBPJC forms. The functional assessment multipliers for each Cowardin class were applied to the acreage of impact associated with each infrastructure feature. The product was multiplied by the pre and post project conditional assessment in order to generate a functional differential between pre and post project conditions, expressed as a functional capacity unit.

3.2 Assumptions and caveats

Wetlands with six or more plant species are considered to have high plant diversity. Breakup falls outside the growing season, so is not considered inundation during the growing season. Water detention was assumed high if the soils was overlain by 8 inches or more of organic material. Aerial cover greater than 50% was considered dense. In the event requisite data was not included on the 2005 wetland delineation data forms, that subindex was removed from consideration; e.g., the palustrine emergent persistent data form 2b did not include soils data due to the presence of primary hydrology indicators and obligate wetland plant species, so subindex C5 was removed from the total calculation and reduced the potential score from 43 to 42.

3.3 Results

3.3.1 Palustrine Emergent Persistent

Palustrine emergent persistent (PEM1) wetlands represent about 12 percent of the total delineated area. They are usually located in drainage ways and in depressions where snow persists until late spring. The communities are typically dominated by bluejoint grass with few herbs and almost no willows. Herbs within these communities include *Petasites frigidus*, *Equisetum sp.*, *Athyrium filix-femina*, dwarf dogwood (*cornus suecica*), and *Angelica lucida*. They are well distributed within the delineated area but are usually common near willow thickets. Palustrine emergent persistent wetlands also include wet sedge meadow tundra dominated by *Carex aquatilis*, *Potentilla palustris*, and green sphagnum. Wet sedge meadow tundra is usually found in areas with standing water along drainages that cross the bottom hills, lake fringes, and crisscross the top plateau tundra.

These wetlands would be impacted primarily by the construction of the runways, which would cause the loss of 5.3 acres including the apron. Roads would destroy 1.2 acres and the quarry would remove .2 acres (Figure 14). These wetlands received a functional score of 21/42 (0.5) and function at a high level in terms of nutrient and toxicant removal, production and export of organic material, and educational or scientific value. Moderate scores were returned in flood flow alteration, sediment removal, general habitat suitability, and native plant richness. This class

provides low uniqueness and heritage functions. Erosion control, shoreline stabilization, and general fish habitat were not evaluated.

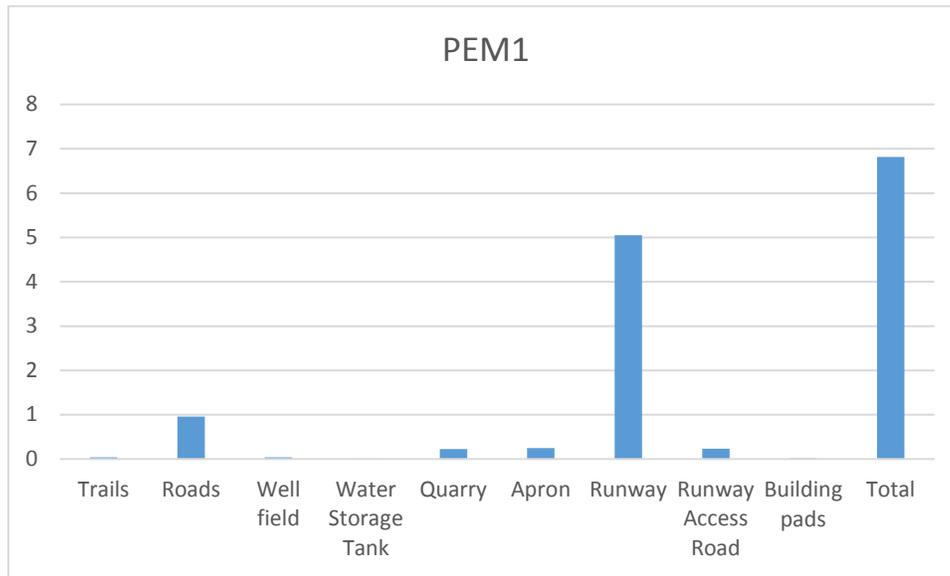


Figure 14. Acreage of impacts to palustrine emergent wetlands arranged by feature type

Wetland assessment area 2 (WAA2) was selected as the most appropriate conditional multiplier to calculate functional capacity differential because most of the impacts to this wetland type would result from the construction of the runway. Palustrine emergent persistent wetlands totaling 6.8 acres would be impacted by the project, applying the pre-project conditional multiplier of 0.97 for WAA2 equals 6.6 conditional units. Subtract the pre-project condition from the post project conditional value (6.8 acres multiplied by post-project conditional multiplier of 0.8); 5.4, to calculate the 1.2 conditional differential. This value is multiplied by the functional score of 0.5 provided by the ARBPJC to derive -0.6 functional capacity units from the impact of the proposed activity on palustrine emergent persistent wetlands in the project area.

3.3.2 Palustrine scrub-shrub

The palustrine scrub-shrub wetlands represent about 58 percent of the delineated area and were separated into the following subclasses depending on the habitat of the dominant species: palustrine scrub-shrub evergreen wetlands dominated by crowberry tundra and birch-ericaceous shrub communities (937 acres), palustrine scrub-shrub/moss peat wetlands where sphagnum and low growing shrubs are the main component of the vegetation community (580 acres), and palustrine scrub-shrub broad leaved-deciduous dominated by willow (*Salix pulcha*) (324 acres). Palustrine scrub-shrub evergreen wetlands were found within the proposed village townsite location. The palustrine scrub-shrub/moss peat wetlands are located at a slightly higher elevation, usually on mounds of about 1 foot in height. Palustrine scrub-shrub broad-leaved deciduous wetlands are well spread out in the general sampled area along several drainage ways and depressions.

3.3.2.1 Palustrine emergent persistent/scrub-shrub

Palustrine emergent persistent/scrub-shrub wetlands represent approximately 16 percent of the total delineated area. They were divided into two groups: palustrine emergent persistent/scrub-shrub evergreen/moss (255 acres) and palustrine emergent persistent/scrub-shrub broad-leaved deciduous (240 acres). Palustrine emergent persistent/scrub-shrub/moss are wetlands located at the foot hills, with a similar component of low growing evergreen species as the palustrine scrub-shrub evergreen wetlands (top plateau), but with a conspicuous cover of tussock cottongrass (*Eriophorum vaginatum*). These wetlands also have a large component of rust-color sphagnum, which gives this community a rusty color and a deep 16-foot peat layer. Palustrine emergent persistent/scrub-shrub deciduous wetlands are dominated by bluejoint grass, but have about 25 percent of willow cover. The vegetation community seems to be an intermediate state between willow-dominated communities and bluejoint grass meadows. They are found along drainage ways, depressions and slopes, and have a large component of wildflowers, herbs, and ferns.

Palustrine emergent persistent/palustrine scrub-shrub wetlands would be impacted primarily by the construction of the runways, which would cause the loss of 4 acres including the apron. Roads would destroy 0.7 acres (Figure 15). These wetlands received a functional score of 20/43 (0.47) and function at a high level in terms of production and export of organic material, general habitat suitability, and educational or scientific value. Moderate scores were returned in nutrient and toxicant removal, flood flow alteration, sediment removal, and native plant richness. This class provides low uniqueness and heritage functions. Erosion control, shoreline stabilization, and general fish habitat were not evaluated.

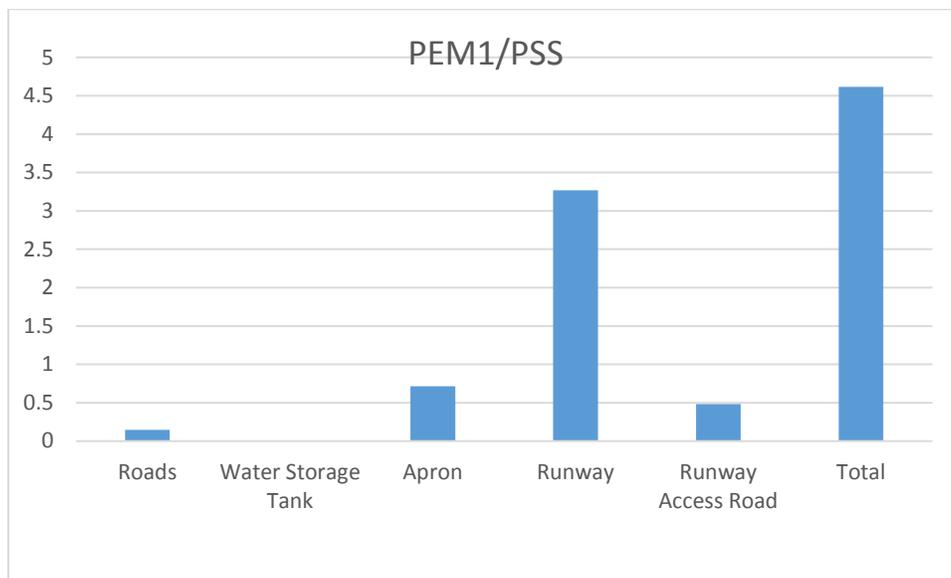


Figure 15. Acreage of impacts to palustrine emergent/scrub-shrub wetlands arranged by feature type

Wetland assessment area 2 (WAA2) was selected as the most appropriate conditional multiplier to calculate functional capacity differential because most of the impacts to this wetland type would result from the construction of the runway. Palustrine emergent persistent/scrub-shrub wetlands totaling 4.6 acres would be impacted by the project, applying the pre-project conditional

multiplier of 0.97 for WAA2 equals 4.5 conditional units. Subtract the pre-project condition from the post-project conditional value (4.6 acres multiplied by post-project conditional multiplier of 0.8); 3.7, to calculate the 0.8 conditional differential. This value is multiplied by the functional score of 0.47 provided by the ARBPJC to derive -0.0376 functional capacity units from the impact of the proposed activity on palustrine emergent persistent/scrub-shrub wetlands in the project area.

3.3.2.2 Palustrine scrub-shrub broad leafed deciduous

Palustrine scrub-shrub broad leafed deciduous wetlands would be impacted primarily by the construction of the roads, which would cause the loss of 3.4 acres. Building pads would destroy 2.8 acres, the lagoon would fill 1.8 acres, and trails would cover 0.6 acres (Figure 16). These wetlands received a functional score of 17/43 (0.395) and function at a high level in terms of production and export of organic material, general habitat suitability, and educational or scientific value. Moderate scores were returned in nutrient and toxicant removal, flood flow alteration, sediment removal, and native plant richness. This class provides low uniqueness and heritage functions. Erosion control, shoreline stabilization, and general fish habitat were not evaluated.

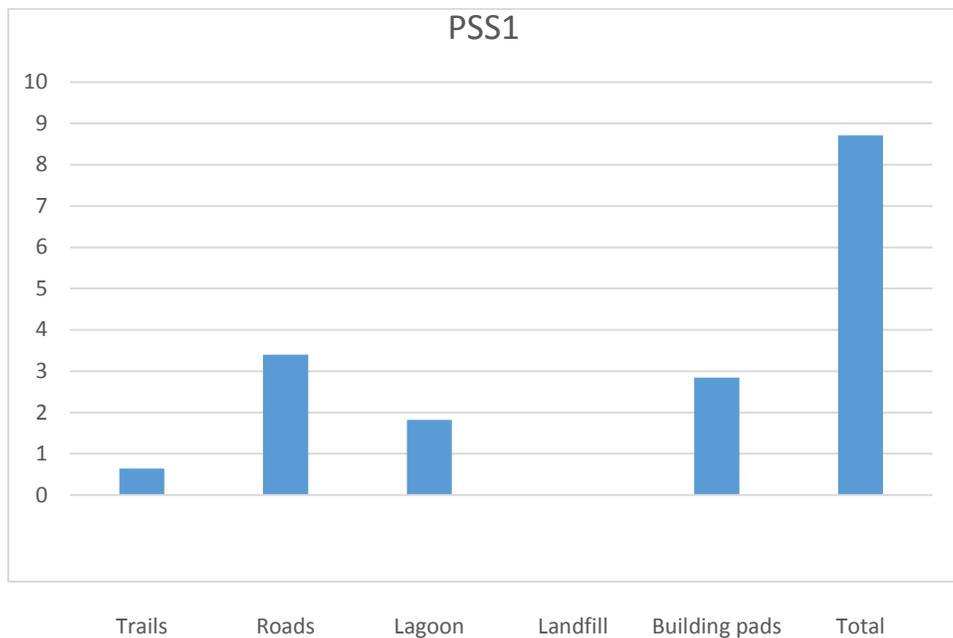


Figure 16. Acreage of impacts to palustrine scrub-shrub broad leafed deciduous wetlands arranged by feature type

Wetland assessment area 1 (WAA1) was selected as the most appropriate conditional multiplier to calculate functional capacity differential because most of the impacts to this wetland type would result from the construction of the townsite. Palustrine scrub-shrub broad leafed deciduous wetlands totaling 8.7 acres would be impacted by the project; applying the pre-project conditional multiplier of 0.85 for WAA1 equals 7.4 conditional units. Subtract the pre-project condition from the post-project conditional value (8.7 acres multiplied by post-project conditional multiplier of 0.59); 5.1, to calculate the 2.3 conditional differential. This value is

multiplied by the functional score of 0.395 provided by the ARBPJC to derive -0.9085 functional capacity units from the impact of the proposed activity on palustrine emergent persistent/scrub-shrub wetlands in the project area.

3.3.2.3 Palustrine scrub-shrub evergreen

Palustrine scrub-shrub evergreen wetlands would be impacted primarily by the construction of the roads, which would cause the loss of 13.5 acres. Building pads would destroy 7.9 acres, the lagoon would fill 3.2 acres, trails would cover 1.6 acres, the quarry would impact 1.6 acres, and the well field and water storage tanks would displace 0.9 acres (Figure 17). These wetlands received a functional score of 14/43 (0.326) and function at a high level in terms of educational or scientific value. Moderate scores were returned in flood flow alteration, sediment removal, nutrient and toxicant removal, production and export of organic matter, general habitat suitability, and native plant richness. This class provides low uniqueness and heritage functions. Erosion control, shoreline stabilization, and general fish habitat were not evaluated.

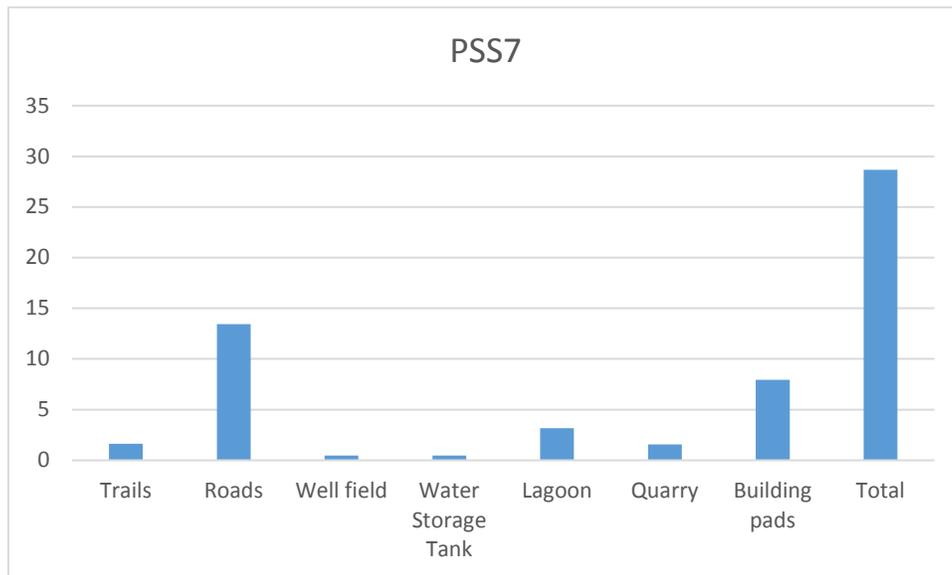


Figure 17. Acreage of impacts to palustrine scrub-shrub evergreen wetlands arranged by feature type

Wetland assessment area 1 (WAA1) was selected as the most appropriate conditional multiplier to calculate functional capacity differential because most of the impacts to this wetland type would result from the construction of the townsite. Palustrine scrub-shrub evergreen wetlands totaling 28.7 acres would be impacted by the project; applying the pre-project conditional multiplier of 0.85 for WAA1 equals 24.4 conditional units. Subtract the pre-project condition from the post-project conditional value (28.7 acres multiplied by post-project conditional multiplier of 0.59); 16.9, to calculate the 7.5 conditional differential. This value is multiplied by the functional score of 0.395 provided by the ARBPJC to derive -2.445 functional capacity units from the impact of the proposed activity on palustrine scrub-shrub evergreen wetlands in the project area.

3.3.2.4 Palustrine scrub-shrub/moss-lichen

Palustrine scrub-shrub/moss-lichen wetlands would be impacted primarily by the construction of the runway, which would cause the loss of 18.4 acres. The runway access road would impact 1.8 acres and infrastructure roads would fill another 0.2 acres (Figure 18). These wetlands received a functional score of 21/43 (0.488) and function at a high level in terms of nutrient and toxicant removal, general habitat suitability, native plant richness, and educational or scientific value. Moderate scores were returned in flood flow alteration, sediment removal, and production and export of organic matter. This class provides low uniqueness and heritage functions. Erosion control, shoreline stabilization, and general fish habitat were not evaluated.

