THE STATE
of ALASKA
GOVERNOR BILL WALKER

Department of Transportation and Public Facilities

NORTHERN REGION
Design and Engineering Services
Preliminary Design and Environmental

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Fairbanks, AK 99709-5316
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July 27, 2018

Mr. James Helfinstine
Commander, Seventeenth Coast Guard District
P.O. Box 25517
Juneau, AK 99802

Dear Mr. Helfinstine:

Re: Kivalina Evacuation and School Site Access Road
Project No. 0002348/NFHWY00162
USCG Bridge Permit Application – Kivalina Lagoon Bridge

The Alaska Department of Transportation and Public Facilities (DOT&PF) is requesting a U.S. Coast Guard Bridge Permit for the following activity.

Project Description
The Alaska Department of Transportation and Public Facilities (DOT&PF) proposes to construct a safe, reliable, all-season evacuation road between the community of Kivalina, Alaska, and Kisimigiuqtuq Hill (K-Hill). The Kivalina Evacuation and School Site Access Road project would provide Kivalina residents a safe and reliable evacuation route in the event of a catastrophic storm or ocean surge, allowing evacuees to temporarily mobilize to safe refuge at an assembly site on K-Hill.

As part of this project, a new, permanent bridge would be constructed over Kivalina Lagoon. This project is scheduled to be advertised for construction in 2017. A detailed project description is provided in the enclosed application form which has been completed according to the format presented in the recently published Bridge Permit Application Guide (COMDTPUB P16591.3D July 2016 OMB Control Number 1625-0015).

Enclosures to this application are listed below, as well as provided electronically on the attached CD. For more information please contact Paul Karczmarczyk, Environmental Impact Analyst, at (907) 451-2288, or e-mail *paul.karczmarczyk@alaska.gov.*

Sincerely,

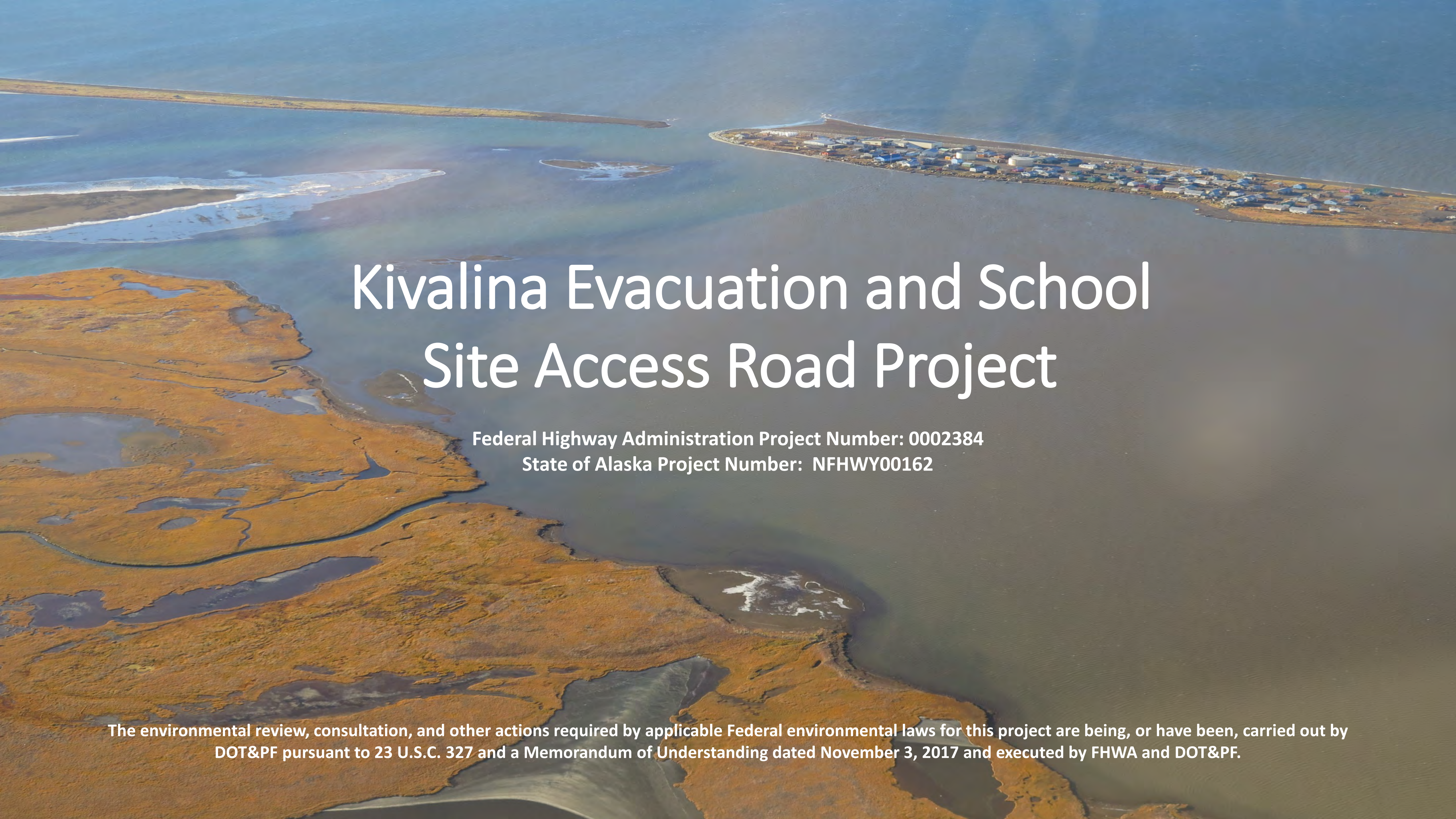
Brett D Nelson

Brett Nelson
Environmental Manager

"Keep Alaska Moving through service and infrastructure."

Enclosures:

CD copy letter and all application materials
Project Synopsis Powerpoint
USCG Bridge Permit Application
Attachment 1.1: Waterway Data
Attachment 1.2: Conceptual Bridge Plan Checklist and Stamped Plan Set
Attachment 2: Kivalina Evacuation and School Site Access Road EA (Vol.1 of 3)
Attachment 3: Kivalina Evacuation and School Site Access Road EA (Vol. 2 of 3)
Attachment 4: Kivalina Evacuation and School Site Access Road EA (Vol. 3 of 3)
Attachment 5: ADEC Certificate of Water Quality Assurance
Attachment 6: USACE Section 404 Permit POA-2012-124
Attachment 7: USACE Kivalina Lagoon Crossing Causeway & Bridge Design Report (2016)



Kivalina Evacuation and School Site Access Road Project

Federal Highway Administration Project Number: 0002384
State of Alaska Project Number: NFHWY00162

The environmental review, consultation, and other actions required by applicable Federal environmental laws for this project are being, or have been, carried out by DOT&PF pursuant to 23 U.S.C. 327 and a Memorandum of Understanding dated November 3, 2017 and executed by FHWA and DOT&PF.

Project Purpose & Need

The Kivalina Evacuation and School Site Access Road project would provide Kivalina residents a safe and reliable evacuation route in the event of a catastrophic storm or ocean surge, allowing evacuees to temporarily mobilize to safe refuge at an assembly site on K-Hill.

This site is also identified by the Northwest Arctic Borough School District, and approved by the community, as a preferred new location for the community school. If constructed, the school could augment the undeveloped evacuation site by serving as a full-service community emergency shelter with all-season support capabilities.

Recent climate data has indicated that arctic sea ice is forming later in the season, increasing fall and winter storm duration and intensity along the Northwest Arctic coast. Consequently, residents of Kivalina face significant and increasing risks to life, health, and safety by storm systems predicted to further intensify over time.

The need for a concerted effort to mitigate these risks became more evident during an evacuation event in October 2007, when debris-laden storm waves overtopped the barrier island. The event resulted in the need for helicopters to carry evacuees off the island, and illustrated that Kivalina currently has no safe method of evacuation in the event of a catastrophic storm surge. In the face of this increased threat, Kivalina needs a safe and reliable means of evacuation.

Environmental Documentation Under NEPA:

In November, 2017, the Alaska Department of Transportation and Public Facilities (DOT&PF) assumed responsibilities of the Federal Highway Administration (FHWA) under 23 U.S.C. 327 and prepared an **Environmental Assessment (EA)** of alternatives to:

- *Establish a safe, reliable, all-season Kivalina Lagoon crossing during evacuation mobilization*
- *Construct an all-season gravel access road between Kivalina Island and the desired K-Hill evacuation site*

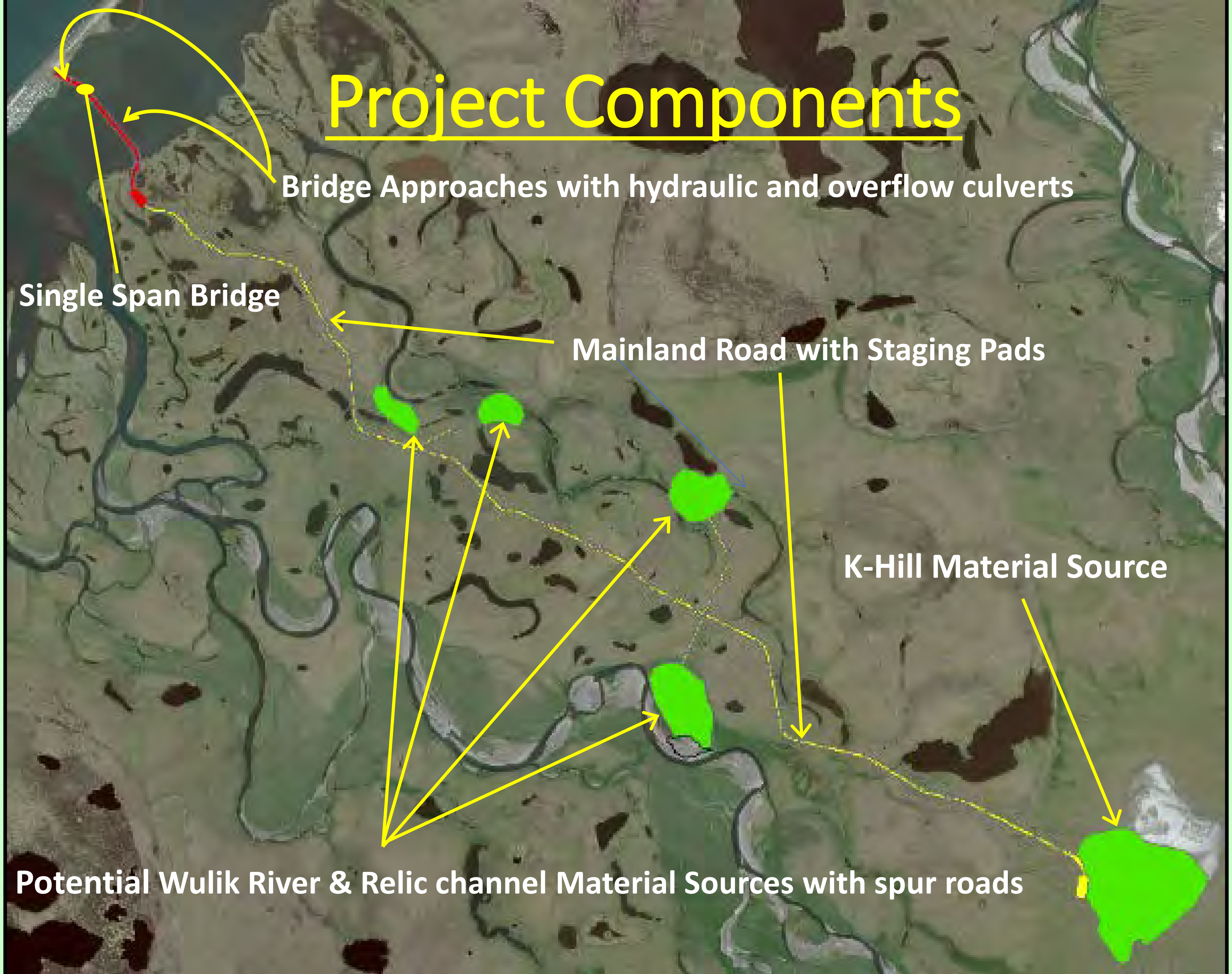
The environmental review, consultation, and other actions required by applicable Federal environmental laws for this project are being, or have been, carried out by DOT&PF pursuant to 23 U.S.C. 327 and a Memorandum of Understanding dated November 3, 2017 and executed by FHWA and DOT&PF.

Milestones of Environmental Assessment (EA) & Project Schedule

- Formal Agency and Public Scoping Commenced in November, 2017
- Notice of Availability of Draft EA published on November 15, 2017
- Public Comment Period Closed on December 15, 2018
- Final EA/Finding Of No Significant Impact (FONSI) issued on January 19, 2018
- U.S. Army Corps of Engineers Section 404/10 permit issued July 9, 2018
- U.S. Coast Guard Bridge Permit submittal anticipated mid-July, 2018
- Anticipated project construction from fall 2018 mobilization to summer 2021 completion

Direct Agency Consultations Conducted

- Northwest Arctic Borough
- Native Village of Kivalina
- City of Kivalina
- U.S. Fish & Wildlife Service – Section 7 Endangered Species Act (ESA)
- National Marine Fisheries Service – Essential Fish Habitat & ESA Consultations
- Alaska Department of Fish & Game – Fish Habitat & Water Withdrawal
- Alaska Department of Natural Resources – Lagoon shoreline easement
- U.S. Army Corps of Engineers – Section 404/10 Wetland Permitting
- Alaska State Historic Preservation Officer – Section 106 Cultural Resources
- U.S.D.I. National Park Service – Cape Krusenstern Nat'l Hist. Landmark
- U.S. Environmental Protection Agency


Project Components
Bridge Approaches with hydraulic and overflow culverts
Single Span Bridge
Mainland Road with Staging Pads
K-Hill Material Source
Potential Wulik River & Relic channel Material Sources with spur roads

U.S. Coast Guard (USCG) Bridge Permit Application

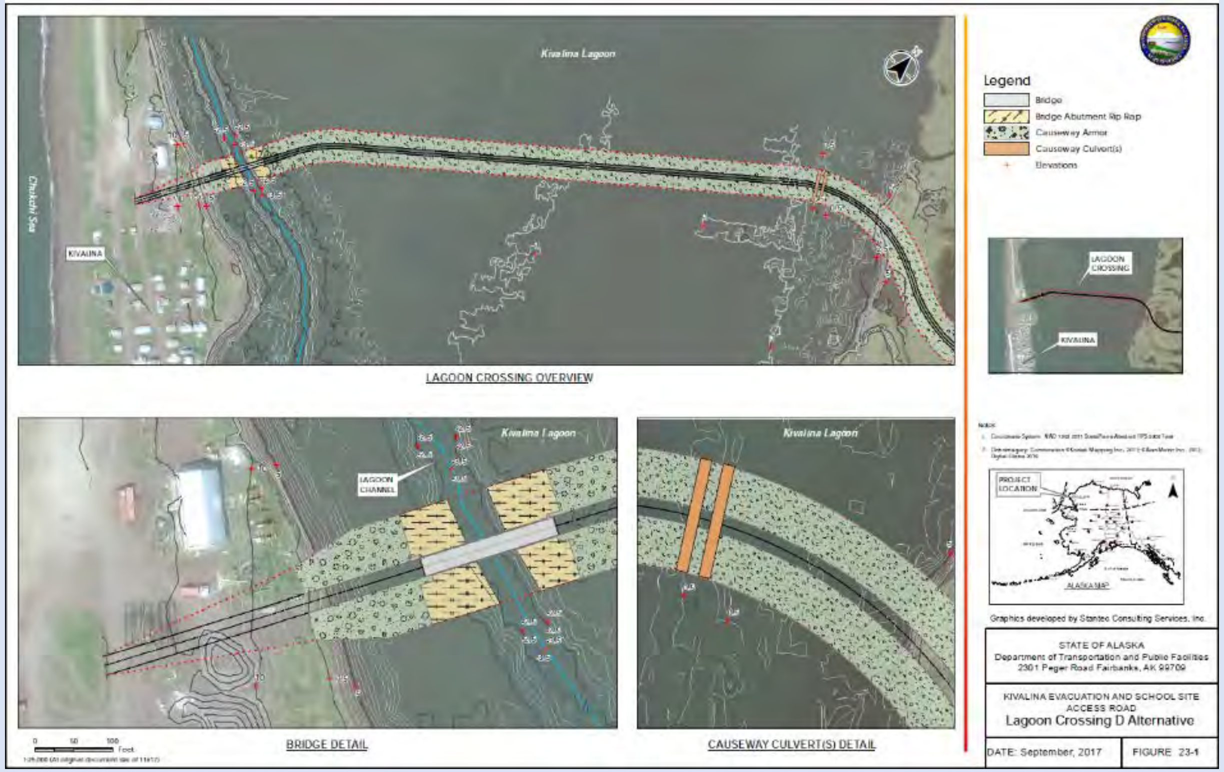
The following required support information will be included with the application submittal:

- **Complete Kivalina Evacuation and School Site Access Road EA and FONSI**
  - **Project Plans and Plan Sets (Typical Drawings; EA Appendix A)**
  - **Section 7/Endangered Species Act Consultations (USFWS, NMFS; EA Appendix G)**
  - **DOT&PF Agency Scoping letters/responses (EA Appendix E)**
  - **DOT&PF Informal Scoping Meeting notes/comments (EA Appendix E)**
  - **Essential Fish Habitat Report (EA Appendix I)**
  - **Section 106 Consultation documentation (EA Appendix F, Scoping Appendix E)**

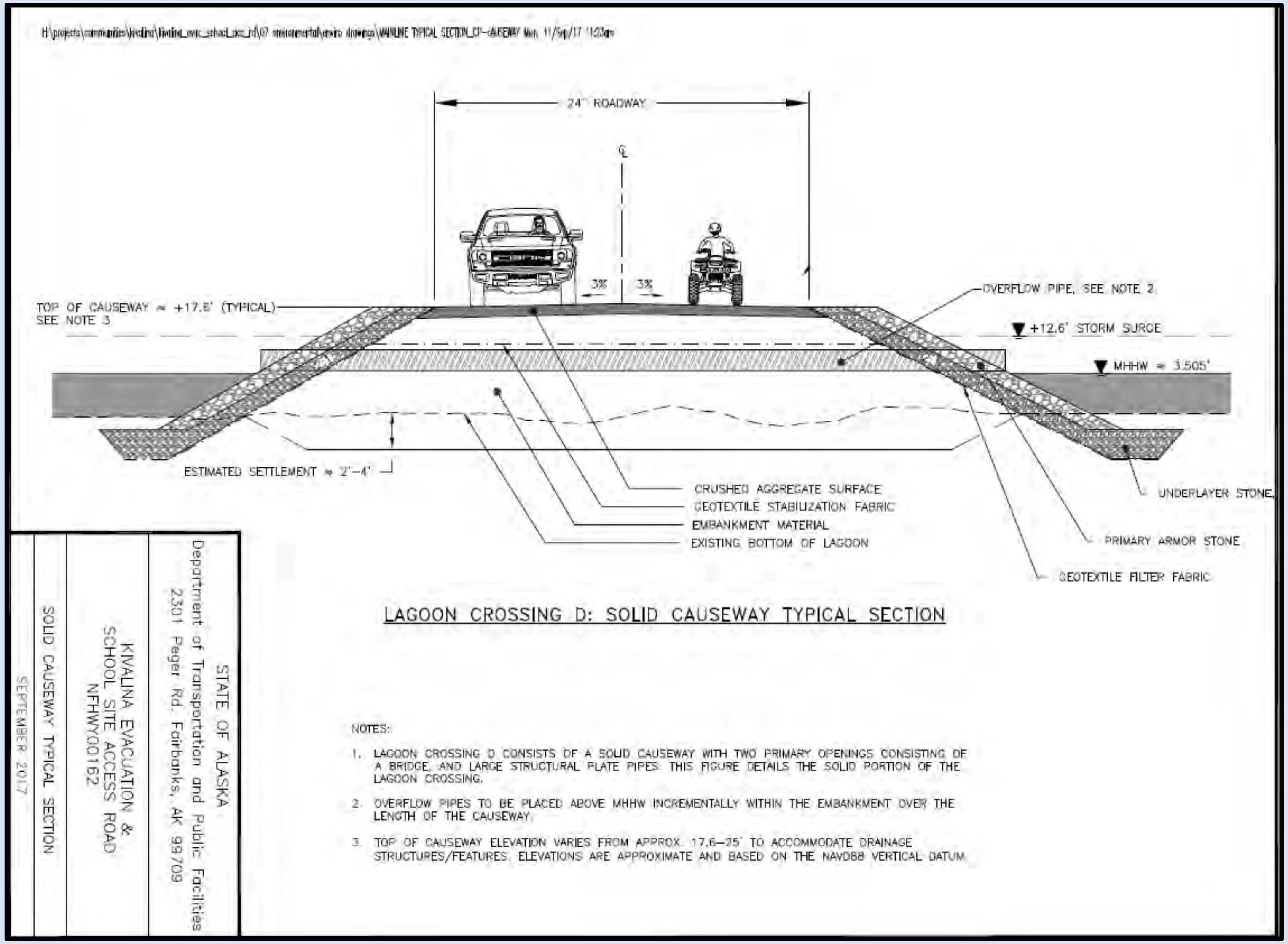
- **U.S. Army Corps of Engineers Section 404/Section 10 Permit Application and Proposed Mitigation Plan.**
- **Section 401 Alaska Department of Environmental Conservation Water Quality Application**
- **Affected Waterway Characteristics Data**

Bridge Approaches

- Bridge Approaches (2) are a combined 3,200 feet long, with both flow passage and overflow culverts in addition to a bridge.
- Placement of approximately 200,000 cubic yards (CY) of fill would impact 8.2 acres of Waters of the United States.
- Kivalina Lagoon is 1-3 feet deep and freezes bottom-fast in winter. Tidally influenced, it is navigable under U.S. Army Corps of Engineers (COE) regulations.
- Constructed Bridge Approaches would include a rock armored embankment with 2:1 side slopes and 24 foot wide roadway.



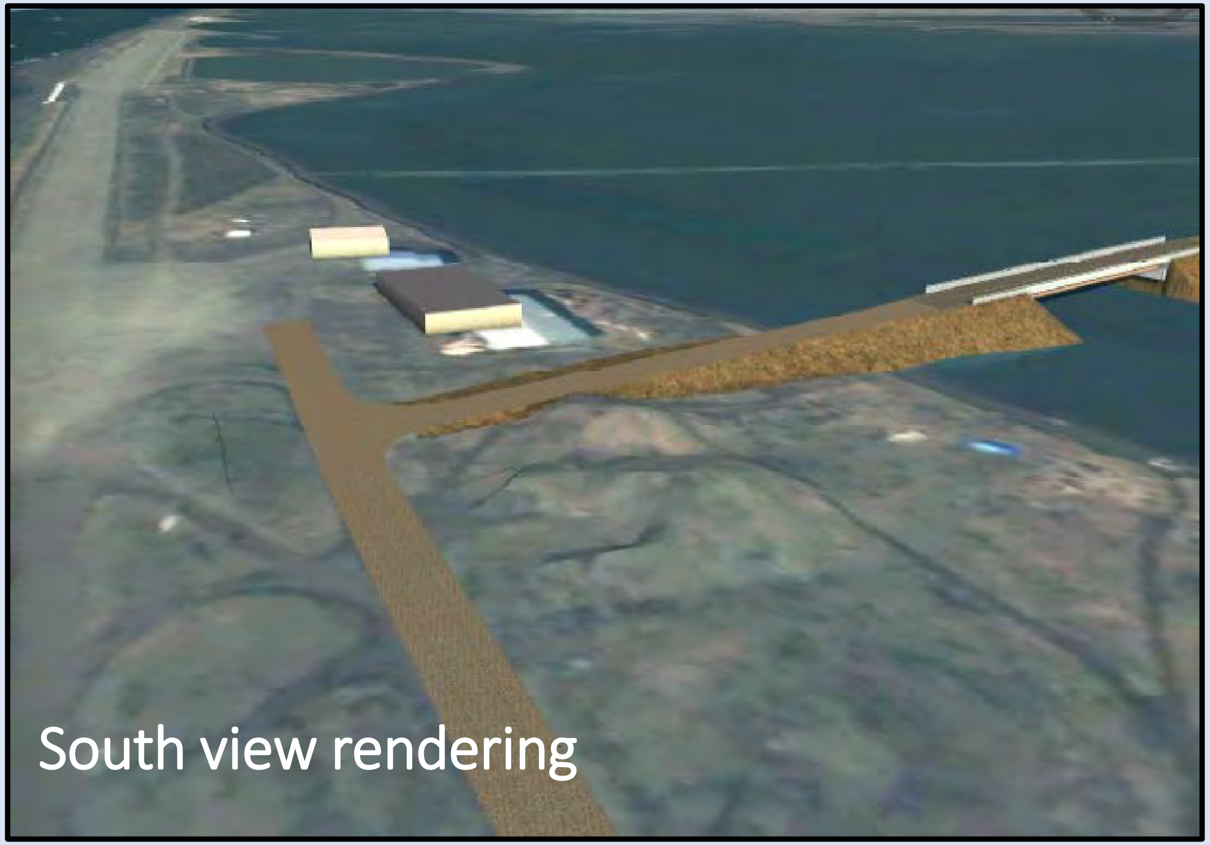
Bridge Approaches (proposed typical)



- 8.2 Acre wetland impact
- 24ft wide driving surface
- 17.5 foot elevation to avoid storm surge
- Overflow pipes
- Culverts at east end for smaller, intermittent lagoon channel
- Lagoon bottom: silts/sands

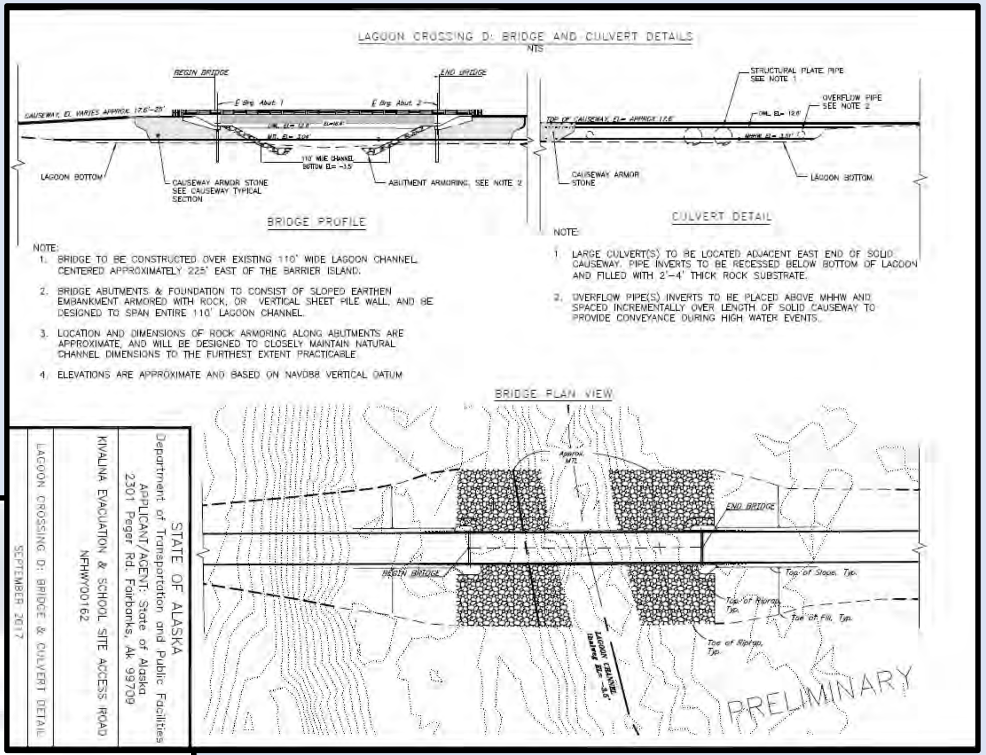
Bridge

- The bridge will be a 180 foot long single span over a 110 foot wide subsurface-lagoon channel averaging 4 feet deep .
- Bridge elevation from water surface will be 12 feet at normal high water to provide clearance for subsistence user boats.
- A total of 8 driven piles, each 3 feet in diameter, will be placed only within the approach footprint/abutments.
- No piles or piers will be placed in lagoon channel beneath the bridge.


South view rendering


North view rendering

Proposed Bridge Design (steel girder)



Evacuation Road

(proposed typical)

- Length of 7.7 miles

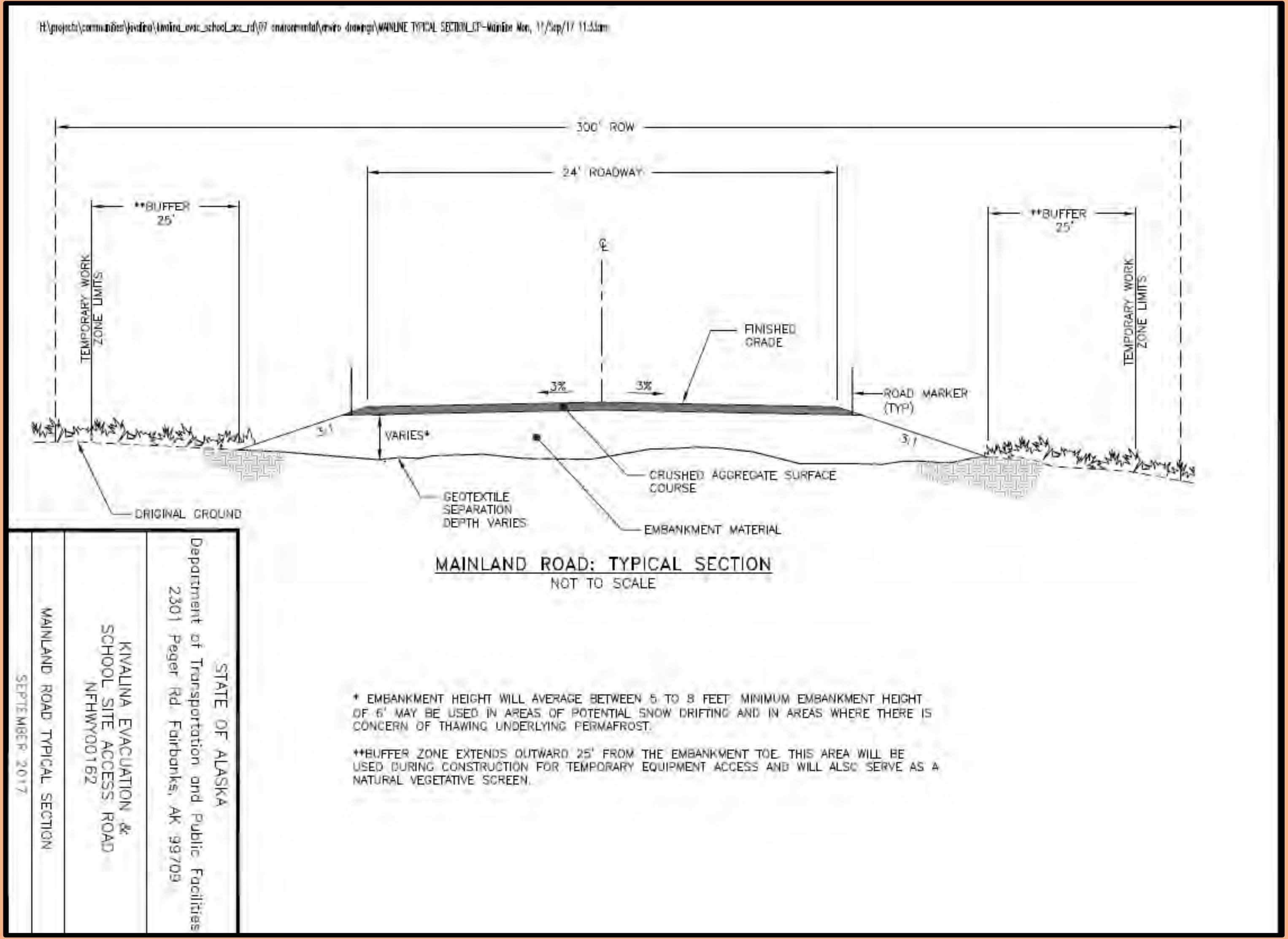
- 2 lane, 24 foot wide surface

- Average embankment height 6 feet

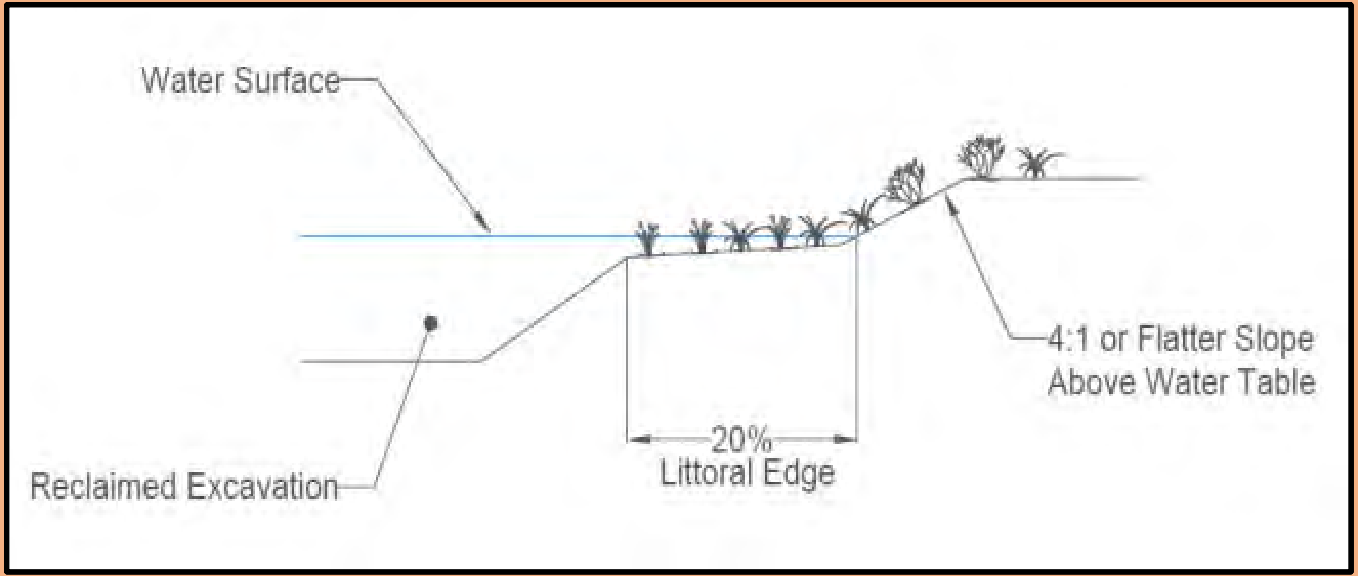
- 3:1 side slopes

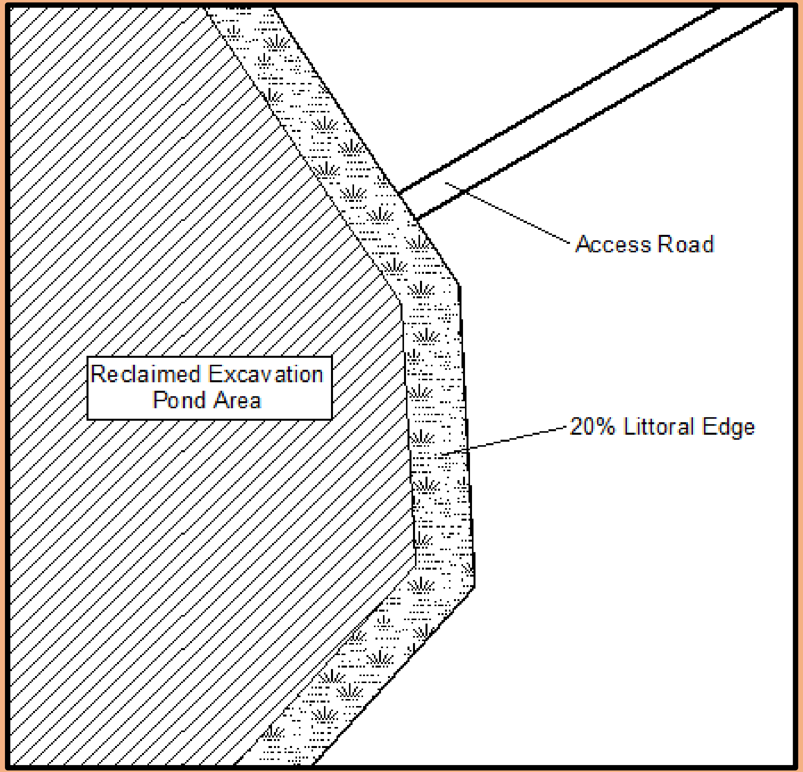
- 2 staging pads:
    - Eastern shoreline of lagoon
    - Terminus at K- Hill

- 66.7 acres of placed fill



Material Sources & Reclamation





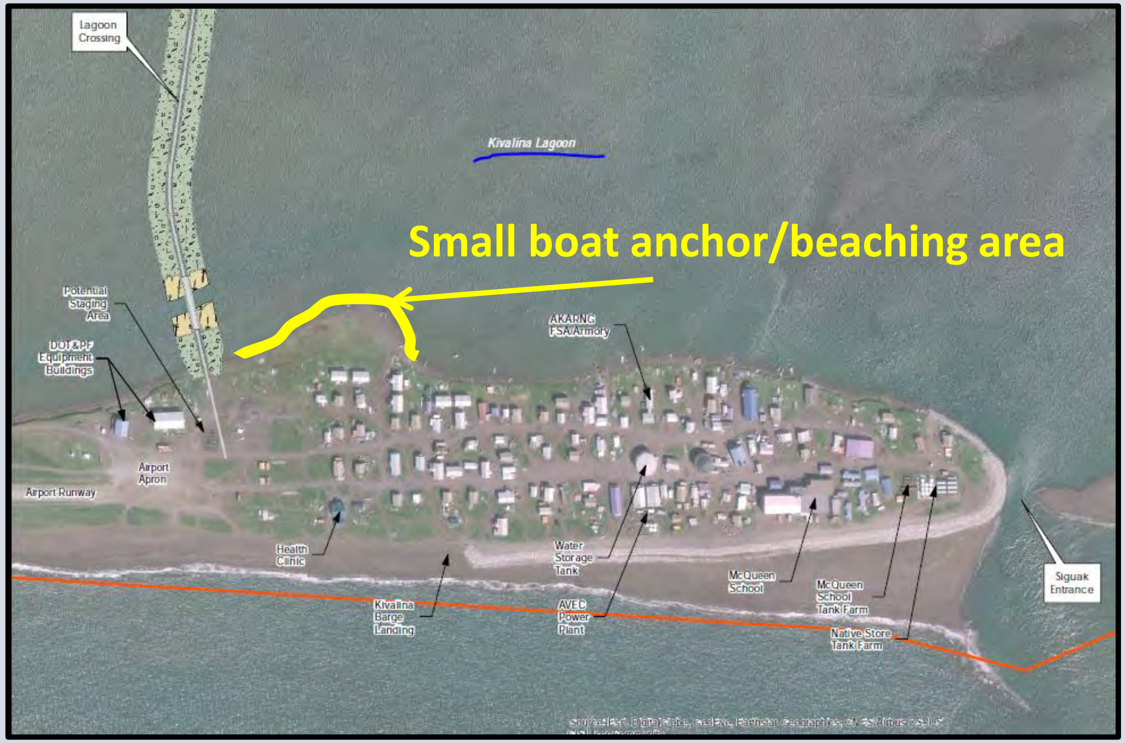
- With the exception of K-Hill Material Source, all other material sites used will be fully reclaimed upon project completion.
- Wulik River and Relic channel sites have water tables within 12 inches below ground surface.
- Proposed material site reclamations would develop ponds with 20 % littoral edges to establish sedge marsh.
- There would be no hydraulic connection made to the Wulik River without agency consultation.

Vessel Use in the Kivalina Lagoon

- Kivalina Lagoon is typically 1-3 feet deep with only a short, 100 foot wide channel parallel to the lagoon shoreline.
- No commercial vessels use the lagoon, and commercial freight barges land at Kivalina island on the Chukchi Sea shoreline.
- Subsistence users operate small boats in the lagoon, Wulik River and Kivalina Rivers.
- As no other village or commercial entity is along the lagoon or rivers, no commercial barges or vessels access these waters.

Boat Access & Temporary Closures During Project

- Residents anchor or beach boats on the lagoon shore near the area of proposed bridge and approaches.
- Boat transit and temporary closures will be coordinated with the City of Kivalina during construction.
- Kivalina Lagoon has two entrances (north and south) across from Kivalina and Wulik Rivers respectively, so Chukchi Sea access will never be completely closed during construction.
- Closures will not be necessary until bridge approach construction nears the lagoon channel. Safety protocols, pilot boats or observers may be used by the Contractor to ensure safe public boat transit.



Critical Path Items

- USCG Bridge Permit application submittal and permit issuance.
- Northwest Arctic Borough Title 9 permit application submittal pending.
- All other federal/state/local regulatory agency permits or approvals are currently in hand.
- CMGC contractor selection is complete and construction is anticipated to commence by August, 2018 with barge mobilization of personnel, equipment, and camps to Kivalina project area.

This template has been developed to be used in conjunction with the Coast Guard Bridge Permit Application Guide (BPAG), COMDTPUB P16591.3(series), to complete the application material required by Section 3 of the BPAG for an application for a Coast Guard bridge permit or permit amendment. It is permissible to copy and paste this template onto letterhead before submitting to the Coast Guard. Please do not delete any language from the template. Double clicking on a box allows you to check/uncheck it.

Salutation (i.e. Dear Sir/Ma'am): Dear Commander Helfinstine:

Application is hereby made for a Coast Guard bridge permit (or permit amendment).

A. ADMINISTRATIVE AND NAVIGATION INFORMATION

1. Application Date: 20 July 2018

   a. Applicant information:

      1) Name: Brett Nelson; Regional Environmental Manager
         Alaska Department of Transportation and Public Facilities

      2) Address: 2301 Peger Road, Fairbanks, AK 99709

      3) Telephone number: 907.451.2238

      4) Email address: brett.nelson@alaska.gov

   b. Consultant/Agent information (if employed):

      1) Name (company or individual):

      2) Address:

      3) Telephone number:

      4) Email address:

      5) Letter authorizing a consultant/agent to obtain permits on behalf of the applicant included: ☐ Yes ☒ No

   c. Name of Proposed Bridge(s): Kivalina Lagoon Bridge

      1) Name of the waterway that the bridge(s) would cross: Kivalina Lagoon

      2) Number of miles above the mouth of the waterway where the bridge(s) would be located and provide latitude and longitude coordinates (degree/minute/second) at centerline of navigation channel (contact the local Coast Guard Bridge Office for guidance): 0.5 Miles/Nav Channel: latitude: 67.43'50.8686", longitude: -164.32'36.891"

      3) City or town, county/parish, and state where the bridge(s) would be located at, near, or between: Kivalina, Northwest Arctic Borough, Alaska

4) Brief description of project to include type of bridge(s) proposed [fixed or movable (drawbridge, bascule, vertical lift, swing span, pontoon), highway, railway, pedestrian, pipeline] and existing bridge(s) at project site, if applicable:

The proposed project is to construct a water crossing over the Kivalina Lagoon, including bridge approaches over the majority of the shallow lagoon and a steel girder bridge over the deeper, 110 ft. wide lagoon channel located approximately 160 ft. east of and parallel to the shore of Kivalina Island. The western bridge approach will begin at the City of Kivalina and extend eastward approximately 500 ft. over the lagoon to the constructed bridge over the lagoon channel. The eastern approach will extend approximately 2590 ft. from the eastern lagoon shore westward to the bridge. From the eastern terminus of the mainland bridge approach, a 6.5-mile road will be constructed heading northeasterly to Kisimigiugtuq Hill (K-Hill) in order to provide an evacuation route for community residents during major storm events.

The proposed bridge is a single span steel girder bridge (Figure 1), with maximum length of 184 feet. The bridge will span the 110-foot lagoon channel. The bridge approaches in the lagoon will be approximately a combined 3,090 feet in total length.

There are no other bridges in the area.

5) Drawbridge Regulations (if applicable): N/A

6) Date of plans and number of plan sheets: See Attachment 1.2; Bridge Plans (2 pg)

7) Estimated cost of bridge(s) and approaches:

a) Provide the estimated cost of the bridge(s) as proposed, with vertical and horizontal navigational clearances: $26M including construction of the two approaches. Vertical clearance is 13' - 6" at Mean High Water (MHW), Horizonal Clearance is 110 feet wide.

b) Provide the estimated cost of a low-level bridge(s) on the same alignment with only sufficient clearance to pass high water while meeting the intended purpose and need: See response to 7(a).

8) Type and source of project funding (federal, state, private, etc.): USDOT Federal Highway Administration (NFHWY00162); State of Alaska (0002384); local match funding through Northwest Arctic Borough, NANA Regional Corporation

9) Proposed project timeline: Construction Winter 2018/2019 to Fall 2022.

10) Other Federal actions (e.g., permits, approvals, funding, etc.) associated with the proposal:

US Army Corps of Engineers (USACE) Section 10/Section 404 Wetland/Waters Permit

USDI Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) Section 7 Consultations (ESA)

USFWS Migratory Bird Act Compliance

NMFS Magnuson -Stevens Fishery Conservation and Management Act Consultation

USDI National Park Service (NPS) Consultation (Section 4(f) resources)

Federal Aviation Administration (FAA) approval for non-aeronautical use of a portion of Kivalina airport property

d. Legal authority for proposed action:

1) Cite appropriate Bridge Act: General Bridge Act of 1946

2) If not the owner of the existing bridge(s) that is being replaced or modified, include a signed statement from the bridge owner authorizing the removal or modification work and cite its location: N/A

3) For privately owned bridges, cite authorization for right to build (e.g. deed or easement from the property owner authorizing the proposed construction or modification work): N/A

e. International bridges (if applicable):

1) Cite the International Bridge Act of 1972, or a copy of the Special Act of Congress if constructed prior to 1972, as the legislative authority for international bridge construction: N/A

2) For permits issued under the International Bridge Act of 1972, cite Presidential approval, via the State Department, included with the application as required: N/A

NOTE: Please include a copy of State Department approval for international bridges in the application package for a Coast Guard bridge permit.

f. Dimensions of the proposed bridge(s):

1) Vertical clearance as indicated on plan sheets: 13 feet 6 inches.

2) Horizontal clearance as indicated on plan sheets: 110 feet

Length of bridge(s) project: The proposed bridge is a single span steel girder bridge, with maximum length of 184 feet. The bridge will span the 110-foot lagoon channel. The bridge approaches in the lagoon will be combined 3,090 feet in total length.

3) If no prior permit exists, and this is a modification or replacement project, is the length the same as the old bridge: N/A

If not, what is the difference:

4) Width of bridge(s) project: Bridge over water: 27 feet, 4-inch-wide. Bridge abutment maximum width (armor rock) on lagoon bottom: 150 feet. Bridge approach width: 120 feet at abutment interfaces tapering to 105 feet for remaining length of approaches.

If no prior permit exists, and this is a modification or replacement project, is the width the same as the old bridge: N/A

If not, what is the difference:

5) Depth of the waterway at project site at MHW if tidal or OHW if non-tidal, using the appropriate elevation and datum (e.g., NGVD 1929, NAVD 1988, etc.): MHW = 3.5 feet (NAVD88)

6) Width of waterway at project site at MHW if tidal or OHW if non-tidal: Lagoon channel is 110 feet; overall width of Kivalina Lagoon is 3,200 feet.

7) Significant effect on flood heights and associated drift, if any, that could cause a navigation hazard: There are no commercial navigational uses in Kivalina Lagoon. MHW will allow for a 13 foot 6 inch clearance from water level for recreational and subsistence harvest boats. It is anticipated no navigation will occur when waters exceed +2MLLW due to rough conditions caused by high-velocity area winds that typically create a concurrent water level surge.

g. Temporary Bridge(s) dimensions (vertical clearance, horizontal clearance, length and width), if applicable: N/A

h. [Include the following language, if applicable] Enclosed are the waterway data requirements as determined by the Coast Guard District Bridge Office. If a navigation impact report was conducted please cite location(s) in the case file, list title and date of document as appropriate: N/A; a navigation impact report has not been conducted for this project.

i. Existing bridge(s) if applicable: N/A

1) Name of bridge(s): N/A

2) Type of bridge(s) and number of lanes (e.g., fixed or moveable (drawbridge, bascule, vertical lift, swing span, pontoon, etc.); highway, railway, pedestrian, pipeline): N/A

3) For movable spans identify the existing drawbridge operating regulation governing the structure (e.g. 33 CFR 117.XXX, if applicable): N/A

When applicable, identify if the local Coast Guard Bridge Office identified that modification of an existing drawbridge requires revision or removal of the existing regulation (e.g. if the bridge project involves replacing the existing drawbridge with a fixed bridge): N/A

<u>NOTE</u>: If the waterway is not already identified in 117 Subpart B, please note if an operating schedule other than open on demand is being considered.

4) Latitude and longitude coordinates (degree/minute/second) at centerline of the bridge(s): N/A

5) Dimensions of the existing bridge(s): N/A

   a) Vertical clearance(s) as indicated on previous plan sheets (include both the open and closed-to-navigation clearances for movable spans). [The proposed and existing vertical clearances must be compared using the same datums. This may require surveying the existing bridge]: N/A

   b) Horizontal clearance as indicated on previous plan sheets: N/A

   c) Length of existing bridge(s): N/A

   d) Width of existing bridge(s): N/A

6) Owner of the existing bridge(s): N/A

j. Discuss construction methodology, if known, and removal of existing bridge(s), as applicable:

1) Discuss proposed construction methodology and restrictions:

See Section 4.3 of the project Environmental Assessment (EA) for construction details.

Construction equipment and supplies will be barged to Kivalina and/or the DeLong Mountain Transportation System (DMTS) port site. Equipment will be moved over winter trails and/or ice roads on Section 10 waters to staging areas near proposed material sites. Construction may require two or more years to complete.

Construction of the lagoon crossing will include in-water placement of fill, bridge support pile driving through the constructed approaches, construction of the bridge, and placement of overflow culverts. Placement of fill is generally done during ice-free conditions, but several construction components associated with the lagoon crossing could be completed in the winter. Grounded ice in shallow depths of the lagoon could be removed allowing placement of the bridge approach base embankment fill and rock protection with no, or minimal, water present, thereby minimizing disturbance or suspension of fine sediments. Pile driving would take place on both sides of the bridge opening, and consist of driving piles at each abutment through the constructed embankments to mitigate potential hydroacoustic impacts to marine mammals and fish. Bridge foundation final design will establish the specific number, size, and depth of required pilings.

For evaluating potential impacts, the following assumptions are made:

Four piles per abutment, for a total of eight piles, would be required to construct the single span bridge;

Piles would typically be 3-4 foot diameter steel pipes, driven to approximately 100 - 150 feet deep. Each abutment would require an estimated 3–5 days to construct;

Pile driving will be conducted from and through constructed earthen embankments;

Pile driving would occur over a period of approximately 30-60 discontinuous days with activity duration guided by resource agency recommendations. The contractor's final proposed methods may potentially alter the frequency and duration of pile driving activity;

As both winter and summer construction activities are anticipated, pile driving windows and activity duration would be established to minimize hydraulic and acoustic impacts to fish, birds, and marine mammals. Bridge construction would likely utilize cranes and other equipment working from the newly placed bridge approach fill.

Best management practices (BMPs) to minimize water quality and habitat impacts would be developed and implemented.

2) Discuss maintenance of land traffic during construction activities:
The project is new construction for an evacuation road having a single intersection with the airport access road in the city of Kivalina. Land traffic on Kivalina Island will be unaffected as a bypass will be constructed for community access to the airport which will remain after project with a ramp to the western bridge approach. During construction of the bridge approach from Kivalina, only construction equipment will be allowed on the approach and a traffic management plan will be implemented to ensure public safety for airport access road users.

3) Discuss extent of removal of existing bridge(s) (e.g. in its entirety, two feet below the mud line, down to or below the natural bottom of the waterway or to a specific elevation), time needed for removal, etc.: No bridges currently exist in the water body.

4) Discuss demolition methodology: N/A

<u>NOTE</u>: In the interest of navigational safety, the Coast Guard must make the final decision concerning the extent of bridge(s) removal.

k. Other agencies with jurisdiction over the proposed project:

1) Agency: USACE for bridge approaches and fill in Waters of U.S (WOUS)

2) Permits or type of approvals required for the project: See Table 20 in the project attached project Environmental Assessment (EA):

US Army Corps of Engineers (USACE) Section 10/Section 404 Wetland/Waters Permit

US Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) Section 7 Consultation (ESA)

USFWS Migratory Bird Treat Act Compliance

NMFS Magnuson -Stevens Fishery Conservation and Management Act Concurrence

Alaska Department of Natural Resources (DNR) submerged lands easement, ROW, State DNR/NANA Material Sales Agreement

Section 106 Cultural Resources Consultation (DNR, Office of History and Archaeology and State Historic Preservation Office

Alaska Department of Environmental Conservation (DEC) Section 401 Certificate of Reasonable Assurance (concurrent with USACE Section 404)

USDI National Park Service (NPS) Consultation (Section 4(f) resources)

Federal Aviation Administration (FAA) approval for non-aeronautical use of a portion of Kivalina Airport property

State of Alaska DEC - APDES Construction General Permit

Northwest Arctic Borough Title 9 Land Use Permit

B. ENVIRONMENTAL INFORMATION:

1. National Environmental Policy Act

Lead Federal Agency: The environmental review, consultation, and other actions required by applicable federal environmental laws for this project are being, or have been, carried out by DOT&PF pursuant to 23 U.S.C. 327 and a Memorandum of Understanding dated November 3, 2017, and executed by FHWA and DOT&PF.

List Cooperating Agencies for project: Federal Highway Administration

a. Type of environmental document.

☐ Environmental Impact Statement/Record of Decision (EIS/ROD)

Cite location(s) in the application package:

☒ Environmental Assessment/Finding of No Significant Impact (EA/FONSI)
(See Attachments 2-4)

Cite location(s) in the application package:

☐ Categorical Exclusion (CE)

Cite location(s) in the application package:

b. Has the environmental document been modified, reevaluated, supplemented or rescinded for the proposed action?

☐ Yes ☒ No

If yes, cite location(s) in the application package:

2. Environmental Effects Abroad

a. Does the proposed project involve a bridge connection to Canada or Mexico?

☐ Yes ☒ No

If yes, cite location(s) in NEPA document where environmental effects abroad are described:

3. Clean Water Act

a. Has a Water Quality Certification (WQC), waiver or statement that the WQC is not required been obtained from the appropriate federal, interstate, or state agency?

☒ Yes ☐ No

If yes, cite location(s) in the application package: An Alaska Department of Environmental Conservation (DEC), Section 401, Certification of Water Quality is required for the USACE CWA 404 permit application. The Certificate of Reasonable Assurance was received from the DEC on April 30, 2018. See Attachment 5.

<u>NOTE</u>: The USCG will not accept an application package as complete if a WQC, waiver, or statement from the appropriate regulatory body has not been obtained.

b. Name of the Federal, State or Tribal certifying agency and point of contact with phone and email address, if available: Alaska Department of Environmental Conservation, Division of Water, Director: Andrew Sayers-Fay, (907) 269-6281, email: andrew.sayers-fay@alaska.gov

c. If the WQC is granted under a Programmatic Agreement (e.g., U.S. Army Corps of Engineers (USACE) Nationwide Permit (NWP) include the date of the NWP, the type of NWP (14, 15, etc.) and the NWP number and title: N/A

d. For permit amendment actions, include a new WQC or a written confirmation from the certifying agency that the existing WQC has been reissued/renewed or is still valid for the proposed action.

☐ New WQC Attached

☐ Written Confirmation of WQC validity attached

4. **<u>Wetlands</u>**

a. Is the proposed project located in or adjacent to a wetland?

☒ Yes ☐ No

b. If yes, what is the acreage of wetlands that will be permanently and temporarily impacted by the proposed project? 66 acres will be permanently filled for roadways and staging pads. Material site excavation in wetlands will include 134.8 acres of which 41.5 acres will be temporarily impacted (2-3 years).

Include USACE permit (nationwide authorization or individual), if required, and cite where wetland mitigation measures are described in the application package: See Attachment 6. Only reclamation measures are required as per ENG Form 1721 Permit and Special Conditions.

5. **<u>Coastal Zone Management Act</u> -** The Coastal Zone Management Act **(**CZMA**)** of 1972 (16 U.S.C. § 1451), as amended, and its implementing regulations (15 CFR Part 930), requires all projects located within the designated coastal zone of a state to be consistent with the State's federally approved CZM plan (CZMP).

a. Is the project located in a state that has an approved Coastal Zone Management Act Plan (CZMP)?

☐ Yes ☒ No

b. If yes, is the project within an area included in the federally approved CZMP?

☐ Yes ☐ No

c. If yes, has the State specifically excluded this activity from its federally approved CZMP?

☐ Yes ☐ No

Include State CZM concurrence/with consistency certification and cite location(s) in the application package: N/A

6. **Floodplains**

a. Is the proposed project located in the base floodplain? An encroachment into the base floodplain does not exist when only the piers, pilings, or pile bents are located in the floodplain.

☒ Yes ☐ No

b. Is there a significant encroachment (constituting a considerable probability of loss of human life; likely future damage associated with the encroachment that could be substantial in cost or extent; or a notable adverse impact on natural and beneficial floodplain values) into the floodplain?

☐ Yes ☒ No

c. If yes, provide documentation and cite location(s) in the application package:

7. **Wild and Scenic Rivers**

a. Is the river involved in the proposed bridge project a designated Wild and Scenic River?

☐ Yes ☒ No

b. If yes, attach correspondence with the river-administering agency and cite location(s) in the application package:

8. **Coastal Barrier Resources Act**

a. Does the proposed project connect to a unit of the Coastal Barrier Resources System?

☐ Yes ☒ No

b. If yes, and the project is federally funded, cite location of Section 6 exception in the application package and any correspondence with the FWS:

9. **Land and Water Conservation Fund Act**

a. Does the proposed project involve a conversion of land or facilities funded under Section 6(f) of the Land and Water Conservation Fund Act?

☐ Yes ☒ No

b. If yes, include correspondence with the NPS and authorization from the Secretary of the Interior for that conversion and cite location(s) in the application package:

10. **National Marine Sanctuaries Act**

a. Is the proposed project in or adjacent to a National Marine Sanctuary?

☐ Yes ☒ No

b. Is the proposed bridge(s) likely to destroy, cause loss of, or injure a resource of a National Marine Sanctuary? (If no, provide evidence)

☐ Yes ☒ No

c. If yes, include evidence of consultation with Office of National Marine Sanctuaries and the agency's findings/conditions and cite location(s) in the application package:

11. **Marine Protected Areas**

a. Is the proposed project in or adjacent to a Marine Protected Area (MPA) as defined in section 4(d) of Executive Order 13158?

☐ Yes ☒ No

b. If yes, will the proposed project affect the natural or cultural resources that are protected by the MPA? (If no, provide evidence)

☐ Yes ☐ No

c. If yes, include evidence of correspondence with MPA Center, if applicable, and cite location(s) in the application package:

12. **Endangered Species Act**

a. Are there federally designated threatened or endangered species and/or critical habitat in the area that the proposed project is located? (If no, provide evidence)

☒ Yes ☐ No

b. May the proposed project affect federally designated threatened or endangered species and/or critical habitat? (If no, provide evidence)

☒ Yes ☐ No

c. If yes, was there formal or informal consultation with the United States Fish and Wildlife Service (USFWS) or the National Marine Fisheries Service (NMFS)?

☐ Formal consultation

☒ Informal consultation, See Attachment 4; EA Appendix G, NMFS Section 7 & Marine Mammal Protection Act (MMPA) Concurrence 01/09/2018

USFWS Section 7 ESA Concurrence 12/21/2017

d. If formal, provide date(s) and attach biological assessment, biological opinion, and any other relevant correspondence and cite location(s) in application package:

e. If informal, provide dates and include correspondence or documented phone conversations with and from USFWS/NMFS and cite location(s) in the application package: Refer to Table 22 and Appendix G of the project EA

f. Include Biological Assessment/Biological Evaluation, as appropriate. N/A

13. **Fish and Wildlife Coordination Act**

a. Include any correspondence with USFWS and the relevant state wildlife agency regarding Fish and Wildlife Coordination Act coordination and cite location(s) in the application package: N/A

14. **Magnuson-Stevens Fishery Conservation and Management Act**

a. Will the proposed project likely adversely affect designated Essential Fish Habitats (EFH) as defined in the Magnuson-Stevens Act? (If no, provide evidence)

☐ Yes ☒ No

b. Identify location of EFH assessment and relevant correspondence with NMFS in the application package: See Attachment 4; EA Appendix I. NMFS correspondence is noted in Table 22, and also Appendix G.

15. **Marine Mammal Protection Act**

a. Does the proposed project involve a "take" of marine mammals as defined in the Marine Mammal Protection Act?

☐ Yes ☒ No

b. If yes, include the incidental harassment authorization or letter of authorization from NMFS and any relevant correspondence and cite location(s) in the application package:

16. **Migratory Bird Treaty Act**

a. Does the proposed project involve a potential take of migratory birds as defined in the Migratory Bird Treaty Act? (If no, provide evidence) No. Initial project construction that includes habitat disturbance will occur outside of the USFWS designated migratory bird nesting window for the region. This includes material site development and placement of first lift of fill in the roadway/pad footprint.

☐ Yes ☒ No

b. If yes, is a permit required?

☐ Yes ☐ No

c. If a permit is required, include it and any correspondence with USFWS and cite location(s) in the application package: N/A

17. **Bald and Golden Eagle Protection Act**

a. May the proposed project take or disturb bald or golden eagles (including nests) as defined in the Bald and Golden Eagle Protection Act? (If no, provide evidence)

☐ Yes ☒ No

b. If yes, is a permit required?

☐ Yes ☐ No

c. If a permit is required, include it and any correspondence with USFWS and cite location(s) in the application package.

18. **Invasive Species**

a. Does the proposed project have potential to introduce or foster the spread of invasive species?

☒ Yes ☐ No

b. If yes, cite the document that describes measures that will be taken to minimize this risk and location(s) in the application package: See Attachment 2; project EA, pg. 19. Seeding of disturbed areas will be conducted with an Alaska DNR Division of Agriculture recommended, regionally appropriate seed mix that minimizes introduction of invasive plant species. All geotechnical materials used for the project will originate from previously undisturbed, local areas within the extent of the project area.

19. **Section 106**

a. Does the proposed project have potential to impact properties (including submerged abandoned shipwrecks) listed in or eligible for inclusion in the National Register of Historic Places?

☐ Yes ☒ No

b. If yes, provide evidence of consultation with the State Historic Preservation Officer (and the Advisory Council on Historic Preservation, if applicable) and cite location (s) in the application package. Include: See Attachment 3; EA Appendix F.

☒ Copies of the correspondence

☐ Memorandum of Agreement

☒ No effect determination

c. For projects involving Federal lands only provide:

☐ Archeological clearances

☐ Archeological reports

20. **Clean Air Act**

a. Does the proposed project occur in an area of nonattainment or maintenance for any criteria pollutant?

☐ Yes ☒ No

b. If project occurs in a nonattainment or maintenance area, do the transportation or general conformity regulations, or both, apply? N/A

☐ General ☐ Transportation

c. Is the project exempt from a transportation conformity analysis for any of the reasons listed in 40 CFR § 93.126? Which reason?

☐ Yes ☒ No Reason:

d. Is the project exempt from a general conformity analysis for any of the reasons listed in 40 CFR § 93.153(c)?

☐ Yes ☒ No

e. If general conformity applies, is the project listed in a conforming State Implementation Plan (SIP)?

☐ Yes ☐ No N/A

f. If a general conformity determination was prepared, include the draft and final determinations and any relevant correspondence and cite their location(s) in the application package: N/A

g. If transportation conformity applies, is the project listed in a conforming SIP, Transportation Improvement Program (TIP), Regional Transportation Plan (RTP), or Federal Implementation Plan (FIP)?

☐ Yes ☐ No N/A

h. If yes, cite location of information regarding listing in the application package:

i. If transportation conformity applies, does the project contribute to any new localized CO, PM_{10}, or $PM_{2.5}$ violations or increase the frequency or severity or any existing violations of the same?

☐ Yes ☐ No N/A

j. If yes, cite location of information in the application package:

21. **Actions to Address Environmental Justice in Minority or Low-Income Populations**

a. Does the proposed project involve disproportionate adverse impacts to minority and/or low-income populations as defined in Executive Order 12898?

☐ Yes ☒ No

b. If yes, include the analysis describing the impacts and cite location(s) in the application package:

c. If yes, cite the location in the application package that describes measures to be taken to reduce those impacts:

22. **Hazardous Materials, Substances or Wastes**

a. Does the proposed project involve or is it located near a Superfund site or any site regulated under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), Resource Conservation and Recovery Act (RCRA) or State law regulating hazardous materials, substances or wastes?

☐ Yes ☒ No

b. If yes, cite the location(s) in the NEPA document where hazardous materials, substances or wastes are discussed:

See Enclosure [Attachment 1.2] for plan sheets.

See Enclosure [Attachment 1.1] for Waterway Data Requirements

Kivalina Lagoon Bridge Permit Application

Project Number: 0002384/NFHWY00162
July 20, 2018

The environmental review, consultation, and other actions required by applicable federal environmental laws for this project are being, or have been, carried out by DOT&PF pursuant to 23 U.S.C. 327 and a Memorandum of Understanding dated November 3, 2017, and executed by FHWA and DOT&PF.

Attachment 1.1. Kivalina Lagoon Bridge Waterway Data

WATERWAY DATA REQUIREMENTS (as required by the Coast Guard, include the below information as an attachment to the application letter per Appendix A of the BPAG)

A. Means of Data Collection: a) Site visits and discussions with local subsistence boat operators; b) Public notice in association with development of project EA; e) Waterways Study as provided in Section C of this Attachment; h) public meetings held in association with development of project EA; i) interagency meetings on potential impacts of bridge constructino and operation in association with development of project EA; k) consultation with local planning interests; l) consultation with USACE Engineering criteria for determination of clearance requirements.

B. Present governing bridge(s) or aerial structure(s) on the waterway: N/A

1. Identify all bridges upstream and downstream of the proposed bridge site and their existing horizontal and vertical clearances to determine the existing minimum horizontal and vertical clearances (including overhead transmission line clearances). Provide in table format. There are no existing bridges, powerlines, or other facilities over/under/through Kivalina Lagoon nor in the area over the waterway.

   (If all bridges downstream have the same minimum clearance, state instead of the above requested information.)

2. Does the proposed bridge(s) match (or is greater than) the navigational clearance of existing structures on the waterway? No other existing structures in within or over the waterway.

3. What is the most restrictive horizontal clearance on the waterway? (This may be a fixed bridge downstream/upstream of the proposed structure, a low hanging power line downstream/upstream of the bridge(s), or it may be some other structure that limits horizontal clearance. Sometimes the existing to-be-replaced bridge(s) is the most restrictive structure.) The new bridge will constitute the most restrictive, and only, horizontal restriction in Kivalina Lagoon. The new bridge will provide a 110-foot horizontal clearance to the existing, submerged longshore channel within the lagoon.
   a. Milepoint: N/A
   b. Horizontal clearance: 110-foot lagoon channel; bridge will allow 110-foot horizonal passage at MHW.

4. What is the most restrictive vertical clearance on the waterway? (This may be a fixed bridge downstream/upstream of the proposed structure, a low hanging power line downstream/upstream of the bridge(s), or it may be some other structure which limits vertical clearance. Sometimes the existing to-be-replaced bridge(s) is the most restrictive structure.) The new bridge will constitute the most restrictive, and only, vertical restriction in the lagoon. Vertical clearance from MHW to low steel is 13' - 6"

5. a. Milepoint: N/A
   b. Vertical clearance: MHW to low steel will allow for 13.5 feet clearance

6. Will the proposed bridge(s) become the most restrictive/obstructive structure across the waterway? Yes, as it will be the only bridge in the area and on this waterway.

C. Waterway characteristics: (All domestic bridge navigational clearances should be stated in linear feet in decimal form vs. feet and inches. All international bridge navigational clearances should be stated in linear unit of measure as well as the metric equivalent.)

1. Various waterway stages: (Datum that is used). NAVD88 Vertical Datum
2. Natural flow of the waterway including currents, waterway velocity, water direction, and velocity fluctuations (seasonal, daily, hourly, etc.), that might affect navigation.

Kivalina Lagoon (excerpted from Attachments 1-3 (project EA and Appendices):

Seasons: Ice-free periods historically have been from early July through late October. Tides range from 3.5 feet mean high water (MHW) to 2.605 mean low water (MLLW).

Kivalina Lagoon is a shallow body of marine, tidally influenced water approximately 10 miles long that ranges in width from 3,000 feet near the mouth of the Wulik River to 8,000 feet north of the Kivalina River. The lagoon is fed by the Kivalina River in the northern half, the Wulik River at the southern end, and by tidal flows from the Chukchi Sea through two inlets that define the Kivalina barrier island: Singuak Inlet on the southeastern side of the community of Kivalina, and Kivalik Inlet, approximately 5.5 miles to the northwest. The lagoon's northeast shoreline is dominated by the deltas of the Kivalina and Wulik Rivers. The majority of the lagoon is between 1 and 3 feet deep. Deeper areas have been recorded in the channels extending from the mouths of the rivers towards the Chukchi Sea as well as along the barrier island on which the community is located (See Attachment 7; USACE 2016).

The Kivalik and Singuak Inlets correspond with the rivers' outlets and allow for the conveyance of the lagoon's tidal and river hydraulic loading, though sediment transport along the Chukchi Sea shoreline of the Kivalina barrier island can occasionally block them. These blockages result in elevation of the lagoon water level until it breaches the blocked inlet and reestablishes a new channel as the flow head cuts through the sand deposits. These inlets are the most dynamic part of the littoral system and are constantly shifting in response to river flow, longshore wave-driven transport of sediments along the outer beach, and the equilibrium cross section that responds to the flood and ebb of tidal surges. Normally the inlets are in balance with the river flow and would have a similar hydraulic radius (See Attachment 3; EA Appendix B).

Historical aerial imagery is an indicator of Singuak Inlet and lagoon channel stability (See Attachment 2, EA Appendix C). Other than river currents assumed to pass directly from river deltas to the Chukchi Sea through river channels in lagoon sediment, there is typically little to no flow inside the lagoon except during large surge events (See Attachment 7; USACE 2016 & Attachment 3; EA Appendix B). Waves from the Chukchi Sea are primarily blocked by the barrier island, or its energy is dissipated by sand bars of material deposited by the rivers and through interaction with the current of the rivers (See Attachment 7; USACE 2016). It is therefore assumed that waves in Kivalina Lagoon are mostly generated by local winds. Local knowledge provided by Kivalina residents support that assumption, with many lagoon travelers indicating that north winds can raise substantial waves and elevate the lagoon water level by several feet in a short period of time (See Attachment 3; EA Appendix D). Analyses of wind speed data from Kivalina Airport resulted in an estimated maximum wind-driven wave height, during a storm surge, inside the lagoon of 3 to 4.5 feet (See Attachment 7; USACE 2016).

3. Width of the waterway at bridge site: 110 feet in lagoon channel.

4. Depth of the waterway and elevation fluctuations at bridge site: [List the depth at each waterway bridge stage (ex. Range of tides, average high water elevation, etc.)].

MLLW is 2.605 feet. MTL is 3.04 feet. MHW is 3.5 feet. Design High water (100 yr) is 12.6 feet.

Seasons: Annual ice-free periods historically have been from early July through late October. Tides range from MLLW (2.605') to MHW (3.5').

5. Waterway layout and geometry: (For example, is there a dam or lock; does the elevation of the approach impact the required bridge(s) clearance?) Kivalina Lagoon is primarily a flat-water, marine influenced lagoon.

6. Channel and waterway alignment: Location of the channel(s) The sole lagoon channel is 110 ft wide and lies parallel to the barrier island; it is located 160 feet to the northeast of the island.

7. Other limiting factors: (For example, bends in the waterway within one-half mile of project site, hindrances to free navigation, fog, hydraulics, etc.) The lagoon is open (ice-free) seasonally, from early July through late October. It is too shallow for commercial barge traffic or large vessels.

D. <u>Do vessels that engage in emergency operations (i.e., law enforcement, fire, rescue, emergency dam repair, etc.), national defense activities (i.e. cruisers, fuel barges, munitions ships, etc.) or channel maintenance (i.e., dredges, dam and levee repair, etc.) operate on the waterway? If yes, describe the vessels and provide the following information:</u> No, only small recreational boats use the Kivalina Lagoon; it is too shallow for any larger vessels.

1. Does levee maintenance, bridge work (other bridges), channel maintenance and emergency operations upstream of bridge require certain vessels to transit the waterway? N/A

2. Does the proposed bridge(s) impact USCG and/or other government vessels' ability to transit the bridge(s) to conduct mission essential functions (icebreakers, patrols, etc.)? N/A

3. Vessels using the waterway during the proposed bridge(s) lifespan (should include): N/A

   a. Vessel name;

   b. Registration/documentation numbers;

   c. Vessel type;

   d. Vessel owner contact information (company/individual name, address, contact info.);

   e. Primary vessel mooring location (include waterway milepoint, if known);

   f. Vessel overall length;

g. Vessel beam;

h. Vessel draft (depth of hull below waterline at full load);

i. Vessel air draft (height of the highest fixed point of the vessel above the waterline, when empty);

j. Specialized vessels that use the waterway (e.g. vessels which have limited maneuverability due to inherent design or mode of operation);

k. Safety margin required by vessel to navigate through the bridge(s);

l. Vessel transit frequencies under proposed bridge(s), transit speeds, and load configurations; and

m. Vessel traffic characteristics (to include if tug assist is required for transit through the bridge(s) due to limited horizontal clearance).

4. Will the proposed bridge(s) provide the horizontal and vertical clearances for the safe, efficient passage of the largest of these vessels? Why? N/A

5. If no, estimate the number of vessels in each of the above categories unable to pass through the proposed bridge(s). Give the name, length overall (LOA), beam, draft and height of highest fixed point above the waterline for vessels affected by the bridge(s). N/A

6. Can these vessels be modified (i.e., folding mast, relocation or equipment, etc.) without decreasing their respective response times? If so, name the vessels. N/A

7. If modifications are feasible, state the name of the vessel(s), their trip frequency, the necessary modifications, the cost of the modification(s) and who will pay for them (i.e., vessel owner, applicant, other). N/A

8. Provide any additional information concerning the potentially impacted or burdened users of the waterway as well as the future use of the waterway. N/A

E. Has the United States Corps of Engineers (USACE) completed or does it plan to complete a federal navigation project on the waterway? If yes, provide the following information: No, USACE has no plans for navigational facilities on the Kivalina Lagoon.

1. Project name, downstream/upstream milepoints, depth, type of project, scope, status of project and other limiting factors. N/A

2. Whether there is/was a "design vessel" used in planning the channel? What is/was the design vessel? Was the design vessel reviewed by the Coast Guard? N/A

3. The following specifications of the vessel for which the navigation project is or will be designed: LOA, beam, draft and height of highest fixed point above the waterline. N/A

4. Will the proposed bridge(s) provide the horizontal and vertical clearances necessary for the safe, efficient passage of the vessel for which the navigation project was designed? N/A

5. If so, can the vessel be modified to clear the proposed bridge(s) without substantially increasing operating costs? N/A

6. If modifications are feasible, state the necessary modifications, costs of any modification(s), and who will pay for the modifications. N/A

7. Are there projected changes in waterway usage based upon anticipated waterway improvement projects? N/A

8. Does the proposed bridge(s) impact USACE ability to transit the bridge(s) in a Federal project channel? N/A

F. Describe the present and prospective recreational navigation: Will the proposed bridge(s) affect the safe, efficient movement of any segment of the present or prospective recreational fleet operation on the waterway? If yes, provide the following information: No, the bridge will not impact recreational navigation. The bridge is located close to Kivalina, near a location where most residents beach or moor their small boats. There are no current and/or prospective recreationally operated tour boats or marinas.

1. Vessels utilizing the waterway during the proposed bridge(s) lifespan. (Information in this bullet should include:) N/A

   a. Vessel name;

   b. Registration/documentation numbers;

   c. Vessel type;

   d. Vessel owner contact information (company/individual name, address, contact info.);

   e. Primary vessel mooring location (include waterway milepoint, if known);

   f. Vessel overall length;

   g. Vessel beam;

   h. Vessel draft (depth of hull below waterline at full load);

   i. Vessel air draft (height of the highest fixed point of the vessel above the waterline, when empty);

   j. Specialized vessels that use the waterway (e.g., vessels which have limited maneuverability due to inherent design or mode of operation);

   k. Safety margin required by vessel to navigate through the bridge(s);

   l. Vessel transit frequencies under proposed bridge(s), transit speeds, and load configurations; and

m. Vessel traffic characteristics (to include if tug assist is required for transit through the bridge(s) due to limited horizontal clearance).

2. What is the estimated percentage of the recreational fleet, which may be affected by the proposed bridge(s)? N/A

3. Will the proposed bridge(s) eliminate the access of these vessels to existing or planned commercial, water-oriented facilities (i.e., restaurants, shops, recreational areas, marinas, etc.) in the vicinity of the proposed bridge(s)? If yes, describe these facilities. N/A

4. Is it feasible to modify the affected segments of the fleet to clear the proposed bridge(s) without substantially increasing operating costs? If yes, name the vessel(s), state the necessary modifications, cost of modifying each vessel and person or entity responsible for financing the modifications. N/A

5. Provide any additional information concerning the potentially impacted or burdened users of the waterway as well as the future use of the waterway. N/A

NOTE: Check with local USACE District Office, Chamber of Commerce or other organizations for proposed marinas, recreational areas, shops, etc.

G. **Describe the present and waterway and prospective commercial navigation and the cargoes moved on the waterway:** Will the proposed bridge(s) affect the safe, efficient movement of any segment of the present or prospective commercial fleet operating on the waterway? If yes, provide the following information:
No, there is no existing or planned commercial vessel traffic on the Kivalina Lagoon.

1. Vessel name;

2. Registration/documentation numbers;

3. Vessel type;

4. Vessel owner contact information (company/individual name, address, contact info.);

5. Primary vessel mooring location (include waterway milepoint, if known); vessel overall length;

6. Vessel beam;

7. Vessel draft (depth of hull below waterline at full load);

8. Vessel air draft (height of the highest fixed point of the vessel above the waterline, when empty);

9. Specialized vessels that use the waterway (e.g. vessels which have limited maneuverability due to inherent design or mode of operation);

10. Safety margin required by vessel to navigate through the bridge(s);

11. Vessel transit frequencies under proposed bridge(s), transit speeds, and load

configurations; and

12. Vessel traffic characteristics (to include if tug assist is required for transit through the bridge(s) due to limited horizontal clearance).

13. Does the proposed bridge(s) impact existing and future cruise ship ports-of-call/terminals?

14. Does the proposed bridge(s) impact ports supporting post-Panamax vessels?

15. Does the proposed bridge(s) impact vessels that produce unique products for the region?

16. Does the proposed bridge(s) impact vessels that require helper boats/tugs? (Note the combined clearance requirement of the vessel and the helper boat/tug.)

17. Document annual cargo movements (cargo types and quantities);

18. State the estimated percentage of the commercial fleet, which may be affected by the proposed bridge(s).

19. Will the proposed bridge(s) clearance impact present and/or prospective upstream commercial activity, e.g., jobs and economic growth and development?

20. If yes, address any existing or planned commercial/industrial developments negatively affected by the proposed clearances and discuss the economic impacts the proposed clearances will have on these businesses:

21. Document the foreseeable needs to future navigation;

22. Provide existing and historical navigational use and waterway conditions;

23. Provide input from waterway dependant facilities concerning future use;

24. Describe land use zoning along the waterway (particularly within the riparian zone);

25. Describe future vessel size and traffic trends;

26. Include input from states based on state development plans;

27. Include input from facilities based on business plans;

28. Document local commercial shipping and other businesses affected by this restriction.

Note: the next opportunity to adjust clearances for navigation is usually between 50-100 years unless interim waterway improvement projects include the cost of bridge alterations.

29. Is it feasible to modify the restricted vessels to clear the proposed bridge(s) without substantially increasing operating costs? If yes, name the vessel(s), state the necessary modifications, cost of modifying each vessel and company or entity responsible

30. Provide any additional information concerning the potentially impacted or burdened users

of the waterway as well as the future use of the waterway.

H. Identify the name and contact information for marine facilities located within a 3-mile radius of the proposed project (public boat ramps, marinas or major docking facilities, boat repair facilities, etc.:

Recreational Boat Launch: There are no designated boat ramps or launches in Kivalina. The shoreline is gradual; boats are launched where conditions variously allow between town and the airport, and docked/beached on-shore or anchored in the lagoon. All recreation (subsistence) boats are anchored/beached on the lagoon side of the barrier island near the proposed bridge. The bridge will have no permanent impact on the boat launching/beaching/anchoring; however, during construction temporary restrictions will be developed in coordination with community members to maintain public safety.

Barge Landing: Commercial freight barges destined for Kivalina land on the Chukchi Sea shoreline-side of Kivalina Island. While the community barge landing is not a constructed feature; there is a dedicated location used for landing barges on the gradual beach of the island's seaward shore.

I. Will the proposed bridge(s) block access of any vessel presently using local service facilities (i.e., repair shops, parts distributors, fuel stations)? If yes, provide the following information: No, all recreational and subsistence users' vessels currently using Kivalina Lagoon will be able to continue doing so and accessing the traditional beaching/mooring/take out areas near the City of Kivalina.

1. Describe the facilities impacted and estimate the number of vessels currently using these facilities. N/A

    a. Vessel information should include the following for each blocked vessel:

        1) Vessel name;

        2) Registration/ documentation numbers;

        3) Vessel type;

        4) Vessel owner contact information (company/individual name, address, contact info);

        5) Primary vessel mooring location (include waterway milepoint, if known); vessel overall length;

        6) Vessel beam;

        7) Vessel draft (depth of hull below waterline at full load); and

        8) Vessel air draft (height of the highest fixed point of the vessel above the waterline, when empty);

2. Could any of these facilities be considered critical infrastructure, key resources, or

important/unique U.S. industrial capability (i.e., are these facilities unique or one of only a few of the type in the area?) Address whether the proposed clearances negatively affect those facilities and their customers. N/A

3. What economic impact will loss of access have on these facilities? Include estimated dollar amount to support Commandant and DHS goals. N/A

4. What is the distance to alternate service facilities capable of servicing the affected vessels? Describe the facilities. N/A

5. Will use of these alternate facilities substantially increase vessel operation affected vessels? Describe the facilities. N/A

6. Is it feasible to modify the affected vessels to clear the proposed bridge(s)? N/A

7. If yes, state the name, necessary modifications, cost of modifying each vessel and who will pay for the modifications. N/A

J. Are alternate routes bypassing the proposed bridge(s) available for use by vessels unable to pass the proposed bridge(s)? If yes, provide the following information:

All vessels currently using Kivalina Lagoon will continue to be able to do so. The bridge would not hinder current levels of navigational capability by subsistence and recreational boat operators.

There are two entrances to the lagoon from the Chukchi Sea, so an alternative access will remain available if larger vessels with exceptionally shallow draft are ever required to access the shallow-depth lagoon.

1. State the number of vessels that will be forced to use alternate routes. N/A

2. For each vessel identified in section H1.a. above, include the following information: N/A

    a. Vessel name;

    b. Registration/documentation numbers;

    c. Vessel type;

    d. Vessel owner contact information (company/individual name, address, contact info.);

    e. Primary vessel mooring location (include waterway milepoint, if known);

    f. Vessel overall length;

    g. Vessel beam;

    h. Vessel draft (depth of hull below waterline at full load);

    i. Vessel air draft (height of the highest fixed point of the vessel above the waterline, when empty); and

   j. Specialized vessels that use the waterway (e.g., vessels which have limited maneuverability due to inherent design or mode of operation);

3. Identify any alternate routes and provide the respective distances between the proposed bridge(s) and these routes. N/A

4. Will use of these routes substantially increase the transit time and/or operating costs of the affected vessels? This relates to the mobility goals of the Commandant and DHS. N/A

5. If yes, describe the impacts of increased transit time and/or operating costs. N/A

6. Is it feasible to modify these vessels to clear the proposed bridge(s)? N/A

7. If yes, state the name, necessary modifications, cost of modifying each vessel and who will pay for these modifications. N/A

K. Will the bridge(s) prohibit the entry of any vessels to the local harbor of refuge? If yes, describe the harbor and provide the following information: No, Kivalina Lagoon is too shallow to be considered for commercial vessel refuge. Recreational vessels will remain able to pass under the bridge. The access to the Wulik River and Kivalina River channels will not be restricted for any current vessels.

1. What percentage of vessels currently using the harbor refuge will not be able to pass the proposed bridge(s) to gain access to that refuge? Describe the vessels. N/A

2. Provide vessel information for those vessels identified in J.1.: N/A

   a. Vessel name;

   b. Registration/documentation numbers;

   c. Vessel type;

   d. Vessel owner contact information (company/individual name, address, contact info.);

   e. Primary vessel mooring location (include waterway milepoint, if known);

   f. Vessel overall length;

   g. Vessel beam;

   h. Vessel draft (depth of hull below waterline at full load);

   i. Vessel air draft (height of the highest fixed point of the vessel above the waterline, when empty); and

   j. Specialized vessels that use the waterway (e.g. vessels which have limited maneuverability due to inherent design or mode of operation);

3. Is it feasible to modify these vessels to clear the proposed bridge(s)? N/A

4. If yes, state the name, necessary modification, cost of modifying each vessel and who will pay for the modifications. N/A

5. If alternate refuges are available, describe them and state the distance of each from the present harbor of refuge. N/A

NOTE: A harbor of refuge is defined as a naturally or artificially protected water area that provides a place of relative safety or refuge for commercial and recreational vessels traveling along the coast or operating in a region.

L. Will the proposed bridge(s) be located within one-half mile of a bend in a waterway? If yes, describe the bend and provide the following information:
The bridge location is 3,000 feet from the Siguak Entrance to Kivalina Lagoon. Recreational boat traffic enters the lagoon eastward from the Chukchi Sea, then turns 90 degrees north to connect to the lagoon channel and proceed towards the bridge.

1. Is there sufficient distance between the bridge(s) and the bend to allow proper vessel alignment for the safe, efficient passage of vessels through the proposed bridge(s)? Yes, the distance of 3,000 feet from the Siguak Entrance to the Kivalina Lagoon is sufficiently long for recreational boats to align with the lagoon channel and the bridge passage.

2. If no, what factors make construction of the bridge(s) at an alternate location impractical? N/A

M. Are there other factors (i.e., dockages, lightering areas, existing bridges, etc.) located within one-half mile of the proposed bridge(s), which would create hazardous passage through the proposed structure? If yes, provide the following information:
No, there are no other facilities that would impact vessel traffic in or near the bridge location.

1. Describe the factors. (For example, construction impacts to navigation and waterway users, etc.) N/A

2. What mitigative measures are being recommended? (For example, navigation safety during construction, etc.) Why? N/A

N. Do local hydraulic conditions (i.e., wave chop, cross currents, tides, shoals, etc.) increase the hazard of passage through the proposed bridge(s)? If yes, provide the following information: No, the proposed bridge would safely accommodate passage during both extreme high and extreme low tide conditions.

1. Describe the conditions: N/A

2. What mitigative measures are being recommended? Why? N/A

O. Do local atmospheric conditions (i.e., strong, prevailing winds, fog, rapidly developing storms, etc.) increase the hazard of passage through the proposed bridge(s)? If yes, provide the following information:

P. Describe the conditions: Current velocities are only anticipated to increase through the proposed bridge during extreme storm surge events, when there is little likelihood that community residents would be operating boats in the lagoon.

1. What mitigative measures are being recommended? Why? To further reduce potential velocities, a bank of elevated overflow culverts is engineered into bridge approaches to provide added flow through capacity during extreme storm surge events.

Q. Have guide clearances been established for the waterway? If yes, provide the following information: No, this will be the only bridge on the waterway**.**

1. Horizontal guide clearance; N/A
2. Vertical guide clearance; N/A
3. Do the proposed bridge(s) clearances differ from these guide clearances? N/A
4. If yes, what factors justify deviating from these guide clearances? N/A

R. Are there other natural or man-made conditions that affect navigation (atmospherics, exclusion zones, etc.)? No

1. Describe the conditions: N/A
2. What mitigative measures are being recommended? Why? N/A

S. State any other factors considered necessary for the safe, efficient passage of vessels through the proposed bridge(s)? Are clearance gauges needed? Why?
Clearance gauges are not necessary for this bridge. Recreational boats will be the only vessels passing under the bridge and are of sufficiently small size with the ability to quickly slow down to visually determine individual clearance needs during passage. Only local boats from Kivalina are expected to utilize the area of the immediate waterway. Boat operators live in Kivalina, and will observe construction of the bridge as it progresses. The other nearest communities are Point Hope (80 miles northwest) and Kotzebue (70 miles southeast).

T. Include a description of the impacts to navigation caused or which could be reasonably caused by the proposed bridge(s) including but not limited to: proposed construction methodology, proposed or prospective changes to the existing bridge(s) operating schedule (for movable bridges), and any proposed mitigation to all unavoidable impacts to navigation.

a. The approaches and the bridge may be built in the winter. If so, the Kivalina Lagoon is frozen to the bottom; no recreational boating will occur during construction.

b. If work is done in the summer, temporary boating closures will occur for placement of the superstructure, pile driving, setting of girders. The bridge size is small (1 single span bridge) and up to 8 pilings will be used for support. Anticipated closure times will be temporary and of short duration.

c. Closures will be coordinated in advance with the City of Kivalina. This will give boaters a chance to moor boats on the side of the bridge they need to access during closures. In addition, during navigable ocean conditions, boaters can go around the barrier island to the Chukchi Sea to access the lagoon through Kivalik Inlet to the north.

2. Conduct a navigational impact report, and include a review of all bridges upstream and downstream of the proposed site to determine the minimum vertical and horizontal clearances available on the waterway. There are no bridges or other waterway crossings upstream or downstream of the Wulik River, Kivalina River, or within Kivalina Lagoon.

3. If the proposed bridge(s) is fixed, and is replacing an existing drawbridge with unlimited vertical clearance, the applicant must determine whether the proposed bridge(s) will accommodate existing and perspective navigation. N/A

U. Is there any proposed or completed mitigation for impacted waterway users? Are there any impacts that cannot be mitigated?

Mitigation for vessel traffic is not needed; there is no commercial traffic in the Kivalina Lagoon. All current recreational boats will be able to transit under the bridge.

1. Can vessels and cargoes be partially disassembled/dismantled in order to transit the proposed bridge(s), and if so, is it economically reasonable? The Coast Guard must take into consideration a vessel's ability to adjust its operations without economic loss. Adjustment or mitigations techniques may include using other routes, lowering electronics (GPS, radar, communication antennae, etc.), lowering crane booms, etc. Commercial vessels do not operate in the Kivalina Lagoon, and no mitigation is required.

2. Are alternative routes available for vessel passage?
Yes, through the Kivalik and Singuak Inlets to Kivalina Lagoon.

3. Can vessels transit at typical lower water stages (mean low water, mean pool level, etc.)?
Recreational boats will be able to transit at all water levels.

The environmental review, consultation, and other actions required by applicable federal environmental laws for this project are being, or have been, carried out by DOT&PF pursuant to 23 U.S.C. 327 and a Memorandum of Understanding dated November 3, 2017, and executed by FHWA and DOT&PF.

Attachment 1.2. Kivalina Lagoon Bridge

- Plan Sheet Checklist
- Stamped Conceptual Plan Set

C. **PLAN SHEETS - Plans submitted with the bridge permit application become an official, and permanent, part of the issued permit or permit amendment. To minimize delays, provide the following information:**

1. Plan Sheet Checklist - Use the following checklist for specifics to include with bridge plans:

   a. **General**

   ✓ Provide all plans in standard 8 ½ X 11" size, providing the fewest sheets possible that still show significant project structural details. Plan sheets may be submitted electronically.

   NOTE: Do not show bridge navigational lighting plans on bridge plan and elevation views.

   ✓ Show all dimensions and distances in U.S. linear feet in decimal form (versus feet and inches). For international bridges also show all dimensions in both linear feet and meters.

   ✓ Include the datum used in the plan and elevation view. Use the same datum for all submitted drawings (e.g. NAVD, NGVD). For replacement and modification projects, the datum used may differ between the new plans and the previously approved plans for the existing structure. If this situation occurs, please be sure to show all necessary conversions to demonstrate any change in approved clearances.

   ✓ All plan sheets must bear the date, signature and stamp of a professional engineer.

   NOTE: the engineer stamp date must either match or be dated later than the title block date before the permit and plans can be approved by the Coast Guard.

   If desired, it is acceptable for the engineer to add the following statement to the plans, "Conceptual plans utilized to obtain Coast Guard bridge permit".

   ✓ The total number of plan sheets identified in the title block must match the number of plan sheets submitted for approval.

   b. **Title Blocks** - Include the following items in the title blocks (lower right-hand corner on all of the plan sheets):

   ✓ Applicant/Owner;

   ✓ Consultant/Agent;

   ✓ Name of Bridge(s);

   ✓ Name of Waterway;

   ✓ Mile point of bridge(s) location (from confluence of mouth of waterway) in

✓ statute miles;

____ City, county/parish, and state (state whether the bridge(s) is at, near, or between – as appropriate);

✓ Date of plans (i.e., mm/dd/yyyy, must either match or be dated prior to the engineer's date stamp); and

✓ Sheet number and total number of sheets in set to be approved (i.e., Sheet 1 of 5).

c. **Location/Vicinity Map**

✓ Show graphic scale and north arrow;

✓ Show location of bridge(s) on waterway;

✓ Identify the name of the waterway;

✓ Show course of waterway (i.e. ebb/flood, or direction of flow for non-tidal waters);

✓ Show structures immediately adjacent to the proposed bridge(s) and their relation to the proposed bridge(s);

N/A Identify wildlife and waterfowl refuges and any historical and archaeological sites; and

✓ Insert a small map of the state in which the project is located with an arrow showing the location of the proposed project.

d. **Plan View**

✓ Show graphic bar scale and north arrow;

✓ Identify the adjacent property owners at the four corners of the proposed structure(s);

on sheet 1 Show existing shorelines (may be defined or established by local or state regulation);

✓ Show ebb and flood in tidal waters and direction of flow in non-tidal waterway;

✓ Show mean high and low waterlines in tidal areas. Show ordinary high water and ordinary low water elevations if proposed activity is in a non-tidal waterway;

✓ Show all portions of existing bridge(s) that will remain in place;

✓ Show all portions of existing bridge(s) that will be removed by using dashed lines;

✓ Show principal dimensions of structure(s) from grade-to-grade. Show length, width, etc.;

✓ Show location of dredging, excavation, fill or rip-rap, to include approximate number of cubic yards. Note: The Coast Guard does not approve these activities or items. Contact the U.S. Army Corps of Engineers for approval;

N/A ✓ Show location of the bridge protective system, piles, cables, etc. existing or to be constructed in the waterway. Identify type of material to be used;

✓ Show limits of navigational channel;

✓ Show axis (centerline) of channel;

✓ Show horizontal clearances, normal to the axis (centerline) of the channel between the bridge protective system, pilings, or abutments;

✓ Show water depth at mean low (or ordinary low if non-tidal) at various locations in the channel, under, upstream and downstream of the bridge(s); and

N/A ✓ Show the bridge protective system.

e. **Elevation View**

✓ Show graphic bar scale and north arrow;

✓ Show mean high and mean low water elevations in tidal areas. Show ordinary high and low water elevations in non-tidal areas;

✓ Show amount of fill material in cubic yards below mean high water;

✓ Show horizontal clearance normal to the axis (centerline) of the channel between the bridge protective fender system, pilings, or abutments, as appropriate for navigational channel;

✓ Show vertical clearances referenced to the appropriate high water stage either Mean High Water (MHW) or Ordinary High Water (OHW). Show vertical clearances at the center, as well as at the horizontal limits of the navigational channel (the most restrictive vertical clearance in the navigational channel);

N/A If the bridge(s) will have a draw, show the draw in the open and closed positions. Vertical clearances in the open position might not be unlimited, especially for vertical lift bridges and bascule bridges. For bascule bridges, specify which part of the navigation channel has an unlimited clearance in the open position i.e. the center 50 feet of the channel, etc;

✓ Show proposed navigational envelope (opening);

✓ Show proposed and existing contour of waterway bottom;

✓ Show 100-year flood elevation;

✓ Show the location and elevation of the low steel member of the navigation span; and

N/A If the bridge(s) will have a permanent traveler system installed for inspection/maintenance, show the reduction in vertical clearance (traveler height below low steel) and the location of traveler storage when not in use.

f. **Typical Section View**

✓ Show graphic bar scale;

✓ Show out-to-out width of the structure(s). (This is the width of the bridge(s) at its widest point.); and

✓ Include location and dimensions of travel lanes, shoulders, sidewalks, fishing/pedestrian platforms, railings, pipelines, etc.

g. **Details of the Bridge Protective System** (if details are known and ready for CG approval as part of the permit decision)

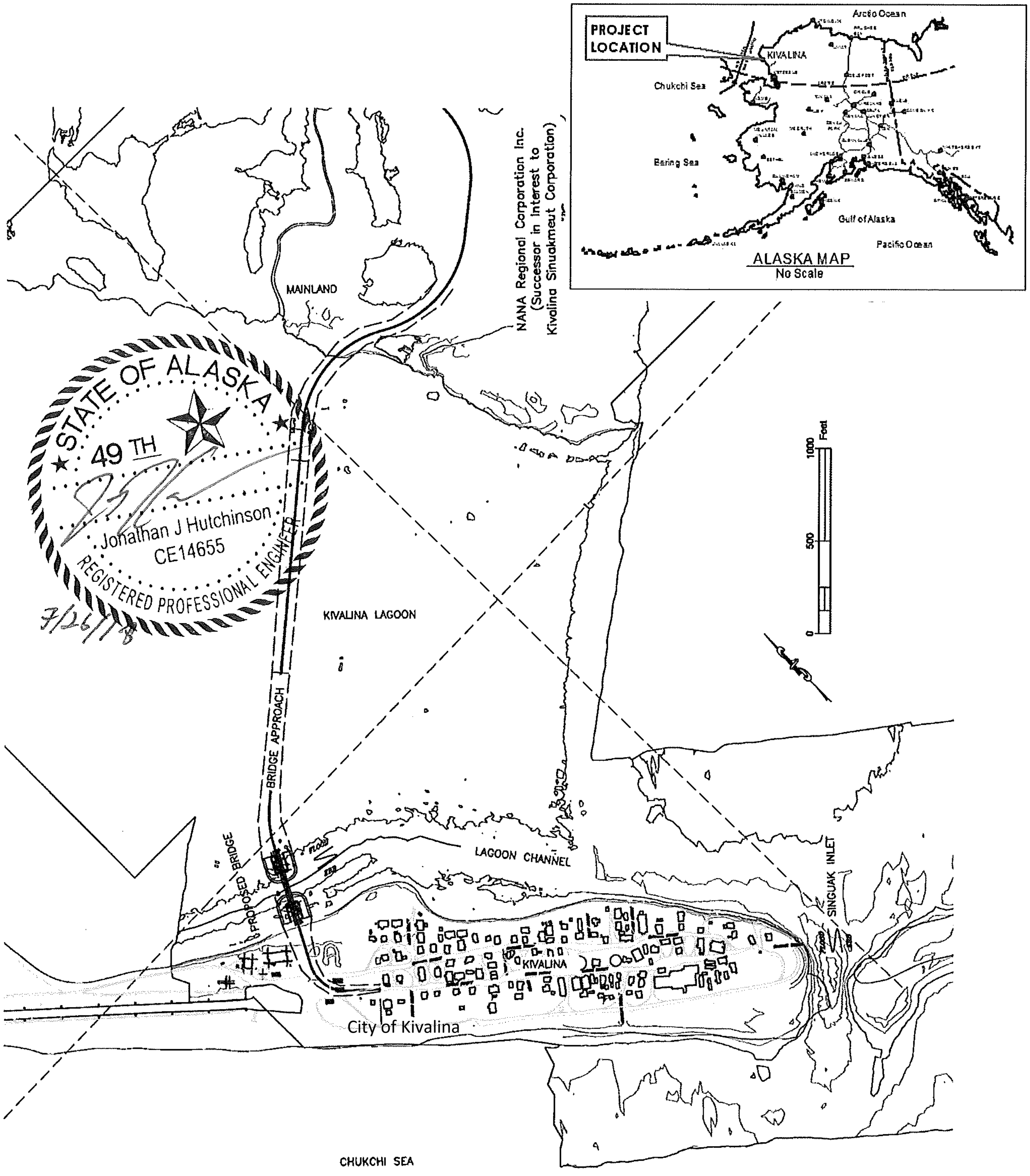
N/A Show bridge pier protective system in plan and elevation views including detail of attachment to pier, countersunk bolts, and relationship to mean high and low waterlines (on elevation view).

h. **Temporary Structures/Falsework** (if details are developed and ready for CG approval as part of the permit decision)

N/A Show temporary structures/falsework;

N/A Show existing bridge(s) to be removed using dashed lines; and

N/A Show minimum horizontal and vertical clearances during construction.



DATE: 7/25/18

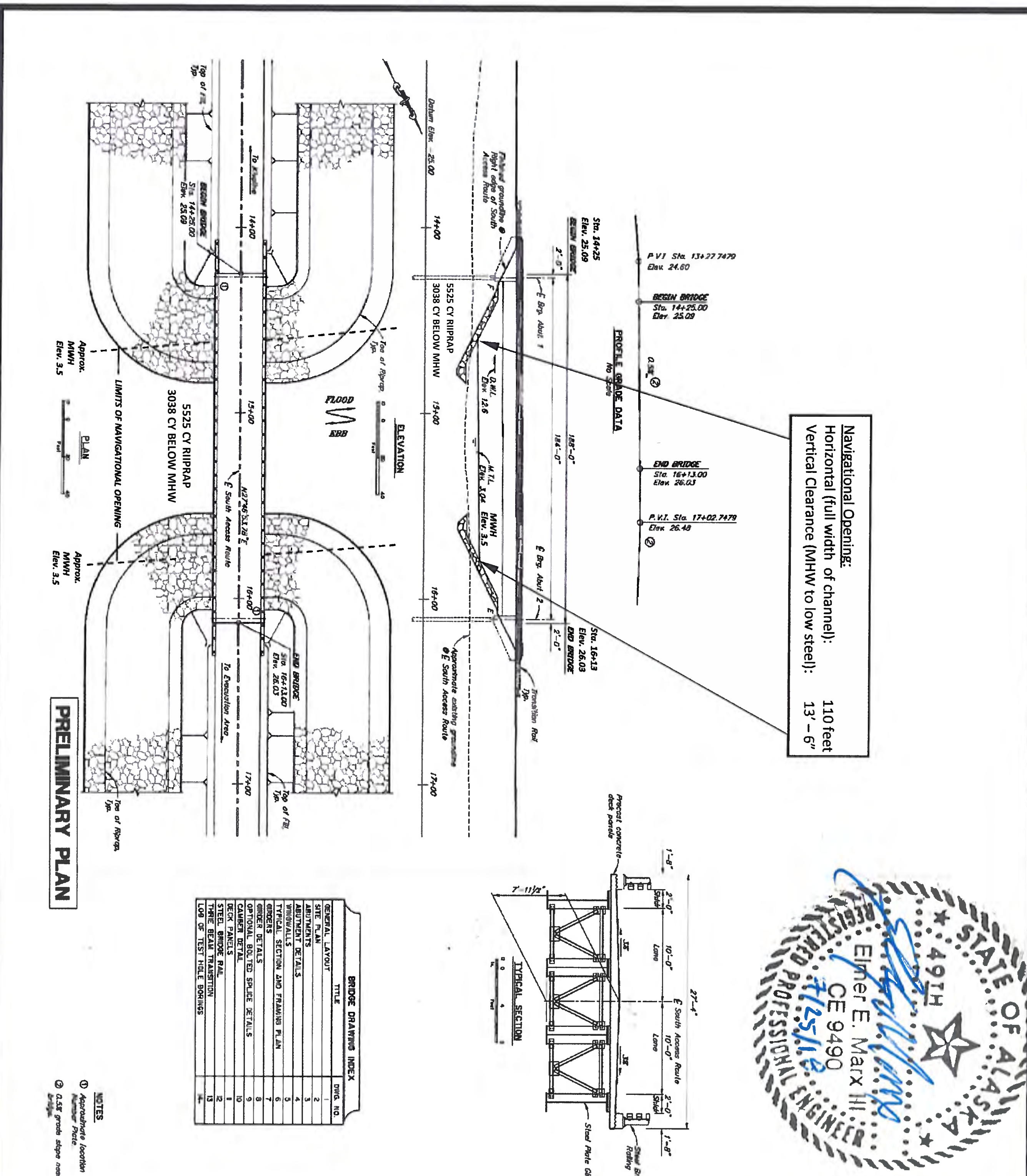
NOTES:

1. PERMIT FIGURES ARE NOT TO BE USED FOR CONSTRUCTION. ENGINEER STAMP APPLIES STRICTLY TO THE NAVIGATIONAL OPENING AND GENERAL LOCATION INFORMATION. BRIDGE DESIGN MEETS AASHTO STANDARDS AND BRIDGE HAS BEEN DESIGNED TO WITHSTAND AN IMPACT FROM VESSELS THAT TYPICALLY USE THE WATERWAY.
2. PROPERTY ADJACENT TO THE PROPOSED BRIDGE IS OWNED BY NANA (TO THE EAST) AND CITY OF KIVALINA (WEST).
3. ELEVATIONS REFERENCE NAVD88 VERTICAL DATUM.
4. CHANNEL DEPTH IS APPROXIMATELY 4' AT MHW (ELEV 3.5'). THE ESTIMATED 100-YR FLOOD ELEVATION IS 12.6'.
5. PROPOSED BRIDGE IS LOCATED 0.5 MILES FROM THE SINGUAK INLET (CONFLUENCE OF CHUKCHI SEA WITH THE WULIK RIVER)

OWNER/AGENT:Alaska DOT&PF
KIVALINA LAGOON BRIDGE
Kivalina, Alaska
Project # NFHWY00162

Kateel River Meridian
T 27N R26W Section 21

BRIDGE PLANS
Sheet 1 of 3



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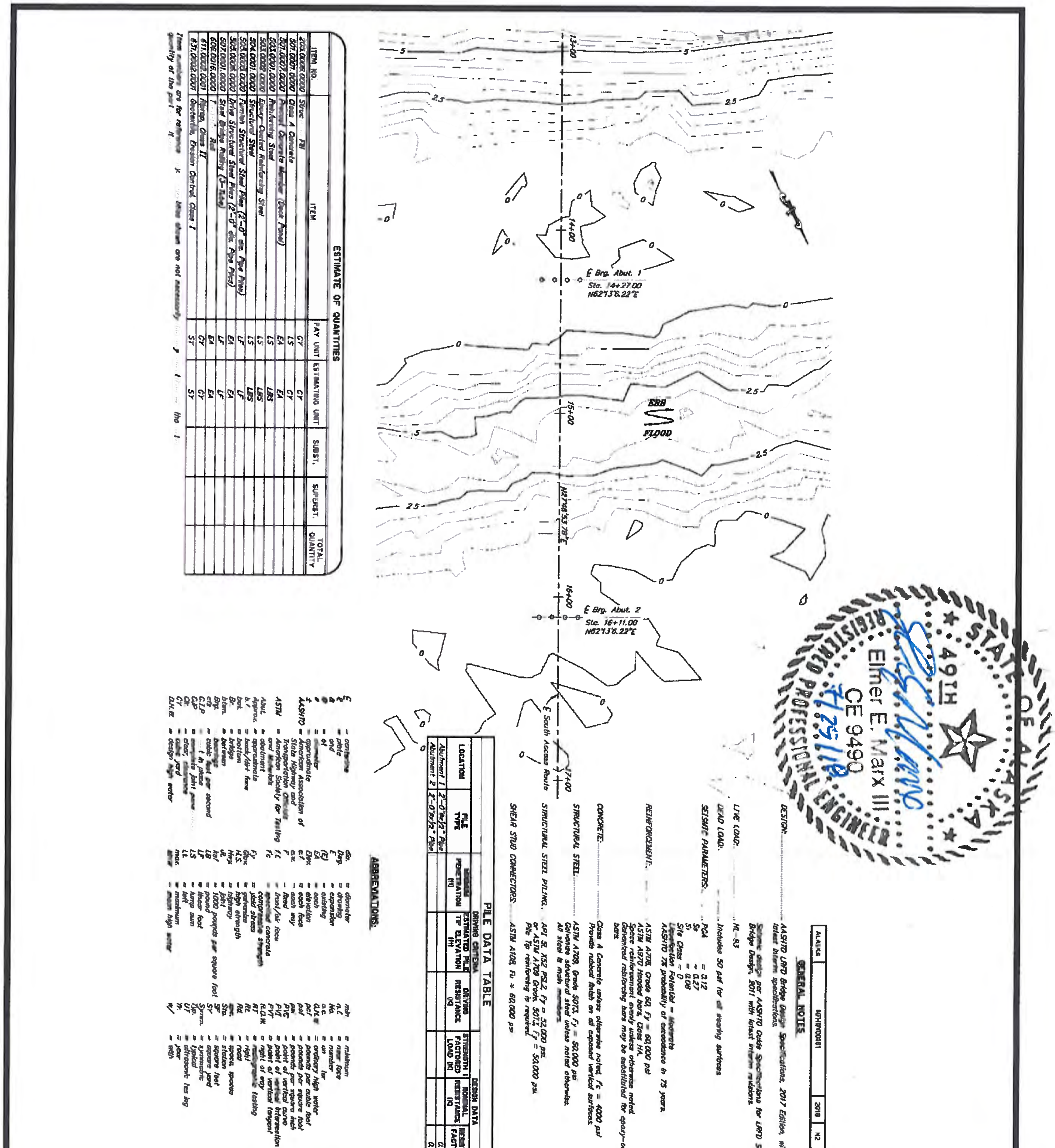
OWNER/AGENT: Alaska DOT&PF
KIVALINA LAGOON BRIDGE
Kivalina Lagoon , Alaska
Project # NFHWY00162

Kateel River Meridian
T 27N R26W Section 21

BRIDGE PLANS
Sheet 2 of 3



DATE: 7/25/18

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OWNER/AGENT:Alaska DOT&PF
KIVALINA LAGOON BRIDGE
Kivalina, Alaska
Project # NFHWY00162

Kateel River Meridian
T 27N R26W Section 21

BRIDGE PLANS
Sheet 3 of 3

Kivalina Lagoon Bridge Permit Application

Project Number: 0002384/NFHWY00162
July 20, 2018

The environmental review, consultation, and other actions required by applicable federal environmental laws for this project are being, or have been, carried out by DOT&PF pursuant to 23 U.S.C. 327 and a Memorandum of Understanding dated November 3, 2017, and executed by FHWA and DOT&PF.

Attachment 2. Kivalina Evacuation and School Site Access Road project Environmental Assessment (EA) and Finding of No Significant Impact (FONSI)

The environmental review, consultation, and other actions required by applicable federal environmental laws for this project are being, or have been, carried out by DOT&PF pursuant to 23 U.S.C. 327 and a Memorandum of Understanding dated November 3, 2017, and executed by FHWA and DOT&PF.

Final Environmental Assessment
Kivalina Evacuation and School Site Access Road

Project Number: 0002384/NFHWY00162

January 2018

Alaska Department of Transportation & Public Facilities,
Statewide Environmental Office

FINDING OF NO SIGNIFICANT IMPACT

KIVALINA EVACUATION AND SCHOOL SITE ACCESS ROAD

Project Number: 0002384/NFHWY00162

The environmental review, consultation, and other actions required by applicable Federal environmental laws for this project are being, or have been, carried out by DOT&PF pursuant to 23 U.S.C. 327 and a Memorandum of Understanding dated November 3, 2017 and executed by FHWA and DOT&PF.

Purpose and Need

Purpose

The Alaska Department of Transportation and Public Facilities (DOT&PF) proposes to construct a safe, reliable, all-season evacuation road between the community of Kivalina, Alaska, and Kisimigiuqtuq Hill (K-Hill). The Kivalina Evacuation and School Site Access Road project would provide Kivalina residents a safe and reliable evacuation route in the event of a catastrophic storm or ocean surge, allowing evacuees to temporarily mobilize to safe refuge at an assembly site on K-Hill. This site is also identified by the Northwest Arctic Borough (NAB) School District, and approved by the community, as a preferred new location for the community school. While school construction is remote and speculative[1], if constructed within the vicinity of the project terminus, the school could augment the undeveloped evacuation site by serving as a full-service community emergency shelter with all-season support capabilities.

Need

Recent climate data has indicated that arctic sea ice is forming later in the season, increasing fall and winter storm duration and intensity along the Northwest Arctic coast (Simmonds and Keay 2009; Screen et al. 2013). Consequently, residents of Kivalina face significant and increasing risks to life, health, and safety by storm systems predicted to further intensify over time (Brubaker et al. 2010). The need for a concerted effort to mitigate these risks became more evident during an evacuation event in October 2007, when debris-laden storm waves overtopped the barrier island. The event resulted in the need for

[1] An action or impact occurring at some distance or time in the future that depends on assumptions or events that are contingent, conjectural, or problematic [Eccleston, 2000]

helicopters to carry evacuees off the island, and illustrated that Kivalina currently has no safe method of evacuation in the event of a catastrophic storm surge. In the face of this increased threat, Kivalina needs a safe and reliable means of evacuation.

Requested Federal Action

The DOT&PF is requesting the following federal action from the Federal Highway Administration (FWHA): (1) participation in funding the proposed project.

As part of the FHWA Surface Transportation Project Delivery Program (23 U.S. Code [USC] 327), commonly known as the NEPA Assignment Program, the DOT&PF has assumed the FHWA's responsibilities for complying with the National Environmental Policy Act (NEPA) and for the environmental review, consultation, or other actions as required by Federal environmental laws on FHWA-funded projects under a Memorandum of Understanding (MOU) with FHWA executed on November 3, 2017.

Selected Alternative

The DOT&PF selected causeway construction across the Kivalina Lagoon; evacuation road construction connecting the Kivalina Lagoon causeway to the K-Hill evacuation site; and development of up to four material source alternatives to supply the project. The selected causeway and evacuation road alternative is the Southern Route with Lagoon Crossing D. The selected material source alternatives are the K-Hill Site, Wulik River Source 1, Relic Channel Source 1, and Relic Channel Source 2 with the K-Hill site and Relic Channel sources given highest priority, and the Wulik River Source used last, if needed, once the other sites have been exhausted of the needed material. The Southern Route is 7.7 miles long and would begin adjacent to the Kivalina Airport, immediately cross the lagoon with a 3,020-foot long causeway, and follow lowlands and relic channels of the Wulik River to a permanent 5-acre gravel staging pad on K-Hill configured to not preclude later development of a community evacuation site. The selected alternative also includes construction of a second permanent pad near the inland side of the lagoon crossing used for contractor staging. The DOT&PF has selected the Southern Route with Lagoon Crossing D based on its ability to best meet the project's purpose while minimizing environmental impacts and addressing the concerns of the public and agencies.

Reasonable Alternatives

For over a decade, Kivalina and the NAB have evaluated the feasibility of numerous road routes, lagoon crossing options, and material source locations that could provide for evacuation road construction as well as other infrastructure or general material needs. DOT&PF has been working with the community, local and regional government stakeholders, and state and federal agencies to refine evacuation road alternatives to be evaluated under the *National Environmental Policy Act* (NEPA).

Under the No-Action Alternative, an evacuation road would not be constructed from Kivalina to K-Hill. Residents would continue to be exposed to environmental threats with no safe way to evacuate during storm events with the potential to detrimentally impact the community over time. As a consequence, there would remain severe risk to life, health, and safety of residents during a storm surge event. This does not meet the purpose and need of the project.

<u>Road Route Alternatives</u>: Three preliminary route options (Northern, Southern, and Combined Route A) were independently proposed by Kivalina and the NAB within the Study Area (Community Proposed Alternatives). These community initiated route concepts were refined and a fourth route was developed (Combined Route B) based on feedback received during public and agency scoping efforts in the fall of 2016. Route alternatives were evaluated for feasibility based on purpose and need; engineering considerations; wetland, fish, and wildlife impacts; number and type of water crossing structures; proximity to material sources; and cost. After evaluation (detailed in Section 3 of the attached Final Environmental Assessment (EA)), the Southern Route and Combined Route B were determined feasible and carried forward for further evaluation.

<u>Lagoon Crossing Alternatives</u>: Four lagoon crossing alternatives (Solid Causeway, Solid Causeway with Culverts, Solid Causeway with Culverts and Bridge, and Full Span Bridge) were considered and developed in collaboration with the community of Kivalina, agency stakeholders, and other local and regional stakeholders. After evaluation, only the Lagoon Crossing D (Solid Causeway with Culverts and Bridge) was determined feasible and carried forward for further evaluation (detailed in Section 3 of the Final EA).

<u>Material Source Location Alternatives</u>: Four general areas known to contain potentially viable sources of various project materials were evaluated in past studies. Several material source locations within these areas were evaluated for feasibility based on proximity to potential routes, quantity and quality of material, access constraints, and potential impacts to protected resources (Golder Associates 2013). After evaluation, four potential sources within these areas have been determined feasible and are carried forward for further evaluation (K-Hill, Wulik River Channel Source 1, Wulik Relic Chanel Source 1 and 2).

Coordination

DOT&PF initiated public involvement and agency coordination for the Kivalina Evacuation and School Site Access Road Project in fall 2016. DOT&PF held multiple public and working group meetings in Kivalina, Noatak, and Kotzebue during November 2016, July 2017, and August 2017. Letters and emails were sent to Federal, State and local agencies, City of Kivalina, NAB and surrounding Villages, Native Village of Kivalina, Alaska Native Claims Settlement Act (ANCSA) Corporations, and other interested parties beginning on November 10, 2016. Individual agency scoping meetings were held with interested agencies beginning on December 19, 2016.

On December 5, 2017, DOT&PF held public meetings in Kivalina, Noatak, and Kotzebue to announce Draft Environmental Assessment (EA) availability and request comments. In addition, DOT&PF held several individual agency meetings from December 11-19, 2017 to gather comments. Prior to the meetings, notices and Draft EA copies were provided to the City of Kivalina, NAB, and surrounding Villages, Native Village of Kivalina, ANCSA Corporations, and other interested parties announcing Draft EA availability and comments request. Letters and comments received during the comment period are included in Appendix D and E.

Impact Assessment

The selected alternative (the Southern Route with Lagoon Crossing D) is 1.2 miles shorter than Combined Route B, providing a more efficient route to the evacuation site in an emergency. The selected alternative therefore requires less right-of-way from NANA compared to the Combined Route B (280 acres compared to 324 acres, respectively).

Project impacts include a loss of uplands and Section 404/10 waters and wetlands, which provide fish, migratory bird, and wildlife habitat.

The selected alternative would impact 147.3 acres of wetland for the construction of the Southern Route with Lagoon Crossing D, compared to 171.3 acres for the construction of the Combined Route B with Lagoon Crossing D. Both alternatives would impact a total of 1.3 acres of uplands for the construction of the evacuation route, and a total of 233.6 acres of wetland and 20.1 acres of upland for material source development. There is no practicable alternative to building on wetlands due to their prevalence in the area.

The selected alternative includes constructing a causeway across Kivalina Lagoon, with a bridge and multiple culverts. This has the potential to impact marine mammal and fish movement, reduce navigability, and alter floodplains or hydraulic regimes. The bridge and culverts will be designed to accommodate fish and marine mammal movement, and the bridge will also allow personal boats sized to support subsistence activities to access both sides of the lagoon.

With the exception of the lagoon crossing, no other portions of the proposed route alternatives would cross anadromous and/or Essential Fish Habitat (EFH) waterbodies. The selected alternative, the Southern Route, would require a total of nine water crossings: two fish passage crossings, four non-fish passage crossings, three enhanced design crossings. This is less than the 12 water crossings that would be required for the Combined Route B, which includes three fish passage crossings (one of which is a crossing of the Wulik River relic channel), six non-fish passage crossings, and three enhanced design crossings. The crossing types are described in Section 4.8.2.2 of the attached Final EA.

The polar bear, spectacled eider and Steller's eider are listed as threatened under the Endangered Species Act (ESA) and are under U.S. Fish and Wildlife Service (USFWS) jurisdiction. These species are recorded infrequently as they migrate through the region. The selected alternative would impact less of the Closed Low Scrub habitat identified by USFWS as important bird habitat compared to the Combined Route B with Lagoon Crossing D alternative (2.3 acres compared to 6.3 acres respectively). Impacts are expected to not be significant as there is alternative preferred habitat available.

Marine mammals typically seen in Kivalina Lagoon include spotted seals, bearded seals, ringed seals, and polar bears. Bearded seals and ringed seals are listed as threatened under the ESA and are under National Marine Fisheries Service jurisdiction. These seals may be present in the Kivalina Lagoon, and could be disturbed by underwater noise associated with construction activities, primarily pile driving, in the lagoon. Compared to the alternatives presented in the 2017 Draft EA, DOT&PF avoided underwater noise impacts resulting from in-water pile driving by committing to pile driving through the constructed embankment.

If project specific barges are required, other listed species may be encountered along the vessel routes. These species include Western DPS Steller sea lions, North Pacific right whales, Western North Pacific and Mexico DPS humpback whales, fin whales, sperm whales and bowhead whales. Mitigation measures (Section 4.12.3 of the Final EA) would limit potential residual adverse effects of the project on marine mammal species exposed to underwater noise.

The evacuation route may cause impacts to wildlife and marine mammals due to vehicle noise and creating a visual barrier along the corridor. These are expected to not be significant due to the low number of vehicles anticipated to use the route as compared to roads in other similar locations, as well as accommodation for fish and marine mammal passage incorporated into the design.

The project will cross lands in the Cape Krusenstern National Historic Landmark (CKNHL), a historic property. The project may disturb unknown cultural, historical, and archeological resources in the CKNHL. Cultural resource surveys have been conducted, and no eligible resources have been recorded in the project’s Area of Potential Effect (APE). Two AHRS-reported sites are on the periphery of the APE. No ground disturbing activities are planned for the portions of the APE containing these two sites. If a resource is inadvertently discovered during construction, measures will be taken to mitigate potential impacts. As a result of consultation under 23 CFR 800.5 (Section 106), DOT&PF has determined that no historic properties will be adversely affected from the proposed project. The National Park Service (NPS) agreed with and State Historic Preservation Officer (SHPO) concurred with this finding (Appendix F).

As a historic property, the CKNHL is also protected under Section 4(f) of the Department of Transportation Act. Based on the SHPO’s concurrence with a finding that no historic properties will be adversely affected from the proposed project, the DOT&PF has approved a Section 4(f) *De Minimis* Impact Finding (Section 5 and Appendix K of the attached Final EA).

Temporary construction impacts will predominantly occur due to material source development and material placement into wetlands and waters. These activities will potentially discharge sediment to adjacent waterways, and impact fish habitat, including EFH. These impacts are expected to not be significant with proper implementation of construction best management practices and compliance with permit requirements.

Construction noise associated with material placement, and material source development have the potential to temporarily disturb wildlife, marine mammals, birds, and fish, either resulting in temporary relocation to other habitats, or mortality. Implementation of construction best management practices, and proper activity scheduling during low risk seasons, is expected to result in no significant impacts.

Secondary and Cumulative Impacts: The project would open access to the Wulik River for subsistence and possible development of adjacent public and private lands. These impacts are anticipated to not be significant as the area is already a travel corridor for subsistence use and the anticipated increase in activity is expected to be relatively small compared to the levels of existing traffic and noise along the corridor.

Avoidance, Minimization, and Mitigation Measures

Conditions of approval associated with this project are detailed in the Final EA and project permits and requirements will be included in the construction contract documents. The project has been coordinated with the appropriate agencies and the local Tribe, and includes measures to avoid and minimize impacts. The following commitments will be included in the project to reduce environmental impacts.

Land Use and Transportation

- Wulik River Source 1 is adjacent to and includes a portion of a Native allotment (less than a quarter of the proposed material site); however, use of this material source has been given lower priority as described in Section 4.3.4 of the EA, and the material source may be developed outside of the Native allotment if a material sales agreement with the owner cannot be reached. All other material sources and route alternatives avoid development in Native allotments; and
- Material sources near Native allotments would be designed to not block access to these areas.
- During permitting of the Wulik Relic Channel Source 2, DOT&PF will work with the Alaska Department of Natural Resources (DNR) to avoid the use of state-owned submerged lands.

Social and Economic Environment

- Individual material source reclamation plans would be developed, in consultation with appropriate agencies, local government, and landowners. Potential reclamation options may include flooding for creation of wetland and waterfowl/fish habitat, which may support increased subsistence use at these locations.

Hazardous Materials, Pollution Prevention, and Solid Waste

- Prior to construction, the contractor would develop a best management practices (BMP) based Solid Waste and Hazardous Materials Control Plan to address contaminant spill response, storage, management, and handling of hazardous materials, including fuel and lubricants. If leaks or spills occur, contaminated material and soils would be contained and disposed of properly; and

- The construction contractor would be required to stop work and notify the DOT&PF Project Engineer if suspected contaminated soil or water is encountered. DOT&PF would notify the Alaska Department of Environmental Conservation (ADEC) in compliance with 18 AAC 75.300. Any contamination encountered would be handled and disposed of in an ADEC-approved manner.

Water Resources and Water Quality

- Water Quality:
  - Measures to minimize releases of sediment to water bodies would be implemented during construction as part of compliance with the Alaska Pollution Discharge Elimination System (APDES) Construction General Permit (CGP). Compliance with the CGP includes preparation of a Storm Water Pollution Prevention Plan (SWPPP) and implementation and monitoring of erosion and sediment control BMPs;
  - Utilization of low erodible material and armor rock placed in the Kivalina Lagoon would minimize sedimentation to these waterbodies. Sediment entrainment measures would further reduce impacts to water quality; and
  - Water withdrawal requires permitting through DNR and Alaska Department of Fish and Game (ADF&G), which would specify appropriate BMPs. BMPs, including water withdrawal volume limitations, would reduce the potential effects on stream flows during construction.
- Floodplain:
  - Material sites would be constructed to avoid river capture, floodplain widening, and increased erosion;
  - The road would be designed above the 100-year flood elevation.
  - Causeway bridge and culverts would be designed for adequate flows through the causeway at flood stage.
- Hydrology:
  - Roadway and causeway embankments would be protected from erosion to prevent sediment transport to adjacent habitats; and
  - Construction of a bridge or causeway in tidal waters falls under the jurisdiction of the U.S. Coast Guard (USCG) Office of Bridge Programs (33C.F.R. Chapter I, Subchapter J, Part 115) and all necessary USCG authorizations would be obtained prior to construction.

Wetlands and Vegetation

Executive Order 11990, "Protection of Wetlands," issued May 24, 1977, requires there be no practicable alternative to a Proposed Action if such action affects wetlands, and that any proposed federally funded action include all practicable measures to avoid and minimize harm to wetlands. As the majority of the Study Area is dominated by high functioning wetlands and waters, construction of an evacuation route from Kivalina to K-Hill would cause impacts to high value wetlands, and a USACE Section 404/10 Individual Permit would be required.

Avoidance, minimization and, if required, either compensatory or sponsor-proposed mitigation are the primary measures available to offset wetland losses for the proposed project. In fulfillment of Executive Order 11990, the following avoidance and minimization measures would be implemented to reduce the impacts to wetlands:

- The proposed route alternatives are routed to avoid and minimize impacts to Waters of the U.S. and the higher Category I+ wetlands. Upland areas are utilized as possible, while avoiding upland important bird habitat (Closed Low Scrub) at the same priority as Category I+ wetlands;

- Project elements (e.g., road embankment geometry, vehicle turn outs, water crossings) are designed to safely incorporate the minimal dimensions necessary to serve the project purpose and need to minimize required wetland fill;

- Staking or otherwise delineating the road embankment footprint and associated temporary impact areas would be completed prior to construction;

- Construction materials would be stockpiled within existing fills and/or developed staging areas to minimize construction disturbance and avoid impacting additional wetland acreage;

- Setbacks from surface waters would be maintained for refueling and vehicle maintenance activities to reduce the likelihood of hazardous substances entering waterbodies from accidental spills or releases; and

- A project Erosion and Sediment Control Plan, SWPPP, and Hazardous Material Control Plan would be implemented to protect streams and wetlands, and minimize the introduction of sediment and runoff to adjacent waterbodies.

Fish and Fish Habitat

- All Features
  - Compliance with the APDES CGP, and implementation of the required SWPPP and BMPs during construction, to reduce the potential for sediment laden storm water runoff during construction. Stabilization of side slopes with vegetation or non-erodible material would also be implemented as part of CGP compliance to further reduce the potential for sedimentation of nearby streams;
  - Construction of all crossing structures would adhere to appropriate BMPs for in-water works to minimize potential effects to fish or fish habitats from sediment mobilization and transport, and accidental contaminant spills;
  - During in-water construction activities, monitoring may be required onsite to implement site specific BMPs and other potential permit requirements; and
  - Obtain Fish Habitat Permit from ADF&G.
- Lagoon Crossing:
  - In-water work associated with the lagoon crossing would be scheduled to reduce impacts to fish;
  - Implementation of BMPs that avoid or minimize adverse impacts to water quality and marine habitats;
  - The causeway’s northeastern culvert(s) will be designed to be easily maintained as an open water passage at mean tide and accommodate anticipated debris and icing mitigation to prevent flow blockage; and
  - Pile driving would be conducted through constructed embankment, to limit impacts to salmon juveniles and adults (NMFS, 2017a).

- Road Construction:
  - During construction occurring concurrent with critical timing windows, appropriate measures would be implemented (e.g., construction of a diversion channel) to maintain fish migration and passage
  - DOT&PF will coordinate with ADF&G to mitigate impacts to fish during water withdrawal activity and ice harvest that may be needed for construction of ice roads; and
  - DOT&PF and the construction contractor would coordinate with ADF&G to identify and implement appropriate migration measures.
- Material Sources:
  - Material source selection, site specific mining plan design, permitting, and reclamation would reduce the potential for adverse impacts and could enhance fish habitats in some drainages, such as the Wulik Relic Channel;
  - Reclamation plans may include developing shallow littoral zones and shrubby riparian areas for migratory bird habitat;
  - Site specific material site plans will incorporate work timing windows to work around sensitivities for salmon and Dolly Varden;
  - Material sites will be prioritized for use: 1) K-Hill and Relic Channel sources and 2) Wulik River 1 (only after other sites are exhausted);
    - If the Wulik River Material Site 1 is constructed, maintain a connection to the Wulik River; and
  - Coordination with ADF&G and NMFS would be conducted during design to develop an adequately sized material source at the selected location, maintain adequate setbacks from the river, and avoid adverse impacts to EFH.

Terrestrial and Aquatic Birds

- The Proposed Action alternatives have been routed to minimize interactions with waterbodies (i.e., aquatic bird habitat) wherever feasible. Where possible, the road alignment would approach the waterbody perpendicularly to minimize impacts to the riparian habitats;

- Temporary disturbance, reclaimed land, and other areas of ground disturbance would be revegetated with regionally appropriate seed mix that minimizes introduction of noxious weeds where practicable;

- Where possible, vegetation clearing, site preparation, and construction activities would adhere to the recommended periods to avoid vegetation clearing from June 1–July 31 for Northern Alaska. If vegetation clearing, site preparation, and construction occurs within these periods, pre-construction nest surveys would be conducted by qualified personnel and appropriate mitigation developed in consultation with the USFWS; and

- High-disturbance project-related activities (e.g., blasting, pile driving) would be avoided where practicable during the nesting and peak migration window.

Marine Mammals

- Pile driving would will occur through constructed embankment;
- Project specific Barges and Small Boats:
    - If project specific barges are required, operators would be required to follow the best practices and safety regulations required of barge operators which regularly service the communities.
    - Barges that may provide some incremental project support but are not strictly under project control will be encouraged to avoid designated (73 FR 19000) North Pacific right whale critical habitat or maintain vigilant watch while under way in order to avoid vessel strikes to individuals of the Critically Endangered population frequenting the Bering Sea.
    - If project specific barges are required, during vessel transit, the project will follow 50 CFR 224.103 regulations and NMFS marine mammal viewing guidelines.
    - Small project-specific boats will move at less than 10 knots (kn; 18.52 km/h) when in the Kivalina Lagoon to reduce noise impacts and for safe vessel maneuverability to avoid obstacles and marine mammals in the water.

- If project specific barges are required and practicable vessel operation requires purposely approaching within 1.6 km (1 mi) of observed whales, except in emergency situations, the vessel operator will take reasonable precautions to avoid potential interaction with the whales
- Reducing vessel speed to less than 5 kn (9.26 km/h) within 300 yards (274 m) of pinnipeds
- If project specific barges are required, they will avoid transiting through identified (73 FR 19000) North Pacific right whale critical habitat. Protected Species Observers (PSOs) are not required if barges do not enter designated North Pacific right whale critical habitat.
- If project specific barges are required to transit through North Pacific right whale critical habitat, the following will be implemented:
  - Vessels will not make way in excess of 10 kn (18.52 km/h) while travelling within the boundaries of designated North Pacific right whale critical habitat.
  - Dedicated PSOs will be on board all motorized vessels travelling through designated North Pacific right whale critical habitat. PSOs are not required if barges transit around North Pacific right whale critical habitat. PSOs will maintain a constant watch for all marine mammals from the bridge or other similar vantage point. PSOs will maintain direct contact with the vessel pilot, advising the pilot/operator of the position of all observed marine mammals as soon as they are observed.
  - The vessel pilot/operator will maneuver vessels to the extent practicable to:
    - Remain further than 874 yds (800 m) from North Pacific right whales,
    - Remain further than 100 yds from other marine mammal species, and
    - Avoid approaching any species of whale head-on.
  - Vessels will adjust speed and heading as needed to avoid disturbance of all marine mammals, provided vessel speed and heading adjustments are consistent with maintaining vessel safety.

- Fill Placement:
  - If material is being placed in summer during ice-free conditions, a qualified PSO will monitor for marine mammal presence and implement a 50 m (164 ft) exclusion zone around the material placement site to avoid physical harm, direct, and indirect takes by construction equipment.
  - If material is being placed in the winter, a PSO is only needed if there are areas of naturally occurring open water within 50 m (164 ft) of construction activities. If there is no naturally occurring open water within 50 m (164 ft) of construction activities, no PSO is required and no exclusion zone is necessary.

  - If an observed marine mammal is likely to approach within 50 m (164 ft) of the fill placement site, fill placement will stop until the marine mammal is farther than 50 m (164 ft) from the fill placement site, or is not seen for 15 minutes. The PSO will continuously scan the activity-specific monitoring zone for the presence of species for 30 min before any fill placement activities take place.
    - If any species are present within the exclusion zone, fill placement activities will not begin until such animal(s) has left the exclusion zone or no species have been observed in the exclusion zone for 15 min (for pinnipeds) or 30 min (for cetaceans).
    - If any species enter, or appear likely to enter, the exclusion zone during fill placement, all inwater activities will cease immediately. Fill placement activities may resume when the animal(s) has been observed leaving the area on its own accord. If the animal(s) is not observed leaving the area, fill placement activities may begin 15 min (for pinnipeds) or 30 min (for cetaceans) after the animal is last observed in the area.
- Subsistence Activities
  - Signs will be installed reminding the public that State of Alaska Fish and Game regulations prohibit shooting from, on, or across a highway (5 AAC 92.080; ADF&G 2006).

- A polar bear interaction plan would be developed as required by USFWS.

<u>Wildlife—Terrestrial Mammals</u>

- To reduce potential disturbance to caribou during migration, mitigation measures such as those applied at the Red Dog Mine are recommended during construction. Vehicles traveling the project road would be required to stop when they are within sight of migrating caribou either approaching or actively crossing the road. Vehicles would not be permitted to proceed until all caribou have crossed the road. Road closures may last anywhere from 30 minutes to multiple days depending on the number of caribou and speed of travel (USEPA 2009; Teck 2013);

- Reduce speed limit along the project road as well as any temporary spur roads; and

- A bear-human conflict management plan would be developed to reduce potential mortality risk of bears during construction activities. Such a plan would include, among other considerations, measures to manage waste disposal and reduce bear attractants at camps or temporary works sites.

Historic, Architectural, Archaeological, and Cultural Resources

- An Archaeological Monitoring Procedures and Inadvertent Discovery Plan has been developed in consultation between DOT&PF, SHPO, NPS, and local consulting parties to be implemented during the continued planning and execution of the project, including ground-disturbing work associated with construction and material source development; and

- A professional archaeologist would monitor vegetation removal and stripping of fine-grained sediments possibly capping buried gravel deposits within Relic Channel Source 1, and north of the exposed gravel bar within the Wulik River Source 1 area.

Required Permits and/or Approvals

This Finding of No Significant Impact (FONSI) is based on:

- **ESA (Section 7 Informal Consultation) and Marine Mammal Protection Act (MMPA):** The National Marine Fisheries Service and US Fish and Wildlife Service provided concurrence under informal consultation that the project with mitigation measures was not likely to adversely affect Endangered Species or Marine Mammals.

- **EFH:** Concurrence from the NMFS (12/14/17) that the project with mitigation measures was not likely to adversely affect EFH or that adverse effects to EFH would be minimal, with incorporation of specific conservation recommendations.

- **National Historic Preservation Act (NHPA; Section 106):** Concurrence from the SHPO (10/9/17) of no historic properties adversely affected for the proposed project.

- **Department of Transportation Act (Section 4[f]):** Based on concurrence from the NPS (10/6/17) and SHPO (10/9/17) with the finding that no historic properties under NHPA Section 106 will be adversely affected, it is DOT&PF's finding that the project's use of the CKNHL would only result in a *de minimis* impact, and DOT&PF documented its determination in a *De Minimis Impact Finding (Appendix K)*.

Major permits and/or approvals required include:

#	Permit or Authorization; Agency	Why Permit/Clearance is Required
Federal Permits and Authorizations		
1	Section 404/10 *Clean Water Act* (CWA) Wetlands Dredge or Fill Permit; USACE	A Section 404/10 permit is required for the placement of fill within jurisdictional wetlands and waters of the U.S.
2	USCG Bridge Permit	Construction of a bridge or causeway in tidal waters falls under the jurisdiction of the USCG Office of Bridge Programs (33C.F.R. Chapter I, Subchapter J, Part 115).
3	ESA Section 7 Consultation; USFWS	Section 7 consultation is required as part of NEPA when the project may affect a listed Threatened or Endangered species. Section 7 consultation with USFWS would cover potential impacts to Spectacled and Steller's Eiders and Polar Bear Critical Habitat. Consultation with USFWS is complete and they concurred that the project is not likely to adversely affect listed eiders or polar bears (Appendix G).
4	MBTA compliance; USFWS	Compliance with MBTA USFWS recommended "no clearing" timing windows would reduce the potential for incidental take of protected migratory bird species and their nests. USFWS recommended timing window is May 20-July 20.
5	Magnuson-Stevens Fishery Conservation and Management Act EFH consultation and assessment (NMFS)	EFH assessment is prepared by the lead agency (DOT&PF) to describe potential impacts to EFH and propose conservation measures to reduce those impacts. This is used to consult with NMFS, who would either concur on the lead agency's findings or recommend additional conservation measures and/or mitigation. Consultation with NMFS is complete as of approval of the Final EA and additional conservation measures have been incorporated into the project (Appendix I).
6	ESA Section 7 and MMPA Consultation (NMFS)	Section 7 and MMPA consultation is required as part of NEPA when the project may affect a listed Threatened or Endangered species that is also a marine mammal protected under the MMPA. Section 7 and MMPA consultation with NMFS would cover potential impacts to bearded and ringed seals, as well as other listed species that may be encountered along project specific barge routes (if required). Consultation with NMFS is complete and they concurred with a finding of may affect but it not likely to adversely affect, any listed species or critical habitat under NMFS jurisdiction (Appendix G).
State Permits and Authorizations		
7	Cultural, Historical, and Archaeological Resources Consultation (Section 106 Review); DNR, Office of History & Archaeology and SHPO	Section 106 compliance is required as part of NEPA, and provides for the identification and protection of cultural and historic resources that are listed or eligible for listing in the National Register of Historic Places. Consultation is completed with SHPO, Tribes, and other consulting parties, and a determination of effect is issued, with mitigation measures and agreements amongst stakeholders completed as needed, depending on anticipated impacts. Consultation has been completed at the time of this publication.
8	Section 401 Certification – Certificate of Reasonable	A 401 water quality certification would be issued concurrently with the USACE 404/10 permit and notify compliance with state water quality

#	Permit or Authorization; Agency	Why Permit/Clearance is Required
	Assurance; ADEC Division of Water Quality	administrative code. The USACE 404/10 permit would not be issued until this certification is complete.
9	ROW (State-owned non-marine waters and submerged lands); DNR, DMLW	An Interagency Land Management Assignment (ILMA) would be required from DNR DMLW to cross the state owned tidelands with the lagoon crossing.
10	DNR Material Site Designation	To develop any new material sites within state-owned lands, DNR DMLW would need to designate those sites as material sites/sources which would require a "best interest" decision.
11	APDES CGP for Stormwater Discharges Associated with Large and Small Construction Activities; ADEC, Division of Water	For projects with disturbance of over 1 acre, compliance with the APDES CGP is required. A SWPPP and notice of intent to seek coverage under the CGP would be required prior to construction.
12	Title 16 Fish Habitat Permit; ADF&G	For any work below the ordinary high water of a stream containing fish, a Title 16 permit would be required. Measures to maintain fish passage within these waters would be required, as well as measures to avoid and minimize impacts to fish and their habitats.
13	Temporary Water Use Permit (TWUP)	Water use (including water withdrawals, dewatering, diversions) can be authorized through a TWUP. These will last for up to 5 years, and allow the use of water during construction.
Local Permits and Authorizations		
14	Title 9 Community Infrastructure and Conditional Use Permit; NAB Planning Department	Development of lands within the Study Area designated as a Subsistence Conservation District, a conditional use permit would be required from the NAB planning department. Also as the Study Area is not within a zoned NAB resource development or transportation corridor, an evacuation route would need to be zoned as such by the NAB Planning Commission prior to construction.

Federal Finding and Approval

The DOT&PF Statewide Environmental Office (SEO) has determined that the Southern Route with Lagoon Crossing D selected in this decision will have no significant impact on the human environment. This Finding of No Significant Impact (FONSI) is based on the attached Final EA and Section 4(f) *De Minimis* Impact Findings (see Section 5 and Appendix K of the Final EA), which the SEO independently evaluated and determined the documents adequately and accurately discuss the need, environmental issues, and impacts of the proposed project and appropriate mitigation measures. The EA complies with Executive Orders: E.O. 12898, Environmental Justice; E.O. 11988, Floodplain Management; E.O. 11990, Protection of Wetlands; E.O. 11593, Protection and Enhancement of the Cultural Environment; E.O. 13007, Indian Sacred Sites; E.O. 13175 Consultation and Coordination with Indian Tribal Governments; and E.O. 13112, Invasive Species, as amended by E.O. 13751.

The EA and concurrence documents provide sufficient evidence and analysis for determining an Environmental Impact Statement is not required. The DOT&PF SEO takes full responsibility for the accuracy, scope and content of the attached Final EA, and the ESA, MMPA, NHPA, and Department of Transportation Act consultations. A full list of required permits and compliance activities is included in Section 4.15 of the EA.

I have carefully and thoroughly considered the facts contained in the attached EA. Based on that information, I have found the proposed Federal action is consistent with existing national environmental policies and objectives as set forth in Section 101(a) of the National Environmental Policy Act and other applicable environmental requirements. I also find the proposed Federal action will not significantly affect the quality of the human environment or include any condition requiring consultation pursuant to Section 102(2)(c) of NEPA. As a result, DOT&PF Statewide Environmental Office will not prepare an EIS for this action.

1/19/2018

Date

Amy Sumner
Acting Statewide Environmental Program Manager
DOT&PF Statewide Environmental Office

Final Environmental Assessment
Kivalina Evacuation and School Site Access Road

January 2018
Project Number: 0002384/NFHWY00162

Prepared for:

Alaska Department of Transportation & Public Facilities,
Statewide Environmental Office

In Cooperation with:

Northwest Arctic Borough
Native Village of Kivalina
City of Kivalina
NANA Regional Corporation

Prepared by:

State of Alaska
Department of Transportation & Public Facilities, Northern Region
Stantec Consulting Services Inc.
Remote Solutions, LLC

KIVALINA EVACUATION AND SCHOOL SITE ACCESS ROAD
Project Number: 0002384/NFHWY00162

FINAL ENVIRONMENTAL ASSESSMENT

The environmental review, consultation, and other actions required by applicable Federal environmental laws for this project are being, or have been, carried out by DOT&PF pursuant to 23 U.S.C. 327 and a Memorandum of Understanding dated November 3, 2017 and executed by FHWA and DOT&PF.

By the
State of Alaska
Department of Transportation and Public Facilities

The action complies with:
E.O. 12898, Environmental Justice;
E.O. 11988, Floodplain Management;
E.O. 11990, Protection of Wetlands;
E.O. 11593, Protection and Enhancement of the Cultural Environment;
E.O. 13007 Indian Sacred Sites;
E.O. 13175 Consultation and Coordination with Indian Tribal Governments; and
E.O. 13112, Invasive Species, as amended by E.O. 13751.

1/19/2018
Date of Approval

Sarah Schacher
Regional Preconstruction Engineer
State of Alaska Department of Transportation and Public Facilities, Northern Region

1/19/2018
Date of Approval

Amy Sumner
Acting Statewide Environmental Program Manager
State of Alaska Department of Transportation and Public Facilities, Statewide Environmental Office

The following individual may be contacted for additional information concerning this document:

Jonathan Hutchinson, P.E., Project Manager. Alaska Department of Transportation and Public Facilities, Northern Region, 2301 Peger Road, Fairbanks, AK 99709

The Proposed Action would construct a safe, reliable, all-season evacuation road between the community of Kivalina and Kisimigiuqtuq Hill. The proposed project would provide Kivalina residents a safe and reliable evacuation route in the event of a catastrophic storm or ocean surge, allowing evacuees to temporarily mobilize to safe refuge at an assembly site on Kisimigiuqtuq Hill.

SUMMARY OF FINAL ENVIRONMENTAL ASSESSMENT
CHANGES IN RESPONSE TO COMMENTS RECEIVED
for the
KIVALINA EVACUATION AND SCHOOL SITE ACCESS ROAD

Project Number: 0002384/NFHWY00162

The basis of this Final Environmental Assessment (EA) is the Draft EA published November 2017. A notice of availability of the Draft EA for public review was published in the Fairbanks Daily News Miner, Arctic Sounder, and a project interview broadcasted on KOTZ, community public radio, and direct emails sent to ANCSA Corporations, tribal entities, resource and government agency representatives, and other interested parties. The Draft EA notice of availability also advertised three public meetings in Kivalina, Noatak, and Kotzebue to review the Draft EA and request comments. The Draft EA public comment period closed December 15, 2017. Comments were received relevant to changing content of the Draft EA are analyzed below.

Considering the Draft EA input received, aspects of the Proposed Action have changed slightly, and more information has been provided to better explain the decisions made by the DOT&PF. The table below summarizes concerns about the analysis presented in the Draft EA and how the document was revised in response. The table also references the specific EA chapters and sections where more complete information can be found.

Draft EA Comments Summary		
Comment, Agency, Date	**Comment**	**Response/Location of Final EA Changes (as applicable)**
Kivalina Public Meeting Notes, December 5, 2017	• Local residents expressed support for the project.	• Acknowledged.
Kotzebue Public Meeting Notes, December 5, 2017	• Apply for a NWAB Title 9 permit once we have finalized project design. It takes 1-2 months, and will involve rezoning.	• Acknowledged.
	• Incorporate road crossings for subsistence use over the high road	• Section 3.3.1: Added language about slopes being incorporated into turnouts.
	• Address concerns about ice and material that can jam up the bridge and culverts on the causeway	• Section 4.10.2.2: Causeway Impacts to Marine and Anadromous Fish Passage: Added language about culverts needing to maintain an open water passageway. • Section 4.10.3: Added language about causeway culvert(s) design and maintenance
Noatak Public Meeting Notes, December 5, 2017	• Local residents expressed support for the project.	• Acknowledged.

Draft EA Comments Summary		
Kathy Christy, December 6, 2017. Letter.	• Recommend addressing future transportation use of the road once a school is constructed. The proposed road and lagoon crossing should be designed to support year-round bus and pick-up truck use in addition to smaller vehicles.	• Section 4.5.2.2: Increased Access to Adjacent Lands: Added language about increase in traffic volume along the road due to the school.
	• Ongoing road maintenance and operation would also need to occur to ensure year-round use, and that would have a socio-economic impact.	• Section 3.3.1 and 4.3.3: Added language about ongoing Operations and Maintenance for the road.
Sean Eagan, Samantha Simpson, Bonnie Easley-Appleyard, National Marine Fisheries Service, December 12, 2017. Meeting.	• The Wulik River material source is the least desirable material source alternative and may affect spawning. • Can a contract be written that the contractor must exhaust the other three material sources before using the Wulik River material source?	• Section 3.4, 4.3.4, 4.5.3, 4.6.2.3, and 4.10.3: Added language ranking the material sites, and making Wulik River Source available only when others have been exhausted.
	• NMFS would like to review Northeast causeway culvert design for EFH. Annual maintenance will need to be incorporated into the design to meet NMFS EFH concurrence.	• Section 4.10.2.2 and 4.10.3: Added language about culverts needing to maintain an open water passageway.
	• Mitigation measures to address hunting from the causeway need to be incorporated into the EA.	• Sections 4.6.2.2 and 4.12.2.2: Hunting Pressure: Added language about signage
Jill Nogi, EPA, December 13, 2017. Letter.	• Address the potential use of the proposed evacuation road	• Section 2, 4.2, and 4.5.2.2: clarified language to state school construction is remote and speculative. Potential impacts associated with that action is acknowledged, but a full assessment was not completed.
	• Address fugitive dust generation and methods to reduce road dust	• Sections 3.3.1 and 4.3.3: Added language about ongoing Operations and Maintenance to address dust control for the road.
	• Address impacts of fugitive dust on air quality	• Table 2: Updated and added language about impact of dust on air quality.

Draft EA Comments Summary		
	• Address impacts of fugitive dust on water quality and aquatic resources (including wetlands).	• Section 4.8.2.2: Secondary and Cumulative Impacts: Added language about dust impact to water quality from increased traffic. • Section 4.9.2.2: Secondary and Cumulative Impacts: Added language about dust impact to wetlands from increased traffic.
	• Address impacts of dust on subsistence.	• Section 4.6.2.2: Impacts to Subsistence: Added language about dust impacts to vegetation and berry picking resources.
James Balsiger, National Marine Fisheries Service, December 14, 2017. Letter.	• Consult with NMFS on EFH for Wulik River Source #1 prior to allowing the contractor to extract material from the site.	• Section 3.4, 4.3.4 and 4.10.3: Added language ranking the material sites, and making Wulik River Source available only when others have been exhausted.
	• Design the northeast fish passage structure on the causeway to be easily maintained on an annual basis.	• Section 4.10.2.2: Added language about culverts needing to maintain an open water passageway. • Section 4.10.3: Added language about northeastern fish passage structure design and maintenance
Audra Brase, Alaska Department of Fish and Game, December 14, 2017. Meeting.	• Wulik River Material Source: Would like to see connected to channel.	• Section 4.10.3: Added language about connecting material site to Wulik River
	• The Wulik River material source is the least desirable material source alternative.	• Section 3.4, 4.3.4 and 4.10.3: Added language ranking the material sites, and making Wulik River Source available only when others have been exhausted.
	• Incorporate work timing and time constraints for salmon and Dolly Varden.	• Section 4.10.3: Added language about work timing for material sites.
	• Water withdrawal permits will be needed, and should be mentioned in EA.	• Table 20: Updated TWUP language
Audra Brase, Alaska Department of Fish and Game, December 14, 2017. Letter.	• One 17(b) easement appears to cross the southern road route. Legal access should be maintained and identified in the EA.	• Section 4.5.1 and 4.5.2.3: Added language about 17(b) easements. From the BLM easements website, we found that one 17(b) easement is crossed, using the Haul Route between Kivalina and DMTS.
	• The Wulik River material source is the least desirable material source alternative.	• Section 3.4 and 4.10.3: Added language ranking the material sites, and making Wulik River Source available only when others have been exhausted.

Draft EA Comments Summary		
	• The Wulik River material source could entrap fish and prevent spawning. Recommendations would include only extract during the winter, and connecting to the Wulik River channel.	• Section 3.4, 4.3.4 and 4.10.3: Added language ranking the material sites, and making Wulik River Source available only when others have been exhausted. • Section 4.10.3: Added language about connecting material site to Wulik River
	• Supports reclamation of sites, including shallow littoral zones and developing riparian areas for migratory bird habitat.	• Section 4.10.3: Added language about reclamation of material sites
Louise Smith, Katie Ott, US Fish and Wildlife Service, December 14, 2017. Meeting.	• Concerns about material sites creating predatory and overwintering fish habitat.	• Section 3.4, 4.3.4 and 4.10.3: Added language ranking the material sites, and making Wulik River Source available only when others have been exhausted. • Section 4.10.2.3: Added language about predator-prey relationships in the Wulik River are not anticipated to be altered.
Dianna Leinberger, Alaska Department of Natural Resources, December 15, 2017. Letter.	• The project will require a Temporary Water Use Permit.	• Section 4.8.2.2: Impacts to Wulik River Hydrology: Updated language for permits.
	• Multiple water rights exist on the Wulik River, which have not been mentioned in EA.	• Section 4.8.1.2 and 4.8.3: Added language about water rights on the Wulik River and potential impacts. Section 4.6.2.2 and 4.6.2.3 already addressed impacts to the community's drinking water source.
	• Material sites would be easier to permit if they did not have submerged lands. Wulik River Relic Channel Source 2 in the EA appears to include submerged lands. Perhaps another figure to exclude some of that material site should be used.	• Acknowledged. Section 4.5.3: Added commitment to work with DNR during permitting the material sites to avoid submerged lands. Figures: The boundaries of the Wulik Relic Channel Source 2 have been modified to avoid use of submerged lands.
NMFS Informal Consultation	• Through several informal discussions with NMFS, project design and construction methodologies were refined to minimize and mitigate potential impacts to marine mammals.	• Section 4.3.1, 4.3.2, 4.10.2.2, 4.10.3, 4.11.2.2 4.12.1, 4.12.2, and 4.12.3: Language modified to commit to pile driving within constructed embankments and align with NMFS consultation. In addition, level of detail regarding impacts of in-water pile driving in these Sections was reduced since the project will no longer result in these impacts due to this commitment.

Draft EA Comments Summary		
Kivalina resident Larry Adams 12/16/17 Kivalina IRA Tribal Transportation Program Comment Form	• Supports the project. • Why: "*Because we need it.*" • No further suggestions or comment.	• Acknowledged. Thank you for your input.
Kivalina resident Eugene W. 12/12/17 Kivalina IRA Tribal Transportation Program Comment Form	• Supports the project, with written addition: "*You'd better believe it!*" • Why: "*Want to live, and save earthly material things we own. We cannot start over and buy a house, vehicles, tools, clothes, etc.*" • Suggestions: "*Start both at the new site and existing site together [with] many crews working to meet in the middle. This is the fastest and easiest way, all the gravel is mostly at the new site.*" • Comments: "*Please hurry and thanks for your time and help to move our community.*"	• Acknowledged, with the clarification that the proposed project scope is solely to construct an evacuation road to the Kisimigiuqtuq Hill evacuation site and not to additionally develop infrastructure that would serve to move or relocate the community in part or whole. Thank you for your input.
Kivalina resident Monetta Adams 12/16/17 Kivalina IRA Tribal Transportation Program Comment Form	• Supports the project. • Why: "*For safety purposes in case of storm surge and in case we need funding for water/sewer*." • Suggestions: "*For development of the road we would need a lot of communication between entities, stakeholders and especially the public.*" • Comments: "*Continue to work with us! You guys are doing great!*"	• Acknowledged, with the clarification that the proposed project scope is solely to construct an evacuation road to the Kisimigiuqtuq Hill evacuation site and not to additionally develop or provide funding for water or sewer infrastructure in part or whole. Thank you for your input.

Draft EA Comments Summary		
Kivalina resident Stanley Hawley 12/12/17 Kivalina IRA Tribal Transportation Program Comment Form	• Supports the project. • Why: *"We have nowhere to go if and when the high water overtops K*[ivalina] *Is*[land]. • Suggestions: *"Make it big and solid enough to support a village relocation."* • Comments: *"Just do it!"*	• Acknowledged, with the clarification that the proposed project scope is solely to construct an evacuation road to the Kisimigiuqtuq Hill evacuation site and not to additionally develop infrastructure that would serve to move or relocate the community in part or whole. The road will be constructed using AASHTO guidelines for GEOMETRIC DESIGN OF VERY LOW VOLUME LOCAL ROADS, which is the DOT&PF statewide standard for low volume gravel roads. Thank you for your input.
Kivalina resident L. Adams 12/12/17 Kivalina IRA Tribal Transportation Program Comment Form	• Supports the project. • Why: "*Safety"* • Suggestions: "*Don't make it too tall."* • Comments: "*N/A"*	• Acknowledged. The road and causeway will be constructed to an elevation sufficient to remain above the 100 year storm surge to ensure evacuation safety during severe storm events, and with typical 3-to-1 embankment side slopes. Various pull outs along the road will incorporate more gradually sloped embankments to allow for ease of ATV/snowmachine/pedestrian access to surrounding lands. Thank you for your input.
Kivalina resident Alice B. Swan 12/12/17 Kivalina IRA Tribal Transportation Program Comment Form	• Supports the project. • Why: *"Everything has just weight to it, there's good and bad to it, but I think it would benefit the town of Kivalina for safety purposes."* • Suggestions: *"It would have to be built to withstand the harsh weather as well as the force and power of the ocean."* • Comments: *"Consult our elders, hire as many locals as you can, try not to limit qualifications but take into consideration knowledge of work ethics and hard workers."*	• Acknowledged. DOT&PF has continuously sought community input during project development, and appreciates the significant Traditional and local knowledge brought to the project team by local residents. Of particular importance was the meeting with the Tribal Council and attended by a number of community Elders, all of whom shared important details about land, water and wildlife resources in the project area. While DOT&PF cannot insist that contractors hire staff or equipment locally, once project construction funding is identified and made available, we will hold at least one pre-construction meeting in Kivalina specifically to allow the community to share information on the availability of qualified workers, equipment and other local resources with whichever contractor is selected for project construction. Thank you for your input.

Draft EA Comments Summary		
Kivalina resident Amos Hawley Jr. 12/13/17 Kivalina IRA Tribal Transportation Program Comment Form	• Supports the project. • Why: *"Since climate* [and] *weather changes, it is very serious that we have a road to get to safe ground."* • Suggestions: "*That it will be able to last for many severe disasters and to protect the people of the village."* • Comments: *"We have waited long enough for the road project. Make our community more aware of the road safety."*	• Acknowledged. The road and causeway will be constructed to an elevation sufficient to remain above the 100 year storm surge to ensure evacuation safety during severe storm events, and will be constructed to standards of arctic engineering that, provided normal use and adequate routine maintenance, should be very durable. Thank you for your input.
Kivalina resident Lowell Sage Jr. 12/13/17 Kivalina IRA Tribal Transportation Program Comment Form	• Supports the project. • Why: "*In case of emergency, we need a place to go."* • Suggestions: "*Barge in the heavy duty equipment – wait for freeze-up* [to] *build an ice road, move equipment to the site, build road from there to* [the] *village."* • Comments: *"Hire local as much as you can."*	• Acknowledged. Though DOT&PF anticipates that equipment will be mobilized by barge to the project area, it has yet to be determined what specific construction method and sequencing will be utilized by the eventual project construction contractor to build the road, and your comment will be incorporated into the discussions on that topic. While DOT&PF cannot insist that contractors hire staff or equipment locally, once project construction funding is identified and made available, we will hold at least one pre-construction meeting in Kivalina specifically to allow the community to share information on the availability of qualified workers, equipment and other local resources with whichever contractor is selected for project construction. Thank you for your input.
Kivalina resident Becky Norton 12/13/17 Kivalina IRA Tribal Transportation Program Comment Form	• Supports the project. • Why: *"Because we need it."* No further comments or suggestions.	• Acknowledged. Thank you for your input.

Draft EA Comments Summary		
Kivalina resident Gary Swan 12/12/17 Kivalina IRA Tribal Transportation Program Comment Form	• Supports the project. • Why: *“Possible expansion of village.”* • Suggestions: *“Add at least 2 turn around points if not planned already.”* • Comments: *“Have mile markers posted.”*	• Acknowledged, with the clarification that the proposed project scope is solely to construct an evacuation road to the Kisimigiuqtuq Hill evacuation site and not to additionally develop infrastructure that would serve to expand the village in part or whole. Multiple turn out points, anticipated to average one per mile, are already incorporated into road design. Your recommendation on placement of mile markers along the road will be brought forward to the final design process once the environmental document is finalized and approved. Thank you for your input.
Kivalina resident Austin Swan Sr. 12/12/17 Kivalina IRA Tribal Transportation Program Comment Form	• Supports the project. • Why: No response. • Suggestions: *“Rail guard at causeway.”* • Comments: None.	• Acknowledged. Installation of guard rails has previously been considered, and the preliminary project design specifies that guard rails may be incorporated at portions of the project to address specific safety concerns. You comment on installing guard rails along the causeway will be brought forward into the final design process once the environmental document is finalized and approved. Thank you for your input.
Kivalina resident Ida Swan 12/13/17 Kivalina IRA Tribal Transportation Program Comment Form	• Supports the project. • Why: *“To help* [the] *village.”* • Suggestions: “*Build a bridge.”* • Comments: *“Readiness for* [the] *village in case of storms. Thanks for helping us.”*	• Acknowledged. The preliminary project causeway design incorporates a 160 ft. long bridge over the 110 ft. wide lagoon channel that parallels Kivalina Island. The bridge will be built to specifications that will allow boats, marine mammals, fish and tidal flows to pass through the causeway freely to ensure there are no adverse impacts to biological resources or human uses. Also, several large culverts will be included at the eastern end of the causeway to allow fish and tidal flows to pass through the causeway at its eastern end. Additional elevated cross-culverts will also be installed in the causeway to allow water to pass through the causeway during high water events. Thank you for your input.

Draft EA Comments Summary		
Kivalina resident Andrew Baldwin 12/14/17 Kivalina IRA Tribal Transportation Program Comment Form	• Supports the project. • Why: No response. • Suggestions: *Cement road or gravel, and wide enough for 2 Hondas to travel."* • Comments: "*No comments."*	• Acknowledged. The preliminary project design is for a causeway, bridge and gravel road with a 24 ft wide, two-lane/two-way surface with turn outs averaging one mile apart. Thank you for your input.
Kivalina resident Leona Baldwin 12/14/17 Kivalina IRA Tribal Transportation Program Comment Form	• Supports the project. • Why: No response. • Suggestions: *"We need a wide road if we have to evacuate, and we need to relocate."* • Comments: *"They will need to watch the kids if they build the road."*	• Acknowledged. The preliminary project design is for a causeway, bridge and gravel road with a 24 ft wide, two-lane/two-way surface with turn outs averaging one mile apart; however, the proposed project scope is solely to construct an evacuation road to the Kisimigiuqtuq Hill evacuation site and not to additionally develop infrastructure that would serve to expand the village in part or whole. To provide for public safety during construction, the contractor would be required to work with the community to develop and implement traffic control and worksite safety plans that would incorporate measures protecting the safety of local vehicle operators (highway vehicles, ATVs, snowmachines, boats, bicycles, etc.) and pedestrians in the project area. Thank you for your input.
Kivalina resident Oral Hawley 12/06/17 Kivalina IRA Tribal Transportation Program Comment Form	• Supports the project. • Why: "*The safety of the village to evac to a safe* [location] *from flooding stage or perilous weather."* • Suggestions: *"Who is going to maintain road when complete? The higher above flood stage the better to travel on. Make sure to use delineators for path/road, and berm on edge of road."* • Comments: *"Please consider to expedite the evac road and school site to be built as I am now nearing elder age and hearing of relocate*[ing] *the village since I was seven years old."*	• Acknowledged. DOT&PF anticipates that a maintenance agreement will be developed with the City of Kivalina to maintain the road once it is completed. The road and causeway will be constructed to an elevation sufficient to remain above the 100 year storm surge to ensure evacuation safety during severe storm events. Roadway delineators have been previously discussed during design, and currently are anticipated to be placed where safety concerns warrant. Your comment to provide delineators for the entire roadway and to berm the road edge will be brought forward to the final design process once the environmental document is finalized and approved. Thank you for your input.

Draft EA Comments Summary		
Kivalina resident Dolly E. Foster 12/06/17 Kivalina IRA Tribal Transportation Program Comment Form	• Supports the project. • Why: *“Safety precaution of life.”* • Suggestions: *“Please incorporate local hire in the plans. And local leaders in the discussions as much as possible.* • Comments: No reponse.	• Acknowledged. While DOT&PF cannot insist that contractors hire staff or equipment locally, once project construction funding is identified and made available, we will hold at least one pre-construction meeting in Kivalina specifically to allow the community to share information on the availability of qualified workers, equipment and other local resources with whichever contractor is selected for project construction. DOT&PF is committed to maintaining open communications and working with local community leadership throughout the remainder of the design process, and throughout any future construction activities until project completion. Subsequent to project construction, it is anticipated that the City of Kivalina would be maintaining the road under an agreement with DOT&PF, which would ensure ongoing communications with community leaders. Thank you for your input.
Kivalina resident Sylvester Swan III 12/06/17 Kivalina IRA Tribal Transportation Program Comment Form	• Supports the project. • Why: *“The reason I chose yes* [marked the check line indicating support for the project] *is because we the people of Kivalina NEED a*[n] *evacuation route.”* • Suggestions: *“Not sure at the moment.”* • Comments: *“We really need a*[n] *evacuation route for our village.”*	• Acknowledged. Thank you for your input.
Kivalina resident Laretta Adams 12/06/17 Kivalina IRA Tribal Transportation Program Comment Form	• Supports the project. • Why: *“Because we are in need of relocation.”* • Suggestions: *“I suggest more houses or apartments to rent. We need more places to live for we are a growing village.”* • Comments: *“Thanks for all you are doing for Kivalina.”*	• Acknowledged, with the clarification that the proposed project scope is solely to construct an evacuation road to the Kisimigiuqtuq Hill evacuation site and not to additionally develop infrastructure that would serve to expand the village in part or whole. Thank you for your input.

Draft EA Comments Summary		
Kivalina resident Shirley Adams 12/06/17 Kivalina IRA Tribal Transportation Program Comment Form	• Supports the project. • Why: *"Yes, because we need a road to higher ground in case we start sinking deeper."* • Suggestions: *"No suggestions, thanks."* • Comments: *"Patiently waiting ☺."*	• Acknowledged. Thank you for your input.
Kivalina resident Kelly Hawley 12/06/17 Kivalina IRA Tribal Transportation Program Comment Form	• Not sure about the project. • Why: *"I am not sure, I've been to meetings but I don't speak or say anything about the road."* • Suggestions: "*No suggestions."* • Comments: "*Will we be able to travel on the road at any time of the day?"*	• Acknowledged. The road is being designed as an all-season, all weather road. While lighting of the road is not within the scope of the project, DOT&PF does not impose travel restrictions prohibiting travel during any time of the day. The only foreseeable circumstance that may restrict travel would be if a safety concern emerges at some time in the future that requires a temporary road closure for repairs or maintenance. Thank you for your input.
Kivalina resident Robert Swan 12/06/17 Kivalina IRA Tribal Transportation Program Comment Form	• Supports the project. • Why: *"Because it's something to do besides wondering what to do."* • Suggestions: *Side walks, bus stops, bus tickets."* • Comments: *"Stop signs, miles limitation, fences."*	• Acknowledged. The preliminary project design is for a causeway, bridge and gravel road with a 24 ft wide, two-lane/two-way surface with turn outs averaging one mile apart. While it is anticipated that guard rails may be installed where safety concerns warrant them, the addition of sidewalks, bus stops, or public transit system development (bus tickets) is beyond the project scope. Road signage, including the installation of stop signs, mile markers and road delineator marking, has been discussed and your comment will be brought forward into final design for consideration. Thank you for your input.
Kivalina resident Quunguq Hawley 12/07/17 Kivalina IRA Tribal Transportation Program Comment Form	• Supports the project. • Why: *"Because erosion is getting bad by the year."* • Suggestions: "*Need to hurry up."* • Comments; "*N/A"*	• Acknowledged. Thank you for your input.

Draft EA Comments Summary		
Kivalina resident Coolbreeze 12/07/17 Kivalina IRA Tribal Transportation Program Comment Form	• Supports the project. • Why: *Ocean waves and ocean current* [are] *too dangerous for our Island along the coast.* • Suggestions: *"None"* • Comments: *"Taking too long, just like relocation, still no results there. I'm afraid just a road will be the same thing, probably better to expand the village."*	• Acknowledged. Recognizing that the process of project preliminary design and environmental documentation is often long and tedious, and that the community of Kivalina is in immediate danger due to coastal erosion, DOT&PF has made all attempts to accelerate this project to the degree we can while still responsibly addressing critical engineering and environmental issues. Thank you for your input.
Kivalina resident Anonymous 11[12?]/07/17 Kivalina IRA Tribal Transportation Program Comment Form	• Supports the project. • Why: [Respondent circled the "Why not?" question as a creative statement of support.] • Suggestions: *"Get it DONE!!"* • Comments: *"When will it be DONE?"*	• Acknowledged. Thank you for your input.
Kivalina resident Dollie A. Hawley 12/07/17 Kivalina IRA Tribal Transportation Program Comment Form	• Supports the project • Why: *"Because in Kivalina, Alaska, we now get heavy unpredictable storms throughout the year. We need our Grandchildren to run to safety when they need to evacuate from the Kivalina Island in the future."* • Suggestions: *"It is pretty structured, I hope, but I keep hoping that they use bailored material."* • Comments: *"I am very happy that DOT has made an effort to help the Kivalina IRA (the Village of Kivalina) to build an Evacuation Road for the safety of our people. We need the road built because it is very important, for our village is getting smaller and sinking."*	• Acknowledged. DOT&PF will not use "bailored" material (understood to mean a combination of baled trash from the landfill combined with gravel, etc.), as contaminants present in baled solid waste would pose an environmental hazard were they to become suspended in dust by traffic, or leach into adjacent lands or the lagoon during rain events or spring breakup. Clean, new gravel and rock materials for road and causeway construction are anticipated to be obtained from proposed material sites at Kisimigiuqtuq Hill as well as several sites within the Wulik River floodplain which will be reclaimed to areas supporting fish and wildlife habitats once extraction is complete. Thank you for your input.

Draft EA Comments Summary		
Kivalina resident Anonymous No date Kivalina IRA Tribal Transportation Program Comment Form	• Supports the project. • Why: *"Safety"* • Suggestions: "*Get it done, quit Kainaqaking."* • Comments: "*N/A"*	• Ii! Tautugukkigaptauq. Taiku. (We want to get it done too. Thank you.)
Noatak resident Joseph Luther 12/05/17 Draft EA Comment Form; Noatak Public Meeting	• Comment: *What kind of material would be used because lots of marsh conditions you have to go through?"*	• Project materials will be a combination of armor rock, crushed rock, and borrow/gravel obtained from the proposed Kisimigiuqtuq Hill, Wulik Relic Channel Sources 1 & 2 and, if necessary, the Wulik River Source. These are detailed in EA Section 4.3.4. Thank you for your input.
Noatak resident Melford Booth 12/05/17 Draft EA Comment Form; Noatak Public Meeting	• Comment: *"I would support the shortest route."*	• Acknowledged. Thank you for your input.
Noatak resident Ricky 12/05/17 Draft EA Comment Form; Noatak Public Meeting	• Comment: "*July or-winter time good for working before rainy season, and after freeze up. Also, on gravel pit snow fence on gravel site. Thank for the efforts to help our neighbors.*	• Acknowledged. Construction scheduling will be developed in detail during final design and coordinated with the project construction contractor to maximize project efficiency as well as prevent adverse environmental impacts. Your comment to place snow fencing at the material sites will be forwarded into the final design process. Thank you for your input.
Kivalina resident Heather Dominguez 12/05/17 Draft EA Comment Form; Kivalina Public Meeting	• Comment: "*It would be nice to be able to fish off of the bridge, but at the same time I don't want it to be a bridge that would be easily accessible to "jumpers".*	• Acknowledged. At this time it is unknown whether there would be a need to restrict fishing from the bridge or its abutment areas, however it has been discussed that hunting from the bridge or causeway would be in violation of existing regulations prohibiting shooting from, on, or across roadways. There have not been discussions on any bridge structure accessories that would serve to prevent jumping from the bridge, and your comment will be brought forward into final design for consideration. Thank you for your input.

Draft EA Comments Summary		
Kivalina resident Nathan Koonook 12/05/17 Draft EA Comment Form; Kotzebue Public Meeting	• Comment: *"Is there going to be a setup or protocol in case of environmental incidents that happen? And as far as waste will you be taking care of wastes that need to be shipped out?*	• Construction contractors will be required to implement documented environmental commitments to protect the natural and human environment. Examples of these Avoidance, Minimization, and Mitigation measures are outlined in Section 4.9.3 of the Draft EA and address protecting wetland and habitats, minimizing construction disturbance and sediment runoff, and maintaining surface water setbacks for vehicle fueling and maintenance. Section 4.7.2.2 of the EA specifies that plans will be developed for disposal and off-site hauling of construction waste, as the Kivalina landfill has insufficient area to accommodate the volume anticipated for the project. Thank you for your input.

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APPENDICES

LIST OF ACRONYMS

AAC	Alaska Administrative Code
ADEC	Alaska Department of Environmental Conservation
ADF&G	Alaska Department of Fish and Game
AHRS	Alaska Heritage Resources Survey
ANCSA	Alaska Native Claims Settlement Act
APDES	Alaska Pollutant Discharge Elimination System
APE	Area of Potential Effect
ATVs	all-terrain vehicles
AVEC	Alaska Village Electric Cooperative
AWC	Anadromous Waters Catalog
BMP	best management practice
CFR	Code of Federal Regulations
cfs	Cubic Feet per Second
CGP	Construction General Permit
CKNHL	Cape Krusenstern National Historic Landmark
CWA	*Clean Water Act*
CY	cubic yards
DCCED	Department of Commerce, Community, and Economic Development
DMTS	DeLong Mountain Transportation System
DNR	Alaska Department of Natural Resources
DOT&PF	Alaska Department of Transportation and Public Facilities
DPS	Distinct Population Segment
EFH	Essential Fish Habitat
ESA	*Endangered Species Act*
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FONSI	Finding of No Significant Impact
ft	feet
ILMA	Interagency Land Management Assignment
IRA	*Indian Reorganization Act*
K-Hill	Kisimigiuqtuq Hill
MBTA	*Migratory Bird Treaty Act*
MLLW	mean lower low water
MMPA	*Marine Mammal Protection Act*
NAB	Northwest Arctic Borough
NANA	NANA Regional Corporation

NEPA	*National Environmental Policy Act*
NLURA	Northern Land Use Research Alaska, LLC
NMFS	National Marine Fisheries Service
NPS	National Park Service
NWI	National Wetland Inventory
PSO	Protected Species Observer
PVC	polyvinyl chloride
ROW	right-of-way
SAIC	Science Applications International Corporation
SEL	sound exposure level
SHPO	State Historic Preservation Office
Stantec	Stantec Consulting Services Inc.
SWPPP	Storm Water Pollution Prevention Plan
U.S.	United States
USACE	U.S. Army Corps of Engineers
USCG	U.S. Coast Guard
USDOI	U.S. Department of the Interior
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Service
WAH	Western Arctic Herd

1 PROPOSED ACTION

Project Location

The proposed project origin is at the City of Kivalina, located on the southeast tip of the barrier island located between the Chukchi Sea (Arctic Ocean) and Kivalina Lagoon (Figure 1). The project terminus is located on the mainland across the Kivalina Lagoon approximately six miles northeast at a community selected evacuation site on Kisimigiuqtuq Hill (K-Hill). The Study Area encompasses the Kivalina barrier island, the southern portion of Kivalina Lagoon, and the lower Wulik and Kivalina River drainages.

Proposed Action

The Proposed Action would construct a safe, reliable, all-season evacuation road between the community of Kivalina and K-Hill. A range of route alternatives are being considered (discussed further in Section 3), but common to all are the following actions:

- **Establishment of a safe, reliable, all-season Kivalina Lagoon crossing.** All alternatives include construction of a causeway across the lagoon that variously incorporate different configurations of hydrological openings including bridge(s), culvert(s), or both;
- **Construction of an all-season access road connecting the Kivalina Lagoon crossing to the K-Hill evacuation site.** The road would be designed to accommodate a wide variety of motorized vehicles over a two-way road with shoulders, multiple turnouts, and side slopes that may include guardrail and other safety features (e.g. signage) where determined to be necessary and prudent; and
- **Development of up to four material sources including the K-Hill Site, Wulik River Source 1, Relic Channel Source 1, and Relic Channel Source 2.** These material sources are anticipated to be suitable local sources of select material to supply the project. Selection and development of viable material sources and haul routes are considered as part of the Proposed Action.

2 PURPOSE AND NEED

Background

The community of Kivalina has been working for decades with a variety of local, state, and federal agencies to address threats of coastal erosion and flooding. Numerous study, concept, and planning documents exist on potential solutions, which range from erosion protection around a portion of the barrier island to relocation of the entire community at a new mainland site. Issues surrounding community relocation have been challenging to overcome, as they are neither culturally preferable nor fiscally practicable in the foreseeable future. Consequently, Kivalina proposes to develop a safe, reliable, and direct means of temporary community evacuation to an acceptable mainland location on K-Hill.

Purpose

The Kivalina Evacuation and School Site Access Road project would provide Kivalina residents a safe and reliable evacuation route in the event of a catastrophic storm or ocean surge, allowing evacuees to temporarily mobilize to safe refuge at an assembly site on K-Hill. This site is also identified by the Northwest Arctic Borough School District, and approved by the community, as a preferred new location for the community school. While school construction is remote and speculative[1], if constructed within the vicinity of the project terminus, the school could augment the undeveloped evacuation site by serving as a full-service community emergency shelter with all-season support capabilities.

Need

Recent climate data has indicated that arctic sea ice is forming later in the season, increasing fall and winter storm duration and intensity along the Northwest Arctic coast (Simmonds and Keay 2009; Screen et al. 2013). Consequently, residents of Kivalina face significant and increasing risks to life, health, and safety by storm systems predicted to further intensify over time (Brubaker et al. 2010). The need for a concerted effort to mitigate these risks became more evident during an evacuation event in October 2007, when debris-laden storm waves overtopped the barrier island. The event resulted in the need for helicopters to carry evacuees off the island, and illustrated that Kivalina currently has no safe method of evacuation in the event of a catastrophic storm surge. In the face of this increased threat, Kivalina needs a safe and reliable means of evacuation.

[1] An action or impact occurring at some distance or time in the future that depends on assumptions or events that are contingent, conjectural, or problematic [Eccleston, 2000]

3 ALTERNATIVES

For over a decade, Kivalina and the Northwest Arctic Borough (NAB) have evaluated the feasibility of numerous road routes, lagoon crossing options, and material source locations that could provide for evacuation road construction as well as other infrastructure or general material needs. DOT&PF has been working with the community, local and regional government stakeholders, and state and federal agencies to refine evacuation road alternatives to be evaluated under the *National Environmental Policy Act* (NEPA) (see Figures 2 and 3).

<u>Road Route Alternatives</u>: Three preliminary route options (Northern, Southern, and Combined Route A) were independently proposed by Kivalina and the NAB within the Study Area (Community Proposed Alternatives, Figure 2). These community initiated route concepts were refined and a fourth route was developed (Combined Route B) based on feedback received during public and agency scoping efforts in the fall of 2016. Route alternatives were evaluated for feasibility based on purpose and need; engineering considerations; wetland, fish, and wildlife impacts; number and type of water crossing structures; proximity to material sources; and cost. After evaluation (see Table 1), Combined Route B and the Southern Route have been determined feasible for further consideration. The Southern Route is the Preferred Alternative.

<u>Lagoon Crossing Alternatives</u>: Four lagoon crossing alternatives (Solid Causeway, Solid Causeway with Culverts, Solid Causeway with Culverts and Bridge, and Full Span Bridge) were considered and developed in collaboration with the community of Kivalina, agency stakeholders, and other local and regional stakeholders. Community input was gathered to determine the alternatives' ability to accommodate lagoon boat traffic and local subsistence activities. Agency input was used to evaluate potential resource impacts of the lagoon crossing alternatives. These alternatives were also evaluated for feasibility based on purpose and need, engineering considerations, hydrology, sediment transport, erosion, fish and wildlife passage, habitat impacts, and cost. After evaluation, only the Lagoon Crossing D was determined feasible and is carried forward for further evaluation (Table 1).

<u>Material Source Location Alternatives</u>: Four general areas known to contain potentially viable sources of various project materials were evaluated in past studies. Several material source locations within these areas were evaluated for feasibility based on proximity to potential routes, quantity and quality of material, access constraints, and potential impacts to protected resources (Golder Associates 2013). After evaluation, four potential sources within these areas have been determined feasible and are carried

forward for further evaluation (K-Hill, Wulik River Channel Source 1, Wulik Relic Chanel Source 1 and 2).

- **K-Hill**: K-Hill geology is characterized by exposed limestone and rock rubble at the ground surface. It is anticipated that sub-surface, larger frost-fractured rocks and boulders may also exist that may be suitable for armoring the lagoon crossing (Golder Associates 2013). Although the full extent of K-Hill has not been characterized for material availability and quality, one potential material source on the southeast side of K-Hill has been identified;
- **Wulik River Deposition:** This area is characterized by gravel deposits that contain suitable materials for construction of the proposed road (Golder Associates 2013). Three known locations with the potential for material extraction have been identified in the Wulik River Deposition area;
- **Wulik River Relic Channel**: This area is characterized by gravel and sand at the ground surface and contains suitable materials for construction of the proposed road (Golder Associates 2013). The Wulik River Relic Channel contains three known locations with the potential for material extraction; and
- **Kivalina River Deposition**: This area is characterized by gravel bars that contain suitable materials, with the potential for extraction, for construction of the proposed road (Golder Associates 2013). This area contains several gravel bars with the potential for material extraction.

3.1 Alternatives Evaluation

The following road route, lagoon crossing, and material source location alternatives (Figures 2 and 3) were evaluated based on the criteria detailed above and determinations were made to dismiss them without further study or carry them forward for full environmental assessment.