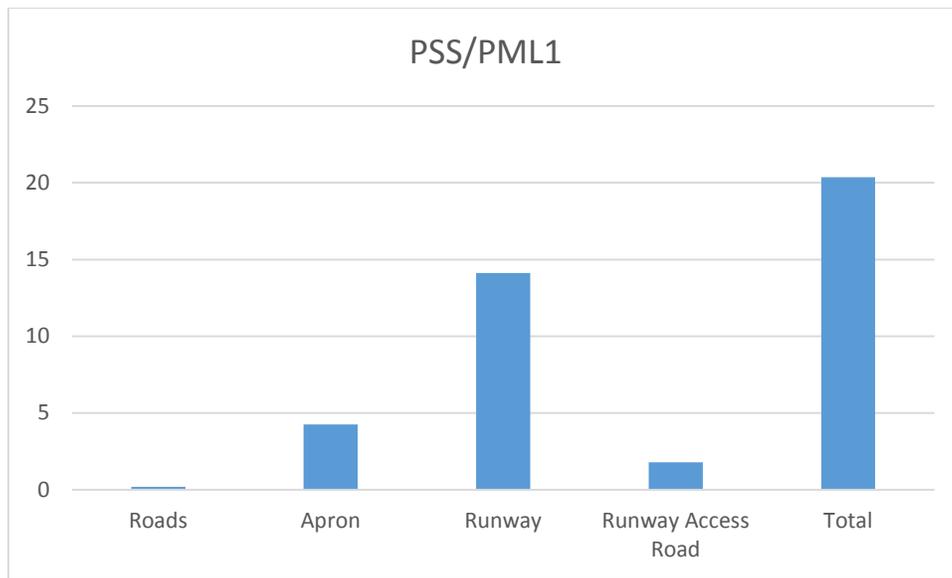


Figure 18. Acreage of impacts to palustrine scrub-shrub/moss-lichen wetlands arranged by feature type

Wetland assessment area 2 (WAA2) was selected as the most appropriate conditional multiplier to calculate functional capacity differential because most of the impacts to this wetland type would result from the construction of the runways. Palustrine scrub-shrub/moss lichen wetlands totaling 20.4 acres would be impacted by the project; applying the pre-project conditional multiplier of 0.97 for WAA2 equals 19.8 conditional units. Subtract the pre-project condition from the post-project conditional value (28.7 acres multiplied by post-project conditional multiplier of 0.8); 16.3, to calculate the 3.5 conditional differential. This value is multiplied by the functional score of 0.488 provided by the ARBPJC to derive -1.698 functional capacity units from the impact of the proposed activity on palustrine scrub-shrub evergreen wetlands in the project area.

3.3.2.5 Palustrine emergent persistent/scrub-shrub/moss-lichen

Palustrine emergent persistent/scrub-shrub/moss-lichen wetlands would be impacted primarily by the construction of the roads, which would cause the loss of 2.7 acres. Trails and building pads would cumulatively impact 0.05 acres (Figure 19). These wetlands received a functional score of 23/43 (0.534) and function at a high level in terms of nutrient and toxicant removal,

production and export of organic matter, general habitat suitability, native plant richness, and educational or scientific value. Moderate scores were returned in flood flow alteration, and sediment removal. This class provides low uniqueness and heritage functions. Erosion control, shoreline stabilization, and general fish habitat were not evaluated.

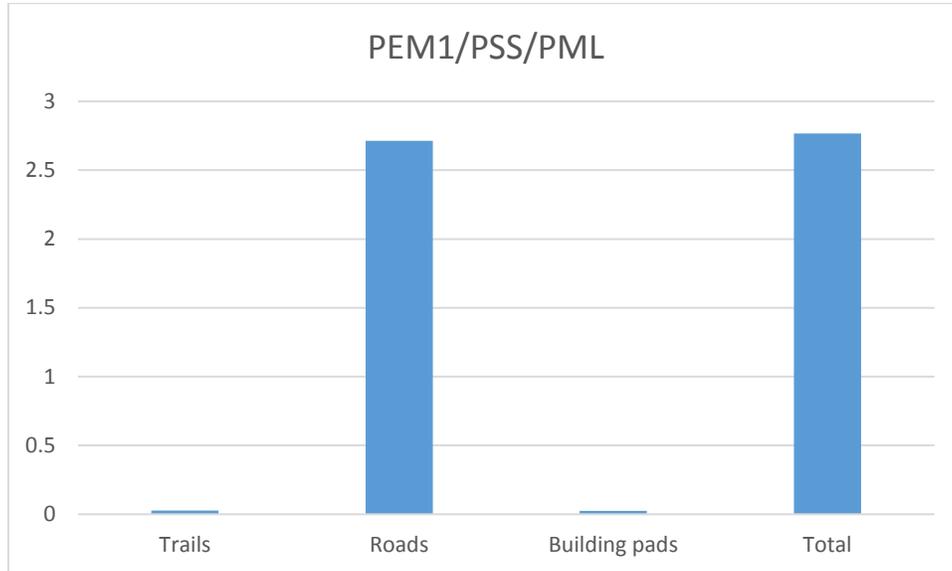


Figure 19. Acreage of impacts to palustrine emergent persistent/scrub-shrub/moss-lichen wetlands arranged by feature type

Wetland assessment area 3 (WAA3) was selected as the most appropriate conditional multiplier to calculate functional capacity differential because most of the impacts to this wetland type would result from the construction of the roads. Palustrine emergent persistent/scrub-shrub/moss lichen wetlands totaling 2.8 acres would be impacted by the project; applying the pre-project conditional multiplier of 0.71 for WAA2 equals 2.0 conditional units. Subtract the pre-project condition from the post-project conditional value (2.8 acres multiplied by post project conditional multiplier of 0.64); 1.8, to calculate the 1.0 conditional differential. This value is multiplied by the functional score of 0.534 provided by the ARBPJC to derive -0.534 functional capacity units from the impact of the proposed activity on palustrine emergent persistent/scrub-shrub/moss-lichen wetlands in the project area.

4.0 Summary

The construction of the Mertarvik Infrastructure Development project has the potential to impact 72 acres of wetlands. These wetlands have varying degrees of intrinsic value, as expressed by the functional assessment performed in the previous sections. The functions provided by the wetlands in the project area would be degraded to a certain extent by the construction of the proposed project through direct impact, hydrologic disruption, habitat fragmentation, and other anthropogenic influences (Figure 20). The assessment in the preceding sections quantifies those impacts in a repeatable and objective way in order to determine the significance of the proposed action.

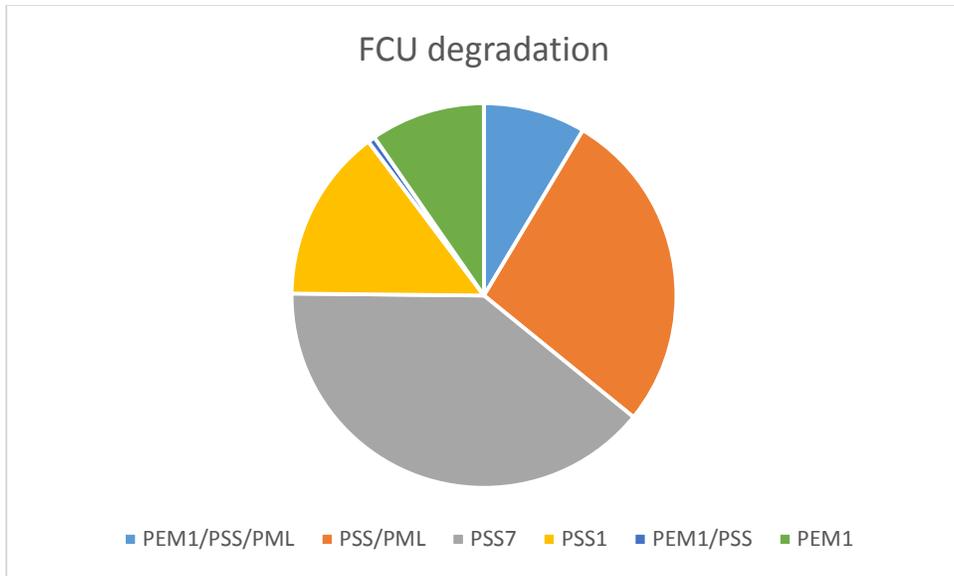


Figure 20. Functional capacity unit degradation arranged by wetland class

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Appendix D

Newtok (Mertarvik) Airport Environmental Study (Excerpt)

NEWTOK (MERTARVIK) AIRPORT ENVIRONMENTAL STUDY

CFAPT00307 / AIP 3-02-0487-001-2017

CONCEPT DESIGN NARRATIVE

November 2017

Prepared for:

Alaska Department of
Transportation & Public Facilities
Central Region
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TABLE OF CONTENTS

1. Introduction	1
2. Design Analysis	1
A. Airport Layout	1
B. Design Standards	3
C. Soils and Grading	5
Potential Material Source.....	5
Overburden Disposal	6
Geotechnical Assumptions.....	7
3. Environmental Review	8
4. References.....	10

FIGURES

Figure 1. Location and Vicinity Map.....	2
Figure 2. Revisions to ALP Ultimate Layout	3
Figure 3. Project Layout Plan	7

TABLES

Table 1. Airport Design Criteria.....	4
Table 2. AASHTO Guidelines for Road Design Criteria	4
Table 3. Geotechnical Assumptions	6
Table 4. Wetland Impacts by Project Component	8

APPENDICES

Appendix A – Newtok (Mertarvik) Airport Environmental Study - 2012 Baseline Data with 2017 Updates	
Appendix B – Cultural Resource Assessment for Proposed Improvements at Newtok Airport, Alaska	
Appendix C – Wetland Impact Maps with Summary Statistics	

1. INTRODUCTION

The village of Newtok, located on the north bank of the Ninglick River in western Alaska, has experienced rapid and continuous erosion that threatens its existence. There is no cost-effective way to protect Newtok from the encroaching Ninglick River, so the residents of Newtok have decided to relocate and construct a new village at a site called Mertarvik, 9 miles to the southeast on Nelson Island (Figure 1). A collaborative effort of federal, state, and local agencies and organizations have been working to design and construct the infrastructure needed for the phased relocation of Newtok to Mertarvik.

Construction of an airport at the new village site of Mertarvik is critical, as the area has no roads connecting it to other communities. The residents of Mertarvik will rely heavily on air transportation for travel, movement of supplies, and emergency medical evacuations.

The Alaska Department of Transportation & Public Facilities (DOT&PF) commissioned PDC Engineers (PDC) to provide engineering and environmental services in support of an Environmental Impact Statement (EIS) being prepared by the U.S. Army Corps of Engineers (USACE) for the Denali Commission, with the Federal Aviation Administration (FAA) as a cooperating agency. For this project, PDC supplemented prior study work of potential environmental effects summarized in the *Mertarvik Airport Site Selection Study* (PDC, 2012). This supplemental study considered changes to the apron and road layouts and material waste disposal sites to accommodate community development.

2. DESIGN ANALYSIS

A. Airport Layout

The *Mertarvik Airport Site Selection Study* (PDC, 2012) and ultimate development shown on the *Newtok Airport Layout Plan* (DOT&PF, 2014) provided the basis for the airport facilities under this study. Per DOT&PF's request, revisions to the ultimate layout included relocating the aircraft parking apron and airport access road as shown in bold dashed linetype on Figure 2.

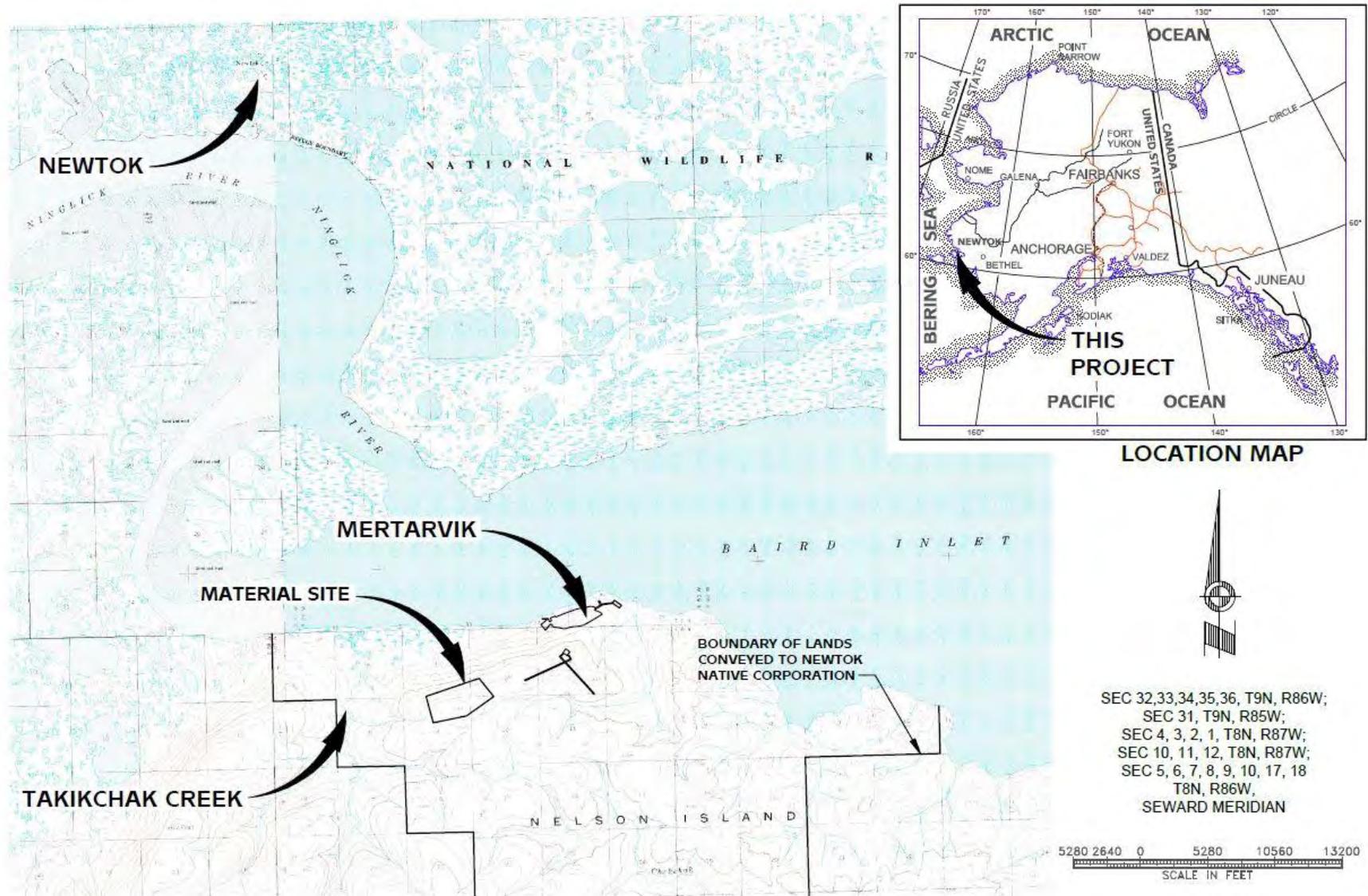


Figure 1. Location and Vicinity Map

Table 1. Airport Design Criteria

Airport Feature	Standard
Runway Design Code/ Approach Visibility Minimums	B-II-4000 / greater than ¾ mile
Runway Surface	Aggregate
Dimensions and Offsets	
Runway Length	4,000 feet
Runway Width	75 feet
Runway Safety Area Width and Length	150 feet and 300 feet beyond each end, respectively
Taxiway Width	50 feet ¹
Taxiway Safety Area	118 feet ¹
Apron	350 feet x 400 feet
Apron Offset from Runway Centerline	400 feet
Slopes and Grades	
<i>Longitudinal Grades</i>	
Runway	Maximum 2%
Taxiway	Maximum 2%
Apron	Maximum 2%
<i>Transverse Grades</i>	
Runway/Runway Safety Area	Maximum 2% / 5%
Taxiway/Taxiway Safety Area	Maximum 2% / 5%
Apron	Maximum 2% (when combined with the longitudinal grades, the combined grades not to exceed 2%)

¹ Taxiway and taxiway safety area widths were increased to the next higher Aircraft Design Group to accommodate occasional use of larger aircraft, to provide additional room for snow removal, and to provide a thermal barrier to protect frozen ground beneath the taxiway.

Table 2. AASHTO Guidelines for Road Design Criteria

Design Feature	Requirement
Functional Classification	Rural Industrial/Commercial Local Road
Width of Traveled Way	10 feet each lane, providing a 20-foot-wide traveled way
Design Speed	30 miles per hour ¹
Stopping Sight Distance	200 feet
Passing Sight Distance	N/A
Maximum Allowable Grade	14% (5% preferred)
Maximum Allowable Degree of Curvature	20.75 degrees (minimum radius of 275 feet) with a 6% superelevation

¹ Based on anticipated road speeds.

C. Soils and Grading

Newtok Island is mainly composed of quaternary and tertiary volcanic rock. The lowlands are poorly draining flat terrain with numerous lakes, marshes, and meandering streams. The highlands are rolling terrain with gentle slopes. The region is underlain by permafrost.

Soils at the airport relocation site are typically silts with high moisture content with some sand and gravels. The thickness of the soil over bedrock was encountered from as little as four feet to more than 31.5 feet. The permafrost conditions across the site are similarly variable.

Geotechnical Assumptions

Through a separate contract with DOT&PF, R&M Consultants performed geotechnical exploration of the airport sites and potential material sites and provided preliminary recommendations for conceptual design of the aircraft embankments. Those recommendations and conversations with DOT&PF Materials resulted in the assumptions presented in Table 3 below.