Table 1 Alternatives Evaluated

Alternative	Description	Alternative Evaluation
Lagoon Crossing Alternatives		
Crossing A	**Solid Causeway.** Lagoon Crossing A would require an approximately 3,200 ft solid earthen causeway armored with roughly 4 ft thick armor stone and under layer stone. A series of smaller overflow pipes would be placed in even increments over the length of the solid portions of the causeway to provide conveyance during high water events.	**This alternative is dismissed from further evaluation** as it does not meet environmental requirements regarding continued passage of fish and marine mammals, and may cause adverse impacts to natural hydrological regimes. It also does not allow for boat passage, which is preferred by the community.
Crossing B	**Solid Causeway with Culverts.** Lagoon Crossing B would require an approximately 3,200 ft solid earthen causeway armored with roughly 4 ft thick armor stone and under layer stone. Multiple large culverts, designed to accommodate all life-stage passage of fish, would be constructed at both the southwest and northeast end of the causeway. In addition, a series of overflow pipes would be placed incrementally over the length of the causeway to provide additional conveyance during high water events.	**This alternative is dismissed from further evaluation** as it does not meet environmental requirements regarding continued passage of marine mammals. It also does not allow for safe or efficient boat or snow machine passage beneath the causeway, which is preferred by the community.
Crossing C	**Full Span Bridge.** Lagoon Crossing C would require an approximately 3,200 ft bridge to cross the lagoon to the mainland.	**This alternative is dismissed from further evaluation** due to several factors: 1. Prohibitive cost ($90-$110M). 2. Substantially greater construction noise and vibration impacts, spread out over multiple seasons (a 30 span bridge would be required), as well as additional temporary work trestles with additional pile impacts. 3. Increased construction time (anticipated four full construction seasons would be required) would delay safe and reliable evacuation route in the event of a catastrophic storm surge.
Crossing D (Preferred Alternative)	**Solid Causeway with Culverts and Bridge.** Lagoon Crossing D would require an approximately 3,020 ft solid, armored, earthen causeway. A single span bridge would cross the existing 110 ft lagoon channel located approximately 160 ft northeast from the barrier island. Large culvert(s) designed to accommodate all life-stage passage of fish, would be constructed at the northeast end of	**This alternative is considered feasible and is incorporated in the Preferred Alternative**. Crossing D provides the most feasible lagoon crossing option that balances community preference, cost, and environmental considerations. The single span bridge across the lagoon channel, large culvert pipes on the northeast end of the causeway, and a series of overflow pipes over the length of the causeway would

Alternative	Description	Alternative Evaluation
	the causeway. A series of overflow pipes would be placed incrementally over the length of the solid portions of the causeway to provide additional conveyance during high water events.	minimally impact natural hydrological regimes. The bridge over the existing lagoon channel would also provide passage of fish and marine mammals as well as boat passage for the local community.
Evacuation Route Alternatives		
Northern Route	**The Northern Route** was originally proposed by the community of Kivalina and the NAB, and later refined by DOT&PF subsequent to the public and agency scoping process. The Northern Route is approximately 9.5 miles in length. The route would originate near the south end of the Kivalina Airport, parallel the runway on its northeast side northward for approximately 1.5 miles, cross the lagoon eastward via a causeway and/or bridge, and follow higher ground between the Wulik and Kivalina Rivers to its terminus at K-Hill.	**This route is dismissed from further evaluation** as it does not meet the purpose and need of the project by failing to provide a safe and reliable evacuation route in the event of a catastrophic storm surge. The Northern Route would require Kivalina residents to travel 1.5 miles along the barrier island during an evacuation when prolonged exposure to debris laden waves would increase danger during transit. In addition, the Northern Route would require a large amount of fill to be placed in Kivalina Lagoon marine intertidal wetlands for the portion of the route that parallels the airport in order to remain compatible with adjacent aviation related land uses. This would cause additional environmental impacts and significant cost increase.
Combined Route A	**The Combined Route A** was originally proposed by the community of Kivalina and the NAB, and is approximately 8.6 miles in length. Combined Route A would follow the Northern Route northward along the barrier island, across the lagoon, and then eastward for approximately 4.1 miles before merging with the Southern Route via a one mile long connecting segment.	**This route is dismissed from further evaluation** as it does not meet the purpose and need of the project by failing to provide a safe and reliable evacuation route in the event of a catastrophic storm surge. It follows the same route along the barrier island as the Northern Route and would put residents in potential danger during an evacuation by prolonging exposure to intense storm surge waves and debris. In addition, the Combined Route A would require a large amount of fill to be placed in Kivalina Lagoon marine intertidal wetlands for the portion of the route that parallels the airport in order to remain compatible with adjacent aviation related land uses. This would cause additional environmental impact and significant cost increase. The mainland portion of the route deviates southward from the Northern Route to provide a shorter, more direct route to K-Hill. However, the more direct route would require additional water crossings and traverse additional lowlands.

Alternative	Description	Alternative Evaluation
Southern Route (Preferred Alternative)	**The Southern Route** was originally proposed by the community of Kivalina and the NAB, and later refined by DOT&PF subsequent to the public and agency scoping process in fall 2016. The Southern Route is approximately 7.7 miles in length and would begin near the south end of the Kivalina Airport, immediately cross the lagoon eastward, and follow lowlands between relic channels of the Wulik River to K-Hill. The embankment northeast of the lagoon would be armored with rock.	**This route is considered feasible and is the Preferred Alternative**. The Southern Route was identified as a feasible option as it follows the most direct path from the community across the Kivalina Lagoon to the mainland and therefore provides the safest, most reliable evacuation route across the lagoon in the event of a catastrophic storm surge. The mainland portion of the route lies between the active Wulik River and a series of relic channels and is proximal to several viable material source options on either side of the route. The route also minimizes impacts by following the shortest, most direct mainland route to the terminus.
Combined Route B	**The Combined Route B** is approximately 8.9 miles long and was developed subsequent to public and agency scoping. The route would begin near the south end of the Kivalina Airport, immediately cross the lagoon eastward, and follow lowlands and relic channels of the Wulik River for approximately 5 miles before shifting northward, following higher ground approximately 3.9 miles to the terminus. The embankment northeast of the lagoon would be armored with rock.	**This route is considered feasible** and carried forward for further evaluation. Combined Route B was identified as a feasible option as it follows the most direct path from the community across the Kivalina Lagoon to the mainland and therefore provides the safest, most reliable evacuation route across the lagoon in the event of a catastrophic storm surge. The Combined Route B shifts northerly off the southern route through a series of relic channels of the Wulik River where multiple viable material sources have been identified. The route's immediate proximity to material sources would minimize impacts associated with temporary access to material sources.
Material Source Alternatives		
K-Hill Site	This site consists of predominately limestone material located on the southeast side of K-Hill. A 100 acre material source within this area would support materials extraction, staging, and a construction camp. This site is expected to produce up to ~1,000,000 cubic yards (CY) of select material suitable for use in the roadway embankment, crushable material for use as roadway surfacing, and rock for potential use as armor stone.	**This alternative is considered feasible** and carried forward for further evaluation. The K-Hill Site is situated adjacent the terminus of all route alternatives. Material quality is anticipated to be suitable for use in the roadway embankment, for use as crushed surfacing material, and for potential use as armor stone. Once reclaimed, the developed area could be utilized as a potential evacuation site for the community.

Alternative	Description	Alternative Evaluation
Wulik River Source 1	This source is located on a point bar along the west banks of the Wulik River. The source consists of unvegetated and vegetated gravel bars in the floodplain and wetlands outside of the floodplain. A 40 acre material source within this area is expected to produce up to ~240,000 CY of well graded alluvial gravels, suitable for use in the roadway embankment, and roadway surfacing.	**This alternative is considered feasible** and carried forward for further evaluation. Wulik River Source 1 is located proximal to route alternatives and is anticipated to produce a high volume of high quality alluvial material suitable for use as embankment fill and crushed surfacing. The source is also centrally located along the route alternatives to minimize haul distance to construct the causeway embankment.
Wulik River Source 2	This source is located on a point bar along the west banks of the Wulik River. The source consists of unvegetated gravel bars in the floodplain and wetlands outside of the floodplain. A material source within this area is expected to produce poorly graded alluvial gravels with sand, suitable for use in the roadway embankment, and potentially as crushable material for roadway surfacing.	**This alternative is dismissed from further evaluation.** Wulik River Source 2 is located a long distance from the route alternatives and would require construction of a spur road in excess of one mile over wetlands. Access to the source would also require crossing a minor channel of the Wulik River.
Wulik River Source 3	This source is located along the west banks of the Wulik River. The source consists of unvegetated gravel bars in the floodplain. A material source within this area is expected to produce up to ~50,000 CY of alluvial gravel and sand, suitable for use in the roadway embankment and potentially as crushable material for roadway surfacing.	**This alternative is dismissed from further evaluation**. Wulik River Source 3 is located a long distance from the route alternatives and would require construction of a spur road in excess of one mile. The material quality is suitable for use as embankment material and potentially as crushable surfacing material, however the anticipated material quantity is small.
Relic Channel Source 1	This source is located within wetlands associated with relic channels of the Wulik River. A 50 acre material source within this area is expected to produce up to ~250,000 CY of gravel and sand, suitable for use in the roadway embankment and possibly as crushable material for roadway surfacing in limited quantities.	**This alternative is considered feasible** and carried forward for further evaluation. This source is immediately proximal to route alternatives and is centrally located to provide minimal haul distance to construct the causeway and roadway embankment.
Relic Channel Source 2	This source is located in wetlands located within relic channels of the Wulik River. A 40 -acre material source within this area is expected to produce up to ~200,000 CY of gravel and sand, suitable for use in the roadway embankment and possibly as crushable material for roadway surfacing in limited quantities.	**This alternative is considered feasible** and carried forward for further evaluation. This source is immediately proximal to route alternatives and is centrally located to provide minimal haul distance to construct the causeway embankment.

Alternative	Description	Alternative Evaluation
Relic Channel Source 3	This source is located within relic channels of the Wulik River and tidal area of the Kivalina lagoon. A material source within this area is expected to produce gravel and sand, suitable for use in the roadway embankment, but likely unsuitable as crushable material for roadway surfacing.	**This alternative is dismissed from further evaluation** because of its long distance from route alternatives, proximity to tidelands, and the added cost and wetland impacts associated with constructing access to the source. The anticipated quantity of material is limited, and quality expected from the source is likely only suitable as roadway subbase in the embankment and likely unsuitable as crushed material for roadway surfacing.
Kivalina River Source	This source is located on a point bar along the east banks of the Kivalina River. The source consists of unvegetated gravel bars in the floodplain and wetlands outside of the floodplain. A material source within this area is expected to produce alluvial gravel and sand, suitable for use in the roadway embankment, and potentially as crushable material suitable for roadway surfacing.	**This alternative is dismissed from further evaluation** because of its long distance from route alternatives and the added cost and wetland impacts associated with constructing access to the source.

3.2 No-Action Alternative

Under the No-Action Alternative, an evacuation road would not be constructed from Kivalina to K-Hill. Residents would continue to be exposed to environmental threats with no safe way to evacuate during storm events with the potential to detrimentally impact the community over time. As a consequence, there would remain severe risk to life, health, and safety of residents during a storm surge event.

3.3 Evacuation Road and Lagoon Crossing Alternatives Carried Forward

3.3.1 Preferred Alternative: Southern Route with Lagoon Crossing D

The Southern Route is approximately 7.7 miles in length and would begin adjacent to the Kivalina Airport, immediately cross the lagoon, and follow lowlands and relic channels of the Wulik River to a permanent 5 acre gravel staging pad configured to not preclude later development of a community evacuation site (Figure 4 and 5).

The 3,200 ft lagoon crossing would require construction of an earthen causeway protected with a layer of armor stone, a bridge, and culvert(s). The top of the causeway would be at an elevation to accommodate the anticipated maximum potential storm surge and design wave for no less than a 100 year recurrence event (Appendix B). The bridge would be constructed over the existing 110 ft wide lagoon channel, located approximately 160 ft northeast from the barrier island. The bridge would be a pile supported structure with sloped, rock protected earthen abutments or vertical sheet pile walls, and be designed to span the entire lagoon channel width to minimize potential impact to natural channel dimensions and function. Large diameter culvert(s), located near the northeast end of the causeway, would accommodate passage of all life-stage fish and maintain flow within a discontinuous channel. Overflow pipes would be spaced regularly in series over the length of the causeway at an elevation providing hydraulic conveyance during high water events to protect the evacuation road and community from potential flooding.

The road would be constructed within a 300 ft right-of-way (ROW) and consist of a 24 ft wide, two-lane/two-way gravel surface with edge markers or the appropriate roadside hardware for improved safety and visibility during winter use. The embankment would be constructed with a minimum of 3 (horizontal) to 1 (vertical) side slopes for safety, thermal stability, and to minimize snow drifting. The road would be surfaced with crushed aggregate. Side slopes and all other disturbed areas would be seeded with regionally appropriate seed mix that minimizes introduction of noxious weeds. Roadway embankment height would average between 5 and 8 ft above existing ground. Greater embankment thickness would occur at natural grade depressions and over water crossings. An average embankment thickness of 6 ft would minimize impacts from drifting snow and the thawing of permafrost in the Study Area. The roadway would end at a permanent 5 acre gravel staging pad configured to not preclude later development of a community evacuation site (Figure 4).

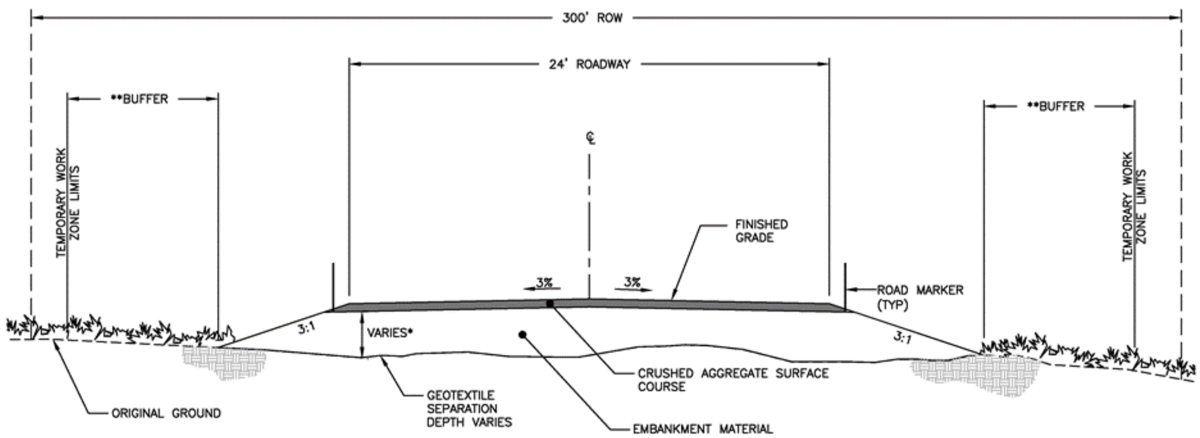

Exhibit 1 Typical Evacuation Road Cross Section

Culverts would be placed at appropriate locations along the roadway to accommodate cross drainage, with larger culverts placed along identified permanent and intermittent water crossings. Culverts at water crossings would be designed to accommodate icing conditions. Culverts may require outlet aprons with rip rap of various thicknesses in locations with significant flow. Insulation board may be used under culvert crossings and the roadway embankment in areas of degrading permafrost.

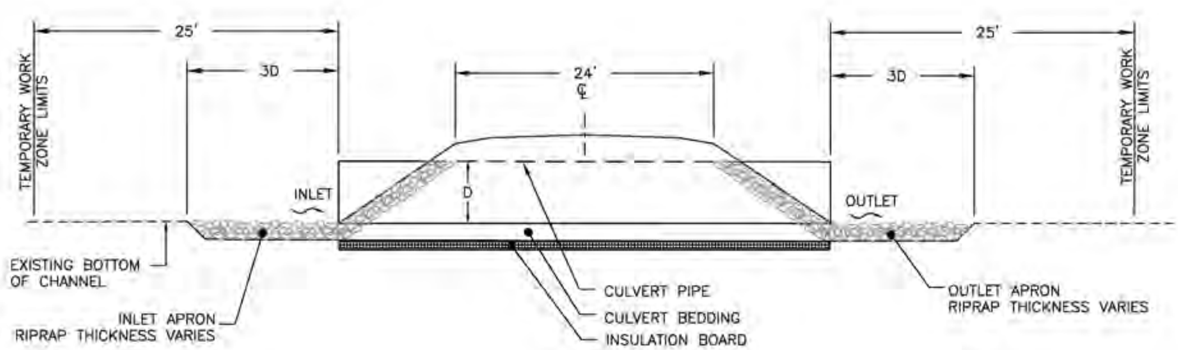

Exhibit 2 Typical Culvert Detail

Turnouts would be constructed along the road and would consist of a 25 ft wide by 200 ft long area adjacent to either side of the road to accommodate vehicle parking and equipment turnarounds. One turnout per mile is expected to be constructed, along with gradual side slopes to help facilitate exit from and entrance onto the roadway. Ongoing maintenance and operations would take place to ensure year-round use, maintain drainage structures, implement dust control, and provide snow plowing.

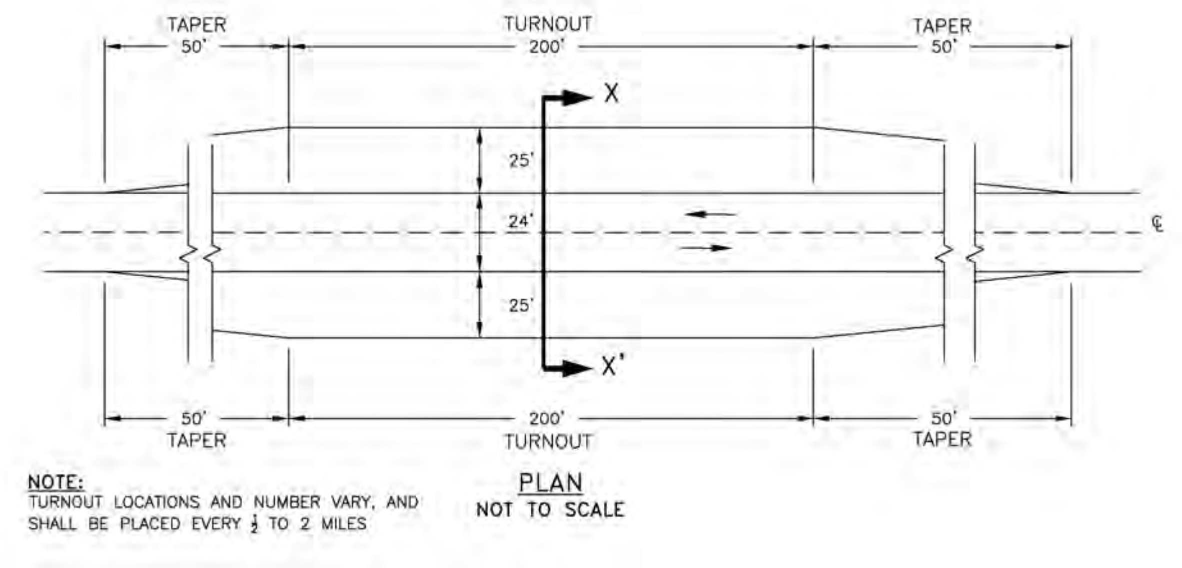

Exhibit 3 Typical Vehicle Turnout Plan

3.3.2 Combined Route B with Lagoon Crossing D

The Lagoon Crossing D for this alternative is the same as proposed for the Southern Route, consisting of an approximately 3,200 ft long earthen causeway with a bridge and culvert openings (Figure 3).

The Combined Route B is approximately 8.9 miles in length and would begin adjacent to the Kivalina Airport, immediately cross the lagoon, and follow lowlands and relic channels of the Wulik River for approximately 5 miles before shifting northward, following higher ground approximately 3.9 miles to the permanent 5 acre gravel staging pad configured to not preclude later development of a community evacuation site (Figure 4).

Combined Route B would be constructed similarly to the Southern Route with the exception that three additional water crossings are required.

3.4 Material Source Alternatives Carried Forward

Based on reconnaissance field work and limited subsurface investigations, the following material sources are expected to supply materials required to construct the proposed project, and are carried forward for consideration: K-Hill Site, Wulik River Source 1, Relic Channel Source 1, and Relic Channel Source 2 (Table 1 and Figure 4). These sources would be made available to the contractor for development of the Preferred Alternative, with the K-Hill site and Relic Channel sources given highest priority, and the Wulik River Source used last, if needed, once the other sites have been exhausted of the needed material. Details regarding typical methods for development of these sources are described in Section 4.3.

4 ENVIRONMENTAL CONSEQUENCES

4.1 Overview

This section describes the existing environment that would be affected by Proposed Action alternatives, and establishes a baseline for their comparison and selection. Direct, indirect, secondary (induced), and cumulative environmental impacts of alternatives are analyzed as are temporary impacts associated with construction including haul routes, material source development, and permanent pads used for contractor staging areas.

Direct effects are caused by an action and occur at the same time, whereas indirect effects are caused by an action and occur later in time or farther removed in distance. Cumulative and secondary (induced) impacts result from incremental impacts of an action when added to other past, present, and reasonably foreseeable future actions regardless of what entities (agencies or persons) undertake such other actions.

This section is organized to concurrently discuss impacts of all alternatives, and highlight differences in alternatives' impacts in tabular format within each resource category as many potential impacts are the same across the range of Proposed Action alternatives. This allows for a streamlined description of potential impacts and their comparison across alternatives for each resource category.

4.2 Past, Present, and Potential Future Actions

Cumulative impacts to the natural and human environment occur as a result of a synergy between Proposed Action effects and those of other past, present, and potential future actions taking place within the same geographic area.

For the proposed project, no past actions are considered as no recent actions have taken place within the Study Area. One action presently occurring within the Study Area includes implementation of runway and coastal erosion control measures at the existing Kivalina Airport. An action potentially occurring within the Study Area in the future includes development of a school project near the proposed road terminus. The potential school project and its location is in the early planning stages and at this time is remote and speculative. Details about what the school project would entail is not known. Therefore, potential impacts associated with that action are acknowledged, but a full assessment is not completed.

No other viable potential future actions are identified at this time. While community relocation has been discussed for some time, it is not considered reasonably foreseeable. At present, the community supports construction of an evacuation road due to the immediate threat of storm events.

Secondary (Induced) impacts may occur as a result of the proposed project. Several Alaska Native allotments lie adjacent to the Study Area (Figure 4) and development of these and other adjacent public and private lands may occur consequent to road development. In addition, temporary material sources developed in support of this project may be further developed or expanded for community use.

4.3 Potential Construction Methods

Potential construction methodology may vary across such elements as timing of construction, contractor methods, locations of permanent pads used for contractor staging areas, camps, haul routes, and sequencing of activities. This section describes typical construction methods that may be employed for the Proposed Action alternatives.

4.3.1 Contractor Staging and Haul Route Development

Large equipment and bulk supplies necessary for construction may be flown or barged to the project area. Due to the availability of local material for this project, use of project specific barges that would transport material and equipment solely to and from the project area is not anticipated. It is anticipated that the contractor will utilize barges that regularly service communities in the region to deliver equipment or other materials needed to construct the project.

Initial mobilization activities may require temporary storage of equipment and fuel in the community of Kivalina or at the DeLong Mountain Transportation System (DMTS) port site. Some equipment and material may be barged directly to the Kivalina barge landing, or the contractor may choose to utilize the DMTS port site, and then haul the material and equipment to Kivalina in the winter along a winter ice road. Once sea ice is formed and ground is frozen, equipment could be moved to Kivalina on a 16 mile ice road (if at the port site) and then inland for development of material sources and construction of roadway embankments (Figure 4). Mobilization and demobilization activities would result in a moderate increase in the use of Kivalina infrastructure.

Construction may require two or more work seasons. In addition to available space near the Kivalina Airport, two permanent pads used for contractor staging areas may be constructed, including one on the northeast side of the lagoon for the storage of fuel, equipment and embankment material, and another at the K-Hill Site for a temporary construction camp, material and equipment staging area, and a rock quarry. No disposal sites are anticipated for this project. Any temporary stockpiling of material is anticipated to take place within contractor staging areas. All construction-related waste would be hauled off site by the contractor at the end of the project.

4.3.2 Lagoon Crossing

Construction of the lagoon crossing may include in-water placement of fill, bridge support pile driving, and placement of culvert(s). Placement of fill is generally done during ice-free conditions, but several construction components associated with the lagoon crossing could be completed in the winter. Grounded ice in shallow depths of the lagoon could be removed allowing placement of the base causeway embankment layer and rock protection with no, or minimal water present, thereby minimizing disturbance of fine sediments. Pile driving would take place on both sides of the bridge opening, and consist of driving piles at each abutment. The final design of the bridge foundation would establish the specific number, size, and depth of the pilings.

For evaluating potential impacts, the following assumptions are made:

- Four piles per abutment for a total of eight piles would be required to construct the single span bridge;
- Piles would typically be 3 ft diameter steel pipes, driven roughly 100 to 150 ft deep. Each abutment would require roughly 3–5 days to construct; and
- Pile driving will be conducted on land, through constructed embankments;
- Pile driving would occur over approximately 30-60 days, not continuous, in which the shift duration would be guided by agency recommendations. The contractor's methods could potentially alter the frequency and duration.

Both winter and summer construction activities are anticipated. Pile driving windows and durations would be established to minimize hydraulic and noise impacts to fish, birds, and marine mammals. The bridge work would likely utilize cranes and other equipment working from the new causeway fill.

Best management practices (BMPs) to minimize water quality and habitat impacts would be developed and implemented.

4.3.3 Evacuation Road

For evaluating potential impacts, the following assumptions are made.

- Arctic road construction in areas dominated by tundra underlain with continuous permafrost would begin in the winter after the ground freezes;
- Road and drainage structure construction would continue during summer months and may require temporary bridges and culverts to provide for seasonal drainage;

- A leveling course of gravel may be required under geotextile depending on local ground conditions;
- Vegetative clearing would be limited to brush removal within the roadway footprint, however the existing organic mat would not be removed;
- Temporary construction impacts may occur within a 25 ft area outside the roadway embankment footprint, and would be permitted for use for contractor equipment access, culvert installation, and placement of sediment control (BMPs);
- Water crossings would include placement of appropriately sized drainage structures, with additional cross culverts installed along the roadway as needed to equalize drainage;
- Excavation would be avoided to minimize thermal degradation of subgrade permafrost;
- Installation of larger culverts needing bedding materials for fish passage or for maintaining stream flow would require diverting flow into a temporary channel while constructing the structure;
- Use of temporary bridges, temporary culverts, and pumping may also be employed;
- Disturbed areas outside the roadway footprint would be stabilized; and
- Ongoing maintenance and operations would take place to ensure year-round use, maintain drainage structures, implement dust control, and provide snow plowing.

Both winter and summer construction activities are anticipated. Construction windows and durations would be established to minimize impacts when fish, birds and wildlife are more abundant.

4.3.4 Material Source Development

Methods and means used to develop project material sources would be determined by the selected construction contractor.

For evaluating potential impacts, the following overall assumptions are made:

- Access to and development of selected material sources may occur year-round;
- Extracted materials, not hauled and placed, may be stockpiled within a material source or staging area for later use; and
- Construction windows and durations would be established to minimize impacts when fish, birds, and wildlife are more abundant.
- The K-Hill site and Relic Channel sources given highest priority, and the Wulik River Source used last, if needed, once the other sites have been exhausted of the needed material

4.3.4.1 K-Hill Site

The following assumptions outline the material source development methodology for the K-Hill Site:

- A quarry site on K-Hill would be likely accessed when the ground is frozen and equipment can travel overland;
- The site would be developed by removing overburden and temporarily stockpiling for reclamation activities;
- Materials from the site are expected to be used for constructing staging areas and roadway embankments;
- Ripping, drilling, and blasting would likely be used to remove overburden as well as to produce select material and armor rock from subsurface deposits; and
- Quarry excavation would be benched to maintain slope stability, drainage, and access for development and reclamation activities.

4.3.4.2 Wulik River Source 1

The following assumptions outline the material source development methodology for the Wulik River Source 1:

- A material source would be initially developed along the west bank of the Wulik River when ground is frozen and water levels are relatively low;
- Excavation may occur below the water table; however, a minimum of 100 ft buffer would be maintained between the active river channel and the excavation area;
- Source development would require excavation of overburden that may be used for reclamation. Material would be extracted, hauled, and placed using conventional equipment, though blasting may be necessary if permafrost is encountered;
- Material source reclamation would include converting the source into a pond. A fish escapement channel may be connected to the Wulik River to prevent trapping fish;
- The Southern Route, the Preferred Alternative, would require a 1,500 ft spur road to access this source (Exhibit 4 and Figure 4); and
- Combined Route B would require a 4,500 ft spur road to access this source.

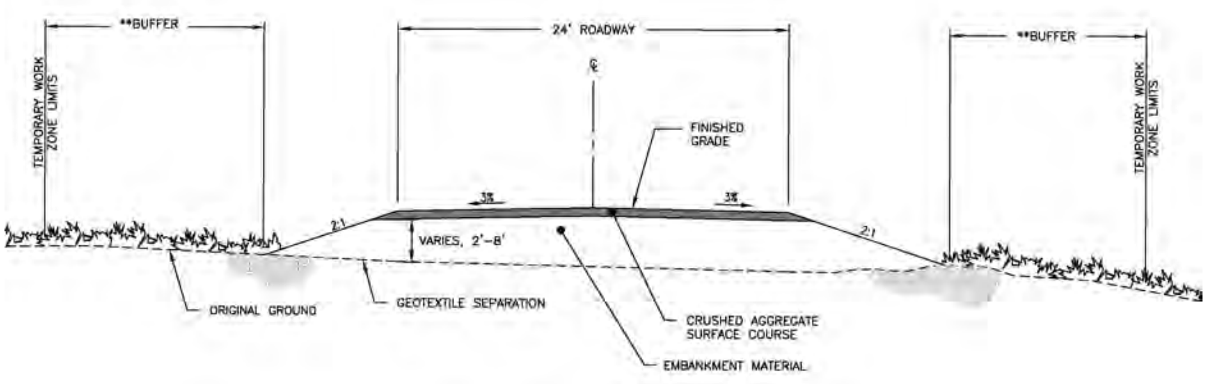

Exhibit 4 Typical Permanent Material Source Spur Road Cross Section

4.3.4.3 Wulik Relic Channel Sources 1 and 2

The following assumptions outline the material source development methodology for the Wulik Relic Channel Source 1 and 2:

- Material sources adjacent to the relic channels of the Wulik River would be developed as a series of deep cells extending below the water table;
- Blasting may be required depending on the presence of permafrost, moisture content, and types of materials encountered;
- The Southern Route, the Preferred Alternative, would require a 3,000 ft spur road to access the Wulik Relic Channel Source 1 (if all the material sites are developed);
- The Combined Route B alternative would require a 4,550 ft spur road to connect to the Wulik Relic Channel Source 1 (if all the material sites are developed).
- Wulik Relic Channel Source 2 would require development of a 2,000 ft spur road to the preferred Southern Route alternative (if all the material sites are developed); and
- Sources would be reclaimed by excavating ponds and may be connected to existing relic channels, that could provide potential overwintering habitat for juvenile fish.

4.4 Non-Issue Resource Categories

This EA is issue-based, meaning that only resource categories that were identified as potential issues through public and agency involvement are evaluated in detail. Table 2 summarizes resource categories identified as non-issues, and consequently not discussed further in this document.

Table 2 Non-Issue Resource Categories

Resource Category	Evaluation
Noise	• Land uses along the road corridor are not noise sensitive uses, including aviation, industrial, undeveloped lands zoned for subsistence uses, and undeveloped Native Allotments (Categories F and G in 23 CFR 772). • Noise sensitive receivers occur within the community of Kivalina, but are more than 400 feet outside the proposed ROW corridor. Noise sensitive receivers include residences, the McQueen School, and other public buildings. Impacts to noise sensitive receivers are not anticipated. • Kivalina has ~412 residents that primarily use all-terrain vehicles (ATVs) and snowmobiles to currently access the Study Area; the evacuation road is not anticipated to increase noise levels along the route. • The Northwest Arctic Borough (NAB), which is responsible for land use planning in the Study Area, and NANA, the primary land owner of undeveloped lands, have been involved in the development of the Proposed Action, and have not expressed concerns about noise-related impacts. • Construction-related noise impacts are discussed throughout this EA in each applicable resource category.
Air Quality	• The Study Area has no Non-Attainment areas for national air quality criteria pollutants. Accordingly, the State Implementation Plan does not have any special control strategies that apply for air quality concerns in the Study Area. • Federal Highway Administration (FHWA) does not require the project to undergo a transportation conformity analysis for carbon monoxide or particulate matter with an aerodynamic diameter of 10 microns or less because the Study Area is not located in Non-Attainment or Maintenance areas (40 Code of Federal Regulations [CFR] Parts 51 and 93). • Temporary impacts from construction would be minimized through compliance with the Alaska Pollutant Discharge Elimination System (APDES) which would include development of dust control Best Management Practices associated with the project's Stormwater Pollutant Prevention Plan (SWPPP). • Cumulative impacts to air quality from fugitive dust may occur from future use of the road. However, given the relatively low levels of traffic the impacts from fugitive dust would be minimal. A long term operation and maintenance contract will be developed with the community that will include measures for dust control.
Farmlands	• There are no prime or unique farmlands in the Study Area, as defined by the *Farmland Protection Policy Act* of 1981, Public Law 97-98.

Resource Category	Evaluation
Natural Resources and Energy Supply	• The proposed project would not change the energy requirements for the community of Kivalina. • Fill material, construction materials, and other natural resources are required for construction. Adequate supplies are expected to be available through local sources with some material being imported. • Energy resources needed for construction camps and temporary facilities associated with construction are expected to be relatively small, and would be predominantly self-contained. • The proposed project would not cause demands exceeding available or future natural resource or energy supplies. The project would likely increase accessibility to additional natural resources.
Coastal Resources	• The Alaska Coastal Management Program expired on June 11, 2011 and is no longer in effect. Although a state coastal consistency determination is no longer required, the NAB Comprehensive Plan (1993) and the Northwest Area Plan (DNR, 2008) were evaluated to confirm no adverse coastal impacts occur within the Study Area and the project is consistent with coastal resource management referenced in these plans.

4.5 Land Use and Transportation

4.5.1 Affected Environment

The community of Kivalina lies on a barrier island with no access road (see also Section 1, Project Location), relying on supplies solely delivered by air and barge. There is year-round air service to Kivalina, although severe weather often prevents air travel. Community residents use all-terrain vehicles (ATVs), snow machines, and boats as personal modes of transportation within the community and to access subsistence use areas. There are no reliable transportation options for evacuation during storm surge events. Land ownership within the Study Area includes NANA, Native allotments, DOT&PF, and the Alaska Department of Natural Resources (DNR). The following describes land uses, formal land use plans, and long range transportation goals within the Study Area:

- The undeveloped Study Area is within a NAB Subsistence Conservation zoning district (NAB 2011). Subsistence Conservation zoning districts are designated for natural ecosystem conservation, subsistence resource access, subsistence harvest lands, and are of high importance for subsistence resources and activities (NAB 1993);
- The Northwest Arctic Borough Comprehensive Plan (NAB 1993) contains language specifying that the NAB needs to develop a system of managing lands in the best interest of Borough residents and assist communities and regional organizations with identifying and solving problems with infrastructure development. Additionally, the Comprehensive Plan states that the NAB would work with villages to identify transportation priorities for the region;

- The Northwest Alaska Transportation Plan (DOT&PF 2004) recommended the community of Kivalina either move inland to avoid storm surges or fortify its surrounding shoreline. Issues surrounding community relocation have been challenging to overcome, as they are neither culturally preferable nor fiscally practical in the foreseeable future;
- The Kivalina [2016-2026] Comprehensive Community Development Plan identified the permitting and construction of the evacuation road as the #1 top Native village and city priority for Kivalina (NAB and Remote Solutions, LLC);
- The Kivalina Strategic Management Plan (Department of Commerce, Community, and Economic Development [DCCED] 2016) identifies the immediate need to develop an evacuation road so residents have a safe place of refuge for use in an emergency;
- The Native Village of Kivalina Long Range Transportation Plan (WHPacific 2012c) identifies the Kivalina Evacuation Road as a high priority transportation project;
- The DNR Northwest Area Plan (DNR 2008) states that permanent roads should be routed, to the extent feasible and prudent, to avoid long-term adverse effects on water quantity and/or quality, and surface access routes should be sited and designated to accommodate future development and avoid unnecessary duplication;
- The Study Area is located entirely within the Cape Krusenstern National Historic Landmark (CKNHL), managed by the National Park Service (NPS) (NPS 2016a), and established to preserve extensive archaeological resources in the area. Section 4(f) of the *U.S. Department of Transportation Act* would apply to any use of land identified within the CKNHL;
- Kivalina Lagoon includes a small portion of the Alaska Maritime National Wildlife Refuge (Chukchi Sea Unit; USFWS 2017a) consisting of two islands, totaling 75 acres, owned by NANA, and located directly southeast of Kivalina at the mouth of the Wulik River (Figure8). Another 116 acres of the Refuge, also owned by NANA, are located 4 miles south of the community and effectively constitute the land spit separating Imikruk Lagoon from the Chukchi Sea. None of the proposed alternatives would include development within the Alaska Maritime National Wildlife Refuge; and
- 17(b) easements are reservations of use to allow access across lands conveyed to Alaska Native Village and Regional Corporation in the Alaska Native Claims Settlement Act. Three 17(b) easements are present in the project vicinity. Two of these easements make up the trail that allows for winter travel between Kivalina and both Point Hope and Noatak. One easement runs along the shoreline north and south of Kivalina. This is the route proposed to the DMTS port for the proposed Haul Route (Figure 4).

4.5.2 Environmental Consequences

4.5.2.1 No Action Alternative

An evacuation road would not be constructed and no changes to current land use or transportation infrastructure would occur. As a consequence, there would remain severe risk to life, health, and safety of residents during a storm surge event with the potential to detrimentally impact the community over time. There would be no reliable transportation options for evacuation during storm surge events. Implementing this alternative would be inconsistent with the Native Village of Kivalina Long Range Transportation Plan (WHPacific 2012c).

4.5.2.2 Route and Lagoon Crossing Alternatives

Direct and Indirect Impacts:

<u>Changes to Traffic</u>: Availability of a road for travel would increase traffic in the area for subsistence, recreation, and other land uses. Traffic is expected to consist of primarily ATVs or snow machines, currently the primary modes of transportation in Kivalina. Few highway vehicles are present due to the lack of suitable support infrastructure.

<u>Consistency with Land Use Plans</u>: The proposed route and lagoon crossing alternatives are consistent with local land use and transportation plans, including the Native Village of Kivalina Long Range Transportation Plan (WHPacific 2012) and the State of Alaska Northwest Area Plan (DNR 2008) which anticipate transportation facility authorizations across State-owned waterbodies. Additionally, letters of support were written to acquire funding for an evacuation route by NANA, the Native Village of Kivalina, and the City of Kivalina (Appendix D).

<u>Section 4(f) Evaluation:</u> Section 4(f) of the *U.S. Department of Transportation Act* would apply as proposed project alternatives would be located on lands within the CKNHL (see Section 4.14 for impacts to historic resources, Section 5 for information on Section 4(f) considerations, and Appendix K for the Section 4(f) De Minimis Impact Finding).

<u>Impacts to Zoning and Easements:</u> As the entirety of the Study Area outside of the community of Kivalina is designated as a Subsistence Conservation District (NAB 2011), all route and lagoon crossing alternatives would need to be permitted as a Conditional Use under Title 9 of the NAB Code. Title 9 provides NAB the authority to control and regulate future land development within the Borough in accordance with its land use policies. The NAB Planning Commission considers Conditional Use permit

applications, and either rejects or approves the proposed use after public notice and a formal hearing. As the Study Area is not within a NAB Resource Development Zone or Transportation Corridor, all route and lagoon crossing alternatives would require rezoning by the NAB Planning Commission (Title 9, Article VIII, Section 9.28.220) prior to construction. Where 17(b) easements exist (Section 4.5.1), legal access will be maintained.

ROW Requirements: Land interest sufficient for a dedicated 300-foot public ROW along either proposed route alternative would ultimately be conveyed by NANA (the current private landowner) to a government entity currently identified as the City of Kivalina. Additionally, an easement would be acquired from the State of Alaska DNR for tidelands associated with the lagoon crossing.

Secondary (Induced) and Cumulative Impacts:

Changes to Future Transportation Needs: According to the community, during storm events access to an evacuation area may be challenging because not all residents have access to, or are physically able to safely operate or ride on an ATV, making efficient evacuation impractical. Therefore, additional transportation options, such as highway vehicles, may be needed; and the proposed evacuation road has been designed to accommodate this need. As a result of this accommodation, transportation may increase the already limited number of highway vehicles in Kivalina. The top of the causeway would be at an elevation to accommodate the anticipated maximum potential storm surge and design wave for no less than a 100 year recurrence event (Appendix B).

Increased Access to Adjacent Lands: Construction of either road and crossing alternative would allow increased summer overland access to the lower Wulik River and K-Hill for subsistence use. Public access to the Wulik River is currently limited by adjacent privately-owned lands.

Increased access to adjacent public and private lands may occur, potentially resulting in changes to land use and increased transportation activities along the road corridor. Any change in land use would require rezoning by the NAB Planning Commission and approval by ordinance by the Assembly prior to construction (Title 9, Chapter 9.20.060). Future school construction at a site identified by the NAB is remote and speculative at this time; however, the Northwest Arctic Borough School District has commented that if constructed within the vicinity of the project terminus, school operations could potentially include transportation of students between the school and community using private or public vehicles. In addition, school management and operations could include the provision of teacher housing in proximity to the eventual school location and the associated supply and support infrastructure necessary to maintain it.

4.5.2.3 Material Source Alternatives

Direct and Indirect Impacts:

Changes to Traffic: Traffic levels would temporarily increase near material source alternatives during construction. The impact due to elevated traffic levels would be minimized by using material sources proximate to the project, improving haul efficiency. Traffic levels near material sources are expected to decrease to very low levels after construction.

Consistency with Land Use Plans: Proposed material sources are consistent with local land use and transportation plans. Additionally, letters of support were written to acquire funding for an evacuation route by NANA, the Native Village of Kivalina, and the City of Kivalina (Appendix D).

Impacts to Zoning and Easements: Proposed material sources are currently located within a Subsistence Conservation District (NAB 2011). Development of all sources would require review and permitting for Conditional Use and rezoning by the NAB Planning Commission.

The DNR would also need to designate the material sites, and develop a material sales agreement with DOT&PF. This may include permitting for Land Use and Tideland uses for each material site.

ROW Requirements: Land ownership for material sources would remain with current landowners: NANA (most lands above ordinary high water), State of Alaska for submerged land, and Native allotments. In all cases, proposed material source development has been designed to avoid and minimize impacts to Native allotments. The use of a portion of the Wulik River Source 1 material source would require agreement with a Native allotment owner.

Secondary (Induced) and Cumulative Impacts:

Changes to Future Needs: Material sources may be reopened and/or expanded by the community to accommodate future needs for community projects. The location and material source characteristics of the K-Hill Site may encourage future use of this specific site over other local material sources.

Increased Access to Adjacent Lands: With permission of the private land owner, material sources and the lands adjacent may be used for subsistence activities. Private lands adjacent to material sources may experience increased use due to ease of access.

4.5.2.4 Alternatives Comparison

Table 3 compares impacts that vary between proposed route and crossing alternatives, as well as potential material source alternatives. All other impacts are similar across all proposed alternatives.

Table 3 Land Use and Transportation Impacts

Land Use and Transportation: Differences Between Route Alternatives		
	Southern Route (Preferred Alternative) with Lagoon Crossing D	**Combined Route B with Lagoon Crossing D**
Direct and Indirect and Construction	ROW Requirements: • 280 acres of ROW required from NANA	ROW Requirements: • 324 acres of ROW required from NANA
Secondary and Cumulative	Increased Access to Adjacent Lands: • Shorter summer overland access to the lower Wulik River than Combined Route B	Increased Access to Adjacent Lands: • Less practical summer overland access to the lower Wulik River than Southern route

Differences Between Material Source Alternatives				
	K-Hill Site	**Wulik River Source 1**	**Relic Channel Source 1**	**Relic Channel Source 2**
Direct and Indirect and Construction	Changes to Land Use: • 100 acres of lands zoned Subsistence Conservation District would require rezoning	Changes to Land Use: • 40 acres of lands zoned Subsistence Conservation District would require rezoning • Would require permission from Native allottee • Spur road would be required	Changes to Land Use: • 50 acres of lands zoned Subsistence Conservation District would require rezoning • Spur road would be required	Changes to Land Use: • 40 acres of lands zoned Subsistence Conservation District would require rezoning • Spur road would be required
Secondary and Cumulative	Changes to Future Transportation Needs: • Most likely to be used for future material source needs for community projects	Changes to Future Transportation Needs: • Less likely to be used for future material source needs for community projects	Changes to Future Transportation Needs: • Less likely to be used for future material source needs for community projects	Changes to Future Transportation Needs: • Less likely to be used for future material source needs for community projects

4.5.3 Avoidance, Minimization, and Mitigation

- Wulik River Source 1 is adjacent to and includes a portion of a Native allotment (less than a quarter of the proposed material site); however, use of this material source has been given lower priority as described in Section 4.3.4., and the material source may be developed outside of the Native allotment if a material sales agreement with the owner cannot be reached. All other material sources and route alternatives avoid development in Native allotments; and
- Material sources near Native allotments would be designed to not block access to these areas.
- During permitting of the Wulik Relic Channel Source 2, DOT&PF will work with DNR to avoid the use of state-owned submerged lands.

4.6 Social and Economic Environment

4.6.1 Affected Environment

4.6.1.1 Socioeconomics and Environmental Justice

Executive Order 12898: Environmental Justice addresses impacts from Federal Actions to minority populations and low-income populations. According to the most recent State of Alaska data, Kivalina is a community of approximately 412 residents (DCCED 2016). Most of Kivalina's residents are Inupiat; 96.3% of the population identifies their race as American Indian or Alaska Native; and over half of Kivalina's residents are under the age of 20 (U.S. Census Bureau 2010).

Kivalina is designated as a second-class city with a mayor and a seven-member city council (DCCED 2016). The current town site became a permanent settlement in 1905 when the Bureau of Indian Affairs built a school on the barrier island on the southwest side of Kivalina Lagoon and mandated compulsory attendance of the local school-age children (Haley et al. 2009). NANA is the *Alaska Native Claims Settlement Act* chartered regional corporation representing Kivalina. The Native Village of Kivalina *Indian Reorganization Act* (IRA) Council serves as the federally recognized tribal government. Maniilaq Association, a non-profit corporation, provides tribal government services for the twelve tribes of northwest Alaska including the Native Village of Kivalina. NANA serves Kivalina as both the regional and village corporation for the community.

Community and public facilities include the washeteria, the City/Tribal Office, the U.S. Post Office, the Alaska Village Electric Cooperative (AVEC) power plant, a heavy equipment building, the airport snow removal equipment building, an armory, two churches, a bingo hall, community hall, and the Boys and Girls Club (NANA 2016). AVEC provides electricity to the community via diesel generators. Drinking water is obtained every summer by the community who lays out a combination of hose and sections of PVC pipe to convey water from a pump intake on the Wulik River (Figure 4) extending three-miles to a pair of holding tanks near the center of the community where the water is treated and stored for use during the winter months. No households in the community have full plumbing. Typically, water is hauled from the storage tanks to residences. Residential sewage is hauled from residences in "honey buckets" to disposal bunkers located throughout the community. The washeteria, operated by the city, is a community facility which houses restroom, laundry, and bathing facilities to allow community members to have access to running water and sewage disposal. In addition, the regional Maniilaq Association operates the Kivalina Clinic, which provides basic medical services.

The McQueen School provides instruction from pre-school through 12th grade. The ~15,000 sq. ft. school has both running water and sewage disposal and purchases electricity through AVEC. According to DCCED, the school had approximately 145 students and 12 teachers in 2016. Online post-secondary courses are available for those with internet access through the Chukchi Campus, a rural division of the University of Alaska located in Kotzebue (Himes-Cornell et al. 2013).

Economic opportunities in Kivalina are limited, with many of the wage labor job/positions being part-time or seasonal. The Alaska Department of Labor and Workforce Development (DLWD 2015) reports almost two thirds of the available workforce was employed in local government, education, health and social services, resource extraction industries, and other service sectors. Local employers include the City, Village Council, school district, local store, Maniilaq Association, NANA Regional Corporation, and the Red Dog Mine (located 50 miles away by air). Commercial fishing offers limited seasonal employment outside of Kivalina; and the sale of Alaska Native ivory carvings brings additional revenue to individuals in the community (Himes-Cornell et al. 2013; WHPacific 2014). According to the U.S. Census Bureau's 2009-2013 American Community Survey 5 Year Estimates, per capita annual income was estimated at $14,185, and the median household income was $59,167 (DCCED 2017). It is estimated that 28% of people in the community of Kivalina live below poverty level (DCCED 2017).

There are no roads connecting Kivalina with other communities in the region. Existing ANCSA 17b easement trails allow for winter travel between Kivalina and both Point Hope and Noatak (Figure 4). Air freight and passenger services are provided by commercial carriers operating between Kotzebue and Kivalina. Heavy freight including fuel, automobiles, and general supplies are transported by barge to the community between July and August (Himes-Cornell et al. 2013). Nearly all of Kivalina is dependent, to varying degrees, on subsistence fish and game resources.

4.6.1.2 Subsistence

Subsistence activities are an integral part in the lives of Kivalina's residents (Braem and Kostick 2014). A comprehensive subsistence survey, conducted by the ADF&G in 2008, stated that over 88% of respondents reported using fish, land mammals, marine mammals, birds and eggs, berries, and greens. Of surveyed households, 95% reported harvesting at least one kind of wild food (Magdanz et al. 2010). Kivalina residents made use of at least 12 fish species, five species of large land mammals, six species of small land mammals, eight species of marine mammals, nine species of migratory birds, three resident bird species, as well as bird eggs and shellfish. When quantified by edible weight, bearded seals, Dolly Varden (locally referred to as "trout"), and caribou contributed 78% of the total community harvest. Four types of berries and at least six types of greens were also harvested.

A recent project, completed by the NAB, (Satterthwaite-Phillips et al. 2016) focused on mapping the subsistence harvest areas of the residents of the Kotzebue Sound region, and recorded Kivalina residents' harvest locations and targeted resources.

- Kivalina residents reported harvesting marine mammals along the coast from Cape Krusenstern to Chariot in spring and summer, and offshore from the Kivalina barrier islands in the fall;
- Birds were taken in the winter around Kivalina Lagoon, the mouth of the Kivalina River, and the lower reaches of the Wulik River. Spring and summer bird harvest locations were reported throughout the Study Area;
- Egg collection locations were reported throughout the Study Area in the spring. During the fall, egg collection locations were reported along the middle and lower Wulik River drainage and in the lowlands south and east of Kivalina Lagoon;
- Fishing areas were reported in Kivalina Lagoon and along the Kivalina and Wulik Rivers during all seasons;
- Large game harvest locations were reported in the middle and upper Kivalina River drainage, in the uplands between the Kivalina and Wulik Rivers in the spring and summer, along the middle Kivalina River and in the middle and lower Wulik River channels in the fall, and throughout the Study Area in the winter;
- Small game is hunted or trapped along the middle Wulik River channel in the fall, and along the Kivalina and Wulik River channels and the interior uplands in the Study Area during the winter; and
- Spring plant harvest locations were reported around the mouth of the Kivalina River, and throughout the Study Area in the summer and fall.

Based on this mapping data and earlier descriptions of local subsistence hunting, fishing, and gathering (Burch 1985), the Kivalina and Wulik Rivers are currently the two main routes from Kivalina into the interior and that the Study Area is at the center of Kivalina's subsistence harvest area.

4.6.2 Environmental Consequences

4.6.2.1 No-Action Alternative

An evacuation road would not be constructed and no changes to current subsistence use would occur. Residents would continue to be exposed to environmental threats with no reliable options for evacuation during storm event with the potential to detrimentally impact the community and its socioeconomic stability over time. There would remain severe risk to life, health, and safety of residents.

4.6.2.2 Route and Lagoon Crossing Alternatives

Direct and Indirect Impacts:

Environmental Justice: Since the entire Kivalina population would be affected similarly, neither of the route and crossing alternatives would result in disproportionately high and adverse impacts to minority or low-income populations. Both route and crossing alternatives would increase safety of all Kivalina residents by providing a reliable route to a safe mainland evacuation location during emergencies. Therefore, neither route and crossing alternative would result in environmental health or safety risks to Kivalina residents.

Impacts to Subsistence: The Proposed Action would provide reliable access to subsistence hunting, fishing, and gathering locations during seasons when low river flows prohibit boat travel and during warm winters when thin river and lagoon ice prevents safe snow machine operation. It would also expand subsistence harvest opportunities to Kivalina residents who do not currently have access to boats or other off-road transportation necessary to reach subsistence use areas within the Study Area. A road to K-Hill would increase the window of available time to easily access caribou hunting areas in the foothills and within the Kivalina and Wulik River drainages. Installation of signs along the road would remind the public of Alaska Fish and Game regulations that prohibit shooting from, on, or across a highway (5AAC 92.080; ADF&G 2006).

Public dialogue has indicated that there are berry picking resources along the Combined Route B alternative (Appendix D). The project may result in a reduction of some berry picking resources within the road footprint along the Combined Route B. Fugitive dust has been measured to impact vegetation out to 300 feet from the Dalton Highway (Auerback et al, 1997; Walker and Everett, 1987). However, the evacuation road would not see levels and type of traffic nearing those of an industrial road like the Dalton Highway, and fugitive dust impacts to berry picking resources are not anticipated to extend that far from the roadway. In addition, both alternatives are likely to expand access to additional berry resources beyond the footprint of the road resulting in more harvest intensity over a broader area. Berry harvest may also intensify along the roadside, rather than expanding harvest areas, due to easier access along the road corridor.

Construction Impacts:

Impacts to Socioeconomics: Construction of either route and crossing alternative is anticipated to have a positive socioeconomic impact on the community. Economic advantages could arise from local hire opportunities during construction, improved access to private lands along the Wulik River, and increased opportunities for subsistence activities in portions of the Study Area. Permanent jobs could be created for maintenance of the road in the future. The community water source infrastructure would not be impacted by the Proposed Action.

Secondary (Induced) and Cumulative Impacts:

Increased access to subsistence resources may cause an increase in harvest. Both route alternatives would allow greater scouting of the area, allowing increased hunting efficiency. Individuals without boats would also be able to participate in the harvest.

Increased road access may increase the participation of non-subsistence hunting and/or fishing. Land outside of the project's ROW is privately owned. This secondary impact is expected to be managed through existing NANA permit requirements. Installation of signs along the road would remind the public of State of Alaska Fish and Game regulations that prohibit shooting from, on, or across a highway (5 Alaska Administrative Code [AAC] 92.080; ADF&G 2006).

4.6.2.3 Material Source Alternatives

Direct and Indirect Impacts:

Impacts to Socioeconomics: Development of new local material resources is expected to increase the socioeconomic wellbeing of the community. Mineral resources sold by NANA would provide a direct revenue stream to the Native corporation. Locally available materials could also reduce the cost of building and maintaining infrastructure in the region.

Impacts to Subsistence: Material source spur roads would provide additional access to subsistence locations, beyond the roadway. Depending on the route and material sources selected, between ~0 and 6,400 ft of spur roads may be constructed (depending on contractor methodology used (spur road, ice road, or combination). Alternatives with spur roads would increase the amount of additional access for subsistence. Reclaimed material sources may also provide additional deep-water habitat for subsistence fish species.

Construction Impacts:

Impacts to Socioeconomics: Construction of any of the material sites is anticipated to have a positive socioeconomic impact on the community. Economic advantages could arise from local hire opportunities during construction, improved access to private lands along the Wulik River, and increased opportunities for subsistence activities in portions of the Study Area. Development and operation of the Wulik River

Source 1 has the potential to introduce sediment laden Stormwater into the Wulik River, the community water source. However, the use of this material has been given lower priority as described in Section 4.3.4 and, if developed, use of BMPs and compliance with the APDES would reduce the potential for impacts.

Secondary (Induced) and Cumulative Impacts:

Impacts to Socioeconomics: Material sources may be reopened and/or expanded by the community to accommodate future needs for community projects. Locally available materials could also reduce the cost of building and maintaining infrastructure in the region. The location and material source characteristics of the K-Hill Site may encourage future use of this specific site over other local material sources.

4.6.2.4 Alternatives Comparison

Table 4 compares impacts that vary between proposed route and crossing alternatives, as well as potential material source alternatives. All other impacts are similar across all proposed alternatives.

Table 4 Social Environment Impacts

<table>
<tr><th colspan="5">Social Environment: Differences Between Route Alternatives</th></tr>
<tr><th></th><th colspan="2">Southern Route (Preferred Alternative) with Lagoon Crossing D</th><th colspan="2">Combined Route B with Lagoon Crossing D</th></tr>
<tr><td>Direct and Indirect and Construction</td><td colspan="2">No Difference Between Alternatives</td><td colspan="2">No Difference Between Alternatives</td></tr>
<tr><td>Secondary and Cumulative</td><td colspan="2">No Difference Between Alternatives</td><td colspan="2">No Difference Between Alternatives</td></tr>
<tr><th colspan="5">Differences Between Material Source Alternatives</th></tr>
<tr><th></th><th>K-Hill Site</th><th>Wulik River Source 1</th><th>Relic Channel Source 1</th><th>Relic Channel Source 2</th></tr>
<tr><td>Direct and Indirect and Construction</td><td>Socioeconomics:
• Highest potential revenue generation to regional economy from material sales as compared to other sites
Subsistence:
• No opportunities for creation of</td><td>Socioeconomics:
• Lowest revenue generation potential to regional economy from material sales
Subsistence:
• Some overwintering, habitat may be created, increasing resources</td><td>Socioeconomics:
• Moderate potential for revenue generation to regional economy from material sales
Subsistence:
• Some overwintering habitat may be created, increasing resources</td><td>Socioeconomics:
• Moderate potential for revenue generation to regional economy from material sales
Subsistence:
• Some overwintering habitat may be created, increasing resources</td></tr>
</table>

	overwintering habitat • No Spur Roads	• Spur Roads: 1,500 ft (Southern), or 4,550 ft Combined B)	• Spur Roads: 3,000 ft (Southern), or 0 ft (Combined B)	• Spur Roads: 2,000 ft (Southern), or 0 ft (Combined B)
Secondary and Cumulative	Socioeconomics: • Greatest potential to support future infrastructure	Socioeconomics: • Less potential to support future infrastructure	Socioeconomics: • Less potential to support future infrastructure	Socioeconomics: • Less potential to support future infrastructure

4.6.3 Avoidance, Minimization, and Mitigation

- Individual material source reclamation plans would be developed, in consultation with appropriate agencies, local government, and landowners. Potential reclamation options may include flooding for creation of wetland and waterfowl/fish habitat, which may support increased subsistence use at these locations.

4.7 Hazardous Materials, Pollution Prevention, and Solid Waste

4.7.1 Affected Environment

The Alaska Department of Environmental Conservation (ADEC) *Contaminated Sites Program Database* (ADEC 2016a) identifies only one contaminated site in the Study Area: Alaska Air National Guard (AKARNG) Kivalina FSA, which is listed for petroleum contamination. The site is in the middle of the community of Kivalina near the Kivalina Lagoon, and is not near proposed evacuation route alignments or material sources (Figure 2). The ADEC issued a Cleanup Complete determination for AKARNG Kivalina FSA on January 5, 2009.

The City of Kivalina Hazard Mitigation Plan (City of Kivalina, 2015) describes the 6.5 acre Class 3 unpermitted municipal landfill that is located within the Study Area on the barrier island, approximately 0.3 miles northwest of the Kivalina Airport (Figure 2). Possible hazardous materials at the landfill include construction and demolition waste, asbestos, and sewage.

The ADEC Spill database tracks reported spills from 1995 to the present. A search for the City of Kivalina on October 9, 2017 revealed three reports. These reports were all for spills at the McQueen School Tank Farm in 1998 (40 gal diesel), 2000 (150 gal diesel), and 2005 (400 gal diesel).

Residential sewage is hauled from residences in honey buckets to disposal bunkers located throughout the community. Honey bucket waste is comingled with solid waste at the landfill (ADEC 2016b). Other potential sources of waste may include the power plant and clinic. Figure 5 shows locations for all recorded sources of contamination within the Kivalina area.

4.7.2 Environmental Consequences

4.7.2.1 No-Action Alternative

An evacuation road would not be constructed and no changes to hazardous materials, pollution prevention, and solid waste use would occur. Residents would continue to be exposed to environmental threats with no reliable options for evacuation during storm events with the potential to detrimentally impact the community over time. There would remain severe risk to life, health, and safety of residents.

4.7.2.2 Route and Lagoon Crossing and Material Site Alternatives

Direct and Indirect Impacts:

No known hazardous waste sites, generators, or contaminated sites are identified within footprint of the proposed alternatives. Therefore, contamination or hazardous waste would not likely be encountered during construction, and no impacts would be expected. Storm surge related destruction of the AKARNG or other contaminated sites in the Study Area are not expected to prevent access to the evacuation route.

A plan for disposal and hauling of solid waste generated during construction would need to be developed prior to construction. It is anticipated the Kivalina municipal landfill would not have sufficient area to accommodate project construction waste.

Land interest sufficient for a dedicated public ROW along either proposed route alternative would ultimately be made available by private land owners or a government entity. This process would require completion of a Phase I Environmental Site Assessment for the proposed evacuation route prior to DOT&PF ROW acquisition.

Construction Impacts:

Construction activities pose a small risk of incidental spills taking place, primarily from heavy equipment and fuel storage at material sites, staging areas, and temporary construction camps. Either alternative is expected to have a similar risk of incidental spills. Releases would trigger spill response operations, and the site would be treated in accordance with consultation with ADEC.

Secondary (Induced) and Cumulative Impacts:

While increased access to adjacent public and private lands may occur along the route in the future, no secondary (induced) or cumulative impacts to hazardous materials and solid waste are anticipated, as a result of this project, with proper implementation of BMPs.

4.7.2.3 Alternatives Comparison

There are no notable differences between alternatives relevant to impacts to hazardous materials, pollution prevention, and solid waste. Impacts described above are relevant for both route and lagoon crossing alternatives, as well as materials source alternatives.

4.7.3 Avoidance, Minimization, and Mitigation

- Prior to construction, the contractor would develop a BMP-based Solid Waste and Hazardous Materials Control Plan to address contaminant spill response, storage, management, and handling of hazardous materials, including fuel and lubricants. If leaks or spills occur, contaminated material and soils would be contained and disposed of properly; and
- The construction contractor would be required to stop work and notify the DOT&PF Project Engineer if suspected contaminated soil or water is encountered. DOT&PF would notify ADEC in compliance with 18 AAC 75.300. Any contamination encountered would be handled and disposed of in an ADEC-approved manner.

4.8 Water Resources and Water Quality

4.8.1 Affected Environment

The major surface water sources in the Kivalina area include the Kivalina Lagoon, Wulik and Kivalina Rivers, the Chukchi Sea, and various streams and lakes (WHPacific 2012a). Marine waters in the Study Area have historically been ice-free from early July through late October. However, later freeze-up and earlier melting has resulted in longer ice-free periods during recent years. As a result, Kivalina has been facing significant increased risks of flooding and erosion from storms (DCCED 2015). Sea level information in the area is available since August 2003 from the Red Dog Mine Dock tide station. Tides range from 0.79 ft mean high water to 0.12 ft mean low water (USACE 2016). Trends in the tidal signal over this period are not identifiable and there are no regional specific sea level change estimates available. The most recent global estimate of sea level rise by 2100 ranges from 1.7 to 2.4 ft, depending on the carbon emission scenario used (AMAP 2017).

4.8.1.1 Lagoon

Kivalina Lagoon is a shallow body of marine, tidally influenced water approximately 10 miles long that ranges in width from 3,000 ft near the mouth of the Wulik River to 8,000 ft north of the Kivalina River (Figure 2). The lagoon is fed by the Kivalina River in the northern half, the Wulik River at the southern end, and by tidal flows from the Chukchi Sea through two inlets that define the Kivalina barrier island: Singuak Inlet on the southeastern side of the community of Kivalina, and Kivalik Inlet, approximately 5.5 miles to the northwest. The lagoon’s northeast shoreline is dominated by the deltas of the Kivalina and Wulik Rivers. The majority of the lagoon is between 1 and 3 ft deep. Deeper areas have been recorded in the channels extending from the mouths of the rivers towards the Chukchi Sea as well as along the barrier island on which the community is located (USACE 2016).

The Kivalik and Singuak Inlets correspond with the rivers’ outlets and allow for the conveyance of the lagoon’s tidal and river hydraulic loading; though sediment transport along the Chukchi Sea shoreline of the Kivalina barrier island can occasionally block them (USACE 2016). These blockages result in elevation of the lagoon water level until it breaches the blocked inlet and reestablishes a new channel as the flow head cuts through the sand deposits. These inlets are the most dynamic part of the littoral system and are constantly shifting in response to river flow, longshore wave-driven transport of sediments along the outer beach, and the equilibrium cross section that responds to the flood and ebb of tidal surges. Normally the inlets are in balance with the river flow and would have a similar hydraulic radius (Appendix B).

Historical aerial imagery is an indicator of Singuak Inlet and lagoon channel stability (Appendix C). Other than river currents, assumed to pass directly from the river deltas to the Chukchi Sea through river channels in lagoon sediment, there is typically little to no flow inside the lagoon except during large surge events (USACE 2016; Appendix B). Waves from the Chukchi Sea are primarily blocked by the barrier island, or its energy is dissipated by sand bars of material deposited by the rivers and through interaction with the current of the rivers (USACE 2016). It is therefore assumed that waves in Kivalina Lagoon are mostly generated by local winds. Local knowledge provided by Kivalina residents support that assumption, with many lagoon travelers indicating that north winds can raise substantial waves and elevate the lagoon water level by several feet in a short period of time (Appendix D). Analyses of wind speed data from the Kivalina Airport resulted in an estimated maximum wind-driven wave height, during a storm surge, inside the lagoon of 3–4.5 ft (USACE 2016).

4.8.1.2 Rivers and Streams

Neither the Wulik nor Kivalina Rivers are listed as Wild and Scenic Rivers by the NPS, but are important anadromous Essential Fish Habitat for fish and provide important habitat for other biological resources in the area (see Sections 4.10 through 4.13). Neither river is listed as navigable by the USACE, but both are considered navigable by the State of Alaska.

Wulik River

The Wulik River roughly defines the southeast boundary of the Study Area (Figure 2). Ponds, sloughs, and one major relic channel of the Wulik River regularly flood and flow in a southwesterly direction to the Kivalina Lagoon and the Chukchi Sea. The Wulik River is not listed as impaired (ADEC 2010).

The Wulik River is approximately 80 miles long and originates in the DeLong Mountains, generally flowing southwest into Kivalina Lagoon. There is a U.S. Geological Survey (USGS) streamflow gauge located 22 miles upstream of the river mouth that has been continuously operating since 1984. Based on flow data from this gauge, the 100 year flow event was calculated to be 55,000 cubic-feet-per-second (cfs) (USACE 2016).

The Wulik River has annual average discharge of approximately 1,600 cfs with large seasonal variation in surface water flow ranging from a monthly average discharge of 136 cfs in November to 3,175 cfs in June (U.S. Environmental Protection Agency [USEPA] 2009). The Wulik River Watershed drainage basin is approximately 578,000 acres (USDA 2017).

Water rights govern the legal use to use surface or groundwater in Alaska. The Wulik River has two water rights for public drinking water issued to the City of Kivalina (ADL 46323 and ADL 72129). A reservation of water for the Wulik River has been issued to ADF&G (LAS 10067).

A visual investigation of the stability of the mouth of the Wulik River from the 1950s to the present revealed a fairly stable system morphology through time, with most changes only evident in the southern portion of the delta and not along the north bank where the proposed crossing is planned (Appendix C).

The Wulik River has had extensive biological and physical monitoring due to the activities of the Red Dog Mine. The Ikalukrok Creek, Buddy Creek, and Red Dog Creeks are the draining watersheds of Red Dog Mine, and tributaries to the Wulik River 37 miles upstream of the lagoon. The mine's wastewater and effluent discharge permits require annual monitoring for metals, pH, total dissolved solids, periphyton (chlorophyll-a), and invertebrates. Detailed analyses of water quality results are documented in the aquatic biomonitoring technical reports (e.g., ADF&G 2017a). In brief, results from 2016 showed median metals concentrations to be lower than pre-mining levels; total dissolved solids and pH to be higher than pre-mining levels; periphyton measurements to vary with zinc and cadmium concentrations; and variable invertebrate results depending on the tributaries considered. Fishery monitoring has also been conducted and is discussed in Section 4.10 and Appendix I (ADF&G 2017a).

Kivalina River

The Kivalina River roughly defines the northwest boundary of the Study Area (Figure 2). The Kivalina River is not listed as impaired (ADEC 2010). The Kivalina River is approximately 60 miles long and originates in the DeLong Mountains, generally flowing southwest into Kivalina Lagoon. It is neither gauged nor has any hydrologic analysis been performed to estimate peak flows. However, previous studies have assumed that the Kivalina River exhibits the same general flow pattern as the Wulik River (USACE 2016). Based on basin areas and similarities to the Wulik River in its watershed and river slope, the U.S. Army Corps of Engineers (USACE) estimated that the Kivalina River could convey approximately 75% of the discharge of the Wulik River, resulting in an estimated 100 year flow of 41,250 cfs.

4.8.1.3 Floodplains

Executive Order 11988 Floodplain Management requires federal agencies to avoid adverse impacts associated with the occupancy and modification of floodplains. The Federal Emergency Management Agency (FEMA) administers the National Flood Insurance Program (NFIP) which aims to reduce the impacts of flooding on private and public structures. The program encourages communities to adopt and enforce floodplain management regulations and is intended to reduce the socioeconomic impact of disasters by promoting the purchase of flood insurance. Kivalina does not participate in the NFIP and there are no FEMA floodplain maps available for the Study Area.

In lieu of available flood maps for the Study Area, DOT&PF used existing hydrology studies (Appendix B) of the Kivalina Lagoon to inform design and assess potential floodplain impacts of the Proposed Action. Information presented in various location hydrology studies within the Study Area are summarized as follows:

The elevation of the island at the location of the community varies between +10 and +11 ft mean lower low water (MLLW). Analysis using the Wulik River gauging station to estimate the 100 year flood water surface elevation on the lower Wulik River using the HEC-2 numerical river flow model, found water surface elevation in the lagoon had a much greater effect on flood elevations than river discharge (USACE 1998). The size of the lagoon and the low ground elevation on the mainland provide a large area for storage when the river flows overtops their banks. With river flow into the lagoon passing through to the ocean with little change in water surface elevation, high flows in the rivers cause only minor changes to the lagoon water level during flood events (USACE 2016).

Flood hazards in Kivalina result almost exclusively from Chukchi Sea storm surges caused by south to southeasterly winds (City of Kivalina 2015). Erosion is a particular concern for the Singuak Inlet, as storm events in 2004, 2005 and 2006 resulted in significant erosion on the seaward side of the inlet from wind driven tidal surges (USACE 2006). Chapman et al. (2009) estimated the 100 year storm surge flood event at 7.77 +/- 1.08 SD ft (MLLW) based on the four years of tide gauge data from Red Dog Mine available at the time. The USACE (2016) later adapted this estimate, and used 7.3 ft MLLW for their design recommendations. In 2011, a storm surge event of 7.4 ft MLLW occurred. Using 12 years of tide gauge data, a recent analysis updated the 100 year surge event estimate to 8.5 ft MLLW and provided a 500 year estimate of 9.6 ft MLLW (Appendix B). The author noted that elevations at or above the new estimated 100 year event could cause significant damage along the seaward shoreline of the village and likely trigger evacuation.

4.8.2 Environmental Consequences

4.8.2.1 No-Action Alternative

An evacuation road would not be constructed from Kivalina to K-Hill and no impacts to water resources and water quality would occur. Residents would continue to be exposed to environmental threats with no reliable options for evacuation during storm events with the potential to detrimentally impact the community over time. There would remain severe risk to life, health, and safety of residents.

4.8.2.2 Route and Lagoon Crossing Alternatives

This section focuses on Kivalina Lagoon and the lower Wulik River drainage system. No interactions between the proposed alternatives and the lower Kivalina River have been identified. As such, no discussion of lower Kivalina River is included.

Direct and Indirect Impacts:

<u>Impacts to Navigability:</u> No impact to navigability is expected from the proposed lagoon crossing. Due to the shallow bathymetry of the lagoon (1–3 ft deep), navigability is limited to personal boats sized to

support subsistence activities. The bridge has been designed to span the deepest channel, and would be designed so that the community can continue to access both sides of the Kivalina Lagoon.

Impacts to Water Quality: Once the road is constructed, rainfall or melting events may result in mobilization of runoff from the roadway, which could discharge into nearby freshwater resources. Wind generated and fugitive dust deposition in adjacent waterways could occur along the route. Other potential impacts to water quality would be associated with accidental spills or leaks from vehicles or heavy equipment operating adjacent to wetlands and water bodies during either construction or subsequent use of the evacuation route (see also Section 4.7).

Impacts to Wulik River Hydrology: There are four types of water crossings in the Proposed Action alternatives: fish passage, non-fish passage, enhanced design and Wulik River Relic Channel crossings. Fish passage crossings are for fish-bearing waterways which incorporate stream simulation designs per the DOT&PF and ADF&G 2001 Memorandum of Agreement for the Design, Permitting and Construction of Culverts for Fish Passage. Non-fish passage crossings are not located in fish-bearing waterways and are designed to DOT&PF design standards. Enhanced design crossings are for fish-bearing waterways that require more coordination with ADF&G to determine design requirements. The Wulik River Relic Channel is fish-bearing, and would be individually designed and permitted.

The Southern Route (Preferred Alternative) would require two fish passage crossings, four non-fish passage crossings, three enhanced design crossings, and no crossings of the Wulik River relic channel. Combined Route B would require three fish passage crossings (one of which is a crossing of the Wulik River relic channel), six non-fish passage crossings, and three enhanced design crossings. The water crossing of the Wulik River relic channel would be designed as a fish passage culvert, which would also maintain stream geomorphology and its hydrological regime. Channel crossing locations and types are shown in Figure 9.

Impacts to Lagoon Currents and Sediment Transport: Other than the river currents assumed to pass directly from the river deltas through river channels in lagoon sediment and the inlets into the Chukchi Sea (USACE 2016), there is typically little to no current and sediment transport inside the lagoon except during large surge events (Appendix B). Recent surveys and photography have observed that the Kivalina and Wulik River sediments simply pass through the lagoon and are deposited on the outer shoreline. With river water outflow into the lagoon and Chukchi Sea not anticipated to be impacted by the proposed project, sediment transport would also not be impacted, allowing for this accretion of the barrier island on the outer beach to continue and maintain this natural erosion buffering dynamic (Appendix B).

A bridge would span the approximately 110 ft wide channel that parallels the inside of the barrier island (Figure 3) and is mostly the result of scour during the ebb portion of the surge, thus maintaining that dynamic. Culvert(s) would be placed across the northeast end of the causeway, with overflow pipes placed regularly in series along the length of the causeway, further ensuring maintenance of any low-level energy flow and sediment transport regime in the lagoon.

Impacts to Floodplains: Portions of the Proposed Action alternatives would be constructed within base floodplain areas susceptible to storm surge flooding, but would not be located within a regulatory floodway or FEMA mapped 100 year floodplain. Neither the proposed crossing alternative nor the evacuation routes are likely to increase the 100 year floodplain backwater elevation of the Wulik River. With what are basically two separate and independent inlet and river systems with an intermediate 'stagnation zone' in the middle of the lagoon (as described above), the proposed hydraulically permeable crossing alternative with a bridge and culverts should not impact the dynamics currently observed during storm surge events nor substantively alter the estimated storm surge flood levels (Appendix B; USACE 2016).

A *Location Hydraulic Study for the Wulik River* (Stantec, 2017, and in Appendix D) was conducted to address floodplain impacts, including the practicability of alternatives to any longitudinal encroachments. The study found there are no practicable alternatives to development outside the floodplain; however, the proposed project design (bridge and numerous cross culverts with overflow pipes) is expected to maintain existing flow and drainage patterns and convey seasonal runoff.

Construction Impacts:

Impacts to Water Quality: Minor, short term impacts to water quality would likely result from construction of either route and crossing alternative within the Wulik River drainage and Kivalina Lagoon. These impacts would primarily be associated with construction-related sediment releases during causeway fill and armor stone placement, drainage structure construction, and stormwater runoff on disturbed road embankments before final stabilization is completed. Proper installation techniques of the proposed road water crossings (e.g., bypass or plug and pump) would limit the introduction of sediment into freshwater resources (ADF&G 2001), and winter construction would minimize the potential for runoff generation and transport. Localized effects of sediment-laden runoff during construction are anticipated to be temporary and of short duration with the implementation of required SWPPPs and BMPs.

Impacts to Wulik River Hydrology: During project construction, water withdrawals would be required to create temporary ice/snow roads, dust control, to support road compaction, and to support temporary construction camps. Water to support these activities would likely be sourced from surface waterbodies along the final selected route alignment, and permitted through a Temporary Water Use authorization and Title 16 permit. Winter water withdrawal could lead to reduced flows in small streams, and summer season withdrawal could lead to similar effects if volume removal is too great relative to water levels at that time.

Secondary (Induced) and Cumulative Impacts:

The ongoing activity of implementing runway or coastal erosion control measures at the existing Kivalina airport would have minimal cumulative impact on water resources as it is outside the influence of the Kivalina Lagoon, and the Wulik and Kivalina Rivers.

The potential development of adjacent public and private lands may create a demand for greater water use; however, water use is regulated by the state through permitting. No cumulative impacts to water quality or quantity are anticipated. Proper implementation of BMPs would be required to operate under the APDES Construction General Permit (CGP). Such developments could alter the path and amount of surface water, but would not be anticipated to substantively impact the floodplain. Dust impacts to water quality from an increase in traffic along the road are anticipated to be minor. A road maintenance and operations contract with the community will be developed that would include long term measures for dust abatement, as needed.

4.8.2.3 Material Source Alternatives

Direct and Indirect Impacts:

Except for K-Hill, material source development involves extraction in or adjacent to waterbodies. This type of material source development can lead to destabilization of river channels, river channel capture, floodplain widening, increased erosion and sedimentation, increased water velocities, and reduced water quality (Joyce et al. 1980). Through appropriate planning and adherence to site specific mitigation measures and management plans, however, material source excavation within relic channels and the river bar of the Wulik River would likely be temporary and have minimal effects.

Secondary (Induced) and Cumulative Impacts:

Once the proposed lagoon crossing and evacuation route is constructed, increased access to adjacent public and private lands may enable development in those areas, which may encourage expansion or development of material sources. This could cause additional potential impacts on water quality and flow regimes if unmitigated.

4.8.2.4 Alternatives Comparison

Table 5 compares impacts that vary between proposed route and crossing alternatives, as well as potential material source alternatives. All other impacts are similar across all proposed alternatives.

Table 5 Water Resources and Water Quality Impacts

<table>
<tr><th colspan="5">Water Resources: Differences Between Route Alternatives</th></tr>
<tr><th></th><th colspan="2">Southern Route (Preferred Alternative) with Lagoon Crossing D</th><th colspan="2">Combined Route B with Lagoon Crossing D</th></tr>
<tr><td>Direct and Indirect and Construction</td><td colspan="2">• Total of 9 water crossings:
• 0 crossings of Wulik River Relic Channel;
• 2 fish passage crossings;
• 4 non-fish passage crossings; and
• 3 enhanced design crossings.</td><td colspan="2">• Total of 12 water crossings:
• 1 fish passage crossing (Wulik River Relic Channel);
• 2 fish passage crossings;
• 6 non-fish passage crossings; and
• 3 enhanced design crossings.</td></tr>
<tr><td>Secondary and Cumulative</td><td colspan="2">No Difference Between Alternatives.</td><td colspan="2">No Difference Between Alternatives.</td></tr>
<tr><th colspan="5">Differences Between Material Source Alternatives</th></tr>
<tr><th></th><th>K-Hill Site</th><th>Wulik River Source 1</th><th>Relic Channel Source 1</th><th>Relic Channel Source 2</th></tr>
<tr><td>Direct and Indirect and Construction</td><td>• Least potential for water quality impacts to area water bodies as compared to other resources due to further distance form Wulik River.</td><td>• Most potential for water quality impacts, river capture, floodplain widening, and increased erosion to the Wulik River as compared to other resources due to close proximity to the Wulik River.</td><td>• Medium potential for water quality impacts, river capture, floodplain widening, and increased erosion to area water bodies as compared to other resources due to proximity to the Wulik River Relic Channel.</td><td>• Medium potential for water quality impacts, river capture, floodplain widening, and increased erosion to area water bodies as compared to other resources due to proximity to the Wulik River Relic Channel.</td></tr>
<tr><td>Secondary and Cumulative</td><td>• More potential secondary and cumulative impacts could occur due to proximity to</td><td>• More secondary impact potential compared to relic channel sources due to increased access for greater</td><td>• Less secondary impact potential compared to other material sources due to greater distance from Wulik River and</td><td>• Less secondary impact potential compared to other material sources due greater distance from Wulik River and</td></tr>
</table>

	proposed school site.	number of private land owners near the Wulik River.	fewer number of private land owners.	fewer number of private land owners.

4.8.3 Avoidance, Minimization, and Mitigation

Water Quality:

- Measures to minimize releases of sediment to water bodies would be implemented during construction as part of compliance with the APDES CGP. Compliance with the CGP includes preparation of a SWPPP and implementation and monitoring of erosion and sediment control BMPs;
- Utilization of low erodible material and armor rock placed in the Kivalina Lagoon would minimize sedimentation to these waterbodies. Sediment entrainment measures would further reduce impacts to water quality; and
- Water withdrawal requires permitting through DNR and ADF&G would specify appropriate BMPS, including water withdrawal volume limitations, which would reduce the potential effects on stream flows and existing water rights during construction.

Floodplain:

- Material sites would be constructed to avoid river capture, floodplain widening, and increased erosion;
- The road would be designed above the 100-year flood elevation.
- Causeway bridge and culvert would be designed for adequate flows through the causeway at flood stage.

Hydrology:

- Roadway and causeway embankments would be protected from erosion to prevent sediment transport to adjacent habitats; and
- Construction of a bridge or causeway in tidal waters falls under the jurisdiction of the U.S. Coast Guard (USCG) Office of Bridge Programs (33C.F.R. Chapter I, Subchapter J, Part 115) and all necessary USCG authorizations would be obtained prior to construction.

4.9 Wetlands and Vegetation

4.9.1 Affected Environment

The Study Area falls within the Wulik-Kivalina Rivers Watershed (USEPA/USGS hydrologic catalog unit 19050404 [https://cfpub.epa.gov/surf/huc.cfm?huc_code=19050404]), which is comprised primarily of dwarf shrub and emergent tundra, and located immediately adjacent to Kivalina Lagoon and the Chukchi Sea.

National Wetlands Inventory (NWI) was used to initially classify wetlands within the entire Study Area, with a more detailed desktop mapping effort completed by the NAB for the area surrounding the community proposed alternatives. A wetland verification report was completed for the Study Area, using both the NWI and the more detailed mapping provided by the NAB (USFWS 2017c; ASRC 2015). The objective of that study was to verify and refine existing wetland mapping with ground data collected in the vicinity of the proposed alternatives. This effort also used LiDAR data (DOT&PF 2011) and information from four field investigations conducted in 2015, 2016, and 2017 (in four reports: Golder Associates 2015; Stantec 2016b, 2017c; USACE 2017). The following affected environment descriptions are based on the findings described in the verification report.

4.9.1.1 Wetlands and Vegetation

The wetland verification report (Stantec 2017c) provides detailed ground truthed wetland delineation using the Cowardin classification system (Cowardin et al. 1979). The report verified limited uplands within the Study Area. The field data confirmed the presence of wetlands throughout the Study Area, with the Wulik River and Kivalina River being important features. The report identified isolated small additional areas of uplands, generally on pingos or relic stream banks. Wetland classifications were updated with field data throughout the Study Area. Table 6 provides a summary of acres and percentage of Study Areas of the verified water, wetland types, and uplands.

Table 6 Summary of Wetlands, Waters of the U.S., and Uplands

Wetlands, Waters of the U.S., and Uplands		
Habitat Type	**Acres**	**% Study Area**
Estuarine	3,822.0	10.4%
Lacustrine	1,164.3	3.2%
Marine	182.8	0.5%
Palustrine Flooded	3,540.10	9.6%
Palustrine Saturated & Seasonally Flooded	23,894.0	64.6%

Wetlands, Waters of the U.S., and Uplands		
Habitat Type	**Acres**	**% Study Area**
Pond	949.5	2.6%
Riverine	2,292.2	6.2%
Upland	1,071.5	2.9%
Total Study Area	**36,916.4**	**100.0%**

The wetland verification work determined that the mainland portion of the Study Area is dominated by Palustrine wetlands. The mainland area also contains some Uplands, which occur within a few higher elevation areas between the Kivalina and Wulik Rivers (Figure 6).

Vegetation types within the Study Area were mapped using the Viereck classification system (Viereck et al. 1992). Results indicate the majority of the Study Area is comprised of Mesic Graminoid Herbaceous (III.A.2) vegetation, followed by Willow Dwarf Scrub (II.D.2), Wet Graminoid Herbaceous (III.A.3), and Closed Low Scrub (II.C.1) vegetation (Stantec 2017c) (Table 7, Figure 8). Developed areas are locations where gravel fill has been placed, such as around the houses in the current town or the airport runway.

Closed Low Scrub has shrubs which are 20 cm (centimeter) to 1.5 m (meter) tall, and are often found bordering waterways. These habitats were identified by the U.S. Fish and Wildlife Service (USFWS) (2016b) as important bird nesting habitat, providing nesting habitat, elevation above predators, and locations for surveillance. They are the highest canopy vegetation available in the Study Area and provide some of the only perching locations.

Table 7 Summary of Habitat (Viereck) Types

Habitat (Viereck) Type	Acres	% Study Area
Developed	64.8	0.2%
Closed Low Scrub (II.C.1)	3,228.7	8.7%
Willow Dwarf Shrub (II.D.2)	9,057.3	24.5%
Mesic Graminoid Herbaceous (III.A.2)	14,348.7	38.9%
Wet Graminoid Herbaceous (III.A.3)	1,877.6	5.1%
Water (W)	8,339.3	22.6%
Total Study Area	**36,916.4**	**100.0%**

4.9.1.2 Wetland Hydrology and Connectivity

Wetland hydrology within the Study Area appears to be driven by a restrictive permafrost layer perching water on the surface. Soil data collected during the fall 2016 cultural resource survey, showed that in low lying areas, permafrost was shallow (e.g., 4–10 in.). In contrast, depth to permafrost was greater (e.g., greater than 10 in.) in relic channels or on the outer bends of oxbow lakes (Stantec 2017b, 2017c). Vegetation differences are apparent on aerial photography where these slight elevation differences occur. While most of the higher elevation areas within relic channels had greater depth to permafrost, the ground surface remained saturated at or near the surface, or standing water was observed, with hydrophytic plants dominating the landscape. Uplands were observed in some elevated areas including remnant pingos and point bars preserved along relic channels. In these areas, well drained gravels were visible near the surface and dominated by larger willow species (Stantec 2017b, 2016b).

All wetlands and waters within the Study Area appear to have a surface water connection to either the Kivalina River or Wulik River, and an apparent hydrologic connection to the Chukchi Sea via Kivalina Lagoon. While many of the lakes, ponds, and sloughs appear to be isolated from these waterbodies, as observed during the 2016 reconnaissance survey (Stantec 2016b), it is assumed they are connected via surface saturation on top of permafrost and seasonal flooding during annual breakup.

4.9.1.3 Wetland Functional Value

Wetlands were generally found to be high ranking (Category I and II, Table 8, Figure 7). This is expected for a largely undisturbed ecosystem (Stantec 2017c).

Due to most Study Area wetlands falling into Category I classification, a further category of higher functioning wetlands (Category I+), was introduced. Waters of the U.S. (ponds, riverine, estuarine, and lacustrine) were promoted to Category I+ to indicate their intrinsic importance. Upon consultation with the USFWS (2016b), all Closed Low Scrub habitat was promoted one functional level (e.g., II to I or I to I+) because this type of vegetation is considered important bird habitat in this area. This Category I+ designation allows project planners, regulators, and the public to evaluate impacts to wetlands in a largely undisturbed ecosystem where most wetlands are very high quality.

The wetlands and waters within the Study Area are generally of high value, but are not rare or unique. Rather, they are ubiquitous in both the Study Area and regionally. They also provide several important functional characteristics, including nutrient and toxicant removal, native plant richness, and production and export of organic material (ASRC 2015). The majority of Study Area wetlands are either seasonally inundated or permanently flooded, and have high surface water connectivity to the Wulik or Kivalina Rivers (Stantec 2017c).

Table 8 Functional Value of Study Area Wetlands and Waters of the U.S.

Functional Value of Study Area Wetlands and Waters of the U.S.					
Habitat Type	**Initial Functional Value**	**USFWS Bird Habitat?**	**Final Functional Value/Category**	**Acres**	**% Study Area**
Estuarine	I+	No	I+	3,822.0	10.4%
Lacustrine	I+	No	I+	1,164.3	3.2%
Marine	I+	No	I+	182.8	0.5%
Palustrine Flooded	I	Yes	I+	759.4	2.1%
		No	I	2,780.7	7.5%
Palustrine Saturated & Seasonally Flooded	I	Yes	I+	2,247.6	6.1%
		No	I	15,326.4	41.5%
	II	Yes	I	150.3	0.4%
		No	II	6,169.7	16.6%
Pond	I+	No	I+	949.5	2.6%
Riverine	I+	No	I+	2,292.2	6.2%
Upland	Upland	Upland	Upland	1,071.5	2.9%
			Total Study Area	**36,916.4**	**100.0%**

4.9.2 Environmental Consequences

4.9.2.1 No-Action Alternative

An evacuation road would not be constructed from Kivalina to K-Hill and no impacts to wetlands would occur. Residents would continue to be exposed to environmental threats with no reliable options for evacuation during storm events with the potential to detrimentally impact the community over time. There would remain severe risk to life, health, and safety of residents.

4.9.2.2 Route and Lagoon Crossing Alternatives

Direct and Indirect Impacts:

Impacts to Wetland Habitat and Functional Value: Impacts to wetlands from either proposed route and crossing alternative would result in a reduction of wetlands within the Study Area. Permanent impacts are the areas of fill.

Given the ubiquity of wetlands and Waters of the U.S. in the Study Area, the relative loss of wetland habitat due to the proposed route and lagoon crossing temporary and permanent impacts would be minor. Neither route or lagoon crossing alternative is expected to change area drainage patterns or the surrounding area's ability to retain floodwaters. Culverts and other water crossings would be constructed to maintain drainage.

The impacted wetlands and Waters of the U.S. would no longer provide wetland functions, including habitats for various fish and wildlife. This impact is expected to be minor due to the abundance of similar surrounding habitat types given the undisturbed landscape surrounding the Study Area. The amount of Category I+ wetlands affected by temporary and permanent impacts is relatively small.

In addition, while the lagoon crossing would result in the loss of relatively minimal benthic habitat, it would also create more rock shoreline habitat than currently exists, which can contribute to biotic diversity

Closed Low Scrub habitat has been identified by the USFWS as having characteristics of important bird nesting habitat (USFWS 2016b). Both the Southern Route (Preferred Alternative) and Combined Route B alternatives avoid Closed Low Scrub habitat to the extent practicable.

Elevated surfaces tend to be drier and support more shrub species so new Closed Low Scrub habitat may become naturally established along the road embankments. However, operations and maintenance of the road may require clearing of vegetation established on the embankment. BMPs could limit impacts of these activities.

Impacts to Wetland Connectivity: No impacts to wetland connectivity are expected from route and lagoon crossing alternatives. Cross drainage culverts would be installed as appropriate to maintain connectivity. The lagoon crossing alternative being evaluated incorporates bridge and cross drainage culverts to retain connectivity of the Kivalina Lagoon. While wetlands in the Study Area may be impacted, wetlands in the surrounding landscape would retain connectivity with Waters of the U.S.

Construction Impacts:

Temporary impacts would occur within the 25 ft width from the embankment toes of slope (along the road, material source spur roads, staging areas) which may be used during construction for temporary equipment access and natural vegetative buffer.

Secondary (Induced) and Cumulative Impacts:

Impacts to Vegetation and Wetland Habitat: Potential development of a school site, as well as new road access within the Study Area may encourage private land owners adjacent to the alignment to develop portions of their land, requiring additional fill in wetlands to support such new development. As the

Southern Route (Preferred Alternative) provides more direct access to existing allotments than the Combined Route B, cumulative impacts to wetlands may be greater along the Southern Route. Cumulative impacts to wetlands from fugitive dust are not anticipated for this project. Potential fugitive dust resulting from potential increases and changes to traffic along the road would be covered under a road operations and maintenance agreement with the community, as described in 3.3.1.

Impacts to Wetland Hydrology and Connectivity: Secondary and cumulative impacts are not expected to affect wetland connectivity. The proposed school site and nearby private lands could potentially be developed, but these are not expected to be a barrier to connectivity. The Study Area landscape is predominately flat and the wetlands have a variety of connections to Waters of the U.S.

4.9.2.3 Material Source Alternatives

Direct and Indirect Impacts:

Impacts to Wetland Habitat and Functional Value: Development of material source alternatives and spur roads with a 25 ft buffer would result in both temporary and permanent alteration to wetlands and Waters of the U.S. Material sources avoid Category I+ wetlands as much as practicable. Material source development would only impact a relatively small percentage of Category I and Category II wetlands and would not impact overall wetland functionality within the Study Area. In addition, as some of the impacted material source acres can be reclaimed, impacts to wetlands would be further minimized.

Proposed material source locations avoid high quality bird habitat (Closed Low Scrub) where possible, although Wulik River Source 1 and Wulik River Relic Channel Source 1 & 2 do contain this habitat. This type of habitat is difficult to avoid during material source planning, as high quality material sources often exhibit soil characteristics required to support low scrub habitat.

Impacts to Wetland Hydrology and Connectivity: No impacts are expected to affect wetland connectivity from developing material source alternatives. While wetlands in the Study Area may be affected, connectivity would be retained with Waters of the U.S. Connectivity may be increased during material source reclamation by the creation of surface water habitat connecting to palustrine wetlands.

Secondary (Induced) and Cumulative Impacts:

Impacts to Wetland Habitat: Secondary and cumulative impacts to wetlands may be ongoing if material sources are kept open after construction is complete. Considering the amount of regionally available similar habitats, cumulative impacts would be minor and not impact overall availability and functionality.

Secondary and cumulative impacts to habitat would occur near material sources with access to private lands adjacent to the Wulik River. While the majority of Study Area lands are privately owned, the Southern Route (Preferred Alternative) provides increased access for a larger number of private land owners. Most of this use can be expected to be local, and in support of subsistence activities, as off route use would require an access permit by NANA.

Impacts to Wetland Connectivity: No secondary and cumulative impacts are expected to affect wetland connectivity from development of material source alternatives. While a small percentage of local wetlands may be permanently affected, wetlands surrounding the material sources are expected to retain connectivity to Waters of the U.S.

4.9.2.4 Alternatives Comparison

Tables 9–14 compare impacts that vary between proposed route and crossing alternatives, as well as potential material source alternatives. All other impacts are similar across proposed alternatives. Permanent impacts are expected within the footprint of disturbance (embankment toe of slope to embankment toe of slope). Temporary impacts would occur within an additional 25 ft width from the embankment toes of slope (along the road, material source spur roads, staging areas) which may be used during construction for temporary equipment access and natural vegetative buffer.

Table 9 Wetlands Impacts: Route and Crossing Alternatives

Alternative	**Southern Route (Preferred Alternative) with Lagoon Crossing D and Staging Areas**				**Combined Route B with Lagoon Crossing D and Staging Areas**		
	Wetlands and Waters Type	**Permanent (Acres)**	**Temporary (Acres)**	**Total**	**Permanent (Acres)**	**Temporary (Acres)**	**Total**
Direct and Indirect and Construction	Estuarine	8.7	2.6	**11.3**	8.7	2.6	**11.3**
	Lacustrine	-	-	**-**	-	-	**-**
	Marine	-	-	**-**	-	-	**-**
	Palustrine Flooded	19.2	5.6	**24.8**	11.7	3.4	**15.1**
	Palustrine Saturated & Seasonally Flooded	86.0	24.8	**110.8**	111.8	32.6	**144.4**
	Pond	0.1	0.3	**0.4**	0.2	0.3	**0.5**
	Riverine	-	-	**-**	-	-	**-**
	Upland	1.0	0.3	**1.3**	1.0	0.3	**1.3**
	Total	**115.0**	**33.6**	**148.6**	**133.4**	**39.2**	**172.6**

Alternative	Southern Route (Preferred Alternative) with Lagoon Crossing D and Staging Areas				Combined Route B with Lagoon Crossing D and Staging Areas		
	Wetlands and Waters Type	Permanent (Acres)	Temporary (Acres)	Total	Permanent (Acres)	Temporary (Acres)	Total
Secondary and Cumulative	• Greater potential secondary impacts compared to the Combined Route B due increased access to greater number of private land owners near the Wulik River.				• Fewer potential secondary impacts compared to the Southern Route due to greater distance from Wulik River and fewer private land owners.		

Table 10 Wetland Functions Impacts: Route and Crossing Alternatives

Alternative	Southern Route (Preferred Alternative) with Lagoon Crossing D and Staging Areas				Combined Route B with Lagoon Crossing D and Staging Areas		
	Function	Permanent (Acres)	Temporary (Acres)	Total	Permanent (Acres)	Temporary (Acres)	Total
Direct and Indirect and Construction	Category I+	8.8	2.9	**11.7**	8.9	2.9	**11.8**
	Category I	101.7	29.3	**131.0**	109.1	32.0	**141.1**
	Category II	3.5	1.1	**4.6**	14.4	4.0	**18.4**
	Upland	1.0	0.3	**1.3**	1.0	0.3	**1.3**
	Total	**115.0**	**33.6**	**148.6**	**133.4**	**39.2**	**172.6**
Secondary and Cumulative	• Greater potential secondary impacts compared to the Combined Route B due increased access to greater number of private land owners near the Wulik River.				• Fewer potential secondary impacts compared to the Southern Route due to greater distance from the Wulik River and fewer numbers of private land owners.		

Table 11 Habitat (Viereck) Impacts: Route and Crossing Alternatives

Alternative	Southern Route (Preferred Alternative) with Lagoon Crossing D and Staging Areas				Combined Route B with Lagoon Crossing D and Staging Areas		
	Viereck	Permanent (Acres)	Temporary (Acres)	Total	Permanent (Acres)	Temporary (Acres)	Total
Direct and Indirect and Construction	Developed	1.0	0.3	**1.3**	1.0	0.3	**1.3**
	Closed Low Scrub (II.C.1)	1.8	0.5	**2.3**	4.8	1.5	**6.3**
	Willow Dwarf Shrub (II.D.2)	17.9	5.4	**23.3**	34.8	10.4	**45.2**
	Mesic Graminoid Herbaceous (III.A.2)	80.7	23.2	**103.9**	74.7	21.5	**96.2**
	Wet Graminoid	4.8	1.3	**6.1**	9.2	2.6	**11.8**

	Herbaceous (III.A.3)						
	Water (W)	8.8	2.9	**11.7**	8.9	2.9	**11.8**
	Total	**115.0**	**33.6**	**148.6**	**133.4**	**39.2**	**172.6**
Secondary and Cumulative	• Greater potential secondary impacts compared to the Combined Route B due increased access to greater number of private land owners near the Wulik River.				• Fewer potential secondary impacts compared to the Southern Route due to greater distance from the Wulik River and fewer numbers of private land owners.		

Table 12 Wetlands Impacts: Material Source Alternatives*

Alternative	K-Hill Site		Wulik River Source 1	Relic Channel Source 1 and Access**		Relic Channel Source 2 and Access***	
	Wetland Type	**Permanent (Acres)**	**Permanent (Acres)**	**Permanent (Acres)**	**Temporary (Acres)**	**Permanent (Acres)**	**Temporary (Acres)**
Direct and Indirect and Construction	Estuarine	-	-	-	-	-	-
	Lacustrine	-	-	2.0	-	-	-
	Marine	-	-	-	-	-	-
	Palustrine Flooded	-	33.7	2.1	0.1	0.4	0.1
	Palustrine Saturated & Seasonally Flooded	86.6	0.3	48.0	5.1	42.4	2.3
	Pond	-	-	2.5	-	2.3	-
	Riverine	-	5.7	-	-	-	-
	Upland	13.3	-	6.8	-	-	-
	Total	**99.9**	**39.7**	**61.4**	**5.2**	**45.1**	**2.4**
Secondary and Cumulative	• More potential secondary and cumulative impacts could occur due to proximity to proposed school site.		• More secondary impact potential compared to relic channel sources due to increased access for greater number of private land owners near the Wulik River.	• Less secondary impact potential compared to other material sources due to greater distance from Wulik River and fewer number of private land owners.		• Less secondary impact potential compared to other material sources due greater distance from Wulik River and fewer number of private land owners.	

NOTES:
* Acreages reflect a sub-portion of the areas depicted on figures.
** Includes Relic Channel Source 1 to Wulik River Source 1 Spur road.
*** If Combined Route B is selected, impacts would be slightly less due to shorter spur road.

Table 13 Wetland Functions Impacts: Material Source Alternatives*

Alternative	K-Hill Site		Wulik River Source 1	Relic Channel 1 and Access**		Relic Channel 2 and Access***	
	Function	**Permanent (Acres)**	**Permanent (Acres)**	**Permanent (Acres)**	**Temporary (Acres)**	**Permanent (Acres)**	**Temporary (Acres)**
Direct and Indirect and Construction	Category I+	-	20.6	4.6	0.1	2.3	-
	Category I	86.6	19.1	50.0	5.1	32.6	2.4
	Category II	-	-	-	-	10.2	-
	Upland	13.3	-	6.8	-	-	-
	Total	**99.9**	**39.7**	**61.4**	**5.2**	**45.1**	**2.4**
Secondary and Cumulative	• More potential secondary and cumulative impacts could occur due to proximity to proposed school site.		• More secondary impact compared to other material sources due to increased access for greater number of private land owners near the Wulik River.	• Less secondary impact compared to other material sources due to greater distance from Wulik River and fewer number of private land owners.		• Less secondary impact compared to other material sources due to greater distance from Wulik River and fewer number of private land owners.	

NOTES:
* Acreages reflect a sub-portion of the areas depicted on figures.
** Includes Relic Channel 1 to Wulik River Source 1 Spur road.
*** If Combined Route B is selected, impacts would be slightly less due to shorter spur road.

Table 14 Habitat (Viereck) Impacts: Material Source Alternatives*

Alternative	K-Hill Site		Wulik River Source 1	Relic Channel Source 1 and Access**		Relic Channel Source 2 and Access***	
	Viereck	**Permanent (Acres)**	**Permanent (Acres)**	**Permanent (Acres)**	**Temporary (Acres)**	**Permanent (Acres)**	**Temporary (Acres)**
Direct and Indirect and Construction	Closed Low Scrub (II.C.1)	-	14.9	0.1	0.1	17.3	0.2
	Willow Dwarf Shrub (II.D.2)	13.3	18.8	12.0		10.6	0.1
	Mesic Graminoid Herbaceous (III.A.2)	86.6	0.3	42.8	5.1	14.9	2.1
	Wet Graminoid Herbaceous (III.A.3)	-	-	2.0	-	-	-
	Water (W)	-	5.7	4.5	-	2.3	-
	Total	**99.9**	**39.7**	**61.4**	**5.2**	**45.1**	**2.4**
Secondary and Cumulative	• More potential secondary and cumulative impacts could occur due to proximity to proposed school site.		• More secondary impact potential compared to relic channel sources due to increased access for greater number of private land owners near the Wulik River.	• Less secondary impact potential compared to other material sources due to greater distance from Wulik River and fewer number of private land owners.		• Less secondary impact potential compared to other material sources due greater distance from Wulik River and fewer number of private land owners.	

NOTES:
* Acreages reflect a sub-portion of the areas depicted on figures.
** Includes Relic Channel Source 1 to Wulik River Source 1 Spur road.
*** If Combined Route B is selected, impacts would be slightly less due to shorter spur road.

4.9.3 Avoidance, Minimization, and Mitigation

Executive Order 11990, "Protection of Wetlands," issued May 24, 1977, requires there be no practicable alternative to a Proposed Action if such action affects wetlands, and that any proposed federally funded action include all practicable measures to avoid and minimize harm to wetlands. As the majority of the Study Area is dominated by high functioning wetlands and waters, construction of an evacuation route from Kivalina to K-Hill would cause impacts to high value wetlands, and a USACE Section 404/10 Individual Permit would be required.

Avoidance, minimization and, if required, either compensatory or sponsor-proposed mitigation are the primary measures available to offset wetland losses for the proposed project. In fulfillment of Executive Order 11990, the following avoidance and minimization measures would be implemented to reduce the unavoidable impacts to wetlands:

- The proposed route alternatives are routed to avoid and minimize impacts to Waters of the U.S. and the higher Category I+ wetlands. Upland areas are utilized as possible, while avoiding upland important bird habitat (Closed Low Scrub) at the same priority as Category I+ wetlands;
- Project elements (e.g., road embankment geometry, vehicle turn outs, water crossings) are designed to safely incorporate the minimal dimensions necessary to serve the project purpose and need in order to minimize required wetland fill;
- Staking or otherwise delineating the road embankment footprint and associated temporary impact areas would be completed prior to construction;
- Construction materials would be stockpiled within existing fills and/or developed staging areas to minimize construction disturbance and avoid impacting additional wetland acreage;
- Setbacks from surface waters would be maintained for refueling and vehicle maintenance activities to reduce the likelihood of hazardous substances entering waterbodies from accidental spills or releases; and
- A project Erosion and Sediment Control Plan, SWPPP, and Hazardous Material Control Plan would be implemented to protect streams and wetlands, and minimize the introduction of sediment and runoff to adjacent waterbodies.

4.10 Fish and Fish Habitat

4.10.1 Affected Environment

The Study Area encompasses the Kivalina barrier island, the southern portion of Kivalina Lagoon, and the lower Wulik and Kivalina River drainages. The Kivalina River (Anadromous Waters Catalog [AWC] Stream No. 331-00-10044) and the Wulik River (AWC Stream No. 331-00-10060) are both listed as important for the spawning, rearing, and migration of anadromous fish including all five species of Pacific salmon (ADF&G 2016a). The Kivalina Lagoon is documented to provide habitat for anadromous fish, Pacific salmon, and several demersal species, and is listed in the AWC as Stream No. 331-00-10060-0010 (ADF&G 2016a). As the Kivalina Lagoon, Wulik River, and Kivalina River are listed watercourses in the AWC, they are considered Essential Fish Habitat (EFH) under the Federal Management Plan for Pacific Salmon in the Economic Exclusion Zone off the Coast of Alaska (NMFS 2005; ADF&G 2016a). A detailed report focused on EFH is provided in Appendix I.

4.10.1.1 Kivalina Lagoon

Algal communities in nearshore marine habitats of the region are typically made up of pelagic phytoplankton, benthic algae, and sea-ice-associated algal mats (USACE 2005). The relative proportion of these algae depends on the season and extent of sea ice. During the summer season of sustained daylight and warmer temperatures, there are phytoplankton blooms in the water column, and benthic algae cover bottom substrates (USACE 2005).

Muddy and sandy substrates in the region provide habitat for fish and invertebrates such as polychaete worms, clams, tunicates, sponges, and burrowing anemones (USACE 2007). Sea stars (*Evasterias echinosoma*, *Asterias amurensis*, *Leptasterias polaris acervata*, and *L. nanimensis*), basket star (*Gorgonocephalus eucnemis*), and shrimp from the family Crangonidae, were all captured during surveys to the south of the lagoon for the DeLong Mountain Transportation System project (USACE 2005). Brackish water tolerant amphipods and clams have been noted inside Kivalina Lagoon (USACE 2007).

Kivalina Lagoon is considered EFH for five species of Pacific salmon, saffron cod (*Eleginus gracillis*), and Arctic cod (*Arctogadus glacialus*) (USACE 2007; NMFS 2011). EFH for crab (e.g., snow crab, *Chionoecetes opilio*) is located on the marine side of the Kivalina barrier island, with habitat inside Kivalina Lagoon expected to be marginal (NMFS 2017b). See Appendix I for more details about EFH.

In addition to the salmon and Dolly Varden that pass through the lagoon, various species of demersal fish can be found in the lagoon during summer months, including yellowfin sole, Bering flounder (*Hippoglossoides robustus*), starry flounder (*Platichthys stellatus*), and sculpins (USACE 2007). Schooling Pacific herring (*Clupea pallasii*), capelin (*Mallotus villosus*), and rainbow smelt (*Osmerus dentex*) are all caught seasonally inside the lagoon, while Arctic cod (*Boreogadus saida*) and saffron cod (*Eleginus gracilis*) are present year-round (USACE 2007).

4.10.1.2 Wulik River

The Wulik River supports chum salmon (*Oncorhynchus keta*), Chinook salmon (*O. tshawytscha*), sockeye salmon (*O. nerka*), coho salmon (*O. kisutch*), pink salmon (*O. gorbuscha*), Dolly Varden (*Salvelinus malma*), Arctic grayling (*Thymallus arcticus*), slimy sculpin (*Cottus cognatus*), and several species of whitefish (ADF&G 2016a). Studies of the Ikalukrok Creek, a tributary the enters the Wulik River 37 miles upstream from Kivalina Lagoon, found small numbers of spawning Chinook salmon (Tetra Tech, Inc. 2009); however, aerial surveys conducted by the ADF&G along the Wulik River and Ikalukrok Creek have most consistently identified runs of chum and pink salmon and Dolly Varden with other salmon species identified in lower numbers and less consistently (ADF&G 2017a). Chum salmon have been observed spawning in the lower portion of Ikalukrok Creek annually since the late 1980s in late July and August (Scannell and Ott 2002). Since 2006, annual return estimates for chum salmon in lower Ikalukrk Creek have ranged from around 1,000–7,000 salmon. Chum salmon spawning has been documented in the Wulik River, with preferred spawning habitat conditions located approximately five miles upstream from the lagoon (ADF&G 2017a).

Dolly Varden are a main source of subsistence fish for people in Kivalina, contributing 86% edible weight of all harvested fish species (ADF&G 2010). Juveniles emerge in the spring after spawning in the Wulik River (Ott and Morris 2007), and spend between one and five years in the Wulik River drainage before migrating to the Chukchi Sea. Most adult Dolly Varden migrate out of the Wulik River shortly after peak break-up flows recede and as water clarity begins to improve. Adults typically re-enter the lagoon in later summer (USACE 2007); however, spawning fish typically return earlier in the summer. Annual surveys conducted between 1979 and 2015 as part of ongoing monitoring for the nearby Red Dog Mine, estimated between 22,000 and 144,000 mixed stock Dolly Varden in the Wulik River in each year (Ott et al. 2016). In most years, greater than 90% of Dolly Varden overwintered downstream from Ikalukrok Creek (ADF&G 2017a). The Dolly Varden found upstream of Ikalukrok are those believed to be natal to the Wulik River and move into the upper river for spawning. Most Dolly Varden spawning outside of the Wulik River occur in Tutak Creek and Dudd Creek, tributaries of Ikalukrok Creek, both of which are likely used by summer spawners (Ott and Morris 2012).

From late August to September, age-0 and adult Arctic grayling move downstream from spawning habitat in Red Dog Creek to overwinter in the Wulik River (Ott and Morris 2007; Tetra Tech Inc. 2009). Several species of whitefish (Bering cisco, *Coregonus laurettae*; least cisco, *C. sardinella;* broad whitefish, *C. nasus*; humpback whitefish, *C. pidschian*; and round whitefish, *Prosopium cylindraceum*) all make use of the lower Wulik River (USACE 2005; Tetra Tech Inc. 2009; USACE 2007).

The Wulik River estuary (confluence of the Wulik River with the Kivalina Lagoon) is located immediately east of Kivalina. The estuary is characterized by a series of small, low gradient tributary channels across the Wulik River floodplain. Several relic channels to the Wulik River and isolated lake/pond features are also located in the estuary (northwest of the river confluence). The relic channels appear to have lost connectivity to the mainstem of the Wulik River; however, many are directly connected to the Kivalina Lagoon (Figure 7). Estuary habitat can be important habitat for outmigrating juvenile salmon, Dolly Varden, and numerous marine fish and invertebrate species discussed further in Section 4.10.1.1 (McClelland 2012). The relic channels are characterized by low velocity conditions and could provide high value rearing habitat for juvenile Arctic grayling if salinity conditions in the lagoon do not create a migration barrier blocking seasonal access. Fish-bearing status of the various isolated lake/pond features is unknown, but most of the ponds are shallow and they are anticipated to provide rearing habitat for juvenile Arctic grayling. The ponds likely cannot support overwintering fish due to shallow depths and probability of freezing to the channel bed.

4.10.1.3 Kivalina River

No interactions between the Proposed Action and fish or fish habitat in the lower Kivalina River were identified. As such, no further discussion of lower Kivalina River is included.

4.10.2 Environmental Consequences

4.10.2.1 No-Action Alternative

An evacuation road would not be constructed from Kivalina to K-Hill and no impacts to fish or fish habitats would occur. Residents would continue to be exposed to environmental threats with no reliable options for evacuation during storm events with the potential to detrimentally impact the community over time. There would remain severe risk to life, health, and safety of residents.

4.10.2.2 Route and Lagoon Crossing Alternatives

Direct and Indirect Impacts:

Evacuation Road Water Crossing Impacts to Freshwater and Anadromous Fish: With the exception of the lagoon crossing, no other portions of the proposed route alternatives would cross anadromous and/or EFH waterbodies. The Southern Route (Preferred Alternative) would require two fish passage crossings, four non-fish passage crossings, three enhanced design crossings, and no crossings of the Wulik River relic channel.

Combined Route B would require three fish passage crossings (one of which is a crossing of the Wulik River relic channel), six non-fish passage crossings, and three enhanced design crossings. The crossing types are described in Section 4.8.2.2 and are shown in Figure 9.

Causeway Fill Impacts to Marine and Anadromous Fish and Fish Habitat: Placement of aggregate materials and/or crossing structures in the Kivalina Lagoon would result in localized alteration of soft sediment and sand habitats to a coarse aggregate habitat. Given the localized placement of these structures and the abundance of both soft sand and sediment habitat types in the lagoon, the overall effect to fish is anticipated to be minimal. The alteration of the otherwise ubiquitous soft or sandy benthic habitats to coarser aggregate along the crossing would likely increase species richness and overall biological utility of the lagoon in this area. Sessile invertebrates could use coarse aggregate habitat for attachment and feeding, while fish species could use it for feeding, cover, and potentially breeding (Reynolds et al. 2010). It is anticipated that benthic communities could take 1–4 years to recover and colonize the disturbance (Jewitt et al. 1999), and fish species could use the habitat immediately. Therefore, placement of rock armoring along the causeway into the Kivalina Lagoon would likely have a positive effect with respect to marine and anadromous fish and invertebrate richness, by creating habitat diversity, and ecological function.

Placement of the aggregate fill could cause mortality of invertebrates or marine and anadromous fish even with implementation of appropriate BMPs. Mortality is anticipated to be limited and predominantly restricted to sessile, infaunal, and slow moving invertebrates and some demersal fish (e.g., starry flounder). If material is placed along the seafloor of the lagoon, these species may become buried or crushed; although mortality of invertebrate and demersal fish is not expected to have a measurable effect on the sustainability and success of local fishery species. Placement of the base causeway and rock protection would be done with no or minimal water present (see Section 4.3.2), avoiding potential impacts to fish and other aquatic organisms. DOT&PF would coordinate with ADF&G to determine the timing of low-risk work windows to minimize potential for fish mortality.

Causeway Impacts to Marine and Anadromous Fish Passage: Fish passage would not be impeded by placement of the causeway as an open bridge would span the channel nearest Kivalina. This channel is likely the pathway for most fish moving north-south in the lagoon. In addition, culverts would be placed across the northeast end of the causeway, further providing passage opportunities for fish. These culverts will be designed to be easily maintained as an open water passage at mean tide, preventing an area of stagnant water. Based on the proposed causeway design, no velocity barriers to fish passage are anticipated at any of the structures.

Construction Impacts:

Evacuation Road In-water Work Impacts to Freshwater and Anadromous Fish: Placement of culverts would likely require the temporary dewatering or diversion of stream sections. This may result in the displacement of fish and the temporary interruption of fish migration or movement, depending on construction timing. Critical timing windows (e.g., salmon outmigration, spawning, migration) would be avoided or fish could be captured and relocated outside of the construction area prior to culvert placement, if required. As culvert installation can typically be completed within a week, temporal impacts to fish migration and movement of resident or anadromous species would be minimal. Through proper design and planning, culvert type and size would maintain fish passage during low and high flow conditions (ADF&G 2001).

In-water work has the potential to impact fish and their habitat through degradation of water quality. Culvert installation may cause an increase in sediment loading and turbidity in fish habitat, which may inhibit oxygen exchange in all life stages (Bash et al. 2001). Proper installation techniques (e.g., bypass or plug and pump) would limit the introduction of suspended sediments into fish habitat (ADF&G 2001). Winter construction would minimize the potential for runoff generation and transport into adjacent freshwater resources during critical life history stages (e.g., spawning or egg development) (NMFS 2017a). Once the proposed road is constructed, rainfall or melting events may also result in mobilization of runoff from previously frozen, ice-rich sediments, which could discharge into nearby freshwater resources. Localized effects of sediment-laden runoff, following construction, are anticipated to be temporary and of short duration with limited potential to adversely affect freshwater anadromous fish and fish habitat.

Water Withdrawal Impacts to Freshwater and Anadromous Fish and Fish Habitat: During project construction, water withdrawals would be required to create temporary ice/snow roads, dust control, and to support road compaction. Water to support these activities would likely be sourced from surface waterbodies along the final selected route alignment. Water withdrawal activities can affect fish directly through entrainment or trapping within the pumping system itself or impingement on the intake structure at the point of withdrawal. Excessive withdrawal from any given source could also impact fish habitat through the reduction of water levels or habitat quality, including inadequate volume to resist freezing in winter or to retain high enough dissolved oxygen concentration for fish survival. Winter withdrawal could also lead to reduced flows in small streams, affect spawning beds and fish eggs within the gravel, or impede fish passage to and between important overwintering habitats. Summer season withdrawal could also lead to similar effects if volume removal is too great relative to water levels at that time. In general, reductions in water levels and flows can increase water temperatures. Species tolerance of thermal changes would vary and may exceed lethal thresholds of some species or increase the productivity for others. Any withdrawal resulting in discontinuous surface flows within a creek or lake outlet would trap fish.

Screened intake and volume withdrawal criteria would be identified to mitigate potential effects to fish and fish habitat. Volume limitations and use of ADF&G-compliant screened intakes would reduce the potential for effects associated with fish impingement and entrapment. Through appropriate BMPs, minimal effects to freshwater and anadromous fish and fish habitat are anticipated due to water withdrawal activities during construction.

Causeway Construction Impacts to Marine and Anadromous Fish and Fish Habitat: Noise and hydraulic forces from causeway construction or pile driving could impact fish and invertebrate use of nearby habitats in the lagoon. In particular, in-water pile driving causes large sound pressure waves, which could injure or kill fish, and adversely impact invertebrates (NMFS 2017a). The primary methods to avoid impacts from pile driving are to conduct installation on land, or in water when larval and juvenile fish are not present (NMFS 2017a). Consequently, DOT&PF has committed to no in-water pile driving. In addition, placement of the base causeway and rock protection would be done with no or minimal water present (see Section 4.3.2). This would reduce potential impacts to fish and other aquatic organisms.

Secondary (Induced) and Cumulative Impacts:

Increased Access to Subsistence Fisheries: The Wulik River is currently fished year-round by residents of Kivalina for subsistence use, and sites are typically accessed via boat in the summer and snow machine during winter months for fishing through the ice. Construction of either road and crossing alternative would allow increased summer overland access to the lower Wulik River for subsistence fisheries. Public access to the Wulik River is limited by adjacent privately-owned lands. Some redistribution of current fishing efforts is expected.

4.10.2.3 Material Source Alternatives

Direct, Indirect, and Construction Impacts:

Material Source Impacts to Freshwater and Anadromous Fish and Fish Habitats: Development of material sources and their spur roads have the potential to impact freshwater anadromous fish and fish habitats. Material extraction sites studied in arctic and subarctic floodplains in Alaska have demonstrated both adverse and beneficial effects on fish and fish habitats depending on the type and size of the river, type of material extraction employed, and the amount of material extracted (Joyce et al. 1980; Ott et al. 2014). Material source development can lead to destabilization of river channels, river channel capture, floodplain widening, increased erosion and sedimentation, increased water velocities, reduced water quality, can lead to aquatic habitat shifts, and in some instances, has been documented to cause subsurface flows, creating a barrier to fish passage (Joyce et al. 1980). Alternatively, local fish populations have benefited from gravel mine sites in some locations through the creation of overwintering and productive feeding habitats (Ott et al. 2014). Ott et al. (2014) also found that several gravel mine sites, most constructed as pits, were eventually connected to nearby drainages on Alaska's North Slope, and successfully used for overwintering. Gravel extraction sites in that study provided a habitat that is limited in the arctic and thus functioned as viable habitat creation.

Material source development for this project is not anticipated to alter current predator-prey relationships. While some species present in the Wulik River (e.g. Dolly Varden, whitefish, Arctic Grayling) can eat salmon eggs or juveniles, they are not expected to be present in the reclaimed material site ponds concurrent with salmon smolts. The primary salmon species spawning in the Wulik River drainage are pink and chum salmon which smolt as age-0 fish, migrating out of the drainage during peak flows at break-up. Residence of juvenile pink and chum salmon within the reclaimed material sources is unlikely. Salmon spawning within the reclaimed material sources is also unlikely as suitable habitat occurs further upstream (Figure 9).

Blasting at material sources may be required to develop adequate source rock (Kolden and Aimone-Martin 2013). Blasting has the potential to impact fish from substrate vibration and water overpressure (Kolden and Aimone-Martin 2013). These can disrupt incubating egg and embryo development, and lead to trauma to adult fish (Kolden and Aimone-Martin 2013). Kolden and Aimone-Martin (2013) also found that current ADF&G (1991) blasting standards appear to sufficiently protect salmonid embryos, juveniles, and adults. Blasting at individual material sources would require site specific mitigation measures to comply with ADF&G guidelines and prevent impacts to fishery resources.

Access to and development of material sources near the Wulik River and its relic channels would likely occur, at least in part, during the winter months when the ground is frozen. Upon completion of the project, material sources would be reclaimed as per permit requirements (see Section 4.10.3).

Through appropriate planning and adherence to site specific construction timing windows, and other mitigation measures and management plans, material excavation impacts within relic channels or river bars of the Wulik River are expected to be only temporary and have minimal effects on freshwater and anadromous fish and fish habitat.

Secondary (Induced) and Cumulative Impacts:

Once the evacuation route is constructed, increased access to adjacent public and private lands may enable development in those areas, which may encourage reclaimed material sources to be reopened. This may cause additional impacts to fish and fish habitats through expansion of existing material sources.

4.10.2.4 Alternative Comparison

Table 15 compares impacts that vary between proposed route and crossing alternatives, as well as potential material source alternatives. All other impacts are similar across all proposed alternatives.

Table 15 Fish and Fish Habitat Impacts

Fish Habitat: Differences Between Route Alternatives		
	Southern Route (Preferred Alternative) with Lagoon Crossing C	**Combined Route B with Lagoon Crossing C**

Direct and Indirect and Construction	Water Crossings:
	• No EFH disturbance outside of lagoon
	• Total of 9 water crossings:
	  • 0 crossings of Wulik River Relic Channel;
	  • 2 fish passage crossings;
	  • 4 non-fish passage crossings; and
	  • 3 enhanced design crossings.
	Water Crossing Disturbance*:
	• 1.24 acres.
		Water Crossings:
		• No EFH disturbance outside of lagoon
		• Total of 12 water crossings:
		  • 1 fish passage crossing (Wulik River Relic Channel);
		  • 2 fish passage crossings;
		  • 6 non-fish passage crossings; and.
		  • 3 enhanced design crossings.
		Water Crossing Disturbance*:
		• 1.65 acres.

Secondary and Cumulative	Access to Adjacent Lands: • Greater access to the Wulik River as compared to Combined Route B.		Access to Adjacent Lands: • Lesser access to the Wulik River than Southern route.	
Differences Between Material Source Alternatives				
	K-Hill Site	**Wulik River Source 1**	**Relic Channel Source 1**	**Relic Channel Source 2**
Direct and Indirect and Construction	Fish and Fish Habitat • No impacts anticipated.	Fish and Fish Habitat • Potential impacts to chinook, sockeye, pink and chum salmon spawning habitat, incubating salmon eggs and embryos. • Potential impacts to EFH. • Permanent impact: 5.7 acres of within ordinary high water of the Wulik River.	Fish and Fish Habitat • No impacts to salmon spawning habitat, incubating eggs, or embryos. • No impact to EFH. • Permanent impact: 2.0 acres to lacustrine 2.5 acres to ponds.	Fish and Fish Habitat • No impacts to salmon spawning habitat, incubating eggs, or embryos. • No impact to EFH. • Permanent impact: 2.3 acres to ponds.
Secondary and Cumulative	No secondary impacts anticipated.	• Increased access to the Wulik River may cause some redistribution of current fishing locations. • Increased access may encourage reclaimed material sources to be re-opened and cause additional impacts to fish or fish habitat.	• Increased access may encourage reclaimed material sources to be re-opened and cause additional impacts to fish or fish habitat.	• Increased access may encourage reclaimed material sources to be re-opened and cause additional impacts to fish or fish habitat.

NOTE:
* Water crossing area disturbance assumes an average impact length of 120 ft and width of 50 ft (0.138 acres) for each crossing.

4.10.3 Avoidance, Minimization, and Mitigation

The following measures are identified to avoid, minimize, or mitigate potential effects to fish and fish habitats in the Study Area freshwater and marine environments.

<u>All Features:</u>

- Compliance with the APDES CGP, and implementation of the required SWPPP and BMPs during construction, to reduce the potential for sediment laden storm water runoff during construction. Stabilization of side slopes with vegetation or non-erodible material would also be implemented as part of CGP compliance to further reduce the potential for sedimentation of nearby streams;

- Construction of all crossing structures would adhere to appropriate BMPs for in-water works to minimize potential effects to fish or fish habitats from sediment mobilization and transport, and accidental contaminant spills;
- During in-water construction activities, monitoring may be required onsite to implement site specific BMPs and other potential permit requirements; and
- Obtain Fish Habitat Permit from ADF&G.

<u>Lagoon Crossing:</u>

- In-water work associated with the lagoon crossing would be scheduled to reduce impacts to fish;
- Implementation of BMPs that avoid or minimize adverse impacts to water quality and marine habitats;
- The causeway's northeastern culvert(s) will be designed to accommodate fish passage, be easily maintained as an open water passage at mean tide and accommodate anticipated debris and icing mitigation to prevent flow blockage; and
- Pile driving would be conducted through constructed embankment, to limit impacts to salmon juveniles and adults (NMFS, 2017a).

<u>Road Construction:</u>

- During construction occurring concurrent with critical timing windows, appropriate measures would be implemented (e.g., construction of a diversion channel) to maintain fish migration and passage
- DOT&PF will coordinate with ADF&G to mitigate impacts to fish during water withdrawal activity and ice harvest that may be needed for construction of ice roads; and
- DOT&PF and the construction contractor would coordinate with ADF&G to identify and implement appropriate migration measures.

<u>Material Sources:</u>

- Material source selection, site specific mining plan design, permitting, and reclamation would reduce the potential for adverse impacts and could enhance fish habitats in some drainages, such as the Wulik Relic Channel;
- Reclamation plans may include developing shallow littoral zones and shrubby riparian areas for migratory bird habitat;
- Site specific material site plans will incorporate work timing windows to work around sensitivities for salmon and Dolly Varden;

- Material sites will be prioritized for use: 1) K-Hill and Relic Channel sources and 2) Wulik River 1 (only after other sites are exhausted);
  - If the Wulik River Material Site 1 is constructed, maintain a connection to the Wulik River; and
- Coordination with ADF&G and NMFS would be conducted during design to develop an adequately sized material source at the selected location, maintain adequate setbacks from the river, and avoid adverse impacts to EFH.

4.11 Terrestrial and Aquatic Birds

4.11.1 Affected Environment

More than 100 species of birds, primarily waterfowl and shorebirds, migrate from southern latitudes of North, Central, and South America to breed in the Study Area (Tetra Tech 2009; Audubon Alaska 2016). Terrestrial and aquatic birds, and their nests and eggs, are protected under the *Migratory Bird Treaty Act* (MBTA). All species discussed in this section would be protected by MBTA except for the Willow and Rock Ptarmigan (see below). The following sections describe the occurrence, abundance, richness, and habitat associations of terrestrial and aquatic bird species in the Study Area.

Upland habitats and water bodies in the Study Area support vegetation, invertebrates, and freshwater, marine and anadromous fish, that serve as food for shorebirds, waterbirds, and waterfowl. Coastal habitats in the Study Area are comprised of grass-dominated gravel beaches that divide the Chukchi Sea from the Kivalina Lagoon (Figure 6 and Figure 8). The inland areas surrounding the community of Kivalina include scrub-shrub, emergent, riparian, and intertidal areas, some of which provide breeding habitat for birds (Figure 6 and Figure 8). The Kivalina and Wulik Rivers flow into the Kivalina Lagoon, creating brackish water conditions. The near-shore marine environment experiences seasonal ice build-up between mid-November and late May. Polynyas (i.e., open water areas surrounded by sea ice) can occur under the right sea conditions and provide important migration, foraging, and reproduction areas for arctic birds (ADF&G 2016b).

4.11.1.1 Terrestrial Birds

Most terrestrial birds in the Study Area are transitory or seasonal breeders, and their abundance and diversity are relatively low during winter months (USACE 2016). Inland scrub, inland shrub, tussock tundra, riparian vegetation, and wetland habitats provide foraging, breeding, staging, molting, and habitat for raptors, ptarmigan, shorebirds, waterfowl, and migratory and resident songbird species (WHPacific 2012b).

Within the Study Area, riparian corridors of willow and alder shrubs likely support the highest diversity of terrestrial bird species. The USFWS has indicated that high quality shrub areas are important migratory bird habitat (USFWS 2017d). This habitat was mapped and identified in this report as Closed Low Scrub habitat (Section 4.9). This "low scrub" habitat represents the highest regional vegetation (i.e., 20 cm–1.5 m), taller than "dwarf shrubs", which are less than 20 cm tall. This additional level of shrub canopy provides nesting, perching, and refuge from predators for terrestrial bird species.

Coastal tundra provides breeding habitat for the Northern Pintail (*Anas acuta*), Long-tailed Duck (*Clangula hyemalis*), American Golden-Plover (*Pluvialis dominica*), Red-necked Phalarope (*Phalaropus lobatus*), Lapland Longspur (*Calcarius lapponicus*), Baird's Sandpiper (*Calidris bairdii*), Stilt Sandpiper (*Calidris himantopus*), and Buff-breasted Sandpiper (*Calidris subruficollis*) (ADF&G 2016b; USACE 2016; USGS 2016). Rock Ptarmigan (*Lagopus muta*) breed on hilly or mountainous tundra throughout Alaska (ADF&G 2016b). In winter, most male Rock Ptarmigan migrate to lower elevations within their breeding range whereas the hens move to the hills where they spend the winter in shrubby, open habitat. In western Alaska, Willow Ptarmigan (*Lagopus lagopus*) prefer riparian areas that support abundant willow and other tall bushes for breeding (ADF&G 2016d). In winter, Willow Ptarmigan remain close to shrubby slopes and valleys, but seek out areas at lower elevations compared to the breeding season. Willow and Rock Ptarmigan are a regionally important subsistence resource (ADF&G 2005a).

Higher elevation cliffs, rock outcrops, and hill outcroppings in the region provide potential suitable breeding habitat for cliff-nesting raptors such as Rough-legged Hawk (*Buteo lagopus*), Gyrfalcon (*Falco rusticolus*), and Peregrine Falcon (*Falco peregrinus*) (ADF&G 2008; 2011a). In the Study Area, potential raptor nesting habitat for these species is likely limited to K-Hill near the proposed project terminus, as well as to other rock outcroppings northeast of K-Hill near the Study Area boundary (Figure 6 and Figure 8). Hawk and Gyrfalcon nests were previously recorded within or near the Red Dog Mine footprint and transportation corridor (Tetra Tech 2009; ADF&G 2016c). Unidentified raptor presence (skull) was recorded during a fall reconnaissance survey (Stantec 2016c).

4.11.1.2 Aquatic Birds

Near-shore coastal waters and the Kivalina Lagoon are situated along the Pacific Flyway (USFWS 2017d) and provide important staging habitat for migrating seabirds, shorebirds, waterfowl, and waterbirds

(USACE 2006, 2017). During the spring migration, thousands of ducks, geese, loons, and other aquatic bird species migrate north, flying low along the barrier islands or over the near-shore ice (USACE 2005). Notable numbers of Canada Goose (*Branta canadensis*), Greater White-fronted Goose (*Anser albifrons*), Brant (*Branta bernicla*), Tundra Swan (*Cygnus columbianus*), Northern Pintail (*Anas acuta*), and all five species of loon (Red-throated Loon [*Gavia stellate*], Arctic Loon [*Gavia arctica*], Pacific Loon [*Gavia pacifica*], Common Loon [*Gavia immer*], Yellow-billed Loon [*Gavia adamsii*]) migrate through coastal habitats in the Study Area (USACE 2005; Tetra Tech 2009; WHPacific 2012b; Audubon Alaska 2016).

The Study Area contains two small islands that are part of the Alaska Maritime National Wildlife Refuge and are located approximately 45 miles south of a much larger portion of the refuge located around Cape Thompson, which provides globally significant breeding habitat for various auklets (*Aethia sp.*, *Cerorhinca sp.*, *Ptychoramphus sp.*), Red-legged Kittiwakes (*Rissa brevirostris*), Aleutian Terns (*Onychoprion aleuticus*), and Red-faced Cormorants (*Phalacrocorax urile*) (USFWS 2016a; Figure 8).

Coastal lagoons in Cape Krusenstern National Monument, 8.5 miles south of the Study Area, provide breeding habitat for Yellow-billed Loon (*Gavia adamsii)* as well as for Threatened species, including Spectacled Eider and Steller's Eider (USFWS 2012; NPS 2016b). The Krusenstern Lagoon, within the Cape Krusenstern National Monument, supports significant summer populations of Black Scoter (*Melanitta americana*). Coastal habitats north of the community of Kivalina also support regionally large colonies of murres, gulls, and terns (Audubon Alaska 2016).

The Wulik and Kivalina River deltas and the Kivalina Lagoon host brackish-water tolerant fish and invertebrates. Accordingly, these areas provide important spring and fall staging habitats for migrating seabirds, waterfowl, waterbirds, and shorebirds (Tetra Tech 2009; Audubon Alaska 2016). Due to the combination of open water and emergent vegetation, low-lying sedge marshes and riparian habitat along the Kivalina River also serve as breeding habitat for Canada Goose, Northern Pintail, and American Wigeon (*Anas americana*) (WHPacific 2012b). The lagoon and lakes in the Study Area may support breeding habitat for Yellow-billed Loon (Earnst 2004; Earnst et al. 2006; USFWS 2012).

4.11.1.3 Threatened and Endangered Species

The Spectacled Eider and Steller's Eider (Alaska breeding population) are listed as Threatened under the *Endangered Species Act* (ESA). Spectacled Eider (*Somateria fischeri*) and Steller's Eider (*Polysticta stelleri*) are recorded infrequently in the Study Area during their migration to breeding habitats in northern latitudes (WHPacific 2012b).

Spectacled Eider

Spectacled Eider occurs throughout marine habitats in Alaska, and are typically found within coastal waters 1 to 28 miles from shore. Molting eiders are found in eastern Norton Sound and Ledyard Bay mid-July through December and wintering birds congregate in small groups near St. Lawrence Island. In western Alaska, core breeding habitat extends from Nelson Island to the Askinuk Mountains (Petersen et al. 2000). They are recorded infrequently in the Study Area during their migration to breeding habitats in northern latitudes (WHPacific 2012b). Coastal lagoons in Cape Krusenstern National Monument, 8 miles south of the Study Area, provide breeding habitat for spectacled eider (NPS 2016b).

Population declines are primarily attributed to alteration or destruction of habitat, contaminant exposure, and predation (USFWS 2010). Critical habitat for Spectacled Eider has been designated for molting sites in Norton Sound and Ledyard Bay, for breeding on the Yukon-Kuskokwim Delta, and for wintering south of St. Lawrence Island (USFWS 2010). The closest tract of designated critical habitat represents critical habitat to the Study Area in Ledyard Bay, approximately 143 miles from the Study Area (USFWS 2010). The Study Area does not overlap with any designated critical habitat for this species.

Steller's Eider

Steller's Eider breed primarily along the Arctic Coastal Plain, but also have a small population that nests on the Yukon-Kuskokwim Delta. Eiders molt throughout southwest Alaska mid-July through December, primarily along the north side of the Alaska Peninsula, Izembek Lagoon, Nelson Lagoon, Port Heiden, and Seal Islands (Frederickson 2001; USFWS 2002). Wintering birds congregate in shallow, sheltered waters along the south side of the Alaska Peninsula.

Reasons for population declines are poorly understood but potential threats include oil or contaminant exposure, predation, and hunting pressures (USFWS 2002). Critical habitat for Steller's Eider has been designated for breeding habitat on the Yukon-Kuskokwim Delta, and molting sites in Kuskokwim Bay, Izembek Lagoon, Nelson Lagoon, and Seal Islands (USFWS 2002).

There are no records of Steller's Eider occurring within the Study Area. The NPS indicates that coastal lagoons in Cape Krusenstern National Monument, 8 miles south of the Study Area, provide breeding habitat for Steller's Eider (NPS 2016b). The closest tract of designated critical habitat represents critical molting habitat in Hooper Bay, approximately 429 miles from the Study Area (USFWS 2002). The Study Area does not overlap with any designated critical habitat for this species.

4.11.2 Environmental Consequences

4.11.2.1 No-Action Alternative

An evacuation road would not be constructed from Kivalina to K-Hill and no impacts to terrestrial and aquatic birds would occur. Residents would continue to be exposed to environmental threats with no reliable options for evacuation during storm events with the potential to detrimentally impact the community over time. There would remain severe risk to life, health, and safety of residents.

4.11.2.2 Route and Lagoon Crossing Alternatives

Direct and Indirect Impacts:

<u>Potential Changes to Terrestrial Bird Habitat</u>: A permanent loss or alteration of terrestrial bird habitat would result from construction of route and lagoon crossing alternatives. The placement and construction of a road would result in the loss of existing habitat to both resident and seasonal species. The footprint of the Proposed Action would result in the removal or alteration of Closed Low Scrub habitat from construction of the Southern or Combined Route B with Lagoon Crossing D. Resident and migrant species would likely relocate to other nearby, similarly suitable habitats available in the Study Area resulting in no permanent impacts to the use of habitats by terrestrial bird species (Figure 7).

<u>Potential Changes to Aquatic Bird Habitat</u>: Placement and construction of a permanent lagoon crossing structure across Kivalina Lagoon would result in a direct loss of approximately 11.3 acres of estuarine habitat due to placement of fill, piers, and culverts (Figure 3 and Table 9). Armor rock placed along the causeway portion of the structure would provide new habitat potentially suitable for many algal and invertebrate species that could serve as potential prey for aquatic birds (ADF&G 2005b).

<u>Potential Changes to Terrestrial and Aquatic Bird Movement</u>: Construction and operation of the evacuation road has potential to cause changes in movement for terrestrial and aquatic birds by creating a perceived or physical barrier to movement, or by causing sensory disturbances; although the sensitivity and degree of response is expected to vary by species (Barber et al. 2009; Ortega 2012). The construction and use of the route alternatives and lagoon crossing can alter bird activity along existing movement corridors (e.g., daily or seasonal migratory routes, dispersal routes) or change access to preferred habitats (e.g., staging, foraging, and breeding sites) (MacKinnon et al. 2013; Bishop et al. 2017). Although the response varies by species or species group and the nature of a disturbance activity, birds tend to avoid habitats subjected to high sensory disturbance (Korschgen and Dahlgren 1992; Madsen 1995; Mayo et al.

2015). Project infrastructure and activities are not expected to limit access to key staging, foraging, or breeding habitats for terrestrial or aquatic birds based on availability of habitats within the Study Area (Figure 5 and Figure 7).

Threatened and Endangered Species:

Spectacled Eider

Spectacled Eider breed along peninsulas, pond shorelines, or wet meadows dominated by sedges (Petersen et al. 2000). Construction of the Proposed Action would result in some loss or alteration of shoreline or wetland habitats potentially suitable for spectacled eider breeding. Although some areas of aquatic and shoreline habitats would be removed or altered by construction of a lagoon crossing structure, aquatic habitats in the Study Area are ubiquitous. Remaining suitable aquatic and shoreline habitats are expected to be sufficiently abundant for aquatic bird species to not be disrupted in staging, foraging, or breeding activities.

Construction-related noise impacts to the Spectacled Eider are similar to those described for aquatic birds in the *Construction Impacts* discussion. The project would implement several avoidance, minimization, or mitigation measures (described in Sections 4.10.2 and 4.12.2) to limit potential adverse effects of the project.

Steller's Eider

Steller's Eider breed in open tundra or within shrubby willow or birch stands in close proximity to coastal areas (Frederickson 2001; USFWS 2002). Construction of the project would result in some loss or alteration of tundra or shrub habitats adjacent to the Kivalina Lagoon or wetlands along the evacuation road, as described above for Spectacled Eider. Construction-related noise impacts described for aquatic birds in the *Construction Impacts* discussion could also potentially impact Steller's Eider.

Construction Impacts:

Potential Changes to Terrestrial Bird Habitat: Construction activities that result in the clearing of vegetation or other terrain alteration (e.g., excavation or placement of material) have potential to remove suitable breeding, staging, or foraging habitats used by resident or migratory waterfowl, raptors, shorebirds, and songbirds. Construction related sensory disturbances (e.g., noise) in winter would be limited to resident species, such as ptarmigan. Activities scheduled during spring or summer would potentially affect seasonal species that use the Study Area for staging during migration or for breeding (USFWS 2017d).

Potential Changes to Aquatic Bird Habitat: Construction activities within and adjacent to the lagoon may result in changes to the physical, chemical, or acoustic parameters of that section of the lagoon that could result in the temporary displacement of species that stage, feed, or breed there (e.g., geese, swans, waterfowl, and shorebirds). However, the footprint of the crossing represents less than 1% of potentially suitable estuarine intertidal and subtidal habitat for aquatic birds in the Study Area (Table 9). Although aquatic and shoreline habitats would be removed or altered by construction of a lagoon crossing structure, aquatic habitats in the Study Area are ubiquitous (Figure 5). Remaining suitable aquatic and shoreline habitat is expected to be sufficient for aquatic bird species to not be disrupted in staging, foraging, or breeding activities.

Change in habitat availability and use by aquatic birds can similarly result from sensory disturbance associated with pile driving in Kivalina Lagoon. Water filling, culvert installation, and construction boats would also create noise, but is anticipated to be at levels below that of pile driving. The frequency, intensity, and duration of in-air or underwater acoustic emissions can result in displacement from suitable staging, foraging, or breeding habitats (Ronconi and St. Clair 2002; Bellefleur et al. 2009). Gladwin et al. (1988), found that waterfowl, waterbirds, and shorebirds can be disturbed by in-air noise levels up to 105 decibel (dB) from 500 m–1,200 m away. The effect of underwater noise on aquatic birds is poorly understood compared to other marine wildlife (e.g., marine mammals). Nevertheless, existing studies suggest that underwater noise results in low-level responses among aquatic bird species (Lacroix et al. 2003 and Melvin et al. 1999).

The propagation and attenuation of in-air or underwater noise is influenced by the size, speed, and design of construction boats, equipment, and materials in combination with localized oceanic conditions (e.g., depth, topography, surface conditions; Ronconi and St. Clair 2002). DOT&PF has committed to pile driving through constructed embankments to avoid and minimize underwater noise. In addition, placement of the base causeway and rock protection would be done with no or minimal water present (see Section 4.3.2). The duration of noise associated with pile driving for the lagoon crossing structure is assumed to be 30-60 days (not continuous). As a result, in-air or underwater noise levels in the vicinity of the lagoon would increase for only a relatively short period of time, resulting in only temporary, localized displacement of aquatic birds.

Potential Changes to Terrestrial and Aquatic Bird Mortality: Terrestrial and aquatic birds, and their nests and eggs, are protected under the MBTA. Construction of either route alternative and the lagoon crossing has the potential to result in direct injury or mortality of birds, nests, and eggs depending on the timing of construction activities. Impacts are expected to be limited by scheduling construction and vegetation clearing activities to take place outside of important nesting periods (USFWS 2017d). Infrastructure development may alter habitat indirectly via changes in noise, traffic, and vegetation cover (Benítez-López et al. 2010; Liebezeit et al. 2009; NRC 2003; Ortega 2012).

There is limited potential for construction of either route and lagoon crossing alternative to result in mortality of nesting aquatic birds. Because shoreline habitats along the mainland side of the lagoon crossing are not expected to be lost or altered during construction, except at the tie-in points for the crossing structure, mortality of nesting birds, including their nests and eggs is expected to be limited.

The potential for change in mortality risk is primarily associated with permanent injury resulting from short-duration impulsive or vibratory underwater activities (i.e. impact pile driving) produced during construction of the lagoon crossing structure. At high enough received sound levels, diving birds can experience direct physiological effects. Sudden, high-amplitude noise sources that produce pressure pulses in the vicinity of the source can result in lethal or sub-lethal injury (e.g., barotrauma) from shock waves (SAIC 2011).

However, as discussed, DOT&PF has committed to no in-water pile driving to avoid and minimize underwater noise. In addition, placement of the base causeway and rock protection would be done with no or minimal water present (see Section 4.3.2). Therefore, underwater noise levels are not anticipated to reach the surrogate thresholds recommended by SAIC (2011), and auditory and non-auditory injury to aquatic birds is not expected. In addition, diving species are generally expected to be present in nearshore coastal habitats as opposed to inside Kivalina Lagoon, and aquatic birds using the lagoon for staging or foraging are anticipated to avoid active construction areas and move to alternative suitable habitat available in the area, and are thus not expected to interact with construction equipment.

Secondary (Induced) and Cumulative Impacts:

With construction of the route alternatives and lagoon crossing, there is potential for increased vehicle traffic to access the evacuation site and adjacent lands for subsistence and recreation. There is some risk for vehicle/bird strikes due to the presence of the new road corridor, however, the anticipated risk is minimal. There is also likely less off-road vehicle use, resulting in fewer impacts to nests and bird habitat from travel inland. Any off-road vehicle use is likely to be concentrated along the road corridor.

Potential development of adjacent public and private lands may also increase because of new road access created by the project. This increase in human presence and activity may cause additional indirect impacts to terrestrial and aquatic birds through further development or disturbance in the Study Area (Kertell et al.

1997; NRC 2003; Liebezeit et al. 2009; Meixell and Flint 2017). Although potential development of adjacent lands may result in the direct loss of bird habitat, most habitat types are common and distributed ubiquitously throughout the region (Figure 6 and Figure 8). Increased access supporting subsistence activities may result in a redistribution of effort, however, the majority of subsistence take of birds is concentrated around the mouth of the Wulik River. Increased impacts to bird habitat from expansion of access to subsistence use areas is anticipated to be minimal for birds as these species are not a major subsistence resource within lands along the road corridor inland from the lagoon crossing.

4.11.2.3 Material Source Alternatives

Direct and Indirect Impacts:

Potential Changes to Terrestrial Bird Habitat: A permanent loss or alteration of terrestrial bird habitat could result from development of the material source alternatives (including spur roads), and the stockpiling of materials at various locations.

Construction Impacts:

Potential Changes to Terrestrial Bird Habitat: Clearing of vegetation or other habitat alteration (e.g., excavation or placement of material) has potential to remove suitable staging, foraging, or breeding habitats used by resident or migratory waterfowl, raptors, shorebirds, and songbirds. An estimated 12% of the material source alternatives is comprised of Closed Low Scrub habitat that would be removed or altered, depending on the source(s) selected. Conversely, these altered habitats may create new habitat for certain bird species. For example, gravel sources may support ptarmigan or grouse grit digestion (ADF&G 2005a), or may support nesting habitat for some upland shorebirds and songbird species following site abandonment (ConocoPhillips 2005).

During winter, construction-related impacts would be limited to resident species, such as ptarmigan. Spring or summer activities are more likely to affect seasonal species that use the Study Area for staging during migration or for breeding (USFWS 2017d). Summer construction also has the potential to impact raptors that may be nesting near K-Hill. While permanent material sources could result in altered habitats to both resident and seasonal species, both groups are expected to continue to access or relocate to other nearby suitable habitats available in the Study Area (Figure 6 and Figure 8) (ConocoPhillips 2005).

Blasting activities to support excavation at material source alternatives and construction noise have potential to result in displacement of terrestrial birds. Sudden, impulsive or impact noises can shock birds; repetitive in-air or ground vibration disturbance can be sufficient that terrestrial birds would avoid habitats up to several kilometers from material source alternatives (Dooling and Popper 2007; ECCC 2017). The level of disturbance is influenced by the size and location of blasting activities, blast depth and material, direction, sediment type and topography, wind conditions. Based on studies completed on raptors in the central and southern U.S., terrestrial birds are expected to alter patterns in habitat used in habitats adjacent to material source alternatives based on the timing and duration of blasting activities (Bednarz 1984). However, buffer areas around blasting activities have been shown to limit changes in breeding behavior (Holthuijzen et al. 1990).

<u>Potential Changes to Terrestrial Bird Mortality</u>: As described for the alternatives, terrestrial birds, and their nests and eggs, are protected under the MBTA. Development of all material source alternatives has potential to result in direct injury or mortality of birds, nests, and eggs. Consistent with regional recommendations, winter construction would further limit the temporary impacts related to construction activity and restrict it to resident species only (USFWS 2017d). If vegetation clearing, site preparation, and construction is scheduled within sensitive nesting periods, pre-construction nest surveys would be conducted by qualified personnel.

Secondary (Induced) and Cumulative Impacts:

With increased access to adjacent public and private lands additional material sources may be developed over time. This increase in activity may cause additional impacts to aquatic and terrestrial birds. Direct conversion of habitat could take place from specific activities, although the majority of habitat types are common in the Study Area. Material sources located near USFWS identified high quality bird habitat may have an increased impact from secondary development. This high-quality Closed Low Scrub habitat is relatively rare in the Study Area, but is common in the Relic Channel Source 2 and Wulik River Source 1 (Table 14).

4.11.2.4 Alternatives Comparison

Table 16 compares impacts that vary between proposed route and crossing alternatives, as well as potential material source alternatives. All other impacts are similar across all proposed alternatives.

Table 16 Terrestrial and Aquatic Birds Impacts

Terrestrial and Aquatic Birds: Differences Between Route Alternatives		
	Southern Route (Preferred Alternative) with Lagoon Crossing D and Staging Areas	**Combined Route B with Lagoon Crossing D and Staging Areas**

<table>
<tr><td>Direct and Indirect and Construction</td><td colspan="2">Habitat (including Threatened and Endangered):
• Loss of 115.0 acres (permanent) and 33.6 acres (temporary) of habitat.
• Habitat impact includes 1.8 acres (permanent) and 0.5 acres (temporary) of high quality bird habitat (Closed Low Scrub).</td><td colspan="2">Habitat (including Threatened and Endangered):
• Loss of 133.4 acres (permanent) and 39.2 acres (temporary) of habitat.
• Habitat impact includes 4.8 acres (permanent) and 1.5 acres (temporary) of high quality bird habitat (Closed Low Scrub).</td></tr>
<tr><td>Secondary and Cumulative</td><td colspan="2">Habitat (including Threatened and Endangered):
• Higher potential for secondary development as compared to Combined Route B due to the number of private land owners and proximity to Wulik River.</td><td colspan="2">Habitat (including Threatened and Endangered):
• Lower potential for secondary development overall due to fewer number of private land owners and distance to Wulik River.</td></tr>
<tr><td colspan="5">Differences Between Material Source Alternatives</td></tr>
<tr><td></td><td>K-Hill Site</td><td>Wulik River Source 1</td><td>Relic Channel Source 1</td><td>Relic Channel Source 2</td></tr>
<tr><td>Direct and Indirect and Construction</td><td>Habitat (including Threatened and Endangered):
• Loss of 86.6 acres (permanent) of wetland habitat and 13.3 acres (permanent) of uplands.
• Impacts to potential raptor nesting areas on K-Hill.
• No impacts to high quality bird habitat (Closed Low Scrub)</td><td>Habitat (including Threatened and Endangered):
• Loss of 34.0 acres (permanent) of wetland habitat and 5.7 acres (permanent) of riverine.
• Habitat impact includes 14.9 acres (permanent) of high quality bird habitat (Closed Low Scrub).</td><td>Habitat (including Threatened and Endangered):
• Loss of 50.1 acres (permanent) of wetland habitat, 2.0 acres (permanent) of lacustrine, 2.5 acres (permanent) of pond, and 6.8 acres (permanent) of upland.
• Loss of 5.2 acres (temporary) of wetland habitat.
• Habitat impact includes 0.1 acres (permanent) and 0.1 acres (temporary) of high quality bird habitat (Closed Low Scrub).</td><td>Habitat (including Threatened and Endangered):
• Loss of 42.8 acres (permanent) of wetland habitat, and 2.3 acres (permanent) of pond.
• Loss of 2.4 acres (temporary) of wetland habitat.
• Habitat impact includes 17.3 acres (permanent) and 0.2 acres (temporary) of high quality bird habitat (Closed Low Scrub).</td></tr>
<tr><td>Secondary and Cumulative</td><td>Habitat (including Threatened and Endangered):
• Higher probability for secondary development</td><td>Habitat (including Threatened and Endangered):
• Increased potential for secondary habitat loss of high quality bird habitat (Closed Low Scrub).</td><td>Habitat (including Threatened and Endangered):
• Relatively low chance of loss of important bird habitat due to</td><td>Habitat (including Threatened and Endangered):
• Increased potential for secondary habitat loss of high quality bird habitat (Closed Low Scrub).</td></tr>
</table>

	due to proximity to evacuation site.	• High potential for secondary development overall due to greater number of private land owners and proximity to Wulik River.	secondary development.	

4.11.3 Avoidance, Minimization, and Mitigation

Mitigation measures to avoid, minimize, or mitigate potential changes in habitat, mortality risk, or movement of terrestrial and aquatic birds were selected based on state and federal regulations and policies, management practices and guidelines, and relevant peer-reviewed literature, and include:

- The Proposed Action alternatives have been routed to minimize interactions with waterbodies (i.e., aquatic bird habitat) wherever feasible. Where possible, the road alignment would approach the waterbody perpendicularly to minimize impacts to the riparian habitats;
- Temporary disturbance, reclaimed land, and other areas of ground disturbance would be revegetated with regionally appropriate seed mix that minimizes introduction of noxious weeds where practicable;
- Where possible, vegetation clearing, site preparation, and construction activities would adhere to the recommended periods to avoid vegetation clearing from June 1–July 31 for Northern Alaska (USFWS 2017d). If vegetation clearing, site preparation, and construction occurs within these periods, pre-construction nest surveys would be conducted by qualified personnel and appropriate mitigation developed in consultation with the USFWS; and
- High-disturbance project-related activities (e.g., blasting, pile driving) would be avoided where practicable during the nesting and peak migration window.

4.12 Marine Mammals

4.12.1 Affected Environment

Marine mammals are an essential part of the culture and food security in Kivalina. Marine mammal species that can occur in the coastal waters near Kivalina include: beluga whale (*Delphinapterus leucas*), gray whale (*Eschrichtius robustus*), bowhead whale (*Balaena mysticetus*), bearded seal (*Erignathus barbatus*), ringed seal (*Phoca hispida*), spotted seal (*Phoca largha*), and polar bear (*Ursus maritimus*). Of these species, those identified as important subsistence species are bowhead whale, beluga whale, bearded seal, and ringed seal (Huntington et al. 2016; SRB&A 2009). Walrus are also an important subsistence species, but are typically found farther offshore (Huntington et al. 2016; Tetra Tech 2009).

All marine mammals in the U.S. are protected under the *Marine Mammal Protection Act* (MMPA), which was enacted in response to concerns about population declines caused by human activities. The National Marine Fisheries Service (NMFS) is charged with protecting whales, dolphins, porpoises, seals and sea lions, whereas the USFWS is responsible for walrus, manatees, otters and polar bears (*Marine Mammal Protection Act* of 1972). One of the policies of the MMPA is to protect stocks of these species from falling below the level of "depleted" (i.e., population numbers for the species that are below optimum for a sustainable population). In Alaska, given their cultural and dietary importance, marine mammals are co-managed by the federal government and a variety of Alaska Native organizations such as the Ice Seal Committee, the Alaska Eskimo Whaling Commission, the Alaska Beluga Whale Committee, and the Eskimo Walrus Commission.

On a federal level, several marine mammal species have further protection under the ESA. The ESA lists four of the marine mammal species in the project vicinity: bowhead whale, bearded seal, ringed seal, and polar bear. Although project specific barging is not anticipated, if it occurs, additional ESA listed species could be encountered, including western Distinct Population Segment (DPS) Steller sea lions (*Eumetopias jubatus*), western North Pacific DPS humpback whales (*Megaptera novaeangliae*), Mexico DPS humpback whales, fin whales (*Balaenoptera physalus*), sperm whales (*Physeter macrocephalus*), North Pacific right whale (*Eubalaena japonica*), and bowhead whales. Critical habitat has been designated for polar bear and overlaps with Kivalina (75 FR 76086 76137). Proposed critical habitat for ringed seals also overlaps with Kivalina Lagoon (79 FR 73010). In addition, if project specific barges are required, vessel traffic may occur within Steller sea lion (58 FR 45269) and North Pacific right whale (73 FR 19000) designated critical habitat.

The seasonal occurrence of marine mammal species found in the Study Area and along potential project specific barge route, if required, their typical subsistence hunting seasons (where applicable), population estimates, and status under the ESA and MMPA are summarized in Table 17.

Table 17 Marine Mammal Seasonal Occurrence in Coastal Waters associated with the Project, Population Estimates and Conservation Listings

Species	Stock	Typical subsistence hunting period for Kivalina[d]	Minimum population estimate	ESA listing	Critical Habitat	MMPA listing
Beluga whale	Beaufort Sea	April–May	32,453[a]	not listed	None Designated	not listed
	Eastern Chukchi Sea	July	3,710*[a]	not listed	None Designated	not listed
Bowhead whale	Western Arctic	April–May	16,091[b]	endangered	None Designated	depleted
Gray whale	Eastern North Pacific	-	20,125[c]	not listed	None Designated	not listed
North Pacific Right Whale	Eastern North Pacific	-	26 [b]	endangered	Designated	depleted
Humpback Whale	Western North Pacific DPS	-	865 [b]	endangered	None Designated	depleted
Humpback Whale	Mexico DPS	-	6,000-7,000[e]	threatened	None Designated	depleted
Fin Whale	Northeast Pacific Stock	-	1,036 *[c]	endangered	None Designated	depleted
Sperm Whale	North Pacific Stock	-	N/A [b]	endangered	None Designated	depleted
Bearded seal	Alaska (Beringia Distinct Population Segment)	May–July	273,676[b]	threatened	In Process	depleted
Ringed seal	Alaska	November-April	300,000*[b]	not listed**	In Process	not listed
Spotted seal	Alaska	-	391,000[a]	not listed	In Process	not listed
Polar bear	Chukchi/Bering Sea	-	2,000[b]***	threatened	Designated	depleted

NOTES:

Marine mammal presence can vary and sightings of other species not listed may occur.

* Considered an underestimate.

** ESA listing is currently being appealed in the U.S. District Court; National Oceanic and Atmospheric Administration (NOAA) Fisheries published a final rule listing the Arctic subspecies as threatened.

*** Not considered reliable as based on extrapolation from aerial den surveys.

SOURCES: [a] Allen and Angliss (2014), [b] Muto et al. (2016), [c] Carretta et al. (2015), [d] USEPA (2009), [e]Calambokidis et al (2008)

4.12.1.1 *Marine Mammals within the Study Area*

Marine mammals typically seen in Kivalina Lagoon include spotted seals, bearded seals, ringed seals, and polar bears (Stantec 2016a; Huntington et al. 2016). Although numerous observations of marine mammals within Kivalina Lagoon have been documented through sampling of local traditional knowledge, to date no systematic marine mammal surveys have been conducted in the lagoon.

Spotted Seals

Spotted seals are seasonally present in the lagoon, arriving after the ice melts (Huntington et al. 2016), and using both the north and south entrances (Stantec 2016a; P. Hawley, pers. comm., June 30, 2017). No systematic information on seal sighting locations in Kivalina Lagoon have been collected.

Threatened and Endangered Species

Bearded Seals

Bearded seals are seen coming into Kivalina Lagoon in the summer following fish (Huntington et al. 2016, Stantec 2016a) and have been sighted at the north (Kivalik) (Stantec 2016a) and south (Singuak) entrance to the lagoon (P. Hawley, pers. comm., June 30, 2017). Juvenile bearded seals have been observed foraging up river channels in the fall (Huntington et al. 2016; Stantec 2016a). Aerial surveys in the eastern Chukchi Sea, conducted in May and June, estimated highest densities of bearded seals (0.401–0.7 seals/km^2; unadjusted for survey timing and haulout behavior) south of Kivalina and west of Kivalina in the offshore area, and moderate densities in coastal waters by Kivalina (0.051–0.2 seals/km^2; unadjusted for survey timing and haulout behavior) (Bengtson et al. 2005). Movement data shows they have a wide range in the Chukchi Sea including the coastal waters near Kivalina in fall and summer (Boveng and Cameron 2013; Wiese et al. 2017).

Ringed Seals

Ringed seal activity in the Chukchi Sea is strongly influenced by sea ice (Kelly et al. 2010). Movement data suggests that ringed seals use the Chukchi Sea, and coastal waters near Kivalina, year-round (ADF&G 2015c; Crawford et al. 2012; Von Duyke et al. 2017). Density estimates, based on aerial surveys conducted in May and June, are higher along the coast south of Kivalina (10.001-20 seals/km^2; unadjusted for survey timing and haulout behavior) compared to the coastal region around Kivalina (2.001-5 seals/km^2; unadjusted for survey timing and haulout behavior) (Bengtson et al. 2005). Ringed seals occur year-round in the Kivalina area (Huntington et al. 2016).

Recent field observations (Stantec 2016b) confirmed seal presence within Kivalina Lagoon near the Kivalik and Siguak Inlets. Personal interviews conducted with local subsistence hunters concurrent to the Stantec survey effort also yielded generalizations that seals occasionally access shallower portions of the lagoon. However, follow up interviews with those and other local subsistence hunters in 2017 clarified that the majority of seal foraging in lagoon occurs directly south and east of Singuak Inlet proximate to deeper water near and within the Wulik River outlet, and in like fashion within deeper waters between the mouth of the Kivalina River and its outlet to the Chukchi Sea at Kivalik Inlet. Comparatively, seal use of the shallow Lagoon Channel lying parallel to Kivalina Island is substantially less common, and generally limited to infrequent occasions of combined high water and thin ice in the lagoon (pers. comm. O. Hawley, September 15, 2017; R. Sage, September 15, 2017 and October 5, 2016; D. Foster October 5, 2016; P. Hawley September 15, 2017).

Polar Bears

Two polar bear populations occur in Alaska: the Beaufort Sea population and the Chukchi Sea population (Schliebe et al. 2006). The Chukchi Sea population typically moves into the southern Chukchi Sea with the pack ice in fall and winter and migrates north with the pack ice in spring and summer (Garner et al. 1990). Traditional knowledge indicates that polar bear tracks are found along the coast and on barrier islands in late fall and winter in the south-eastern Chukchi Sea, when they first arrive in the region (Voorhees et al. 2014). Tagging and movement data show polar bear presence on the sea ice west of Kivalina in spring (Garner et al. 1990; Rode et al. 2014). Although polar bears in the Chukchi Sea are typically closely associated with sea ice, recent increases in land use (primarily Wrangel Island, rather than the Alaskan coast) have been detected (Rode et al. 2015). Habitat selection modeling predicts lower probability of habitat selection by polar bears along the coast near Kivalina, compared to offshore regions in the Chukchi Sea in winter and spring (Wilson et al. 2016). Polar bears have been observed near Kivalina in winter; during interviews on seals, walrus, and whales a community member mentioned possible polar bear dens in the hills behind Kivalina, although the specific locations were not provided (Huntington et al. 2016). Region-wide subsistence interviews and data collection highlight the existence of polar bear dens north of Kivalina near Cape Thompson (Satterthwaite-Phillips et al. 2016).

4.12.1.2 Other Listed Species

If project specific barges are required, other listed species may be encountered along the vessel routes. These species include Western DPS Steller sea lions, North Pacific right whales, Western North Pacific and Mexico DPS humpback whales, fin whales, sperm whales and bowhead whales. Life history summaries for these species can be found in the Section 7 consultation letter located in Appendix G. Summaries of Western DPS Steller sea lion and North Pacific right whale critical habitat are below.

Steller Sea Lion Critical Habitat

NMFS designated critical habitat for Steller sea lions on August 27, 1993 (58 FR 45269). In Alaska, designated critical habitat includes the following areas as described at 50 CFR §226.202.

- Terrestrial zones that extend 3,000 feet (0.9 km) landward from each major haulout and major rookery.
- Air zones that extend 3,000 feet (0.9 km) above the terrestrial zone of each major haulout and major rookery in Alaska.
- Aquatic zones that extend 3,000 feet (0.9 km) seaward of each major haulout and major rookery in Alaska that is east of 144° W longitude.
- Aquatic zones that extend 20 nm (37 km) seaward of each major haulout and major rookery in Alaska that is west of 144° W longitude.
- Three special aquatic foraging areas: the Shelikof Strait area, the Bogoslof area, and the Seguam Pass area, as specified at 50 CFR §226.202(c).

North Pacific Right Whale Critical Habitat

Critical habitat for the North Pacific right whale was designated in the eastern Bering Sea and in the Gulf of Alaska on April 8, 2008 (73 FR 19000). The Gulf of Alaska portion includes a small area just east of Kodiak Island, where whales seasonally migrate to the Bering Sea. The eastern Bering Sea portion includes a polygon, which is roughly 50 miles north of the Aleutian Islands, and at least 100 miles off the Bristol Bay coastline, leaving the majority of the Bering Sea outside of Critical Habitat (73 FR 19000). Environmental Consequences

4.12.1.3 No-Action Alternative

An evacuation road would not be constructed from Kivalina to K-Hill and no changes to current impacts to marine mammals would occur. Residents would continue to be exposed to environmental threats with no reliable options for evacuation during storm events with the potential to detrimentally impact the community over time. There would remain severe risk to life, health, and safety of residents.

4.12.1.4 Route and Lagoon Crossing Alternatives

Based on the project activities in the lagoon (see Section 4.3.2) and the proposed avoidance, minimization, and mitigation measures, adverse effects to marine mammals are not anticipated. DOT&PF will coordinate with NMFS and USFWS to ensure impacts will be minimized. The following sections detail potential impacts to marine mammals. Whales in the vicinity are not anticipated to be impacted since they do not enter the shallow lagoon where impacts to marine mammals could occur.

Direct and Indirect Impacts:

<u>Habitat Quality and Movement</u>: All three species of seal observed in Kivalina Lagoon are known to enter it through the north (Kivalik Inlet) and south (Singuak Inlet) entrance to the lagoon (P. Hawley, pers. comm., June 30, 2017). Juvenile bearded seals have been observed foraging up river channels in the fall (Huntington et al. 2016). The presence of the lagoon-crossing structure may result in an ecological and physical alteration of marine mammal habitat in the lagoon as it may change distribution of prey species, and area movement of seals. It is not known if seals would swim through culverts, but the presence of a bridge with water flowing freely beneath it would likely not impede passage of marine mammals (e.g., Shelden et al. 2013). Marine mammal use of habitat on either side of in-water structures, and their swimming beneath such structures, has been observed for other projects (e.g., Twentymile River Bridge, Cook Inlet, Alaska; HDR Alaska Inc. 2010). The proposed design of the lagoon crossing is not anticipated to negatively affect bearded, spotted, or ringed seal habitat use and foraging as it would accommodate the passage of seals and their prey. Prey densities are not anticipated to be adversely affected.

<u>Threatened and Endangered Species Critical Habitat</u>: Polar bear critical habitat has been designated in the Kivalina region (75 FR 76086 76137). For Kivalina, this habitat consists of the barrier island the town is currently located on, and the adjacent similar islands fronting the Chukchi Sea. The Kivalina River Delta is also considered critical habitat and is inside the study area, but North of the proposed alternatives.

Given the presence of the community and activities in the area such as low flying aircraft, vessel use, and subsistence hunting activity, it is anticipated that project in-water and terrestrial construction activities would not appreciably impact critical polar bear habitat. Bearded seal critical habitat has not yet been defined (77 FR 76740) and no critical habitat has been designated for bowhead whale (67 FR 55767).

Construction Impacts:

Potential for Injury and/or Disturbance from Underwater Noise during Construction: Construction boat operation, and placement of fill in water would create increased levels of underwater noise in Kivalina Lagoon. No additional increase in underwater noise from pile driving is expected due to DOT&PF's commitment of pile driving within constructed embankments. The relative isolation from open water, soft substrates, and shallowness of the lagoon would further reduce propagation of underwater noise. Injury and changes in marine mammal behavior could result from underwater noise, although potential effects depend on the species, individual, animal activity, and the novelty, type, and level of underwater noise (Ellison et al. 2012; Richardson et al. 1995; Southall et al. 2007). The effects of noise on ice-associated seals such as ringed, bearded, and spotted seals, and their auditory capabilities are poorly understood (Sills et al. 2016). Ringed and spotted seals have similar ranges of underwater hearing (Sills et al. 2014; Sills et al. 2015). Both species can hear a broad range of frequencies underwater, and have hearing capabilities similar to harbor seals (Sills et al. 2014). The range of underwater hearing of bearded seals has not been studied, although the frequency range of their vocalizations is very large (up to 11 kHz; Risch et al. 2007), and so similarities to spotted and ringed seals may be assumed.

Changes in marine mammal behavior due to underwater noise can include avoidance of the area, change in vocalizations, change in foraging activity, or no detectable response. For example, construction of an offshore island during a pipeline construction project had no significant effect on the densities of basking ringed seal when spring densities before intensive winter construction of the island was compared to densities in spring following construction (Moulton et al., 2005). Abandonment of breathing holes and subnivian lairs by ringed seal, when exposed to anthropogenic noise (i.e., seismic surveys), was highest closer to seismic activity (Kelly et al., 1988). However, ringed seals have also shown no significant change in abandonment of subnivian lairs when exposed to noise from an oil-production facility (e.g., drilling activity, pipeline construction) (Williams et al., 2006).

Construction-related boat traffic in the lagoon would create underwater noise, which may result in the disturbance or communication masking of seals. The effects of boat noise on ringed, spotted, and bearded seal behavior are not well known. Studies on other seal species have shown displacement due to the presence of high levels of vessel traffic in the case of grey seals (Anderwald et al. 2013). Harbor seals are more likely to be disturbed and enter water from a haulout if vessels are within 150 m than when vessels are farther away (Mathews et al. 2016). Currently, all boat traffic in the lagoon is related to community activities. The duration of noise associated with the installation of piles is assumed to be 30-60 days (not continuous) and, as a result, would increase levels of underwater noise in the lagoon for only a relatively short period of time. Reductions in boat speeds have been shown to reduce the extent of underwater noise (e.g., Houghton et al. 2015).

Placement of fill in water would also create underwater noise, but is anticipated to be at levels below that of boat noise. The anticipated specific levels of these noises are not known for this project, but it is unlikely that their levels would result in injury to seals within the lagoon. Levels of underwater noise may result in disturbance of marine mammals, although ringed seals were not displaced by slope preparations and deposition of gravel during construction of an artificial island in the Beaufort Sea (Blackwell et al. 2004). Placement of the base causeway and rock protection could be done with no or minimal water present (see Section 4.3.2). Ice associated species are naturally exposed to underwater noise from ice movement and cracking, with varying intensities, depending on conditions and scenario (Richardson et al. 1995). For example, an active pressure ridge produced source levels of 124–137 dB re 1 µPa m in the 4 and 8 Hz tones (Buck and Greene 1979). Mitigation measures to further reduce any potential for injury or disturbance from underwater noise to seals that may be present in the lagoon during construction are outlined in Section 4.12.3.

If project specific barges are required, underwater noise from barges may temporarily disturb or mask communication of bearded seal, and ringed seal, western distinct population segment (DPS) Steller sea lion, North Pacific right whale, Mexico DPS humpback whale, western North Pacific DPS humpback whale, fin whale, sperm whale, and bowhead whale.

It is expected that vessel noise from barges, if project specific barges are required, are the only project specific activity that may result in potential impacts to listed whales and Steller sea lions, due to the rest of the work being located inside of Kivalina Lagoon. If animals are exposed to vessel noise they may exhibit avoidance behavior, short-term vigilance behavior, or short-term masking behavior, but these behaviors are not likely to result in adverse consequences for the animals due to the temporary nature of barge noise along the vessel route. Individual whales' past experiences with vessels appear to be important for individual whale response (Shell 2012). Vessels moving at slow speeds and avoiding rapid changes in direction may be tolerated by some species. Other individuals may deflect around vessels and continue on their migratory path. Humpback whale reactions to approaching boats are variable, ranging from approach to avoidance (Payne 1978, Salden 1993). Whales have been known to tolerate slow-moving vessels within several hundred meters, especially when the vessel is not directed toward the animal and when there are no sudden changes in direction or engine speed (Wartzok et al. 1989, Richardson et al. 1995a, Heide-Jorgensen et al. 2003). Mitigation measures would limit potential residual adverse effects of the project on marine mammal species exposed to underwater noise as a result of construction activities (Section 4.12.3).

Decrease in Habitat Quality due to Increases in Turbidity from Placement of Fill and Culverts in Water: Ringed and spotted seals are visual hunters and increases in turbidity from fill or culvert placement may temporarily modify visibility within preferred feeding habitats. However, pinnipeds (including ringed seals and bearded seals) have highly developed sensory organs (i.e., vibrissae) which likely assist with foraging in dark or turbid conditions (e.g., Hyvärinen 1989; Marshall et al. 2006). As such, any changes in behavior caused by increased turbidity in the lagoon are unlikely to translate into harmful effects on seals. Further, if this activity occurs in winter, effects would be limited to ringed seals as the only species likely to be present.

The location and presence of the proposed lagoon crossing is not anticipated to negatively affect bearded seal or ringed seal habitat accessibility and foraging as its design would facilitate movement of seals and their prey through the crossing. Seal prey densities are not anticipated to be adversely affected. While the lagoon crossing lies within proposed ringed seal habitat, this proposed designation has not been finalized. The project would implement several avoidance, minimization, or mitigation measures to limit potential residual adverse effects of the project.

Boat Strikes during Construction: Recreational boats currently use the lagoon and are active when seals are present. The possibility of vessel strikes of seals in the Kivalina Lagoon is minimal per the data analyzed in Alaska waters which documented no ship strikes of spotted, bearded or ringed seals over a five year period (Helker et al. 2016, 2017).

Project specific barges, if needed, have the potential to collide with, or strike, marine mammals (Laist et al. 2001, Jensen and Silber 2003). From 1978-2012, there were at least 108 recorded whale-vessel collisions in Alaska, with the majority occurring in Southeast Alaska (Neilson et al. 2012). Among larger whales, humpback whales are the most frequent victims of ship strikes in Alaska, accounting for 86% of all reported collisions. Fin whales accounted for 2.8% of reported collisions, gray whales 0.9%, and sperm whale 0.9%. Six of the whales (5.6%) were unidentifiable and the remaining are of non-listed species. 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. Vanderlaan and Taggart (2007) used observations to develop a model of the probability of lethal injury based upon vessel speed. They projected that the chance of lethal injury to a whale struck by a vessel is approximately 80 percent at vessel speeds over 15 kn (27.78 km/hr) and approximately 20 percent at 8.6 kt (15.92 km/hr).

Although risk of ship strike has not been identified as a significant concern for Steller sea lions (Loughlin and York 2000), the recovery plan for this species states that Steller sea lions may be more susceptible to ship strike mortality or injury in harbors or in areas where animals are concentrated [e.g., near rookeries or haulouts; (NMFS 2008)]. To minimize this risk, project vessels will not travel within 3 nm (5.5 km) of major Steller sea lion haulouts or rookeries.

Secondary (Induced) and Cumulative Impacts:

Potential Disturbance from Vehicle Noise: Spotted seals and ringed seals have acute in-air hearing (Sills et al. 2014; Sills et al. 2015). In-air hearing of bearded seals has not been studied, but due to the wide frequency range of their vocalizations (Risch et al. 2007), similar in-air hearing capabilities to spotted and ringed seals may be assumed. Vehicular noise would be audible to species present in the lagoon and may result in changes in behavior, although behavioral responses can vary widely depending on context and novelty of the noise source (Ellison et al. 2012; Richardson et al. 1995; Southall et al. 2007). Densities of basking ringed seals present in spring during active use of a proximate ice road did not vary between years (Moulton et al. 2005). Harwood et al. (2007) also report no avoidance of an ice road by ringed seals in the south-eastern Beaufort Sea, suggesting they were not displaced by in-air noise from the vehicular traffic. A contrasting study concluded that in-air noise from snow machines, when within 2.8 km, resulted in most ringed seals leaving their lairs (Kelly et al. 1988). Given the current presence of boat traffic within the lagoon in the open water season and the presence of snow machines during the winter, seals in the lagoon would have been previously exposed to noise. Seals would be expected to habituate to this new noise regime (Moulton et al. 2005), and no long-term changes of seal presence and behavior due to vehicle noise is expected.

Hunting Pressure: A permanent structure across the lagoon would increase lagoon accessibility. The location of the crossing would span an area of the lagoon that is currently accessible via boat during the open water period. State of Alaska Fish and Game regulations state that shooting from, on, or across a highway is illegal (5AAC 92.080; ADF&G 2006). Installation of signs along the road would remind the public of the regulations. As a result, it is anticipated that hunting pressure would remain unchanged.

4.12.1.5 Material Source Alternatives

Direct and Indirect Impacts:

No direct or indirect negative impacts to marine mammals are expected as a result of the development of the proposed material sites and use of in-project-area materials as fill. Local sourcing of construction materials would reduce the need for increased boat activity otherwise required to import materials from outside the region, and thus limit any anticipated disturbance of marine mammals in the Chukchi Sea.

Secondary (Induced) and Cumulative Impacts:

No secondary or cumulative impacts to marine mammals are expected as a result of the development of the proposed material sites and use of in-project-area materials.

4.12.1.6 Alternatives Comparison

As there is only one Kivalina Lagoon crossing alternative proposed, no alternatives comparison is provided.

4.12.2 Avoidance, Minimization, and Mitigation

The following are proposed to reduce impacts to marine mammals (also in Appendix G):

- Pile driving would will occur through constructed embankment;
- Project specific barges and small boats:
  - If project specific barges are required, operators would be required to follow the best practices and safety regulations required of barge operators which regularly service the communities.
  - Barges that may provide some incremental project support but are not strictly under project control will be encouraged to avoid designated (73 FR 19000) North Pacific right whale critical habitat or maintain vigilant watch while under way in order to avoid vessel strikes to individuals of the Critically Endangered population frequenting the Bering Sea.
  - If project specific barges are required, during vessel transit, the project will follow 50 CFR 224.103 regulations and NMFS marine mammal viewing guidelines.
  - Small project-specific boats will move at less than 10 knots (kn; 18.52 km/h) when in the Kivalina Lagoon to reduce noise impacts and for safe vessel maneuverability to avoid obstacles and marine mammals in the water.
  - If project specific barges are required and practicable vessel operation requires purposely approaching within 1.6 km (1 mile) of observed whales, except in emergency situations, the vessel operator will take reasonable precautions to avoid potential interaction with the whales
  - Reducing vessel speed to less than 5 kn (9.26 km/h) within 300 yards (274 m) of pinnipeds
  - If project specific barges are required, they will avoid transiting through identified (73 FR 19000) North Pacific right whale critical habitat. Protected Species Observers (PSOs) are not required if barges do not enter designated North Pacific right whale critical habitat.

- If project specific barges are required to transit through North Pacific right whale critical habitat, the following will be implemented:
    - Vessels will not make way in excess of 10 kn (18.52 km/h) while travelling within the boundaries of designated North Pacific right whale critical habitat.
    - Dedicated PSOs will be on board all motorized vessels travelling through designated North Pacific right whale critical habitat. PSO's are not required if barges transit around North Pacific right whale critical habitat. PSOs will maintain a constant watch for all marine mammals from the bridge or other a similar vantage point. PSO's will maintain direct contact with the vessel pilot, advising the pilot/operator of the position of all observed marine mammals as soon as they are observed.
    - The vessel pilot/operator will maneuver vessels to the extent practicable to:
        - Remain further than 874 yds (800 m) from North Pacific right whales,
        - Remain further than 100 yds from other marine mammal species, and
        - Avoid approaching any species of whale head-on.
    - Vessels will adjust speed and heading as needed to avoid disturbance of all marine mammals, provided vessel speed and heading adjustments are consistent with maintaining vessel safety.

- Fill placement:
    - If material is being placed in summer during ice-free conditions, a qualified PSO will monitor for marine mammal presence and implement a 50 m (164 ft) exclusion zone around the material placement site to avoid physical harm, direct, and indirect takes by construction equipment.
    - If material is being placed in the winter, a PSO is only needed if there are areas of naturally occurring open water within 50 m (164 ft) of construction activities. If there is no naturally occurring open water within 50 m (164 ft) of construction activities, no PSO is required and no exclusion zone is necessary.
    - If an observed marine mammal is likely to approach within 50 m (164 ft) of the fill placement site, fill placement will stop until the marine mammal is farther than 50 m (164 ft) from the fill placement site, or is not seen for 15 minutes. The PSO will continuously scan the activity-specific monitoring zone for the presence of species for 30 min before any fill placement activities take place.
        - If any species are present within the exclusion zone, fill placement activities will not begin until such animal(s) has left the exclusion zone or no species have been observed in the exclusion zone for 15 min (for pinnipeds) or 30 min (for cetaceans).

- If any species enter, or appear likely to enter, the exclusion zone during fill placement, all inwater activities will cease immediately. Fill placement activities may resume when the animal(s) has been observed leaving the area on its own accord. If the animal(s) is not observed leaving the area, fill placement activities may begin 15 min (for pinnipeds) or 30 min (for cetaceans) after the animal is last observed in the area.

- Subsistence Activities
  - Signs will be installed reminding the public that State of Alaska Fish and Game regulations prohibit shooting from, on, or across a highway (5AAC 92.080; ADF&G 2006).
- A polar bear interaction plan would be developed as required by USFWS.

4.13 Wildlife—Terrestrial Mammals

4.13.1 Affected Environment

Five species of large terrestrial mammals are known to occur in the Study Area: caribou (*Rangifer tarandus*), moose (*Alces alces*), muskoxen (*Ovibos moschatus*), Dall's sheep (*Ovis dalli)*, and brown bear (*Ursus arctos*). Caribou, moose, and Dall's sheep have historically been and continue to be important subsistence resources for Kivalina (SRB&A 2009). Common furbearers in the Study Area include wolf (*Canis lupus*), wolverine (*Gulo gulo*), red fox (*Vulpes vulpes*), Arctic fox (*Alopex lagopus*), lynx (L*ynx canadensis*), marten (*Martes americana*), and mink (*Mustela vison*). Many of these species are important to hunters and trappers in the region for their pelts, which are used to make traditional Alaska Native crafts and clothing (USEPA 2009).

There are no federally listed Threatened or Endangered species or federally designated critical habitat for terrestrial mammal species that occur in the Study Area. The discussion below focuses on *other species of concern* known to occur in the Study Area including caribou, moose, muskoxen, Dall's sheep, and brown bear (ADF&G 2015a).

4.13.1.1 Caribou

The Study Area occurs along the border of caribou summer range and the migratory area of the Western Arctic Herd (WAH) (Western Arctic Caribou Herd Working Group 2011). The WAH is currently the largest herd in the State of Alaska with a 2016 estimate of 201,000 individuals (ADF&G 2016e). Satellite collar data (1988–2006) reveal the general WAH caribou distribution providing migration date approximations, which vary year to year. Caribou occupy the vicinity of the Study Area in low densities between September 1–May 31, leave between June 1–June 30 for calving, spend July 1–July 31 approximately 10–30 miles north of the Study Area for bug relief, and leave August 1–August 31 for the Brooks Range to feed (CARMA 2017). Since 1996, most individuals have wintered south of the Study Area, on the Seward Peninsula (CARMA 2017). Satellite collar data also revealed that a few individuals of the Teshekpuk Lake Herd are present in the region from November 1–May 1 (CARMA 2017). These data suggest that caribou can be present in the Study Area at any time, but are most likely to be present in low densities during September 1–May 31 with a few individuals remaining throughout July.

Although there are several traditional migration pathways connecting the WAH winter range with summer/calving grounds, a portion of the WAH migrates through the Study Area during September as individuals move south to winter range located south of the Kobuk River near the Nulato Hills (Joly et al. 2012; WHPacific 2012b; ADF&G 2015d). The herd generally crosses the Kivalina and Wulik Rivers on the southwestern side of K-Hill during migration, and occasionally spends time in the hills to the east of K-Hill (WHPacific 2012b). Although caribou often move to the east of the Study Area during spring migration, some do migrate through the Study Area as they head north to calving grounds on the North Slope of the Brooks Range near the Utokuk Hills (USEPA 2009; Western Arctic Caribou Herd Working Group 2011; ADF&G 2015d). Caribou sign (pellets, antlers, skeletal remains) were observed at multiple locations throughout the Study Area, including trails on the north and east sides of K-Hill (Appendix J).

Caribou are the principal terrestrial subsistence animal in the region and are hunted in the mainland tundra hills east of Kivalina Lagoon. A subsistence survey conducted in Kivalina by ADF&G in 2007 indicated a harvest of 268 caribou which equates to 14.2% of the community total edible weight and 94% of the land mammal harvest (ADF&G 2010). Most caribou are harvested in the fall when the main migration reaches the Kivalina area, but they are also hunted throughout the winter, as available, and harvested opportunistically year-round.

4.13.1.2 Moose

Compared to other areas in Alaska, moose presence within the Study Area is of low density (MMS 2007; USEPA 2009). Fall and spring surveys conducted between 1992 and 2001 (Dau 2002), as well as more recent survey estimates conducted in Game Management Unit 23 (ADF&G 2012), indicate densities averaging less than one moose per square mile in the Lower Noatak and Wulik River drainages. During winter, moose are found along the drainages of the Wulik and Kivalina Rivers (Tape et al. 2016; Mould 1979; LeResche et al. 1973). As snow cover subsides, moose disperse to higher elevation shrub habitats outside the Study Area during the summer and fall (Tape et al. 2016; Mould 1979; LeResche et al. 1973).