Table 3. Geotechnical Assumptions

Material	Recommendation
Surfacing Materials	Anticipated to be imported
Embankment Materials	Anticipated to come from Hill 460
Embankment	Minimum 6-foot thick extending 5-6 feet above adjacent ground 6H:1V cut/fill side slopes
Geosynthetic Reinforcement	Under all aircraft embankments, within surface along haul routes during construction
Stripping of Vegetative/ Organic Mat	Sub-excavate to a depth of 5 feet below runways, taxiways, apron, and access road

Potential Material Source

A massive rock outcrop exists on top of the ridge, hereafter designated Hill 460, just south of the proposed village relocation site (Figure 1). This bedrock exposure was the only significant outcrop observed in the immediate vicinity of the proposed village relocation site that appeared capable of providing sufficient quantities of borrow and aggregate materials potentially suitable for construction of the new airport and access road. The bedrock exposure ranged in height from approximately 30 to 100 feet along the northern flank. The depth of overburden may be greater than 10 feet across portions of the hill. Boulders and rubble along the top of the ridge generally appeared to be a hard, massive dark gray to black vesicular basalt. Basalt is often formed in layers, called flows, one laid on top of another; these flows may have different composition, structure, and weathering characteristics. Thus, the rock may become softer and more weathered with depth.

The hill northeast of Runway 31 was considered but eliminated as a material source. Preliminary geotechnical data noted bedrock was found at depths greater than 15.5 feet. This depth of overburden material (at least 4.0 feet of organics over 10 to 15.5 feet of silt) would add significant

quantity to the waste disposal areas and increase associated environmental (wetland) impacts without providing the quantity of useable material needed for construction.

Overburden Disposal

The overburden soils recovered from the proposed material source designated Hill 460, as well as the foundation soils underlying the vegetative mat at the airport site are assumed to be susceptible to erosion. Future designs will need to consider appropriate erosion-control measures to protect these materials, especially where exposed on embankment side-slopes or in cuts and ditches (e.g. permanent erosion protection matting, rock blanket, etc.).

Sub-excavation and overburden materials will be disposed of on airport property. Disposal embankments should be sloped to drain, protected from erosion, and located below the Part 77 Airspace surfaces. Potential disposal areas for purposes of evaluating impacts are shown on Figure 3. The disposal areas were sized to accommodate the estimated sub-excavation and overburden removal within the airport property boundary without creating obstructions to the FAA Part 77 imaginary surfaces. Waste Disposal Site A (east of Runway 13-31) was sited in the low saddle present between hill peaks, allowing for deep fills. Waste Disposal Site B was selected for the lower lying terrain south of Runway 5-23. The south side of Runway 5-23 appears to offer greater subgrade stability (silty gravels, cobbles, boulders) than the area north which consists of deep silts.

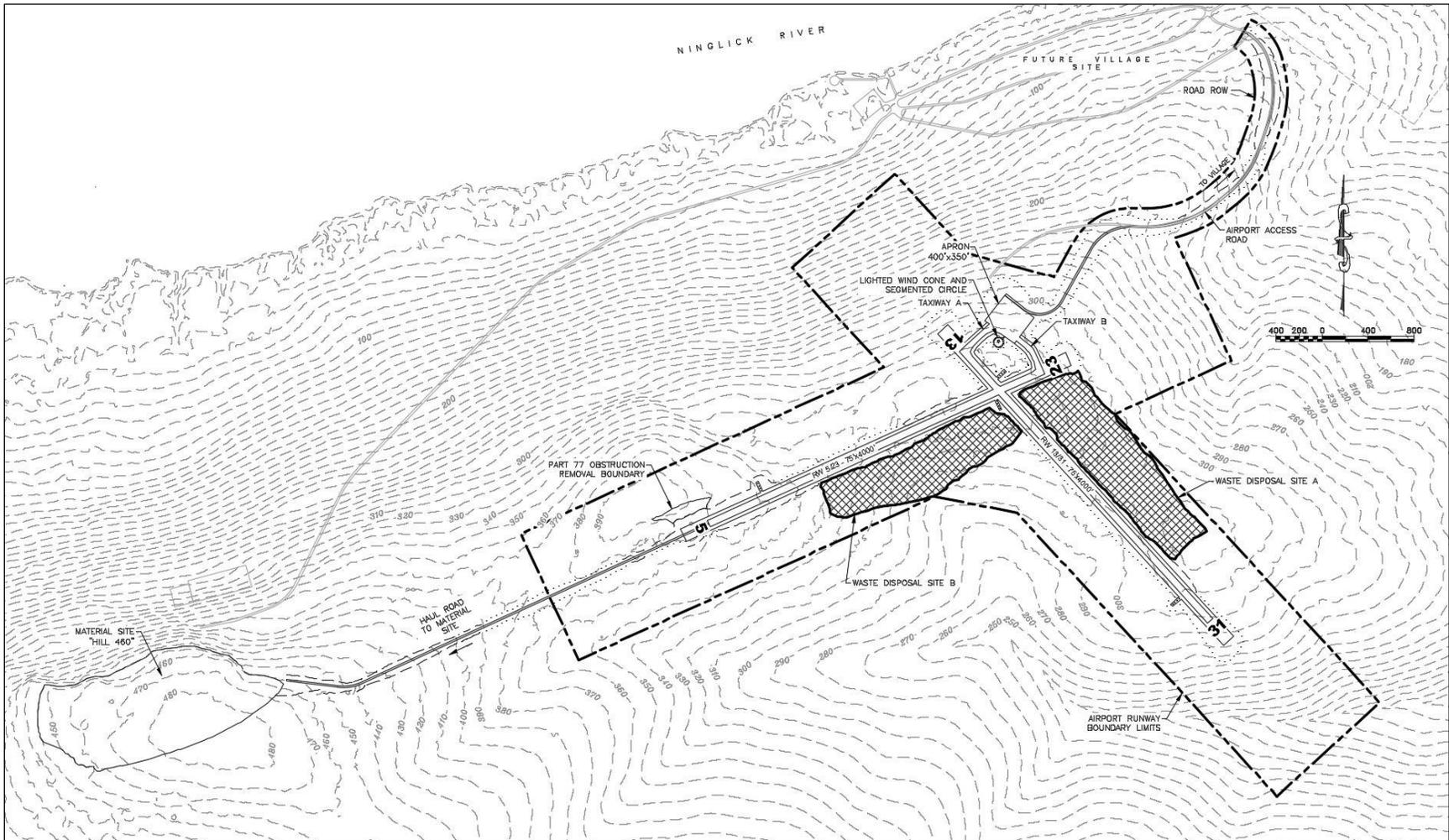


Figure 3. Project Layout Plan

3. ENVIRONMENTAL REVIEW

PDC completed a desktop exercise to update potential environmental effects of the preferred airport, access road, and material site alternative summarized in the *Mertarvik Airport Site Selection Study* (PDC, 2012). Impacts not re-evaluated from the 2012 Study include: Air Quality; Coastal Barriers; Section4(f), Farmlands; Floodplains; Hazardous Materials; Light Emissions & Visual Effects; Natural Resources & Energy Supply; Noise; Socioeconomic, Environmental Justice, and Children's Health & Safety Risks.

Updated entries to the *Mertarvik Airport Site Selection Study* (PDC, 2012) environmental impacts are shown in italic and can be found in Appendix A.

Cultural Resource services included limited background research summarized in a short letter report included in Appendix B.

Anticipated wetland impacts for the ultimate airport development are approximately 232 acres. See Table 4 below and Appendix C for wetland impact breakdowns by project component and wetland type. Cut/fill volumes within upland areas are not included.

Table 4. Wetland Impacts by Project Component

Project Component	Wetland Type	Impact Area* (AC)	Rounded Fill Vol (CY)	Rounded Cut Vol (CY)
Runways	L2UB	0.04	440	270
	PEM1	12.82	138,330	86,410
	PEM1/SS6	10.48	113,080	70,640
	PSS7	0.51	5,510	3,440
	PSS/ML1	48.41	522,350	326,270
	subtotal	72.26	779,710	487,030
Taxiways	PEM1	0.0902	3,910	940
	PEM1/SS6	0.0992	4,300	1,030
	PSS/ML1	1.728	74,830	17,830
	subtotal	1.9174	83,040	19,800
Apron	PEM1	0.42	8,380	2,530
	PEM1/SS6	1.07	21,350	6,440
	PSS7	2.05	40,900	12,340
	PSS/ML1	5.88	117,300	35,370
	subtotal	9.42	187,930	56,680

Project Component	Wetland Type	Impact Area* (AC)	Rounded Fill Vol (CY)	Rounded Cut Vol (CY)
Access Rd	PEM1	2.13	25,240	14,740
	PEM1/SS6	0.74	8,770	5,120
	PSS7	12.24	145,020	84,660
	PSS/ML1	5.43	64,340	37,560
	subtotal	20.54	243,370	142,080
Obstruction Removal	PEM1	0.14	0	850
	PSS/ML1	1.51	0	9,170
	subtotal	1.65	0	10,020
Material Waste Disposal	L2UB	0.09	1,650	0
	PEM1	14.07	257,390	0
	PEM1/SS6	8.84	161,720	0
	PSS/ML1	36.23	662,760	0
	subtotal	59.23	1,083,520	0
Temporary Haul Rd	L2UB	0.15	550	250
	PEM1	1.11	4,060	1,850
	PEM1/SS6	2.11	7,710	3,500
	PSS/ML1	11.91	43,520	19,760
	subtotal	15.28	55,840	25,360
Material Source	PEM1	9.3	0	7,530
	PSS/ML1	41.92	0	33,930
	subtotal	51.22	0	41,460
TOTAL		232	2,433,410	782,430

* includes a 10-foot construction work area around perimeter

Total impacted area by wetland type:

L2UB.....Lacustrine Litoral Unconsolidated Bottom	0.28 acres
PEM1.....Palustrine Emergent Persistent.....	40.08 acres
PEM1/SS6.....Palustrine Emergent Persistent/Scrub-shrub Deciduous.....	23.34 acres
PSS7.....Palustrine scrub-shrub evergreen	14.80 acres
PSS/ML1.....Palustrine Scrub-shrub/Moss peat.....	153.02 acres

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APPENDIX C

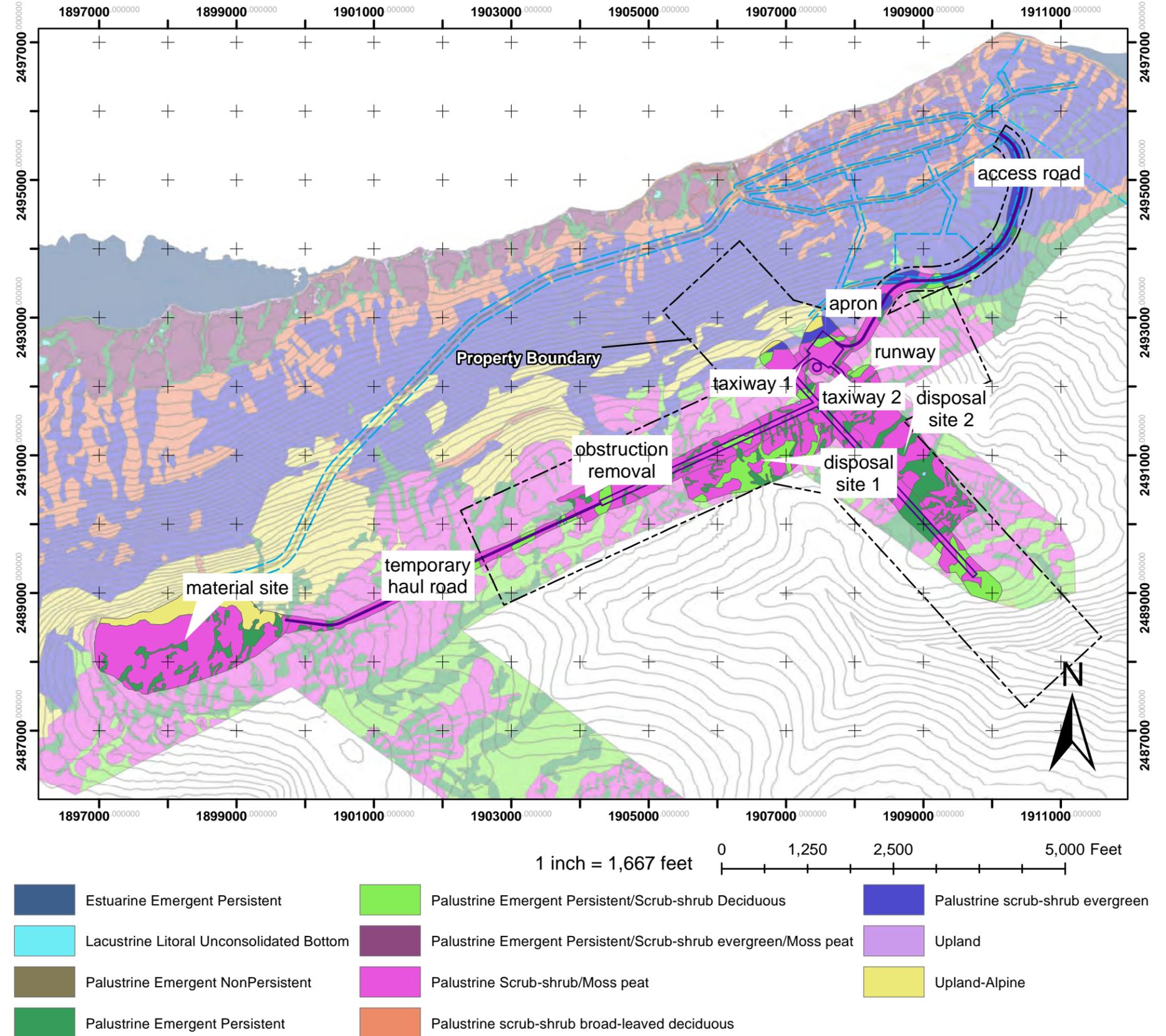
(of the Airport Environmental Study)

Wetland Impact Maps with Summary Statistics

Mertarvik Airport Construction Boundaries Wetlands Delineation

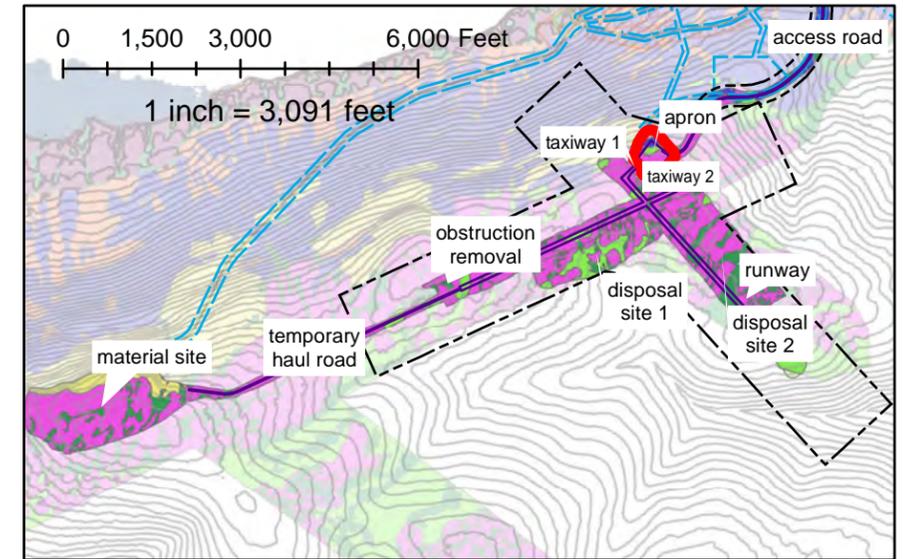
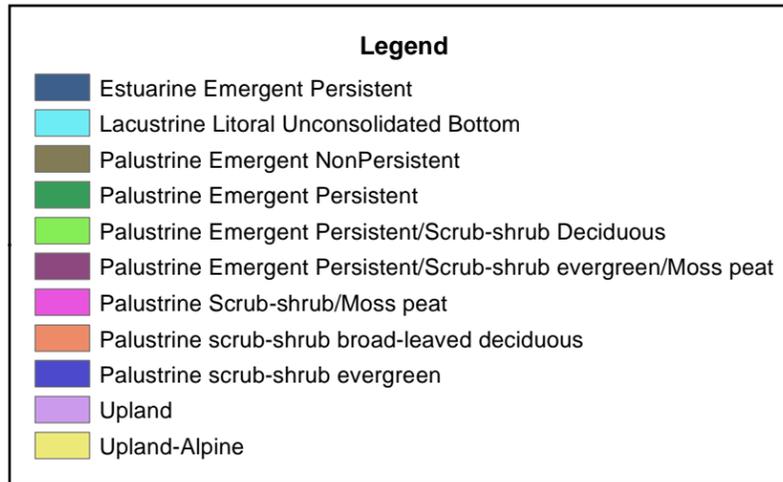
Summary Statistics: total area for each extent area and wetland type