4.13.1.3 Muskoxen

Reintroduced in 1970, the Cape Thompson population (ranging from the Noatak River north to Cape Lisburne) remains fairly small (around 300 animals), and is generally found within 20–35 miles of the coast (ADF&G 2015b). The Cape Thompson population has been expanding their range north and out from the coast (ADF&G 2015a). The Wulik River muskoxen population was 89 in 2004 but declined to 11–14 between 2009 and 2012 (the most recent data available, ADF&G 2015b). Muskoxen were observed during field visits of the Study Area in 2016 and a 2017 cultural resource survey (Appendix J; Stantec 2017d).

Small numbers of muskoxen can be expected in the Study Area, primarily during spring and summer. During spring calving season (April–June) muskoxen use riparian areas, such as the Wulik and Kivalina River, where there are abundant sources of grasses and willows exposed from melting snow and ice (Danks and Klein 2002; Klein et al. 1991). During winter, muskoxen are less likely to be in the Study Area, as they prefer exposed ridgetops which maintain easier access to forage (primarily lichen, sedges, and mosses) with shallow soft snow cover (Ihl and Klein 2001; Klein et al. 1991).

4.13.1.4 Dall's Sheep

Dall's sheep range is limited to the rolling hills and mountainous terrain of the DeLong and Baird Mountains of the western Brooks Range (DeLong Mountains population) located northwest and outside of the Study Area (ADF&G 2011b). Dall's sheep typically inhabit mountainous terrain (Schmidt et al. 2012), and K-Hill (~460 ft) has a rubble topography without escape habitat; not fitting typical sheep preferences.

Dall's sheep are prized for their meat, fat, sinew, skins, and horns, and are hunted in the fall in the upper Wulik and Kivalina River drainages (MMS 2007). Overall, population densities of the DeLong Mountains population are relatively low compared to other areas of the Brooks Range that contains more suitable seasonal habitat. Recent population estimates indicate the Dall's sheep populations are declining in the Western Brooks Range (ADF&G 2014).

4.13.1.5 Brown Bear

Brown bears occur throughout northwestern Alaska, including the Study Area, but at relatively lower densities as compared to parts of southern Alaska (Sterling et al. 1997; USEPA 2009). Availability of seasonal food resources influences brown bear habitat use. Brown bears in northern parts of Alaska use tussock tundra, tall shrubland, and riparian communities during spring and summer (Phillips 1987). Tussock tundra provides seasonally important forage plants (e.g., sedges) as well as potential prey or carrion (e.g., caribou calves). Riparian areas provide hedysarum roots as well as availability of prey such as moose (Philips 1987). Kivalina residents have also reported that brown bears are occasionally harvested during the fall in riparian areas inside the Study Area when bears are feeding on fish and berries (Loon and Georgette 1989). In addition, Ballard et al. (1991) studied brown bear habitat use between the Wulik and Noatak Rivers and reported radio-collared brown bears move to lower elevations during late summer and fall, which coincides with the arrival of spawning salmon in major river systems and tributaries as well as sloughs.

Brown bears in the central arctic excavate their own dens each year with no apparent fidelity to the same den site (McLoughlin et al. 2002). In these areas, bears excavate dens in heath tundra and heath boulder habitats as well as riparian tall shrub and birch seeps. Dens are commonly constructed under cover of dwarf birch with other tundra shrubs nearby (e.g., crowberry). Overall, bear dens are typically found on steep (greater than 25 degrees) slopes, with sandy substrates and warm aspects (McLoughlin et al. 2002). Previous reconnaissance efforts identified potential bear excavations, one of which may have been used as a denning site. When observed, excavations and the potential den site did not appear to have been used recently; and all exhibited some weather-related erosion and/or appeared collapsed (Appendix J).

4.13.2 Environmental Consequences

4.13.2.1 No-Action Alternative

An evacuation road would not be constructed from Kivalina to K-Hill and no changes to current impacts to terrestrial mammals would occur. Residents would continue to be exposed to environmental threats with no reliable options for evacuation during storm events with the potential to detrimentally impact the community over time. There would remain severe risk to life, health, and safety of residents.

4.13.2.2 Route and Lagoon Crossing Alternatives

Direct and Indirect Impacts:

Habitat Alteration: Construction of the project, as well as material source development and associated access, would result in habitat alteration for terrestrial mammals (Tables 9 through 14). Both routes would disturb less than 1% of the Study Area: 148.6 acres Southern Route (Preferred Alternative) and 172.6 acres Combined Route B (see Section 4.9). Overall, the Combined Route B Route would result in the permanent loss of a slightly more Palustrine Saturated and Seasonally Flooded vegetation (see Table 9). The removal of these vegetation communities would result in a small reduction in the amount of potential foraging habitat for brown bears, moose, muskoxen, and caribou.

K-Hill site has steep slopes and potential denning habitat for brown bears (McLoughlin et al. 2002). Multiple bear excavations were observed on the south and eastern flank of K-Hill in 2016 and 2017 (Figure 8; Stantec 2016b; Appendix J). When observed, the excavations did not appear to be recent and had experienced erosion and cave ins. The Southern Route largely avoids this habitat, but comes within 0.25 miles of K-Hill. The Combined Route B parallels K-Hill for 0.5 miles, coming within 400 ft of K-Hill. State of Alaska guidelines generally prohibit construction within half a mile of occupied bear dens (DNR 2016).

<u>Mortality Risk</u>: Mortality risk during operations of the evacuation road is expected to be relatively higher than during construction due to potential vehicle-animal collisions. Overall, the degree of mortality risk during operations of roads are dependent on seasonality and species. Winter coincides with environmental factors (e.g., poor driving conditions and reduced visibility) that can increase direct mortality risk. Mortality risk is a factor of roads paralleling habitat, and cutting across drainages (Gunson et al. 2011). Increased road side vegetation can also lead to higher mortality (Gunson et al. 2011). Both routes are similar for such characteristics and so are expected to have equally low mortality risks. Avoidance and minimization measures, such as brush clearing along embankments, can reduce the risk for vehicle/animal encounters (FHWA 2008).

Mortality risk for individual species include:

- Caribou are most likely to be present September 1–May 31 (CARMA 2017) but a few individuals may be present year-round. Neither route has a significant difference in mortality risk for caribou;
- Moose are most likely to be present in riverine areas during the winter and equally distributed during the summer (Tape et al. 2016; Mould 1979). The Southern Route (Preferred Alternative) is in closer proximity to riverine areas, increasing relative mortality risk for moose along this route in the winter;
- Bears are most likely to be encountered during the summer, as they hibernate during the winter. They congregate in riparian areas in the fall (Philips 1987; Ballard et al. 1993), when they focus on salmon food resources. Although mortality risk is low, the Southern Route (Preferred Alternative) has greater potential impacts due to closer proximity to the Wulik River riparian area; and

- Muskoxen are more likely to be present in riverine systems during the summer (Danks and Klein 2010; Klein et al. 1991), and windswept ridges during the winter (Ihl and Klein 2001; Klein et al. 1991). Although mortality risk is low, the Southern Route (Preferred Alternative) has increased relative mortality risk during the summer as it is located along the Wulik River. The Combined B Route has slightly increased relative mortality risk during the winter, as it is closer to ridge habitat.

Migration Patterns and Movement: Traffic during operation might result in changes to species migration patterns. Overall, potential effects depend on species, season, timing and duration of construction activities as well as traffic volume and road maintenance activities during operation (Benítez-López et al. 2010; Northrup et al. 2012; Beyer et al. 2013; Lesmerises et al. 2013; Kite et al. 2016). Roads and associated activities may alter local caribou migration patterns and habitat use (Murphy and Curatalo 1987), as well as movement behavior of the WAH (Wilson et al. 2016). Wilson et al. (2016) studied the WAH response to the Red Dog Mine Road located to the south of the Study Area, and observed individuals altering their movement behavior by taking longer to cross the road (i.e., delayed crossing time) and increasing their movement rates despite the relatively low traffic volume. Particularly sensitive periods would be during migration, which according to the satellite collar data would be approximately May 17–June 14, and August 24–September 15 (CARMA 2017). No difference in impact between routes is expected in terms of migration patterns and avoidance and minimization measures for both routes may include reducing construction activity or vehicle traffic during these time periods.

Moose occur in relatively low densities in the Study Area, but both route alternatives have the potential to alter moose seasonal movement patterns. Moose use riparian areas for forage, shelter, and movement corridors during the winter (Tape et al. 2016; Mould 1979). The Southern Route (Preferred Alternative) is the closest to the Wulik River riparian areas, which could result in more sensory disturbance to wintering moose.

Muskoxen use riparian and lowland areas during the summer, and prefer windswept ridges during the winter (Ihl and Klein 2001, Danks and Klein 2002; Klein et al. 1991). The muskoxen calve in the spring, and raise their young along riparian and lowland areas during the summer (Danks and Klein 2002; Klein et al. 1991). The Southern Route (Preferred Alternative) is closer to the riparian areas, with a greater potential impact to movement during summer. The Combined B Route is closer to windswept ridges, and would have greater potential impact to movement during winter.

Bear are evenly distributed throughout the summer, but congregate along riparian areas in the fall (Philips 1987; Ballard et al. 1993). The Southern Route (Preferred Alternative) is closer to the Wulik River and traverses relatively more wetland and herbaceous vegetation communities that occur in riparian areas. As such, this route has potential to result in greater sensory disturbance to bears using riparian areas along the Wulik River system during spring and fall.

Construction Impacts:

Mortality Risk: Although there is potential for increased mortality risk to terrestrial wildlife during construction and operation of the evacuation road, proposed mitigation (such as stop work authorizations) is expected to reduce potential effects (see Section 4.13.3). As a result, direct mortality risk would not be considered substantial, as affected species would likely use other suitable habitats available in and nearby the Study Area. The largest route is proposed to disturb less than 1% of the Study Area (Section 4.9), which is undisturbed with comparable habitat.

Indirect mortality during construction may pose a risk to wildlife due to human-wildlife conflicts. Bears and other wildlife can be attracted to solid waste as an alternative feeding strategy (ADF&G 2017c). Minimization measures to manage bear interaction include proper solid waste management strategies, including bear-proof dumpsters (ADF&G 2017c).

Migration Patterns and Movement: Road construction might result in changes to species migration patterns, similar to those discussed for traffic during operation above.

Secondary (Induced) and Cumulative Impacts:

Subsistence and Non-Subsistence Hunting Pressure: Subsistence pressure may increase due to easier access to the area proximate to the selected route. This would decrease the time and cost of those participating in subsistence activities, potentially allowing a greater number of participants from the community. The Southern Route (Preferred Alternative) would make access to portions of the Wulik River easier, and open land year-round. Such areas include important habitat to a number of species (e.g., summer muskoxen, winter moose, fall bear habitat). The Combined Route B would open land year-round and provide increased road access closer to the Kivalina River.

Non-subsistence hunting pressure may increase due to road access from either route. However, this pressure is expected to be limited due to the requirement for NANA land use permits for non-shareholders to access NANA lands outside of the proposed new ROW. Hunting could also be closed or restricted if necessary. This type of action has precedent in the region. In response to concerns about Western Arctic

Caribou population growth, the local community worked with the Federal Subsistence Board to close sport hunting in Game Management Unit 23 in 2016 and 2017 (FSMP 2016a, 2016b, 2017).

Private Land Allotment Development: Permanent road access to the evacuation site has potential to increase the likelihood of Native allotment development. Material source development on private lands could result in additional habitat loss or alteration as well as increased mortality risk and changes to wildlife movement in the Study Area. Overall, development of the Southern Route (Preferred Alternative) might result in relatively greater secondary effects due to the number of private land owners and the increased access to the Wulik River as compared to Combined Route B. In addition, should construction and operation of the proposed school on K-Hill occur, it could result in cumulative effects due to potential additional loss and alteration of terrestrial mammal habitat and increased risk of collisions from increased traffic.

4.13.2.3 Material Source Alternatives

Direct and Indirect Impacts:

Habitat Alteration: Material source development would result in the direct alteration of wildlife habitat. The Lower Wulik and Kivalina River drainages surrounding are undisturbed. The removal of these vegetation communities inside the Study Area would result in a small reduction in the amount of potential foraging habitat for brown bear, moose, muskox, and caribou, and is not considered to pose any threats to these populations.

Material source development would reduce the potential number of berry-producing shrubs and willow browse available to brown bears and ungulates by up to 87.3 acres (Table 14), or approximately 0.7% of all scrub/shrub habitat in the Study Area (Table 7). These reductions are not expected to cause any population level impact to terrestrial wildlife species given the 12,286 acres of scrub and shrub habitat available in the Study Area (Table 7) and other undisturbed, comparable habitat surrounding it.

Wildlife, particularly ungulates, can be attracted to gravel sites for insect relief or as mineral licks. Caribou have been shown to prefer developed sites as a relief from tundra and associated insect harassment (Pollard et al. 1996, Noel et al. 1998). Wildlife on the North Slope have also been shown to be mineral deficient (O’Hara et al. 2001), and gravel sources can expose minerals to the surface for easy consumption. While these attraction mechanisms may potentially increase the local population, it may also change traditional migration and movement patterns.

Mortality Risk: Indirect mortality may take place at inactive or rehabilitated material sources. Deep pits can pose a fall hazard to wildlife, which can be mediated by sloping material sources side slopes (ADF&G 1993). Flooded material sources can also present entrainment hazards to wildlife, which encounter side slopes too steep to escape (ADF&G 1993). Reclamation plans should include the creation of shallow benches around material source boundaries to allow a gradual slope to the water (ADF&G 1993).

Construction Impacts:

Habitat Alteration: The K-Hill material site is located within half a mile of potential bear denning habitat. State of Alaska guidelines generally prohibit industrial activity (e.g., road construction) within half a mile of occupied bear dens (DNR 2016). Pre-construction activities would need to include fall and winter bear denning surveys to determine if there are active bear dens.

Mortality Risk: Construction activities associated with material source development are not anticipated to significantly increase mortality. Avoidance and minimization measures would include pre-construction surveys to identify active dens and implementation of appropriate mitigation as well as development of a bear-human conflict management plan, which would reduce the potential for additional mortality to bears and other wildlife.

Migration Patterns and Movement: Material sources have the potential to impact wildlife migration and movement in the Study Area. Potential changes to caribou movement would be the result of sensory disturbance during the construction phase (i.e., drilling, blasting, human activity). These would be expected to be similar to the disturbance studied at Red Dog by Wilson et al. (2016). It is expected that individuals temporarily displaced due to sensory disturbance would use other suitable habitats available in the Study Area and surrounding habitats.

Material source development at the K-Hill site has potential to alter caribou movement during the spring and fall migration period, when individuals of the WAH caribou herd are known to travel through the Study Area near the southwest side of K-Hill (WHPacific 2012b). Overall, potential effects on caribou movement are difficult to predict based on the variability of project activities and resulting caribou reactions (Wilson et al. 2016). Avoidance and minimization measures may include reducing activity at the site during migration periods.

The Wulik River Source 1 may impact the use of the Wulik River as a wildlife movement corridor. Muskox prefer riverine habitat during the summer (Danks and Klein 2002; Klein et al. 1991), and moose prefer riverine corridors during the winter (Tape et al. 2016). Development of the material source may cause avoidance activity at the site. It is not clear if wildlife would avoid only the material source, or also avoid movement throughout the lower reaches of the Wulik River.

Activity at the Wulik River Relic Source 1 and Source 2 may also impact wildlife migration and movement, but the impacts are expected to be lower. The Wulik River Relic sites may be used by wildlife, but are a smaller system without an active river channel and the variation in vegetation of the Wulik River. Although material source development has potential to temporally alter local movement patterns of terrestrial mammals (e.g., moose, brown bear, furbearers), construction activities are not expected to result in barriers to wildlife movement within the Study Area (Wilson et al. 2016).

Secondary (Induced) and Cumulative Impacts:

Subsistence and Hunting Pressure: Both subsistence and non-subsistence hunting pressure would likely increase near material sources and material source spur roads. Once reclaimed, these areas may serve as staging areas for activities into the surrounding area. For either road route, the Wulik River Source 1 Source and associated spur road pose the largest potential impact to wildlife from subsistence and hunting pressure. This site would directly open the Wulik River to road access; facilitating subsistence, hunting, and fishing activities. The other material sources are located relatively close to the route alternatives, and would have relatively smaller impacts to wildlife from subsistence and non-subsistence hunting pressure.

Private Land Development: Private lands are distributed throughout with Study Area, and road access could open those areas to development, which may include subsistence use, hunting, or fishing camps. The Southern Route (Preferred Alternative) includes easier access for a greater number of private land owners than the Combined Route B. Additionally, the Southern Route is closer to a larger number of privately owned land parcels abutting the Wulik River. These parcels could be developed to provide access to fishing resources and summer muskox and winter moose and caribou range.

4.13.2.4 Alternatives Comparison

Table 18 compares impacts that vary between proposed route and crossing alternatives, as well as potential material source alternatives. All other impacts are similar across all proposed alternatives.

Table 18 Terrestrial Mammals Impacts

<table>
<tr><th colspan="5">Terrestrial Mammals: Differences Between Routes</th></tr>
<tr><th></th><th colspan="2">Southern Route (Preferred Alternative) with Lagoon Crossing D</th><th colspan="2">Combined Route B with Lagoon Crossing D</th></tr>
<tr><td>Direct and Indirect and Construction</td><td colspan="2">Habitat Alteration:
• Total disturbance of 148.6 acres of habitat, including a permanent loss of 25.6 acres of potential scrub/shrub habitat for ungulates and bears.
• Proximity to Wulik River has potential to result in relatively greater sensory disturbance and mortality risk to bears and ungulates.</td><td colspan="2">Habitat Alteration:
• Total disturbance of 172.6 acres of habitat, including a permanent loss of 51.5 acres of potential scrub/shrub foraging habitat for ungulates and bears.
• Traverses relatively more upland habitat and is farther away from the Wulik River, which would reduce sensory disturbance and mortality risk to bears and ungulates using the Wulik River during spring and fall. However, this route could result in more sensory disturbance to wintering muskoxen and bears foraging on berries in upland areas during summer.</td></tr>
<tr><td>Secondary and Cumulative</td><td colspan="2">Subsistence and Hunting Pressure
• This route would make access to the Wulik River easier and open land year-round that is already relatively accessible during certain seasons, which would result in increased mortality risk to bears and ungulates due to increased subsistence and non-subsistence hunting pressure.</td><td colspan="2">Subsistence and Hunting Pressure
• This route would open land year-round which is currently difficult to access, which would result in relatively greater mortality risk to wildlife using upland habitats (e.g., caribou, muskoxen) due to increased subsistence and hunting pressure. Although this route would result in less potential mortality risk to wildlife using the Wulik River, mortality risk could increase along the Kivalina River where a portion of the route alignment lies within a half mile.</td></tr>
<tr><th colspan="5">Differences Between Material Source Alternatives</th></tr>
<tr><th></th><th>K-Hill Site</th><th>Wulik River Source 1</th><th>Relic Channel Source 1</th><th>Relic Channel Source 2</th></tr>
<tr><td>Direct and Indirect and Construction</td><td>Habitat Alteration:
• Total disturbance of 99.9 acres of habitat, including a permanent loss of 13.3 acres of potential scrub/shrub foraging habitat for ungulates and bears.
• Potential to result in sensory</td><td>Habitat Alteration:
• Total disturbance of 39.7 acres of habitat, including a permanent loss of 33.7 acres of potential scrub/shrub foraging habitat for ungulates and bears.
• Potential to result in relatively greater sensory disturbance to wildlife using riparian areas along the Wulik River</td><td>Habitat Alteration:
• Total disturbance of 66.6 acres of habitat, including a permanent loss of 12.1 acres of potential scrub/shrub foraging habitat for ungulates and bears.
• This site is farther away from the Wulik River, which would result in less potential sensory disturbance to wildlife using riparian</td><td>Habitat Alteration:
• Total disturbance of 47.5 acres of habitat, including a permanent loss of 27.9 acres of potential scrub/shrub foraging habitat for ungulates and bears.
• These sites are farther away from the Wulik River, which would result</td></tr>
</table>

	disturbance to caribou during spring and fall migration. Potential to result in loss and alteration of brown bear denning habitat.	(e.g., muskoxen, moose, bears).	areas along the Wulik River.	in less potential sensory disturbance to wildlife using riparian areas along the Wulik River.
Secondary and Cumulative	• No secondary impacts anticipated due to overlap with end-route alignments.	• Development of this site would result in increased road access directly to the Wulik River, which could result in additional mortality risk to wildlife from increased subsistence and hunting pressure.	• This site is located close to Combined Route B, which would result in relatively less incremental change in mortality risk to wildlife.	• These sites are located closer to Combined Route B and would result in relatively less incremental change in mortality risk to wildlife.

4.13.3 Avoidance, Minimization, and Mitigation

- To reduce potential disturbance to caribou during migration, mitigation measures such as those applied at the Red Dog Mine are recommended during construction. Vehicles traveling the project road would be required to stop when they are within sight of migrating caribou either approaching or actively crossing the road. Vehicles would not be permitted to proceed until all caribou have crossed the road. Road closures may last anywhere from 30 minutes to multiple days depending on the number of caribou and speed of travel (USEPA 2009; Teck 2013);
- Reduce speed limit along the project road as well as any temporary spur roads; and
- A bear-human conflict management plan would be developed to reduce potential mortality risk. Such a plan would include, among other considerations, measures to manage waste disposal and reduce bear attractants at camps or temporary works sites.

4.14 Historic, Architectural, Archaeological, and Cultural Resources

4.14.1 Affected Environment

One Alaska Heritage Resources Survey (AHRS) site, the Cape Krusenstern Archaeological District National Monument National Historic Landmark (CKNHL), is located within the Area of Potential Effects to Historic Resources (APE) defined by the DOT&PF (2017). The boundary of the CKNHL (AHRS site number NOA-00042) extends more than 10 miles northwest of the Cape Krusenstern National Monument boundary (NPS 2016a), encompassing the entirety of the APE.

Archaeological investigations intended to identify archaeological resources within the APE have included predictive modeling and archaeological field investigations conducted in 2016 and 2017. The following identification efforts were conducted:

- Northern Land Use Research Alaska, LLC (NLURA) used geospatial modeling techniques to prepare an archaeological predictive model that integrated environmental, archaeological, and ethnohistoric data from the region to rank locations in terms of their probability for containing archaeological resources (NLURA 2016). The model predictions suggested that there was a high probability of identifying cultural resources along interior portions of the APE, and at other specific locations including areas along the relic channels of the Wulik River. Elevated areas within the proposed material source locations were assigned a moderate probability value. The NLURA report recommended that an archaeological survey involving pedestrian survey and shovel testing be conducted to ground-truth the model predictions (NLURA 2016);
- Stantec conducted a cultural resources assessment, including pedestrian survey and subsurface testing of high, moderate, and low probability areas within the Study Area that was defined in the fall of 2016 (Stantec 2017b). The 2016 field investigations focused on three preliminary route options identified by the NAB, and potential material sources identified at K-Hill and in the Wulik and Kivalina River Deposition zones. No buried pre-contact or historic archaeological resources were identified within the three preliminary route corridors or within any of the identified material sources during the 2016 field investigations (Stantec 2017b); and
- Stantec conducted a supplemental archaeological resources assessment in August 2017 to address data gaps identified by DOT&PF in coordination with State Historic Preservation Office (SHPO) and NPS. The goals of Stantec's field investigations were to examine revisions to proposed alignments and material sources and to determine whether buried resources were present at the western terminus of the evacuation road on the barrier island of Kivalina (Stantec 2017b). Four artifacts were found at the causeway terminus on the barrier island: three were recovered in imported or highly disturbed contexts and the fourth was recovered from intact stratigraphic context well below the level of proposed ground disturbance (Stantec 2017b).

4.14.2 Environmental Consequences

4.14.2.1 No-Action Alternative

An evacuation road would not be constructed from Kivalina to K-Hill and impacts to historic, architectural, archaeological, and cultural resources would not occur. Residents would continue to be exposed to environmental threats with no reliable options for evacuation during storm events with the potential to detrimentally impact the community over time. There would remain severe risk to life, health, and safety of residents.

4.14.2.2 Route and Lagoon Crossing Alternatives

Direct and Indirect Impacts:

Pursuant to 36 CFR 800.5(b), implementing regulations of Section 106 of the *National Historic Preservation Act*, DOT&PF, in consultation with SHPO and the National Park Service (NPS), has made a Finding of No Historic Properties Adversely Affected to historic properties by the Proposed Action. DOT&PF initiated consultation with the SHPO on August 7, 2017.

The DOT&PF transmitted a Finding of Effect letter on Sept. 19, 2017, documenting the Finding of No Historic Properties Adversely Affected. Responses were received from the NPS on October 6, 2017 and from SHPO on October 9, 2017 stating concurrence with the Finding of No Historic Properties Adversely Affected, conditional to including an archaeological monitoring and an Inadvertent Discovery Plan (Appendix F). On December 29, 2017, the DOT&PF transmitted an informational letter to SHPO, NPS, Native Village of Kivalina, City of Kivalina, Native Village of Noatak, NANA Regional Corporation, NAB, NPS-Western Arctic National Parklands, and BIA to respond to comments received from NPS in their October 2017 concurrence letter. The updated letters address two AHRS sites on the periphery of the APE, where visual effects were of greatest concern. No ground disturbing activities are planned for the portions of the APE containing these two sites. The updated letters also include a finalized Inadvertent Discovery Plan (Appendix F).

The archaeological investigations conducted over the 2016 and 2017 field seasons did not result in the identification of any elements which contribute to our continuing understanding of the prehistory or history of the Arctic within the APE which is located within the boundaries of the CKNHL. As such, construction of the Proposed Action would not have an adverse effect to the integrity of the CKNHL or its continuing eligibility for the National Register of Historic Places as no contributing elements have been identified. Due to the project being located within the CKNHL boundary, DOT&PF submitted the Archaeological Monitoring Procedures and Inadvertent Discovery Plan to be implemented during the continued planning and execution of the project (Appendix F). In the event that cultural resources are encountered, this plan will be implemented and all identified parties will be contacted.

Section 4(f) Evaluation: The project is located entirely within the boundaries of the CKNHL. The Proposed Action would permanently incorporate a portion of the CHNHL, a Section 4(f) property, into a transportation facility; therefore, Section 4(f) of the *U.S. Department of Transportation Act* would apply under criteria 23 CFR 774.17(1).

Pursuant to 36 CFR 800.5(d)(2), implementing regulations of Section 106 of the *National Historic Preservation Act*, DOT&PF has found that the Proposed Action would not adversely affect the CKNHL. Based on this, DOT&PF proposes a *de minimis* (23 CFR 774.17) impact to the CKNHL (Section 5).

Secondary (Induced) and Cumulative Impacts:

Future development of private lands may result in additional impacts to historic, archaeological, and cultural resources outside of the APE assessed in 2016 and 2017. Several Native allotments are located immediately south of the proposed Southern Route alignment. The allotment boundaries included elevated areas with direct access to the Wulik River, which increases the probability of identifying archaeological resources at these locations.

4.14.2.3 Material Source Alternatives

Direct and Indirect Impacts:

No archaeological or historical resources were identified during pedestrian survey and subsurface testing within any of the potential material source. The presence of buried surfaces, identified beneath flood deposited sediments at Wulik River Source 1 and Relic Channel Source 1, could indicate there is an increased possibility that buried archaeological resources may be identified at these locations.

Secondary (Induced) and Cumulative Impacts:

Future development of material sources may result in additional impacts to historic, archaeological, and cultural resources. Elevated areas with direct access to current or relic channels of the Wulik River have an increased probability of containing archaeological resources associated with repeated occupation and use of these locations in the past. Future expansion of material sources developed as part of the current project may encounter and impact archaeological resources located on high probability landforms outside of the APE assessed in 2016 and 2017.

4.14.2.4 Alternatives Comparison

Table 19 compares impacts that vary between proposed route and crossing alternatives, as well as potential material source alternatives. All other impacts are similar across all proposed alternatives.

Table 19 Historic, Architectural, Archaeological, and Cultural Resources Impacts

Historic and Cultural Resources: Differences Between Routes		
	Southern Route (Preferred Alternative) with Lagoon Crossing D	**Combined Route B with Lagoon Crossing D**
Direct and Indirect and Construction	• No relative difference in impacts.	• No relative difference in impacts.
Secondary and Cumulative	• Increased likelihood of impacts compared to Combined Route B from secondary development due to proximity of the Wulik River.	• Decreased likelihood of impacts compared to Southern Route from secondary development due to distance from the Wulik River.

Differences Between Material Source Alternatives				
	K-Hill Site	**Wulik River Source 1**	**Relic Channel Source 1**	**Relic Channel Source 2**
Direct and Indirect and Construction	• No known impacts.	• Increased probability of impacts due to the presence of buried surfaces below current permafrost.	• Increased probability of impacts due to the presence of buried surfaces below current permafrost.	• No known impacts.
Secondary and Cumulative	• No known impacts.	• Greater likelihood of impacts from secondary development due to proximity the Wulik River, and the presence of buried surfaces under flood-deposited sediments along the Wulik River.	• Greater likelihood of impacts from secondary development due to proximity of high probability landforms and the presence of buried surfaces along relic channel of the Wulik River.	• Relatively low likelihood of secondary impacts due to distance from the Wulik River, and lack of high-probability landforms with evidence of buried surfaces.

4.14.3 Avoidance, Minimization, and Mitigation

- An Archaeological Monitoring Procedures and Inadvertent Discovery Plan has been developed in consultation between DOT&PF, SHPO, NPS, and local consulting parties to be implemented during the continued planning and execution of the project, including ground-disturbing work associated with construction and material source development; and
- A professional archaeologist would monitor vegetation removal and stripping of fine-grained sediments possibly capping buried gravel deposits within Relic Channel Source 1, and north of the exposed gravel bar within the Wulik River Source 1 area.

4.15 Permits and Authorizations

The permits and authorizations listed in the following table will be the same for both Proposed Action alternatives and material site alternatives and, unless otherwise noted, would be obtained prior to construction to comply with applicable federal, state, and local regulations:

Table 20 Permits and Authorizations

#	Permit or Authorization; Agency	Why Permit/Clearance is Required
Federal Permits and Authorizations		
1	Section 404/10 *Clean Water Act* (CWA) Wetlands Dredge or Fill Permit; USACE	A Section 404/10 permit is required for the placement of fill within jurisdictional wetlands and waters of the U.S.
2	USCG Bridge Permit	Construction of a bridge or causeway in tidal waters falls under the jurisdiction of the USCG Office of Bridge Programs (33C.F.R. Chapter I, Subchapter J, Part 115).
3	ESA Section 7 Consultation; USFWS	Section 7 consultation is required as part of NEPA when the project may affect a listed Threatened or Endangered species. Section 7 consultation with USFWS would cover potential impacts to Spectacled and Steller's Eiders and Polar Bear Critical Habitat. Consultation with USFWS is complete and they concurred that the project is not likely to adversely affect listed eiders or polar bears (Appendix G).
4	MBTA compliance; USFWS	Compliance with MBTA USFWS recommended "no clearing" timing windows would reduce the potential for incidental take of protected migratory bird species and their nests. USFWS recommended timing window is May 20-July 20.
5	Magnuson-Stevens Fishery Conservation and Management Act EFH consultation and assessment (NMFS)	EFH assessment is prepared by the lead agency (DOT&PF) to describe potential impacts to EFH and propose conservation measures to reduce those impacts. This is used to consult with NMFS, who would either concur on the lead agency's findings or recommend additional conservation measures and/or mitigation. Consultation with NMFS is complete as of approval of the Final EA and additional conservation measures have been incorporated into the project (Appendix I).
6	ESA Section 7 and MMPA Consultation (NMFS)	Section 7 and MMPA consultation is required as part of NEPA when the project may affect a listed Threatened or Endangered species that is also a marine mammal protected under the MMPA. Section 7 and MMPA consultation with NMFS would cover potential impacts to bearded and ringed seals, as well as other listed species that may be encountered along project specific barge routes (if required). Consultation with NMFS is complete and they concurred with a finding of may effect but it not likely to adversely affect, any listed species or critical habitat under NMFS jursidiciton (Appendix G).
State Permits and Authorizations		
7	Cultural, Historical, and Archaeological Resources Consultation (Section 106 Review); DNR, Office of History & Archaeology and SHPO	Section 106 compliance is required as part of NEPA, and provides for the identification and protection of cultural and historic resources that are listed or eligible for listing in the National Register of Historic Places. Consultation is completed with SHPO, Tribes, and other consulting parties, and a determination of effect is issued, with mitigation measures and agreements amongst stakeholders completed as needed, depending on anticipated impacts. Consultation has been completed at the time of this publication.
8	Section 401 Certification – Certificate of Reasonable	A 401 water quality certification would be issued concurrently with the USACE 404/10 permit and notify compliance with state water quality

#	Permit or Authorization; Agency	Why Permit/Clearance is Required
	Assurance; ADEC Division of Water Quality	administrative code. The USACE 404/10 permit would not be issued until this certification is complete.
9	ROW (State-owned non-marine waters and submerged lands); DNR, DMLW	An Interagency Land Management Assignment (ILMA) would be required from DNR DMLW to cross the state owned tidelands with the lagoon crossing.
10	DNR Material Site Designation	To develop any new material sites within state-owned lands, DNR DMLW would need to designate those sites as material sites/sources which would require a "best interest" decision.
11	APDES CGP for Stormwater Associated with Large and Small Construction Activities; ADEC, Division of Water	For projects with disturbance of over 1 acre, compliance with the APDES CGP is required. A SWPPP and notice of intent to seek coverage under the CGP would be required prior to construction.
12	Title 16 Fish Habitat Permit; ADF&G	For any work below the ordinary high water of a stream containing fish, a Title 16 permit would be required. Measures to maintain fish passage within these waters would be required, as well as measures to avoid and minimize impacts to fish and their habitats.
13	Temporary Water Use Permit (TWUP)	Water use (including water withdrawals, dewatering, diversions) can be authorized through a TWUP. These will last for up to 5 years, and allow the use of water during construction.
Local Permits and Authorizations		
14	Title 9 Community Infrastructure and Conditional Use Permit; NAB Planning Department	Development of lands within the Study Area designated as a Subsistence Conservation District, a conditional use permit would be required from the NAB planning department. Also as the Study Area is not within a zoned NAB resource development or transportation corridor, an evacuation route would need to be zoned as such by the NAB Planning Commission prior to construction.

5 SECTION 4(F) EVALUATION

Cape Krusenstern National Historic Landmark: Proposed project alternatives would permanently incorporate a minor portion of the CKNHL (approximately 400 acres of the CKNHL expanse of 500,000 acres), a Section 4(f) property, into a transportation facility; therefore, Section 4(f) of the Department of Transportation Act would apply under criteria 23 CFR 774.17(1).

Pursuant to 36 CFR 800.5(d)(2), implementing regulations of Section 106 of the National Historic Preservation Act, DOT&PF has found, and the NPS and SHPO concurred (on October 6 and 9, 2017, respectively) that the Proposed Action would not adversely affect the CKNHL. Based on the undertaking not adversely affecting the function or historic qualities of the CKNHL and that agreement from the SHPO and NPS has been obtained in writing, the proposed project alternatives appear to meet a *de minimis* (23 CFR 774.17) use.

DOT&PF determined that there are no feasible and prudent alternatives that meet the project's purpose and need and avoid using the Section 4(f) property, and has prepared a De Minimis Impact Finding for the proposed activities in the CKNHL (Appendix K). The following measures were implemented to avoid adverse impacts to the CKNHL, and are included in the De Minimis Impact Finding (Appendix K):

- Project elements (e.g. road embankment geometry, vehicle turn outs, water crossings) would be designed to incorporate the minimal dimensions necessary to serve the project purpose and need to minimize required fill placement;
- Project elements would be contained within a 300-ft ROW, the road would be no greater than 24 ft wide with 3:1 side slopes, and embankment height no greater than 8 ft above existing ground;
- Develop an Archaeological Monitoring Procedures and Inadvertent Discovery Plan between DOT&PF, SHPO, NPS, and local consulting parties to be implemented during the continued planning and execution of the project, including ground disturbing work associated with material site development; and
- Monitor vegetation removal and stripping fine-grained sediments, possibly capping buried gravel deposits within Relic Channel Source 1, and north of the exposed gravel bar within the Wulik River Source 1 area. A professional archaeologist would complete monitoring.

Alaska Maritime National Wildlife Refuge: None of the proposed alternatives would include development within the Alaska Maritime National Wildlife Refuge (Refuge), a Section 4(f) property. The closest proposed project alternative would be 0.4 mile from the Refuge which would include construction of a new 24 ft wide road, separated by land and sea. Proposed project alternatives are not anticipated to result in noise or vibration impacts to the Refuge as construction work would be temporary and the community of Kivalina is about the same distance from the Refuge with existing noise generated from vehicular and aircraft traffic. There would be a change in the aesthetic nature of land where the proposed project alternative would be constructed, but the nearest distance to the refuge would be 0.4 mile away. No ecological intrusions would result from proposed project alternatives as the alternatives are not within the Refuge itself. Migratory bird impacts would be reduced by scheduling construction and vegetation clearing activities to occur outside of important nesting periods (USFWS 2017d). The proposed project alternatives would not have a permanent incorporation, adverse temporary occupancy, or constructive use of the Refuge; therefore, the Proposed Action would not result in a use of the Refuge.

6 PUBLIC INVOLVEMENT AND AGENCY COORDINATION SUMMARY

6.1 Activities

Public involvement and agency coordination activities occurred throughout the development of the EA. Newspapers, flyers, community working group meetings, and public meetings were held consistently for this project to keep the community involved and informed about project elements, impact assessments, and schedule. The community was an important part of the project team and informed much of the design parameters and assisted with alternatives evaluation. Local staff provided technical field work support, informed impact assessments for wildlife and marine mammals, and provided input on the socioeconomic benefits of the project. Table 21 outlines the public involvement activities and Table 22 outlines agency coordination completed to date. Records of correspondence, meeting materials and summaries are included in Appendix D and E.

Table 21 Public Involvement Activity Summary

Public Involvement		
Date/Time	**Activity**	**Description**
11/12/16	Publish Newspaper Ad	Public Notice to Conduct NEPA and public meeting invitation
11/11/16	Public Scoping letter	Scoping letter sent to interested public stakeholders
11/15/16	Public Meeting	Kivalina Public meeting
11/16/16	Public Meeting	Noatak Public meeting
11/16/16	Public Meeting	Kotzebue Public meeting
6/1/17	Newsletter	Spring 2017 Newsletter
7/6/17	Working Group Meeting	Community Working Group Meeting
8/3/17	Working Group Meeting	Community Working Group Meeting
8/15/17	Public Meeting	Community Update Meeting, Kivalina
11/14/17	Online Public Notice	Notice of EA availability and public meetings on DOT&PF website
11/14/17	Email Notice	Notice of EA availability and public meetings to ANCSA Corporations, Native Village of Kivalina, and NAB.
11/15/17	Email Notice	Notice of EA availability and public meetings to ANCSA Corporations, Native Village of Kivalina, NAB, and interested agencies.
11/27/17	Facebook Events Posted	Public meeting open houses for Kotzebue, Kivalina, and Noatak to solicit draft EA comments on DOT&PF Facebook page
12/5/17	Public Meeting	Kivalina Public Meeting
12/5/17	Public Meeting	Kotzebue Public Meeting
12/5/17	Public Meeting	Noatak Public Meeting

Public Involvement		
Date/Time	**Activity**	**Description**
12/5/17	Radio Interview	DOT&PF interview on air with 720 AM, KOTZ Radio

Table 22 Agency Coordination Activity Summary

Agency Scoping and Coordination		
Date	**Activity**	**Description**
11/10/16	Agency Scoping letter	Scoping letter sent to agencies
11/25/16	Agency Comment	SHPO Scoping comment
11/29/16	Agency Comment	NPS Scoping comment
12/12/16	Agency Comment	DNR Scoping comment
12/12/16	Agency Comment	USFWS Scoping comment
12/19/16	Agency Meeting	USFWS Scoping meeting
12/19/16	Agency Meeting	ADF&G Scoping meeting
12/20/16	Agency Meeting	NPS and SHPO Scoping meeting
12/21/16	Agency Meeting	NMFS Scoping meeting
12/21/16	Agency Meeting	USACE Scoping meeting
6/6/17	Agency Meeting	NMFS Lagoon Hydrology Meeting
7/10/17	Agency Meeting	SHPO and NPS Section 106 Coordination Meeting
7/25/17	Agency Meeting	USACE Wetland Delineation Presentation and Meeting
8/8/17	Agency Meeting	DNR Project Update Meeting
8/9/17	Agency Meeting	NMFS Marine Mammals Meeting
8/15/17	Agency Site Visit	USACE Site Visit and Project Update Meeting
8/15/17	Agency Site Visit	ADF&G Site Visit and Project Update Meeting
8/16/17	Agency Site Visit	SHPO and NPS Site Visit and Project Update Meeting
8/17/17	Agency Site Visit	NMFS Site Visit and Project Update Meeting
12/12/17	Agency Meeting	NMFS Comments on Draft EA
12/12/17	Agency Meeting	USACE Comments on Draft EA
12/12/17	Agency Letter	NWAB Comments on Draft EA
12/13/17	Agency Letter	EPA Comments on Draft EA
12/14/17	Agency Letter	NMFS Comments on EFH for Draft EA
12/14/17	Agency Meeting	ADF&G Comments on Draft EA
12/14/17	Agency Letter	ADF&G Comments on Draft EA
12/14/17	Agency Meeting	USFWS Comments on Draft EA
12/14/17	Agency Letter	USACE Comments on Draft EA
12/15/17	Agency Letter	ADNR Comments on Draft EA

Agency Scoping and Coordination		
Date	**Activity**	**Description**
12/18/17	Agency Meeting	EPA Comments on Draft EA

6.2 Comments Summary

Public and agency comments were collected throughout development of this EA. Comments gathered have served to shape the evaluation of alternatives, and identify appropriate measures to avoid, minimize, and mitigate adverse effects of the final proposed project. Kivalina residents shared local traditional knowledge of the area and its natural and cultural resources that have contributed to descriptions of the potentially affected environment. Similarly, agency coordination and consultation informed overall project design. Most comments obtained to date were received through public and agency meeting discussions, and have been paraphrased and presented in meeting notes provided in Appendices D and E.

7 LIST OF PREPARERS

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Kacy Hillman	Environmental Scientist, Stantec	Land Use and Transportation; Hazardous Materials and Solid Waste; 4(f)
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Andrew Niemiec	Transportation Manager, Stantec	Construction Methods; Independent Review

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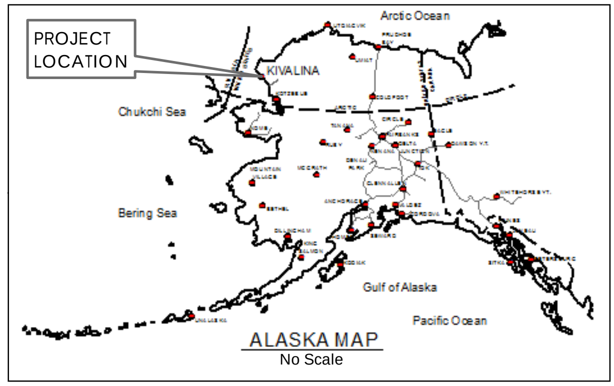
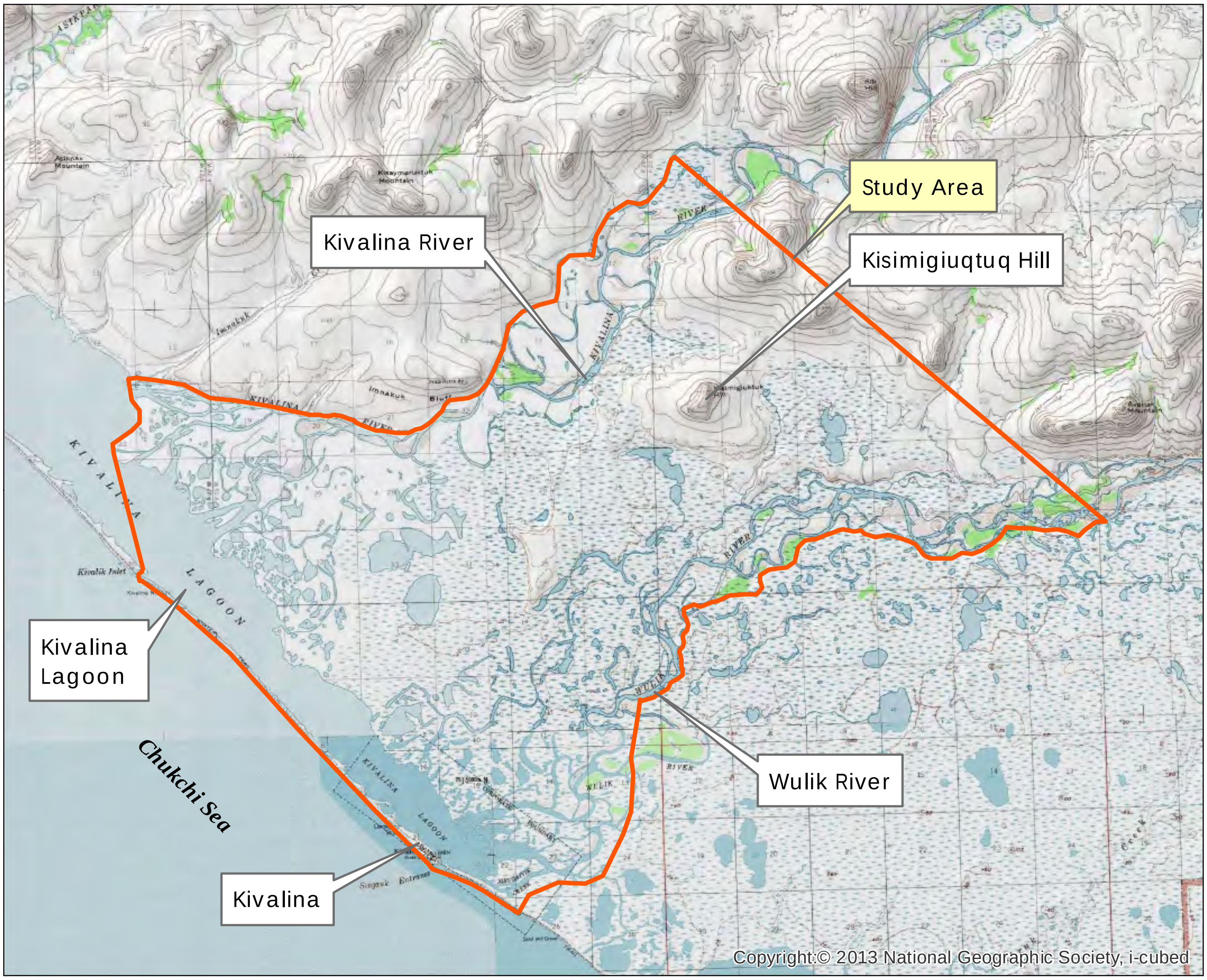
9 FIGURES





Graphics developed by Stantec Consulting Services, Inc.

Project Origin: City of Kivalina,
Kotzebue Recording District,
Section 21, Township 27N, Range 26W,
Kateel River Meridian

Project Terminus: Kisimigiuqtuq Hill,
Section 19, Township 28N, Range 25W
Kateel River Meridian

0 1.25 2.5 5 Miles

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KIVALINA EVACUATION AND SCHOOL SITE ACCESS ROAD

Location and Vicinity Map

DATE: January, 2018	FIGURE **1**

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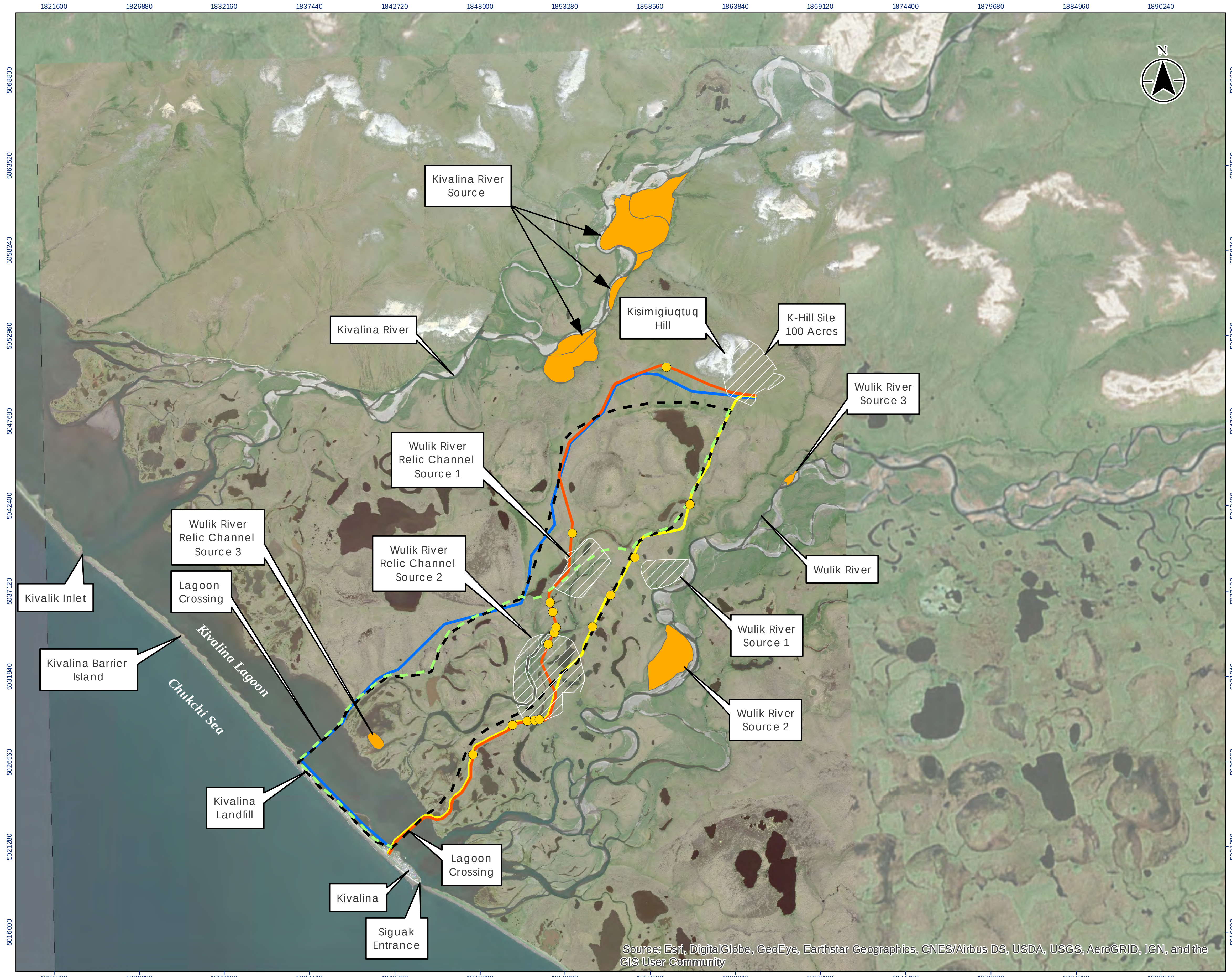

Legend

- Community Proposed Alternatives
- Community Combined Route A
- Northern Route - 9.5 miles*
- Southern Route - 7.7 miles*
- Combined Route B - 8.9 miles*
- Study Area
- Dismissed Material Sites
- Potential Material Source Areas**
- Water Crossings

* Proposed Routes are centered within ~1000 ft corridor.

** Material sources would be developed within identified areas (See EA Section 3.1 Table 1).

0 0.5 1 Miles

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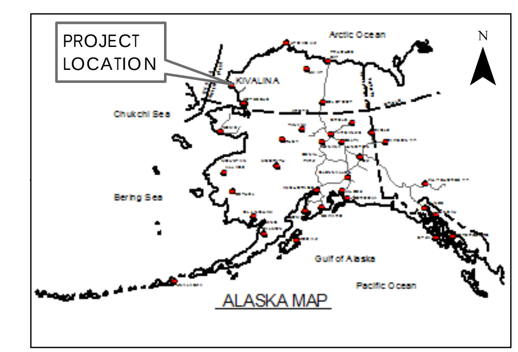
Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
2. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011; ©AeroMetric Inc., 2013; Digital Globe 2016
3. Ethnohistoric named locations derived from NLURA Cultural Resource Study (January 2016), referenced from published sources (Burch 1994, 1998, 2006).



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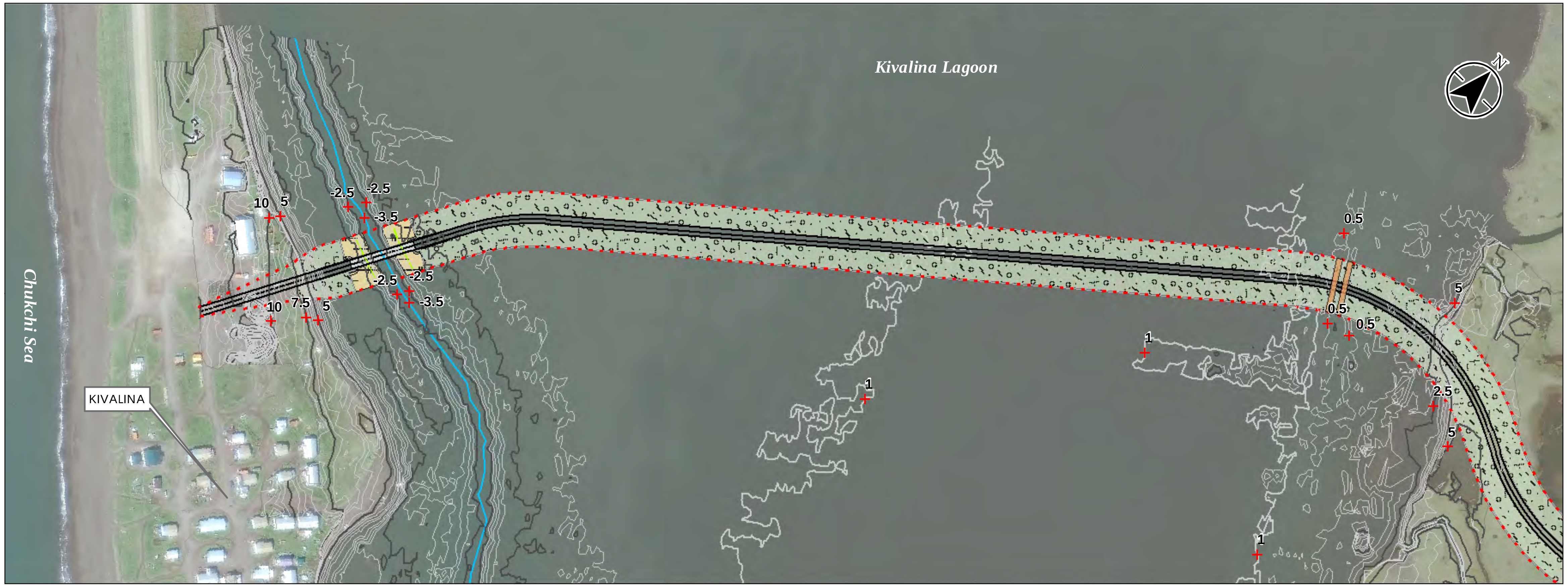
KIVALINA EVACUATION AND SCHOOL SITE ACCESS ROAD

Alternatives Considered

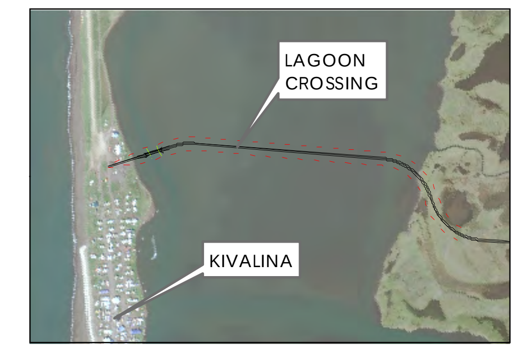
DATE: January, 2018 | FIGURE 2

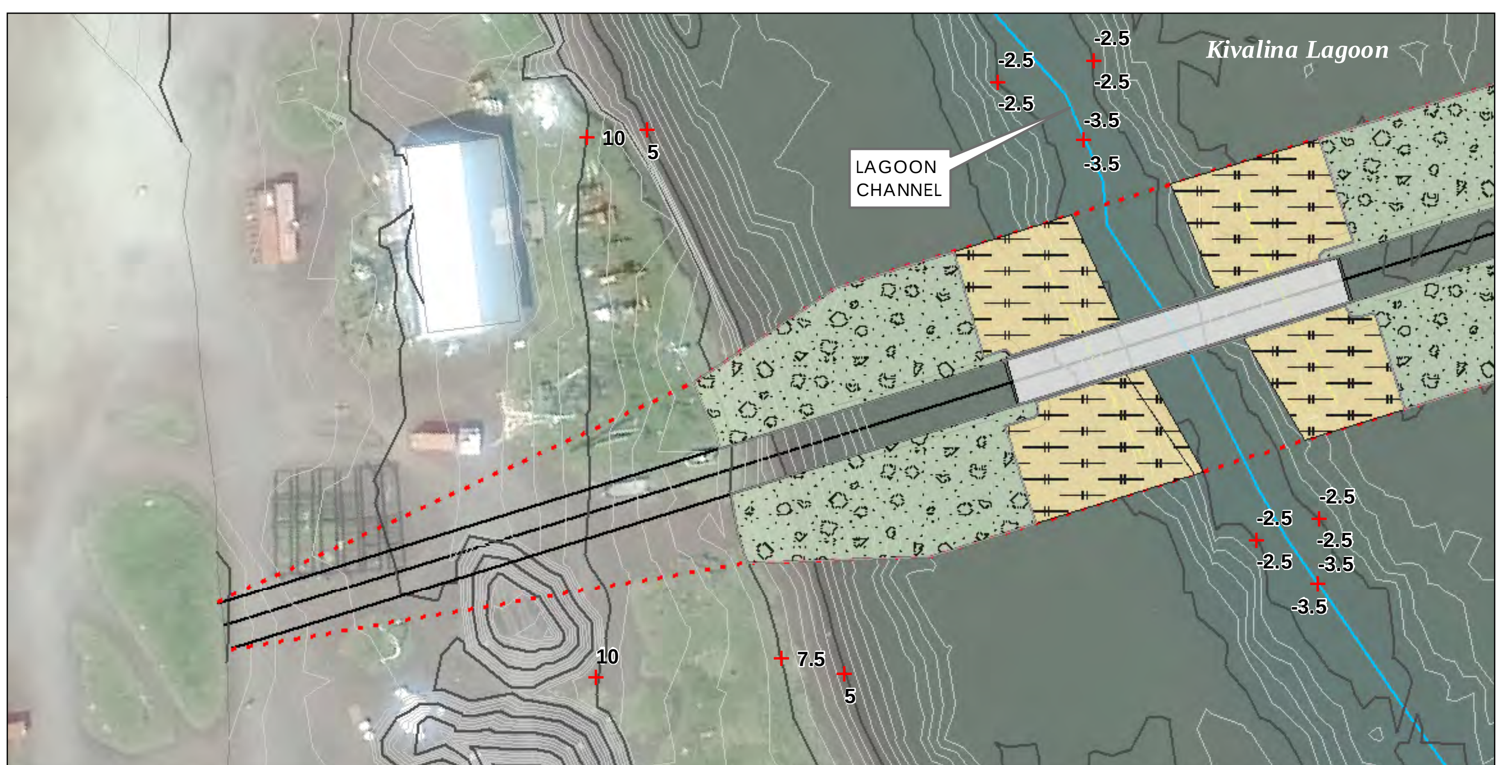


LAGOON CROSSING OVERVIEW

Legend

- Bridge
- Bridge Abutment Rip Rap
- Causeway Armor
- Causeway Culvert(s)
- + Elevations





0 50 100 Feet

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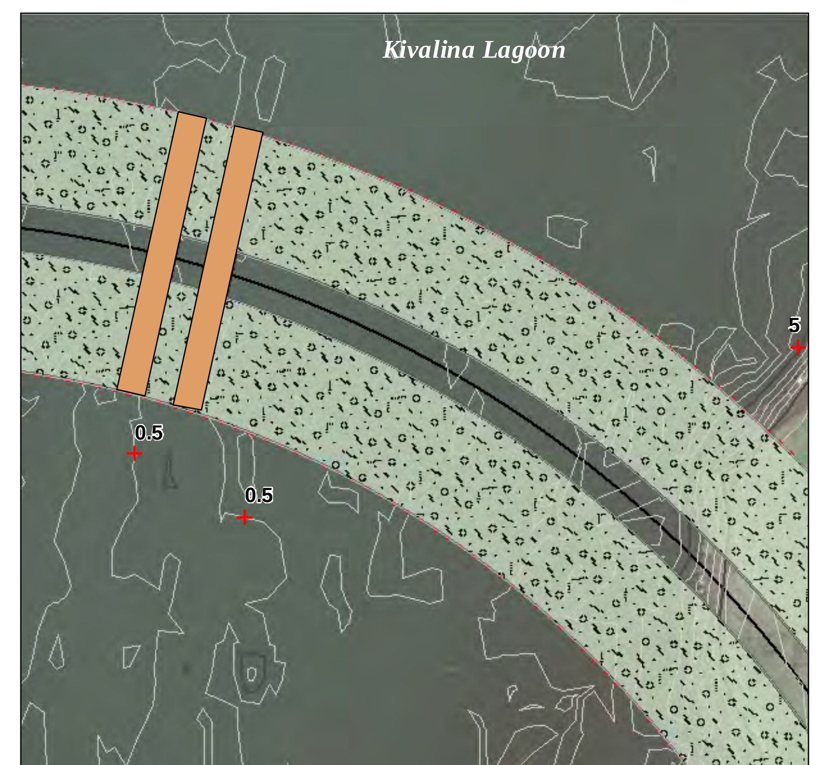
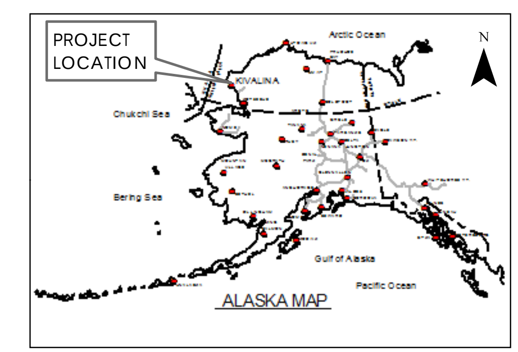
BRIDGE DETAIL



CAUSEWAY CULVERT(S) DETAIL

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
2. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011; ©AeroMetric Inc., 2013; Digital Globe 2016



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KIVALINA EVACUATION AND SCHOOL SITE ACCESS ROAD

Lagoon Crossing D Alternative

DATE: January, 2018 | FIGURE 3

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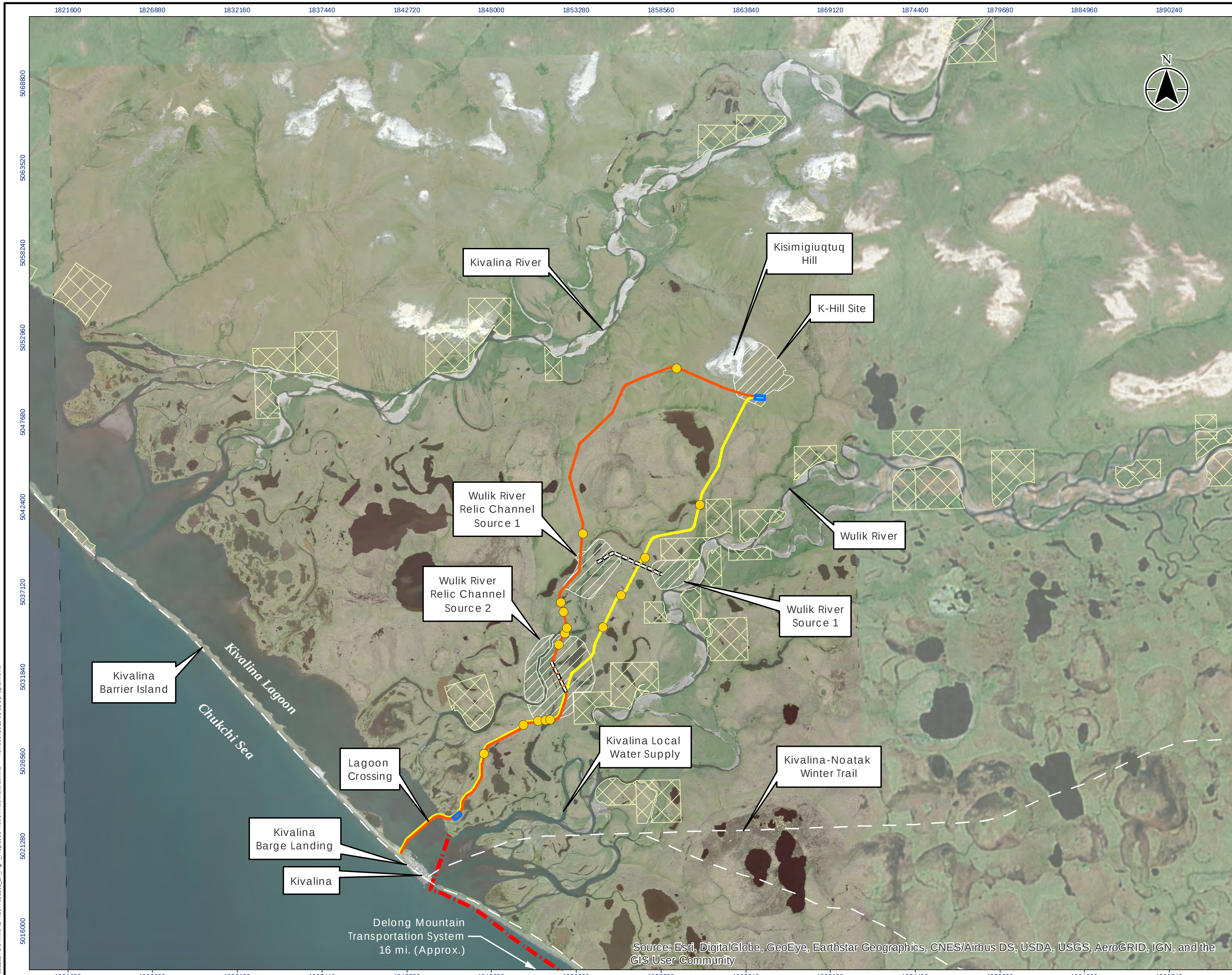


Legend

- Southern Route - 7.7 miles*
- Combined Route B - 8.9 miles*
- Material Source Spur Road
- Winter Access via DMTS Port
- Winter Trail / Easement
- Contractor Staging Areas
- Potential Material Source Areas**
- Native Allotments
- Water Crossings

* Proposed Routes are centered within ~1000 ft corridor.

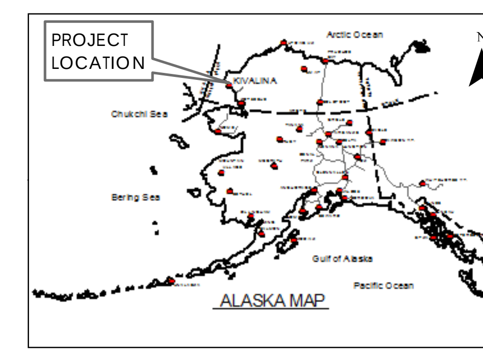
** Material sources would be developed within identified areas (See EA Section 3.1 Table 1).

0 0.5 1 Miles

1:75,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
2. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011; ©AeroMetric Inc., 2013; Digital Globe 2016



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KIVALINA EVACUATION AND SCHOOL SITE ACCESS ROAD

Proposed Action Alternatives

DATE: January, 2018 | FIGURE 4

U:\204765102\GIS\mxd\EA\204765102_EA_Fig-4_Proposed Action Alternatives.mxd Revised: 2018-01-02 By: cpannone

Legend

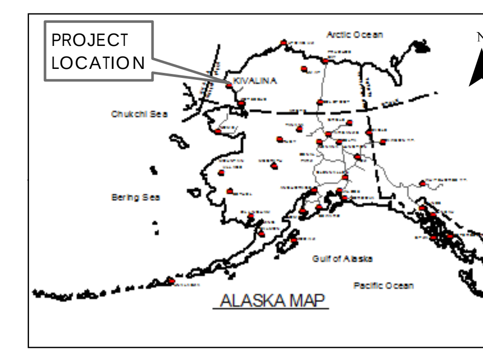
Study Area

0 200 400 Feet

1:3,800 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
2. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011; ©AeroMetric Inc., 2013; Digital Globe 2016



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KIVALINA EVACUATION AND SCHOOL SITE ACCESS ROAD

Kivalina Detail

DATE: January, 2018 | FIGURE 5

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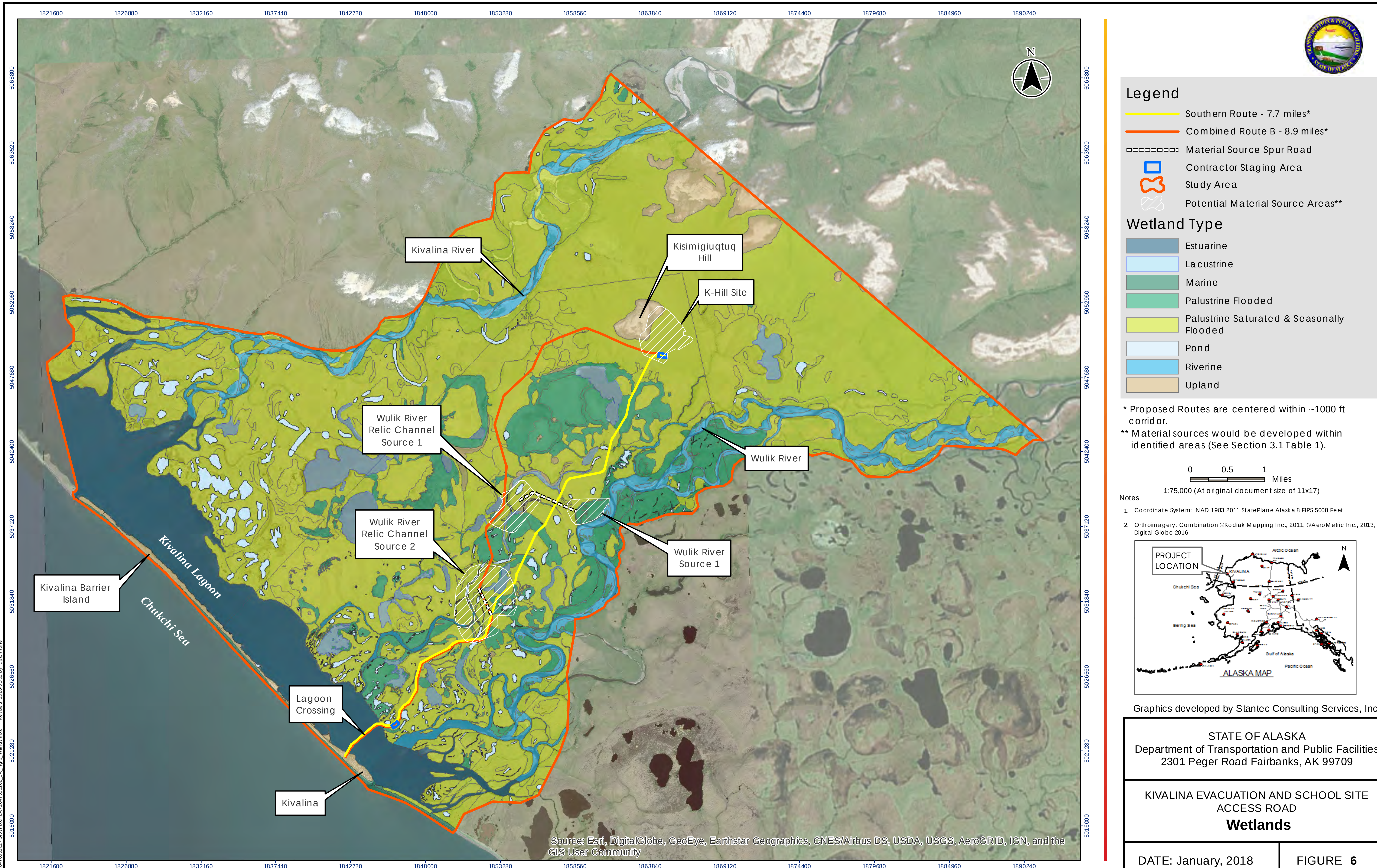

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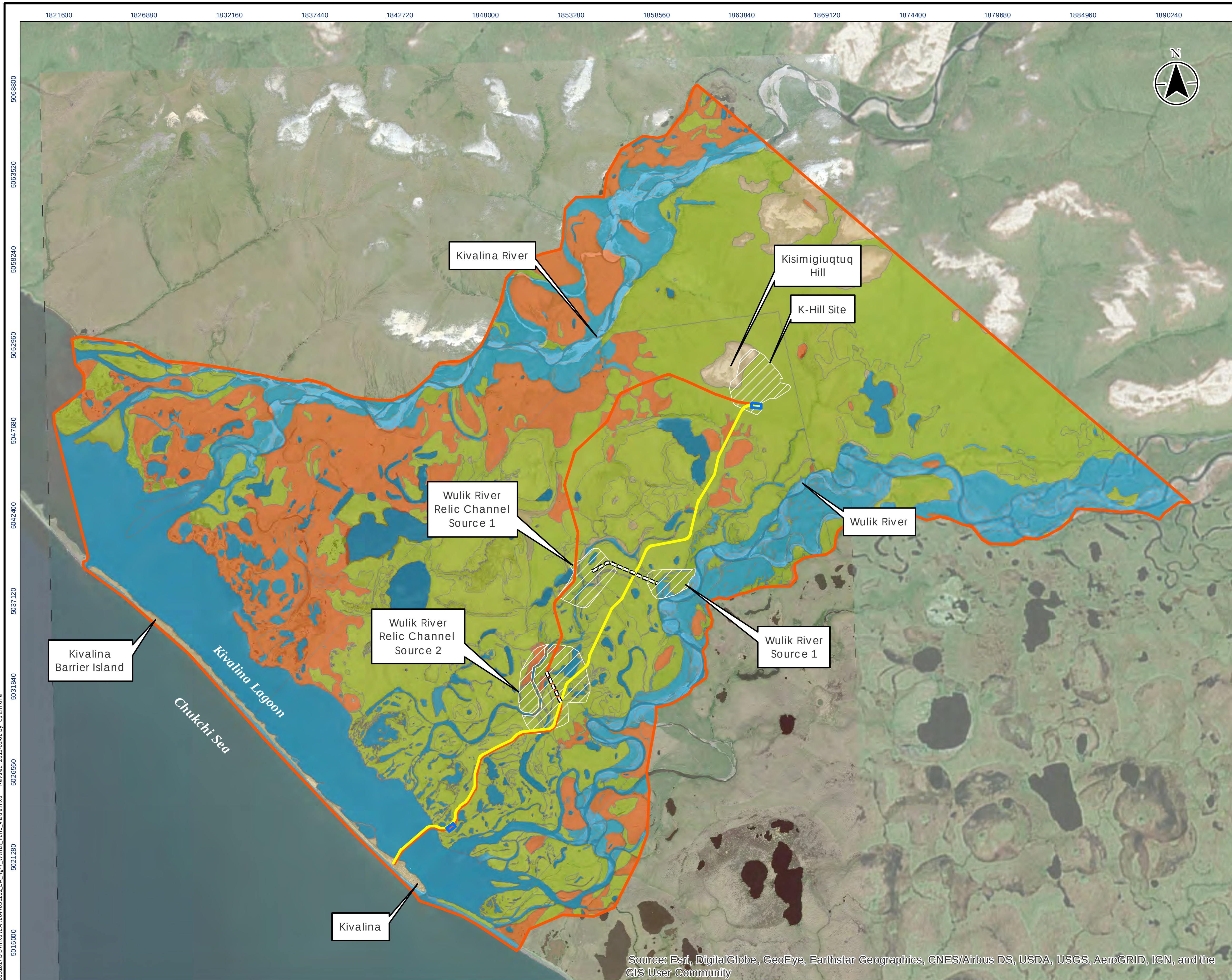
KIVALINA EVACUATION AND SCHOOL SITE ACCESS ROAD

Wetlands

DATE: January, 2018

FIGURE 6



Legend

- Southern Route - 7.7 miles*
- Combined Route B - 8.9 miles*
- Material Source Spur Road
- Contractor Staging Areas
- Study Area
- Potential Material Source Areas**

Wetland Function

- Upland
- II
- I
- I+

* Proposed Routes are centered within ~1000 ft corridor.

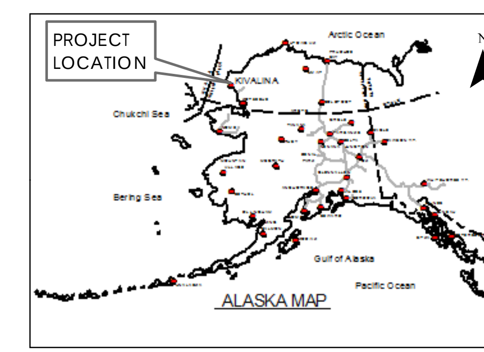
** Material sources would be developed within identified areas (See EA Section 3.1 Table 1).

0 0.5 1 Miles

1:75,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
2. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011; ©AeroMetric Inc., 2013; Digital Globe 2016



Graphics developed by Stantec Consulting Services, Inc.

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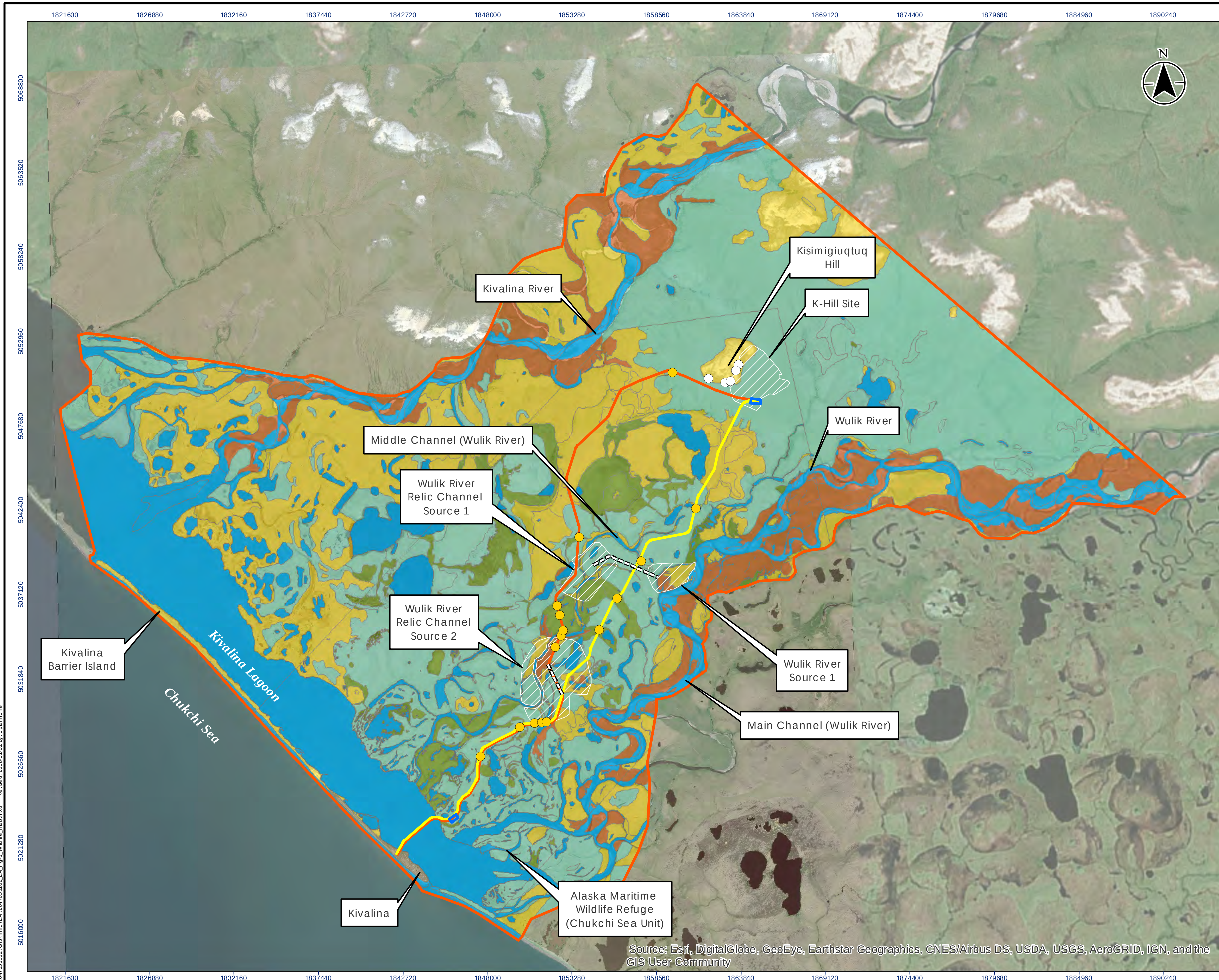
KIVALINA EVACUATION AND SCHOOL SITE ACCESS ROAD

Wetlands Functions

DATE: January, 2018

FIGURE 7



Legend

- Southern Route - 7.7 miles*
- Combined Route B - 8.9 miles*
- Material Source Spur Road
- Contractor Staging Areas
- Study Area
- Potential Material Source Areas**
- Excavation (Possible Bear Den)
- Water Crossings

Viereck

- Developed
- II.C.1: Closed Low Scrub***
- II.D.2: Willow Dwarf Shrub
- III.A.2: Mesic Graminoid Herbaceous
- III.A.3: Mesic Graminoid Herbaceous
- W: Water

* Proposed Routes are centered within ~1000 ft corridor.

** Material sources would be developed within identified areas.

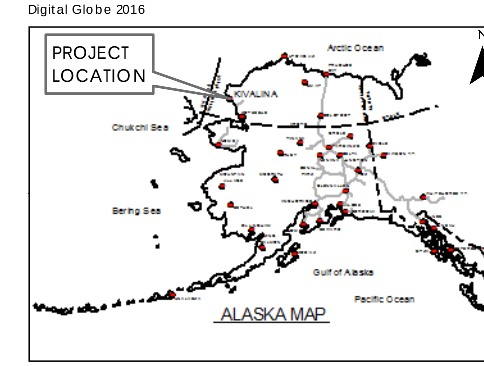
*** Closed Low Scrub is considered important bird habitat.

0 0.5 1 Miles

1:75,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
2. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011; ©AeroMetric Inc., 2013; Digital Globe 2016



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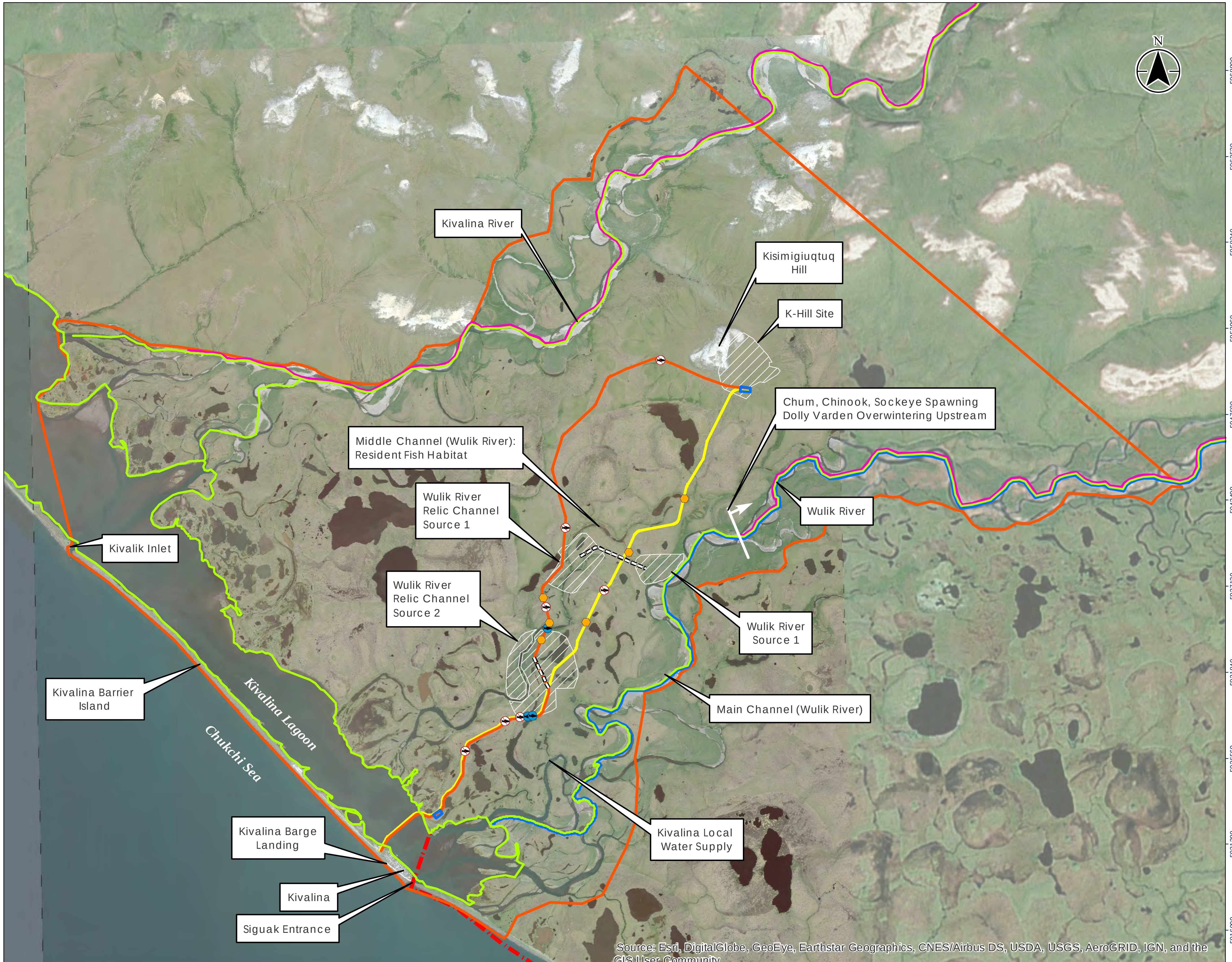
KIVALINA EVACUATION AND SCHOOL SITE ACCESS ROAD

Wildlife Habitat

DATE: January, 2018

FIGURE 8



Legend

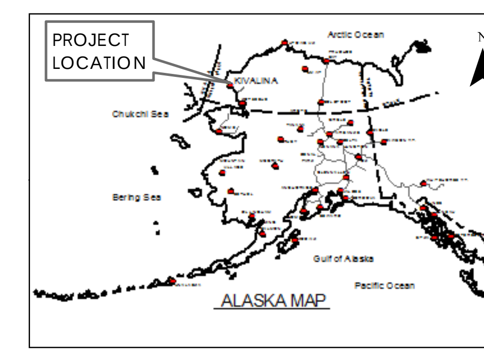
- Southern Route - 7.7 miles**
- Combined Route B - 8.9 miles**
- Material Source Spur Road
- Contractor Staging Areas
- Study Area
- Potential Material Source Areas**
- Pacific Salmon Present***
- Pink Salmon Spawning
- Chum Salmon Spawning
- Fish Passage Crossing
- Non-Fish Passage Crossing
- Enchanced Crossing

* Material sources would be developed within identified areas.
** Proposed Routes are centered within ~1000 ft corridor
*** Arctic cod and saffron cod are present in the Kivalina Lagoon year round.

0 0.5 1 Miles
1:75,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
2. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011; ©AeroMetric Inc., 2013; Digital Globe 2016
3. Essential Fish Habitat Data shown was produced using 2017 Regulatory Mapping Data from the Anadromous Waters Catalog (AWC), acquired from ADF&G website.



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KIVALINA EVACUATION AND SCHOOL SITE ACCESS ROAD
Fish Habitat

DATE: January, 2018 | FIGURE 9

U:\204705102\GIS\mxd\EA\204705102_EA_Fig-9_Ess_Fish_Hab_jjc.mxd Revised: 2018-01-02 By: cpannone

Kivalina Lagoon Bridge Permit Application

Project Number: 0002384/NFHWY00162
July 20, 2018

The environmental review, consultation, and other actions required by applicable federal environmental laws for this project are being, or have been, carried out by DOT&PF pursuant to 23 U.S.C. 327 and a Memorandum of Understanding dated November 3, 2017, and executed by FHWA and DOT&PF.

Attachment 3. Kivalina Evacuation and School Site Access Road EA Appendices A - F

APPENDIX A

TYPICAL SECTIONS

Page

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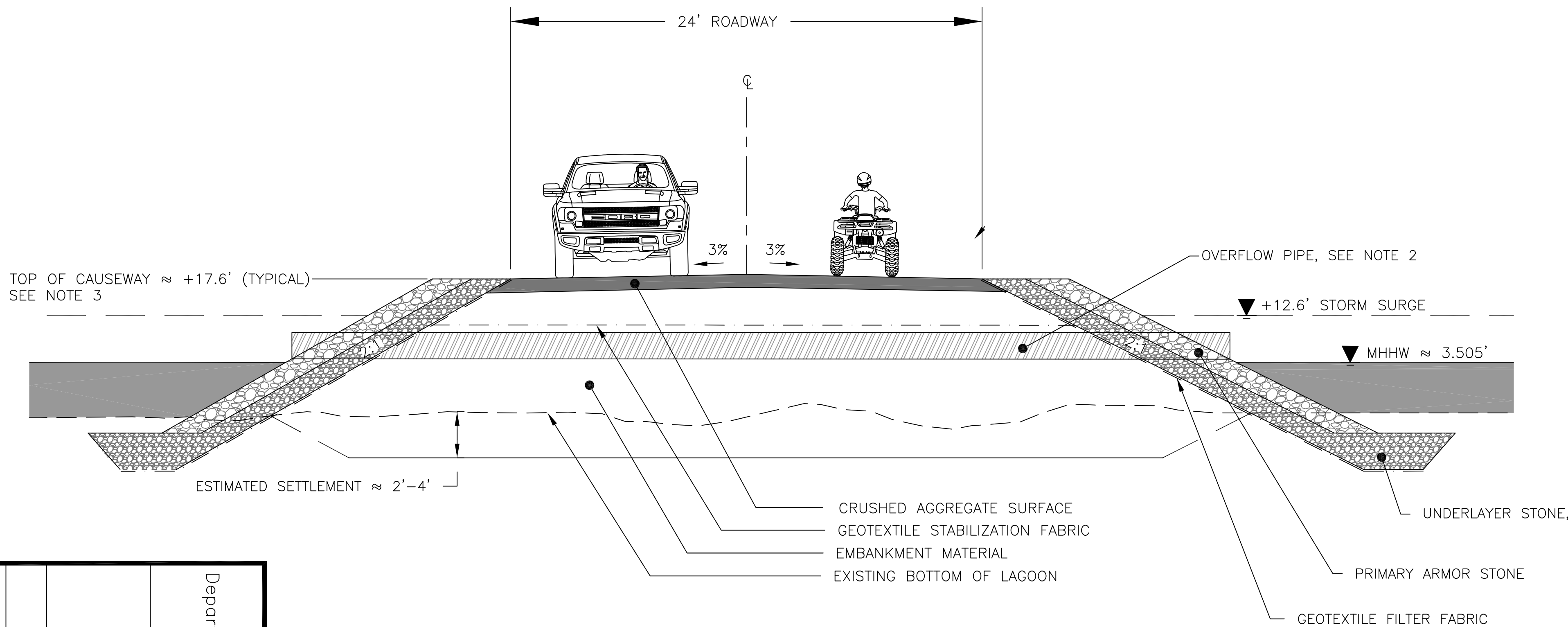

LAGOON CROSSING D: SOLID CAUSEWAY TYPICAL SECTION

NOTES:

1. LAGOON CROSSING D CONSISTS OF A SOLID CAUSEWAY WITH TWO PRIMARY OPENINGS CONSISTING OF A BRIDGE, AND LARGE STRUCTURAL PLATE PIPES. THIS FIGURE DETAILS THE SOLID PORTION OF THE LAGOON CROSSING.
2. OVERFLOW PIPES TO BE PLACED ABOVE MHHW INCREMENTALLY WITHIN THE EMBANKMENT OVER THE LENGTH OF THE CAUSEWAY.
3. TOP OF CAUSEWAY ELEVATION VARIES FROM APPROX. 17.6–25' TO ACCOMMODATE DRAINAGE STRUCTURES/FEATURES. ELEVATIONS ARE APPROXIMATE AND BASED ON THE NAVD88 VERTICAL DATUM.

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KIVALINA EVACUATION &
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SOLID CAUSEWAY TYPICAL SECTION

SEPTEMBER 2017

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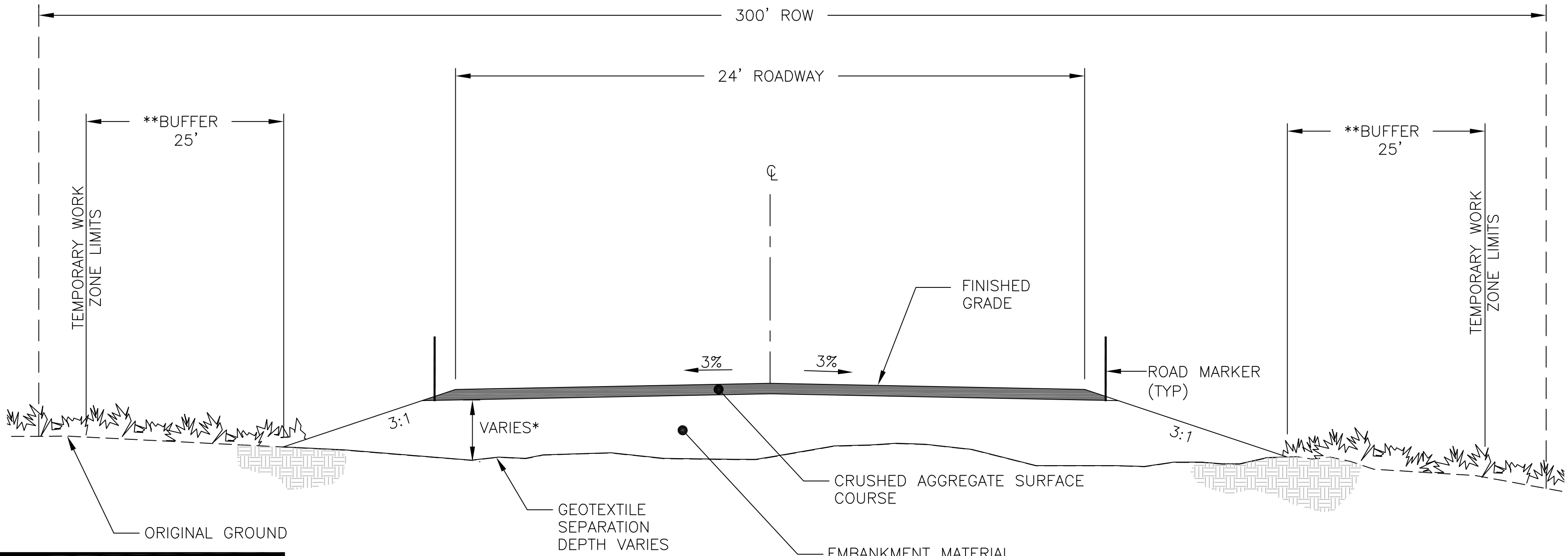

MAINLAND ROAD: TYPICAL SECTION

NOT TO SCALE

* EMBANKMENT HEIGHT WILL AVERAGE BETWEEN 5 TO 8 FEET. MINIMUM EMBANKMENT HEIGHT OF 6' MAY BE USED IN AREAS OF POTENTIAL SNOW DRIFTING AND IN AREAS WHERE THERE IS CONCERN OF THAWING UNDERLYING PERMAFROST.

**BUFFER ZONE EXTENDS OUTWARD 25' FROM THE EMBANKMENT TOE. THIS AREA WILL BE USED DURING CONSTRUCTION FOR TEMPORARY EQUIPMENT ACCESS AND WILL ALSO SERVE AS A NATURAL VEGETATIVE SCREEN.

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MAINLAND ROAD TYPICAL SECTION

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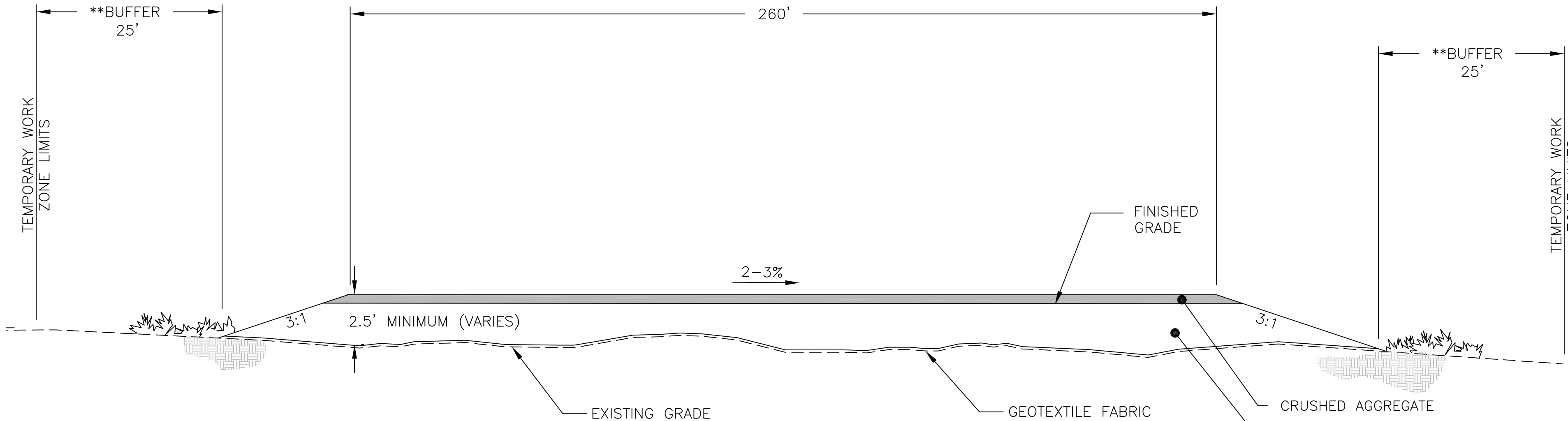
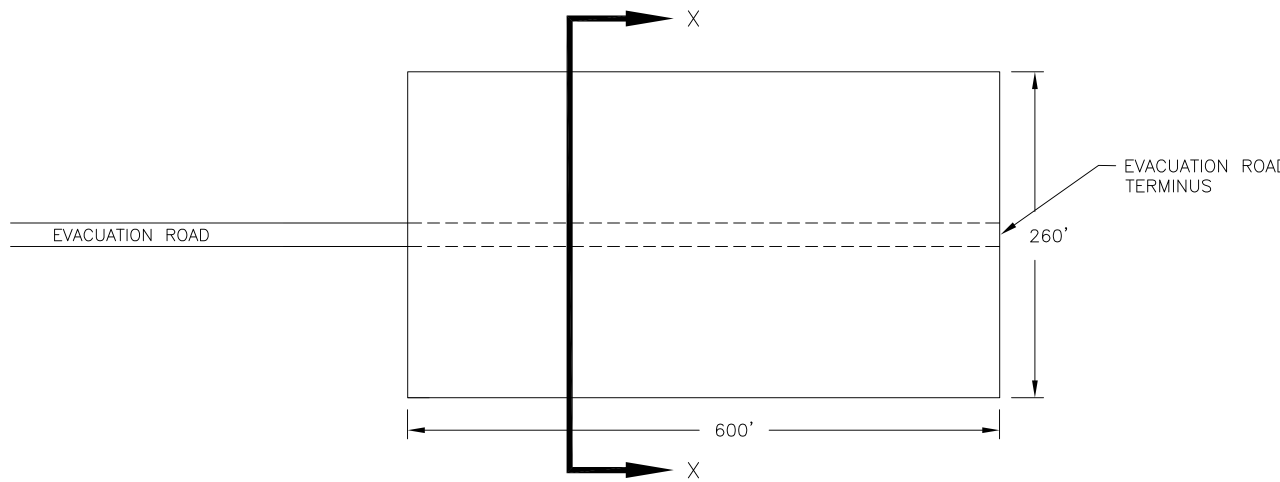


**BUFFER ZONE EXTENDS OUTWARD 25' FROM THE EMBANKMENT TOE. THIS AREA WILL BE USED DURING CONSTRUCTION FOR TEMPORARY EQUIPMENT ACCESS AND WILL ALSO SERVE AS A NATURAL VEGETATIVE SCREEN.

TYPICAL SECTION
SECTION X-X'
NOT TO SCALE



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NOT TO SCALE

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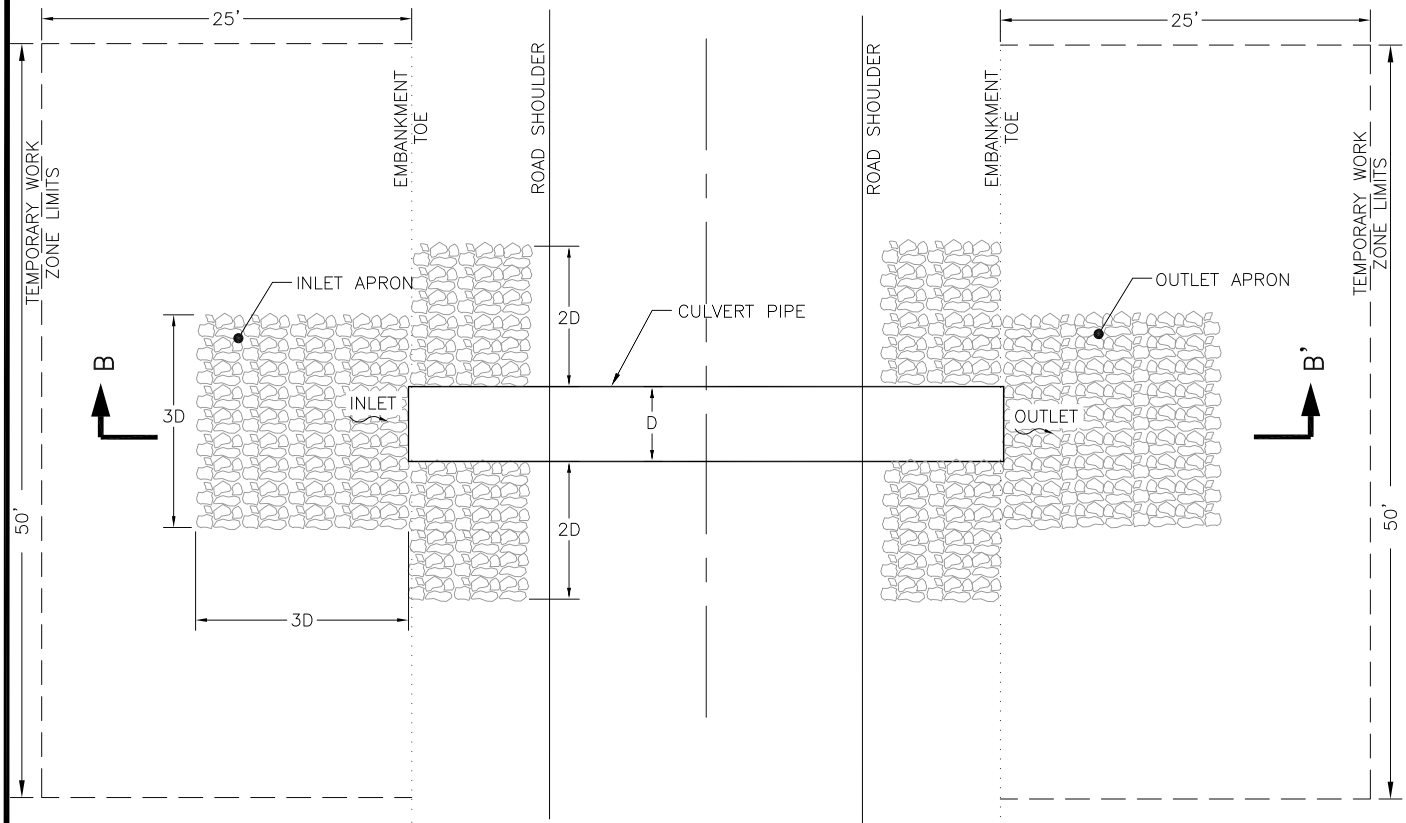
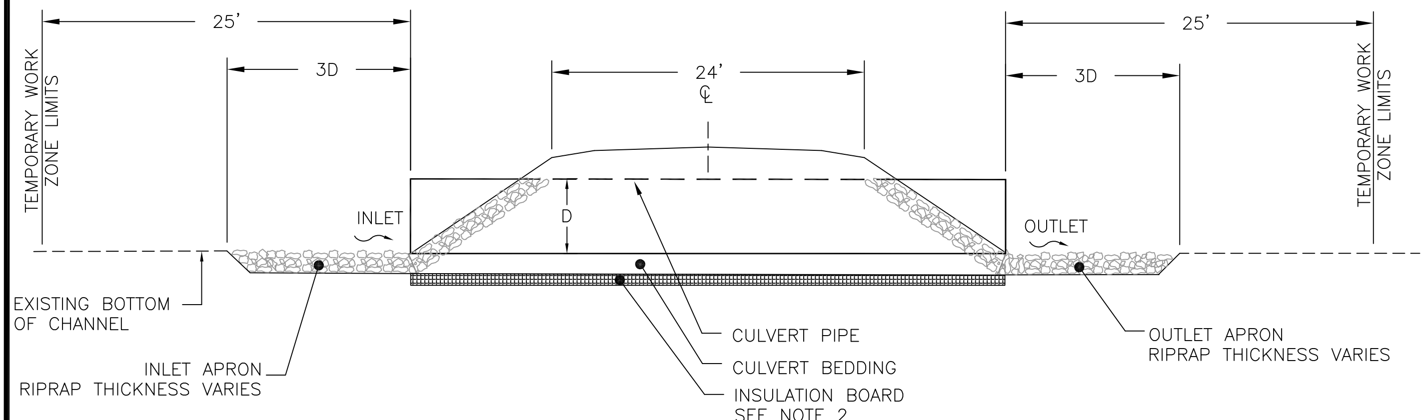
EVACUATION STAGING PAD TYPICAL

SEPTEMBER 2017



TYPICAL CULVERT APRON DETAIL
NOT TO SCALE



SECTION B–B'
NOT TO SCALE

NOTES:

1. THIS TYPICAL SECTION IS FOR CONVEYANCE STRUCTURES NOT INTENDED FOR FISH PASSAGE. LOCATIONS AND SIZE VARY.
2. INSULATION BOARD TO BE USED IN AREAS OF PERMAFROST
3. INLET, OUTLET, AND FORESLOPE RIPRAP TO BE INSTALLED IN AREAS WHERE EROSION AT CULVERT INVERTS IS A CONCERN. DIMENSIONS ARE APPROXIMATE.
4. FOR ENHANCED HYDRAULIC DESIGN CULVERTS, INVERTS TO BE RECESSED BELOW EXISTING BOTTOM OF CHANNEL TO PROMOTE FISH PASSAGE.

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NON–FISH PASSAGE &
ENHANCED HYDRAULIC DESIGN CULVERT DETAIL

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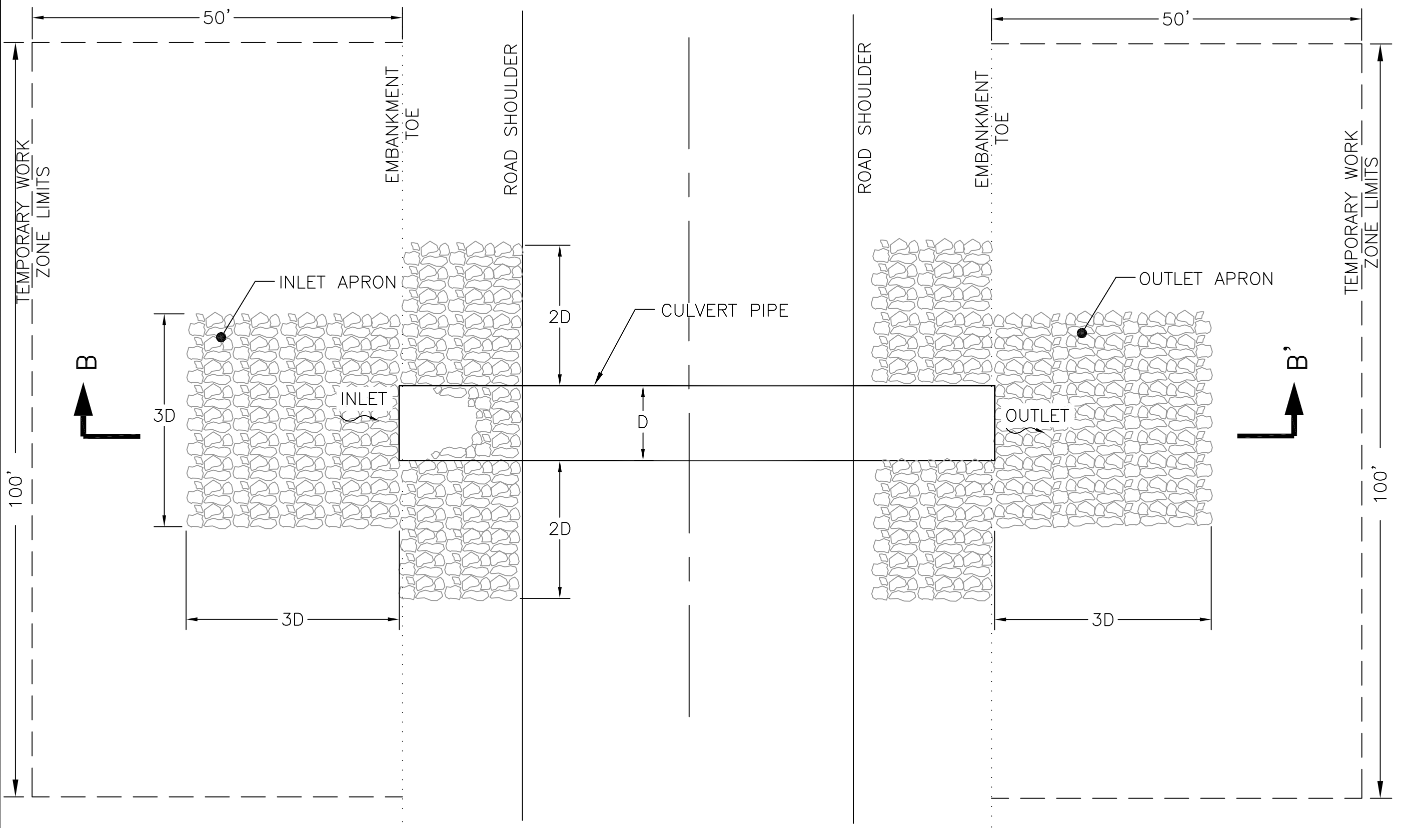
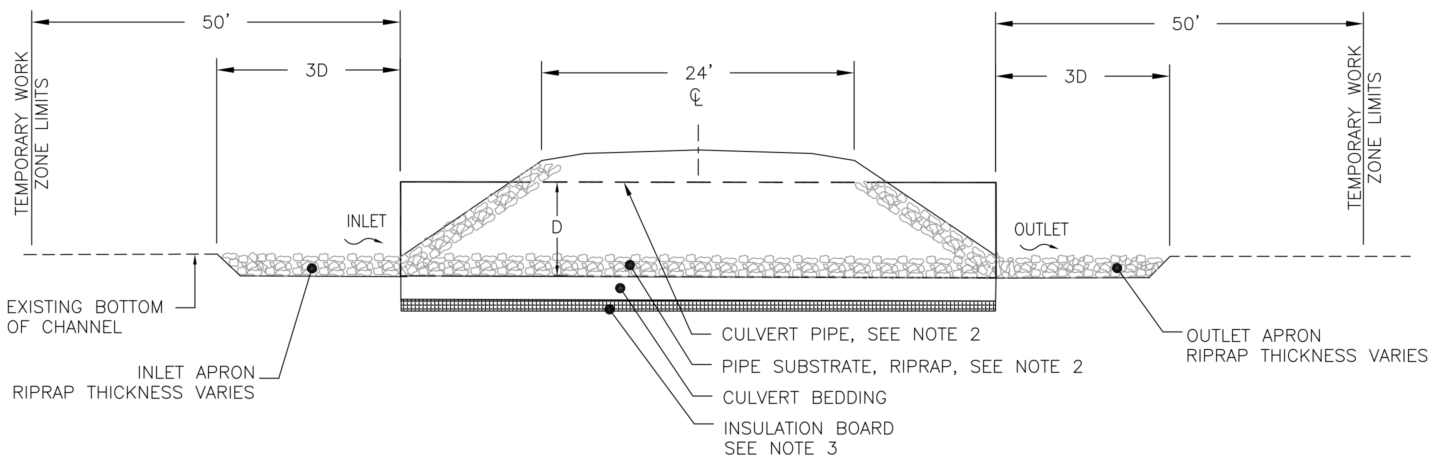


TYPICAL FISH PASSAGE CULVERT APRON DETAIL

NOT TO SCALE



SECTION B–B'

NOT TO SCALE

NOTES:

1. THIS TYPICAL SECTION IS FOR CONVEYANCE STRUCTURES INTENDED FOR FISH PASSAGE. LOCATIONS AND SIZE VARY.
2. CULVERT INVERTS ARE DEPRESSED BELOW THE BOTTOM OF THE EXISTING CHANNEL, AND FILLED WITH RIPRAP SUBSTRATE THROUGH THE LENGTH OF CULVERT TO PROVIDE FISH PASSAGE. THICKNESS VARIES.
3. INSULATION BOARD TO BE USED IN AREAS OF PERMAFROST.
4. INLET, OUTLET, AND FORESLOPE RIPRAP DIMENSIONS SHOWN ARE APPROXIMATE.

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FISH PASSAGE CULVERT DETAL

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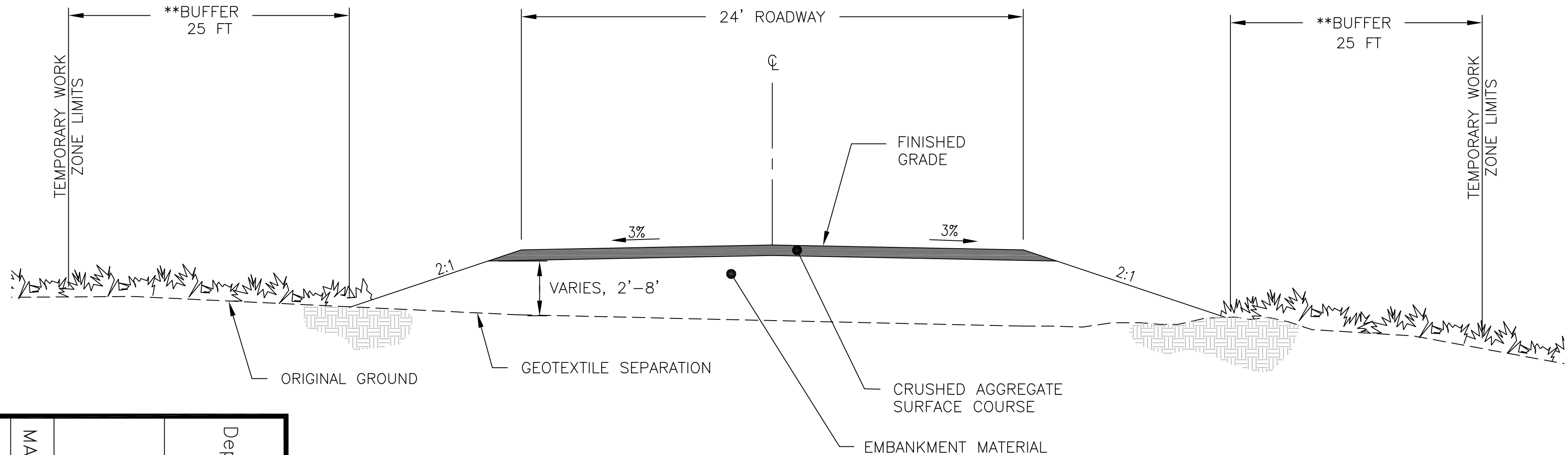

MATERIAL SOURCE SPUR ROAD TYPICAL SECTION

NOT TO SCALE

**BUFFER ZONE EXTENDS OUTWARD 25' FROM THE EMBANKMENT TOE. THIS AREA WILL BE USED DURING CONSTRUCTION FOR TEMPORARY EQUIPMENT ACCESS AND WILL ALSO SERVE AS A NATURAL VEGETATIVE SCREEN.

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MATERIAL SOURCE SPUR ROAD TYPICAL SECTION

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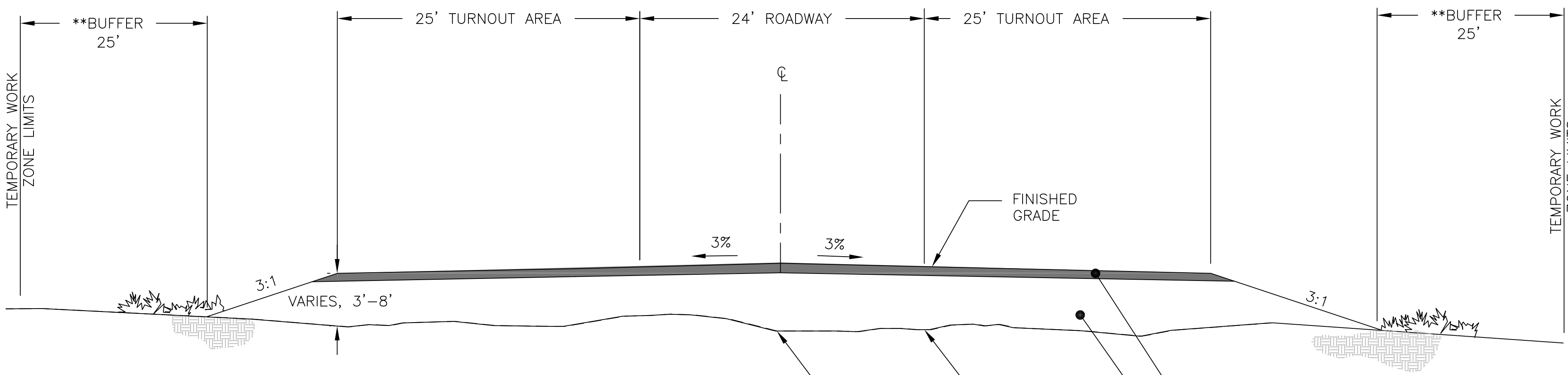
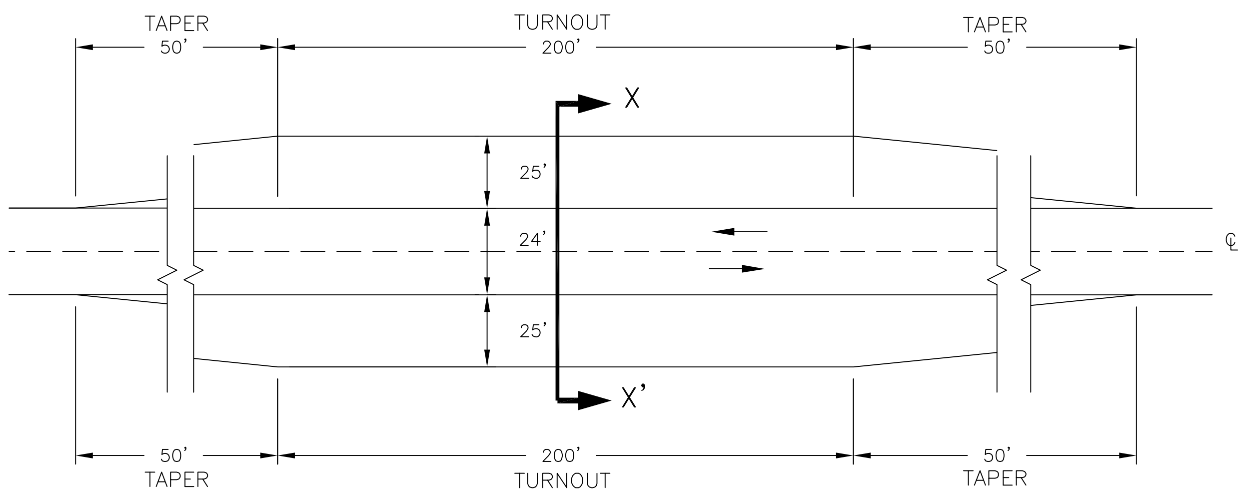


**BUFFER ZONE EXTENDS OUTWARD 25' FROM THE EMBANKMENT TOE. THIS AREA WILL BE USED DURING CONSTRUCTION FOR TEMPORARY EQUIPMENT ACCESS AND WILL ALSO SERVE AS A NATURAL VEGETATIVE SCREEN.

TYPICAL SECTION
SECTION X–X'
NOT TO SCALE



NOTE:
TURNOUT LOCATIONS AND NUMBER VARY,

PLAN
NOT TO SCALE

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TURNOUT TYPICAL

SEPTEMBER 2017

LAGOON CROSSING D: BRIDGE AND CULVERT DETAILS

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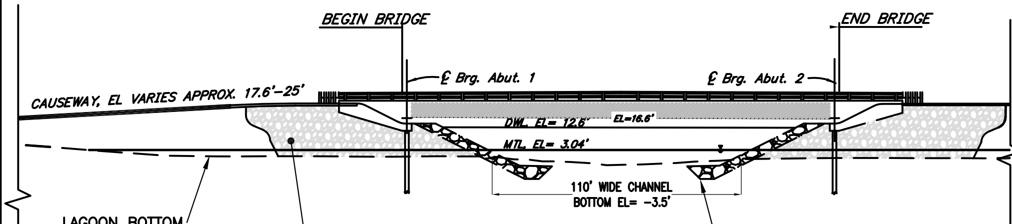
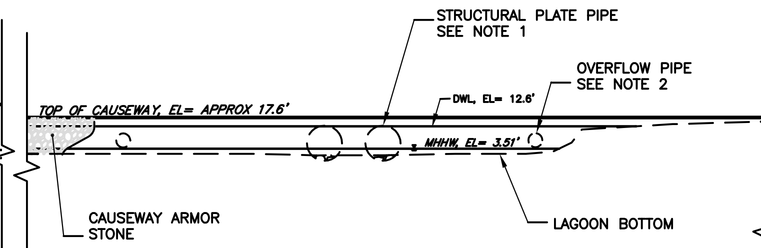


BRIDGE PROFILE

NOTE:

1. BRIDGE TO BE CONSTRUCTED OVER EXISTING 110' WIDE LAGOON CHANNEL, CENTERED APPROXIMATELY 225' EAST OF THE BARRIER ISLAND.
2. BRIDGE ABUTMENTS & FOUNDATION TO CONSIST OF SLOPED EARTHEN EMBANKMENT ARMORED WITH ROCK, OR VERTICAL SHEET PILE WALL, AND BE DESIGNED TO SPAN ENTIRE 110' LAGOON CHANNEL.
3. LOCATION AND DIMENSIONS OF ROCK ARMORING ALONG ABUTMENTS ARE APPROXIMATE, AND WILL BE DESIGNED TO CLOSELY MAINTAIN NATURAL CHANNEL DIMENSIONS TO THE FURTHEST EXTENT PRACTICABLE.
4. ELEVATIONS ARE APPROXIMATE AND BASED ON NAVD88 VERTICAL DATUM

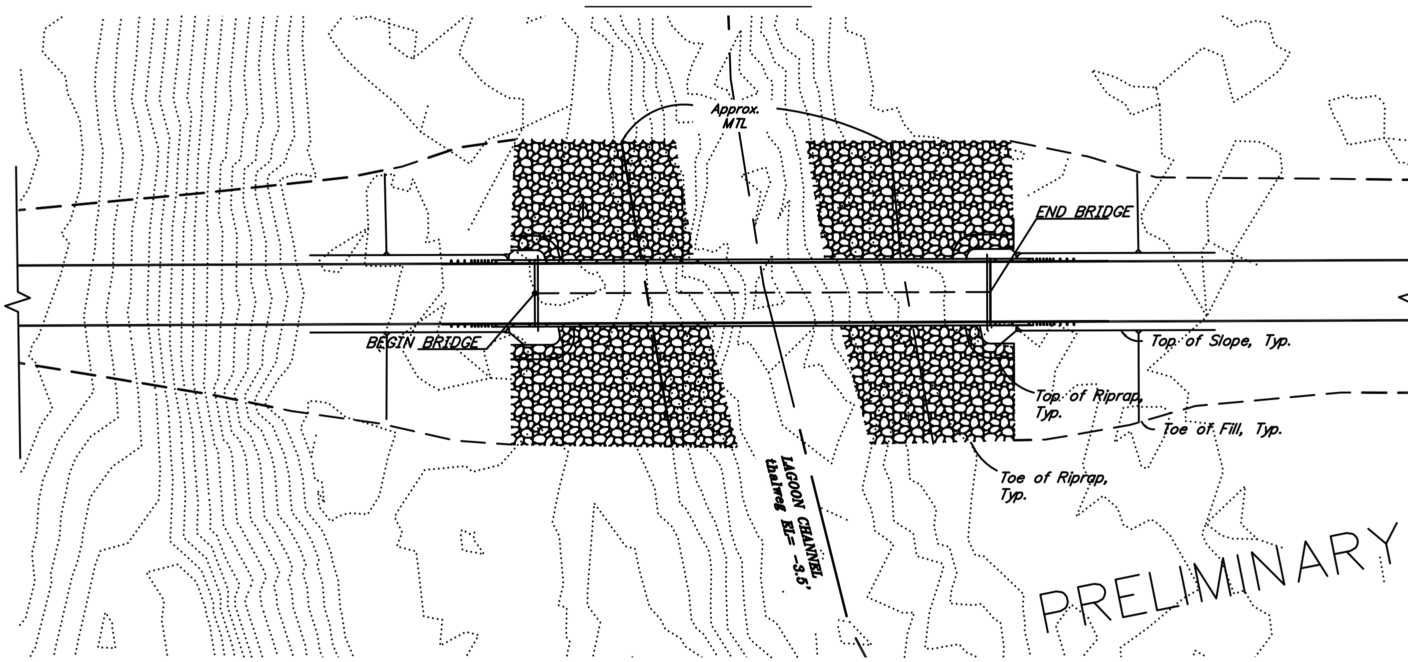


CULVERT DETAIL

NOTE:

1. LARGE CULVERT(S) TO BE LOCATED ADJACENT EAST END OF SOLID CAUSEWAY. PIPE INVERTS TO BE RECESSED BELOW BOTTOM OF LAGOON AND FILLED WITH 2'-4' THICK ROCK SUBSTRATE.
2. OVERFLOW PIPE(S) INVERTS TO BE PLACED ABOVE MHHW AND SPACED INCREMENTALLY OVER LENGTH OF SOLID CAUSEWAY TO PROVIDE CONVEYANCE DURING HIGH WATER EVENTS.

BRIDGE PLAN VIEW



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LAGOON CROSSING D: BRIDGE & CULVERT DETAIL

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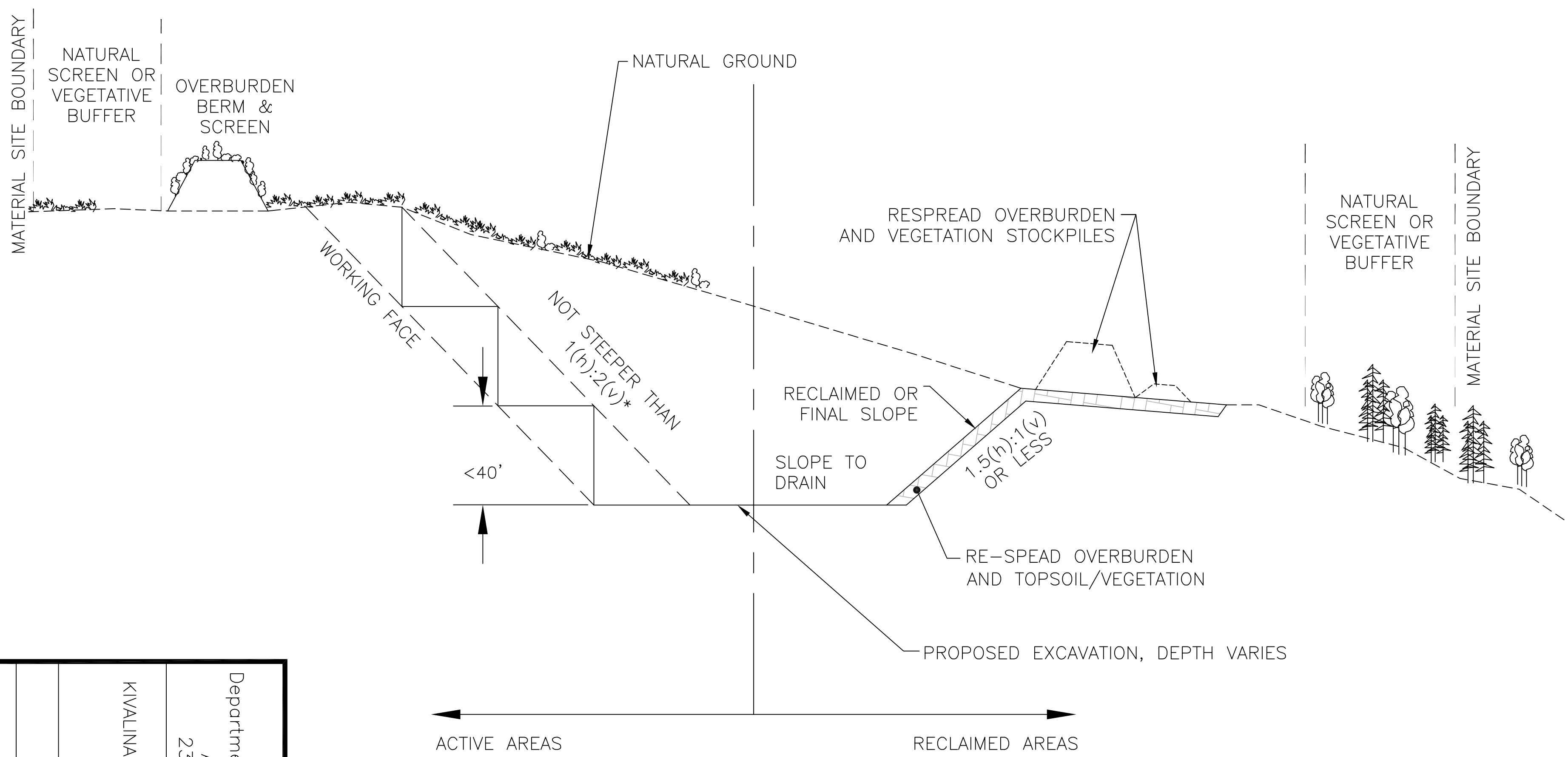

TYPICAL MINING/REC SECTION FOR K-HILL SITE
NOT TO SCALE

* MAXIMUM SLOPE ANGLE DEPENDS ON SITE-SPECIFIC PARAMETERS AND WILL BE DETERMINED BY THE CONTRACTOR.

**PRIMARY MINING METHOD WITHIN UPLANDS QUARRY SITE WOULD INVOLVE BLASTING AND RIPPING OF ROCK AND CONSOLIDATED MATERIAL.

PRELIMINARY

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MINING/REC SECTION: K-HILL SITE

SEPTEMBER 2017

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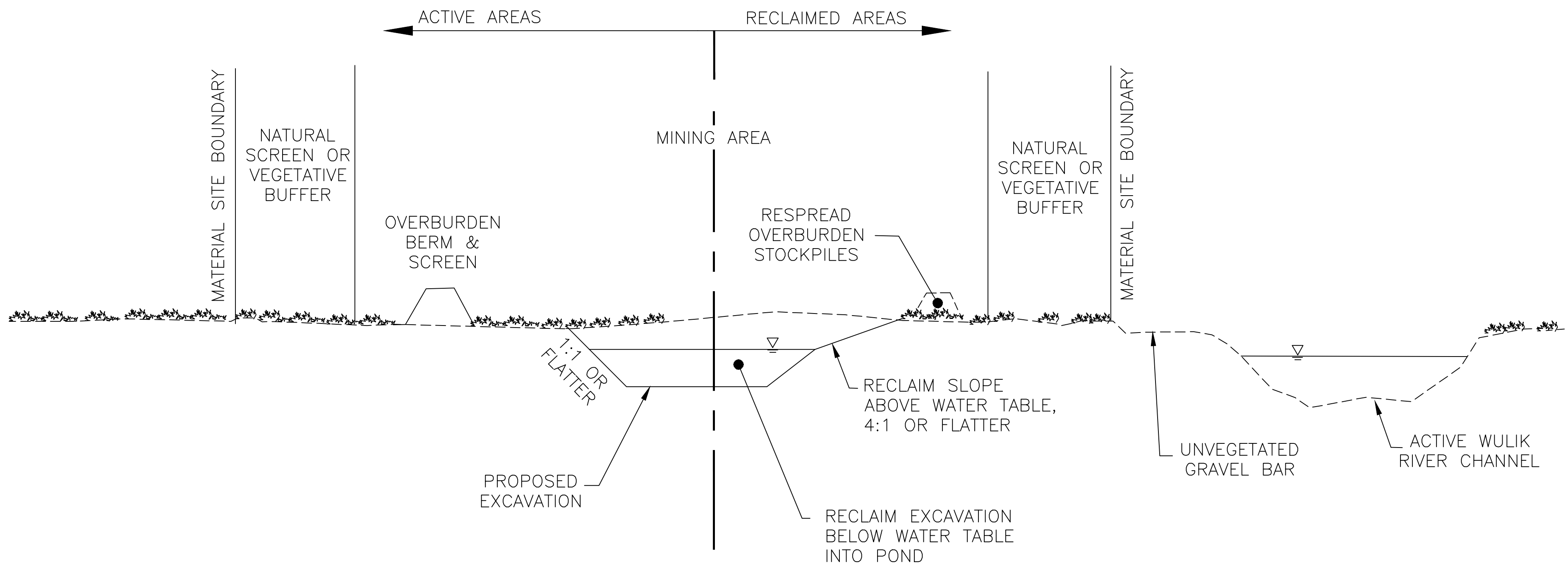

TYPICAL MINING/REC SECTION: WULIK RIVER SOURCE 1

NOT TO SCALE

NOTES:

1. EXCAVATION MAY OCCUR BELOW THE WATER TABLE, HOWEVER A 100' BUFFER WOULD BE MAINTAINED BETWEEN THE ACTIVE RIVER CHANNEL AND THE EXCAVATION AREA.
2. RECLAMATION WOULD INCLUDE CONVERTING THE SOURCE INTO A POND. RECLAIMED POND(S) MAY BE CONNECTED TO THE WULIK RIVER VIA A CONSTRUCTED CHANNEL.

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NFHWY00162

MINING/REC SECTION: WULIK RIVER SOURCE 1

DATE:

SHEET:

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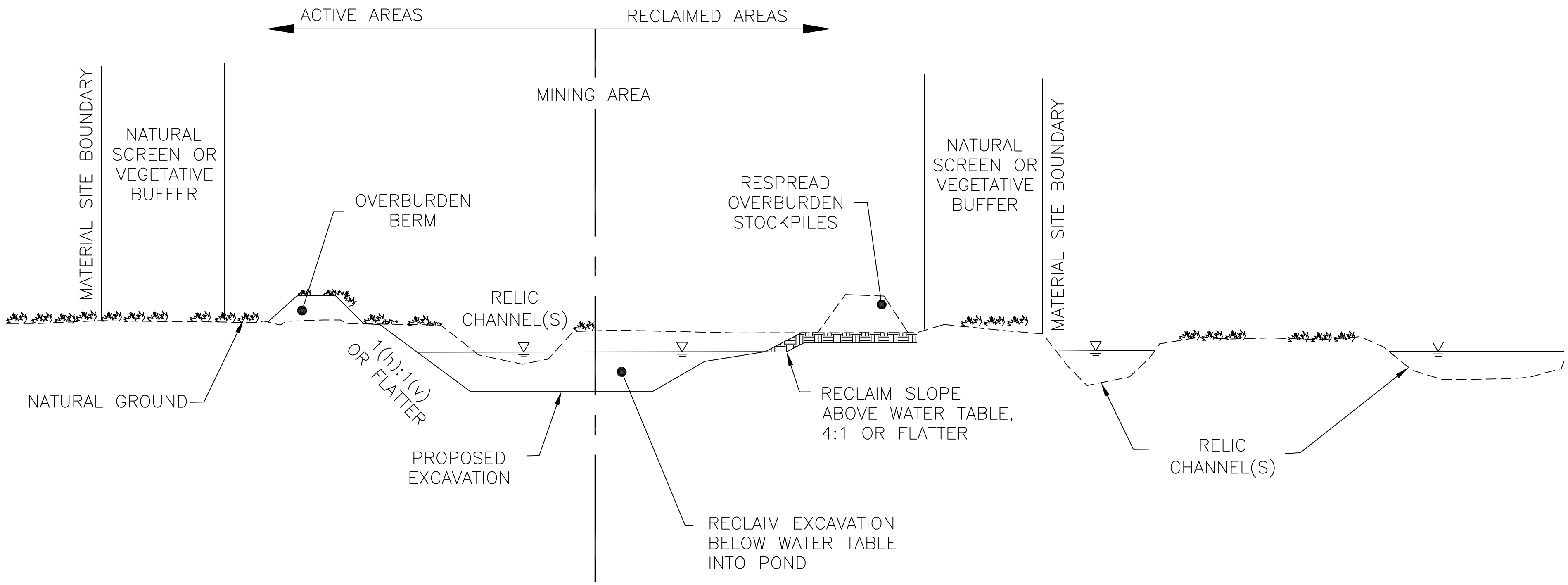

TYPICAL MINING/REC SECTION: WULIK RELIC CHANNEL SOURCES 1 & 2
NOT TO SCALE

NOTES:

1. MINING ACTIVITIES TO OCCUR WITHIN AND ADJACENT TO RELIC CHANNEL(S) ABOVE AND BELOW THE WATER TABLE.

2. MINED AREAS TO BE RECLAIMED INTO DEEP WETLAND PONDS TO IMPROVE FISH OVERWINTERING HABITAT. RECLAIMED PONDS MAY BE CONNECTED TO EXISTING RELIC CHANNELS TO PROVIDE POTENTIAL OVERWINTERING HABITAT FOR JUVENILE FISH.

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MINING/REC SECTION: WULIK RELIC CHANNEL SOURCES 1 & 2

SEPTEMBER 2017

APPENDIX B

KIVALINA LAGOON CROSSING – DESIGN WATER LEVEL AND SEDIMENTATION CHARACTERISTICS

Page

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3504 Industrial Avenue #102 • Fairbanks, AK 99701 • 907.452.5270
9737 Mud Bay Road #301 • Ketchikan, AK 99901 • 907.220.9424

Technical Memorandum

To:	Jonathan Hutchinson, PE (ADOT&PF)
From:	Harvey Smith, PE (HNS) and Kim Nielsen, PE (R&M)
Subject:	Kivalina Lagoon Crossing Design Water Levels and Sedimentation Characteristics
Date:	9/7/17
Project #:	R&M Project # 2485.01

This memo is intended as internal communication to design and environmental team members for the Kivalina Lagoon Crossing project to provide a summary of discussions and recommendations on the design water level and sedimentation characteristics for the proposed project.

Design Water Elevation:

The primary purpose of the road project, as described by the US Army Corps of Engineers (USACE) and others, is to "Allow residents of Kivalina to evacuate the barrier Island where they are located in the event of a storm that threatens to overtop the island". The elevation of the island at the location of the community varies between +10 and +11 feet (MLLW).

The USACE report did not identify a design high water condition that would require evacuation of the village. They did, however, calculate a 100 year (1% annual probability) high water elevation equal to +7.3' (MLLW). This surge elevation may result in some erosion and could threaten some nearshore infrastructure but would not threaten human life and would not "overtop" the island. The conditions that would overtop the island and threaten human life would be somewhat greater than the USACE's estimated 100 year event. Note: a 7.4' surge event occurred in 2011. This exceeded the 100 year event and there was no report of significant damage.

Since the USACE report did not address a design high water condition, particularly the one that would "overtop" the island and require evacuation, I performed an independent check on design conditions. The USACE estimate of 7.3' for a hundred year event was taken from Chapman et.al. "Storm Induced Water Level Prediction Study for The Western Coast of Alaska", 2009. The methodology from Chapman appeared reasonable from an academic standpoint, however, it estimated a 100 year event based on only four years of data. It is not recommended practice to predict a 100-year event based on such a small period of data. Although we have to work with what is available, it should be noted that at least 30-years of data is industry standard practice for such a prediction. There is now more than 12 years of data, including an event exceeding the 100 year prediction, so an updated hindcast was in order. Using similar methods as the USACE, an updated hindcast using current data would increase the 100 year event to roughly 8.5 feet. For the same reason, this should also be considered with some caution and adjusted based on engineering judgement. A surge to this elevation could cause significant damage along the seaward shoreline of the village and would probably initiate an evacuation. Waves may be running up into the village but structures along the lee side of the village would probably remain intact and provide shelter to the community.

Because the greatest need for the road will be when the 100 year surge event is exceeded, and because of the insufficient amount of historical data available for hindcasting, it is recommended that an event closer to a 500 year recurrence be selected for design. This will bring the design elevation up to 9.6' MLLW adding roughly one foot to the 100 year event. Note that these estimates have a wide confidence band due to the small data set used for the hindcast. Due to uncertainties in the estimate, rounding the 500 year surge elevation up to 10' is reasonable.

The road elevation of 15' MLLW was originally based on a 500 year event with a 3 foot significant wave height. For runup and overtopping on a road an H2 (2% of highest waves) is normally recommended as a design wave. This would add about 4.5 feet to the 10 foot design surge. A typical causeway structure would more appropriately be designed for a significant wave or an H10 wave depending on engineering judgement. However, given the life-safety critical nature of this causeway, one could also consider using H1 (highest 1%). It should be noted that the armor design, including slope, layering, and permeability will have an effect on runup so some flexibility can be incorporated into the road surface elevation.

Sedimentation in Lagoon

In earlier studies, years ago, it was believed that sediment being carried down the Kivalina and Wulik rivers was being deposited in the lagoon. With more recent surveys and photography, including google earth it can be seen that the river sediments, particularly bed load, simply pass through the lagoon and are deposited on the outer shoreline. This is particularly significant with respect to the long term stability of the village. If the river sediments were deposited into the lagoon then the community would be more vulnerable to long term erosion as most studies have reported. With the river sediments deposited on the outer beach the erosion and accretion of the barrier island, including the village, will remain more in a balanced equilibrium.

The most dynamic part of the littoral system are the two inlets that correspond with the rivers. These inlets are constantly shifting in response to river flow, longshore transport of sediments along the outer beach which are driven by waves, and the equilibrium cross section that responds to the flood and ebb of tidal surges. Normally the inlets are in balance with the river flow and would have a similar hydraulic radius. However, when a storm surge occurs, there is a large inward flow and the inlets will scour out to accommodate the required surge volume. The discharge (Q) through the entrances can be roughly estimated by the area of the lagoon multiplied by the time rate of change of the water surface. It has been observed that significant storm surges at Kivalina rise at about half a foot per hour. The lagoon is roughly 10 miles long and 1 mile wide (assuming a small amount of overland flooding). Calculating the combined Q through the two inlets for a surge rising at 6 inches/hour flooding ten square miles the combined discharge would be on the order of 38,000 CFS. Or about 19,000 CFS if the inlets were in balance. The discharge would also need to consider river flow. This would be subtracted on the flood and added on the ebb. Since the inlet cross-sections appear to be on the order of 1000 square feet during non-surge conditions it can be seen that there will be significant widening and deepening through scour to bring the equilibrium cross section into balance with the velocities. The greatest scour may occur during the ebb phase of the surge when the lagoon is draining due to the added discharge from the rivers and flow is more channeled. It also depends on the time rate of change of the water surface outside the lagoon. (This is typically the primary boundary condition in computer models). The channel that the causeway is crossing is a result of scour from the ebb portion of the surge. Typically it would have little to no flow except during large surge events. These drainage channels are characteristic of any area that has wide mud flats and large tides (such as upper Cook Inlet). The drainage channel will be most pronounced at the seaward end. Their depth, relative to the surrounding bottom, diminishes to zero moving landward or, in the case of the Kivalina, moving farther into the lagoon.

With two separate and independent inlet and river systems, a restricted barrier placed across the lagoon such as a solid causeway, a hydraulically permeable causeway, or a restricted causeway with a bridge or culvert should not have a large detrimental effect on the lagoon. Whatever is constructed will cause the inlet and river systems to adjust to a new equilibrium. Because the causeway would be aligned slightly south of the "stagnation zone" the northern inlet may widen and deepen slightly more during surge events; on the other hand, the entrance at the village would be slightly less responsive providing greater protection against scour to the USACE's rock revetment. The inlet hydraulic radius at the village would remain similar to that of the Wulik River and would be less dynamic than it is currently.

The USACE PAS study provided diagrams of the flow conditions as predicted by the ADCIRC computer model. The model was based on a fixed bed analysis so inlet responses to tidal surges could not be modeled. The response of the inlets to tidal surges is the most dynamic part of the system and is critical to understanding the equilibrium condition that will result from a causeway crossing. The results of the ADCIRC model, as interpreted by the USACE, showed that a 3-span bridge would be required to avoid scour at the piers. However, interpreting the model output using continuity and a sediment budget approach shows that the shallow portions of the lagoon would be severely eroded and the material would be deposited at the pier location in the deeper channel. I believe the conclusion was that the model was intended for larger scale circulation and was not appropriate for evaluating scour. With the uncertainties in erosion at the causeway, a solution that is less sensitive to scour should be considered and a much smaller span may be sufficient.

Alaska Department of Transportation & Public Facilities

Kivalina Evacuation Road & School Site Access Road – Location Hydraulic Study for the Wulik River

Project NFHWY00162

Stantec Project: #2047055102

Prepared:
December 4, 2017

Prepared by:
Stantec Consulting Services Inc.

Introduction

Executive Order 11988 Floodplain Management requires federal agencies to avoid adverse impacts associated with the occupancy and modification of floodplains. The Federal Emergency Management Agency (FEMA) administers the National Flood Insurance Program (NFIP) which aims to reduce the impacts of flooding on private and public structures.

Kivalina does not participate in the NFIP and there are no FEMA floodplain maps available for the Study Area. This Location Hydraulic Study examines the existing information regarding the floodplain of the Kivalina Lagoon (USACE, 1998; R&M Consultants 2017), defines the Wulik River floodplain within the Kivalina Evacuation and School Site Access Road project study area via a hydrodynamic model, documents any potential impacts to, or encroachment on, the floodplain, and recommends any mitigation that may be required.

Project Description

The Kivalina Evacuation and School Site Access Road project would provide Kivalina residents a safe and reliable evacuation route in the event of a catastrophic storm or ocean surge, allowing evacuees to temporarily mobilize to safe refuge at an assembly site on Kisimigiuqtuq Hill (K-Hill). This site is also identified by the Northwest Arctic Borough School District, and approved by the community, as a preferred new location for the community school. If constructed, the school could augment the undeveloped evacuation site by serving as a full-service community emergency shelter with all-season support capabilities.

The proposed road has a total approximate length of 7.7 miles and would begin near the south end of the Kivalina Airport, immediately cross the Kivalina lagoon eastward, and follow lowlands between relic channels of the Wulik River to K-Hill. Crossing of the Lagoon would require an approximately 3,020 ft solid, armored, earthen causeway. The lagoon crossing would include a single span bridge crossing an existing 110 ft channel located approximately 160 ft northeast from the barrier island. Large culvert(s) designed to accommodate all life-stage passage of fish, would be constructed at the northeast end of the causeway. A series of overflow pipes would be placed incrementally over the length of the solid portions of the causeway to provide additional conveyance during high water events.

Proposed Action components located on the mainland include the evacuation road, material sources, and material source access roads, with a total footprint of 468.6 acres. To maintain existing drainage patterns and convey seasonal runoff along the road, numerous cross culverts of various diameters would be installed, and overflow pipes would be placed in areas expected to be subject to high water events.

Kivalina Lagoon Floodplain

The elevation of the barrier island at the location of the community varies between +10 and +11 ft mean lower low water (MLLW). Erosion is a particular concern for the Singuak Inlet, as storm events in 2004, 2005 and 2006 resulted in significant erosion on the seaward side of the inlet from wind driven tidal surges (USACE 2006). Flood hazards for the community of Kivalina result almost exclusively from Chukchi Sea storm surges caused by south to southeasterly winds (USACE 1998, City of Kivalina 2015). The size of the lagoon and the low ground elevation on the mainland provide a large area for water storage when the river flow overtops its banks. With river flow into the lagoon passing through to the ocean with little change in water surface elevation, high flows in the rivers cause only minor changes to the lagoon water level during flood events and thus are not anticipated to impact the community of Kivalina nor the extent of the lagoon floodplain (USACE 2016).

Chapman et al. (2009) estimated the 100-year storm surge flood event at 7.77 +/- 1.08 SD ft (MLLW) based on the four years of tide gauge data from Red Dog Mine available at the time. The USACE (2016) later adapted this estimate, and used 7.3 ft MLLW for their design recommendations. In 2011, a storm surge event of 7.4 ft MLLW occurred. Using 12 years of tide gauge data, a recent analysis updated the 100-year surge event estimate to 8.5 ft MLLW and provided a 500-year estimate of 9.6 ft MLLW (R&M Consultants 2017).

The entire barrier island, including the community of Kivalina, and the entire Kivalina Lagoon located within the Study Area are in the Kivalina Lagoon floodplain (Figure 1). As such, the entire project footprint in this part of the Study Area would be affected by a 100-year storm surge.

Wulik River Floodplain

A 100-year flow event of the Wulik River is not expected to significantly affect Kivalina Lagoon water levels nor the community of Kivalina. Such an event would, however, have the potential to impact the Project footprint on the mainland, such as the evacuation road, material sources, and material source access roads. To determine a maximum estimated 100-year Wulik River floodplain extent, acreage of project footprint impacted, and resulting elevation, we developed a MIKE 21 2D Hydrodynamic model for the Wulik River within the Study Area (see Appendix 1 for details).

Information to model the Wulik River floodplain during a 100-year flow event comes from the inflow hydrograph estimated based on a USGS river gauge located upstream of the model domain (USGS 15747000, see Figure 2 in Appendix 1). Topographic information for the area comes from LiDAR data with 2 ft interval contours previously collected for the Study Area. Tide gauge information from Red Dog Mine was used to develop Kivalina Lagoon water level that serves as the models' lower domain boundary condition (see Appendix 1 for details).

In summary, the model estimated that between 196.6 and 226.4 acres, or 41.0-47.2% of the project footprint within the model domain would be within the lower Wulik River floodplain (Figures 4 and 5 and Table 1 in Appendix 1). Based on model assumptions and parametrization, the lower of these values are considered to be the most realistic

Figure 1 Tidal Floodplain Extents

prediction. A small portion of the causeway is in both the Wulik River floodplain and Kivalina Lagoon floodplain, and so the amount of the project inside a floodplain (Table 1) is slightly different than just the Wulik River floodplain (Appendix 1).

Model results from a co-occurrence of a 100-year storm surge and 100-year river flow are not presented as their likelihood to co-occur is extremely unlikely based on pure probability, and also because river flow maxima occur in July, whereas storm surge events occur in the fall.

Risks Associated with the Implementation of the Action

The Proposed Action would constitute a longitudinal encroachment within the 100-year floodplain of the Kivalina Lagoon and the Wulik River (Table 1).

The risk associated with an increased probability of flooding, due to the encroachment is low. Proposed causeway and road designs include a bridge and numerous cross culverts of various diameters with overflow pipes that would be placed in areas expected to be subject to high water events. Together, this is expected to maintain existing flow and drainage patterns and convey seasonal runoff.

Impacts on Natural and Beneficial Floodplain Values

This project is expected to have minimal permanent impact on natural and beneficial floodplain values. These values include providing fish, marine mammal and bird habitat, wetland connectivity, and a subsistence transportation corridor. None of these values are expected to be impacted by the Project because of the minimization and mitigation measures detailed below.

Support of Probable Incompatible Floodplain Development

The proposed project may facilitate better access to private land owners within the Wulik River floodplain. Route and material source alternatives are adjacent to private land owners. Enhanced access to private parcels will not support or authorize incompatible development.

Measures to Minimize Floodplain Impacts Associated with the Action

Causeway and Road:

- The lagoon crossing would be constructed at a design elevation above the estimated 100-year storm surge elevation, and have flow through structures to maintain general hydrography and drainage patterns
- Flood relief culverts (overflow pipes) would be utilized at major drainage locations or in areas where deeper water during breakup or flood events is expected.
- Measures to minimize releases of sediment to water bodies would be implemented during construction as part of compliance with the Alaska Pollutant Discharge Elimination System (APDES) Construction General Permit (CGP).
- Compliance with the CGP includes preparation of a SWPPP and implementation and monitoring of erosion and sediment control BMPs.

Material Sources:

- Material sources would be constructed to avoid river capture, floodplain widening, and increased erosion.
- Site specific hydrological studies would be performed as needed to address potential floodplain impacts from the use of a particular source and to measure the practicability of opening a particular site and any associated access road.

Measures to Restore and Preserve the Natural and Beneficial Flood-Plain Values Impacted by the Action

- Placement of aggregate materials and crossing structures in the Kivalina Lagoon would alter the otherwise ubiquitous soft or sandy benthic habitats to coarser aggregate along the crossing, which would likely increase species richness and overall biological utility of the lagoon in this area. Sessile invertebrates could use coarse aggregate habitat for attachment and feeding, while fish species could use it for feeding, cover, and potentially breeding (Reynolds et al. 2010), therefore improving the natural and beneficial floodplain values within the area of the lagoon crossing.
- Temporary disturbance, reclaimed land, and other areas of ground disturbance would be revegetated with regionally appropriate seed mix that minimizes introduction of noxious weeds where practicable.
- Where possible, vegetation clearing, site preparation, and construction activities would adhere to the recommended periods to avoid vegetation clearing from June 1–July 31 for Northern Alaska (USFWS 2017). If vegetation clearing, site preparation, and construction occurs within these periods, pre-construction nest surveys would be conducted by qualified personnel and appropriate mitigation developed in consultation with the USFWS; and
- High-disturbance project-related activities (e.g., blasting, pile driving) would be avoided where practicable during the nesting and peak migration window.
- Material sites, if developed within the floodplain, will be designed, and reclaimed to support and enhance the beneficial floodplain values.

Practicability of alternatives to floodplain encroachments

There are no practicable alternatives to development outside the floodplain.

Crossing the Kivalina Lagoon without encroaching on the floodplain is not possible. The low ground elevation on the mainland provides a large area for storage when the river flows overtop their banks. As a result, routing outside of the river floodplain is not possible either. To minimize impact, the lagoon crossing would be constructed at a design elevation above the estimated 100-year storm surge elevation, and have flow through structures to maintain general hydrography and drainage patterns. The road would be constructed at an elevation above the estimated height of the 100-year

Wulik River floodplain, and have cross culverts installed as necessary to facilitate drainage.

The material sites would have unavoidable floodplain encroachments. Except for K-Hill, the only practicable material source developments involve extraction in or adjacent to waterbodies and floodplains. This type of material source development could lead to destabilization of river channels, river channel capture, floodplain widening, increased erosion and sedimentation, increased water velocities, and reduced water quality. Through appropriate planning and adherence to site specific mitigation measures and management plans, however, material source excavation within relic channels and the river bar of the Wulik River is anticipated to be temporary and have minimal effects.

Table 1 Unavoidable Floodplain Encroachment

<table>
<tr><th colspan="4">Route</th></tr>
<tr><th colspan="2">Southern Route</th><th colspan="2">Lagoon Crossing</th></tr>
<tr><td colspan="2">• Unavoidable floodplain encroachment
• 42.3 acres inside Wulik River floodplain (39% of component’s footprint)
• Overland Route: 9 water crossings:
  • 0 crossings of Wulik River Relic Channel;
  • 2 fish passage crossings;
  • 4 non-fish passage crossings; and
  • 3 enhanced design crossings.</td><td colspan="2">• Unavoidable floodplain encroachment
• 12.1 acres inside Kivalina Lagoon floodplain (100% of component’s footprint)
• Overland Route: 12 water crossings:
  • 1 fish passage crossing (Wulik River Relic Channel);
  • 2 fish passage crossings;
  • 6 non-fish passage crossings; and
  • 3 enhanced design crossings.</td></tr>
<tr><th colspan="4">Material Source Alternatives</th></tr>
<tr><th>K-Hill Site</th><th>Wulik River Source 1</th><th>Relic Channel Source 1</th><th>Relic Channel Source 2</th></tr>
<tr><td>• 0 acres inside floodplain (0% of component’s footprint)</td><td>• 75.8 acres inside floodplain (100% of component’s footprint).
• Actual material source may be smaller than planned.</td><td>• 34.1 acres inside floodplain (68% of component’s footprint)
• Actual material source may be smaller than planned.</td><td>• 42.8 acres inside floodplain (92% of component’s footprint)
• Actual material source may be smaller than planned.</td></tr>
</table>

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Attachments

FLOODPLAIN MAPPING OF THE WULIK RIVER, KIVALINA ALASKA (STANTEC 2017)

KIVALINA LAGOON CROSSING DESIGN WATER LEVELS AND SEDIMENTATION CHARACTERISTICS (R&M CONSULTANTS 2017)

To:	Andrew Niemiec Stantec, Anchorage, USA	From:	Seifu Guangul Stantec, Winnipeg, Canada
File:	2047055101	Date:	November 30, 2017

Reference: Floodplain Mapping of the Wulik River, Kivalina-Alaska

This memo describes the data, assumption, method, analysis, and result for floodplain mapping of the Wulik River. The primary objective of this work is to delineate floodplain extent of the Wulik River for the 100-year flow under different topographical scenarios. Because there was no bathymetry data available to properly describe a stream cross-section of the Wulik River, a scenario based modelling approach was adopted, using topographic data obtained from LiDAR.

SCOPE OF WORK

The scope of work completed for this river floodplain mapping study includes the following:

- Review of available existing LiDAR data.
- Review of available existing 100-year flow event hydrograph for Wulik River.
- Estimate 100-year flood hydrography at the upstream boundary of the hydrodynamic model.
- Develop 2D Hydrodynamic model for the Wulik River.
- Delineate a 100-year river floodplain map for the Wulik River.
- Estimate the area of the project footprint that will potentially be affected by a 100-year flow event of the Wulik River.

MODEL ASSUMPTION

Several assumptions were made in completing the required work described in this memo:

1. *Upstream inflow boundary condition*: A 100-year inflow hydrograph was estimated based on a USGS site located further upstream of the model domain (USGS 15747000). The inflow hydrograph assumes this full flow at the model boundary and does not account for local flow for areas between the gauge site and the model domain (see Figure 2).

2. *River bathymetry data*: River geometry affects the amount excess water spilled-out by the river and hence the river floodplain extent. In the absence of river cross-section information, we ran two different hypothetical cross-sections scenarios (as detailed below).

3. *Roughness coefficients*: The velocity and depth of flood water also depends on the impediment or resistance the land surface and river channel offer against flow. Such resistance to flow depends on land-use/-cover of the land surface, surface roughness of the bed material, geometry of the channel and flow obstruction. In the absence of this information, the roughness coefficients used in this analysis don’t explicitly consider these

factors. Roughness coefficients were therefore assumed based on aerial and site photos and published coefficient values.

Results presented in this memo should be taken considered in context of these assumptions.

MODEL SCENARIOS

Two scenarios were considered for the floodplain modeling:

Scenario I: assumes river channel bottom matches the LiDAR elevation. This assumption in conservative as it would result in a larger estimated floodplain compared to Scenario II.

Scenario II: assumes river channel bottom elevation is the LiDAR lowered by 10ft. Based on anecdotal observations, this assumption is considered to more accurately reflect the real river channel dimension than Scenario I.

HYDRODYNAMIC MODEL DEVELOPMENT

AVAILABLE DATA

LiDAR Data

A continuous surface layer was first created based on the available LiDAR data with 2 ft interval contours, and then a point cloud for the hydrodynamic model was generated.

Inflow Hydrograph

A 100-year flow of 55,000 cfs was applied to delineate the river floodplain. Based on flow hydrograph analysis of the Wulik River (at USGS station number 15747000), a unit peak hydrograph was created and then scaled for the 55,000 cfs (Figure 1). This inflow hydrograph constituted the upstream boundary condition of the model.

Lagoon Water Level Data

MHHW record from Red Dog Mine tide gauge is 3.5ft. To be conservative, we allowed for spatial variance between the gauge location and the study area, and assumed that the river flood could coincide with a higher than average high tide. As a result, we set the lagoon water level elevation, which is the downstream model boundary condition, at 4.5ft.

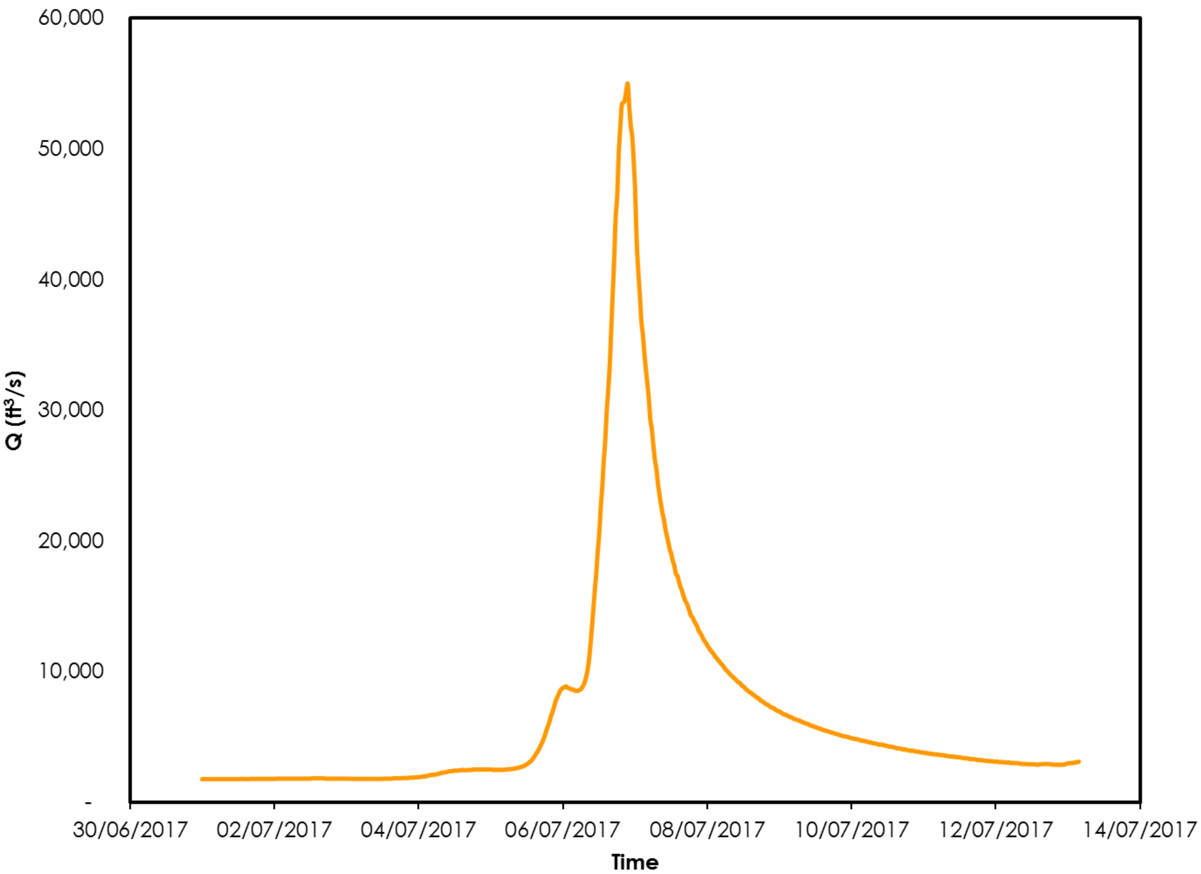

Figure 1: Input Inflow Hydrograph

MODEL SETUP

We used the MIKE 21 Hydrodynamic model to simulate the floodplain during a 100-year river flow event. The hydrodynamic model simulates unsteady flow considering density variations, bathymetry and external forcing in rivers, lakes, estuaries, and coastal areas. The modelling system is based on the numerical solution of 2-D incompressible Reynolds averaged Navier-Stokes equations subject to the assumptions of Boussinesq and of hydrostatic pressure. Thus, the model consists of continuity, momentum, temperature, salinity and density equations and it is closed by a turbulent closure scheme. The density does not depend on the pressure, but only on the temperature and salinity.

The model setup involves defining model domain, generating computational element meshes, and specifying model parameters and boundary conditions

Model Mesh Development

- Computational Model Domain

  The model domain was defined based on the available LiDAR data extent. The LiDAR grids were created within the model domain, based on the available LiDAR data (Figure 2).

- Computational Mesh

  The elevation scatter points were used to develop the river bathymetry and surface elevation for the overland flow computations. The computational mesh was derived after an iterative process of refining and smoothing the mesh density to ensure proper convergence and accuracy of the numerical solution over a full range of river flows.

  The generated mesh contains 38,594 triangular elements (Figure 3). The mesh arrangement was optimized to establish smooth boundaries. The resolution of the mesh, combined with the chosen time-step, governs the Courant number developed in the model set-up. The Courant number affects the numerical stability of the model. The resolution of the model in geographical space and time must be selected to maintain numerical stability. The mesh was optimized, based on the level of detail required and the amount of computational time necessary to run the model.

Legend

- Streamflow Gauging Station
- Stream
- LiDAR extent

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Figure No.
2

Title
Location Map

Notes
1. Coordinate System: NAD 1983 StatePlane Alaska 8 FIPS 5008 Feet
2. Base features provided by State of Alaska Department of Transportation and Public Facilities
3. Microsoft product screen shot(s) reprinted with permission from Microsoft Corporation

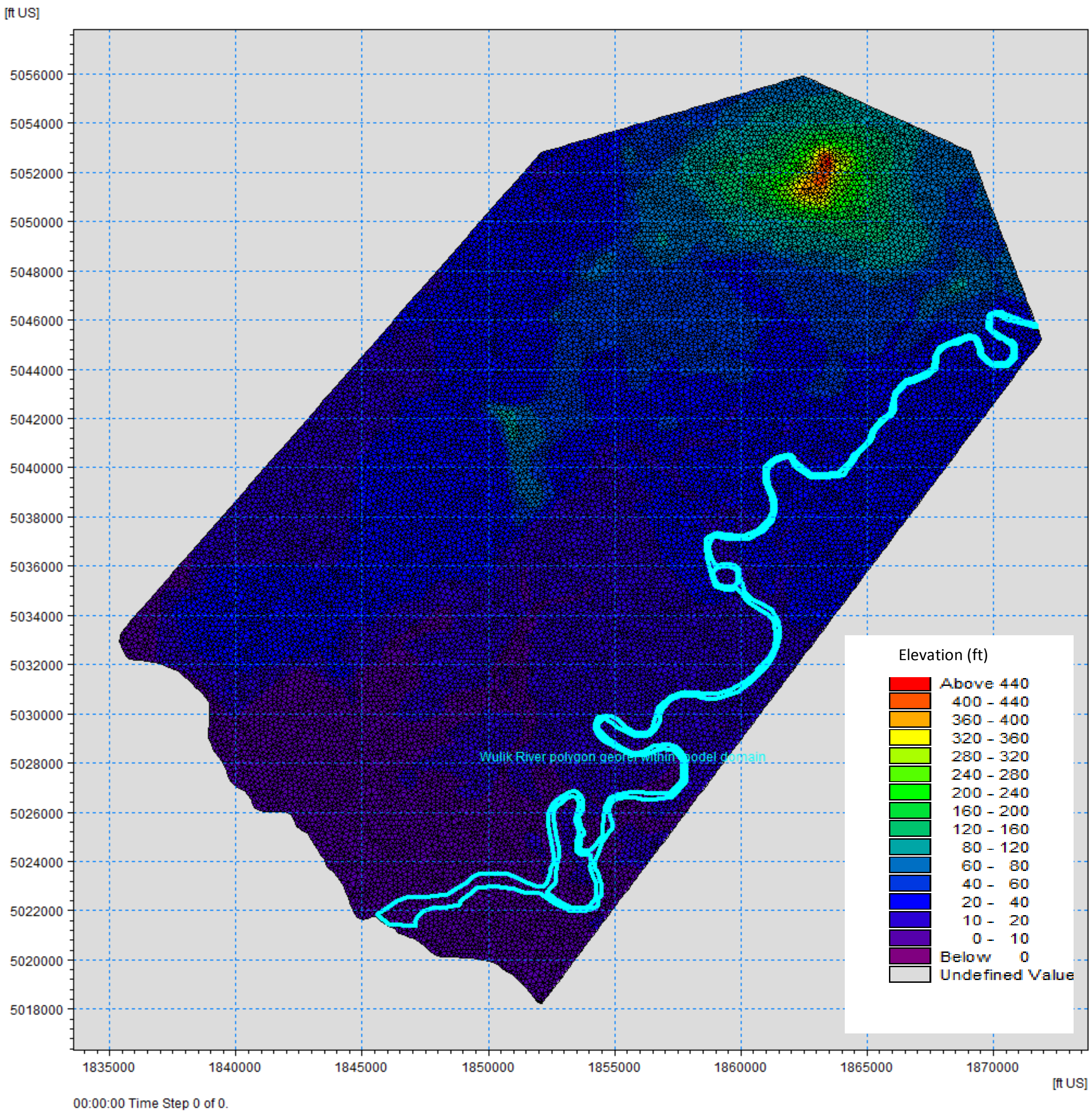

Figure 3: Computational Mesh

Boundary Conditions

The following model boundaries were applied to the model domain setup:

- The upstream boundary condition was set the flow boundary condition. The 100-year flood inflow hydrograph (Figure 1) was used as the upstream boundary condition.
- The downstream river control boundary was set as a lagoon water level boundary condition. We used a lagoon water level of 4.5ft. The downstream boundary condition was considered as constant head boundary, but porous, where water in the floodplain could be lost to the lagoon if the floodplain water level exceeds that of the constant head boundary.
- Manning's roughness values of 0.1 for the overland part of the model domain and 0.02 for the main river were used.

RESULTS

Floodplains for each of the river depths were mapped to estimate the maximum extent of a 100-year river flood event (Figures 4 and 5) and to estimate the area of project footprint that would be in the floodplain (Table 1). Results for Scenario I are considered conservative; the shallower river depth combined with a higher than MHHW lagoon water level, resulting in a larger estimated floodplain extent as compared to the more realistic Scenario II conditions. The maximum estimated floodplain extents, acreage of project footprint impacted, and resulting elevations of both scenarios, were similar, estimated between 196.6 and 226.4 acres of the project footprint occurring within the 100-year Wulik River floodplain; a 6.2% difference. Based on the available data and assumptions made herein, we consider these model results to be a reasonable prediction of maximum floodplain extent for the lower Wulik River inside the model domain.

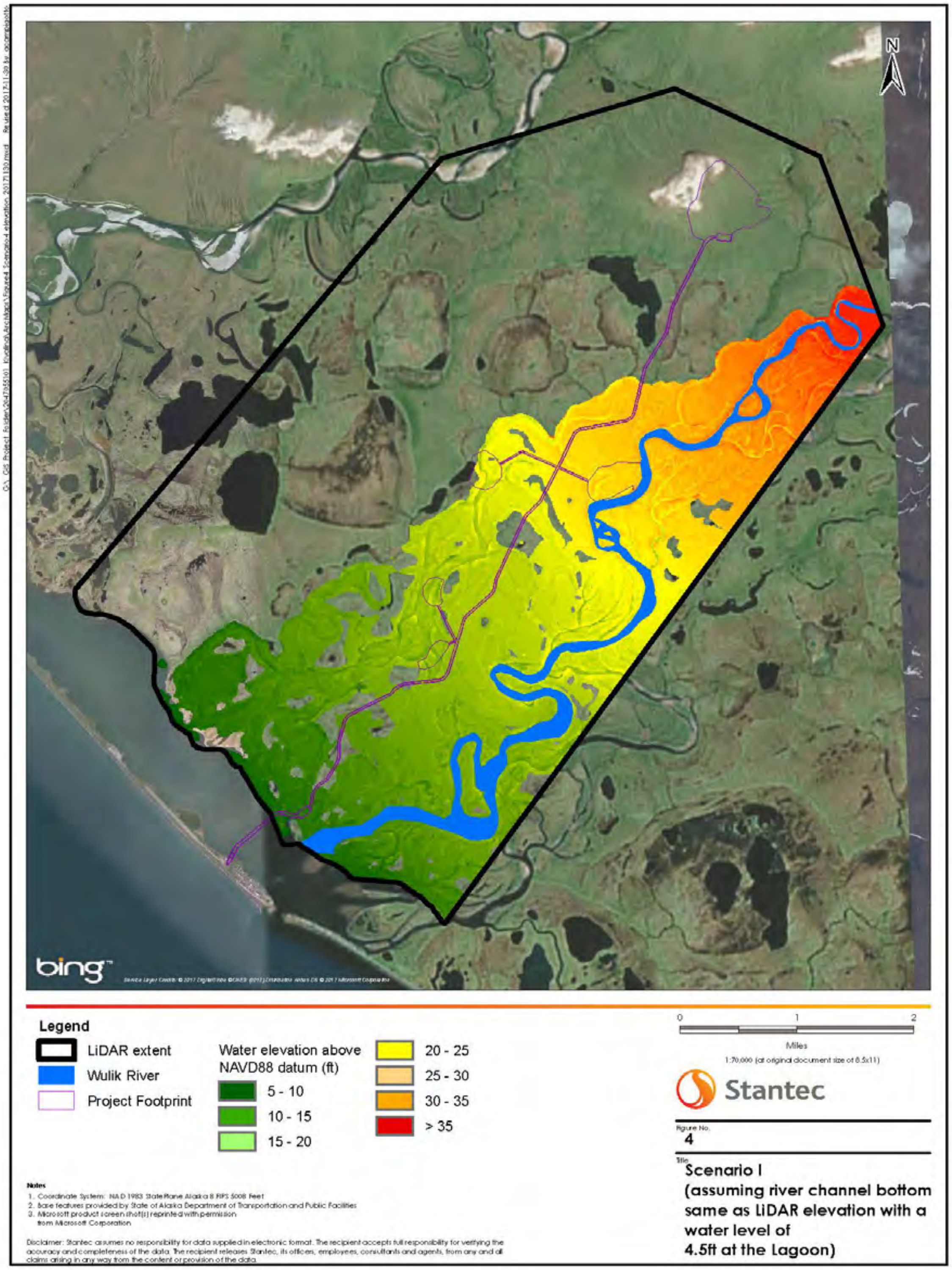
N
bing
Legend
LiDAR extent
Wulik River
Project Footprint
Water elevation above NAVD88 datum (ft)
5 - 10
10 - 15
15 - 20
20 - 25
25 - 30
30 - 35
> 35
0
1
2
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Figure No.
4
Title
Scenario I
(assuming river channel bottom same as LiDAR elevation with a water level of 4.5ft at the Lagoon)
Notes
1. Coordinate System: NAD 1983 StatePlane Alaska 8 FIPS 5008 Feet
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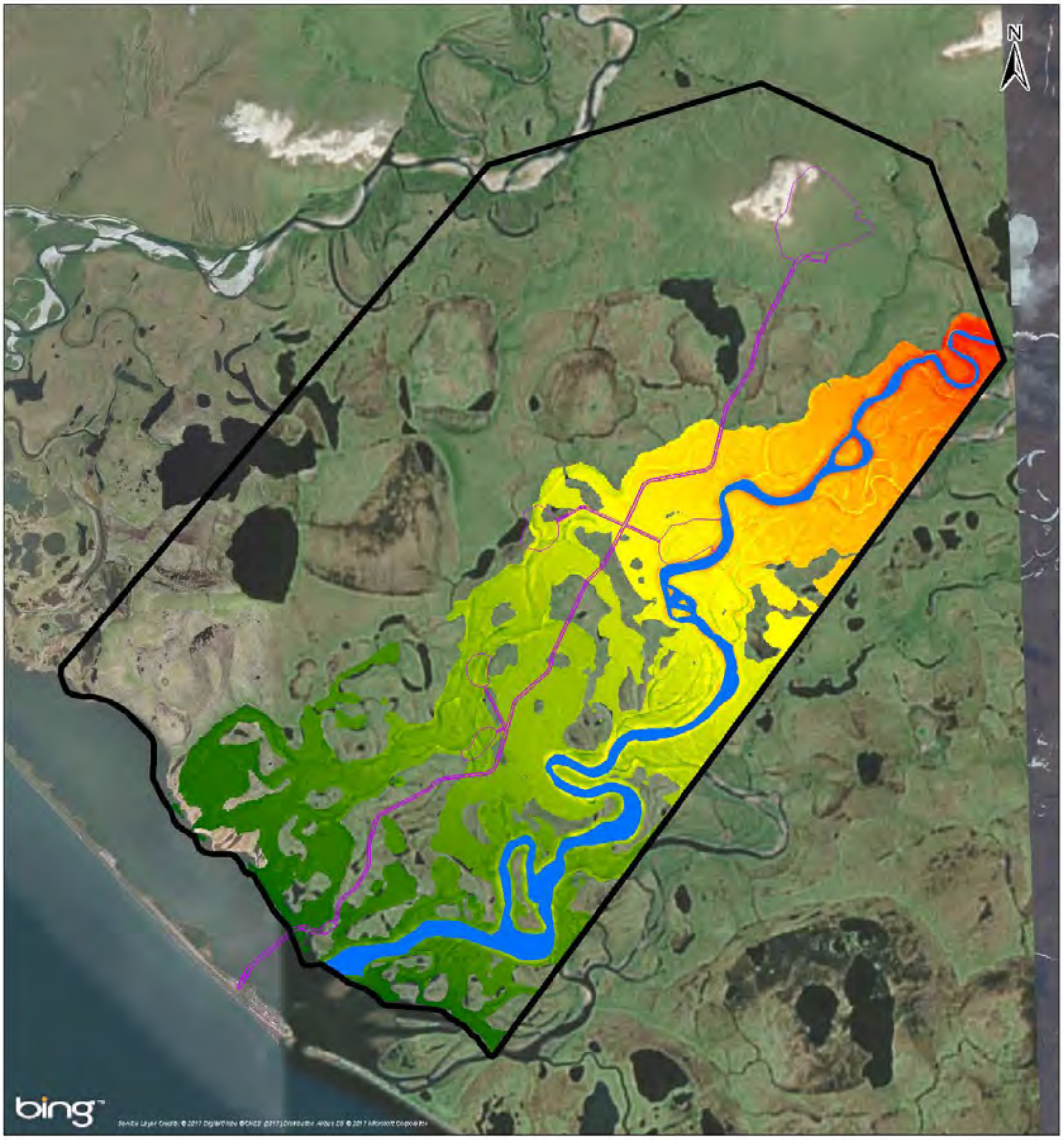

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1:70,000 (at original document size of 8.5x11)

Legend

LiDAR extent	
Wulik River	
Project Footprint	

Water elevation above NAVD88 datum (ft)

- 5 - 10
- 10 - 15
- 15 - 20
- 20 - 25
- 25 - 30
- 30 - 35
- > 35

Stantec

Figure No.
5

Title
Scenario II
(assuming river channel bottom same as LiDAR elevation lowered by 10ft with a water level of 4.5ft at the Lagoon)

Notes
1. Coordinate System: NAD 1983 StatePlane Alaska 8 FIPS 5008 Feet
2. Base features provided by State of Alaska Department of Transportation and Public Facilities
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Table 1: Project Footprint in the Model Domain affected

Scenario	Project Footprint within the Floodplain (sqft)	Project Footprint within the Floodplain (acres)	Percent Project Footprint within the Floodplain
Scenario I	9,859,697	226.4	47.2
Scenario II	8,562,745	196.6	41.0

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Technical Memorandum

To:	Jonathan Hutchinson, PE (ADOT&PF)
From:	Harvey Smith, PE (HNS) and Kim Nielsen, PE (R&M)
Subject:	Kivalina Lagoon Crossing Design Water Levels and Sedimentation Characteristics
Date:	9/7/17
Project #:	R&M Project # 2485.01

This memo is intended as internal communication to design and environmental team members for the Kivalina Lagoon Crossing project to provide a summary of discussions and recommendations on the design water level and sedimentation characteristics for the proposed project. Additional information can be found in the memorandum dated May 22, 2017 which outlines our review of the "Kivalina Lagoon Crossing Planning Assistance to State, Causeway and Bride Design Report" (USACE, June 2016).

Design Water Elevation:

The primary purpose of the road project, as described by the US Army Corps of Engineers (USACE) and others, is to "Allow residents of Kivalina to evacuate the barrier Island where they are located in the event of a storm that threatens to overtop the island". The elevation of the island at the location of the community varies between +10 and +11 feet (MLLW).

The USACE report did not identify a design high water condition that would require evacuation of the village. They did, however, calculate a 100 year (1% annual probability) high water elevation equal to +7.3' (MLLW). This surge elevation may result in some erosion and could threaten some nearshore infrastructure but would not threaten human life and would not "overtop" the island. The conditions that would overtop the island and threaten human life would be somewhat greater than the USACE's estimated 100 year event. Note: a 7.4' surge event occurred in 2011. This exceeded the 100 year event and there was no report of significant damage.

Since the USACE report did not address a design high water condition, particularly the one that would "overtop" the island and require evacuation, I performed an independent check on design conditions. The USACE estimate of 7.3' for a hundred year event was taken from Chapman et.al. "Storm Induced Water Level Prediction Study for The Western Coast of Alaska", 2009. The methodology from Chapman appeared reasonable from an academic standpoint, however, it estimated a 100 year event based on only four years of data. It is not recommended practice to predict a 100-year event based on such a small period of data. Although we have to work with what is available, it should be noted that at least 30-years of data is industry standard practice for such a prediction. There is now more than 12 years of data, including an event exceeding the 100 year prediction, so an updated hindcast was in order. Using similar methods as the USACE, an updated hindcast using current data would increase the 100 year event to roughly 8.5 feet. For the same reason, this should also be considered with some caution and adjusted based on engineering judgement. A surge to this elevation could cause significant damage along the seaward shoreline of the village and would probably initiate an evacuation. Waves may be running up into the village but structures along the lee side of the village would probably remain intact and provide shelter to the community.

Because the greatest need for the road will be when the 100 year surge event is exceeded, and because of the insufficient amount of historical data available for hindcasting, it is recommended that an event closer to a 500 year recurrence be selected for design. This will bring the design elevation up to 9.6' MLLW adding roughly one foot to the 100 year event. Note that these estimates have a wide confidence band due to the small data set used for the hindcast. Due to uncertainties in the estimate, rounding the 500 year surge elevation up to 10' is reasonable.

The road elevation of 15' MLLW was originally based on a 500 year event with a 3 foot significant wave height. For runup and overtopping on a road an H2 (2% of highest waves) is normally recommended as a design wave. This would add about 4.5 feet to the 10 foot design surge. A typical causeway structure would more appropriately be designed for a significant wave or an H10 wave depending on engineering judgement. However, given the life-safety critical nature of this causeway, one could also consider using H1 (highest 1%). It should be noted that the armor design, including slope, layering, and permeability will have an effect on runup so some flexibility can be incorporated into the road surface elevation.

Sedimentation in Lagoon

In earlier studies, years ago, it was believed that sediment being carried down the Kivalina and Wulik rivers was being deposited in the lagoon. With more recent surveys and photography, including google earth it can be seen that the river sediments, particularly bed load, simply pass through the lagoon and are deposited on the outer shoreline. This is particularly significant with respect to the long term stability of the village. If the river sediments were deposited into the lagoon then the community would be more vulnerable to long term erosion as most studies have reported. With the river sediments deposited on the outer beach the erosion and accretion of the barrier island, including the village, will remain more in a balanced equilibrium.

The most dynamic part of the littoral system are the two inlets that correspond with the rivers. These inlets are constantly shifting in response to river flow, longshore transport of sediments along the outer beach which are driven by waves, and the equilibrium cross section that responds to the flood and ebb of tidal surges. Normally the inlets are in balance with the river flow and would have a similar hydraulic radius. However, when a storm surge occurs, there is a large inward flow and the inlets will scour out to accommodate the required surge volume. The discharge (Q) through the entrances can be roughly estimated by the area of the lagoon multiplied by the time rate of change of the water surface. It has been observed that significant storm surges at Kivalina rise at about half a foot per hour. The lagoon is roughly 10 miles long and 1 mile wide (assuming a small amount of overland flooding). Calculating the combined Q through the two inlets for a surge rising at 6 inches/hour flooding ten square miles the combined discharge would be on the order of 38,000 CFS. Or about 19,000 CFS if the inlets were in balance. The discharge would also need to consider river flow. This would be subtracted on the flood and added on the ebb. Since the inlet cross-sections appear to be on the order of 1000 square feet during non-surge conditions it can be seen that there will be significant widening and deepening through scour to bring the equilibrium cross section into balance with the velocities. The greatest scour may occur during the ebb phase of the surge when the lagoon is draining due to the added discharge from the rivers and flow is more channeled. It also depends on the time rate of change of the water surface outside the lagoon. (This is typically the primary boundary condition in computer models). The channel that the causeway is crossing is a result of scour from the ebb portion of the surge. Typically it would have little to no flow except during large surge events. These drainage channels are characteristic of any area that has wide mud flats and large tides (such as upper Cook Inlet). The drainage channel will be most pronounced at the seaward end. Their depth, relative to the surrounding bottom, diminishes to zero moving landward or, in the case of the Kivalina, moving farther into the lagoon.