Extent	Wetland Type	Area (AC)
access road	Palustrine Emergent Persistent	2.12
access road	Palustrine Emergent Persistent/Scrub-shrub Deciduous	0.74
access road	Palustrine scrub-shrub evergreen	12.23
access road	Palustrine Scrub-shrub/Moss peat	5.42
apron	Palustrine Emergent Persistent	0.42
apron	Palustrine Emergent Persistent/Scrub-shrub Deciduous	1.06
apron	Palustrine scrub-shrub evergreen	2.04
apron	Palustrine Scrub-shrub/Moss peat	5.87
apron	Upland-Alpine	0.78
disposal site 1	Palustrine Emergent Persistent	3.75
disposal site 1	Palustrine Emergent Persistent/Scrub-shrub Deciduous	8.41
disposal site 1	Palustrine Scrub-shrub/Moss peat	14.14
disposal site 2	Lacustrine Litoral Unconsolidated Bottom	0.08
disposal site 2	Palustrine Emergent Persistent	10.31
disposal site 2	Palustrine Emergent Persistent/Scrub-shrub Deciduous	0.42
disposal site 2	Palustrine Scrub-shrub/Moss peat	22.09
material site	Palustrine Emergent Persistent	9.29
material site	Palustrine Scrub-shrub/Moss peat	41.91
material site	Upland-Alpine	12.95
obstruction removal	Palustrine Emergent Persistent	0.13
obstruction removal	Palustrine Scrub-shrub/Moss peat	1.51
runway	Lacustrine Litoral Unconsolidated Bottom	0.03
runway	Palustrine Emergent Persistent	12.81
runway	Palustrine Emergent Persistent/Scrub-shrub Deciduous	10.48
runway	Palustrine scrub-shrub evergreen	0.5
runway	Palustrine Scrub-shrub/Moss peat	48.4
runway	Upland-Alpine	0.41
taxiway 1	Palustrine Emergent Persistent	0.07
taxiway 1	Palustrine Scrub-shrub/Moss peat	0.72
taxiway 2	Palustrine Emergent Persistent	0.02
taxiway 2	Palustrine Emergent Persistent/Scrub-shrub Deciduous	0.1
taxiway 2	Palustrine Scrub-shrub/Moss peat	1.01
temporary haul road	Lacustrine Litoral Unconsolidated Bottom	0.15
temporary haul road	Palustrine Emergent Persistent	1.1
temporary haul road	Palustrine Emergent Persistent/Scrub-shrub Deciduous	2.11
temporary haul road	Palustrine Scrub-shrub/Moss peat	11.91
temporary haul road	Upland-Alpine	0.01

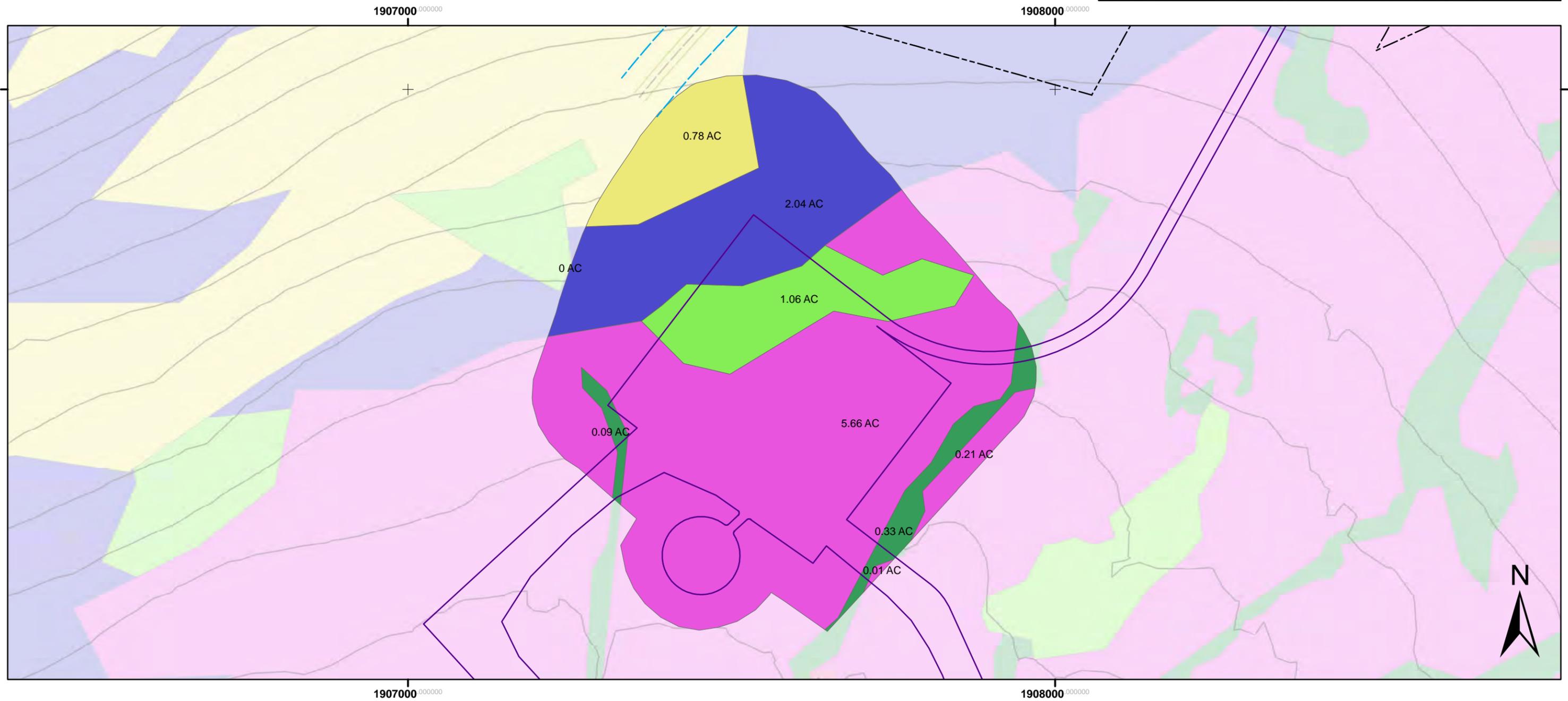
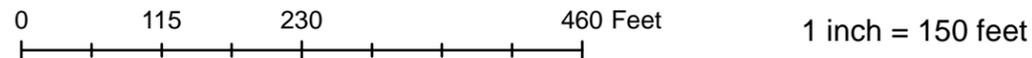


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Mertarvik Airport Construction Boundaries Wetlands Delineation

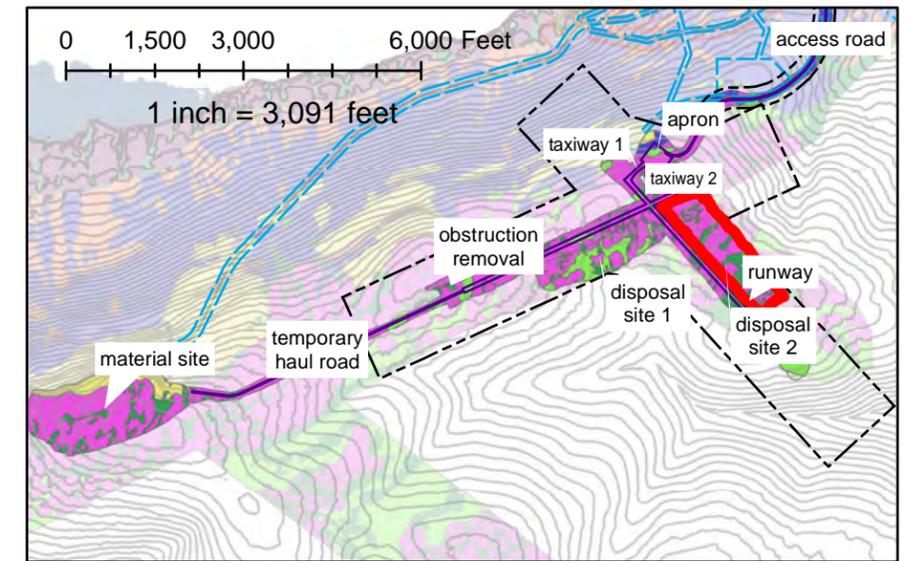
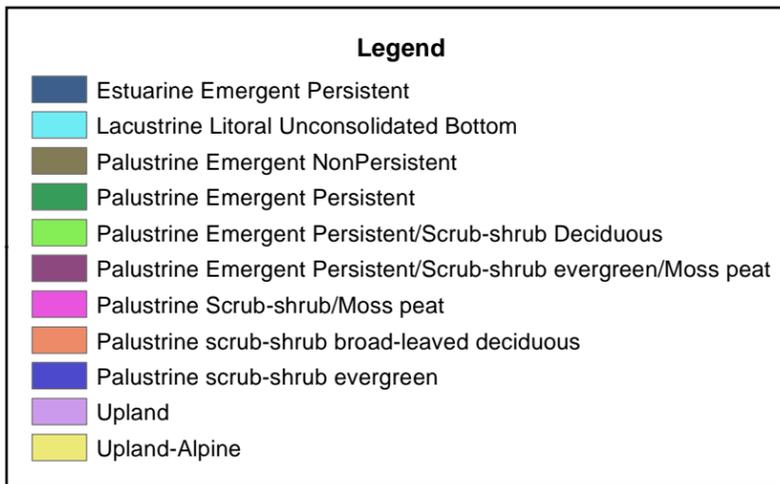


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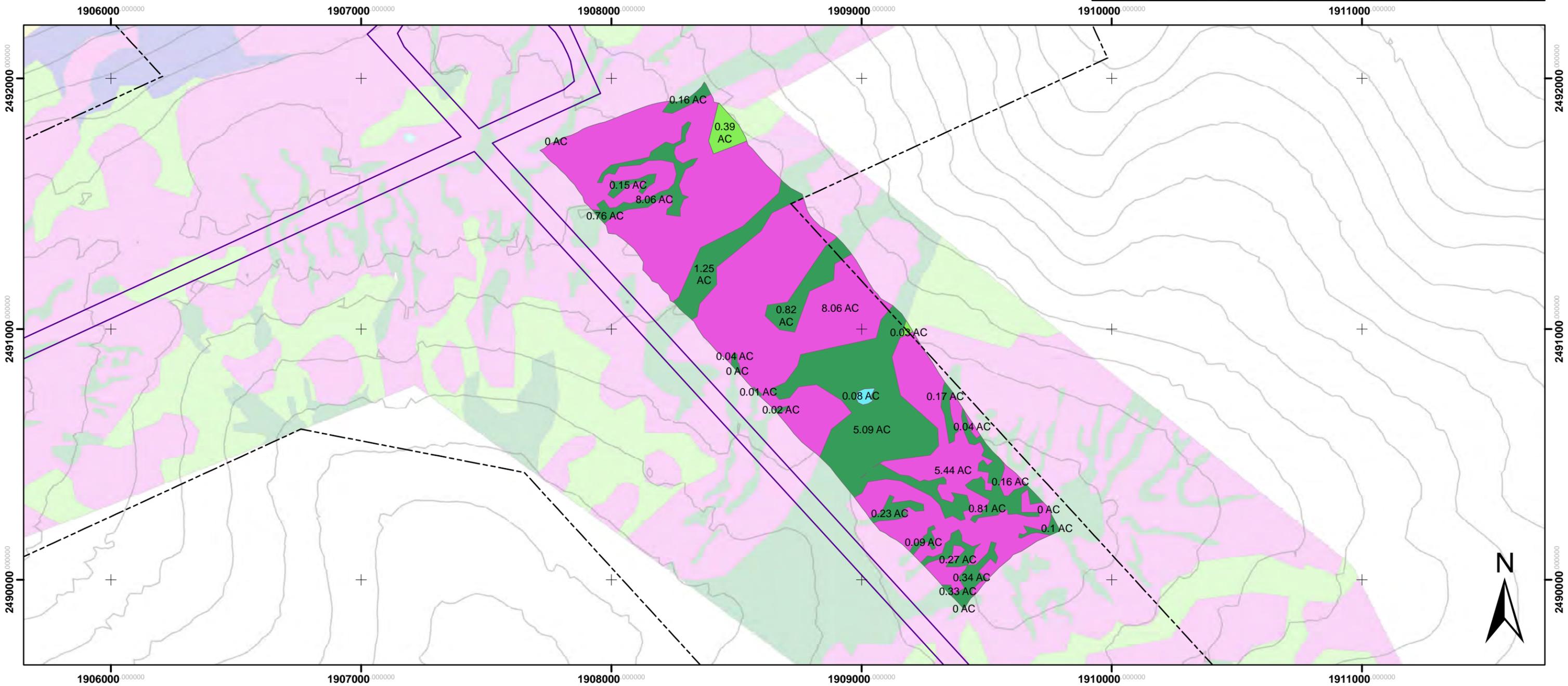
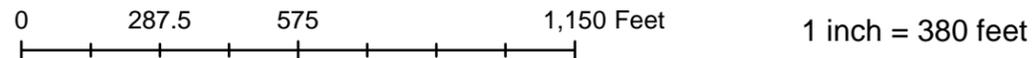


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Mertarvik Airport Construction Boundaries Wetlands Delineation

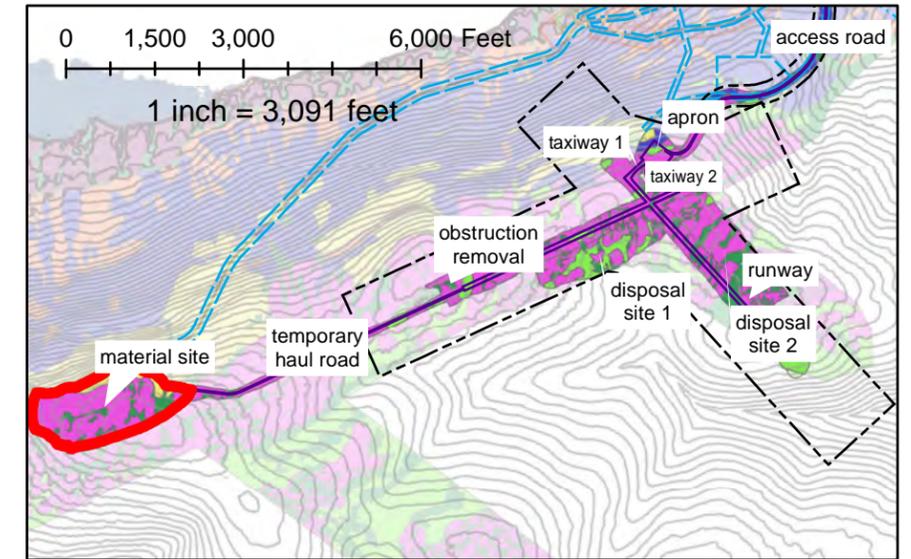
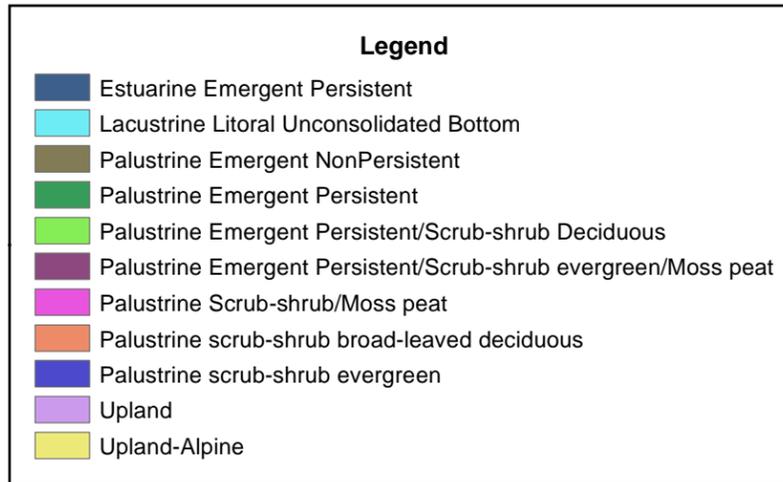