With two separate and independent inlet and river systems, a restricted barrier placed across the lagoon such as a solid causeway, a hydraulically permeable causeway, or a restricted causeway with a bridge or culvert should not have a large detrimental effect on the lagoon. Whatever is constructed will cause the inlet and river systems to adjust to a new equilibrium. Because the causeway would be aligned slightly south of the "stagnation zone" the northern inlet may widen and deepen slightly more during surge events; on the other hand, the entrance at the village would be slightly less responsive providing greater protection against scour to the USACE's rock revetment. The inlet hydraulic radius at the village would remain similar to that of the Wulik River and would be less dynamic than it is currently.

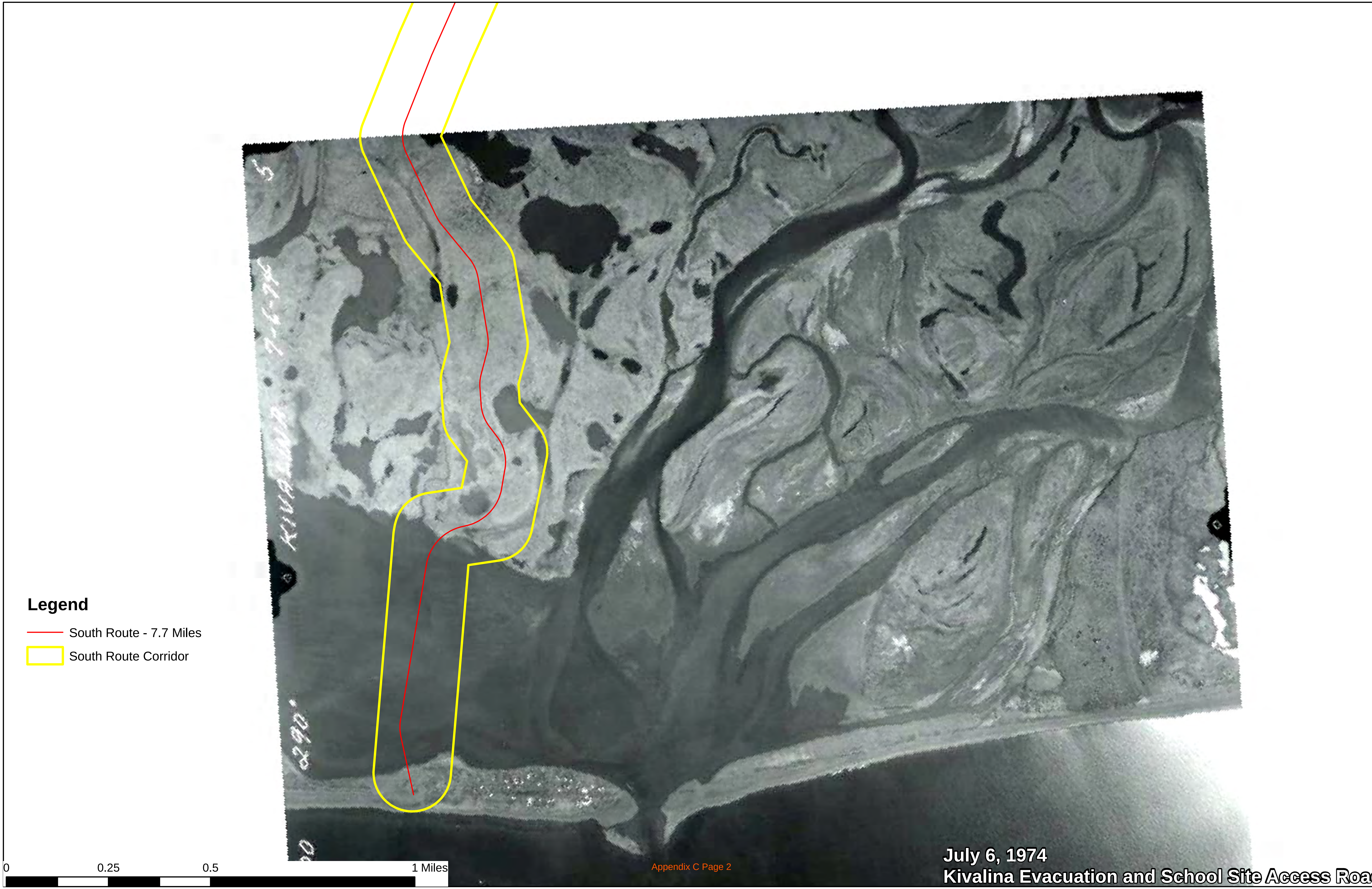
The USACE PAS study provided diagrams of the flow conditions as predicted by the ADCIRC computer model. The model was based on a fixed bed analysis so inlet responses to tidal surges could not be modeled. The response of the inlets to tidal surges is the most dynamic part of the system and is critical to understanding the equilibrium condition that will result from a causeway crossing. The results of the ADCIRC model, as interpreted by the USACE, showed that a 3-span bridge would be required to avoid scour at the piers. However, interpreting the model output using continuity and a sediment budget approach shows that the shallow portions of the lagoon would be severely eroded and the material would be deposited at the pier location in the deeper channel. I believe the conclusion was that the model was intended for larger scale circulation and was not appropriate for evaluating scour. With the uncertainties in erosion at the causeway, a solution that is less sensitive to scour should be considered and a much smaller span may be sufficient.

APPENDIX C

HISTORIC AERIAL PHOTOGRAPHY – WULIK RIVER MOUTH

Page


Legend
South Route - 7.7 Miles
South Route Corridor
0
0.25
0.5
1 Miles
July 13, 1952
Kivalina Evacuation and School Site Access Road


Legend
South Route - 7.7 Miles
South Route Corridor
0
0.25
0.5
1 Miles
July 6, 1974
Kivalina Evacuation and School Site Access Road


Legend
South Route - 7.7 Miles
South Route Corridor
0
0.25
0.5
1 Miles
July 1980
Kivalina Evacuation and School Site Access Road

Legend
South Route - 7.7 Miles
South Route Corridor
0
0.25
0.5
1 Miles
July 19, 2003
Kivalina Evacuation and School Site Access Road

Legend
South Route - 7.7 Miles
South Route Corridor
0
0.25
0.5
1 Miles
July 4, 2006
Kivalina Evacuation and School Site Access Road


Legend
South Route - 7.7 Miles
South Route Corridor
0
0.25
0.5
1 Miles
July 19, 2016
Kivalina Evacuation and School Site Access Road

APPENDIX D

PUBLIC INVOLEMENT RECORDS

Page

STATEMENTS OF PROJECT SUPPORT

DISTRIBUTION OF DRAFT EA

COMMENTS ON DRAFT EA

HAND WRITTEN COMMENTS ON DRAFT EA

Fairbanks News Miner

AFFIDAVIT OF PUBLICATION

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STATE OF ALASKA } **SS.**
FOURTH DISTRICT

Before me, the undersigned, a notary public, this day personally appeared Jenny Nance **, who, being first duly sworn, according to law, says that he/she is an Advertising Clerk of the Fairbanks Daily News-Miner, a newspaper (i) published in newspaper format, (ii) distributed daily more than 50 weeks per year, (iii) with a total circulation of more than 500 and more than 10% of the population of the Fourth Judicial District, (iv) holding a second class mailing permit from the United States Postal Service, (v) not published primarily to distribute advertising, and (vi) not intended for a particular professional or occupational group. The advertisement which is attached is a true copy of the advertisement published in said paper on the following day(s):**

November 12, 2016

Remote Solutions

Acct # 9010

Ad # 38412

Kivalina Evacuation & School Access Road (Project No. 0002384)

and that the rate charged thereon is not excess of the rate charged private individuals, with the usual discounts.

Jenny Nance

Subscribed and sworn to before me on this 14 **day of** Nov **, 20**16

[signature]

Notary Public in and for the State Alaska.

My commission expires DEC 7, 2017

NOTARY PUBLIC
M. BURNELL
STATE OF ALASKA
My commission Expires December 7, 20____

Kivalina Evacuation and School Access Road (Project No. 0002384)

The Alaska Department of Transportation and Public Facilities (DOT&PF) and the Federal Highway Administration (FHWA) in partnership with the Northwest Arctic Borough and the Community of Kivalina are proposing a project to improve community safety in Kivalina, Alaska by providing an evacuation road between the community of Kivalina and a new school, located at a proposed site on Kisimigiuqtuq Hill (K-Hill). Proposed project components include:

- Construction of a bridge and/or causeway across Kivalina Lagoon. Concepts being evaluated include construction of an earthen causeway across the lagoon with varying hydraulic and boat passage options such as a bridge and/or culverts.
- Construction of an all-season gravel access road. The evacuation and school access road would be designed to accommodate both general purpose and emergency evacuation vehicles and include a single travel lane with turnouts at specified locations.

DOT&PF is conducting formal scoping to support preparation of an environmental document for the proposed project in accordance with the National Environmental Policy Act (NEPA). DOT&PF is planning upcoming public meetings in the communities of Kivalina, Noatak, and Kotzebue. These meetings are an important part of the formal NEPA scoping process. A detailed summary of the currently proposed alternatives, as well as supporting studies will be presented at the public meeting. Project team members will be available to discuss the proposed alternatives, answer questions, and document public comments.

Your input at this time is important.

Join us for an Open House Meeting in Noatak:

Arctic Sounder

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NORTHERN REGION
Design and Engineering Services

2301 Peger Road
Fairbanks, Alaska 99709-5316
Main: 907-451-2273
TDD: 907-451-2363
Fax: 907-451-5126

November 10, 2016

Dear Project Stakeholder:

Re: Kivalina Evacuation and School Site Access Road
0002384/NFHWY00162
Request for Scoping Comments

The Alaska Department of Transportation and Public Facilities (DOT&PF) and the Federal Highway Administration (FHWA) in partnership with the Northwest Arctic Borough (NAB), Native Village of Kivalina, and the City of Kivalina, are proposing to improve community safety in Kivalina, Alaska by providing an evacuation road between Kivalina Island and a school to be constructed by the NAB that would also serve as a safe emergency evacuee assembly site on Kisimigiuqtuq Hill (K-Hill). Kivalina is located on the southeast tip of a 5.5-mile long barrier island, located between the Chukchi Sea (Arctic Ocean) and Kivalina Lagoon approximately 80 miles northwest of Kotzebue.

DOT&PF is conducting formal scoping to support preparation of an environmental document for the proposed road project in accordance with the National Environmental Policy Act of 1969 (NEPA), as amended. Please identify any environmental, cultural, historic, or subsistence resources you believe may potentially be impacted by the proposed project, and provide any other information you deem valuable to the environmental documentation process. Your responses will help provide us with the necessary inputs to develop and design a proposed final project that avoids and minimizes as many potential adverse environmental and human impacts as possible.

Background

The community of Kivalina has been working for decades with a variety of local, state, and federal agencies to address threats of coastal erosion and flooding. Numerous study, concept, and planning documents exist on potential solutions, which range from: erosion protection around the city; to relocation of the entire community; to a new mainland site. Options involving community relocation have been problematic, as they are neither culturally preferable nor fiscally practical in the foreseeable future. Accordingly, Kivalina has turned to a locally approved approach of facilitating a safe, reliable, and direct means of community evacuation to an acceptable mainland location on K-Hill.

Project Location

The proposed road project origin would be at the City of Kivalina, which lies within the Kotzebue Recording District and is located in Section 21, Township 27 N, Range 26 W, of the Kateel River Meridian. The desired project terminus at K-Hill is located in Section 19, Township 28N, Range 25W, of the Kateel River Meridian. The feasibility of several potential route alignments is currently being evaluated within a project study area encompassing Kivalina Island, the southern portion of Kivalina Lagoon, and the lower Wulik and Kivalina River drainages in Townships 27N and 28N, Ranges 25W, 26W and 27W of the Kateel River Meridian (Figure 1).

Purpose and Need

The Kivalina Evacuation and School Site Access Road project would provide Kivalina residents a safe and reliable evacuation route in the event of a catastrophic storm or ocean surge, allowing evacuees to mobilize to safe refuge at a site on K-Hill also dedicated by the NAB as the preferred new location for the community school. Upon its anticipated construction, the school will augment the undeveloped evacuation site by serving as a full-service community emergency shelter with all-season, longer-term support capabilities.

Recent climate data has indicated that arctic sea ice is forming later in the season, increasing fall and winter storm duration and intensity along the Northwest Arctic coast. Consequently, residents of Kivalina face significant and increasing risks to safety, life and property by storm systems predicted to further intensify over time. The need for a concerted effort to mitigate these risks became more evident during an evacuation event in October 2007 when debris-laden storm waves overtopped the barrier island.

To facilitate community safety in the face of this increased threat, Kivalina needs a safe, stable, and reliable evacuation infrastructure (routing, transportation, shelter) in the event of impending catastrophe. To provide the routing component of this infrastructure will require construction of a road facility over a safe route that allows emergency response vehicles to access a secure location capable of supporting evacuees in times of need.

Proposed Action

Within the project study area, DOT&PF and FHWA are currently reviewing the feasibility of three existing, preliminary route options independently proposed by Kivalina and the NAB (Figure 2). While these routes may provide a useful basis for alternative development during NEPA documentation, additional draft alternatives are anticipated to be identified and considered as a consequence of agency and public scoping. Common to all anticipated alternatives will be the requirement to support the following actions:

- **Establishment of a safe, reliable, all-season Kivalina Lagoon crossing during evacuation mobilization.**
    - Concepts previously studied for their feasibility include construction of an earthen causeway across the lagoon that variously incorporates hydraulic and boat passage options including bridge(s), culvert(s), or both.

- **Construction of an all-season gravel access road between Kivalina Island and the desired K-Hill evacuation site**.

- The road would be designed to accommodate both general purpose and emergency evacuation vehicles over a two-way road with shoulders, multiple turnouts, and safe side slopes that include guard rails or other safety features as required.

- Over the last decade, Kivalina and the NAB have evaluated the feasibility of numerous local road routings that could potentially provide for evacuation, school access, or material site development. Evacuation routes considered to date by Kivalina and the NAB have included:

  - An alignment referred to as a *Northern Route* approximately 9.1 miles in length that would originate at the south end of the Kivalina Airport runway, parallel the runway on its east side northward for approximately 1.5 miles, cross the lagoon eastward via a causeway and/or bridge, and follow high ground between the Wulik and Kivalina Rivers to its terminus at K-Hill.

  - An alignment considered a *Southern Route* approximately 6.9 miles in length that would begin at the south end of the Kivalina Airport runway, immediately cross the lagoon eastward via a causeway and/or bridge, and follow lowlands and relic channels of the Wulik River to K-Hill.

  - A *Combined Route* approximately 8.6 miles in length that would follow the Northern route before merging with the Southern route via a one-mile long connecting segment.

- **Identification of Material Sources:** Although project materials would be specified as contractor furnished and development of material sources would not be included in the Proposed Action, analyses of material locations proximate to potential routes would be conducted to determine their feasibility and evaluate environmental impacts of their development. Four locations in the project study area known to contain potentially viable project materials, and currently being evaluated by Kivalina and the NAB, include:
  - *K-Hill*: K- Hill geology is characterized by exposed limestone and rock rubble at the ground surface. It is anticipated that below the surface, larger frost-fractured rocks and boulders may also exist.

  - *Wulik River Deposition Zone*: The Wulik River Deposition Zone is characterized by visible gravel bars and beaches along the river banks that would contain suitable materials to construct the proposed project.

  - *Wulik River Relic Channel*: The Wulik River Relict Channel is characterized by visible gravel and sand at the ground surface. The fluvial material in these areas was likely deposited when the Wulik River was located north of its present location.

  - *Kivalina River Deposition Zone*: The Kivalina River is also being evaluated for potential material sources due to the areas visible on gravel bars and beaches that appear to contain suitable material.

To provide you with additional information of project interest, we have made a substantial document cache of previous studies and assessments on the project area, potential development projects at Kivalina, and various natural resources available on the DOT&PF project website at: http://dot.alaska.gov/nreg/KivalinaEvacRd.

Based on additional agency and public input, engineering and environmental analyses and evaluations, and the application of regional Traditional Knowledge, DOT&PF intends to identify issues of environmental, technical and cultural concern, refine the project scope as necessary, and through evaluation of qualified potential routes develop a preferred project alternative that minimizes human and environmental impacts while meeting project purpose and need.

We respectfully request your written comments no later than December 12, 2016. Please mail them to: DOT&PF Attn: Sarah E. Schacher, P.E., 2301 Peger Road Fairbanks, AK, 99709; or you may e-mail comments to me at sarah.schacher@alaska.gov.

Thank you for your attention to this request. If you have any questions regarding the proposed project, please contact me at (907) 451-5361.

Sincerely,

Sarah E. Schacher, P.E.
Preconstruction Engineer

Enclosures: Figure 1 – Location & Vicinity Map
Figure 2 – Study Area and Potential Routes

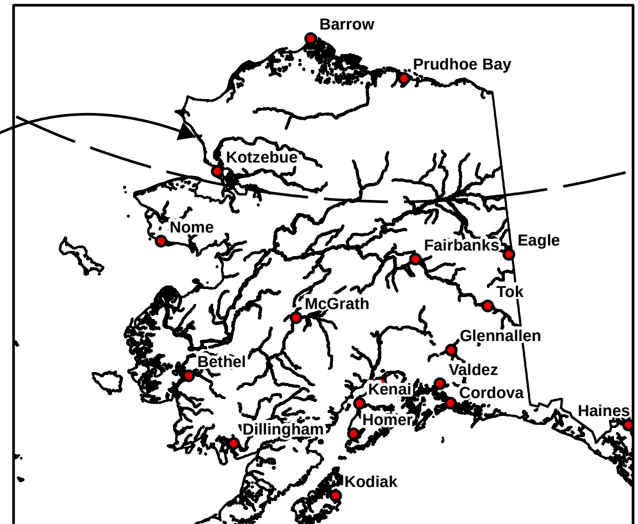
pk/lmc

Distribution by email:

Mayor Vernon Adams, Sr., Native Village of Noatak
Heidi Drygas, Commissioner, Alaska Dept. of Labor & Workforce Development
Millie Hawley, Tribal President, Native Village of Kivalina
Stanley Hawley, Tribal Administrator, Native Village of Kivalina
Dr. Michael Johnson, Commissioner, Alaska Dept. of Education & Early Development
Linda Lee, Secretary, NANA
John Lincoln, Board Chairman, Maniilaq Association
Tim Mearig, P.A., Facilities Manager, Alaska Dept. of Education & Early Development
Janet Mitchell, City Administrator, City of Kivalina
The Honorable Lisa Murkowski, United States Senate
Dr. Annmarie O'Brien, Superintendent, NAB School District
The Honorable Donald Olson, Alaska State Senate
Mayor Clement Richards, Sr., Northwest Arctic Borough
Sandy Shroyer, President, NAB School District
Tim Schuerch, President, Maniilaq Association
Nicole Stoops, Executive Director, Native Village of Kotzebue
The Honorable Dan Sullivan, United States Senate

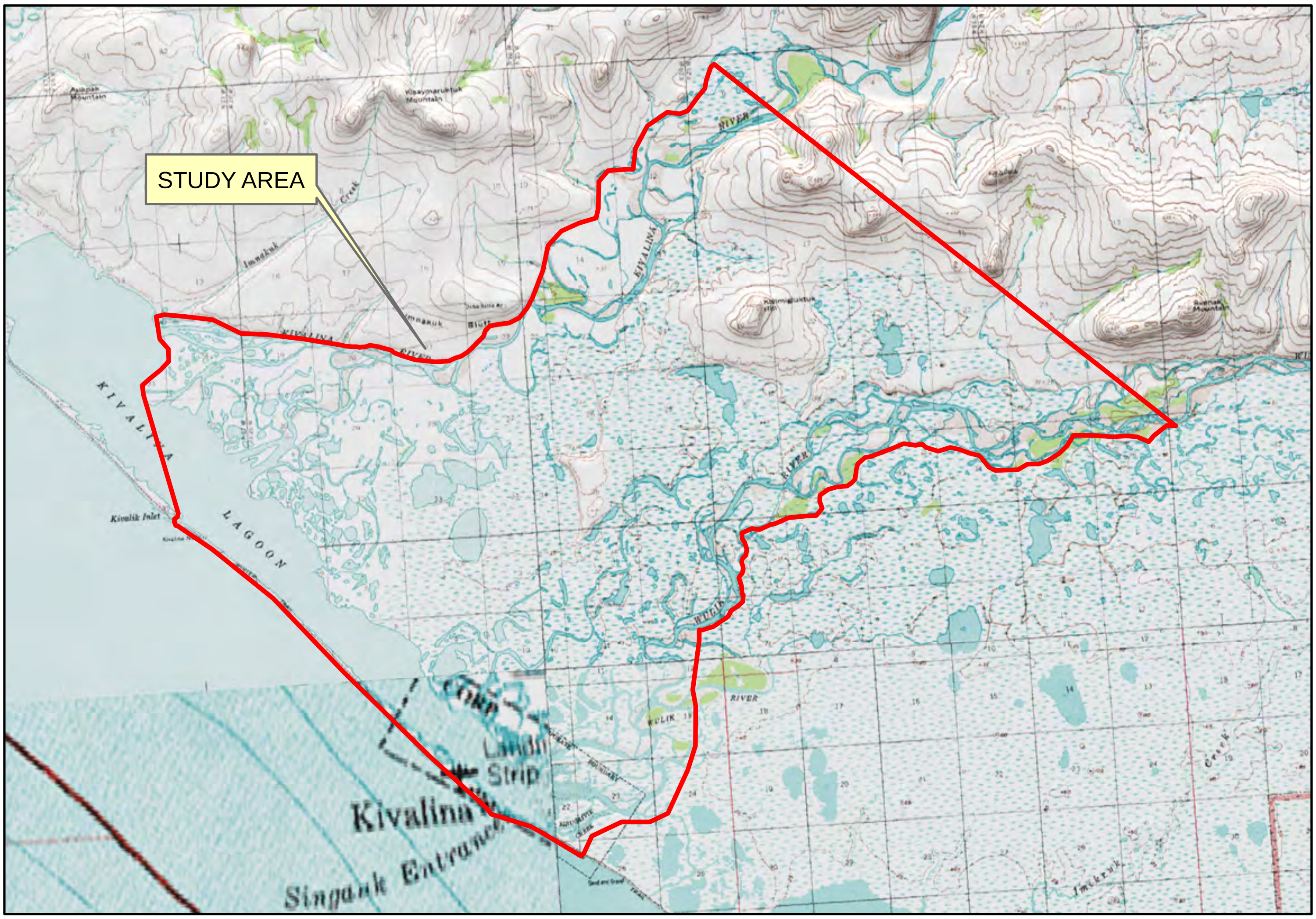
Mayor Austin Swan, City of Kivalina
Herbert Walton, Tribal Administrator, Native Village of Noatak
Representative-Elect Dean Westlake, Alaska State House of Representatives
Wayne Westlake, President/Chief Executive Officer, NANA
The Honorable Don Young, United States House of Representatives

PROJECT LOCATION



LOCATION MAP

NO SCALE



Northwest Arctic Borough
Alaska Department of Transportation
and Public Facilities - Northern Region

Location & Vicinity Map
Project Number: 0002384/NFHWY00162

DATE: November 2016	FIGURE 1

0 1.25 2.5 5 Miles

NOTES:

*Access routes shown are from "Evacuation and School Access Road Project, Kivalina, Alaska, Route reconnaissance Study, submitted to Native Village of Kivalina, submitted by WHPacific (revised June 2014).

The imagery background is WV-2 satellite imagery from July 2016.

Legend

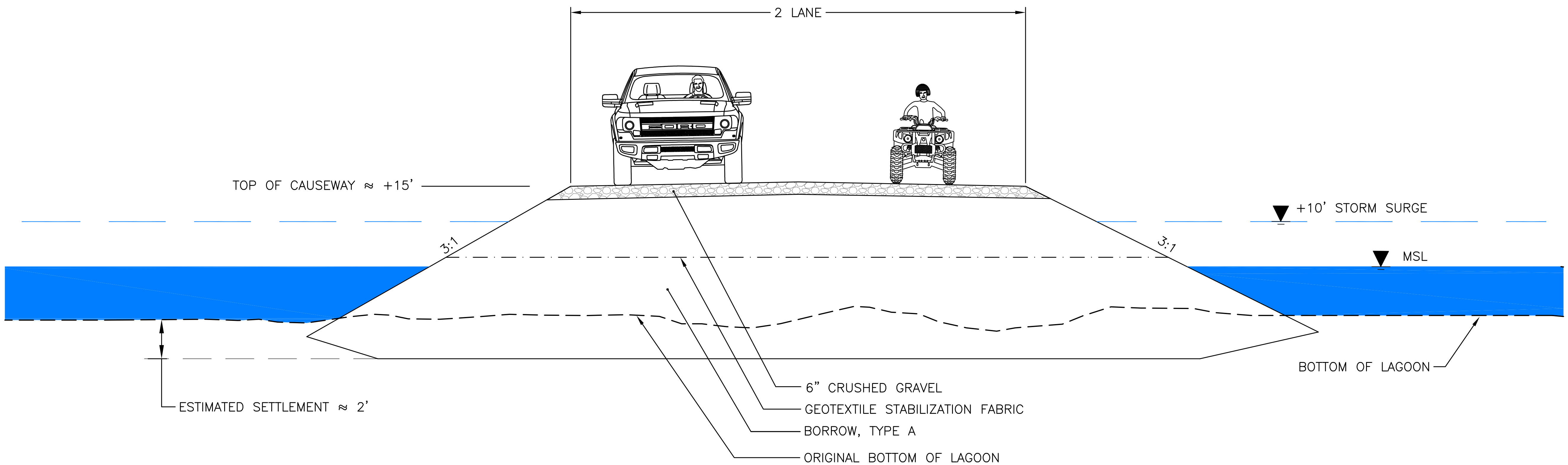
- North Access Route*
- Combined Access Route*
- South Access Route*
- Native Allotments
- Potential Material Sources
- Project Study Area

0 0.5 1 2 Miles

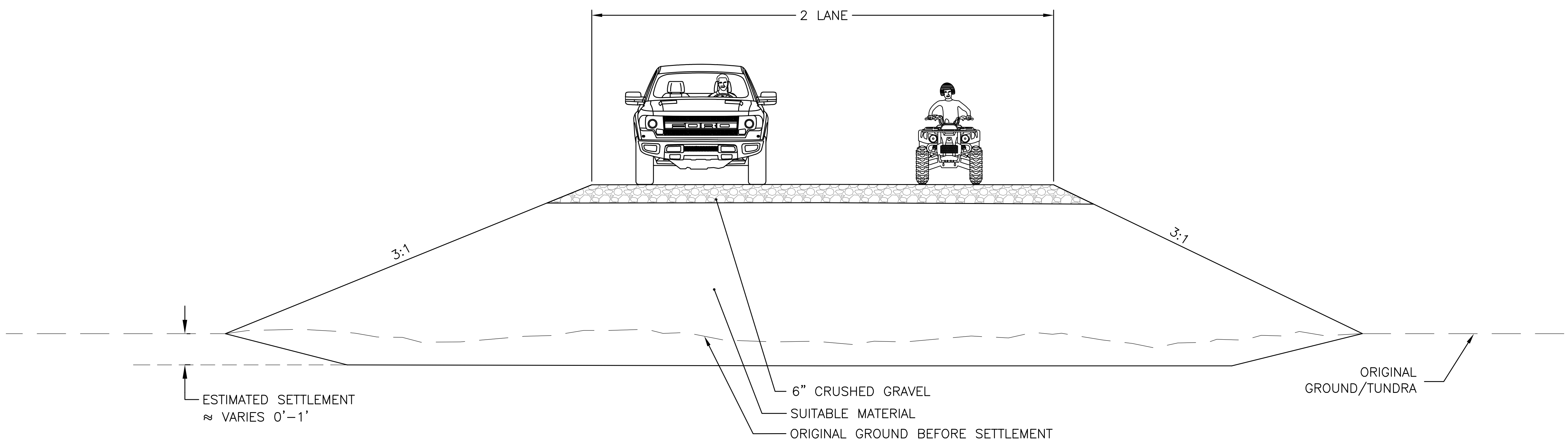
DATE: November 2016

FIGURE 2

STUDY AREA AND POTENTIAL SITES
PROJECT NUMBER: 0002384/NFHWY00162



CAUSEWAY TYPICAL SECTION (LAGOON CROSSING)



UPLAND/WETLAND TYPICAL SECTION

KIVALINA EVACUATION AND SCHOOL SITE ACCESS ROAD

Fall 2016 Public Meetings – Kivalina, Noatak, Kotzebue

Kivalina Evacuation and School Site Access Road / Public Meeting Summaries

Date/Place:	November 15, Kivalina, Kivalina School Gym November 16, Noatak, Noatak IRA Building November 16, Kotzebue, Northwest Arctic Borough (NAB) Chambers
Attendees:	See Attached Sign-in Sheets
Distribution:	Ryan Anderson, Department of Transportation and Public Facilities (DOT&PF) Sarah Schacher, DOT&PF Paul Karczmarczyk, DOT&PF Johnathan Hutchinson, DOT&PF Katherine Keith, Remote Solutions John Baker, Remote Solutions Millie Hawley, Kivalina IRA Council Sara Lindberg, Stantec Andrew Niemiec, Stantec

Meeting Overview:

The DOT&PF proposes to construct a road from Kivalina to a safe location at the proposed Kivalina school site on the mainland. The Kivalina Evacuation and School Site Access Road Project (project)team presented the project to the communities of Kivalina, Noatak, and Kotzebue. The meetings goal was to present the project and gather comments. The meetings were held in an open house format to allow for ample interactive discussions with the project team. A table of comments and responses for each meetings location is below. The following agenda topics were discussed at each community:

<u>Introduction, Purpose and Need, Background and Overview – Millie Hawley and John Baker</u>

- Introduced project team present.
- Discussed project history and DOT&PF, NAB, and the Kivalina community partnership.
- Discussed funding from federal and state agencies, and local project contributions.

<u>Overview of National Environmental Policy Act (NEPA) Process – Paul Karczmarczyk</u>

- Explained NEPA process and mechanics.
- Discussed importance and timing of community input during the NEPA process.

<u>Work Completed to Date – John Baker</u>

- Introduced study area, and routes previously studied by NAB and the Kivalina community (southern, northern, and combined routes).
- Acknowledged southern route as the Kivalina community selected route.
- Presented engineering, geotechnical, and environmental studies completed to date.

<u>Purpose and Need, Project Description – Ryan Anderson and Sarah Schacher</u>

- Explained the project's purpose and need, and how the community's previous work fits into the DOT&PF process.
- Discussed importance and uniqueness of the partnership--projects where everyone comes together are the most successful.

- Discussed importance of community involvement and contributions in future project scoring for federal transportation funding.
- Explained the DOT&PF project pertains only to the road portion of the project and will cover the following actions:
    - Lagoon crossing – discussed things to consider in design
    - Road construction – discussed two-way traffic and room for pedestrians
- Explained material site selection – sites will be identified but not permitted as part of this work. Material will be contractor supplied.

<u>Environmental Review Completed to Date/Work This Fall – Sara Lindberg</u>

- Discussed the project team is using the studies and evaluations completed to date in the NEPA process.
- Explained previous studies are critically important. The project team will meet with agencies to determine if previous studies are sufficient for permitting or if further information is needed to satisfy NEPA and other environmental compliance requirements.
- Described cultural, biological, and marine mammal work completed this fall.

<u>Project Next Steps – John Baker</u>

- Discussed ability to expedite the project schedule and how valuable previous studies have been to allow winter work to continue without delay.
- Described project next steps:
    - Public and agency scoping
    - Completion of draft Environmental Assessment (EA)
    - Public meeting to discuss EA findings
    - Final EA
    - Detailed design and permitting
    - Construction

Kivalina Comments/Questions Summary:

Meeting Location: Kivalina, School Gym	
Comment/Question	**Response/Next Steps**
Evacuation Route	
If this is to be an evacuation road please build it for that purpose.	The purpose of the project is to construct an evacuation route that will also serve as access to the new school site.
In your studies of the higher and lower routes, did anything change from what was previously proposed?	We are considering the previously proposed routes, and those have not changed. We are also looking at other routes.
Could the road be used as an emergency airplane landing? The runway by the dump is a bird hazard.	No, the road could never be designated as a runway. Runway width requirements are much wider than this road would be.
Is the road going all the way to the mountain, or to the side?	The selected school site is on the side of K Hill. The road would go to the selected school site.
When you go through the process of addressing alternatives, will you come back and go through our comments and how they were addressed?	Yes. DOT&PF will return to the community often to provide updates during the alternative analysis process. Once we complete our assessment of the reasonable range of alternatives, we will return to gather further input.

Meeting Location: Kivalina, School Gym	
Comment/Question	**Response/Next Steps**
If you are going to build a gravel road it will have to be 15' above the sea level for the storms. (The airport is at 16' msl at centerline, the town is approx. 11-12' msl)	Yes, right now the preliminary concepts show the road at 15'above sea level. We want the road to provide safe travel during a storm surge.
Lagoon Crossing	
The U.S. Army Corps of Engineers (USACE) said they would not build a lagoon crossing because it was too expensive. How did this project get to this point given that response?	The USACE design focused on the lagoon crossing and estimated cost at $80M. The DOT&PF project is evaluating more economical designs for the lagoon crossing and road. DOT&PF will evaluate the feasibility of this project based on similar designs in other locations like Kotzebue and we believe it is feasible.
Will there be a causeway/bridge or something different? Is a causeway the only solution? Could you build a bridge all the way across?	DOT&PF is looking at multiple options for the lagoon crossing. There may be a combination of both design elements. We are currently evaluating feasibility of multiple options.
The best option would be a bridge instead of gravel. What if the gravel washes away? Who will pay for the maintenance?	DOT&PF will evaluate both bridge and causeway options to find the most practicable solution to meet the purpose and need of the project. The selected option would be designed to withstand storm surge events. For regular maintenance, we are looking for someone to take on those activities for the road and crossing.
In the springtime ice comes down from the river and would hit the bridge or gravel causeway.	Thank you for your comment. We will be looking at ice effects as part of the design and environmental process.
Most of the storm surges happen at night. It would be good to have the causeway located close to town.	The purpose of this project is to provide direct and reliable access. A crossing that is closer to the community would be more direct than others.
Make sure when you do your studies that you consider all seasons. Make sure the lagoon crossing and the road can stand up in all seasons.	These are considerations that we are looking at. We want to be sure the road is high enough where it doesn't flood, and the design takes snow drifting and ice into consideration.
Is it possible to build a barge landing into the project? Last fall the swells were too high and the barge couldn't make it in.	A barge landing may be required for construction but a permanent landing is not part of this project.
Has anyone conducted studies of the water level in the fall when it is the highest?	There have been numerous storm surge water level studies in the Kivalina area, and we will evaluate them.
Transportation Options	
Discussions are needed on what types of vehicles will travel along the road. How will kids get to school? Be sure to include the Kivalina community in discussions of road needs.	Transportation options are an important aspect of the NEPA review process. We would like to hear community transportation needs for the school to help inform the road design. There will be many questions about transportation as we go through this process and DOT&PF wants to hear about community needs.

Meeting Location: Kivalina, School Gym	
Comment/Question	**Response/Next Steps**
Will this project consider transporting children and the elderly in poor weather? How will the road be designed to accommodate conditions encountered during an evacuation?	Community transportation needs will be addressed during this process. Please tell us what you will need for transportation to evacuate. The partnership between the NAB, DOT&PF, and the community will allow a more comprehensive forum to hear your needs for things that the DOT&PF project may not cover like vehicles.
School Site	
On January 3, 2012, the community voted on the selection of the school site. There have been resolutions from the City and the IRA supporting both the road and the school project.	This project is evaluating route options from Kivalina to the proposed school site. This will be an evacuation road and the school will also double as the evacuation shelter for the community. DOT&PF's goal is to identify the best route to K hill and they have federal money to move it through the environmental process.
Has the school been funded already?	Yes.
Environmental /NEPA	
How long will it take to get through the environmental process?	If an EA, 6-8 months, depending on the feedback we get from the regulatory agencies and the community.
What is the difference in timeline between an EA and an EIS?	An EIS could take 1-2 years.
Can we get copies of the studies done this summer?	Yes, available studies will be posted on the DOT&PF project website. You can also look on *www.kivalinaroad.org* for information as well.
Did you see the seal up river?	No, but we heard some seals go up the Kivalina River.
The road will have lots of uses – subsistence, commercial activities, etc.	Existing and future uses of the area as well as secondary uses of the road will be included in the environmental document. Thank you for your comment.
Is the Borough and DOT&PF looking at all the work that has been completed to date? Have you looked at comments made in the past during this project development? Who has the list of concerns from the community?	DOT&PF will address project concerns and comments as part of the NEPA process. We will consider comments made as part of previous projects if relevant to the current project. It is important we gather community comments on the current project so they can be considered under NEPA.
Are you considering traditional knowledge? In your studies, are you getting the right information on local place names?	Yes, traditional knowledge is an extremely important aspect of this project. Any knowledge that regional residents have regarding place names, important hunting areas, gathering and other activities should be noted. We want to gather this information from you so we can be sure to evaluate options that will work for the community and avoid impacting local areas of importance.
I have a concern about potential future impacts like potential environmental changes and transportation issues.	We appreciate hearing your concerns. We want this road to work for the community now and into the future. Part of the NEPA process looks at how this project could affect the future environment, and how induced impacts and reasonable near future actions may contribute to project impacts.

Meeting Location: Kivalina, School Gym	
Comment/Question	**Response/Next Steps**
Please provide us a chart of comments people have made on this project to date with a list of the answers for each comment. We would also like to see a summary of the work completed to date so we can better provide comments.	That is a great idea. We will complete a project summary and a comment summary for community distribution to help facilitate more meaningful comments. After agency scoping is complete we will speak with Kivalina again about the results of the agency scoping effort, and review some of the comments we received during these public meetings.
Which agencies will be involved in addressing comments?	Agency scoping letters were sent to numerous regulatory agencies with project jurisdiction or interest. Notable agencies include the USACE, U.S. Fish and Wildlife Service, National Marine Fisheries Service, Alaska Department of Fish and Game, and the State Historic Preservation Office.
Funding	
Was federal money approved for this project? Is there funding to build the road?	Yes, for the environmental and preliminary design process. Funding for Construction will be requested.
Do you have to satisfy the national benefit criteria? Do you have to show the project will benefit the rest of the U.S.?	We do not believe that criterion is part of the federal aid program, this project has been approved for State and Federal Transportation Improvement Funds. We will research your question.
Is this project funded out of a general pot of funds, or is it specific to Kivalina?	There is a pot of money per year and the DOT&PF scores each project per project needs and decides which ones get funded. Safety improvement projects score the highest.
If you ask for funding be sure to communicate that the community is flooding with storms we currently are seeing. That should be communicated.	Thank you for your comment. Yes, there is a very real safety need for an evacuation road for the community in the immediate future.
Does some of the land belong to DOT&PF?	Land ownership is either NANA or shareholder allotment land. ROW acquisition will be a part of this project. DOT owns the airport property.
Local Hire	
Local hire – where would I apply? What are the restrictions on local hire?	Procurement laws don't allow us to include preference for local hire and we cannot discriminate based on location. However, once the project is closer to construction we can discuss how to make it easier for the selected contractor to hire locally.
What was the helicopter doing this summer? Did you hire local people?	The helicopter was part of studies conducted including terrain mapping, marine mammal survey, cultural resource survey, and geotechnical investigations. We used local hire for much of the work this fall.
Construction	
How long before you build the road?	The earliest construction date would be 2019.
Once you start construction, which end will be constructed first?	Either end could be constructed first, or both ends at the same time. If construction takes place in the winter, there would be more flexibility.

Meeting Location: Kivalina, School Gym	
Comment/Question	**Response/Next Steps**
Where will the materials/gravel come from?	There are several potential gravel sources being studied. There are three general zones where material could come from: K-Hill, Wulik channel, Kivalina channel, and Wulik relic channels in the center of the study area.
What types of materials could be used to build the road?	Multiple types of materials would be used. Gravel and sand would mostly come from the study area material sites, if feasible. Other material may need to be imported.
Will you put underlayment down before you build the road?	Yes, it would likely be beneficial in most of the project area and evaluated during design.

Noatak Comments/Questions Summary:

Meeting Location: Noatak, IRA Building	
Comment/Question	**Response/Next Steps**
Evacuation Route	
This project isn't just for the families in Kivalina now, but also for their children and their grandchildren. It's important to remember this.	Thank you for your comment.
Do the right studies to understand the project to help build the project, but don't waste money.	Agreed. We are using previously gathered data as much as possible to avoid rework.
In Kivalina, I pack two pairs of clothes each fall and other things so I am prepared for an evacuation. In the fall, we have to always be aware and ready for storms.	There is a great need for this project. Thank you for your comment.
There are behavior problems in Kivalina when people are living in fear of the storms.	Thank you for your comment.
I am asking the NANA Board Members for help.	Thank you. The more local and regional collaboration and cooperation on this project the more successful it will be.
Consider the threat of earthquakes and flooding. Also consider building the road to the port site. Is it farther to K-Hill or the port site?	Earthquakes and flooding will be considered during the process. Building a road to the port an alternative to the school site, but this project's purpose and need is to provide a "direct and reliable" route to a safe evacuation location. A road along the barrier island to the port may not be reliable during a storm surge event, but we will consider it. The community previously considered an inlet bridge, but omitted when a school site was required above the 100-year floodplain.
Can the port site road help with the issues?	The community previously considered an inlet bridge, but omitted when a school site was required above the 100-year floodplain.
Glad to see the project moving, I remember this project from the 90's when Maniilaq was working on it.	Thank you for your comment.

Meeting Location: Noatak, IRA Building	
Comment/Question	**Response/Next Steps**
Thank you for including Noatak in your scoping. We hear first hand of the problems in Kivalina, and communication is very important.	Thank you for your comment.
Every time there is a storm I ask myself will Kivalina be there in the morning? Glad that this project is happening. Move faster!	This is a very important project for the community. Thank you for your comment.
Lagoon Crossing	
The lagoon has ice rich soils down to 20'. I'm skeptical that the lagoon crossing will work. The USACE was not willing to ask for $79M to build the causeway. It's cost prohibitive. The Corps bowed out of the process.	We believe the project is feasible based on similar work in nearby locations like Kotzebue. However, we will be looking at compaction and frozen silt as part of the alternatives evaluation of this project.
Are there different options to get across the lagoon? Barges?	We are looking at several options for the lagoon crossing.
The route straight across the lagoon from Kivalina is the quickest route for evacuation.	Thank you for your comment.
Environmental Process	
Is there a website with all the information?	Yes, DOT&PF has a project website where all project information will be posted. You can go to *www.kivalinaroad.org* to find much of the background information and studies previously completed by others.
EPA has studied the ecosystem in this region for years. This information should be available somewhere. With the very real evacuation efforts that have gone on over time, I would hope people would recognize the need to support this project. For safety reasons, it is important that the evacuation road is constructed.	Yes. The area has been extensively studied and we have useful information for the NEPA process. Right now we are reviewing past studies and conducting agency scoping. We will ask agencies if we have enough information for permitting. Although we have many area studies, there may be additional questions that come up during the NEPA process and we are researching that now.
The entire area has been over-studied.	We intend to use as much past information that we can to minimize further studies. We will talk to the regulatory agencies about their comments and see how much of the past data can be used to permit the project.
School Site	
If the current school location doesn't work, it will be back to square one on finding an acceptable location for the school above the 100 year floodplain.	Yes. Fortunately, the school site has been selected by the community through a vote. The site is set.
If there is funding to build a school, let's build it.	The NAB is working on the school project it has funding available.
The City doesn't choose the school site – the People chose the site.	Thank you for your comment.

Local Hire	
Will there be local hire?	DOT&PF cannot select the contractor based on location or local hire, but with the partnership on this project with the NAB and Kivalina community we have a good opportunity to help facilitate local hire. As we get further along in the process we will return and discuss potential options for local hire.
Construction Materials	
Are the cells at the port site made of the same material that is at Kivalina? Is that an option for the causeway?	We are not sure but that is a great suggestion. We will consider this.

Kotzebue Comments/Questions Summary:

Meeting Location: Kotzebue, NAB Chambers	
Comment/Question	**Response/Next Steps**
Evacuation Route	
How long/wide will the road be?	DOT&PF proposes 2 lanes. Several options for the road length include about 6 miles.
Any idea about what the traffic levels will be on the road? Differences in summer or winter?	The road will be used during the entire school season, and for subsistence uses. The Allotments could be developed if they have road access.
What was the consensus in Kivalina at your meeting yesterday?	The consensus was that this project is greatly needed and they would like the process to move quickly.
Is this the first step to relocating the village? Younger people are excited about the road project to expand. Older people will stay in the village and won't move.	No. There is no consensus about relocation. This road has not been discussed for relocation. This project is not part of the relocation discussions.
Lagoon Crossing	
A main concern of the causeway and bridge is fish. We rely on trout heavily.	Thank you for your comment. Potential impacts to fish from the lagoon crossing and alternative routes close to the rivers will be evaluated.
School Site	
The existing Kivalina School was completed in 1978 – it is overcrowded, there are two trailers outside to accommodate all the students.	Thank you for your comment.
Are there other alternatives if the school project doesn't happen?	Even if the school wasn't built, the Tribe could allocate funds for an emergency evacuation shelter at K-Hill.
Environmental Process	
Are there projects like this that can be covered by an EA with no significant impact? Why?	If the project can avoid and minimize impacts, and avoid significant impacts an EA can cover it. The current EA process will determine project impacts. Communication with resource agencies and the public will identify importance issues early so project design can meet community needs, while avoiding significant impacts to the human and natural environment.

Meeting Location: Kotzebue, NAB Chambers	
Comment/Question	**Response/Next Steps**
Is the Park Service involved in this project?	Yes, the study area overlaps a portion of the Cape Krusenstern National Landmark boundary. We will coordinate with the NPS about this during agency scoping.
Can you share the GIS data?	Yes, we will provide available reports and other data on the DOT&PF project website. You can also go to *www.kivalinaroad.org* for project information and background information leading up to DOT&PF involvement.
When is the next update?	The scoping period ends on December 12th. We could have another update meeting in January.
What is the next step after scoping?	DOT&PF will complete a class of action document, which states whether the project could be covered under an EA or EIS.
Housing in Kivalina doesn't meet any regulations- close to tank farms, the airport is right next to the landfill.	Thank you for your comment.
Construction Materials	
Will there be spur roads to the material sites?	Yes, the construction contractor will develop material sites and possible access routes evaluated for feasibility and environmental impacts during the NEPA process.
Will equipment be dropped off in Kivalina? How will the logistics of building a road work?	Heavy equipment can currently be dropped off at the port site, and driven to Kivalina. Past projects barged equipment directly to Kivalina.
Who owns the land in the study area?	Most of it is NANA lands, with a small portion owned by shareholders.

ALASKA DEPARTMENT OF TRANSPORTATION & PUBLIC FACILITIES

KIVALINA PUBLIC MEETING

SIGN IN SHEET

PROJECT NAME: Kivalina Evacuation and School Site Access Road **DATE: November 15, 2016**
Project No. 0002384/NFHWY00162

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effective: December 2004

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LOCATION: Kivalina

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ALASKA DEPARTMENT OF TRANSPORTATION & PUBLIC FACILITIES

KIVALINA PUBLIC MEETING

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effective: December 2004

PROJECT NAME: Kivalina Evacuation and School Site Access Road
Project No. 0002384/NFHWY00162

DATE: November 15, 2016
LOCATION: Kivalina

NAME (PLEASE PRINT)	**MAILING ADDRESS and *EMAIL**	**PHONE**	***GENDER (M/F)**	***RACE (W, AN, N, B, H, A, P, O)**
Stephen M Koenig	PO Box 50063	907 645 5497	M	AN

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effective: December 2004

ALASKA DEPARTMENT OF TRANSPORTATION & PUBLIC FACILITIES

KIVALINA PUBLIC MEETING

SIGN IN SHEET

PROJECT NAME: Kivalina Evacuation and School Site Access Road
Project No. 0002384/NFHWY00162

DATE: November 15, 2016

NAME (PLEASE PRINT)	MAILING ADDRESS and *EMAIL	PHONE	*GENDER (M/F)	*RACE (see below)
Jolene Wesley	P.O. Box 48	645-5114	F	Eskimo
Loretta Hawley	PO Box 43	645-5420	F	AN
Quun Hawley	P.O box 50026	645-5055	M	Native
Kevin Hawley	P.O. box 50056	645-5152	M	Native
JD Sage	PO Box 50006	645 2340	M	AN
Virgil J. Adams	P.O Box 50074	6455384	M	AN

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effective: December 2004

PROJECT NAME: Kivalina Evacuation and School Site Access Road
Project No. 0002384/NFHWY00162

DATE: November 15, 2016
LOCATION: Kivalina

NAME (PLEASE PRINT)	**MAILING ADDRESS and *EMAIL**	**PHONE**	***GENDER (M/F)**	***RACE (W, AN, N, B, H, A, P, O)**
Louisa Hawley	P.O Box 50026	645-2342	F	AN
Regina Turner	McQueen School	645-2125	F	W
Linda Roberts	McQueen School			
Tasha Knox	P.O Box 50007		f	An
Ray				
Kathy Christy	5172 E. 98th Anchorage	907-223-2999		
Amy Hensley	P O Box 50034 Kvl AK	6455207	F	AN
[illegible] Adams	P.O BOX 50063	645-5497	F	AN
Shield [illegible]	P.O. Box 50071		M	AN

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PROJECT NAME: Kivalina Evacuation and School Site Access Road **DATE: November 15, 2016**

Project No. 0002384/NFHWY00162 **LOCATION: Kivalina**

NAME (PLEASE PRINT)	**MAILING ADDRESS and *EMAIL**	**PHONE**	***GENDER (M/F)**	***RACE (W, AN, N, B, H, A, P, O)**
Reppi Swan	P.O, Box 23 KVL AK 99750	645-5155		
Gloria Adams	PO Box 50073 Kivaline AK 99750	645-5243		

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effective: December 2004

Kivalina Evacuation and School Site Access Road

Project No. 0002384/NFHWY00162

Comments Are Welcome!
Kivalina, Alaska
November 15, 2016

Please take a moment to fill out this comment sheet so that we can respond to your comments. If you do not finish the comment sheet today, please mail to Sarah E. Schacher, P.E., DOT&PF, 2301 Peger Road Fairbanks, AK 99709; or e-mail to sarah.schacher@alaska.gov. Thank You!

Name: Dolly E. Foster Telephone: 907-645-5131 c.

Address: P.O. Box 50074 Kivalina, Alaska 99750-0074

Please add comments you think may be helpful during the design development process. Are there specific elements of the project that you wish to address?

I envision a (2) lane road, for the use for a busing system to and from the school.

*We respectfully request comments by **December 12, 2016** so we may have time to consider and respond to concerns*

ALASKA DEPARTMENT OF TRANSPORTATION & PUBLIC FACILITIES

NOATAK PUBLIC MEETING

SIGN IN SHEET

PROJECT NAME: Kivalina Evacuation and School Site Access Road **DATE: November 16, 2016**
Project No. 0002384/NFHWY00162

NAME (PLEASE PRINT)	MAILING ADDRESS and *EMAIL	PHONE	*GENDER (M/F)	*RACE (see below)
Sara Lindberg	Anchorage	(907)328 6622	F	W
Millie Hawley	P.O. Box 50051 Kivalina 99750	907 645-2153	F	Iñupiaq
JOHN BAKER	Box 312 Kotzebue	412-0910	M	IN
Andrew Niemiec	Anchorage	343-5263	M	W
Vernon Calamas	NOATAK		M	E
Gretchen Booth	Noatak AK	485-2392	F	E

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effective: December 2004

PROJECT NAME: Kivalina Evacuation and School Site Access Road
Project No. 0002384/NFHWY00162

DATE: November 16, 2016
LOCATION: Noatak

NAME (PLEASE PRINT)	MAILING ADDRESS and *EMAIL	PHONE	*GENDER (M/F)	*RACE (W, AN, N, B, H, A, P, O)
Roland Booth	rbooth545@gmail.com		m	
Stanley Hawley	quun43sr@gmail.com	645-5499	M	AN
Alice A Adams ahloolc Allie A Adams Ahlook	Housing #1 Bering St Box 53 KVL 99750	645-5393	F	Esk..
Janet Mitchell	PO Box 76 KVL	6455419	F	Ak Inupiaq
Dolly Sage	P.O. Box 56	485-5175	F	AN.
Caleb P Sage Sr	PO. Box 56	485-5175	M	AN
Janet N Mills	Box 58 Noatak	485-5210	F	AN
Benjamin P. Arnold	Box 28 Noatak	4852123	F	Inupiaq
Victor Onalik Sr	Box 63	485-2321	M	Inupiaq

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PROJECT NAME: Kivalina Evacuation and School Site Access Road
Project No. 0002384/NFHWY00162

DATE: November 16, 2016
LOCATION: Noatak

NAME (PLEASE PRINT)	**MAILING ADDRESS and *EMAIL**	**PHONE**	***GENDER (M/F)**	***RACE (W, AN, N, B, H, A, P, O)**
Joey Walton	PO Box 180	907 485-5382	M	AN
Vincent Onalik Sr	Box 141	4852940	M	AN
Chuck Sage Sr	Box 12	4852059	M	AN
Melford Booth	Box 66	4852117	M	AN
Joseph Luther	Box 53	485-2520	M	A.N
Edith J. Onalik	Box 63	485-2321	F	A.N.
Stella Shy	educationcoordinator@nautaaq.org Box 95, Noatak 99761	485-2244	F	AN
Whitten Burns	Box 57 Noatak	485 [illegible]	M	AN
Frank Onalik Sr	Box 5 Noatak Ak	485-2455	M	Inupiaq

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effective: December 2004

PROJECT NAME: Kivalina Evacuation and School Site Access Road
Project No. 0002384/NFHWY00162

DATE: November 16, 2016
LOCATION: Noatak

NAME (PLEASE PRINT)	**MAILING ADDRESS and *EMAIL**	**PHONE**	***GENDER (M/F)**	***RACE (W, AN, N, B, H, A, P, O)**
Debra Onalik	PO Box 5	485 2455	F	AK Native
Eva Onalik	Box 98 Noatak	485-5444	F	AK Native
Herbert Onalik Jr	Box 23		M	AK NATive

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ALASKA DEPARTMENT OF TRANSPORTATION & PUBLIC FACILITIES

KOTZEBUE PUBLIC MEETING

SIGN IN SHEET

PROJECT NAME: Kivalina Evacuation and School Site Access Road **DATE: November 16, 2016**
Project No. 0002384/NFHWY00162

NAME (PLEASE PRINT)	MAILING ADDRESS and *EMAIL	PHONE	*GENDER (M/F)	*RACE (see below)
Sara Lindberg	Anchorage	907-328-9622		
John Chase	jchase@nwabor.org	442.8212	M	human
STANLEY HAWLEY	P.O. BOX 50026 KIVALINA AK. 99750 quun4355@gmail.com	645-5499	M	ISLANDER
Millie Hawley	PO Box 50051 Kivalina Ak 99750	645-2153	M	Inupiaq
Alice A Adams	Box 53 Kivalina, Alaska	645-2833	F	Inupiaq
Janet Mitchell	PO Box 50079 Kivalina Ak 99750	645-5419	F	Ak Native

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effective: December 2004

PROJECT NAME: Kivalina Evacuation and School Site Access Road **DATE: November 16, 2016**
Project No. 0002384/NFHWY00162 **LOCATION: Kotzebue**

NAME (PLEASE PRINT)	MAILING ADDRESS and *EMAIL	PHONE	*GENDER (M/F)	*RACE (W, AN, N, B, H, A, P, O)
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Justice Hildreth	PO Box 964 Kotzebue AK 99752	412-2013	m	An
[illegible]	PO BOX 361 99752 Kotzebue AK	412-3544	M	AN
MAE MENDENHALL	P.O. BOX 377 KOTZEBUE ALASKA 99752	434 1995	F	AN
Jennifer Tobl	909 W 9th Ave Ste 200 Anchorage, AK 99501	265-3798	F	AN
Andrew Niemiec	Anchorage	343-5263	M	W
Susan Georgette	PO Box 270 USFWS Kotzebue susan_georgette@fws.gov	442-3799	F	W
Bill Carter	PO BOX 270 USFWS Kotzebue bill_carter@fws.gov	442-3799	M	W
Jim Dau	Box 574 Ktz 99752	442-3953	M	[illegible]

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effective: December 2004

PROJECT NAME: Kivalina Evacuation and School Site Access Road **DATE: November 16, 2016**

Project No. 0002384/NFHWY00162 **LOCATION: Kotzebue**

NAME (PLEASE PRINT)	**MAILING ADDRESS and *EMAIL**	**PHONE**	***GENDER (M/F)**	***RACE (W, AN, N, B, H, A, P, O)**
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Angeline Sturm	PO Box 575 Kotzebue AK 99752	907-227-0037	F	AN
John Lincoln	PO Box 456 Kotz, AK 99752	907-444-1655	M	AN

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effective: December 2004

Kivalina Evacuation and School Site Access Road Project

NEWSLETTER

MAY 2017

What's New

Remote Solutions awarded competitive contract to conduct project outreach.

In April 2017 Remote Solutions LLC was selected through a competitive process by the Alaska Department of Transportation and Public Facilities (DOT&PF) to provide community support, public outreach, and logistics coordination for DOT&PF Northern Region projects as needed, including the current Kivalina Evacuation and School Site Access Road Project. Remote Solutions will focus on facilitating community engagement and outreach with the community of Kivalina, surrounding communities, and both private and agency project partners.

John Baker, company President and CEO, is the primary Remote Solutions contact for these efforts. John can be contacted at John@akremotesolutions.com or by phone 412-0910.

NEPA and the Project

What is NEPA?

The National Environmental Policy Act (NEPA) establishes the broad national framework designed to ensure that proper consideration is given to the environment before undertaking any major federal action that may significantly affect the environment.

The Kivalina Evacuation and School Site Access Road Project invokes NEPA due to the Federal Highway Administration (FHWA) funding and required federal permitting.

This spring, the DOT&PF reported that the FHWA determined that the project scope and potential environmental impacts fit the Class of Action criteria for an Environmental Assessment (EA). This is currently being prepared as the necessary NEPA document.

The purpose of an EA is to determine if the Kivalina Road Project, including its efforts to avoid, minimize and/or mitigate impacts, would cause potentially significant environmental effects. The EA will provide a detailed analysis of the project scope and construction methodology, develop draft project alternatives for agency and public review, and provide a comment period during which the public and agencies can potentially modify alternatives to further minimize environmental effects.

The Draft EA is expected to be ready for review by the Federal Highways Administration in the early fall. The Final EA is expected to be completed by December 31, 2017. Based on the EA, the Kivalina Road Project will either be approved through a Finding of No Significant Impact (FONSI) and final design work will be approved and able to commence; or it will reveal that significant impacts may occur and further studies and analyses will be required through the preparation of an Environmental Impact Statement (EIS).

Stantec hired to lead NEPA efforts

In April 2017, a competitive proposal by the engineering and environmental consultant Stantec received the highest score for contract work to complete the NEPA work for the Kivalina Road Project. Stantec is currently finalizing a contract with the DOT&PF and work is expected to begin June 1, 2017. Stantec's involvement will include collecting additional baseline data, conducting biological field studies, assessing cultural and social resources, reviewing construction material sites, and determining the potential cumulative environmental and social impacts of the project. They will be the primary authors of the EA. Kivalina residents and agency offices, as well as other communities in the Northwest Arctic Borough, may be contacted by Stantec as they seek local input on environmental issues and Traditional Knowledge.

Public Involvement

One of the most critical steps in the NEPA process is engaging with the potentially affected public. Remote Solutions will collaborate with Stantec to further build on previous project efforts and to provide additional opportunities for public input and involvement.

Public involvement will occur in the form of community meetings in Kivalina, Noatak, and Kotzebue. Additionally, the project team will maintain close communication with communities using newsletters, social media, and email. Please visit the project website to stay involved.

PROJECT PARTNERS

- Alaska Department of Transportation & Public Facilities, Northern Region
- Native Village of Kivalina
- City of Kivalina
- Northwest Arctic Borough
- Remote Solutions, LLC
- Stantec

UPCOMING EVENTS

For more information, please visit:

http://dot.alaska.gov/nreg/KivalinaEvacRd/

www.kivalinaroad.org

Upcoming Work

Project area site visits for required fieldwork and data gathering will begin soon and are expected to continue into the fall. Land access permissions, scheduling to avoid conflict with area subsistence activities, and issues regarding culturally sensitive locations will be coordinated with community and corporation leadership.

Route Alignments Map

Below is the map showing the primary Project Area being currently evaluated by federal and state agencies. The map includes the alignments originally selected by the community for reference. This and other maps can be found at the project websites.

Final Thoughts

It will be critical at all times to remember that while the potential for construction of a new Kivalina school and long-term relocation strategies may benefit from the construction of a road, the sole, core purpose and need for this project is to provide Kivalina residents with the critical, life-saving, direct access to higher ground during increasingly likely catastrophic storm events.

Your thoughts and feedback are crucial to the success of the Kivalina Evacuation and School Site Access Road Project.

We want to hear from you!

TOGETHER WE WILL GET TO THE HILL!

For more information please visit:

www.kivalinaroad.org

http://dot.alaska.gov/nreg/KivalinaEvacRd/

Project Contact Information:

Alaska Department of Transportation, Northern Region: **Sarah Schacher**

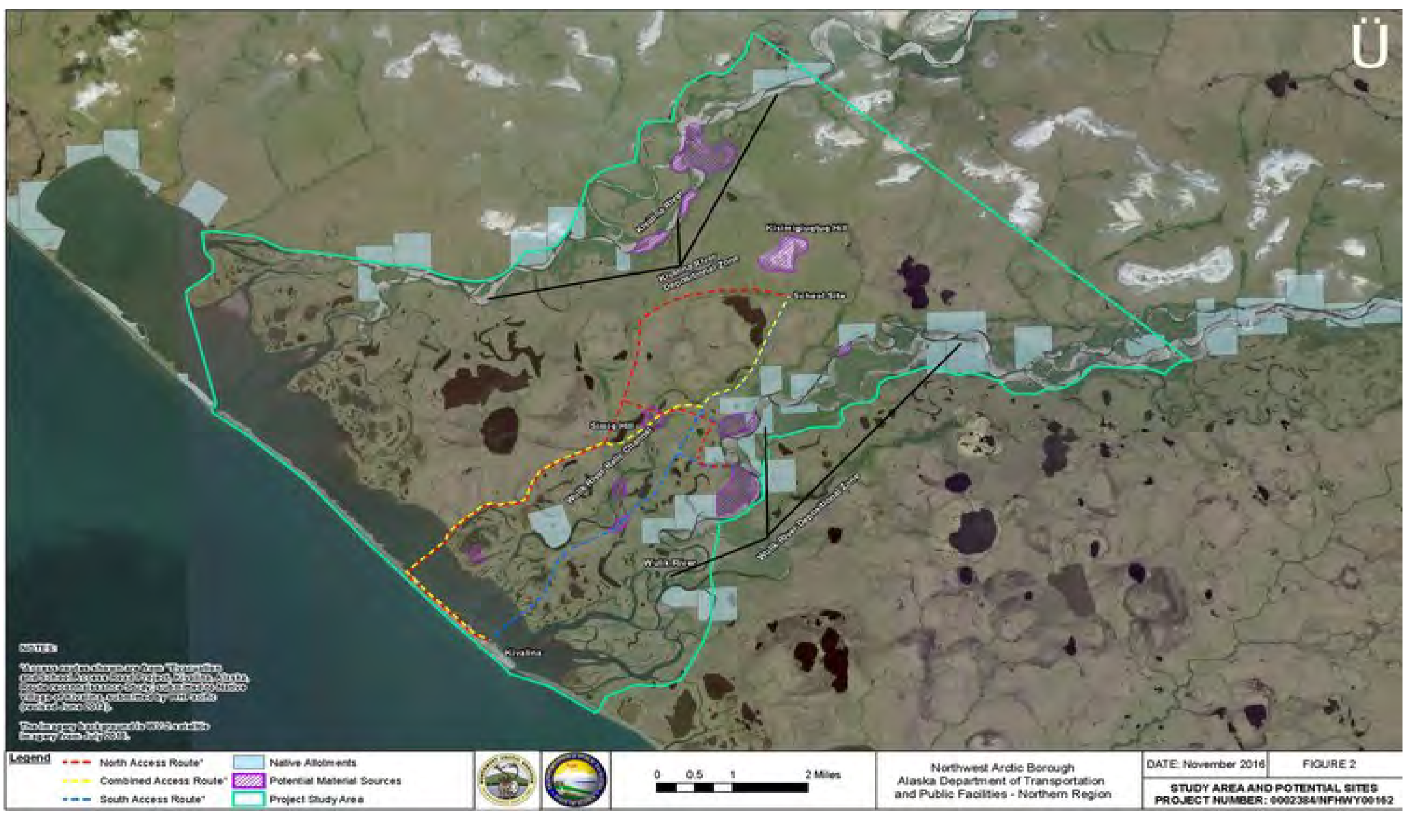
sarah.schacher@alaska.gov

907-451-2363

Remote Solutions: **John Baker**

John@akremotesolutions.com

907-412-0910



Kivalina Evacuation and School Site Access Road External Working Group
In-Person Workshop

Location: Alaska Technical Center; 1st Floor Kotzebue

Date: July 6th, 2017: 10:00-4:00pm Lunch Provided

Attendees

DOT: Jonathan Hutchinson, Paul Karczmarczyk, Scott Maybrier
NANA: John Lincoln
Northwest Arctic Borough: Noah Naylor
Native Village of Kivalina: Stanley Hawley, Millie Hawley, Kivalina IRA Council Members
City of Kivalina: Austin Swan
Remote Solutions: John Baker, Katherine Keith, Eva Harvey, Eugene Smith

Schedule

- **10:00-10:15** **Invocation, Sonny Russell; Introductions, John Baker**
- **10:15-2:30** **Status of Kivalina Road Project**
  - General Overview of Work in 2017, Jonathon Hutchinson
  - Project Schedule, Jonathan Hutchinson
  - Environmental Document Overview, Paul Karczmarczyk
    - Community Engagement
  - GIS Work, Scott Maybrier
  - Current Alignment Options, Scott Maybrier
    - Decision Making
  - Risk Assessment, Katherine Keith
    - Resolving Challenges
  - Project Funding, Katherine Keith
    - Spend Down and Future Applications
- **12:00-12:30** **Break to Gather Food for Working Lunch**
- **2:30-3:00** **Process for the Environmental Document,** Paul Karczmarczyk
  - Expectations for an EA
  - Data Needs
  - Timeline for Completion
- **3:00-3:30** **Strategic Planning and Next Steps, Katherine Keith**
  - Team Meetings Frequency and Structure
- **3:30-3:45** **Kivalina Road Working Group Roles & Responsibilities Document, John Baker**
- **3:45-4:00** **Closing**

Kivalina Evacuation and School Site Access Road External Working Group
In-Person Workshop Minutes

Location: Alaska Technical Center (ATC) Training Room

Date: July 6th, 2017

Attendees Present:
DOT&PF: Jonathan Hutchinson, Paul Karczmarczyk, Scott Maybrier
NANA: Liz Cravalho, alternate for John Lincoln
Northwest Arctic Borough: Noah Naylor
Native Village of Kivalina: Stanley Hawley, Millie Hawley, Kivalina IRA Council Members: Becky Norton, Eleanore, Dollie Hawley, Daniel Foster, Dolly Foster, Isabelle Booth, Susan (WHPacific Contractor for Native Village of Kivalina)
City of Kivalina: Austin Swan
Remote Solutions: John Baker, Katherine Keith, Eva Harvey, Eugene Smith
Community Members: Walter Sonny Russell, Fred Smith

Workgroup meeting began with introductions by John Baker at approximately 10:15, he welcomed everyone and thanked DOT &PF personnel who were in attendance for their time, stating that work on multiple projects and thanked them for coming up to Kotzebue. He also gave all Remote Solutions members the opportunity to introduce themselves. Mr. Baker asked Walter Sonny Russell to carry out the invocation for the meeting. Coffee and pastries were provided to the Workgroup Members by Remote Solutions. The location of the meeting was provided by ATC at no expense to the Working Group. It was verbally stated by Fred Smith, that the Working Group was welcome to utilize the same location for the next meeting. The CAD video was shown on the 2nd screen throughout the workshop. Members of the workgroup enjoyed the visual of the proposed road to K Hill. Millie Hawley humorously stated that a game should be made with the intent, "Escaping From the Ocean, will You Survive?"

Questions/ Comments:

Comment (C): Stanley Hawley (SH) stated that it was in the best interest of the community to take advantage of this opportunity to follow through with this evacuation road project.

Question (Q): Dolly Foster (DF) mobilization? A. Jonathan: Mobilization will occur during construction process.

Q: Millie Hawley (MH) How does the archeologist feel about with DOT &PF is proposing? A. (footage within the video) A. Look at other material sites.

C: MH concerned about wind studies Response (R): Shawn Deagon (sp?) has completed studies and there is actual wind study equipment located in Kivalina which is very resourceful.

Q: MH asked if those checker boxes are all allotments R: Yes.

Q/C: MH Has DOT & PF thought about constructing an airport? Q added by DF: Shouldn't Kivalina's current runway be a concern? A. DOT &PF is concerned to protect the runway.

End of Road Map, gravel pad visualized at the end of the road: Q Susan: Is that why you have a gravel pad?

C: Becky Norton (BN) Stated at Kivalina right now, the fall storms are early as last month and we're getting the storms early as right now. "We call this an evacuation road, we need to an evacuation shelter!" The main concerns are at the end of the road. R: Jonathan: regarding the evacuation infrastructure, need to work with the community for that development.

Q: Susan: Is there potential funding from FEMA?

Material Sources:

Lagoon has a V shape channel 120 W x 4 feet deep

C: Dolly Foster: 12 feet colvert? A: Jonathan: 12 foot diameter

There was a question regarding settlement. Response on the video coverage I took. Austin Swan (AS) made a comment stating that USACE drilled in the winter; when is drilling going to occur?

Q: Millie Hawley (MH): Is a bridge going to be built? A: Jonathan: It's a mixture.

C: Stanley Hawley (SH) made a comment of the 100 year storm. (The last storm went over 16.5') R: Jonathan: need to clear up a lot of confusion, DOT & PF is going to add 3 feet to the standard. R: Paul K: stated that USACE and DOT & PF reference points are different. DOT & PF is going to over build.

C: Fred Smith (FS): Is there silt in the lagoon? R: Jonathan: Expects silt is displaced, a lot more silt because of the causeway.

C: MH: We need to move forward, just do it!

Lunch was provided by Remote Solutions for all Work Group members @ 1215. Walter Sonny Russell blessed the food. It was great food, prepared by Little Louie's. Workgroup started back up at 1309, started with GIS work, Scott Maybrier. Walter and Fred returned back to other obligations after lunch. Kat thanked ATC for utilizing their facility at no cost.

Q: ES: What elevation is considered wetland? A: It's not based on elevation, it's classification.

C: MH: regarding GIS visual, this needs to be shown at the community engagement meeting and ask people where the berry picking spots, avoiding where there are subsistence activity spots. The people need to also know the technical reasons if we cannot go around it. MH also made a comment at the end of the road where the stable spot where is changed instead of passing three creeks.

Q: LC: At what stage will we have the actual flood plane? A: Jonathan: It's just a matter of time.

To Do per request of Workgroup Members: Print pictures out to let Kivalina let DOT & PT know they pick berries.

C: BN: Made a comment on 1952 photos, pretty wide area. R: Susan: there needs to be a constant balancing, making everyone happy or equal medium.

C: BN: Based on local traditional knowledge, an area, a flood plain, they've never seen that place flood before – east of channel, just across the channel. She also stated the studies from 1992.

Q: DF: What is the 1st section is most flood plain?

Q: BN: IS there any photos back from 1952?

Q: MH: Can we convince NWABSD to build a school?

C: MH: Need the final print outs to bring back to Kivalina.

Funding Opportunity 13:56

Q: MH: When is the next community visit? Someone made a comment about sharing the EA with the community.

Cost Estimates: Jonathan 14:00

C: DF: Define reminent channels, old channels that were connected to main channels.
C: SH: Golder was going to drill at KHill? Senior geologists stated that KHill is mostly rock. They stated that towards the river, its mostly limestone and granite. Stan said that Golder said that, "They're lucky!" R: Scott: Granite is hard to find.

Q: ES: What kind of rock are we looking for? R: Scott: Need to drill more to determine.

Paul K: Expalined section 4F; another hoop to jump through.

Data Needs 14:24

Polar Bear discussion came up; MH stated that they hardly see them anymore.

Strategic Planning 14:35

Break 14:35 -14:50

Q: DF: When is the next meeting in Kivalina? Need to be very clear with the people.

Risk Assessment 14:50

Q: DF: Does the population just mean Kivalina? Kivalina feeds to the whole region. Kat stated that she can share in depth risk assessment if needed.

Funding Opportunities 15:00

NWAB – Noah will get remaining money available.

Native Village of Kivalina – MH will look into the balance for FY13-17 TTP funds. She stated that TTP contracts include $ for surveys, design, XXX, archeology , ROW; estimated at $578,570.00. Kat stated that they can use FY14 for field work or construction.

Denali Commission – Erosion Control +$500,000.00; might be able to also use for homes. MH stated that DC was invited to this work group session, but she forgot to give them the date.

USACE – FY17 $262,000.00

NANA – In-kind match

City – Dependent on Borough/State

FHWA – will be in Kotzebue the following week , tentative time 13:30 – 15:00. Kat will confirm. FHWA will also travel to PHO and KVL. They are confirmed to stay at the Nullagvik Hotel on 07/11/17.

Working Group Roles:

To Do: Email liz her copy of what she signed.

DF stated that it would be good to use Facebook to communicate with community members.

The last community meeting was Mid November, 2016; the next Kivalina public meeting in 6 weeks. Austin Swan stated that we should have it soon. MH stated that August 15, 2017 Tuesday would be a good date to include a Wellness Potluck. Date okayed with Paul K.

Kat reminded everyone that we will be conducting Bi-Weekly teleconferences; Thursdays are good for Noah and Millie. 1st and 3rd Thursday's are good for NANA due to their Board Meetings.

Work Group Session concluded at 15:54.

Kivalina Evacuation and School Site Access Road Working Group
In-Person Workshop

Location: Alaska Technical Center; 1st Floor Kotzebue
Date: July 6th, 2017: 10:00-4:00pm Lunch Provided

Attendees:

NANA: Liz Cravalho
DOT: Jonathan Hutchinson, Paul Karczmarczyk, Scott Maybrier
NWAB: Noah Naylor
KIVALINA IRA: Stanley Hawley, Millie Hawley, Dollie Hawley, Becky Norton, Dolly Foster, Isabella, Evelyn,
City of Kivalina: Austin Swan
WHPacific: Suzanne Taylor
Remote Solutions: John Baker, Katherine Keith, Eugene Smith, Eva Harvey

Jonathan-

Top priority project for DOT and the Northern Region Director, Ryan Anderson

Purpose and Need: Erosion events from one storm have been extremely dangerous for the community.

The initial first hurdle for this project has been for Kivalina to get the recognition for the event. Previous studies from 2016 and before are now actively turning into.

Proposed Action: What do we actually want to construct?

Material needs to come from a local source to make this project viable. Looking at multiple sources to see where this can come from.

300-350 cubic yards to get Rock from Nome. This summer we will be looking around for a local rock source.

Stanley: Based on the USACE we need to consider looking at other avenues because the cost was too high.

Eugene: The USACE was developing a superhighway. The USACE was planning on designing to go down to bedrock.

Jonathan: The causeway is the biggest challenge to the project both environmentally and cost wise. The idea is to look at reducing the amount of local materials.

The amount of rock that is will take to develop the causeway so we are hyper focusing on local material. We believe there is enough preliminary data from K-Hill to indicate that there are rocks.

DOT is finding balance between the thickness of rock and the thickness of the layer to reduce the requirements of the rock.

Millie: Demonstrate to the community what has worked in the past with other communities to ease their concerns over causeway failing. Concerned about safety.

Paul: Environmental Assessment highlights two viable alternatives to FHWA. SHPO Remaining concerns are mostly related to material sites which double as high probability areas. Sean Eagen, hydrologist, wanting to visit out in Kivalina

Jonathan: DOT Funding is currently targeted for increasing the airport safety. Currently looking at Rock for the airport project rather than supersacks.

Paul: Try to separate the two projects such as road and school. The requirement for FHWA is a logical terminus so we are working to come up with a logical site.

Becky: Fall storms are coming very early, like last month, which usually we don't see until later in the year.

-Need an Evacuation Shelter/Infrastructure and this should be one of the main concerns.

Jonathan: Material sites are plentiful but need to evaluation for Rock potential.

If there was Rock available it would be 5-15 feet below surface level.

Millie, the berry picking areas are at the connector bring the maps to the community to evaluate new routes for subsistence use. "Kiyaktovak" Creek.

ALASKA DEPARTMENT OF TRANSPORTATION & PUBLIC FACILITIES

Kivalina Evacuation Road Working Group Meeting

SIGN IN SHEET

PROJECT NAME: Kivalina Evacuation and School Site Access Road
Project No. 0002384/NFHWY00162

DATE: July 6, 2017

NAME (PLEASE PRINT)	MAILING ADDRESS and *EMAIL	PHONE	*GENDER (M/F)	*RACE (see below)
Millie Hawley	transportation@kivalina.org	907 645 5593	F	
Eleanor K. Swan	PO BOX 50042 Kivalina, AK 99750	907 645-5406	F	
Isabella K. Booth	commcoor@kivalinaf.org PO Box 3 IRA Kivalina Council	645-2217	F	
Becky Norton	Box 46 KVL, AK 99750 buck-kvl@yahoo.com	645 5115	F	
Dolly Foster	p.o.box 50074 KVL.AK dollyfoster@hotmail.com	645-5131	F	Inupiaq
Daniel Foster	" "	645-5123	M	"

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effective: December 2004

PROJECT NAME: Kivalina Evacuation and School Site Access Road
Project No. 0002384/NFHWY00162

DATE: July 6, 2017
LOCATION: Kotzebue

NAME (PLEASE PRINT)	MAILING ADDRESS and *EMAIL	PHONE	*GENDER (M/F)	*RACE (W, AN, N, B, H, A, P, O)
Suzanne Taylor	3111 C St Ste 300 Anch. AK 99503 staylor@whpacific.com	907 339 6570	F	
Austin Swan Sr	Box 50047 Kivalina, AK. 99750	907-645 5427	M	AN
Dollie A Hawley				
Stanley Hawley	P.O. Box 50051 Kivalina, AK 99750 TRIBEADMIN@KIVALINIQ.ORG	907-645-2201	M	AN
Paul Karczmarczyk	DOT PF Fbks, AK	907-451-2208	M	W
Walter Sonny Russell	PO BOX 963	442 3170	M	AN
Jonathan Hutchinson	DOT+PF	451-5479	M	Other

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effective: December 2004

PROJECT NAME: Kivalina Evacuation and School Site Access Road
Project No. 0002384/NFHWY00162

DATE: July 6, 2017
LOCATION: Kotzebue

NAME (PLEASE PRINT)	MAILING ADDRESS and *EMAIL	PHONE	*GENDER (M/F)	*RACE (W, AN, N, B, H, A, P, O)
Isabelle K. Booth	PO Box 3 Kivalina AK 99750 IRA Council member	907-645-2217	F	AN
Eleanor K. Swan	PO Box 50042 Kivalina, AK 99750 commcoord@kivaliniq.org	907-645 5406	F	AN
Dollie A. Hawley	Gen Delivery Kivalina, Alaska 99750	(907) 645-5165	F	AN
Katherine Keith	PoBox 831 Kotzebue, AK 99752	907-412-2882	F	W
Eugene Smith	POB 1158 Kotzebue, AK	360-4696	M	AN
Noah Naylor	POB 1110 Kotzebue, AK	412-1888	M	AN
Austin Swan Sr	Box 50047 Kivalina 99750	645-5427	M	AN
* Eva Harvey	2354 Sunflower Loop North Pole AK 99705	328 8170	F	AN
Liz Cravalho	P.O Box 49 OTZ 99752 liz.cravalho@nana.com	(907) 442-8135	F	AN

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PROJECT NAME: Kivalina Evacuation and School Site Access Road
Project No. 0002384/NFHWY00162

DATE: July 6, 2017
LOCATION: Kotzebue

NAME (PLEASE PRINT)	**MAILING ADDRESS and *EMAIL**	**PHONE**	***GENDER (M/F)**	***RACE (W, AN, N, B, H, A, P, O)**

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Kivalina Evacuation Road Working Group

Location: Teleconference

Date: August 3rd, 2017 1:00-2:00pm

Teleconference +1 408-638-0968 pin 427 150 2436

Join from PC, Mac, Linux, iOS or Android: https://zoom.us/j/4271502436

Attendees

DOT: Jonathan Hutchinson, Paul Karczmarczyk, Scott Maybrier
NANA: John Lincoln, Liz Cravalho, Jeff Nelson
Northwest Arctic Borough: Noah Naylor
Native Village of Kivalina: Stanley Hawley, Millie Hawley, Kivalina IRA Council Members
City of Kivalina: Austin Swan
Remote Solutions: John Baker, Katherine Keith

Schedule

- **1:00-1:15** **Opening/Meeting Objectives,** Katherine Keith
- **1:15-1:30** **Status of Kivalina Road Project**
    - General Overview of Work Completed in July 2017, Jonathan Hutchinson
    - Environmental Assessment Update, Paul Karczmarczyk
- **1:30-1:50** **Agency Site Visits on August 15, 16, and 17,** Katherine Keith
    - Logistics and Permissions
    - Cultural Resources
- **1:50-2:00** **Closing**

TASK: Extend the access permit for pending cultural resource field work. NANA please extend the permit from 8/15 to 8/31.

Austin will be in Kotzebue 8/14-8/16.

TASK: Hear back from NANA and NWAB on any interested Kivalina site visitors.

Paul: Draft EA in the next 2-3 weeks for review to send out to FHWA at the end of September.

Task: Need 2 local people for field work support.

Task: Title 9 Permit from NWAB Paul will follow up with Noah.

Task: Find a boat with a depth of the water or fish finder to get up the Wulik River.

Kivalina Evacuation and School Site Access Road

Public Update

Meeting Summary

August 15th, 2017 12:00 pm - 2:00 pm

Introduction by Millie Hawley 12:09 pm. Prayer by Lowell Sage Jr.

Visitors: Katherine Keith (Remote Solutions), John Baker (Remote Solutions), Paul Karczmarczyk (Stantec), Sara Lindberg(Stantec), Bill Morris (Stantec), Jeremy Grauf (USACE), and Audra Brace (USF&G)

John Baker: We have helped to create a team with DOT&PF, NWAB, IRA, and the city. The DOT&PF has taken the lead in gathering information, approaching agencies early, and having everyone's involvement.

Paul Karczmarczyk: Currently writing the draft environmental assessment. Discussed the project's purpose and need which is doesn't involve the school project. Causeway will require local gravel to be cost effective. Preliminary engineering is ongoing

Dolly Foster: Why do we have public scoping meeting with Noatak and Kotzebue?

> **Paul K**: Because we wanted to collect comment from the region.

Paul K: Went over the different alternatives. Regarding material sites, K-Hill looks the most promising.

Colleen Swan: How high does the tide get when stormy?

> **Paul K**: We are designing for 500 years storm event. It will be engineered to survive predicted storms.

Myra Wesley: What is the time frame for construction?

> **John Baker**: DOT is working on environmental documents now and needs to finish environmental stage first. Goal is now to get construction funding and mobilize in spring 2019.

Myra Wesley: Will it effect the school project?

> **Katherine Keith**: It will greatly help the school project.

Lowell Sage: Can you build the evacuation causeway first?

> **Paul K:** The purpose and need won't be met without one big project.
>
> **Katherine**: We need to design the road in a cost-effective manner.
>
> **Katherine:** There is a real need here and so we need to focus first on safety and have strong vocal leadership.

Colleen: How are we going to prevent vehicles being blown off the road?

Paul K: We will include this consideration during design. This local input is critical for a successful project.

Millie: Everyone I talked to during the trip to DC, said Kivalina Evacuation Road is the highest priority. Everyone is looking out for Kivalina. People do confirm with me before speaking on our behalf. Evacuation project is public. Meetings are always public. People can come or call if you have any questions.

Stanley: We need to start thinking down the road. Kivalina needs to get ready and get in front of starting this project. Kotzebue is building a new road trilateral group and can get everyone together. We need to also.

Paul K: We are in the middle of the draft EA and will hopefully have the final available on October 10th for everyone to review publicly, late finish draft DEA let everyone review.

Lowell: Appreciate everyone's help.

Prizes:

Daniel Foster Sr- 1st prize

Dollie Hawley 2nd prize

Ralph Knox 3rd prize

Adjourned 1:50 pm

ALASKA DEPARTMENT OF TRANSPORTATION
& PUBLIC FACILITIES

KIVALINA PUBLIC MEETING

SIGN IN SHEET

PROJECT NAME: Kivalina Evacuation and School Site Access Road **DATE: August 15, 2017**
Project No. 0002384/NFHWY00162

NAME (PLEASE PRINT)	MAILING ADDRESS and *EMAIL	PHONE	*GENDER (M/F)	*RACE (see below)
Daniel Foster Sr.	N/A	645 5131	M	ESKIMO
Jack A Koenig	P.O. BOX 50005	N/A	~~F~~ M	NATIVE
[illegible]	P.o. box 69	n/A	m	Native
Becky Norton	Box 46 Kvl Ak 99750	645 5115	F	Esk
Heather Dominguez	1 Postal Way Kivalina, AK	412 0557	F	white
Laretta Adams	P.O. Box 50058 Kivalina, Alaska	645 5858	F	Native

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effective: December 2004

PROJECT NAME: Kivalina Evacuation and School Site Access Road **DATE: August 15, 2017**
Project No. 0002384/NFHWY00162 **LOCATION: Kivalina**

NAME (PLEASE PRINT)	MAILING ADDRESS and *EMAIL	PHONE	*GENDER (M/F)	*RACE (W, AN, N, B, H, A, P, O)
Jerry Knox	Kivalina, AK 99750	645-5242	M	AN
Nathan Koonook	P.O. Box 50080 Kivalina, AK	4440587	M	AN
Richard Sage	Box 77 Kivalina, AK 99750	645-5005	M	AN
Stan Hawley	P.O. Box 50024 KIVALINA, AK 99750	645-5820	M	AN
Angelo Hawley	P.O. Box 50033 Kivalina AK. 99750	645-5454	M	AN
Alice Adams		645-2433	F	AN
Myra Wesley	Box 30 Kivalina	645-2235	F	AN
Dolly Foster	P.O. box 50074 KVL AK 99750 dollyfoster@hotmail.com	645-5131	F	AN
Seymour Tuzroyluke III	PO Box 50065 Kivalina, AK 99750		M	AN

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Project No. 0002384/NFHWY00162 **LOCATION: Kivalina**

NAME (PLEASE PRINT)	MAILING ADDRESS and *EMAIL	PHONE	*GENDER (M/F)	*RACE (W, AN, N, B, H, A, P, O)
Lizzie Hawley	Gen. Del.		F	AN
Lowell Sage Jr	POBox 50006	645 5045	M	AN
Sara Lindberg	Anchorage		F	
Bill Morris	Fairbanks		M	W
Franklin Knox	~~E~~ Kivalina		M	AN
Dollie A. Hawley	General Delivery Kivalina, AK 99750	645-5165	F	~~Alaskan~~ A Native
Chris Koenig's	Kivalina AK 99750	X	M	A Native
[illegible]	POB 50025 Kivalina 99750	645-5023	~~N~~ F	Inupiaq ~~A~~
Carlos Hawley	Box 58004 Kivalina AK	645-2143	M	

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Project No. 0002384/NFHWY00162

DATE: August 15, 2017
LOCATION: Kivalina

NAME (PLEASE PRINT)	MAILING ADDRESS and *EMAIL	PHONE	*GENDER (M/F)	*RACE (W, AN, N, B, H, A, P, O)
Lewis Mosley SR	PO Box 50038	5219587	M	AN
Sylvester Swan Jr	Box 10		M	AN
Ross Stalker	Box 50071		M	AN
Sylvester Swan III	Box 10		M	AN
Carl Swan	Box 50068	645-2339	M	AN
Alice Swan	Box 50068	645-2339	F	AN
HENRIETTA ADAMS	POBOX50015 KIVALINA, AK 99750 henrietta.adams@outlook.com	6452248	F	AN
Genny Swan	Box 50010		F	AN
Irene Carter	Box 33 Kivalina AK 99750	645-5454	F	AN

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effective: December 2004

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Project No. 0002384/NFHWY00162 **LOCATION: Kivalina**

NAME (PLEASE PRINT)	MAILING ADDRESS and *EMAIL	PHONE	*GENDER (M/F)	*RACE (W, AN, N, B, H, A, P, O)
Nora D. Swan	Box 50060 Kivalina, Alaska 99750	(907) 645-5094	F	AN
Myra E Stalker	Box 50073 Kivalina AK 99750	645-2143	F	AN
OKAN KNOX Jr	Box 50007 KVL AK 99750	645-5074	M	AN
Kelly Hawley	PO BOX 50022 Kivalina AK	412-1180	F	AN
E. Lenett	BX 50054 Kivalina	645-5011	F	AN
Theodore Booth SR	Box 3 Kivalina AK	645 3217	M	A.N
VEE VENTERS	BOX 50054 KIVALINA	645-5004	F	AN
Martin Sours	P.O. Box 50071 Kivalina AK 99750		F	AN
Danny Foster	PO Box 50074 Kivalina, AK 99750	645-5131	M	AN

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effective: December 2004

PROJECT NAME: Kivalina Evacuation and School Site Access Road Project No. 0002384/NFHWY00162

DATE: August 15, 2017
LOCATION: Kivalina

NAME (PLEASE PRINT)	MAILING ADDRESS and *EMAIL	PHONE	*GENDER (M/F)	*RACE (W, AN, N, B, H, A, P, O)
Emma L Swan	Sdley Kivalina	907-538-8845	F	AN
Deem Booth Della Booth	Box 114 Noatak AK 99761	744-8130	F	AN
Ralph Knox	P.O. Box 50067	—	M	AN
Maria Kneeni	—	—	F	AN
Tasha Knox	P.O Box 50007	645-5074	F	AN
Brett Oktollik	P.O. Box 50007	645-5074	M	AN
Leroy Adams	58	645-5288	M	AN
Freida.	50006	6452340	F	AN
Lawrence S. Adams	P.O Box 50058	645-5288	M	AN

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effective: December 2004

THE STATE of ALASKA
GOVERNOR BILL WALKER

Department of Transportation and Public Facilities

NORTHERN REGION
Planning

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www.dot.state.ak.us

April 16, 2016

The Honorable Anthony Foxx
Secretary
U.S. Department of Transportation
800 Independence Ave, SW
Washington, DC 20591

Dear Secretary Foxx:

I am writing to request your support of the Alaska Department of Transportation's efforts, on behalf of the people of northwest Alaska, in planning and building the Kivalina Evacuation and School Access Road. Given recent climatic changes this project is a top priority for the region.

Kivalina is a traditional Inupiat community situated on a low lying barrier island between the Chukchi Sea and Kivalina Lagoon. Historically, sea ice has shielded the village from cold weather storm waves and surges; now, the ice forms later and melts sooner each year. Erosion and the severity of recent storms have put the village at serious risk of being inundated by an ocean storm event. Currently, there is no way to safely escape the island during major storms.

The Alaska Department of Transportation will be updating the regional transportation plan for northwest Alaska within the next two years, and the Kivalina Evacuation and School Access Road will be included as a top priority. The most recent plan, written in 2004, is out of date and requires an update. When it was developed, the Kivalina Road was not such a critical priority because the coastal erosion was then thought to be more manageable and less of a threat to the residents of Kivalina.

However, given recent climatic changes and a drastic increase in erosion, the Kivalina Evacuation Road is now a high priority project for the region. The Alaska Department of Transportation supports the timely construction of this road.

We ask that the United States Department of Transportation join with the Alaska Department of Transportation and the people of northwest Alaska in building the Kivalina Evacuation and School Access Road. This project is critical to the safety of the people of Kivalina, and to the preservation of their traditional way of life.

Sincerely,

Judy Chapman

Judy Chapman, CM, ACE
Alaska DOT&PF Northern Region Planning Chief

"Keep Alaska Moving through service and infrastructure."

April 16, 2016

The Honorable Anthony Foxx
Secretary
U.S. Department of Transportation
800 Independence Ave, SW
Washington, DC 20591

Dear Secretary Foxx:

Re: Tiger Discretionary Grant, Department of Transportation

Dear Secretary Foxx:

It is my pleasure to express NANA Regional Corporation's (NANA) support for the Northwest Arctic Borough's (NAB) application to the Department of Transportation Tiger Discretionary Grant to construct an evacuation route out of Kivalina. NANA is an Alaska Native Corporation created pursuant to the 1971 Alaska Native Claims Settlement Act. NANA is a for-profit corporation owned by 14,000 shareholders who are the descendants of the Inupiat people of Northwest Alaska. NANA's mission is to provide economic opportunities for shareholders and to protect and enhance NANA lands. Kivalina is one of 11 communities within the NANA region.

We have worked with and supported the efforts of the NAB, Native Village of Kivalina and City of Kivalina over the years as they have made strides toward constructing an essential ground evacuation route out of the community.

The community of Kivalina is vulnerably located on a barrier island in the Chukchi Sea. Due to shrinking sea ice as a result of climate change, the island is no longer protected from winter storms. As a result, the community is continually eroding and inundated with floods. It is only a matter of time until there is a critical need for people to evacuate, yet with current infrastructure, evacuation is improbable and will have a devastating impact.

Significant work has already been conducted to evaluate evacuation route options, material sources, needed permits, and potential impacts. A route has been selected, local material resources are identified, and the community is now waiting for the road to be built. We urge you to support their efforts, prioritize their safety, and help fund the critical construction of the Kivalina evacuation road.

NANA is fully committed to providing ongoing support for this project until the evacuation road is constructed.

Sincerely,

Wayne Westlake

Wayne Westlake
President/CEO

NANA Regional Corporation, Inc. • P.O. Box 49, Kotzebue, Alaska, 99752 • T: (907) 442-3301, (800) 478-3301 • F:(907) 442-4161 • nana.com/regional

Native Village of Kivalina

P.O. Box 50051 Kivalina, AK 99750 **Ph:** (907)645-2201 or 645-2153 **Fax:** (907)645-2250 or 645-2193
e-mail: tribeadmin@kivaliniq.org

"Advocating for our people, land, waters and subsistence way of life"

April 16, 2016

The Honorable Anthony Foxx, Secretary
U.S. Department of Transportation
800 Independence Ave, SW
Washington, DC 20591

Re: Tiger Discretionary Grant, Department of Transportation

Dear Secretary:

Per this letter, the Native Village of Kivalina supports the Northwest Arctic Borough's application to the Department of Transportation Tiger discretionary grant for the construction of an evacuation road from our community to higher ground. Kivalina is located on a barrier island in the Chukchi Sea where climate change is an immediate threat. The Kivalina shoreline is quickly eroding and we are inundated by more and more severe fall and winter storms each year. It is not a question of whether we will ever need to evacuate, but when.

The arctic sea ice has considerably declined over the past several decades, creating thinner, more fragile ice that no longer protects the barrier island from winter storms. In addition to limiting our traditional subsistence practices and seasonal travel, the changes have exposed our community to harsh fall and winter storms that have brought severe flooding and erosion. Due to the remoteness of our community, travel to and from Kivalina is limited and often seasonal. The primary means of transportation to and from Kivalina are by plane, small boat and snow machine. No roads connect our village with the rest of Alaska. Such limited modes of transportation make Kivalina extremely vulnerable and isolated as fall and winter storms become more severe and frequent.

Our community would benefit from an evacuation road to the mainland. It has been a priority for years as we watch our situation worsen. The people of Kivalina deserve the security of knowing that there is a reliable, year-round evacuation route to quickly and safely make it to higher ground. The construction of an evacuation road will help mitigate the problems that our community faces from climate change, a significant stride in the right direction.

We fully support the efforts of the Northwest Arctic Borough as they work with us to make advances toward a safe evacuation route. This is a critical and long overdue project and we hope that you will help us finally see it materialize.

Millie Hawley, President
Kivalina IRA Council

Kivalina City Council

P.O. Box 50079
Kivalina, Alaska 99750

Phone: 907-645-2137
Fax: 907-645-2175
email: kivalinacity@aol.com

April 29, 2016

The Honorable Anthony Foxx
Secretary
U.S. Department of Transportation
800 Independence Ave, SW
Washington, DC 20591

Re: Tiger Discretionary Grant, Department of Transportation

Dear Secretary:

The Kivalina City Council is pleased to partner with and support the Northwest Arctic Borough's Tiger Discretionary Grant application to construct an evacuation road. This project is long overdue and is an absolutely necessity and priority in order to keep the people of our community safe.

Our community of 464 people is located on a narrow, 8-mile long barrier reef island between the Chukchi Sea and Kivalina Lagoon. Our isolated location means that access to and from our community is limited and often seasonal. There are no roads in and out of Kivalina. This limited transportation infrastructure, coupled with climate change and the resulting impact on our community, makes the need for an evacuation route of critical importance. The shrinking sea ice has left our barrier island vulnerable, resulting in flooding and destructive erosion. As fall storms worsen and our community continues to be exposed and erode, everyone in Kivalina knows that it is just a matter of time before there is an imminent need to evacuate.

As the local municipal government, there is no greater priority than providing for the people of Kivalina and keeping them safe. We cannot do this without an evacuation road. This need is urgent and the city implore you to help us construct the basic infrastructure that we need to keep our community safe as a result of factors far beyond our control. Our community has contributed nominally to climate change, yet we are paying one of the greatest prices.

We are pleased to partner with the Northwest Arctic Borough and the Native Village of Kivalina on the evacuation road and we hope that you will support our efforts and help us implement this critical and timely project.

Thank you!

Sincerely,

Austin Swan Sr., Mayor

Cc: Kivalina City Council
Files

Northwest Arctic Borough

163 Lagoon Street
P.O Box 1110 Kotzebue, Alaska 99752
(907) 442-2500 Fax (907) 442-2930
www.nwabor.org

August 4, 2016

Marc Luiken, ADOTPF Commissioner
Alaska Department of Transportation
3132 Channel Drive
PO Box 112500
Juneau, AK 99811-2500

RE: STIP Amendment

Dear Mr. Luiken:

The Northwest Arctic Borough (NWAB) would like to voice its support for the 2016-2019 STIP Amendment 1; Need ID 28109 – Kivalina Evacuation and School Site Access Road. We also wanted to express our gratitude for including the funding in the new amendment and for acknowledging the significance of this need. This project is a crucial and necessary step toward ensuring the community of Kivalina's stability, sustainability, and safety.

Since 2006, it has been well documented that Kivalina faces an accelerated risk of erosion to their shoreline due to climatic changes and the subsequent rising tides and increasing storm intensity. The evacuation and school access road would provide necessary safety infrastructure for the residents of Kivalina, as well as provide access to the new school proposed to be constructed.

The project proposal before you make essential gains in the safety and quality of life for the residents of Kivalina. As you are aware, the village of Kivalina is the last area in the NWAB that is without certain critical infrastructure. The approval of this proposal would allow for these necessary improvements. This STIP amendment is the first step in moving this important and long over-due project forward. Meanwhile, the NWAB will continue to do its part to find alternative funding sources for construction of the evacuation and school access road.

We respectfully ask that ADOTPF advance this proposal and award the necessary funding for this much needed project.

Thank you sincerely for your support of this project

Sincerely,

Clement Richard

Clement Richard Sr., Mayor
Northwest Arctic Borough

DAN SULLIVAN
ALASKA

SUITE 702
HART SENATE OFFICE BUILDING
WASHINGTON, DC 20510

United States Senate

COMMITTEES

ARMED SERVICES
COMMERCE, SCIENCE, AND TRANSPORTATION
ENVIRONMENT AND PUBLIC WORKS
VETERANS' AFFAIRS

August 23, 2016

Gregory G. Nadeau, Administrator
Federal Highway Administration
1200 New Jersey Avenue, SE
Washington, DC 20590

Dear Mr. Nadeau:

During my recent visit to the community of Kivalina, Alaska, I witnessed firsthand the critical nature of the need for the community to have access to an evacuation road in the event of a large storm and related ocean surge.

You will recall that last year, President Obama overflew Kivalina to observe and highlight the potential challenges to Alaska Native coastal communities which Secretary Sally Jewell had earlier relayed as being impacted by coastal erosion during her visit in February of 2015. Additionally, the Government Accountability Office pointed to Kivalina as one of four villages in imminent danger (GAO-04-142), and will likely need to move all at once and as soon as possible (GAO-09-551).

The rapid erosion of the island has resulted from increased storm activity, coupled with declining sea ice, which once provided more protection from storm surges. Having no safe means to evacuate during a storm has created a dire situation, putting the residents of the community in peril. Life and property are in immediate and growing danger. It is critical that an evacuation road be constructed that will allow residents to safely evacuate from the barrier island and reach higher ground.

While meeting with community leaders, I was informed that the City of Kivalina has sought and obtained funding for environmental analyses necessary to construct an evacuation road that would provide a means of reaching a safe area in the event of storms threatening to flood the community. I understand that the Federal Highway Administration (FHWA), acting through the Alaska Department of Transportation and Public Facilities, will administer this effort, and encourage you and FHWA regional and statewide staff to make this effort a priority.

Given the importance of this project's timely initiation, both directly to Kivalina and as a working-solution model to other coastal communities, please consider it critical that FHWA avoid unjustifiable delays in administrative oversight. Should there be any support that I can provide or obstacles that I can provide assistance in remedying, please do not hesitate to contact me.

Sincerely,

Dan Sullivan

DAN SULLIVAN
United States Senator

ANCHORAGE
510 L STREET
SUITE 750
ANCHORAGE, AK 99501
(907) 271-5915

FAIRBANKS
101 12TH AVENUE
SUITE 328
FAIRBANKS, AK 99701
(907) 456-0261

JUNEAU
800 GLACIER AVENUE
SUITE 101
JUNEAU, AK 99801
(907) 586-7277

KENAI
805 FRONTAGE ROAD
SUITE 101
KENAI, AK 99611
(907) 283-4000

KETCHIKAN
1900 FIRST AVENUE
SUITE 225
KETCHIKAN, AK 99901
(907) 225-6880

MAT SU
851 EAST WESTPOINT DRIVE
SUITE 309
WASILLA, AK 99654
(907) 357-9956

NOTICE OF ENVIRONMENTAL DOCUMENT AVAILABILITY AND PUBLIC MEETINGS: Kivalina Evacuation and School Site Access Road

Public Meeting(s) Location/Date: (see Attachment A for Maps of locations)

Noatak - Native Village of Noatak Office	**December 5, 2017**	**10:00a – 12:00p**
Kivalina - McQueen School Gym	**December 5, 2017**	**2:00p – 4:00p**
Kotzebue - Northwest Arctic Borough Assembly Room	**December 5, 2017**	**6:00p – 8:00p**

The Alaska Department of Transportation and Public Facilities (DOT&PF) in partnership with the Northwest Arctic Borough (NAB), the Community of Kivalina, NANA Regional Corporation (NANA), and the Federal Highway Administration (FHWA), announces the availability of the Draft Environmental Assessment (EA) for the Kivalina Evacuation and School Site Access Road project in Kivalina, Alaska for public review.

The project team proposes to construct a combined causeway and bridge facility across Kivalina Lagoon and associated all-season gravel access road from the lagoon eastern shoreline eastward to a community-selected evacuation site near Kisimigiuqtuq Hill (K-Hill). Up to four local material sites would also be developed to supply project requirements. The proposed project would provide Kivalina residents a safe and reliable evacuation route in the event of a catastrophic storm or ocean surge, allowing evacuees to temporarily mobilize to safe refuge at an assembly site on K-Hill also identified by the Northwest Arctic Borough School District as a preferred new location for the community school. The Draft EA addresses the proposed action and potential impacts to the natural and human environments.

The proposed project would also involve a portion of the Cape Krusenstern National Historic Landmark (CKNHL), an historic site listed on the National Register of Historic Places (NHRP) and protected under Section 4(f) of The Department of Transportation Act of 1966. The CKNHL, which in part encompasses private and state lands comprising the proposed project location as well the community of Kivalina, is administered by the U. S. Department of Interior, National Park Service (NPS). Based on consultation with the Alaska Department of National Resources Office of History and Archeology and the NPS, DOT&PF intends to make a finding that, after consideration of impact avoidance, minimization, and mitigation or enhancement measures, the proposed project would not adversely affect contributing elements, activities, features, and attributes of the CKNHL. The comment period for the 4(f) determination took place concurrently with the Section 106 review and has ended prior to this publication. However, DOT&PF will consider any additional comments regarding the potential impacts to the CKNHL received during the EA comment period. Documentation and other data informing this proposed 4(f) determination are provided in the Draft EA.

If you are unable to attend the public meeting dates referenced above but wish to provide comments on the Draft EA, you may access it via the project website listed below and also at the offices of the Northwest Arctic Borough (Kotzebue), the Native Village of Kivalina (Kivalina), the City of Kivalina (Kivalina), the Native Village of Noatak (Noatak), NANA Corporation (Anchorage and Kotzebue), and at the Red Dog Mine library. Formal written comments can be made until 12/15/2017 either via the project website at: http://dot.alaska.gov/nreg/KivalinaEvacRd/, or directly to the project manager by U.S. mail or email as noted below.

For more information or to provide written comments, please contact:

Jonathan Hutchinson, P.E., Project Manager
Alaska Department of Transportation and Public Facilities, Northern Region
2301 Peger Road, Fairbanks, AK 99709
(907) 451-5479
Jonathan.hutchinson@alaska.gov

The environmental review, consultation, and other actions required by applicable federal environmental laws for this proposed project are being, or have been, carried out by DOT&PF pursuant to 23 U.S.C. 327 and a Memorandum of Understanding dated November 3, 2017 and executed by FHWA and DOT&PF.

This proposed project will comply with Section 106 of the National Historic Preservation Act; Executive Orders: 11990 (Wetlands Protection), 11988 (Floodplain Protection), 12898 (Environmental Justice), the Clean Air Act, Clean Water Act, Fish and Wildlife Coordination Act, and U.S. DOT Act Section 4(f).

It is the policy of the DOT&PF that no person shall be excluded from participation in, or be denied benefits of any and all programs or activities we provide based on race, religion, color, gender, age, marital status, ability, or national origin, regardless of the funding source including Federal Transit Administration, Federal Aviation Administration, Federal Highway Administration and State of Alaska Funds. The DOT&PF complies with Title II of the Americans with Disabilities Act of 1990. Individuals with a hearing impairment can contact DOT&PF at our Telephone Device for the Deaf (TDD) at (907) 451-2363.

ADOT&PF operates all programs without regard to race, religion, color, gender, age, marital status, ability, or national origin. Full Title VI Nondiscrimination Policy: dot.alaska.gov/tvi_statement.shtml. *To file a complaint go to:* dot.alaska.gov/cvlrts/titlevi.shtml.

Attachments, History, Details

Attachments

Attachment A.pdf

Revision History

Created 11/13/2017 1:03:30 PM by plord
Modified 11/13/2017 3:45:52 PM by plord
Modified 11/14/2017 3:12:35 PM by plord

Details

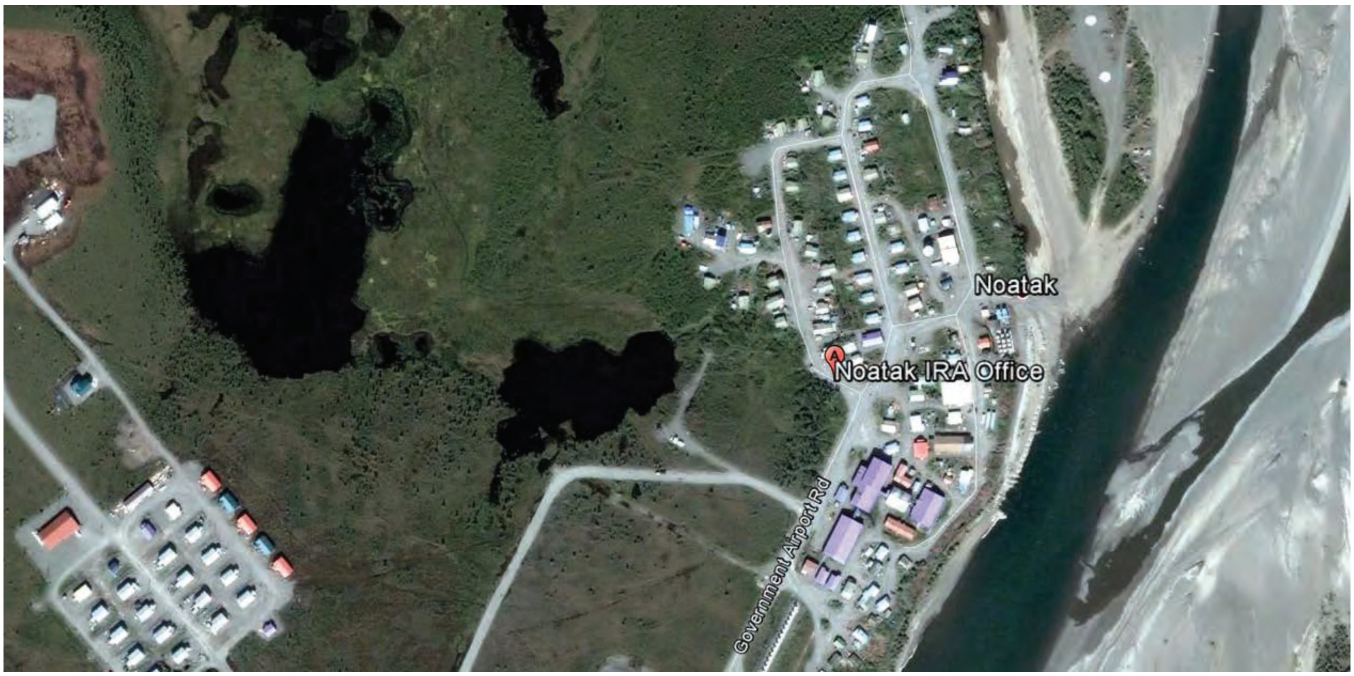
Department:	Transportation and Public Facilities
Category:	Public Notices
Sub-Category:	
Location(s):	Kotzebue, Other
Project/Regulation #:	
Publish Date:	11/14/2017
Archive Date:	12/6/2017
Events/Deadlines:	

ONLINE PUBLIC NOTICE – Attachment A

Title: Kivalina Evacuation & School Site Access Road
ADOT&PF/FHWA Project No. NFHWY00162/0002384

Public Meeting Location(s):

Noatak:
Native Village of Noatak Office
Po Box 89
Noatak, Alaska 99761



Kivalina:
McQueen School Gym
#6 Oceanside Expressway
Kivalina, AK 99750

<u>Kotzebue:</u>
Northwest Arctic Borough Assembly Chambers
163 Lagoon Street
Kotzebue, AK 99752

From:	Anderson, Ryan (DOT)
To:	liz.cravalho@nana.com; Kivalina IRA Council; john.lincoln@nana.com; Noah Naylor; Patrick Savok; atchugunnaq@gmail.com; transportation@kivaliniq.org
Cc:	Schacher, Sarah E (DOT); Hutchinson, Jonathan J (DOT); Maybrier, Scott L (DOT); Lindberg, Sara; Katherine Keith (katherine@akremotesolutions.com); Karczmarczyk, Paul F (DOT); Carpenter, Margaret (DOT)
Subject:	Kivalina Evacuation and School Site Access Road - Draft EA for Public Review
Date:	Tuesday, November 14, 2017 4:02:48 PM

Good Afternoon all –

I'm pleased to announce that the Final Draft Environmental Assessment for the Kivalina Evacuation and School Site Access Road is now available for public review. This is a major milestone in the project development process, and marks the beginning of the 30 day public comment period. The project team is planning public meetings to present the document in Kivalina, Noatak, and Kotzebue on December 5th. Details for the meetings can be found on the public notice.

The on-line public notice for the document can be found at the following link:
https://aws.state.ak.us/OnlinePublicNotices/Notices/View.aspx?id=187769

Notices will also appear in the Arctic Sounder, as well as the Fairbanks News Miner and Alaska Daily News.

The document can be downloaded from our website at: http://dot.alaska.gov/nreg/KivalinaEvacRd/

We will be following up in each community with hard copies of the document to be placed in your local communities for people that may not have access to computers.

Thank you all for your continued commitment to this important project, and please do not hesitate to call if you have questions.

Ryan F. Anderson, P.E.
Northern Region Director
Alaska Department of Transportation and Public Facilities
907-451-2211
ryan.anderson@alaska.gov

From:	Hutchinson, Jonathan J (DOT)
To:	Sumner, Amy L (DOT); Nelson, Brett D (DOT)
Cc:	Katherine Keith (katherine@akremotesolutions.com); John Baker; Karczmarczyk, Paul F (DOT); Anderson, Ryan (DOT); Lindberg, Sara; Carpenter, Margaret (DOT); Schacher, Sarah E (DOT)
Subject:	FW: Notice of availability of DRAFT Environmental Assessment: Kivalina Evacuation and School Site Access Road, Project No. 0002(384) / NFHWY00162
Date:	Wednesday, November 15, 2017 4:37:44 PM

Brett and Amy,

Please see notice of availability of DRAFT Environmental Assessment: Kivalina Evacuation and School Site Access Road, Project No. 0002(384) / NFHWY00162 below.

Jonathan J. Hutchinson, P.E.
Engineering Manager, AK DOT&PF
Jonathan.hutchinson@alaska.gov
907-451-5479

From: Hutchinson, Jonathan J (DOT)
Sent: Wednesday, November 15, 2017 4:32 PM
To: 'wayne.westlake@nana.com' <wayne.westlake@nana.com>; 'john.lincoln@nana.com' <john.lincoln@nana.com>; 'linda.lee@nana.com' <linda.lee@nana.com>; Hansen, Margaret A (CED) <margaret.hansen@alaska.gov>; 'aobrien@nwarctic.org' <aobrien@nwarctic.org>; 'tim.gilbert@maniilaq.org' <tim.gilbert@maniilaq.org>; 'eva.Kinneeveauk@maniilaq.org' <eva.Kinneeveauk@maniilaq.org>; 'environmental.irrcoordinator@kivaliniq.org' <environmental.irrcoordinator@kivaliniq.org>; 'tribeadmin@kivaliniq.org' <tribeadmin@kivaliniq.org>; 'atchugunnaq@gmail.com' <atchugunnaq@gmail.com>; 'kivalinacity@aol.com' <kivalinacity@aol.com>; 'tribeadmin@nautaaq.org' <tribeadmin@nautaaq.org>; 'tribeadmin@nautaaq.org' <tribeadmin@nautaaq.org>; 'nicole.stoops@qira.org' <nicole.stoops@qira.org>; 'deannvwestlake@gmail.com' <deannvwestlake@gmail.com>; Olson, Donny (LEG) <senator.donny.olson@akleg.gov>; Labor, Commissioner (DOL sponsored) <commissioner.labor@alaska.gov>; Commissioner, DEED (EED sponsored) <deed.commissioner@alaska.gov>; Mearig, Timothy C (EED) <tim.mearig@alaska.gov>; 'ulbill.walker@alaska.gov' <ulbill.walker@alaska.gov>; 'chad.padgett@mail.house.gov' <chad.padgett@mail.house.gov>; 'pamela.day@mail.house.gov' <pamela.day@mail.house.gov>; 'Senator@sullivan.senate.gov' <Senator@sullivan.senate.gov>; 'Joe_Balash@sullivan.senate.gov' <Joe_Balash@sullivan.senate.gov>; 'lisa_murkowski@murkowski.senate.gov' <lisa_murkowski@murkowski.senate.gov>; 'Michael_Pawlowski@murkowski.senate.gov' <Michael_Pawlowski@murkowski.senate.gov>; 'ULbyron.mallott@alaska.gov' <ULbyron.mallott@alaska.gov>; 'crichards@nwabor.org' <crichards@nwabor.org>; 'psavok@nwabor.org' <psavok@nwabor.org>; 'nnaylor@nwabor.org' <nnaylor@nwabor.org>; 'Wayne.Hall@teck.com' <Wayne.Hall@teck.com>; Rypkema, James (DEC) <james.rypkema@alaska.gov>; Brase, Audra L (DFG) <audra.brase@alaska.gov>; Stout, Glenn W (DFG) <glenn.stout@alaska.gov>; Bittner, Judith E (DNR) <judy.bittner@alaska.gov>; Proulx, Jeanne A (DNR) <jeanne.proulx@alaska.gov>; 'Cavallo, Alan (MVA)'; 'jeanne.hanson@noaa.gov' <jeanne.hanson@noaa.gov>; 'matthew.eagleton@noaa.gov' <matthew.eagleton@noaa.gov>; 'mary.r.romero@usace.army.mil' <mary.r.romero@usace.army.mil>; 'ryan.h.winn@usace.army.mil'

<ryan.h.winn@usace.army.mil>; 'lesley.dewilde@bia.gov' <lesley.dewilde@bia.gov>; 'curtis.jennifer@epa.gov' <curtis.jennifer@epa.gov>; 'bob_henszey@fws.gov' <bob_henszey@fws.gov>; 'pete_probasco@fws.gov' <pete_probasco@fws.gov>; 'abittner@blm.gov' <abittner@blm.gov>; 'rhea_hood@nps.gov' <rhea_hood@nps.gov>; Cox, Sally A (CED) <sally.cox@alaska.gov>; 'wayne.westlake@nana.com' <wayne.westlake@nana.com>; 'susan_georgette@fws.gov' <susan_georgette@fws.gov>; 'kristi.warden@faa.gov' <kristi.warden@faa.gov>; Wall, Ronald J (DPS) <ronald.wall@alaska.gov>; 'sandra.garcia-aline@dot.gov' <sandra.garcia-aline@dot.gov>; 'kaithryn_ott@fws.gov' <kaithryn_ott@fws.gov>; 'Jeremy.Grauf@usace.army.mil' <Jeremy.Grauf@usace.army.mil>; 'greg.balogh@noaa.gov' <greg.balogh@noaa.gov>; 'maija_lukin@nps.gov' <maija_lukin@nps.gov>; 'james.n.helfinstine@uscg.mil' <james.n.helfinstine@uscg.mil>; 'Gordon Brower' <Gordon.Brower@north-slope.org>
Subject: Notice of availability of DRAFT Environmental Assessment: Kivalina Evacuation and School Site Access Road, Project No. 0002(384) / NFHWY00162

Dear Interested Stakeholder,

The Alaska Department of Transportation and Public Facilities (DOT&PF) in partnership with the Northwest Arctic Borough (NAB), the Community of Kivalina, NANA Regional Corporation (NANA), and the Federal Highway Administration (FHWA), announces the availability of the Draft Environmental Assessment (EA) for the Kivalina Evacuation and School Site Access Road project in Kivalina, Alaska for public review.

The project team proposes to construct a combined causeway and bridge facility across Kivalina Lagoon and associated all-season gravel access road from the lagoon eastern shoreline eastward to a community-selected evacuation site near Kisimigiuqtuq Hill (K-Hill). Up to four local material sites would also be developed to supply project requirements. The proposed project would provide Kivalina residents a safe and reliable evacuation route in the event of a catastrophic storm or ocean surge, allowing evacuees to temporarily mobilize to safe refuge at an assembly site on K-Hill also identified by the Northwest Arctic Borough School District as a preferred new location for the community school. The Draft EA addresses the proposed action and potential impacts to the natural and human environments.

The proposed project would also involve a portion of the Cape Krusenstern National Historic Landmark (CKNHL), an historic site listed on the National Register of Historic Places (NHRP) and protected under Section 4(f) of The Department of Transportation Act of 1966. The CKNHL, which in part encompasses private and state lands comprising the proposed project location as well the community of Kivalina, is administered by the U. S. Department of Interior, National Park Service (NPS). Based on consultation with the Alaska Department of National Resources Office of History and Archeology and the NPS, DOT&PF intends to make a finding that, after consideration of impact avoidance, minimization, and mitigation or enhancement measures, the proposed project would not adversely affect contributing elements, activities, features, and attributes of the CKNHL. The comment period for the 4(f) determination took place concurrently with the Section 106 review and has ended prior to this publication. However, DOT&PF will consider any additional comments regarding the potential impacts to the CKNHL received during the EA comment period. Documentation and other data informing this proposed 4(f) determination are provided in the Draft EA.

This proposed project will comply with Section 106 of the National Historic Preservation Act; Executive Orders: 11990 (Wetlands Protection), 11988 (Floodplain Protection), 12898 (Environmental Justice), the Clean Air Act, Clean Water Act, Fish and Wildlife Coordination Act, and U.S. DOT Act Section 4(f). The environmental review, consultation, and other actions required by applicable federal environmental laws for this proposed project are being, or have been, carried out by DOT&PF pursuant to 23 U.S.C. 327 and a Memorandum of Understanding dated November 3, 2017 and executed by FHWA and DOT&PF.

The Draft EA is available via the project website listed below and also at the offices of the Northwest Arctic Borough (Kotzebue), the Native Village of Kivalina (Kivalina), the City of Kivalina (Kivalina), the Native Village of Noatak (Noatak), NANA Corporation (Anchorage and Kotzebue), and at the Red Dog Mine library.
Public meetings at which interested individuals can review the Draft EA, ask questions of project staff and provide formal comments will be held at the following locations and times:

Noatak - Native Village of Noatak Office December 5, 2017 10:00a – 12:00p
Kivalina - McQueen School Gym December 5, 2017 2:00p – 4:00p
Kotzebue - Northwest Arctic Borough Assembly Room December 5, 2017 6:00p – 8:00p

If you are unable to attend the public meeting dates referenced above but wish to provide comments on the Draft EA, you may access it via the project website listed below and also at the offices of the Northwest Arctic Borough (Kotzebue), the Native Village of Kivalina (Kivalina), the City of Kivalina (Kivalina), the Native Village of Noatak (Noatak), NANA Corporation (Anchorage and Kotzebue), and at the Red Dog Mine library. Formal written comments can be made until 12/15/2017 either via the project website at:

http://dot.alaska.gov/nreg/KivalinaEvacRd/

Or directly to the project manager by U.S. mail or email as noted below.
For more information or to provide written comments, please contact:

Jonathan Hutchinson, P.E., Project Manager
Alaska Department of Transportation and Public Facilities, Northern Region
2301 Peger Road, Fairbanks, AK 99709
(907) 451-5479
Jonathan.hutchinson@alaska.gov

Thank you,

Kivalina Project Team

Fairbanks
News
Miner

Legal Notices

Kivalina Evacuation and School Site Access Road ADOT&PF/FHWA (Project No. NFHWY00162/0002384)

PUBLIC MEETINGS

Noatak	Noatak IRA Office	December 5, 2017	10:00a – 12:00p
Kivalina	McQueen School	December 5, 2017	2:00p – 4:00p
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For more information or to provide written comments, please contact:

Jonathan Hutchinson, P.E., Project Manager
Alaska Department of Transportation and Public Facilities, Northern Region
2301 Peger Road, Fairbanks, AK 99709
(907) 451-5479
Jonathan.hutchinson@alaska.gov

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ADOT&PF operates all programs without regard to race, religion, color, gender, age, marital status, ability, or national origin. Full Title VI Nondiscrimination Policy: dot.alaska.gov/tvi_statement.shtml. To file a complaint go to: dot.alaska.gov/cvrts/titlevi.shtml.

If you have any questions or require additional information, please contact Chris Johnston, P.E., Project Manager at (907) 451-2322 (chris.johnston@alaska.gov). To correspond by text telephone (TDD), call (907) 451-2363.

43602

NOTICE OF DEFAULT AND ELECTION TO SELL UNDER DEED OF TRUST Trustee's Sale No: 060689-AK This NOTICE OF DEFAULT AND ELECTION TO SELL is given by CLEAR RECON CORP, as Successor Trustee under that certain Deed of Trust executed by ADRIANNA M. VOSS, as Trustor, to HANOVER SETTLEMENT AND ESCROW, as Trustee, in favor of MORTGAGE ELECTRONIC REGISTRATION SYSTEMS INC., SOLELY AS NOMINEE FOR NATIONWIDE MORTGAGE CONCEPTS, A LIMITED LIABILITY CORPORATION, ITS SUCCESSORS AND ASSIGNS, as Beneficiary, dated 6/21/2010, recorded 7/15/2010, as Instrument No. 2010-012624-0, in the Fairbanks Recording District, State of Alaska. The beneficial interest in the Deed of Trust has been assigned to OCWEN LOAN SERVICING, LLC and the record owner of the property is purported to be ADRIANNA M. VOSS. Said Deed of Trust covers real property situated in said Recording District, described as follows: LOT 2, BLOCK 3 OF NEWBY PARK SUBDIVISION, FIRST ADDITION, ACCORDING TO THE PLAT FILED MAY 15, 1980 AS PLAT NO. 80-82; RECORDS OF THE FAIRBANKS RECORDING DISTRICT, FOURTH JUDICIAL DISTRICT, STATE OF ALASKA. Commonly referred to as: 3321 WHITE SPRUCE DR, NORTH POLE, AK 99705 A breach of the obligation which said Deed of Trust secures has occurred in that Installment of Principal and Interest plus impounds and/or advances which became due on 8/1/2013 plus late charges, and all subsequent installments of principal, interest, balloon payments, plus impounds and/or advances and late charges that become payable.. By reason thereof, and under the terms of the Note and Deed of Trust, the Beneficiary has declared all sums so secured to be immediately due and payable, together with any trustee fees, attorney fees, costs and advances made to protect the security associated with this foreclosure. The sum owing on the obligation good through 10/24/2017 is $211,658.18 as follows:

Unpaid Principal Balance: $154,943.66
Interest: $30,078.50
Late Charges: $266.52
Beneficiary Advances: $26,369.50

002 Public Not

43697

NOTICE OF PROPOSED CH
PRE-RELEASE FURLOUG
REGULATIONS OF THE DEP
CORRECTIONS

The Department of Corrections p
adopt regulation changes in 22 A
the Alaska Administrative Code,
Pre-release Furlough, including t
22 AAC 05.321 is proposed to be
give the Commissioner discretio
offenders that have been found g
major or high moderate infractio
past 120 days eligible for pre-rele
the commissioner finds that the d
action does not affect the prisone
for community placement.

You may comment on the propos
changes, including the potential c
persons of complying with the pro
changes, by submitting written co
Department of Corrections Regul
PO Box 112000, Juneau AK 998
Additionally, the Department of C
accept comments by facsimile at
(907) 465-3315 and by electronic
doc.admin.comments@alaska.go
may also be submitted through th
Online Public Notice System, by a
notice on the system and using th
link. The comments must be recei
than 5:00 PM AST December 15,

You may submit written questions
the proposed action to the Depart
Corrections Regulations Writer,
doc.admin.comments@alaska.gov
Street, Douglas AK 99824. The qu
be received at least 10 days befor
the public comment period. The D
Corrections will aggregate its resp
substantially similar questions and
questions and responses available
Alaska Online Public Notice Syste
Department of Corrections website

If you are a person with a disability
a special accommodation in order
participate in this process, please c
Department of Corrections Regulat
at doc.admin.comments@alaska.g
907-465-3480 not later than Decem
to ensure that any necessary acco
can be provided.

A copy of the proposed regulation c
available on the Alaska Online Pub
System and by contacting DOC Re
Writer doc.admin.comments@alask
call 907-465-3480.

After the public comment period en
Department of Corrections will eithe
proposed regulation changes or oth
provisions dealing with the same su
without further notice, or decide to t
action. The language of the final reg
be different from that of the propose
regulation. You should comment du
time allowed if your interests could b

Statutory authority: AS 33.30.011;
33.30.111; AS 33.30.021; AS 33.30

EMPLOYMENT

The State of Alaska's Legislative Branch is recruiting a Victims' Rights Advocate for the Office of Victims' Rights. The Advocate's primary responsibility is to perform all tasks that direct, manage and support victims and their rights in accordance with its statutory duties (AS 24.65.100). The position is located in Anchorage and is compensated on the State of Alaska Exempt salary schedule at a range 26 step A ($8,305.00 per month). The successful candidate will need to be licensed to practice law in the State of Alaska, at least 21 years of age, have significant experience in criminal law, and must have been actively practicing law sometime within the last three years. In addition the successful candidate MUST be a resident of the State of Alaska for the last three consecutive years (since March 1, 2015).

Applications must be submitted through the Workplace Alaska recruitment system no later than 5 p.m. Monday, February 19, 2018. For more information regarding this recruitment visit Workplace Alaska at: https://www.governmentjobs.com/careers/alaska

The Alaska State Legislature does not discriminate on the basis of race, color, national origin, sex, age, religion, or disability. Persons with disabilities who require special accommodations please contact the Legislative Affairs Personnel Office at 907 465-3854. Please allow sufficient notice for the Agency to accommodate your needs prior to the closing date.

Search for President/CEO

The KIC Board of Directors has opened a search for a new Chief Executive Officer for the corporation. We wanted to include our shareholders by sharing this recruitment information and encourage any qualified candidates to apply for the CEO position. We will be taking resumes and applications until November 27, 2017.

The Chief Executive, will work hand-in-hand with the Board establishing clear direction for the company, create operating plans aligned with the mission, provide effective and efficient support services, and deliver overall profitability of the business. A bachelor's degree preferred and successful leadership of a multidivisional organization, with a minimum 10 years' experience. The position will be located in Kotzebue, Alaska. KIC offers preference to share-holders and Alaska Native/ American Indians. E-mail resume to: ceo.hr@kikiktagruk.com. A detailed position description and online application can be found at www.kikiktagruk.com , KIC is an Equal Opportunity Employer

Taikuu,

KIC Board of Directors

Kikiktagruk Inupiat Corporation

Phone: 907-442-3165
Fax: 907-442-2165
E-mail: ceo.hr@kikiktagruk.com

PUTU- 2 WELL & SIDETRACK EXPLORATION PROGRAM ELEVATED
30-DAY PUBLIC NOTICE

The NSB Planning Commission will be conducting regular meeting and Public Hearing after a 30-day public notice period; the public hearing will be held in the Village of Nuiqsut on December 14th, 2017, at 6pm at the Kisik Community Center located at 2226 Second Avenue, Nuiqsut, Alaska.

The purpose of this public hearing is to discuss the merits of permit NSB 18-208, 2017-2018 Putu 2 Well & Sidetrack Exploration Drilling Program.

Any person(s) wishing to comment or present testimony may do so at the public hearing, or by sending written comments by December 7th, 2017, to:

Gordon R. Brower, Director
North Slope Borough Department of Planning and Community Services
P.O. Box 69
Barrow, Alaska 99723
(907) 852-0320/ Fax (907) 852-0321
Or
Gordon.Brower@north-slope.org

PUBLIC NOTICE

ASNA BOARD VACANCY – ATQASUK REPRESENTATIVE

The three (3) year term ending in 2020 for the Atqasuk seat on the Arctic Slope Native Association, Ltd., Board of Directors is currently vacant.

Interested Tribal Members who would like to be considered for the vacancy shall submit a letter of interest by November 30, 2017 to:

Nancy Rock, Acting Board Chairperson
Arctic Slope Native Association, Limited.
P.O. Box 1232 Utqiaġvik, Alaska 99723

The qualifications for Board Membership of ASNA are stated in the bylaws as:

"All persons who are currently members of the Arctic Slope Native Association, Ltd. and all Alaska Natives who are enrolled or who are eligible for enrollment to the Arctic Slope Region pursuant to the provisions of the Alaska Native Claims Settlement Act of 1971, as amended, are members of the Corporation."

If you have any questions please contact Marie Solomon at 907.852.9358 or email marie.solomon@arcticslope.org

PUBLIC MEETINGS

Noatak, Noatak IRA Office	December 5, 2017 10:00a – 12:00p
Kivalina, McQueen School	December 5, 2017 2:00p – 4:00p
Kotzebue, Northwest Arctic Borough Assembly Chambers	December 5, 2017 6:00p – 8:00p

Kivalina Evacuation and School Site Access Road
ADOT&PF/FHWA Project No. NFHWY00162/0002384

The Alaska Department of Transportation and Public Facilities (DOT&PF) in partnership with the Northwest Arctic Borough (NAB), the Community of Kivalina, NANA Regional Corporation (NANA), and the Federal Highway Administration (FHWA), announces the availability of the Draft Environmental Assessment (EA) for the Kivalina Evacuation and School Site Access Road project in Kivalina, Alaska for public review.

The project team proposes to construct a combined causeway and bridge facility across Kivalina Lagoon and associated all-season gravel access road from the lagoon eastern shoreline eastward to a community-selected evacuation site near Kisimigiuqtuq Hill (K-Hill). Up to four local material sites would also be developed to supply project requirements. The proposed project would provide Kivalina residents a safe and reliable evacuation route in the event of a catastrophic storm or ocean surge, allowing evacuees to temporarily mobilize to safe refuge at an assembly site on K-Hill also identified by the Northwest Arctic Borough School District as a preferred new location for the community school. The Draft EA addresses the proposed action and potential impacts to the natural and human environments.

The proposed project would also involve a portion of the Cape Krusenstern National Historic Landmark (CKNHL), an historic site listed on the National Register of Historic Places (NHRP) and protected under Section 4(f) of The Department of Transportation Act of 1966. The CKNHL, which in part encompasses private and state lands comprising the proposed project location as well the community of Kivalina, is administered by the U. S. Department of Interior, National Park Service (NPS). Based on consultation with the Alaska Department of National Resources Office of History and Archeology and the NPS, DOT&PF intends to make a finding that, after consideration of impact avoidance, minimization, and mitigation or enhancement measures, the proposed project would not adversely affect contributing elements, activities, features, and attributes of the CKNHL. The comment period for the 4(f) determination took place concurrently with the Section 106 review and has ended prior to this publication. However, DOT&PF will consider any additional comments regarding the potential impacts to the CKNHL received during the EA comment period. Documentation and other data informing this proposed 4(f) determination are provided in the Draft EA.

If you are unable to attend the public meeting dates referenced above but wish to provide comments on the Draft EA, you may access it via the project website listed below and also at the offices of the Northwest Arctic Borough (Kotzebue), the Native Village of Kivalina (Kivalina), the City of Kivalina (Kivalina), the Native Village of Noatak (Noatak), NANA Corporation (Anchorage and Kotzebue), and at the Red Dog Mine library. Formal written comments can be made until 12/15/2017 either via the project website at: http://dot.alaska.gov/nreg/KivalinaEvacRd/, or directly to the project manager by U.S. mail or email as noted below.

For more information or to provide written comments, please contact:

Jonathan Hutchinson, P.E., Project Manager
Alaska Department of Transportation and Public Facilities, Northern Region
2301 Peger Road, Fairbanks, AK 99709
(907) 451-5479
Jonathan.hutchinson@alaska.gov

The environmental review, consultation, and other actions required by applicable federal environmental laws for this proposed project are being, or have been, carried out by DOT&PF pursuant to 23 U.S.C. 327 and a Memorandum of Understanding dated November 3, 2017 and executed by FHWA and DOT&PF.

This proposed project will comply with Section 106 of the National Historic Preservation Act; Executive Orders: 11990 (Wetlands Protection), 11988 (Floodplain Protection), 12898 (Environmental Justice), the Clean Air Act, Clean Water Act, Fish and Wildlife Coordination Act, and U.S. DOT Act Section 4(f).

It is the policy of the DOT&PF that no person shall be excluded from participation in, or be denied benefits of any and all programs or activities we provide based on race, religion, color, gender, age, marital status, ability, or national origin, regardless of the funding source including Federal Transit Administration, Federal Aviation Administration, Federal Highway Administration and State of Alaska Funds. The DOT&PF complies with Title II of the Americans with Disabilities Act of 1990. Individuals with a hearing impairment can contact DOT&PF at our Telephone Device for the Deaf (TDD) at (907) 451-2363.

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Open House: Kivalina Evacuation & School Site Access Road

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Interested

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Tuesday, December 5 at 10:00 AM - 12:00 PM AKST
6 days ago

Native Village of Noatak Offices, Noatak, Alaska

About Discussion

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Details

The Alaska Department of Transportation and Public Facilities (DOT&PF) and the Federal Highway Administration (FHWA) in partnership with the Northwest Arctic Borough and the Community of Kivalina are proposing a project to improve community safety in Kivalina, Alaska by constructing a safe, reliable, all-season evacuation road between the community of Kivalina and K-Hill.

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-Development of up to four material sources including the K-Hill Site, Wulik River Source 1, Relic Channel Source 1, and Relic Channel Source 2. These material sources are anticipated to be suitable local sources of select material to supply the project. Selection and development of viable material sources and haul routes are considered as part of the Proposed Action.

DOT&PF is conducting a thirty (30) day review period of an environmental document for the proposed project in accordance with the National Environmental Policy Act (NEPA). DOT&PF is planning upcoming public meetings in the communities of Kivalina, Noatak, and Kotzebue. These meetings are an important part of the formal NEPA scoping process. A

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This project is being developed in accordance with the following special purpose regulations including Sections: 4(f) of the Department of Transportation Act; 106 of the National Historic Preservation Act, 7 of the Endangered Species Act; and Executive Orders: 11988 (Floodplain Protection); 11990 (Wetlands Protection); and 12898 (Environmental Justice).

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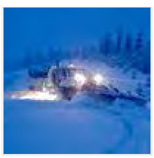

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Open House: Kivalina Evacuation & School Site Access Road

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Interested ...

Tuesday, December 5 at 6:00 PM - 8:00 PM AKST
6 days ago

Northwest Arctic Borough Assembly Room, Kotzebue, AK

About Discussion

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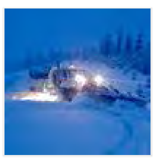

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Open House: Kivalina Evacuation & School Site Access Road

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Tuesday, December 5 at 2:00 PM - 4:00 PM AKST
6 days ago

McQueen School Gym, Kivalina, AK

About Discussion

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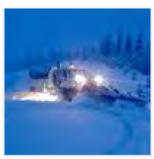

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2017-12-05 Kivalina Public Meeting notes

Kivalina Evacuation and School Site Access Road

Environmental Document Public Review Meeting

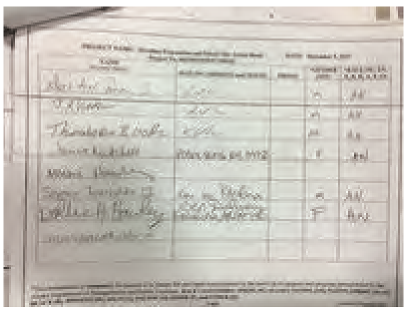
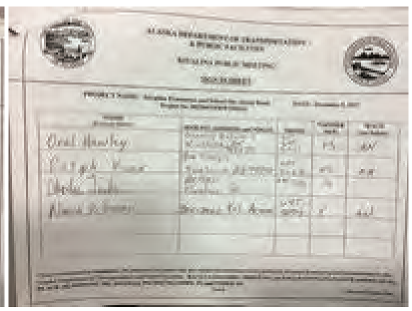
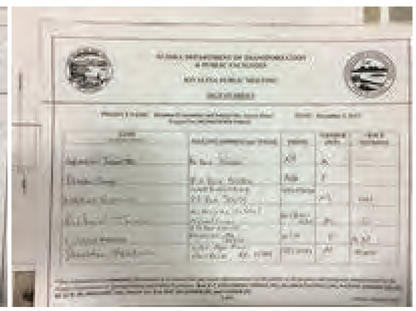
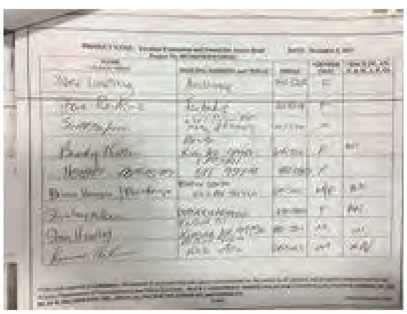
2:00-4:00

December 5th, 2017

McQueen School, Kivalina

Documented by Katherine Keith and edited by the Visiting Team

Sign In Sheets:

Visiting Team:

DOT&PF: Jonathan Hutchinson; Brett Nelson; Scott Maybrier; Missy Jensen; Margaret Carpenter

Remote Solutions: John Baker; Paulette Schuerch; Katherine Keith

Stantec: Sara Lindberg

Michael Baker Intl: Steve Reidsma

John Baker discussed the origin of the project and the expedited nature of the project.   John introduced DOT&PF as the lead project lead about one year ago. In the past 12 months the environmental document was started and completed. DOT&PF completed a review of existing projects in order to expedite completion of the project.   John asked Oral Hawley to lead a prayer.   John asked the attendees to introduce themselves.

- Nathan, environmental coordinator, IRA
- Brian and Rhea Barger
- Charles Baker
- Becky Norton, IRA Council Member
- Gary Swan, McQueen School, Maintenance
- Richard Tree, McQueen School, Behavioral Health
- Heather Dominguez
- Stan Hawley, Tribal Administrator

- Loretta Adams, Secretary, IRA
- Paulette Schuerch, Remote Solutions
- Jonathan Hutchinson, Scott, Missy, Brett Nelson, DOT
- Sara Lindberg, Stantec
- Steve Reidsma, Michael Baker
- Austin Swan, City Mayor
- Janet Mitchell
- Millie Hawley, President and Transportation Coordinator
- (*More in attendance after introductions. See sign-in sheets for reference)*

Jonathan Hutchinson mentioned that we brought out a large team of people to discuss the project because there are a large mix of specialties. The project team watches the weather warnings frequently and understand the project need. One year ago we received $3.2 million in federal funding which enabled this project to move forward as a project and get it closer to reality. All the comments from the November 2016 public meeting have been incorporated into the Environmental Assessment. We are here to receive comments so that this draft EA can become final. All comments will be recorded if you want to give them verbally. You can also give them in written form. The formal deadline for December 15th, 2017.

Theodore Booth asks how far along is the project because the extremely high water is a very real threat. The water came up, on the ocean side, to a house right by the clinic. (The last storm we couldn't get out of here because the water was so high that there was no way to cross)

Jonathan Hutchinson shows Figure 2 "Study Area and Potential Sites." On this figure, during the scoping phase, you can see the various route options that have been proposed during the project. **John Baker** points out the Southern Route, Northern Route, and Combined Route B which were evaluated in the EA. **Jonathan Hutchinson** stated that the Team needed to come up with a Preferred Alternative. The obvious route to eliminate were the crossing that went north along the runway. During this process the Preferred Alternative is the Southern Route which is almost identical to the one that the community and the NWAB proposed during the planning phases. If this is still the Preferred Alternative for the community, we will move this forward with the agencies and finalize the EA report.

Becky Norton. The NWAB did not choose the route but the community choose it. (It should be made clear that the community chose the route, not the Borough)

Scott Maybrier displayed a 3D flyover of the alternatives. Survey data/LiDAR was collected over an area 5 miles by 10 miles long. The survey data is displayed into a 3D environment with 2016 imagery laid over it. The whole purpose is to help you see what the road route might look like.

Heather Dominguez, Chukchi College has a drone available for use and could do a flyover of the road. They are collecting sea ice information.

Scott Maybrier has seen project area flyovers. Drones do allow you to collect some non-controlled survey data. The large amounts of data on the drones would be difficult to manage for a project this size but there could be useful applications.

Scott Maybrier then displayed a 3D rendering of the bridge of what it might look like using DCCED mapping as a base.

Becky Norton: How long is the bridge?

Scott Maybrier: 120 feet (24'x110')

Jonathan Hutchinson: The exact length of the bridge will be determined after the EA is finalized.

Becky Norton: Will there be culverts?

Jonathan Hutchinson: There will be a series of 12-foot diameter culvert at a V shaped channel at the far end of the lagoon. Other designs considered during planning included greater numbers of larger culverts however the bridge was . There will be a series of overflow pipes as well near the top of the causeway. (12-15' diameter)

Becky Norton:: Will you have rails along the entire length of the road?

Jonathan Hutchinson: That is a design level detail, but it is likely the causeway will need railing because of the high winds and ice.

Theodore Booth: How high will the bridge be built?

Jonathan Hutchinson: 15-feet will be the minimum height for considering for construction. This will be evaluated further during design.

Theodore Booth: When will you start?

Jonathan Hutchinson: The soonest we can start is fall/winter of 2019 but we still don't have the construction funding needed. We have to wrap up this EA so that we can apply for construction funding and complete the design phase.

Millie Hawley: What is the current cost estimate?

Jonathan Hutchinson: still around $50 million

Millie Hawley: Have you identified gravel sources?

Jonathan Hutchinson: There are four material site options that we are considering moving forward with on the project. The four sites provide flexibility. The Wulik River site is easy to access and has good material for surfacing the road. The most valuable site is at K-Hill because there is rock there. We will be blasting the rock there to get what is needed.

Millie Hawley: Is the quality of the material sites good enough for the road?

Jonathan Hutchinson: Yes, the data we have indicates that it is good.

Millie Hawley: Is there enough gravel or will you have to import material?

Jonathan Hutchinson: The information we have indicates that there are enough local materials available.

Becky Norton: How will you get material from the Wulik River?

Jonathan Hutchinson: If we use the Wulik river sources we would likely build it in the winter so that we don't degrade the water quality.

Becky Norton: Are you near the allotments? Will you impact the allotments?

Scott Maybrier pulled up a map of allotments on the screen.

Jonathan Hutchinson: You can see that the project avoids the allotments. One material site would impact an allotment and DOT&PF would need to get permission if that site was selected for moving forward. We want to avoid the allotments.

Sara Lindberg began discussing the NEPA process. Sara works at Stantec and leads the EA writing. Any environmental process starts with the purpose and need which was already very well defined. The Draft EA was published November 15, 2017 and we now have 10 more days to complete the review process. Comments have helped to refine the alignment to one preferred alignment. Agency coordination will be completed as part of the EA review process. DOT&PF has taken on the responsibility of the NEPA Assignment.

Brett Nelson is the DOT&PF Environmental Coordinator, and this is his first time to Kivalina. He is happy to see the area and get to know the community better. Brett's role is to review, advise, and help approve the EA. This is a federally funded project and DOT&PF is now taking the lead of the NEPA process for FHWA. This project is getting a lot of attention from being the first project to go through this process. This is also helping to keep the resources focused in on this project to get it completed. DOT&PF asked FHWA for NEPA assignment so that DOT&PF can help prioritize getting things done. We also don't want to do anything wrong so that we don't jeopardize the project and project federal funds. Right now, we are most interested in hearing from you. We are also listening to the resource agencies because they also have a lot of input. All comments will be reviewed and responded to. Also, positive comments are very helpful because it helps the federal agencies to understand the need for the project.

If we work closely with the permitting agencies and include them as part of the team they help us to solve issues together as things evolve. This is a result of a lot of hard work on behalf of the entire team for years leading up to now.

John Baker: What can the community do to help support the project?

Brett Nelson: Talk to Margaret who is collecting verbal notes and/or fill out comment sheets.

Becky Norton: We have already said our piece and have already commented more than enough how much we need this project. Lets just get to work and start making it happen.

Margaret Carpenter: What about a letter of support from the IRAs, City, and NWAB?

Millie Hawley: I am currently the president and Tribal Transportation Coordinator. I appreciate all the work that you have been doing as an agency to expedite and be moving this forward. I apologize for the lack of attendance at this meeting because I have been ill for the past three weeks. I would have done more if I felt better. I do have a plan to help get community input. I could solicit comments, as the Transportation Coordinator, from the coordinator and submit them to you guys by the end of the comment period. If the community would like to extend the comment period would that be possible?

Brett Nelson: The project isn't hinging on needing to have the comments. We are fully committed to getting this done as quickly as possible. When people are able to share how they feel about the project they have more ownership which is very positive. If comments trickle in after the 15th they are still incorporated and will be used during the design phase.

Millie Hawley: During one of the meetings we had over 100 people and they all expressed the desire for the evacuation road. They also stated their trust to community leadership to make decisions for the community. There have been storms with high water that came up near the clinic and so people are very very concerned. We hope it is over for now but the ocean is still not frozen. We can work with you and provide what is needed. Do you need more funding for design?

Brett Nelson: We are mostly focused on getting construction funding.

Jonathan Hutchinson: We should have enough funding for design. The momentum and aggressive pace is helping to control the budget. We are watching very carefully for how we are spending the money.

Millie Hawley: The reason I ask is that we are still finalizing the Denali Commission funding. We need specifics on what the funding could be used for to help support the project. We need to discuss how to work together on how to help Denali Commission. The past four years of tribal transportation funding has been saved for this project and could be used for this project if the IRA could receive an invoice to pay.

Brett Nelson: That would be very helpful to consider.

Steve Reidsma: Steve is new to the project and new to Kivalina. The permitting process I have been working lately is on the Kotzebue to Cape Blossom Road. The Cape Blossom Road project was completed in 2013 and the permit applications are just being completed. This is not what is happening on this project. It is being started far in advance of what is typical.

It is really helpful to get agencies out to Kivalina to see the importance of the project. We have gotten a long way in preparing the permit applications. We hope to submit them soon. This project is unique. It is an evacuation road to safety. We need to continue to impress this upon the agencies so that we can keep aggressively moving this along.

John Baker: We have time for more comments.

Austin Swan: During the last storm that we had we did have a pretty good bunch of sand which raised up the beach area. All along the spit we have chunks of ice that were moved over to the lagoon from wave action. There is a sandbar that is building up in front of town which saved us. That sandbar is thankfully breaking off waves before hitting the beach. However, we are losing ground on the lagoon side and in the middle of the village as it is blowing away and getting torn up by traffic. Electrical cables are now showing that weren't there before. Rutts aren't going away.   I am glad we are moving as fast as we can with this project.

Jerry Norton: The only known flooding that occurred in the late 1900s when my grandmother was a teenager. Now that has changed. The highest land was show was East tigpick when you could. If we are going to make this road it has to be higher than the two sides of the lagoon otherwise it will go under.

Becky Norton. I wanted to thank search and rescue and the fire department during the last blizzard. The team got together to plan and had night guards watch the village to evacuate people to the gym when the water begins coming up too high. We were lucky it didn't come up too much higher. Thanks to everyone. I hope this project goes as planned so that we can get started.

Dollie Hawley: Thank you for coming to Kivalina and wanting to help our people. We have tried to get our voices heard about the need for this project. The seasons are changing and so we don't know always what to expect.   We have real bad storms and we just keep watching the ocean. The ice is melting in ways that are not understandable. Sometimes the blizzards scare the grandkids. I am in favor of this project. I am not thinking of myself but my five grandkids. If we are all gone, and God takes us home, I would hope for my grandkids sake that they could be safe. We want DOT to build us a road to safety.

Gary: What I noticed in the last storm was that the water level came up over the ice in the lagoon. The water level went past the end of the runway over from the ocean. What was going through my mind was how the water was coming up so quickly over the spit. Thank you for coming out and working so hard on this. I know what it is like to work on holidays and be away from family. So thank you for taking that time to come and help us.

Stanley Hawley: When I saw the power point slide of the road design of the bridge I was amazed at how high it was.. If it works, we could use that to go beyond the scope of the road. If it works, we could think about moving the entire village even. Right now, I would say go for it. Just go for it.

Theodore Booth: Thank you coming here. Time after time. We all have been working hard. I know it will happen. Hopefully, while I am still alive to see it. Once the evacuation road is done I am hopeful that it will open up opportunities for the community. Since 1970 we have seen changes over the years. The beach used to go way out there with grass and gravel. 3,500 feet out. The change is in how narrow it is getting every year. The ocean moved the big boulders that were placed there for protection. I am happy you are moving along smoothly. Thank you for making it happen and coming out here.

Becky Norton: Our gramma, when she was growing up, told us that we are right now on the 3rd place of living.   They moved three times. This area, we are living now, was their main berry picking land during their first home. That is how much it has eroded.

Oral Hawley closed the meeting with a prayer.

PROJECT NAME: Kivalina Evacuation and School Site Access Road
Project No. 002384/NFHWY00162

DATE: December 5, 2017

NAME (PLEASE PRINT)	MAILING ADDRESS and *EMAIL	PHONE	*GENDER (M/F)	*RACE (W, AN, N, B, H, A, P, O)
Austin Swan Jr	KVL		M	AN
J Rhoda	KVL		M	AN
Theodore B Booth	KVL		M	AN
Janet Mitchell	PO Box 50076 KVL 99750		F	AN
Mimi Hawley				
Seymour Tuzroyluke III	Gen Del Kivalina		M	AN
Dollie A. Hawley	Gen Delivery Kivalina, AK 99750		F	AN
Margaret Baldwin				

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ALASKA DEPARTMENT OF TRANSPORTATION & PUBLIC FACILITIES

KIVALINA PUBLIC MEETING

SIGN IN SHEET

PROJECT NAME: Kivalina Evacuation and School Site Access Road
Project No. 002384/NFHWY00162

DATE: December 5, 2017

NAME (PLEASE PRINT)	MAILING ADDRESS and *EMAIL	PHONE	*GENDER (M/F)	*RACE (see below)
Oral Hawley	General Delivery Kivalina, AK 99750	907 645 5011	M	AN
Ralph Knox	Box 50067 Kivalina Ak 99750	645 5068	M	AN
Charles Tinker	Box 50011 Kivalina Ak	645-2199	M	
Nova D. Swan	Box 50060 KvL. Ak. 99750	645-5094	F	AN

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effective: December 2004

ALASKA DEPARTMENT OF TRANSPORTATION & PUBLIC FACILITIES

KIVALINA PUBLIC MEETING

SIGN IN SHEET

PROJECT NAME: Kivalina Evacuation and School Site Access Road **DATE:** December 5, 2017
Project No. 002384/NFHWY00162

NAME (PLEASE PRINT)	MAILING ADDRESS and *EMAIL	PHONE	*GENDER (M/F)	*RACE (see below)
Sylvester Swan III	Po Box 50010	N/A	M	
Freida Sage	P.O Box 50006	N/A	F	
Nathan Koonook	isap@kivaliniq.org P.O. Box 50051	9076452236	M	AN
Richard Tree	McQueen School Kivalina	(907)645-2125	M	C
Loretta Adams	P.O. Box 50058 Kivalina, AK 99750	N/A	F	AN
Jonathan Hutchinson	2301 Roger Road Fairbanks, AK 99709	451-5479	M	mixed

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effective: December 2004

PROJECT NAME: Kivalina Evacuation and School Site Access Road **DATE: December 5, 2017**
Project No. 002384/NFHWY00162

NAME (PLEASE PRINT)	MAILING ADDRESS and *EMAIL	PHONE	*GENDER (M/F)	*RACE (W, AN, N, B, H, A, P, O)
Sara Lindberg	Anchorage	343-5250	F	
Steve Reidsma	Fairbanks	3227744	M	
Scott Manbrre	2301 Peger Rd. Fbks, AK 99709	451-5380	M	
Becky Norton	Box 46 KVL AK 99750	645-5715	F	AN
Heather Dominguez	PO 591 KVL 99750	412-0557	F	
Brian Barger / Rhea Barger	PO Box 50020 KVL AK 99750	645-5031	M/F	AN
Shirley Adams	POB58 KVL AK 99750	645-5805	F	AN
Stan Hawley	P.O. Box 51 Kivalina AK 99750	645-2201	M	AN
Russell Adams	PO Box 80 KVL AK	645-5028	M	AN

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2017-12-05 Kivalina Public Meeting in Kotzebue notes

Visiting Team

DOT&PF: Jonathan Hutchinson; Brett Nelson; Scott Maybrier; Missy Jensen; Margaret Carpenter

Remote Solutions: John Baker; Paulette Schuerch; Katherine Keith

Stantec: Sara Lindberg

Michael Baker Intl: Steve Reidsma

Attendees

John Chase, Planning, Northwest Arctic Borough

Date

05 Dec 2017

Meeting Notes

Jonathan Hutchinson: The project doesn't have construction funding but we are targeting fall/winter 2019.

John Chase: So does the project include the gravel pad for the School. I worked with Sonny Adams, NANA on a permit for a rock quarry close to Kivalina. I know there was going to be an ice road for material site development. I can send you the permit for the project. With Title 9 permit the project is null and void if you don't act on the project for over a year. I don't know exactly where it is through.

Jonathan Hutchinson: I think you are talking about Essepuk.

Steve Reidsma: Is it best to get our permit the year we want to start construction? Or get it as soon as possible.

John Chase: Once you have a final design work with NWAB on the Title 9 permit but we don't need to do it sooner than that.

John Baker: How long does it take to get a Title 9 Permit.

John Chase: Could be one month maybe two months to process a conditional use permit because the planning commission is involved. It would be best for DOT To come up to present to the planning commission. I have reviewed the EA and the project isn't rocket science.

Jonathan Hutchinson: Used a lot of preexisting information, being very aggressive, and have wrapped up the EA in a very short amount of time. We are working to get environmental wrapped up in the next 1.5 months.

Sara Lindberg: I think the Title 9 permit will involve rezoning because of the subsistence zone.

Jonathan Hutchinson: Whats the Title 9 process?

John Chase: I will review the permit process, John will write the permit, John will get a date with the quarterly planning commission meetings for a dialogue. No assembly involvement.

Jonathan Hutchinson: We are trying to provide the most direct route for the community to evacuate. The communities are happy to get an update and are very happy to have a process that has gotten them to a Preferred Alternative. The yellow route is the Preferred Route. The red line is the Northern Route which is longer and more costly. The elevation of the red line is favorable but the ground conditions weren't truly any better but it had more water crossing to consider. Not enough value or reason to go with the red route. Therfore, the yellow route has remained the Preferred Alternative.

John Chase: I am glad we have consensus because this has been a topic of discussion for a long time. Sounds like the community is happy with this project now. I participated in the Consensus Building Process many years ago with Glenn Gray and this was discussed even then.

Jonathan Hutchinson: The flood depth is being refined right now but it is clear why we need to go so far to get out of the flood plain. This is why we need to go

John Chase: How much material is needed?

Steve Reidsma: 1.3 million cubic yards

John Chase: How deep is the lagoon?

Sara Lindberg: 4-5 feet deep at most.

Jonathan Hutchinson:: The bridge clearance is 12 feet at the highest tide.

Sara Lindberg: What isn't shown on the bridge rendering is the overflow pipes. But you can see the culverts.

John Chase: The main thing about Title 9 is subsistence is the highest priority so the culverts are good.

Jonathan Hutchinson: The reason the causeway is so costly is because we have to armor the whole thing with rock. We plan to use all local source for the rock though. 6 foot high embankment.

John Chase: I think I forwarded the NANA Kivalina Rock Quarry permit to someone at DOT. Has DOT looked at the engineering of the DMTS Road and compared it to the proposed Kivalina Road? It would be good to learn from that project.

Paulette Schuerch: Because it is so high are there going to be road crossings for subsistence use to allow for back and forth travel across the road? J

Jonathan Hutchinson: One turnout per mile but the locations haven't been identified yet but this could be a great place for 'on-ramps'.

Sara Lindberg: The Noatak Airport access road is considering 4:1 or 5:1 side slopes at areas where there are known side slopes.

Sara Lindberg: The NEPA process has been done to take all the community input to get to a draft EA at this expedited rate. Hoping to get draft EA comments by December 15th. The next step is to work with the federal and state agencies to get any input.

John Chase: How do I provide comments? Who approves the EA

Brett Nelson: The State of Alaska now has sole responsbility for approving environmental documents. This happened just in the past few weeks and we have been working on this with FHWA for over two years to make this happen. FHWA has made a great partner but the state would like to try new delivery methods to help expedite needed projects. We also have to do it well so that we aren't putting federal funds in jeapordy. This is the first big project that is going to be approved by the State under this new NEPA assignement.

Steve Reidsma: What we are doing with this project. The environmental document is typically complete and other acquistion issues prevent a smooth and expedious permitting process. This project has a number of permits including USACE, DNR, and other. A group of us are reviewing permits concurrently to get the process together. We are meeting with permitting agencies this month to see keep them informed. We will also inform them that the purpose of this project is safety.

John Chase: When do you anticipate final design? Come talk to me when you have a stamped final design.

Sara Lindberg: Spring 2018

Jonathan Hutchinson: When we go to permitting we use a conservative design to go forward with. We are close to having a design that is ready for permitting purposes before too long. Final Design Study Report is scheduled for May 2018 which is close to 50% design level. I don't expect a major issue with the design other than the bridge.

John Chase: So for the EA are you just asking the public for comments on the project and how it might affect their every day life?

Brett Nelson: A lot of the comments and concerns have already been heard and incorportated. However, this EA is a chance to report back on findings, ensure agreements. These comments are rolled into a revised EA. If the Preferred Alternative is accepted is moves forward with one further 30 day comment period for any additional chances to comment.

John Chase: My concerns will be about the ice, logs, etc things that coud jam up the bridge. Also wildlife impacts.

Brett Nelson: We have communicated with the communities and consulted with all of the agencies.

Sara Lindberg: The way the ice goes out is that it mostly melts into place. The ice at that location isn't typically a risk to bridge design.

John Chase: At the NWAB we support the communities. If the community supports the project, the NWAB will support the community and therefore the projects. Worst case scenario would be issues with Caribou being deflected away from crossing the road. The way I do permitting is through asking questions with direct answers. This is great. I applaud the team who has made this all happen.

2017-12-05 Kivalina Public Meeting in Noatak notes

Kivalina Evacuation and School Site Access Road

Environmental Document Public Review Meeting

11am-12pm

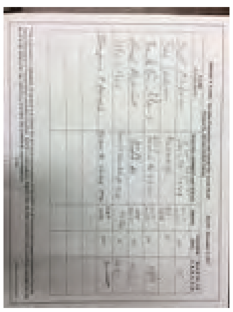
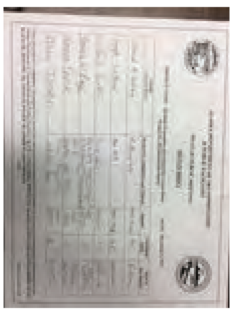
December 5th, 2017

Noatak IRA Building

Documented by Sara Lindberg and edited by the Visiting Team

05 Dec 2017

Sign In Sheets:

Visiting Team:

DOT&PF: Jonathan Hutchinson; Brett Nelson; Scott Maybrier; Missy Jensen

Remote Solutions: John Baker

Stantec: Sara Lindberg

Meeting Notes:

Jonathan Hutchinson discussed the project overview informally with community members while the team waited for others to arrive.

Richard Ashby: You will need a snow fence along the road because of snow drifting. You should also consider installing snow fence at the material sources so drifting snow does not build up in the work area.

Jonathan Hutchinson: The height of the road embankment has been designed to accommodate that need. The height of the embankment will act as a snow fence in a way, and will have the same effect of keeping the snow drifts a distance from the road like a fence would. The comment about snow fence in the material sites is a good one, we will consider this for construction.

Richard Ashby: What obstacles have you overcome with the Cape Krusenstern Landmark boundary being within the project area?

Jonathan Hutchinson: We have completed a detailed cultural survey within the project area and have been working closely with the SHPO and NPS on this project. Both agencies have been out on site and seen the project area first hand. Due to the lack of resources found during the surveys, we have received clearances from both agencies for this project already.

John Baker started the meeting as most of the attendees had gathered. John began by introducing the project team, and talking about how the community, the strongest member of the team, has been critical to helping this project move forward on an expedited timeline. John asked **xxx** to start the meeting with a prayer.

Jonathan Hutchinson discussed the EA document and the previous community outreach and public involvement efforts. Jonathan showed the attendees the EA appendix where all the previous sign in sheets and meeting comments were located, and discussed how the project at this stage has incorporated all previous community and agency comments, and that the project they are seeing today is a route and design that incorporates those comments. Jonathan talks a little about the project history and how the DOT became involved a year ago with getting the project onto the federal STIP program, that this was a huge milestone. Jonathan states that without all the community input and studies that had been completed in the past this would have taken much longer.

Jonathan Hutchinson goes over the previous routes that had been studied and how the project team coordinated with state and federal agencies over the past year. This process allowed the DOT to select a preferred alternative as part of the EA process, and the preferred alternative, the Southern Route, is very close to the route that the community has previously selected as their preferred route.

Jonathan Hutchinson talk about ways the community can comment on the project, and that supportive comments at this stage will help in the ongoing agency meetings and permitting process that is still ahead.

Sara Lindberg discussed the NEPA process, the project purpose and need, and how alternative development and evalauton is a big part of the process. Sara mentions that this NEPA document is a decision document and that after we gather additional community comments the EA will be finalized and a decision will be made on whether the preojct would have siginifcant impacts. Usually for this type of project the Federal Highway Administration would be the one to make that decision as the federal funding agency, but over the last 3 years DOT&PF and FHWA have been working together to assign DOT that decision authority. This assignment just happened very recently in the last month and the Kivalina evacuation road project will be one of the first major projects to be approved under the new assignment. **Brett Nelson** talks about how this is beneficial as the DOT is closer to the communities this will allow projects to be expedited more quickly, but that the process will be just as thorough and thoughtful as it was preivsouly, DOT is taking their role very seriously.

A community member asks what the timeline is for construction.

Jonathan Hutchinson says the earliest they could start construction would be winter of 2019, but that construction funding still needs to be found for this project. Getting through the EA is a big milestone for this project and DOT can now start to move forward with final design and identifying construction funds.

Scott Maybrier showed the community over flight videos of the project corridor and 3D renderings of what the road and bridge would look like. There was a lot of discussion during this portion of the meeting by various community members.

Question: Will boats be able to go under the bridge? How high will the bridge be?

Scott Maybrier: Yes, the bridge design will accommodate passage of boats, fish, and wildlife and is set to have a 12 foot clearance. The bridge is about 15 feet above the mean tide level.

Question: Will the road and bridge be above the level of the floodwaters?

Jonathan Hutchinson: Yes it is designed to be above the maximum storm surge wave height and 100-year flood elevation.

Question: Is this the final plan for the road?

Scott Maybrier: No, there will be some adjustments to it. This is about a 35% design.

John Baker thanked the community for coming and reittereated that this preojct is making very good progress. **xxxx** closed the meeting with a prayer.

ALASKA DEPARTMENT OF TRANSPORTATION & PUBLIC FACILITIES

NOATAK PUBLIC MEETING

SIGN IN SHEET

PROJECT NAME: Kivalina Evacuation and School Site Access Road
Project No. 002384/NFHWY00162

DATE: December 5, 2017

NAME (PLEASE PRINT)	MAILING ADDRESS and *EMAIL	PHONE	*GENDER (M/F)	*RACE (see below)
Wilfred R Ashby	Po Box 44	444 5020	m	Eskimo
Joseph Luther	Box 53	485-2580	M	Eskimo
Melford Booth	Box 64	485-2117	M	Eskimo
Susie W. Page	Box 89 Native Village of Noatak Noatak (Tribal Member)	485-2172	F	AK Native
Hannah Onalik	Box 8 Noatak, AK. 99761	485-5058	F	Alaska Native
Mary Jensen	2301 Peger Rd FBKS, AK	451-5377	F	White

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effective: December 2004

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NAME (PLEASE PRINT)	**MAILING ADDRESS and *EMAIL**	**PHONE**	***GENDER (M/F)**	***RACE (W, AN, N, B, H, A, P, O)**
Scott Maybrer	2 3rd Peger Rd. Fbks, AK 99709	451-5360	M	W
Sara Lindberg	Anchorage	343-5250	F	
Frank [illegible] Sr	Box 5 Noatak Ak 99761	485 2455	M	AK/N
Harold Mitchell	Box 86 Noatak AK	485 5635	M	Eskimo
Della Wther	Box139 Noatak, AK 99761	4120266	M	AK/N
Benjamin P. Arnold	PO Box 28 Noatak 99761	485 5090	M	Inupiat

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Hillman, Kacy

From: Kathy Christy <christykj@gci.net>
Sent: Wednesday, December 06, 2017 6:56 PM
To: 'Anderson, Ryan (DOT)'; Lindberg, Sara; jonathan.hutchinson@alaska.gov
Cc: 'Annmarie O'Brien'
Subject: Comments Kivalina Evacuation and School Site Access Road - Draft EA for Public Review

Thank you for the opportunity to review the draft Environmental Assessment. The comments I have are in regard to Section 4.5 and 4.5.2.2. and are related to changes to traffic. The EA title includes School Access Road. The State has already allocated funding for the construction of the school. School Construction is anticipated to start as soon as the road is completed. I would not expect the EA to address the impacts of the school and its construction but shouldn't the EA address the traffic to and from the school?

The EA does a thorough job of addressing construction related impacts but is limited in addressing future use of the road beyond use for access to subsistence resources. The District anticipates that students would be transported between the school and current community by school bus. Multiple bus trips will be required to transport the number of Kivalina students. Teachers would likely reside in housing on the school site. Goods and services supporting the school, including fuel, would need to be transported on this road.

The community currently primarily utilizes small ATV's and snow machines as there is essentially nowhere to drive larger vehicles. Construction of a road will change this as evidenced by other communities within the region. The planned road and lagoon crossing should be developed to support year round bus, and pickup truck use in addition to the smaller vehicles.

Related to this would be issues associated with on going maintenance and operation of the road to assure its use during the school year and for evacuation purposes. There would be socio-economic impacts associated with year round road maintenance.

I would hope that other sections of the document would not require revision.

Again, your work is much appreciated and I look forward to the synergy of shared planning efforts.

From: Anderson, Ryan (DOT) [mailto:ryan.anderson@alaska.gov]
Sent: Tuesday, November 14, 2017 4:05 PM
To: Kathy Christy <christykj@gci.net>
Cc: Schacher, Sarah E (DOT) <sarah.schacher@alaska.gov>
Subject: FW: Kivalina Evacuation and School Site Access Road - Draft EA for Public Review

Hi Kathy –

We've been busy! But great accomplishment in getting the environmental document to review. See below to the links. I hope this information is helpful to the school project.

Ryan

From: Anderson, Ryan (DOT)
Sent: Tuesday, November 14, 2017 4:02 PM
To: liz.cravalho@nana.com; Kivalina IRA Council <tribeadmin@kivaliniq.org>; john.lincoln@nana.com; 'Noah Naylor' <NNaylor@nwabor.org>; 'Patrick Savok' <PSavok@nwabor.org>; atchugunnaq@gmail.com;

'transportation@kivaliniq.org' <transportation@kivaliniq.org>
Cc: Schacher, Sarah E (DOT) <sarah.schacher@alaska.gov>; Hutchinson, Jonathan J (DOT) <jonathan.hutchinson@alaska.gov>; Maybrier, Scott L (DOT) <scott.maybrier@alaska.gov>; 'Lindberg, Sara' <sara.lindberg@stantec.com>; Katherine Keith (katherine@akremotesolutions.com) <katherine@akremotesolutions.com>; Karczmarczyk, Paul F (DOT) <paul.karczmarczyk@alaska.gov>; Carpenter, Margaret (DOT) <margaret.carpenter@alaska.gov>
Subject: Kivalina Evacuation and School Site Access Road - Draft EA for Public Review

Good Afternoon all –

I'm pleased to announce that the Final Draft Environmental Assessment for the Kivalina Evacuation and School Site Access Road is now available for public review. This is a major milestone in the project development process, and marks the beginning of the 30 day public comment period. The project team is planning public meetings to present the document in Kivalina, Noatak, and Kotzebue on December 5th. Details for the meetings can be found on the public notice.

The on-line public notice for the document can be found at the following link: https://aws.state.ak.us/OnlinePublicNotices/Notices/View.aspx?id=187769

Notices will also appear in the Arctic Sounder, as well as the Fairbanks News Miner and Alaska Daily News.

The document can be downloaded from our website at: http://dot.alaska.gov/nreg/KivalinaEvacRd/

We will be following up in each community with hard copies of the document to be placed in your local communities for people that may not have access to computers.

Thank you all for your continued commitment to this important project, and please do not hesitate to call if you have questions.

Ryan F. Anderson, P.E.
Northern Region Director
Alaska Department of Transportation and Public Facilities
907-451-2211
ryan.anderson@alaska.gov

Northwest Arctic Borough

163 Lagoon Street
P.O Box 1110 Kotzebue, Alaska 99752
(907) 442-2500 Fax (907) 442-2930
www.nwabor.org

December 12, 2017

Mr. Jonathan Hutchinson, P.E., Engineering Manager
Northern Region DOT & PF Design
2301 Peger Road
Fairbanks, AK 99709

Re: Northwest Arctic Borough Comments
Alaska Department of Transportation & Public Facilities
Draft Environmental Assessment (EA) for the Kivalina Evacuation and School Site Access Road Project

Dear Mr. Hutchinson;

The Northwest Arctic Borough is glad to submit these comments on the draft environmental assessment for the proposed Kivalina Evacuation and School Site Access Road Project. The Northwest Arctic Borough supports the proposed action, which would construct a safe, reliable, all-season evacuation road between the community of Kivalina and Kisimiguiqtuq Hill (K-Kill).

Kivalina has been the scope of many studies to examine the need for relocation and/or an evacuation road due to the effects of a changing climate. Coastal erosion and flooding have also been real threats that residents have had to face. The proposed evacuation road will enable the residents of Kivalina to mobilize to safety in the event of a catastrophic storm surge. We fully support this project.

Thank you for your time.
Sincerely,

Noah Naylor
Planning Director

TRIBAL TRANSPORTATION PROGRAM

DRAFT ENVIRONMENTAL ASSESSMENT

COMMENT FORM

1. ARE YOU IN SUPPORT OF THE EVACUATION ROAD?
   YES X NO ____ NOT SURE ____

   WHY? OR WHY NOT?

2. WHAT SUGGESTIONS DO YOU HAVE FOR THE DEVELOPMENT OF THE FINAL DESIGN AND CONSTRUCTION OF THE EVACUATION ROAD?
   Get it Done!!

3. OTHER COMMENTS/CONCERNS/QUESTIONS?
   When will it be done?

OPTIONS:

NAME: ____ DATE: 11/7/2017

TRIBAL TRANSPORTATION PROGRAM

DRAFT ENVIRONMENTAL ASSESSMENT

COMMENT FORM

1. ARE YOU IN SUPPORT OF THE EVACUATION ROAD?
YES X NO________ NOT SURE________

WHY? OR WHY NOT? Safety precaution of life.

2. WHAT SUGGESTIONS DO YOU HAVE FOR THE DEVELOPMENT OF THE FINAL DESIGN AND CONSTRUCTION OF THE EVACUATION ROAD?
Please incorporate local hire in the plans. And local leaders in the discussions as much as possible.

3. OTHER COMMENTS/CONCERNS/QUESTIONS?

OPTIONS:

NAME: Dolly E. Foster DATE: 12/6/17

TRIBAL TRANSPORTATION PROGRAM

DRAFT ENVIRONMENTAL ASSESSMENT

COMMENT FORM

1. ARE YOU IN SUPPORT OF THE EVACUATION ROAD?
   YES________ NO________ NOT SURE__✓____

   WHY? OR WHY NOT?
   I am not sure, I've been to meetings but I dont speak or say anything about the road.

2. WHAT SUGGESTIONS DO YOU HAVE FOR THE DEVELOPMENT OF THE FINAL DESIGN AND CONSTRUCTION OF THE EVACUATION ROAD?
   No suggestions,

3. OTHER COMMENTS/CONCERNS/QUESTIONS?
   Will we be able to travel on the road at any time of the day?

OPTIONS:

NAME: Kelly Hawley DATE: 12/6/17

TRIBAL TRANSPORTATION PROGRAM

DRAFT ENVIRONMENTAL ASSESSMENT

COMMENT FORM

1. ARE YOU IN SUPPORT OF THE EVACUATION ROAD?
   YES √ NO________ NOT SURE________

   WHY? OR WHY NOT?
   Because we are in need of relocation

2. WHAT SUGGESTIONS DO YOU HAVE FOR THE DEVELOPMENT OF THE FINAL DESIGN AND CONSTRUCTION OF THE EVACUATION ROAD?
   I suggest more houses or apartments to rent. We need more places to live for we are a growing village.

3. OTHER COMMENTS/CONCERNS/QUESTIONS?
   Thanks for all you are doing for Kivalina.

OPTIONS:

NAME: Laretta Adams DATE: 12-6-17

TRIBAL TRANSPORTATION PROGRAM

DRAFT ENVIRONMENTAL ASSESSMENT

COMMENT FORM

1. ARE YOU IN SUPPORT OF THE EVACUATION ROAD?
   YES X NO________ NOT SURE________

   WHY? OR WHY NOT?
   Need safety of the village to evac to a safe from flooding stage or perilous weather

2. WHAT SUGGESTIONS DO YOU HAVE FOR THE DEVELOPMENT OF THE FINAL DESIGN AND CONSTRUCTION OF THE EVACUATION ROAD?
   who is going to maintain road when complete? The higher above flood stage better to travel on. Make sure use delinators for path road, and berm or edge of road

3. OTHER COMMENTS/CONCERNS/QUESTIONS?
   Please consider to expedite the evac road + school site to be built as I am now nearing elder age, hearing of relocate village since I was seven year old.

OPTIONS:

NAME: Oral Hawley DATE: 12/06/2017

TRIBAL TRANSPORTATION PROGRAM

DRAFT ENVIRONMENTAL ASSESSMENT

COMMENT FORM

1. ARE YOU IN SUPPORT OF THE EVACUATION ROAD?
   YES ✓ NO______ NOT SURE______

   WHY? OR WHY NOT?
   Because it's something to do besides
   wondering whats todo

2. WHAT SUGGESTIONS DO YOU HAVE FOR THE DEVELOPMENT OF THE FINAL DESIGN AND CONSTRUCTION OF THE EVACUATION ROAD?
   side walks, bus stops, bus tickets

3. OTHER COMMENTS/CONCERNS/QUESTIONS?
   stop signs miles limitation
   Fences

OPTIONS:

NAME: Robertsswan DATE: 12/6/17

TRIBAL TRANSPORTATION PROGRAM

DRAFT ENVIRONMENTAL ASSESSMENT

COMMENT FORM

1. ARE YOU IN SUPPORT OF THE EVACUATION ROAD?
YES X NO ________ NOT SURE ________

WHY? OR WHY NOT?
Yes, because we need a road to higher ground in case we start sinking deeper

2. WHAT SUGGESTIONS DO YOU HAVE FOR THE DEVELOPMENT OF THE FINAL DESIGN AND CONSTRUCTION OF THE EVACUATION ROAD?
No Suggestions, thanks

3. OTHER COMMENTS/CONCERNS/QUESTIONS?
Patiently Waiting !!

OPTIONS:

NAME: Shirley Adams DATE: 12/6/17

TRIBAL TRANSPORTATION PROGRAM

DRAFT ENVIRONMENTAL ASSESSMENT

COMMENT FORM

1. ARE YOU IN SUPPORT OF THE EVACUATION ROAD?
   YES X NO____ NOT SURE____

   WHY? OR WHY NOT?
   The reason I chose yes, is because we the People of Kivalina NEED a evacuation route

2. WHAT SUGGESTIONS DO YOU HAVE FOR THE DEVELOPMENT OF THE FINAL DESIGN AND CONSTRUCTION OF THE EVACUATION ROAD?
   Not Sure at the moment

3. OTHER COMMENTS/CONCERNS/QUESTIONS?
   We really need a evacuation road for our village.

OPTIONS:

NAME: Sylvester Swan III DATE: 12-6-17

TRIBAL TRANSPORTATION PROGRAM

DRAFT ENVIRONMENTAL ASSESSMENT

COMMENT FORM

1. ARE YOU IN SUPPORT OF THE EVACUATION ROAD?
   YES X NO ____ NOT SURE ____

   WHY? OR WHY NOT?
   Ocean Waves and Ocean Current too dangerous for our Island along the Coast.

2. WHAT SUGGESTIONS DO YOU HAVE FOR THE DEVELOPMENT OF THE FINAL DESIGN AND CONSTRUCTION OF THE EVACUATION ROAD?
   none

3. OTHER COMMENTS/CONCERNS/QUESTIONS?
   Taking too long, Just like Relocation still no Results there. I'm afraid Just A Road will be the same thing. probably better to Expand the Village

OPTIONS:

NAME: Coolbreeze DATE: 12-7-17

TRIBAL TRANSPORTATION PROGRAM

DRAFT ENVIRONMENTAL ASSESSMENT

COMMENT FORM

1. ARE YOU IN SUPPORT OF THE EVACUATION ROAD?

YES X NO________ NOT SURE________

WHY? OR WHY NOT?

Because In Kivalina, Alaska, We now get Heavy unpreditable Storms throughout the Year. We Need our Grandchildren to run to Safety When they Need to evacuate from the Kivalina Island In the Future

2. WHAT SUGGESTIONS DO YOU HAVE FOR THE DEVELOPMENT OF THE FINAL DESIGN AND CONSTRUCTION OF THE EVACUATION ROAD?

It is Pretty Structured I hope. But I was hoping that theyed use Bailored material.

3. OTHER COMMENTS/CONCERNS/QUESTIONS?

I am Very happy that DOT has made an effort to help the Kivalina IRA & the (Village) of Kivalina to build an Evacuation Road for the Safety of our people. We need the road build, because it is very Important for our Village is getting Smaller & Sinking.

OPTIONS:

NAME: Dollie A. Hawley DATE: Dec 7, 2017

TRIBAL TRANSPORTATION PROGRAM

DRAFT ENVIRONMENTAL ASSESSMENT

COMMENT FORM

1. ARE YOU IN SUPPORT OF THE EVACUATION ROAD?
YES ✓ NO________ NOT SURE________

WHY? OR WHY NOT?
Because Erosion is getting bad by the year

2. WHAT SUGGESTIONS DO YOU HAVE FOR THE DEVELOPMENT OF THE FINAL DESIGN AND CONSTRUCTION OF THE EVACUATION ROAD?
need to hurry up.

3. OTHER COMMENTS/CONCERNS/QUESTIONS?
N/A

OPTIONS:

NAME: Quungug Hawley DATE: 12/7/17

TRIBAL TRANSPORTATION PROGRAM

DRAFT ENVIRONMENTAL ASSESSMENT

COMMENT FORM

1. ARE YOU IN SUPPORT OF THE EVACUATION ROAD?

YES ✓ NO____ NOT SURE____

WHY OR WHY NOT?

Every thing has just wieght to it, there's good & bad to it, but I think it would bennefit the town of Kivalina for safety purposes.

2. WHAT SUGGESTIONS DO YOU HAVE FOR THE DEVELOPMENT OF THE FINAL DESIGN AND CONSTRUCTION OF THE EVACUATION ROAD?

It would have to be built to with stand the harsh weather aswell as the force & power of the ocean.

3. OTHER COMMENTS/CONCERNS/QUESTIONS?

Consult our elder's, hire as many locals as you can, try not to limit qualifications but take into consideration knowledge of work ethic's & hard worker's.

OPTIONS:

NAME: Alice B. Swan DATE: 12-12-17

TRIBAL TRANSPORTATION PROGRAM

DRAFT ENVIRONMENTAL ASSESSMENT

COMMENT FORM

1. ARE YOU IN SUPPORT OF THE EVACUATION ROAD?
   YES X NO________ NOT SURE________

   WHY OR WHY NOT?

2. WHAT SUGGESTIONS DO YOU HAVE FOR THE DEVELOPMENT OF THE FINAL DESIGN AND CONSTRUCTION OF THE EVACUATION ROAD?

   Rail guard at causeway.

3. OTHER COMMENTS/CONCERNS/QUESTIONS?

OPTIONS:

NAME: Austin Swan, Sr. DATE: 12-12-17

TRIBAL TRANSPORTATION PROGRAM

DRAFT ENVIRONMENTAL ASSESSMENT

COMMENT FORM

1. ARE YOU IN SUPPORT OF THE EVACUATION ROAD?

YES You better believe it ~~NO~~______ NOT SURE______

WHY OR WHY NOT?

Want to live, and save earthly material things we own. We cannot start over and buy house, vehicles, tools, clothes, etc.

2. WHAT SUGGESTIONS DO YOU HAVE FOR THE DEVELOPMENT OF THE FINAL DESIGN AND CONSTRUCTION OF THE EVACUATION ROAD?

Start both at New Site and existing site together, many crews working to meet in middle, This is the fastest and easiest way, all the gravel is mostly at new site.

3. OTHER COMMENTS/CONCERNS/QUESTIONS?

Please Hurry and thanks for your time and help to move our community.

OPTIONS:

NAME: Eugene W. DATE: 12-12-2017

TRIBAL TRANSPORTATION PROGRAM

DRAFT ENVIRONMENTAL ASSESSMENT

COMMENT FORM

1. ARE YOU IN SUPPORT OF THE EVACUATION ROAD?
   YES X NO____ NOT SURE____

   WHY OR WHY NOT?
   Possible expansion of Village

2. WHAT SUGGESTIONS DO YOU HAVE FOR THE DEVELOPMENT OF THE FINAL DESIGN AND CONSTRUCTION OF THE EVACUATION ROAD?
   Add at least 2 turn around points if not planned already.

3. OTHER COMMENTS/CONCERNS/QUESTIONS?
   Have mile markers posted.

OPTIONS:

NAME: Gary Swan DATE: 12/12-17

TRIBAL TRANSPORTATION PROGRAM

DRAFT ENVIRONMENTAL ASSESSMENT

COMMENT FORM

1. ARE YOU IN SUPPORT OF THE EVACUATION ROAD?
   YES X NO ______ NOT SURE ______

   WHY OR WHY NOT?
   Safety

2. WHAT SUGGESTIONS DO YOU HAVE FOR THE DEVELOPMENT OF THE FINAL DESIGN AND CONSTRUCTION OF THE EVACUATION ROAD?
   Don't make it too tall.

3. OTHER COMMENTS/CONCERNS/QUESTIONS?
   N/A

OPTIONS:

NAME: L. Adams DATE: 12/12/17

TRIBAL TRANSPORTATION PROGRAM

DRAFT ENVIRONMENTAL ASSESSMENT

COMMENT FORM

1. ARE YOU IN SUPPORT OF THE EVACUATION ROAD?

   YES X   NO____   NOT SURE____

   WHY OR WHY NOT?

   We have nowhere to go if and when the high water over-tops KVIS.

2. WHAT SUGGESTIONS DO YOU HAVE FOR THE DEVELOPMENT OF THE FINAL DESIGN AND CONSTRUCTION OF THE EVACUATION ROAD?

   Make it big & solid enough to support a village relocation.

3. OTHER COMMENTS/CONCERNS/QUESTIONS?

   Just do it!

OPTIONS:

NAME: Stanley Hawley   DATE: 12 Dec 2017.

TRIBAL TRANSPORTATION PROGRAM
DRAFT ENVIRONMENTAL ASSESSMENT
COMMENT FORM

1. ARE YOU IN SUPPORT OF THE EVACUATION ROAD?
   YES___X___ NO________ NOT SURE________

   WHY OR WHY NOT?
   SINCE Climant Weather changes
   it is very serious that we have
   a Road to get to safe grounds.

2. WHAT SUGGESTIONS DO YOU HAVE FOR THE DEVELOPMENT OF THE FINAL DESIGN AND CONSTRUCTION OF THE EVACUATION ROAD?
   That it will be able to last for
   many severe disasters and
   to protect the people of the
   Village.

3. OTHER COMMENTS/CONCERNS/QUESTIONS?
   We have waited long enough for
   the Road Project, To make our
   Community more aware of the Road
   Safety,

OPTIONS:

NAME: Amos Hawley JR DATE: 12-13-17

TRIBAL TRANSPORTATION PROGRAM

DRAFT ENVIRONMENTAL ASSESSMENT

COMMENT FORM

1. ARE YOU IN SUPPORT OF THE EVACUATION ROAD?

   YES X   NO______   NOT SURE______

   WHY OR WHY NOT?

   It is much needed, our storms are getting worst

2. WHAT SUGGESTIONS DO YOU HAVE FOR THE DEVELOPMENT OF THE FINAL DESIGN AND CONSTRUCTION OF THE EVACUATION ROAD?

   Sturdy side rails + deliniators,

3. OTHER COMMENTS/CONCERNS/QUESTIONS?

   I hope they can build a evacuation building first, because we know the bigger School won't be build right away if we have to evacuate we need shelter

OPTIONS:

NAME: Becky Norton   DATE: 12/13/17

TRIBAL TRANSPORTATION PROGRAM

DRAFT ENVIRONMENTAL ASSESSMENT

COMMENT FORM

1. ARE YOU IN SUPPORT OF THE EVACUATION ROAD?

YES X NO______ NOT SURE______

WHY OR WHY NOT?

to help Village

2. WHAT SUGGESTIONS DO YOU HAVE FOR THE DEVELOPMENT OF THE FINAL DESIGN AND CONSTRUCTION OF THE EVACUATION ROAD?

build a bridge

3. OTHER COMMENTS/CONCERNS/QUESTIONS?

readiness for Village incase of Storms

OPTIONS: thanks forhelping us

NAME: Ida Swan DATE: 12-13-17

TRIBAL TRANSPORTATION PROGRAM

DRAFT ENVIRONMENTAL ASSESSMENT

COMMENT FORM

1. ARE YOU IN SUPPORT OF THE EVACUATION ROAD?

   YES X NO____ NOT SURE____

   WHY OR WHY NOT?

   In case of emergency - we need a place to go

2. WHAT SUGGESTIONS DO YOU HAVE FOR THE DEVELOPMENT OF THE FINAL DESIGN AND CONSTRUCTION OF THE EVACUATION ROAD?

   Barge in the heavy duty equipment - wait for freezeup built an ice road, move equipment to the site built road from there - to village

3. OTHER COMMENTS/CONCERNS/QUESTIONS?

   Hire local as much as you can

OPTIONS:

NAME: Lowell Sage Jr DATE: Dec 13, 17

TRIBAL TRANSPORTATION PROGRAM

DRAFT ENVIRONMENTAL ASSESSMENT

COMMENT FORM

1. ARE YOU IN SUPPORT OF THE EVACUATION ROAD?
   YES X   NO____   NOT SURE____

   WHY OR WHY NOT?

2. WHAT SUGGESTIONS DO YOU HAVE FOR THE DEVELOPMENT OF THE FINAL DESIGN AND CONSTRUCTION OF THE EVACUATION ROAD?
   Cement Road or gravel and wide enough for 2 honda's to travel

3. OTHER COMMENTS/CONCERNS/QUESTIONS?
   no comments

OPTIONS:

NAME: Andrew Baldwin   DATE: 12/14/17

TRIBAL TRANSPORTATION PROGRAM

DRAFT ENVIRONMENTAL ASSESSMENT

COMMENT FORM

1. ARE YOU IN SUPPORT OF THE EVACUATION ROAD?
   YES ✓ NO____ NOT SURE____

   WHY? OR WHY NOT?

   ______

2. WHAT SUGGESTIONS DO YOU HAVE FOR THE DEVELOPMENT OF THE FINAL DESIGN AND CONSTRUCTION OF THE EVACUATION ROAD?

   We need a wide Road, if we have to Evacute, and we need to relocate.

3. OTHER COMMENTS/CONCERNS/QUESTIONS?

   They will need to watch the kids if they Build the Road?

OPTIONS:

NAME: Leona Baldwin DATE: 12/14/17

TRIBAL TRANSPORTATION PROGRAM

DRAFT ENVIRONMENTAL ASSESSMENT

COMMENT FORM

1. ARE YOU IN SUPPORT OF THE EVACUATION ROAD?
   YES ✓ NO________ NOT SURE________

   WHY? OR WHY NOT?
   Because we need it.

2. WHAT SUGGESTIONS DO YOU HAVE FOR THE DEVELOPMENT OF THE FINAL DESIGN AND CONSTRUCTION OF THE EVACUATION ROAD?
   None

3. OTHER COMMENTS/CONCERNS/QUESTIONS?
   None

OPTIONS:

NAME: Larry Adams DATE: 12-16-17

TRIBAL TRANSPORTATION PROGRAM

DRAFT ENVIRONMENTAL ASSESSMENT

COMMENT FORM

1. ARE YOU IN SUPPORT OF THE EVACUATION ROAD?
   YES X NO________ NOT SURE________

   WHY? OR WHY NOT?
   ① For safety purposes.
   ② In case of storm surge.
   ③ In case we need funding for water/sewer.

2. WHAT SUGGESTIONS DO YOU HAVE FOR THE DEVELOPMENT OF THE FINAL DESIGN AND CONSTRUCTION OF THE EVACUATION ROAD?
   For development of the road we would need a lot of communication between entities, stakeholders and especially public.

3. OTHER COMMENTS/CONCERNS/QUESTIONS?
   Continue to work with us!
   You guys are doing great!

OPTIONS:

NAME: Monetta Adams DATE: 12/16/17

Draft EA Comment Form

Kivalina Evacuation and School Site Access Road

Please take a moment to fill out this comment sheet so that we can respond to any comments you have. If you do not submit a comment sheet at the scoping meeting, please mail to Jonathan Hutchinson, P.E., Engineering Manager, Northern Region DOT&PF Design, 2301 Peger Road, Fairbanks, AK 99709; fax to (907) 451-5126; or e-mail Jonathan.Hutchinson@alaska.gov. Please provide comments by December 15, 2017. Thank You!

Name: Nathan Koonook

Address: P.O.Box 50080 Kivalina, AK 99750

Telephone: (907) 444-0587 **Email :** natek20@yahoo.com

Please add comments that you think may be helpful during the design development process. Are there any specific elements of the project that you wish to address?

Is there going to be a setup or protocol in case of environmental incidents that happens? And as far as waste will you be taking care of wastes that needs to be shipped out?

TRIBAL TRANSPORTATION PROGRAM

DRAFT ENVIRONMENTAL ASSESSMENT

COMMENT FORM

1. ARE YOU IN SUPPORT OF THE EVACUATION ROAD?
   YES X NO ______ NOT SURE ______

   WHY? OR WHY NOT? Safety

2. WHAT SUGGESTIONS DO YOU HAVE FOR THE DEVELOPMENT OF THE FINAL DESIGN AND CONSTRUCTION OF THE EVACUATION ROAD?

   Get it done, quit Kaizagaking.

3. OTHER COMMENTS/CONCERNS/QUESTIONS?

   N/A

OPTIONS:

NAME: ______________________ DATE: ______________

APPENDIX E

AGENCY COORDINATION RECORDS

Page

COMMENTS ON DRAFT EA

THE STATE of ALASKA

GOVERNOR BILL WALKER

Department of Transportation and Public Facilities

NORTHERN REGION
Design and Engineering Services

2301 Peger Road
Fairbanks, Alaska 99709-5316
Main: 907-451-2273
TDD: 907-451-2363
Fax: 907-451-5126

November 10, 2016

Dear Agency Contact:

Re: Kivalina Evacuation and School Site Access Road
0002384/NFHWY00162
Request for Scoping Comments

The Alaska Department of Transportation and Public Facilities (DOT&PF) and the Federal Highway Administration (FHWA) in partnership with the Northwest Arctic Borough (NAB), Native Village of Kivalina, and the City of Kivalina, are proposing to improve community safety in Kivalina, Alaska by providing an evacuation road between Kivalina Island and a school to be constructed by the NAB that would also serve as a safe emergency evacuee assembly site on Kisimigiuqtuq Hill (K-Hill). Kivalina is located on the southeast tip of a 5.5-mile long barrier island, located between the Chukchi Sea (Arctic Ocean) and Kivalina Lagoon approximately 80 miles northwest of Kotzebue.

DOT&PF is conducting formal scoping to support preparation of an environmental document for the proposed road project in accordance with the National Environmental Policy Act of 1969 (NEPA), as amended. Please identify any environmental, cultural, historic, or subsistence resources you believe may potentially be impacted by the proposed project, and provide any other information you deem valuable to the environmental documentation process. Your responses will help provide us with the necessary inputs to develop and design a proposed final project that avoids and minimizes as many potential adverse environmental and human impacts as possible.

Background

The community of Kivalina has been working for decades with a variety of local, state, and federal agencies to address threats of coastal erosion and flooding. Numerous study, concept, and planning documents exist on potential solutions, which range from: erosion protection around the city; to relocation of the entire community; to a new mainland site. Options involving community relocation have been problematic, as they are neither culturally preferable nor fiscally practical in the foreseeable future. Accordingly, Kivalina has turned to a locally approved approach of facilitating a safe, reliable, and direct means of community evacuation to an acceptable mainland location on K-Hill.

Project Location

The proposed road project origin would be at the City of Kivalina, which lies within the Kotzebue Recording District and is located in Section 21, Township 27 N, Range 26 W, of the Kateel River Meridian. The desired project terminus at K-Hill is located in Section 19, Township 28N, Range 25W, of the Kateel River Meridian. The feasibility of several potential route alignments is currently being evaluated within a project study area encompassing Kivalina Island, the southern portion of Kivalina Lagoon, and the lower Wulik and Kivalina River drainages in Townships 27N and 28N, Ranges 25W, 26W and 27W of the Kateel River Meridian (Figure 1).

Purpose and Need

The Kivalina Evacuation and School Site Access Road project would provide Kivalina residents a safe and reliable evacuation route in the event of a catastrophic storm or ocean surge, allowing evacuees to mobilize to safe refuge at a site on K-Hill also dedicated by the NAB as the preferred new location for the community school. Upon its anticipated construction, the school will augment the undeveloped evacuation site by serving as a full-service community emergency shelter with all-season, longer-term support capabilities.

Recent climate data has indicated that arctic sea ice is forming later in the season, increasing fall and winter storm duration and intensity along the Northwest Arctic coast. Consequently, residents of Kivalina face significant and increasing risks to safety, life and property by storm systems predicted to further intensify over time. The need for a concerted effort to mitigate these risks became more evident during an evacuation event in October 2007 when debris-laden storm waves overtopped the barrier island.

To facilitate community safety in the face of this increased threat, Kivalina needs a safe, stable, and reliable evacuation infrastructure (routing, transportation, shelter) in the event of impending catastrophe. To provide the routing component of this infrastructure will require construction of a road facility over a safe route that allows emergency response vehicles to access a secure location capable of supporting evacuees in times of need.

Proposed Action

Within the project study area, DOT&PF and FHWA are currently reviewing the feasibility of three existing, preliminary route options independently proposed by Kivalina and the NAB (Figure 2). While these routes may provide a useful basis for alternative development during NEPA documentation, additional draft alternatives are anticipated to be identified and considered as a consequence of agency and public scoping. Common to all anticipated alternatives will be the requirement to support the following actions:

- **Establishment of a safe, reliable, all-season Kivalina Lagoon crossing during evacuation mobilization.**
    - Concepts previously studied for their feasibility include construction of an earthen causeway across the lagoon that variously incorporates hydraulic and boat passage options including bridge(s), culvert(s), or both.

- **Construction of an all-season gravel access road between Kivalina Island and the desired K-Hill evacuation site**.

  - The road would be designed to accommodate both general purpose and emergency evacuation vehicles over a two-way road with shoulders, multiple turnouts, and safe side slopes that include guard rails or other safety features as required.

  - Over the last decade, Kivalina and the NAB have evaluated the feasibility of numerous local road routings that could potentially provide for evacuation, school access, or material site development. Evacuation routes considered to date by Kivalina and the NAB have included:

    - An alignment referred to as a *Northern Route* approximately 9.1 miles in length that would originate at the south end of the Kivalina Airport runway, parallel the runway on its east side northward for approximately 1.5 miles, cross the lagoon eastward via a causeway and/or bridge, and follow high ground between the Wulik and Kivalina Rivers to its terminus at K-Hill.

    - An alignment considered a *Southern Route* approximately 6.9 miles in length that would begin at the south end of the Kivalina Airport runway, immediately cross the lagoon eastward via a causeway and/or bridge, and follow lowlands and relic channels of the Wulik River to K-Hill.

    - A *Combined Route* approximately 8.6 miles in length that would follow the Northern route before merging with the Southern route via a one-mile long connecting segment.

- **Identification of Material Sources:** Although project materials would be specified as contractor furnished and development of material sources would not be included in the Proposed Action, analyses of material locations proximate to potential routes would be conducted to determine their feasibility and evaluate environmental impacts of their development. Four locations in the project study area known to contain potentially viable project materials, and currently being evaluated by Kivalina and the NAB, include:

  - *K-Hill*: K- Hill geology is characterized by exposed limestone and rock rubble at the ground surface. It is anticipated that below the surface, larger frost-fractured rocks and boulders may also exist.

  - *Wulik River Deposition Zone*: The Wulik River Deposition Zone is characterized by visible gravel bars and beaches along the river banks that would contain suitable materials to construct the proposed project.

  - *Wulik River Relic Channel*: The Wulik River Relict Channel is characterized by visible gravel and sand at the ground surface. The fluvial material in these areas was likely deposited when the Wulik River was located north of its present location.

- *Kivalina River Deposition Zone:* The Kivalina River is also being evaluated for potential material sources due to the areas visible on gravel bars and beaches that appear to contain suitable material.

Independent preliminary research and review on project study area resources was conducted by Kivalina and the NAB and is summarized in Appendix A. Additionally, a substantial document cache of previous studies and assessments on the project area, potential development projects at Kivalina, and various natural resources are available on the DOT&PF project website at: http://dot.alaska.gov/nreg/KivalinaEvacRd.

Based on additional agency and public input, engineering and environmental analyses and evaluations, and the application of regional Traditional Knowledge, DOT&PF intends to identify issues of environmental, technical and cultural concern, refine the project scope as necessary, and through evaluation of qualified potential routes develop a preferred project alternative that minimizes human and environmental impacts while meeting project purpose and need.

We respectfully request your written comments no later than December 12, 2016. Please mail them to: DOT&PF Attn: Sarah E. Schacher, P.E., 2301 Peger Road Fairbanks, AK, 99709; or you may e-mail comments to me at sarah.schacher@alaska.gov.

Thank you for your attention to this request. If you have any questions regarding the proposed project, please contact me at (907) 451-5361.

Sincerely,

Sarah E. Schacher, P.E.
Preconstruction Engineer

Enclosures: Figure 1 – Location & Vicinity Map
Figure 2 – Study Area and Potential Routes
Appendix A

pk/lmc

Distribution by email:

Alan Bittner, Anchorage Field Manager, U.S. Bureau of Land Management
Judy Bittner, State Historic Preservation Officer, Alaska Dept. of Natural Resources
Audra Brase, Regional Supervisor, Alaska Dept. of Fish & Game
Alan Cavallo, Public Assistance Branch Chief, Alaska Dept. of Military & Veteran Affairs
Sally Cox, Alaska Dept. of Commerce, Community & Economic Development
Jennifer Curtis, Environmental Protection Specialist, U.S. Environmental Protection Agency
Lesley DeWilde, Real Estate Services Chief, Bureau of Indian Affairs
Matthew Eagleton, Regional EFH Coordinator, NOAA-NMFS
Sandra Garcia-Aline, Division Administrator, Federal Highway Administration

Susan Georgette, Refuge Manager, U.S. Fish & Wildlife Service
Jeanne Hanson, Asst. Regional Administrator, NOAA-NMFS
James Helfinstine, Commander, U.S. Coast Guard, JBER
Bob Henszey, Fish & Wildlife Biologist, U.S. Fish & Wildlife Service
Rhea Hood, Archaeologist, U.S. National Park Service
Pete Probasco, Assistant Regional Director, U.S. Fish & Wildlife Service
Jeanne Proulx, Natural Resource Manager, Alaska Dept. of Natural Resources
Mary Romero, Project Manager, U.S. Army Corps of Engineers
James Rypkema, Environmental Program Manager, Alaska Dept. of Environmental Conservation
Glen Stout, Wildlife Biologist, Alaska Dept. of Fish & Game
Ronald Wall, Captain, Alaska State Troopers 'D' Detachment
Kristi Warden, Deputy Division Manager, Federal Aviation Administration
Ryan Winn, Field Office Project Manager, U.S. Army Corps of Engineers

State Parks, Refuges, and Critical Habitat Areas

A review of the Alaska Department of Fish & Game (ADF&G) Conservation Areas website (http://www.adfg.alaska.gov/index.cfm?adfg=protectedareas.locator) on September 26, 2016 revealed no state refuges, sanctuaries, critical habitat areas, or wildlife ranges within the study area.

National Parks, Preserves, Monuments, and Wild and Scenic Rivers, and Private Properties

A review of the National Park Service's website (https://www.nps.gov/hfc/carto/PDF/WEARmap1.pdf) was conducted on September 26, 2016 to determine if any National Parks, Preserves, Monuments, or Wild and Scenic Rivers exist in the study area. Cape Krusenstern National Monument is located approximately 8.5 miles to the south but does extend into the project study area. Noatak National Preserve is located approximately 45 miles to the east. None of these designated sites are within the study area. Kivalina Lagoon includes a small portion of the Alaska Maritime National Wildlife Refuge (Chukchi-Sea Unit); two islands, totaling 75 acres are owned by the Kivalina Sinuakmeut Corporation located directly east of Kivalina at the mouth of the Wulik River http://fws.maps.arcgis.com/apps/webappviewer/index.html?id=3eed8d6b30ea443dafe4380d70d0fa5el). Another 116 acres of the Refuge, owned by the same Corporation, is located 4 miles south and effectively constitutes the land spit separating the Imikruk Lagoon from the Chukchi Sea.

Navigable Waters

All tidal and marine waters are considered navigable, which in this case would include Kivalina Lagoon. Building a causeway over the lagoon would require a U.S. Army Corps of Engineers (USACE) Section 10 permit, and potentially a U.S. Coast Guard (USCG) Bridge permit if applicable. Neither the Kivalina nor the Wulik River are listed as navigable waters (http://www.poa.usace.army.mil/Portals/34/docs/regulatory/NavWat.pdf). DOT&PF and FHWA will coordinate with the USCG on permit requirements, if any.

Floodplain Management

Two rivers flow into Kivalina Lagoon: the Kivalina River at the northern end of the lagoon and the Wulik River at the southern end. The floodplains of both rivers are broad and braided. The Northwest Arctic Borough (NAB) implements flood prevention in code in order for communities, including the City of Kivalina, to participate in the National Flood Insurance Program (NFIP). Although Kivalina does not have a 100-year floodplain identified or mapped by the Federal Emergency Management Agency (FEMA), Flood Hazard Data from the USACE indicates that the limits of the 100-year floodplain is the 30-foot contour on the 1976 ADCRA Community Map. The proposed project area is at or below the 25-foot contour and therefore in the floodplain of the Kivalina and Wulik Rivers. Consideration of floodplain impacts will be included as part of the NAB permitting process for this project.

Water Resources and Water Quality

The Alaska Department of Environmental Conservation (ADEC) has delineated a drinking water protection area (http://www.arcgis.com/home/webmap/viewer.html?webmap=a1196dd615694cccb85fd9088212412e) for the Kivalina Water System which encompasses the Wulik River adjacent areas, including a portion the southern study area (PWSID: AK2340117). Water for the community of Kivalina is obtained from the Wulik River using a seasonal three-mile long surface transmission line (*Evacuation and School Access Road Route Reconnaissance Study, Native Village of Kivalina, 2014*). A search of ADEC data on September 26th, 2016 revealed no impaired waterbodies nor any water quality monitoring locations within the study area (http://www.arcgis.com/home/webmap/viewer.html?webmap=f7e8ca8c14fe4520b9e2e1498e3cdee3).

Wetlands and Vegetation

A search of the U.S. Fish and Wildlife (UFWS) National Wetlands Inventory (NWI) mapper (https://www.fws.gov/wetlands/Data/Mapper.html) identifies most the study area as mapped wetlands. In addition, a previous desktop wetland delineation and functional assessment completed for the NAB in 2015 identifies 95% of the study area as comprised of wetlands and Waters of the United States (*Wetland Delineation and Functions and Values Assessment Kivalina Evacuation Route Wetlands Mapping Study, NAB 2015*). Necessary permitting will be conducted in accordance with Section 404 and 10 of the Clean Water Act for unavoidable wetland impacts.

Fish and Fish Habitat

A diversity of marine and anadromous fish may be found in lagoon and/or rivers within the study area. Both the Kivalina and Wulik Rivers, as well as Kivalina Lagoon and a small connector stream, are identified in the ADF&G Alaska Waters Catalog (AWC) Fish Resource Monitor as anadromous waterbodies within the study area (http://www.adfg.alaska.gov/sf/SARR/AWC/index.cfm?ADFG=maps.interactive). Species identified in these waterbodies are summarized in the table below:

Anadromous Stream Name	**Anadromous Stream Number**	**Species Identified**
Kivalina River	331-00-10044	Pink, chum, king, coho, sockeye, Dolly Varden (char)
Wulik River	331-00-10060	Pink, chum, king, coho, sockeye, Dolly Varden (char), whitefish
Kivalina Lagoon	331-00-10060-0010	Pink, chum, king, coho, sockeye, Dolly Varden (char), whitefish
Unnamed reach connecting Kivalina Lagoon and Kivalina River	331-00-10050	Pink, chum, coho, Dolly Varden (char)

Of the several species of anadromous whitefish found in the Wulik River and Kivalina Lagoon, sheefish (inconnu) are the largest. Arctic grayling are sometimes present in the Kivalina Lagoon. Rainbow smelt are indigenous to most all Chukchi Sea lagoons that are open to the sea. Several species of marine fish, some of which are relatively brackish-water tolerant, are found in Kivalina Lagoon and near-shore coastal waters. These include Bering flounder, yellowfin sole, starry flounder, saffron cod, Arctic cod, Pacific herring, sculpin, and capelin. Arctic cod and saffron are documented to appear in Kivalina Lagoon twice a year after freeze-up and in early July (*Subsistence Production in Kivalina, Alaska: A Twenty Year Perspective. Technical Report No. 128 prepared for the ADF&G Division of Subsistence. Juneau, Alaska. Burch, 1985*).

Kivalina residents rely heavily on fish as cultural and nutritional resources. In 2007, Kivalina harvested more than 54,000 fish. Of the estimated 79,000 edible pounds of fish and shellfish harvested, 86% were Dolly Varden. Safron cod, locally known as tomcod, comprised 2%, and salmon species made up 1% of the total. All other species fell below 1% (*Alaska Subsistence Salmon Fisheries 2007 Annual Report Technical Paper No. 346 prepared for the ADF&G Division of Subsistence. Anchorage, Alaska. Fall et al. 2009*). In the Kotzebue area, subsistence salmon fishing has few restrictions other than the general statewide provision. Standard conditions include prohibition of fishing within 300ft of a dam, fish ladder, weir, culvert or other artificial obstructions (Fall et al. 2009).

Essential Fish Habitat

The Arctic Fisheries Management Plan includes the study area in Essential Fish Habitat (EFH) designations for late juvenile and adult saffron and arctic cod, potentially for late juvenile and adult snow crab and arctic cod, and has determined that there is insufficient information for determine EFH for eggs, larvae and early juveniles of arctic cod and saffron cod and for larvae and early juveniles of snow crab. (http://www.npfmc.org/wp-content/PDFdocuments/fmp/Arctic/ArcticFMP.pdf#page=89. A Preliminary EFH Assessment has been completed by WHPacific in 2012. Any outstanding work will be completed and DOT&PF will consult with the National Marine Fisheries Service (NMFS) on effects to EFH and implementation of any proposed conservation measures.

Aquatic Wildlife

The study area is strongly influenced by seasonal ice cover. Ice directly affects the distribution and migration patterns of birds and marine mammals. Ice freezes to the bottom in the fall in shallow nearshore areas and many species of birds and marine mammals migrate south along the coast as sea ice advances. In spring, nutrients and sea ice algae trapped in the ice nourish primary production, resulting in a highly productive estuarine-like nearshore corridor which anadromous and marine fish, shorebirds, waterfowl, and some species of marine mammals take advantage off, including during their migration back north to feed and breed.

Marine Mammals:

Marine mammals are an essential part of the culture and food security in Kivalina year-round with different species occurring at different times of the year (IEA Chapter 4: Important Areas for marine mammals and coastal species). In the coastal area off Kivalina, marine mammal species include beluga whale (*sisuaq, Delphinapterus leucas*), gray whale (*aġviġluaq, Eschrichtius robustus*), bowhead whale (*aġvik, Balaena mysticetus*), bearded seal (*ugruk, Erignathus barbatus*), ringed seal (*natchiq, Phoca hispida*), spotted seal (*qasigiaq, Phoca largha*), and polar bear (*nanuq, Ursus maritimus*). In Kivalina Lagoon, marine mammals most frequently observed are bearded, spotted and ringed seals. Marine mammals that are consistently important for subsistence harvest are beluga, bearded seal and ringed seal (OCS EIS, 2007:
http://www.boem.gov/uploadedFiles/BOEM/About_BOEM/BOEM_Regions/Alaska_Region/Environment/Environmental_Analysis/2007-026-Vol%20I.pdf).

All marine mammals are protected under the Marine Mammal Protection Act, and, ringed seals and polar bear are also listed as Threatened under the Endangered Species Act (ESA).

Aquatic Birds:

The area around Kivalina is a staging area for migratory aquatic species in the spring and the fall and more than 100 species of birds, most of which are waterfowl and shorebirds have been identified in this region (*Red Dog Mine Extension Aqqaluk Project Final Supplemental EIS, 2009*), including Canada geese (*Branta canadensis*), greater white-fronted goose (*Anser albifrons*), tundra swan (*Cygnus columbianus*) and all four species of loon. Both Steller's Eider (*Polysticta stelleri*) and the Spectacled eider (*Somateria fischeri*) are also known to be in this area, both of which are listed as Threatened under ESA (*Environmental Assessment and Finding of No Significant Impact: Section 117 Expedited Erosion Control Project, Kivalina, USACE, Alaska District, 2007*). Specifically, the presence of open water and emergent vegetation in the sedge-grass marshes associated with ponds and the riparian low shrub areas along the Kivalina and Wulik river drainages provide suitable inland breeding and molting habitat for species such as the Canada goose. The near-shore areas and lagoon provide habitat for the yellow-billed loon (*Gavia adamsii*), which feeds on fish and invertebrates in the marine environment as well as in freshwater. Yellow-billed loons nest exclusively in coastal and inland low-lying tundra from 62° to 74° N latitude, in association with permanent, fish-bearing lakes. Waterfowl are important birds harvested for subsistence. Migratory aquatic birds are protected under Migratory Bird Treaty Act.

Terrestrial Wildlife

Terrestrial Birds:

More than 100 species of birds migrate from the lower 48 states and Central and South America, to nesting, breeding, and rearing grounds in the State of Alaska. Five species have been identified as species of concern for northern Alaska, including the gyrfalcon (*Falco rusticolus*), snowy owl (*Bubo scandiacus*), gray-cheeked thrush (*Catharus minimus*), Smith's longspur (*Calcarius pictus*), and hoary redpoll (*Acanthis hornemanni*) (BPIF 1999 cited in Red Dog Mine EA). Within the project area, riparian corridors of willow and alder shrubs likely contain the highest diversity of land birds. In addition to these long-distant migrants, the general area also has occurrences of raptors like golden eagles (*Aquila chrysaetos*), gyrfalcon and peregrine falcons (*Falco peregrinus*) (which are known to nest along in the rocky cliffs of the area close to Red Dog Mine (Red Dog Mine Supplemental EIS, 2009). In addition, willow (*Lagopus lagopus*) and rock ptarmigan (*Lagopus muta*) appear to occur in low shrub and tussock tundra in the region, and are considered the most important terrestrial birds for subsistence. Migratory birds are protected under the Migratory Bird Treaty Act. Golden eagles are further protected under the Bald and Golden Eagle Protection Act of 1940.

Terrestrial Mammals:

Five species of large terrestrial mammals are known to occur in the study area: caribou (*Rangifer tarandus*), moose (*Alces alces*), muskox (*Ovibos moschatus*), Dall sheep (*Ovis dalli*), and brown bear (*Ursus arctos*). Caribou, moose, and Dall sheep have historically been and continue to be important subsistence resources for Kivalina. Common furbearers in the project area include wolves (*Canis lupus*), wolverine (*Gulo gulo*), red fox (*Vulpes vulpes*), arctic fox (*Alopex lagopus*), lynx (*Felis lynx*), marten (*Martes americana*), and mink (*Mustela vison*). Many of these species are important to hunters and trappers in the region for their pelts, which are used to make traditional Alaska Native crafts and clothing (Red Dog Mine Supplemental EIS, 2009).

Caribou:

Caribou are the principal terrestrial subsistence animal in the region and are hunted in the tundra hills behind Kivalina. A 1992 ADF&G subsistence survey conducted in the community indicated a harvest of 351 caribou—18.2% of the total subsistence harvest (OCS EIS, 2007). Local caribou are part of the Western Arctic Herd the largest caribou herd in the State of Alaska and one of the largest in the world (Red Dog Mine Supplemental EIS) that migrates annually in large numbers through the region. Most caribou are harvested in the fall when the main migration reaches the Kivalina area, but they are also hunted throughout the winter, as available, and shot opportunistically year-round. Winter distributions, in both numbers and location, are highly variable and may be dependent on local weather conditions (*U.S. Environmental Protection Agency Draft Environmental Impact Statement Red Dog Mine Project Northwest Alaska, February 1984*). Most of the spring migration occurs well to the east of Kivalina (Red Dog Mine Supplemental EIS, 2009).

Other Species:

Moose: Moose in the Kivalina area are part of Game Management Unit 23. During winter, moose are found along the drainages of the Wulik and Kivalina rivers. Compared to other populations in Alaska, moose in this area are considered to be of low density (OCS EIS 2007, Red Dog Mine Supplemental EIS, 2009).

Muskoxen: Reintroduced in 1970, the Cape Thompson population, ranging from the Noatak River north to Cape Lisburne remains fairly small (around 300 animals), and is generally found within 15 miles of the coast (Red Dog Mine Supplemental EIS, 2009).

Dall Sheep: Dall sheep are prized for their meat, fat, sinew, skins, and horns and hunted in the upper Wulik and Kivalina River drainages (OCS EIS, 2007). Kivalina hunters reported taking about 25 Dall sheep in the 25 years prior to 1991.

Brown Bear: Brown bears occur in the area throughout the year, making use of a variety of habitats (Red Dog Mine Supplemental EIS, 2009). In spring, bears use alpine slopes, shifts to lowland or coastal areas during summer, and during fall in particular, can be found around salmon spawning streams.

Protected Species and Habitats

Threatened and endangered species are managed under the ESA, requiring federal agencies to ensure that all activities they "authorize, fund, or carry out" do not jeopardize the continued existence of any threatened or endangered species or designated critical habitat. Migratory birds are protected by the Migratory Bird Treaty Act of 1918. Executive Order 13186 (Responsibilities of Federal Agencies to Protect Migratory Birds), issued in 2001, requires the evaluation of the effects of federal actions on migratory birds, with an emphasis on species of concern. Although eagles are not considered rare in this part of Alaska, another potential regulatory mechanism that applies to wildlife in the study area is the Bald and Golden Eagle Protection Act of 1940. Marine mammals are further protected by the Marine Mammal Protection Act of 1972. Fish and fish habitat have further protection if federally designated under EFH in the Magnuson-Stevens Fishery Conservation and Management Act.

On a State level, water bodies listed in the AWC are considered important to anadromous fish species and are afforded protection under Alaska Statute 16.05.871. For other wildlife, it should be noted that as of August 15, 2011, the Alaska Department of Fish and Game (ADF&G) no longer maintains a Species of Special Concern list. The list has not been reviewed and revised since 1998 and is no longer considered valid. Instead ADF&G currently uses the Alaska Wildlife Action Plan to assess the needs of species with conservation concerns, and to prioritize conservation actions and research.

Species that fall under these formal protections and may occur in the study area include all species of Pacific salmon, ringed, bearded and spotted seals, beluga whales, spectacled and Steller's eider, and all migratory birds (see specific sections above for details).

Historical, Architectural, Archeological, and Cultural Resources

Twenty-nine Alaska Heritage Resource Survey (AHRS) sites are currently located within or directly adjacent to the study area (see Table below). Twenty-four of these are archaeological resources and potential historic structures located within the community of Kivalina. Three sites, including the remains of a camp (NOA-301), meat caches and icehouses (NOA-298), and a reindeer corral and processing site (NOA-302), are located within the study area south of the mouth of the Wulik River. One site, the Ualliik Trail (NOA-304) is mapped outside of the study area but historically followed the east bank of the Wulik River into the study area. Additionally, the boundaries of the Cape Krusenstern National Historic Landmark (NHL), which extends more than 10 miles northwest of the Cape Krusenstern National Monument boundary, encompasses a portion of the south half of the study area.

An archaeological predictive model prepared for this project in January 2016 and results of a reconnaissance investigation completed in September 2016 suggest that locally proposed route corridors and material source areas encompass landforms with increased potential for containing archaeological resources. FHWA and DOT&PF will consult with the State Historic Preservation Officer (SHPO), Tribal entities, and the National Park Service in accordance with Section 106 of the National Historic Preservation Act (NHPA) and Section 4(f) of the DOT Act of 1966 to identify resources that may be adversely affected by the proposed undertaking.

Alaska Heritage Resource Survey (AHRS) sites

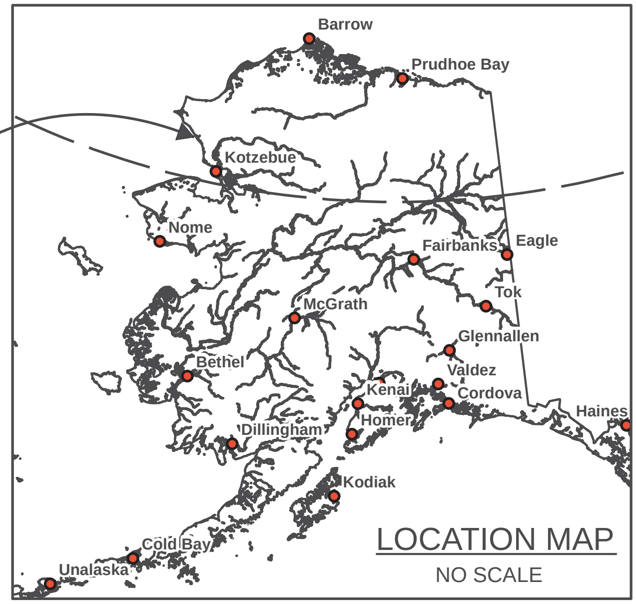
AHRS #	Approx. Location (relative to nearest Proposed Project Element)	Description	DOE Status
NOA-004	0.30 mile SE of Southern Route Causeway	Kivalina Village	Unevaluated
NOA-042	Encompasses southern portions of North/Combined and Southern Routes	Cape Krusenstern Archaeological District	National Historic Landmark
NOA-298	1.60 miles southeast of Southern Route	Meat Caches/Icehouses	NRHP Eligible
NOA-301	1.53 miles southeast of Southern Route	Camp	NRHP Eligible

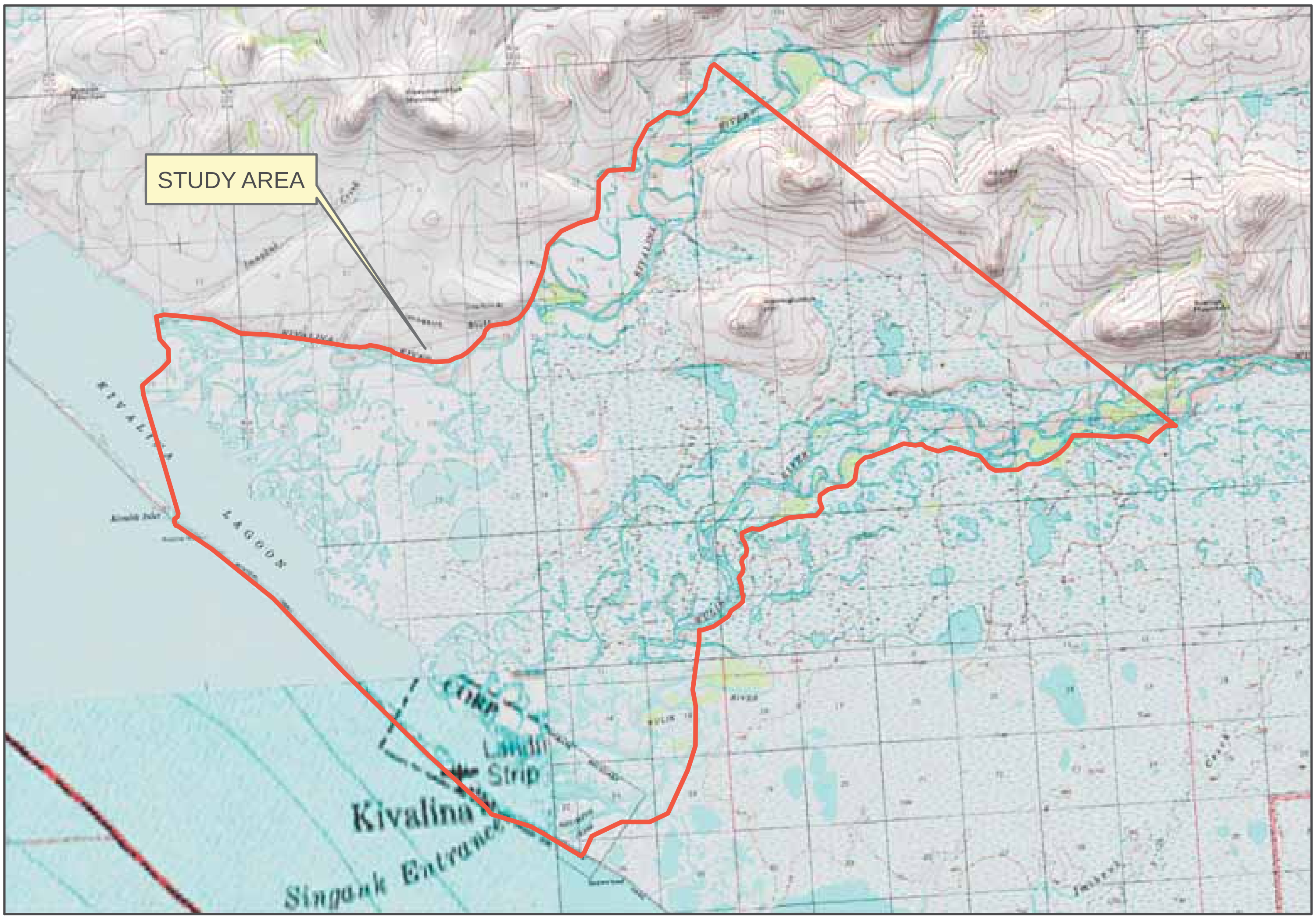
AHRS #	Approx. Location (relative to nearest Proposed Project Element)	Description	DOE Status
NOA-302	1.55 miles southeast of Southern Route	Reindeer Corral and Processing Site	NRHP Eligible
NOA-304	1.80 miles southeast of Southern Route	Ualliik Trail	Unevaluated
NOA-311	0.50 mile southeast of Southern Route Causeway	Single Story Wood Frame Structure	Unevaluated
NOA-312	0.50 mile southeast of Southern Route Causeway	Single Story Wood Frame Structure	Unevaluated
NOA-313	0.45 mile southeast of Southern Route Causeway	Single Story Wood Frame Structure	Unevaluated
NOA-314	0.20 mile southeast of Southern Route Causeway	Two Story Wood Frame Structure	Unevaluated
NOA-315	0.38 mile southeast of Southern Route Causeway	Kivalina Cemetery (used prior to the mid-1940s)	Unevaluated
NOA-316	0.38 mile southeast of Southern Route Causeway	Kivalina Cemetery #2	Unevaluated
NOA-317	0.40 mile southeast of Southern Route Causeway	Eroding Human Remains and Artifacts	Unevaluated
NOA-318	0.50 mile southeast of Southern Route Causeway	Eroding Human Remains and Artifacts	Unevaluated
NOA-319	0.55 mile southeast of Southern Route Causeway	Human Remains	Unevaluated
NOA-320	0.57 mile southeast of Southern Route Causeway	Eroding Human Remains	Unevaluated
NOA-321	0.50 mile southeast of Southern Route Causeway	Human Remains	Unevaluated
NOA-322	0.53 mile southeast of Southern Route Causeway	Possible House Pit Depressions	Unevaluated
NOA-323	0.42 mile southeast of Southern Route Causeway	Possible Gravesite and Historic Sod House	Unevaluated
NOA-324	0.41 mile southeast of Southern Route Causeway	Burial Structure	Unevaluated
NOA-325	0.15 mile southeast of Southern Route Causeway	Human Remains	Unevaluated
NOA-326	0.15 mile southeast of Southern Route Causeway	Human Remains and Burial Box	Unevaluated
NOA-327	0.15 mile southeast of Southern Route Causeway	Artifacts	Unevaluated
NOA-328	0.15 mile southeast of Southern Route Causeway	Historic Sod Houses	Unevaluated
NOA-339	0.48 mile southeast of Southern Route Causeway	Non-human Faunal Remains	Unevaluated
NOA-362	0.40 mile southeast of Southern Route Causeway	Buried Wood Structure; Human Remains	Unevaluated
NOA-587	0.35 mile southeast of Southern Route Causeway	Kivalina Federal Scout Readiness Center	Recommended Not Eligible
NOA-591	0.25 mile southeast of Southern Route Causeway	Artifact Scatter	Unevaluated
NOA-592	0.27 mile southeast of Southern Route Causeway	Possible Historic Sod House	Unevaluated

Hazardous Materials, Pollution Prevention, and Solid Waste

A search of the ADEC *Contaminated Sites Database* identified only one site in the study area. This site, ADEC# AKARNG Kivalina FSA, is recorded as having its cleanup complete. A 6.5- acre Class 3 unpermitted municipal landfill is located within the study area, approximately 0.3 miles north of the Kivalina Airport runway and surrounded by the Chukchi Sea to the west and the Kivalina Lagoon to the east. Possible contaminants at this site include construction and demolition waste, asbestos, and sewage. Honey bucket waste is comingled with solid waste at this site.

PROJECT
LOCATION





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Appendix E Page 12

Northwest Arctic Borough
Alaska Department of Transportation
and Public Facilities - Northern Region

Location & Vicinity Map
Project Number: 0002384/NFHWY00162

DATE: November 2016	FIGURE 1

NOTES:

*Access routes shown are from "Evacuation and School Access Road Project, Kivalina, Alaska, Route reconnaissance Study; submitted to Native Village of Kivalina, submitted by WHPacific (revised June 2014).

The imagery background is WV-2 satellite imagery from July 2016.

Legend

- North Access Route*
- Combined Access Route*
- South Access Route*
- Native Allotments
- Potential Material Sources
- Project Study Area

0 0.5 1 2 Miles

DATE: November 2016

FIGURE 2

STUDY AREA AND POTENTIAL SITES
PROJECT NUMBER: 0002384/NFHWY00162

AK SHPO, Scoping Response:

From: Rollins, Mark W (DNR)
Sent: Friday, November 25, 2016 3:10 PM
To: Schacher, Sarah E (DOT)
Cc: Gamza, Thomas A (DOT)
Subject: Kivalina Evacuation and School Site Access Road, Request for Scoping Comments

Hi Sarah,

The Alaska State Historic Preservation Office (AK SHPO) has no additional information regarding identified cultural resources (historic, prehistoric, and archaeological sites, locations, remains, or objects) at this time for the subject project. We look forward to future consultation on additional draft alternatives anticipated to be identified during the NEPA process and recommend DOT&PF include all potential material sources and route alternatives in the area of potential effects (APE). If you have any questions about developing the APE, once alternatives are identified, we are happy to assist you. As you noted in Appendix A of your letter, there are several cultural resources within the study area and potential for archaeological sites along the proposed route corridors, as such we look forward to reviewing the archaeological predictive model and report from the fieldwork completed in September, 2016. Please note that if additional alternatives are located outside of the fieldwork conducted in September, 2016 that additional archaeological investigations may be appropriate. Before further identification is considered, we recommend DOT&PF establish an APE.

As a reminder, The APE should encompass the geographic area within which an undertaking may directly or indirectly affect historic properties. Following the establishment of the APE, any potential historic properties within the APE must be evaluated for eligibility for inclusion to the National Register of Historic Places *(36 CFR § 800.4).* The nature of project effects on any historic properties, including those listed in or eligible for inclusion in the National Register of Historic Places, will need to be assessed *(36 CFR § 800.5).* Adverse effects to eligible historic properties will need to be resolved through mitigation measures developed in consultation with our office *(36 CFR § 800.6).*

As more information becomes available, we will work with DOT&PF and consulting parties to avoid, minimize, and/or mitigate effects to historic properties. We look forward to further consultation with DOT&PF for this project in accordance with the 2014 *Programmatic Agreement… for the Federal-Aid Highway Program in Alaska* and Section 106 of the National Historic Preservation Act.

Thank you for submitting the scoping materials for the subject project for our review and comment. If you have any questions about cultural resources please contact me or Northern region's Professionally Qualified Individual (PQI) Tom Gamza.

Mark W. Rollins

Archaeologist II

Alaska State Historic Preservation Office/ Office of History and Archaeology

550 West 7th Avenue, Suite 1310

Anchorage, AK 99501

(907) 269-8722

National Park Service, Scoping Comments:

From: Hood, Rhea [mailto:rhea_hood@nps.gov]
Sent: Tuesday, November 29, 2016 12:22 PM
To: Schacher, Sarah E (DOT)
Subject: Kivalina Evacuation and School Site Access Road 0002384/NFHWY000162

VIA ELECTRONIC MAIL: NO HARD COPY TO FOLLOW
IN REPLY REFER TO:
8.A.4 (AKRO-RCR)

National Park Service
240 W. 5th Ave.
Anchorage, AK 99501

Sarah E. Schacher, P.E.
2301 Peger Road
Fairbanks, AK 99709

Dear Ms. Schacher,

Thank you for your letter of November 11, 2016, requesting National Park Service preliminary review and comment of the proposed Kivalina Evacuation and School Site Access Road Project.

The NPS administers the National Historic Landmark program for the Secretary of the Interior. The NPS serves as an interested party throughout the Section 106 process to help ensure the integrity of the NHL, which includes consultation prior to an agency making a determination of effect.

Based on the project description you provided, the entire project study area is within the boundary of the Cape Krusenstern Archeological District National Historic Landmark (attachment). Kivalina is part of the NHL because of its evidence of precontact occupation, and because of the understanding that currently submerged lands and wetlands were dry during the Pleistocene and have potential for research on the history of that period. We are interested in the process of identification and evaluation of cultural resources in the study area, activities or construction that will involve ground disturbance in the study area, and mitigation actions during and after construction of the access road.

Please direct questions and correspondence to me at (907) 644-3460 or rhea_hood@nps.gov. We look forward to working with you to minimize harm to this important property.

Sincerely,

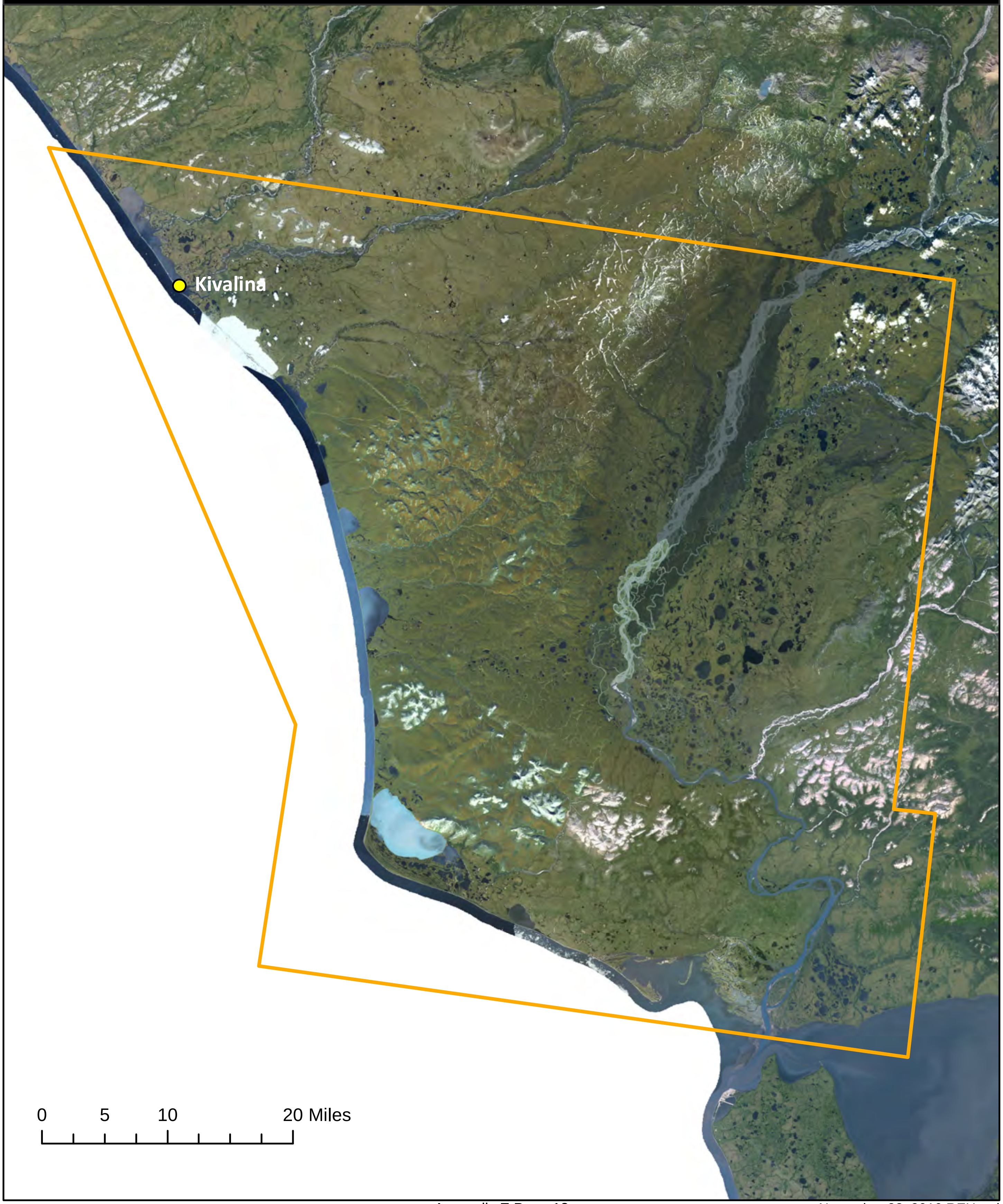
/s/ Rhea Hood

Rhea Hood

Archeologist, National Register of Historic Places Program

Cape Krusenstern Archeological District
National Historic Landmark Boundary
NOA-00042

National Park Service
Alaska Regional Office
Cultural Resources



November 28, 2016 REHood

Alaska Department of Natural Resources, Scoping Comments:

From: "Leinberger, Dianna L (DNR)" <dianna.leinberger@alaska.gov>
To: "Schacher, Sarah E (DOT)" <sarah.schacher@alaska.gov>
Cc: "Wait, Alexander J (DNR)" <aj.wait@alaska.gov>, "Smith, Julie A (DNR)" <julie.smith@alaska.gov>
Subject: FW: Kivalina Evacuation and School Site Access Road 0002384/NFHWY000162: Request for Agency Scoping Comments by 12/12/2016

Hello,

Thank you for the opportunity to provide comment during scoping notice for the Kivalina Evacuation and School Site Access Road. The Department of Natural Resources (DNR), Division of Mining, Land and Water (DMLW), Northern Region Lands Office has reviewed the material and has the following comments.

1. The State received title to the affected lands beneath navigable waters under the Alaska Statehood Act (P. L. 85-508) and the Submerged Land Act of 1953 (P.L. 31, 83rd Congress, First Session; 67 Stat. 29) as well as the Equal Footing Doctrine, which declares that all new states enter the Union on an equal footing with the original states with respect to sovereign rights and powers to include ownership of the beds of navigable waters. The proposed alternatives all cross the Kivalina Lagoon and therefore will require an easement from DNR, DMLW. Easements are a type of disposal of interest and therefore require a public process that involves public notice and an appeal period; therefore project planners should consider this when developing timelines for permitting. Submitting an easement application a year in advance would be best. For any easement related questions, please contact AJ Wait, Natural Resource Manager, at aj.wait@alaska.gov or at 451-2777.

2. While USACE does not list the Kivalina or the Wulik Rivers as navigable, they are considered navigable by the State of Alaska. Any material mined from tidelands, shorelands or submerged lands, or from islands determined to have emerged from the bed of the navigable rivers which passed to the State are state land/resources and a material sale will be required. In order to issue material sale contracts, DMLW will need to designate the sites as material sites/sources which will require a full disposal of interest decision to determine if the action is in the best interests of the State; therefore project planners should consider this when developing timelines for permitting. Submitting applications a year in advance would be best. For any material site/sale questions, please contact Julie Smith, Natural Resource Manager, at julie.smith@alaska.gov or at 451-3010.

3. DNR, DMLW reviews all mining and reclamation plans for all material site mining within the State regardless of land ownership, so a mining and reclamation plan should be submitted for DNR, DMLW review/approval (AS 27.19). Any non-state land mining and reclamation plans may be submitted to Julie Smith.

DNR, DMLW understands this is an important project for the people of Kivalina and we look forward to working with the community, the Northwest Arctic Borough, and state and federal agencies on this project. Thank you again for the opportunity to comment. If you have any questions or we can provide additional information, please let us know.

Sincerely,

Dianna

Dianna Leinberger
Natural Resource Manager
Northern Region Office
Division of Mining, Land & Water
Department of Natural Resources
(907) 451-2728

United States Department of the Interior

U.S. FISH AND WILDLIFE SERVICE
Fairbanks Fish and Wildlife Field Office
Planning and Consultation Branch
101 12th Avenue, Room 110
Fairbanks, Alaska 99701

December 12, 2016

Sarah E. Schacher
Preconstruction Engineer
Department of Transportation and Public Facilities
Northern Region
2301 Peger Road
Fairbanks, Alaska, 99709-5316

Re: Kivalina Evacuation and School Site Access Road
0002384/NFHWY00162
Request for Scoping Comments

Dear Ms. Schacher:

The U.S. Fish and Wildlife Service (Service) has reviewed the Request for Scoping Comments by The Alaska Department of Transportation and Public Facilities (ADOT&PF) to construct an all-season evacuation road between Kivalina Island and Kisimigiuqtuq Hill (K-hill; Figure 1). We understand ADOT&PF and FHWA are reviewing three preliminary route options (Figure 2):

- A northern route of approximately 9.1 mi (14.6 km), originating at the south end of the Kivalina Airport runway. This route would run north on the east side of the barrier island for approximately 1.5 mi (2.4 km), cross the lagoon eastward via a causeway or bridge, and then proceed along higher (drier) ground between the Wulik and Kivalina rivers to the terminus at K-Hill;
- A southern route of approximately 6.9 mi (11.1 km), originating at the south end of the Kivalina Airport runway. This route would immediately cross the lagoon eastward via a causeway or bridge, and proceed through low-lying wetlands along relic channels of the Wulik River to K-Hill; and
- A combined route of approximately 8.6 mi (13.8) would follow the northern route before merging with the southern route via a 1-mi (1.6 km) connecting segment.

In addition, four potential material source locations have been identified in the project area. These include: K-Hill, the Wulik River deposition zone, Wulik River relic channels, and the Kivalina River deposition zone (Figure 2).

Recommendations: The Service recognizes the purpose and need for the proposed project and appreciates the opportunity to comment on these preliminary options. We offer the following recommendations to help reduce adverse impacts from the proposed project to fish, wildlife, and habitat.

Threatened and Endangered Species: The proposed project is within the range of three species listed as threatened under the Endangered Species Act of 1973 (ESA), as amended: spectacled eiders (*Somateria fischeri*), Alaska-breeding Steller's eiders (*Polysticta stelleri*), and polar bears (*Ursus maritimus*). Additionally, the project area occurs within Unit 3, barrier island habitat, of designated polar bear critical habitat (75 FR 76085).

Although low numbers of spectacled and Steller's eiders may migrate through the project area, neither species is currently known to nest in the region. Polar bears may occasionally pass through, or rarely den, in the area, although their density is very low and encounters are expected to be infrequent. The Service recommends the applicant develop a Polar Bear Interaction Plan for personnel to follow in the unlikely event that a polar bear enters the project area. Alternatively, if desired by the applicant, the Service can provide standard *Polar Bear Interaction Guidelines*.

When the project description is finalized and the permitting process begins, the Service will conduct section 7 consultation under the ESA for the proposed project. The lead Federal action agency (i.e., the federal funding or permitting agency) will be responsible for initiating section 7 consultation.

Migratory Birds: Migratory bird nests, eggs, or nestlings could be destroyed if work is conducted in nesting habitat during the spring and summer breeding season, which is generally May 20 through July 20 in the proposed project area. The Migratory Bird Treaty Act (MBTA) prohibits the willful killing or harassment of migratory birds. To minimize disturbance to nesting birds and help comply with the MBTA, we recommend land disturbing activities (e.g., clearing, excavation, fill, brush hogging, etc.) not occur from May 20 to July 20. For more information on timing guidelines for land disturbance activities, please refer to the following link: http://www.fws.gov/alaska/fisheries/fieldoffice/anchorage/pdf/vegetation_clearing.pdf (please also note these guidelines are currently under revision).

In addition, the scoping letter does not identify a source of electrical power for the evacuation site on K-Hill. The Service recommends avoidance of overhead powerlines by burying power cables in the roadbed, or by providing on-site power generation. If overhead powerlines would be proposed to connect the evacuation site on K-Hill to the existing power supply in Kivalina, migratory birds (including listed eiders) would be at risk of collision with the overhead lines. Birds in flight suffer considerable mortality from collisions with man-made objects (Manville 2004). Birds involved in collisions with man-made objects may also experience sever injuries including concussions, internal hemorrhaging, and broken bones. Birds in flight are particularly at risk of collision when visibility is impaired by darkness or inclement weather (Weir 1976); conditions which are common in northwest Alaska. Overhead power lines would also constitute a long-term, if not permanent, collision risk to all migratory birds.

Therefore, if overhead powerlines cannot be avoided, the Service recommends installation of fixed-tag bird flight diverters similar to the FireFly™ (Figure 3) to increase visibility of any overhead lines and reduce collision risk for migratory birds. Recent analysis suggest line marking devices placed at adequate spacing are likely to reduce collision rate by 50-80% (APLIC 2012).

Finally, if lighting would be proposed for the road corridor or evacuation site at K-Hill, the Service would recommend incorporation of design features (e.g., shielding to reduce outward-radiating light) to minimize the potential for attracting and disorienting migratory birds.

Evacuation Road Route: The Service considers wetlands, ponds, sloughs, watercourses, and riparian areas to be higher-value habitat types where impacts should be avoided or minimized. Although the Northern route is longer, 9.1 m (14.6 km), it avoids riverine and wetland habitats within the floodplain of the Wulik River (Figure 2). While the Southern and Combined routes take a more direct path, and may initially be more economical to develop, due to the dynamic nature of the Wulik River meander plain, both the Southern route and eastern portion of the Combined route would likely be more costly to maintain in the long-term. Additionally, the Northern route would largely avoid traversing important riverine and wetland habitats in the project area, and would therefore be the least impactful alternative. Therefore, because the Northern route would be the least impactful to wetland habitat, and represents the lowest-maintenance, long-term alternative, the Service recommends selection of the Northern route for the proposed Kivalina Evaction Road.

Material Sources: The Service recommends avoiding development of the three potential material sources within the Wulik and Kivalina rivers (e.g., the Wulik River deposition zone, Wulik River relic channels, and the Kivalina River deposition zone). The Kivalina and Wulik rivers are important spawning, rearing, and migratory habitat for King (*Oncorhynchus tshawytscha*), Sockeye (*Onchorhynchus nerka*), Pink (*Onchorhynchus gorbuscha*), Coho (*Onchorhynchus kisutch*), and Chum salmon (*Onchorhynchus keta*), as well as Dolly varden (*Salvelinus malma*) (WHPacific 2012). Gravel mining within the Kivalina or Wulik river channels could be problematic because once material sources are depleted, they would likely fill with water and potentially become anoxic deepwater traps for overwintering fish. Due to the potential for disrupting important fish habitat from in-channel material extraction, and the importance of the local fisheries to subsistence, we recommend against development of any material source within the Kivalina or Wulik river channels.

Instead, the Service advocates for development of the K-Hill material source. Because the K-Hill source is located 1) in drier habitat outside the Wulik and Kivalina river channels, and 2) proximal to the evacuation road terminus at K-Hill, the Service believes development of this material source would be least impactful to important local fisheries and wetland habitat.

Kivalina Lagoon Causeway/Bridge: To avoid and minimize impacts to marine mammals and anadromous fish species, the Service recommends any crossing of Kivalina Lagoon should maintain normal physical and ecological processes within the lagoon by promoting natural sediment transport patterns, accommodating tidal shifts, and maintaining functional connectivity for wildlife passage and fish spawning.

Invasive Weeds: River corridors provide an easy pathway for spreading invasive species and the Service recommends implementing Best Management Practices (BMPs) for minimizing the introduction and proliferation of invasive species. BMPs can include establishing an equipment cleaning practice, invasive species education for staff and contractors, scheduling work at times when plants do not have viable seeds, using certified weed-free gravel and erosion control products, controlling invasive species at material sites, disposing of spoil and vegetation contaminated with invasive species appropriately, revegetating with local native plant species, and developing a monitoring and treatment plan. For more assistance with managing for invasive species in the project area, please contact our office.

Mitigation: Service policy regarding impacts to fish and wildlife habitat includes first avoiding, then minimizing, and finally compensating for any remaining unavoidable impacts. These impacts include direct, indirect, and temporal impacts. If there are unavoidable project impacts, then the Service recommends compensatory mitigation for the unavoidable impacts by restoring or permanently protecting equal or higher-value wetlands as described in the 2008 Final Compensatory Mitigation Rule (33 CFR 325 and 332).

We appreciate this opportunity for early comment. If you need further assistance, please contact Kaithryn Ott at 907-456-0277 or *kaithryn_ott@fws.gov*.

Sincerely,

Robert J. Henszey
Branch Chief
Planning and Consultation

ecc: Susan Georgette, Refuge Manager, U.S. Fish and Wildlife Service
Mary Romero, U.S. Army Corps of Engineers

Literature Cited

Avian Power Line Interaction Committee (APLIC). 2012. *Reducing Avian Collisions with Power Lines: The State of the Art in 2012.* Edison Electric Institute and APLIC. Washington, D.C.

Manville, A.M., II. 2004. Bird strikes and electrocutions at power lines, communication towers, and wind turbines; State of the art and state of the science – next steps towards mitigation. Proceedings 3rd International Partners in Flight Conference, March 20-24, 2002, Asilomar Conference Grounds, CA. USDA Forest Service General Technical Report PSW-GTR-191. 25 pp.

Weir, R. 1976. Annotated bibliography of bird kills at man-made obstacles: a review of the state of the art and solutions. Unpublished report prepared for Department of Fisheries & Environment, Canadian Wildlife Service-Ontario Region.

WHPacific. 2012. Native Village of Kivalina Evacution route significant biological resources baseline report and preliminary essential fish habitat analysis. Prepared for Maniilaq Association on behalf of: Native Village of Kivalina. 41 pp.

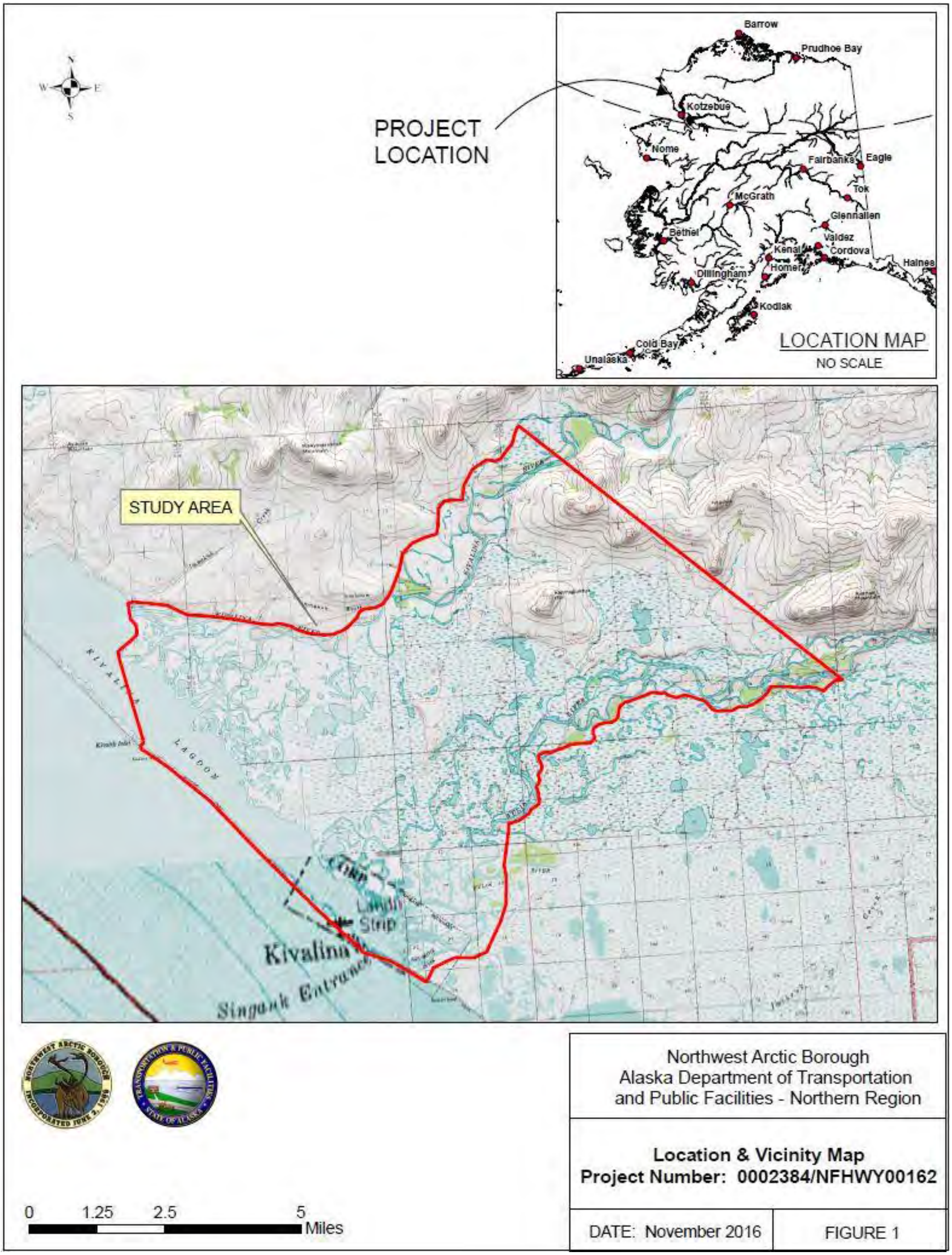


Figure 1. Location of the proposed evacuation road project east of the community of Kivalina, Alaska.

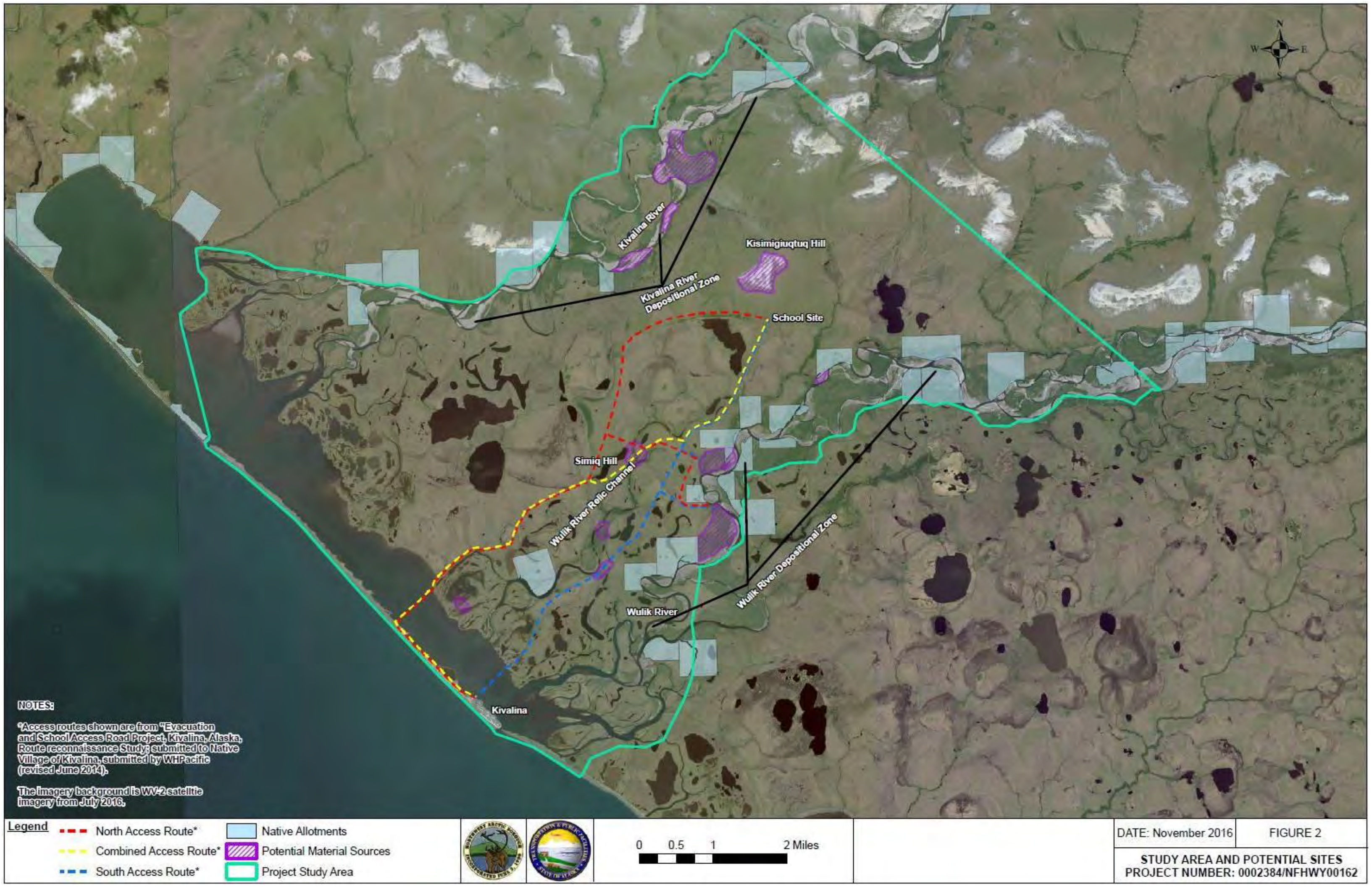


Figure 2. Detail of the proposed Kivalina Evacuation Road route alternatives and potential material sources within the Kivalina and Wulik rivers.

Figure 3. The Service recommends fixed-tag FireFly™ diverters (or similar) be installed at appropriate intervals on and overhead powerlines associated with the proposed Kivalina Evacuation Road Project.

Kivalina Evacuation and School Site Access Road
Project Number: 0002384/NFHWY00162
USFWS Agency Scoping Meeting
USFWS Office, Anchorage, AK
12/19/2016

Attendees:

USFWS:
Kaithryn Ott, USFWS Endangered Species Wildlife Biologist; Section 7 Consultation
Louise Smith, USFWS Wildlife Biologist
Robert Henszey, Fairbanks Branch Chief

DOT&PF:
Paul Karczmarczyk, AK DOT&PF
Sarah Schacher, AK DOT&PF
Jonathon Hutchinson, AK DOT&PF

OTHERS:
Katherine Keith, Remote Solutions
John Baker, Remote Solutions
Sara Lindberg, Stantec

DOT&PF provided a brief project summary and opened the meeting up to discuss USFWS questions, comments, and concerns. The following summarizes the meeting discussion by topic.

Preferred Route

Question from Louise: Can you use the existing airport runway as part of an evacuation road? Why not?

> Paul: The FHWA regulations have specific embankment standards and this activity would not be allowed by FAA.
>
> Sarah S: The Purpose and Need for the project also dictate that having a direct route out of the community is critical to having a safe and reliable access route rather than running in parallel to the runway.

Question from Louise: How long before the community moves once the school moves?

> Sarah S: The FHWA won't get involved in a school relocation project so that isn't within the scope of this meeting. The federal action for this meeting relates solely to the evacuation road.
>
> Sara L: The community is not ready to determine where they are going to relocate.

Follow up from Louise: Regarding the Northern Route, building a road at the northern higher lands seem more ideal.

> Sara L: The purpose and need of this project is to provide a safe and immediate evacuation route. Taking their elders north along the barrier island one mile may not be possible during a

storm surge event and would not be safe. Furthermore, people in public meetings speak about staying up all night in fear during storms and would like the lagoon crossing to be as close to town as possible.

Material Sites

Louise: The Wulik is pristine and is a beautiful river known for Dolly Varden. My opinion, regarding gravel, is that you will constantly need to dewater, which could be problematic in the winter. The concern is the excavation may not recharge naturally, resulting in permanent alteration in that part of the river. In other areas, excavations too deep may become anoxic from sedimentation and we would generally like to see avoidance of the river channels.

Sarah S: We know that's something to consider; and there is an example regionally of a material site on the Noatak River that remains dry during winter excavation, and we anticipate this site would be the same. On that issue, DOT is currently working with UAF on a Sag river sedimentation study to see how fast its river bars replenish after excavation, although that is a very different system than what we are looking at with this project.

Jonathon: There was a pond that was trapping fish during flooding events on the Dalton Highway, and we developed criteria with DNR and ADF&G for excavation in that area to avoid fish entrapment. Instead of creating shallow pits during excavation, we used deep trench pits with perpendicular access to the channel to allow fish escapement. The trenches were sloped so they would continue to drain and avoid both entrapment and concerns about anoxic conditions. We could agree to similar stipulations for this project.

Louise: That sounds like a great solution and may be workable in this scenario. The Wulik appears to act like a delta. If you do mine deep, you will need to include an egress.

Causeway

The current crossing options for the lagoon will include some form of bridge and/or culverts with a causeway of gravel with or without rock. Considerations for these options are sediment transport, hydraulic processes, boat passage, marine mammals, ice impacts, and other issues. A similar design, as an example for reference, but on a larger scale is the Safety Sound bridge in Nome.

Question from Louise: What is water flow like in the lagoon?

> John: There are two inlets into the lagoon from the sea.
>
> Sarah S: Most of the hydrologic movement in the lagoon occurs during storm surge events, but otherwise there is minimal lagoon circulation.
>
> John: Breakup is not at all a big event in the lagoon. There's so little movement of the water, that rather than flowing out through the inlets, the ice just melts in place.

Questions from Louise: Was there modeling from USACE on closing the causeway?

> Sarah S: The biggest challenge to closing the lagoon completely would be the ability of the community to navigate in or out of the enclosed portion of the lagoon;

Paul: …and also we anticipate both adult and juvenile fish, and marine mammal, passage will be concerns from NOAA/NMFS too, so at this point I'm not thinking full closure will be acceptable, but we'll know more when we talk with the EFH and marine mammal folks in Anchorage.

Katherine: The USACE Causeway and Bridge Design Report June 2016 study modeling has completed multiple circulation studies and flow modeling that is available as a reference.

Question from Louise: What are your money constraints and schedule?

Sarah S: Our goal is to get through scoping and get to a Class of Action decision early in February, with the conclusion of the environmental documentation occurring before end of 2017. Design itself will be rather straightforward.

Katherine: We will be applying again for a TIGER grant application on behalf of the community this April (2017). We submitted a grant application in 2016 and have also completed significant lobbying in DC to help make legislators and federal agencies aware of the project.

Comment from Robert: What is your current data on the wetlands?

Sara L: ASRC completed a desktop wetlands study in 2016. As you can imagine, the majority of the area is considered high value wetlands. We wanted to characterize those values on a finer scale, so we took the high value wetlands and further divided them into both High and High+ values based on a number of criteria. The permanently flooded, emergent wetlands are the highest functioning according to the study.

Follow up from Robert: Interestingly, it may turn out that instead of emergent wetlands, the less common shrubby habitat in that area is actually of higher value locally for wildlife habitat. In that regard, we might actually prefer you avoid areas with taller willows and brush, as these would be higher value nesting habitat for migratory birds than the low scrub and emergent habitats.

Section 7 Consultation

Kaithryn: There really isn't a Section 7 concern in this area for either of the eiders or other species, except that reinstatement of Section 7 polar bear critical habitat could create a delay if we hadn't prepared properly for it. It should not be an issue for this project, but a polar bear interaction plan will be required. Otherwise, this project should meet requirements for an Informal Section 7 consultation.

Summary of USFWS Comments/Concerns

- Avoid Fish trapping within material sites
- Defer to NOAA/NMFS re: causeway openings on EFH and marine mammal passage/concerns
- Shrubby wetlands may be of higher value and more important for bird nesting than emergent, flooded areas. Parse those areas out if possible during design and seek avoidance/minimization
- Informal Section 7 consultation will be sufficient

ACTION ITEMS

Katherine to Share: Links to USACE Bridge Design and Wetlands Study

Kivalina Evacuation and School Site Access Road
Project Number: 0002384/NFHWY00162
ADF&G Agency Scoping Meeting
DOT&PF Building, Fairbanks, AK
12/19/16

Attendees:
ADF&G:
Audra Brase, Region 3 Supervisor, ADF&G Habitat Division

DOT&PF:
Ryan Anderson, AK DOT&PF
Paul Karczmarczyk, AK DOT&PF
Sara Schacher, AK DOT&PF
Jonathan Hutchinson, AK DOT&PF

OTHERS:
Katherine Keith, Remote Solutions
John Baker, Remote Solutions
Sara Lindberg, Stantec

DOT&PF provided a brief project summary and opened the meeting up to discuss ADF&G questions, comments, and concerns. The following summarizes the meeting discussion by topic.

Fish Habitat

Audra: Ideally, it would be better to do more work in the Kivalina River drainage then in the Wulik River. However, the challenges with the Purpose and Need are understood. The Wulik is a much bigger system and more greater subsistence resource than the Kivalina, although on paper ADF&G does treat the two rivers the same. It appears the material sites you have selected in the Wulik River are below known spawning sites. For overwintering, the Dolly Varden go into the sound (lagoon) especially with the warming climate. When overwintering in the sound and the lower part of the Wulik, they don't just sit in a hole but they are a bit active and swim around. Knowing about the Dolly Varden and their overwintering activity in the lagoon would be helpful as we get closer to designing the lagoon crossing. ADF&G is trying to do a sonar count this spring in the Wulik River for the Red Dog Mine, and has data every year for three years. Sport fish division has done this. Juvenile fish outmigration happens in the spring, and spawning for Dolly Varden are farther up the river and takes place in the fall.

Lagoon Crossing

Paul: We would be interested in hearing about your concerns for the lagoon crossing and implications on both adult salmon and other fish passage, and also any potential effects on, for example, the lagoon's prey base or other resources used by juvenile fish during outmigration.

Audra: We wouldn't be at all comfortable with a solid causeway concept because of the impacts that would have on marine mammals, fish habitat, and overwintering Dolly Varden.

Material Sites

Sarah S: River material extraction is appealing because of the ability to have a winter haul, and using the K-hill site is more costly.

Jonathan: The summer and winter mining methods and hence costs will be very dependent on agency feedback and any specific measures implemented for mitigation.

Audra: Using the Wulik gravel is not off the table if appropriate reclamation is used and connectivity is maintained to avoid impacts to fish and habitat values.

John: What design elements can we incorporate now to make you more comfortable?

Ryan: For example, is it possible for us to look at the depths of the channels along the river, and then use that depth as a reference for the maximum extent of how deep you would be comfortable with us going when accessing gravel? The nearby ponds in the area could be used as reference when suggesting excavation depths.

Audra: Yes. You need to make sure any proposed gravel site next to the river is day-lighted to allow for channel connectivity, and you might also need to design what is left afterward to create appropriate fish habitat. As for extraction methods, ADF&G would rather see a shallow trench vs a deep hole. What constitutes "deep" will depend on the location.

John: Is there a way we can extract on the big gravel bar on the Wulik and make the habitat better?

Audra: You would not want a big pond, as that would divert flow and in effect "shallow up the river". Instead, you want to be sure any excavation is day-lighted, and make it narrow. You want to be sure you leave a slot to make sure the fish can get back out to the river. Also, you don't want to work near known spawning areas.

Ryan: We could include conceptual material site designs to show an acceptable typical version in the environmental document, but we'll need input from the agencies on criteria to consider and specifics we'll need to mandate in order to reach that acceptable design.

Mitigation

Paul: The best thing we can do is to incorporate both fish habitat and wetland impact mitigation into design as we go. We'd like to work up front with ADF&G and other agencies to come up with a mitigation proposal acceptable to the USACE and also serve to mitigate other resource impacts.

Audra: Reconnecting sloughs and oxbows may be valuable, as long as it is not impacting the local whitefish fishing areas. I would be interested in seeing which waterbodies flood and then determine logical locations to connect channels.

Audra: As for the lagoon and larger crossings, a bridge is always better than a culvert. Culverts have typically failed around the state. Once you nail down the route, we can work with you to see where bridges may be more appropriate.

Water Withdrawal

Ryan: What about water withdrawals? There will be water needs for this project to create ice roads, and also later on for dust control and compaction.

Audra: We would need to get a handle on whether there are fish in the various lakes along the routes.

Ryan: To simplify matters, could we just assume there are fish in all the lakes? That way, rather than going out and spending time and money sampling all the lakes, we could create parameters for the contractors based on that worst-case assumption, have them go get bathymetry of any lake they'd like to use for water withdrawal, and then put parameters on the depth of withdrawal based on a standard assumption of fish presence?

Audra: Yes, we can assume there are fish in all lakes, and then limit draw down of water accordingly, or limit draw down to just lakes where a certain depth could be maintained. This would avoid having to do a pre-survey.

Audra: Something else that may help is when you reclaim the material sites, you can make sure they are connected to the river and then you could still use them for maintenance water after construction. We do allow water withdrawals from fish bearing waters, but would need to implement fish screening requirements that would need to be followed.

Audra: As for permitting, we'd issue two different permits - one for construction and one for maintenance. Gravel pits could double as water storage for the winter haul road, and then also be used long-term for ongoing maintenance. You could also pump the water back into the river as long as the sedimentation wasn't a problem.

ACTION ITEMS

ADF&G to provide: The spawning and overwintering areas mapped, and the data collected can be provided to DOT&PF by Fred DeCicco.

Audra: I suggest you talk to Nikki Braem, ADF&G Subsistence, as she's got a lot of local use information.

The ADF&G point of contact for this project will be Parker Bradley.

Kivalina Evacuation and School Site Access Road
Project Number: 0002384/NFHWY00162
Combined NPS and ADNR/OHA-SHPO Agency Scoping Meeting
NPS Building, Anchorage, AK
12/20/16

Attendees:

NPS:
Rhea Hood, Archaeologist, NPS National Register of Historic Places Program
Andrew Tremayne, NPS Alaska Regional Office Archaeologist

SHPO:
Mark Rollins, OHA Archaeologist
Alan Depew, OHA Archaeologist

DOT&PF:
Paul Karczmarczyk, AK DOT&PF
Sara Schacher, AK DOT&PF

OTHERS:
Katherine Keith, Remote Solutions
John Baker, Remote Solutions
Sara Lindberg, Stantec
Ross Smith, Stantec

DOT&PF provided a brief project summary, review of work completed to date, and opened the meeting up to discuss NPS and SHPO questions, comments, and concerns. The following summarizes the meeting discussion by topic.

Section 106 Process and Impacts to Cultural Resources

Question from Rhea: What is the general approach to impacts to cultural resources? Has this been discussed with the community of Kivalina? What will you do if you find human remains? Has an inadvertent discovery plan been completed for Kivalina?

> Sarah S: Our Standard Contract Provisions will be included in the construction contract documents. That is, if anything in the field is discovered, work would stop, and the contractor would need to contact SHPO, and then proceed as determined. This will be discussed with community of Kivalina during the Section 106 consultation process, and we'd also develop an inadvertent discovery plan.

Mark: It will be important for DOT&PF to identify an appropriate Area of Potential Effect (APE) for consideration by SHPO. While the study area boundary you show is good, an APE could stay the same size or get smaller. SHPO will defer to Tom Gamza (DOT&PF Environmental Analyst/Professionally Qualified Archeologist) to determine if enough work has been done within the resulting APE.

Paul: And we also assume we'll need inadvertent discovery plans in place and require monitoring during any ground disturbance. There is a still a long way to go with the project before we get to that point, and there is still a lot of room for avoidance and minimization. And remember that no NEPA-qualified alternative has been proposed yet, so we have lots of flexibility with design…within engineering parameters of course.

Question from Andrew: What is your project timeline?

Sarah S: We need to start the 106 process with an initiation of consultation letter as soon as possible. We will approach FHWA next month for a Class of Action call, and expect to complete the environmental document next year.

Question from Andrew: Do you anticipate preparing a Memorandum of Agreement (MOA)?

Sarah S: If there is something to mitigate, then we would.

Paul: Any mitigation measures, including an MOA, if needed, would be captured in the construction contract specifications. For example, as Sarah mentioned the inadvertent discovery plan developed during consultation would likely result in an MOA with the Native Village of Kivalina regarding a process to follow should human remains be discovered.

Mark: The DOT Statewide programmatic agreement for handing cultural resources could meet the requirements for this project. This agreement has appendices with templates that help in the development of construction monitoring and inadvertent discovery plans. If a determination of adverse effect was completed for this project it would trigger a need for an MOA. Another option is, if you can't do sufficient identification beforehand, you could do a Programmatic Agreement (PA) with protocols on how to proceed with construction and what would be done if something was encountered. Also, if SHPO was not able to make a finding of effect but wanted to keep the process moving, you could do a PA.

<u>National Historic Landmark (NHL) Boundary/4(f) concerns</u>

DOT&PF provided a brief overview of Section 4(f) and its elements for NPS staff, and conveyed concerns on anticipated actual and potentially perceived impacts to the NHL by NPS and the public.

Question from Sarah S: One of our questions is about the NHL boundary, where it is and how it will affect Section 106 consultation. The SHPO and NPS have two different boundary maps. The AHRS website shows the study area partially within the NHL, but the NPS map shows a different coverage.

Andrew: Based on our map, the whole study area is within the landmark boundary. We can provide SHPO with the latest GIS files for the correct boundary mapping. However, no matter where the boundary is, the NPS position on the project would not change. The Park Service offers technical assistance to SHPO and DOT&PF to ensure any cultural sites within the boundary do not get damaged. It sounds like DOT&PF is doing everything right in your approach. One thing we would like to see is a description of how you will deal with mitigating sites during construction if they are encountered.

Alan: It will depend on if they are contributing sites that are encountered. There might not be any contributing sites within the landmark boundary. Because the entire project is within the landmark boundary, there will not be a finding of no historic properties effected. Rather, we will be looking at either a finding of adverse effect, or no adverse effect. The question is whether there are resources within that boundary that are being affected.

Mark: The National Historic Landmark is considered a historic property, so you can never have a "no effect" determination, it is either a no adverse or adverse effect.

Section 4f Consultation

Question from Paul: Given the extent of the NHL, there would be no practicable alternative to going through the landmark as it encompasses the entire study area, the community of Kivalina, and the evacuation road terminus. Will the presence of a road necessarily have an adverse effect on the landmark by its own right? For example, in terms of setting, viewshed, historical context?

Mark: DOT&PF will need to do the analysis to determine that there is no alternative to going through the landmark to make sure you are minimizing going through it. There will be a public notice process and the Park Service has final jurisdiction on the Landmark. The NPS will receive consultations for a non-objection for both the 4(f) evaluation and the Section 106 process.

Question from Paul: Any ideas on mitigation?

Alan: Mitigation will be consulting party driven. The Park Service would also be involved in that process.

Andrew: We will bring in Janet Clemens in as a Section 106 reviewer for the Park Service.

Action Items:

- DOT&PF/Remote Solutions/Stantec complete the cultural resources survey report
- Depending on consultation &/or proposed routing differences, consider add'l 2017 field survey effort.

Kivalina Evacuation and School Site Access Road
Project Number: 0002384/NFHWY00162
NMFS Agency Scoping Meeting
NMFS Office, Anchorage, AK
12/21/16

Attendees:

NMFS:
Greg Balogh, Protected Resources, Deputy Director, Marine Mammals
Matt Eagleton, Regional Essential Fish Habitat (EFH) Coordinator, Habitat Conservation Division
Sam Simpson, EFH Coordinator, Habitat Conservation Division

DOT&PF:
Paul Karczmarczyk, AK DOT&PF
Sarah Schacher, AK DOT&PF

OTHERS:
Katherine Keith, Remote Solutions
John Baker, Remote Solutions
Sara Lindberg, Stantec

DOT&PF provided a brief project summary and opened the meeting up to discuss NMFS questions, comments, and concerns. The following summarizes the meeting discussion by topic.

Lagoon Crossing

Question from Greg Balogh: For the lagoon crossing, did the community indicate their preferred crossing method?

> Paul: The community has independently selected the southern route as their preferred road. But for the lagoon crossing concept, we haven't made any decisions on configuration and are looking to NMFS and other agencies for what will minimize impacts to marine mammals and fish. We want to engineer the crossing around those concerns, not design something without knowing about problems then have to go back and revise it.

Matt: A causeway could potentially bottleneck fish, so we will be looking for fish passage accommodation. Also, you'll need to protect points along the active floodplain for erosion.

John: The area is pretty stable. The currents are very low.

Question from Paul: Regarding juvenile fish in the lagoon and rearing habitat. Would a causeway pose issues with salinity and water chemistry due to reduced hydrological exchange or flow rates? Would you for instance be concerned about some incremental decrease in salinity affecting fish survival or habitat elements due to a causeway reducing unimpeded salt water exchange?

Matt: I don't see an issue as long as you maintain natural sediment transport. You also need to consider ice scour. Dolly Varden are a consideration but NMFS doesn't manage Dollies.

John: Ice scour should not be an issue. Ice doesn't move through the lagoon it just melts. The lagoon is mostly shallow throughout the entire middle of the lagoon. The far ends have depth.

Paul: And we've talked to ADF&G about Dolly Varden recently, both about adult spawning and juvenile rearing habitats, and they've given us a lot of good information to incorporate into preliminary design considerations.

Question from Paul: What about marine mammal passage in the lagoon? What criteria will you be looking for? Do you know of any information available on passage concepts or limitations of different types of culverts, box structures, bridges with or without piers, etc.?

Greg: I can't think of any instances where there have been culverts for seals. I will have to look into that to see if there is any evidence of seals swimming through culverts.

Matt: The Endicott Causeway has 3 bridges that were installed as mitigation. Seals will go through those; they are 100 feet long each. I don't think seals would go through a culvert. We have found fish won't go through any culvert longer than 300 feet, regardless of if there is light showing at the end of, or even within the culvert or not. There was actually a long culvert they installed artificial lighting in, and fish wouldn't go through it. You'll need to consider migrating crabs too. In Nome there's the Port Causeway breech, and that is 3-5 meters wide and is specifically designed for crab migration.

Matt: Our hydrologist Sean Eagan could help you locate the best place for the bridge within the lagoon.

<u>MMPA, EFH, and Section 7 consultation process</u>

Question from Sarah S: Do you have any construction concerns about timing or method and how that might impact marine mammals?

Greg: From the marine mammal point of view, aerial surveys completed in the spring would help to identify the various densities of seals depending on timing. We should also assume both the ringed and bearded seal will be T&E listed species before this project is constructed. If densities of seals are low enough based on spring surveys that you have the ability to suspend construction when a seal comes close, then Informal Consultation will be sufficient. For example you would set up a protocol where you would have observers watching for seals and would only need to pause things such as 120-160 decibel pile driving while they're present within a pre-determined distance of the specific project area. If seal densities are too great, or you are not able to pause construction, then Formal Consultation and the issuance of an Incidental Harassment Authorization (IHA) will be required.

Question from Sara L: Can we assume presence and estimate densities of seals in the lagoon to keep the process moving without a spring survey?

Greg: Yes, we can assume presence, and numbers for densities, if we want to keep moving without a survey. Everyone uses assumptions. If you want to keep consultation informal, then you will not be allowed to have any take. Harassment of a seal from construction noise would be considered a take. Acoustic harassment is the big concern for this project. We would apply threshold distances to the activity area, usually of 2km, which is standard. Marine mammal observers would have to be present during construction to monitor for any seals within this distance. If they see a seal entering the 2km threshold, the contractor would be required to stop work until the seal moved out of the area. I doubt seals are in the lagoon in the winter because it's so shallow, so winter construction is probably preferred. The north end of the lagoon would be out of the action area if the southern lagoon crossing was selected.

Question from Sara L: If DOT&PF moves forward with a IHA, could we make assumptions on presence and numbers for this as well?

Greg: Yes, estimates and assumptions are fine. You are to use the best available data. If you go forward with an IHA, consultation will take a minimum of 5 months. The IHA application consists of 14 questions that you can answer with best available data. Estimates and assumptions are fine. The take we would be worried about for this project would be through noise harassment. The application process includes a 60-day public notice period. Once the permit is issued, NMFS will then need an additional 45 days after that to process the information and complete its biological opinion. Alternatively, the informal consultation process consists of a filling out a template requesting informal consultation. The informal consultation process will take 30 days.

Question from Sarah S: Given the shallow lagoon depth and, from what we've heard, that it freezes to the bottom in most places or at the worst there is little water beneath the ice, we would likely be able to schedule placement of causeway fill during the winter. We could access the area on the ice, break and excavate ice, and place fill during the time there are no seals at all in the area. Would that be the best option?

Greg: Absolutely, as that would not pose the threat of a take given that no seals would be anticipated to be in the area during that time of year. That would be a good example of a specified method that could fit with an information consultation.

Material Sites

Matt: Make sure that for the relic channel material sources, you don't inadvertently cause erosion issues where they may come close to the road.

Mitigation

Question from Paul: Do you have any suggestions on fish habitat mitigation for gravel sources?

Matt: I am just glad you are not proposing to take sand from the beach. The publication *Impacts to Essential Fish Habitat From Non-Fishing Activities in Alaska, 2016* is a document located on our website that has a list of conservation recommendations. It also lists EFH issues by activity. Use that when completing your EFH Assessment.

Question from Paul: Do you have ideas for EFH mitigation projects that might also help satisfy USACE mitigation requirements? Something we could incorporate into design that would serve to mitigate impacts to several resources…wetlands and fish habitat…simultaneously? Or absent that something specific to EFH or marine mammals? For instance, were we to put in a causeway that had a bridge opening or two where passive sonar counters could be installed for marine mammal counts or to collect passage timing or other data, that would be easy to incorporate as we'd essentially be constructing the fixed pass-by points that could serve as survey stations for long term data collection. We're open to any ideas.

Greg: There is no data on if ringed seals swim under structures but I am not sure how valuable that information would be for the future.

Matt: There is a lack of tide information in the north. Maybe an avenue for mitigation is to look at collecting local tide information? The closest tide station is at Red Dog, which is a very different setting than in the lagoon. Often we model things based on stations such as Red Dog and as far south as Nome and then extrapolate, but as you know that's always a guess, particularly given the differences in the types of shorelines. The Non-Fishing Activities document also has ideas about how to mitigate for climate change. You might also talk to the community about what they expect will occur as a result of climate change, and think about accommodating those concerns in your design.

Action Items:

DOT&PF:

- Contact Sean Eagan to discuss hydraulics and placement of the bridge structure in the lagoon.
- Review the referenced document for potential design applications
- Discuss climate change impacts w/ the community to seek design input
- Get a more detailed bathymetry on potential lagoon crossing location(s) to qualify construction methodology that would not pose take hazard on seals (i.e., winter construction feasibility).

Kivalina Evacuation and School Site Access Road
Project Number: 0002384/NFHWY00162
USACE Agency Scoping Meeting
Stantec Office, Anchorage, AK
12/21/16

Attendees:
USACE:
Jeremy Grauf, Regulatory Specialist
Janet Post, Regulatory Specialist

DOT&PF:
Paul Karczmarczyk, AK DOT&PF
Sara Schacher, AK DOT&PF

OTHERS:
Katherine Keith, Remote Solutions
John Baker, Remote Solutions
Sara Lindberg, Stantec

DOT&PF provided a brief project summary and opened the meeting up to discuss USACE questions, comments, and concerns. The following summarizes the meeting discussion by topic.

<u>Potential Routes and Project Cost</u>

Question from Janet: Why do you think the lagoon crossing will be less expensive than the USACE design?

> Sarah S: We are looking at the assumptions that went into the Corps study so we can consider other options, such as material costs, along with the lagoon crossing opening needs. We are still in the preliminary phases of work on that. The biggest driver of cost is going to be material sources. We are hopeful that we can get good material on site.

Question from Janet: Where will the material come from?

> Sarah S: We are looking at K-hill as a very logical site. The Wulik River also has great alluvial resources. Actual rock material might still need to be imported, but at least the other materials could be found locally.

Questions from Janet: Although there are three listed routes, is there one realistic route that would be most beneficial?

> Paul: It's worth making the distinction now that the routes on the study area map are not by any means our NEPA alternatives. They are just several routes the community of Kivalina has proposed based on their local and traditional knowledge coupled with all the previous studies that have been conducted by the Corps, the Borough, the City, and others. We're just now in the

process of scoping to begin developing a range of alternatives for NEPA, and while those proposed routes will be a huge help in developing them, they are just a part of the data we'll be using. We'll need to incorporate recent surveys by the Borough that Remote Solutions has done, along with fitting the purpose and need, including all the past studies, as well as the agency and public input we're getting during scoping and consultation. So with that, your input on wetlands and what comes from our discussions here with you and other agencies will play a big part in determining what that most beneficial route would be.

Sarah S: That said, so far the community's proposed southern route or something in that vicinity seems the most beneficial and feasible. For evacuation purposed, the community needs to have a lagoon crossing as close to town as possible for safety. Also, a route going north along the spit is definitely more complex of a design because of how far out in the lagoon you would need to fill in order to avoid the airport.

School Site

Question from Janet: What is the school site footprint?

Paul: We don't know. The school construction is a parallel project being conducted by the Northwest Arctic Borough, but a completely separate action and not part of this project.

Wetlands

Question from Jeremy: What information do you have on wetlands for the study area?

Sara L: Development of an evacuation road road has a long standing project concept investigated by a number of agencies and entities for decades. As a result there are reams of existing data that is being synthesized into our new environmental review document for this project. For example ASRC completed a desktop wetlands study in January of 2016 which lines up with the NWI mapping pretty well. The majority of the study area is wetlands, most of which are semi-permanently or permanently flooded and which were evaluated as high value as part of their study. Because there were so many high value wetlands across the entire study area and it didn't seem appropriate to lump them all as having one value measure, we further split them into high and high+ wetlands based on function. To augment the ASRC desktop information, this fall the NAB had Remote Solutions and Stantec do field work in multiple areas. We looked for connectivity between the numerous lake and sloughs, and looked for other data points to verify wetlands status. Also 2' resolution LiDAR was completed this fall which still needs to be evaluated.

Question from Sara L: The existing wetlands information we have is based on desktop studies, but after extensive field reconnaissance this fall, and with an extensive photo record throughout the study area coupled with soils data taken during archaeological survey work, we intend to strengthen the desktop mapping in hopes of being sufficient for permitting without additional field surveys. Do you think this will be sufficient?

Jeremy: It is difficult to say for sure without seeing the data. Most of the study area is clearly wetlands. Let's just see how far we can get utilizing the desktop supplemented approach.

Compensatory Mitigation

Question from Paul: For the Cape Blossom project near Kotzebue, we had a generally similar length project that calculated out to about 160 debits for 11 miles of road. Do you see something similar for this project or can you even predict that given the new compensatory mitigation calculation process?

> Janet: Don't assume that you would need any compensatory mitigation. It may be that you will not need any at all given the project location in Western Alaska.

Question from Paul: What information would you need to make that determination?

> Jeremy: We would need the acreage of the impacts and resource types in both Cowardin and HGM. Then we would compare that to the acreage of wetlands available within the watershed. A Hydrologic Unit Code (HUC) of 12 would be sufficient, unless the project spans two units, and then two HUC 10 units would be sufficient to determine watershed acreage.

Question from Paul: Because the majority of study area is wetlands, selecting a route that avoids wetlands is going to come down to qualitative avoidance. We can use LiDAR data to find the high spots, but it will likely still be mostly wetlands. How much detail do you need to see in our avoidance documentation?

> Jeremy: We would like to see you avoid the High+ value wetlands. Documenting that will go a long way.
>
> Paul: As a sidebar, when we were talking to the USFWS, they explained that in that region, they really valued the woody shrub habitat over the emergent marsh wetlands which the Corps has usually considered of higher value, so there is likely going to be some competing notions of "high value" between the two agencies. Do you see a way to address that difference?
>
> Janet: We are open to protecting habitat resources that may be important to other agencies like the USFWS. Also, avoidance of salmon streams, adhering to the bird timing window…these are great avoidance and minimization measures as well. Your application should note all those considerations so they can be incorporated into our review.

Question from Paul: When we sent out scoping letters, I'd anticipated that we'd receive a response from the Corps that basically acknowledged jurisdiction, and provided a reference POA# for future use in correspondence and such. We haven't gotten one yet, and are wondering why?

> Janet: This project would definitely need an individual permit, and we have a POA# already set up for this project that was used during the Corps study back a few years ago. We'll just use that same number as it covers the same project area, and we can send you confirmation of that.

Action Items:

Janet: The Corps will send a letter to DOT&PF with the POA# for the project.

Kivalina Evacuation and School Site Access Road
Project Number: 2047055102
NMFS Meeting
NMFS Office, Anchorage, AK
06/06/17

Attendees:
NMFS:
Matt Eagleton, Regional Essential Fish Habitat (EFH) Coordinator, Habitat Conservation Division
Sean Eagan, Hydrologist (via phone)

DOT&PF:
Paul Karczmarczyk, AK DOT&PF

OTHERS:
Katherine Keith, Remote Solutions (via Phone)
John Baker, Remote Solutions (via Phone)
Andrew Niemiec, Stantec
Francis Wiese, Stantec
Seifu Guangul, Stantec (via Phone)

Purpose: The purpose of the meeting was to brief Sean Eagan on the lagoon-specific hydrological aspects of this project, and to determine if he had any feedback, and would be interested and able to assist and collaborate.

NMFS and DOT&PF provided a brief project summary and opened the meeting to discuss lagoon and lagoon-crossing related hydrology questions, comments, and concerns. The following summarizes the main discussion.

DOT&PF noted that the main design considerations are to construct a lagoon crossing that is efficient, safe, cost effective, and balances biology, hydrology, sediment transport/erosion, and engineering. From a USACE perspective, the crossing could be a solid fill, but DOT&PF is looking for input from NMFS on specific design criteria to ensure the ultimate design is acceptable, cost effective, and balances all key considerations.

NMFS offered to help with the hydrology if needed, and noted that if the Southern entrance blocks naturally sometimes, then the design may also need to account for possible northward flow of the Wulik River outflow volume. Stantec and Remote Solutions (RS) replied that local observations support a water level rise more than it does water movement north or southward, and that some water flows through the sand, eventually weakening and then releasing the blockage.

NMFS asked whether the community will want to get boats to the North side of the lagoon, and that for this, and biological purposes, any design should help maintain water flow in the deeper channel located next to the barrier island. RS noted that the community would prefer to be able to pass, but that if not, a boat ramp on the north side would be needed.

NMFS asked about fish resources in the lagoon and rivers, noting that they get their fish information for this area from ADF&G. RS replied that the focus in the lagoon and rivers is on trout, whitefish, and some baitfish. Tomcod used to be present but they have not been seen for 7 years and people now go to Kotzebue to get it. Crab are not in the lagoon but a target further offshore. Offshore there is also a focus on bowheads, walrus, and seals (spotted and bearded).

NMFS replied that they also do not see crab movement inside the lagoon as an issue, as larval dispersal is along-shore on the outside of the barrier island are few or no crab are likely to settle in the lagoon if they were to be entrained.

To DOT&PF's question about the large sizes of the char in the lagoon and NMFS's inquiry on residence fish, RS answered that most fish appear to overwinter in the ocean, including trout and sheefish, and come back to the lagoon in the Spring.

Stantec inquired about the existence of any federal or state guidelines for minimum/maximum flow velocities that need to be considered in the lagoon crossing design from a biological or other perspective. NMFS noted that there are no guidelines to this effect but that a reasonable measure would be those that allow for continued fish passage. DOT&PF noted that there are some velocity requirements used for fish passage through culverts in rivers and we could ensure we meet at least those.

NMFS noted that, from a hydrological perspective, assuming fish and seals can pass, they would be most worried about sediment transport inside the lagoon that could clog up any culverts. The lagoon crossing will have to be built such that general water and sediment movement regimes are maintained. In the absence of guidelines, they also mentioned that in general, in terms of fish and seal movement, free spans are better, and that having bottom structures in culverts is better than not. They provided lessons learned from the ship creek crossings, where it became clear that depending on culverts for marine mammal passage is not a good idea (seals appear to avoid culverts), but that if some portion of the crossing is free span, marine mammals seem to do ok. On the topic of culvert size, NMFS further brought up the possibility of half pipe culverts, that, if needed, can be up to 30ft wide and elliptical in shape.

ACTION: NMFS noted that it would be good to examine the historical movement of the Wulik channel, i.e. is there an indication that the main channel location has changed over the last 50 years to the point where it may impact the location of the crossing or other main hydrological considerations?

Closure: NMFS thanked all attendees for their time and their effort to involve NMFS this early in the process. They closed by stating that they have their supervisors (Gretchen Harrington) support to keep engaging with us in the project and that the team should feel free to contact Sean directly if there are further questions regarding hydrological criteria.

Kivalina Evacuation and School Site Access Road Project Update
Project Number: 0002384/NFHWY00162
OHA/NPS Section 106 Meeting
Stantec Office, Anchorage, AK
July 10, 2017

ATTENDEES

State of Alaska Office of History and Archaeology: Shina Duvall, Mark Rollins; **National Park Service**: Rhea Hood; **NANA**: Jeff Nelson; **DOT&PF**: Paul Karczmarczyk, Jonathan Hutchinson, Tom Gamza, Amy Sumner; **Remote Solutions**: John Baker; **Stantec**: Sara Lindberg, Ross Smith.

DOT&PF provided a project overview and update on the preliminary design progress, project components, EA alternative being evaluated, and the plan for completing geotechnical drilling at material sites. Stantec provided a summary of the cultural resource survey work completed to date, and the level of coverage for the project components being evaluated in the EA. The team discussed an approach for completing a separate Section 106 process for the geotechnical drilling program for the Proposed project.

The team discussed potential findings of effects outcomes and the tradeoff between completing more cultural resource survey work now, or completing a phased approach Memorandum of Agreement (MOA) now, so the Section 106 process could be completed and the EA could move forward. OHA said that there is nothing precluding them from continuing to consult on Section 106 during or after the EA is complete, but DOT&PF expressed the anticipation that FHWA would likely require the Section 106 process be completed before the Draft EA was released for public comment.

The team agreed that if more field work was warranted, it would be better to complete that quickly now, rather than hold off and go through an MOA process. Tom Gamza will review the survey work completed to date with Ross Smith and make a determination whether additional field work is warranted prior to Findings, and follow up with OHA and NPS.

TAKE AWAY NEAR TERM TASKS

- **TASK:** DOT&PF, NPS, and OHA will meet to discuss the extent of field work needed, if any, and articulate a path forward before August 1st.
- **TASK:** Tom to send NPS and OHA the revised Cultural Resources report for review and comment.
- **TASK:** Jeff Nelson, NANA should be appraised of all helicopter work on NANA lands planned for the fall. Paul will coordinate locally in Kotzebue for any Title 9 permitting requirements for the survey efforts.
- **TASK**: Rhea will coordinate internally at the Park Service on the 4(f) call and possible *De Minimis* finding.

TAKE AWAY LONG TERM TASKS

- **TASK**: Agency site visits are schedule for mid-August. Team to check on availability and travel authorizations.

State of Alaska
DOT&PF
Kivalina Evacuation Road Project Meeting
July 25th, 2017
US Army Corps of Engineers: Jeremy Grauf
DOT: Paul Karczmarczyk, Jonathan Hutchinson (via phone)
Remote Solutions: John Baker (via phone)
Stantec: Sara Lindberg, Ryan Cooper

TAKE AWAY NEAR TERM TASKS

- **TASK:** Collect more information on K-Hill and surrounding area
- **TASK:** Provide USACE with wetland report and GIS shapefiles

General Notes:

- Presentation on methodology of wetland verification report. Objective is to update the Northwest Arctic Borough desktop wetlands mapping using a variety of field reports. These reports include LIDAR, geotechnical logs, cultural studies, and field reconnaissance. The Northwest Arctic Borough desktop study was updated with more accurate boundaries and classifications from the field data.
- 11 Full wetland datasheets were evaluated, and 31 photo points. Additional points are planned for fall 2017.
- Almost all of the study area is wetlands or Waters of the U.S.
- **Functions**: Most of the area is undisturbed and has naturally functioning wetlands. Following the Northwest Arctic Borough wetlands report, Saturated wetlands were evaluated as Class II, and all other wetter wetlands (seasonally flooded, permanently flooded, etc) were evaluated as Class I. Waters of the United States and ponds were evaluated as Class I+.
    - During consultation with agencies, the USFWS identified that high shrubs provided important bird habitat. Our method delineated these (identified in Viereck classification as 'Closed Low Scrub') and raised their functional value one class.
- During discussion, the methodology was found to be reasonable. There is little question most of the area is wetlands.
    - Most interest focused on the area surrounding K-Hill and the upland/wetlands status. Points to be taken in 2017 will help resolve this status.
- Discussion also included the proposed bridge with 12-15 ft structural plate pipes across the Kivalina Lagoon on the causeway.
- Bill Morris, an ex-Alaska Department of Fish and Game fisheries biologist for the Wulik River, is on the Stantec team. He would be a good person for Jeremy to meet.

State of Alaska
DOT&PF and DNR
Kivalina Evacuation and School Site Access Road Project Update

August 8th, 2017

Northern Region Division of Mining, Land and Water State: Jeanie Proulx, jeanne.proulx@alaska.gov; Dianna Leinberger, dianna.leinberger@alaska.gov; Julie Smith, Julie.smith@alaska.gov; AJ Wait, aj.wait@alaska.gov

DOT: Ryan Anderson, Paul Karczmarczyk, Brett Nelson, Sara Schacher, Addison Young, Scott Maybrier, Jonathan Hutchinson

Remote Solutions: John Baker, Katherine Keith

Stantec: Sara Lindberg

TAKE AWAY NEAR TERM TASKS

- **TASK:** Send AJ maps from EA for project review
- **TASK:** Send all public information and meeting notes to Julie Smith so they can understand public concerns. Send the EA document alternatives chapter to both Julie and Dianna for review
- **TASK:** Get a surveyor out there and ask for an ordinary high-water level mark on the gravel bar. Do a preliminary rough estimate of the ordinary high-water using imagery.
- **TASK**: Jonathan, move the material site boundary over away from the unvegetated gravel bar and into the vegetative buffer.

TAKE AWAY LONG TERM TASKS

- **TASK**: Submit easement applications
- **TASK**: Material sales agreement
- **TASK**: Mining Reclamation Plan

General Notes:

- The State has ownership of the submerged lands within the study area, but changes in water courses over time can call ownership into question. However, review of historic aerial imagery shows the Wulik river and relic sloughs and ponds have remained stable over time. Team to send EA maps to AJ Wait for review.
- DNR considers the Wulik and the Kivalina river as navigable. NANA has asked for these determinations.
- Ownership considers length of tidal influence up the Wulik. US surveys shows split ownership lots about 10 miles up the river. So chances are the Wulik is navigable within the study area.
- For easement purposes, AJ can review existing documents and aerial imagery. DNR jurisdiction starts in the lagoon below the mean high tide line. Landowners will permit anything above high tide.
- DNR requests the team to coordinate actively before permit application is submitted so that issues can be resolved for ROW and material sale application (for areas below ordinary high on state land).

- What channels matter for DNR? Active channels, or Relic channels that were active at the time of statehood which were submerged at the time of statehood.
- Material Sites:
    - State submerged land with different uplands land owners can be problematic within the same material site.
    - Better if DOT gets the material site designated and material sales agreement going before the contractor gets on board because there won't be enough time for the contractor to do this on a contractor furnished site that has not already been designated.
    - DOT is considering an alternative procurement method (CMGC) during design which would allow a contractor to come on board early. This would help with material site sales agreement. Another benefit could be management and a better understanding environmental constraints by getting CMGC.
    - Material sites are driven by a best interest process.
- In the EA, discuss why other sites were not considered or dismissed from evaluation. Julie could help us by reviewing the draft EA, which would help them integrate the alternatives evaluation into their decision and can help expedite the process.
- Would be helpful to have the State DNR come to meetings with federal agencies. That will help DNR navigate the needs of the federal agencies and alleviate conflicting priorities and potential discord down the line.
- Mining and Rec Plans will need owner approval. The contractor typically submits the Plan to DNR and will need to show approval.
- Jonathan-what if we do need to go into the Wulik? Bill Morris has been working with us on the plan. DNR would defer to other agencies when you start connecting to submerged lands.
- Julie stated that there will be pit capture if you are digging a hole next to the river.
- AJ request: Show the existing ROW lines are on the scoping documents.
- Has the Coast Guard been approached? Jonathan stated they have been scoped as it is on tidal water, we are waiting for something more concrete. Do we know what Coast Guard wants for traffic? They might have odd height requirements despite not commenting. Jonathan stated that the current plan is for a single span steal bridge with 12-foot clearance over 110-ft wide channel from the mean high tide level.
- Regarding funding, the team is considering many sources, including TTP funds, DOT Call for Projects in the fall, IRT Program, and FLAP funds.
- After EA, then begin permitting process but having DNR be a part of the EA team will greatly expedite the permitting/designation process
- Advise for the KVL Team in the permitting effort: Julie prefers a coordinated permit approach to happen near simultaneously for more transparent dialogue. AJ would like to be coordinated on the requirements of the permit.
- Ryan suggested to try for a post-application meeting to help clear up any concerns.

State of Alaska

DOT&PF

Kivalina Evacuation Road Project Meeting

August 9th, 2017

National Marine Fisheries Service: Greg Balogh, Barbara Mahoney, Bonnie Eslay

DOT: Paul Karczmarczyk, Jonathan Hutchinson, Sarah Schacher

Stantec: Sara Lindberg, Francis Wiese, Rowenna Gryba (via phone)

TAKE AWAY NEAR TERM TASKS

- **TASK:** Coordinate with locals to get a rough estimated of the number of marine mammals which may occupy the area.
- **TASK:** Develop an estimate for appropriate marine mammal exclusion zone during construction.

TAKE AWAY LONG TERM TASKS

- **TASK**: DOT&PF needs to determine if takes may occur. If not, a Letter of Concurrence (LOC) is appropriate. If takes may occur, an Incidental Harassment Authorization (IHA) should be obtained.

General Notes:

- The project was presented, with a focus on the lagoon crossing components and potential impacts to marine mammals. Discussion focused on design elements of the lagoon crossing, and potential needs for pile driving. Sheetpile vs earthen abutments were compared.
- Material sources are being developed locally to reduce barging impacts.
- 500-year storm surge event is what is currently being used for design. Water depth of lagoon: 3.5-4 ft in channel with rest of lagoon very shallow (2 ft). Tide is 0.5 feet.
    - Mean High Water to bottom of girders is currently plan at 12 ft.
- Hunting from causeway could become an issue, but will assume no illegal hunting.
- Noise impacts can be mitigated by conducting activities in the fall/winter (January or February would be best). Getting pile driving activities completed as quickly as possible would be best for marine mammals (as opposed to pauses in between activities).
- Modeling of noise impacts is not required. Practical spreading loss model does not work. Noise would not be propagated outside the island, and shallow water noise attenuates faster. Recommend just to state a distance rather than go through the effort to model.
- If takes are expected, an IHA would take 8-10 months to process. This is likely the best course if the project believes marine mammals will be located near the project. Probably start the process in October prior to the next year's construction. Most of the information is likely to be in the EA, but additional information may be needed.
- If takes are not expected, a LOC would be much faster. This is likely the best course of action if it is believed that marine mammals will not be located near the project. A Section 7 informal consultation letter could serve to initiate this process.
- Activities would need to stop, and not restart, until a marine mammal present leaves or is not seen again for 30 minutes.
- Number estimates for marine mammal individuals would be difficult. A systematic survey is not needed, just a justified estimate. Recommend using local knowledge.

CEPOA-RD-NN

Wetland Delineation Report

SUBJECT: Kivalina Evacuation Route Wetland Delineation

SUMMARY: A delineation was conducted on the Kisimigiuqtuq Hill. Field work was conducted on August 15, 2017. Three sample points were taken. Two that were determined to be wetlands, and one determined to be upland. There was a visible vegetative shift from wetlands to uplands (see enclosure 1 figure 1 of 10), and the upland soil consisted of shallow (6 inch) organic layer with gravel and coble layer below. Standing water and flowing water was observed. There is no climate data for Kivalina, however, the climate data for Kotzebue indicates that July, August, and September are the wet months within the region. According to a Direct Antecedent Rainfall Evaluation Method analysis, rainfall during the field work was during a normal rainfall year (see enclosure 2 page 1).

LOCATION: Kisimigiuqtuq Hill which is approximately 6.77 miles northeast of Kivalina, Alaska.

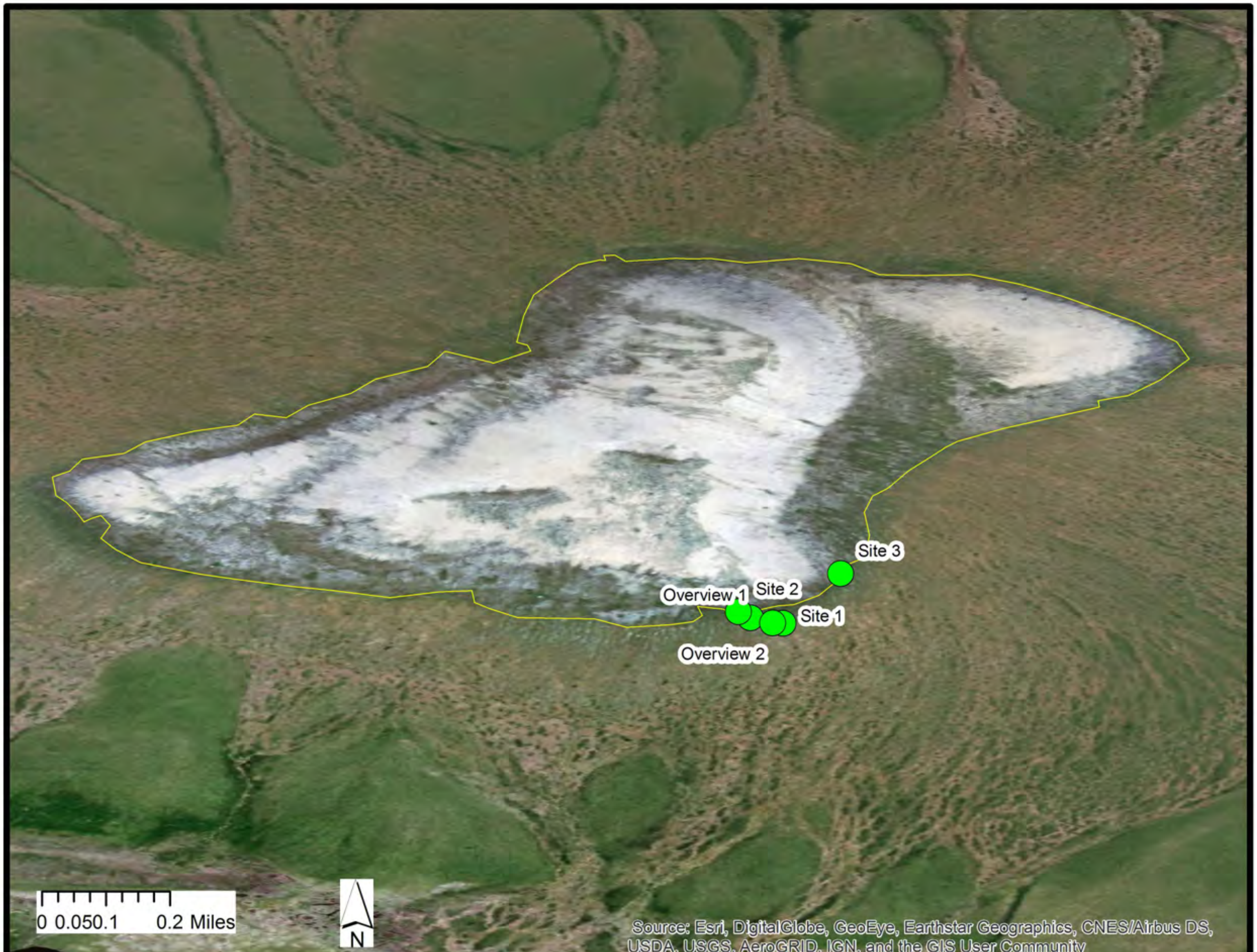
Latitude: 67.808282º N., **Longitude:** 164.385975º W.

SOURCE (S):
Aerial Photographs: Digital Globe (7-19-2016)
Soil Survey Maps: s9293
USGS Maps: NOATAK D-5
Other: See enclosure 1 (Wetland Delineation maps)

DATE: 8-31-2017

Jeremy Grauf
Project Manager

POA-2012-124
Wetland Delineation Overview Map



Legend

- Photo Points
- Upland Outline

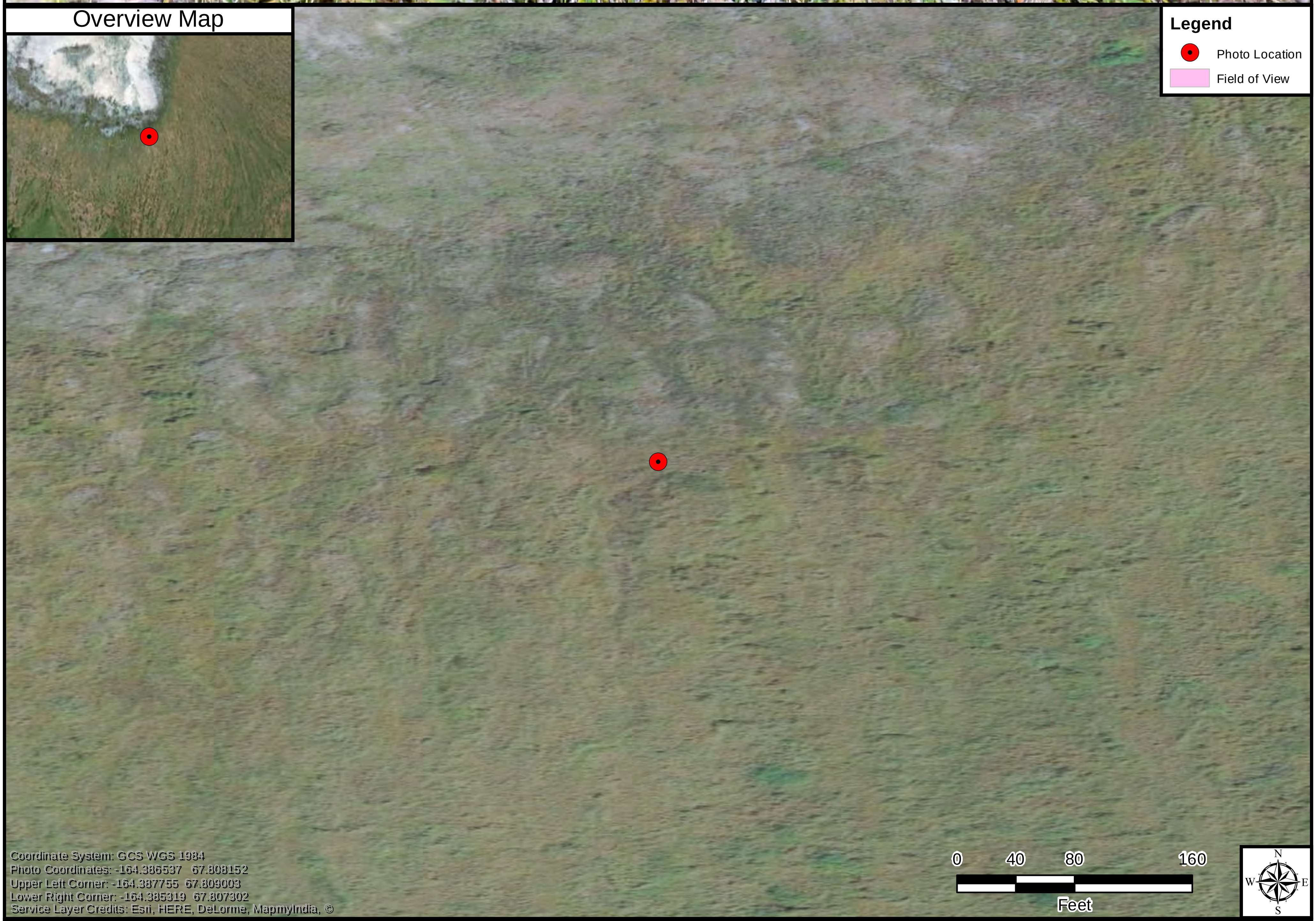
POA-2012-124, Kivalina Lagoon, Kivalina Evacuation Route Project

Date: 8-30-2017

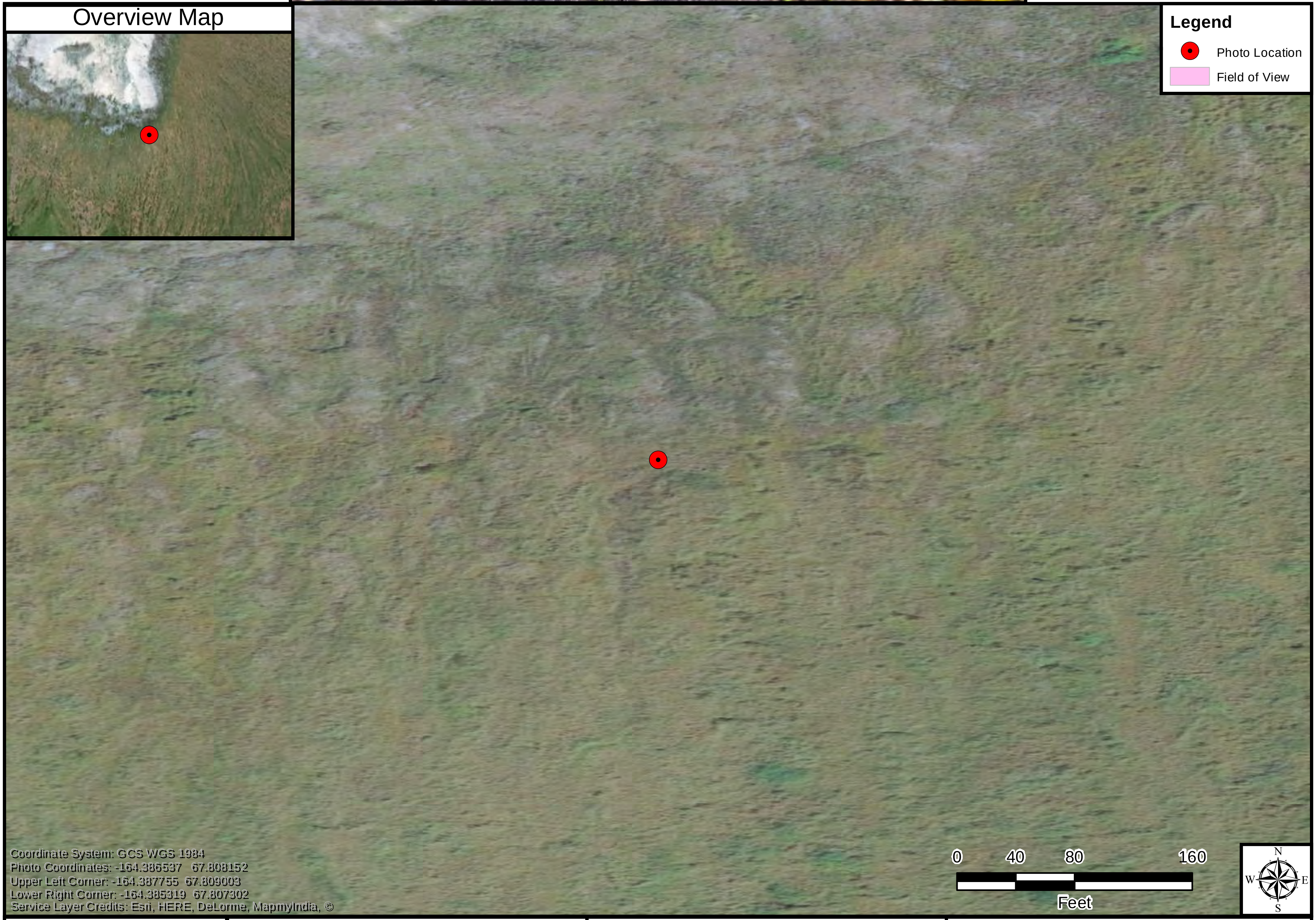
Notes: K-Hill upland delineation. Field data was collected 8-15-2017.
Imagery Date: 7-19-2016

For planning purposes only.

Figure: 1 of 10



	Mapped Photo Log for Kivalina Evacuation Route Wetland Delineation POA-2012-124 Page 2 of 10	Description: Site 1 Appendix E Page 53	Photographed by Jeremy Grauf on 8/15/2017 at 3:49:13 PM AKDT Camera: samsung SM-G950U Location Source: Camera's internal GPS Heading Source: Map generated on 8/30/2017 using the Photo Log Toolbar, written by Jason C. Deters

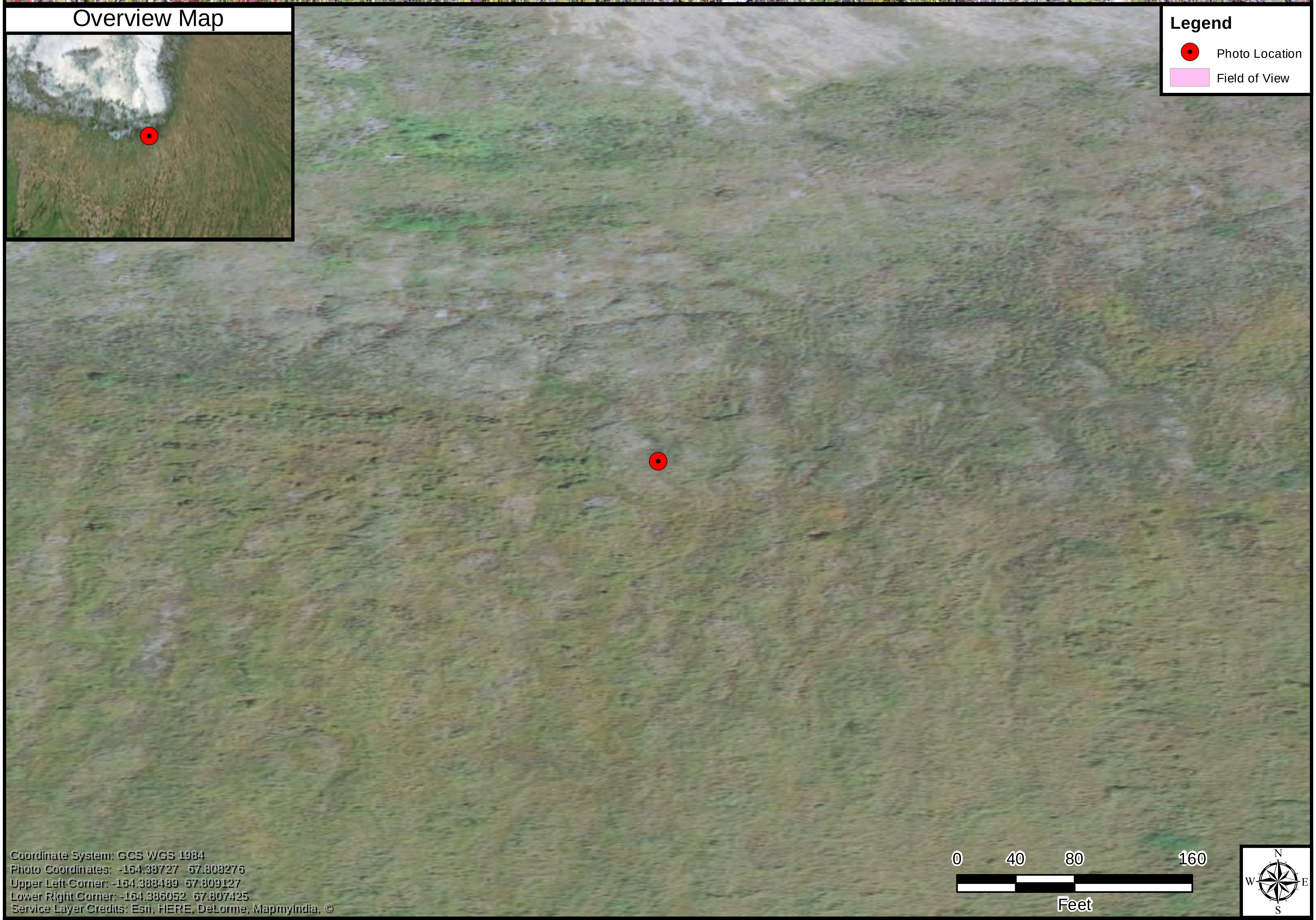


Mapped Photo Log
for Kivalina Evacuation Route
Wetland Delineation
POA-2012-124

Description:

Site 1

Photographed by Jeremy Grauf
on 8/15/2017 at 3:49:13 PM AKDT
Camera: samsung SM-G950U
Location Source: Camera's internal GPS
Heading Source:
Map generated on 8/30/2017 using the
Photo Log Toolbar, written by Jason C. Deters



Mapped Photo Log
for Kivalina Evacuation Route
Wetland Delineation
POA-2012-124

Description:

Overview 1

Photographed by Jeremy Grauf
on 8/15/2017 at 3:51:37 PM AKDT
Camera: samsung SM-G950U
Location Source: Camera's internal GPS
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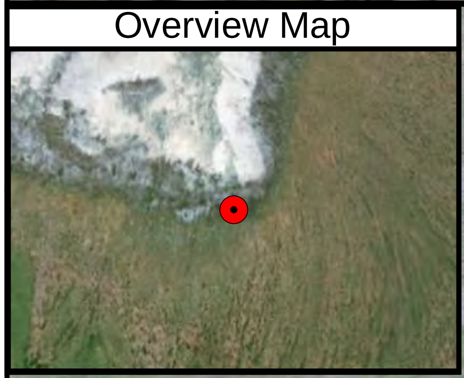

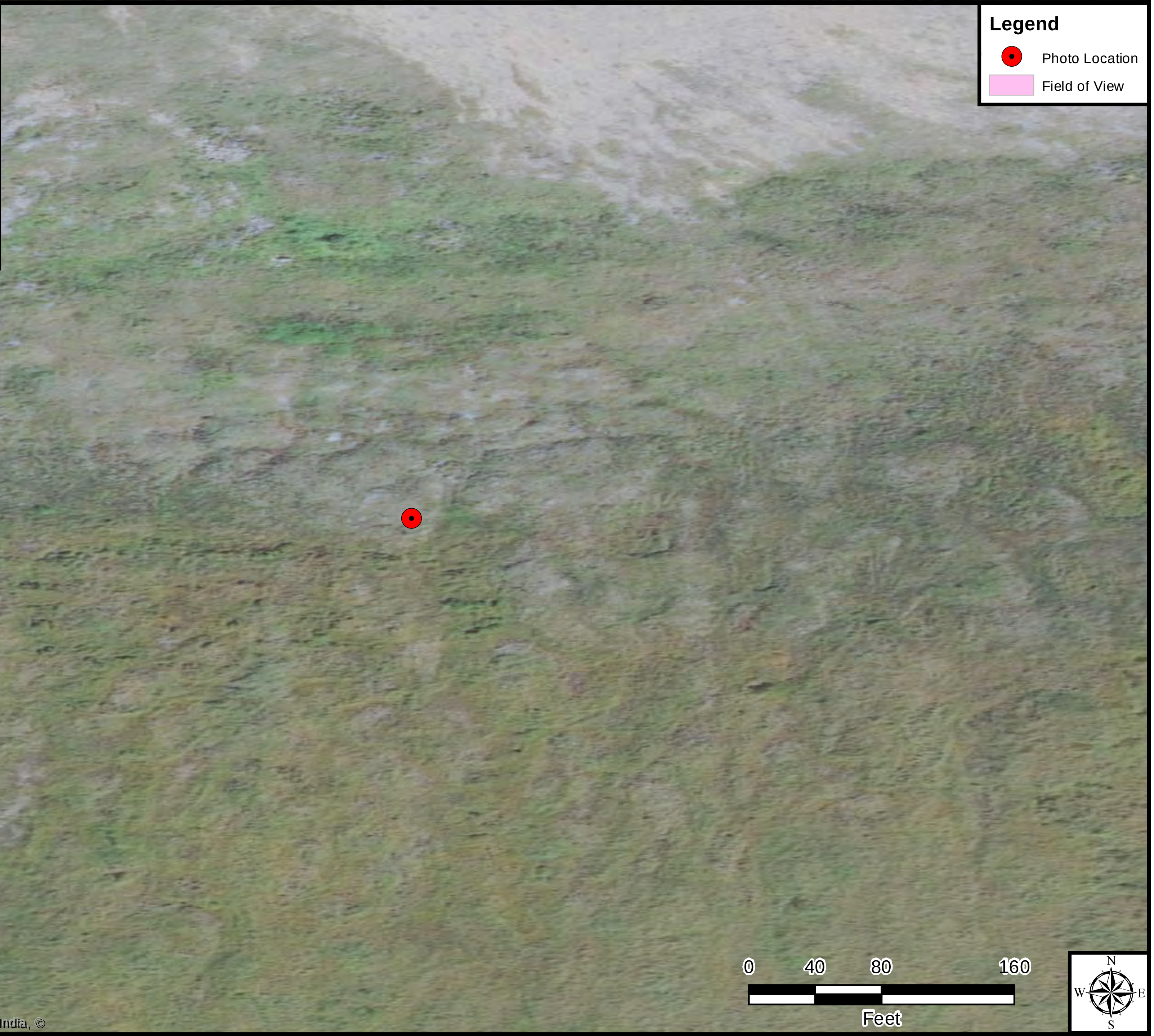

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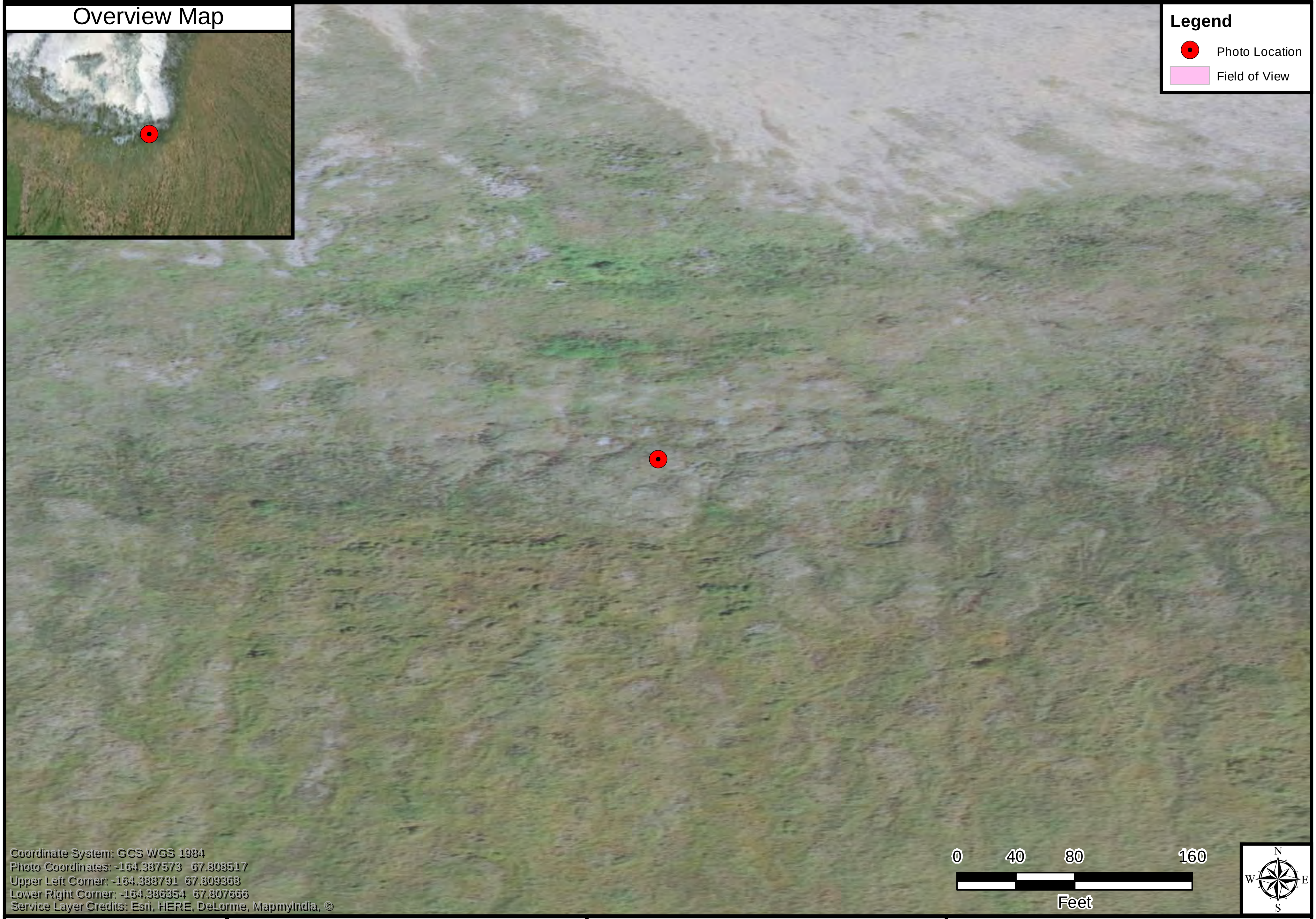
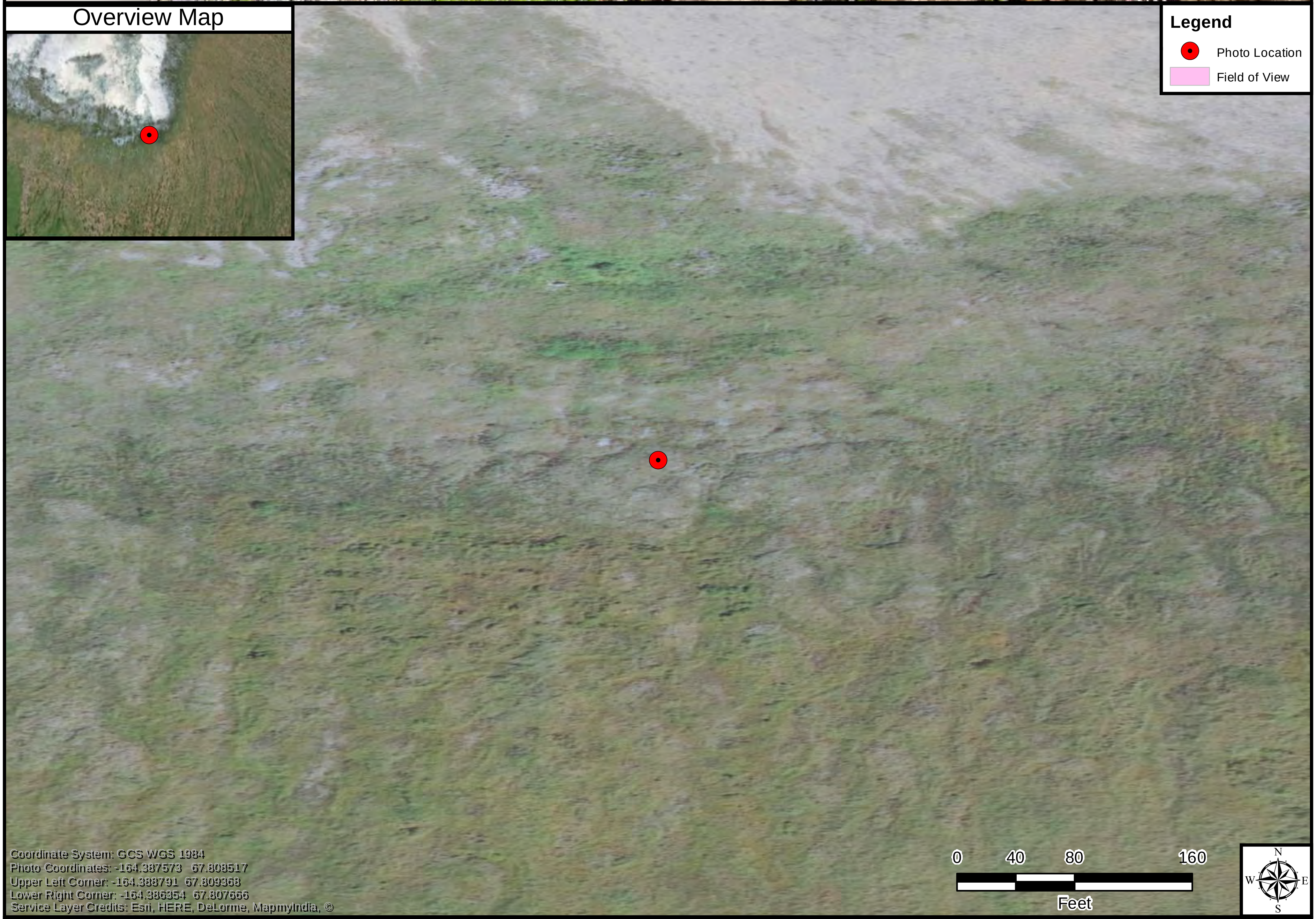


Mapped Photo Log
for Kivalina Evacuation Route
Wetland Delineation
POA-2012-124

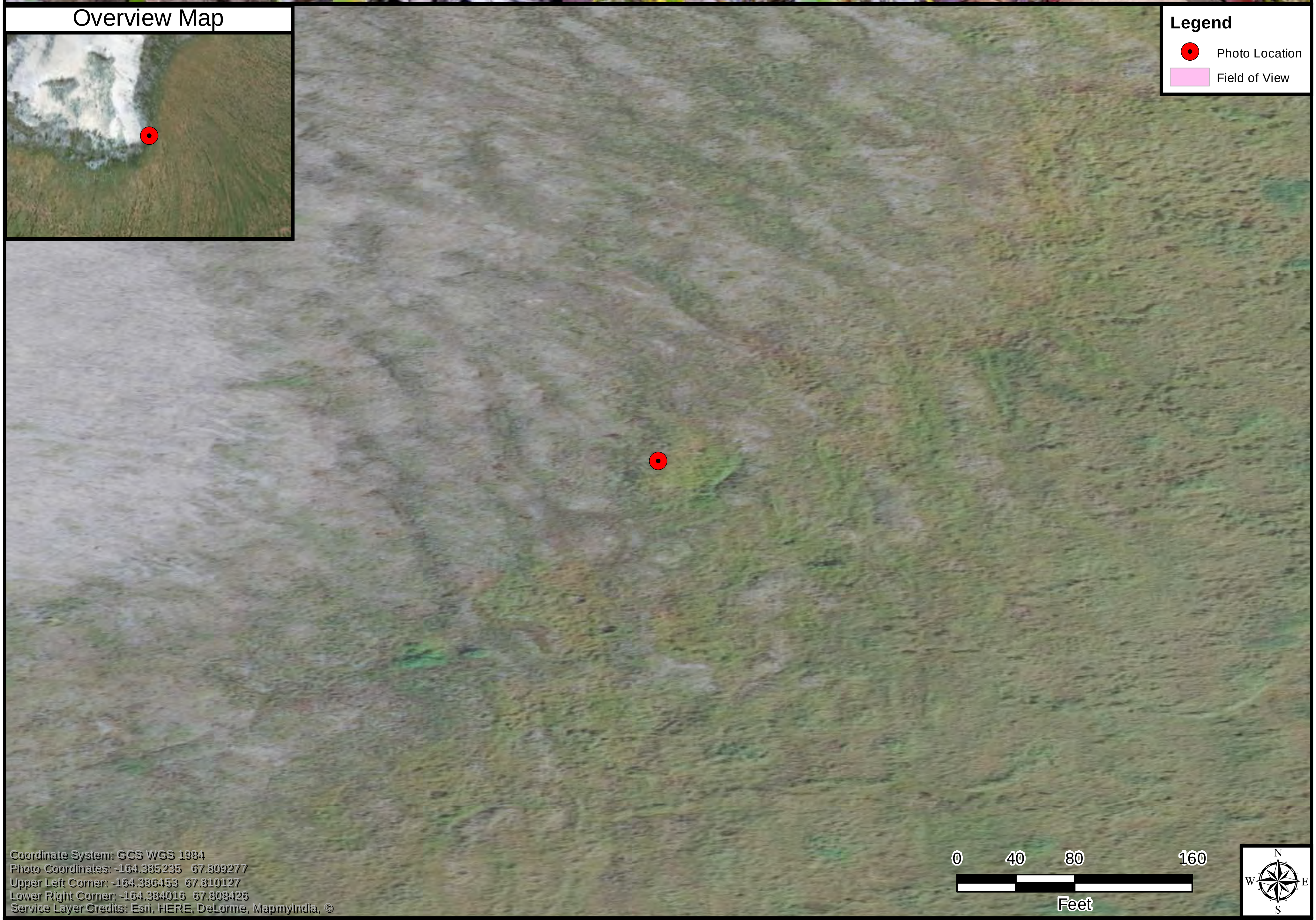
Description:

Site 2

Photographed by Jeremy Grauf
on 8/15/2017 at 3:56:23 PM AKDT
Camera: samsung SM-G950U
Location Source: Camera's internal GPS
Heading Source:
Map generated on 8/30/2017 using the
Photo Log Toolbar, written by Jason C. Deters



	Mapped Photo Log for Kivalina Evacuation Route Wetland Delineation POA-2012-124 Page 7 of 10	Description: Site 2 Appendix E Page 58	Photographed by Jeremy Grauf on 8/15/2017 at 3:56:23 PM AKDT Camera: samsung SM-G950U Location Source: Camera's internal GPS Heading Source: Map generated on 8/30/2017 using the Photo Log Toolbar, written by Jason C. Deters



Mapped Photo Log
for Kivalina Evacuation Route
Wetland Delineation
POA-2012-124

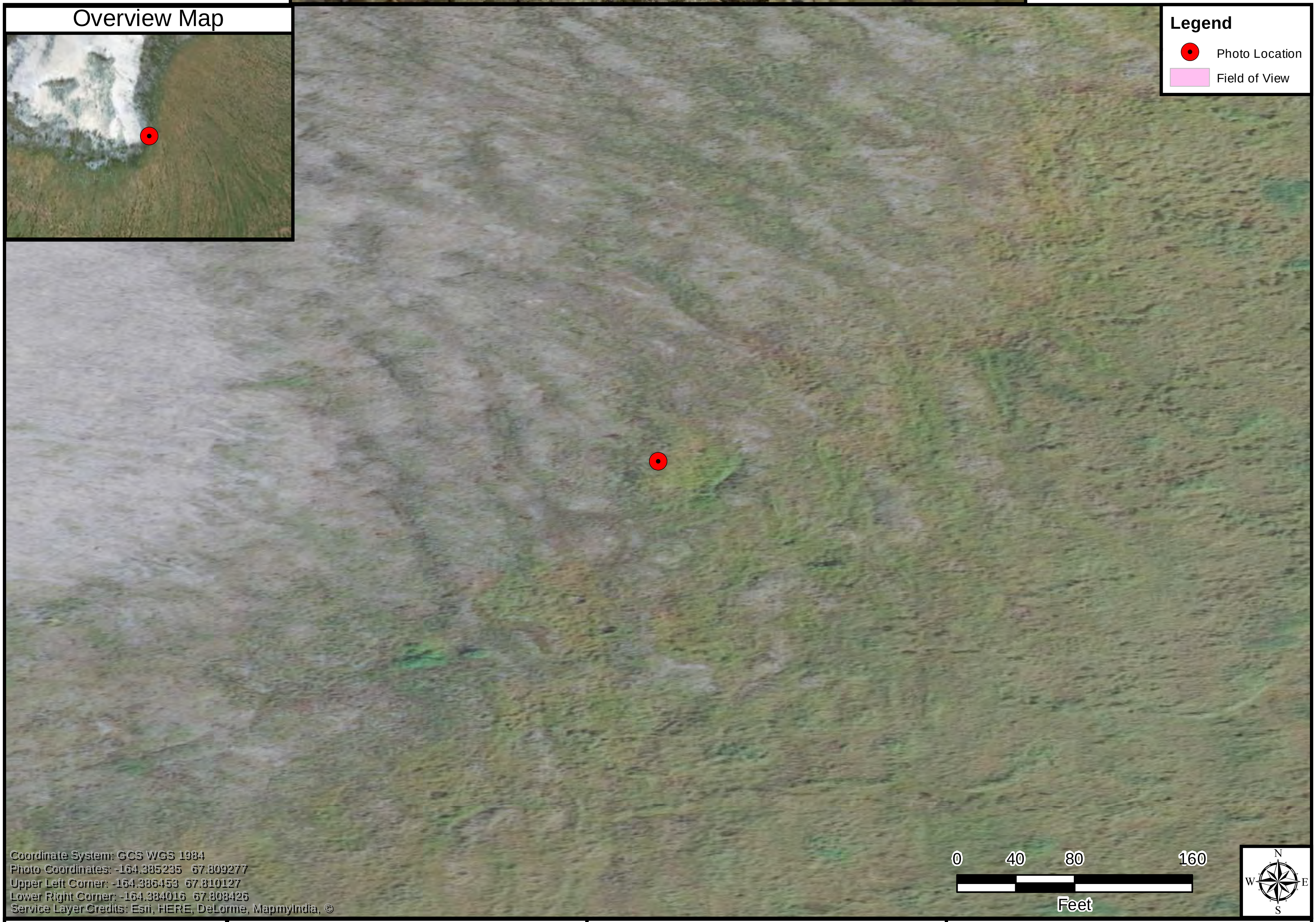
Page 8 of 10

Description:

Site 3

Appendix E Page 59

Photographed by Jeremy Grauf
on 8/15/2017 at 4:21:55 PM AKDT
Camera: samsung SM-G950U
Location Source: Camera's internal GPS
Heading Source:
Map generated on 8/30/2017 using the
Photo Log Toolbar, written by Jason C. Deters



Mapped Photo Log
for Kivalina Evacuation Route
Wetland Delineation
POA-2012-124

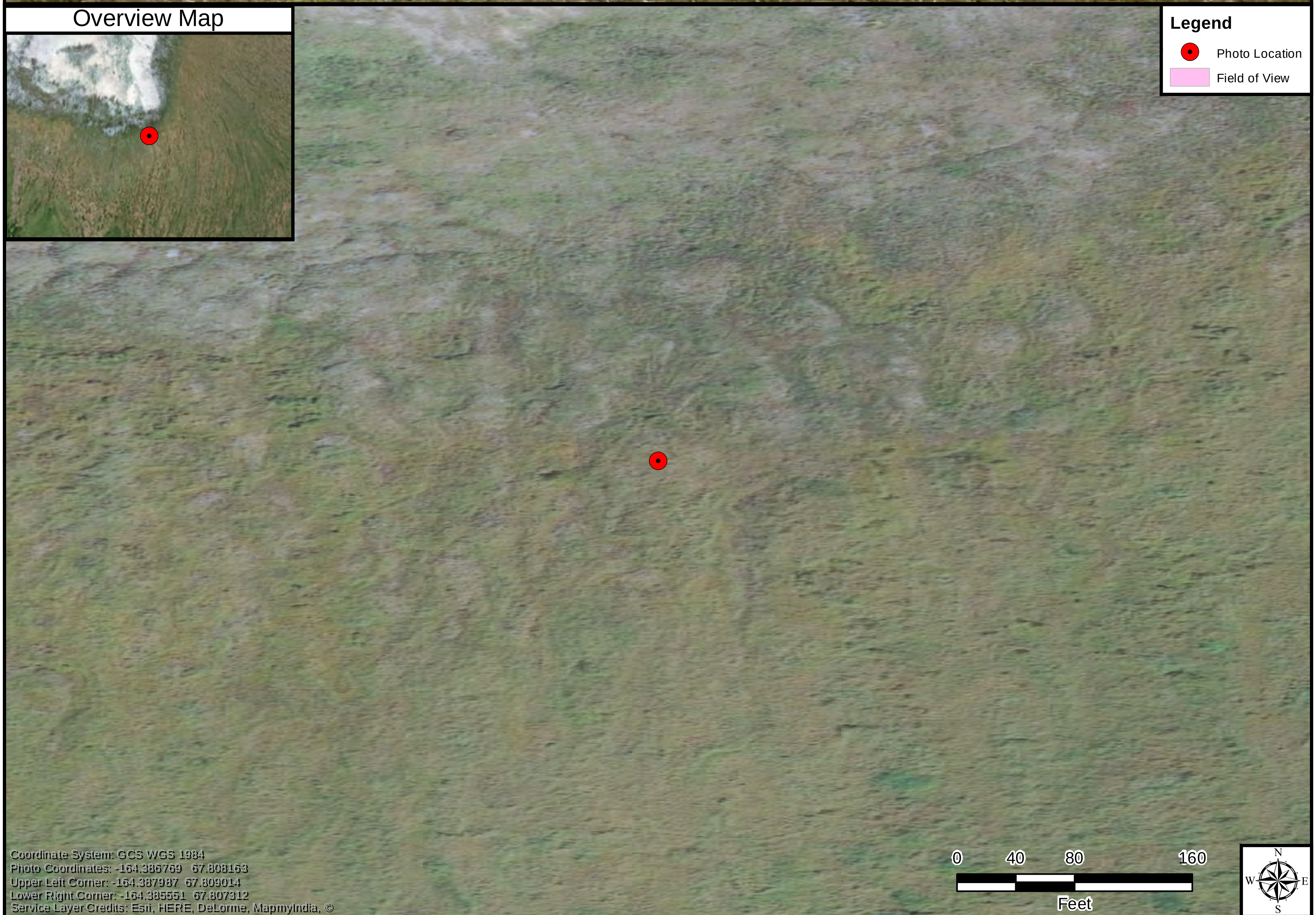
Page 9 of 10

Description:

Site 3

Appendix E Page 60

Photographed by Jeremy Grauf
on 8/15/2017 at 4:21:55 PM AKDT
Camera: samsung SM-G950U
Location Source: Camera's internal GPS
Heading Source:
Map generated on 8/30/2017 using the
Photo Log Toolbar, written by Jason C. Deters



Mapped Photo Log for Kivalina Evacuation Route Wetland Delineation POA-2012-124

Page 10 of 10

Description:

Overview 2

Photographed by Jeremy Grauf
on 8/15/2017 at 5:14:59 PM AKDT
Camera: samsung SM-G950U
Location Source: Camera's internal GPS
Heading Source:
Map generated on 8/30/2017 using the
Photo Log Toolbar, written by Jason C. Deters

DAREM analysis demonstrating rainfall normality. The example examines rainfall normality in Kotzebue during August 2017 by evaluating rainfall amounts during the June, July, and August.

Prior Month	Name	WETS 30th percent	WETS 70th percent	Rainfall Amount	Condition	Value	Weight	Score	Result
3rd	Jun	0.27	0.7	0.2	Drier	1	1	1	
2nd	Jul	0.72	1.74	2.63	Wetter	3	2	6	
Most recent	Aug	1.07	2.44	1.55	Normal	2	3	6	
Month examined	April						Total	13	Normal

WETS Station: KOTZEBUE RALPH WEIN MEM AP, AK

Requested years: 1971 - 2000

Month	Temperature (°F)			Precipitation (inches)				
	Avg daily max	Avg daily min	Avg daily mean	Avg	30% chance will have		Avg number of days with 0.10 inch or more	Average total snowfall
					less than	more than		
Jan	4.5	-8.7	-2.1	0.55	0.28	0.67	2	7.8
Feb	4.0	-9.9	-3.0	0.42	0.21	0.51	1	5.1
Mar	8.4	-7.8	0.3	0.39	0.17	0.46	1	5.2
Apr	20.6	3.3	12.0	0.44	0.18	0.53	1	4.9
May	38.2	25.3	31.8	0.33	0.14	0.38	1	1.3
Jun	50.7	38.8	44.7	0.57	0.27	0.70	2	0.0
Jul	59.6	49.4	54.5	1.43	0.72	1.74	4	0.0
Aug	56.5	47.4	51.9	2.00	1.07	2.44	6	0.0
Sep	46.5	37.2	41.9	1.70	1.16	2.03	5	1.0
Oct	27.8	18.8	23.3	0.95	0.54	1.15	3	6.9
Nov	13.6	3.2	8.4	0.71	0.34	0.87	3	8.7
Dec	6.4	-6.5	0.0	0.60	0.43	0.71	2	8.8
Annual:					8.70	11.19		
Average	28.1	15.9	22.0	-	-	-	-	-
Total	-	-	-	10.08			32	49.8

GROWING SEASON DATES

Requested years of data:	1971 - 2000		
Years with missing data:	24 deg = 0	28 deg = 0	32 deg = 0
Years with no occurrence:	24 deg = 0	28 deg = 0	32 deg = 0
Data years used:	24 deg = 30	28 deg = 30	32 deg = 30

Monthly Total Precipitation for KOTZEBUE RALPH WEIN MEM AP, AK

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2016	0.38	0.34	0.14	0.60	0.65	0.25	1.44	1.92	2.02	0.30	0.11	0.75	8.90
2017	0.55	1.04	0.03	0.05	0.41	0.20	2.63	1.55	M	M	M	M	M
Mean	0.47	0.69	0.09	0.33	0.53	0.23	2.04	1.74	2.02	0.30	0.11	0.75	8.90

TRIP REPORT

State of Alaska
Department of Fish and Game

Field Date(s): August 15, 2017

Location(s): **Kivalina**

Objective(s): Assess fish passage needs for the proposed Kivalina evacuation and school access road project.

Participant(s): Audra Brase

Weather: Cloudy, breezy, temps in low 60s

Access: R-44 helicopter

I flew from Fairbanks to Kotzebue on Monday August 14. In Kotzebue I met with contractors Sara Lindberg (StanTec) and Bill Morris (Owl Ridge). We had dinner at the hotel (Nullagvik Hotel, new and very nice) and discussed the plan for the next day's travel to Kivalina. We would catch the 11am flight to Kivalina and meet ADOT&PF and Army Corps of Engineers (USACE) staff at the noon public meeting. The R-44 Helicopter would be arriving from Fairbanks at approximately 1:30pm.

Tuesday morning Bill, Sara and I met John Baker and Katherine Keith (of Remote Solutions) at their office in Kotzebue, they helped us acquire bear spray and PFDs. We looked at maps of the project area (Appendix A) and discussed the causeway crossing. A bridge is being proposed on the side nearest the village, two large (12-15' diameter) culverts will be placed on the mainland side and multiple overflow culverts will be placed along the remainder of the causeway (all this detail will be in the EA). We also discussed the potential material sites, and it sounds like DOT would prefer if most of the material could come from K-Hill to avoid impacting active channels. DOT will need approximately 1 million cubic yards of gravel for this road and causeway.

We arrived in Kivalina about noon (Figure 1) and attended the public meeting for about 1.5 hours. Paul Karczmarczyk (DOT) and John Baker did the majority of the speaking about the project. I spoke with Jeremy Grauf (USACE) about their thoughts for mitigation. They are open to brushy areas (bird habitat) being used as mitigation as bird habitat is hard to come by in this part of Alaska. I talked to him about the larger overwintering lakes that could be developed if the material sites near the old relic channel are utilized (Relic Channel Source 1 and/or 2).

The helicopter arrived about 1:45pm and Bill Morris and I were able to go upriver soon afterwards. We flew both proposed road routes, walked around the proposed Wulik River Bar Source 1, and flew over the other proposed material sites (Figures 2-9, photo locations may be cross referenced on Appendix A). We paid particular attention to the road crossing sites that had been identified as water crossings and were thought may require fish passage. The majority of these crossings were just wet tundra, and will not require fish passage, but Figure 4 & 8 illustrate two locations which may seasonally contain fish.

Most of the lakes appeared to be very shallow and no fish were observed either rising or swimming. Survey conditions were fair with overcast skies & light wind.

The proposed Wulik River Bar material site has a low gradient and obviously floods during moderately high water (Figure 3). Additionally our local bear guard was familiar with the particular location and said it was a common place to fish through the ice in November and December before the ice is safe enough to go further upriver for the bigger fish (Dolly Varden).

After completing our helicopter survey Bill Morris and I flew back to Kotzebue and caught the evening flight back to Fairbanks via Anchorage.

Figure 1. Looking towards Kivalina from the Chukchi Sea side of the barrier island, August 15, 2017.

Figure 2. Spawned out pink salmon in Wulik River, near proposed material site: “Wulik River Bar Source 1”.

Figure 3. Slough/ overflow channel of the Wulik River near middle of proposed material site: “Wulik River Bar Source 1”.

Figure 4. Road crossing point on proposed “Southern Route” which may require allowance for fish passage.

Figure 5. Kisimigiuqtuq Hill (K-Hill) – proposed material site, road teminus and location of school.

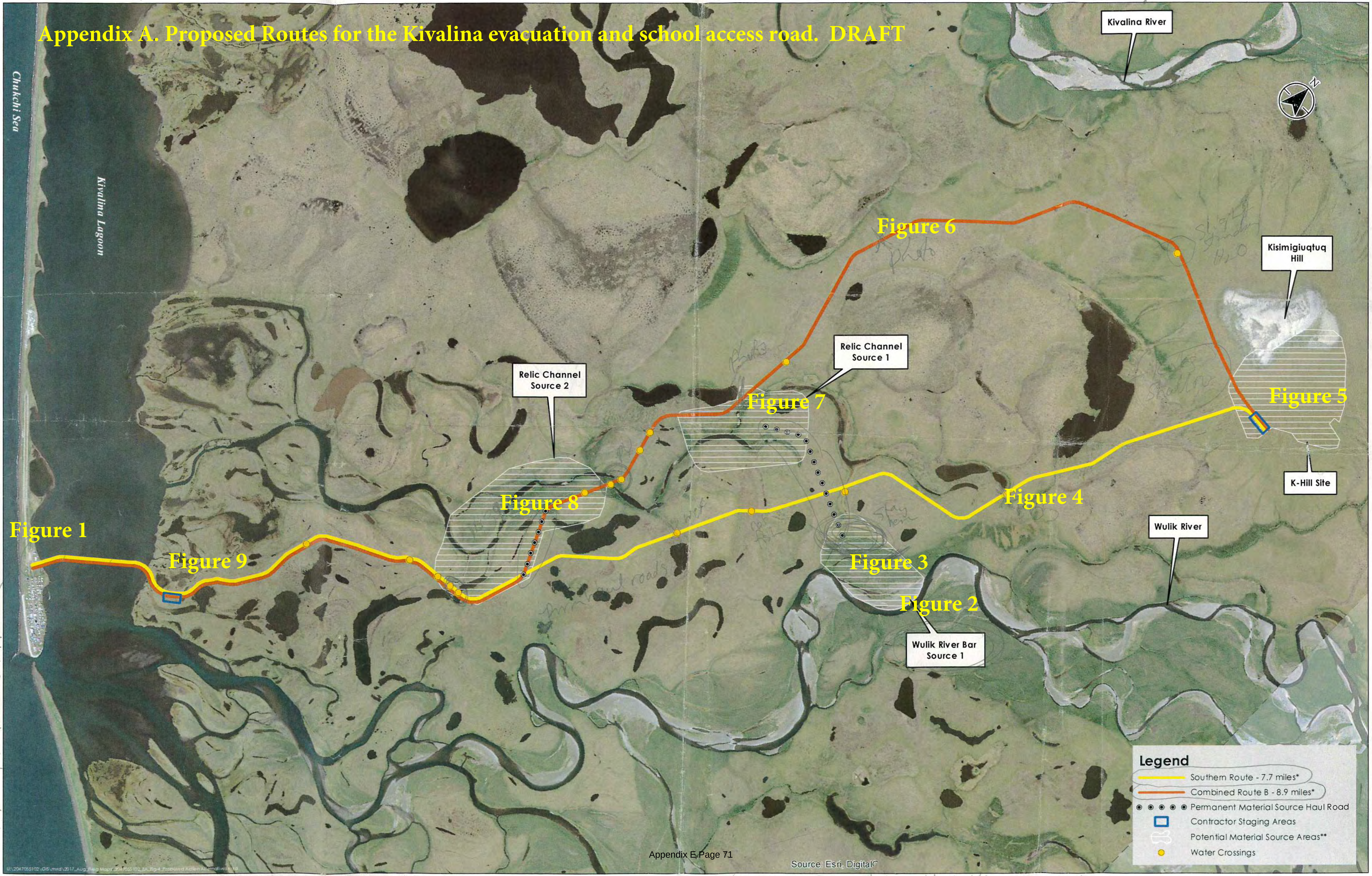
Figure 6. Upland point on proposed “Combined Route”.

Figure 7. Lakes near proposed material site: “Relic Channel Source 1”.

Figure 8. Relic channel/ lakes near proposed material site: “Relic Channel Source 2”, and near proposed road crossing of “Combined Route” that may require allowance for fish passage.

Figure 9. Looking from the mainland, across Kivalina Lagoon towards the barrier island where the proposed 3200’ causeway/ bridge would be located.

2016 images AUDRA



DOT would like to avoid Wulik Material Site

Arrived in Kivalina by way of Kotzebue on Wednesday August, 16th on Bering Air flight 681 at 12:00PM with Rhea Hood, Archaeologist, National Register of Historic Places Program, National Park Service Alaska Region (NPS) and Mark Rollins, Archaeologist II, Review and Compliance Alaska State Historic Preservation Office/Office of History and Archaeology (OHA).

Rhea Hood (NPS) and Mark Rollins (OHA) arriving at Kivalina, Alaska.

Conditions were less than optimal. Temperatures were in the low 40's° F with steady light rainfall and winds of 10-20 mph out of the west and a low cloud ceiling. Everyone put on rain gear and boarded helicopter piloted by Quintin Slade of InFlight helicopters and preceded to Kisimigiuqtuq Hill. We flew the proposed southern route and along the way Quintin pointed out the related survey markers located on the tundra.

Rhea Hood (NPS) and Quintin Slade (InFlight) discussing potential landing areas along the southern route; survey marker along southern route.

We inspected the location ground conditions, including previous shovel test area and taking a GPS point of the cairn located during the 2016 cultural resource field investigation.

Rhea Hood (NPS) and Mark Rollins (OHA) inspecting the ground conditions around Kisimigiuqtuq Hill.


Cairn on Kisimigiuqtuq Hill. Note eroding bedrock surface with scrub vegetation.

After stopping at an elevated area identified on the project maps to look at the ground conditions within the route independently, we met up with Ross Smith and Perry Hawley at one of the testing locations at about 1:20PM. We discussed the ground conditions (permafrost levels) and lack of soil development within the project APE.

Rhea Hood (NPS), Mark Rollins (OHA), Ross Smith (Stantec) and Perry Hawley (Kivalina) discussing testing results and archaeological potential within the survey area.

At about 2:00PM we met up with Justin Junge and Oral Hawley at a location where they had just finished digging a test pit which had a negative result for archaeological remains. Justin's description of ground conditions and archaeological potential was in-step with those explained by Ross Smith previously. The areas that appeared on the maps as high ground and potentially dry were little more than slightly elevated and poorly drained versions of the general field conditions of the surrounding area. Earlier during our visit it was posited by Ross Smith that the LIDAR imagery is like picking up subsurface contours in the topography that is not evident on the surface due to a combination of vegetative cover and permafrost conditions.

Typical flora and fauna located within the project APE.

Justin Junge (Stantec), Rhea Hood (NPS), Oral Hawley (Kivalina), Mark Rollins (OHA) discussing field results and future testing locations within the project APE.


John Hemmeter (Stantec) conducting a soil probe test along the southern route APE.

We left Justin's field crew at about 2:30PM and flew back along the combined route APE. None of the locations appeared to be of any higher probability. We arrived back at Kivalina at about 2:50PM in expectation of returning to Kotzebue on the 3:15PM flight. While waiting for the flight to arrive we decided to walk along the lagoon shoreline to look for any survey markers for the proposed causeway location. About a minute into our walk along the shore line Rhea Hood almost stepped on a complete biface. It was a surface find and likely was deposited by the tidal actions of the lagoon. We were unable to collect the artifact as we could not properly record its location. We were also unable to confirm the proposed location of the causeway.

Biface found by Rhea Hood (NPS) on the lagoon shoreline surface just behind the Airport maintenance building (penny used for scale).

Standing at location of biface behind Maintenance building.

Bering Air flight 662 arrived over two hours late but we all boarded the flight at around 5:30PM and raced to meet our connecting flight in Kotzebue. Overall, it was a very educational trip. It is always difficult to get an appreciation for the real terrain without actually being there. The take home messages were that the area is mostly covered with low-lying poorly drained tussock swamp conditions and that the only high areas consist of poor to know soil formation with scrub vegetation over eroding bedrock. Abundant blueberries and seasonal game are evident in the area.

I believe that we all could agree that the likelihood of finding in situ buried cultural resources within the proposed project APE is low. Due to the location of the project within the Cape Krusenstern National Historic Landmark the extra testing measures conducted within the project APE were both necessary and sufficient to constitute an appropriate level of investigation to assess the project's potential effects on cultural resources. Additional monitoring efforts were not discussed indepth.

Kivalina Evacuation and School Site Road Project Agency Tour Trip Report
NMFS Recon of KVL Evac Road project study area EFH and lagoon hydrology
Paul Karczmarczyk DOT&PF EA II

National Marine Fisheries Service (NMFS) fisheries biologist Samantha Simpson and hydrologist Sean Eagan were accompanied by DOT&PF Environmental Analyst Paul Karczmarczyk on a helicopter flight/study area survey for the Kivalina Evacuation and School Site Road project on 08/17/17. Weather was good and the survey was conducted from a Robinson R-44 piloted by Quentin Slade of InFlight Helicopter (Photo 1).

Photo 1. Survey team on site at project study area (photo NMFS).

Essential Fish Habitat assessment: The proposed alignments were flown and areas where potential fish passage may be required were assessed. Two potential areas depicted on project figures as such were closely observed in-flight or landed at and reviewed for potential to pose obstructions to anadromous fishes. Water levels were visibly low, and both potential crossing areas were characterized by broad, shallow floodplain channels completely covered by emergent vegetation and with very little to no distinct flow channel. Rather, flow during the survey was negligible and primarily constituted of seepage through the vegetation. Relic channel crossing site 1 was landed at for close survey (Photos 2, 3, 4).

Photo 2. Broad, shallow channel at relict channel crossing 2.

Photo 3. Vegetation completely filling relic channel crossing 1.

Photo 4: Indistinct channel/seepage flow at crossing site 1.

Discussion among NMFS and DOT&PF staff yielded agreement that neither potential crossing location were remarkable in their ability to provide quality habitat/passage options for anadromous or other fish and, rather, were more likely to result in fish being trapped during periods of high water due to the channel morphology and high volume of persistent emergent vegetation.

Lagoon Crossing Hydrology: Hydrological review of the lagoon was conducted by overflight of the lower Wulik and Kivalina Rivers as well as the length of Kivalina Island from Kivalik Inlet to the community of Kivalina. The potential lagoon crossing location was surveyed by air in greater detail.

Photo 5. Potential lagoon crossing area from mainland shoreline.

Sediment deposition and patterning for the two river deltas, lagoon shoreline and both inlets were also observed from the air as were patterns of deposition within the lagoon both by helicopter and by drone flight video provided by InFlight pilot Quentin Slade.

A helicopter landing was made on the lagoon shoreline opposite the community and where the mainland terminus of the proposed lagoon crossing would be located. NMFS staff visually inspected sediment type and observed the land/water interface sediments and vegetation to estimate the typical extent of storm/high water event flooding and potential erosion (Photos 5-8). NMFS has indicated they will provide additional guidance and recommendations on lagoon crossing engineering and construction methodology.

Photo 6. Lagoon shoreline opposite Kivalina.

Photo 7. Observation of typical water elevations vs. vegetation types.

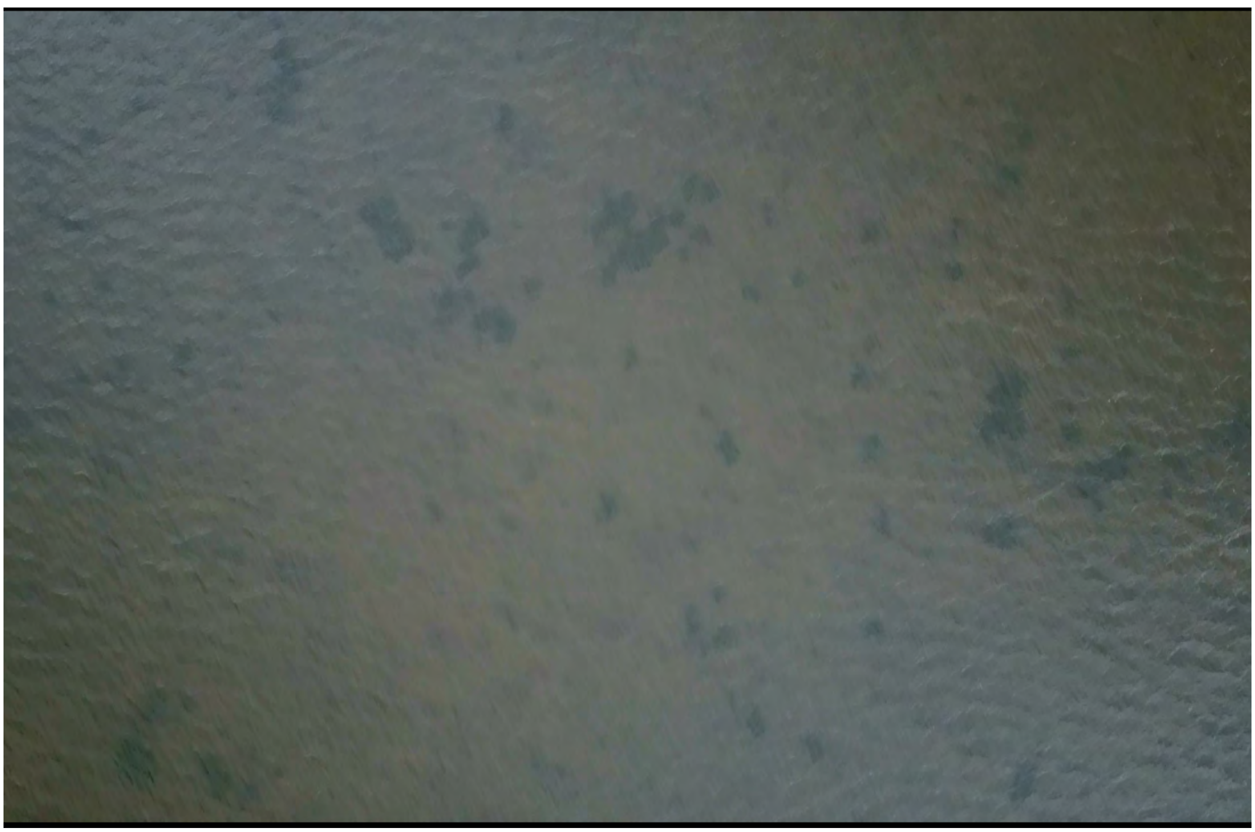


Photo 8. Still image of drone-flight video showing detailed in-lagoon sediment deposition and vegetation.

2017-12-12 Kivalina Road NMFS Meeting notes

Date: 12 Dec 2017

Purpose of Meeting:

The DOT&PF Kivalina team would like to meet with you to discuss the Kivalina Evacuation and School Site Access Road Draft Environmental Assessment, as well as discuss the EFH Assessment and MMPA compliance. We appreciate your collaboration on our team and we look forward to discussing further.   As you saw recently the Draft EA is out for public and agency comment.

Attendees On the Phone:

Amy Sumner, DOT

Sarah Schacher, DOT Sarah Schacher

Brett Nelson, DOT
brett.nelson@alaska.gov

Katherine Keith, Remote Solutions
Katherine Keith

Samantha Simpson, NMFS

Sean Eagan, NMFS

Bonnie Easley-Appleyard, NMFS

Bill Morris, Owl Ridge

Attendees In Person:

Paul Karczmarczyk, DOT
paul.karczmarczyk@alaska.gov

John Baker, Remote Solutions John Baker

Steve Reidsma, Michael Baker
Steve Reidsma

Sara Lindberg, Stantec Sara Lindberg

Sara Taylor, Senator Sullivans Office

Digital Items:

1. Powerpoint was emailed and screen shared.

2. EA http://dot.alaska.gov/nreg/KivalinaEvacRd/

Kivalina.pptx

Team Goals

FONSI by January 1st, 2018

Agenda:

Emailed Concerns on EFH:

1. Single span bridge over the channel is a requirement for concurrence with EFH.
2. Concerns about Wulik River source and connection to river after construction is complete.
3. Causeway culverts on inland side need to be made fish passable and maintained on a yearly basis, making sure it maintains a water connection at all tide levels.

Agenda:

Emailed Notes on Marine Mammals:

For the EA:

1. Need the EA to reference noise anticipated from a 36 inch pile since that is what we are proposing. EA currently only covers 40 and 60 inch piles.
2. Need to clarify if any equipment, boats or vessels will be used in the lagoon during construction. Right now the EA talks about winter construction but not what summer construction would look like, although this is left open as an option. Can briefly mention and then discount as not adding a significant amount of noise.