Extent: disposal site 2

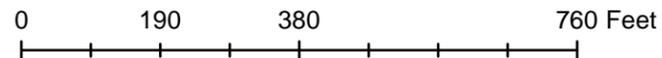


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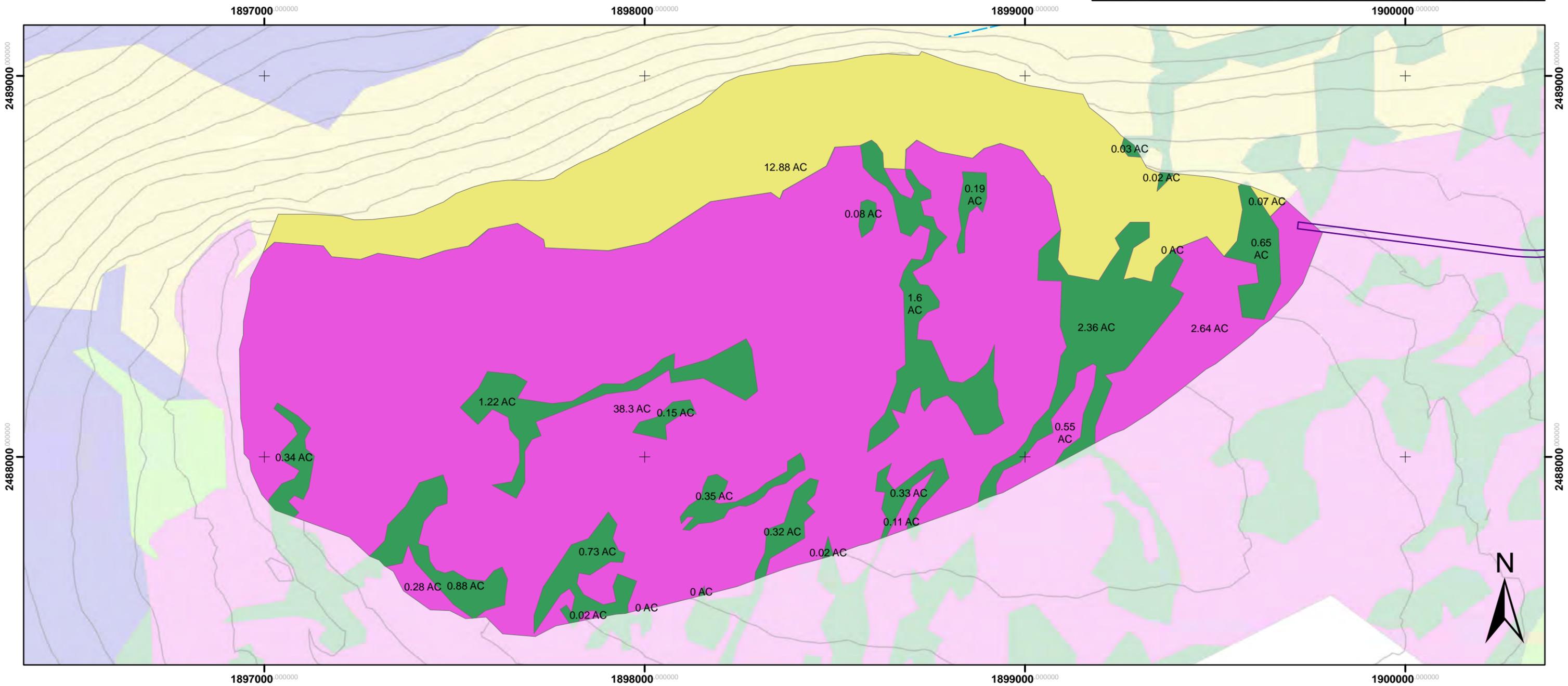
Mertarvik Airport Construction Boundaries Wetlands Delineation



Extent: material site

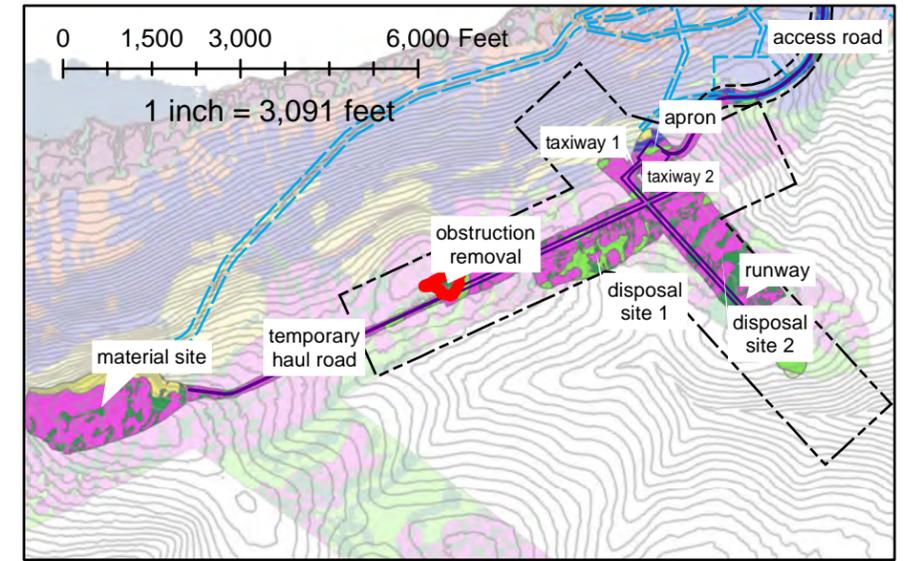
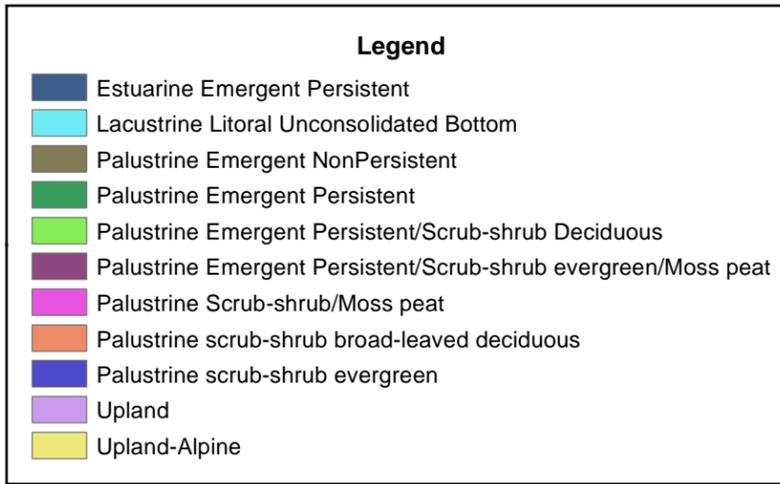


1 inch = 250 feet

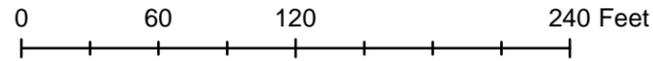


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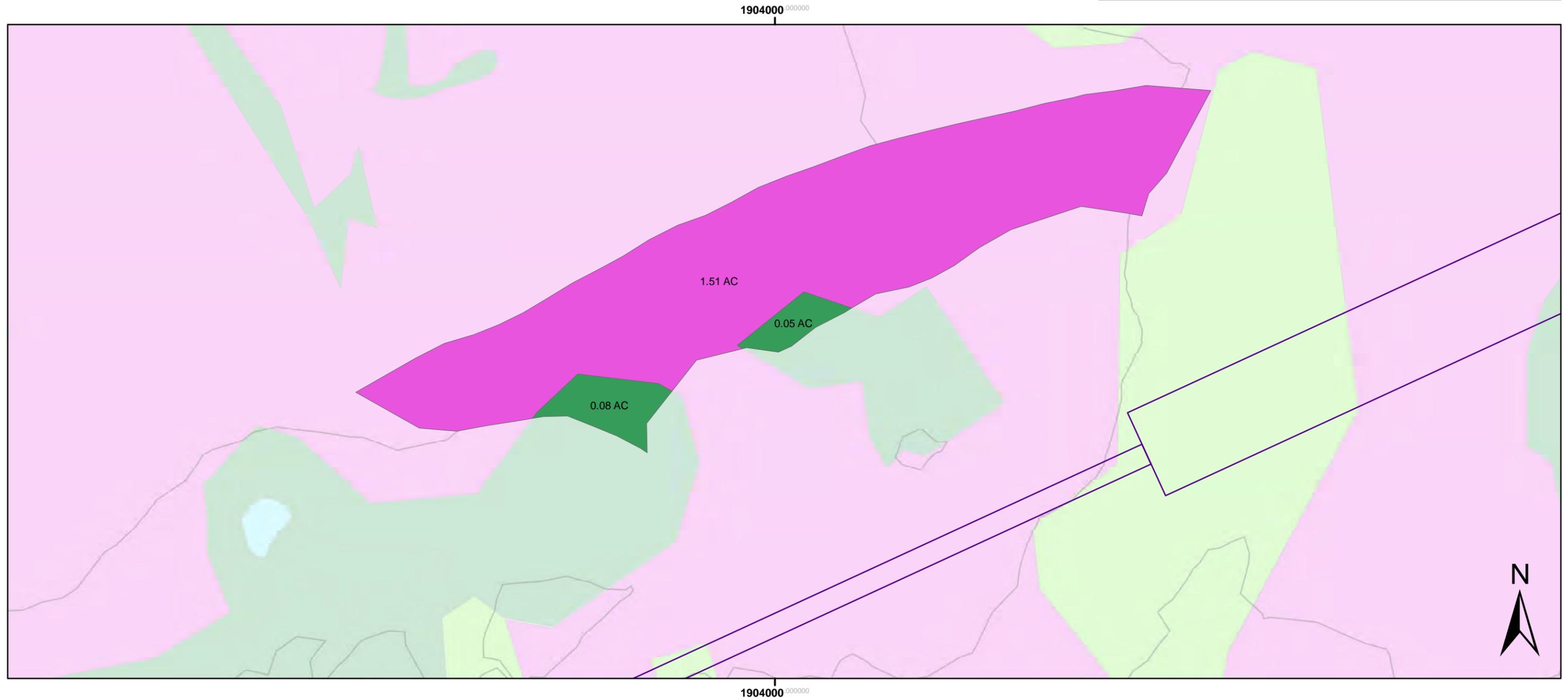
Mertarvik Airport Construction Boundaries Wetlands Delineation



Extent: obstruction removal

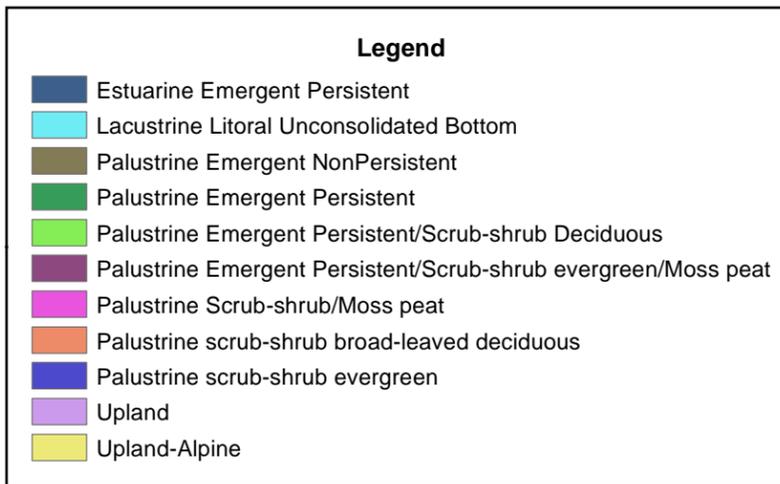


1 inch = 80 feet

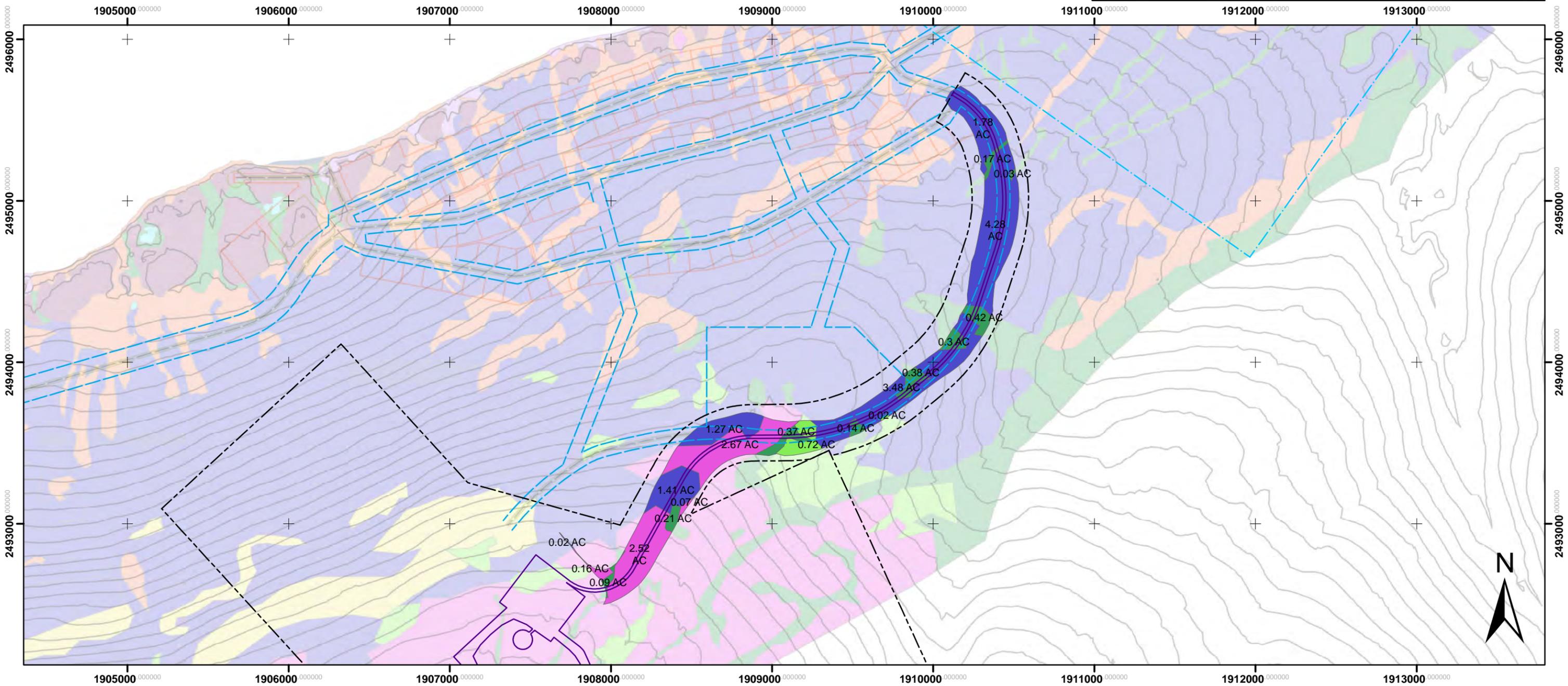
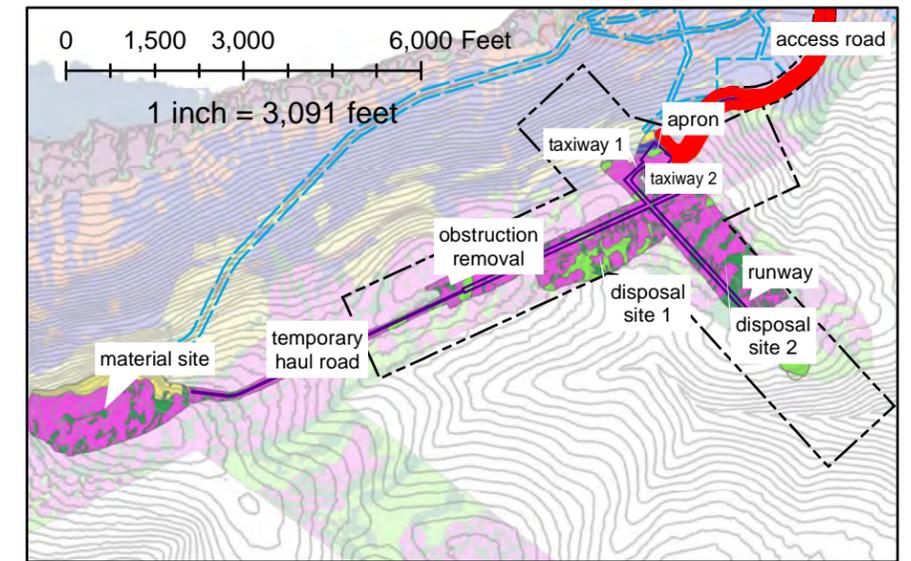
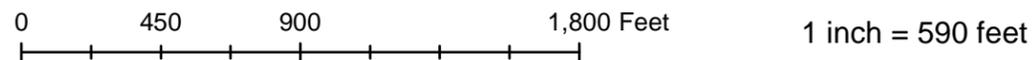


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Mertarvik Airport Construction Boundaries Wetlands Delineation