For ESA Consultation:

1. Need more detail about in water equipment (boats, vessels, other equipment) required to place fill in summer, build temporary work trestle. Need # of boats, vessels, barges, equipment with timing.
2. Need size of culverts on the inland side of lagoon crossing.
3. Need to calculate a sound source level for the 36 inch pile driving and development of an exclusion zone. Fine to

commit in EA, but for consultation will need that calculation to be completed. Need to look at exclusion zone for both filling and pile driving, summer vs winter.

4. The pile driving plan commitment is fine in the EA, but this will need to be developed before we can get to ESA concurrence.
5. Considerations should be made for sea ice travel for Red Dog Port haul route and avoidance of impacts to Ice Seal lairs.
6. Any project specific boats, barges, or vessels, if they are used for the project, will need to be included in consultation.

Parking Lot

Action items

- [ ] Bonnie will provide the team with sample informal consultation letters.
- [x] Sean will send a letter Thursday or Friday and response with a letter stating you are amendable to the suggestions.
- [x] Sara Lindberg send out distribution list for Sara Taylor

Discussion items

Blue text are comments/questions.

Item	Who/Topic	Notes
Senator Sullivan's Office	Sara Taylor	Sullivan visited Kivalina in July 2016 and this project has been a major priority for him since then. Mike Fleagle is the main contact but had a family emergency today. Mike Fleagle and Sullivan's Office will continue to track progress and be engaged as needed.
	Sara Lindberg	We recently went out to Kivalina for positive public meetings. ESA compliance is important to our team so we can resolve any concerns as quickly as possible.
Bridge and Road Overview of Preferred Alternative	Sara Lindberg and Sarah Schacher	Overview of bridge design. There is a defined lagoon channel and bridge is being strategically placed where deeper water is. 9 water crossings. Culverts.
Does the lagoon freeze all the way to the bottom? (Bonnie)	Lagoon Characteristics	John Baker: When tidal action occurs the ice can be lifted however the lagoon is other wise frozen to the bottom of the lagoon.

NMFS is pleased with bridge and bridge design. Do they need to comment one way or the other? (Sean Eagan)	Bridge Design	**Sarah Schacher**: It would be helpful if there are positive comments for general support. You could make your comments with the preferred alternative presented. Unless there are strong public comments that steer us in another way we will put forward the preferred alternative. **Sean**: All three routes are acceptable to us so we will not comment on them. **Paul:** We understand that the routes come together before NMFS area of interest. **Sean**: OK we won't worry about commenting on the routes.
We are good with 3-4 material sources and the Wulik is the least desirable. (Sean Eagan). Our comments were not behind the Wulik River Source. Can you write a contract such that the contractor would need to exhaust the other three before using the Wulik River Source?(Sean Eagan).	Material Sites	**Sarah S:** It is possible to include a contract with preference to the preferred three material sites. How can we mitigate issues with Wulik River? **Sean:** The K-Hill site has no fish impacts. The Wulik relic channel sources do not effect EFH. The Wulik river source may effect spawning. Development of this source will create a deep pond in an area that could otherwise be spawning habitat. The Relic Channel sources on the NE side of the road aren't as much of a concern as the have a road between it and the Wulik River. **Sean**: Is there a way to develop the site in a way to keep river out of the pond during flooding? **Bill M**: There are definite high water channels throughout the site, in extreme events the bar is inundated. But the material site development would be a smaller overall footprint than what is shown. There is leeway within the gravel bar to stay away from high water channels. Hard to say if it will always stay completely isolated from Wulik. Sean is concerned Wulik will go right to pond in high event. **Bill M**: Considering the biggest fish use of this reach of the river, you'd end up creating a more consistent overwintering area for Dolly Varden. There should not be concerns about predatory whitefish, as that species does not occur in the Wulik. Dolly Varden spawning occurs many miles upstream from this location.

NMFS would like to see NE passage culvert size detail (squashed pipe versus full culvert) for maintenance purposes. Would like to see a maintenance plan for the final EA and FONSI that can guarantee regular flow. Our letter will request that a design be in place so we don't end up with islands of sediment. (Sean Eagan)	Culvert Maintenance	**Sarah S:** We do design culverts for debris and icing mitigation to prevent flow blockage. **Sam Simpson:** agrees with discussion and they can summarize what they've expressed in their letter as well as praise for aspects of project alternatives they support.
We won't be providing formal comments on the EA as our comments are specific towards the consultation and some content won't be always included in the EA. We need more project information on things that wouldn't be occurring without the project. Not that the determination would be altered but that it needs to be included. (Bonnie Easley-Appleyard)	ESA Consultation-Construction Impacts	Items include: • barging; • potential for an ice road going over sea ice including type of equipment going over that sea ice road; • potential for recreation boats in the lagoon related to the project; • Placement of fill in the summer or winter (Need brief description of summer fill placement) • Trestle placement processed or any in water equipment used to build the bridge Bonnie can type this up but won't be providing formal comments for the EA but needs these questions answered during consultation.
	ESA Consultation-Ringed Seal and Bearded Seal Observation	Please provide information on this data collection to date in a table perhaps.
	Pile Driving and Exclusion Zone Mitigation Measures	36" piles (We have 60" and 40") Bonnie did find a source for sound impact of 36" piles /exclusion zone for pile driving and fill placement. In our letter we could include two different exclusion zones for the 60" and for 36" piles.
	Mitigation for Hunting Seals	Topic of Hunting of Seals on the Causeway is missing from August 9th meeting notes or EA. Mitigation Measure would be to have signs mentioning that it is illegal to hunt seals from the causeway.

There is an expedited information process. If we provide NOAA a letter with all the project information, analysis, mitigation measures, etc. We would request an expedited informal consultation with that information and we might receive a shorter letter back approving the request for that. This typically takes two weeks. (Bonnie Easley-Appleyard) Online Resource for Expedited Informal Consultation: https://alaskafisheries.noaa.gov/pr/esa-section-7-expedited-informal-consultation	USACE Permit and ESA Consultation Overlapping	**Brett** continue with ESA Consultation but we need to have an agreement for completion before our Corps permit goes out. **Bonnie** will send a letter requesting further information before they can finalize the consultation. **Sarah S**: Trying to avoid duplicating agency reviews. **Bonnie**: Unless something has significantly changed in the project there won't be a need to reopen consultation and they can reissue the same letter. **Sara L:** We are going to have to do a lot of estimating. So we will only need to re-initiate consultation if we exceed the impacts correct? Certain things are unknowable until we have a contractor on the team. **Sarah S**. We can provide general assumptions but we have to keep things open ended because different contractors have different means and methods and we cant spec out equipment requirements which could impact the project and then have to rewrite the EA because of equipment changes. We want to answer your questions and concerns without having to commit to something that is simply unknowable right now. **Bonnie:** We understand that you will be putting forward your best guess of the worst case scenario so that you are covered. It helps to repeat information from the EA in the letter so that we don't have to go into the EA for constant reference. **Paul**: Is there a mechanism in which your consultation can accept a reasonable worst case scenario?
	Timeline for getting this done by 1/1/2018? (John Baker)	**EFH:** Sean will send a letter Thursday or Friday and response with a letter stating you are amendable to the suggestions. **ESA**: Bonnie will work as quickly as see can to complete the consultation but needs the requested information.

2017-12-12 Kivalina USACE Draft EA Meeting notes

Date: 12 Dec 2017

Project Number: 0002384/NFHWY00162

Stantec Office, Anchorage, AK

Meeting Request:
The DOT&PF Kivalina team would like to meet with you to discuss the Kivalina Evacuation and School Site Access Road Draft Environmental Assessment, as well as complete a pre-application meeting with you. We appreciate your collaboration on our team and we look forward to discussing further. As you saw recently the Draft EA is out for public and agency comment.

Attendees On the Phone:

- Brett Nelson, DOT brett.nelson@alaska.gov
- Katherine Keith, Remote Solutions Katherine Keith

Attendees In Person:

- Paul Karczmarczyk, DOT paul.karczmarczyk@alaska.gov
- Janet Post, USACE
- Jason Berkner, USACE
- Sara Taylor, Senator Sullivan's Office
- John Baker, Remote Solutions John Baker
- Steve Reidsma, Michael Baker Steve Reidsma
- Sara Lindberg, Stantec Sara Lindberg

Prior Meeting History on Kivalina Evacuation Road with USACE

8/24/2016 3:15 pm. Senator Sullivan, Mike Fleagle, Randy Bowker, Deputy Project and Program Management Division Chief; Bruce Sexauer the Branch Chief of Civil Works; NWAB Mayor Clement Richards, Katherine Keith, Remote Solutions; John Baker, Remote Solultions

12/21/2016: USACE: Jeremy Grauf, Regulatory Specialist; Janet Post, Regulatory Specialist. DOT&PF: Paul Karczmarczyk, ADOT&PF; Sara Schacher, ADOT&PF. OTHERS: Katherine Keith, Remote Solutions; John Baker, Remote Solutions; Sara Lindberg, Stantec

8/15/2017: Jeremy Grauf completed a two day site visit to Kivalina

Problem Statement/Meeting Topic

Please follow the link below to access the document: http://dot.alaska.gov/nreg/KivalinaEvacRd/

Kivalina Evacuation Road Summary Powerpoint

2_Draft_EA_Figures_110617_rfs.pdf

Short Term Goals

- Review Draft EA
- Pre-Application Meeting

Parking Lot

Action items

- [ ]

Discussion items

*Items in blue were questions/comments

Item	Who	Notes
Introductions of Team	John Baker and Sara Taylor	This project is a priority to the entire delegation and Senator Sullivan has watched its progress closely.
Team member update	Janet Post	Janet Post will be the project manager. Jeremy Grauf updated Janet on the project, site visits, and discussions to date. Jason Berkner will assist.
Project Purpose and Need; Project Description; Route Alternatives; Preferred Alternative	Sara Lindberg	Sara summarized the project's purpose and need, project background, and other project information.
327	Brett Nelson	FHWA doesn't have project level oversight because of the 327 transference of authority to DOT&PF.
Material Sites Permitted	Sara Lindberg	Sara reviewed the material sites already evaluated, relative benefits, and relative impacts.

Why is your preferred route the one selected? (Janet)		Sara walked the team through the methodology for the preferred alternative.
404 Application Presentation	Steve Reidsma	Provided an overview of project and impact stating that application impacts are less than was stated in the EA itself. Reviewed contents of the draft 404 permit.
USACE Jurisdiction	Jason Berkner	Bridge has joint jurisdiction: USACE has clean water act authority; Coast Guard has jurisdiction on Section 10 rivers and harbors.
Goals/Timeline	Sara Lindberg	We want a FONSI January 1, 2018. We will submit a draft application shortly after the FONSI to USACE.
What happened to the school? (Janet)		That is a separate project. Its identified as a potential future impact in the cumulative impact section.
Next Steps	Steve Reidsma	Is there an advantage for another application meeting so we can ensure that we have everything included in the application? (Jason) After receipt the USACE completes a 15-20 day completeness determination. Our goal is to complete permit processing within 120 days of submission. About 20% of projects take longer than that. (Janet) I would be happy to have another meeting to go through the application prior to submittal.
Mitigation Ideas. What is going on with the landfill as potential mitigation? (Janet)		Paul discussed the status of the Kivalina landfill and the options for potential cleanup as proposed mitigation.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, WA 98101-3140

OFFICE OF
ENVIRONMENTAL REVIEW
AND ASSESSMENT

December 13, 2017

Jonathan Hutchinson, P.E., Project Manager
Alaska Department of Transportation and
Public Facilities, Northern Region
2301 Peger Road
Fairbanks, Alaska 99709

Dear Mr. Hutchinson:

The U.S. Environmental Protection Agency has reviewed the Draft Environmental Assessment prepared by the Alaska Department of Transportation and Public Facilities for the Kivalina Evacuation and School Site Access Road Project (EPA Project Number: 17-0049-FHW). Our comments are provided pursuant to the National Environmental Policy Act, Council on Environmental Quality regulations (40 CFR § 1500-1508), and Section 309 of the Clean Air Act.

The proposed action would construct an approximately eight-mile all-season evacuation road between the community of Kivalina and Kisimigiuqtuq Hill, K-Hill, including construction of a causeway across the Kivalina Lagoon. This road would provide Kivalina residents a safe and reliable evacuation route in the event of a catastrophic storm or ocean surge. The assembly site on K-Hill has also been identified as a preferred new location for the community school, which, if constructed, could serve as a community emergency shelter.

We support the need to ensure the safety of the residents of Kivalina, who are faced with increasing risk from storm surges. Overall, we find the Draft EA appropriately identifies environmental resources of concern. However, we are concerned the Draft EA, as currently written, lacks some of the detailed information for agency decision makers and the public to fully understand the potential impacts of future use of the proposed road. We, therefore, recommend the Final EA discuss the following topics in greater detail:

- Potential use of the proposed evacuation road;
- Fugitive dust generation and methods to reduce road dust;
- Impacts of fugitive dust on air quality; and,
- Impacts of fugitive dust on water quality and aquatic resources.

Use of the Proposed Evacuation Road

The construction of a new school on K-Hill is briefly discussed in the Draft EA as a potential future action for the purpose of conducting a cumulative effects analysis, though the document notes this project is still in its early planning stages and details are not yet known. Based on the information provided in the Draft EA, we recommend the future use of the road to access the proposed community school and emergency shelter, or other anticipated uses, be analyzed in the Final EA as reasonably foreseeable indirect effects of constructing the evacuation road.

Potential Fugitive Dust Generation and Recommendations to Reduce Road Dust

The EPA's primary concern, based on our review of the Draft EA, is the potential for fugitive dust blowing off the road surface to impact air quality and water resources throughout the use of the road. Dust from roadways can be a substantial source of particle pollution in rural communities. In addition to human health effects, dust blown from the road can settle onto vegetation or waterbodies, adversely affecting those resources as well.

The Draft EA states that in 2016, the existing McQueen School had 145 students and 16 teachers. In addition to the daily transport of students, we note community schools in rural Alaska typically serve as community gathering places, and hosting events would potentially generate additional traffic. It would make sense that transportation to and from the school for both school and community events would be typically be provided by private, all-terrain vehicles during the snow-free months. Because of the aggressive tires found on ATVs, they are particularly effective at generating airborne road dust. Therefore, the potential exists for this local road to generate sufficient road dust to result in human health or environmental impacts. We recommend the Final EA disclose these potential impacts from the road dust and discuss the appropriate mitigation measures to reduce the identified impacts.

We recommend consideration be given to ways to reduce road dust generated by the proposed evacuation road, throughout the design, maintenance, and use of the road, and these measures be discussed in the Final EA. We recognize DOT&PF has published information on road dust concerns in Alaska and is an expert on the topic. If helpful, we offer the following general recommendations:

- 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).
- Dust palliatives can be applied to roadways, although these have varying costs and potential environmental impacts associated with their use. The primary mitigation measure to control road dust employed on the North Slope is road watering, by spraying water on the road surface from tanker trucks. The effectiveness of this measure, however, depends on frequent road watering runs (up to several times daily) during the summer season, which results in a long-term maintenance commitment and associated cost.

Air Quality

Although air quality was identified as an issue not warranting further analysis in the Draft EA, the potential for fugitive dust to impact air quality during construction is mentioned briefly with reference to the use of best management practices to reduce dust during construction. We recommend the potential for the ongoing release of particle pollution during the future use of the road also be discussed in the Final EA.

We know that particle pollution, especially fine particles, contains microscopic solid or liquid droplets that can get deep into the lungs and cause serious human health problems. Numerous scientific studies have linked particle pollution exposure to: 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 someone is relatively healthy, they may experience temporary symptoms from the exposure to elevated levels of particle pollution. (For more information see https://www.epa.gov/pm-pollution).

Water Quality

With respect to potential water quality impacts, the Draft EA notes that wind-generated dust from the future road could deposit in adjacent waterways along the route. We recommend this discussion be expanded to also disclose the potential impacts of daily traffic along the road, which could result in greater dust deposition in the adjacent waterways than that generated by wind alone. It is important for the Final EA to also disclose the impacts to human health and to water quality of having increased dust deposition in surface waters occur. For example, according to the Draft EA, the community of Kivalina obtains drinking water from the Wulik River during the summer months. In addition, the Kivalina and Wulik Rivers are used for subsistence harvest of fish, which may be impacted by changes to water quality due to dust deposition. We recommend the Final EA discuss whether dust deposition to the Kivalina and Wulik Rivers is a potential concern for water quality.

Wetlands

During our review of the Draft EA, we noted it does not seem to address the potential effects of fugitive road dust on wetland resources. Changes to soil, permafrost, and vegetation in the Arctic ecosystem have been documented as a result of fugitive road dust (Auerbach et. al. 1997, Walker and Everett 1987). Based on these studies of the Dalton Highway and the Spine Road subjected to years of chronic road dust disturbance, soils next to the gravel roads were observed to have lower nutrient levels, altered organic horizon depth, higher bulk density, and lower moisture. Permafrost thaw was also deeper next to the road. Increased drifting of snow in the lee of the road and earlier initiation of thaw near the road were both observed, due to dust-induced change in albedo, with the concomitant contribution to increased thermokarst in roadside areas. The vegetation biomass of most taxa was reduced and the community composition was altered, developing into decreased moss and lichen cover, increased barren ground, and colonization by many taxa that are common on mineral-rich soils. These effects have been measured out to 300 feet from gravel roads. We, therefore, recommend the Final EA include a discussion of the potential effects of fugitive road dust on the wetlands located along the proposed road.

The effects, which have been observed on the Dalton Highway and the Spine Road, may differ in magnitude from those that could occur along the proposed Kivalina evacuation road, due to differences in vehicle type and traffic load. However, we want to share the following resources, which may be helpful in discussing the potential effects of fugitive road dust on wetlands:

Auerbach, N. A., M. D. Walker, and D. A. Walker. 1997. Effects of roadside disturbance on substrate and vegetation properties in Arctic Tundra. *Ecological Applications* 7(1): 218-235.

Walker, D. A., and K. R. Everett. 1987. Road dust and its environmental impact on Alaska taiga and tundra. *Arctic and Alpine Research* 19(4): 479-489.

Subsistence

According to the Draft EA, construction of the proposed evacuation road is anticipated to expand access to berry picking resources near the road, including potential intensified berry harvest along the roadside. As noted above, impacts of dust to certain types of vegetation have been measured out to 300 feet from roadways. In addition to potentially impacting the growth of subsistence berry species, dust deposition could affect the ability of residents to consume the berries. We recommend the Final EA discuss the potential impacts of road construction and use on subsistence use of berries or other plants.

In conclusion, we appreciate the opportunity to review this Draft EA and hope our recommendations for additional information to be included in the Final EA will help to ensure decision-makers and community members are aware of the full range of potential impacts of the construction and use of the proposed road.

The EPA recognizes the importance of establishing a safe and reliable means of evacuation for the residents of Kivalina. We would be happy to have a meeting or phone call to follow up on any of the information included here. In addition, if you have questions about 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 Nogi

Jill A. Nogi, Manager
Environmental Review and Sediment Management Unit

2017-12-14 ADF&G Kivalina Meeting notes

Project Name & Number: Kivalina Evacuation Road

Meeting Location: 11:00 am

Teleconference Info:

1-866-546-3377

453631#

Video-conference Info:

Date: 14 Dec 2017

Attendees - In Person

Sara Lindberg; Steve Reidsma (Michael Baker); paul.karczmarczyk@alaska.gov; Audra Brase (DFG), John Baker Sarah Schacher, brett.nelson@alaska.gov, Bill Morris (Owl Ridge)

Attendees - Virtual

Amy Sumner, SW Environmental

Problem Statement/Meeting Topic:

INVITE: The DOT&PF Kivalina team would like to meet with you to discuss the Kivalina Evacuation and School Site Access Road Draft Environmental Assessment, as well as follow up with Title 16 permit details, specifically about how much detail will be needed for material site development at this stage. We appreciate your collaboration on our team and we look forward to discussing further. As you saw last week the Draft EA is out for public and agency comment. Please follow the link below to access the document. If you haven't already, you should be receiving a hardcopy of the Draft EA either today or early next week.

Previous Meeting Docs

12/18/16 Attendees: Aubra Brace, USF&G; Ryan Anderson, AK DOT&PF; Paul Karczmarczyk, AK DOT&PF; Sara Schacher, AK DOT&PF; Jonathon Hutchinson, AK DOT&PF; Katherine Keith, Remote Solutions; John Baker, Remote Solutions; Sara Lindberg, Stantec

Digital Files

http://dot.alaska.gov/nreg/KivalinaEvacRd/

Standing Agenda:

1. Safety Minute
2. Team Meeting Ground Rules
3. Review short term goals
4. Review task lists from the previous check in (On main Meeting Note page)
5. Identify work tasks that have been accomplished since the last check in
6. Identify work tasks that will be completed before the next check in
7. Identify any obstacles preventing the team from accomplishing the goals
8. Adjourn

Action items

- [ ] Audra- trail easement info. She thinks this is non-issue but will follow up.
- [ ] Audra- info on spawn areas. It is further up than where we are proposing mining so thinks it's a non-issue but wants us to have the info.
- [ ] Audra- will discuss if the lagoon needs to be permitted or not.
- [ ]

Discussion items

Item	Who	Notes

		• Audra is good with EA language re: fish pass. • **Audra** has trail easement info? • **Sara** clarified we pulled off the gravel bar in the boundary. • **Steve/Bill:** geotech data will refine depths of mining in Wulik. Audra would like to see channel connected due to potential for flooding. NMFS was concerned with predatory white fish so did not want to see channel connected, but **Bill** thought that was addressed because there is no presence of she fish. Bill said the connection channel would be designed above Thalweg of the Wulik. • **Sara**: NMFS asked if material sources could be prioritized. DOT&PF agreed this could be done. Audra agreed K Hill, then relic channels, then Wulik would be preferred preference for order of mining. • **Audra**: wants to know more about work timing and time constraints. Timing windows may be placed. Audra said June and July is very sensitive for salmon. Also concerned with worst case scenario of a high water year, such as adult salmon getting washed into gravel pit. No concern about any upland mining, but just concern anything close to rivers. **Bill:** usually higher magnitude flood events are late fall/high rainfall events. There is a gage on the Wulik. Audra said likely to expect general statement on this as well as Dolly Varden in the fall. **Paul:** commun ity expresses concern on char, not so much salmon. Audra said yes, char falls into anadromous category as well but they spawn in the fall, whereas salmon in summer. Does not believe char spawn near this proposed work location in the Wulik, and can provide this info. • **Sara**: would it be good to have a pre-application meeting for Title 16 permit? Need contractor on board to have details as to schedule, timing. Team discussed that DFG permits can be turned around quickly, but everyone needs to be on the same page about parameters/constraints. **Steve:** already anticipate reclamation will be required at all sites. We expect ponds based on other reclamations for material sites on the north slope, and this is similar. **Audra** said there is flexibility in their permits particularly with reclamation of gravel bars, so basically permit can have conceptual requirements, but specifics to be addressed in greater detail by DOT&PF and/or contractor. They also do not have public notice requirements. Steve said we can provide an application in, using material from USACE application. Anticipates later in January they could be seeing something from us. • **Sarah & Sara** stressed any supportive comments also welcome, as it helps communicate agency concerns or non-concerns on certain issues. • Wulik channel #1 - these channels are very shallow. Audra recalled Jeremy at USACE was talking about mitigation through limited riparian habitat–Bill suggested scrape edges in this country, it nearly immediately vegetates. Steve said USFWS liked that shrubby habitat. Steve says we want to do reclamation on everything we disturb, would be easier to do this type of reclamation than deeper excavations elsewhere. • Wulike Relic channel #2 - access roads avoid any types of water crossings as do Relic Channel #1. These roads are being permitted as permanent fill because of difficulty reclaiming and anticipated future use of these sites. Bill said these sites will be good long term water sources if they are kept accessible. (Future ice roads, roads watering, etc). • **Steve & Audra**: to summarize, items in permit application needs to include: discussion on each of the material sites as each are unique, the main road and culvert locations, which are fish pass, discuss those. Leave sizing based on Fish Pass MOA, and use enhanced fish pass design (upsize for aufeis/debris) for others. Enhanced fish pass location designs were ID'd by DFG, Steve has point files for these locations. The lagoon itself: bridges are great. DFG will not permit in the lagoon because salt water so defers to NMFS for jurisdiction. Bill mentioned somebody let the mouths of the river slide into the catalog, so then Audra questioned if we should permit or not. It was discussed in EFH. They would like to know about vibration for pile driving but agree anything required for marine mammals would easily cover concerns for fish. Bill inquired about NMFS request to have no shooting signs on bridge–group agreed community education would be more effective but a sign was not difficult mitigation • **Audra**–water withdrawals. Sara said we would use general info in EFH. DFG will need this info for the permit. Asked if we would harvest ice for ice roads. Bill said this cuts down water needs substantially, and this was a possible solution for using lake ice in the area to construct ice roads.

Parking Lot

MEMORANDUM

Department of Fish and Game

State of Alaska

Division of Habitat

TO: Jonathan Hutchinson, Project Manager
ADOT&PF
Northern Region
Fairbanks

DATE: 12/14/2017

TELEPHONE: 459-7282

FROM: Audra L.J. Brase, Regional Supervisor
Department of Fish and Game
Division of Habitat
Fairbanks

SUBJECT: ADF&G Comments regarding DEA Kivalina Evacuation and School Site Access Road

The Alaska Department of Fish and Game (ADF&G) has reviewed the Draft Environmental Assessment (DEA) for the Kivalina Evacuation and School Site Access Road. The Alaska Department of Transportation and Public Facilities (ADOT&PF) is proposing to construct an all-season road from Kivalina to an evacuation/ school location near Kisimigiuqtuq Hill (K-Hill). Comments were solicited from the Wildlife, Sport Fish, Habitat, Commercial Fisheries and Subsistence divisions; and are summarized below.

Route - ADF&G appreciates that the route alternatives were developed in consultation with the local community, and we support the preferred alternative (Southern Route with Lagoon Crossing D) as it is approximately 1.2 miles shorter than the "Combined Route" and has three fewer water crossings which will help minimize the road's impact to the surrounding habitat.

There appear to be at least three 17(b) easements near the start of the proposed road, one of which appears to cross the proposed southern road route (Figure 1). This 25ft easement is described in patent 50-2015-0071. This legal access should be maintained & identified by ADOT&PF in describing effects from the road project.

Material Sites - ADF&G prefers that the material sites be considered in the following order: first the upland location (K-Hill), then the Relic Channel sites (Sources 1 & 2), and finally the Wulik River Source 1. These preferences are based on the potential impacts to the fish resources of the Wulik River. The Wulik River has been identified to be important to the spawning, migration and/or rearing of Chinook, coho, sockeye, chum and pink salmon; as well as anadromous Dolly Varden; additionally the river supports resident fish species including Arctic grayling and various whitefish. The ADF&G appreciates that the ADOT&PF has identified a 100ft buffer between the river & the edge of the material site. However, utilizing a material site immediately adjacent to the river, in a low gradient area prone to flooding may be problematic during open water periods as migrating fish could become entrapped and not successfully spawn.

If the Wulik River Source 1 site is utilized, the ADF&G will likely recommend that gravel be extracted only during low open water periods or during the winter when the potential impacts to spawning fish may be minimized. Additionally, to allow any entrapped fish to escape, the ADF&G will require that the material site be connected to the active Wulik River channel. Any development specifics of the Wulik River material site will be coordinated with the applicant, the ADF&G and the Alaska Department of Natural Resources (ADNR).

Material Site Reclamation – The ADF&G supports developing the material sites into ponds once gravel extraction is complete. We would recommend shallow littoral zones around the pond perimeters to provide diverse habitat for waterfowl, aquatic insects and rearing fish. Additionally, we would support efforts to develop the riparian areas into migratory bird habitat by encouraging the growth of native shrubs.

Kivalina Lagoon Crossing – The ADF&G appreciates that the ADOT&PF has designed a causeway which should allow for fish, boat and marine mammal passage; as well as sufficient water flow to maintain the existing estuarine habitat. We have no objection to this design.

Fish Passage – The ADF&G will be responsible for issuing permits for all culverts in fish bearing waters. Design specifications and stipulations for installation will be developed in coordination with the applicant utilizing best management practices and standards for fish passage.

Water Withdrawals – The specifics of water withdrawals for road construction/ maintenance activities do not appear to be identified in the EA. Once these sites are determined, the ADNR and ADF&G will be responsible for issuing water use permits. The ADF&G will place screening stipulations and maximum flow velocities upon any water withdrawals from fish bearing waterbodies.

The ADF&G appreciates the early consultation and coordination that the ADOT&PF has provided and we welcome the opportunity to provide feedback on this DEA. Any questions about these comments should be directed to Audra Brase at 907-459-7282 or emailed to audra.brase@alaska.gov.

ecc: Al Ott, ADF&G Habitat, Fairbanks
Brendan Scanlon, ADF&G Sport Fish, Fairbanks
Mark Fink, ADF&G Wildlife, Access Defense, Anchorage
James Menard, ADF&G Commercial Fish, Nome
Beth Mikow, ADF&G Subsistence, Fairbanks
Daniel Alex Hansen, ADF&G Wildlife, Kotzebue

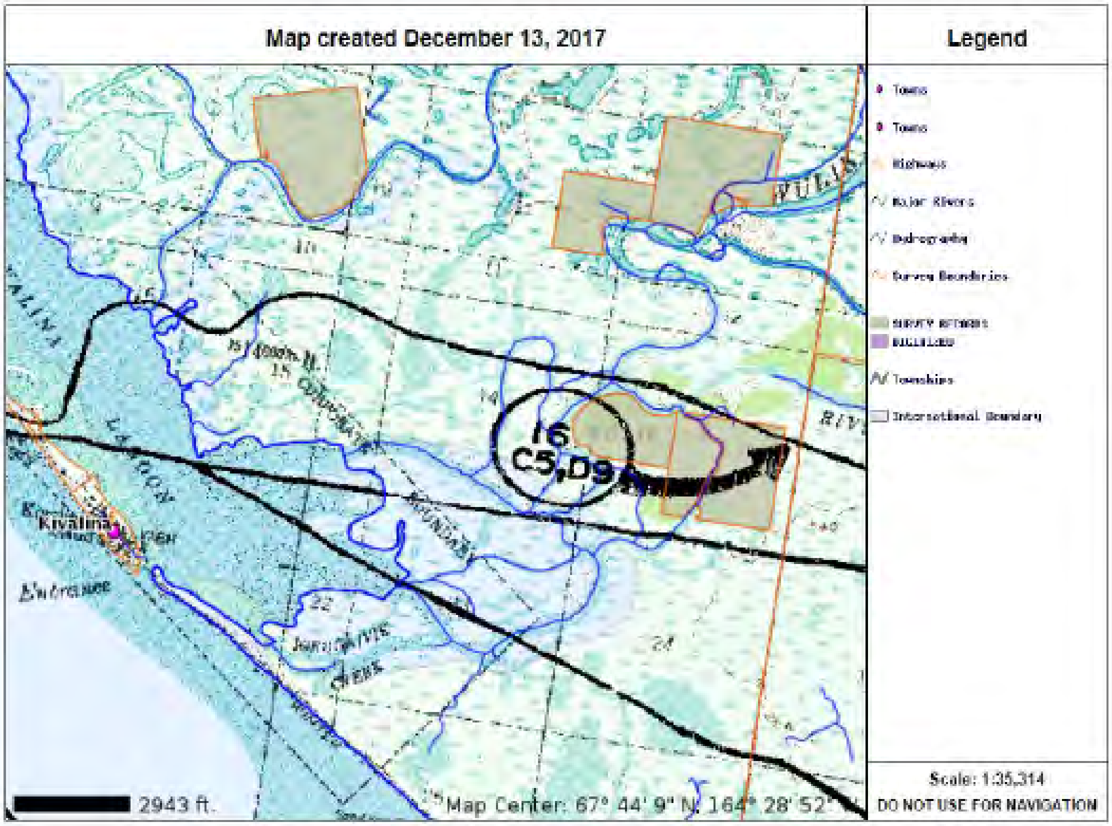


Figure 1. Map depicting 17(b) easements in vicinity of proposed Kivalina evacuation route. The map was created from BLM's SDMS site. https://sdms.ak.blm.gov/isdms/imf.jsp?site=sdms

2017-12-14 USF&WS Kivalina Meeting notes

Project Name & Number: Kivalina Evacuation Road

Meeting Location: 1:30-3:00

Teleconference Info: 1-866-546-3377 453 631#

Video-conference Info:

Date: 14 Dec 2017

Attendees - In Person

Steve Reidsma; John Baker; Sara Lindberg; paul.karczmarczyk@alaska.gov, Sarah Schacher brett.nelson@alaska.gov, Louise Smith, USFWS and Kaiti Ott, USFWS

Attendees - Virtual

Amy Sumner, SW Environmental

Problem Statement/Meeting Topic

Meeting Goals:

• Receive USFWS comments on Draft EA, learn if we can anticipate any comments that will require further analysis or evaluation prior to FONSI, or if any, can they be incorporated in as environmental commitments.

• Review Section 7 consultation letter, do they need any additional information?

• Summarize Draft 404 permit. Receive and preliminary comments they have now so we can revise the application if needed prior to submittal. Anticipated to be submitted to USACE in January 2018.

Previous Meeting Documents

12/19/2016. 1st Draft Notes USFWS: Kaiti Ott, Wildlife Section 7 Consultation; Louise Smith, USFWS Wildlife Biologist; Robert Henzey, Branch Chief; Paul Karczmarczyk, ADOT&PF; Sarah Schacher, AK DOT&PF; Jonathon Hutchinson, ADOT&PF; Katherine Keith, RS; John Baker, RS; Sara Lindberg, Stantec

12/12/2016. Scoping Comments from USFWS

Digital Files

Standing Agenda:

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4. Review task lists from the previous check in (On main Meeting Note page)
5. Identify work tasks that have been accomplished since the last check in
6. Identify work tasks that will be completed before the next check in
7. Identify any obstacles preventing the team from accomplishing the goals
8. Adjourn

Action items

- [ ] Sara Lindberg to provide USFWS estimated number of barge increase associated with construction
- [ ] Louise to provide simple email (comment deadline 12/15) outlining prior discussions and that USFWS concern items have been addressed. Will send to jonathan hutchinson
- [ ] Kaiti to follow up on how to move forward with Section 7 to conclude FONSI.
- [ ] Amy to find legal citation for need to complete NMFS and Section 7 consultation prior to concluding NEPA document.

Discussion items

Item	Who	Notes
		• **Louise:** questions on proposed gravel sites. Will they provide habitat for predatory fish of any nature? Understand they may create overwintering habitat for any species. Sara: NMFS asked the same question. Bill Morris did the EFH assessment. The species of white fish that is predatory does not exist in the project area. Even with regime changes with ice or reconfiguration of gravel sites, would this invite them? Bill does not believe so. It is too far from any other sources of these species to make it there. If an occasional one did make it there, they would be overwhelmed by volume of pinks and chums coming out. If She-fish did come up it would definitely become a subsistence resource. • **Louise**: clarify, southern route is preferred route? Yes. Team discussed how and why they came to this conclusion. John explained that for an evacuation route the shorter distance was preferred. The northern route is longer with more wetlands and more fish passage crossings. We therefore prefer the straightest route with less impacts that is closer to what the community had selected initially. • **Louise**: your proposed sources will provide enough for the gravel road? **John** explained K-Hill

will provide enough for whole project? Yes. Asked if school pad would be placed on in proximity to mining area. Team discussed school would be in vicinity, we designed for terminus near a proposed school site. Our intent is to not obviate a use a school site.

• **John**: the lagoon is 1-3 feet deep. There is a defined channel about 4' deep and it does not move in or out. A bridge will be constructed across it to provide for boat passage to get out to the ocean or the river. Bridge span will be approx. 160'. Along the causeway there will be overflow culverts to allow conveyance within the lagoon. **Louise**: what type of culverts? **Sarah:** to be determined, will be designed for fish passage. Not sure yet on exact sizing or type of bottom. **Sara**: aerial photos show historically this channel has not changed much at all. **Louise:** north slope rivers tend to flood and the areas are flat. John: ice from Wulik comes down and melts and ice melt stays within the channel. **Sara**: a Locations Hydraulic study has been completed to model worst case scenario, but road intended to be built above flood. Flooding historically tends to be widespread/flat, not a raging flows against road embankment. The mouth of Wulik has been stable. Louise: K-hill has elevation compared to Kivalina island? Yes. 10 identified water crossings but may include more equalization culverts. **Steve**: with material sites other than K-Hill, water table is within 12" of surface. So we will reclaim ponds after project. We will contour edges to have gradual slopes, creating a sedge marsh around it to encourage shrubby growth. Louise: is there shrub growth in the delta? **Steve**: yes. Appears to be good bird habitat. **Sara**: recall Bob Henzey suggested a year ago low scrub be higher value wetlands for the habitat reasons. Also we have more opportunities to create more with the reclamation.

• Randy, the USFWS fisheries expert told Louise earlier he was a little concerned about overwintering fish and predatory fish. But, **Louise** says if DFG says likelihood is slim, or would become a subsistence resource, and drainage all good with passage locations in the right place, does not see a lot of issue. **Sara**: does USFWS plan to write a comment letter for the EA? **Louise**: no. The overwintering/predatory was the largest concern. This is a different kind of project. Feels we have looked at several alternatives and considered all the relevant factors. **Louise**: do we see Kivalina eventually moving up to this area? **John**: we haven't discussed this, it is probably very divided in the community. **Paul:** it would be helpful to avoid the perception that we haven't avoided working with them. Even just an email saying we have discussed relevant factors and have no further concern. John also wants the community to see that there are not concerns. USACE permit application should go out first part of January so USFWS will be looking for that. Can USFWS join the team as we go through pre-application meeting with them line by line? **Sara**: who would comment on USACE app? **Kaiti** would be doing consultation with DOT&PF on Section 7, not sure if we would have other comments outside of Section 7. But may depend on what comes out in application. **Kaiti** says they could join in if we think it would help. Janet Post is leading at Corps, along with Jason Berkner.

• **Kaiti**: ESA. Very happy we will develop our own polar bear interaction plan. Not very concerned about polar bears denning near community. They den at very low density in the Chukchi. Probably can't measure impacts to denning polar bears associated with this project impact, and no appreciable impact to habitat. Already impacts by existing levels of human activity. This will be acknowledged in Section 7 but no adverse impacts. Listed eiders may pass through, but no adverse impacts. It's a little premature to initiate consultation as DOT&PF requested. When they do Section 7 consultation it's on final project design. They typically do this at same time application sent to USACE, and takes less than 30 days to process. **Brett:** un fortunately we need this consultation complete to complete a FONSI/sign our document. ESA can be challenged in court so FHWA likes these things to be lined out. We are the lead federal agency in this case. Did not want to get consultation done until USACE permit mod complete. USFWS was not aware this was our requirement. **Sara** said typically this has been informal consultation at agency scoping. **Steve**: clarify, does consultation start when USACE application goes in or USACE public notice? **Brett:** does a CE or EA trigger USFWS system differently? We mostly do CEs so not as experienced with EA. **Kaiti:** for Section 7 we just ask for BA when adverse impacts are anticipated, which we do not have here. With informal consultation, much quicker process. Sarah: is there a provisional way to move forward with some sort of provisional approval given basic parameters, or agreement USFWS will be involved as construction gets closer for more details/information?

• **Kaiti:** we don't want Section 7 to hold up our FONSI. Will discuss with Ted Swem. We don't want to have to do this twice either. But need to follow protocol and be aware of precedents. She needs a ballpark number of barges associated with construction impacts. **Brett**: NMFS has expedited consultation process, and had asked the same question. We are trying to be general enough to be flexible, but be specific enough. **Sarah**: is there a threshold number of barges that would trigger USFWS concern? **Kaiti**: Vessel traffic in open water season can pose a collision hazard for eiders/all birds, and probably marine mammals. So they need to have a way to try to estimate the probability of collisions with vessels. They can estimate potential take assessment and in BO. Just need this info to be consistent with how they evaluate every project.

• **John:** let's go back to Section 7 and FONSI. **Amy**: completion of consultation is required. She will look up actual legal reference for this. We need a concurrence from both NMFS and USFWS on not likely to be adverse effect finding. **Paul**: what does final really mean? Substantive changes in design? Grade changes? Because in big picture sense not a lot changes. **Brett**: this could also be addressed in re-eval process for more significant changes. **P aul:** short of a new material site, realignment, or major grade changes, does not see a lot of changes in the future. Not really a lot of options or other places to go. **Steve**: we have a

		footprint (conservative) we are taking to USACE, so we are fairly solid on there. Giving ourselves some flexibility for possible areas needed for widening, etc. Feels USFWS could consult off of this because it is the worst case scenario. We will permit the whole material site even though we are not using the whole thing, permitting a road wider than we anticipate building. What we permit will probably even be less than EA, as design has continued to be fine tuned.

		• **Sara:** sounds like we can work together to try to complete the Section 7 for the FONSI? **Kaiti** f eels they can do this and meet Jan 1 date. Email is fine to clarify barging? **Kaiti**: yes. Would causeway and road be illuminated? **Sarah**: No, only possibly reflective roadway delineators.

Parking Lot

DEPARTMENT OF THE ARMY
ALASKA DISTRICT, U.S. ARMY CORPS OF ENGINEERS
REGULATORY DIVISION
P.O. BOX 6898
JBER, AK 99506-0898

Regulatory Division
POA-2012-124

Stantec
Attention: Ms. Sara Lindberg
725 East Fireweed Lane, Suite 200
Anchorage, Alaska 99503

Dear Ms. Lindberg:

Thank you for the opportunity to review the Draft Environmental Assessment for the proposed Kivalina evacuation road, and the productive pre-application meeting. Your comprehensive analysis will aid us in making a timely evaluation of your forthcoming application. We greatly appreciate the collaboration between the US Army Corps of Engineers (USACE) and the Alaska Department of Transportation, and look forward to the input from other agencies and the public.

I am available to answer any questions, as your team is working through the USACE application process, so please do not hesitate to contact me by phone at (907)753-2831 or arrange another pre-application meeting.

Sincerely,

Janet Post

Janet Post
Project Manager

Lindberg, Sara

From: Leinberger, Dianna L (DNR) <dianna.leinberger@alaska.gov>
Sent: Friday, December 15, 2017 6:37 PM
To: Schacher, Sarah E (DOT); Lindberg, Sara
Cc: Anderson, Ryan (DOT); Nelson, Brett D (DOT); Karczmarczyk, Paul F (DOT); Reidsma, Steve; jkbaker.kotz@gmail.com; Pineault, Nanette C (DOT); Wait, Alexander J (DNR); Schick, Lesli J (DNR)
Subject: Kivalina Draft EA Comments

Follow Up Flag: Follow up
Flag Status: Flagged

Hello,

At today's Kivalina Draft Environmental Assessment (EA) meeting at DNR, it was asked if there were any concerns regarding water withdrawals. We touched base with our Water Section and they provided the following comments on the Draft EA.

1. The project will require Temporary Water Use Authorizations (which is not listed in the permitting section). There was an initial TWUA issued for the project (TWUA A2015-01), but it has expired and is closed.

2. The Wulik River has multiple water rights for public drinking water issued to the City of Kivalina (ADL 46323 and ADL 72129) and a reservation of water for the Wulik River issued to ADF&G (LAS 20067). None of these are mentioned in the report when discussing the river.

Also, in the meeting today I had mentioned that it would be best if the upland or terrestrial material sites did not include state owned submerged lands as it would be difficult to manage a site in which there were two land owners. For the Wulik River Relic Channel Source 2 as depicted in the Draft EA, figure 2, it appears to include some state submerged lands. In the handout that Steve provided, the "project components" page shows two distinct areas versus one larger area. The two smaller separate areas better reflect avoiding state submerged lands. It might be helpful to use that figure in the final EA to be clear that no state (DNR) material site authorizations would be required for the recommended potential material sources.

We would like thank the Department of Transportation and the Village of Kivalina for their early coordination on this important project. We appreciate the effort and all the hard work that has gone into a project that is so vital to the people of Kivalina. Thank you.

If you have any questions regarding our comments, please let us know.

Sincerely,
Dianna

Dianna Leinberger
Natural Resource Manager
Northern Region Office - Fairbanks
Division of Mining, Land & Water
Department of Natural Resources
(907) 451-2728

2017-12-18 Kivalina Road EPA Meeting notes

EPA Project Name & Number: Kivalina Evacuation Road

Meeting Location: Teleconference

Teleconference Info: Zoom

Video-conference Info: Zoom

Date: 18 Dec 2017

Attendees - In Person

- Katherine Keith
- paul.karczmarczyk@alaska.gov
- Sara Lindberg
- John Baker
- Molly Vaughn

Attendees - Virtual

Problem Statement/Meeting Topic

To Discuss the EPA Comments on the Draft EA.

Short Term Goals

Digital Files

EPA_Draft EA comments_memo.pdf

Standing Agenda:

1.

Action items

- [ ]

Discussion items

Item	Who	Notes	
EPA	Molly Vaughan	Got on the phone call with Molly Vaughan, EPA Anchorage Office, to discuss the project. Molly is fairly new to the project as she has not been a part of the ongoing agency coordination efforts. She has only been involved with the Kivalina Project for reading the EA. They have not coordinated with other agencies. Sara L went over the schedule to have a FONSI by Jan. 1. 2017 and asked Molly what level of detail we need to provide. SL: The amount of dust generated is going to minimal. The intent is that dust impacts would be addressed during the APDES and USACE 404 permitting processes and through an M&O agreement with the community which would include long term dust abatement measures. MV: The intent of the comments was to request the Final EA address expected higher intensity of travel if the school was built. The way the EA is written it appears the purpose of the project was to ultimately build access for a school. EPA feels the community should be familiar with the possible impacts of higher intensity road use on air quality and dust. There are potential concerns to subsistence resources from berries being covered in dust along the road. If the school is not reasonably foreseeable then maybe the EA needs to be revised. The text along with the title indicate that the project does include an expected future school to be located at the terminus. The comments were not intended to address a substantial concern but the impact analysis seems to be missing. Various resource sections make mention of cumulative impacts associated with the school but others do not. The team explained the project history and discussion of the school project. This project is to address the immediate need of the community to have a safe and reliable means of evacuation during a storm event, and the school project is not a part of the scope of this work. Not much in detail about the school project is known at this time. In addition, the location of the school site is still not finalized. MV: If the school is not a reasonably foreseeable future project and evaluation of it would be more speculative and remote, then it does not need to be evaluated in detail. The EA needs to show the best mitigation has been considered, a lot of detail is not needed to cover it. The team summarized the ongoing community involvement and support for this project, as well as the input received during the alternatives evaluation process, including consideration of berry picking areas. <u>Next Steps</u>: • If school is remote and speculative the comments are not relevant then the EA could be revised to reflect that. • Reasonably foreseeable impacts for the school will need to be included. • Make sure the intent for the long term M&O contract to address dust from potential future actions is clearly stated.	

Lindberg, Sara

From: Lindberg, Sara
Sent: Thursday, December 21, 2017 11:50 AM
To: Lindberg, Sara
Subject: EXTERNAL: RE: Coast Guard Call

From: Reidsma, Steve [mailto:Steve.Reidsma@mbakerintl.com]
Sent: Thursday, December 21, 2017 11:48 AM
To: Lindberg, Sara <sara.lindberg@stantec.com>
Cc: Nelson, Brett D (DOT) <brett.nelson@alaska.gov>; jonathan <Jonathan.hutchinson@alaska.gov>; paul.karczmarczyk@alaska.gov; John Baker (jkbaker.kotz@gmail.com) <jkbaker.kotz@gmail.com>; Katherine Keith <katherine@akremotesolutions.com>
Subject: RE: EXTERNAL: RE: Coast Guard Call

Jim Helfinstine, called today to discuss the Kivalina Evacuation Road project, and to provide guidance on the material he would like to see for the US Coast Guard permitting process. He has read the previous material that was sent to him about the project, and would like additional information.

I told him I would send him a series of emails (based on size of content), starting today (Dec 21) to respond to his comments.
These include the following:

1. Purpose/Need of Project (send previously)
2. Description of the Bridge and Approaches, using material from recent Agency Meetings
3. Description of navigation; what type of boats use the lagoon (photos help), is all subsistence based, is there commercial traffic
4. How will the local boater community be informed of potential closures during construction.
5. What is the timeline of the project, what are the funding sources, permitting status, Project team members
6. Agencies Consulted; Topics
7. Recap the DOT&PF/Federal Hwys 327 NEPA Program

Steve Reidsma

APPENDIX F

SECTION 106 CONSULTATION

Page

Department of Transportation and Public Facilities

THE STATE of ALASKA
GOVERNOR BILL WALKER

Northern Region
Design and Engineering Services
Preliminary Design and Environmental Section

2301 Peger Road
Fairbanks, Alaska 99709-5316
Main: 907-451-2237
Toll free: 800-451-2363
Fax: 907-451-5126

In Reply Refer To:
Kivalina Evacuation and School Site Access Road
Federal/State Project No. 0002384/NFHWY00162
Consultation Initiation

August 7, 2017

Ms. Judith Bittner
State Historic Preservation Officer
Alaska Office of History and Archaeology
550 W. 7th Avenue, Suite 1310
Anchorage, Alaska 99501-3565

Dear Ms. Bittner:

The Alaska Department of Transportation and Public Facilities (DOT&PF) is proposing to construct an evacuation road between Kivalina Island and a site on Kisimigiuqtuq Hill (K-Hill) (Figure 1). The project location is legally described in Table 1 below:

Table 1: Project Location

Section(s)	Township	Range	Meridian	USGS Quad
1, 2, 10, 11, 15, 16, 21	027N	026W	Kateel River	Noatak C-5
19. 20, 29, 30, 31	028N	026W	Kateel River	Noatak C-5
25, 26, 35, 36	029N	025W	Kateel River	Noatak C-5

Consultation is being conducted in accordance with the 2014 *Programmatic Agreement...for the Federal-Aid Highway Program in Alaska.* For purposes of the National Historic Preservation Act, we are initiating this consultation with you to assist us in identifying historic properties that may be affected by the proposed project.

Project Description

The proposed project origin would be at the City of Kivalina and the project terminus would be at K-Hill which is the evacuation site selected by the community. Originally three routes were

under consideration for the evacuation road location within the initial project Study Area. This has now been reduced to two potential route alignments which are currently being evaluated within the Preliminary Area of Potential Effect shown on Figure 1. Common to all route alternatives are the following actions:

- Construction of a causeway across the lagoon that may incorporate different hydrological openings including bridge(s), culvert(s), or both.
- Construction of an all-season gravel access road between Kivalina Island and the K-Hill evacuation site. The road would be designed to accommodate both general purpose and emergency evacuation vehicles over a two-way road with shoulders, multiple turnouts, and safe side slopes that may include guard rails and other safety features.
- Testing, analysis and development of material locations proximate to potential routes within the Preliminary APE to determine their feasibility and evaluate environmental impacts of their development (Figures 1-5).

Preliminary Area of Potential Effect (APE)
The Preliminary APE encompasses the direct footprint of the project, including two alternative route alignments, staging areas, and potential material sources that are variously located on NANA Regional Corporation, City of Kivalina, and DOT&PF-managed lands. The final APE will be defined after comments are received from your agency and other consulting parties.

Identification Efforts
A search of the Alaska Heritage Resources Survey (AHRS) database identified one site within the Preliminary APE which is described in table 2 below:

Table 2. AHRS Site Located within the Study Area

Site Number	Site Name	Site Description	Determination of Eligibility?
NOA-00042	Cape Krusenstern Archaeological District National Monument (NHL)	This district covers over 2 million acres, extending along the beach 8 miles and varying in width from 1-3 miles. 114 parallel marine beach ridges, formed at an average of 60 years each, are the main features. These former coastal margins contain houses, burials, cache pits, and other remains of the peoples who have occupied these beaches progressively for at least 5,000 years. This horizontal stratigraphy includes virtually the entire range of known cultural history in NW Alaska. Near the beach ridges, on unglaciated uplands, are two older sites dated from BP 11,000-6,000. The lower Noatak Valley, an important avenue between the coast and the interior for millennia, contains a number of archaeological sites. The villages of Noatak and Kivalina are within the district. The number of sites listed here includes only those cited as "important sites" in the Final Environmental Statement on Cape Krusenstern National Monument published in 1974. Other reports break down these major sites into many others. Includes	National Register Listed 05/03/1974

		NOA-00002, NOA-00078, NOA-00138, and NOA-00139.	

A literature review identified sixteen reports describing the results of cultural resource surveys conducted from the 1970s through 2016 within the initial Study Area. There are known archaeological and historical resources within the community of Kivalina south of the project origin, and south of the Wulik River mouth outside of the Study Area; however, no resources have been identified inland of Kivalina Lagoon within the Preliminary APE. The Preliminary APE is located within the boundaries of the Cape Krusenstern Archaeological District National Historic Landmark (NOA-00042). In January 2016, an archaeological predictive model was developed for the Study Area, and an archaeological survey of alternative route alignments and proposed material sites was conducted in September-October 2016. This field investigation involved pedestrian survey and subsurface testing at potentially sensitive locations identified in the predictive model and during the pedestrian survey along the three routes originally under consideration. The results of the field investigation are included in the *Kivalina Evacuation and School Site Access Road* report produced by Stantec for DOT&PF (Attachment 1). Testing locations along the abandoned northern route are shown on Figure 1. The entire northern route is shown on Figure one of Appendix D of the report. No archaeological sites or historic properties were identified along the three alternative routes, or within the material sites that were defined at that time.

DOT&PF intends to send a cultural resource survey team in the summer of 2017 to conduct addition fieldwork within the preliminary APE. The results of this work will be provided to the State Historic Preservation Officer and National Park Service for review upon its completion.

Under the Alaska Historic Roads Programmatic Agreement Interim Guidance, a group of Alaska roads has been identified which are being treated as eligible for the National Register of Historic Places (NRHP). This project does not affect any of these roads.

Consultation Efforts

The following consulting parties are being contacted regarding this project: the Alaska State Historic Preservation Officer (SHPO); the National Park Service (NPS); the Native Village of Kivalina; the City of Kivalina; the Native Village of Noatak; NANA Regional Corporation; the Northwest Arctic Borough; NPS-Western Arctic National Parklands; and the Bureau of Indian Affairs (BIA).

If you have questions or comments related to this proposed project, or corrections and/or additions to the contact list, I can be reached at the address above, by telephone at 907-451-5293, or by e-mail at *thomas.gamza@alaska.gov*.

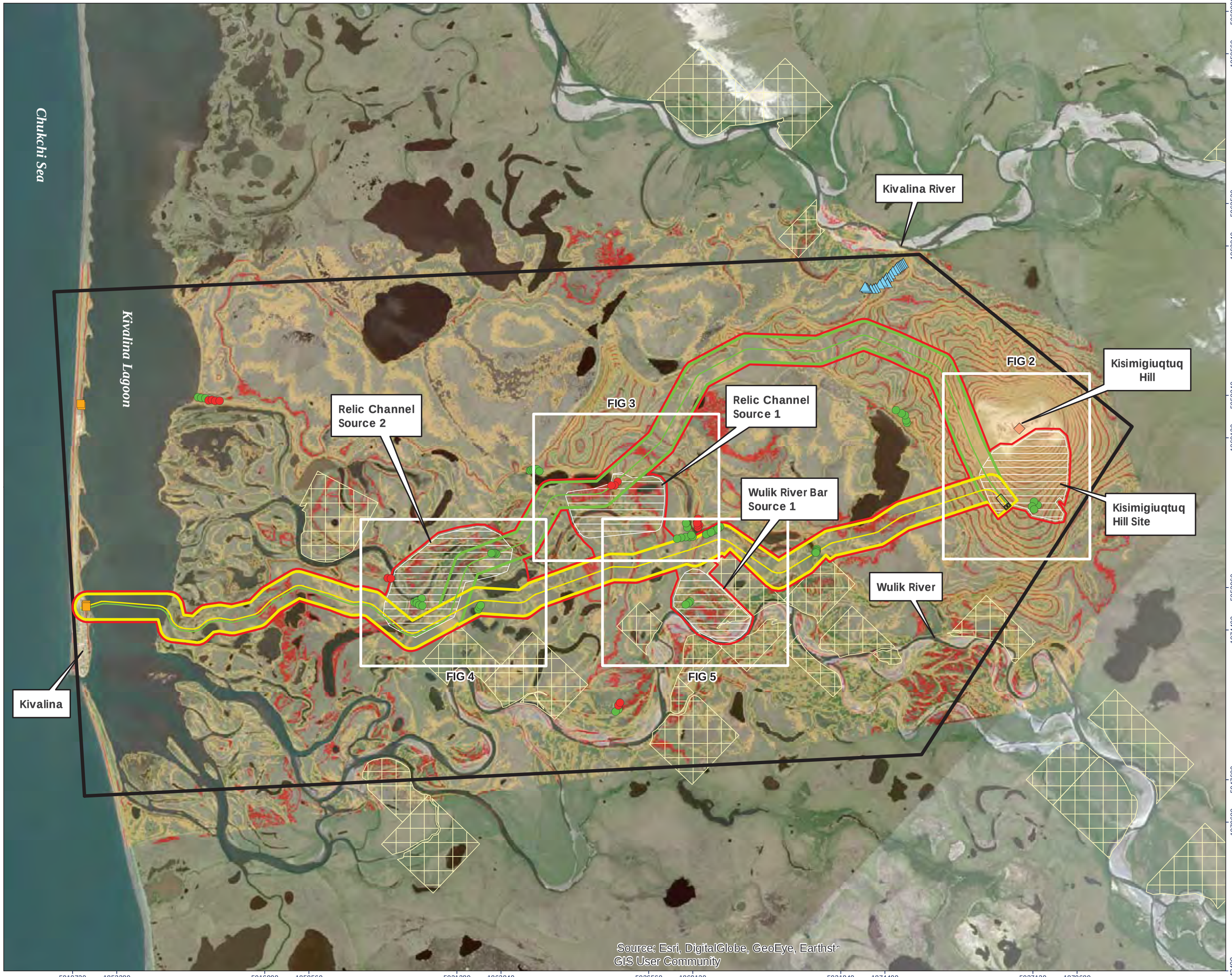
We request your input on our proposal so that we can incorporate your concerns into project development. Your timely response will greatly assist our compliance efforts and the preparation of any required environmental documentation. For that purpose, we request that you respond within thirty days of your receipt of this correspondence.

Sincerely,

Thomas A. Gamza
Cultural Resource Specialist-Archaeologist (PQI)
State of Alaska DOT&PF, Northern Region

Figure 1: Location and Vicinity Map
Figures 2-5 Proposed Material Site Investigation APE
Attachment 1: OHA Coversheet and Report: *Kivalina Evacuation and School Site Access Road*

Electronic cc w/ enclosures:
Michael Cain, FHWA Alaska Division, Northern Region Area Engineer
Jonathan Hutchinson, P.E., DOT&PF Northern Region, Project Manager
Paul Karczmarczyk, DOT&PF Northern Region, Environmental Impact Analyst
Brett Nelson, DOT&PF Northern Region, Regional Environmental Manager
Kathy Price, DOT&PF, Statewide Cultural Resources Manager
Amy Sumner, DOT&PF Statewide Environmental NEPA Manager



Legend

- Study Area
- Area of Potential Effect (APE)
- Southern Route - 7.7 miles
- Combined Route B - 8.9 Miles
- Potential Material Source
- Native Allotments
- Shovel Test Probe - Local
- Shovel Test Probe - Probability
- Assessed Feature
- Soil Probe
- Test Unit

0 0.4 0.8 Miles

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Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
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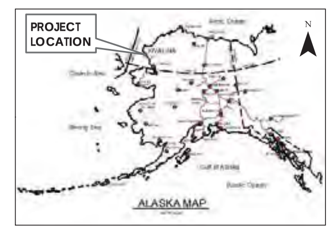

STATE OF ALASKA
Department of Transportation and Public Facilities
2301 Peger Road Fairbanks, AK 99709

KIVALINA EVACUATION AND SCHOOL SITE ACCESS ROAD

Area of Potential Effect - Overview

DATE: August, 2017

FIGURE 1

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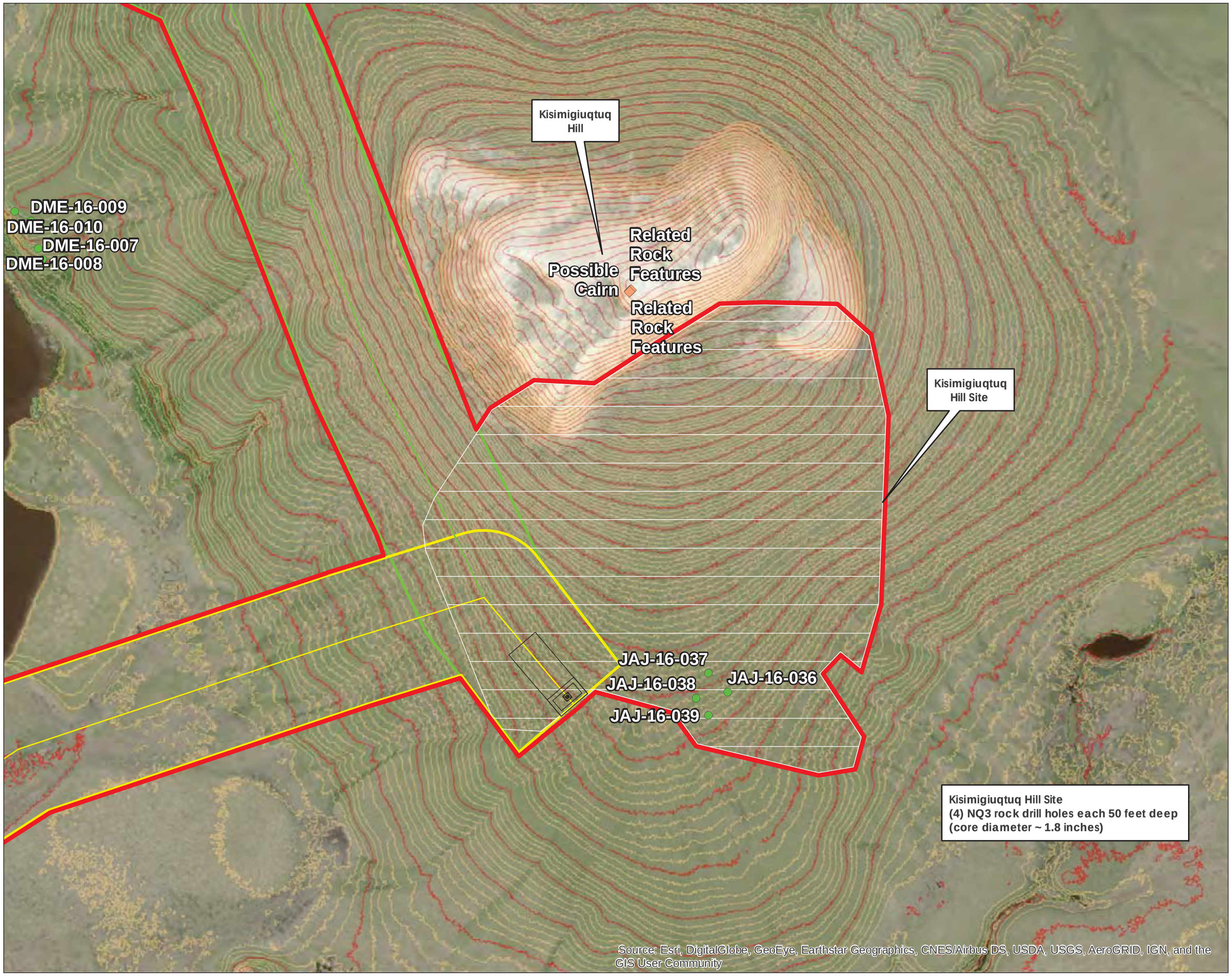

Legend

- Area of Potential Effect (APE)
- Southern Route - 7.7 miles
- Combined Route B- 8.9 Miles
- Potential Material Source
- Native Allotments
- Shovel Test Probe - Local
- Shovel Test Probe - Probability
- Assessed Feature
- Soil Probe
- Test Unit

0 600 1,200 Feet

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Notes

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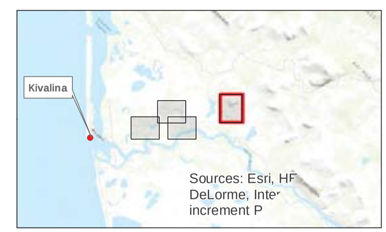

STATE OF ALASKA
Department of Transportation and Public Facilities
2301 Peger Road Fairbanks, AK 99709

KIVALINA EVACUATION AND SCHOOL SITE ACCESS ROAD

Area of Potential Effect

DATE: August, 2017

FIGURE 2

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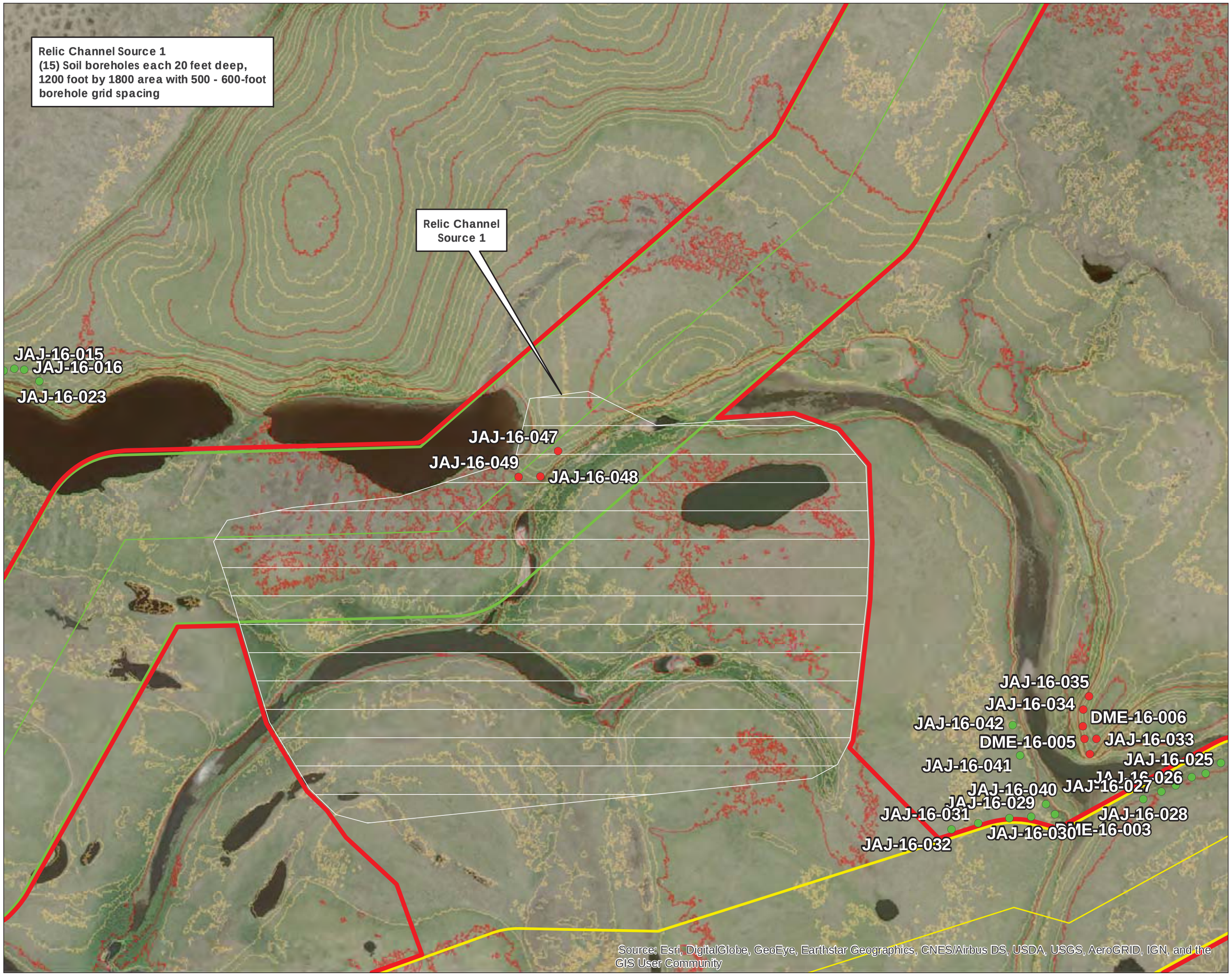

Legend

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- Shovel Test Probe - Probability
- Assessed Feature
- Soil Probe
- Test Unit

0 475 950 Feet

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Notes

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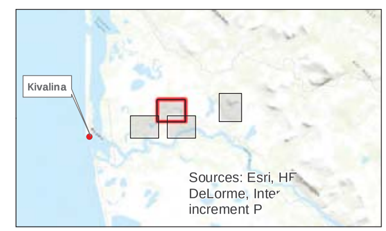

STATE OF ALASKA
Department of Transportation and Public Facilities
2301 Peger Road Fairbanks, AK 99709

KIVALINA EVACUATION AND SCHOOL SITE ACCESS ROAD

Area of Potential Effect

DATE: August, 2017

FIGURE 3

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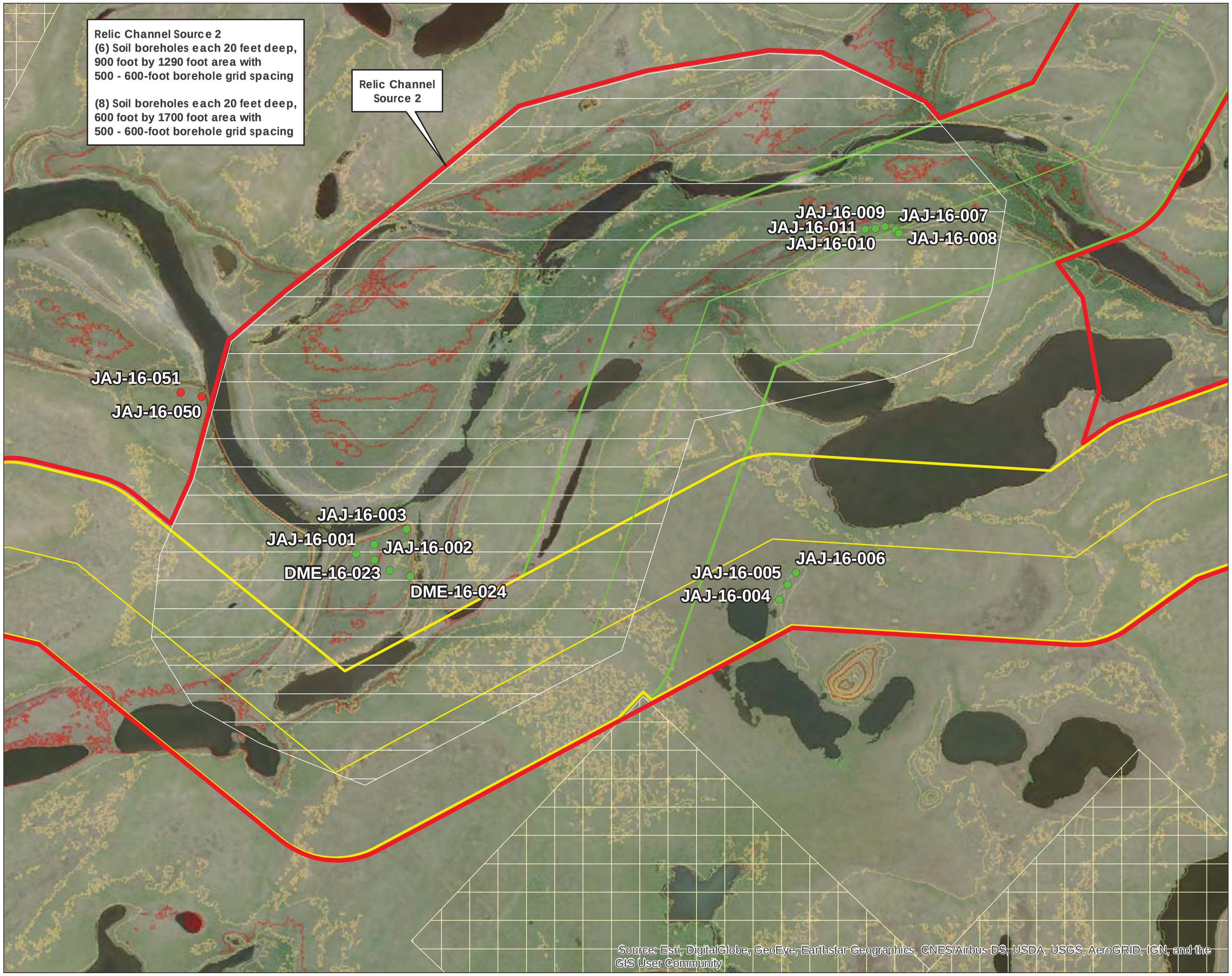
U:\204705102\GIS\mxd\Section 106\204705102_Sec106_Fig-2_Fig-5_Detail.mxd Revised: 2017-08-04 By: cpannone



Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
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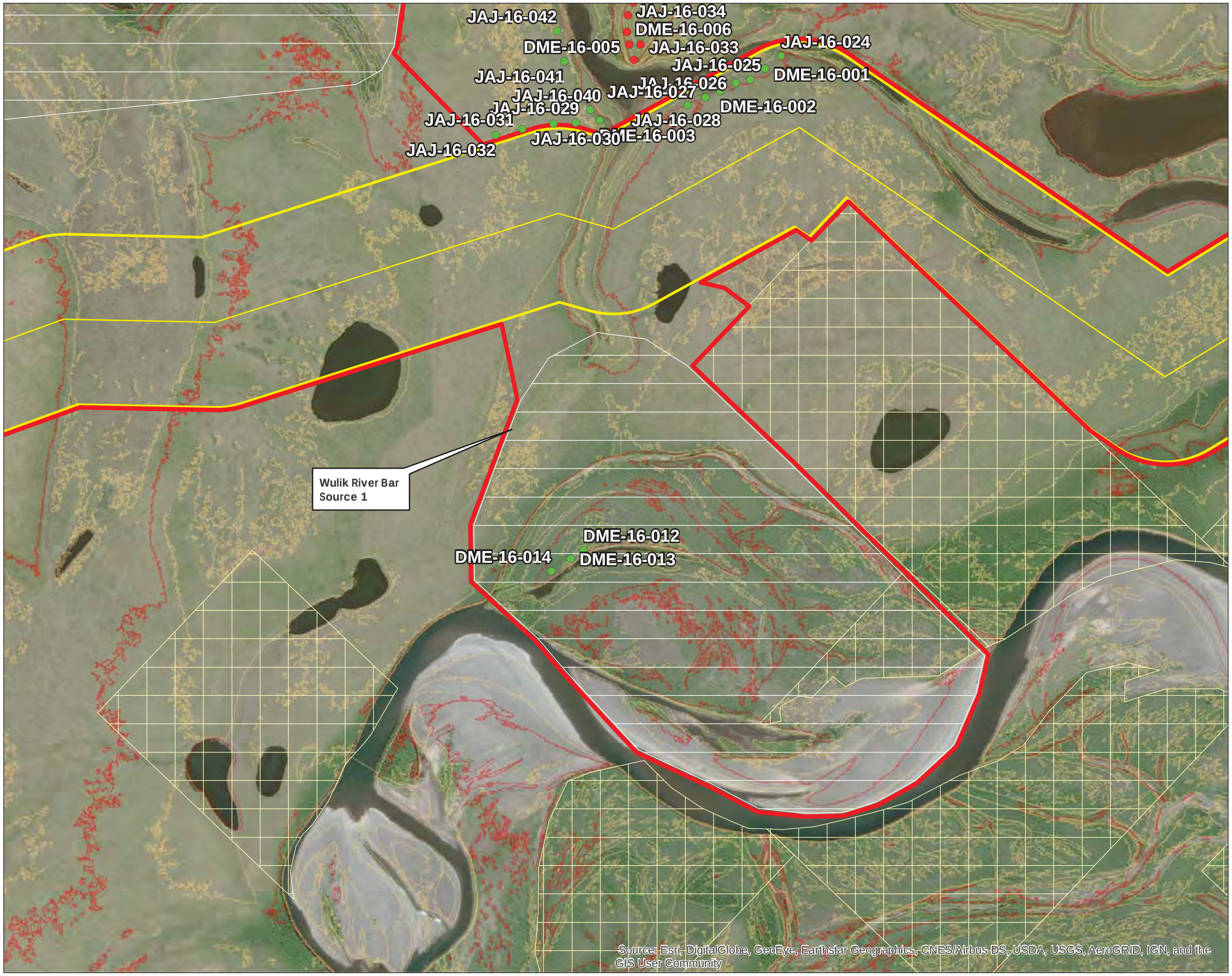
STATE OF ALASKA
Department of Transportation and Public Facilities
2301 Peger Road Fairbanks, AK 99709

KIVALINA EVACUATION AND SCHOOL SITE ACCESS ROAD

Area of Potential Effect

DATE: August, 2017 | FIGURE 4



Legend

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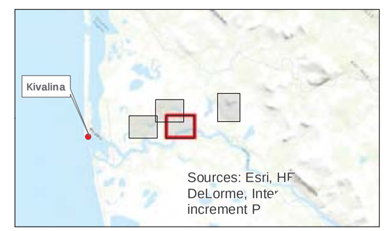
Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
2. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011;' ©AeroMetric Inc., 2013; Digital Globe 2016



STATE OF ALASKA
Department of Transportation and Public Facilities
2301 Peger Road Fairbanks, AK 99709

KIVALINA EVACUATION AND SCHOOL SITE ACCESS ROAD

Area of Potential Effect

DATE: August, 2017

FIGURE 5

Department of Transportation and Public Facilities

THE STATE of ALASKA

GOVERNOR BILL WALKER

Northern Region
Design and Engineering Services
Preliminary Design and Environmental Section

2301 Peger Road
Fairbanks, Alaska 99709-5316
Main: 907-451-2237
Toll free: 800-451-2363
Fax: 907-451-5126

In Reply Refer To:
Kivalina Evacuation and School Site Access Road
Federal/State Project No. 0002384/NFHWY00162
Consultation Initiation

August 7, 2017

Bert Frost
Regional Director
Alaska Regional Office
National Park Service
240 West 5th Avenue
Anchorage, AK 99501

Dear Mr. Frost:

The Alaska Department of Transportation and Public Facilities (DOT&PF) is proposing to construct an evacuation road between Kivalina Island and a site on Kisimigiuqtuq Hill (K-Hill) (Figure 1). The project location is legally described in Table 1 below:

Table 1: Project Location

Section(s)	Township	Range	Meridian	USGS Quad
1, 2, 10, 11, 15, 16, 21	027N	026W	Kateel River	Noatak C-5
19. 20, 29, 30, 31	028N	026W	Kateel River	Noatak C-5
25, 26, 35, 36	029N	025W	Kateel River	Noatak C-5

Consultation is being conducted in accordance with the 2014 *Programmatic Agreement…for the Federal-Aid Highway Program in Alaska.* For purposes of the National Historic Preservation Act, we are initiating this consultation with you to assist us in identifying historic properties that may be affected by the proposed project.

Project Description

The proposed project origin would be at the City of Kivalina and the project terminus would be at K-Hill which is the evacuation site selected by the community. Originally three routes were under consideration for the evacuation road location within the initial project Study Area. This has now been reduced to two potential route alignments which are currently being evaluated within the Preliminary Area of Potential Effect shown on Figure 1. Common to all route alternatives are the following actions:

- Construction of a causeway across the lagoon that may incorporate different hydrological openings including bridge(s), culvert(s), or both.
- Construction of an all-season gravel access road between Kivalina Island and the K-Hill evacuation site. The road would be designed to accommodate both general purpose and emergency evacuation vehicles over a two-way road with shoulders, multiple turnouts, and safe side slopes that may include guard rails and other safety features.
- Testing, analysis and development of material locations proximate to potential routes within the Preliminary APE to determine their feasibility and evaluate environmental impacts of their development (Figures 1-5).

Preliminary Area of Potential Effect (APE)

The Preliminary APE encompasses the direct footprint of the project, including two alternative route alignments, staging areas, and potential material sources that are variously located on NANA Regional Corporation, City of Kivalina, and DOT&PF-managed lands. The final APE will be defined after comments are received from your agency and other consulting parties.

Identification Efforts

A search of the Alaska Heritage Resources Survey (AHRS) database identified one site within the Preliminary APE which is described in table 2 below:

Table 2. AHRS Site Located within the Study Area

Site Number	Site Name	Site Description	Determination of Eligibility?
NOA-00042	Cape Krusenstern Archaeological District National Monument (NHL)	This district covers over 2 million acres, extending along the beach 8 miles and varying in width from 1-3 miles. 114 parallel marine beach ridges, formed at an average of 60 years each, are the main features. These former coastal margins contain houses, burials, cache pits, and other remains of the peoples who have occupied these beaches progressively for at least 5,000 years. This horizontal stratigraphy includes virtually the entire range of known cultural history in NW Alaska. Near the beach ridges, on unglaciated uplands, are two older sites dated from BP 11,000-6,000. The lower Noatak Valley, an important avenue between the coast and the interior for millennia, contains a number of archaeological sites. The villages of Noatak and Kivalina are within the district. The number of sites listed here includes only those cited as	National Register Listed 05/03/1974

		"important sites" in the Final Environmental Statement on Cape Krusenstern National Monument published in 1974. Other reports break down these major sites into many others. Includes NOA-00002, NOA-00078, NOA-00138, and NOA-00139.	

A literature review identified sixteen reports describing the results of cultural resource surveys conducted from the 1970s through 2016 within the initial Study Area. There are known archaeological and historical resources within the community of Kivalina south of the project origin, and south of the Wulik River mouth outside of the Study Area; however, no resources have been identified inland of Kivalina Lagoon within the Preliminary APE. The Preliminary APE is located within the boundaries of the Cape Krusenstern Archaeological District National Historic Landmark (NOA-00042). In January 2016, an archaeological predictive model was developed for the Study Area, and an archaeological survey of alternative route alignments and proposed material sites was conducted in September-October 2016. This field investigation involved pedestrian survey and subsurface testing at potentially sensitive locations identified in the predictive model and during the pedestrian survey along the three routes originally under consideration. The results of the field investigation are included in the *Kivalina Evacuation and School Site Access Road* report produced by Stantec for DOT&PF. Testing locations along the abandoned northern route are shown on Figure 1. No archaeological sites or historic properties were identified along the three alternative routes, or within the material sites that were defined at that time.

DOT&PF intends to send a cultural resource survey team in the summer of 2017 to conduct addition fieldwork within the preliminary APE. The results of this work will be provided to the State Historic Preservation Officer and National Park Service for review upon its completion.

Under the Alaska Historic Roads Programmatic Agreement Interim Guidance, a group of Alaska roads has been identified which are being treated as eligible for the National Register of Historic Places (NRHP). This project does not affect any of these roads.

Consultation Efforts

The following consulting parties are being contacted regarding this project: the Alaska State Historic Preservation Officer (SHPO); the National Park Service (NPS); the Native Village of Kivalina; the City of Kivalina; the Native Village of Noatak; NANA Regional Corporation; the Northwest Arctic Borough; NPS-Western Arctic National Parklands; and the Bureau of Indian Affairs (BIA).

If you have questions or comments related to this proposed project, or corrections and/or additions to the contact list, I can be reached at the address above, by telephone at 907-451-5293, or by e-mail at *thomas.gamza@alaska.gov*.

We request your input on our proposal so that we can incorporate your concerns into project development. Your timely response will greatly assist our compliance efforts and the preparation of any required environmental documentation. For that purpose, we request that you respond within thirty days of your receipt of this correspondence.

Sincerely,

Thomas A. Gamza
Cultural Resource Specialist-Archaeologist (PQI)
State of Alaska DOT&PF, Northern Region

Figure 1: Location and Vicinity Map
Figures 2-5 Proposed Material Site Investigation APE

Electronic cc w/ enclosures:
Michael Cain, FHWA Alaska Division, Northern Region Area Engineer
Jonathan Hutchinson, P.E., DOT&PF Northern Region, Project Manager
Paul Karczmarczyk, DOT&PF Northern Region, Environmental Impact Analyst
Brett Nelson, DOT&PF Northern Region, Regional Environmental Manager
Kathy Price, DOT&PF, Statewide Cultural Resources Manager
Amy Sumner, DOT&PF Statewide Environmental NEPA Manager

Department of Transportation and Public Facilities

THE STATE of ALASKA

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In Reply Refer To:
Kivalina Evacuation and School Site Access Road
Federal/State Project No. 0002384/NFHWY00162
Consultation Initiation

August 7, 2017

Maija Lukin
Superintendent
NPS-Western Arctic National Parklands
PO Box 1029
Kotzebue, AK 99752

Dear Ms. Lukin:

The Alaska Department of Transportation and Public Facilities (DOT&PF) is proposing to construct an evacuation road between Kivalina Island and a site on Kisimigiuqtuq Hill (K-Hill) (Figure 1). The project location is legally described in Table 1 below:

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Consultation is being conducted in accordance with the 2014 *Programmatic Agreement...for the Federal-Aid Highway Program in Alaska.* For purposes of the National Historic Preservation Act, we are initiating this consultation with you to assist us in identifying historic properties that may be affected by the proposed project.

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under consideration for the evacuation road location within the initial project Study Area. This has now been reduced to two potential route alignments which are currently being evaluated within the Preliminary Area of Potential Effect shown on Figure 1. Common to all route alternatives are the following actions:

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We request your input on our proposal so that we can incorporate your concerns into project development. Your timely response will greatly assist our compliance efforts and the preparation of any required environmental documentation. For that purpose, we request that you respond within thirty days of your receipt of this correspondence.

Sincerely,

Thomas A. Gamza
Cultural Resource Specialist-Archaeologist (PQI)
State of Alaska DOT&PF, Northern Region

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Figures 2-5 Proposed Material Site Investigation APE

Electronic cc w/ enclosures:
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Paul Karczmarczyk, DOT&PF Northern Region, Environmental Impact Analyst
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Department of Transportation and Public Facilities

THE STATE of ALASKA

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Northern Region
Design and Engineering Services
Preliminary Design and Environmental Section

2301 Peger Road
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In Reply Refer To:
Kivalina Evacuation and School Site Access Road
Federal/State Project No. 0002384/NFHWY00162
Consultation Initiation

August 7, 2017

Rhea Hood
Archeologist
Alaska Regional Office
National Park Service
240 West 5th Avenue
Anchorage, AK 99501

Dear Ms. Hood:

The Alaska Department of Transportation and Public Facilities (DOT&PF) is proposing to construct an evacuation road between Kivalina Island and a site on Kisimigiuqtuq Hill (K-Hill) (Figure 1). The project location is legally described in Table 1 below:

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DOT&PF intends to send a cultural resource survey team in the summer of 2017 to conduct addition fieldwork within the preliminary APE. The results of this work will be provided to the State Historic Preservation Officer and National Park Service for review upon its completion.

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Thomas A. Gamza
Cultural Resource Specialist-Archaeologist (PQI)
State of Alaska DOT&PF, Northern Region

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Attachment 1: Report: *Kivalina Evacuation and School Site Access Road*

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In Reply Refer To:
Kivalina Evacuation and School Site Access Road
Federal/State Project No. 0002384/NFHWY00162
Consultation Initiation

August 7, 2017

Wayne Westlake
President & CEO
NANA Regional Corporation, Inc.
909 West 9th Avenue
Anchorage, AK 99501

Dear Mr. Westlake:

The Alaska Department of Transportation and Public Facilities (DOT&PF) is proposing to construct an evacuation road between Kivalina Island and a site on Kisimigiuqtuq Hill (K-Hill) (Figure 1). The project location is legally described in Table 1 below:

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August 7, 2017

John Lincoln
Vice President of Lands
NANA Regional Corporation, Inc.
909 West 9th Avenue
Anchorage, AK 99501

Dear Mr. Lincoln:

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DOT&PF intends to send a cultural resource survey team in the summer of 2017 to conduct addition fieldwork within the preliminary APE. The results of this work will be provided to the State Historic Preservation Officer and National Park Service for review upon its completion.

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Sincerely,

Thomas A. Gamza
Cultural Resource Specialist-Archaeologist (PQI)
State of Alaska DOT&PF, Northern Region

Figure 1: Location and Vicinity Map
Figures 2-5 Proposed Material Site Investigation APE

Electronic cc w/ enclosures:
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Amy Sumner, DOT&PF Statewide Environmental NEPA Manager

THE STATE of ALASKA

GOVERNOR BILL WALKER

Department of Transportation and Public Facilities

Northern Region
Design and Engineering Services
Preliminary Design and Environmental Section

2301 Peger Road
Fairbanks, Alaska 99709-5316
Main: 907-451-2237
Toll free: 800-451-2363
Fax: 907-451-5126

In Reply Refer To:
Kivalina Evacuation and School Site Access Road
Federal/State Project No. 0002384/NFHWY00162
Consultation Initiation

August 7, 2017

Millie Hawley
President
Native Village of Kivalina
PO Box 50051
Kivalina, AK 99750

Dear Ms. Hawley:

The Alaska Department of Transportation and Public Facilities (DOT&PF) is proposing to construct an evacuation road between Kivalina Island and a site on Kisimigiuqtuq Hill (K-Hill) (Figure 1). The project location is legally described in Table 1 below:

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Consultation is being conducted in accordance with the 2014 *Programmatic Agreement...for the Federal-Aid Highway Program in Alaska.* For purposes of the National Historic Preservation Act, we are initiating this consultation with you to assist us in identifying historic properties that may be affected by the proposed project.

Project Description

The proposed project origin would be at the City of Kivalina and the project terminus would be at K-Hill which is the evacuation site selected by the community. Originally three routes were

under consideration for the evacuation road location within the initial project Study Area. This has now been reduced to two potential route alignments which are currently being evaluated within the Preliminary Area of Potential Effect shown on Figure 1. Common to all route alternatives are the following actions:

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If you have questions or comments related to this proposed project, or corrections and/or additions to the contact list, I can be reached at the address above, by telephone at 907-451-5293, or by e-mail at *thomas.gamza@alaska.gov*. Should you prefer to conduct government-to-government consultation with the Federal Highway Administration (FHWA) on this project, please advise me of your request.

We request your input on our proposal so that we can incorporate your concerns into project development. Your timely response will greatly assist our compliance efforts and the preparation of any required environmental documentation. For that purpose, we request that you respond within thirty days of your receipt of this correspondence.

Sincerely,

Thomas A. Gamza
Cultural Resource Specialist-Archaeologist (PQI)
State of Alaska DOT&PF, Northern Region

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Figures 2-5 Proposed Material Site Investigation APE

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Amy Sumner, DOT&PF Statewide Environmental NEPA Manager

Project Consultation Options

Native Village of Kivalina

Project Name: **Kivalina Evacuation and School Site Access Road**
State/Federal Project Numbers: **0002384/NFHWY00162**

I. Please check the appropriate response(s) from the list below and use the back of this form or additional sheets if you wish to make comments:

____ There are no known places of traditional religious or cultural importance present or within the vicinity of the proposed project and further consultation is not requested.

____ There are or may be places of traditional religious or cultural importance present or within the vicinity of the proposed project and further consultation is requested (*select one*):

____ We will continue consultations for this proposed project directly with **Tom Gamza Cultural Resource Specialist-Archaeologist**, with the understanding that we may at our discretion request consultations directly with the Federal Highway Administration.

____ We prefer to consult directly with the Federal Highway Administration on this project.

____ We have no interest associated with this proposed project and further consultation is not required.

II. If you have chosen to consult, please indicate the manner(s) in which you wish to continue consultation, and your preferred contact person for this project:

Name of our designated contact person for this proposed project:

____
(Please print)

We would like to continue consultation via:

☐ Phone ☐ Fax ☐ Mail ☐ E-mail ☐ Other: (please describe) ____________________

If you prefer consultation by phone, fax, email, or a different mailing address than was used on this letter, please provide that contact information here:

____

____

III. Signed: ______________________________ Date: ____________
[Name and title of formal Tribal representative]

Please mail (or email) to:
Thomas A. Gamza Cultural Resource Specialist-Archaeologist (907)452-5293
thomas.gamza@alaska.gov of DOT&PF Professionally Qualified Individual
Or, fax to: **Tom Gamza, Archaeologist 907-451-5126**

TG

THE STATE of ALASKA

GOVERNOR BILL WALKER

Department of Transportation and Public Facilities

Northern Region
Design and Engineering Services
Preliminary Design and Environmental Section

2301 Peger Road
Fairbanks, Alaska 99709-5316
Main: 907-451-2237
Toll free: 800-451-2363
Fax: 907-451-5126

In Reply Refer To:
Kivalina Evacuation and School Site Access Road
Federal/State Project No. 0002384/NFHWY00162
Consultation Initiation

August 7, 2017

Vernon Adams, Sr.
President
Native Village of Noatak
PO Box 89
Noatak, AK 99761

Dear Mr. Adams:

The Alaska Department of Transportation and Public Facilities (DOT&PF) is proposing to construct an evacuation road between Kivalina Island and a site on Kisimigiuqtuq Hill (K-Hill) (Figure 1). The project location is legally described in Table 1 below:

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Consultation is being conducted in accordance with the 2014 *Programmatic Agreement...for the Federal-Aid Highway Program in Alaska.* For purposes of the National Historic Preservation Act, we are initiating this consultation with you to assist us in identifying historic properties that may be affected by the proposed project.

Project Description

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Cultural Resource Specialist-Archaeologist (PQI)
State of Alaska DOT&PF, Northern Region

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Figures 2-5 Proposed Material Site Investigation APE

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Project Consultation Options

Native Village of Noatak

Project Name: **Kivalina Evacuation and School Site Access Road**
State/Federal Project Numbers: **0002384/NFHWY00162**

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Name of our designated contact person for this proposed project:

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We would like to continue consultation via:

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If you prefer consultation by phone, fax, email, or a different mailing address than was used on this letter, please provide that contact information here:

____

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III. Signed: ______________________________ Date: ____________
[Name and title of formal Tribal representative]

Please mail (or email) to:
Thomas A. Gamza Cultural Resource Specialist-Archaeologist (907)452-5293
thomas.gamza@alaska.gov of DOT&PF Professionally Qualified Individual
Or, fax to: **Tom Gamza, Archaeologist 907-451-5126**

TM

THE STATE of ALASKA
GOVERNOR BILL WALKER

Department of Transportation and Public Facilities

Northern Region
Design and Engineering Services
Preliminary Design and Environmental Section

2301 Peger Road
Fairbanks, Alaska 99709-5316
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In Reply Refer To:
Kivalina Evacuation and School Site Access Road
Federal/State Project No. 0002384/NFHWY00162
Consultation Initiation

August 7, 2017

Honorable Clement Richards, Sr.
Borough Mayor
Northwest Arctic Borough
P.O. Box 1110
Kotzebue, AK 99752

Dear Mayor Richards:

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Sincerely,

Thomas A. Gamza
Cultural Resource Specialist-Archaeologist (PQI)
State of Alaska DOT&PF, Northern Region

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THE STATE of ALASKA
GOVERNOR BILL WALKER

Department of Transportation and Public Facilities

Northern Region
Design and Engineering Services
Preliminary Design and Environmental Section

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In Reply Refer To:
Kivalina Evacuation and School Site Access Road
Federal/State Project No. 0002384/NFHWY00162
Consultation Initiation

August 7, 2017

Honorable Austin Swan Sr.
Mayor
City of Kivalina
PO Box 50079
Kivalina, AK 99752

Dear Mr. Swan:

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25, 26, 35, 36	029N	025W	Kateel River	Noatak C-5

Consultation is being conducted in accordance with the 2014 *Programmatic Agreement…for the Federal-Aid Highway Program in Alaska.* For purposes of the National Historic Preservation Act, we are initiating this consultation with you to assist us in identifying historic properties that may be affected by the proposed project.

Project Description

The proposed project origin would be at the City of Kivalina and the project terminus would be at K-Hill which is the evacuation site selected by the community. Originally three routes were

under consideration for the evacuation road location within the initial project Study Area. This has now been reduced to two potential route alignments which are currently being evaluated within the Preliminary Area of Potential Effect shown on Figure 1. Common to all route alternatives are the following actions:

- Construction of a causeway across the lagoon that may incorporate different hydrological openings including bridge(s), culvert(s), or both.
- Construction of an all-season gravel access road between Kivalina Island and the K-Hill evacuation site. The road would be designed to accommodate both general purpose and emergency evacuation vehicles over a two-way road with shoulders, multiple turnouts, and safe side slopes that may include guard rails and other safety features.
- Testing, analysis and development of material locations proximate to potential routes within the Preliminary APE to determine their feasibility and evaluate environmental impacts of their development (Figures 1-5).

Preliminary Area of Potential Effect (APE)

The Preliminary APE encompasses the direct footprint of the project, including two alternative route alignments, staging areas, and potential material sources that are variously located on NANA Regional Corporation, City of Kivalina, and DOT&PF-managed lands. The final APE will be defined after comments are received from your agency and other consulting parties.

Identification Efforts

A search of the Alaska Heritage Resources Survey (AHRS) database identified one site within the Preliminary APE which is described in table 2 below:

Table 2. AHRS Site Located within the Study Area

Site Number	Site Name	Site Description	Determination of Eligibility?
NOA-00042	Cape Krusenstern Archaeological District National Monument (NHL)	This district covers over 2 million acres, extending along the beach 8 miles and varying in width from 1-3 miles. 114 parallel marine beach ridges, formed at an average of 60 years each, are the main features. These former coastal margins contain houses, burials, cache pits, and other remains of the peoples who have occupied these beaches progressively for at least 5,000 years. This horizontal stratigraphy includes virtually the entire range of known cultural history in NW Alaska. Near the beach ridges, on unglaciated uplands, are two older sites dated from BP 11,000-6,000. The lower Noatak Valley, an important avenue between the coast and the interior for millennia, contains a number of archaeological sites. The villages of Noatak and Kivalina are within the district. The number of sites listed here includes only those cited as "important sites" in the Final Environmental Statement on Cape Krusenstern National Monument published in 1974. Other reports break down these major sites into many others. Includes	National Register Listed 05/03/1974

		NOA-00002, NOA-00078, NOA-00138, and NOA-00139.	

A literature review identified sixteen reports describing the results of cultural resource surveys conducted from the 1970s through 2016 within the initial Study Area. There are known archaeological and historical resources within the community of Kivalina south of the project origin, and south of the Wulik River mouth outside of the Study Area; however, no resources have been identified inland of Kivalina Lagoon within the Preliminary APE. The Preliminary APE is located within the boundaries of the Cape Krusenstern Archaeological District National Historic Landmark (NOA-00042). In January 2016, an archaeological predictive model was developed for the Study Area, and an archaeological survey of alternative route alignments and proposed material sites was conducted in September-October 2016. This field investigation involved pedestrian survey and subsurface testing at potentially sensitive locations identified in the predictive model and during the pedestrian survey along the three routes originally under consideration. The results of the field investigation are included in the *Kivalina Evacuation and School Site Access Road* report produced by Stantec for DOT&PF. Testing locations along the abandoned northern route are shown on Figure 1. No archaeological sites or historic properties were identified along the three alternative routes, or within the material sites that were defined at that time.

DOT&PF intends to send a cultural resource survey team in the summer of 2017 to conduct addition fieldwork within the preliminary APE. The results of this work will be provided to the State Historic Preservation Officer and National Park Service for review upon its completion.

Under the Alaska Historic Roads Programmatic Agreement Interim Guidance, a group of Alaska roads has been identified which are being treated as eligible for the National Register of Historic Places (NRHP). This project does not affect any of these roads.

Consultation Efforts

The following consulting parties are being contacted regarding this project: the Alaska State Historic Preservation Officer (SHPO); the National Park Service (NPS); the Native Village of Kivalina; the City of Kivalina; the Native Village of Noatak; NANA Regional Corporation; the Northwest Arctic Borough; NPS-Western Arctic National Parklands; and the Bureau of Indian Affairs (BIA).

If you have questions or comments related to this proposed project, or corrections and/or additions to the contact list, I can be reached at the address above, by telephone at 907-451-5293, or by e-mail at *thomas.gamza@alaska.gov*.

We request your input on our proposal so that we can incorporate your concerns into project development. Your timely response will greatly assist our compliance efforts and the preparation of any required environmental documentation. For that purpose, we request that you respond within thirty days of your receipt of this correspondence.

Sincerely,

Thomas A. Gamza
Cultural Resource Specialist-Archaeologist (PQI)
State of Alaska DOT&PF, Northern Region

Figure 1: Location and Vicinity Map
Figures 2-5 Proposed Material Site Investigation APE

Electronic cc w/ enclosures:
Michael Cain, FHWA Alaska Division, Northern Region Area Engineer
Jonathan Hutchinson, P.E., DOT&PF Northern Region, Project Manager
Paul Karczmarczyk, DOT&PF Northern Region, Environmental Impact Analyst
Brett Nelson, DOT&PF Northern Region, Regional Environmental Manager
Kathy Price, DOT&PF, Statewide Cultural Resources Manager
Amy Sumner, DOT&PF Statewide Environmental NEPA Manager

THE STATE of ALASKA
GOVERNOR BILL WALKER

Department of Transportation and Public Facilities

Northern Region
Design and Engineering Services
Preliminary Design and Environmental Section

2301 Peger Road
Fairbanks, Alaska 99709-5316
Main: 907-451-2237
Toll free: 800-451-2363
Fax: 907-451-5126

In Reply Refer To:
Kivalina Evacuation and School Site Access Road
Federal/State Project No. 0002384/NFHWY00162
Consultation Initiation

August 7, 2017

Bruce Loudermilk
Regional Director
Bureau of Indian Affairs
3601C Street
Anchorage, AK 99503-5947

Dear Mr. Loudermilk:

The Alaska Department of Transportation and Public Facilities (DOT&PF) is proposing to construct an evacuation road between Kivalina Island and a site on Kisimigiuqtuq Hill (K-Hill) (Figure 1). The project location is legally described in Table 1 below:

Table 1: Project Location

Section(s)	Township	Range	Meridian	USGS Quad
1, 2, 10, 11, 15, 16, 21	027N	026W	Kateel River	Noatak C-5
19. 20, 29, 30, 31	028N	026W	Kateel River	Noatak C-5
25, 26, 35, 36	029N	025W	Kateel River	Noatak C-5

Consultation is being conducted in accordance with the 2014 *Programmatic Agreement...for the Federal-Aid Highway Program in Alaska.* For purposes of the National Historic Preservation Act, we are initiating this consultation with you to assist us in identifying historic properties that may be affected by the proposed project.

Project Description

The proposed project origin would be at the City of Kivalina and the project terminus would be at K-Hill which is the evacuation site selected by the community. Originally three routes were

under consideration for the evacuation road location within the initial project Study Area. This has now been reduced to two potential route alignments which are currently being evaluated within the Preliminary Area of Potential Effect shown on Figure 1. Common to all route alternatives are the following actions:

- Construction of a causeway across the lagoon that may incorporate different hydrological openings including bridge(s), culvert(s), or both.
- Construction of an all-season gravel access road between Kivalina Island and the K-Hill evacuation site. The road would be designed to accommodate both general purpose and emergency evacuation vehicles over a two-way road with shoulders, multiple turnouts, and safe side slopes that may include guard rails and other safety features.
- Testing, analysis and development of material locations proximate to potential routes within the Preliminary APE to determine their feasibility and evaluate environmental impacts of their development (Figures 1-5).

Preliminary Area of Potential Effect (APE)
The Preliminary APE encompasses the direct footprint of the project, including two alternative route alignments, staging areas, and potential material sources that are variously located on NANA Regional Corporation, City of Kivalina, and DOT&PF-managed lands. The final APE will be defined after comments are received from your agency and other consulting parties.

Identification Efforts
A search of the Alaska Heritage Resources Survey (AHRS) database identified one site within the Preliminary APE which is described in table 2 below:

Table 2. AHRS Site Located within the Study Area

Site Number	Site Name	Site Description	Determination of Eligibility?
NOA-00042	Cape Krusenstern Archaeological District National Monument (NHL)	This district covers over 2 million acres, extending along the beach 8 miles and varying in width from 1-3 miles. 114 parallel marine beach ridges, formed at an average of 60 years each, are the main features. These former coastal margins contain houses, burials, cache pits, and other remains of the peoples who have occupied these beaches progressively for at least 5,000 years. This horizontal stratigraphy includes virtually the entire range of known cultural history in NW Alaska. Near the beach ridges, on unglaciated uplands, are two older sites dated from BP 11,000-6,000. The lower Noatak Valley, an important avenue between the coast and the interior for millennia, contains a number of archaeological sites. The villages of Noatak and Kivalina are within the district. The number of sites listed here includes only those cited as "important sites" in the Final Environmental Statement on Cape Krusenstern National Monument published in 1974. Other reports break down these major sites into many others. Includes	National Register Listed 05/03/1974

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A literature review identified sixteen reports describing the results of cultural resource surveys conducted from the 1970s through 2016 within the initial Study Area. There are known archaeological and historical resources within the community of Kivalina south of the project origin, and south of the Wulik River mouth outside of the Study Area; however, no resources have been identified inland of Kivalina Lagoon within the Preliminary APE. The Preliminary APE is located within the boundaries of the Cape Krusenstern Archaeological District National Historic Landmark (NOA-00042). In January 2016, an archaeological predictive model was developed for the Study Area, and an archaeological survey of alternative route alignments and proposed material sites was conducted in September-October 2016. This field investigation involved pedestrian survey and subsurface testing at potentially sensitive locations identified in the predictive model and during the pedestrian survey along the three routes originally under consideration. The results of the field investigation are included in the *Kivalina Evacuation and School Site Access Road* report produced by Stantec for DOT&PF. Testing locations along the abandoned northern route are shown on Figure 1. No archaeological sites or historic properties were identified along the three alternative routes, or within the material sites that were defined at that time.

DOT&PF intends to send a cultural resource survey team in the summer of 2017 to conduct addition fieldwork within the preliminary APE. The results of this work will be provided to the State Historic Preservation Officer and National Park Service for review upon its completion.

Under the Alaska Historic Roads Programmatic Agreement Interim Guidance, a group of Alaska roads has been identified which are being treated as eligible for the National Register of Historic Places (NRHP). This project does not affect any of these roads.

Consultation Efforts

The following consulting parties are being contacted regarding this project: the Alaska State Historic Preservation Officer (SHPO); the National Park Service (NPS); the Native Village of Kivalina; the City of Kivalina; the Native Village of Noatak; NANA Regional Corporation; the Northwest Arctic Borough; NPS-Western Arctic National Parklands; and the Bureau of Indian Affairs (BIA).

If you have questions or comments related to this proposed project, or corrections and/or additions to the contact list, I can be reached at the address above, by telephone at 907-451-5293, or by e-mail at *thomas.gamza@alaska.gov*.

We request your input on our proposal so that we can incorporate your concerns into project development. Your timely response will greatly assist our compliance efforts and the preparation of any required environmental documentation. For that purpose, we request that you respond within thirty days of your receipt of this correspondence.

Sincerely,

Thomas A. Gamza
Cultural Resource Specialist-Archaeologist (PQI)
State of Alaska DOT&PF, Northern Region

Figure 1: Location and Vicinity Map
Figures 2-5 Proposed Material Site Investigation APE

Electronic cc w/ enclosures:
Michael Cain, FHWA Alaska Division, Northern Region Area Engineer
Jonathan Hutchinson, P.E., DOT&PF Northern Region, Project Manager
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THE STATE
of ALASKA
GOVERNOR BILL WALKER

Department of Transportation and Public Facilities

Northern Region
Design and Engineering Services
Preliminary Design and Environmental Section

2301 Peger Road
Fairbanks, Alaska 99709-5316
Main: 907-451-2237
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Fax: 907-451-5126

In Reply Refer To:
Kivalina Evacuation and School Site Access Road
Federal/State Project No. 0002384/NFHWY00162
Consultation Initiation

August 7, 2017

Sean Mack
Acting Regional Archeologist
Bureau of Indian Affairs
3601C Street, Suite 1100
Anchorage, AK 99503-5947

Dear Mr. Mack:

The Alaska Department of Transportation and Public Facilities (DOT&PF) is proposing to construct an evacuation road between Kivalina Island and a site on Kisimigiuqtuq Hill (K-Hill) (Figure 1). The project location is legally described in Table 1 below:

Table 1: Project Location

Section(s)	Township	Range	Meridian	USGS Quad
1, 2, 10, 11, 15, 16, 21	027N	026W	Kateel River	Noatak C-5
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Consultation is being conducted in accordance with the 2014 *Programmatic Agreement...for the Federal-Aid Highway Program in Alaska.* For purposes of the National Historic Preservation Act, we are initiating this consultation with you to assist us in identifying historic properties that may be affected by the proposed project.

Project Description

The proposed project origin would be at the City of Kivalina and the project terminus would be at K-Hill which is the evacuation site selected by the community. Originally three routes were

"Keep Alaska Moving through service and infrastructure."

under consideration for the evacuation road location within the initial project Study Area. This has now been reduced to two potential route alignments which are currently being evaluated within the Preliminary Area of Potential Effect shown on Figure 1. Common to all route alternatives are the following actions:

- Construction of a causeway across the lagoon that may incorporate different hydrological openings including bridge(s), culvert(s), or both.
- Construction of an all-season gravel access road between Kivalina Island and the K-Hill evacuation site. The road would be designed to accommodate both general purpose and emergency evacuation vehicles over a two-way road with shoulders, multiple turnouts, and safe side slopes that may include guard rails and other safety features.
- Testing, analysis and development of material locations proximate to potential routes within the Preliminary APE to determine their feasibility and evaluate environmental impacts of their development (Figures 1-5).

Preliminary Area of Potential Effect (APE)
The Preliminary APE encompasses the direct footprint of the project, including two alternative route alignments, staging areas, and potential material sources that are variously located on NANA Regional Corporation, City of Kivalina, and DOT&PF-managed lands. The final APE will be defined after comments are received from your agency and other consulting parties.

Identification Efforts
A search of the Alaska Heritage Resources Survey (AHRS) database identified one site within the Preliminary APE which is described in table 2 below:

Table 2. AHRS Site Located within the Study Area

Site Number	Site Name	Site Description	Determination of Eligibility?
NOA-00042	Cape Krusenstern Archaeological District National Monument (NHL)	This district covers over 2 million acres, extending along the beach 8 miles and varying in width from 1-3 miles. 114 parallel marine beach ridges, formed at an average of 60 years each, are the main features. These former coastal margins contain houses, burials, cache pits, and other remains of the peoples who have occupied these beaches progressively for at least 5,000 years. This horizontal stratigraphy includes virtually the entire range of known cultural history in NW Alaska. Near the beach ridges, on unglaciated uplands, are two older sites dated from BP 11,000-6,000. The lower Noatak Valley, an important avenue between the coast and the interior for millennia, contains a number of archaeological sites. The villages of Noatak and Kivalina are within the district. The number of sites listed here includes only those cited as "important sites" in the Final Environmental Statement on Cape Krusenstern National Monument published in 1974. Other reports break down these major sites into many others. Includes	National Register Listed 05/03/1974

		NOA-00002, NOA-00078, NOA-00138, and NOA-00139.	

A literature review identified sixteen reports describing the results of cultural resource surveys conducted from the 1970s through 2016 within the initial Study Area. There are known archaeological and historical resources within the community of Kivalina south of the project origin, and south of the Wulik River mouth outside of the Study Area; however, no resources have been identified inland of Kivalina Lagoon within the Preliminary APE. The Preliminary APE is located within the boundaries of the Cape Krusenstern Archaeological District National Historic Landmark (NOA-00042). In January 2016, an archaeological predictive model was developed for the Study Area, and an archaeological survey of alternative route alignments and proposed material sites was conducted in September-October 2016. This field investigation involved pedestrian survey and subsurface testing at potentially sensitive locations identified in the predictive model and during the pedestrian survey along the three routes originally under consideration. The results of the field investigation are included in the *Kivalina Evacuation and School Site Access Road* report produced by Stantec for DOT&PF (Attachment 1). Testing locations along the abandoned northern route are shown on Figure 1. The entire northern route is shown on Figure one of Appendix D of the report. No archaeological sites or historic properties were identified along the three alternative routes, or within the material sites that were defined at that time.

DOT&PF intends to send a cultural resource survey team in the summer of 2017 to conduct addition fieldwork within the preliminary APE. The results of this work will be provided to the State Historic Preservation Officer and National Park Service for review upon its completion.

Under the Alaska Historic Roads Programmatic Agreement Interim Guidance, a group of Alaska roads has been identified which are being treated as eligible for the National Register of Historic Places (NRHP). This project does not affect any of these roads.

Consultation Efforts

The following consulting parties are being contacted regarding this project: the Alaska State Historic Preservation Officer (SHPO); the National Park Service (NPS); the Native Village of Kivalina; the City of Kivalina; the Native Village of Noatak; NANA Regional Corporation; the Northwest Arctic Borough; NPS-Western Arctic National Parklands; and the Bureau of Indian Affairs (BIA).

If you have questions or comments related to this proposed project, or corrections and/or additions to the contact list, I can be reached at the address above, by telephone at 907-451-5293, or by e-mail at *thomas.gamza@alaska.gov*.

We request your input on our proposal so that we can incorporate your concerns into project development. Your timely response will greatly assist our compliance efforts and the preparation of any required environmental documentation. For that purpose, we request that you respond within thirty days of your receipt of this correspondence.

Sincerely,

Thomas A. Gamza
Cultural Resource Specialist-Archaeologist (PQI)
State of Alaska DOT&PF, Northern Region

Figure 1: Location and Vicinity Map
Figures 2-5 Proposed Material Site Investigation APE
Attachment 1: Report: *Kivalina Evacuation and School Site Access Road*

Electronic cc w/ enclosures:
Michael Cain, FHWA Alaska Division, Northern Region Area Engineer
Jonathan Hutchinson, P.E., DOT&PF Northern Region, Project Manager
Paul Karczmarczyk, DOT&PF Northern Region, Environmental Impact Analyst
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THE STATE of ALASKA

GOVERNOR BILL WALKER

Department of Transportation and Public Facilities

Northern Region
Design and Engineering Services
Preliminary Design and Environmental Section

2301 Peger Road
Fairbanks, Alaska 99709-5316
Main: 907-451-2237
Toll free: 800-451-2363
Fax: 907-451-5126

In Reply Refer To:
Kivalina Evacuation and School Site Access Road
Federal/State Project No. 0002384/NFHWY00162
No Historic Properties Adversely Affected
ATTENTION: This finding contains no DOE's

September 19, 2017

Ms. Judith E. Bittner
State Historic Preservation Officer
Alaska Office of History and Archaeology
550 W. 7th Avenue, Suite 1310
Anchorage, Alaska 99501-3565

Dear Ms. Bittner:

The Alaska Department of Transportation and Public Facilities (DOT&PF) has assumed the responsibilities of the Federal Highway Administration under 23 U.S.C.§ 326, and is proposing to construct a safe, reliable, all-season evacuation road between the community of Kivalina and a site on Kisimigiuqtuq Hill (K-Hill) (Figure 1). The Kivalina Evacuation and School Site Access Road (the Project) location is legally described in Table 1 below:

Table 1: Project Location

Section(s)	Township	Range	Meridian	USGS Quad
1, 2, 10, 11, 15, 16, 21	027N	026W	Kateel River	Noatak C-5
19. 20, 29, 30, 31	028N	026W	Kateel River	Noatak C-5
25, 26, 35, 36	029N	025W	Kateel River	Noatak C-5

Consultation for this project is being conducted in accordance with the 2014 *Programmatic Agreement... for the Federal-Aid Highway Program in Alaska.* The DOT&PF, acting as a Federal agency, finds no adverse effect on historic properties by the proposed project pursuant to 36 CFR 800.5(b), implementing regulations of Section 106 of the National Historic Preservation

Act. This submission provides documentation in support of this finding, as required at 36 CFR 800.11(e).

Project Description
The proposed Project origin is at the City of Kivalina, located on the southeast tip of the barrier island located between the Chukchi Sea (Arctic Ocean) and Kivalina Lagoon (Figure 1). The project terminus is located on the mainland across the Kivalina Lagoon approximately six miles northeast at a community selected evacuation site on K-Hill. A range of route alternatives were considered within the project Study Area. This has now been reduced to two potential route alignments, the Combined Route B and the Southern Route, which are currently being considered as the Area of Potential Effect shown on Figure 2. Common to both route alternatives are the following actions:

- Construction of a 3,200-foot long causeway across the lagoon that may incorporate different hydrological openings including bridge(s), culvert(s), or both.
- Construction of an all-season two-way 24-foot wide gravel access road, either 7.7 miles or 8.9 miles long depending on the route selected, between Kivalina Island and the desired K-Hill evacuation site. Road construction would be within a 300-foot right-of-way (ROW) and include shoulders, multiple turnouts and 3:1 side slopes that may include guard rails and other safety features.
- Testing, analysis and development of material locations proximate to potential routes within the APE to determine their feasibility and evaluate environmental impacts of their development (Figures 2-6).

Area of Potential Effect (APE)
Potential direct and indirect effects were considered prior to the creation of the proposed APE. The APE, as presented, is a 2000-foot corridor encompasses the direct footprint of the project, including two alternative route alignments, staging areas, and potential material sites that are located on variously managed lands and allows for in-field construction adjustments. One final route APE will be defined with the completion of the environmental assessment.

The Kivalina Evacuation and School Site Access Road project would provide Kivalina residents a safe and reliable evacuation route in the event of a catastrophic storm or ocean surge, allowing evacuees to temporarily mobilize to safe refuge at an assembly site on K-Hill. This site is also identified by the Northwest Arctic Borough School District, and approved by the community, as a preferred new location for the community school. If constructed in the future, the school could augment the undeveloped evacuation site by serving as a full-service community emergency shelter with all-season support capabilities. No other viable potential future actions are identified at this time. While community relocation has been discussed for some time, it is not considered reasonably foreseeable. At present, the community supports construction of an evacuation road due to the immediate threat of storm events.

Kivalina relies on the currently existing airstrip adjacent to the city for a majority of its transportation and outside goods. Currently, DOT&PF has a project, Kivalina Airport Erosion Control (Z638720000), which is planning to construct a runway embankment erosion control

feature. Initiation of Consultation letters were sent in February of 2017 for the Kivalina Airport Erosion Control project and a cultural resource investigation was conducted in August of 2017.

Several Alaska Native allotments lie adjacent to the APE and development of these and other private lands may occur consequent to road development. However, the DOT&PF believes that if this were to occur it will be limited to increased access to currently used traditional subsistence locations by people in the community. In addition, material sites developed in support of this project may be further developed or expanded for community use but this expansion will likely occur within the boundary of the current APE.

The potential viewshed effects of the creation of the road were also considered. The DOT&PF believes the minimal elevation and the limited width and method of construction of the road will not have an effect on the current viewshed of open tundra.

In order for the community of Kivalina to consider a future relocation move to a location along the evacuation road, near or at the evacuation road terminus or any place else, extensive planning, land transfers and the securing of significant funding would have to be in place. At this time those actions are neither reasonably foreseeable nor considered a cumulative impact of the proposed project. The DOT&PF does not believe that this action would be directly caused by the Project

Identification Efforts

A search of the Alaska Heritage Resources Survey (AHRS) database identified one site within the APE which is described in table 2 below:

Table 2. AHRS Site Located within the APE

Site Number	Site Name	Site Description	Determination of Eligibility?
NOA-00042	Cape Krusenstern Archaeological District National Monument National Historic Landmark (NHL)	This district covers over 2 million acres, extending along the beach 8 miles and varying in width from 1-3 miles. 114 parallel marine beach ridges, formed at an average of 60 years each, are the main features. These former coastal margins contain houses, burials, cache pits, and other remains of the peoples who have occupied these beaches progressively for at least 5,000 years. This horizontal stratigraphy includes virtually the entire range of known cultural history in NW Alaska. Near the beach ridges, on unglaciated uplands, are two older sites dated from BP 11,000-6,000. The lower Noatak Valley, an important avenue between the coast and the interior for millennia, contains a number of archaeological sites. The villages of Noatak and Kivalina are within the district. The number of sites listed here includes only those cited as "important sites" in the Final Environmental Statement on Cape Krusenstern National Monument published in 1974. Other reports break down these major sites into many others. Includes	National Register of Historic Places Listed 05/03/1974

		NOA-00002, NOA-00078, NOA-00138, and NOA-00139.	

A literature review identified sixteen reports describing the results of cultural resource surveys conducted from the 1970s through 2016 within the initial Study Area. There are known archaeological and historical resources within the community of Kivalina south of the project origin, and south of the Wulik River mouth outside of the APE Area; however, no resources have been identified inland of Kivalina Lagoon within the APE. The APE is located within the boundaries of the Cape Krusenstern Archaeological District National Historic Landmark (NOA-00042). In January 2016, an archaeological predictive model was developed for the Study Area, and an archaeological survey of alternative route alignments and proposed material sites was conducted in September-October 2016. This field investigation involved pedestrian survey and subsurface testing at potentially sensitive locations identified in the predictive model and during the pedestrian survey along the three routes originally under consideration. The results of the field investigation are included in the *Kivalina Evacuation and School Site Access Road* report produced by Stantec for DOT&PF (Attachment 1). Testing locations along the abandoned northern route are shown on Figure 2. The entire northern route is shown on Figure 1 of Appendix D of the report. No archaeological sites or historic properties were identified along the three alternative routes, or within the material sites that were defined at that time.

DOT&PF sent a cultural resource survey team in the August of 2017 to conduct addition fieldwork within the APE which now includes potential material site locations. The results of the field investigation are provided in a memo from Stantec entitled *Archaeological Assessment Update for the Kivalina Evacuation and School Site Access Road* (Attachment 2).

Under the Alaska Historic Roads Programmatic Agreement Interim Guidance, a group of Alaska roads has been identified which are being treated as eligible for the National Register of Historic Places (NRHP). This project does not affect any of these roads.

Finding of Effect
NOA-00042 Cape Krusenstern Archaeological District National Monument National Historic Landmark (NHL)

Cape Krusenstern Archaeological District National Historic Landmark (NHL) was designated November 7, 1973 prior to the establishment if the National Monument which was designated on December 1, 1978. Properties designated as National Historic Landmarks are automatically listed in the NRHP CFR36§65.2(b). The primary reason for the designation of both the Archaeological District and National Monument was the overall significance of the region to the understanding the prehistory of the Arctic based on the positive results of archaeological investigations that took place between the late 1940's and early 1970's and continue today. At first, the boundary of the National Monument, which is restricted to the archaeologically rich beach ridge complex, was used for the boundaries for the NHL under National Landmark Criteria 36CFR§64.4(a)(6). It was later expanded to include areas, such as the Project location, which had not had any archaeological investigation conducted at the time.

The archaeological investigations conducted over the 2016 and 2017 field seasons did not result in the identification any elements which contribute to our continuing understanding of the prehistory or history of the Arctic within the Project's APE which is located within the boundaries of NHL. As such, the proposed construction of the Evacuation and School Site Access Road will not have an adverse effect on the integrity of the NHL or its continuing eligibility for the NRHP as no contributing elements have been identified. Due to the Project being located within the NHL boundary the DOT&PF is submitting monitoring and inadvertent discovery plan to be implemented during the continued planning and execution of the Project (Attachment 3). In the event that cultural resources are encountered this plan will be implemented and all identified parties will be contacted. As the proposed routes, the Project terminus and the potential material site locations have only one historic property located within their boundaries the potential effect for all were addressed in one evaluation.

Overall, the DOT&PF has determined that the activities proposed for the Kivalina Evacuation and School Site Access Road Project will result in **no historic properties adversely affected** and seeks the Alaska SHPO's concurrence with this finding of effect.

Section 4(f)
It is the DOT&PF's intent to make a Section 4(f) de minimis impact finding premised on your written concurrence that the project **will not adversely affect** NOA-00042 Cape Krusenstern Archaeological District National Monument National Historic Landmark (NHL).

Consultation Efforts
On July 10, 2017 a meeting was among Agency cultural resource staff. The DOT&PF Northern Region PQI, staff from the Office of History and Archaeology and the Alaska State Historic Preservation Officer (SHPO) and the National Park Service Archaeologist for the National Register of Historic Places Program, Alaska Region. Initiation of Consultation letters were sent out to the identified consulting parties on August 7, 2017. A response was received from the SHPO office on August 22, 2017 stating there was no objection to the proposed Study Area or level of identification at this time (Attachment 4). No other responses to the Section 106 Initiation of Consultation letters were received.

A copy of this letter has been submitted to the National Park Service for their evaluation and recommendation regarding activities within a NHL.

In addition to the Alaska State Historic Preservation Officer (SHPO), other parties being contacted regarding the findings for this project are: the National Park Service (NPS); the Native Village of Kivalina; the City of Kivalina; the Native Village of Noatak; NANA Regional Corporation; the Northwest Arctic Borough; NPS-Western Arctic National Parklands; the Bureau of Indian Affairs (BIA); and the Advisory Council on Historic Preservation.

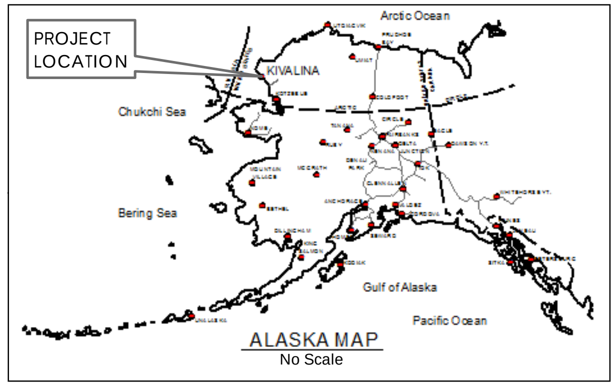
Please direct your concurrence or comments to me at the address above, by telephone at 907-451-5293, or by e-mail at *thomas.gamza@alaska.gov*.

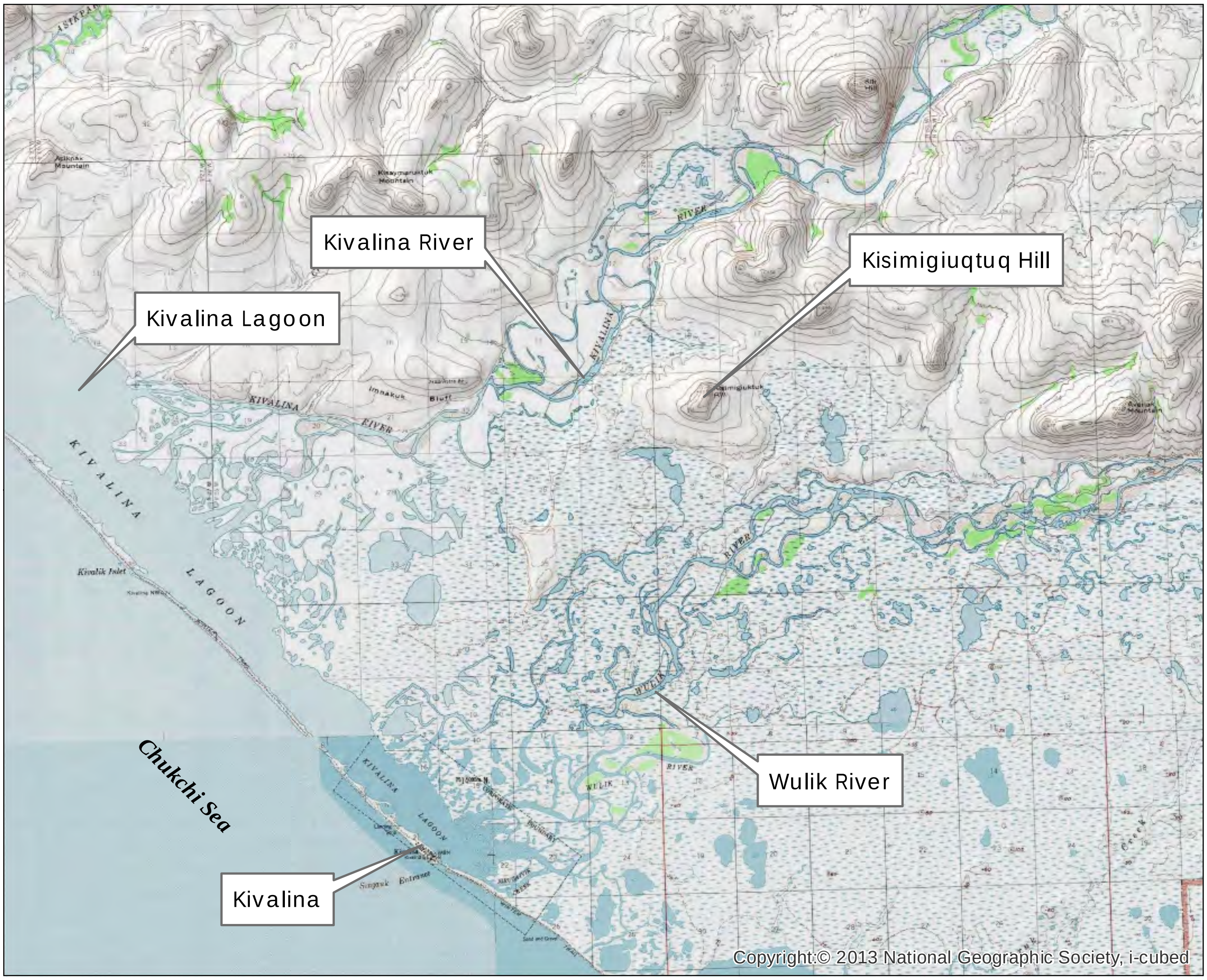
Sincerely,

Thomas A. Gamza
Cultural Resource Specialist-Archaeologist (PQI)
State of Alaska DOT&PF, Northern Region

Figure 1: Location and Vicinity Map
Figure 2: Area of Potential Effect-Overview
Figures 3-6 Proposed Material Site Investigation APE
Attachment 1: Report: *Kivalina Evacuation and School Site Access Road*
Attachment 2: OHA Coversheet and Report: *Archaeological Assessment Update for the Kivalina Evacuation and School Site Access Road*
Attachment 3: Draft Inadvertent Discovery Plan – Kivalina Evacuation and School Site Access Road
Attachment 4: August 22, 2017 response from the SHPO to August 7, 2017 Initiation of Consultation Letter

Electronic cc w/ enclosures:
Michael Cain, FHWA Alaska Division, Northern Region Area Engineer
Jonathan Hutchinson, P.E., DOT&PF Northern Region, Project Manager
Paul Karczmarczyk, DOT&PF Northern Region, Environmental Impact Analyst
Brett Nelson, DOT&PF Northern Region, Regional Environmental Manager
Kathy Price, DOT&PF, Statewide Cultural Resources Manager
Amy Sumner, DOT&PF Statewide Environmental NEPA Manager





Graphics developed by Stantec Consulting Services, Inc.

Project Origin: City of Kivalina,
Kotzebue Recording District,
Section 21, Township 27N, Range 26W,
Kateel River Meridian

Project Terminus: Kisimigiuqtuq Hill,
Section 19, Township 28N, Range 25W
Kateel River Meridian

0 1.25 2.5 5 Miles

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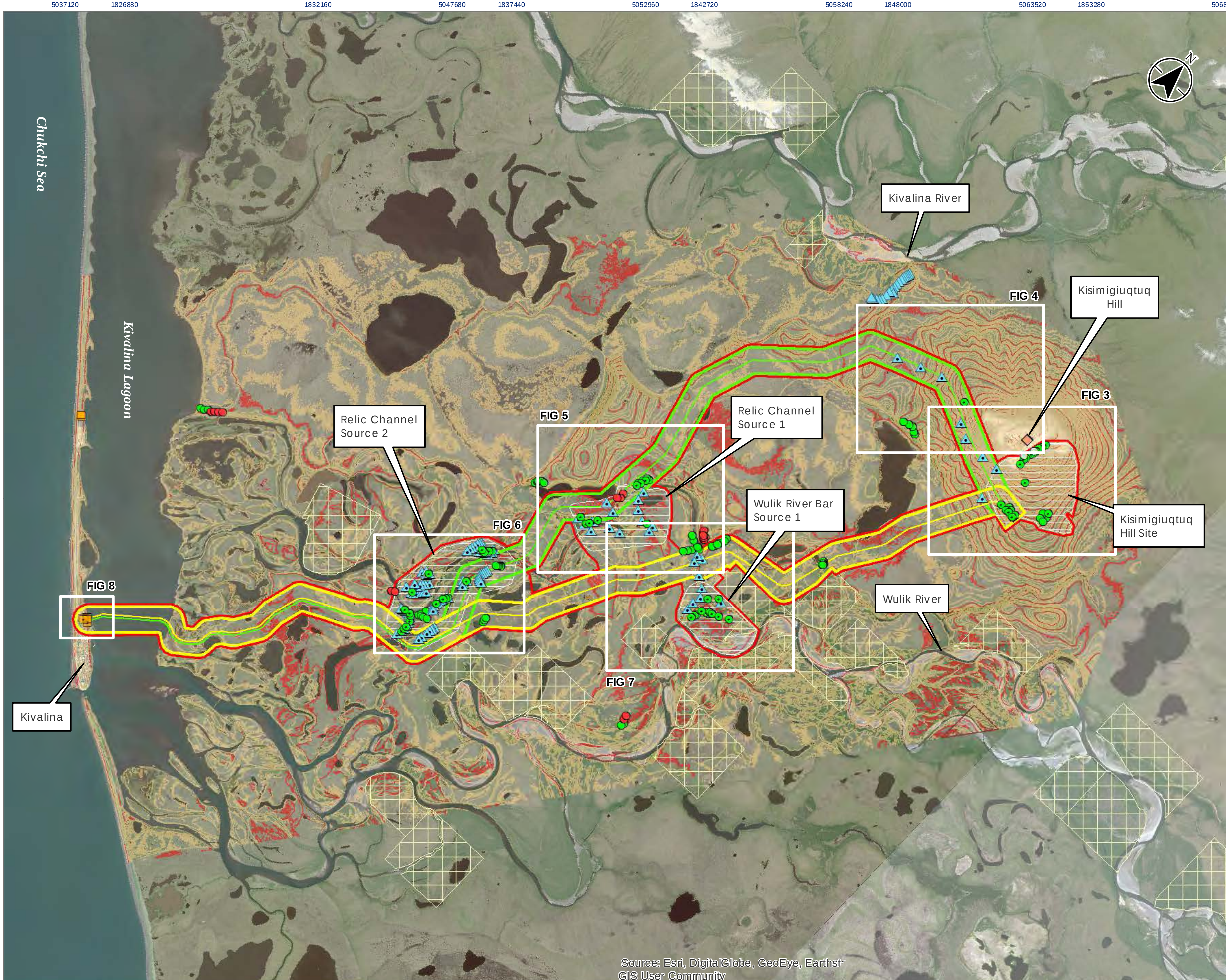
STATE OF ALASKA
Department of Transportation and Public Facilities
2301 Peger Road Fairbanks, AK 99709

KIVALINA EVACUATION AND SCHOOL SITE
ACCESS ROAD

Location & Vicinity Map

DATE: September, 2017	FIGURE 1

U:\2047055102\GIS\mxd\Section 106\2047055102_Sec106_Fig-1_Loc-Vic_Map.mxd Revised: 2017-09-06 By: cpannone



Legend

- Area of Potential Effect (APE)
- Southern Route - 7.7 miles
- Combined Route B - 8.9 Miles
- Potential Material Source
- Native Allotments

Data Points (2017)

- Bear Den
- Shovel Test Probe
- Soil Probes
- Test Unit

Data Points (2016)

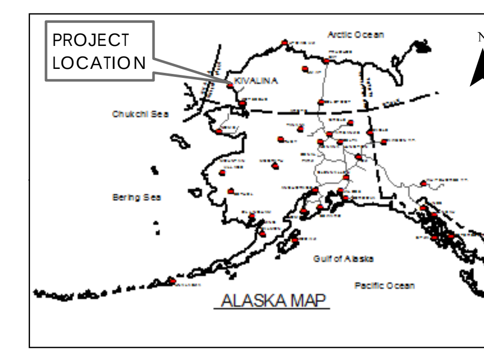
- Shovel Test Probe - Local
- Shovel Test Probe - Probability
- Assessed Feature
- Soil Probe
- Test Unit

0 0.4 0.8 Miles

1:47,520 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
2. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011; ©AeroMetric Inc., 2013; Digital Globe 2016



Graphics developed by Stantec Consulting Services, Inc.

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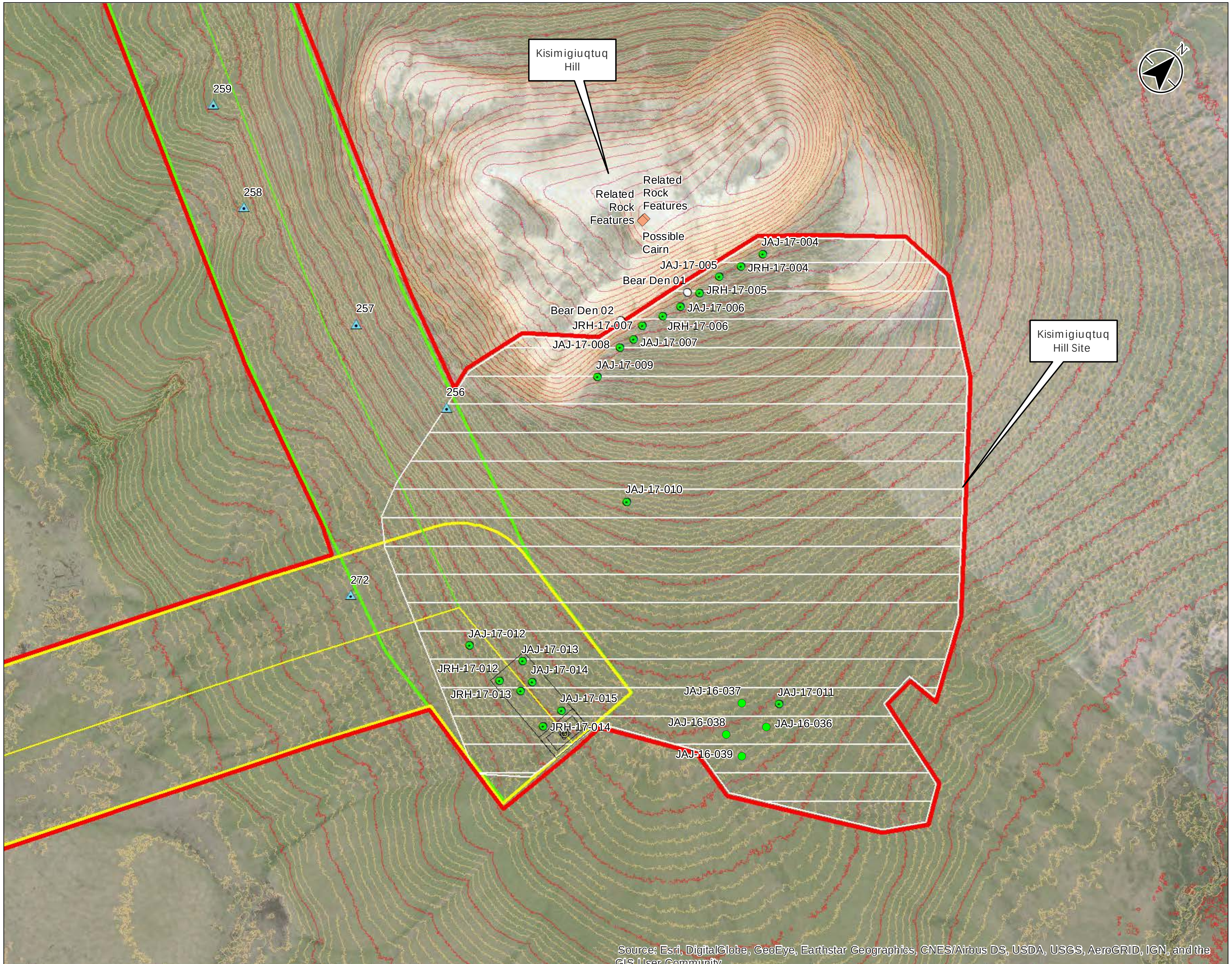
KIVALINA EVACUATION AND SCHOOL SITE ACCESS ROAD

Area of Potential Effect - Overview

DATE: September, 2017 | FIGURE 2



Legend

- Area of Potential Effect (APE)
- Southern Route - 7.7 miles
- Combined Route B- 8.9 Miles
- Potential Material Source
- Native Allotments
- Gravel Mounds

Data Points (2017)

- Bear Den
- Shovel Test Probe
- Soil Probes
- Test Unit

Data Points (2016)

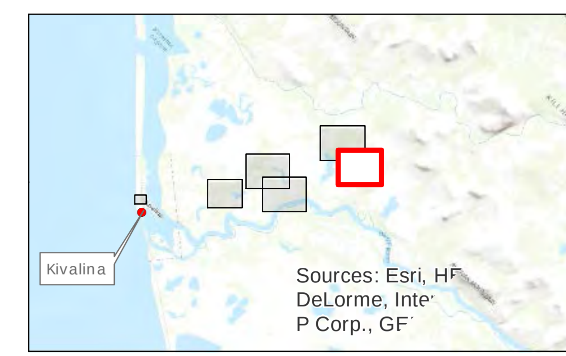
- Shovel Test Probe - Local
- Shovel Test Probe - Probability
- Assessed Feature
- Soil Probe
- Test Unit

0 500 1,000 Feet

1:7,200 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
2. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011; ©AeroMetric Inc., 2013; Digital Globe 2016



Graphics developed by Stantec Consulting Services, Inc.

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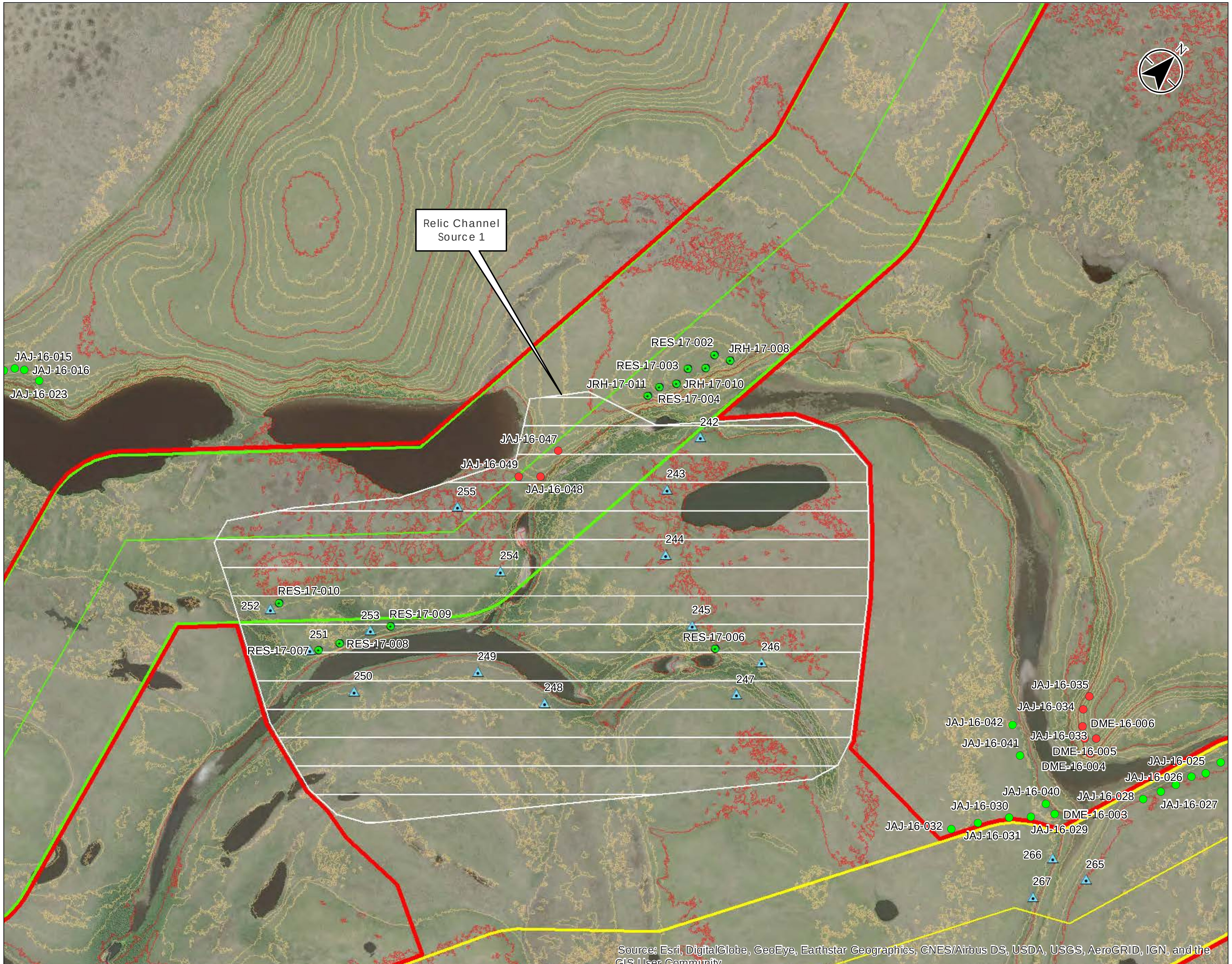
Department of Transportation and Public Facilities
2301 Peger Road Fairbanks, AK 99709

KIVALINA EVACUATION AND SCHOOL SITE ACCESS ROAD

Kisimigiuqtuq Hill

DATE: September, 2017	FIGURE 3



Legend

- Area of Potential Effect (APE)
- Southern Route - 7.7 miles
- Combined Route B- 8.9 Miles
- Potential Material Source
- Native Allotments
- Gravel Mounds

Data Points (2017)

- Bear Den
- Shovel Test Probe
- Soil Probes
- Test Unit

Data Points (2016)

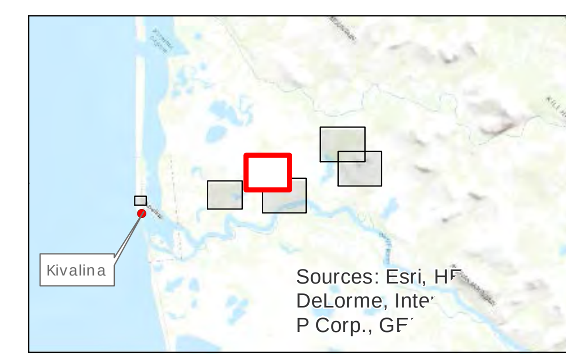
- Shovel Test Probe - Local
- Shovel Test Probe - Probability
- Assessed Feature
- Soil Probe
- Test Unit

0 500 1,000 Feet

1:7,200 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
2. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011; ©AeroMetric Inc., 2013; Digital Globe 2016



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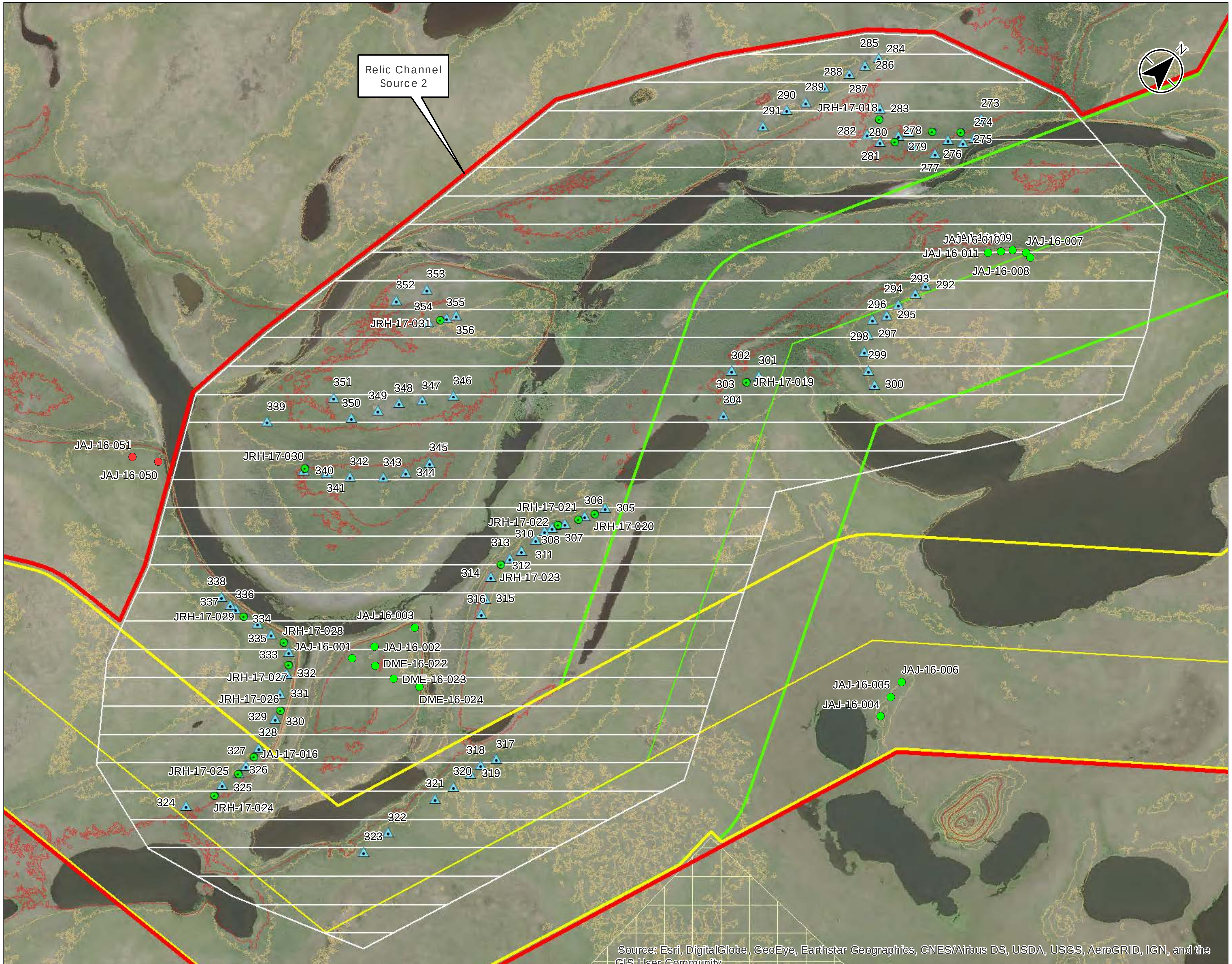
KIVALINA EVACUATION AND SCHOOL SITE ACCESS ROAD

Relic Channel Source 1

DATE: September, 2017	FIGURE 4

U:\204705102\GIS\mxd\Arch Report Maps\204705102_Arch_Fig-3_Fig-8_Detail.mxd Revised: 2017-09-06 By: cpannone



Legend

- Area of Potential Effect (APE)
- Southern Route - 7.7 miles
- Combined Route B- 8.9 Miles
- Potential Material Source
- Native Allotments
- Gravel Mounds

Data Points (2017)

- Bear Den
- Shovel Test Probe
- Soil Probes
- Test Unit

Data Points (2016)

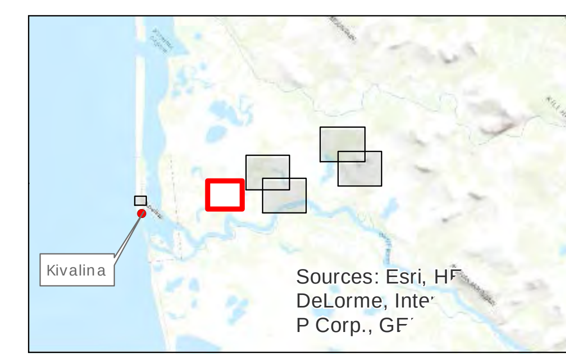
- Shovel Test Probe - Local
- Shovel Test Probe - Probability
- Assessed Feature
- Soil Probe
- Test Unit

0 400 800 Feet

1:5,760 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
2. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011; ©AeroMetric Inc., 2013; Digital Globe 2016



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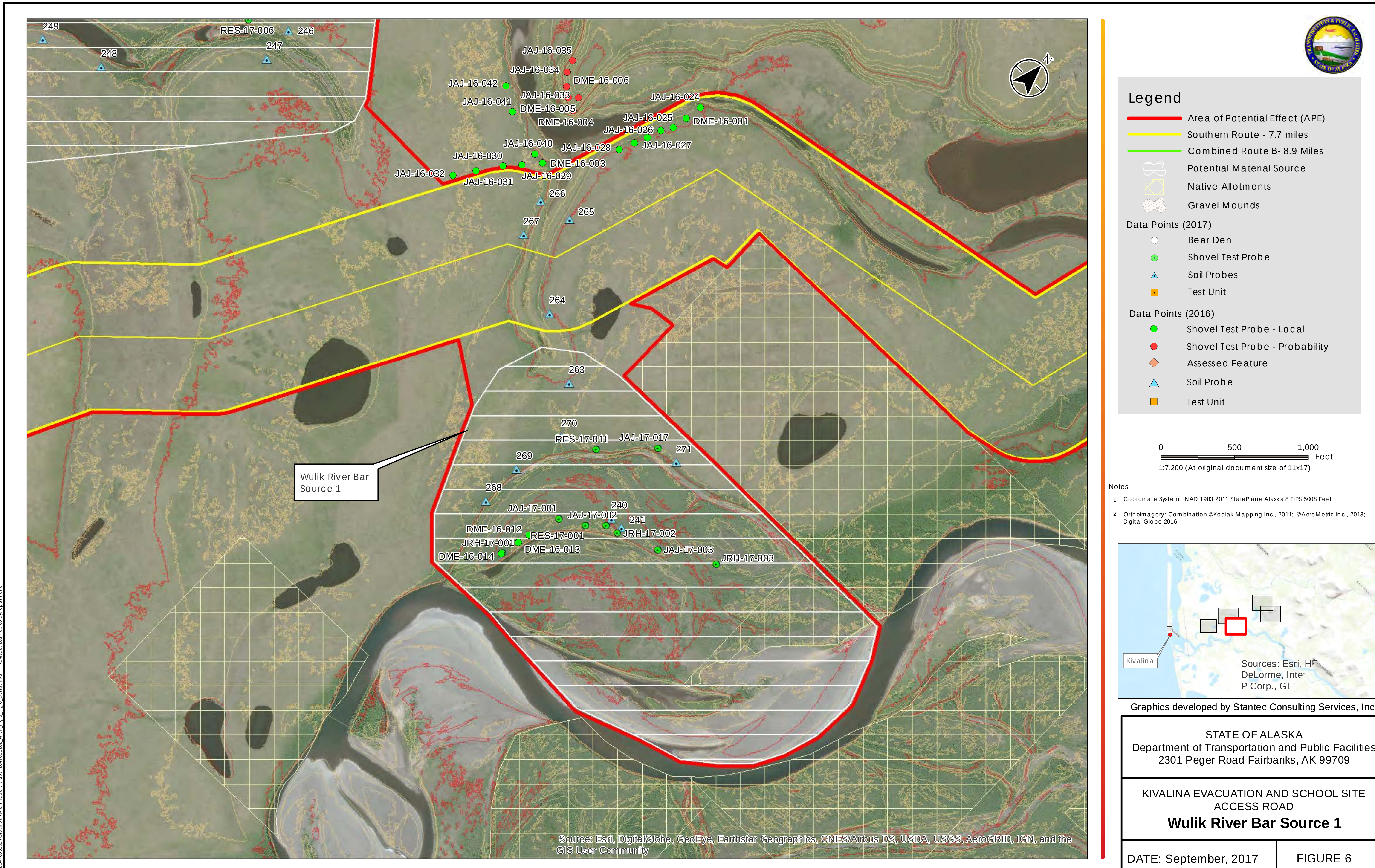
KIVALINA EVACUATION AND SCHOOL SITE ACCESS ROAD

Relic Channel Source 2

DATE: September, 2017 | FIGURE 5



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RES-17-006
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JAJ-16-035
JAJ-16-034
DME-16-006
JAJ-16-042
JAJ-16-033
JAJ-16-041
DME-16-005
DME-16-004
JAJ-16-024
JAJ-16-025
DME-16-001
JAJ-16-026
JAJ-16-040
JAJ-16-028
JAJ-16-027
JAJ-16-030
DME-16-003
JAJ-16-032
JAJ-16-029
JAJ-16-031
266
265
267
264
263
270
RES-17-011
JAJ-17-017
271
269
Wulik River Bar Source 1
268
JAJ-17-001
240
JAJ-17-002
241
DME-16-012
RES-17-001
JRH-17-002
JRH-17-001
DME-16-013
JAJ-17-003
DME-16-014
JRH-17-003
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
N
Legend
Area of Potential Effect (APE)
Southern Route - 7.7 miles
Combined Route B- 8.9 Miles
Potential Material Source
Native Allotments
Gravel Mounds
Data Points (2017)
Bear Den
Shovel Test Probe
Soil Probes
Test Unit
Data Points (2016)
Shovel Test Probe - Local
Shovel Test Probe - Probability
Assessed Feature
Soil Probe
Test Unit
0 500 1,000
Feet
1:7,200 (At original document size of 11x17)
Notes
1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
2. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011; ©AeroMetric Inc., 2013; Digital Globe 2016
Kivalina
Graphics developed by Stantec Consulting Services, Inc.
STATE OF ALASKA
Department of Transportation and Public Facilities
2301 Peger Road Fairbanks, AK 99709
KIVALINA EVACUATION AND SCHOOL SITE ACCESS ROAD
Wulik River Bar Source 1
DATE: September, 2017
FIGURE 6

To:	Thomas A. Gamza Archaeologist (PQI) Environmental Impact Analyst III Cultural Resource Specialist State of Alaska DOT&PF Northern Region	From:	Ross Smith, MA, RPA Stantec Consulting Services Inc.
File:	Kivalina Evacuation and School Site Access Road	Date:	September 19, 2017

REFERENCE: Inadvertent Discovery Plan – Kivalina Evacuation and School Site Access Road

INTRODUCTION

This Inadvertent Discovery Plan (IDP) will be followed if cultural resources, including human remains, are encountered during ground disturbing activities at the Kivalina Evacuation and School Site Access Road in Kivalina, Alaska.

Project Location:

The proposed project origin is at the City of Kivalina, located on the southeast tip of the barrier island located between the Chukchi Sea (Arctic Ocean) and Kivalina Lagoon (Figure 1). The project terminus is located on the mainland across the Kivalina lagoon approximately six miles northeast at a community selected evacuation site on Kisimigiuqtuq Hill (K-Hill). The proposed project includes part of the Kivalina barrier island, the southern portion of Kivalina Lagoon, and the lower Wulik and Kivalina River drainages.

The Proposed Action would construct a safe, reliable, all-season evacuation road between the community of Kivalina and K-Hill. A range of route alternatives are being considered (Figure 2), but common to all are the following actions:

- **Establishment of a safe, reliable, all-season Kivalina Lagoon crossing.** All alternatives include construction of a causeway across the lagoon that variously incorporate different configurations of hydrological openings including bridge(s), culvert(s), or both.

- **Construction of an all-season access road connecting the Kivalina Lagoon crossing to the K-Hill evacuation site**. The road would be designed to accommodate a wide variety of motorized vehicles over a two-way road with shoulders, multiple turnouts, and side slopes that may include guard rails and other safety features where determined to be necessary and prudent.

- **Development of up to four material sites including the K-Hill Site, Wulik River Source 1, Relic Channel Source 1, and Relic Channel Source 2.** These material sites are anticipated to be suitable local sources of select material to supply the project. Selection and development of viable material sources and haul routes are considered as part of the Proposed Action.

Causeway Design:

Potential construction methodology may vary across such elements as timing of construction, contractor methods, locations of staging areas, camps, haul routes, and sequencing of activities.

Construction of the lagoon crossing may include in-water placement of fill, bridge support pile driving, and placement of culvert(s). Placement of fill is generally done during ice-free conditions, but several construction components associated with the lagoon crossing could be completed in the winter. Grounded ice in shallow depths of the lagoon could be removed allowing placement of the base causeway embankment layer and rock protection with no, or minimal water present, thereby minimizing disturbance of fine sediments. Pile driving would take place on both sides of the bridge opening, and consist of driving piles at each abutment. The final design of the bridge foundation would establish the specific number, size, and depth of the pilings.

Areas to be Monitored:

No archaeological or historical resources were identified during pedestrian survey and subsurface testing within any of the potential material sites.

Archaeological monitoring is planned for the evacuation road terminus at K-Hill, and the proposed of the material site (MS) locations. In the event that geotechnical investigations are conducted DOT&PF will insure a Secretary of the Interior (SOI) qualified professional archaeologist will be present to monitor for potential cultural resources encountered.

PROTOCOL FOR INADVERTENT DISCOVERY OF CULTURAL RESOURCES

In the unlikely event that archaeological materials, features, and other potentially sensitive cultural resources are encountered during construction activities or the material site development in association with the Project, all work must cease within 100 feet of the area of the discovery until a qualified archaeologist can evaluate the discovery, the Alaska State Historic Preservation Officer (SHPO) is notified, and the lead agency Federal Highway Administration (FHWA), the Alaska Department of Transportation and Public Facilities (DOT&PF), NANA Regional Corporation, the Native Village of Kivalina, the National Park Service and the Native Village of Noatak have agreed that ground-disturbing activities may resume.

Cultural resources may include evidence of pre-contact or historic activities, artifacts such as formed stone or bone tools, tool-making debris, fire-modified rock, organic materials such as charcoal, and faunal remains, historic debris scatters, and features such as hearths, pits, privies, post-holes or post-molds, foundations, and other evidence of structural remains.

If cultural resources are discovered during work, the construction foreman will immediately halt work at that location and notify each of the contacts listed in Table 1 below. The discovery area and a surrounding buffer zone shall be delineated with flags tied to stakes that will be driven into the ground. These stakes shall not be removed. The buffer zone established around the discovery zone shall be large enough to allow ground disturbance activities to resume outside the buffer. Work will not restart at the discovery location(s) until clearance is received from the Alaska State Historic Preservation Officer (SHPO).

If any pre-contact or historic archaeological materials are recovered from lands managed by the State of Alaska, these materials and any associated documentation will be curated at the University of Alaska Museum of the North (UAMN) in accordance with the provisions of an existing

Memorandum of Understanding between the DOT&PF and UAMN. Archaeological resources recovered from NANA Regional Corporation, Incorporated lands will be transferred to the Assistant Director of Lands, who will coordinate with the Native Village of Kivalina and the Native Village of Noatak regarding the final disposition of the recovered materials.

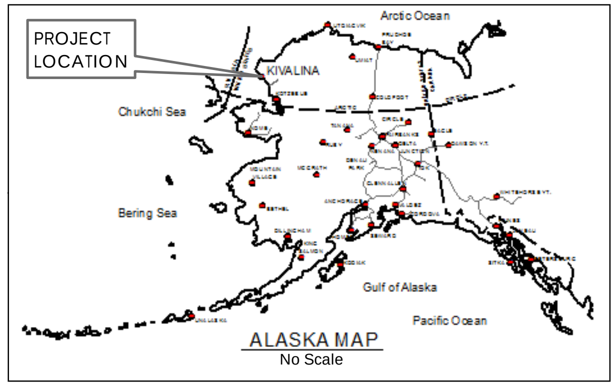
PROTOCOL FOR INADVERTENT DISCOVERY OF HUMAN REMAINS

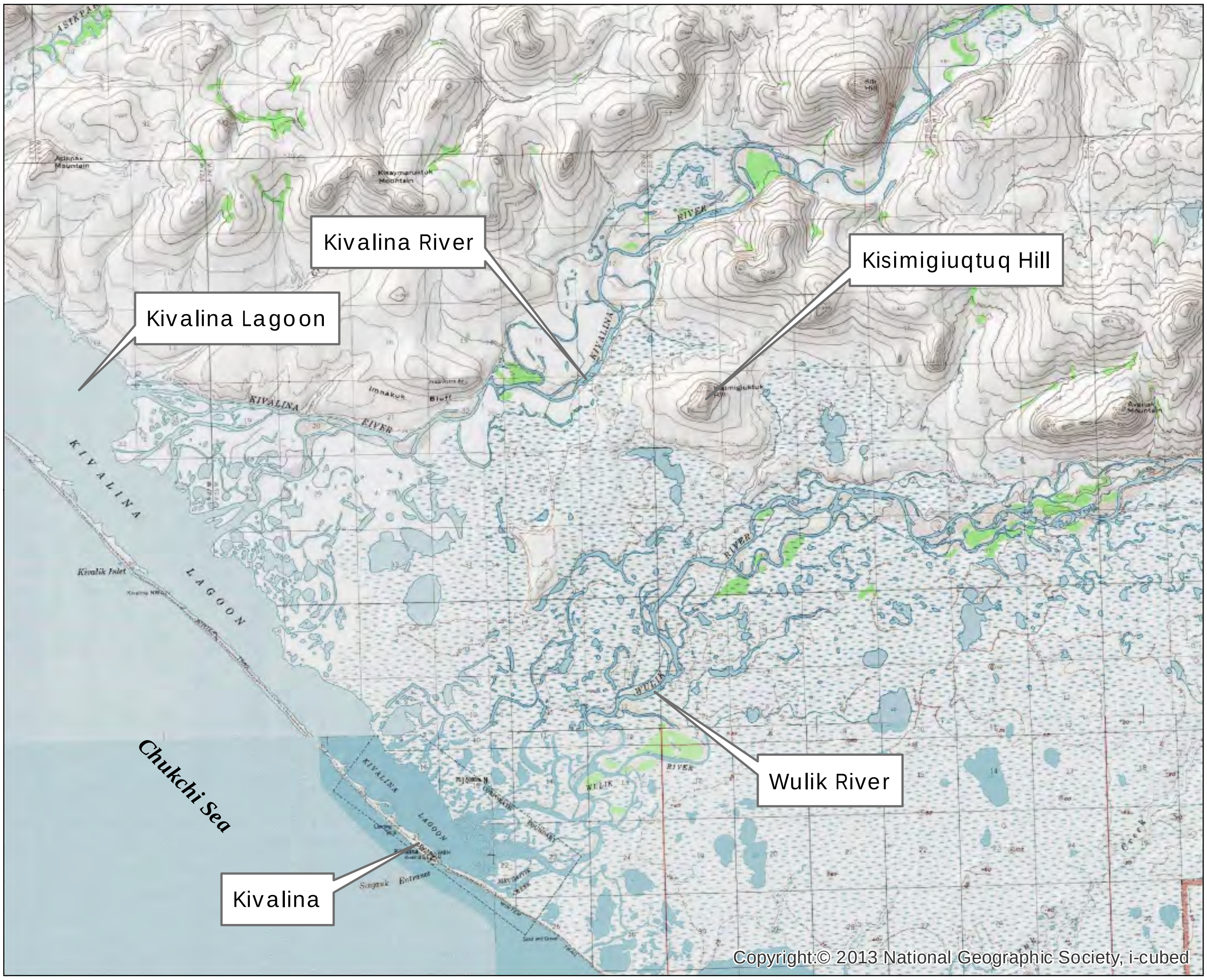
If human remains are identified at any time during this project, any excavation or other project activities in the area of the discovery will cease and the location will be secured, and protected from further disturbance. The Construction Coordinator will immediately initiate the notification process established by the OHA (see Attached Guidelines Laws and Protocols Pertaining to the Discovery of Human Remains in Alaska), and notify designated representatives of the FHWA, DOT&PF, NPS, and NANA Regional Corporation, Incorporated, the Native Village of Kivalina, and the Native Village of Noatak (see Table 1).

Table 1 - Notification of Cultural Resource Discovery

Organization	Contact*	Telephone/Fax/Email
USDOT - Federal Highway Administration (FHWA)	Michael Cain, (Northern Area Region Engineer)	Telephone: 907-586-7429 michael.cain@dot.gov
Alaska Department of Transportation and Public Facilities	Kathy Price (Statewide Cultural Resources Manager); Thomas Gamza (Cultural Resource Specialist Northern Region-Archaeologist)	Telephone: 907-451-5439 kathy.price@alaska.gov Telephone:9 07-451-5293 thomas.gamza@alaska.gov
National Park Service	Rhea Hood (Archaeologist)	Telephone: (907) 644-3460 rhea_hood@nps.gov
NANA Regional Corporation, Incorporated	Jeffrey Nelson (Assistant Director of Lands)	Telephone: (907) 442-3301 Jeffrey.Nelson@nana.com
Alaska State Historic Preservation Officer (SHPO)	Judith E. Bittner, SHPO	Telephone: (907) 269-8715 judy.bittner@alaska.gov
Alaska State Archaeologist	Dr. Richard VanderHoek	Telephone: (907) 269-8728 richard.vanderhoek@alaska.gov
Native Village of Kivalina	Millie Hawley (President); Stanley Hawley (Tribal Administrator)	Telephone: (907) 645-2153 tribeadmin@kivaliniq.org
Native Village of Noatak	Vernon Adams (President); Herbert Walton Sr (Tribal Administrator	Telephone: (907) 485-2173 tribeadmin@nautaaq.org

*Agency representatives identified in Table 1 may be changed, and additional contacts can be added at the request of the reviewing and consulting parties.





Graphics developed by Stantec Consulting Services, Inc.

Project Origin: City of Kivalina,
Kotzebue Recording District,
Section 21, Township 27N, Range 26W,
Kateel River Meridian

Project Terminus: Kisimigiuqtuq Hill,
Section 19, Township 28N, Range 25W
Kateel River Meridian

0 1.25 2.5 5 Miles

1:142,961 (at original document size of 8.5x11)

STATE OF ALASKA
Department of Transportation and Public Facilities
2301 Peger Road Fairbanks, AK 99709

KIVALINA EVACUATION AND SCHOOL SITE ACCESS ROAD

Location & Vicinity Map

DATE: September, 2017	FIGURE **1**

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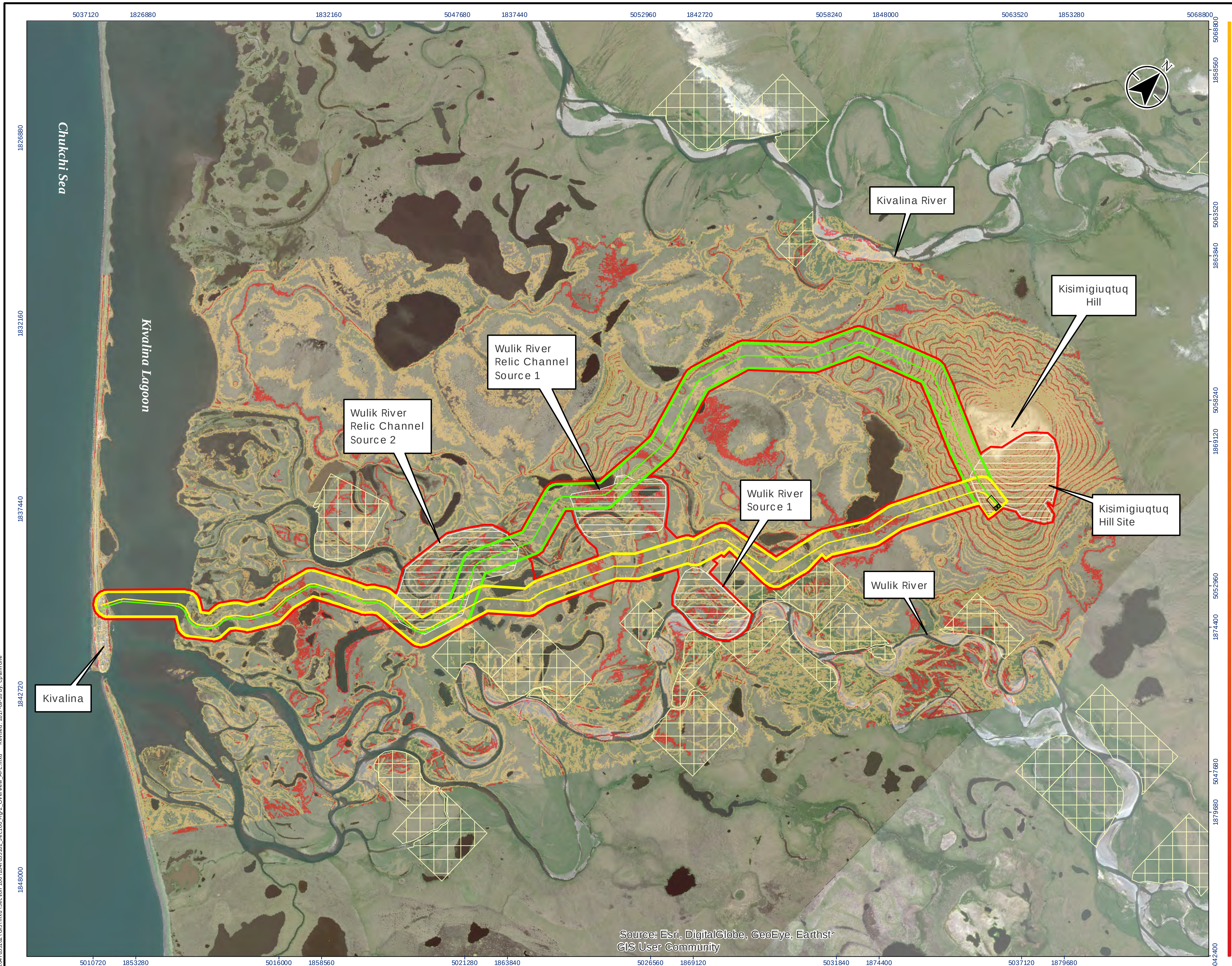


Legend

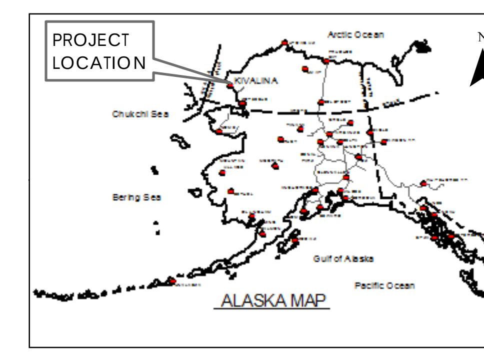
- Area of Potential Effect (APE)
- Southern Route - 7.7 miles
- Combined Route B - 8.9 Miles
- Potential Material Source
- Native Allotments

0 0.4 0.8 Miles

1:47,520 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
2. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011; ©AeroMetric Inc., 2013; Digital Globe 2016



Graphics developed by Stantec Consulting Services, Inc.

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Department of Transportation and Public Facilities
2301 Peger Road Fairbanks, AK 99709

KIVALINA EVACUATION AND SCHOOL SITE ACCESS ROAD

Area of Potential Effect - Overview

DATE: September, 2017	FIGURE 2

GUIDELINES

Laws and Protocols Pertaining to the Discovery of Human Remains in Alaska

The treatment of human remains following inadvertent discovery is governed by state and federal laws, land status, postmortem interval (time since death), and biological/cultural affiliation. First and foremost, the site of discovered remains should be regarded a potential "crime scene" until a person with appropriate expertise and authority determines otherwise.

State Laws:

Several State laws are applicable to the discovery of human remains in Alaska. The State Medical Examiner (SME) has jurisdiction over all human remains in the state (with rare exceptions, such as military aircraft deaths), regardless of age.

AS 12.65.5 requires immediate notification of a peace officer of the state (police, Village Public Safety Officer, or Alaska State Trooper [AST]) and the State Medical Examiner when death has "been caused by <u>unknown</u> or criminal means, during the commission of a crime, or by suicide, accident, or poisoning."

<u>In this regard, contact the Alaska State Trooper/Missing Persons Bureau first</u>. (See list of contacts on following page.) The AST has interpreted notification procedures as applicable to all remains, including ancient remains.

AS 11.46.482(a)(3), which applies to <u>all</u> lands in Alaska, makes the "intentional and unauthorized destruction or removal of any human remains or the intentional disturbance of a grave" a class C felony.

AS 41.35.200, which applies only to <u>State</u> lands, makes the disturbance of "historic, prehistoric and archeological resources" (including graves, per definition) a class A misdemeanor.

AS 18.50.250, which applies to <u>all</u> lands in Alaska, requires permits for the disinterment, transport, and reinterment of human remains. Guidance and permits are available from the Bureau of Vital Statistics (see attached list of contacts).

Federal Laws:

On Federal lands and Federal trust lands, the unauthorized destruction or removal of <u>archaeological</u> human remains (i.e., more than 100 years old) is a violation of **16 USC 470ee** (Archeological Resources Protection Act). If human remains on federal or federal trust lands are determined to be Native American, their treatment and disposition are also governed by the Native American Graves and Repatriation Act (NAGPRA) of 1990 (**PL 101-601; 25 USC 3001-30013**; 104 Stat. 3048-3058; 43 CFR 10). NAGPRA also applies to Native American human remains from <u>any</u> lands <u>if</u> the remains are curated in any institution that receives federal funds.

<u>General Guidance:</u>

<u>Your first contacts should be the AST/Missing Persons Bureau, the Alaska State Medical Examiner's Office, local law enforcement, the Alaska Office of History and Archaeology, and the landowner.</u>

In many instances, the field archaeologist must make a judgement call regarding the age of the remains, his/her level of confidence in the evaluation, and whether further investigation by a specialist is warranted. While notification under State Law is required, peace officers and the SME generally regard archaeologists competent to make these type determinations and welcome input that may assist with the investigation. With regard to ancient remains (> 100 years old), the SME and AST will generally defer to the opinion of the field archaeologist and require no further criminal investigation. However, the remains and a surrounding buffer area should not be disturbed until appropriate reporting and consultation have occurred.

Dr. Richard VanderHoek, State Archaeologist
Alaska Office of History and Archaeology
550 W. 7th Avenue, Suite 1310
Anchorage, AK 99501
(907) 269-8728 or richard.vanderhoek@alaska.gov

CONTACT INFORMATION FOR STATE OFFICIALS INVOLVED WITH HUMAN REMAINS ISSUES IN ALASKA

Denotes suggested contact person in list below.

1.) *Alaska State Troopers, Missing Persons Bureau:*

Phone: (907) 269-5477
Fax: (907) 338-7243

Sgt. Kid Chan

Phone: (907) 269-5058
e-mail: choong.chan@alaska.gov

*Stephanie Johnson

Phone: (907) 269-5497
e-mail: steph.johnson@alaska.gov

*After contact by phone, send e-mail with relevant information and photos to Sgt. Chan and Stephanie Johnson.

2.) *Alaska State Medical Examiner's Office:*

* Reporting Hotline (Death Hotline) to speak with on-duty investigator.

Phone: (907) 334-2356
1-888-332-3273 (Outside Anchorage)

Stephen Hoage, Operations Administrator

Phone: (907) 334-2202
Fax: (907) 334-2216
e-mail: stephen.hoage@alaska.gov

Dr. Gary Zientek, Chief Medical Examiner

Phone: (907) 334-2200
Fax: (907) 334-2216
e-mail: gary.zientek@alaska.gov

3.) *Alaska Office of History and Archaeology (State Historic Preservation Office):*

Judith E. Bittner, Chief / State Historic Preservation Officer (SHPO)

Phone: (907) 269-8721
Fax: (907) 269-8908
E-mail: judy.bittner@alaska.gov

*Dr. Richard VanderHoek, State Archaeologist / Deputy SHPO

Phone: (907) 269-8728
Fax: (907) 269-8908
E-mail: richard.vanderhoek@alaska.gov

Alaska Bureau of Vital Statistics

Heidi Lengdorfer, Chief

Phone: (907) 465-8643
e-mail: heidi.lengdorfer@alaska.gov

For questions regarding disinterment permits or burial transit permits:

Margo Meyer

Phone: (907) 465-8610
e-mail: margo.meyer@alaska.gov

From:	Rollins, Mark W (DNR)
To:	Gamza, Thomas A (DOT)
Cc:	Hood, Rhea
Subject:	FW: Kivalina Evacuation and School Site Access Road, Consultation Initiation
Date:	Tuesday, August 22, 2017 4:16:03 PM

3130-1R FHWA
RevComp ID # 2016-01460

Hi Tom,
The Alaska State Historic Preservation Office (AK SHPO) received your correspondence (dated August 7, 2017) on August 10, 2017. Following our review of the documentation provided in the initiation letter, we have no objections to the preliminary APE or level of effort being conducted for identification at this time. We look forward to receiving the results of the additional fieldwork conducted during the 2017 field season and evaluation of the project area as well as DOT&PF's findings for this undertaking and will respond with our concurrence and/or comments at that time.
As we discussed previously, one of the remaining issues is if the National Park Service feels that the presence of a road within the Cape Krusenstern Archaeological District National Monument (NHL) would be an adverse effect to the district. We look forward to further discussion on this matter, and if necessary we will assist you in developing minimization and mitigation measures to offset impacts to the district.
Thank you for sending a Section 106 consultation initiation letter to our office. Please let me know if we can be of further assistance.

Mark W. Rollins
Archaeologist II
Alaska State Historic Preservation Office/ Office of History and Archaeology
550 West 7th Avenue, Suite 1310
Anchorage, AK 99501

(907) 269-8722

THE STATE
of ALASKA
GOVERNOR BILL WALKER

Department of Transportation and Public Facilities

Northern Region
Design and Engineering Services
Preliminary Design and Environmental Section

2301 Peger Road
Fairbanks, Alaska 99709-5316
Main: 907-451-2237
Toll free: 800-451-2363
Fax: 907-451-5126

In Reply Refer To:
Kivalina Evacuation and School Site Access Road
Federal/State Project No. 0002384/NFHWY00162
No Historic Properties Adversely Affected
ATTENTION: This finding contains no DOE's

September 19, 2017

Millie Hawley, President
Native Village of Kivalina
PO Box 50051
Kivalina, AK 99750

Dear Ms. Hawley:

The Alaska Department of Transportation and Public Facilities (DOT&PF) has assumed the responsibilities of the Federal Highway Administration under 23 U.S.C.§ 326, and is proposing to construct a safe, reliable, all-season evacuation road between the community of Kivalina and a site on Kisimigiuqtuq Hill (K-Hill) (Figure 1). The Kivalina Evacuation and School Site Access Road (the Project) location is legally described in Table 1 below:

Table 1: Project Location

Section(s)	Township	Range	Meridian	USGS Quad
1, 2, 10, 11, 15, 16, 21	027N	026W	Kateel River	Noatak C-5
19. 20, 29, 30, 31	028N	026W	Kateel River	Noatak C-5
25, 26, 35, 36	029N	025W	Kateel River	Noatak C-5

Consultation for this project is being conducted in accordance with the 2014 *Programmatic Agreement... for the Federal-Aid Highway Program in Alaska.* The DOT&PF, acting as a Federal agency, finds no adverse effect on historic properties by the proposed project pursuant to 36 CFR 800.5(b), implementing regulations of Section 106 of the National Historic Preservation Act. This submission provides documentation in support of this finding, as required at 36 CFR 800.11(e).

Project Description

The proposed Project origin is at the City of Kivalina, located on the southeast tip of the barrier island located between the Chukchi Sea (Arctic Ocean) and Kivalina Lagoon (Figure 1). The project terminus is located on the mainland across the Kivalina Lagoon approximately six miles northeast at a community selected evacuation site on K-Hill. A range of route alternatives were considered within the project Study Area. This has now been reduced to two potential route alignments, the Combined Route B and the Southern Route, which are currently being considered as the Area of Potential Effect shown on Figure 2. Common to both route alternatives are the following actions:

- Construction of a 3,200-foot long causeway across the lagoon that may incorporate different hydrological openings including bridge(s), culvert(s), or both.
- Construction of an all-season two-way 24-foot wide gravel access road, either 7.7 miles or 8.9 miles long depending on the route selected, between Kivalina Island and the desired K-Hill evacuation site. Road construction would be within a 300-foot right-of-way (ROW) and include shoulders, multiple turnouts and 3:1 side slopes that may include guard rails and other safety features.
- Testing, analysis and development of material locations proximate to potential routes within the APE to determine their feasibility and evaluate environmental impacts of their development (Figures 2-6).

Area of Potential Effect (APE)

Potential direct and indirect effects were considered prior to the creation of the proposed APE. The APE, as presented, is a 2000-foot corridor encompasses the direct footprint of the project, including two alternative route alignments, staging areas, and potential material sites that are located on variously managed lands and allows for in-field construction adjustments. One final route APE will be defined with the completion of the environmental assessment.

The Kivalina Evacuation and School Site Access Road project would provide Kivalina residents a safe and reliable evacuation route in the event of a catastrophic storm or ocean surge, allowing evacuees to temporarily mobilize to safe refuge at an assembly site on K-Hill. This site is also identified by the Northwest Arctic Borough School District, and approved by the community, as a preferred new location for the community school. If constructed in the future, the school could augment the undeveloped evacuation site by serving as a full-service community emergency shelter with all-season support capabilities. No other viable potential future actions are identified at this time. While community relocation has been discussed for some time, it is not considered reasonably foreseeable. At present, the community supports construction of an evacuation road due to the immediate threat of storm events.

Kivalina relies on the currently existing airstrip adjacent to the city for a majority of its transportation and outside goods. Currently, DOT&PF has a project, Kivalina Airport Erosion Control (Z638720000), which is planning to construct a runway embankment erosion control feature. Initiation of Consultation letters were sent in February of 2017 for the Kivalina Airport Erosion Control project and a cultural resource investigation was conducted in August of 2017.

Several Alaska Native allotments lie adjacent to the APE and development of these and other private lands may occur consequent to road development. However, the DOT&PF believes that if this were to occur it will be limited to increased access to currently used traditional subsistence locations by people in the community. In addition, material sites developed in support of this project may be further developed or expanded for community use but this expansion will likely occur within the boundary of the current APE.

The potential viewshed effects of the creation of the road were also considered. The DOT&PF believes the minimal elevation and the limited width and method of construction of the road will not have an effect on the current viewshed of open tundra.

In order for the community of Kivalina to consider a future relocation move to a location along the evacuation road, near or at the evacuation road terminus or any place else, extensive planning, land transfers and the securing of significant funding would have to be in place. At this time those actions are neither reasonably foreseeable nor considered a cumulative impact of the proposed project. The DOT&PF does not believe that this action would be directly caused by the Project

Identification Efforts

A search of the Alaska Heritage Resources Survey (AHRS) database identified one site within the APE which is described in table 2 below:

Table 2. AHRS Site Located within the APE

Site Number	Site Name	Site Description	Determination of Eligibility?
NOA-00042	Cape Krusenstern Archaeological District National Monument National Historic Landmark (NHL)	This district covers over 2 million acres, extending along the beach 8 miles and varying in width from 1-3 miles. 114 parallel marine beach ridges, formed at an average of 60 years each, are the main features. These former coastal margins contain houses, burials, cache pits, and other remains of the peoples who have occupied these beaches progressively for at least 5,000 years. This horizontal stratigraphy includes virtually the entire range of known cultural history in NW Alaska. Near the beach ridges, on unglaciated uplands, are two older sites dated from BP 11,000-6,000. The lower Noatak Valley, an important avenue between the coast and the interior for millennia, contains a number of archaeological sites. The villages of Noatak and Kivalina are within the district. The number of sites listed here includes only those cited as "important sites" in the Final Environmental Statement on Cape Krusenstern National Monument published in 1974. Other reports break down these major sites into many others. Includes NOA-00002, NOA-00078, NOA-00138, and NOA-00139.	National Register of Historic Places Listed 05/03/1974

A literature review identified sixteen reports describing the results of cultural resource surveys conducted from the 1970s through 2016 within the initial Study Area. There are known archaeological and historical resources within the community of Kivalina south of the project origin, and south of the Wulik River mouth outside of the APE Area; however, no resources have been identified inland of Kivalina Lagoon within the APE. The APE is located within the boundaries of the Cape Krusenstern Archaeological District National Historic Landmark (NOA-00042). In January 2016, an archaeological predictive model was developed for the Study Area, and an archaeological survey of alternative route alignments and proposed material sites was conducted in September-October 2016. This field investigation involved pedestrian survey and subsurface testing at potentially sensitive locations identified in the predictive model and during the pedestrian survey along the three routes originally under consideration. The results of the field investigation are included in the *Kivalina Evacuation and School Site Access Road* report produced by Stantec for DOT&PF. Testing locations along the abandoned northern route are shown on Figure 2. The entire northern route is shown on Figure 1 of Appendix D of the report. No archaeological sites or historic properties were identified along the three alternative routes, or within the material sites that were defined at that time.

DOT&PF sent a cultural resource survey team in the August of 2017 to conduct addition fieldwork within the APE which now includes potential material site locations. The results of the field investigation are provided in a memo from Stantec entitled *Archaeological Assessment Update for the Kivalina Evacuation and School Site Access Road.*

Under the Alaska Historic Roads Programmatic Agreement Interim Guidance, a group of Alaska roads has been identified which are being treated as eligible for the National Register of Historic Places (NRHP). This project does not affect any of these roads.

Finding of Effect

NOA-00042 Cape Krusenstern Archaeological District National Monument National Historic Landmark (NHL)

Cape Krusenstern Archaeological District National Historic Landmark (NHL) was designated November 7, 1973 prior to the establishment if the National Monument which was designated on December 1, 1978. Properties designated as National Historic Landmarks are automatically listed in the NRHP CFR36§65.2(b). The primary reason for the designation of both the Archaeological District and National Monument was the overall significance of the region to the understanding the prehistory of the Arctic based on the positive results of archaeological investigations that took place between the late 1940's and early 1970's and continue today. At first, the boundary of the National Monument, which is restricted to the archaeologically rich beach ridge complex, was used for the boundaries for the NHL under National Landmark Criteria 36CFR§64.4(a)(6). It was later expanded to include areas, such as the Project location, which had not had any archaeological investigation conducted at the time.

The archaeological investigations conducted over the 2016 and 2017 field seasons did not result in the identification any elements which contribute to our continuing understanding of the prehistory or history of the Arctic within the Project's APE which is located within the boundaries of NHL. As such, the proposed construction of the Evacuation and School Site

Access Road will not have an adverse effect on the integrity of the NHL or its continuing eligibility for the NRHP as no contributing elements have been identified. Due to the Project being located within the NHL boundary the DOT&PF is submitting monitoring and inadvertent discovery plan to be implemented during the continued planning and execution of the Project (Attachment 1). In the event that cultural resources are encountered this plan will be implemented and all identified parties will be contacted. As the proposed routes, the Project terminus and the potential material site locations have only one historic property located within their boundaries the potential effect for all were addressed in one evaluation.

Overall, the DOT&PF has determined that the activities proposed for the Kivalina Evacuation and School Site Access Road Project will result in **no historic properties adversely affected** and seeks the Alaska SHPO's concurrence with this finding of effect.

Section 4(f)
It is the DOT&PF's intent to make a Section 4(f) de minimis impact finding premised on your written concurrence that the project **will not adversely affect** NOA-00042 Cape Krusenstern Archaeological District National Monument National Historic Landmark (NHL).

Consultation Efforts
On July 10, 2017 a meeting was among Agency cultural resource staff. The DOT&PF Northern Region PQI, staff from the Office of History and Archaeology and the Alaska State Historic Preservation Officer (SHPO) and the National Park Service Archaeologist for the National Register of Historic Places Program, Alaska Region. Initiation of Consultation letters were sent out to the identified consulting parties on August 7, 2017. A response was received from the SHPO office on August 22, 2017 stating there was no objection to the proposed Study Area or level of identification at this time (Attachment 2). No other responses to the Section 106 Initiation of Consultation letters were received.

A copy of this letter has been submitted to the National Park Service for their evaluation and recommendation regarding activities within a NHL.

In addition to the Alaska State Historic Preservation Officer (SHPO), other parties being contacted regarding the findings for this project are: the National Park Service (NPS); the Native Village of Kivalina; the City of Kivalina; the Native Village of Noatak; NANA Regional Corporation; the Northwest Arctic Borough; NPS-Western Arctic National Parklands; the Bureau of Indian Affairs (BIA); and the Advisory Council on Historic Preservation.

If you wish to comment on this finding I can be reached at the address above, by telephone at 907-451-5293, or by e-mail at thomas.gamza@alaska.gov. Should you prefer to conduct government-to-government consultation with the Federal Highway Administration (FHWA) on this project, please advise me of your request.

Your timely response will greatly assist us in incorporating your concerns into project development. For that purpose, we respectfully request that you respond within thirty days of your receipt of this correspondence.

Sincerely,

Thomas A. Gamza
Cultural Resource Specialist-Archaeologist (PQI)
State of Alaska DOT&PF, Northern Region

Figure 1: Location and Vicinity Map
Figure 2: Area of Potential Effect-Overview
Figures 3-6 Proposed Material Site Investigation APE

Attachment 1: Draft Inadvertent Discovery Plan – Kivalina Evacuation and School Site Access Road
Attachment 2: August 22, 2017 response from the SHPO to August 7, 2017 Initiation of Consultation Letter

Electronic cc w/ enclosures:
Michael Cain, FHWA Alaska Division, Northern Region Area Engineer
Jonathan Hutchinson, P.E., DOT&PF Northern Region, Project Manager
Paul Karczmarczyk, DOT&PF Northern Region, Environmental Impact Analyst
Brett Nelson, DOT&PF Northern Region, Regional Environmental Manager
Kathy Price, DOT&PF, Statewide Cultural Resources Manager
Amy Sumner, DOT&PF Statewide Environmental NEPA Manager

Department of Transportation and Public Facilities

THE STATE of ALASKA

GOVERNOR BILL WALKER

Northern Region
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In Reply Refer To:
Kivalina Evacuation and School Site Access Road
Federal/State Project No. 0002384/NFHWY00162
No Historic Properties Adversely Affected
ATTENTION: This finding contains no DOE's

September 19, 2017

Vernon Adams, Sr., President
Native Village of Noatak
PO Box 89
Noatak, AK 99761

Dear Mr. Adams:

The Alaska Department of Transportation and Public Facilities (DOT&PF) has assumed the responsibilities of the Federal Highway Administration under 23 U.S.C.§ 326, and is proposing to construct a safe, reliable, all-season evacuation road between the community of Kivalina and a site on Kisimigiuqtuq Hill (K-Hill) (Figure 1). The Kivalina Evacuation and School Site Access Road (the Project) location is legally described in Table 1 below:

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Consultation for this project is being conducted in accordance with the 2014 *Programmatic Agreement… for the Federal-Aid Highway Program in Alaska.* The DOT&PF, acting as a Federal agency, finds no adverse effect on historic properties by the proposed project pursuant to 36 CFR 800.5(b), implementing regulations of Section 106 of the National Historic Preservation Act. This submission provides documentation in support of this finding, as required at 36 CFR 800.11(e).

Project Description
The proposed Project origin is at the City of Kivalina, located on the southeast tip of the barrier island located between the Chukchi Sea (Arctic Ocean) and Kivalina Lagoon (Figure 1). The project terminus is located on the mainland across the Kivalina Lagoon approximately six miles northeast at a community selected evacuation site on K-Hill. A range of route alternatives were considered within the project Study Area. This has now been reduced to two potential route alignments, the Combined Route B and the Southern Route, which are currently being considered as the Area of Potential Effect shown on Figure 2. Common to both route alternatives are the following actions:

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Finding of Effect

NOA-00042 Cape Krusenstern Archaeological District National Monument National Historic Landmark (NHL)

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Access Road will not have an adverse effect on the integrity of the NHL or its continuing eligibility for the NRHP as no contributing elements have been identified. Due to the Project being located within the NHL boundary the DOT&PF is submitting monitoring and inadvertent discovery plan to be implemented during the continued planning and execution of the Project (Attachment 1). In the event that cultural resources are encountered this plan will be implemented and all identified parties will be contacted. As the proposed routes, the Project terminus and the potential material site locations have only one historic property located within their boundaries the potential effect for all were addressed in one evaluation.

Overall, the DOT&PF has determined that the activities proposed for the Kivalina Evacuation and School Site Access Road Project will result in **no historic properties adversely affected** and seeks the Alaska SHPO's concurrence with this finding of effect.

Section 4(f)
It is the DOT&PF's intent to make a Section 4(f) de minimis impact finding premised on your written concurrence that the project **will not adversely affect** NOA-00042 Cape Krusenstern Archaeological District National Monument National Historic Landmark (NHL).

Consultation Efforts
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Sincerely,

Thomas A. Gamza
Cultural Resource Specialist-Archaeologist (PQI)
State of Alaska DOT&PF, Northern Region

Figure 1: Location and Vicinity Map
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Michael Cain, FHWA Alaska Division, Northern Region Area Engineer
Jonathan Hutchinson, P.E., DOT&PF Northern Region, Project Manager
Paul Karczmarczyk, DOT&PF Northern Region, Environmental Impact Analyst
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THE STATE
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GOVERNOR BILL WALKER

Department of Transportation and Public Facilities

Northern Region
Design and Engineering Services
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In Reply Refer To:
Kivalina Evacuation and School Site Access Road
Federal/State Project No. 0002384/NFHWY00162
No Historic Properties Adversely Affected
ATTENTION: This finding contains no DOE's

September 19, 2017

Honorable Austin Swan Sr., Mayor
City of Kivalina
PO Box 50079
Kivalina, AK 99750

Dear Mayor Swan:

The Alaska Department of Transportation and Public Facilities (DOT&PF) has assumed the responsibilities of the Federal Highway Administration under 23 U.S.C.§ 326, and is proposing to construct a safe, reliable, all-season evacuation road between the community of Kivalina and a site on Kisimigiuqtuq Hill (K-Hill) (Figure 1). The Kivalina Evacuation and School Site Access Road (the Project) location is legally described in Table 1 below:

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Consultation for this project is being conducted in accordance with the 2014 *Programmatic Agreement... for the Federal-Aid Highway Program in Alaska.* The DOT&PF, acting as a Federal agency, finds no adverse effect on historic properties by the proposed project pursuant to 36 CFR 800.5(b), implementing regulations of Section 106 of the National Historic Preservation Act. This submission provides documentation in support of this finding, as required at 36 CFR 800.11(e).

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The Kivalina Evacuation and School Site Access Road project would provide Kivalina residents a safe and reliable evacuation route in the event of a catastrophic storm or ocean surge, allowing evacuees to temporarily mobilize to safe refuge at an assembly site on K-Hill. This site is also identified by the Northwest Arctic Borough School District, and approved by the community, as a preferred new location for the community school. If constructed in the future, the school could augment the undeveloped evacuation site by serving as a full-service community emergency shelter with all-season support capabilities. No other viable potential future actions are identified at this time. While community relocation has been discussed for some time, it is not considered reasonably foreseeable. At present, the community supports construction of an evacuation road due to the immediate threat of storm events.

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Several Alaska Native allotments lie adjacent to the APE and development of these and other private lands may occur consequent to road development. However, the DOT&PF believes that if this were to occur it will be limited to increased access to currently used traditional subsistence locations by people in the community. In addition, material sites developed in support of this project may be further developed or expanded for community use but this expansion will likely occur within the boundary of the current APE.

The potential viewshed effects of the creation of the road were also considered. The DOT&PF believes the minimal elevation and the limited width and method of construction of the road will not have an effect on the current viewshed of open tundra.

In order for the community of Kivalina to consider a future relocation move to a location along the evacuation road, near or at the evacuation road terminus or any place else, extensive planning, land transfers and the securing of significant funding would have to be in place. At this time those actions are neither reasonably foreseeable nor considered a cumulative impact of the proposed project. The DOT&PF does not believe that this action would be directly caused by the Project

Identification Efforts
A search of the Alaska Heritage Resources Survey (AHRS) database identified one site within the APE which is described in table 2 below:

Table 2. AHRS Site Located within the APE

Site Number	Site Name	Site Description	Determination of Eligibility?
NOA-00042	Cape Krusenstern Archaeological District National Monument National Historic Landmark (NHL)	This district covers over 2 million acres, extending along the beach 8 miles and varying in width from 1-3 miles. 114 parallel marine beach ridges, formed at an average of 60 years each, are the main features. These former coastal margins contain houses, burials, cache pits, and other remains of the peoples who have occupied these beaches progressively for at least 5,000 years. This horizontal stratigraphy includes virtually the entire range of known cultural history in NW Alaska. Near the beach ridges, on unglaciated uplands, are two older sites dated from BP 11,000-6,000. The lower Noatak Valley, an important avenue between the coast and the interior for millennia, contains a number of archaeological sites. The villages of Noatak and Kivalina are within the district. The number of sites listed here includes only those cited as "important sites" in the Final Environmental Statement on Cape Krusenstern National Monument published in 1974. Other reports break down these major sites into many others. Includes NOA-00002, NOA-00078, NOA-00138, and NOA-00139.	National Register of Historic Places Listed 05/03/1974

A literature review identified sixteen reports describing the results of cultural resource surveys conducted from the 1970s through 2016 within the initial Study Area. There are known archaeological and historical resources within the community of Kivalina south of the project origin, and south of the Wulik River mouth outside of the APE Area; however, no resources have been identified inland of Kivalina Lagoon within the APE. The APE is located within the boundaries of the Cape Krusenstern Archaeological District National Historic Landmark (NOA-00042). In January 2016, an archaeological predictive model was developed for the Study Area, and an archaeological survey of alternative route alignments and proposed material sites was conducted in September-October 2016. This field investigation involved pedestrian survey and subsurface testing at potentially sensitive locations identified in the predictive model and during the pedestrian survey along the three routes originally under consideration. The results of the field investigation are included in the *Kivalina Evacuation and School Site Access Road* report produced by Stantec for DOT&PF. Testing locations along the abandoned northern route are shown on Figure 2. The entire northern route is shown on Figure 1 of Appendix D of the report. No archaeological sites or historic properties were identified along the three alternative routes, or within the material sites that were defined at that time.

DOT&PF sent a cultural resource survey team in the August of 2017 to conduct addition fieldwork within the APE which now includes potential material site locations. The results of the field investigation are provided in a memo from Stantec entitled *Archaeological Assessment Update for the Kivalina Evacuation and School Site Access Road.*

Under the Alaska Historic Roads Programmatic Agreement Interim Guidance, a group of Alaska roads has been identified which are being treated as eligible for the National Register of Historic Places (NRHP). This project does not affect any of these roads.

Finding of Effect

NOA-00042 Cape Krusenstern Archaeological District National Monument National Historic Landmark (NHL)

Cape Krusenstern Archaeological District National Historic Landmark (NHL) was designated November 7, 1973 prior to the establishment if the National Monument which was designated on December 1, 1978. Properties designated as National Historic Landmarks are automatically listed in the NRHP CFR36§65.2(b). The primary reason for the designation of both the Archaeological District and National Monument was the overall significance of the region to the understanding the prehistory of the Arctic based on the positive results of archaeological investigations that took place between the late 1940's and early 1970's and continue today. At first, the boundary of the National Monument, which is restricted to the archaeologically rich beach ridge complex, was used for the boundaries for the NHL under National Landmark Criteria 36CFR§64.4(a)(6). It was later expanded to include areas, such as the Project location, which had not had any archaeological investigation conducted at the time.

The archaeological investigations conducted over the 2016 and 2017 field seasons did not result in the identification any elements which contribute to our continuing understanding of the prehistory or history of the Arctic within the Project's APE which is located within the boundaries of NHL. As such, the proposed construction of the Evacuation and School Site

Access Road will not have an adverse effect on the integrity of the NHL or its continuing eligibility for the NRHP as no contributing elements have been identified. Due to the Project being located within the NHL boundary the DOT&PF is submitting monitoring and inadvertent discovery plan to be implemented during the continued planning and execution of the Project (Attachment 1). In the event that cultural resources are encountered this plan will be implemented and all identified parties will be contacted. As the proposed routes, the Project terminus and the potential material site locations have only one historic property located within their boundaries the potential effect for all were addressed in one evaluation.

Overall, the DOT&PF has determined that the activities proposed for the Kivalina Evacuation and School Site Access Road Project will result in **no historic properties adversely affected** and seeks the Alaska SHPO's concurrence with this finding of effect.

Section 4(f)

It is the DOT&PF's intent to make a Section 4(f) de minimis impact finding premised on your written concurrence that the project **will not adversely affect** NOA-00042 Cape Krusenstern Archaeological District National Monument National Historic Landmark (NHL).

Consultation Efforts

On July 10, 2017 a meeting was among Agency cultural resource staff. The DOT&PF Northern Region PQI, staff from the Office of History and Archaeology and the Alaska State Historic Preservation Officer (SHPO) and the National Park Service Archaeologist for the National Register of Historic Places Program, Alaska Region. Initiation of Consultation letters were sent out to the identified consulting parties on August 7, 2017. A response was received from the SHPO office on August 22, 2017 stating there was no objection to the proposed Study Area or level of identification at this time (Attachment 2). No other responses to the Section 106 Initiation of Consultation letters were received.

A copy of this letter has been submitted to the National Park Service for their evaluation and recommendation regarding activities within a NHL.

In addition to the Alaska State Historic Preservation Officer (SHPO), other parties being contacted regarding the findings for this project are: the National Park Service (NPS); the Native Village of Kivalina; the City of Kivalina; the Native Village of Noatak; NANA Regional Corporation; the Northwest Arctic Borough; NPS-Western Arctic National Parklands; the Bureau of Indian Affairs (BIA); and the Advisory Council on Historic Preservation.

If you wish to comment on this finding, I can be reached at the address above, by telephone at 907-451-5293, or by e-mail at *thomas.gamza@alaska.gov*. Your timely response will greatly assist us in incorporating your concerns into project development. For that purpose, we respectfully request that you respond within thirty days of your receipt of this correspondence.

Sincerely,

Thomas A. Gamza
Cultural Resource Specialist-Archaeologist (PQI)
State of Alaska DOT&PF, Northern Region

Figure 1: Location and Vicinity Map
Figure 2: Area of Potential Effect-Overview
Figures 3-6 Proposed Material Site Investigation APE

Attachment 1: Draft Inadvertent Discovery Plan – Kivalina Evacuation and School Site Access Road
Attachment 2: August 22, 2017 response from the SHPO to August 7, 2017 Initiation of Consultation Letter

Electronic cc w/ enclosures:
Michael Cain, FHWA Alaska Division, Northern Region Area Engineer
Jonathan Hutchinson, P.E., DOT&PF Northern Region, Project Manager
Paul Karczmarczyk, DOT&PF Northern Region, Environmental Impact Analyst
Brett Nelson, DOT&PF Northern Region, Regional Environmental Manager
Kathy Price, DOT&PF, Statewide Cultural Resources Manager
Amy Sumner, DOT&PF Statewide Environmental NEPA Manager

THE STATE of ALASKA
GOVERNOR BILL WALKER

Department of Transportation and Public Facilities

Northern Region
Design and Engineering Services
Preliminary Design and Environmental Section

2301 Peger Road
Fairbanks, Alaska 99709-5316
Main: 907-451-2237
Toll free: 800-451-2363
Fax: 907-451-5126

In Reply Refer To:
Kivalina Evacuation and School Site Access Road
Federal/State Project No. 0002384/NFHWY00162
No Historic Properties Adversely Affected
ATTENTION: This finding contains no DOE's

September 19, 2017

Wayne Westlake
President & CEO
NANA Regional Corporation, Inc.
909 West 9th Avenue
Anchorage, AK 99501

Dear Mr. Westlake:

The Alaska Department of Transportation and Public Facilities (DOT&PF) has assumed the responsibilities of the Federal Highway Administration under 23 U.S.C.§ 326, and is proposing to construct a safe, reliable, all-season evacuation road between the community of Kivalina and a site on Kisimigiuqtuq Hill (K-Hill) (Figure 1). The Kivalina Evacuation and School Site Access Road (the Project) location is legally described in Table 1 below:

Table 1: Project Location

Section(s)	Township	Range	Meridian	USGS Quad
1, 2, 10, 11, 15, 16, 21	027N	026W	Kateel River	Noatak C-5
19. 20, 29, 30, 31	028N	026W	Kateel River	Noatak C-5
25, 26, 35, 36	029N	025W	Kateel River	Noatak C-5

Consultation for this project is being conducted in accordance with the 2014 *Programmatic Agreement... for the Federal-Aid Highway Program in Alaska.* The DOT&PF, acting as a Federal agency, finds no adverse effect on historic properties by the proposed project pursuant to 36 CFR 800.5(b), implementing regulations of Section 106 of the National Historic Preservation

Act. This submission provides documentation in support of this finding, as required at 36 CFR 800.11(e).

Project Description

The proposed Project origin is at the City of Kivalina, located on the southeast tip of the barrier island located between the Chukchi Sea (Arctic Ocean) and Kivalina Lagoon (Figure 1). The project terminus is located on the mainland across the Kivalina Lagoon approximately six miles northeast at a community selected evacuation site on K-Hill. A range of route alternatives were considered within the project Study Area. This has now been reduced to two potential route alignments, the Combined Route B and the Southern Route, which are currently being considered as the Area of Potential Effect shown on Figure 2. Common to both route alternatives are the following actions:

- Construction of a 3,200-foot long causeway across the lagoon that may incorporate different hydrological openings including bridge(s), culvert(s), or both.
- Construction of an all-season two-way 24-foot wide gravel access road, either 7.7 miles or 8.9 miles long depending on the route selected, between Kivalina Island and the desired K-Hill evacuation site. Road construction would be within a 300-foot right-of-way (ROW) and include shoulders, multiple turnouts and 3:1 side slopes that may include guard rails and other safety features.
- Testing, analysis and development of material locations proximate to potential routes within the APE to determine their feasibility and evaluate environmental impacts of their development (Figures 2-6).

Area of Potential Effect (APE)

Potential direct and indirect effects were considered prior to the creation of the proposed APE. The APE, as presented, is a 2000-foot corridor encompasses the direct footprint of the project, including two alternative route alignments, staging areas, and potential material sites that are located on variously managed lands and allows for in-field construction adjustments. One final route APE will be defined with the completion of the environmental assessment.

The Kivalina Evacuation and School Site Access Road project would provide Kivalina residents a safe and reliable evacuation route in the event of a catastrophic storm or ocean surge, allowing evacuees to temporarily mobilize to safe refuge at an assembly site on K-Hill. This site is also identified by the Northwest Arctic Borough School District, and approved by the community, as a preferred new location for the community school. If constructed in the future, the school could augment the undeveloped evacuation site by serving as a full-service community emergency shelter with all-season support capabilities. No other viable potential future actions are identified at this time. While community relocation has been discussed for some time, it is not considered reasonably foreseeable. At present, the community supports construction of an evacuation road due to the immediate threat of storm events.

Kivalina relies on the currently existing airstrip adjacent to the city for a majority of its transportation and outside goods. Currently, DOT&PF has a project, Kivalina Airport Erosion Control (Z638720000), which is planning to construct a runway embankment erosion control

feature. Initiation of Consultation letters were sent in February of 2017 for the Kivalina Airport Erosion Control project and a cultural resource investigation was conducted in August of 2017.

Several Alaska Native allotments lie adjacent to the APE and development of these and other private lands may occur consequent to road development. However, the DOT&PF believes that if this were to occur it will be limited to increased access to currently used traditional subsistence locations by people in the community. In addition, material sites developed in support of this project may be further developed or expanded for community use but this expansion will likely occur within the boundary of the current APE.

The potential viewshed effects of the creation of the road were also considered. The DOT&PF believes the minimal elevation and the limited width and method of construction of the road will not have an effect on the current viewshed of open tundra.

In order for the community of Kivalina to consider a future relocation move to a location along the evacuation road, near or at the evacuation road terminus or any place else, extensive planning, land transfers and the securing of significant funding would have to be in place. At this time those actions are neither reasonably foreseeable nor considered a cumulative impact of the proposed project. The DOT&PF does not believe that this action would be directly caused by the Project

Identification Efforts

A search of the Alaska Heritage Resources Survey (AHRS) database identified one site within the APE which is described in table 2 below:

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		NOA-00002, NOA-00078, NOA-00138, and NOA-00139.	

A literature review identified sixteen reports describing the results of cultural resource surveys conducted from the 1970s through 2016 within the initial Study Area. There are known archaeological and historical resources within the community of Kivalina south of the project origin, and south of the Wulik River mouth outside of the APE Area; however, no resources have been identified inland of Kivalina Lagoon within the APE. The APE is located within the boundaries of the Cape Krusenstern Archaeological District National Historic Landmark (NOA-00042). In January 2016, an archaeological predictive model was developed for the Study Area, and an archaeological survey of alternative route alignments and proposed material sites was conducted in September-October 2016. This field investigation involved pedestrian survey and subsurface testing at potentially sensitive locations identified in the predictive model and during the pedestrian survey along the three routes originally under consideration. The results of the field investigation are included in the *Kivalina Evacuation and School Site Access Road* report produced by Stantec for DOT&PF. Testing locations along the abandoned northern route are shown on Figure 2. The entire northern route is shown on Figure 1 of Appendix D of the report. No archaeological sites or historic properties were identified along the three alternative routes, or within the material sites that were defined at that time.

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Under the Alaska Historic Roads Programmatic Agreement Interim Guidance, a group of Alaska roads has been identified which are being treated as eligible for the National Register of Historic Places (NRHP). This project does not affect any of these roads.

Finding of Effect

NOA-00042 Cape Krusenstern Archaeological District National Monument National Historic Landmark (NHL)

Cape Krusenstern Archaeological District National Historic Landmark (NHL) was designated November 7, 1973 prior to the establishment if the National Monument which was designated on December 1, 1978. Properties designated as National Historic Landmarks are automatically listed in the NRHP CFR36§65.2(b). The primary reason for the designation of both the Archaeological District and National Monument was the overall significance of the region to the understanding the prehistory of the Arctic based on the positive results of archaeological investigations that took place between the late 1940's and early 1970's and continue today. At first, the boundary of the National Monument, which is restricted to the archaeologically rich beach ridge complex, was used for the boundaries for the NHL under National Landmark Criteria 36CFR§64.4(a)(6). It was later expanded to include areas, such as the Project location, which had not had any archaeological investigation conducted at the time.

The archaeological investigations conducted over the 2016 and 2017 field seasons did not result in the identification any elements which contribute to our continuing understanding of the prehistory or history of the Arctic within the Project's APE which is located within the boundaries of NHL. As such, the proposed construction of the Evacuation and School Site Access Road will not have an adverse effect on the integrity of the NHL or its continuing eligibility for the NRHP as no contributing elements have been identified. Due to the Project being located within the NHL boundary the DOT&PF is submitting monitoring and inadvertent discovery plan to be implemented during the continued planning and execution of the Project (Attachment 1). In the event that cultural resources are encountered this plan will be implemented and all identified parties will be contacted. As the proposed routes, the Project terminus and the potential material site locations have only one historic property located within their boundaries the potential effect for all were addressed in one evaluation.

Overall, the DOT&PF has determined that the activities proposed for the Kivalina Evacuation and School Site Access Road Project will result in **no historic properties adversely affected** and seeks the Alaska SHPO's concurrence with this finding of effect.

Section 4(f)
It is the DOT&PF's intent to make a Section 4(f) de minimis impact finding premised on your written concurrence that the project **will not adversely affect** NOA-00042 Cape Krusenstern Archaeological District National Monument National Historic Landmark (NHL).

Consultation Efforts
On July 10, 2017 a meeting was among Agency cultural resource staff. The DOT&PF Northern Region PQI, staff from the Office of History and Archaeology and the Alaska State Historic Preservation Officer (SHPO) and the National Park Service Archaeologist for the National Register of Historic Places Program, Alaska Region. Initiation of Consultation letters were sent out to the identified consulting parties on August 7, 2017. A response was received from the SHPO office on August 22, 2017 stating there was no objection to the proposed Study Area or level of identification at this time (Attachment 2). No other responses to the Section 106 Initiation of Consultation letters were received.

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In addition to the Alaska State Historic Preservation Officer (SHPO), other parties being contacted regarding the findings for this project are: the National Park Service (NPS); the Native Village of Kivalina; the City of Kivalina; the Native Village of Noatak; NANA Regional Corporation; the Northwest Arctic Borough; NPS-Western Arctic National Parklands; the Bureau of Indian Affairs (BIA); and the Advisory Council on Historic Preservation.

If you wish to comment on this finding, I can be reached at the address above, by telephone at 907-451-5293, or by e-mail at *thomas.gamza@alaska.gov*. Your timely response will greatly assist us in incorporating your concerns into project development. For that purpose, we respectfully request that you respond within thirty days of your receipt of this correspondence.

Sincerely,

Thomas A. Gamza
Cultural Resource Specialist-Archaeologist (PQI)
State of Alaska DOT&PF, Northern Region

Figure 1: Location and Vicinity Map
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Figures 3-6 Proposed Material Site Investigation APE

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Attachment 2: August 22, 2017 response from the SHPO to August 7, 2017 Initiation of Consultation Letter

Electronic cc w/ enclosures:
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THE STATE of ALASKA
GOVERNOR BILL WALKER

Department of Transportation and Public Facilities

Northern Region
Design and Engineering Services
Preliminary Design and Environmental Section

2301 Peger Road
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Main: 907-451-2237
Toll free: 800-451-2363
Fax: 907-451-5126

In Reply Refer To:
Kivalina Evacuation and School Site Access Road
Federal/State Project No. 0002384/NFHWY00162
No Historic Properties Adversely Affected
ATTENTION: This finding contains no DOE's

September 19, 2017

John Lincoln
Vice President of Lands
NANA Regional Corporation, Inc.
PO Box 49
Kotzebue, AK 99752

Dear Mr. Lincoln:

The Alaska Department of Transportation and Public Facilities (DOT&PF) has assumed the responsibilities of the Federal Highway Administration under 23 U.S.C.§ 326, and is proposing to construct a safe, reliable, all-season evacuation road between the community of Kivalina and a site on Kisimigiuqtuq Hill (K-Hill) (Figure 1). The Kivalina Evacuation and School Site Access Road (the Project) location is legally described in Table 1 below:

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Consultation for this project is being conducted in accordance with the 2014 *Programmatic Agreement... for the Federal-Aid Highway Program in Alaska.* The DOT&PF, acting as a Federal agency, finds no adverse effect on historic properties by the proposed project pursuant to 36 CFR 800.5(b), implementing regulations of Section 106 of the National Historic Preservation

Act. This submission provides documentation in support of this finding, as required at 36 CFR 800.11(e).

Project Description
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The potential viewshed effects of the creation of the road were also considered. The DOT&PF believes the minimal elevation and the limited width and method of construction of the road will not have an effect on the current viewshed of open tundra.

In order for the community of Kivalina to consider a future relocation move to a location along the evacuation road, near or at the evacuation road terminus or any place else, extensive planning, land transfers and the securing of significant funding would have to be in place. At this time those actions are neither reasonably foreseeable nor considered a cumulative impact of the proposed project. The DOT&PF does not believe that this action would be directly caused by the Project

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Under the Alaska Historic Roads Programmatic Agreement Interim Guidance, a group of Alaska roads has been identified which are being treated as eligible for the National Register of Historic Places (NRHP). This project does not affect any of these roads.

Finding of Effect

NOA-00042 Cape Krusenstern Archaeological District National Monument National Historic Landmark (NHL)

Cape Krusenstern Archaeological District National Historic Landmark (NHL) was designated November 7, 1973 prior to the establishment if the National Monument which was designated on December 1, 1978. Properties designated as National Historic Landmarks are automatically listed in the NRHP CFR36§65.2(b). The primary reason for the designation of both the Archaeological District and National Monument was the overall significance of the region to the understanding the prehistory of the Arctic based on the positive results of archaeological investigations that took place between the late 1940's and early 1970's and continue today. At first, the boundary of the National Monument, which is restricted to the archaeologically rich beach ridge complex, was used for the boundaries for the NHL under National Landmark Criteria 36CFR§64.4(a)(6). It was later expanded to include areas, such as the Project location, which had not had any archaeological investigation conducted at the time.

The archaeological investigations conducted over the 2016 and 2017 field seasons did not result in the identification any elements which contribute to our continuing understanding of the prehistory or history of the Arctic within the Project's APE which is located within the boundaries of NHL. As such, the proposed construction of the Evacuation and School Site Access Road will not have an adverse effect on the integrity of the NHL or its continuing eligibility for the NRHP as no contributing elements have been identified. Due to the Project being located within the NHL boundary the DOT&PF is submitting monitoring and inadvertent discovery plan to be implemented during the continued planning and execution of the Project (Attachment 1). In the event that cultural resources are encountered this plan will be implemented and all identified parties will be contacted. As the proposed routes, the Project terminus and the potential material site locations have only one historic property located within their boundaries the potential effect for all were addressed in one evaluation.

Overall, the DOT&PF has determined that the activities proposed for the Kivalina Evacuation and School Site Access Road Project will result in **no historic properties adversely affected** and seeks the Alaska SHPO's concurrence with this finding of effect.

Section 4(f)
It is the DOT&PF's intent to make a Section 4(f) de minimis impact finding premised on your written concurrence that the project **will not adversely affect** NOA-00042 Cape Krusenstern Archaeological District National Monument National Historic Landmark (NHL).

Consultation Efforts
On July 10, 2017 a meeting was among Agency cultural resource staff. The DOT&PF Northern Region PQI, staff from the Office of History and Archaeology and the Alaska State Historic Preservation Officer (SHPO) and the National Park Service Archaeologist for the National Register of Historic Places Program, Alaska Region. Initiation of Consultation letters were sent out to the identified consulting parties on August 7, 2017. A response was received from the SHPO office on August 22, 2017 stating there was no objection to the proposed Study Area or level of identification at this time (Attachment 2). No other responses to the Section 106 Initiation of Consultation letters were received.

A copy of this letter has been submitted to the National Park Service for their evaluation and recommendation regarding activities within a NHL.

In addition to the Alaska State Historic Preservation Officer (SHPO), other parties being contacted regarding the findings for this project are: the National Park Service (NPS); the Native Village of Kivalina; the City of Kivalina; the Native Village of Noatak; NANA Regional Corporation; the Northwest Arctic Borough; NPS-Western Arctic National Parklands; the Bureau of Indian Affairs (BIA); and the Advisory Council on Historic Preservation.

If you wish to comment on this finding, I can be reached at the address above, by telephone at 907-451-5293, or by e-mail at *thomas.gamza@alaska.gov*. Your timely response will greatly assist us in incorporating your concerns into project development. For that purpose, we respectfully request that you respond within thirty days of your receipt of this correspondence.

Sincerely,

Thomas A. Gamza
Cultural Resource Specialist-Archaeologist (PQI)
State of Alaska DOT&PF, Northern Region

Figure 1: Location and Vicinity Map
Figure 2: Area of Potential Effect-Overview
Figures 3-6 Proposed Material Site Investigation APE

Attachment 1: Draft Inadvertent Discovery Plan – Kivalina Evacuation and School Site Access Road
Attachment 2: August 22, 2017 response from the SHPO to August 7, 2017 Initiation of Consultation Letter

Electronic cc w/ enclosures:
Michael Cain, FHWA Alaska Division, Northern Region Area Engineer
Jonathan Hutchinson, P.E., DOT&PF Northern Region, Project Manager
Paul Karczmarczyk, DOT&PF Northern Region, Environmental Impact Analyst
Brett Nelson, DOT&PF Northern Region, Regional Environmental Manager
Kathy Price, DOT&PF, Statewide Cultural Resources Manager
Amy Sumner, DOT&PF Statewide Environmental NEPA Manager

Department of Transportation and Public Facilities

THE STATE of ALASKA

GOVERNOR BILL WALKER

Northern Region
Design and Engineering Services
Preliminary Design and Environmental Section

2301 Peger Road
Fairbanks, Alaska 99709-5316
Main: 907-451-2237
Toll free: 800-451-2363
Fax: 907-451-5126

In Reply Refer To:
Kivalina Evacuation and School Site Access Road
Federal/State Project No. 0002384/NFHWY00162
No Historic Properties Adversely Affected
ATTENTION: This finding contains no DOE's

September 19, 2017

Bert Frost, Regional Director
Alaska Regional Office
National Park Service
240 West 5th Avenue
Anchorage, AK 99501

Dear Mr. Frost:

The Alaska Department of Transportation and Public Facilities (DOT&PF) has assumed the responsibilities of the Federal Highway Administration under 23 U.S.C.§ 326, and is proposing to construct a safe, reliable, all-season evacuation road between the community of Kivalina and a site on Kisimigiuqtuq Hill (K-Hill) (Figure 1). The Kivalina Evacuation and School Site Access Road (the Project) location is legally described in Table 1 below:

Table 1: Project Location

Section(s)	Township	Range	Meridian	USGS Quad
1, 2, 10, 11, 15, 16, 21	027N	026W	Kateel River	Noatak C-5
19. 20, 29, 30, 31	028N	026W	Kateel River	Noatak C-5
25, 26, 35, 36	029N	025W	Kateel River	Noatak C-5

Consultation for this project is being conducted in accordance with the 2014 *Programmatic Agreement... for the Federal-Aid Highway Program in Alaska.* The DOT&PF, acting as a Federal agency, finds no adverse effect on historic properties by the proposed project pursuant to 36 CFR 800.5(b), implementing regulations of Section 106 of the National Historic Preservation

Act. This submission provides documentation in support of this finding, as required at 36 CFR 800.11(e).

Project Description

The proposed Project origin is at the City of Kivalina, located on the southeast tip of the barrier island located between the Chukchi Sea (Arctic Ocean) and Kivalina Lagoon (Figure 1). The project terminus is located on the mainland across the Kivalina Lagoon approximately six miles northeast at a community selected evacuation site on K-Hill. A range of route alternatives were considered within the project Study Area. This has now been reduced to two potential route alignments, the Combined Route B and the Southern Route, which are currently being considered as the Area of Potential Effect shown on Figure 2. Common to both route alternatives are the following actions:

- Construction of a 3,200-foot long causeway across the lagoon that may incorporate different hydrological openings including bridge(s), culvert(s), or both.
- Construction of an all-season two-way 24-foot wide gravel access road, either 7.7 miles or 8.9 miles long depending on the route selected, between Kivalina Island and the desired K-Hill evacuation site. Road construction would be within a 300-foot right-of-way (ROW) and include shoulders, multiple turnouts and 3:1 side slopes that may include guard rails and other safety features.
- Testing, analysis and development of material locations proximate to potential routes within the APE to determine their feasibility and evaluate environmental impacts of their development (Figures 2-6).

Area of Potential Effect (APE)

Potential direct and indirect effects were considered prior to the creation of the proposed APE. The APE, as presented, is a 2000-foot corridor encompasses the direct footprint of the project, including two alternative route alignments, staging areas, and potential material sites that are located on variously managed lands and allows for in-field construction adjustments. One final route APE will be defined with the completion of the environmental assessment.

The Kivalina Evacuation and School Site Access Road project would provide Kivalina residents a safe and reliable evacuation route in the event of a catastrophic storm or ocean surge, allowing evacuees to temporarily mobilize to safe refuge at an assembly site on K-Hill. This site is also identified by the Northwest Arctic Borough School District, and approved by the community, as a preferred new location for the community school. If constructed in the future, the school could augment the undeveloped evacuation site by serving as a full-service community emergency shelter with all-season support capabilities. No other viable potential future actions are identified at this time. While community relocation has been discussed for some time, it is not considered reasonably foreseeable. At present, the community supports construction of an evacuation road due to the immediate threat of storm events.

Kivalina relies on the currently existing airstrip adjacent to the city for a majority of its transportation and outside goods. Currently, DOT&PF has a project, Kivalina Airport Erosion Control (Z638720000), which is planning to construct a runway embankment erosion control

feature. Initiation of Consultation letters were sent in February of 2017 for the Kivalina Airport Erosion Control project and a cultural resource investigation was conducted in August of 2017.

Several Alaska Native allotments lie adjacent to the APE and development of these and other private lands may occur consequent to road development. However, the DOT&PF believes that if this were to occur it will be limited to increased access to currently used traditional subsistence locations by people in the community. In addition, material sites developed in support of this project may be further developed or expanded for community use but this expansion will likely occur within the boundary of the current APE.

The potential viewshed effects of the creation of the road were also considered. The DOT&PF believes the minimal elevation and the limited width and method of construction of the road will not have an effect on the current viewshed of open tundra.

In order for the community of Kivalina to consider a future relocation move to a location along the evacuation road, near or at the evacuation road terminus or any place else, extensive planning, land transfers and the securing of significant funding would have to be in place. At this time those actions are neither reasonably foreseeable nor considered a cumulative impact of the proposed project. The DOT&PF does not believe that this action would be directly caused by the Project

Identification Efforts
A search of the Alaska Heritage Resources Survey (AHRS) database identified one site within the APE which is described in table 2 below:

Table 2. AHRS Site Located within the APE

Site Number	Site Name	Site Description	Determination of Eligibility?
NOA-00042	Cape Krusenstern Archaeological District National Monument National Historic Landmark (NHL)	This district covers over 2 million acres, extending along the beach 8 miles and varying in width from 1-3 miles. 114 parallel marine beach ridges, formed at an average of 60 years each, are the main features. These former coastal margins contain houses, burials, cache pits, and other remains of the peoples who have occupied these beaches progressively for at least 5,000 years. This horizontal stratigraphy includes virtually the entire range of known cultural history in NW Alaska. Near the beach ridges, on unglaciated uplands, are two older sites dated from BP 11,000-6,000. The lower Noatak Valley, an important avenue between the coast and the interior for millennia, contains a number of archaeological sites. The villages of Noatak and Kivalina are within the district. The number of sites listed here includes only those cited as "important sites" in the Final Environmental Statement on Cape Krusenstern National Monument published in 1974. Other reports break down these major sites into many others. Includes	National Register of Historic Places Listed 05/03/1974

		NOA-00002, NOA-00078, NOA-00138, and NOA-00139.	

A literature review identified sixteen reports describing the results of cultural resource surveys conducted from the 1970s through 2016 within the initial Study Area. There are known archaeological and historical resources within the community of Kivalina south of the project origin, and south of the Wulik River mouth outside of the APE Area; however, no resources have been identified inland of Kivalina Lagoon within the APE. The APE is located within the boundaries of the Cape Krusenstern Archaeological District National Historic Landmark (NOA-00042). In January 2016, an archaeological predictive model was developed for the Study Area, and an archaeological survey of alternative route alignments and proposed material sites was conducted in September-October 2016. This field investigation involved pedestrian survey and subsurface testing at potentially sensitive locations identified in the predictive model and during the pedestrian survey along the three routes originally under consideration. The results of the field investigation are included in the *Kivalina Evacuation and School Site Access Road* report produced by Stantec for DOT&PF. Testing locations along the abandoned northern route are shown on Figure 2. The entire northern route is shown on Figure 1 of Appendix D of the report. No archaeological sites or historic properties were identified along the three alternative routes, or within the material sites that were defined at that time.

DOT&PF sent a cultural resource survey team in the August of 2017 to conduct addition fieldwork within the APE which now includes potential material site locations. The results of the field investigation are provided in a memo from Stantec entitled *Archaeological Assessment Update for the Kivalina Evacuation and School Site Access Road.*

Under the Alaska Historic Roads Programmatic Agreement Interim Guidance, a group of Alaska roads has been identified which are being treated as eligible for the National Register of Historic Places (NRHP). This project does not affect any of these roads.

Finding of Effect

NOA-00042 Cape Krusenstern Archaeological District National Monument National Historic Landmark (NHL)

Cape Krusenstern Archaeological District National Historic Landmark (NHL) was designated November 7, 1973 prior to the establishment if the National Monument which was designated on December 1, 1978. Properties designated as National Historic Landmarks are automatically listed in the NRHP CFR36§65.2(b). The primary reason for the designation of both the Archaeological District and National Monument was the overall significance of the region to the understanding the prehistory of the Arctic based on the positive results of archaeological investigations that took place between the late 1940's and early 1970's and continue today. At first, the boundary of the National Monument, which is restricted to the archaeologically rich beach ridge complex, was used for the boundaries for the NHL under National Landmark Criteria 36CFR§64.4(a)(6). It was later expanded to include areas, such as the Project location, which had not had any archaeological investigation conducted at the time.

The archaeological investigations conducted over the 2016 and 2017 field seasons did not result in the identification any elements which contribute to our continuing understanding of the prehistory or history of the Arctic within the Project's APE which is located within the boundaries of NHL. As such, the proposed construction of the Evacuation and School Site Access Road will not have an adverse effect on the integrity of the NHL or its continuing eligibility for the NRHP as no contributing elements have been identified. Due to the Project being located within the NHL boundary the DOT&PF is submitting monitoring and inadvertent discovery plan to be implemented during the continued planning and execution of the Project (Attachment 1). In the event that cultural resources are encountered this plan will be implemented and all identified parties will be contacted. As the proposed routes, the Project terminus and the potential material site locations have only one historic property located within their boundaries the potential effect for all were addressed in one evaluation.

Overall, the DOT&PF has determined that the activities proposed for the Kivalina Evacuation and School Site Access Road Project will result in **no historic properties adversely affected** and seeks the Alaska SHPO's concurrence with this finding of effect.

Section 4(f)
It is the DOT&PF's intent to make a Section 4(f) de minimis impact finding premised on your written concurrence that the project **will not adversely affect** NOA-00042 Cape Krusenstern Archaeological District National Monument National Historic Landmark (NHL).

Consultation Efforts
On July 10, 2017 a meeting was among Agency cultural resource staff. The DOT&PF Northern Region PQI, staff from the Office of History and Archaeology and the Alaska State Historic Preservation Officer (SHPO) and the National Park Service Archaeologist for the National Register of Historic Places Program, Alaska Region. Initiation of Consultation letters were sent out to the identified consulting parties on August 7, 2017. A response was received from the SHPO office on August 22, 2017 stating there was no objection to the proposed Study Area or level of identification at this time (Attachment 2). No other responses to the Section 106 Initiation of Consultation letters were received.

A copy of this letter has been submitted to the National Park Service for their evaluation and recommendation regarding activities within a NHL.

In addition to the Alaska State Historic Preservation Officer (SHPO), other parties being contacted regarding the findings for this project are: the National Park Service (NPS); the Native Village of Kivalina; the City of Kivalina; the Native Village of Noatak; NANA Regional Corporation; the Northwest Arctic Borough; NPS-Western Arctic National Parklands; the Bureau of Indian Affairs (BIA); and the Advisory Council on Historic Preservation.

If you wish to comment on this finding, I can be reached at the address above, by telephone at 907-451-5293, or by e-mail at *thomas.gamza@alaska.gov*. Your timely response will greatly assist us in incorporating your concerns into project development. For that purpose, we respectfully request that you respond within thirty days of your receipt of this correspondence.

Sincerely,

Thomas A. Gamza
Cultural Resource Specialist-Archaeologist (PQI)
State of Alaska DOT&PF, Northern Region

Figure 1: Location and Vicinity Map
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Figures 3-6 Proposed Material Site Investigation APE

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Electronic cc w/ enclosures:
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Department of Transportation and Public Facilities

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Design and Engineering Services
Preliminary Design and Environmental Section

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In Reply Refer To:
Kivalina Evacuation and School Site Access Road
Federal/State Project No. 0002384/NFHWY00162
No Historic Properties Adversely Affected
ATTENTION: This finding contains no DOE's

September 19, 2017

Rhea Hood, Archeologist
Alaska Regional Office
National Park Service
240 West 5th Avenue
Anchorage, AK 99501

Dear Ms. Hood:

The Alaska Department of Transportation and Public Facilities (DOT&PF) has assumed the responsibilities of the Federal Highway Administration under 23 U.S.C.§ 326, and is proposing to construct a safe, reliable, all-season evacuation road between the community of Kivalina and a site on Kisimigiuqtuq Hill (K-Hill) (Figure 1). The Kivalina Evacuation and School Site Access Road (the Project) location is legally described in Table 1 below:

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Consultation for this project is being conducted in accordance with the 2014 *Programmatic Agreement... for the Federal-Aid Highway Program in Alaska.* The DOT&PF, acting as a Federal agency, finds no adverse effect on historic properties by the proposed project pursuant to 36 CFR 800.5(b), implementing regulations of Section 106 of the National Historic Preservation

Act. This submission provides documentation in support of this finding, as required at 36 CFR 800.11(e).

Project Description

The proposed Project origin is at the City of Kivalina, located on the southeast tip of the barrier island located between the Chukchi Sea (Arctic Ocean) and Kivalina Lagoon (Figure 1). The project terminus is located on the mainland across the Kivalina Lagoon approximately six miles northeast at a community selected evacuation site on K-Hill. A range of route alternatives were considered within the project Study Area. This has now been reduced to two potential route alignments, the Combined Route B and the Southern Route, which are currently being considered as the Area of Potential Effect shown on Figure 2. Common to both route alternatives are the following actions:

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Finding of Effect

NOA-00042 Cape Krusenstern Archaeological District National Monument National Historic Landmark (NHL)

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Section 4(f)
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If you wish to comment on this finding, I can be reached at the address above, by telephone at 907-451-5293, or by e-mail at *thomas.gamza@alaska.gov*. Your timely response will greatly assist us in incorporating your concerns into project development. For that purpose, we respectfully request that you respond within thirty days of your receipt of this correspondence.

Sincerely,

Thomas A. Gamza
Cultural Resource Specialist-Archaeologist (PQI)
State of Alaska DOT&PF, Northern Region

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Figure 2: Area of Potential Effect-Overview
Figures 3-6 Proposed Material Site Investigation APE
Attachment 1: Report: *Kivalina Evacuation and School Site Access Road*
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Electronic cc w/ enclosures:
Michael Cain, FHWA Alaska Division, Northern Region Area Engineer
Jonathan Hutchinson, P.E., DOT&PF Northern Region, Project Manager
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Department of Transportation and Public Facilities

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In Reply Refer To:
Kivalina Evacuation and School Site Access Road
Federal/State Project No. 0002384/NFHWY00162
No Historic Properties Adversely Affected
ATTENTION: This finding contains no DOE's

September 19, 2017

Maija Lukin, Superintendent
NPS-Western Arctic National Parklands
PO Box 1029
Kotzebue, AK 99752

Dear Ms. Lukin:

The Alaska Department of Transportation and Public Facilities (DOT&PF) has assumed the responsibilities of the Federal Highway Administration under 23 U.S.C.§ 326, and is proposing to construct a safe, reliable, all-season evacuation road between the community of Kivalina and a site on Kisimigiuqtuq Hill (K-Hill) (Figure 1). The Kivalina Evacuation and School Site Access Road (the Project) location is legally described in Table 1 below:

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25, 26, 35, 36	029N	025W	Kateel River	Noatak C-5

Consultation for this project is being conducted in accordance with the 2014 *Programmatic Agreement... for the Federal-Aid Highway Program in Alaska.* The DOT&PF, acting as a Federal agency, finds no adverse effect on historic properties by the proposed project pursuant to 36 CFR 800.5(b), implementing regulations of Section 106 of the National Historic Preservation Act. This submission provides documentation in support of this finding, as required at 36 CFR 800.11(e).

Project Description

The proposed Project origin is at the City of Kivalina, located on the southeast tip of the barrier island located between the Chukchi Sea (Arctic Ocean) and Kivalina Lagoon (Figure 1). The project terminus is located on the mainland across the Kivalina Lagoon approximately six miles northeast at a community selected evacuation site on K-Hill. A range of route alternatives were considered within the project Study Area. This has now been reduced to two potential route alignments, the Combined Route B and the Southern Route, which are currently being considered as the Area of Potential Effect shown on Figure 2. Common to both route alternatives are the following actions:

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- Construction of an all-season two-way 24-foot wide gravel access road, either 7.7 miles or 8.9 miles long depending on the route selected, between Kivalina Island and the desired K-Hill evacuation site. Road construction would be within a 300-foot right-of-way (ROW) and include shoulders, multiple turnouts and 3:1 side slopes that may include guard rails and other safety features.
- Testing, analysis and development of material locations proximate to potential routes within the APE to determine their feasibility and evaluate environmental impacts of their development (Figures 2-6).

Area of Potential Effect (APE)

Potential direct and indirect effects were considered prior to the creation of the proposed APE. The APE, as presented, is a 2000-foot corridor encompasses the direct footprint of the project, including two alternative route alignments, staging areas, and potential material sites that are located on variously managed lands and allows for in-field construction adjustments. One final route APE will be defined with the completion of the environmental assessment.

The Kivalina Evacuation and School Site Access Road project would provide Kivalina residents a safe and reliable evacuation route in the event of a catastrophic storm or ocean surge, allowing evacuees to temporarily mobilize to safe refuge at an assembly site on K-Hill. This site is also identified by the Northwest Arctic Borough School District, and approved by the community, as a preferred new location for the community school. If constructed in the future, the school could augment the undeveloped evacuation site by serving as a full-service community emergency shelter with all-season support capabilities. No other viable potential future actions are identified at this time. While community relocation has been discussed for some time, it is not considered reasonably foreseeable. At present, the community supports construction of an evacuation road due to the immediate threat of storm events.

Kivalina relies on the currently existing airstrip adjacent to the city for a majority of its transportation and outside goods. Currently, DOT&PF has a project, Kivalina Airport Erosion Control (Z638720000), which is planning to construct a runway embankment erosion control feature. Initiation of Consultation letters were sent in February of 2017 for the Kivalina Airport Erosion Control project and a cultural resource investigation was conducted in August of 2017.

Several Alaska Native allotments lie adjacent to the APE and development of these and other private lands may occur consequent to road development. However, the DOT&PF believes that if this were to occur it will be limited to increased access to currently used traditional subsistence locations by people in the community. In addition, material sites developed in support of this project may be further developed or expanded for community use but this expansion will likely occur within the boundary of the current APE.

The potential viewshed effects of the creation of the road were also considered. The DOT&PF believes the minimal elevation and the limited width and method of construction of the road will not have an effect on the current viewshed of open tundra.

In order for the community of Kivalina to consider a future relocation move to a location along the evacuation road, near or at the evacuation road terminus or any place else, extensive planning, land transfers and the securing of significant funding would have to be in place. At this time those actions are neither reasonably foreseeable nor considered a cumulative impact of the proposed project. The DOT&PF does not believe that this action would be directly caused by the Project

Identification Efforts

A search of the Alaska Heritage Resources Survey (AHRS) database identified one site within the APE which is described in table 2 below:

Table 2. AHRS Site Located within the APE

Site Number	Site Name	Site Description	Determination of Eligibility?
NOA-00042	Cape Krusenstern Archaeological District National Monument National Historic Landmark (NHL)	This district covers over 2 million acres, extending along the beach 8 miles and varying in width from 1-3 miles. 114 parallel marine beach ridges, formed at an average of 60 years each, are the main features. These former coastal margins contain houses, burials, cache pits, and other remains of the peoples who have occupied these beaches progressively for at least 5,000 years. This horizontal stratigraphy includes virtually the entire range of known cultural history in NW Alaska. Near the beach ridges, on unglaciated uplands, are two older sites dated from BP 11,000-6,000. The lower Noatak Valley, an important avenue between the coast and the interior for millennia, contains a number of archaeological sites. The villages of Noatak and Kivalina are within the district. The number of sites listed here includes only those cited as "important sites" in the Final Environmental Statement on Cape Krusenstern National Monument published in 1974. Other reports break down these major sites into many others. Includes NOA-00002, NOA-00078, NOA-00138, and NOA-00139.	National Register of Historic Places Listed 05/03/1974

A literature review identified sixteen reports describing the results of cultural resource surveys conducted from the 1970s through 2016 within the initial Study Area. There are known archaeological and historical resources within the community of Kivalina south of the project origin, and south of the Wulik River mouth outside of the APE Area; however, no resources have been identified inland of Kivalina Lagoon within the APE. The APE is located within the boundaries of the Cape Krusenstern Archaeological District National Historic Landmark (NOA-00042). In January 2016, an archaeological predictive model was developed for the Study Area, and an archaeological survey of alternative route alignments and proposed material sites was conducted in September-October 2016. This field investigation involved pedestrian survey and subsurface testing at potentially sensitive locations identified in the predictive model and during the pedestrian survey along the three routes originally under consideration. The results of the field investigation are included in the *Kivalina Evacuation and School Site Access Road* report produced by Stantec for DOT&PF. Testing locations along the abandoned northern route are shown on Figure 2. The entire northern route is shown on Figure 1 of Appendix D of the report. No archaeological sites or historic properties were identified along the three alternative routes, or within the material sites that were defined at that time.

DOT&PF sent a cultural resource survey team in the August of 2017 to conduct addition fieldwork within the APE which now includes potential material site locations. The results of the field investigation are provided in a memo from Stantec entitled *Archaeological Assessment Update for the Kivalina Evacuation and School Site Access Road.*

Under the Alaska Historic Roads Programmatic Agreement Interim Guidance, a group of Alaska roads has been identified which are being treated as eligible for the National Register of Historic Places (NRHP). This project does not affect any of these roads.

Finding of Effect

NOA-00042 Cape Krusenstern Archaeological District National Monument National Historic Landmark (NHL)

Cape Krusenstern Archaeological District National Historic Landmark (NHL) was designated November 7, 1973 prior to the establishment if the National Monument which was designated on December 1, 1978. Properties designated as National Historic Landmarks are automatically listed in the NRHP CFR36§65.2(b). The primary reason for the designation of both the Archaeological District and National Monument was the overall significance of the region to the understanding the prehistory of the Arctic based on the positive results of archaeological investigations that took place between the late 1940's and early 1970's and continue today. At first, the boundary of the National Monument, which is restricted to the archaeologically rich beach ridge complex, was used for the boundaries for the NHL under National Landmark Criteria 36CFR§64.4(a)(6). It was later expanded to include areas, such as the Project location, which had not had any archaeological investigation conducted at the time.

The archaeological investigations conducted over the 2016 and 2017 field seasons did not result in the identification any elements which contribute to our continuing understanding of the prehistory or history of the Arctic within the Project's APE which is located within the boundaries of NHL. As such, the proposed construction of the Evacuation and School Site

Access Road will not have an adverse effect on the integrity of the NHL or its continuing eligibility for the NRHP as no contributing elements have been identified. Due to the Project being located within the NHL boundary the DOT&PF is submitting monitoring and inadvertent discovery plan to be implemented during the continued planning and execution of the Project (Attachment 1). In the event that cultural resources are encountered this plan will be implemented and all identified parties will be contacted. As the proposed routes, the Project terminus and the potential material site locations have only one historic property located within their boundaries the potential effect for all were addressed in one evaluation.

Overall, the DOT&PF has determined that the activities proposed for the Kivalina Evacuation and School Site Access Road Project will result in **no historic properties adversely affected** and seeks the Alaska SHPO's concurrence with this finding of effect.

Section 4(f)

It is the DOT&PF's intent to make a Section 4(f) de minimis impact finding premised on your written concurrence that the project **will not adversely affect** NOA-00042 Cape Krusenstern Archaeological District National Monument National Historic Landmark (NHL).

Consultation Efforts

On July 10, 2017 a meeting was among Agency cultural resource staff. The DOT&PF Northern Region PQI, staff from the Office of History and Archaeology and the Alaska State Historic Preservation Officer (SHPO) and the National Park Service Archaeologist for the National Register of Historic Places Program, Alaska Region. Initiation of Consultation letters were sent out to the identified consulting parties on August 7, 2017. A response was received from the SHPO office on August 22, 2017 stating there was no objection to the proposed Study Area or level of identification at this time (Attachment 2). No other responses to the Section 106 Initiation of Consultation letters were received.

A copy of this letter has been submitted to the National Park Service for their evaluation and recommendation regarding activities within a NHL.

In addition to the Alaska State Historic Preservation Officer (SHPO), other parties being contacted regarding the findings for this project are: the National Park Service (NPS); the Native Village of Kivalina; the City of Kivalina; the Native Village of Noatak; NANA Regional Corporation; the Northwest Arctic Borough; NPS-Western Arctic National Parklands; the Bureau of Indian Affairs (BIA); and the Advisory Council on Historic Preservation.

If you wish to comment on this finding, I can be reached at the address above, by telephone at 907-451-5293, or by e-mail at *thomas.gamza@alaska.gov*. Your timely response will greatly assist us in incorporating your concerns into project development. For that purpose, we respectfully request that you respond within thirty days of your receipt of this correspondence.

Sincerely,

Thomas A. Gamza
Cultural Resource Specialist-Archaeologist (PQI)
State of Alaska DOT&PF, Northern Region

Figure 1: Location and Vicinity Map
Figure 2: Area of Potential Effect-Overview
Figures 3-6 Proposed Material Site Investigation APE

Attachment 1: Draft Inadvertent Discovery Plan – Kivalina Evacuation and School Site Access Road
Attachment 2: August 22, 2017 response from the SHPO to August 7, 2017 Initiation of Consultation Letter

Electronic cc w/ enclosures:
Michael Cain, FHWA Alaska Division, Northern Region Area Engineer
Jonathan Hutchinson, P.E., DOT&PF Northern Region, Project Manager
Paul Karczmarczyk, DOT&PF Northern Region, Environmental Impact Analyst
Brett Nelson, DOT&PF Northern Region, Regional Environmental Manager
Kathy Price, DOT&PF, Statewide Cultural Resources Manager
Amy Sumner, DOT&PF Statewide Environmental NEPA Manager

Department of Transportation and Public Facilities

THE STATE of ALASKA

GOVERNOR BILL WALKER

Northern Region
Design and Engineering Services
Preliminary Design and Environmental Section

2301 Peger Road
Fairbanks, Alaska 99709-5316
Main: 907-451-2237
Toll free: 800-451-2363
Fax: 907-451-5126

In Reply Refer To:
Kivalina Evacuation and School Site Access Road
Federal/State Project No. 0002384/NFHWY00162
No Historic Properties Adversely Affected
ATTENTION: This finding contains no DOE's

September 19, 2017

Honorable Clement Richards, Sr., Borough Mayor
Northwest Arctic Borough
P.O. Box 1110
Kotzebue, AK 99752

Dear Mayor Richards:

The Alaska Department of Transportation and Public Facilities (DOT&PF) has assumed the responsibilities of the Federal Highway Administration under 23 U.S.C.§ 326, and is proposing to construct a safe, reliable, all-season evacuation road between the community of Kivalina and a site on Kisimigiuqtuq Hill (K-Hill) (Figure 1). The Kivalina Evacuation and School Site Access Road (the Project) location is legally described in Table 1 below:

Table 1: Project Location

Section(s)	Township	Range	Meridian	USGS Quad
1, 2, 10, 11, 15, 16, 21	027N	026W	Kateel River	Noatak C-5
19. 20, 29, 30, 31	028N	026W	Kateel River	Noatak C-5
25, 26, 35, 36	029N	025W	Kateel River	Noatak C-5

Consultation for this project is being conducted in accordance with the 2014 *Programmatic Agreement... for the Federal-Aid Highway Program in Alaska.* The DOT&PF, acting as a Federal agency, finds no adverse effect on historic properties by the proposed project pursuant to 36 CFR 800.5(b), implementing regulations of Section 106 of the National Historic Preservation Act. This submission provides documentation in support of this finding, as required at 36 CFR 800.11(e).

Project Description

The proposed Project origin is at the City of Kivalina, located on the southeast tip of the barrier island located between the Chukchi Sea (Arctic Ocean) and Kivalina Lagoon (Figure 1). The project terminus is located on the mainland across the Kivalina Lagoon approximately six miles northeast at a community selected evacuation site on K-Hill. A range of route alternatives were considered within the project Study Area. This has now been reduced to two potential route alignments, the Combined Route B and the Southern Route, which are currently being considered as the Area of Potential Effect shown on Figure 2. Common to both route alternatives are the following actions:

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Area of Potential Effect (APE)

Potential direct and indirect effects were considered prior to the creation of the proposed APE. The APE, as presented, is a 2000-foot corridor encompasses the direct footprint of the project, including two alternative route alignments, staging areas, and potential material sites that are located on variously managed lands and allows for in-field construction adjustments. One final route APE will be defined with the completion of the environmental assessment.

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Kivalina relies on the currently existing airstrip adjacent to the city for a majority of its transportation and outside goods. Currently, DOT&PF has a project, Kivalina Airport Erosion Control (Z638720000), which is planning to construct a runway embankment erosion control feature. Initiation of Consultation letters were sent in February of 2017 for the Kivalina Airport Erosion Control project and a cultural resource investigation was conducted in August of 2017.

Several Alaska Native allotments lie adjacent to the APE and development of these and other private lands may occur consequent to road development. However, the DOT&PF believes that if this were to occur it will be limited to increased access to currently used traditional subsistence locations by people in the community. In addition, material sites developed in support of this project may be further developed or expanded for community use but this expansion will likely occur within the boundary of the current APE.

The potential viewshed effects of the creation of the road were also considered. The DOT&PF believes the minimal elevation and the limited width and method of construction of the road will not have an effect on the current viewshed of open tundra.

In order for the community of Kivalina to consider a future relocation move to a location along the evacuation road, near or at the evacuation road terminus or any place else, extensive planning, land transfers and the securing of significant funding would have to be in place. At this time those actions are neither reasonably foreseeable nor considered a cumulative impact of the proposed project. The DOT&PF does not believe that this action would be directly caused by the Project

Identification Efforts

A search of the Alaska Heritage Resources Survey (AHRS) database identified one site within the APE which is described in table 2 below:

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A literature review identified sixteen reports describing the results of cultural resource surveys conducted from the 1970s through 2016 within the initial Study Area. There are known archaeological and historical resources within the community of Kivalina south of the project origin, and south of the Wulik River mouth outside of the APE Area; however, no resources have been identified inland of Kivalina Lagoon within the APE. The APE is located within the boundaries of the Cape Krusenstern Archaeological District National Historic Landmark (NOA-00042). In January 2016, an archaeological predictive model was developed for the Study Area, and an archaeological survey of alternative route alignments and proposed material sites was conducted in September-October 2016. This field investigation involved pedestrian survey and subsurface testing at potentially sensitive locations identified in the predictive model and during the pedestrian survey along the three routes originally under consideration. The results of the field investigation are included in the *Kivalina Evacuation and School Site Access Road* report produced by Stantec for DOT&PF. Testing locations along the abandoned northern route are shown on Figure 2. The entire northern route is shown on Figure 1 of Appendix D of the report. No archaeological sites or historic properties were identified along the three alternative routes, or within the material sites that were defined at that time.

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Under the Alaska Historic Roads Programmatic Agreement Interim Guidance, a group of Alaska roads has been identified which are being treated as eligible for the National Register of Historic Places (NRHP). This project does not affect any of these roads.

Finding of Effect

NOA-00042 Cape Krusenstern Archaeological District National Monument National Historic Landmark (NHL)

Cape Krusenstern Archaeological District National Historic Landmark (NHL) was designated November 7, 1973 prior to the establishment if the National Monument which was designated on December 1, 1978. Properties designated as National Historic Landmarks are automatically listed in the NRHP CFR36§65.2(b). The primary reason for the designation of both the Archaeological District and National Monument was the overall significance of the region to the understanding the prehistory of the Arctic based on the positive results of archaeological investigations that took place between the late 1940's and early 1970's and continue today. At first, the boundary of the National Monument, which is restricted to the archaeologically rich beach ridge complex, was used for the boundaries for the NHL under National Landmark Criteria 36CFR§64.4(a)(6). It was later expanded to include areas, such as the Project location, which had not had any archaeological investigation conducted at the time.

The archaeological investigations conducted over the 2016 and 2017 field seasons did not result in the identification any elements which contribute to our continuing understanding of the prehistory or history of the Arctic within the Project's APE which is located within the boundaries of NHL. As such, the proposed construction of the Evacuation and School Site

Access Road will not have an adverse effect on the integrity of the NHL or its continuing eligibility for the NRHP as no contributing elements have been identified. Due to the Project being located within the NHL boundary the DOT&PF is submitting monitoring and inadvertent discovery plan to be implemented during the continued planning and execution of the Project (Attachment 1). In the event that cultural resources are encountered this plan will be implemented and all identified parties will be contacted. As the proposed routes, the Project terminus and the potential material site locations have only one historic property located within their boundaries the potential effect for all were addressed in one evaluation.

Overall, the DOT&PF has determined that the activities proposed for the Kivalina Evacuation and School Site Access Road Project will result in **no historic properties adversely affected** and seeks the Alaska SHPO's concurrence with this finding of effect.

Section 4(f)
It is the DOT&PF's intent to make a Section 4(f) de minimis impact finding premised on your written concurrence that the project **will not adversely affect** NOA-00042 Cape Krusenstern Archaeological District National Monument National Historic Landmark (NHL).

Consultation Efforts
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A copy of this letter has been submitted to the National Park Service for their evaluation and recommendation regarding activities within a NHL.

In addition to the Alaska State Historic Preservation Officer (SHPO), other parties being contacted regarding the findings for this project are: the National Park Service (NPS); the Native Village of Kivalina; the City of Kivalina; the Native Village of Noatak; NANA Regional Corporation; the Northwest Arctic Borough; NPS-Western Arctic National Parklands; the Bureau of Indian Affairs (BIA); and the Advisory Council on Historic Preservation.

If you wish to comment on this finding, I can be reached at the address above, by telephone at 907-451-5293, or by e-mail at *thomas.gamza@alaska.gov*. Your timely response will greatly assist us in incorporating your concerns into project development. For that purpose, we respectfully request that you respond within thirty days of your receipt of this correspondence.

Sincerely,

Thomas A. Gamza
Cultural Resource Specialist-Archaeologist (PQI)
State of Alaska DOT&PF, Northern Region

Figure 1: Location and Vicinity Map
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Attachment 2: August 22, 2017 response from the SHPO to August 7, 2017 Initiation of Consultation Letter

Electronic cc w/ enclosures:
Michael Cain, FHWA Alaska Division, Northern Region Area Engineer
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Paul Karczmarczyk, DOT&PF Northern Region, Environmental Impact Analyst
Brett Nelson, DOT&PF Northern Region, Regional Environmental Manager
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Amy Sumner, DOT&PF Statewide Environmental NEPA Manager

Department of Transportation and Public Facilities

THE STATE of ALASKA

GOVERNOR BILL WALKER

Northern Region
Design and Engineering Services
Preliminary Design and Environmental Section

2301 Peger Road
Fairbanks, Alaska 99709-5316
Main: 907-451-2237
Toll free: 800-451-2363
Fax: 907-451-5126

In Reply Refer To:
Kivalina Evacuation and School Site Access Road
Federal/State Project No. 0002384/NFHWY00162
No Historic Properties Adversely Affected
ATTENTION: This finding contains no DOE's

September 19, 2017

Sean Mack
Acting Regional Archeologist
Bureau of Indian Affairs
3601C Street, Suite 1100
Anchorage, AK 99503-5947

Dear Mr. Mack:

The Alaska Department of Transportation and Public Facilities (DOT&PF) has assumed the responsibilities of the Federal Highway Administration under 23 U.S.C.§ 326, and is proposing to construct a safe, reliable, all-season evacuation road between the community of Kivalina and a site on Kisimigiuqtuq Hill (K-Hill) (Figure 1). The Kivalina Evacuation and School Site Access Road (the Project) location is legally described in Table 1 below:

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Consultation for this project is being conducted in accordance with the 2014 *Programmatic Agreement... for the Federal-Aid Highway Program in Alaska.* The DOT&PF, acting as a Federal agency, finds no adverse effect on historic properties by the proposed project pursuant to 36 CFR 800.5(b), implementing regulations of Section 106 of the National Historic Preservation

Act. This submission provides documentation in support of this finding, as required at 36 CFR 800.11(e).

Project Description
The proposed Project origin is at the City of Kivalina, located on the southeast tip of the barrier island located between the Chukchi Sea (Arctic Ocean) and Kivalina Lagoon (Figure 1). The project terminus is located on the mainland across the Kivalina Lagoon approximately six miles northeast at a community selected evacuation site on K-Hill. A range of route alternatives were considered within the project Study Area. This has now been reduced to two potential route alignments, the Combined Route B and the Southern Route, which are currently being considered as the Area of Potential Effect shown on Figure 2. Common to both route alternatives are the following actions:

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Several Alaska Native allotments lie adjacent to the APE and development of these and other private lands may occur consequent to road development. However, the DOT&PF believes that if this were to occur it will be limited to increased access to currently used traditional subsistence locations by people in the community. In addition, material sites developed in support of this project may be further developed or expanded for community use but this expansion will likely occur within the boundary of the current APE.

The potential viewshed effects of the creation of the road were also considered. The DOT&PF believes the minimal elevation and the limited width and method of construction of the road will not have an effect on the current viewshed of open tundra.

In order for the community of Kivalina to consider a future relocation move to a location along the evacuation road, near or at the evacuation road terminus or any place else, extensive planning, land transfers and the securing of significant funding would have to be in place. At this time those actions are neither reasonably foreseeable nor considered a cumulative impact of the proposed project. The DOT&PF does not believe that this action would be directly caused by the Project

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NOA-00042	Cape Krusenstern Archaeological District National Monument National Historic Landmark (NHL)	This district covers over 2 million acres, extending along the beach 8 miles and varying in width from 1-3 miles. 114 parallel marine beach ridges, formed at an average of 60 years each, are the main features. These former coastal margins contain houses, burials, cache pits, and other remains of the peoples who have occupied these beaches progressively for at least 5,000 years. This horizontal stratigraphy includes virtually the entire range of known cultural history in NW Alaska. Near the beach ridges, on unglaciated uplands, are two older sites dated from BP 11,000-6,000. The lower Noatak Valley, an important avenue between the coast and the interior for millennia, contains a number of archaeological sites. The villages of Noatak and Kivalina are within the district. The number of sites listed here includes only those cited as "important sites" in the Final Environmental Statement on Cape Krusenstern National Monument published in 1974. Other reports break down these major sites into many others. Includes	National Register of Historic Places Listed 05/03/1974

		NOA-00002, NOA-00078, NOA-00138, and NOA-00139.	

A literature review identified sixteen reports describing the results of cultural resource surveys conducted from the 1970s through 2016 within the initial Study Area. There are known archaeological and historical resources within the community of Kivalina south of the project origin, and south of the Wulik River mouth outside of the APE Area; however, no resources have been identified inland of Kivalina Lagoon within the APE. The APE is located within the boundaries of the Cape Krusenstern Archaeological District National Historic Landmark (NOA-00042). In January 2016, an archaeological predictive model was developed for the Study Area, and an archaeological survey of alternative route alignments and proposed material sites was conducted in September-October 2016. This field investigation involved pedestrian survey and subsurface testing at potentially sensitive locations identified in the predictive model and during the pedestrian survey along the three routes originally under consideration. The results of the field investigation are included in the *Kivalina Evacuation and School Site Access Road* report produced by Stantec for DOT&PF (Attachment 1). Testing locations along the abandoned northern route are shown on Figure 2. The entire northern route is shown on Figure 1 of Appendix D of the report. No archaeological sites or historic properties were identified along the three alternative routes, or within the material sites that were defined at that time.

DOT&PF sent a cultural resource survey team in the August of 2017 to conduct addition fieldwork within the APE which now includes potential material site locations. The results of the field investigation are provided in a memo from Stantec entitled *Archaeological Assessment Update for the Kivalina Evacuation and School Site Access Road* (Attachment 2).

Under the Alaska Historic Roads Programmatic Agreement Interim Guidance, a group of Alaska roads has been identified which are being treated as eligible for the National Register of Historic Places (NRHP). This project does not affect any of these roads.

Finding of Effect

NOA-00042 Cape Krusenstern Archaeological District National Monument National Historic Landmark (NHL)

Cape Krusenstern Archaeological District National Historic Landmark (NHL) was designated November 7, 1973 prior to the establishment if the National Monument which was designated on December 1, 1978. Properties designated as National Historic Landmarks are automatically listed in the NRHP CFR36§65.2(b). The primary reason for the designation of both the Archaeological District and National Monument was the overall significance of the region to the understanding the prehistory of the Arctic based on the positive results of archaeological investigations that took place between the late 1940's and early 1970's and continue today. At first, the boundary of the National Monument, which is restricted to the archaeologically rich beach ridge complex, was used for the boundaries for the NHL under National Landmark Criteria 36CFR§64.4(a)(6). It was later expanded to include areas, such as the Project location, which had not had any archaeological investigation conducted at the time.

The archaeological investigations conducted over the 2016 and 2017 field seasons did not result in the identification any elements which contribute to our continuing understanding of the prehistory or history of the Arctic within the Project's APE which is located within the boundaries of NHL. As such, the proposed construction of the Evacuation and School Site Access Road will not have an adverse effect on the integrity of the NHL or its continuing eligibility for the NRHP as no contributing elements have been identified. Due to the Project being located within the NHL boundary the DOT&PF is submitting monitoring and inadvertent discovery plan to be implemented during the continued planning and execution of the Project (Attachment 3). In the event that cultural resources are encountered this plan will be implemented and all identified parties will be contacted. As the proposed routes, the Project terminus and the potential material site locations have only one historic property located within their boundaries the potential effect for all were addressed in one evaluation.

Overall, the DOT&PF has determined that the activities proposed for the Kivalina Evacuation and School Site Access Road Project will result in **no historic properties adversely affected** and seeks the Alaska SHPO's concurrence with this finding of effect.

Section 4(f)
It is the DOT&PF's intent to make a Section 4(f) de minimis impact finding premised on your written concurrence that the project **will not adversely affect** NOA-00042 Cape Krusenstern Archaeological District National Monument National Historic Landmark (NHL).

Consultation Efforts
On July 10, 2017 a meeting was among Agency cultural resource staff. The DOT&PF Northern Region PQI, staff from the Office of History and Archaeology and the Alaska State Historic Preservation Officer (SHPO) and the National Park Service Archaeologist for the National Register of Historic Places Program, Alaska Region. Initiation of Consultation letters were sent out to the identified consulting parties on August 7, 2017. A response was received from the SHPO office on August 22, 2017 stating there was no objection to the proposed Study Area or level of identification at this time (Attachment 4). No other responses to the Section 106 Initiation of Consultation letters were received.

A copy of this letter has been submitted to the National Park Service for their evaluation and recommendation regarding activities within a NHL.

In addition to the Alaska State Historic Preservation Officer (SHPO), other parties being contacted regarding the findings for this project are: the National Park Service (NPS); the Native Village of Kivalina; the City of Kivalina; the Native Village of Noatak; NANA Regional Corporation; the Northwest Arctic Borough; NPS-Western Arctic National Parklands; the Bureau of Indian Affairs (BIA); and the Advisory Council on Historic Preservation.

If you wish to comment on this finding, I can be reached at the address above, by telephone at 907-451-5293, or by e-mail at *thomas.gamza@alaska.gov*. Your timely response will greatly assist us in incorporating your concerns into project development. For that purpose, we respectfully request that you respond within thirty days of your receipt of this correspondence.

Sincerely,

Thomas A. Gamza
Cultural Resource Specialist-Archaeologist (PQI)
State of Alaska DOT&PF, Northern Region

Figure 1: Location and Vicinity Map
Figure 2: Area of Potential Effect-Overview
Figures 3-6 Proposed Material Site Investigation APE
Attachment 1: Report: *Kivalina Evacuation and School Site Access Road*
Attachment 2: OHA Coversheet and Report: *Archaeological Assessment Update for the Kivalina Evacuation and School Site Access Road*
Attachment 3: Draft Inadvertent Discovery Plan – Kivalina Evacuation and School Site Access Road
Attachment 4: August 22, 2017 response from the SHPO to August 7, 2017 Initiation of Consultation Letter

Electronic cc w/ enclosures:
Michael Cain, FHWA Alaska Division, Northern Region Area Engineer
Jonathan Hutchinson, P.E., DOT&PF Northern Region, Project Manager
Paul Karczmarczyk, DOT&PF Northern Region, Environmental Impact Analyst
Brett Nelson, DOT&PF Northern Region, Regional Environmental Manager
Kathy Price, DOT&PF, Statewide Cultural Resources Manager
Amy Sumner, DOT&PF Statewide Environmental NEPA Manager

Department of Transportation and Public Facilities

THE STATE of ALASKA

GOVERNOR BILL WALKER

Northern Region
Design and Engineering Services
Preliminary Design and Environmental Section

2301 Peger Road
Fairbanks, Alaska 99709-5316
Main: 907-451-2237
Toll free: 800-451-2363
Fax: 907-451-5126

In Reply Refer To:
Kivalina Evacuation and School Site Access Road
Federal/State Project No. 0002384/NFHWY00162
No Historic Properties Adversely Affected
ATTENTION: This finding contains no DOE's

September 19, 2017

Bruce Loudermilk, Regional Director
Bureau of Indian Affairs
3601C Street
Anchorage, AK 99503-5947

Dear Mr. Loudermilk:

The Alaska Department of Transportation and Public Facilities (DOT&PF) has assumed the responsibilities of the Federal Highway Administration under 23 U.S.C.§ 326, and is proposing to construct a safe, reliable, all-season evacuation road between the community of Kivalina and a site on Kisimigiuqtuq Hill (K-Hill) (Figure 1). The Kivalina Evacuation and School Site Access Road (the Project) location is legally described in Table 1 below:

Table 1: Project Location

Section(s)	Township	Range	Meridian	USGS Quad
1, 2, 10, 11, 15, 16, 21	027N	026W	Kateel River	Noatak C-5
19. 20, 29, 30, 31	028N	026W	Kateel River	Noatak C-5
25, 26, 35, 36	029N	025W	Kateel River	Noatak C-5

Consultation for this project is being conducted in accordance with the 2014 *Programmatic Agreement... for the Federal-Aid Highway Program in Alaska.* The DOT&PF, acting as a Federal agency, finds no adverse effect on historic properties by the proposed project pursuant to 36 CFR 800.5(b), implementing regulations of Section 106 of the National Historic Preservation Act. This submission provides documentation in support of this finding, as required at 36 CFR 800.11(e).

Project Description

The proposed Project origin is at the City of Kivalina, located on the southeast tip of the barrier island located between the Chukchi Sea (Arctic Ocean) and Kivalina Lagoon (Figure 1). The project terminus is located on the mainland across the Kivalina Lagoon approximately six miles northeast at a community selected evacuation site on K-Hill. A range of route alternatives were considered within the project Study Area. This has now been reduced to two potential route alignments, the Combined Route B and the Southern Route, which are currently being considered as the Area of Potential Effect shown on Figure 2. Common to both route alternatives are the following actions:

- Construction of a 3,200-foot long causeway across the lagoon that may incorporate different hydrological openings including bridge(s), culvert(s), or both.
- Construction of an all-season two-way 24-foot wide gravel access road, either 7.7 miles or 8.9 miles long depending on the route selected, between Kivalina Island and the desired K-Hill evacuation site. Road construction would be within a 300-foot right-of-way (ROW) and include shoulders, multiple turnouts and 3:1 side slopes that may include guard rails and other safety features.
- Testing, analysis and development of material locations proximate to potential routes within the APE to determine their feasibility and evaluate environmental impacts of their development (Figures 2-6).

Area of Potential Effect (APE)

Potential direct and indirect effects were considered prior to the creation of the proposed APE. The APE, as presented, is a 2000-foot corridor encompasses the direct footprint of the project, including two alternative route alignments, staging areas, and potential material sites that are located on variously managed lands and allows for in-field construction adjustments. One final route APE will be defined with the completion of the environmental assessment.

The Kivalina Evacuation and School Site Access Road project would provide Kivalina residents a safe and reliable evacuation route in the event of a catastrophic storm or ocean surge, allowing evacuees to temporarily mobilize to safe refuge at an assembly site on K-Hill. This site is also identified by the Northwest Arctic Borough School District, and approved by the community, as a preferred new location for the community school. If constructed in the future, the school could augment the undeveloped evacuation site by serving as a full-service community emergency shelter with all-season support capabilities. No other viable potential future actions are identified at this time. While community relocation has been discussed for some time, it is not considered reasonably foreseeable. At present, the community supports construction of an evacuation road due to the immediate threat of storm events.

Kivalina relies on the currently existing airstrip adjacent to the city for a majority of its transportation and outside goods. Currently, DOT&PF has a project, Kivalina Airport Erosion Control (Z638720000), which is planning to construct a runway embankment erosion control feature. Initiation of Consultation letters were sent in February of 2017 for the Kivalina Airport Erosion Control project and a cultural resource investigation was conducted in August of 2017.

Several Alaska Native allotments lie adjacent to the APE and development of these and other private lands may occur consequent to road development. However, the DOT&PF believes that if this were to occur it will be limited to increased access to currently used traditional subsistence locations by people in the community. In addition, material sites developed in support of this project may be further developed or expanded for community use but this expansion will likely occur within the boundary of the current APE.

The potential viewshed effects of the creation of the road were also considered. The DOT&PF believes the minimal elevation and the limited width and method of construction of the road will not have an effect on the current viewshed of open tundra.

In order for the community of Kivalina to consider a future relocation move to a location along the evacuation road, near or at the evacuation road terminus or any place else, extensive planning, land transfers and the securing of significant funding would have to be in place. At this time those actions are neither reasonably foreseeable nor considered a cumulative impact of the proposed project. The DOT&PF does not believe that this action would be directly caused by the Project

Identification Efforts
A search of the Alaska Heritage Resources Survey (AHRS) database identified one site within the APE which is described in table 2 below:

Table 2. AHRS Site Located within the APE

Site Number	Site Name	Site Description	Determination of Eligibility?
NOA-00042	Cape Krusenstern Archaeological District National Monument National Historic Landmark (NHL)	This district covers over 2 million acres, extending along the beach 8 miles and varying in width from 1-3 miles. 114 parallel marine beach ridges, formed at an average of 60 years each, are the main features. These former coastal margins contain houses, burials, cache pits, and other remains of the peoples who have occupied these beaches progressively for at least 5,000 years. This horizontal stratigraphy includes virtually the entire range of known cultural history in NW Alaska. Near the beach ridges, on unglaciated uplands, are two older sites dated from BP 11,000-6,000. The lower Noatak Valley, an important avenue between the coast and the interior for millennia, contains a number of archaeological sites. The villages of Noatak and Kivalina are within the district. The number of sites listed here includes only those cited as "important sites" in the Final Environmental Statement on Cape Krusenstern National Monument published in 1974. Other reports break down these major sites into many others. Includes NOA-00002, NOA-00078, NOA-00138, and NOA-00139.	National Register of Historic Places Listed 05/03/1974

A literature review identified sixteen reports describing the results of cultural resource surveys conducted from the 1970s through 2016 within the initial Study Area. There are known archaeological and historical resources within the community of Kivalina south of the project origin, and south of the Wulik River mouth outside of the APE Area; however, no resources have been identified inland of Kivalina Lagoon within the APE. The APE is located within the boundaries of the Cape Krusenstern Archaeological District National Historic Landmark (NOA-00042). In January 2016, an archaeological predictive model was developed for the Study Area, and an archaeological survey of alternative route alignments and proposed material sites was conducted in September-October 2016. This field investigation involved pedestrian survey and subsurface testing at potentially sensitive locations identified in the predictive model and during the pedestrian survey along the three routes originally under consideration. The results of the field investigation are included in the *Kivalina Evacuation and School Site Access Road* report produced by Stantec for DOT&PF. Testing locations along the abandoned northern route are shown on Figure 2. The entire northern route is shown on Figure 1 of Appendix D of the report. No archaeological sites or historic properties were identified along the three alternative routes, or within the material sites that were defined at that time.

DOT&PF sent a cultural resource survey team in the August of 2017 to conduct addition fieldwork within the APE which now includes potential material site locations. The results of the field investigation are provided in a memo from Stantec entitled *Archaeological Assessment Update for the Kivalina Evacuation and School Site Access Road.*

Under the Alaska Historic Roads Programmatic Agreement Interim Guidance, a group of Alaska roads has been identified which are being treated as eligible for the National Register of Historic Places (NRHP). This project does not affect any of these roads.

Finding of Effect

NOA-00042 Cape Krusenstern Archaeological District National Monument National Historic Landmark (NHL)

Cape Krusenstern Archaeological District National Historic Landmark (NHL) was designated November 7, 1973 prior to the establishment if the National Monument which was designated on December 1, 1978. Properties designated as National Historic Landmarks are automatically listed in the NRHP CFR36§65.2(b). The primary reason for the designation of both the Archaeological District and National Monument was the overall significance of the region to the understanding the prehistory of the Arctic based on the positive results of archaeological investigations that took place between the late 1940's and early 1970's and continue today. At first, the boundary of the National Monument, which is restricted to the archaeologically rich beach ridge complex, was used for the boundaries for the NHL under National Landmark Criteria 36CFR§64.4(a)(6). It was later expanded to include areas, such as the Project location, which had not had any archaeological investigation conducted at the time.

The archaeological investigations conducted over the 2016 and 2017 field seasons did not result in the identification any elements which contribute to our continuing understanding of the prehistory or history of the Arctic within the Project's APE which is located within the boundaries of NHL. As such, the proposed construction of the Evacuation and School Site

Access Road will not have an adverse effect on the integrity of the NHL or its continuing eligibility for the NRHP as no contributing elements have been identified. Due to the Project being located within the NHL boundary the DOT&PF is submitting monitoring and inadvertent discovery plan to be implemented during the continued planning and execution of the Project (Attachment 1). In the event that cultural resources are encountered this plan will be implemented and all identified parties will be contacted. As the proposed routes, the Project terminus and the potential material site locations have only one historic property located within their boundaries the potential effect for all were addressed in one evaluation.

Overall, the DOT&PF has determined that the activities proposed for the Kivalina Evacuation and School Site Access Road Project will result in **no historic properties adversely affected** and seeks the Alaska SHPO's concurrence with this finding of effect.

Section 4(f)
It is the DOT&PF's intent to make a Section 4(f) de minimis impact finding premised on your written concurrence that the project **will not adversely affect** NOA-00042 Cape Krusenstern Archaeological District National Monument National Historic Landmark (NHL).

Consultation Efforts
On July 10, 2017 a meeting was among Agency cultural resource staff. The DOT&PF Northern Region PQI, staff from the Office of History and Archaeology and the Alaska State Historic Preservation Officer (SHPO) and the National Park Service Archaeologist for the National Register of Historic Places Program, Alaska Region. Initiation of Consultation letters were sent out to the identified consulting parties on August 7, 2017. A response was received from the SHPO office on August 22, 2017 stating there was no objection to the proposed Study Area or level of identification at this time (Attachment 2). No other responses to the Section 106 Initiation of Consultation letters were received.

A copy of this letter has been submitted to the National Park Service for their evaluation and recommendation regarding activities within a NHL.

In addition to the Alaska State Historic Preservation Officer (SHPO), other parties being contacted regarding the findings for this project are: the National Park Service (NPS); the Native Village of Kivalina; the City of Kivalina; the Native Village of Noatak; NANA Regional Corporation; the Northwest Arctic Borough; NPS-Western Arctic National Parklands; the Bureau of Indian Affairs (BIA); and the Advisory Council on Historic Preservation.

If you wish to comment on this finding, I can be reached at the address above, by telephone at 907-451-5293, or by e-mail at *thomas.gamza@alaska.gov*. Your timely response will greatly assist us in incorporating your concerns into project development. For that purpose, we respectfully request that you respond within thirty days of your receipt of this correspondence.

Sincerely,

Thomas A. Gamza
Cultural Resource Specialist-Archaeologist (PQI)
State of Alaska DOT&PF, Northern Region

Figure 1: Location and Vicinity Map
Figure 2: Area of Potential Effect-Overview
Figures 3-6 Proposed Material Site Investigation APE

Attachment 1: Draft Inadvertent Discovery Plan – Kivalina Evacuation and School Site Access Road
Attachment 2: August 22, 2017 response from the SHPO to August 7, 2017 Initiation of Consultation Letter

Electronic cc w/ enclosures:
Michael Cain, FHWA Alaska Division, Northern Region Area Engineer
Jonathan Hutchinson, P.E., DOT&PF Northern Region, Project Manager
Paul Karczmarczyk, DOT&PF Northern Region, Environmental Impact Analyst
Brett Nelson, DOT&PF Northern Region, Regional Environmental Manager
Kathy Price, DOT&PF, Statewide Cultural Resources Manager
Amy Sumner, DOT&PF Statewide Environmental NEPA Manager

United States Department of the Interior

NATIONAL PARK SERVICE
Alaska Region
240 West 5th Avenue, Room 114
Anchorage, Alaska 99501

IN REPLY REFER TO:
8.A.4 (AKRO-CR)20171002

OCT 0 6 2017

Thomas A. Gamza
State of Alaska DOT&PF, Northern Region
2301 Peger Road
Fairbanks, AK 99709-5316

Subject: Kivalina Evacuation and School Site Access Road. Federal/State Project No. 0002384/NFHWY00162, Section 106 Determination

Dear Mr. Gamza:

Thank you for providing project information for the proposed Kivalina Evacuation and School Site Access Road, Federal/State Project No. 0002384/NFHWY00162. The National Park Service has served as a consulting party for this project under Section 106 of the National Historic Preservation Act of 1966 (54 U.S.C. § 306108) to help ensure the integrity of Cape Krusenstern Archeological District National Historic Landmark (NHL).

We appreciate the Alaska Department of Transportation and Public Facilities (DOT&PF) providing NPS with the results of the cultural resource assessment survey, accommodating a site visit by NPS archeologist Rhea Hood on August 16, 2017, answering follow-up questions, as well as consulting with other interested parties including the Native Village of Kivalina.

As described, the project consists of building a causeway spanning approximately 0.6 miles across Kivalina Lagoon, constructing a 7.7 to 8.9 mile evacuation road east of Kivalina, and development of up to four different material sites in the same project area. The causeway construction will include pile driving at each abutment and the final bridge design and construction could cause additional ground disturbance near previously recorded sites that are within the Area of Potential Effect (APE). We understand that the two AHRS sites, NOA-00325 and NOA-00327, are documented for human burials and archaeological artifacts respectively and that these sites are within the APE but are over 100 meters away from the western end of the causeway abutment, and therefore the proposed project activity will not harm these sites.

Based on the *Kivalina Evacuation and School Site Access Road Cultural Resources Assessment Report* and the following September 2017 update, and the August 2017 project site visit, we understand that the cultural resources investigations did not reveal any new significant

archeological resources. Since Kivalina was included in the NHL for encompassing "sites evidencing prehistoric occupation," we recognize that there is still the potential for discovery as the project is implemented.

We concur with DOT&PF's finding of "no historic properties adversely affected" (36 CFR 800.5 (b)(1)) conditional to include archaeological monitoring and an Inadvertent Discovery Plan that allows for "reasonable efforts to avoid, minimize or mitigate adverse effects" and that covers post-Section 106 review discoveries of cultural resources.

Given that there is some potential for finding cultural resources and human remains within the NHL, we would appreciate receiving a copy of the Inadvertent Discovery Plan with the specific archaeological monitoring plan, as well as any information that arises as a result of inadvertent discoveries.

We appreciate DOT&PF's inclusion of NPS throughout this Section 106 process. If you have questions about our comments or concerns, please contact Rhea Hood at 907-644-3460 or rhea_hood@nps.gov.

Sincerely,

Herbert C. Frost, Ph.D.
Regional Director

cc: Rhea Hood, Archeologist, NPS Alaska Region
Jennifer Pederson Weinberger, Cultural Resources Program Manager, NPS Alaska Region
Maija Lukin, Superintendent, Western Arctic Parklands
Mark Rollins, Review and Compliance, Alaska State Historic Preservation Office

THE STATE
of ALASKA
GOVERNOR BILL WALKER

Department of Natural Resources

DIVISION OF PARKS & OUTDOOR RECREATION
Office of History & Archaeology

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http://dnr.alaska.gov/parks/oha

SENT BY E-MAIL
DATE 10/9/17

October 9, 2017

File No.: 3130-1R FHWA/ 2016-01460

Subject: Kivalina Evacuation and School Site Access Road, 0002384/ NFHWY00162

Thomas Gamza
Department of Transportation & Public Facilities
2301 Peger Road
Fairbanks, AK 99709-5316

Dear Mr. Gamza,

The Alaska State Historic Preservation Office (AK SHPO) received your letter (dated September 19, 2017) and reports, titled *Kivalina Evacuation and School Site Access Road Cultural Resources Assessment Report* and the *Archaeological Assessment Update for the Kivalina Evacuation and School Site Access Road,* on September 24, 2017. Following our review of the documentation provided, pursuant to Section 106 of the National Historic Preservation Act, we concur with your finding of **no historic properties adversely affected** for the subject project. Furthermore, we concur that the project will not adversely affect NOA-00042 Cape Krusenstern Archaeological District National Monument National Historic Landmark (NHL). This concurrence is conditional to include archaeological monitoring and an Inadvertent Discovery Plan for the subject project. We look forward to receiving the final draft of the Inadvertent Discovery Plan for our records.

Please note that 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 comment letter does not end the 30-day review period provided to other consulting parties. Should unidentified cultural 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.

The AK SHPO appreciates your consultation efforts for the subject project and for including a staff member in a site visit on August 16, 2017. Please contact Mark Rollins at 269-8722 or mark.rollins@alaska.gov if you have any questions or if we can be of further assistance.

Sincerely,

Joan M. Antonson

Judith E. Bittner
Deputy State Historic Preservation Officer

JEB:mwr

Cc: Rhea Hood, National Park Service, rhea_hood@nps.gov

THE STATE
of ALASKA
GOVERNOR BILL WALKER

Department of Transportation and Public Facilities

Northern Region
Design and Engineering Services
Preliminary Design and Environmental Section

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In Reply Refer To:
Kivalina Evacuation and School Site Access Road
Federal/State Project No. 0002384/NFHWY00162
Addendum: NOA-00325 & NOA-00327

December 29, 2017

Ms. Judith E. Bittner
State Historic Preservation Officer
Alaska Office of History and Archaeology
550 W. 7th Avenue, Suite 1310
Anchorage, Alaska 99501-3565

Dear Ms. Bittner:

The Alaska Department of Transportation and Public Facilities (DOT&PF) has assumed the responsibilities of the Federal Highway Administration (FHWA) under 23 U.S.C. 327, and is proposing to construct a safe, reliable, all-season evacuation road between the community of Kivalina and a site on Kisimigiuqtuq Hill (K-Hill) (Figure 1). The Kivalina Evacuation and School Site Access Road (the Project) location is legally described in Table 1 below:

Table 1: Project Location

Section(s)	Township	Range	Meridian	USGS Quad
1, 2, 10, 11, 15, 16, 21	027N	026W	Kateel River	Noatak C-5
19. 20, 29, 30, 31	028N	026W	Kateel River	Noatak C-5
25, 26, 35, 36	029N	025W	Kateel River	Noatak C-5

The environmental review, consultation, and other actions required by applicable Federal environmental laws for this project are being, or have been, carried out by DOT&PF pursuant to 23 U.S.C. 327 and a Memorandum of Understanding dated November 3, 2017, and executed by FHWA and DOT&PF.

The proposed project origin is at the City of Kivalina, located on the southeast tip of the barrier island located between the Chukchi Sea (Arctic Ocean) and Kivalina Lagoon (Figure 1). The project terminus is located on the mainland across the Kivalina Lagoon approximately six miles northeast at a community selected evacuation site on K-Hill.

Background

On September 19, 2017 DOT&PF made a finding of No Historic Properties Adversely Affected (Findings Letter) for the proposed project. The National Park Service (NPS) responded on October 6, 2017 (Attachment 1); their response included the detail that two Alaska Heritage Resources Survey (AHRS) sites, NOA-00325 and NOA-00327, appear to be within the proposed project's Area of Potential Effect (APE) but that they would not be affected by the project's activities. These two sites did not appear in the Findings Letter or in the SHPO concurrence to those Findings on October 9, 2017 (Attachment 2). This informational update addresses those two sites. DOT&PF's original finding of effect has not changed.

NOA-00325 and NOA-00327

Both NOA-00325 and NOA-00327 were assigned AHRS numbers in the 2005 *Cultural Resources Survey of Proposed Sewage and Water Systems Improvements in Kivalina, Alaska* report by Northern Land Use Research, Inc.

Table 2. Site Details from AHRS Database

Site Number	Site Name	Site Description	Determination of Eligibility?
NOA-00325	KIV-HR-05	Informant reported to cultural resource investigators in 2005 that human remains discovered during construction of house in 1990s. No information regarding their handling.	No Determination of Eligibility
NOA-00327	NOA-00327	Local informant reported to other cultural resource investigators in 2004 that artifacts had been found near location when they were a child.	No Determination of Eligibility

The site numbers were assigned based on information from local residents who recalled that in one location (NOA-00325) human remains had been found during the construction of a house foundation in the 1970s. It was not determined at the time of the 2005 interview if the remains were left in place or re-interred in the current cemetery. Another local resident noted that at the other location (NOA-00327) artifacts had been found and he played with them when he was a child. Based on these interviews, AHRS numbers were assigned for the general locations. As of 2017, no extant physical materials have been identified in relation to either of these two sites.

This letter is being sent to acknowledge that the AHRS-reported locations for NOA-00325 and NOA-00327 are within the APE for this project. Their omission from the Findings Letter (September 19, 2017) was a clerical error and DOT&PF does not anticipate ground disturbing activities in the reported site locations that would require a re-evaluation of the finding of effect for this project. The APE for the project was drawn broadly to evaluate potential visual effects as well as any ground disturbing effects the project may have on the surrounding land and community. The AHRS-reported locations for these two sites are on the periphery of the APE where visual effects were the greatest concern due to the presence of standing structures. No ground-disturbing activity is planned for the portions of the APE containing these sites.

Section 4(f)
As stated in in September 19, 2017 Findings Letter it is the DOT&PF's intent to make a Section 4(f) *de minimis* impact finding for this project and NOA-00042, the Cape Krusenstern National Historic Landmark. Section 4(f) findings have not changed with the inclusion of NOA-00325 and NOA-00327 within the project APE as there will be no use of these sites.

Inadvertent Discovery Plan
Additionally, please find attached the finalized Inadvertent Discovery Plan (Attachment 3), as stipulated and required, for this project as presented in the DOT&PF Findings Letters of September 19, 2017 and a full set of the figures for the entire project APE (Figures 1-8).

Consultation Summary
On July 10, 2017 a meeting among Agency cultural resource staff was held in Anchorage. The DOT&PF Northern Region Cultural Resource Specialist-Archaeologist PQI, Office of History and Archaeology staff, the Alaska SHPO, and the NPS Archaeologist for the NRHP Program, Alaska Region were in attendance. Initiation of Consultation letters were sent out to the identified consulting parties on August 7, 2017. A response was received from the SHPO office on August 22, 2017 stating there was no objection to the proposed Study Area or level of identification. No other responses to the Section 106 Initiation of Consultation letters were received. A response to the September 19, 2017 Findings Letter was received from the NPS on October 6, 2017 and SHPO concurrence with the DOT&PF findings was received on October 9, 2017. No responses were received from the other consulting parties.

In addition to the Alaska State Historic Preservation Officer (SHPO), other parties being contacted with this informational update and Inadvertent Discovery Plan for this project are: the National Park Service (NPS); the Native Village of Kivalina; the City of Kivalina; the Native Village of Noatak; NANA Regional Corporation; the Northwest Arctic Borough; NPS-Western Arctic National Parklands; and the Bureau of Indian Affairs (BIA).

Please direct your questions or comments to me at the address above, by telephone at 907-451-5293, or by e-mail at *thomas.gamza@alaska.gov*.

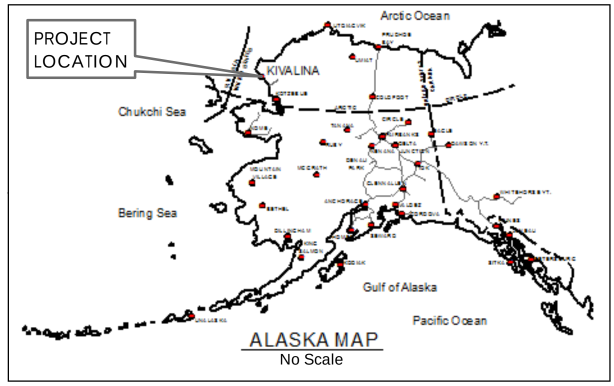
Sincerely,

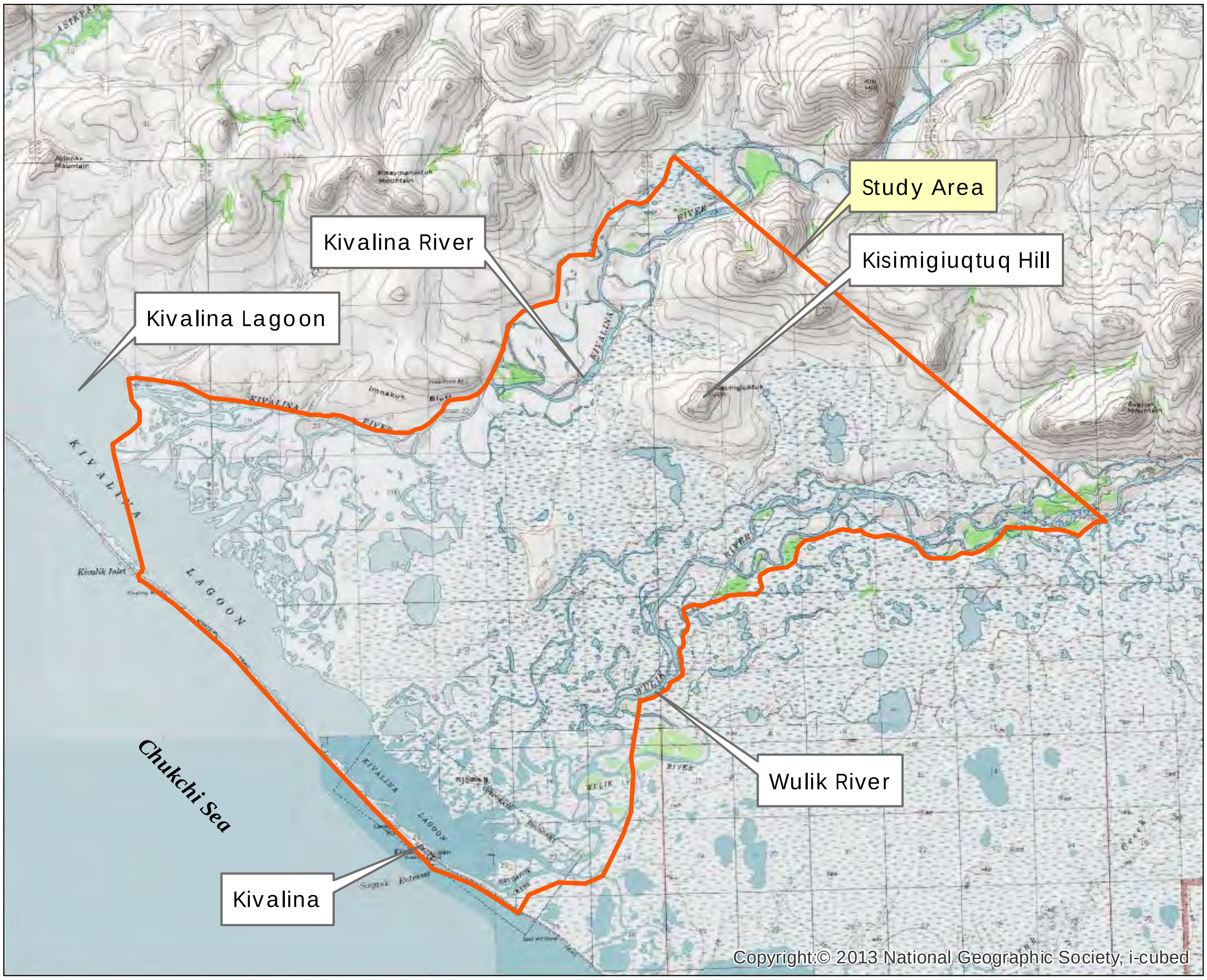
Thomas A. Gamza
Cultural Resource Specialist-Archaeologist (PQI)
State of Alaska DOT&PF, Northern Region

Figure 1: Location and Vicinity Map
Figures 2-7: Project APE Enlarged Sections
Figure 8: Locations of NOA-00325 and NOA-00327 in Western Terminus Enlarged Section

Attachment 1: National Park Service response to the DOT&PF Findings October 6, 2017
Attachment 2: SHPO concurrence with No Historic Properties Adversely Affected Determination October 9, 2017
Attachment 3: Final Inadvertent Discovery Plan – Kivalina Evacuation and School Site Access Road

Electronic cc w/ enclosures:
Jonathan Hutchinson, P.E., DOT&PF Northern Region, Project Manager
Paul Karczmarczyk, DOT&PF Northern Region, Environmental Impact Analyst
Brett Nelson, DOT&PF Northern Region, Regional Environmental Manager
Kathy Price, DOT&PF, Statewide Cultural Resources Manager
Amy Sumner, DOT&PF Statewide Environmental NEPA Manager





Graphics developed by Stantec Consulting Services, Inc.

Project Origin: City of Kivalina,
Kotzebue Recording District,
Section 21, Township 27N, Range 26W,
Kateel River Meridian

Project Terminus: Kisimigiuqtuq Hill,
Section 19, Township 28N, Range 25W
Kateel River Meridian

0 1.25 2.5 5 Miles

1:142,961 (at original document size of 8.5x11)

STATE OF ALASKA
Department of Transportation and Public Facilities
2301 Peger Road Fairbanks, AK 99709

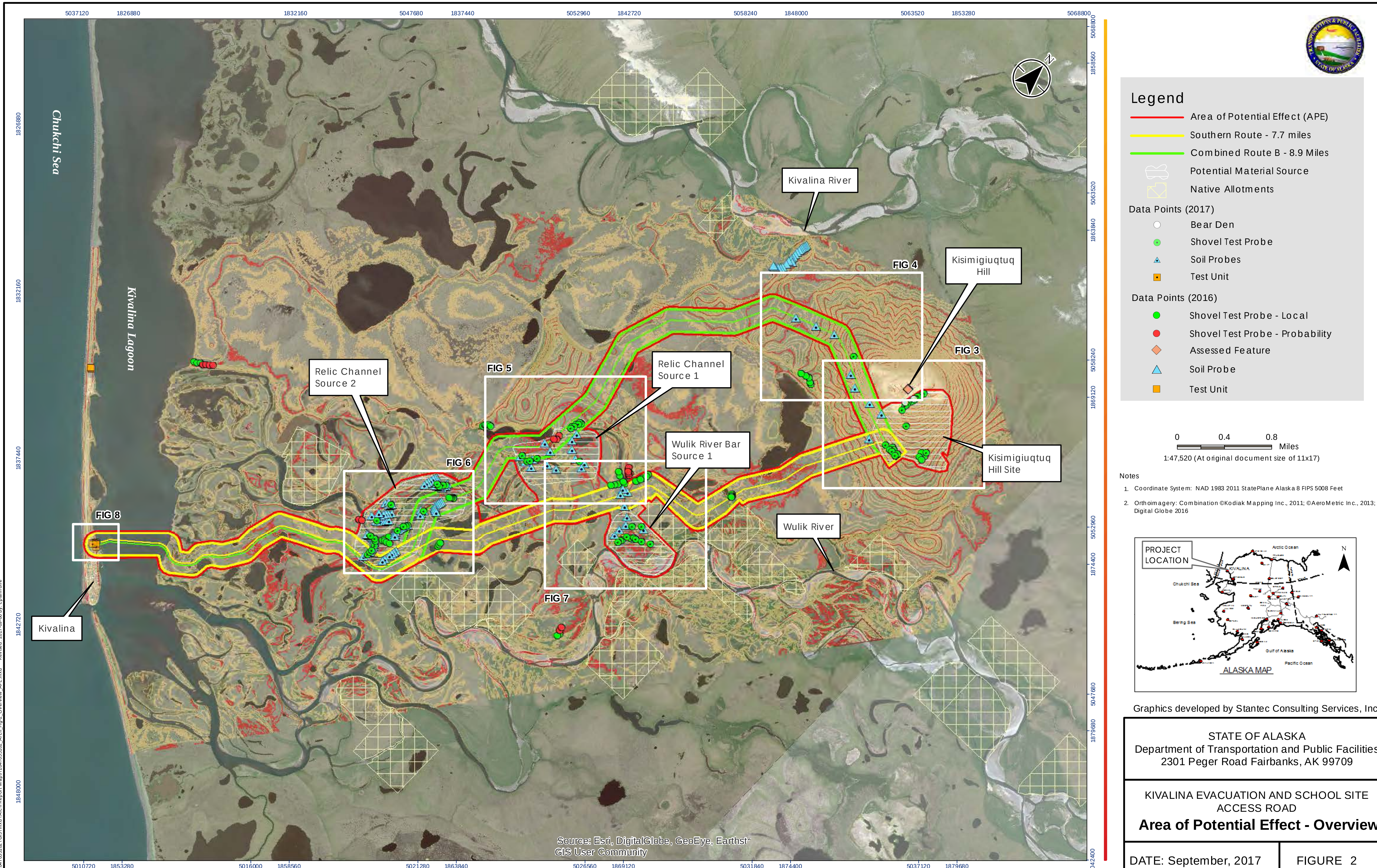
KIVALINA EVACUATION AND SCHOOL SITE ACCESS ROAD

Location & Vicinity Map

DATE: September, 2017

FIGURE 1

U:\2047055102\GIS\mxd\Arch Report Maps\2047055102_Arch_Fig-1_Loc-Vic_Map.mxd Revised: 2017-09-06 By: cpannone



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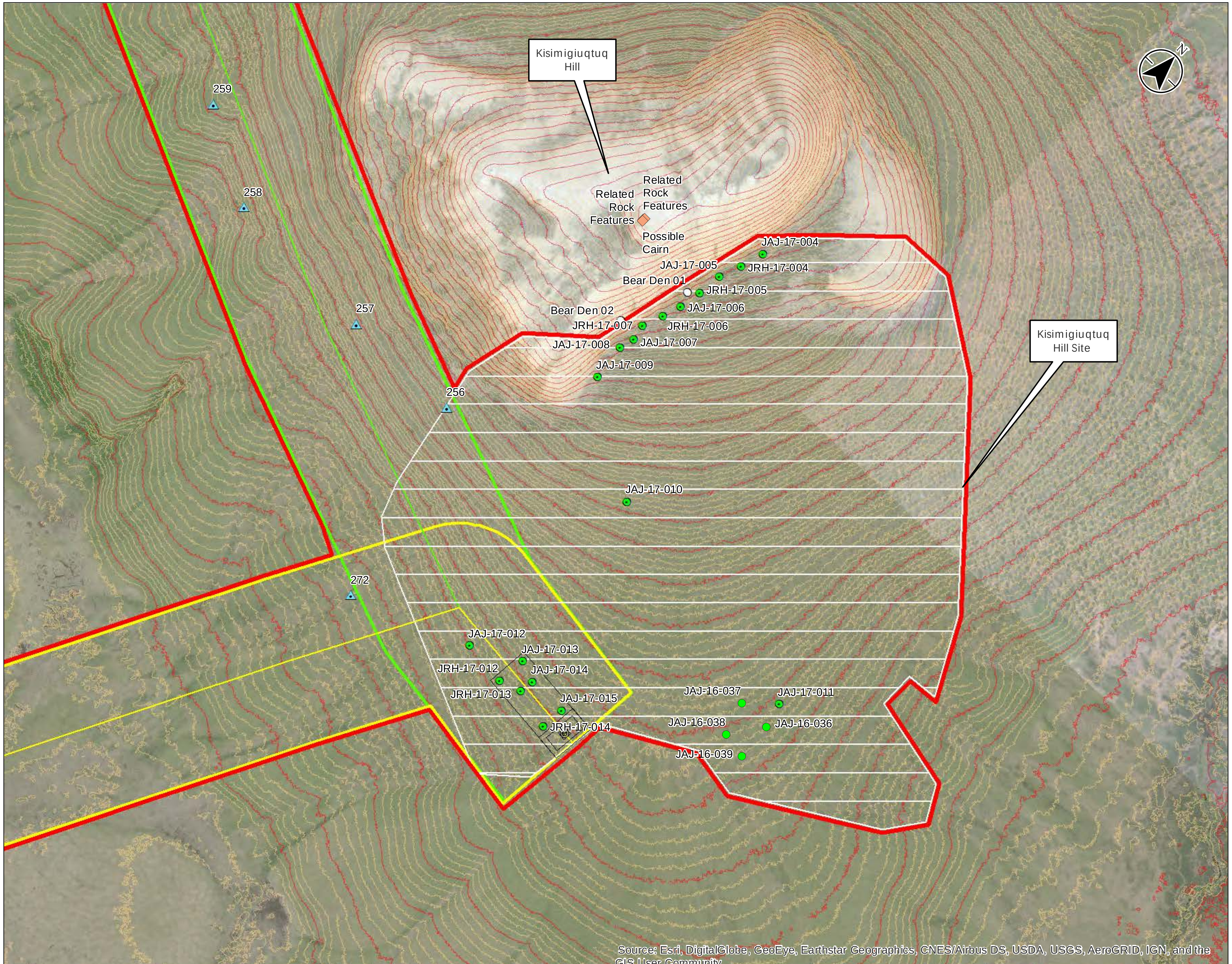
KIVALINA EVACUATION AND SCHOOL SITE ACCESS ROAD

Area of Potential Effect - Overview

DATE: September, 2017 | FIGURE 2



Legend

- Area of Potential Effect (APE)
- Southern Route - 7.7 miles
- Combined Route B- 8.9 Miles
- Potential Material Source
- Native Allotments
- Gravel Mounds

Data Points (2017)

- Bear Den
- Shovel Test Probe
- Soil Probes
- Test Unit

Data Points (2016)

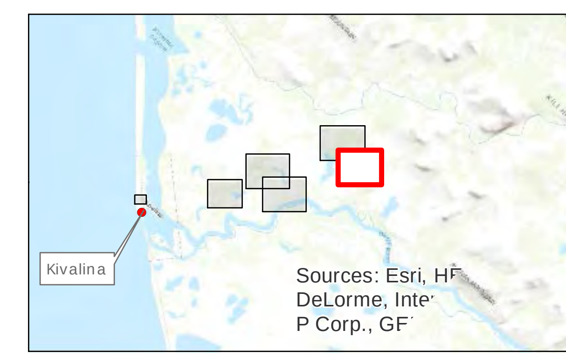
- Shovel Test Probe - Local
- Shovel Test Probe - Probability
- Assessed Feature
- Soil Probe
- Test Unit

0 500 1,000 Feet

1:7,200 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
2. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011; ©AeroMetric Inc., 2013; Digital Globe 2016



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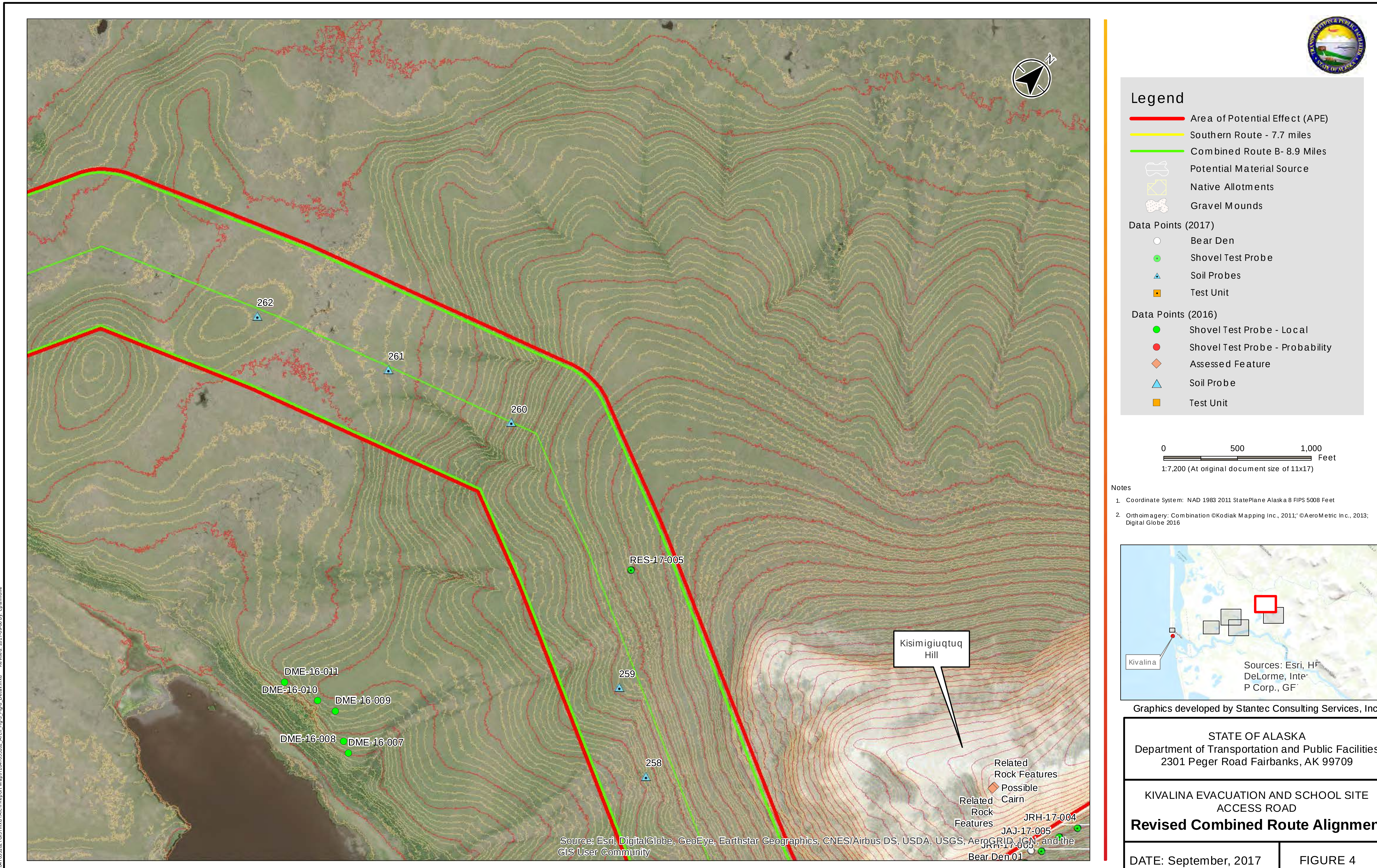
KIVALINA EVACUATION AND SCHOOL SITE ACCESS ROAD

Kisimigiuqtuq Hill

DATE: September, 2017	FIGURE 3

U:\204705102\GIS\mxd\Arch Report Maps\204705102_Arch_Fig-3_Fig-8_Detail.mxd Revised: 2017-09-06 By: cpamone



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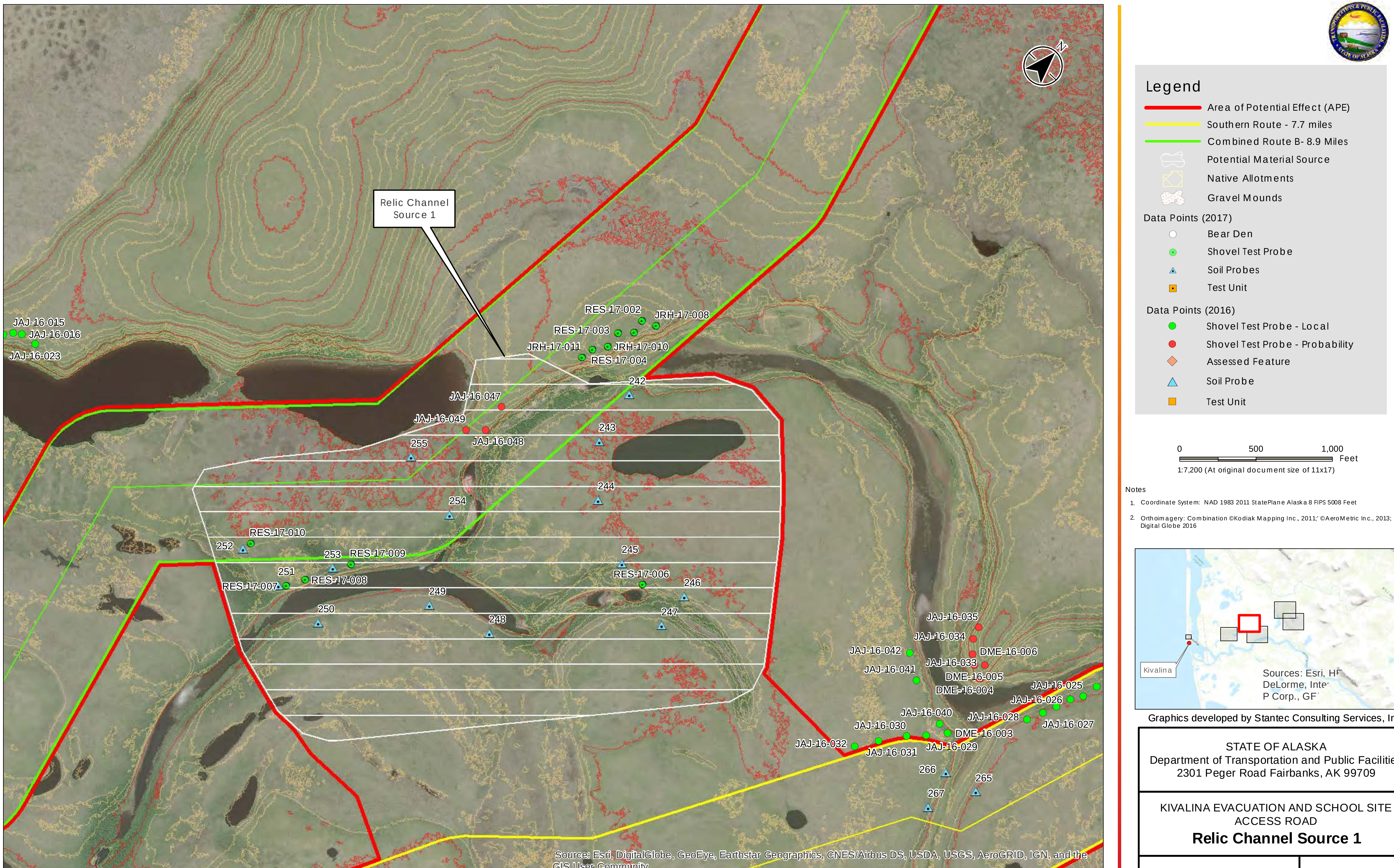
KIVALINA EVACUATION AND SCHOOL SITE ACCESS ROAD

Revised Combined Route Alignment

DATE: September, 2017 | FIGURE 4



Notes

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2. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011; ©AeroMetric Inc., 2013; Digital Globe 2016

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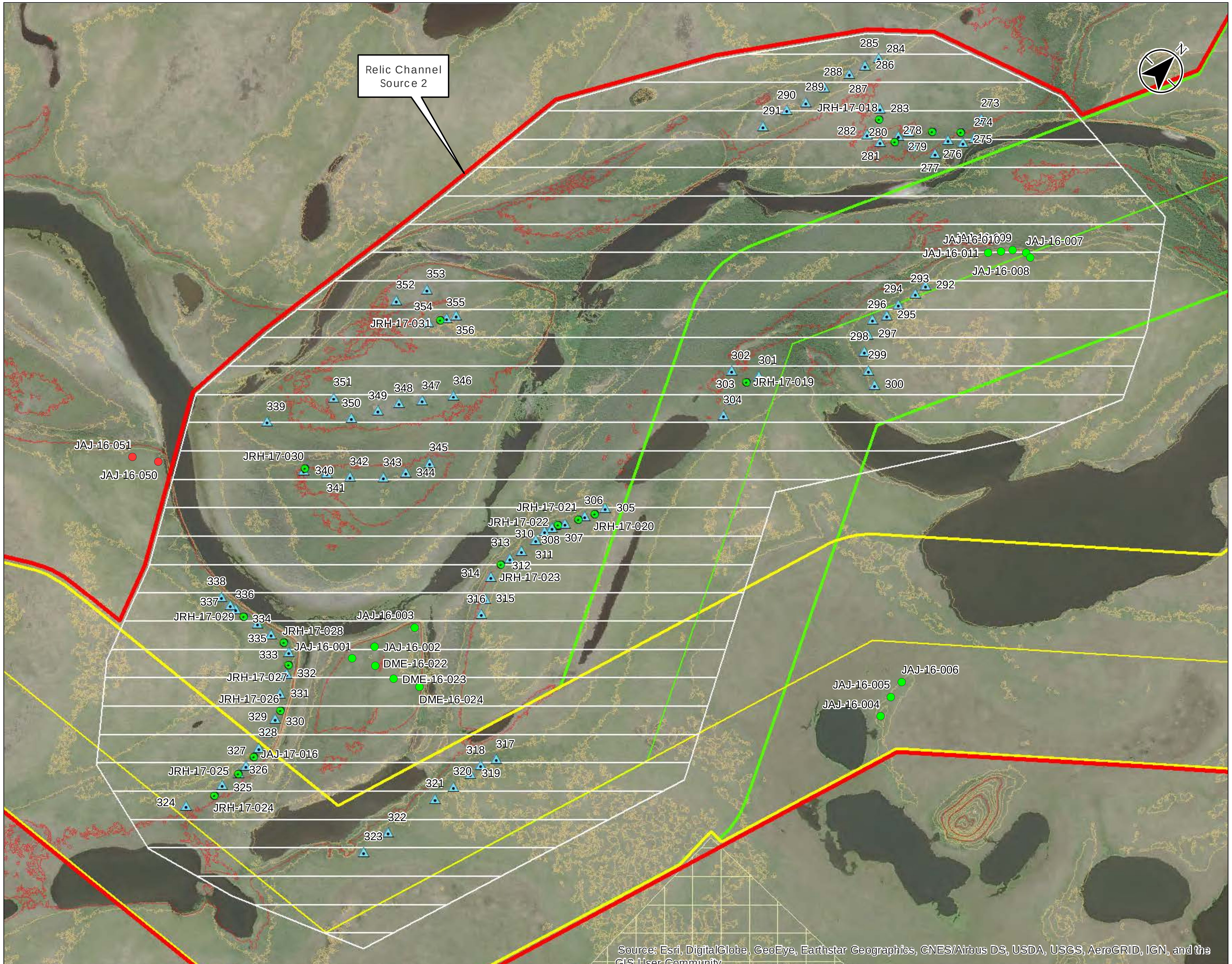
KIVALINA EVACUATION AND SCHOOL SITE ACCESS ROAD
Relic Channel Source 1

DATE: September, 2017 | FIGURE 5

U:\204705102\GIS\mxd\Arch Report Maps\204705102_Arch_Fig-3_Fig-8_Detail.mxd Revised: 2017-09-06 By: cpannone



Legend

- Area of Potential Effect (APE)
- Southern Route - 7.7 miles
- Combined Route B- 8.9 Miles
- Potential Material Source
- Native Allotments
- Gravel Mounds

Data Points (2017)

- Bear Den
- Shovel Test Probe
- Soil Probes
- Test Unit

Data Points (2016)

- Shovel Test Probe - Local
- Shovel Test Probe - Probability
- Assessed Feature
- Soil Probe
- Test Unit

0 400 800 Feet

1:5,760 (At original document size of 11x17)

Notes

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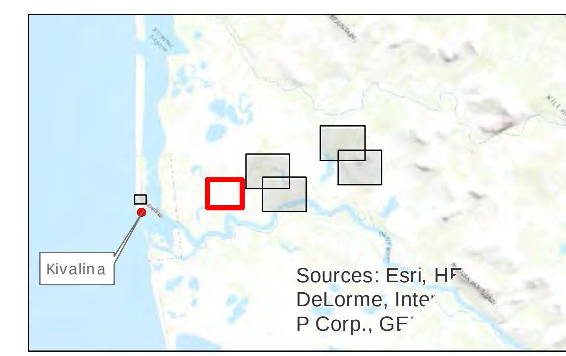
2. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011; ©AeroMetric Inc., 2013; Digital Globe 2016



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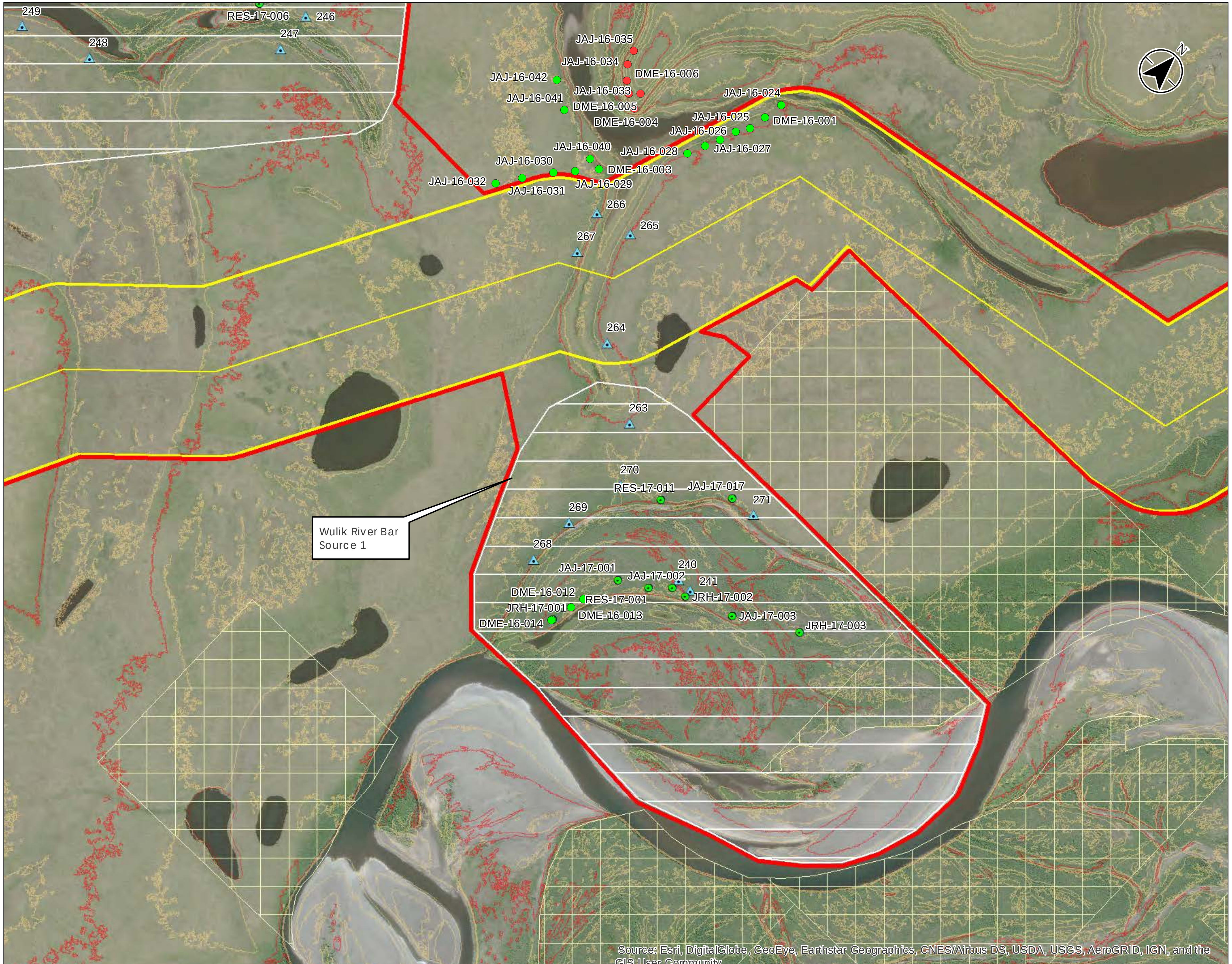
KIVALINA EVACUATION AND SCHOOL SITE ACCESS ROAD

Relic Channel Source 2

DATE: September, 2017 | FIGURE 6

U:\204705510\2\GIS\mxd\Arch Report Maps\204705510\2_Arch_Fig-3_Fig-8_Detail.mxd Revised: 2017-09-06 By: cpamnone



Legend

- Area of Potential Effect (APE)
- Southern Route - 7.7 miles
- Combined Route B- 8.9 Miles
- Potential Material Source
- Native Allotments
- Gravel Mounds

Data Points (2017)

- Bear Den
- Shovel Test Probe
- Soil Probes
- Test Unit

Data Points (2016)

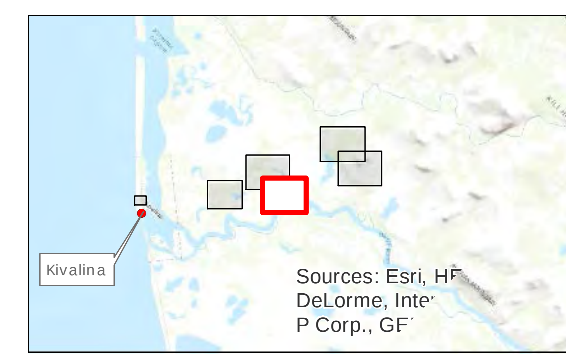
- Shovel Test Probe - Local
- Shovel Test Probe - Probability
- Assessed Feature
- Soil Probe
- Test Unit

0 500 1,000 Feet

1:7,200 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
2. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011; ©AeroMetric Inc., 2013; Digital Globe 2016



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Department of Transportation and Public Facilities
2301 Peger Road Fairbanks, AK 99709

KIVALINA EVACUATION AND SCHOOL SITE ACCESS ROAD

Wulik River Bar Source 1

DATE: September, 2017 | FIGURE 7

Legend

- Area of Potential Effect (APE)
- Southern Route - 7.7 miles
- Combined Route B- 8.9 Miles
- Potential Material Source
- Native Allotments
- Gravel Mounds

Data Points (2017)

- Bear Den
- Shovel Test Probe
- Soil Probes
- Test Unit

Data Points (2016)

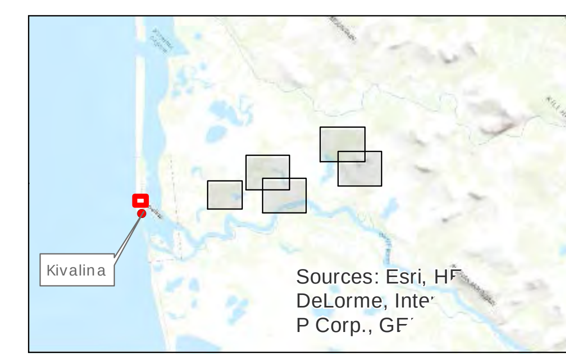
- Shovel Test Probe - Local
- Shovel Test Probe - Probability
- Assessed Feature
- Soil Probe
- Test Unit

0 140 280 Feet

1:2,030 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
2. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011;' ©AeroMetric Inc., 2013; Digital Globe 2016



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Department of Transportation and Public Facilities
2301 Peger Road Fairbanks, AK 99709

KIVALINA EVACUATION AND SCHOOL SITE ACCESS ROAD

Western Causeway Terminus

DATE: September, 2017	FIGURE 8

Attachment 1

United States Department of the Interior

NATIONAL PARK SERVICE
Alaska Region
240 West 5th Avenue, Room 114
Anchorage, Alaska 99501

IN REPLY REFER TO:
8.A.4 (AKRO-CR)20171002

OCT 0 6 2017

Thomas A. Gamza
State of Alaska DOT&PF, Northern Region
2301 Peger Road
Fairbanks, AK 99709-5316

Subject: Kivalina Evacuation and School Site Access Road. Federal/State Project No. 0002384/NFHWY00162, Section 106 Determination

Dear Mr. Gamza:

Thank you for providing project information for the proposed Kivalina Evacuation and School Site Access Road, Federal/State Project No. 0002384/NFHWY00162. The National Park Service has served as a consulting party for this project under Section 106 of the National Historic Preservation Act of 1966 (54 U.S.C. § 306108) to help ensure the integrity of Cape Krusenstern Archeological District National Historic Landmark (NHL).

We appreciate the Alaska Department of Transportation and Public Facilities (DOT&PF) providing NPS with the results of the cultural resource assessment survey, accommodating a site visit by NPS archeologist Rhea Hood on August 16, 2017, answering follow-up questions, as well as consulting with other interested parties including the Native Village of Kivalina.

As described, the project consists of building a causeway spanning approximately 0.6 miles across Kivalina Lagoon, constructing a 7.7 to 8.9 mile evacuation road east of Kivalina, and development of up to four different material sites in the same project area. The causeway construction will include pile driving at each abutment and the final bridge design and construction could cause additional ground disturbance near previously recorded sites that are within the Area of Potential Effect (APE). We understand that the two AHRS sites, NOA-00325 and NOA-00327, are documented for human burials and archaeological artifacts respectively and that these sites are within the APE but are over 100 meters away from the western end of the causeway abutment, and therefore the proposed project activity will not harm these sites.

Based on the *Kivalina Evacuation and School Site Access Road Cultural Resources Assessment Report* and the following September 2017 update, and the August 2017 project site visit, we understand that the cultural resources investigations did not reveal any new significant

archeological resources. Since Kivalina was included in the NHL for encompassing "sites evidencing prehistoric occupation," we recognize that there is still the potential for discovery as the project is implemented.

We concur with DOT&PF's finding of "no historic properties adversely affected" (36 CFR 800.5 (b)(1)) conditional to include archaeological monitoring and an Inadvertent Discovery Plan that allows for "reasonable efforts to avoid, minimize or mitigate adverse effects" and that covers post-Section 106 review discoveries of cultural resources.

Given that there is some potential for finding cultural resources and human remains within the NHL, we would appreciate receiving a copy of the Inadvertent Discovery Plan with the specific archaeological monitoring plan, as well as any information that arises as a result of inadvertent discoveries.

We appreciate DOT&PF's inclusion of NPS throughout this Section 106 process. If you have questions about our comments or concerns, please contact Rhea Hood at 907-644-3460 or rhea_hood@nps.gov.

Sincerely,

Herbert C. Frost, Ph.D.
Regional Director

cc: Rhea Hood, Archeologist, NPS Alaska Region
Jennifer Pederson Weinberger, Cultural Resources Program Manager, NPS Alaska Region
Maija Lukin, Superintendent, Western Arctic Parklands
Mark Rollins, Review and Compliance, Alaska State Historic Preservation Office

Attachment 2

THE STATE of ALASKA

GOVERNOR BILL WALKER

Department of Natural Resources

DIVISION OF PARKS & OUTDOOR RECREATION
Office of History & Archaeology

550 West 7th Ave., Suite 1310
Anchorage, Alaska 99501-3565
Main: 907.269.8721
http://dnr.alaska.gov/parks/oha

SENT BY E-MAIL
DATE 10/9/17

October 9, 2017

File No.: 3130-1R FHWA/ 2016-01460

Subject: Kivalina Evacuation and School Site Access Road, 0002384/ NFHWY00162

Thomas Gamza
Department of Transportation & Public Facilities
2301 Peger Road
Fairbanks, AK 99709-5316

Dear Mr. Gamza,

The Alaska State Historic Preservation Office (AK SHPO) received your letter (dated September 19, 2017) and reports, titled *Kivalina Evacuation and School Site Access Road Cultural Resources Assessment Report* and the *Archaeological Assessment Update for the Kivalina Evacuation and School Site Access Road,* on September 24, 2017. Following our review of the documentation provided, pursuant to Section 106 of the National Historic Preservation Act, we concur with your finding of **no historic properties adversely affected** for the subject project. Furthermore, we concur that the project will not adversely affect NOA-00042 Cape Krusenstern Archaeological District National Monument National Historic Landmark (NHL). This concurrence is conditional to include archaeological monitoring and an Inadvertent Discovery Plan for the subject project. We look forward to receiving the final draft of the Inadvertent Discovery Plan for our records.

Please note that 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 comment letter does not end the 30-day review period provided to other consulting parties. Should unidentified cultural 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.

The AK SHPO appreciates your consultation efforts for the subject project and for including a staff member in a site visit on August 16, 2017. Please contact Mark Rollins at 269-8722 or mark.rollins@alaska.gov if you have any questions or if we can be of further assistance.

Sincerely,

Joan M. Antonson

Judith E. Bittner
Deputy State Historic Preservation Officer

JEB:mwr

Cc: Rhea Hood, National Park Service, rhea_hood@nps.gov

Attachment 3

Archaeological Monitoring Procedures and Inadvertent Discovery Plan – Kivalina Evacuation and School Site Access Road

I. Introduction

These procedures will be followed if cultural resources, including human remains, are encountered during ground disturbing activities at the Kivalina Evacuation and School Site Access Road in Kivalina, Alaska. This plan also includes procedures for archaeological monitoring at selected locations within the project area. Monitoring and discovery protocols contained herein are derived from Appendix F, "Archaeological Monitoring and Discovery Plan," of the *First Amended Programmatic Agreement Among the Federal Highway Administration, the Advisory Council on Historic Preservation, the Alaska State Historic Preservation Officer, and the Alaska Department of Transportation and Public Facilities Regarding Implementation of Section 106 of the National Historic Preservation Act for the Federal-Aid Highway Program in Alaska.*

Project Background

The proposed project origin is at the City of Kivalina, located on the southeast tip of the barrier island located between the Chukchi Sea (Arctic Ocean) and Kivalina Lagoon (Figure 1). The project terminus is located on the mainland across the Kivalina Lagoon approximately six miles northeast of the city at a community selected evacuation site on Kisimigiuqtuq Hill (K-Hill). The proposed project includes part of the Kivalina barrier island, the southern portion of Kivalina Lagoon, and the lower Wulik and Kivalina River drainages.

The Proposed Action would construct a safe, reliable, all-season evacuation road between the community of Kivalina and K-Hill. A range of route alternatives are being considered (Figure 2), but common to all are the following actions:

- **Establishment of a safe, reliable, all-season Kivalina Lagoon crossing.** All alternatives include construction of a causeway across the lagoon that variously incorporate different configurations of hydrological openings including bridge(s), culvert(s), or both.

- **Construction of an all-season access road connecting the Kivalina Lagoon crossing to the K-Hill evacuation site**. The road would be designed to accommodate a wide variety of motorized vehicles over a two-way road with shoulders, multiple turnouts, and side slopes that may include guard rails and other safety features where determined to be necessary and prudent.

- **Development of up to four material sites including the K-Hill Site, Wulik River Source 1, Relic Channel Source 1, and Relic Channel Source 2.** These material sites are anticipated to be suitable local sources of select material to supply the project. Selection and development of viable material sources and haul routes are considered as part of the Proposed Action.

Potential construction methodology may vary depending on timing of construction, contractor methods, locations of staging areas, camps, haul routes, and sequencing of activities.

Construction of the lagoon crossing may include in-water placement of fill, bridge support pile driving, and placement of culvert(s). Placement of fill is generally done during ice-free conditions, but several construction components associated with the lagoon crossing could be completed in the winter.

Grounded ice in shallow depths of the lagoon could be removed allowing placement of the base causeway embankment layer and rock protection with no, or minimal water present, thereby minimizing disturbance of fine sediments. Pile driving would take place on both sides of the bridge opening, and consist of driving piles at each abutment. The final design of the bridge foundation would establish the specific number, size, and depth of the pilings.

II. Archaeological Monitoring

Background

Archaeological monitoring is the stationing of an archaeologist on a construction site to watch for evidence of archaeological remains as the construction proceeds. Archaeological monitoring for the Kivalina project is planned for select activities in defined geographic areas. Monitoring requirements will be implemented during subsurface, ground disturbing activities. Archaeological monitoring was a condition of the SHPO's concurrence with DOT&PF's Finding of No Adverse Effect (SHPO Concurrence Letter, October 9, 2017).

Archaeological monitoring is to be carried out by or under the direct supervision of a person or persons meeting at a minimum the *Secretary of the Interior's Professional Qualifications Standards for Archaeologists* (48 FR 44738-44739). The Archaeological Monitor(s) will conduct on-site monitoring of ground-disturbing activities that extend into cultural resource sensitive areas identified through Section 106 consultation for the project.

Areas Planned for Monitoring

Archaeological monitoring is planned for the west side of the Lagoon Crossing/Causeway construction area (in the city of Kivalina), the evacuation road terminus at K-Hill, and the proposed material site locations DOT&PF will ensure a Secretary of the Interior (SOI) qualified professional archaeologist will be present to monitor for potential cultural resources during all ground disturbing activities in the above monitoring locations.

Monitoring Procedures

Before work begins on the project, the DOT&PF Project Engineer, the DOT&PF Professionally Qualified Individual (PQI), and the Archaeological Monitor(s) will conduct a pre-construction meeting with the Construction Contractor to explain any Section 106 terms or conditions for the project and the procedures to follow if archaeological materials or human remains are found, as well as the role of the Archaeological Monitor. The PQI will provide copies of the contact list contained in this document (Appendix 1) to be used in the event of a cultural resource discovery.

The on-site supervising Archaeological Monitor is authorized to halt construction in a specific location if any previously unidentified cultural resources are encountered during earth-moving activities.

Monitoring Reporting

The Archaeological Monitor will provide a summary construction monitoring memo on a weekly basis to the DOT&PF Project Engineer and the PQI. When the construction monitoring is complete, the Archaeological Monitor will provide to the Project Engineer and PQI draft and final summary reports detailing the construction monitoring activities. The report is to meet contemporary professional standards and the Secretary of the Interior's Standards and Guidelines for Archaeological Documentation (FR Vol. 48, No. 190, pp. 44734-44737). The PQI will provide the summary report to SHPO and other consulting parties

III. Protocols for Discovery of Cultural Resources

Cultural resources may include evidence of pre-contact or historic activities, artifacts such as formed stone or bone tools, tool-making debris, fire-modified rock, organic materials such as charcoal and faunal remains, historic debris scatters, and features such as hearths, pits, privies, post-holes or post- molds, foundations, and other evidence of structural remains. The following procedures must be adhered to in the event of a discovery of cultural resources during any project activities.

These procedures will be followed for a discovery during archaeological monitoring at the required monitoring locations *and* must also be followed if an unexpected discovery is made during project activities which were not required to have a monitor.

On-Site Procedures at the Time of Discovery

In the unlikely event that archaeological materials, features, and other potentially sensitive cultural resources are encountered during construction activities or the material site development in association with the project, all work at and adjacent to the discovery must stop. If an Archaeological Monitor is present, they will examine the discovery to determine if it is a cultural resource. If it is determined to not be a cultural resource, work may proceed with no further delay. If it is determined to be a cultural resource, the discovery site is to be secured by the Contractor. If no Archaeological Monitor is present, the discovery site is to be secured by the Contractor until such time as a qualified professional archaeologist can examine the discovery. The discovery area and a surrounding buffer zone shall be delineated with flags tied to stakes that will be driven into the ground. These stakes shall not be removed except by the PQI or Archaeological Monitor(s) at the conclusion of the cultural resource work. The buffer zone established around the discovery zone shall be large enough to allow ground disturbance activities to resume outside the buffer. If human remains are encountered, treat them with dignity and respect, and follow the protocols outlined below in Protocol for Discovery of Human Remains.

The Project Engineer may direct construction away from cultural resources to work in other areas prior to contacting the discovery notification consulting parties. The Project Engineer will coordinate with the Archaeological Monitor (if one is present) to contact the PQI or Regional Environmental Manager (REM).

The PQI or REM will notify the DOT&PF Statewide Environmental Office NEPA Program Manager, the SHPO, the National Park Service (NPS), the Native Village of Kivalina, City of Kivalina, NANA Regional Corporation, and the Native Village of Noatak; contact information for these parties is listed in Appendix 1. The PQI (or REM) must contact these parties within 48 hours of the discovery in accordance with 36 CFR 800.13.

Evaluation of Cultural Resource Materials

The PQI will be the DOT&PF point of contact for consultation with the FHWA, the SHPO, Tribes, and other consulting parties as appropriate to ensure that the previously unidentified resource or unanticipated effect is evaluated, and an appropriate treatment plan is developed.

For evaluating the resource: If the discovery occurs during archaeological monitoring the monitor will perform the following steps in collaboration with the PQI. If the discovery occurs during project activities not subject to monitoring, the Project Engineer, the PQI, and the Contractor will coordinate to procure archaeological services.

- As a streamlining measure, after a qualified archaeologist confirms that the find is cultural and establishes the boundaries of the discovery site, the PQI may assume an archaeological resource is eligible for inclusion in the National Register of Historic Places (National Register) under Criterion D.

- Alternatively, if the find is confirmed as cultural, the PQI may opt to have the cultural resource formally assessed for eligibility to the National Register using established National Register criteria (36 CFR 800.4(c)) and will provide the National Register evaluation report to the SHPO, Tribes, and other consulting parties as appropriate. The PQI will determine National Register eligibility in consultation with the SHPO and Tribes.

For properties deemed to be eligible for the National Register, the PQI will apply the criteria of adverse effect (36 CFR 800.5) in consultation with the SHPO and the Tribes.
Any treatment plan resulting from the discovery will be developed in consultation with the PQI, SHPO, NPS, and other consulting parties. The PQI will coordinate with the Project Engineer and the Construction Contractor to ensure that the treatment plan is implemented.

Curation and Documentation

If any pre-contact or historic archaeological materials are recovered from lands managed by the State of Alaska, these materials and any associated documentation will be curated at the University of Alaska Museum of the North (UAMN) in accordance with the provisions of an existing Memorandum of Understanding between the DOT&PF and UAMN (Appendix 2). Archaeological resources recovered from City of Kivalina lands will be remanded to the City of Kivalina. Archaeological resources recovered from NANA Regional Corporation, Inc. lands will be transferred to the Assistant Director of Lands, who will coordinate with the Native Village of Kivalina and the Native Village of Noatak regarding the final disposition of the recovered materials.

All documentation, testing and treatment plan, evaluation, data recovery, and reporting of cultural resource materials as described for these procedures will follow and meet the contemporary professional standards and the Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation (48 FR 44716).

Proceeding with Construction

Project construction outside the discovery site may continue as directed by the Project Engineer and the Construction Contractor while documentation and assessment of the cultural resources at the discovery site proceeds. When the PQI ensures that recovery of cultural resource materials as outlined above is satisfied and complete, and the PQI determines that compliance with State and federal laws is complete, the Project Engineer may allow construction at the discovery site to resume.

IV. Protocol for Discovery of Human Remains

If human remains are identified at any time during this project, any excavation or other project activities in the area of the discovery will cease and the location will be secured, and protected from further disturbance. The Project Engineer on Site will immediately initiate the notification process established by the OHA (see Appendix 1: Guidelines Laws and Protocols Pertaining to the Discovery of Human Remains in Alaska), and notify the designated representatives of the DOT&PF, the SHPO, the NPS, and NANA Regional Corporation, Inc., the City of Kivalina, the Native Village of Kivalina, and the Native Village of Noatak.

GUIDELINES

Laws and Protocols Pertaining to the Discovery of Human Remains in Alaska

The treatment of human remains following inadvertent discovery is governed by state and federal laws, land status, postmortem interval (time since death), and biological/cultural affiliation. First and foremost, the site of discovered remains should be regarded a potential "crime scene" until a person with appropriate expertise and authority determines otherwise.

State Laws:

Several State laws are applicable to the discovery of human remains in Alaska. The State Medical Examiner (SME) has jurisdiction over all human remains in the state (with rare exceptions, such as military aircraft deaths), regardless of age.

AS 12.65.5 requires immediate notification of a peace officer of the state (police, Village Public Safety Officer, or Alaska State Trooper [AST]) and the State Medical Examiner when death has "been caused by <u>unknown</u> or criminal means, during the commission of a crime, or by suicide, accident, or poisoning."

<u>In this regard, contact the Alaska State Trooper/Missing Persons Bureau first</u>. (See list of contacts on following page.) The AST has interpreted notification procedures as applicable to all remains, including ancient remains.

AS 11.46.482(a)(3), which applies to <u>all</u> lands in Alaska, makes the "intentional and unauthorized destruction or removal of any human remains or the intentional disturbance of a grave" a class C felony.

AS 41.35.200, which applies only to <u>State</u> lands, makes the disturbance of "historic, prehistoric and archeological resources" (including graves, per definition) a class A misdemeanor.

AS 18.50.250, which applies to <u>all</u> lands in Alaska, requires permits for the disinterment, transport, and reinterment of human remains. Guidance and permits are available from the Bureau of Vital Statistics (see attached list of contacts).

Federal Laws:

On Federal lands and Federal trust lands, the unauthorized destruction or removal of <u>archaeological</u> human remains (i.e., more than 100 years old) is a violation of **16 USC 470ee** (Archeological Resources Protection Act). If human remains on federal or federal trust lands are determined to be Native American, their treatment and disposition are also governed by the Native American Graves and Repatriation Act (NAGPRA) of 1990 (**PL 101-601; 25 USC 3001-30013**; 104 Stat. 3048-3058; 43 CFR 10). NAGPRA also applies to Native American human remains from <u>any</u> lands <u>if</u> the remains are curated in any institution that receives federal funds.

<u>General Guidance:</u>

<u>Your first contacts should be the AST/Missing Persons Bureau, the Alaska State Medical Examiner's Office, local law enforcement, the Alaska Office of History and Archaeology, and the landowner.</u>

In many instances, the field archaeologist must make a judgement call regarding the age of the remains, his/her level of confidence in the evaluation, and whether further investigation by a specialist is warranted. While notification under State Law is required, peace officers and the SME generally regard archaeologists competent to make these type determinations and welcome input that may assist with the investigation. With regard to ancient remains (> 100 years old), the SME and AST will generally defer to the opinion of the field archaeologist and require no further criminal investigation. However, the remains and a surrounding buffer area should not be disturbed until appropriate reporting and consultation have occurred.

Dr. Richard VanderHoek, State Archaeologist
Alaska Office of History and Archaeology
550 W. 7th Avenue, Suite 1310
Anchorage, AK 99501
(907) 269-8728 or richard.vanderhoek@alaska.gov

Department of Transportation & Public Facilities
Brett Nelson
DOT&PF Environmental Coordinator
2301 Peger Road
Fairbanks, AK 99701
Phone: (907) 451-2238
Email: brett.nelson@alaska.gov

State Medical Examiner's Office
5455 Dr. Martin Luther King Jr. Ave Q
Anchorage, AK 99507
Reporting Hotline (Death Hotline):
Phone: (907) 334-2356
1-888-332-3273 (Outside Anchorage)
Stephen Hoage, Operations Administrator Phone: (907) 334-2202
Fax: (907) 334-2216
Email: stephen.hoage@alaska.gov
Dr. Gary Zientek, Chief Medical Examiner Phone: (907) 334-2200
Fax: (907) 334-2216
Email: gary.zientek@alaska.gov

State Bureau of Vital Statistics
Heidi Lengdorfer, Chief
5441 Commercial Blvd.
P.O. Box 110675
Juneau, AK 99801
Phone: (907) 465-8643
Email: heidi.lengdorfer@alaska.gov
For questions regarding burial transit permits
Margo Meyer:
Phone: (907) 465-8610
Email: margo.meyer@alaska.gov

State Troopers
Missing Persons Bureau
Phone: (909) 269-5477
Fax: (907) 338-7243
Sgt. Kid Chan
Phone: (907) 269-5058
Email: choong.chan@alaska.gov
Stephanie Johnson
Phone: (907) 269-5497
Email: stephanie.johnson2@alaska.gov
(Please send email to Sgt. Chan w/cc to Stephanie, with relevant information and photos)

DNR Office of History and Archaeology
Judith E. Bittner
State Historic Preservation Officer (SHPO) Phone: (907) 269-8721
Fax: (907) 269-8908
Email: judy.bittner@alaska.gov
Dr. Richard VanderHoek
State Archaeologist/Deputy SHPO
Phone: (907) 329-8728
Fax: (907) 269-8908
Email: richard.vanderhoek@alaska.gov

Native Village of Kivalina
Millie Hawley, President
PO Box 50051
Kivalina, AK 99750
Phone: (907) 645-2153
Email: tribeadmin@kivaliniq.org

City of Kivalina
Austin Swan Sr., Mayor
PO Box 50079
Kivalina, AK 99750
Phone: (907) 645-2137
Email: atchugunnaq@gmail.com

NANA Regional Corporation, Inc.
Jeffrey Nelson, Assistant Director of Lands
909 West 9th Avenue
Anchorage, AK 99501
Phone: (907) 442-3301
Email: Jeffrey.Nelson@nana.com

National Park Service- Alaska Regional Office
Rhea Hood, Archeologist
240 West 5th Avenue
Anchorage, AK 99501
Phone: (907) 644-3460
Email: rhea_hood@nps.gov

Native Village of Noatak
Vernon Adams, Sr., President
PO Box 89
Noatak, AK 99761
Phone: (907) 485-2173
Email: tribaladmin@nautaaq.org

Appendix 2

MEMORANDUM OF UNDERSTANDING
BETWEEN
THE DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
AND
THE UNIVERSITY OF ALASKA MUSEUM OF THE NORTH
FAIRBANKS, ALASKA

THIS MEMORANDUM OF UNDERSTANDING (Agreement) is hereby entered into by and between the Alaska Department of Transportation and Public Facilities (DOT&PF) Statewide Environmental Office, representing the three DOT&PF regions (i.e., Central, Northern, and Southeast), and the University of Alaska Museum of the North, Fairbanks, Alaska, herein referred to as the Museum.

WHEREAS, the purpose of this Agreement is to provide the framework for the effective museum curation and storage of cultural material collected or excavated during the development of DOT&PF sponsored projects in accordance with the stipulations outlined below.

WHEREAS, the DOT&PF administers federally funded projects that are subject to Section 106 of the National Historic Preservation Act of 1966, as amended (36 CFR 800 Protection of Historic Properties) and State funded projects subject to the Alaska Historic Preservation Act of 1970 (specifically AS 41.35.070 Preservation of Historic, Prehistoric, and Archaeological Resources Threatened by Public Construction); and

WHEREAS, the development of said projects can result in certain cultural material recovered during archaeological survey, excavation, and data recovery, and the creation of associated field records (herein called Collections); and

WHEREAS, DOT&PF as the sponsor for federal and State funded projects has the responsibility under federal and State law to ensure proper care of Collections; and

WHEREAS, the Museum is an accredited institution that has requisite facilities that meet and operate in accordance with the federal standards published in 36 CFR 79 to provide physical security and a controlled environment for Collections, has an established Collection Management Policy that provides procedures and requirements to curate archaeological collections for future research, exhibit, and instruction, and has qualified Museum professionals with the expertise for the curation of Collections; and

WHEREAS, the Parties hereto recognize the mutual benefits to be derived by having Collections from DOT&PF suitably housed and maintained by the Museum; and

WHEREAS, the Parties hereto recognize the continued State legal title to Collections from lands owned or controlled by the State (pursuant to AS 41.35.020 and 11 AAC 16.020) and the responsibility to ensure that the Collections are suitably managed and preserved for the public good; and

WHEREAS, the Parties hereto recognize that DOT&PF sponsored surveys and archaeological excavations on properties not owned or controlled by the State require a separate Right-of-Entry agreement with the land owner or managing entity; and

WHEREAS, Right-of Entry agreements will identify the party holding legal title to the cultural materials, and contain terms and conditions to ensure proper care and curation of any recovered Collections; and

NOW THEREFORE, the DOT&PF and the Museum as signatories to this Agreement mutually agree to promote a unified approach to preservation and protection of cultural materials in accordance with the following stipulations until this Agreement expires or is terminated.

STIPULATIONS

I. RESPONSIBILITIES

A. The Museum
  1. In accordance with the Museum's Collections Management Policy, the Museum agrees to act as repository for appropriately accessioned and cataloged cultural material, and to provide proper space, facilities and personnel for curation, storage and maintenance of the materials.
  2. Collections made on State lands remain the property of the State, while the Right-of-Entry agreements will contain the terms and conditions of Collections from properties not owned or controlled by the State. The Museum shall not transfer or discard a State Collection without written permission of the State. The Museum may not sell any State Collection.
  3. The Museum assumes no responsibility for cultural specimens from DOT&PF sponsored projects that have not been accessioned and cataloged according to the Museum's Curation Guidelines accession system and that have not been physically deposited in the Museum. The Museum reserves the right to refuse to accept a Collection.

B. The DOT&PF
  1. In accordance with the Museum's Curation Guidelines, the DOT&PF will be responsible to coordinate with the Museum for the proper accessioning and cataloging and processing for long-term museum storage of Collections from DOT&PF sponsored projects that are to be deposited with the Museum. This will be accomplished by a qualified consultant(s) under contract to the DOT&PF.
  2. All associated records will be deposited at the Museum at the same time as the Collection(s). These records will include (but not necessarily be limited to) catalog ledgers and copies of all reports, papers, field notes, photographs, profiles, etc. In accordance with applicable federal and State laws, the Museum will restrict access to information about the location of heritage resource sites from which DOT&PF Collections are obtained.

II. ADMINISTRATION

A. Duration of Agreement: The Agreement shall remain in effect for a period of ten (10) years after the date it takes effect. The Museum and the DOT&PF will review this Agreement in five (5) years and make any necessary adjustments unless it is terminated prior to that time. If there are no objections from the parties, the term of the Agreement will automatically be extended for an additional ten (10) years. The procedures, terms and conditions of this Agreement may be modified at any time by joint written consent of the parties.

B. Fees: The DOT&PF and the Museum recognize that fees will be required for the DOT&PF sponsored Collections when they are transferred for deposition and organization at the Museum. The fees for these services will be in accordance with the Museum's Curation Guidelines.

C. Amendment: Parties to this Agreement may at any time propose amendments, whereupon the parties will consult to consider such amendment. This Agreement may be amended only upon written concurrence of the signatory parties. Amendments go into effect on the date of the last signature.

D. Termination: This Agreement becomes effective when final signature is received. A party may terminate this Agreement at any time by giving written notice to the other parties not less than one hundred twenty (120) days in advance of the effective date of termination. If any party proposes termination of this Agreement, the party proposing termination will consult with the other parties to seek alternatives to termination. Should such consultation result in an agreement on an alternative to termination, the parties will proceed in accordance with that agreement.

THE PARTIES HERETO have executed this Memorandum of Understanding.

UNIVERSITY OF ALASKA MUSEUM, FAIRBANKS

By: ______________________________ Date: 1/27/14
Josh Reuther, Ph.D., Curator of Archaeology

By: ______________________________ Date: 1/27/14
Aldona Jonaitis, Ph.D., Museum Director

By: ______________________________ Date: 1/31/14
Rosemary Madnick, Grant and Contract Services Director

ALASKA DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES

By: ______________________________ Date: 12/12/13
Roger Healy, P.E., Chief Engineer

THE STATE of ALASKA

GOVERNOR BILL WALKER

Department of Transportation and Public Facilities

Northern Region
Design and Engineering Services
Preliminary Design and Environmental Section

2301 Peger Road
Fairbanks, Alaska 99709-5316
Main: 907-451-2237
Toll free: 800-451-2363
Fax: 907-451-5126

In Reply Refer To:
Kivalina Evacuation and School Site Access Road
Federal/State Project No. 0002384/NFHWY00162
Addendum: NOA-00325 & NOA-00327

December 29, 2017

Millie Hawley, President
Native Village of Kivalina
PO Box 50051
Kivalina, AK 99750

Dear Ms. Hawley:

The Alaska Department of Transportation and Public Facilities (DOT&PF) has assumed the responsibilities of the Federal Highway Administration (FHWA) under 23 U.S.C. 327, and is proposing to construct a safe, reliable, all-season evacuation road between the community of Kivalina and a site on Kisimigiuqtuq Hill (K-Hill) (Figure 1). The Kivalina Evacuation and School Site Access Road (the Project) location is legally described in Table 1 below:

Table 1: Project Location

Section(s)	Township	Range	Meridian	USGS Quad
1, 2, 10, 11, 15, 16, 21	027N	026W	Kateel River	Noatak C-5
19. 20, 29, 30, 31	028N	026W	Kateel River	Noatak C-5
25, 26, 35, 36	029N	025W	Kateel River	Noatak C-5

The environmental review, consultation, and other actions required by applicable Federal environmental laws for this project are being, or have been, carried out by DOT&PF pursuant to 23 U.S.C. 327 and a Memorandum of Understanding dated November 3, 2017, and executed by FHWA and DOT&PF.

The proposed project origin is at the City of Kivalina, located on the southeast tip of the barrier island located between the Chukchi Sea (Arctic Ocean) and Kivalina Lagoon (Figure 1). The project terminus is located on the mainland across the Kivalina Lagoon approximately six miles northeast at a community selected evacuation site on K-Hill.

Background

On September 19, 2017 DOT&PF made a finding of No Historic Properties Adversely Affected (Findings Letter) for the proposed project. The National Park Service (NPS) responded on October 6, 2017 (Attachment 1); their response included the detail that two Alaska Heritage Resources Survey (AHRS) sites, NOA-00325 and NOA-00327, appear to be within the proposed project's Area of Potential Effect (APE) but that they would not be affected by the project's activities. These two sites did not appear in the Findings Letter or in the SHPO concurrence to those Findings on October 9, 2017 (Attachment 2). This informational update addresses those two sites. DOT&PF's original finding of effect has not changed.

NOA-00325 and NOA-00327

Both NOA-00325 and NOA-00327 were assigned AHRS numbers in the 2005 *Cultural Resources Survey of Proposed Sewage and Water Systems Improvements in Kivalina, Alaska* report by Northern Land Use Research, Inc.

Table 2. Site Details from AHRS Database

Site Number	Site Name	Site Description	Determination of Eligibility?
NOA-00325	KIV-HR-05	Informant reported to cultural resource investigators in 2005 that human remains discovered during construction of house in 1990s. No information regarding their handling.	No Determination of Eligibility
NOA-00327	NOA-00327	Local informant reported to other cultural resource investigators in 2004 that artifacts had been found near location when they were a child.	No Determination of Eligibility

The site numbers were assigned based on information from local residents who recalled that in one location (NOA-00325) human remains had been found during the construction of a house foundation in the 1970s. It was not determined at the time of the 2005 interview if the remains were left in place or re-interred in the current cemetery. Another local resident noted that at the other location (NOA-00327) artifacts had been found and he played with them when he was a child. Based on these interviews, AHRS numbers were assigned for the general locations. As of 2017, no extant physical materials have been identified in relation to either of these two sites.

This letter is being sent to acknowledge that the AHRS-reported locations for NOA-00325 and NOA-00327 are within the APE for this project. Their omission from the Findings Letter (September 19, 2017) was a clerical error and DOT&PF does not anticipate ground disturbing activities in the reported site locations that would require a re-evaluation of the finding of effect for this project. The APE for the project was drawn broadly to evaluate potential visual effects as well as any ground disturbing effects the project may have on the surrounding land and community. The AHRS-reported locations for these two sites are on the periphery of the APE where visual effects were the greatest concern due to the presence of standing structures. No ground-disturbing activity is planned for the portions of the APE containing these sites.

Section 4(f)
As stated in in September 19, 2017 Findings Letter it is the DOT&PF's intent to make a Section 4(f) *de minimis* impact finding for this project and NOA-00042, the Cape Krusenstern National Historic Landmark. Section 4(f) findings have not changed with the inclusion of NOA-00325 and NOA-00327 within the project APE as there will be no use of these sites.

Inadvertent Discovery Plan
Additionally, please find attached the finalized Inadvertent Discovery Plan (Attachment 3), as stipulated and required, for this project as presented in the DOT&PF Findings Letters of September 19, 2017 and a full set of the figures for the entire project APE (Figures 1-8).

Consultation Summary
On July 10, 2017 a meeting among Agency cultural resource staff was held in Anchorage. The DOT&PF Northern Region Cultural Resource Specialist-Archaeologist PQI, Office of History and Archaeology staff, the Alaska SHPO, and the NPS Archaeologist for the NRHP Program, Alaska Region were in attendance. Initiation of Consultation letters were sent out to the identified consulting parties on August 7, 2017. A response was received from the SHPO office on August 22, 2017 stating there was no objection to the proposed Study Area or level of identification. No other responses to the Section 106 Initiation of Consultation letters were received. A response to the September 19, 2017 Findings Letter was received from the NPS on October 6, 2017 and SHPO concurrence with the DOT&PF findings was received on October 9, 2017. No responses were received from the other consulting parties.

In addition to the Alaska State Historic Preservation Officer (SHPO), other parties being contacted with this informational update and Inadvertent Discovery Plan for this project are: the National Park Service (NPS); the Native Village of Kivalina; the City of Kivalina; the Native Village of Noatak; NANA Regional Corporation; the Northwest Arctic Borough; NPS-Western Arctic National Parklands; and the Bureau of Indian Affairs (BIA).

Please direct your questions or comments to me at the address above, by telephone at 907-451-5293, or by e-mail at *thomas.gamza@alaska.gov*.

Sincerely,

Thomas A. Gamza
Cultural Resource Specialist-Archaeologist (PQI)
State of Alaska DOT&PF, Northern Region

Figure 1: Location and Vicinity Map
Figures 2-7: Project APE Enlarged Sections
Figure 8: Locations of NOA-00325 and NOA-00327 in Western Terminus Enlarged Section

Attachment 1: National Park Service response to the DOT&PF Findings October 6, 2017
Attachment 2: SHPO concurrence with No Historic Properties Adversely Affected Determination October 9, 2017
Attachment 3: Final Inadvertent Discovery Plan – Kivalina Evacuation and School Site Access Road

Electronic cc w/ enclosures:
Jonathan Hutchinson, P.E., DOT&PF Northern Region, Project Manager
Paul Karczmarczyk, DOT&PF Northern Region, Environmental Impact Analyst
Brett Nelson, DOT&PF Northern Region, Regional Environmental Manager
Kathy Price, DOT&PF, Statewide Cultural Resources Manager
Amy Sumner, DOT&PF Statewide Environmental NEPA Manager

THE STATE of ALASKA

GOVERNOR BILL WALKER

Department of Transportation and Public Facilities

Northern Region
Design and Engineering Services
Preliminary Design and Environmental Section

2301 Peger Road
Fairbanks, Alaska 99709-5316
Main: 907-451-2237
Toll free: 800-451-2363
Fax: 907-451-5126

In Reply Refer To:
Kivalina Evacuation and School Site Access Road
Federal/State Project No. 0002384/NFHWY00162
Addendum: NOA-00325 & NOA-00327

December 29, 2017

Austin Swan Sr., Mayor
City of Kivalina
PO Box 50079
Kivalina, AK 99750

Dear Mayor Swan:

The Alaska Department of Transportation and Public Facilities (DOT&PF) has assumed the responsibilities of the Federal Highway Administration (FHWA) under 23 U.S.C. 327, and is proposing to construct a safe, reliable, all-season evacuation road between the community of Kivalina and a site on Kisimigiuqtuq Hill (K-Hill) (Figure 1). The Kivalina Evacuation and School Site Access Road (the Project) location is legally described in Table 1 below:

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25, 26, 35, 36	029N	025W	Kateel River	Noatak C-5

The environmental review, consultation, and other actions required by applicable Federal environmental laws for this project are being, or have been, carried out by DOT&PF pursuant to 23 U.S.C. 327 and a Memorandum of Understanding dated November 3, 2017, and executed by FHWA and DOT&PF.

The proposed project origin is at the City of Kivalina, located on the southeast tip of the barrier island located between the Chukchi Sea (Arctic Ocean) and Kivalina Lagoon (Figure 1). The project terminus is located on the mainland across the Kivalina Lagoon approximately six miles northeast at a community selected evacuation site on K-Hill.

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NOA-00325 and NOA-00327

Both NOA-00325 and NOA-00327 were assigned AHRS numbers in the 2005 *Cultural Resources Survey of Proposed Sewage and Water Systems Improvements in Kivalina, Alaska* report by Northern Land Use Research, Inc.

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The site numbers were assigned based on information from local residents who recalled that in one location (NOA-00325) human remains had been found during the construction of a house foundation in the 1970s. It was not determined at the time of the 2005 interview if the remains were left in place or re-interred in the current cemetery. Another local resident noted that at the other location (NOA-00327) artifacts had been found and he played with them when he was a child. Based on these interviews, AHRS numbers were assigned for the general locations. As of 2017, no extant physical materials have been identified in relation to either of these two sites.

This letter is being sent to acknowledge that the AHRS-reported locations for NOA-00325 and NOA-00327 are within the APE for this project. Their omission from the Findings Letter (September 19, 2017) was a clerical error and DOT&PF does not anticipate ground disturbing activities in the reported site locations that would require a re-evaluation of the finding of effect for this project. The APE for the project was drawn broadly to evaluate potential visual effects as well as any ground disturbing effects the project may have on the surrounding land and community. The AHRS-reported locations for these two sites are on the periphery of the APE where visual effects were the greatest concern due to the presence of standing structures. No ground-disturbing activity is planned for the portions of the APE containing these sites.

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Please direct your questions or comments to me at the address above, by telephone at 907-451-5293, or by e-mail at *thomas.gamza@alaska.gov*.

Sincerely,

Thomas A. Gamza
Cultural Resource Specialist-Archaeologist (PQI)
State of Alaska DOT&PF, Northern Region

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Jonathan Hutchinson, P.E., DOT&PF Northern Region, Project Manager
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Brett Nelson, DOT&PF Northern Region, Regional Environmental Manager
Kathy Price, DOT&PF, Statewide Cultural Resources Manager
Amy Sumner, DOT&PF Statewide Environmental NEPA Manager

Department of Transportation and Public Facilities

THE STATE of ALASKA

GOVERNOR BILL WALKER

Northern Region
Design and Engineering Services
Preliminary Design and Environmental Section

2301 Peger Road
Fairbanks, Alaska 99709-5316
Main: 907-451-2237
Toll free: 800-451-2363
Fax: 907-451-5126

In Reply Refer To:
Kivalina Evacuation and School Site Access Road
Federal/State Project No. 0002384/NFHWY00162
Addendum: NOA-00325 & NOA-00327

December 29, 2017

Vernon Adams, Sr., President
Native Village of Noatak
PO Box 89
Noatak, AK 99761

Dear Mr. Adams:

The Alaska Department of Transportation and Public Facilities (DOT&PF) has assumed the responsibilities of the Federal Highway Administration (FHWA) under 23 U.S.C. 327, and is proposing to construct a safe, reliable, all-season evacuation road between the community of Kivalina and a site on Kisimigiuqtuq Hill (K-Hill) (Figure 1). The Kivalina Evacuation and School Site Access Road (the Project) location is legally described in Table 1 below:

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Additionally, please find attached the finalized Inadvertent Discovery Plan (Attachment 3), as stipulated and required, for this project as presented in the DOT&PF Findings Letters of September 19, 2017 and a full set of the figures for the entire project APE (Figures 1-8).

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Please direct your questions or comments to me at the address above, by telephone at 907-451-5293, or by e-mail at *thomas.gamza@alaska.gov*.

Sincerely,

Thomas A. Gamza
Cultural Resource Specialist-Archaeologist (PQI)
State of Alaska DOT&PF, Northern Region

Figure 1: Location and Vicinity Map
Figures 2-7: Project APE Enlarged Sections
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THE STATE
of ALASKA
GOVERNOR BILL WALKER

Department of Transportation and Public Facilities

Northern Region
Design and Engineering Services
Preliminary Design and Environmental Section

2301 Peger Road
Fairbanks, Alaska 99709-5316
Main: 907-451-2237
Toll free: 800-451-2363
Fax: 907-451-5126

In Reply Refer To:
Kivalina Evacuation and School Site Access Road
Federal/State Project No. 0002384/NFHWY00162
Addendum: NOA-00325 & NOA-00327

December 29, 2017

Bert Frost, Regional Director
Alaska Regional Office
National Park Service
240 West 5th Avenue
Anchorage, AK 99501

Dear Mr. Frost:

The Alaska Department of Transportation and Public Facilities (DOT&PF) has assumed the responsibilities of the Federal Highway Administration (FHWA) under 23 U.S.C. 327, and is proposing to construct a safe, reliable, all-season evacuation road between the community of Kivalina and a site on Kisimigiuqtuq Hill (K-Hill) (Figure 1). The Kivalina Evacuation and School Site Access Road (the Project) location is legally described in Table 1 below:

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The environmental review, consultation, and other actions required by applicable Federal environmental laws for this project are being, or have been, carried out by DOT&PF pursuant to 23 U.S.C. 327 and a Memorandum of Understanding dated November 3, 2017, and executed by FHWA and DOT&PF.

The proposed project origin is at the City of Kivalina, located on the southeast tip of the barrier island located between the Chukchi Sea (Arctic Ocean) and Kivalina Lagoon (Figure 1). The project terminus is located on the mainland across the Kivalina Lagoon approximately six miles northeast at a community selected evacuation site on K-Hill.

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Both NOA-00325 and NOA-00327 were assigned AHRS numbers in the 2005 *Cultural Resources Survey of Proposed Sewage and Water Systems Improvements in Kivalina, Alaska* report by Northern Land Use Research, Inc.

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Please direct your questions or comments to me at the address above, by telephone at 907-451-5293, or by e-mail at thomas.gamza@alaska.gov.

Sincerely,

Thomas A. Gamza
Cultural Resource Specialist-Archaeologist (PQI)
State of Alaska DOT&PF, Northern Region

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Electronic cc w/ enclosures:
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THE STATE of ALASKA
GOVERNOR BILL WALKER

Department of Transportation and Public Facilities

Northern Region
Design and Engineering Services
Preliminary Design and Environmental Section

2301 Peger Road
Fairbanks, Alaska 99709-5316
Main: 907-451-2237
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In Reply Refer To:
Kivalina Evacuation and School Site Access Road
Federal/State Project No. 0002384/NFHWY00162
Addendum: NOA-00325 & NOA-00327

December 29, 2017

Rhea Hood, Archeologist
Alaska Regional Office
National Park Service
240 West 5th Avenue
Anchorage, AK 99501

Dear Ms. Hood:

The Alaska Department of Transportation and Public Facilities (DOT&PF) has assumed the responsibilities of the Federal Highway Administration (FHWA) under 23 U.S.C. 327, and is proposing to construct a safe, reliable, all-season evacuation road between the community of Kivalina and a site on Kisimigiuqtuq Hill (K-Hill) (Figure 1). The Kivalina Evacuation and School Site Access Road (the Project) location is legally described in Table 1 below:

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Department of Transportation and Public Facilities

THE STATE of ALASKA

GOVERNOR BILL WALKER

Northern Region
Design and Engineering Services
Preliminary Design and Environmental Section

2301 Peger Road
Fairbanks, Alaska 99709-5316
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Fax: 907-451-5126

In Reply Refer To:
Kivalina Evacuation and School Site Access Road
Federal/State Project No. 0002384/NFHWY00162
Addendum: NOA-00325 & NOA-00327

December 29, 2017

Wayne Westlake, President & CEO
NANA Regional Corporation, Inc.
909 West 9th Avenue
Anchorage, AK 99501

Dear Mr. Westlake:

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In Reply Refer To:
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Addendum: NOA-00325 & NOA-00327

December 29, 2017

John Lincoln
Vice President of Lands
NANA Regional Corporation, Inc.
909 West 9th Avenue
Anchorage, AK 99501

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This letter is being sent to acknowledge that the AHRS-reported locations for NOA-00325 and NOA-00327 are within the APE for this project. Their omission from the Findings Letter (September 19, 2017) was a clerical error and DOT&PF does not anticipate ground disturbing activities in the reported site locations that would require a re-evaluation of the finding of effect for this project. The APE for the project was drawn broadly to evaluate potential visual effects as well as any ground disturbing effects the project may have on the surrounding land and community. The AHRS-reported locations for these two sites are on the periphery of the APE where visual effects were the greatest concern due to the presence of standing structures. No ground-disturbing activity is planned for the portions of the APE containing these sites.

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Additionally, please find attached the finalized Inadvertent Discovery Plan (Attachment 3), as stipulated and required, for this project as presented in the DOT&PF Findings Letters of September 19, 2017 and a full set of the figures for the entire project APE (Figures 1-8).

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Please direct your questions or comments to me at the address above, by telephone at 907-451-5293, or by e-mail at *thomas.gamza@alaska.gov*.