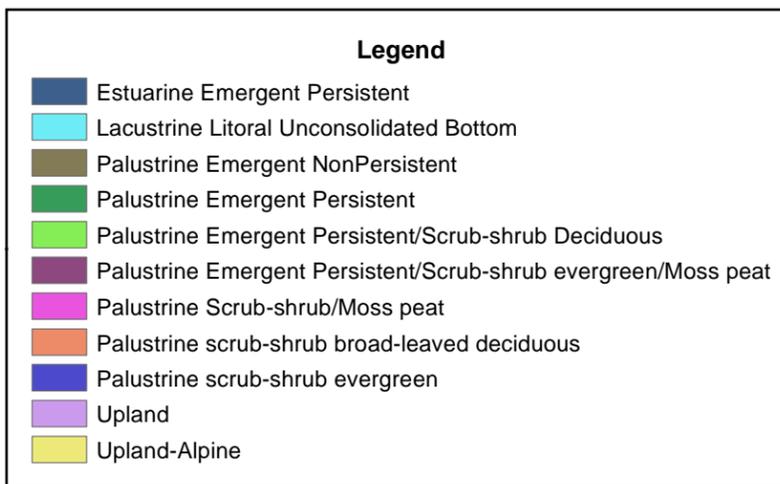


Extent: access road

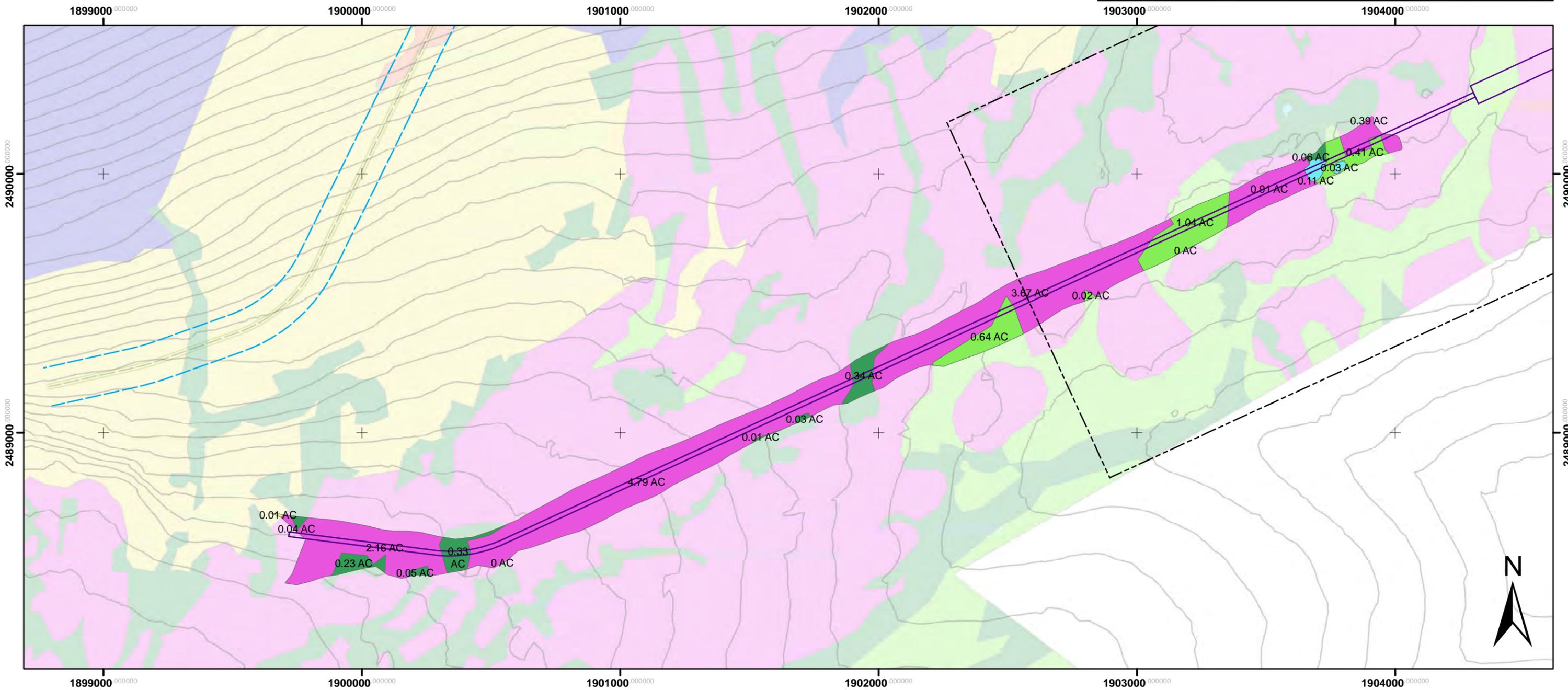
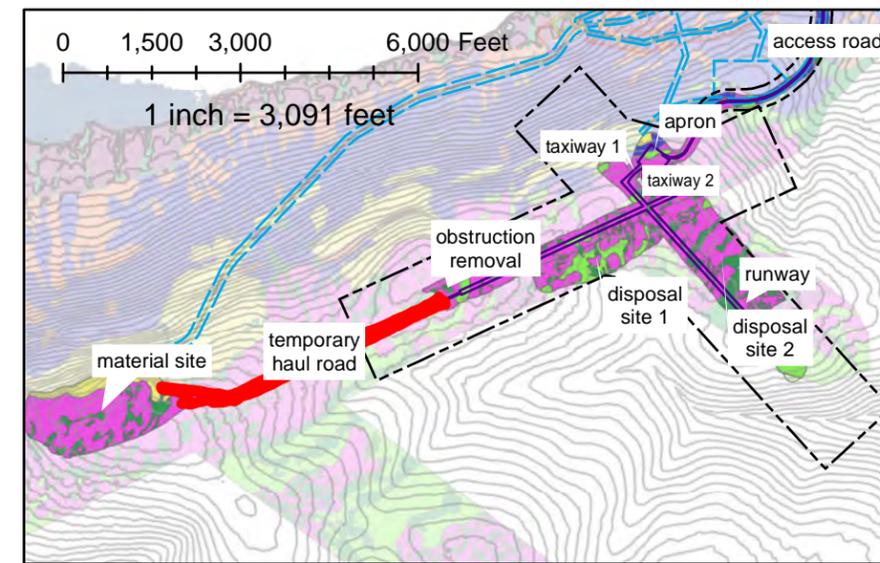
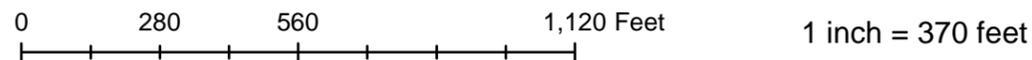


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Mertarvik Airport Construction Boundaries Wetlands Delineation

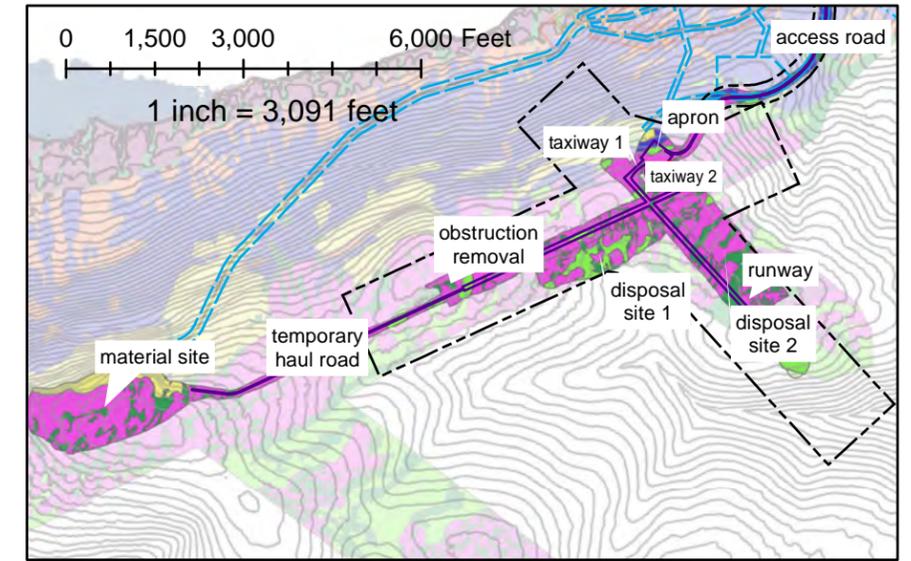
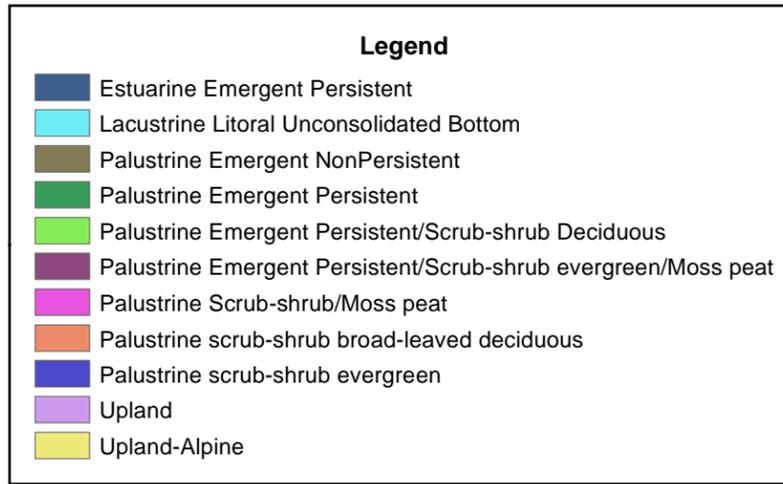


Extent: temporary haul road

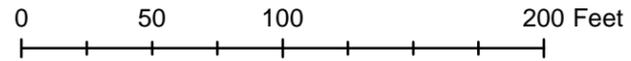


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Mertarvik Airport Construction Boundaries Wetlands Delineation

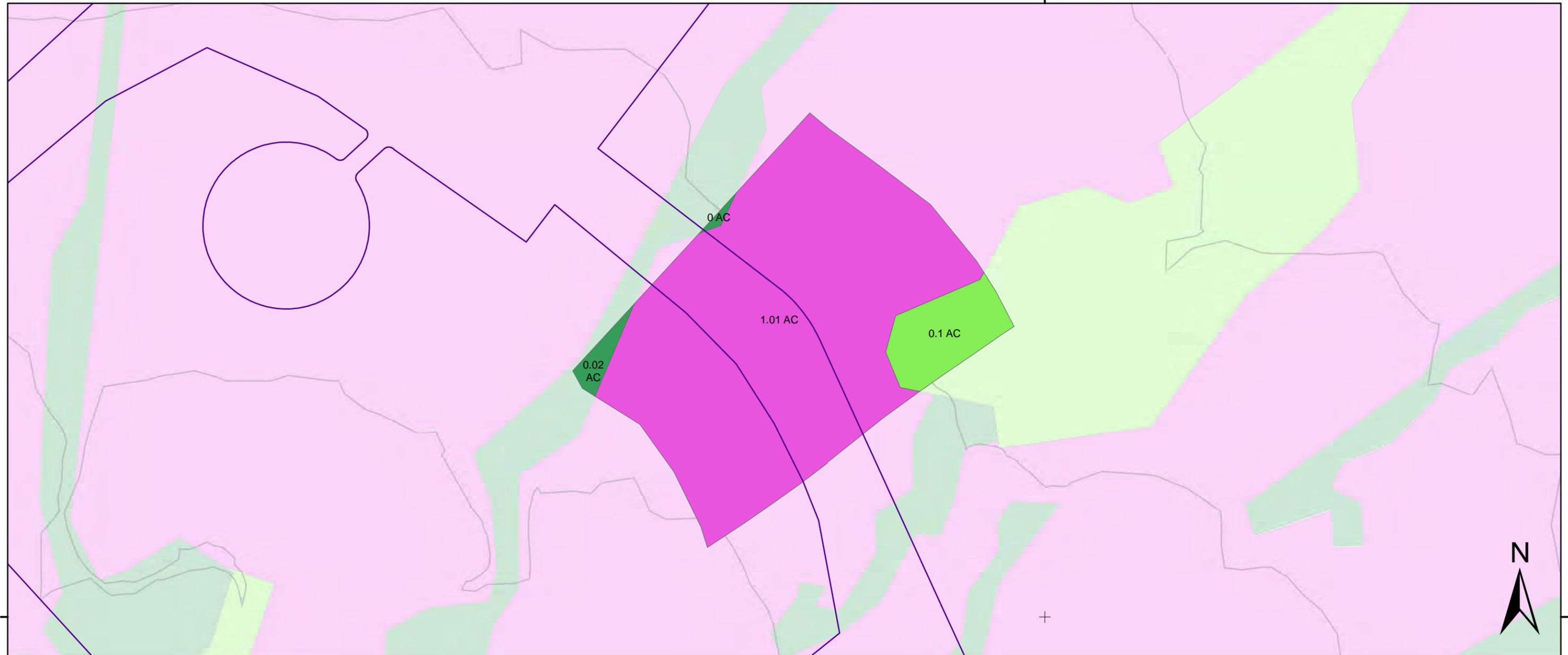


Extent: taxiway 2



1 inch = 70 feet

1908000⁰⁰⁰⁰⁰⁰



2492000⁰⁰⁰⁰⁰⁰

2492000⁰⁰⁰⁰⁰⁰

1908000⁰⁰⁰⁰⁰⁰

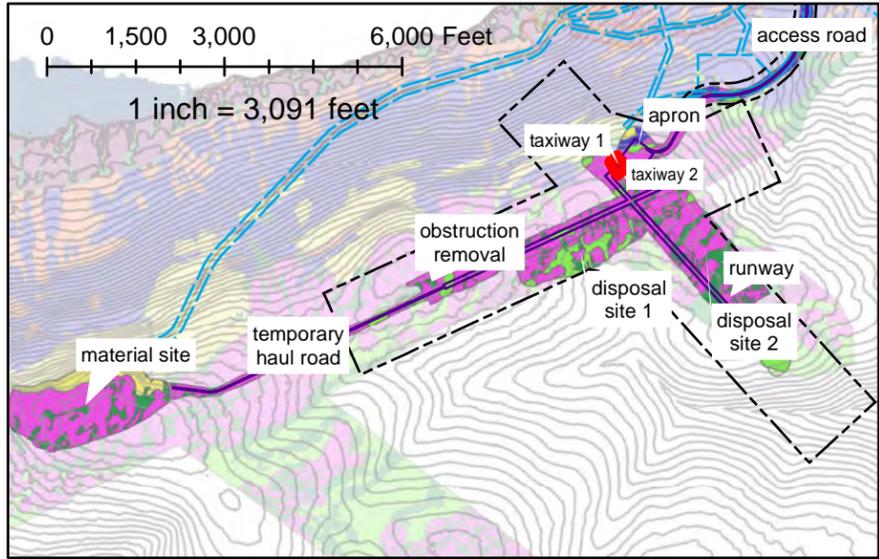


Date: 8/29/2017

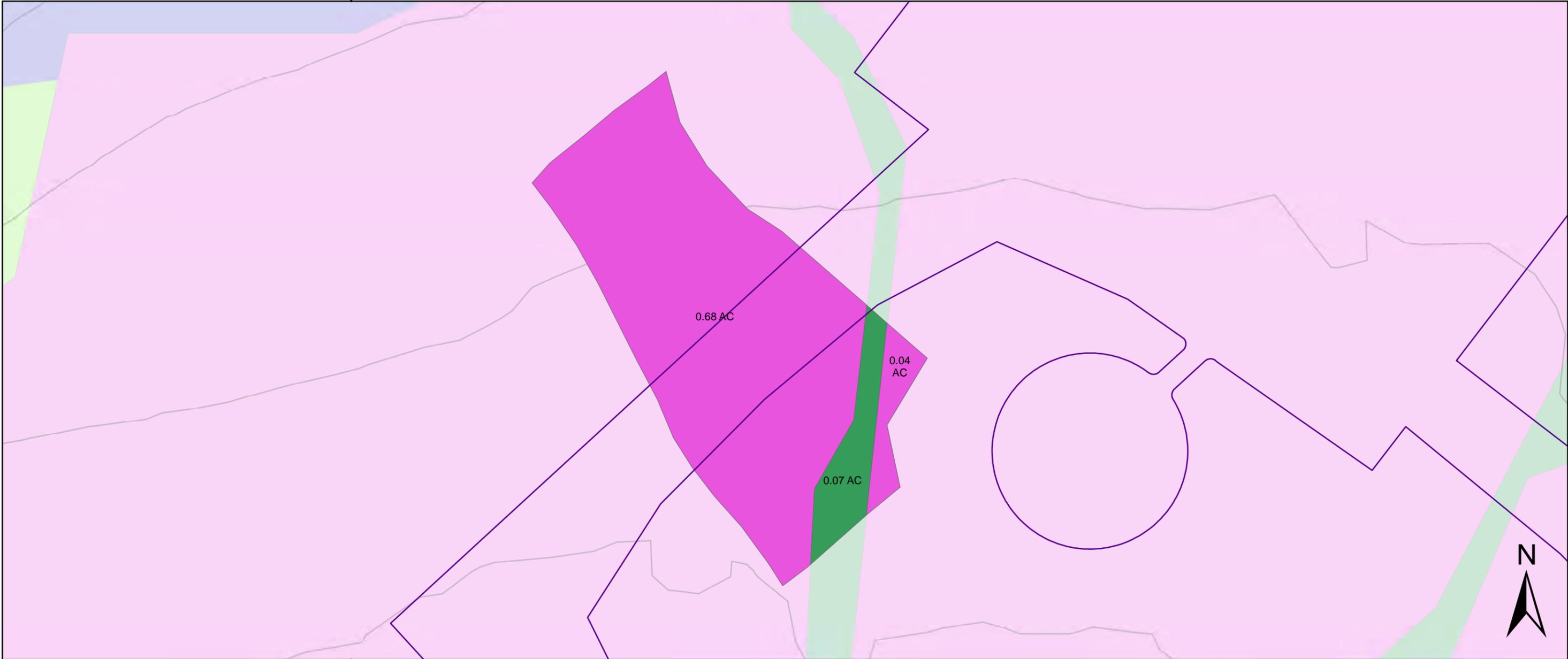
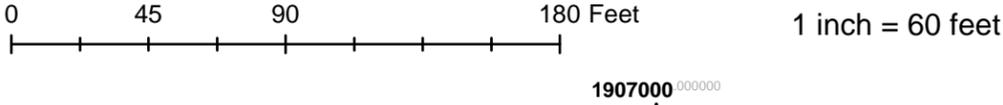
Mertarvik Airport Construction Boundaries Wetlands Delineation

Legend

- Estuarine Emergent Persistent
- Lacustrine Litoral Unconsolidated Bottom
- Palustrine Emergent NonPersistent
- Palustrine Emergent Persistent
- Palustrine Emergent Persistent/Scrub-shrub Deciduous
- Palustrine Emergent Persistent/Scrub-shrub evergreen/Moss peat
- Palustrine Scrub-shrub/Moss peat
- Palustrine scrub-shrub broad-leaved deciduous
- Palustrine scrub-shrub evergreen
- Upland
- Upland-Alpine



Extent: taxiway 1



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Appendix E
Comments and Responses
On Draft EIS



February 13, 2018

Captain Donald Antrobus
Program Manager
Village Infrastructure Protection
Denali Commission
510 L Street, Suite 410
Anchorage, Alaska, 99501

Dear Captain Antrobus:

Re: Draft Environmental Impact Statement for Mertarvik Infrastructure Development

The Alaska Native Tribal Health Consortium (ANTHC) has reviewed the Environmental Impact Statement (EIS) for the Mertarvik Infrastructure Development Project on Nelson Island, Alaska and is pleased to provide the following comments on the document:

1. ANTHC supports and commends the development of the EIS for the Mertarvik Infrastructure Development Project on Nelson Island, Alaska. The EIS streamlines permitting, minimizes potential barriers to development for the community, and is a key step in expediting the relocation of the community.
- 1 2. On Page 39, ANTHC is listed as the Denali Commission's contractor, but ANTHC is not a contractor. It is a federal assistance award recipient and non-profit Tribal health organization with the responsibility and authority to provide health services for (and meet unique health needs of) Alaska Native and American Indian people living in Alaska. Congressional passage of Public Law 105-83 recognizes the work of Tribal health organizations across Alaska to collaborate on statewide Tribal health services under the ANTHC.
3. The Draft Environmental Impact Statement (DEIS) for the Mertarvik Infrastructure Development Project on Nelson Island, Alaska (December 2017) fulfills NEPA requirements for all the project components the community could develop with ANTHC's help. Assuming the record of decision is signed in 2018, all projects constructed as described in Section 4.6.1 would use this EIS to fulfill NEPA requirements. After 2023, ANTHC would complete environmental reviews for water and sewer service, the water treatment plant, the water storage tank, and the lagoon expansion. IHS/USDA RD may require an environmental assessment (EA) for the lagoon expansion. If RD provides funding for the projects and decides not to adopt the EIS, then EAs may be prepared for the sewage lagoon and landfill. Environmental reviews will fulfill the NEPA requirements for the remainder of the potential water, sewer, and solid waste projects with which ANTHC could assist the community.

1. The description of ANTHC's role has been corrected.

- 2 4. There is a discrepancy on the landfill acreage. **Section 5.3.2** describes the landfill as being 0.97 acres; however, **Table 3** and landfill description in **Section 4.6.1** say the footprint is 7 acres. **Wetlands Section 5.12.2 Environmental Impacts** on page 144 says about ½ of 0.97-acre landfill is wetlands (0.49 acres). The landfill footprint should be an estimated lot size of 15 acres with an estimated 12 acres of constructed facilities within the lot.
- 3 5. The 3rd line, 2nd sentence of **Section 5.20.2 Environmental Impacts** states **Section 4.5.1** provides available details on the Mertarvik solid waste landfill, wastewater treatment facility, water storage tank, water distribution system, wastewater collection lines, buildings, and foundations. This information is actually in **Section 4.6.1 Preferred Alternative, Infrastructure Elements**.
6. The second to last paragraph of **Section 5.23.7** on page 191 says "Future design decisions that have potential environmental impact (e.g. buried vs. above-ground utilities) might require supplemental environmental analysis under NEPA, likely in the form of an EA and Finding of No Significant Impact (FONSI)."
- 4 Installation of main and service lines would not require an EA. The EIS is sufficient to address impacts and fulfill NEPA requirements if federal money is used and federal permits are required within the 5-year timeframe. If the EIS is more than 5 years old, NEPA would be addressed using IHS environmental review procedures. If the landfill or sewage lagoon is not developed within the 5-year time frame, then an EA would be required to fulfill NEPA requirements.
- 5 7. **Section 5.23.10** is out of order in the TOC and document.

Please feel free to contact ANTHC with any requests for clarification on the above comments.


for David Beveridge, P.E., P.M.P.
Director of Operations

2. The discrepancy between sections has been corrected.

3. The section reference has been corrected.

4. The language in this section has been clarified.

5. The section numbering sequence has been corrected.



United States Department of the Interior

OFFICE OF THE SECRETARY
Office of Environmental Policy and Compliance
1689 C Street, Suite 119
Anchorage, Alaska 99501-5126

VIA ELECTRONIC MAIL, NO HARD COPY TO FOLLOW

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February 13, 2018

Captain Donald Antrobus
Program Manager
Denali Commission
510 L Street, Suite 410
Anchorage, Alaska 99501

Subject: Draft Environmental Impact Statement for the Mertarvik Community Infrastructure Development Project – Nelson Island, Alaska

Dear Captain Antrobus,

The U.S. Department of the Interior (Department) has reviewed the Denali Commission's (Commission) Draft Environmental Impact Statement (EIS) for the Mertarvik Infrastructure Development on Nelson Island, Alaska, which is a proposal to move the Alaska Native Village of Newtok to a congressionally designated site located on higher elevation across the Ninglick River. We provide the following comments and recommendations in accordance with our authorities under the National Environmental Policy Act.

The Department greatly appreciates the opportunity to comment on the Draft EIS. We acknowledge the extraordinary work involved in dealing with, as the Draft EIS puts it, "unusual twists" required by this project—particularly in terms of the constraints imposed upon the Commission, the U.S. Army Corps of Engineers (Corps), and, particularly, the people of Newtok by both past events and projections for the not-too-distant future.

The Department concurs with the Commission's assessments regarding environmental impacts resulting from infrastructure development at Mertarvik. We do, however, have comments on the Draft EIS regarding: 1) clarification of the role of the Department's U.S. Fish and Wildlife Service (Service) in the EIS process, 2) clarification of the 4(f) analysis, and 3) concerns about decommissioning the Newtok village infrastructure in the context of connected actions and cumulative effects.

The Service's Role

- 1 Page 2 of the Draft EIS notes that "the USFWS ultimately withdrew as a Cooperating Agency when they realized there would be no significant impacts to the Yukon Delta National Wildlife Refuge [(Refuge)]." We wish to clarify that prior to our review of the Draft EIS, the Service had drawn no conclusions about the potential for significant impacts to the Refuge. Rather, the Service opted to serve as a consulting agency (the Commission's original intent) after learning at the March 29, 2017, scoping meeting that issues of particular interest to the Service (including potential land exchanges, the airport hub concept, the small boat harbor, and Newtok decommissioning) were to be excluded from consideration in the EIS. As a result, the Service wrote a letter to the Commission in May 2017 accepting the Commission's original invitation to be a consulting, rather than cooperating agency.
- 2 Page 12 of the Draft EIS reports that "Following the agency scoping meeting, the Denali Commission invited individual participating agencies by letter to identify any regulatory or policy requirements that might cause actions to be 'connected' to the proposed activity. The USFWS provided a letter (dated June 26, 2017, see Appendix A) discussing resources that may be damaged if contaminants are released from Newtok, and several nexuses between decommissioning and legal authorities, but did not demonstrate that decommissioning at Newtok is a connected regulatory requirement for the proposed construction at Mertarvik."

Please note that the letter from the Commission soliciting input from the Service did not request input relative to "connected actions." Rather, the letter indicated that "Other agencies that expect to conduct decommissioning activities in the future should provide information on their responsibility to decommission components of the Newtok village site to the Commission to support the cumulative effects analysis in the EIS." The Draft EIS is correct in concluding that the Service did not demonstrate that decommissioning is a connected regulatory requirement (or a connected action for other reasons) in their June 26 letter, but that was because they were not asked to provide feedback on that topic. We recommend that the Final EIS correct and clarify both of these items (pages 2 and 12).

Section 4(f)

- 3 The Department recommends providing additional clarification in Section 5.23.10—specifically in the first full paragraph of page 190 addressing constructive uses. The paragraph states, "The only potential constructive use impact category defined in the Act that potentially applies to airport impacts on adjacent Yukon Delta National Wildlife Refuge lands is aircraft noise. 'Quietness' is not a stated purpose for refuge establishment but is for wilderness areas where the impact of man is minimal to non-existent." We do not agree with that conclusion. The U.S. Department of Transportation Act of 1966 specifies that "other impacts," including those that "harm wildlife," consist of a "take [of that resource] in every practical way." Given that one of the Refuge's establishing purposes is to conserve wildlife, which includes eliminating or reducing disturbance, Federal Aviation Administration project activities that harm refuge wildlife, including but not limited to aircraft noise, could result in a constructive use if those resources are substantially impaired.

1. The language in the EIS has been clarified.

2. The passages have been corrected and clarified.

3. Language clarifying these issues has been added.

Furthermore, although “quietness” is not a stated purpose of the Refuge, wildlife conservation is one such purpose. The Refuge’s establishing legislation specifically identifies black brant as one of the species to be conserved. Because of the sensitivity of waterfowl, particularly brant, to both the sight and sound of aircraft flights, the Service’s consultation evaluated potential impacts to the nearby brant colonies by the proposed airport at Mertarvik. As the Commission noted, the Service did concur with the draft 4(f) analysis, not because “Quietness is not a stated purpose of the refuge,” but because they concluded that conservation of brant would not be negatively impacted by the operation of the new airport. We recommend correcting the Service’s position on the 4(f) analysis in the Final EIS.

Decommissioning

- 4 As the Service’s June 26 letter indicated, the Service, and the Department, are very concerned about the fate of Newtok during and following the community’s move to Mertarvik. That letter outlined the resources of concern in the area, the potential risks as the community erodes into the river, and several specific aspects of the physical setting at Newtok, which could exacerbate the potential spread of toxic substances and materials as a result of that erosion. Thus, the Department was disappointed with the Commission’s determination that decommissioning was not a “connected action” relative to the Mertarvik Infrastructure project and that “an analysis of possible future decommissioning activities at Newtok does not lie within the scope of this EIS.”

The Department is sensitive to both the environmental and administrative deadlines constraining the completion of this EIS. We are also grateful that both the Commission and the Corps offered and were able to meet with the Service on January 18, 2018, at their Regional Office to discuss this topic. Should there be an opportunity to further address decommissioning in the Final EIS, we provide the following recommendations for your consideration.

1. In some of the analyses, physical events occurring or expected to occur at Newtok, such as storm surges, severe flooding, and continued erosion, are described briefly and then evaluated in terms of their impacts on the community members; however, the environmental effects of these events are not considered. This is particularly true of the “no action” alternative. We recommend that the Final EIS include a description of potential impacts to the environment (e.g., wildlife, water resources, etc.) likely to result from the erosion of the existing village infrastructure.
2. We believe that those environmental impacts will occur under both no action and action alternatives. Under a no action alternative, however, it is very likely that there would be steps taken to retard or slow down the erosion at the village, even if such efforts would be expensive and could not be permanently successful. Such “reasonably foreseeable” steps could at least alter the projected timing of Newtok infrastructure loss. Given that potential, we recommend providing details regarding environmental effects associated with the no action alternative in the Final EIS.
3. Page 177 states that “Past, present and future actions at the village of Newtok should also be considered in the context of cumulative effects. ... Reasonably foreseeable future actions at Newtok, including the activities associated with the actual evacuation to Mertarvik, also include deactivation of the airport and removal of man-made airport infrastructure” We believe that is a limited interpretation of “reasonably foreseeable

4. Language clarifying Denali Commission’s position on decommissioning has been added to sections 3.2.3 and 5.23.4.

future actions at Newtok.” For example, as pointed out on page 12, at least three different existing plans consider decommissioning activities. Admittedly, there are no formal schedules or funding initiatives identified for the implementation of those plans, but that also holds true for the development of Mertarvik infrastructure itself (as explained in Section 5.23.7). If an EIS for infrastructure development can be prepared using incomplete information, analysis of a broader suite of “reasonably foreseeable actions at Newtok,” including those associated with decommissioning, could also be conducted. We recommend including a broader discussion of reasonably foreseeable actions associated with decommissioning in the Final EIS.

- 5 4. On page 178, the Draft EIS states “The year 2022 was defined as the limit of the future timeframe for reasonably foreseeable future actions, since the current village of Newtok is expected to lose a critical amount of infrastructure by that time.” We are concerned about the brevity of that interval. This 4-year future window is problematic, particularly when the Draft EIS presents both environmental (i.e., erosion) projections and Mertarvik construction plans that extend well beyond 2022. We recommend 2027 as a more appropriate end date for considering reasonably foreseeable future actions.
- 6 5. In addition, the use of critical infrastructure loss as the criterion for setting the future action window raises a number of questions: 1) what is meant by *critical* and 2) why is the loss of critical infrastructure a criterion (and apparently the only criterion) for establishing a timeframe for considering reasonably foreseeable actions? We suggest further clarifying this criterion in the Final EIS.
6. The Department recommends that the Commission and the Corps significantly expand the consideration of cumulative effects. Specifically, the middle paragraph on page 179 could provide considerably more detail about the risks and possible solutions associated with decommissioning/clean-up. An actual analysis is not necessary, but we recommend describing and summarizing the environmental and resource concerns and highlighting issues covered in the Mertarvik Energy Master Plan, Hobbit reports, and the Waste Erosion Assessment and Review program’s Detailed Action Plans. The Final EIS should then briefly summarize what is not known at this time, such as schedules, funding, and identifiable project leads.
7. Section 5.23.8 (p. 191) considers Unresolved Issues stating, “Aside from those stated in section 5.23.7 above, there are no known unresolved issues or conflicts.” The Department encourages the Commission and the Corps to briefly, but clearly state in the Final EIS that decommissioning and safely cleaning up the old village is an unresolved issue. How and when decommissioning can proceed is uncertain and dependent on the timing and funding available for infrastructure development. Although the Department agrees that a full analysis of decommissioning is outside the scope of this EIS, we believe it is critical to identify the seriousness of the issue and acknowledge the lack of a formal path forward (at least to date) on this topic in the Final EIS. Emphasizing the importance of this issue could serve as strong encouragement to all interested parties to begin actively and aggressively seeking planning capacity and funding for addressing this issue.

Thank you for the opportunity to comment on the Draft EIS. The Service also very much appreciates participating as a consulting agency and the numerous opportunities for providing input throughout the process. The Commission’s efforts in preparing this Draft EIS and advocacy on behalf of the people of Newtok/Mertarvik are admirable and greatly appreciated. If

5. Section 5.23.3 has been changed to reflect a 2027 end-date.

6. Section 5.23.3 has been reworded for clarity.

7. Language has been added to section 5.23.9 noting that decommissioning is an unresolved issue.

you have any questions, please contact Jennifer Spegon at (907) 271-2768 or jennifer_j_spegon@fws.gov, or Brian McCaffery at (907) 330-7514 or brian_mccaffery@fws.gov.

Sincerely,

A handwritten signature in cursive script that reads "Philip C. Johnson".

Philip Johnson
Regional Environmental Officer - Alaska



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, WA 98101-3140

OFFICE OF
ENVIRONMENTAL REVIEW
AND ASSESSMENT

February 12, 2018

CAPT Donald Antrobus, PE
Denali Commission
510 L Street, Suite 410
Anchorage, AK 99501

Dear Captain Antrobus:

The U.S. Environmental Protection Agency has reviewed the Draft Environmental Impact Statement published by the Denali Commission for the Mertarvik Infrastructure Development Project (EPA Region 10 Project Number 17-0012-COE). The EIS was prepared by the U.S. Army Corps of Engineers on behalf of the Denali Commission, with the assistance of the U.S. Department of Transportation Federal Aviation Administration as a cooperating agency. Our review was conducted in accordance with the EPA's responsibilities under Section 102 of the National Environmental Policy Act and Section 309 of the Clean Air Act.

Project Background

The EIS assesses the potential environmental impacts of reconstructing all required infrastructure to relocate the community of Newtok, imminently threatened by erosion and flooding, to the new village site of Mertarvik. The Mertarvik site on Nelson Island was transferred to the Newtok Native Corporation from the U.S. Fish and Wildlife Service in 2003 and is the closest high ground that avoids damage from both flooding and erosion. The proposed village infrastructure includes an airport; solid waste landfill; wastewater collection system and treatment lagoon; bulk fuel farm and fuel dispensing facility; power house and power distribution system; water treatment plant, storage tank and distribution lines; barge landing; housing; school; public buildings; and all associated subdivision and connecting roads.

The EPA is supporting the Denali Commission in the EIS development effort as a participating agency, subject to available resources. The EPA has participated in agency meetings, provided scoping comments on April 4, 2017, and provided a review of the preliminary Draft EIS on August 16, 2017. We appreciate the many improvements to the Draft EIS to address recommendations made by EPA and other agencies at the preliminary Draft EIS stage, and find it more clearly analyzes the impacts of the proposed action and alternatives under NEPA. In addition, we commend the Denali Commission for their efforts to develop an effective, first-tier, NEPA analysis, which can hopefully be referenced by other agencies in the future to efficiently comply with NEPA prior to the construction of specific infrastructure components, and therefore enable a timely relocation of the community of Newtok.

EPA Comments and Rating

¹ Upon review of the Draft EIS, the EPA remains concerned about the projected impacts to wetlands from the proposed infrastructure development at Mertarvik. The airport is projected to impact approximately 232 acres of wetlands, and the remaining infrastructure components of the community layout plan approximately an additional 45 acres. Appendix C of the Draft EIS indicates the aquatic resources in the

1. Clarifying text added to Sec 5.12.2.

project area are of high integrity. We, therefore, recommend the protection of the functions of these wetland habitats, including avoidance and minimization where possible and compensation for any unavoidable impacts. Based on the characteristics of the project area, which is 93 percent wetlands according to the 2005 wetland delineation, we acknowledge avoidance of all wetland impacts, particularly for large infrastructure components, such as the airport, may not be possible.

As discussed in the Draft EIS, the wetlands in the project area have been determined to be waters of the U.S. due to surface and shallow subsurface connection to the tidally influenced Ninglick River. Therefore, the discharge of dredged or fill material and subsequent impacts to the wetlands will require a Clean Water Act 404 permit from the Corps. The Draft EIS further discloses the Corps Regulatory Division “has stated that it will not issue permits for the project as a whole as described in this DEIS, because of the uncertain project timeline and insufficient details on construction methods and other potential site-specific impacts.” At the point when a Clean Water Act Section 404 permit is required for a specific project component, the EPA will review the project for compliance with the *Federal Guidelines for Specification of Disposal Sites for Dredged or Fill Materials* (40 CFR 230), promulgated pursuant to Section 404(b)(1) of the CWA (“404(b)(1) Guidelines”). Among other restrictions on discharge, the 404(b)(1) Guidelines require:

- any permitted discharge into waters of the U.S. must be the least environmentally damaging practicable alternative (LEDPA) available to achieve the project purpose; and,
- appropriate and practicable steps be taken, in sequence, to: (1) avoid, (2) minimize, and then (3) compensate for impacts to aquatic resources.

2 In order to achieve the goal of facilitating a timely relocation of the community, it is important that this NEPA analysis consider how planning efforts and project alternative selection conform with Section 404(b)(1) guidelines sequencing and criteria. Therefore, for those infrastructure components that are far enough along in the planning process, we recommend the Final EIS include an evaluation of the project alternatives in this context in order to demonstrate the project’s compliance with the 404(b)(1) Guidelines, including how alternatives would avoid wetlands and aquatic resource impacts from fill placement, water impoundment, construction, and other activities before proceeding to minimization/mitigation measures. As discussed further in the enclosed detailed comments, we specifically recommend the Final EIS discuss options for compensatory mitigation for unavoidable impacts to wetlands, including draft compensatory mitigation plans for individual infrastructure components, if available. We recommend, based on the scale of the proposed impacts and the detailed planning and analysis information for the airport in this Draft EIS, that sufficient information may be available for the airport to provide such an evaluation in the Final EIS, including discussion of compensatory mitigation.

2. See comment 1.

3 The EPA’s secondary concern is additional detail is needed in the Final EIS regarding the types of mitigation that could be employed during project implementation, to meet the requirements of NEPA to discuss the “means to mitigate adverse environmental impacts” [40 C.F.R. 1502.16(h)] and to support resource impact significance determinations that rely upon the use of best management practices (BMPs) to reduce impacts. We recognize not all components of the infrastructure development project have progressed to a detailed planning stage; however, it is our understanding this EIS is intended to serve as a foundation for fulfilling NEPA analysis requirements for future specific project proposals. Consequently, a sufficient analysis of mitigation measures to be taken to offset project impacts is necessary in the Final EIS, in order to achieve the goal of expediting the NEPA process for the Mertarvik Infrastructure Development Project as a whole. Although additional site-specific mitigation

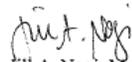
3. See comment 1.

measures may also be developed in the future for individual components of the infrastructure development project, adequate information exists at this time to discuss typical mitigation measures to reduce impacts to air quality, water quality and other environmental resources. As discussed further in the enclosed detailed comments, we recommend the Final EIS discuss specific mitigation measures to reduce any identified potential adverse impacts to each resource of concern.

Based on our review and evaluation of the adequacy of the information and the potential environmental impacts of the action alternatives, the EPA is rating the Draft EIS as Environmental Concerns – Insufficient Information (EC-2). The EC rating indicates the EPA has concerns regarding the projected substantial acreage of impacts to wetlands, which should be avoided where possible, and we recommend considering additional mitigation, including compensatory mitigation, for unavoidable wetland impacts in order to fully protect the environment. The “2” rating indicates the EPA is recommending additional information be included in the Final EIS related to potential wetland and air quality impacts, as well as additional discussion of mitigation measures for a variety of resources, as described in the enclosed detailed comments. An explanation of the EPA’s rating system is enclosed, along with our detailed comments.

We appreciate the opportunity to review the Draft EIS for the Mertarvik Infrastructure Development Project and look forward to working with you as you prepare the Final EIS. Should you have any questions regarding our comments, please contact Molly Vaughan of my staff at (907) 271-1215 or vaughan.molly@epa.gov, or contact me at (206) 553-1841 or nogi.jill@epa.gov.

Sincerely,



Jill A. Nogi, Manager
Environmental Review and Sediment Management Unit

Enclosures:

1. U.S. Environmental Protection Agency Alaska Mertarvik Infrastructure Development Project Draft EIS Detailed Comments
2. U.S. Environmental Protection Agency Rating Sheet for Draft Environmental Impact Statements

U.S. Environmental Protection Agency
Mertarvik Infrastructure Development Project Draft EIS
Detailed Comments

Impacts to Aquatic Resources

- 4 As noted in our cover letter, the EPA's primary concern for the proposed project is the large acreage of projected wetland impacts, which total approximately 277 acres based on conservative estimates. In addition to direct impacts of fill, the Draft EIS notes that roads may result in additional indirect impacts to aquatic resources. Because many roads, as designed, would be placed perpendicular to shallow sub-surface flow, some ponding up-gradient and desiccation down-gradient of roads may result. According to the Draft EIS, this impact is likely to be mitigated by "the extensive use of modular composite road panels," which would reduce the need for placement of fill to permafrost depth, and therefore, allow more natural flow to continue. We recommend the Final EIS provide additional detail regarding this important mitigation measure, including where and to what extent such road panels will be employed, and what percentage of natural flow is anticipated to be maintained by their use.
- 5 The Draft EIS also discloses an additional potential impact to wetland vegetation from the proposed airport construction, which would include the surficial disposal of excess overburden excavated from the runway and taxiway footprints. This disposal is expected to involve spreading of a thin layer of mineral soils over approximately 35 acres of existing tundra surfaces. The Draft EIS states this method is intended to allow rapid growth of plant materials through the soil layer, likely to alter vegetation types without destroying value as habitat in the future. However, we recommend the Final EIS consider whether other beneficial uses may be available for these soils, in order to avoid these additional impacts to vegetation, such as stockpiling the soil for future use as cover material at the landfill.

Given the characteristics of the Mertarvik site, alternatives may not be available, which fully avoid impacts to wetlands and aquatic resources. As discussed in our cover letter, we recommend the Final EIS include additional information regarding potential compensatory mitigation for unavoidable impacts to wetlands. Please see the EPA's scoping letter for additional information regarding the *Compensatory Mitigation for Losses of Aquatic Resources; Final Rule*,¹ which establishes performance standards and criteria for the use of permittee-responsible compensatory mitigation, mitigation banks, and in-lieu programs to improve the quality and success of compensatory mitigation projects for activities authorized by Corps permits. As noted in the Draft EIS, the decommissioning of existing infrastructure at Newtok and securing and/or cleaning up any potential sources of environmental contamination at the townsite is desirable from an environmental perspective; however, such activities will generally not be directly triggered by infrastructure development at Mertarvik. Consequently, the restoration of the existing townsite at Newtok may provide a potential opportunity for compensatory mitigation.

Mitigation

- 6 Section 5.23.9.1 defines "mitigation" and provides a useful discussion of how environmental impacts have been considered and reduced in development of the proposed project. While this section does also note in general terms some of the types of mitigation that could be employed during project implementation, additional detail is needed to meet the requirements of NEPA to discuss the "means to mitigate adverse environmental impacts" [40 C.F.R. 1502.16(h)]. According to the "40 Most-Asked

4. Sections 5.3.2, 5.12.2 have been revised.

5. Additional discussion has been added to section 5.12.2.

6. See comment 7.

¹ 40 CFR 230, Subpart J, commonly referred to as the Final Mitigation Rule

Questions Concerning CEQ's NEPA Regulations," mitigation measures should be discussed for all impacts, even those, which by themselves would not be considered significant. In addition, it is appropriate to identify relevant, reasonable mitigation measures even if they are outside the jurisdiction of the lead or cooperating agencies. Finally, the analysis should address the likelihood the measures will be adopted or enforced by the responsible agencies.² In accordance with this guidance, we recommend the Final EIS discuss the specific mitigation measures, which will be taken to reduce any identified potential adverse impacts from the project to each resource of concern.

- 7 We recommend each resource section include such a discussion following the analysis of environmental impacts. Doing so will help to justify the significance determination (i.e. significance of the impacts), particularly where those determinations rely upon a statement that impacts will be reduced through the use of best management practices. In addition, we recommend the Final EIS discuss, where applicable, the methods through which the mitigation measures will or could be required and/or implemented (e.g., permit condition, grant condition), which will help to address the question of likelihood. A table of appropriate mitigation measures, including who would be responsible for implementation and how the measure would likely be enforced would be beneficial when this document is referenced by other federal agencies for NEPA compliance for specific infrastructure components in the future. We recommend any appropriate measures that are within the authority of the Denali Commission to implement or require be disclosed in the ROD as a component of the selected alternative.

Some specific recommendations related to the EPA's areas of expertise are provided in the following paragraphs. We would also be glad to meet with you to discuss additional mitigation measures that might be considered as you develop the Final EIS, if this would be helpful.

Wetlands:

As discussed in the preceding section, the EPA recommends additional discussion of wetland mitigation be included in the Final EIS, including the use of modular composite road panels or other means to reduce indirect impacts from disruption of flow, reducing impacts from disposal of soils, and compensatory mitigation to address unavoidable impacts.

- 8 The Wetlands Functional Assessment contained in Appendix C uses a combination of the recently-developed North Slope Rapid Assessment Methodology and the Alaska Regulatory Best Professional Judgment Characterization method to assess functional condition, functional performance, and to quantify functional capacity units. Neither Appendix C nor the Draft EIS explains these methods, provides an explanation of how and why they were combined, or explains the purpose of calculating functional capacity units. Although the data from the 2005 delineation (Appendix B) was used, the functional conclusions from this earlier work apparently were not. We recommend additional information be included in the Final EIS regarding the wetland functional assessment. We further recommend a working group meet prior to preparation of the Final EIS to review the data inputs and results described in Appendix C.

Water Quality:

- 9 As noted in the Draft EIS, surface disturbance associated with the development of infrastructure and roads, as well as ongoing use of roads and disturbed areas, facilitates sediment transport to water bodies. We appreciate the statements in the Draft EIS that impacts would be minimized by the use of sediment control BMPs, and recommend the Final EIS discuss the specific mitigation measures and BMPs that are

² 40 Most-Asked Questions Concerning CEQ's NEPA Regulations, Question #19; <https://energy.gov/sites/prod/files/G-CEQ-40Questions.pdf>

7. Additional detail on mitigation measures has been added to resource sections, where relevant.

8. Additional explanation added to section 5.12.2.

9. A description has been added to section 5.23.9.2.

likely to be employed, including any that would be required conditions of future permits. In addition to preventing construction impacts, we recommend all roads be designed with the appropriate BMPs for ongoing prevention of sediment runoff.

Solid Waste Mitigation:

- 10 In order to establish an effective, sustainable waste management program for the community of Mertarvik, we recommend an Integrated Waste Management Plan be developed and included in the Final EIS, if available. The EPA's scoping letter explains the five critical elements of an IWMP, as well as provides information on training and technical assistance available from the EPA, Indian Health Service, and other organizations to assist tribal governments in developing these plans.

Spill Prevention Control and Countermeasure:

- 11 According to the Draft EIS, the new fuel storage tank farm will include 12 tanks with a total gross fuel capacity of 214,000 gallons of diesel fuel and 82,000 gallons of gasoline. The tank farm will be located near the Ninglick River and will include two marine header fill points. Consequently, it appears the proposed bulk fuel farm and fuel dispensing facility will likely trigger the requirements for a Spill Prevention Control and Countermeasure plan and/or a Facility Response Plan. As discussed in detail in the EPA's scoping comments, the SPCC rule helps facilities prevent a discharge of oil into navigable water or adjoining shorelines. A facility is covered by the SPCC rule if it has an aggregate above-ground oil storage capacity greater than 1,320 U.S. gallons, and there is a reasonable expectation of an oil discharge into or upon navigable waters of the U.S. or adjoining shorelines. A FRP is a plan for responding, to the maximum extent practicable, to a worst case discharge of oil and/or to a substantial threat of such a discharge and is generally required if the total oil storage capacity is equal to or greater than 42,000 gallons and the facility transfers oil from a vessel. We continue to recommend the EIS discuss how the Denali Commission and the future Mertarvik community will prevent a release of oil from the proposed facility, and include a draft SPCC plan and FRP, if required, as an appendix to the Final EIS.

Air Quality Reducing Road Dust:

- 12 As discussed in our scoping letter, particle pollution caused by dust released from roadways and other disturbed areas is a key human health concern for the proposed project. The Draft EIS relies upon a statement that "particulate emissions at Mertarvik caused by construction equipment and vehicles can be minimized through BMPs and the adoption of local traffic ordinances" to support a conclusion that air impacts will not be significant. We recommend the Final EIS include the specific measures that will be employed to support this statement. Proper road design and construction, including location, drainage and surfacing, can greatly reduce dust emissions from roads, and we recommend the use of such methods be discussed in the Final EIS, as well. Please see our scoping letter for some specific resources, which may be useful.
- 13 In addition, we note the Draft EIS defines the project as in "full compliance" with the Clean Air Act because the "area of the proposed action is not in or near a "non-attainment" or maintenance" area or Class I area." However, we note air permits from the Alaska Department of Environmental Conservation may still be required for certain infrastructure components and activities to comply with the Clean Air Act. For example, the power plant is likely to need a permit as part of the New Source Review/Prevention of Significant Deterioration program for operation of the generators and may require a Title V permit if the facility is over 100 tons per year for any pollutant, over 10 tons per year for a hazardous air pollutant, or over 25 tons per year for a combination of HAPs. We recommend consulting with ADEC regarding required permits.

10. An IWMP will not be prepared at this time, but EPA's recommendation and a brief description of IWMPs has been added to section 5.23.9.2.

11. A description has been added to section 5.23.9.2.

12. Further discussion has been added to section 5.6.2.

13. Further discussion has been added to sections 5.6.2 and 5.23.9.2.

Air Quality Impact Analysis

14 The Draft EIS provides a very general discussion of potential air quality impacts, without disclosure of the specific pollutants anticipated to be released or an estimation of the amounts of emissions. We recommend this specific information be included to support the conclusion that air quality impacts are expected to be minor. In particular, we recommend additional disclosure of the anticipated air quality impacts of the proposed power plant. The Draft EIS concludes these impacts are not significant because the new power plant will replace the existing power plant at Newtok, and will be cleaner and more efficient than the existing equipment. While this may be true from an airshed perspective, it does not negate the importance of disclosing potential impacts in the immediate vicinity of the proposed power plant. We recommend the Final EIS identify the specific air pollutants anticipated during construction and operation. To the extent this information is available to generate emissions inventory estimates, we recommend the Final EIS provide this information, as well. Doing so will help to advise agency decision makers and the public regarding potential nearfield air quality impacts and will also help to inform a determination of what types of air permits may be needed for the proposed power plant.

14. Further discussion has been added to section 5.6.2.

**U.S. Environmental Protection Agency Rating System for
Draft Environmental Impact Statements
Definitions and Follow-Up Action***

Environmental Impact of the Action

LO – Lack of Objections

The U.S. Environmental Protection Agency (EPA) review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

EC – Environmental Concerns

EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce these impacts.

EO – Environmental Objections

EPA review has identified significant environmental impacts that should be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no-action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

EU – Environmentally Unsatisfactory

EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potential unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the Council on Environmental Quality (CEQ).

Adequacy of the Impact Statement

Category 1 – Adequate

EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis of data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

Category 2 – Insufficient Information

The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses or discussion should be included in the final EIS.

Category 3 – Inadequate

EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the National Environmental Policy Act and or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

* From EPA Manual 1640 Policy and Procedures for the Review of Federal Actions Impacting The Environment
_February, 1987

From: [Meitl, Sarah J \(DNR\)](#)
To: [Eldridge, Kelly A CIV USARMY CEPOA \(US\)](#)
Cc: [Krande, Forrest J CIV USARMY CEPOA \(US\)](#); [Floyd, Christopher B CIV USARMY CEPOA \(US\)](#)
Subject: [EXTERNAL] RE: Mertarvik Draft EIS (Newtok)
Date: Tuesday, January 09, 2016 11:29:40 AM

Hi Kelly,

I've just finished reviewing the DEIS for Mertarvik. The only substantive comment I have is about the significance determination at 5.14.3, which states that the Denail Commission believes that none of the CLP alternatives will have a significant impact on historic properties. However, the DEIS states that the project may have an adverse effect on XBI-183, as well as potential to impact unevaluated sites near the project: XBI-156, XBI-157, XBI-158, and Mertarvik Spring, which might be a TCP. It is my understanding that an adverse effect is a significant impact. Perhaps given the phasing currently in use, it might be good to clarify that a final determination will be deferred until after completing Section 106. If you like, we can talk about this on Friday or over the phone.

Thank you for the opportunity to comment, and I look forward to continuing consultation for this project.

Best,

Sarah Meitl
Review and Compliance Coordinator

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The language in section 5.14.3 has been clarified. Additionally, formal consultation with the Alaska State Historic Preservation Office under Section 106 of the NHPA has been initiated and an assessment made that the undertaking will have no adverse effect on XBI-156, XBI-157, XBI-158, and XBI-183 (see Appendix A).