Sincerely,

Thomas A. Gamza
Cultural Resource Specialist-Archaeologist (PQI)
State of Alaska DOT&PF, Northern Region

Figure 1: Location and Vicinity Map
Figures 2-7: Project APE Enlarged Sections
Figure 8: Locations of NOA-00325 and NOA-00327 in Western Terminus Enlarged Section

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Electronic cc w/ enclosures:
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THE STATE of ALASKA
GOVERNOR BILL WALKER

Department of Transportation and Public Facilities

Northern Region
Design and Engineering Services
Preliminary Design and Environmental Section

2301 Peger Road
Fairbanks, Alaska 99709-5316
Main: 907-451-2237
Toll free: 800-451-2363
Fax: 907-451-5126

In Reply Refer To:
Kivalina Evacuation and School Site Access Road
Federal/State Project No. 0002384/NFHWY00162
Addendum: NOA-00325 & NOA-00327

December 29, 2017

Maija Lukin, Superintendent
NPS-Western Arctic National Parklands
PO Box 1029
Kotzebue, AK 99752

Dear Ms. Lukin:

The Alaska Department of Transportation and Public Facilities (DOT&PF) has assumed the responsibilities of the Federal Highway Administration (FHWA) under 23 U.S.C. 327, and is proposing to construct a safe, reliable, all-season evacuation road between the community of Kivalina and a site on Kisimigiuqtuq Hill (K-Hill) (Figure 1). The Kivalina Evacuation and School Site Access Road (the Project) location is legally described in Table 1 below:

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Section(s)	Township	Range	Meridian	USGS Quad
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The environmental review, consultation, and other actions required by applicable Federal environmental laws for this project are being, or have been, carried out by DOT&PF pursuant to 23 U.S.C. 327 and a Memorandum of Understanding dated November 3, 2017, and executed by FHWA and DOT&PF.

The proposed project origin is at the City of Kivalina, located on the southeast tip of the barrier island located between the Chukchi Sea (Arctic Ocean) and Kivalina Lagoon (Figure 1). The project terminus is located on the mainland across the Kivalina Lagoon approximately six miles northeast at a community selected evacuation site on K-Hill.

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NOA-00325 and NOA-00327

Both NOA-00325 and NOA-00327 were assigned AHRS numbers in the 2005 *Cultural Resources Survey of Proposed Sewage and Water Systems Improvements in Kivalina, Alaska* report by Northern Land Use Research, Inc.

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Please direct your questions or comments to me at the address above, by telephone at 907-451-5293, or by e-mail at *thomas.gamza@alaska.gov*.

Sincerely,

Thomas A. Gamza
Cultural Resource Specialist-Archaeologist (PQI)
State of Alaska DOT&PF, Northern Region

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Department of Transportation and Public Facilities

THE STATE of ALASKA

GOVERNOR BILL WALKER

Northern Region
Design and Engineering Services
Preliminary Design and Environmental Section

2301 Peger Road
Fairbanks, Alaska 99709-5316
Main: 907-451-2237
Toll free: 800-451-2363
Fax: 907-451-5126

In Reply Refer To:
Kivalina Evacuation and School Site Access Road
Federal/State Project No. 0002384/NFHWY00162
Addendum: NOA-00325 & NOA-00327

December 29, 2017

Clement Richards, Sr., Borough Mayor
Northwest Arctic Borough
P.O. Box 1110
Kotzebue, AK 99752

Dear Mayor Richards:

The Alaska Department of Transportation and Public Facilities (DOT&PF) has assumed the responsibilities of the Federal Highway Administration (FHWA) under 23 U.S.C. 327, and is proposing to construct a safe, reliable, all-season evacuation road between the community of Kivalina and a site on Kisimigiuqtuq Hill (K-Hill) (Figure 1). The Kivalina Evacuation and School Site Access Road (the Project) location is legally described in Table 1 below:

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Department of Transportation and Public Facilities

THE STATE of ALASKA

GOVERNOR BILL WALKER

Northern Region
Design and Engineering Services
Preliminary Design and Environmental Section

2301 Peger Road
Fairbanks, Alaska 99709-5316
Main: 907-451-2237
Toll free: 800-451-2363
Fax: 907-451-5126

In Reply Refer To:
Kivalina Evacuation and School Site Access Road
Federal/State Project No. 0002384/NFHWY00162
Addendum: NOA-00325 & NOA-00327

December 29, 2017

Lynn Polacca, Regional Director
Bureau of Indian Affairs
3601C Street
Anchorage, AK 99503-5947

Dear Ms. Polacca:

The Alaska Department of Transportation and Public Facilities (DOT&PF) has assumed the responsibilities of the Federal Highway Administration (FHWA) under 23 U.S.C. 327, and is proposing to construct a safe, reliable, all-season evacuation road between the community of Kivalina and a site on Kisimigiuqtuq Hill (K-Hill) (Figure 1). The Kivalina Evacuation and School Site Access Road (the Project) location is legally described in Table 1 below:

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In Reply Refer To:
Kivalina Evacuation and School Site Access Road
Federal/State Project No. 0002384/NFHWY00162
Addendum: NOA-00325 & NOA-00327

December 29, 2017

Sean Mack
Acting Regional Archeologist
Bureau of Indian Affairs
3601C Street, Suite 1100
Anchorage, AK 99503-5947

Dear Mr. Mack:

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NOA-00327	NOA-00327	Local informant reported to other cultural resource investigators in 2004 that artifacts had been found near location when they were a child.	No Determination of Eligibility

The site numbers were assigned based on information from local residents who recalled that in one location (NOA-00325) human remains had been found during the construction of a house foundation in the 1970s. It was not determined at the time of the 2005 interview if the remains were left in place or re-interred in the current cemetery. Another local resident noted that at the other location (NOA-00327) artifacts had been found and he played with them when he was a child. Based on these interviews, AHRS numbers were assigned for the general locations. As of 2017, no extant physical materials have been identified in relation to either of these two sites.

This letter is being sent to acknowledge that the AHRS-reported locations for NOA-00325 and NOA-00327 are within the APE for this project. Their omission from the Findings Letter (September 19, 2017) was a clerical error and DOT&PF does not anticipate ground disturbing activities in the reported site locations that would require a re-evaluation of the finding of effect for this project. The APE for the project was drawn broadly to evaluate potential visual effects as well as any ground disturbing effects the project may have on the surrounding land and community. The AHRS-reported locations for these two sites are on the periphery of the APE where visual effects were the greatest concern due to the presence of standing structures. No ground-disturbing activity is planned for the portions of the APE containing these sites.

Section 4(f)
As stated in in September 19, 2017 Findings Letter it is the DOT&PF's intent to make a Section 4(f) *de minimis* impact finding for this project and NOA-00042, the Cape Krusenstern National Historic Landmark. Section 4(f) findings have not changed with the inclusion of NOA-00325 and NOA-00327 within the project APE as there will be no use of these sites.

Inadvertent Discovery Plan
Additionally, please find attached the finalized Inadvertent Discovery Plan (Attachment 3), as stipulated and required, for this project as presented in the DOT&PF Findings Letters of September 19, 2017 and a full set of the figures for the entire project APE (Figures 1-8).

Consultation Summary
On July 10, 2017 a meeting among Agency cultural resource staff was held in Anchorage. The DOT&PF Northern Region Cultural Resource Specialist-Archaeologist PQI, Office of History and Archaeology staff, the Alaska SHPO, and the NPS Archaeologist for the NRHP Program, Alaska Region were in attendance. Initiation of Consultation letters were sent out to the identified consulting parties on August 7, 2017. A response was received from the SHPO office on August 22, 2017 stating there was no objection to the proposed Study Area or level of identification. No other responses to the Section 106 Initiation of Consultation letters were received. A response to the September 19, 2017 Findings Letter was received from the NPS on October 6, 2017 and SHPO concurrence with the DOT&PF findings was received on October 9, 2017. No responses were received from the other consulting parties.

In addition to the Alaska State Historic Preservation Officer (SHPO), other parties being contacted with this informational update and Inadvertent Discovery Plan for this project are: the National Park Service (NPS); the Native Village of Kivalina; the City of Kivalina; the Native Village of Noatak; NANA Regional Corporation; the Northwest Arctic Borough; NPS-Western Arctic National Parklands; and the Bureau of Indian Affairs (BIA).

Please direct your questions or comments to me at the address above, by telephone at 907-451-5293, or by e-mail at *thomas.gamza@alaska.gov*.

Sincerely,

Thomas A. Gamza
Cultural Resource Specialist-Archaeologist (PQI)
State of Alaska DOT&PF, Northern Region

Figure 1: Location and Vicinity Map
Figures 2-7: Project APE Enlarged Sections
Figure 8: Locations of NOA-00325 and NOA-00327 in Western Terminus Enlarged Section

Attachment 1: National Park Service response to the DOT&PF Findings October 6, 2017
Attachment 2: SHPO concurrence with No Historic Properties Adversely Affected Determination October 9, 2017
Attachment 3: Final Inadvertent Discovery Plan – Kivalina Evacuation and School Site Access Road

Electronic cc w/ enclosures:
Jonathan Hutchinson, P.E., DOT&PF Northern Region, Project Manager
Paul Karczmarczyk, DOT&PF Northern Region, Environmental Impact Analyst
Brett Nelson, DOT&PF Northern Region, Regional Environmental Manager
Kathy Price, DOT&PF, Statewide Cultural Resources Manager
Amy Sumner, DOT&PF Statewide Environmental NEPA Manager

Kivalina Lagoon Bridge Permit Application

Project Number: 0002384/NFHWY00162
July 20, 2018

The environmental review, consultation, and other actions required by applicable federal environmental laws for this project are being, or have been, carried out by DOT&PF pursuant to 23 U.S.C. 327 and a Memorandum of Understanding dated November 3, 2017, and executed by FHWA and DOT&PF.

Attachment 4. Kivalina Evacuation and School Site Access Road EA Appendices G - K

APPENDIX G

SECTION 7 CONSULTATION

Page

Department of Transportation and Public Facilities

THE STATE of ALASKA

GOVERNOR BILL WALKER

Northern Region
Design and Engineering Services

2301 Peger Road
Fairbanks, Alaska 99709-5316
Main: 907-451-2237
Toll free: 800-451-2363
Fax: 907-451-5126

September 18, 2017

Re: Kivalina Evacuation and School Site Access Road
Project Number: 0002384/NFHWY00162
Subject: Section 7 Consultation – ESA

Dear Kaithryn Ott,

The Alaska Department of Transportation and Public Facilities (DOT&PF) and the Federal Highway Administration (FHWA), in partnership with the Northwest Arctic Borough (NAB), Native Village of Kivalina, and the City of Kivalina, are proposing to improve community safety in Kivalina, Alaska by constructing an evacuation road between Kivalina Island and a site on Kisimigiuqtuq Hill (K-Hill).

The proposed project origin is at the City of Kivalina, located on the southeast tip of the barrier island located between the Chukchi Sea (Arctic Ocean) and Kivalina Lagoon (Figure 1). The project terminus is located on the mainland across the Kivalina lagoon, approximately six-miles northeast at a community selected evacuation site on K-Hill. The Study Area encompasses the Kivalina barrier island, the southern portion of Kivalina Lagoon, and the lower Wulik and Kivalina River drainages.

The Kivalina Evacuation and School Site Access Road project would provide Kivalina residents a safe and reliable evacuation route in the event of a catastrophic storm or ocean surge, allowing evacuees to temporarily mobilize to safe refuge at an assembly site on K-Hill. This site is also identified by the NAB School District, and approved by the community, as a preferred new location for the community school. If constructed, the school could augment the undeveloped evacuation site by serving as a full-service community emergency shelter with all-season support capabilities. The Proposed Action would construct a safe, reliable, all-season evacuation road between the community of Kivalina and K-Hill. One lagoon crossing and two different route alternatives on the mainland are being considered, but common to all, are the following actions:

- **Establishment of a safe, reliable, all-season Kivalina Lagoon crossing.** All alternatives include construction of a causeway across the lagoon that variously incorporate different configurations of hydrological openings including bridge(s), culvert(s), or both.

- **Construction of an all-season gravel access road connecting the Kivalina Lagoon crossing to the K-Hill evacuation site.** The road would be designed to accommodate a wide variety of motorized vehicles over a two-way road with shoulders, multiple turnouts, and side slopes that may include guard rails and other safety features where determined to be necessary and prudent.
- **Development of up to four material source**s including the K-Hill Site, Wulik River Source 1, Relic Channel Source 1, and Relic Channel Source 2. These material sources are anticipated to be suitable local sources of select construction material to supply the project. Selection and development of viable material sources and haul routes are considered as part of the Proposed Action.

An overview of the proposed project components and overlapping critical habitat is provided in Figure 1. To identify any potential residual project effects and not jeopardize the continued existence of a federally listed species or destruction or adverse modification of designated critical habitat, we are consulting with the U.S. Fish and Wildlife Service to comply with requirements mandated in Section 7 of the *Endangered Species Act* (ESA). Given the location of the project, project activities, and review of the species information available, it is anticipated that no adverse effects on any ESA-listed species or designated critical habitat would occur.

The proposed Study Area overlaps with critical habitat for polar bear (*Ursus maritimus*; 75 FR 76086 76137) and with migratory ranges for Spectacled Eider (*Somateria fischeri*) and Steller's Eider (*Polysticta stelleri*); however, it does not overlap with designated critical habitat for either eider species (USFWS, 2002, 2010). A description of occurrence and potential project effects to polar bear, Spectacled Eider, and Steller's Eider is provided below.

Polar Bear

Occurrence of Polar Bear and its Critical Habitat

Polar bear distribution is circumpolar, varying with sea-ice extents and prey availability (Schliebe et al., 2006). Two polar bear populations occur in Alaska: the Beaufort Sea population and the Chukchi Sea population (Schliebe et al., 2006). The Chukchi Sea population typically moves into the southern Chukchi Sea with the pack ice in fall and winter and migrates north with the pack ice in spring and summer (Garner et al. 1990). Traditional knowledge indicates that polar bear tracks are found along the coast and on barrier islands in late fall and winter in the south-eastern Chukchi Sea, when bears first arrive in the region (Voorhees et al. 2014). Tagging and movement data have shown polar bears utilize the sea ice west of Kivalina in spring (Garner et al., 1990; Rode et al., 2014). Although polar bears in the Chukchi Sea are typically closely associated with sea ice, recent increases in terrestrial land use (primarily on Wrangle Island rather than the Alaskan mainland coast) have been detected (Rode et al., 2015). Habitat selection modeling predicts a lower probability for habitat selection by polar bears along the coast near Kivalina, compared to offshore regions in the Chukchi Sea in winter and spring (Wilson et al., 2016). Polar bears have been observed near Kivalina in winter; during interviews on seals, walrus, and whales a community member mentioned possible polar bear dens in the hills behind Kivalina, although the specific locations were not provided (Huntington et al., 2016). Region-wide subsistence interviews and data collection highlight the existence of polar bear dens north of Kivalina near Cape Thompson (Satterthwaite-Phillips et al., 2016).

Polar bear feeding and barrier island critical habitats overlap with the Study Area, with barrier island critical habitat identified for Kivalina and feeding critical habitat in the Kivalina area (Figure 1; 75 FR 76086 76137).

Project Effects on Polar Bear and its Critical Habitat

Project effects are not anticipated to negatively impact polar bears or their barrier island or feeding critical habitat. Construction and operation of the lagoon crossing has overlap with barrier island and feeding critical habitat, but this is already within a disturbed area. Current disturbance in the region include community presence and associated traffic, hunting activities, and presence of low flying aircraft. Construction of the lagoon crossing and evacuation road would create noise that may disturb polar bears if present, although existing noise disturbances are currently present within the Study Area. Neither route alternative of the terrestrial component of the evacuation road overlaps with the critical habitat located on the coast in the Kivalina or Wulik River deltas. Relic Channel Source 2 overlaps with an up-river section of the feeding critical habitat. A polar bear interaction plan would be developed to avoid, minimize or mitigate disturbance to polar bear and their critical habitat (see Actions to Reduce or Remove Project Effects, below).

Spectacled Eider

Occurrence of Spectacled Eider and its Critical Habitat

Spectacled Eider occur throughout marine habitats in Alaska, and are typically found within coastal waters 1 to 28 miles from shore. Molting eiders are found in eastern Norton Sound and Ledyard Bay mid-July through December and wintering birds congregate in small groups near St. Lawrence Island. In western Alaska, core breeding habitat extends from Nelson Island to the Askinuk Mountains (Petersen et al., 2000). They are recorded infrequently in the Study Area during their migration to breeding habitats in northern latitudes (WHPacific, 2012). Coastal lagoons in Cape Krusenstern National Monument, 8 miles south of the Study Area, provide breeding habitat for Spectacled Eider (NPS, 2016).

The Spectacled Eider is listed under the ESA as Threatened. Population declines are primarily attributed to alteration or destruction of habitat, contaminant exposure, and predation (USFWS, 2010). Critical habitat for Spectacled Eider has been designated for molting sites in Norton Sound and Ledyard Bay, for breeding on the Yukon-Kuskokwim Delta, and for wintering south of St. Lawrence Island (USFWS, 2010). The closest tract of designated critical habitat represents critical habitat to the Study Area in Ledyard Bay, approximately 143 miles from the Study Area (USFWS, 2010). The Study Area does not overlap with any designated critical habitat for this species.

Project Effects on Spectacled Eider and its Critical Habitat
Spectacled Eider breed along peninsulas, pond shorelines, or wet meadows dominated by sedges (Petersen et al., 2000). Construction of the Proposed Action would result in some loss or alteration of shoreline or wetland habitats potentially suitable for Spectacled Eider breeding. Although some areas of aquatic and shoreline habitats would be removed or altered by construction of a lagoon crossing structure, aquatic habitats in the Study Area are ubiquitous. Remaining suitable aquatic and shoreline habitats are expected to be sufficiently abundant for aquatic bird species to not be disrupted in staging, foraging, or breeding activities.

The duration of noise associated with pile driving for the lagoon crossing structure is assumed to be 30 days (not continuous). As a result, in-air or underwater noise levels in the lagoon would increase for only a relatively short period of time, resulting in only temporary, localized displacement of aquatic birds. The project would implement several avoidance, minimization, or mitigation measures to limit potential residual adverse effects of the project (see Actions to Reduce or Remove Project Effects, below).

Steller's Eider
Occurrence of Steller's Eider and its Critical Habitat
The Steller's Eider is listed under the ESA as Threatened. Reasons for population declines are poorly understood but potential threats include oil or contaminant exposure, predation, and hunting pressures (USFWS, 2002). Critical habitat for Steller's Eider has been designated for breeding habitat on the Yukon-Kuskokwim Delta, and molting sites in Kuskokwim Bay, Izembek Lagoon, Nelson Lagoon, and Seal Islands (USFWS, 2002).

Steller's Eider breed primarily along the Arctic Coastal Plain, but also have a small population that nests on the Yukon-Kuskokwim Delta. Eiders molt throughout southwest Alaska mid-July through December, primarily along the north side of the Alaska Peninsula, Izembek Lagoon, Nelson Lagoon, Port Heiden, and Seal Islands (Frederickson, L.H., 2001; USFWS, 2002). Wintering birds congregate in shallow, sheltered waters along the south side of the Alaska Peninsula.

There are no records of Steller's Eider occurring within the Study Area. The National Park Service indicates that coastal lagoons in Cape Krusenstern National Monument, 8 miles south of the Study Area, provide breeding habitat for Steller's Eider (NPS, 2016). The closest tract of designated critical habitat represents critical molting habitat in Hooper Bay, approximately 429 miles from the Study Area (USFWS, 2002). The Study Area does not overlap with any designated critical habitat for this species.

Project Effects on Steller's Eider and its Critical Habitat

Steller's Eider breed in open tundra or within shrubby willow or birch stands in close proximity to coastal areas (Frederickson, L.H., 2001; USFWS, 2002). Construction of the project would result in some loss or alteration of tundra or shrub habitats adjacent to the Kivalina Lagoon or wetlands along the evacuation road, as described above for Spectacled Eider. Noise impacts, as also described above for Spectacled Eider, could also potentially impact Steller's Eider. The project would implement several avoidance, minimization, or mitigation measures to limit residual adverse effects of the project (see Actions to Reduce or Remove Project Effects, below).

Actions to Reduce or Remove Project Effects
Proposed mitigation measures to avoid, minimize, or mitigate potential residual adverse effects of the project on polar bear, Spectacled Eider and Steller's Eider are recommended based on state or federal regulations and policies, management practices and guidelines, and relevant peer-reviewed literature. Measures include:

- A pile driving plan would be developed during design that would establish a marine mammal exclusion zone, and implement a marine mammal construction monitoring program to reduce the potential for marine mammals to be exposed to harmful levels of underwater noise.
- Pile driving activity would be completed in as short a time period as possible, to reduce the amount of time the lagoon would be ensonified by the activity.
- A polar bear interaction plan would be developed as required by USFWS.
- Where possible, vegetation clearing, site preparation, and construction activities will adhere to the recommended periods to avoid vegetation clearing from June 1st-July 31st for Northern Alaska (USFWS, 2017b). If vegetation clearing, site preparation, and construction occurs within these periods, pre-construction nest surveys would be conducted by qualified personnel and appropriate mitigation developed in consultation with the USFWS.
- High-disturbance project-related activities (e.g., blasting, pile driving) would be avoided where practicable during the nesting and peak migration window.

We request your review of the project and concurrence that the proposed project is not likely to adversely affect any Federally listed species, proposed species, candidate species, nor their critical habitat.

Thank you for your attention to this request, if you have any questions regarding the proposed project, you may contact me at (907) 451-2238 or brett.nelson@alaska.gov.

Sincerely,

Brett D Nelson

Brett Nelson
Northern Region Environmental Manager

Enclosures: Figure 1 – Study Area and Polar Bear Critical Habitat

cc: Jonathan Hutchinson , P.E., Project Manager
Paul Karczmarczyk , Environmental Analyst

References

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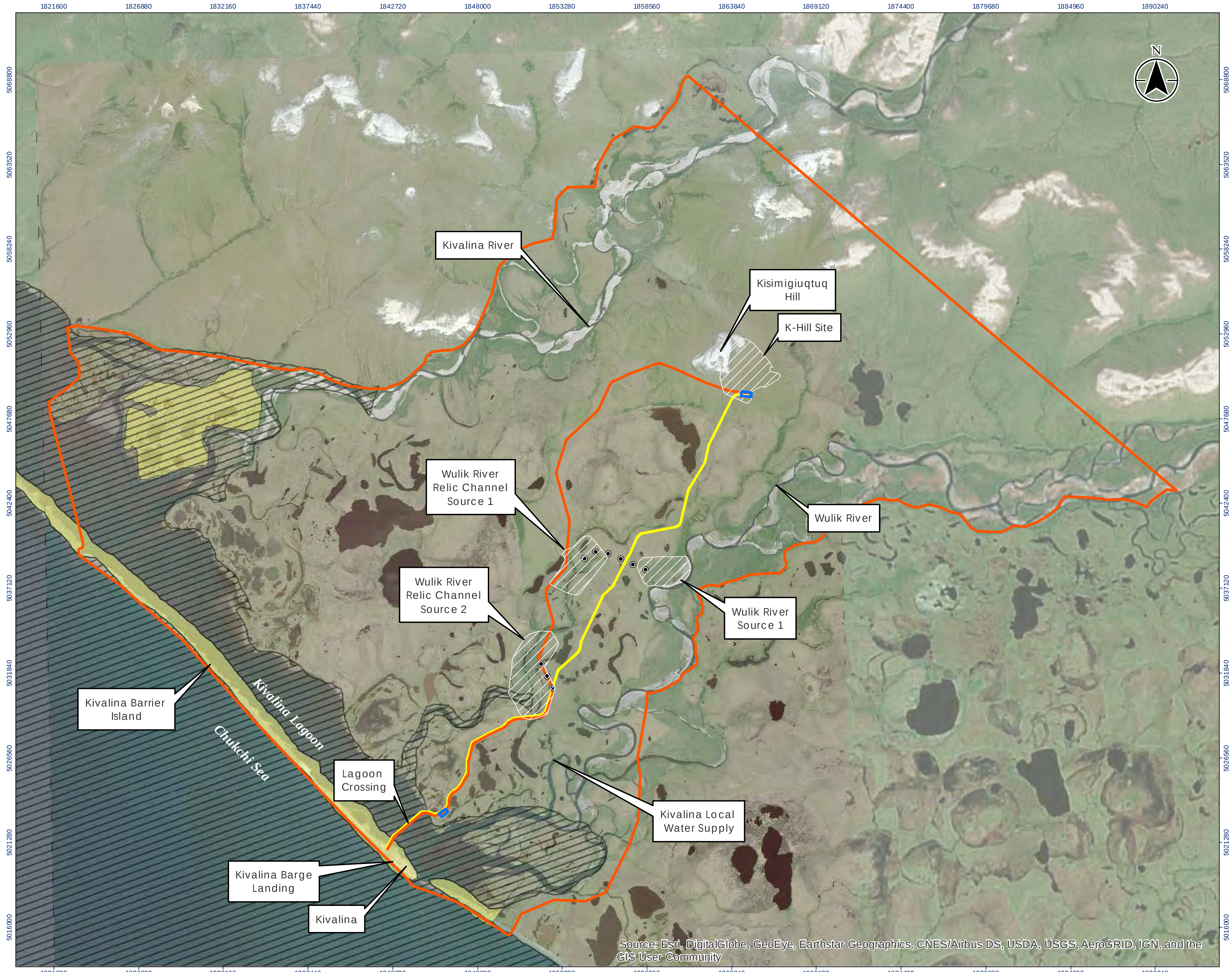


Legend

- Southern Route - 7.7 miles*
- Combined Route B - 8.9 miles*
- Material Source Spur Road
- Contractor Staging Areas
- Study Area
- Potential Material Source Areas**
- Polar Bear Critical Habitat Barrier Islands V2
- Polar Bear Feeding Critical Habitat V2

* Proposed Routes are centered within ~1000 ft corridor.

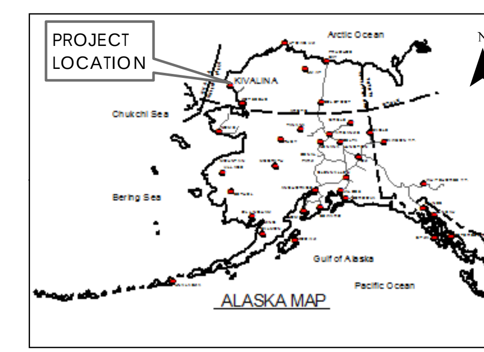
** Material sources would be developed within identified areas. See EA Section 3.1 Table 1.

0 0.6 1.2 Miles

1:75,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
2. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011; ©AeroMetric Inc., 2013; Digital Globe 2016
3. Polar Bear Final Critical Habitat, Federal Register (75 FR 76086 76137), December 7, 2010. Data has been shifted to align with aerial imagery using coastline and landmark signatures.



Graphics developed by Stantec Consulting Services, Inc.

STATE OF ALASKA
Department of Transportation and Public Facilities
2301 Peger Road Fairbanks, AK 99709

KIVALINA EVACUATION AND SCHOOL SITE ACCESS ROAD

Polar Bear Critical Habitat

DATE: September, 2017	FIGURE 1

Department of Transportation and Public Facilities

THE STATE of ALASKA

GOVERNOR BILL WALKER

Northern Region
Design and Engineering Services

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September 18, 2017

Re: Kivalina Evacuation and School Site Access Road
Project Number: 0002384/NFHWY00162
Subject: Section 7 Consultation – MMPA

Dear Greg Balogh,

The Alaska Department of Transportation and Public Facilities (DOT&PF) and the Federal Highway Administration (FHWA), in partnership with the Northwest Arctic Borough (NAB), Native Village of Kivalina, and the City of Kivalina, are proposing to improve community safety in Kivalina, Alaska by constructing an evacuation road between Kivalina Island and a site on Kisimigiuqtuq Hill (K-Hill).

The proposed project origin is at the City of Kivalina, located on the southeast tip of the barrier island located between the Chukchi Sea (Arctic Ocean) and Kivalina Lagoon (Figure 1). The project terminus is located on the mainland across the Kivalina lagoon approximately six-miles northeast at a community selected evacuation site on K-Hill. The Study Area encompasses the Kivalina barrier island, the southern portion of Kivalina Lagoon, and the lower Wulik and Kivalina River drainages.

The Kivalina Evacuation and School Site Access Road project would provide Kivalina residents a safe and reliable evacuation route in the event of a catastrophic storm or ocean surge, allowing evacuees to temporarily mobilize to safe refuge at an assembly site on K-Hill. This site is also identified by the NAB School District, and approved by the community, as a preferred new location for the community school. If constructed, the school could augment the undeveloped evacuation site by serving as a full-service community emergency shelter with all-season support capabilities. The Proposed Action would construct a safe, reliable, all-season evacuation road between the community of Kivalina and K-Hill.

One lagoon crossing and two different route alternatives on the mainland are being considered, but common to all, are the following actions:

- **Establishment of a safe, reliable, all-season Kivalina Lagoon crossing.** All alternatives include construction of a causeway across the lagoon that variously incorporate different configurations of hydrological openings including bridge(s), culvert(s), or both.
- **Construction of an all-season gravel access road connecting the Kivalina Lagoon crossing to the K-Hill evacuation site.** The road would be designed to accommodate a wide variety of motorized vehicles over a two-way road with shoulders, multiple turnouts, and side slopes that may include guard rails and other safety features where determined to be necessary and prudent.
- **Development of up to four material sources** including the K-Hill Site, Wulik River Source 1, Relic Channel Source 1, and Relic Channel Source 2. These material sources are anticipated to be suitable local sources of select construction material to supply the project. Selection and development of viable material sources and haul routes are considered as part of the Proposed Action.

To ensure that any potential residual project effects are identified and do not jeopardize the continued existence of a federally listed species or result in the destruction or adverse modification of designated critical habitat, we are consulting with the National Marine Fisheries Service to comply with requirements mandated in Section 7 of the *Endangered Species Act* (ESA).

The proposed Study Area overlaps with ranges for bearded seals (*Erignathus barbatus*), listed as Threatened under the ESA and Depleted under the MMPA, and ringed seals (*Phoca hispida*), currently not listed but previously listed as Threatened under the ESA with its listing being appealed in the U.S. District Court. Due to the currently unresolved status of a legal appeal of ringed seal ESA listing and critical habitat designation (79 FR 71714, Figure 1), ringed seals have been included. No critical habitat has been designated for bearded seal (77 FR 76740).

The Study Area overlaps with the proposed ringed seal listing and critical habitat designation (79 FR 71714) (Figure 1). No critical habitat has been designated for bearded seal (77 FR 76740). Given the location of the action and project activities, and upon review of the species information available, it is anticipated that no adverse effects on any ESA-listed species or designated critical habitat will occur. A description of occurrence and potential project effects to bearded seal and ringed seal is provided below.

Occurrence of Bearded Seal

Bearded seal range in Alaska waters includes the Beaufort, Chukchi and Bering Seas (Cameron et al., 2010). Aerial surveys in the eastern Chukchi Sea, conducted in May and June 1999 and 2000, estimated highest densities of bearded seals (0.401 – 0.7 seals/km^2; unadjusted for survey timing and haulout behavior) south of Kivalina and west of Kivalina in the offshore area, and moderate densities in coastal waters by Kivalina (0.051 – 0.2 seals/km^2; unadjusted for survey timing and haulout behavior) (Bengtson et al., 2005). Movement data shows bearded seals have a wide range in the Chukchi Sea including the coastal waters near Kivalina in fall and summer

(Boveng and Cameron, 2013; Wiese et al., 2017). Bearded seals are seen foraging in Kivalina Lagoon in the summer foraging (Huntington et al., 2016), have been sighted near the north entrance to the lagoon (Stantec, 2016), and at the south entrance to the lagoon (P. Hawley, personal communication, June 30, 2017). Juvenile bearded seals have also been observed foraging up the Wulik River channels in the fall (Huntington et al., 2016; Stantec, 2016).

Occurrence of Ringed Seal and its Proposed Critical Habitat
Ringed seal activity in the Chukchi Sea is strongly influenced by sea ice (Kelly et al., 2010). Movement data suggests that ringed seals use the Chukchi Sea, and marine coastal waters near Kivalina, year-round (ADF&G, 2015; Crawford et al., 2012; Von Duyke et al., 2017). Density estimates, based on aerial surveys conducted in May and June, are higher along the coast south of Kivalina (10.001-20 seals/km^2; unadjusted for survey timing and haulout behavior) as compared to the coastal region immediately around Kivalina (2.001-5 seals/km^2; unadjusted for survey timing and haulout behavior) (Bengtson et al., 2005). Ringed seals occur year-round in the Kivalina area (Huntington et al., 2016), use both entrances into the lagoon, and have also been observed foraging in the lagoon (Stantec, 2016).

Proposed critical habitat for ringed seal (79 FR 71714) overlaps with Kivalina Lagoon, the lagoon crossing, and Relic Channel Source 2 (Figure 1).

Project Effects on Bearded seal, Ringed Seal and Ringed Seal Proposed Critical Habitat
Potential project effects on bearded seals and ringed seals include risk of injury and disturbance from underwater noise during construction, and unanticipated changes to existing habitat parameters due to the presence of the lagoon crossing. Measures to avoid and minimize underwater noise during construction would reduce the potential for injury and minimize disturbance to bearded seals and ringed seals present in the lagoon. Scheduling construction during late fall and winter would minimize the effects on bearded seals as they are unlikely to be present in the lagoon at that time. Ringed seals, while present year-round, are likely found in lower numbers in late fall and winter due to fewer fish within the lagoon at that time.

The location and presence of the proposed lagoon crossing is not anticipated to negatively affect bearded seal or ringed seal habitat accessibility and foraging as its design will facilitate movement of seals and their prey through the crossing. Seal prey densities are not anticipated to be adversely affected. While the lagoon crossing lies within proposed ringed seal habitat, this proposed designation has not been finalized. The project would implement several avoidance, minimization, or mitigation measures to limit potential residual adverse effects of the project (see Actions to Reduce or Remove Project Effects, below).

Actions to Reduce or Avoid Project Effects
Proposed mitigation measures to avoid, minimize, or mitigate potential residual adverse effects of the project on bearded seals and ringed seals are recommended

based on state or federal regulations and policies, best management practices and guidelines, and relevant peer-reviewed literature.

Measures include:

- A pile driving plan would be developed during design that would establish a marine mammal exclusion zone and implement a marine mammal construction monitoring program to reduce the potential exposure of marine mammals to harmful levels of underwater noise. Components of the plan would include but are not be limited to:
    - Pile driving activity would be completed in as short a time period as possible to reduce the amount of time the lagoon will be ensonified by the activity.
    - Trained marine mammal observers would maintain watch for marine mammals during pile driving and water filling activities. Activities would cease if marine mammals are observed within a predetermined distance from the activity, and would recommence when the marine mammal has left the area or has not been observed for 30 min.
- Boat speed would be reduced when marine mammals are present in the lagoon to reduce extents of underwater noise.

We request your review of the project and concurrence that the proposed project is not likely to adversely affect any Federally listed species, proposed species, candidate species, nor designated or proposed critical habitat.

Thank you for your attention to this request, if you have any questions regarding the proposed project, you may contact me at (907) 451-2238 or brett.nelson@alaska.gov.

Sincerely,

Brett D Nelson

Brett Nelson
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Enclosures: Figure 1 –Study Area and Proposed Ringed Seal Critical Habitat

cc: Jonathan Hutchinson, P.E., Project Manager
Paul Karczmarczyk, Environmental Analyst

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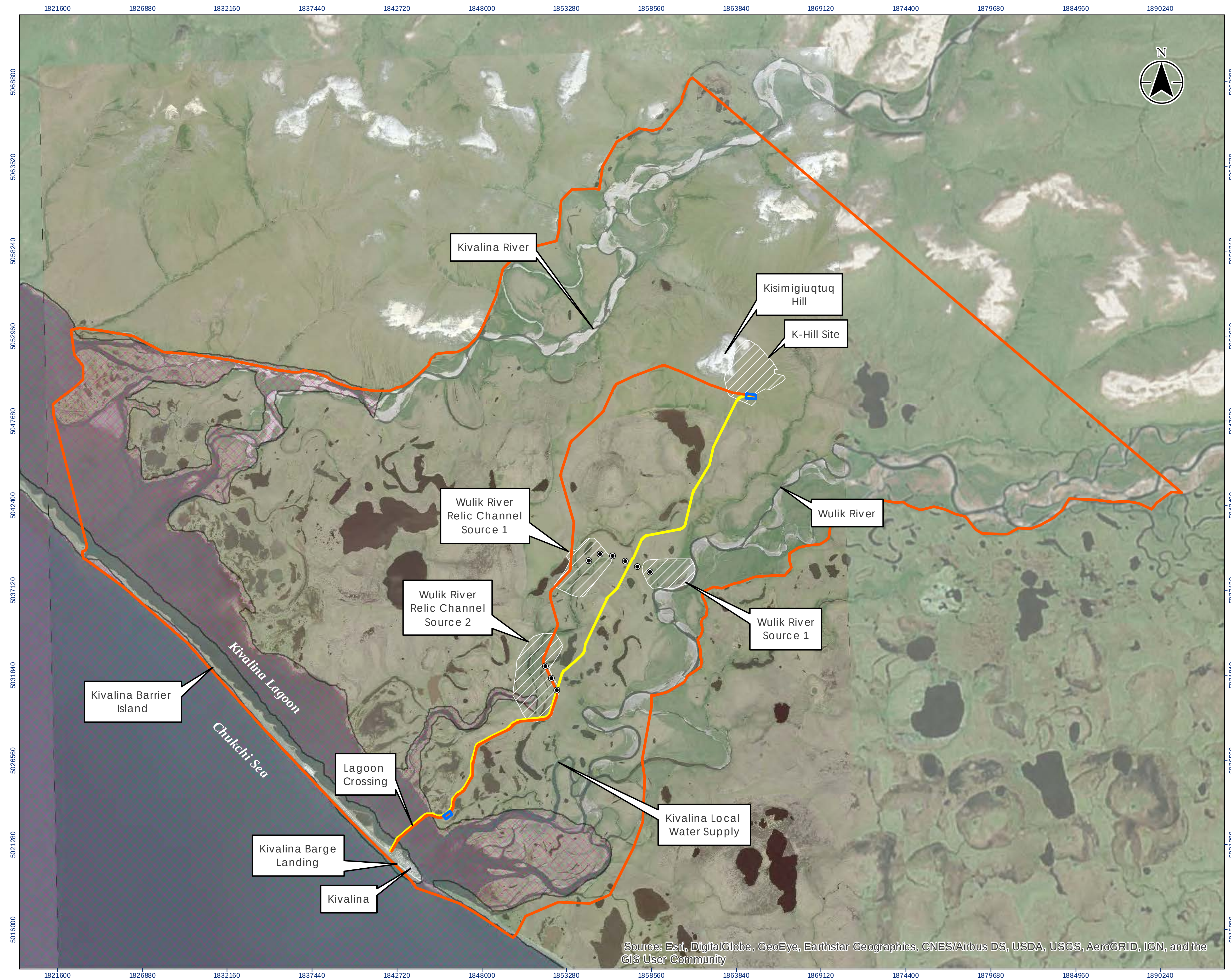


Legend

- Southern Route - 7.7 miles*
- Combined Route B - 8.9 miles*
- Material Source Spur Road
- Contractor Staging Areas
- Study Area
- Potential Material Source Areas**
- Ringed Seal Proposed Critical Habitat

* Proposed Routes are centered within ~1000 ft corridor.

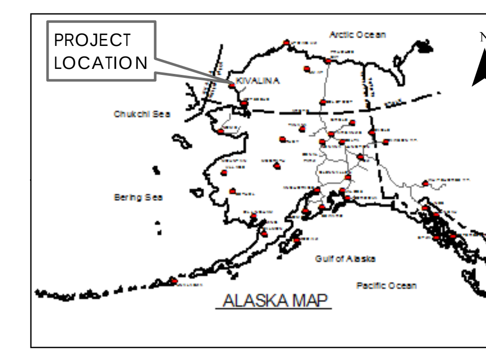
** Material sources would be developed within identified areas. See EA Section 3.1 Table 1.

0 0.6 1.2 Miles

1:75,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
2. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011; ©AeroMetric Inc., 2013; Digital Globe 2016
3. Ringed Seal Proposedl Critical Habitat, Federal Register (79 FR 71714), December 3, 2014. Data has been shifted to align with aerial imagery using coastline and landmark signatures.



Graphics developed by Stantec Consulting Services, Inc.

STATE OF ALASKA
Department of Transportation and Public Facilities
2301 Peger Road Fairbanks, AK 99709

KIVALINA EVACUATION AND SCHOOL SITE ACCESS ROAD

Proposed Ringed Seal Critical Habitat

DATE: September, 2017	FIGURE 1

THE STATE
of ALASKA
GOVERNOR BILL WALKER

Department of Transportation and Public Facilities

NORTHERN REGION
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Preliminary Design and Environmental

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December 19, 2017

Jon Kurland
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PO Box 21668
Juneau, AK 99802

RE: Request for Initiation of Informal Consultation under Marine Mammal Protection Act (MMPA) and Section 7(a)(2) of the Endangered Species Act (ESA) for Kivalina Evacuation and School Site Access Road

The Alaska Department of Transportation and Public Facilities (DOT&PF) has assumed the responsibilities of the Federal Highway Administration under 23 U.S.C. 327, and is proposing to carry out the proposed project as described below. We request initiation of informal consultation under the Marine Mammal Protection Act (MMPA) and Section 7(a)(2) of the Endangered Species Act for the Kivalina Evacuation and School Site Access Road. We have determined that the proposed activity may affect, but is not likely to adversely affect beluga whale, bowhead whale, gray whale, bearded seal, ringed seal, and spotted seal. Our supporting assessment is provided below. We request your written concurrence if you agree with our determinations.

Project Description

This proposed project is intended to construct a safe, reliable, all-season evacuation road between the community of Kivalina and Kisimigiuqtuq (K-Hill). We expect work to commence in August 2019 and continue over a three-year period.

DOT&PF has selected the Southern Route (Figure 1, 2) as the preferred alternative for this project (discussed further in the Environmental Assessment), which includes the following actions:

- Establishment of a safe, reliable, all-season Kivalina Lagoon crossing, consisting of a causeway and a bridge.
- Construction of an all-season access road connecting the Kivalina Lagoon crossing to the K-Hill evacuation site.

- Development of up to four material sources including the K-Hill Site, Wulik River Source 1, Wulik River Relic Channel Source 1, and Wulik River Relic Channel Source 2.

The selected contractor is likely to conduct the following Project associated activities, which may results in residual effects on marine mammals:

- Use barges to bring construction material to the project location, and
- Construct in-water/over-water structures through:
    - Delong Mountain Transportation System (DMTS) Haul Route, and
    - Material being placed in water

Land based pile driving is also proposed for this Project. As this activity is not occurring in water, effects to marine mammal are not anticipated.

<u>Barges:</u>

The proposed activity may require contracting up to 10 barges per year for 4 years that will transport construction equipment and material to Kivalina or DMTS during the open water months (June-November). Barges will arrive in the Action Area (Figure 1, and Page 5 for 'Description of Action Area') when they reach within 3 miles of Kivalina or DMTS. There the barges will transition into project control, and may proceed directly, or wait offshore, until the project is ready for them to offload.

Barges will vary in dimensions, capacity, and draft. Examples may include Crowley 455 Series, Labroy Ballastable Barge, or smaller. The barges will use the existing community barge landing zone, or similar, adjacent to the town of Kivalina and/or the dock at the DMTS. If the barges use the dock at DMTS, goods and materials maybe moved to the construction area by a winter haul route (Figure 1 and 2). Barges will be pulled into position by up to two accompanying tug boats, which are of similar type to the current models used during the annual Kivalina resupply.

In addition to barges, during the open water months (June-November), small skiffs (or similar) present in Kivalina/owned by community members may be used to transport personnel and gear across the lagoon to the inland portions of the project. This activity may include up to 5 small boats (skiffs or similar), being used three times a day to transport goods and personnel across the lagoon. Total travel time across the lagoon would average 20 minutes per trip. This type of traffic is a current activity which the community engages in to access the surrounding region.

Vessel sound levels vary depending on the vessel and on operational speeds. For example, skiffs in Alaska have been measured to operate at sound levels between 160-170 dB_{rms} at 1 yard (Kipple and Gabriele 2003, no speed specified). Tugs with barges have been measured in Anchorage at sound levels between 145-160 dB_{rms} at 68-265 m (URS 2007, no speed specified).

In-water or Over-water Structures:

- DMTS Haul Route

The contractor may barge material and/or equipment to either the DMTS port site or the Kivalina barge landing. If material is deposited at the DMTS, it will need to be hauled along the beach or over sea ice from the DMTS port site to Kivalina. Specific details regarding those activities would be under the control of the selected contractor. In general, if a haul route is needed, it would be built along the traditionally used 17(b) easement between Kivalina and DMTS. No fill would be placed, but ice may be used to create an ice road, if necessary. Equipment along the route may include: up to 5 tracked excavators (or similar), 10 30-ton dump trucks (or similar), 5 bulldozers, 2 200-ton cranes (or similar), 4 180-HP Front End Loaders (or similar), 4 2-ton flatbed trucks (or similar), 6 ATVs, and/or similar equipment. Approximately 3 convoy roundtrips may take place each year.

- Material being placed in water

The Kivalina Lagoon crossing would require an approximately 3,020 ft solid, armored, earthen causeway. A single span bridge would cross the existing 110 ft lagoon channel located approximately 160 ft northeast from the barrier island (Figure 3). Large culvert(s), designed to accommodate passage of all life stages of fish, would be constructed at the northeast end of the causeway. A series of overflow pipes would be placed incrementally over the length of the solid portions of the causeway to provide additional conveyance during high water events.

The causeway and bridge will be installed using the following methods:

Fill activities to construct the causeway will likely occur in both the summer and winter. During the summer the lagoon is open water, generally being 1-3 feet deep except for deeper areas near the mouth of the Wulik River and the channel paralleling Kivalina Island (Figure 3). During the winter, the shallow areas of lagoon are primarily filled with grounded ice, with the mouth of the Wulik and the channel near Kivalina holding water. During high high-tides, water may lift the ice in the shallower portions of the lagoon for short periods.

Fill material would be obtained from permitted material sources proposed for this project, or from an imported commercial source outside the project area, such as Nome. Approximately 195,000 cy of gravel, rock, and rip rap will be required to construct the solid portion of the causeway. The substrate to be covered consists of fine grained sand and silt at the bottom of the lagoon.

The causeway embankment layer and rock protection may require up to 2 tracked excavators (or similar), 10 30-ton dump trucks (or similar), 2 bulldozers, 2 200-ton cranes (or similar), 4 180-HP Front End Loaders (or similar), 4 2-ton flatbed trucks (or similar), 6 ATVs, 2 40-horsepower work skiffs (or similar), and similar heavy construction equipment at any one time.

The base causeway embankment layer and rock protection may be constructed in the winter by removing the grounded ice in shallow depths of the lagoon; with no, or minimal water present.

Conventional winter excavation, using extended reach excavators, is the preferred method of removing the ice. Material will then be placed following project design to build the causeway.

Summer construction of the base causeway embankment layer and rock protection would involve extending the causeway from the mainland and/or barrier island side of the lagoon. Material could be placed by excavators and dump trucks off the pioneer earth portion of the causeway as it extends into the lagoon. Sediment containment would be constructed around the project to limit the off-site migration of silt and fine particles.

Winter travel on the ice within the lagoon will be used to transport equipment and material between Kivalina Island and the mainland during construction of the causeway.

Final embankment and rock protection will be added onto the solid portion of the causeway to meet engineered specifications for final grade and ensure structural integrity. This is likely to occur during the summer, with equipment operating from the causeway.

- Pile driving

A single span bridge is proposed to provide fishery, subsistence use, biological (fish, marine wildlife, aquatic organism), and hydrologic connectivity through the causeway. The bridge would be a pile supported structure with sloped, rock protected earthen abutments or vertical sheet pile walls, and be designed to span the lagoon channel width to minimize potential impact to natural channel dimensions and function.

No in-water pile driving is proposed for this project. The causeway embankment will be placed first. Then the piles and/or sheet pile walls would be driven through the causeway embankment. Finally, the rip rap would be placed on top to armor the entire structure. This will prevent in-water pile driving, and the associated potential impacts to marine mammals.

An impact hammer and/or vibratory hammer are expected to be used for driving pile through the constructed embankment. Pile driving would take place in either winter or summer, on both sides of the bridge opening, and consist of driving piles on each abutment. Eight 36" diameter piles would be driven on either side of the bridge opening (four on each side) using an APE Model 200 Vibratory Driver (with 170 ton drive force) or Delmag D36 (160,000 max ft lb rated) impact hammer, or similar, operating from the shoreline or constructed embankment.

The geotechnical investigation of substrate under the bridge has been found to largely be mixtures of silt and sand (Golder Associates 2015).

Pile driving would occur intermittently over 30-60 day period. Piles would be driven approximately 100-180 feet deep.

No equipment would be needed for in water work, as no in-water pile driving is proposed for the project. All construction will take place on the constructed embankment.

- Pile Driving Sound Pressure

No in-water pile driving is proposed for the project and thus no marine mammal exclusion zones are being suggested for this activity. The contractor may designate a safety area to ensure increased level of safety for marine mammals during operations.

Mitigation Measures

To minimize the risk of harm to listed marine species, the DOT&PF agrees to implement the following mitigation measures:

Barges

1. Project related commercial barge operators would be required to follow best practices and safety regulations of local commercial barge operators which regularly service the communities.
2. Safety permitting, barges, and tug boats will move at less than 10 knots when in the NMFS Action Area (Figure 1 and 2) to reduce noise and for safe vessel maneuverability to avoid obstacles and marine mammals in the water.
3. Small project related boats will move at less than 10 knots when in the Kivalina Lagoon (Figure 1 and 2) to reduce noise impacts and for safe vessel maneuverability to avoid of obstacles and marine mammals in the water.
4. Vessels will adjust speed and direction as needed, considering vessel safety and marine mammal avoidance. Efforts will be made to avoid transiting between whales traveling as a group, transiting in close proximity.

DMTS Haul Route

1. If a haul route is used from DMTS to Kivalina, the routing will be during the winter (freeze up to March 1), sited primarily on barrier islands and on land-fast ice. When the haul route is on land-fast ice vehicles will stay 150 m (500 ft) away from pressure ridges, ice ridges, and ice deformation areas where seal lairs are more likely to be present.
2. If the haul route is used after March 1, NMFS may require the use of trained dogs to determine that no seal lairs are present within 150 m (500 ft) of the haul route or, alternatively, another suitable approach will be taken in consultation with NMFS.

Material being placed in water

1. If material is being placed in summer during ice-free conditions, qualified observers will monitor for marine mammal presence within 50 m of construction activity to avoid physical harm/direct takes by construction equipment. If a marine mammal is identified approaching within 50 m of immediate fill area, work will stop until the marine mammal is farther than 50 m from activities or is not seen for 15 minutes.
2. No exclusion zone is proposed for winter fill placement.

Subsistence Activities

1. Construction of the project has the potential to affect subsistence activities, including fishing. To avoid and minimize impacts on subsistence activities, the project will coordinate with local subsistence users daily during in-water marine work and while hauling material over

the ice over an established VHF radio frequency at a designated morning check in time to implement appropriate mitigation measures to avoid, minimize, and mitigate project impacts to subsistence activities.

Description of the Action Area

The Action Area is defined in the ESA regulations (50 CFR 402.02) as the area within which all direct and indirect effects of the project will occur. The Action Area is distinct from and larger than the project footprint because some elements of the project may affect listed species some distance from the project footprint. The Action Area, therefore, extends out to a point where no measurable effects from the project are expected to occur.

For this project, the Action Area (Figure 1, 2) surrounds the City of Kivalina (67.72°N, -164.54°W), located on the southeast tip of the barrier island located between the Chukchi Sea (Arctic Ocean) and Kivalina Lagoon. The project terminus is located on the mainland across the Kivalina Lagoon approximately six miles northeast at a community selected evacuation site on Kisimigiuqtuq Hill (K-Hill, 67.80°N, -164.39°W). The area encompasses the Kivalina barrier island, the southern portion of Kivalina Lagoon, and the lower Wulik and Kivalina River drainages. For marine mammal consultation, the Action Area also includes the DMTS dock (67.58°N, -164.06°W), and a winter nearshore barrier island/on sea ice haul route between the DMTS dock and City of Kivalina. Barges will arrive in the Action Area when they arrive within 3 miles of Kivalina or DMTS where they transition to project control.

NMFS Listed Species and Critical Habitat in the Action Area

Table 1: NMFS Listed Species and Critical Habitat expected in the Action Area

Species	Stock	Seasonality	Duration of species presence	Primary expected activity in the Action Area	Habitat typically used by the species in the Action Area	ESA listing	Critical Habitat	MMPA listing
Beluga whale	Beaufort Sea	Spring[a]	Occasional	Migrating	Waters outside of Lagoon	not listed	-	not listed
	Eastern Chukchi Sea	Summer[a]	Occasional	Migrating	Waters outside of Lagoon	not listed	-	not listed
Bowhead whale	Western Arctic	Spring, Fall[b]	Occasional	Migrating	Waters outside of Lagoon	endangered	None Designated	depleted
Gray whale	Eastern North Pacific	Summer[c]	Occasional	Migrating	Waters outside of Lagoon	not listed	-	not listed
Bearded seal	Alaska (Beringia Distinct Population Segment)	Spring–Fall[b]	Frequent	Foraging, resident	Kivalina Lagoon, Wulik River, waters outside of Lagoon	threatened	None Designated	depleted
Ringed seal	Alaska	Year Round[d]	Frequent	Foraging, resident, pupping	Kivalina Lagoon, Wulik River, waters/ice outside of Lagoon	not listed*	-	not listed
Spotted seal	Alaska	Spring–Fall[a]	Frequent	Foraging, residence	Kivalina Lagoon, Wulik River, waters outside of Lagoon	not listed	-	not listed

NOTE: Species occurrence and activities can change and other species not listed by be observed in the area.

* ESA listing is currently being appealed in the U.S. District Court; National Oceanic and Atmospheric Administration (NOAA) Fisheries published a final rule listing the Arctic subspecies as threatened.

SOURCES: [a] Allen and Angliss (2014), [b] Muto et al. (2016), [c] Carretta et al. (2015), [d] Huntington et al. (2016)

Species summaries of seals present within the Action Area

No systematic information on seal sighting locations in Kivalina Lagoon have been collected. The below summaries are based on sightings, literature review and interviews with community members.

Bearded Seals

Bearded seals are seen coming into Kivalina Lagoon in the summer following fish (Huntington et al., 2016, Stantec, 2016a) and have been sighted at the north (Kivalik) (Stantec, 2016a) and south (Singuak) entrance to the lagoon (P. Hawley, personal communication, June 30, 2017). Juvenile bearded seals have been observed foraging up river channels in the fall (Huntington et al., 2016; Stantec, 2016a).

Aerial surveys in the eastern Chukchi Sea, conducted in May and June, estimated highest densities of bearded seals (0.401 – 0.7 seals/km2; unadjusted for survey timing and haulout behavior) south of Kivalina and west of Kivalina in the offshore area, and moderate densities in coastal waters by Kivalina (0.051 – 0.2 seals/km2; unadjusted for survey timing and haulout behavior) (Bengtson et al., 2005). Movement data shows they have a wide range in the Chukchi Sea including the coastal waters near Kivalina in fall and summer (Boveng and Cameron, 2013; Wiese et al., 2017).

Ringed Seals

Ringed seal activity in the Chukchi Sea is strongly influenced by sea ice (Kelly et al., 2010). Movement data suggests that ringed seals use the Chukchi Sea, and coastal waters near Kivalina, year-round (ADF&G, 2015; Crawford et al., 2012; Von Duyke et al., 2017). Density estimates, based on aerial surveys conducted in May and June, are higher along the coast south of Kivalina (10.001-20 seals/km2; unadjusted for survey timing and haulout behavior) compared to the coastal region around Kivalina (2.001-5 seals/km2; unadjusted for survey timing and haulout behavior) (Bengtson et al., 2005). Ringed seals occur year-round in the Kivalina area (Huntington et al., 2016).

Recent field observations (Stantec, 2016b) confirmed seal presence within Kivalina Lagoon near the Kivalik and Siguak Inlets. Personal interviews conducted with local subsistence hunters concurrent to the Stantec survey effort also yielded generalizations that seals occasionally access shallower portions of the lagoon. However, follow up interviews with those and other local subsistence hunters in 2017 clarified that the majority of seal foraging in the lagoon occurs directly south and east of Singuak Inlet proximate to deeper water near and within the Wulik River outlet, and in like fashion within deeper waters between the mouth of the Kivalina River and its outlet to the Chukchi Sea at Kivalik Inlet. Comparatively, seal use of the shallow Lagoon Channel lying parallel to Kivalina Island is substantially less common, and generally limited to infrequent occasions of combined high water and thin ice in the lagoon (personal communications O. Hawley, September 15, 2017; R. Sage, September 15, 2017 and October 5, 2016; D. Foster October 5, 2016; P. Hawley September 15, 2017).

Spotted Seals
Spotted seals are seasonally present in the lagoon, arriving after the ice melts (Huntington et al., 2016), and using both the north and south entrances (Stantec, 2016a; P. Hawley, personal communication, June 30, 2017).

Effects Determination

- Construction-related vessels and barges:

Beluga whale, bowhead whale, gray whale, bearded seal, ringed seal, and spotted seal may be exposed to project vessel noise.

Construction-related vessels in the lagoon would create underwater noise, which may result in the disturbance or communication masking of seals. The effects of boat noise on ringed, spotted, and bearded seal behavior are not well known. Studies on other seal species have shown displacement due to the presence of high levels of vessel traffic in the case of grey seals (Anderwald et al. 2013). Harbor seals are more likely to be disturbed and enter water from a haulout if vessels are within 150 m than when vessels are farther away (Mathews et al. 2016). Currently, all boat traffic in the lagoon is related to community activities. Reductions in boat speeds have been shown to reduce the extent of underwater noise (e.g., Houghton et al. 2015).

Recreational boats currently use the lagoon and are active when seals are present. The possibility of vessel strikes of seals in the Kivalina Lagoon is minimal per the data analyzed in Alaska waters which documented no ship strikes of spotted, bearded, or ringed seals over a five-year period (Helker et al. 2016, 2017).

Barge traffic would create underwater noise that may result in disturbance or communication masking for beluga whale, bowhead whale, gray whale, bearded seal, ringed seal, and spotted seal. Impacts to seals from boat noise within the lagoon are discussed above, and are expected to be similar for barge traffic. It is expected that vessel noise from barges are the only project related activity that may result in potential impacts to whales, due to the rest of the work being located inside of Kivalina Lagoon. Individual whale's past experiences with vessels appear to be important for individual whale response (Shell 2012). Vessels moving at slow speeds and avoiding rapid changes in direction may be tolerated by some species. Other individuals may deflect around vessels and continue on their migratory path.

The effects of underwater noise as a result of project vessels and barges on whales and seals are not anticipated to result in harm, although disturbance and communication masking may occur.

The increase in vessel traffic as a result of the proposed project will cause a small, localized, temporary increase in vessel traffic. As a result, this would generally increase the risk of interactions between marine mammals and vessels in the Action Area, in addition to baseline conditions. With proposed mitigations (i.e., limit of maximum vessel speeds in the Action Area), the likelihood of a lethal vessel strike is anticipated to be low. When this project is completed, it will not result in an increased number of vessels in the Action Area, and thus, there is no increased risk of vessel strike in the future as a result of the project.

- In-water or over-water structures

Bearded seal, ringed seal, and spotted seal may be exposed to impacts due to in-water or over-water activities. Adults or juveniles are likely to be exposed during foraging trips near the Wulik River.

  - DMTS Haul Route

If constructed, the bridge, haul route between DMTS to Kivalina, and crossing the Kivalina Lagoon may expose seals of all life stages to vehicular noise. Spotted seals and ringed seals have acute in-air hearing (Sills et al. 2014; Sills et al. 2015). In-air hearing of bearded seals has not been studied, but due to the wide frequency range of their vocalizations (Risch et al. 2007), similar in-air hearing capabilities to spotted and ringed seals may be assumed. Vehicular noise would be audible to species present and may result in changes in behavior, although behavioral responses can vary widely depending on context and novelty of the noise source (Ellison et al. 2012; Richardson et al. 1995; Southall et al. 2007). Densities of basking ringed seals present in spring during active use of a proximate ice road did not vary between years (Moulton et al. 2005). Harwood et al. (2007) also report no avoidance of an ice road by ringed seals in the south-eastern Beaufort Sea, suggesting they were not displaced by in-air noise from the vehicular traffic. A contrasting study concluded that in-air noise from snow machines, when within 2.8 km, resulted in most ringed seals leaving their lairs (Kelly et al. 1988). Given the current presence of boat traffic within the lagoon in the open water season and the presence of snow machines during the winter, seals in the Action Area would have been previously exposed to noise. Seals would be expected to habituate to this new noise regime (Moulton et al. 2005), and no long-term changes of seal presence and behavior due to vehicle noise is expected.

The haul route may expose seal lairs to the threat of being disturbed by vehicular traffic. Seal lairs may occur in land-fast and floating ice. They can also be difficult to identify as they may be located on ice ridges, or in flat featureless areas. Ringed seals can maintain breathing holes and lairs in almost any thickness of ice (Smith and Stirling 1975), while bearded seals prefer pack ice (Bengston et al. 2000), and both are found in habitat south of Kivalina (Bengston et al. 2000). Spotted seals prefer habitat close to the pack ice front. Offshore and nearshore haul routes have the potential to encounter seals, ringed seal lairs, and breathing holes. This is expected to be minimized by maintaining the haul route on barrier islands and as close to shore as possible. If the route must transit sea ice, implementation of the haul route mitigation measures is expected to minimize impacts to seal lairs, and result in no significant harm.

  - Material being placed in water

Bearded seal, ringed seal, and spotted seal may be exposed to the effect of material being placed on the shoreline or bottom of the lagoon. Adults or juveniles are likely to be exposed during foraging trips near the Wulik River.

The presence of the lagoon-crossing structure may result in an ecological and physical alteration of marine mammal habitat in the lagoon as it may change distribution of prey species, and movement of seals. It is not known if seals would swim through culverts, but the presence of a bridge with water flowing freely beneath it would likely not impede passage of marine mammals (e.g., Shelden et al. 2013). Marine mammal use of habitat on either side of in-water structures, and their swimming beneath such structures, has been observed for other projects (e.g., Twentymile River Bridge, Cook Inlet, Alaska; HDR Alaska Inc. 2010). The proposed design of the lagoon crossing is not anticipated to negatively affect bearded, spotted, or ringed seal habitat use and foraging as it would accommodate the passage of seals and their prey. Prey densities are not anticipated to be adversely affected.

Ringed and spotted seals are visual hunters and increases in turbidity from fill or culvert placement may temporarily modify visibility within preferred feeding habitats. However, pinnipeds (including ringed seals and bearded seals) have highly developed sensory organs (i.e., vibrissae) which likely assist with foraging in dark or turbid conditions (e.g., Hyvärinen 1989; Marshall et al. 2006). As such, any changes in behavior caused by increased turbidity in the lagoon are unlikely to translate into harmful effects on seals. Further, if this activity occurs in winter, effects would be limited to ringed seals as the only species likely to be present.
The location and presence of the proposed lagoon crossing is not anticipated to negatively affect bearded seal or ringed seal habitat accessibility and foraging as its design would facilitate movement of seals and their prey through the crossing. Seal prey densities are not anticipated to be adversely affected. While the lagoon crossing lies within proposed ringed seal habitat, this proposed designation has not been finalized.

Placement of fill in water would also create underwater noise, but is anticipated to be at levels below that of boat noise. The anticipated specific levels of these noises are not known for this project, but it is unlikely that their levels would result in injury to seals within the lagoon. Levels of underwater noise may result in disturbance of marine mammals, although ringed seals were not displaced by slope preparations and deposition of gravel during construction of an artificial island in the Beaufort Sea (Blackwell et al. 2004). Ice associated species are naturally exposed to underwater noise from ice movement and cracking, with varying intensities, depending on conditions and scenario (Richardson et al. 1995). For example, an active pressure ridge produced source levels of 124–137 dB re 1 μPa m in the 4 and 8 Hz tones (Buck and Greene 1979).

Given the causeway's design, and incorporation of design elements to ensure passage between the North and South side of Kivalina Lagoon, there will be no harm to marine mammal habitat.

- Pile driving

No impacts to marine mammals from pile driving are expected since no in-water pile driving is proposed.

Conclusions

Based on the above, it is expected that potential effects of the proposed action will be insignificant and/or discountable once mitigation measures are in place. As a result, we have determined that Kivalina Evacuation and School Site Access Road is not likely to adversely affect any listed species or critical habitat under NMFS's jurisdiction. We have used the best scientific and commercial data available to complete this assessment. We request your concurrence with this determination.

Sincerely,

Brett O Nelson

Brett Nelson
Northern Region Environmental Manager

cc: Paul Karczmarczyk, DOT&PF
Jonathan Hutchinson, P.E., DOT&PF
Bonnie Easley-Appleyard, NMFS
Greg Balogh, NMFS

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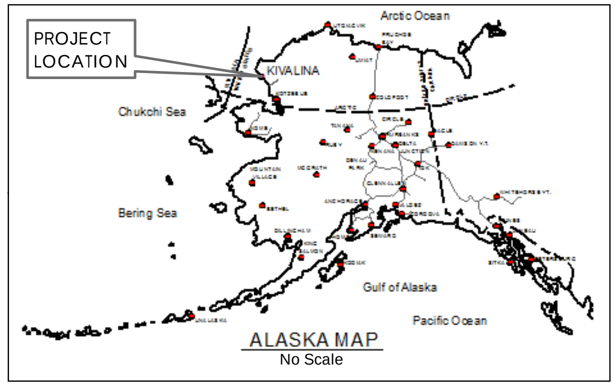
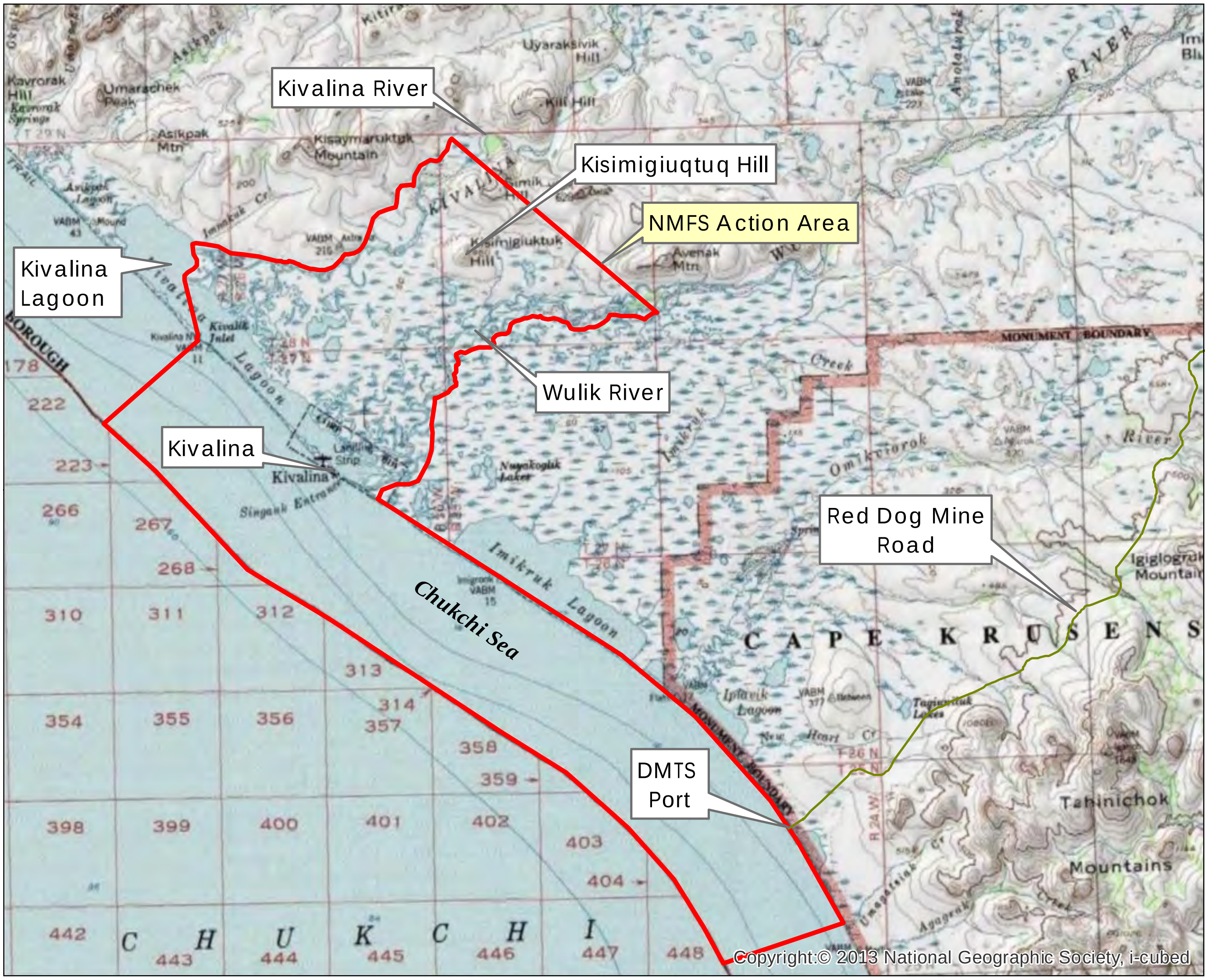
Figures





Graphics developed by Stantec Consulting Services, Inc.

Project Origin: City of Kivalina,
Kotzebue Recording District,
Section 21, Township 27N, Range 26W,
Kateel River Meridian

Project Terminus: Kisimigiuqtuq Hill,
Section 19, Township 28N, Range 25W
Kateel River Meridian

0 2.5 5 10 Miles
1:300,000 (at original document size of 8.5x11)

STATE OF ALASKA
Department of Transportation and Public Facilities
2301 Peger Road Fairbanks, AK 99709

KIVALINA EVACUATION AND SCHOOL SITE ACCESS ROAD
Request for Initiation of Informal Consultation
National Marine Fisheries Service

Location and Vicinity Map

DATE: December, 2017

FIGURE **1**

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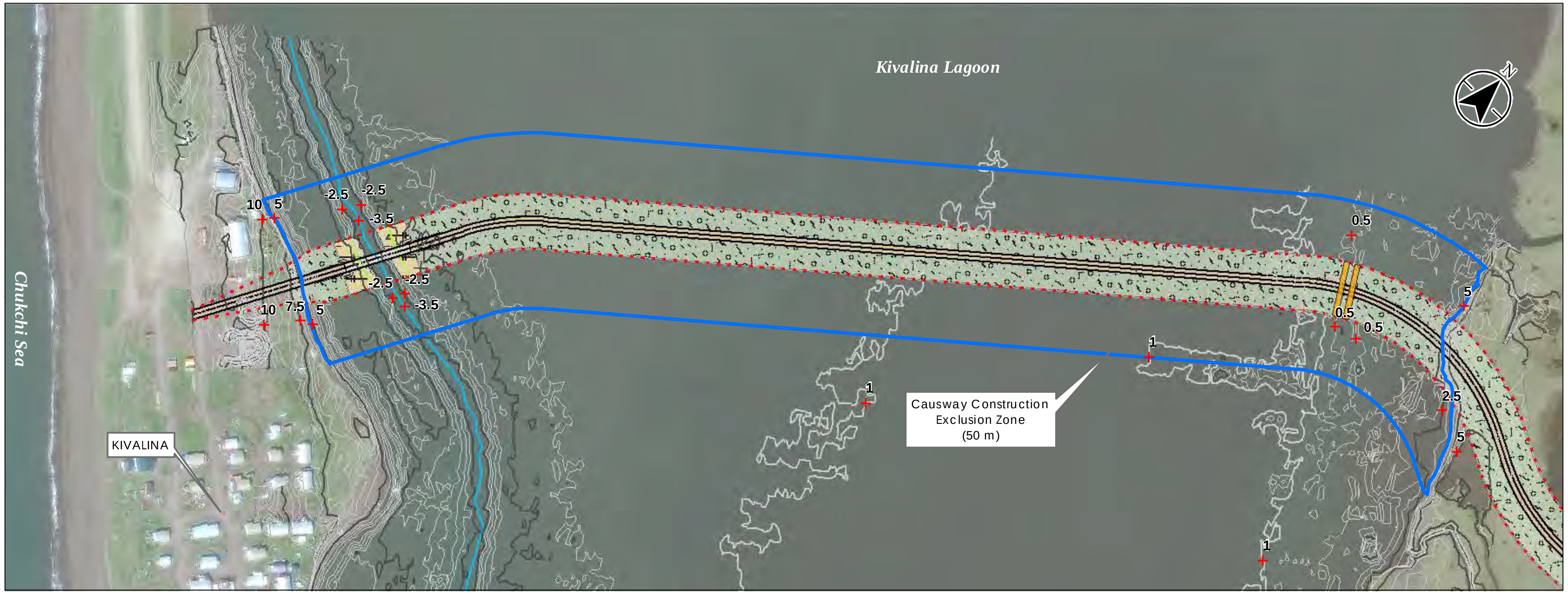
STATE OF ALASKA
Department of Transportation and Public Facilities
2301 Peger Road Fairbanks, AK 99709

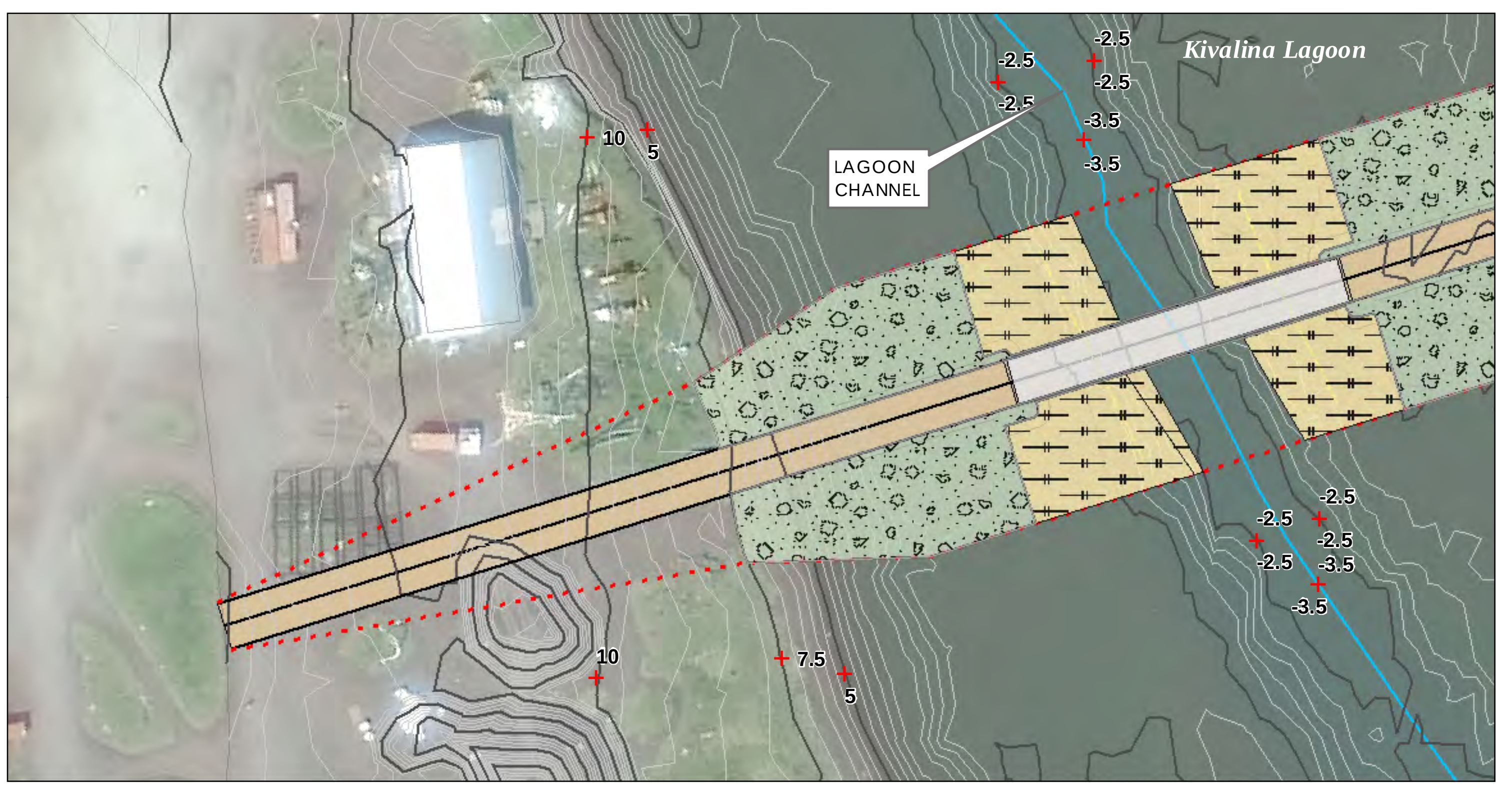
KIVALINA EVACUATION AND SCHOOL SITE ACCESS ROAD
Request for Initiation of Informal Consultation
National Marine Fisheries Service

Proposed Action

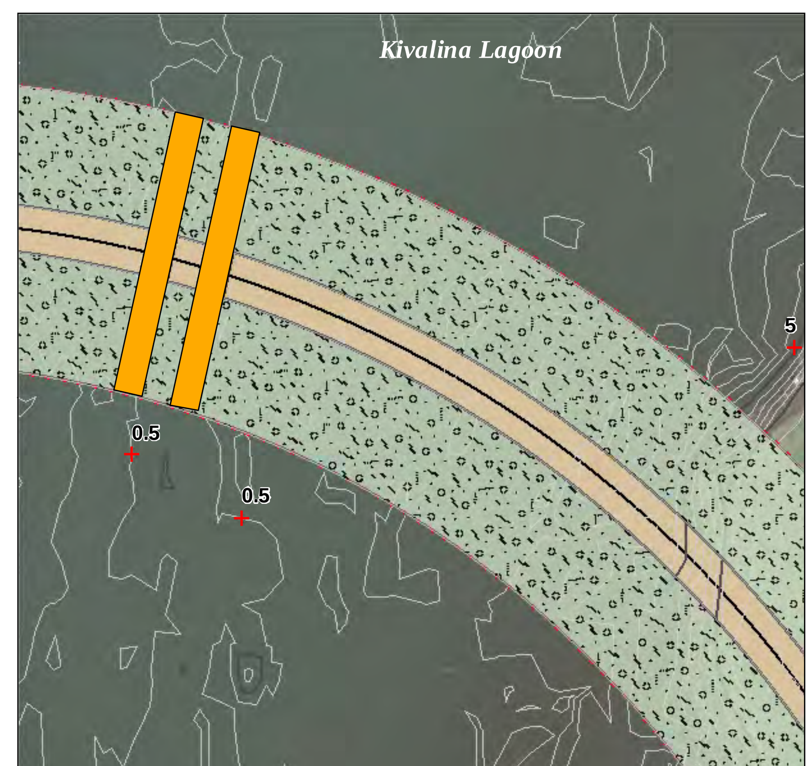
DATE: December, 2017 | FIGURE 2



LAGOON CROSSING OVERVIEW



BRIDGE DETAIL



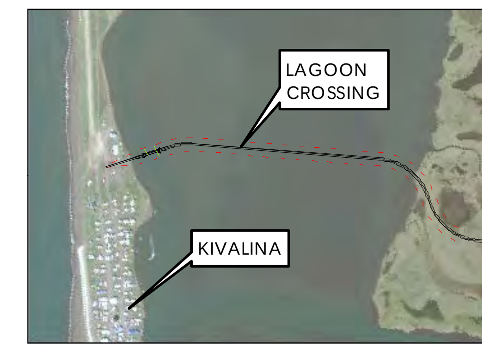
CAUSEWAY CULVERT(S) DETAIL

0 50 100 Feet

1:25,000 (At original document size of 11x17)

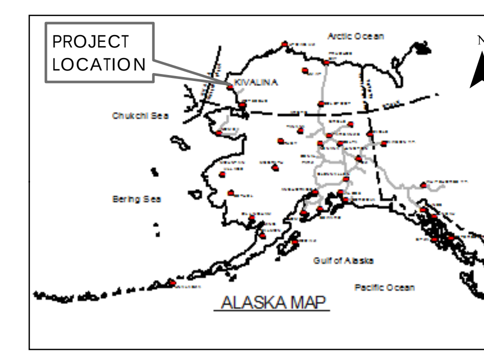
Legend

- Bridge
- Bridge Abutment Rip Rap
- Causeway Armor
- Causeway Culvert(s)
- Proposed Road
- Causeway Construction Exclusion Zone (50 m)
- × Elevation (ft)



Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
2. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011; ©AeroMetric Inc., 2013; Digital Globe 2016



Graphics developed by Stantec Consulting Services, Inc.

STATE OF ALASKA
Department of Transportation and Public Facilities
2301 Peger Road Fairbanks, AK 99709

KIVALINA EVACUATION AND SCHOOL SITE ACCESS ROAD
Request for Initiation of Informal Consultation
National Marine Fisheries Service

Lagoon Crossing D Alternative

DATE: December, 2017

FIGURE 3

U:\204705102\GIS\mxd\NMFS_Informal Consultation\204705102_NMFS_Fig-3_Lagoon Crossing Alternatives.mxd Revised: 2017-12-19 By: cpannone

Lindberg, Sara

From: Karczmarczyk, Paul F (DOT) <paul.karczmarczyk@alaska.gov>
Sent: Tuesday, December 19, 2017 10:39 AM
To: Kaiti Ott
Cc: Nelson, Brett D (DOT); Lindberg, Sara; Schacher, Sarah E (DOT); Anderson, Ryan (DOT); John Baker (jkbaker.kotz@gmail.com); Katherine Keith (katherine@akremotesolutions.com); Hutchinson, Jonathan J (DOT)
Subject: Additional Section 7 information as requested

Follow Up Flag: Follow up
Flag Status: Flagged

Good morning Kaiti:

Here is the barge-related language included in our draft NMFS Section 7 consultation response and which you asked to review during our meeting last week. When we have our formal NMFS response letter signed, I'll send that along to you as well.

Barges:

The proposed activity may require contracting up to 10 barges per year for 4 years that will transport construction equipment and material to Kivalina or DeLong Mountain Transportation System (DMTS) during the open water months (June-November).

Barges will vary in dimensions, capacity, and draft. Examples may include Crowley 455 Series, Labroy Ballastable Barge, or smaller. The barges will use the existing community barge landing zone, or similar, adjacent to the town of Kivalina and/or the dock at the DMTS. Barges will be pulled into position by up to two accompanying tug boats, which are of similar type to the current models used during the annual Kivalina resupply.

If you have any other comments or questions, please don't' hesitate to be in touch by phone or email. Thanks again for your and Louise's participation in the meeting, and we'll keep you posted on our next anticipated trip to KVL in the hope that you can go along as well,

Paul

Paul Karczmarczyk, CWB®
Environmental Impact Analyst
DOT&PF
2301 Peger Road
Fairbanks, AK 99709
(907) 451-2288

"Keep Alaska Moving through service and infrastructure."

"A human being should be able to change a diaper, plan an invasion, butcher a hog, conn a ship, design a building, write a sonnet, balance accounts, build a wall, set a bone, comfort the dying, take orders, give orders, cooperate, act alone, solve equations, analyze a new problem, pitch manure, program a computer, cook a tasty meal, fight efficiently, die gallantly. Specialization is for insects."

–Robert A. Heinlein

United States Department of the Interior

U.S. FISH AND WILDLIFE SERVICE
Fairbanks Fish and Wildlife Field Office
101 12th Avenue, Room 110
Fairbanks, Alaska 99701
December 21, 2017

Brett Nelson
Northern Region Environmental Manager
Alaska Department of Transportation and Public Facilities
2301 Peger Road
Fairbanks, Alaska 99709-5316

Re: Kivalina Evacuation and School Site Access Road

Dear Mr. Nelson:

This letter is in response to your request for consultation pursuant to section 7 of the Endangered Species Act of 1973 (ESA), as amended. The U.S. Fish & Wildlife Service (Service) has reviewed the proposed action to determine if it would adversely affect listed species under our jurisdiction. Three species listed as threatened under the ESA may occur in the project area: spectacled eiders (*Somateria fischeri*), Alaska-breeding Steller's eiders (*Polysticta stelleri*), and polar bears (*Ursus maritimus*), as well as designated polar bear critical habitat.

THE PROPOSED ACTION

We understand the Alaska Department of Transportation and Public Facilities (ADOT) with funding from the Federal Highway Administration (FHWA) proposes to construct an all-season evacuation road between the community of Kivalina, Alaska and an assembly site at Kisimigiuqtuq Hill (K-hill; Figure 1). The ADOT has been designated as the non-federal representative for the proposed project, and the Service is conducting section 7 consultation based on the preferred alternative (southern route with lagoon crossing D) presented in ADOT's draft Environmental Assessment (EA). Should the final project description differ from the preferred alternative, ADOT should contact the Service to determine if re-initiation is necessary.

Based on information provided by ADOT, an approximately 7.7-mi (12.4-km) long 24-ft (7.3-m) wide gravel road, with turnouts, would be constructed from the southern terminus of the Kivalina Airport, cross the lagoon via a causeway, then follow lowlands and relic channels of the Wulik River to a 5-acre (0.02-km^2) gravel staging pad near K-hill (Figure 2). The causeway crossing would be about 3,200-ft (0.98-km), with a 110-ft (33.5-m) bridge spanning the west lagoon channel and large-diameter culverts installed at the northeast end of the causeway (Figure 3).

Up to four material sources may be developed to support construction of the proposed project. These include, the K-Hill Site, Wulik River Source 1, Relic Channel Source 1, and Relic Channel Source 2 (Figure 2). Additionally, up to 10 barges may be used to transport heavy equipment and construction supplies to the project area. Both winter and summer construction activities are planned and the proposed project is expected to require two or more work seasons, with activities beginning as early as the first quarter of 2018. Finally, we understand overhead powerlines are not planned, and the causeway and evacuation road would be unlighted.

THE ACTION AREA

The action area includes the vicinity of Kivalina, Alaska, the proposed material sources, and the evacuation route to K-hill (Figure 1). Additionally, the action area includes the routes of marine transit through the Bering and Chukchi seas during barging operations.

EFFECTS OF THE ACTION ON LISTED SPECIES

Listed eiders

The Service listed the spectacled eider on May 10, 1993 (58 FR 27474) and the Alaska-breeding population of the Steller's eider as threatened on June 11, 1997 (62 FR 31748). Although neither species currently nests in the region, low numbers of listed eiders may migrate through the project area. While migrating listed eiders may rest and feed in terrestrial or marine habitat within the action area, we expect disturbance to migrating listed eiders from construction activities or barging operations would be minor because these individuals can respond to human presence or disturbance by moving to a safe distance. Because listed eider density in the action area is extremely low and disturbance to migrating listed eiders would be so minor that injury or death is not expected, we anticipate effects of disturbance to these birds would be insignificant.

Effects from barging operations

In addition to disturbance, migratory listed eiders would also be at risk of collision with vessels during the proposed barging operations. Migratory birds suffer considerable mortality from collisions with man-made objects (Manville 2004). Birds involved in collisions with man-made objects may also experience severe injuries including concussions, internal hemorrhaging, and broken bones. Birds are particularly at risk of collision when visibility is impaired by darkness or inclement weather (Weir 1976). In a study of avian interactions with offshore oil platforms in the Gulf of Mexico, collision events were more common, and more severe (i.e., the number of collision incidents increased) during poor weather (Russell 2005). There is also evidence that lights on structures, particularly red steady-state lights, result in disorientation which increases collision risk (Reed et al. 1985, Russell 2005, Manville 2000). Strike rate may also be related to flight behavior, in particular, altitude (Anderson and Murphy 1988). Johnson and Richardson (1982) in their study of migratory behavior along the Beaufort Sea coast, reported that 88% of eiders flew below an estimated altitude of 10 m (32 ft) and well over half flew below 5 m (16 ft). Day et al. (2004 and 2005) also noted eider species may be particularly susceptible to collisions with offshore objects as they fly low (mean flight altitude 12.1 ±0.8 m) and at relatively high speeds (approximately 45 mph) over water.

Although limited, the best available information with which to estimate collision risk between marine vessels and migratory birds are observations recorded during Royal Dutch Shell's (Shell) exploratory oil and gas activities in 2012. Ten vessels operating in the Chukchi Sea for 108 days recorded 131 total bird-vessel encounters, 17 of which were fatal collisions between eiders (13 king and 4 common eiders) and vessels. Of these 17 collisions, 2 involved mobile offshore drilling units, while the other 15 involved support vessels, which are reasonably similar to the barges currently planned for use in the proposed action. Considering that 10 vessels were involved in 15 fatal eider collisions, we estimate average collision rate per vessel to be 1.5 (i.e., 15 ÷ 10 = 1.5 collisions/vessel) over a 108-day season.

These rates are based on reported collisions for king and common eiders during a single shortened industry season in the Chukchi Sea. Listed eider species were not among the seaduck collisions recorded in 2012, however spectacled and Steller's eiders moving through the Chukchi and Bering seas during the proposed project would also be at risk of colliding with barges, presumably in proportion to their relative abundance in seaduck populations.

Assuming spectacled and Steller's eiders are equally as vulnerable to collisions as king and common eiders, and because there is no basis to assume otherwise, we would expect collisions to occur in proportion to species abundance. Based on a total of 705,380 eiders (529,271 king and 176,109 common eiders) recorded during migration counts near Utqiaġvik in late summer and fall of 2002 (Quakenbush et al. 2004[1]), we very roughly estimate the risk of collision, per individual eider passing through the Chukchi Sea, for each vessel operating offshore to be:

> 1.5 collisions per vessel per season ÷ 705,380 eiders = 0.0000021 collisions per vessel per season

We can then roughly estimate the risk of collision for listed eiders migrating through the Bering and Chukchi seas, by multiplying the individual eider collision rate (described above), by the estimated abundance of spectacled and Steller's eiders from pre-nesting aerial survey data for the North Slope (Stehn et al. 2013[2]). These surveys estimate spectacled and Steller's eiders number approximately 14,814 (90% CI = 13,501-16,128) and 680, respectively (Stehn et al. 2013). Therefore, we estimate listed eider collision rates would be:

> 14,800 spectacled eiders × 0.0000021 collisions per vessel per season = 0.031 spectacled eiders per vessel per season

> 680 Steller's eiders × 0.0000021 collisions per vessel per season = 0.0014 Steller's eiders per vessel per season

If these figures represent the number of collisions expected per listed eider moving through the Chukchi Sea, we can then approximate the number of collisions expected for 10 barges in the Bering and Chukchi seas:

> 0.031 spectacled eiders per vessel × 10 barges = 0.31 spectacled eiders

> 0.0014 Steller's eiders per vessel × 10 barges = 0.014 Steller's eiders

---

[1]This survey was based on observed counts from a fixed location. It employed a subset of time intervals and extrapolated the data to account for intervals during which no observations were made. Because the majority of king and common eiders nest in Northern Canada, we believe these counts reasonably estimate the number of king and common eiders passing through Arctic Alaska. Listed eiders were not detected during these migration counts, presumably due to the comparative scarcity and identification challenges for spectacled and Steller's eiders.

[2] These surveys were based on aerial observations of a subset of available nesting habitat on the North Slope. The data were then extrapolated to account for available nesting habitat that was not surveyed.

Because the figures above are based on an approximately 108-day season during Shell's 2012 campaign, we have adjusted the calculations to estimate collisions over approximately 150-days[3] of a typical open-water season as follows:

For spectacled eiders:

0.31 spectacled eider collisions ÷ 108 days = 0.0028 collisions per day; therefore,
0.0028 collisions per day × 150 days = 0.43 spectacled eider collisions

For Steller's eiders:

0.0014 Steller's eider collisions ÷ 108 days = 0.000012 collisions per day; therefore,
0.000012 collisions per day × 150 days = 0.0019 Steller's eider collisions

The reliability of these estimates may be limited by several biases. For example, 1) collisions are often episodic, and those resulting from light attraction in inclement weather may be particularly so, such that observations collected on a few vessels in a single year may not be representative of collisions in general, 2) monitoring for collisions is difficult and an unknown number of collisions may go undetected, even by trained bird observers, and 3) low visibility often coincides with increased collisions (Ronconi et al. 2015), which may increase the number of undetected collisions. However, these estimates are based on the best information available, and appreciable impacts to spectacled and Alaska-breeding Steller's eiders from the proposed barging operations are not expected.

Summary
In summary, because 1) listed eider density throughout the action area is low, 2) effects to breeding eiders are not expected, 3) effects of disturbance to non-breeding, brood rearing, or migrating eiders would be minor and temporary, and 4) appreciable impacts from disturbance or collisions due to the proposed barging operations are not anticipated; we expect cumulative effects the proposed project on listed eiders would be insignificant

Polar Bears
The Service listed the polar bear as a threatened species under the ESA on May 15, 2008 (73 FR 28212). Polar bears may occasionally pass through the area, although their density is low and encounters are expected to be infrequent. Transient (non-denning) bears entering the action area could be disturbed by the presence of humans or equipment noise. However, we expect disturbances would be minor and temporary because transient bears would be able to respond to human presence or disturbance by departing the area. Furthermore, we understand the applicant would develop a *Polar Bear Interaction Plan* to minimize potential impacts in the event a polar bear is encountered.

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[3] We expect the proposed barging operations would be of shorter duration (likely much shorter) than the length of a typical open-water season. We also acknowledge the timing of barge operations would be difficult to estimate with precision due to a number of factors including seasonal variation in sea ice conditions and marine forecasts. Therefore, lacking greater certainty in project timing, we have conservatively extrapolated our estimate to cover a full open-water season. We believe this represents an overestimation of collision risk to listed eiders. Furthermore, because appreciable collision risk to listed eiders is not expected despite this acknowledged overestimation, we expect actual collision risk to listed eiders may be considerably less than the level predicted.

In addition to transient animals, female polar bears may very rarely den in the project area. However, because topographic relief throughout the action area is minor and preferred denning habitat is characterized by steep, stable slopes that accumulate snow, we would expect polar bear denning within the project area to be very rare. Accordingly, we anticipate the probability of encountering denning polar bears would be extremely low.

Given 1) the density of polar bears in the action area is low, 2) encounters with polar bears are expected to be rare, 3) behavioral effects to transient bears would be minor and temporary, 4) mitigation measures would be included in the applicant's *Polar Bear Interaction Plan* to minimize potential impacts in the event transient or denning polar bears are encountered, and 5) the very low probability of polar bears denning in the action area; we expect cumulative effects of the proposed action on polar bears would be insignificant.

Polar bear critical habitat
On October 29, 2009, the Service proposed critical habitat for polar bears (74 FR 56058) and a final rule designating critical habitat was issued on December 7, 2010 (75 FR 76086). However, the U.S. District Court for the District of Alaska issued a decision to the Service on January 11, 2013 which vacated and remanded the final rule on polar bear critical habitat in *Alaska Oil and Gas Association et al. v. Salazar et al* (D. Alaska)(3:11-cv-00025-RRB). On February 29, 2016 the Ninth Circuit Court of Appeals upheld the final polar bear critical habitat rule on all points.

The proposed action would occur within Unit 3, barrier island habitat, of designated polar bear critical habitat (Figure 4). However, because the proposed construction would take place within a developed community, subsumed by existing levels of human activity and disturbance, the Service does not expect impacts from the proposed project would appreciably diminish the value of barrier island critical habitat for the survival and recovery of polar bears.

CONCLUSION

The proposed action could temporarily disturb listed eiders and polar bears in the project area. However, due to low densities of these species, and minimization measures included in the interaction guidelines, we expect the effects of disturbance to be insignificant. Therefore, the Service concludes the proposed action is not likely to adversely affect listed eiders or polar bears. Additionally, the proposed project would not adversely affect designated polar bear critical habitat. Preparation of a Biological Assessment or further consultation under section 7 of the ESA is not necessary at this time. Thank you for the opportunity to comment on this project. If you need further assistance, please contact Kaithryn Ott at (907) 456-0277.

Sincerely,

For Ted Swem
Endangered Species Coordinator

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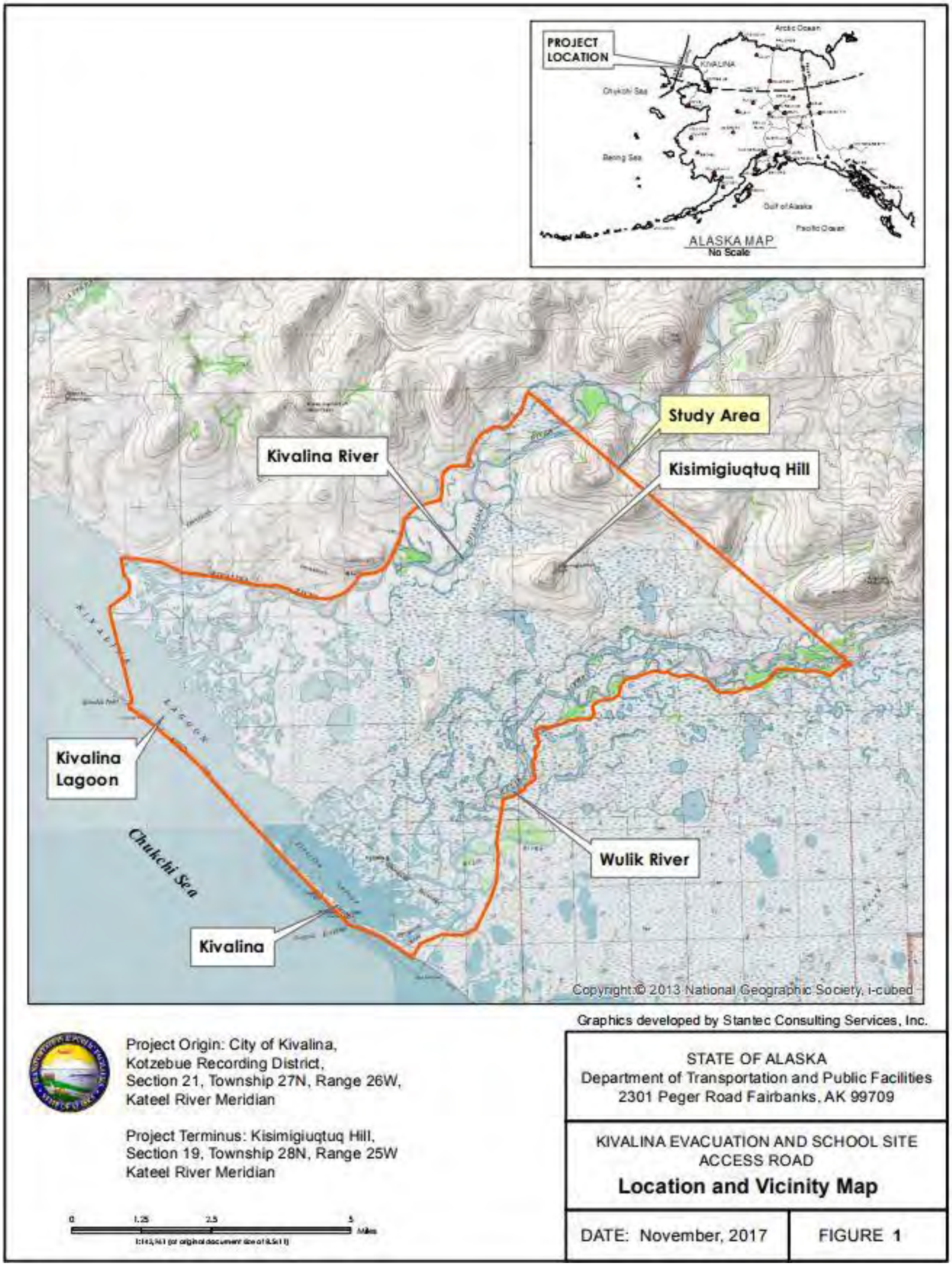

Figure 1. Location of the proposed project in the vicinity of Kivalina, Alaska.

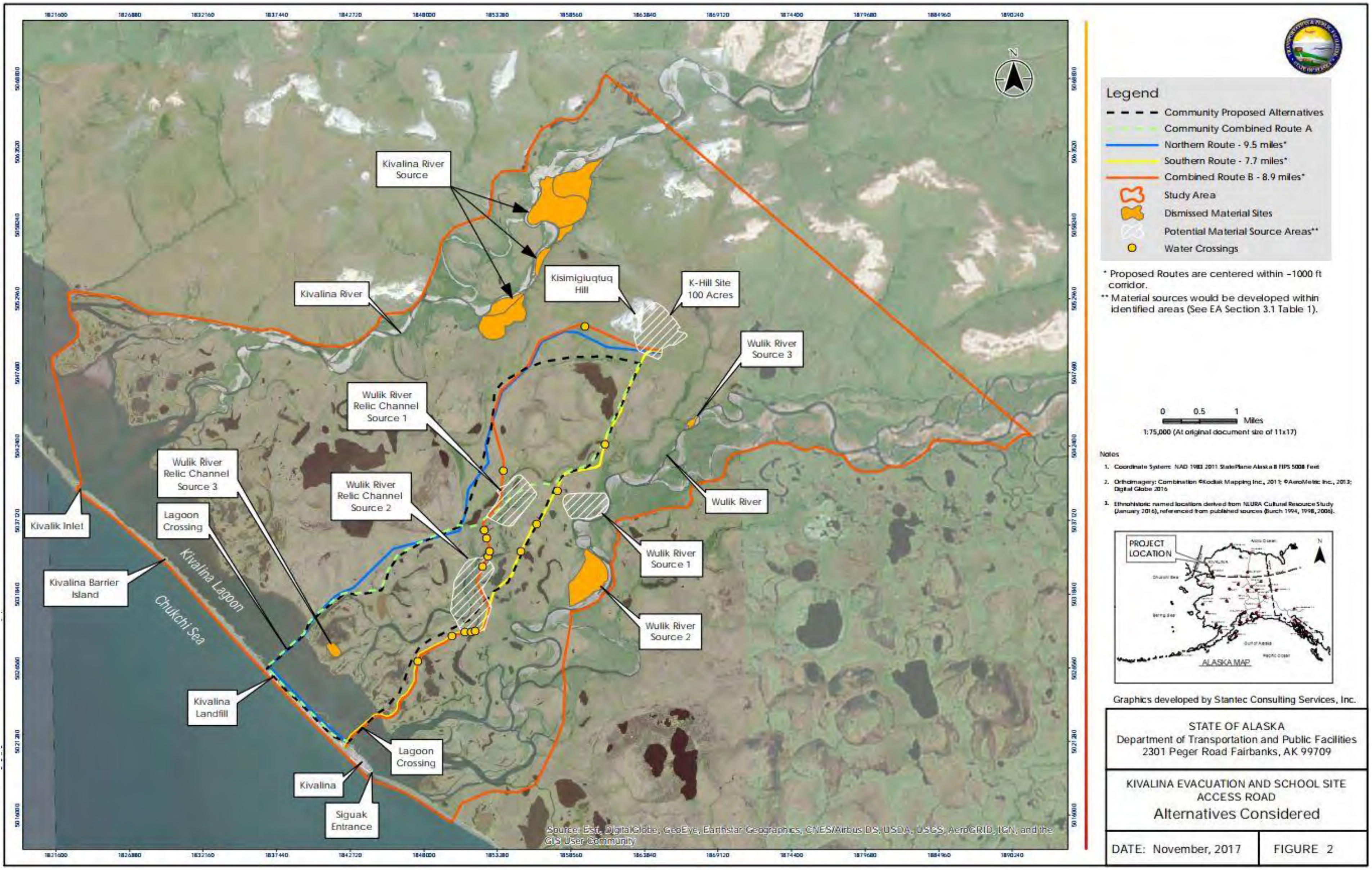

Figure 2. Detail of the proposed Kivalina Evacuation Road, including the preferred road alignment (yellow) to K-hill, and potential material sites (hatched polygons).

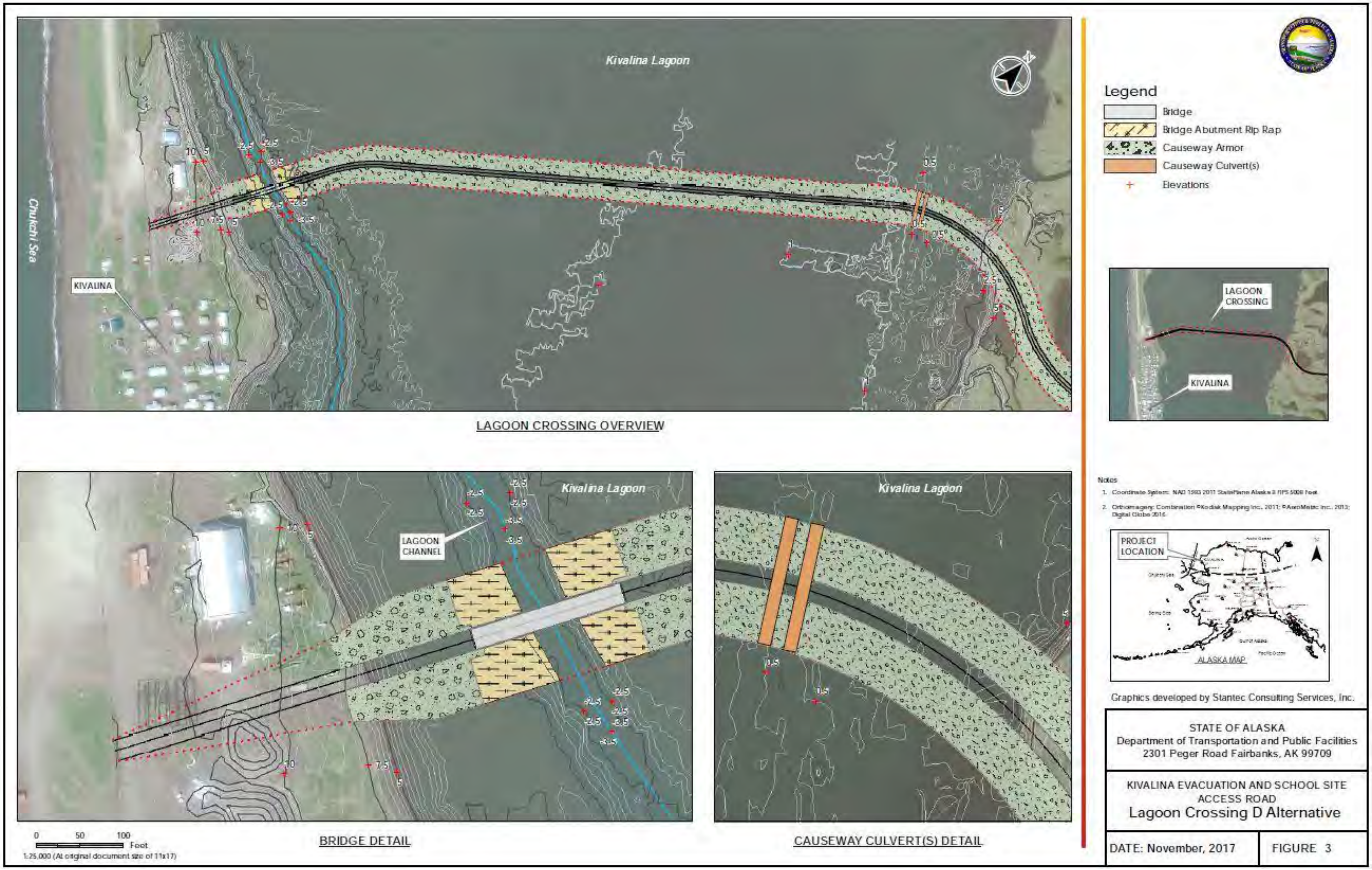

Figure 3. Detail of the proposed 0.98-km Kivalina Lagoon Causeway, including the lagoon channel bridge (bottom left) and northeastern culvert configuration (bottom right).

Figure 3. Designated barrier island critical habitat for polar bears within the Kivalina Evacuation Road action area.

THE STATE of ALASKA
GOVERNOR BILL WALKER

Department of Transportation and Public Facilities

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Preliminary Design and Environmental

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January 5, 2018

Jon Kurland
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RE: Request for Initiation of Informal Consultation under Section 7(a)(2) of the Endangered Species Act (ESA) for Kivalina Evacuation and School Site Access Road

The Alaska Department of Transportation and Public Facilities (DOT&PF) has assumed the responsibilities of the Federal Highway Administration under 23 U.S.C. 327, and is proposing to carry out the proposed project as described below. We request initiation of expedited informal consultation under Section 7(a)(2) of the Endangered Species Act for the Kivalina Evacuation and School Site Access Road. We have determined that the proposed activity may affect, but is not likely to adversely affect bearded seal (*Erignathus barbatus*), ringed seal (*Phoca hispida*), western distinct population segment (DPS) Steller sea lion (*Eumetopias jubatus*), North Pacific right whale (*Eubalaena japonica*), Mexico DPS humpback whale (*Megaptera novaeangliae*), western North Pacific DPS humpback whale, fin whale (*Balaenoptera physalus*), sperm whale (*Physeter macrocephalus*), bowhead whale (*Balaena mysticetus*), or designated Steller sea lion or North Pacific right whale critical habitat. Our supporting assessment is provided below. We request your written concurrence if you agree with our determinations.

Project Description

This proposed project is intended to construct a safe, reliable, all-season evacuation road between the community of Kivalina and Kisimigiuqtuq (K-Hill). We expect work to commence in August 2019 and continue over a three-year period.

DOT&PF has selected the Southern Route (Figure 1, 2) as the preferred alternative for this project (discussed further in the Environmental Assessment), which includes the following actions:

- Establishment of a safe, reliable, all-season Kivalina Lagoon crossing, consisting of a causeway and a bridge.

- Construction of an all-season access road connecting the Kivalina Lagoon crossing to the K-Hill evacuation site.
- Development of up to four material sources including the K-Hill Site, Wulik River Source 1, Wulik River Relic Channel Source 1, and Wulik River Relic Channel Source 2.

The selected contractor is likely to conduct the following project associated activities, which may result in residual effects on marine mammals:

- Use of small skiffs to transport personnel and gear across the lagoon to the inland portions of the project, and
- Construct in-water/over-water structures through placement of material in water.

Land based pile driving is also proposed for this project. As this activity is not occurring in water, effects to marine mammal are not anticipated. In addition, hauling activities along a Delong Mountain Transportation System (DMTS) Haul Route (ice road) is anticipated to occur along the beach, or on bottom fast ice (i.e. ice in waters less than 3 m (9.8 ft. deep). As this activity is not occurring in water, effects to marine mammals are not anticipated.

<u>Project specific vessels and Barges:</u>

Due to the availability of local material for this project, use of project specific barges that would transport material and equipment solely to and from the project area is not anticipated. It is anticipated that the contractor will utilize barges that regularly service communities in the region to deliver equipment or other materials needed to construct the project. We do not anticipate that barge activity specific to the project will occur in addition to traffic normally servicing the area. Barges that are contractually under project control would be considered *project specific*, and the operator would be required to follow specific mitigation measures as described throughout this assessment.

Although project specific barging is not anticipated, should it be required, examples may include such vessels as Crowley 455 Series, Labroy Ballastable Barges, or smaller.

The barges could use the existing community barge landing zone, at Kivalina and/or the dock at the DMTS. If barges dock at DMTS, goods and materials may be moved to the project construction area by a winter haul route (Figure 1 and 2). Barges will be pulled into position by up to two accompanying tug boats, which are of similar type to the current models used during the annual Kivalina resupply. Smaller vessels like the tugs associated with the proposed action have higher engine and propeller speeds than larger vessels or barges. The smaller vessel noise spectra peak around 300 Hz with a source level ranging from 145-170 dB re 1 µPa depending on if the tug is pulling an empty or loaded barge (Richardson 1995). Shipping sounds are often at source levels of 150-190 dB re 1 µPa at 1m (BOEM 2011).

During the open water months (June-November), small outboard-powered skiffs (or similar) present in Kivalina/owned by community members may be used to transport personnel and gear across the lagoon to the inland portions of the project. This activity may include up to 5 small boats (skiffs or similar), each being used three times a day, to transport goods and personnel across the lagoon. Total travel time across the lagoon would average 20 minutes per trip. This is similar in type and volume to existing local community boat traffic.

Vessel sound levels vary depending on the vessel and on operational speeds. For example, skiffs in Alaska have been measured to operate at sound levels between 160-170 dB_{rms} at 1 meter (Kipple and Gabriele 2003, no speed specified).

In-water or Over-water Structures:

Fill Placement

The Kivalina Lagoon crossing would require an approximately 3,020 ft solid, armored, earthen causeway to be placed in waters 1 to 3 feet deep A single span bridge would cross the existing 110 ft lagoon channel that is approximately 4 feet deep, located approximately 160 ft northeast from the barrier island (Figure 3). The single span bridge is proposed to provide fishery, subsistence use, biological (fish, marine wildlife, aquatic organism), and hydrologic connectivity through the causeway. The bridge would be a pile-supported structure with sloped, rock-protected earthen abutments or vertical sheet pile walls, and be designed to span the lagoon channel width to minimize potential impact to natural channel dimensions and function.

Large culvert(s), designed to accommodate passage of all life stages of fish, would be constructed at the northeast end of the causeway. A series of overflow pipes would be placed incrementally over the length of the solid portions of the causeway to provide additional conveyance during high water events.

The causeway and bridge will be installed using the following methods:

Fill activities to construct the causeway will likely occur in both the summer and winter. During the summer, the lagoon is open water, generally being 1-3 feet deep except for deeper areas near the mouth of the Wulik River and the channel paralleling Kivalina Island (Figure 3). During the winter, the shallow areas of the lagoon are primarily filled with grounded ice, with the mouth of the Wulik and the channel near Kivalina holding water. During high high-tides, water may lift the ice in the shallower portions of the lagoon for short periods.

Fill material would be obtained from permitted material sources proposed for this project, however the contractor may choose to import material from a commercial source outside the project area, such as Nome. Approximately 195,000 cy of gravel, rock, and rip rap will be required to construct the solid portion of the causeway. The substrate to be covered consists of fine grained sand and silt at the bottom of the lagoon.

The causeway embankment layer and rock protection may require up to 2 tracked excavators (or similar), 10 30-ton dump trucks (or similar), 2 bulldozers, 2 200-ton cranes (or similar), 4 180-HP Front End Loaders (or similar), 4 2-ton flatbed trucks (or similar), 6 ATVs, 2 40-horsepower work skiffs (or similar), and similar heavy construction equipment at any one time.

The base causeway embankment layer and rock protection may be constructed in the winter by removing the grounded ice in shallow depths of the lagoon; with no, or minimal water present.

Conventional winter excavation, using extended reach excavators, is the preferred method of removing the ice. Material will then be placed following project design to build the causeway.

Summer construction of the base causeway embankment layer and rock protection would involve extending the causeway from the mainland and/or barrier island side of the lagoon. Material could be placed by excavators and dump trucks off the pioneer earth portion of the causeway as it extends into the lagoon. Sediment containment would be constructed around the project to limit the off-site migration of silt and fine particles.

Winter travel on the ice within the lagoon will be used to transport equipment and material between Kivalina Island and the mainland during construction of the causeway.

Final embankment and rock protection will be added onto the solid portion of the causeway to meet engineered specifications for final grade and ensure structural integrity. This is likely to occur during the summer, with equipment operating from the causeway.

Pile driving

No in-water pile driving is proposed for this project. The causeway embankment will be placed first. Then the piles and/or sheet pile walls would be driven through the causeway embankment. Finally, the rip rap would be placed on top to armor the entire structure. This will prevent in-water pile driving, and the associated potential impacts to marine mammals. No equipment would be needed for in-water work, as no in-water pile driving is proposed for the project.

Since no in-water pile driving is proposed for the project and thus no marine mammal exclusion zones are being suggested for this activity. The contractor may designate a safety area to ensure increased level of safety for marine mammals during operations. No impacts to marine mammals from pile driving are expected since no in-water pile driving is proposed therefore pile driving will not be discussed further

Mitigation Measures

To minimize the risk of harm to marine species, the DOT&PF agrees to implement the following mitigation measures:

Project Specific Barges and Small Boats

1. If project specific barges are required, operators would be required to follow the best practices and safety regulations required of barge operators which regularly service the communities. In addition, barges that may provide some incremental project support but are not strictly under project control will be encouraged to avoid designated (73 FR 19000) North Pacific right whale critical habitat or maintain vigilant watch while under way in order to avoid vessel strikes to individuals of the Critically Endangered population frequenting the Bering Sea.
2. If project specific barges are required, during vessel transit, the project will follow 50 CFR 224.103 regulations and NMFS marine mammal viewing guidelines. The vessel operator will not purposely approach:
    a. Within 874 yd (800 m) of a North Pacific right whale;

   b. Within 100 yd (91.4 m) of other marine mammals; and
   c. Within 3 nm (5.5 km) of a major Steller sea lion rookeries or haulouts where vessel safety requirements allow and/or where practicable.
3. Small project-specific boats will move at less than 10 knots (kn; 18.52 km/h) when in the Kivalina Lagoon (Figure 1 and 2) to reduce noise impacts and for safe vessel maneuverability to avoid obstacles and marine mammals in the water.
4. If project specific barges are required and practicable vessel operation requires purposely approaching within 1.6 km (1 mi) of observed whales, except in emergency situations, the vessel operator will take reasonable precautions to avoid potential interaction with the whales by taking one or more of the following actions, as appropriate:
   a. Reducing vessel speed to less than 5 kn (9.26 km/h) within 300 yards (274 m) of whales and within 874 yd (800 m) of North Pacific right whales;
   b. Operating the vessel(s) in a manner that avoids direct approach of whales;
   c. Operating the vessel(s) in a manner that avoids separating members of any group of whales from other members of that group;
   d. Operating the vessel(s) to avoid causing a whale of any species to make multiple changes in direction
   e. If the vessel is taken out of gear, vessel crew will check the waters immediately adjacent to the vessel(s) to ensure that no whales of any species will be injured when the propellers are re-engaged; and
   f. Avoiding sudden vessel speed changes or operating the vessel in a way that increases noise emitted unless necessary to avoid an imminent threat to vessel or crew safety.
5. Reducing vessel speed to less than 5 kn (9.26 km/h) within 300 yards (274 m) of pinnipeds
6. If project specific barges are required, they will avoid transiting through identified (73 FR 19000) North Pacific right whale critical habitat. Protected Species Observers (PSOs) are not required if barges do not enter designated North Pacific right whale critical habitat. If transit through North Pacific right whale critical habitat occurs, the following will be implemented:
   a. Vessels will not make way in excess of 10 kn (18.52 km/h) while travelling within the boundaries of designated North Pacific right whale critical habitat.
   b. Dedicated PSOs will be on board all motorized vessels travelling through designated North Pacific right whale critical habitat. PSO's are not required if barges transit around North Pacific right whale critical habitat. PSOs will maintain a constant watch for all marine mammals from the bridge or other similar vantage point. PSO's will maintain direct contact with the vessel pilot, advising the pilot/operator of the position of all observed marine mammals as soon as they are observed.
   c. The vessel pilot/operator will maneuver vessels to the extent practicable to:
      i. Remain further than 874 yds (800 m) from North Pacific right whales,
      ii. Remain further than 100 yds from other marine mammal species, and
      iii. Avoid approaching any species of whale head-on.
7. Vessels will adjust speed and heading as needed to avoid disturbance of all marine mammals, provided vessel speed and heading adjustments are consistent with maintaining vessel safety.

Fill Placement

8. If material is being placed in summer during ice-free conditions, a qualified PSO will monitor for marine mammal presence and implement a 50 m (164 ft) exclusion zone around the material placement site to avoid physical harm, direct, and indirect takes by construction equipment.

9. If material is being placed in the winter, a PSO is only needed if there are areas of naturally-occurring open water within 50 m (164 ft) of construction activities. If there is no naturally-occurring open water within 50 m (164 ft) of construction activities, no PSO is required and no exclusion zone is necessary.
10. If an observed marine mammal is likely to approach within 50 m (164 ft) of the fill placement site, fill placement will stop until the marine mammal is farther than 50 m (164 ft) from the fill placement site, or is not seen for 15 minutes. The PSO will continuously scan the activity-specific monitoring zone for the presence of species for 30 min before any fill placement activities take place.
    a. If any species are present within the exclusion zone, fill placement activities will not begin until such animal(s) has left the exclusion zone or no species have been observed in the exclusion zone for 15 min (for pinnipeds) or 30 min (for cetaceans).
    b. If any species enter, or appear likely to enter, the exclusion zone during fill placement, all in-water activities will cease immediately. Fill placement activities may resume when the animal(s) has been observed leaving the area on its own accord. If the animal(s) is not observed leaving the area, fill placement activities may begin 15 min (for pinnipeds) or 30 min (for cetaceans) after the animal is last observed in the area.

Subsistence Activities

11. Signs will be installed reminding the public that State of Alaska Fish and Game regulations prohibit shooting from, on, or across a highway (5AAC 92.080; ADF&G 2006).

PSO Requirements

12. A PSO must be able to accurately field identify and distinguish between species of Alaska marine mammals.
13. PSOs will be positioned such that the entire activity-specific monitoring zone is visible to them (e.g., they must be stationed on a platform, elevated promontory, vessel bridge, or similar vantage point).
14. PSOs will have the following to aid in determining the location of observed listed species, to take action if listed species enter the exclusion zone, and to record these events:
    a. Binoculars
    b. Range finder
    c. GPS
    d. Compass
    e. Two-way radio communication with construction foreman/superintendent or vessel pilot/operator. A log book of all activities which will be made available to Federal Highway Administration, DOT&PF, and NMFS upon request.
17. The PSO will have no other primary duty other than to watch for and report on events related to marine mammals.
18. The PSO will work in shifts lasting no longer than 4 hrs with at least a 1-hr break between shifts, and will not perform duties as a PSO for more than 12 hrs in a 24-hr period (to reduce PSO fatigue).

Monitoring Report

19. During months in which PSOs are used on either barges or during fill placement, a monitoring report will be submitted at the end of the month to NMFS. The reporting period for each monthly PSO report will be the entire calendar month, and reports will be submitted

by close of business on the 15th day of the month following the end of the reporting period (e.g., the monthly report covering April 1 to 30, 2018, will be submitted to the NMFS by close of business on May 15, 2018).

  a. PSO report data will also include the following for each listed marine mammal observation (or "sighting event" if repeated sightings are made of the same animal[s]):
     i. Species, date, and time for each sighting event.
     ii. Number of animals per sighting event; and number of adults/juveniles/calves per sighting event (if determinable).
     iii. Primary, and, if observed, secondary behaviors of the marine mammals in each sighting event.
     iv. Geographic coordinates for the observed animals, with the position recorded by using the most precise coordinates practicable (coordinates must be recorded in decimal degrees, or similar standard (and defined) coordinate system).
     v. Time of the most recent project activity prior to marine mammal observation (for observations made during vessel transit, this value would be the same as the time of the marine mammal observation).
     vi. Environmental conditions as they existed during each sighting event, including Beaufort Sea state, weather conditions, visibility (km/mi), lighting conditions, and percent ice cover.

20. A final technical report will be submitted to NMFS within 90 days after the final day PSOs are required on the project. The report will summarize all activities associated with the proposed action in which a PSO was required, and results of marine mammal monitoring conducted during the in-water project activities. The final technical report will include items from the list above as well as the following:
  a. Summaries of monitoring efforts including total hours, coordinates of routes or locations observed each day (or other spatio-temporal representation of observer effort), and marine mammal locations.
  b. Summaries of various factors that may have influenced detectability of marine mammals (e.g., sea state, number of observers, fog, glare, percent ice cover, and other factors as determined by the PSOs).
  c. Species composition, occurrence, and locations of marine mammal sightings, including date, water depth, numbers, age/size/gender categories (if determinable), and group sizes.
  d. Number of marine mammals observed (by species) during periods with and without project activities (and other variables that could affect detectability), such as:
     i. Initial marine mammal sighting distances versus project activity at time of sighting.
     ii. Observed marine mammal behaviors and movement types versus project activity at time of sighting.
     iii. Numbers of marine mammal sightings/individuals seen versus project activity that was ongoing at time of sighting.
     iv. Distribution of marine mammals around the action area versus project activity at time of sighting.

If Take Occurs

Though take is not authorized, if a listed marine mammal is taken (i.e., a listed marine mammal(s) is observed entering the 50m exclusion zone before fill placement operations can be shut down, if a listed species is struck by a vessel), it must be reported to NMFS within one business day. PSO records for listed marine mammals taken by project activities must include:

a. All the information that must be listed in the PSO report.
b. Number of listed animals taken.
c. The date and time of each take.
d. The cause of the take (e.g., vessel strike, animal entered 50m exclusion zone).
e. The time the animal(s) was first observed and last seen.
f. If applicable, the time the animal(s) entered the exclusion zone, and, if known, the time it exited the zone.
g. Mitigation measures implemented prior to and after the animal was taken.

Description of the Action Area

The Action Area is defined in the ESA regulations (50 CFR 402.02) as the area within which all direct and indirect effects of the project will occur. The Action Area is distinct from and larger than the project footprint because some elements of the project may affect listed species some distance from the project footprint. The Action Area, therefore, extends out to a point where no measurable effects from the project are expected to occur.

For this project, the Action Area (Figure 1, 2) surrounds the City of Kivalina (67.72°N, -164.54°W), located on the southeast tip of the barrier island located between the Chukchi Sea (Arctic Ocean) and Kivalina Lagoon. The project terminus is located on the mainland across the Kivalina Lagoon approximately six miles northeast at a community selected evacuation site on Kisimigiuqtuq Hill (K-Hill, 67.80°N, -164.39°W). The area encompasses the Kivalina barrier island, the southern portion of Kivalina Lagoon, and the lower Wulik and Kivalina River drainages. For marine mammal consultation, the Action Area also includes the DMTS dock (67.58°N, -164.06°W), a winter nearshore barrier island/on sea ice haul route between the DMTS dock and City of Kivalina and, if project specific barges are required, a barging route from Unimak Pass.

NMFS Listed Species and Critical Habitat in the Action Area

Ringed and bearded seals maybe encountered during construction activities within the Kivalina Lagoon. No published systematic survey results for seal observation locations in Kivalina Lagoon have been collected. In the species descriptions below, summaries of seal presence within the Kivalina Lagoon are based on sightings, literature review and interviews with community members.

In addition to ringed and bearded seals, other listed species that could be encountered during barging activities include western DPS Steller sea lions, western North Pacific DPS humpback whales, Mexico DPS humpback whales, fin whales, sperm whales, North Pacific right whales, and bowhead whales. In addition, if project specific barges are required, vessel traffic may occur within Steller sea lion or North Pacific right whale designated critical habitats. Table 1 provides a list of the listed species and critical habitats that maybe encountered as part of the project.

Table 1: NMFS Listed Species and Critical Habitat expected in the Action Area

Species	Stock	Habitat typically used by the species in the Action Area	ESA listing	Critical Habitat	MMPA listing
Bearded seal	Alaska (Beringia DPS)	Kivalina Lagoon, Wulik River, waters outside of Lagoon	threatened	None Designated	depleted
Ringed seal	Alaska	Kivalina Lagoon, Wulik River, waters/ice outside of Lagoon	not listed*	-	not listed
Steller Sea Lions	Western DPS	Barging Route	threatened	Designated	depleted
North Pacific Right Whale	Eastern North Pacific	Barging Route	endangered	Designated	depleted
Humpback Whale	Western North Pacific DPS	Barging Route	endangered	None Designated	depleted
Humpback Whale	Mexico DPS	Barging Route	threatened	None Designated	depleted
Fin Whale	Northeast Pacific Stock	Barging Route	endangered	None Designated	depleted
Sperm Whale	North Pacific Stock	Barging Route	endangered	None Designated	depleted
Bowhead whale	Western Arctic	Barging Route	endangered	None Designated	depleted

NOTE: Species occurrence and activities can change and other species not listed by be observed in the area.

* ESA listing is currently being appealed in the U.S. District Court; National Oceanic and Atmospheric Administration (NOAA) Fisheries published a final rule listing the Arctic subspecies as threatened.

SOURCES: [a] Allen and Angliss (2014), [b] Muto et al. (2016), [d] Huntington et al. (2016)

Bearded Seals

Bearded seals are closely associated with sea ice – particularly during the critical life history periods related to reproduction and molting – and can be found in a broad range of ice types. They generally prefer ice habitat that is in constant motion and produces natural openings and areas of open water such as leads, fractures, and polynyas for breathing, hauling out on the ice, and access to water for foraging (Heptner et al. 1976a, Fedoseev 1984, Nelson et al. 1984). The bearded seal's effective range is generally restricted to areas where seasonal sea ice occurs over relatively shallow waters. Cameron et al. (2010) defined the core distribution of bearded seals as those areas over waters less than 500 m deep.

Bearded seals are seen coming into Kivalina Lagoon in the summer following fish (Huntington et al., 2016, Stantec, 2016a) and have been sighted at the north (Kivalik) (Stantec, 2016a) and south (Singuak) entrance to the lagoon (P. Hawley, personal communication, June 30, 2017). Juvenile bearded seals have been observed foraging up river channels in the fall (Huntington et al., 2016; Stantec, 2016a). Bearded seals are not expected to occur within the Kivalina Lagoon during the winter months.

Aerial surveys in the eastern Chukchi Sea, conducted in May and June, estimated highest densities of bearded seals (0.401 – 0.7 seals/km2; unadjusted for survey timing and haulout behavior) south of Kivalina and west of Kivalina in the offshore area, and moderate densities in coastal waters by Kivalina (0.051 – 0.2 seals/km2; unadjusted for survey timing and haulout behavior) (Bengtson et al., 2005). Movement data shows they have a wide range in the Chukchi Sea including the coastal waters near Kivalina in fall and summer (Boveng and Cameron, 2013; Wiese et al., 2017). Additional information on bearded seals is available at: https://alaskafisheries.noaa.gov/pr/ice-seals.

Ringed Seals

Ringed seal activity in the Chukchi Sea is strongly influenced by sea ice (Kelly et al., 2010). Movement data suggests that ringed seals use the Chukchi Sea, and coastal waters near Kivalina, year-round (ADF&G, 2015; Crawford et al., 2012; Von Duyke et al., 2017). Density estimates, based on aerial surveys conducted in May and June, are higher along the coast south of Kivalina (10.001-20 seals/km2; unadjusted for survey timing and haulout behavior) compared to the coastal region around Kivalina (2.001-5 seals/km2; unadjusted for survey timing and haulout behavior) (Bengtson et al., 2005). Ringed seals occur year-round in the Kivalina area (Huntington et al., 2016).

Recent field observations (Stantec, 2016b) confirmed seal presence within Kivalina Lagoon near the Kivalik and Siguak Inlets. Personal interviews conducted with local subsistence hunters concurrent to the Stantec survey effort also yielded generalizations that seals occasionally access shallower portions of the lagoon. However, follow up interviews with those and other local subsistence hunters in 2017 clarified that the majority of seal foraging in the lagoon occurs directly south and east of Singuak Inlet proximate to deeper water near and within the Wulik River outlet, and in like fashion within deeper waters between the mouth of the Kivalina River and its outlet to the Chukchi Sea at Kivalik Inlet. Comparatively, seal use of the shallow Lagoon Channel lying parallel to Kivalina Island is substantially less common, and generally limited to infrequent occasions of combined high water and thin ice in the lagoon (personal communications O. Hawley, September 15, 2017; R. Sage, September 15, 2017 and October 5, 2016; D. Foster October 5, 2016; P. Hawley September 15, 2017).

In winter, ringed seals excavate lairs in the snow above breathing holes for resting, pupping, and nursing young in both shorefast ice and pack ice. Snowdrifts of sufficient depth for birth lair formation and maintenance typically occur in deformed ice along pressure ridges or ice hummocks (Smith and Stirling 1975, Lydersen and Gjertz 1986, Kelly 1988, Furgal et al. 1996, Lydersen 1998). NMFS identified 54 cm as the minimum snowdrift depth because this was the average minimum depth reported in several studies of ringed seal lairs. Additional information on ringed seals is available at: https://alaskafisheries.noaa.gov/pr/ice-seals.

Western DPS Steller Sea Lions

The Steller sea lion was listed as a threatened species under the ESA on November 26, 1990 (55 FR 49204). In 1997, NMFS reclassified Steller sea lions into two distinct population segments (DPS) 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. On November 4, 2013, the eastern DPS was removed from the endangered species list (78 FR 66139). Information on Steller sea lion biology and habitat (including critical habitat) is available at: http://alaskafisheries.noaa.gov/pr/steller-sea-lions

The ability to detect sound and communicate underwater is important for a variety of Steller sea lion life functions, including reproduction and predator avoidance. NMFS categorizes Steller sea lions in the otariid pinniped functional hearing group, with an applied frequency range between 60 Hz and 39 kHz in water (NMFS 2016b).

If project specific barges are utilized, Steller sea lions maybe encountered along the barging route but are not expected to occur within Kivalina Lagoon or adjacent lands and waters where construction activities will take place.

Steller Sea Lion Critical Habitat

NMFS designated critical habitat for Steller sea lions on August 27, 1993 (58 FR 45269). In Alaska, designated critical habitat includes the following areas as described at 50 CFR §226.202.

1. Terrestrial zones that extend 3,000 feet (0.9 km) landward from each major haulout and major rookery.
2. Air zones that extend 3,000 feet (0.9 km) above the terrestrial zone of each major haulout and major rookery in Alaska.
3. Aquatic zones that extend 3,000 feet (0.9 km) seaward of each major haulout and major rookery in Alaska that is east of 144° W longitude.
4. Aquatic zones that extend 20 nm (37 km) seaward of each major haulout and major rookery in Alaska that is west of 144° W longitude.
5. Three special aquatic foraging areas: the Shelikof Strait area, the Bogoslof area, and the Seguam Pass area, as specified at 50 CFR §226.202(c).

If project specific barges are required and depending on the barging route, vessels may travel through Steller sea lion critical habitat, however vessels will not approach within 3 nm (5.5 km) of major Steller sea lion rookeries or haulouts.

North Pacific Right Whales
The North Pacific right whale was listed as an endangered species under the ESCA on June 2, 1970 (35 FR 8491). Congress replaced the ESCA with the ESA in 1973, and North Pacific right whales continued to be listed as endangered.. NMFS later divided the listing into two separate endangered species: North Pacific right whales and North Atlantic right whales (73 FR 120424; March 6, 2008). Only the North Pacific right whale occurs in Alaska. Information on biology and habitat of the North Pacific right whale is available at:
https://alaskafisheries.noaa.gov/pr/npr-whale and
http://www.adfg.alaska.gov/index.cfm?adfg=rightwhale.main

The North Pacific right whale is distributed 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, but sometimes travel into deeper waters. In the spring through the fall their distribution is dictated by the distribution of their prey. 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.

Right whales have been consistently detected in the southeastern Bering Sea around the localized area of designated critical habitat during spring and summer feeding seasons (Goddard and Rugh. 1998, Moore 2000, Moore et al. 2002, Zerbini et al. 2009, Rone et al. 2010, Rone et al. 2012). Of the 184 recent right whale sightings reported north of the Aleutian Islands, 182 occurred within the area designated as critical habitat in the Bering Sea.

Analysis of the data from bottom-mounted acoustic recorders deployed in October 2000, January 2006, May 2006, and April 2007 indicates that right whales remain in the southeastern Bering Sea from May through December with peak call detection in September (Munger and Hildebrand 2004, Stafford and Mellinger 2009). Recorders deployed from 2007 to 2013 have not yet been fully analyzed, but indicate the presence of right whales in the southeastern Bering Sea almost year-round, with a peak in August and a sharp decline in detections in early January (Bonnie Easley-Appleyard, NMFS Pers. Comm. Catherine Berchok, AFSC-NMML, 7600 Sand Point Way NE, Seattle, WA; unpublished data).

A study of right whale ear anatomy indicates a total possible hearing rage of 10 Hz to 22 kHz (Parks et al. 2007). NMFS categorizes right whales in the low-frequency cetacean functional hearing group, with an applied frequency range between 7 Hz and 35 kHz (NMFS 2016b). Additional information on North Pacific right whales can be found at:
https://alaskafisheries.noaa.gov/pr/npr-whale.

North Pacific Right Whale Critical Habitat
Critical habitat for the North Pacific right whale was designated in the eastern Bering Sea and in the Gulf of Alaska on April 8, 2008 (73 FR 19000). The physical or biological features (PBFs) deemed necessary for the conservation of North Pacific right whales include the presence of specific copepods (*Calanus marshallae*, *Neocalanus cristatus*, and *N. plumchris*), and euphausiids (*Thysanoessa Raschii*) which are primary prey items for the species, and physical

and oceanographic forcing that promote high productivity and aggregation of large copepod patches.

If project specific barges are required and depending on the barging route, barges may either travel through, or alternatively around, North Pacific right whale critical habitat. Additional information on North Pacific right whale critical habitat can be found at: https://alaskafisheries.noaa.gov/pr/npr-whale.

Figure 1. North Pacific right whale critical habitat in the Bering Sea and Gulf of Alaska.

Western North Pacific And Mexico DPS Humpback Whales

The humpback whale was listed as endangered under the Endangered Species Conservation Act (ESCA) on December 2, 1970 (35 FR 18319). Congress replaced the ESCA with the ESA in 1973, and humpback whales continued to be listed as endangered. NMFS recently conducted a global status review and changed the status of humpback whales under the ESA. The Western North Pacific DPS (which includes a small proportion of humpback whales found in the Aleutian Islands, Bering Sea, and Gulf of Alaska) is listed as endangered; the Mexico DPS (which includes a small proportion of humpback whales found in the Aleutian Islands, Bering Sea, Gulf of Alaska, and Southeast Alaska) is listed as threatened, and the Hawaii DPS (which includes most humpback whales found in the Aleutian Islands, Bering Sea, Gulf of Alaska, and Southeast Alaska) is not listed (81 FR 62260; September 8, 2016). Critical habitat has not been designated for the Western North Pacific or Mexico DPSs.

The abundance estimate for humpback whales in the Bering Sea Aleutian Islands is estimated at 2,427 (CV= 0.2) animals, which includes whales from the Hawaii DPS (86.5%), Mexico DPS (11.3%), and Western North Pacific DPS (4.4%[1]) (NMFS 2016a, Wade et al. 2016).

Unalaska Island is situated between Unimak and Umnak Passes, important humpback whale migration routes and feeding areas. Humpback whales tagged from August to September in Unalaska Bay, the waterbody adjacent to Captains Bay, were detected in Captains Bay (Kennedy et al. 2014). Given the documented abundance of humpback whales in and near Captains Bay, we assume humpback whales may be present during barging activities.

Additional information on humpback whale biology and natural history is available at:
http://www.nmfs.noaa.gov/pr/species/mammals/whales/humpback-whale.html
http://alaskafisheries.noaa.gov/pr/humpback
http://www.fisheries.noaa.gov/pr/sars/pdf/stocks/alaska/2015/ak2015_humpback-cnp.pdf

Fin Whales

The fin whale was listed as an endangered species under the ESCA on December 2, 1970 (35 FR 18319), and continued to be listed as endangered following passage of the ESA.

Coastal and pelagic catch data from the first half of the twentieth century indicate that fin whales were not uncommon near Unalaska Bay and around Unalaska Island (Nishiwaki 1966, Reeves et al. 1985); however, fin whales have been documented infrequently around Unalaska Island since whaling ended (Stewart et al. 1987, Zerbini et al. 2006). Summer aerial surveys of arctic marine mammals (ASAMM) indicate the presence of fin whales west of Kivalina; survey effort in this region does not extend south of 67° N, west of 169° W or east of 166° W (Figure 2). It therefore seems likely that barges may observe fin whales while in transit.

[1] For endangered Western North Pacific DPS we chose the upper limit of the 95% confidence interval from the Wade et al. (2016) estimate in order to be conservative due to their status.

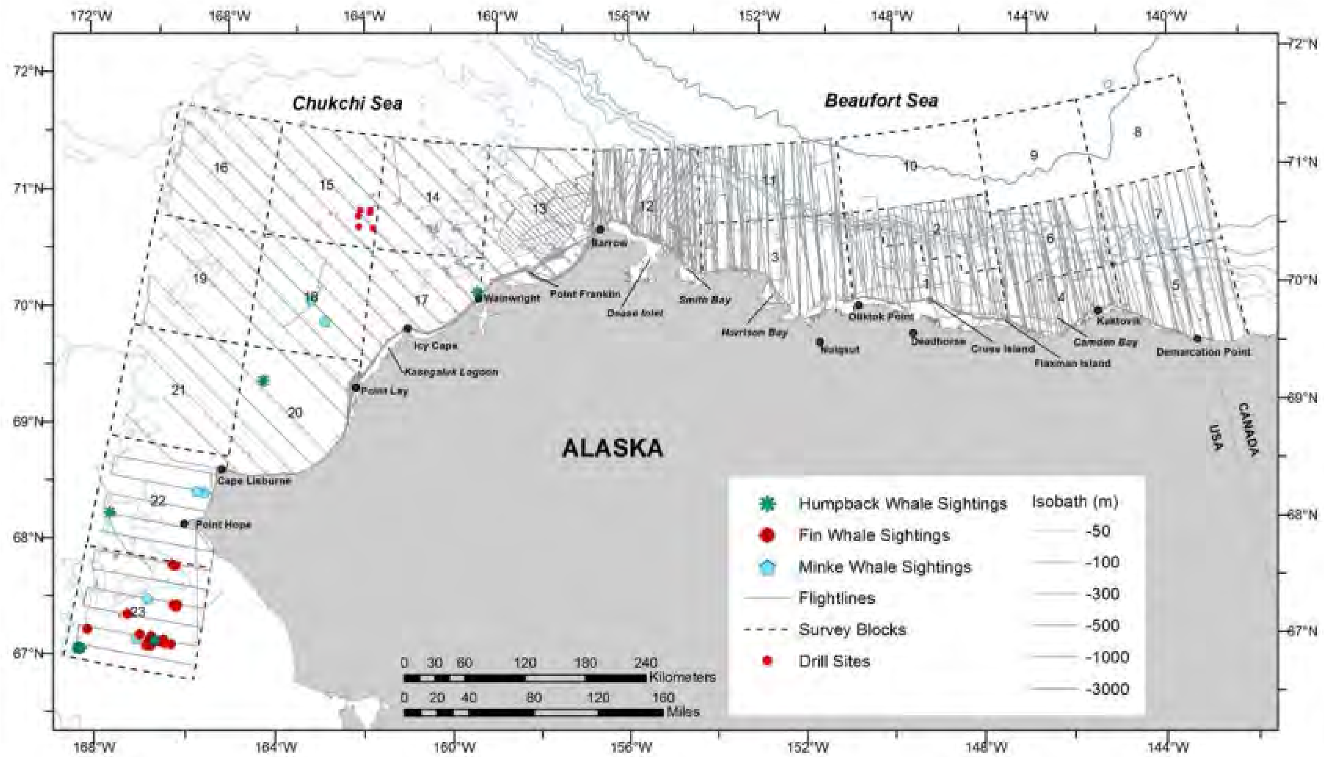

Figure 2 ASAMM 2015 humpback, fin, and minke whale sightings, with transect, search, and circling effort. Source: BOEM 2017

Fin whales produce a variety of low-frequency sounds in the 10 Hz to 0.2 kHz range. While there is no direct data on hearing in low-frequency cetaceans, the applied frequency range is anticipated to be between 7 Hz and 35 kHz (NMFS 2016b). Synthetic audiograms produced by applying models to X-ray computed tomography scans of a fin whale calf skull indicate the range of best hearing for fin whale calves to range from approximately 20 Hz to 10 kHz, with maximum sensitivities between 1 to 2 kHz (Cranford and Krysl 2015). Additional information on fin whale biology and habitat is available at:
http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/finwhale.htm
http://www.fisheries.noaa.gov/pr/sars/pdf/stocks/alaska/2014/ak2014_finwhale.pdf

Sperm Whales
The sperm whale was listed as an endangered species under the ESCA on December 2, 1970 (35 FR 18319), and continued to be listed as endangered following passage of the ESA.

Sperm whales are primarily found in deep waters and sightings of sperm whales in water less than 300 m (984 ft) are uncommon. If project specific barges are required, sperm whales may be encountered along the barging route of the proposed action.

Four of the most common threats cited for Southeast Alaska sperm whales are interactions with commercial fishing, whale watching, acoustic disturbance and ship strikes (NMFS 2010). Neilson et al. (2012) found that out of the 89 defined whale strikes documented from 1978-2011 only one of those was a sperm whale and the fate of that whale is unknown. The level of effects on sperm whales from ship noise is not fully understood, but effects are expected to be similar to those described for humpback whales (NMFS 2010). From 2006-2010, there were 11 sperm whales mortalities reported in the Alaska Region Stranding Program (Allen and Angliss 2015). However the cause of death could not be determined for any of these whales.

Sperm whales produce a variety of vocalizations ranging from 0.1 to 20 kHz (Weilgart and Whitehead 1993, Goold and Jones 1995, Møhl et al. 2003, Weir et al. 2007). Sperm whales are odontocetes (tooth whales) and are considered mid-frequency cetaceans with an applied frequency range of 150 Hz to 160 kHz (NMFS 2016b). The only direct measurement of hearing was from a young stranded individual from which auditory evoked potentials were recorded and indicated a hearing range of 2.5 to 60 kHz (Carder and Ridgway 1990). Additional information on sperm whale biology and habitat is available at:
http://www.fisheries.noaa.gov/pr/species/mammals/whales/sperm-whale.html
http://www.fisheries.noaa.gov/pr/sars/pdf/stocks/alaska/2014/ak2014_spermwhale.pdf

Bowhead Whale

The bowhead whale was listed as endangered under the ESCA on December 2, 1970 (35 FR 18319), and continued to be listed as endangered following passage of the ESA. Bowhead whales in Alaskan waters comprise the Western Arctic stock. Western Arctic bowhead whales are distributed in seasonally ice-covered waters of the Arctic and near-Arctic, generally north of 60°N and south of 75°N. Critical habitat has not been designated for the bowhead whale.

The 2011 ice-based abundance estimate was 16,892 (CV = 0.2442) indicating a minimum population estimate for the Western Arctic stock of bowhead whales of 13,796 (Allen and Angliss 2015). The population may be approaching carrying capacity despite showing no sign of a slowing in the population growth rate (Brandon and Wade 2006). The current estimate for the annual rate of increase for this stock of bowhead whales is 3.2-3.4% (George et al. 2004, Schweder et al. 2010).

In Alaska, the majority of bowhead whales migrate annually from northern Bering Sea wintering areas (December to March), through the Chukchi Sea in spring (April to May), to the Beaufort Sea in waters off Alaska and Canada, where they spend much of the summer (June through early to mid-October) before returning to Bering Sea wintering areas in fall (September through December).

Bowhead whales have an extensive and varied acoustic repertoire that includes simple calls, call sequences, and complex songs. NMFS categorizes bowhead whales in the low-frequency cetacean functional hearing group, with an applied frequency range between 7 Hz and 35 kHz (NMFS 2016b). Inferring from their vocalizations, bowhead whales should be most sensitive to frequencies between 20 Hz-5 kHz, with maximum sensitivity between 100-500 Hz (Erbe 2002b). Additional information on bowhead whale biology and habitat is available at:

http://www.fisheries.noaa.gov/pr/species/mammals/whales/bowhead-whale.html
http://www.nmfs.noaa.gov/pr/sars/pdf/stocks/alaska/2014/ak2014_bowhead.pdf

Effects of the Action

For purposes of the ESA, "effects of the action" means the direct and indirect effects of an action on the listed species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action (50 CFR 402.02). The applicable standard to find that a proposed action is "not likely to adversely affect" listed species or critical habitat is that all of the effects of the action are expected to be insignificant, discountable, or completely beneficial. Insignificant effects relate to the size of the impact and are those that one would not be able to meaningfully measure, detect, or evaluate, and should never reach the scale where take occurs. Discountable effects are those that are extremely unlikely to occur. Beneficial effects are contemporaneous positive effects without any adverse effects to the species.

Physical Presence

Temporary disturbance could occur during project specific barging (if project specific barging is required), small vessel transit within the Kivalina Lagoon, and fill placement activities. An animal is disturbed when human activities alter an animal's natural behavior. A listed species could react to project activities by either investigating the vessel or project equipment or by being startled from project activities. Disturbance from project activities could temporarily increase stress levels or displace an animal from its habitat.

If project specific barges are required, they will travel along transit routes that are frequently used by many ocean-going vessels, and small vessels used within Kivalina Lagoon will travel slowly (< 10kn). Neither barges nor small construction related vessels purposely will approach marine mammals, and will implement the previously detailed mitigation measures in an effort to avoid marine mammals or minimize the impact of the physical presence of humans, vessels and equipment on marine mammals. In-work work (i.e. fill placement activities) will be delayed or stopped if a marine mammal approaches the 50 m (164 ft) fill placement exclusion zone. Taken together, we have determined that the physical presence of humans, vessels and equipment associated with this project will be very small, and is therefore insignificant.

Acoustic Disturbance

Project specific barging and small vessels

Underwater noise from barges may temporarily disturb or mask communication of bearded seal, and ringed seal, western distinct population segment (DPS) Steller sea lion, North Pacific right whale, Mexico DPS humpback whale, western North Pacific DPS humpback whale, fin whale, sperm whale, and bowhead whale. Construction-specific vessels in the lagoon would create underwater noise, which may result in the disturbance or communication masking of ringed or bearded seals. Other listed pinniped and whale species are not expected to occur within the lagoon.

Behavioral reactions from vessels can vary depending on the type and speed of the vessel, the spatial relationship between the animal and the vessel, the species, and the behavior of the animal prior to the disturbance from the vessel. The effects of boat noise on ringed, and bearded seal behavior are not well known. During the open water season in the Chukchi Sea, bearded and ringed seals are commonly observed close to vessels where received sound levels are low (e.g., (Harris et al. 2001, Moulton and Lawson 2002, Blees et al. 2010, Funk et al. 2010b). Funk et al. (2010a) noted among vessels operating in the Chukchi Sea where received sound levels were <120 dB, 40% of observed seals showed no response to a vessel's presence, slightly more than 40% swam away from the vessel, 5% swam towards the vessel, and the movements of 13% of the seals were unidentifiable. Bisson et al. (2013) reported a total of 938 seals observed during vessel-based monitoring of exploratory drilling activities by Shell in the Chukchi Sea during the 2012 open water season. The majority of seals (42%) responded to moving vessels by looking at the vessel, while the second most noted behavior was no observable reaction (38%). The majority of seals (58%) showed no reaction to stationary vessels, while looking at the vessel was the second most common behavioral response (38%). Other common reactions to both moving and stationary vessels included splashing and changing direction.

Studies on other seal species have shown displacement due to the presence of high levels of vessel traffic in the case of grey seals (Anderwald et al. 2013). Harbor seals are more likely to be disturbed and enter water from a haulout if vessels are within 150 m than when vessels are farther away (Mathews et al. 2016). Currently, all boat traffic in the lagoon is related to community activities. Reductions in boat speeds have been shown to reduce the extent of underwater noise (e.g., Houghton et al. 2015).

It is expected that vessel noise from barges if project specific barges are required, are the only project specific activity that may result in potential impacts to whales and Steller sea lions, due to the rest of the work being located inside of Kivalina Lagoon. If animals are exposed to vessel noise they may exhibit slight deflection from the noise source, engage in lowlevel avoidance behavior, short-term vigilance behavior, or short-term masking behavior, but these behaviors are not likely to result in adverse consequences for the animals. Individual whale's past experiences with vessels appear to be important for individual whale response (Shell 2012). Vessels moving at slow speeds and avoiding rapid changes in direction may be tolerated by some species. Other individuals may deflect around vessels and continue on their migratory path. Humpback whale reactions to approaching boats are variable, ranging from approach to avoidance (Payne 1978, Salden 1993). Whales have been known to tolerate slow-moving vessels within several hundred meters, especially when the vessel is not directed toward the animal and when there are no sudden changes in direction or engine speed (Wartzok et al. 1989, Richardson et al. 1995a, Heide-Jorgensen et al. 2003).

Recreational boats currently use the lagoon and are active when seals are present. We have also considered the likelihood that an increase in vessel traffic related to the activities associated with the proposed project would generally increase the risk of interactions between marine mammals and vessels in the action area, in addition to baseline conditions. The use of a barge will cause a small, localized, temporary increase in vessel traffic. When this project is completed, it will not result in an increased number of vessels in the Action Area.

If project specific barges are required, barging activities associated with the proposed action would be transitory and temporary. Barges will either avoid North Pacific right whale critical habitat or travel through critical habitat at speeds less than 10 kn (18.52 km/h) and with designated PSOs. Small vessels within the lagoon will be traveling at speeds of less than 10 kn (18.52 km/h). Barges and vessels will not purposely approach a marine mammal within 100 yd (91.4m) or a North Pacific right whale within 874 yd (800 m). The vessel operator will follow 50 CFR 224.103 regulations and NMFS marine mammal viewing guidelines. Therefore, we conclude that acoustic disturbance from project specific barges and small vessels is insignificant.

Vehicle and Equipment Noise

Bearded and ringed seals may be exposed to noise from construction vehicles and out of water equipment. If constructed, the bridge, haul route (ice road) between DMTS to Kivalina, and crossing the Kivalina Lagoon may expose ringed and bearded seals of all life stages to vehicular noise. Ringed seals have acute in-air hearing (Sills et al. 2014; Sills et al. 2015). In-air hearing of bearded seals has not been studied, but due to the wide frequency range of their vocalizations (Risch et al. 2007), similar in-air hearing capabilities to ringed seals may be assumed. Vehicular noise would be audible to species present and may result in changes in behavior, although behavioral responses can vary widely depending on context and novelty of the noise source (Ellison et al. 2012; Richardson et al. 1995; Southall et al. 2007). Densities of basking ringed seals present in spring during active use of a proximate ice road did not vary between years (Moulton et al. 2005). Harwood et al. (2007) also report no avoidance of an ice road by ringed seals in the south-eastern Beaufort Sea, suggesting they were not displaced by in-air noise from the vehicular traffic. A contrasting study concluded that in-air noise from snow machines, when within 2.8 km, resulted in most ringed seals leaving their lairs (Kelly et al. 1988). Given the current presence of boat traffic within the lagoon in the open water season and the presence of snow machines during the winter, seals in the Action Area would have been previously exposed to noise. Seals would be expected to habituate to this new noise regime (Moulton et al. 2005), and no long-term changes of seal presence and behavior due to vehicle noise is expected.

Effects on ringed and bearded seals from in-air vehicle and out of water equipment noise within the lagoon are expected to be minimal given the current human presence near and around the lagoon. Effects from the haulout route are expected to be minimized by maintaining the haul route on barrier islands and on bottom fast sea ice. Therefore, we conclude that acoustic disturbance from project specific vehicles and equipment is insignificant.

Fill Placement

Placement of fill in water would also create underwater noise, but is anticipated to be at levels below that of boat noise. The anticipated specific levels of these noises are not known for this project, but it is unlikely that their levels would result in injury to seals within the lagoon. Levels of underwater noise may result in disturbance of marine mammals, although ringed seals were not displaced by slope preparations and deposition of gravel during construction of an artificial island in the Beaufort Sea (Blackwell et al. 2004). Ice associated species are naturally exposed to underwater noise from ice movement and cracking, with varying intensities, depending on conditions and scenario (Richardson et al. 1995). For example, an active pressure ridge produced source levels of 124–137 dB re 1 µPa m in the 4 and 8 Hz tones (Buck and Greene 1979).

The project will implement a 50 m (164 ft) fill placement exclusion zone, therefore we conclude that acoustic disturbance from fill placement is insignificant.

Physical Effects

Vessel Strike

Barges and small vessels transiting the marine environment have the potential to collide with, or strike, marine mammals (Laist et al. 2001, Jensen and Silber 2003). From 1978-2012, there were at least 108 recorded whale-vessel collisions in Alaska, with the majority occurring in Southeast Alaska (Neilson et al. 2012). Among larger whales, humpback whales are the most frequent victims of ship strikes in Alaska, accounting for 86% of all reported collisions. Fin whales accounted for 2.8% of reported collisions, gray whales 0.9%, and sperm whale 0.9%. Six of the whales (5.6%) were unidentifiable and the remaining are of non-listed species. 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. Vanderlaan and Taggart (2007) used observations to develop a model of the probability of lethal injury based upon vessel speed. They projected that the chance of lethal injury to a whale struck by a vessel is approximately 80 percent at vessel speeds over 15 kn (27.78 km/hr) and approximately 20 percent at 8.6 kt (15.92 km/hr).

Although risk of ship strike has not been identified as a significant concern for Steller sea lions (Loughlin and York 2000), the recovery plan for this species states that Steller sea lions may be more susceptible to ship strike mortality or injury in harbors or in areas where animals are concentrated [e.g., near rookeries or haulouts; (NMFS 2008)]. To minimize this risk, project vessels will not travel within 3 nm (5.5 km) of major Steller sea lion haulouts or rookeries.

Recreational boats currently use the lagoon and are active when seals are present. The possibility of vessel strikes of seals in the Kivalina Lagoon is minimal given that vessels will travel at speeds of less than 10 kn (18.52 km/h) and per the data analyzed in Alaska waters which documented no ship strikes of bearded, or ringed seals over a five-year period (Helker et al. 2016, 2017).

Project specific barges and vessels will not approach any species of whales or pinnipeds within 100 yd (91.4m) or a North Pacific right whale within 874 yd (800 m). Project specific barges will either avoid North Pacific right whale designated critical habitat or alternatively travel through designated critical habitat at speeds less than 10 kn (18.52 km/h) and with designated PSOs. Small vessels within Kivalina lagoon will be traveling at speeds of less than 10 kn (18.52 km/h). The vessel operator will follow 50 CFR 224.103 regulations and NMFS marine mammal viewing guidelines. Therefore, we have determined that this action is extremely unlikely to result in a vessel strike of listed marine mammals and we conclude that these effects are discountable.

Habitat Alteration

Bearded seal, and ringed seal may be exposed to the effect of material being placed on the shoreline or bottom of the lagoon, but whales will not. Adults or juvenile seals may be exposed to effects of habitat alteration during foraging trips near the Wulik River.

The presence of the lagoon-crossing structure may result in an ecological and physical alteration of marine mammal habitat in the lagoon as it may change distribution of prey species, and movement of seals. It is not known if seals would swim through culverts, but the presence of a bridge over the deepest lagoon channel with water flowing freely beneath it is not expected to impede their passage (e.g., Shelden et al. 2013). Marine mammal use of habitat on either side of in-water structures, and their swimming beneath such structures, has been observed for other projects (e.g., Twentymile River Bridge, Cook Inlet, Alaska; HDR Alaska Inc. 2010). The proposed design of the lagoon crossing is not anticipated to negatively affect bearded, or ringed seal habitat use and foraging as it would accommodate the passage of both seals and their prey. Prey densities are not anticipated to be adversely affected to a measurable degree by this project.

Ringed seals are visual hunters and increases in turbidity from fill or culvert placement may temporarily impede visibility within very small areas within their preferred feeding habitats. However, pinnipeds (including ringed seals and bearded seals) have highly developed sensory organs (i.e., vibrissae) which likely assist with foraging in dark or turbid conditions (e.g., Hyvärinen 1989; Marshall et al. 2006). As such, any changes in behavior caused by increased turbidity in the lagoon are unlikely to result in measurable harmful effects on seals. Further, if this activity occurs in winter, effects would be limited to ringed seals as they are the only marine mammal species likely to be present.

The location and presence of the proposed causeway and lagoon crossing is not anticipated to measurably affect bearded or ringed seals or their habitat because the project is designed to facilitate movement of seals and their prey within the lagoon beneath the open-span channel crossing, and seal prey densities within the lagoon and in surrounding waters are not anticipated to be adversely affected to a measurable degree.

Given the causeway’s design, and incorporation of design elements to ensure passage between the North and South side of Kivalina Lagoon, the shallow waters in which fill will be placed and the implementation of a 50 m (164 ft) exclusion zone during fill placement activities, we conclude that effects of the causeway and bridge on ringed and bearded seals and their habitat (including prey abundance) will be very small, and is therefore insignificant.

Hunting Pressure

A permanent structure across the lagoon would increase lagoon accessibility. The location of the crossing would span an area of the lagoon that is currently accessible via boat during the open water period. However, State of Alaska Fish and Game regulations state that shooting from, on, or across a highway is illegal (5AAC 92.080; ADF&G 2006). Installation of signs along the road are an easy method of reminding the public of the regulations. As a result, legal hunting pressure would remain unchanged as a result of this project, and effects from changes in hunting of listed species is therefore insignificant and discountable.

Conclusions

Based on the above, it is expected that potential effects of the proposed action will be insignificant and/or discountable once mitigation measures are in place. As a result, we have determined that the Kivalina Evacuation and School Site Access Road project may affect, but is not likely to adversely affect, any listed species or critical habitat under NMFS’s jurisdiction. We have used the best scientific and commercial data available to complete this assessment. We request your concurrence with this determination.

Sincerely,

Brett O Nelson

Brett Nelson
Northern Region Environmental Manager

cc: Paul Karczmarczyk, DOT&PF
Jonathan Hutchinson, P.E., DOT&PF
Bonnie Easley-Appleyard, NMFS
Greg Balogh, NMFS

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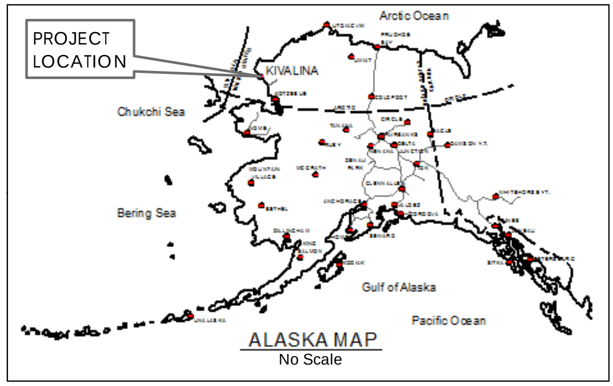
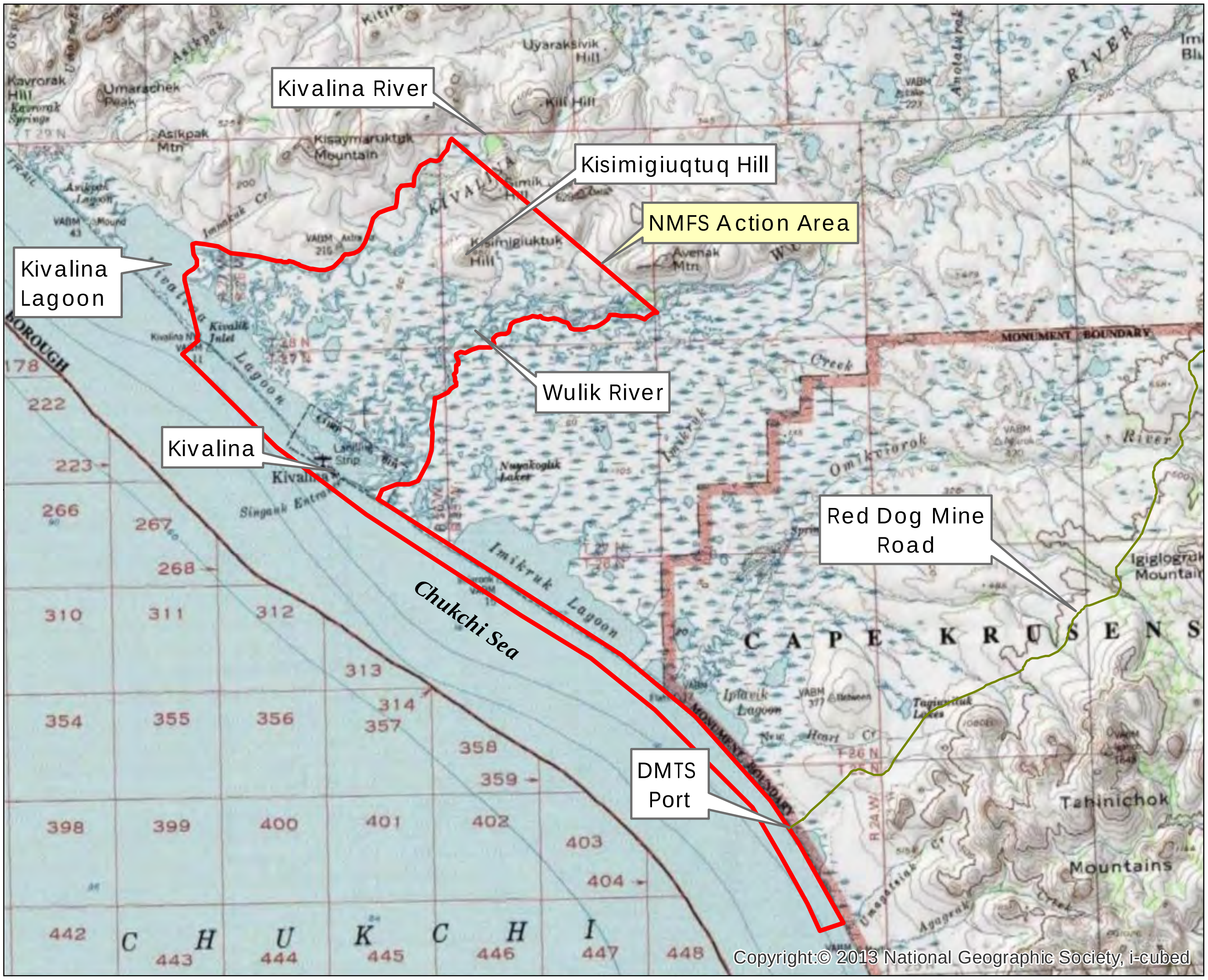
Figures





Graphics developed by Stantec Consulting Services, Inc.

Project Origin: City of Kivalina,
Kotzebue Recording District,
Section 21, Township 27N, Range 26W,
Kateel River Meridian

Project Terminus: Kisimigiuqtuq Hill,
Section 19, Township 28N, Range 25W
Kateel River Meridian

0 2.5 5 10 Miles
1:300,000 (at original document size of 8.5x11)

STATE OF ALASKA
Department of Transportation and Public Facilities
2301 Peger Road Fairbanks, AK 99709

KIVALINA EVACUATION AND SCHOOL SITE ACCESS ROAD
Request for Initiation of Informal Consultation
National Marine Fisheries Service

Location and Vicinity Map

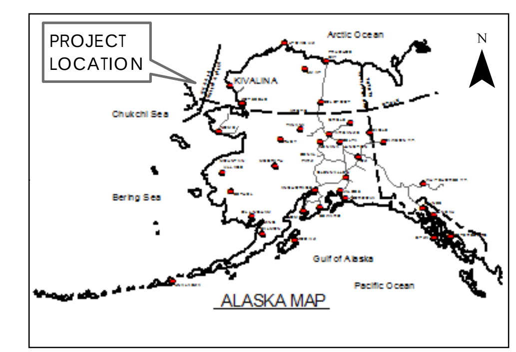
DATE: January, 2018	FIGURE **1**

U:\2047055102\GIS\mxd\NMFS_Informal Consultation\2047055102_NMFS_Fig-1_Loc-Vic_Map.mxd Revised: 2018-01-02 By: cpannone

Legend
- Southern Route - 7.7 miles
- Winter Access via DMTS Port
- Potential Material Source Areas
- NMFS Action Area

0 1 2 Miles
1:160,000 (At original document size of 11x17)

Notes
1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
2. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011; ©AeroMetric Inc., 2013; Digital Globe 2016



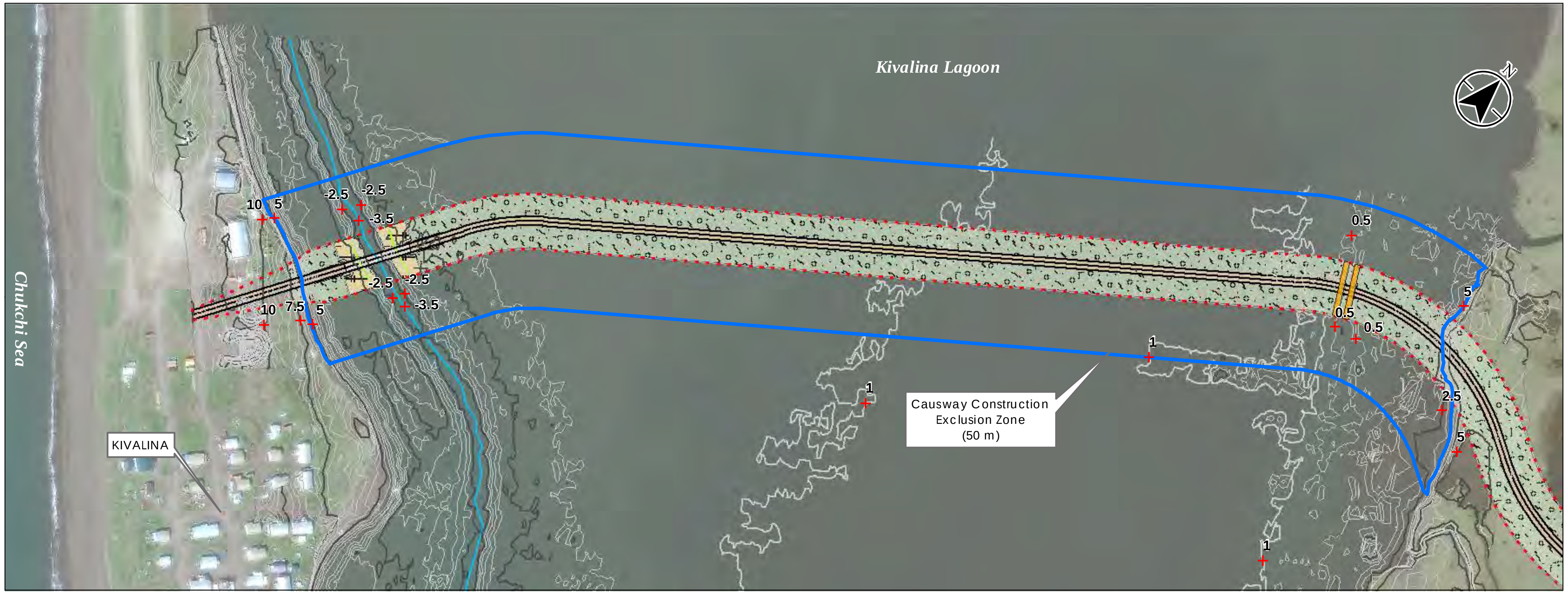
Graphics developed by Stantec Consulting Services, Inc.

STATE OF ALASKA
Department of Transportation and Public Facilities
2301 Peger Road Fairbanks, AK 99709

KIVALINA EVACUATION AND SCHOOL SITE ACCESS ROAD
Request for Initiation of Informal Consultation
National Marine Fisheries Service

Proposed Action

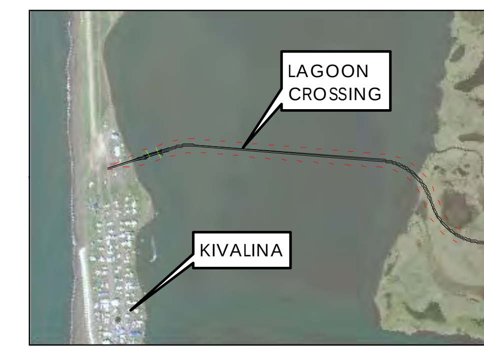
DATE: January, 2018 | FIGURE 2



LAGOON CROSSING OVERVIEW

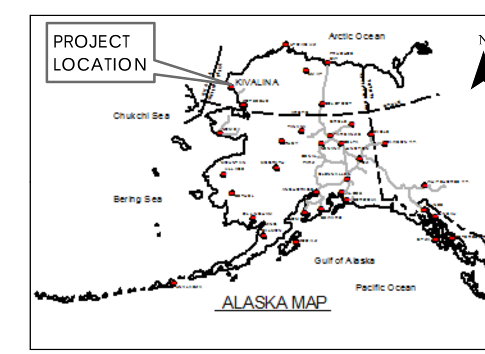
Legend

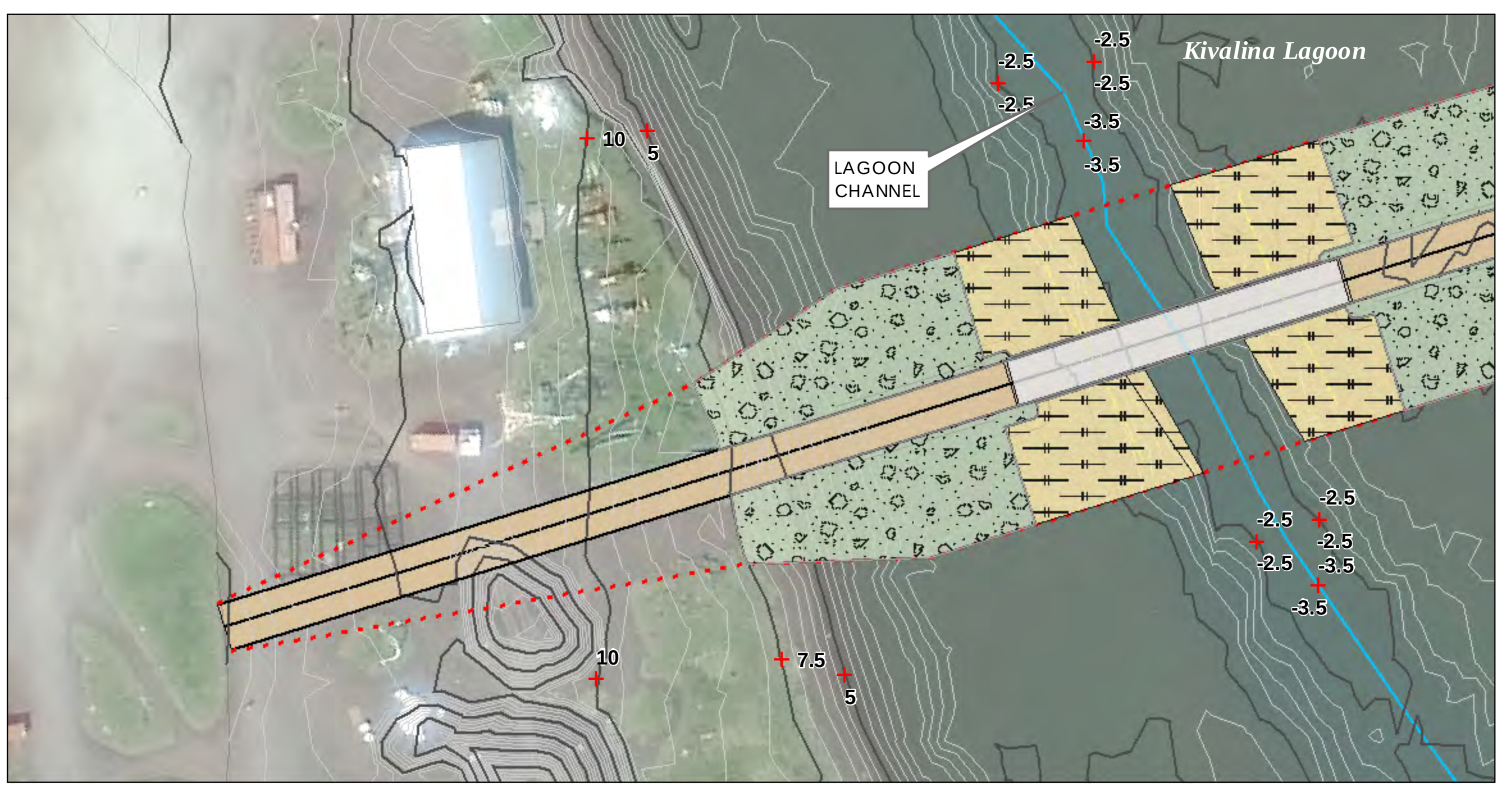
- Bridge
- Bridge Abutment Rip Rap
- Causeway Armor
- Causeway Culvert(s)
- Proposed Road
- Causeway Construction Exclusion Zone (50 m)
- × Elevation (ft)



Notes

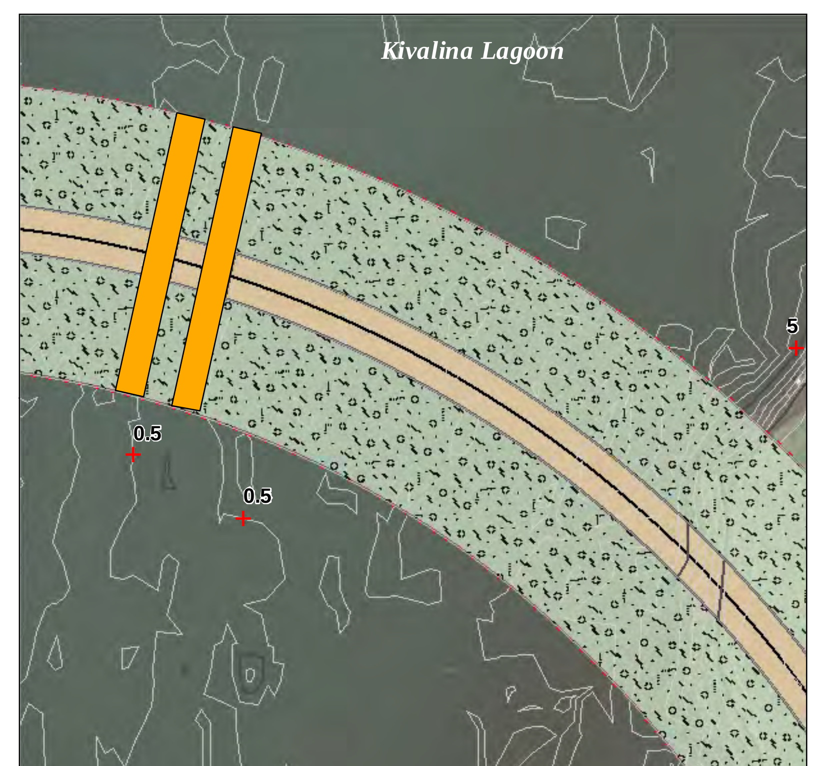
1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
2. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011; ©AeroMetric Inc., 2013; Digital Globe 2016





1:25,000 (At original document size of 11x17)

BRIDGE DETAIL



CAUSEWAY CULVERT(S) DETAIL

Graphics developed by Stantec Consulting Services, Inc.

STATE OF ALASKA
Department of Transportation and Public Facilities
2301 Peger Road Fairbanks, AK 99709

KIVALINA EVACUATION AND SCHOOL SITE ACCESS ROAD
Request for Initiation of Informal Consultation
National Marine Fisheries Service

Lagoon Crossing D Alternative

DATE: January, 2018 | FIGURE 3

U:\2047055102\GIS\mxd\NMFS_informalConsultation\2047055102_NMFS_Fig-3_Lagoon Crossing Alternatives.mxd Revised: 2018-01-02 By: cpannone

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
P.O. Box 21668
Juneau, Alaska 99802-1668

January 9, 2018

Brett Nelson
Alaska Department of Transportation and Public Facilities
Northern Region
2301 Peger Road
Fairbanks, AK 99709

Re: Kivalina Evacuation and School Site Access Road Letter of Concurrence, NMFS #AKR-2018-9717

Dear Mr. Nelson:

This letter responds to your request for concurrence from the National Marine Fisheries Service (NMFS) pursuant to Section 7 of the Endangered Species Act (ESA) for the development of the Kivalina Evacuation and School Site Access Road. NMFS received an initial request for an expedited informal consultation on November 30, 2017. NMFS requested additional information via email and phone December 8 through December 18, 2017. On December 19, 2017, the Alaska Department of Transportation and Public Facilities (DOT&PF) submitted a revised request for expedited informal consultation. NMFS requested additional information December 21 through January 4, 2017. DOT&PF submitted a revised request on January 5, 2018 for concurrence that this project is not likely to adversely affect threatened or endangered species or their critical habitat. This request met our criteria for expedited review and contained all required information on the proposed action and its potential effects to listed species and designated critical habitat.

We reviewed your consultation request document and related materials. Based on our knowledge, expertise, and the materials you provided, we concur with your conclusion that the proposed action is not likely to adversely affect bearded seal, ringed seal, western distinct population segment (DPS) Steller sea lion, North Pacific right whale, Mexico DPS humpback whale, western North Pacific DPS humpback whale, fin whale, sperm whale, bowhead whale, or designated Steller sea lion or North Pacific right whale critical habitat. A complete administrative record of this consultation is on file at the Anchorage NMFS office.

Reinitiation of consultation is required where discretionary federal involvement or control over the action has been retained or is authorized by law and if (1) take of listed species occurs, (2) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered, (3) the action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this concurrence letter, or (4) a new species is listed or critical habitat designated that may be affected by the identified action (50 CFR 402.16).

Please direct any questions regarding this letter to Bonnie Easley-Appleyard at Bonnie.Easley-Appleyard@noaa.gov or (907) 271-5172.

Sincerely,

for James W. Balsiger, Ph.D.
Administrator, Alaska Region

cc: Paul Karczmarczyk, DOT&PF (paul.karczmarczyk@alaska.gov)
Jonathan Hutchinson, P.E., DOT&PF (jonathan.hutchinson@alaska.gov)

APPENDIX H

WETLAND VERIFICATION REPORT

Page

Kivalina Evacuation and School Site Access Road

Wetland Verification Report

Prepared for:
State of Alaska
Department of Transportation &
Public Facilities
Northern Region
2301 Peger Road
Fairbanks, Alaska 99709

Prepared by:
Stantec Consulting Services, Inc.
725 E Fireweed Lane, Suite 200
Anchorage, AK 995003

September 14, 2017

Table of Contents

LIST OF APPENDICES

Executive Summary

The Alaska Department of Transportation and Public Facilities (DOT&PF) and the Federal Highway Administration (FHWA), in partnership with the Northwest Arctic Borough (NAB), Native Village of Kivalina, and the City of Kivalina, propose community safety improvements in Kivalina, Alaska by constructing an evacuation road between Kivalina Island and a site on Kisimigiuqtuq Hill (K-Hill) where a school planned for construction by the NAB would also serve as a safe emergency evacuee assembly site.

A desktop *Wetland Delineation and Functions & Values Assessment* was conducted by Arctic Slope Regional Corporation (ASRC) Energy Services in 2015 (ASRC 2015). This report updates that desktop delineation and functional assessment with ground observations and other information gathered during the following efforts:

- March/April 2015 Golder Associates geotechnical investigations (Golder Associates 2015)
- September 2016 Stantec site reconnaissance (Stantec 2016)
- October 2016 Stantec cultural resources investigation (Stantec 2017)
- August 2017 USACE wetland determination (USACE 2017)
- August 2017 Stantec site reconnaissance (this report)
- 2011 aerial imagery, updated LIDAR (Light Detection and Ranging)
- Agency coordination

The Study Area is a large wetland complex with a variety of emergent, dwarf, and low shrub habitat. Rivers, lakes, and ponds are common defining characteristics. Most of the subsurface data gathered found at least shallow soil saturation, and many field observations described seasonal or permanently flooded regimes.

There are a limited number of uplands scattered throughout the Study Area. K-Hill dominates the eastern end of the Study Area, and provides elevated upland topography with wetlands surrounding its base.

Vegetation consists of low and dwarf shrub, and wet and mesic herbaceous polygons. These provide a variety of wildlife habitat. Most importantly, in consultation with the US Fish and Wildlife Service (USFWS), low scrub habitat was identified as important bird nesting habitat.

Wetlands in the Study Area are high functioning and common. They are largely undisturbed, and operating in their natural state. Rivers, lakes, ponds, estuaries, ocean, and bird nesting habitat was increased to the highest functional value to aid project planners in avoiding these important features.

All wetlands and Waters of the United States were determined to be hydrologically connected to the Kivalina River, Wulik River, or Kivalina Lagoon, which are connected to the Chukchi Sea, a traditional navigable Water of the U.S. For this reason, wetlands and Waters of the U.S. in the Study Area are presumed jurisdictional by the USACE under Section 404 of the CWA and Section III.D.2 of the Jurisdictional Determination Form.

Abbreviations

ANSRAM	Arctic North Slope Rapid Assessment Method
ASRC	Arctic Slope Regional Corporation
AVC	Alaska Vegetation Classification
cm	centimeter
DOT&PF	Department of Transportation and Public Facilities
E1UB	Estuarine, Subtidal, Unconsolidated Bottom
E2US	Estuarine, Intertidal, Unconsolidated Shore
FHWA	Federal Highway Administration
GPS	Global Positioning System
K-Hill	Kisimigiuqtuq Hill
L1UB	Lacustrine, Limnetic, Unconsolidated Bottom
LiDAR	Light Detection and Ranging
m	meter
M1UB	Marine, Subtidal, Unconsolidated Bottom
M2US	Marine, Intertidal, Unconsolidated Shore
NA	Not Applicable
NAB	Northwest Arctic Borough
NWI	National Wetlands Inventory
OFS	Overall Functional Score
PEM1/SS1B	Palustrine Persistent Emergent/ Broad-Leaved Deciduous Scrub Shrub, Saturated
PEM1/SS1C	Palustrine Persistent Emergent/ Broad-Leaved Deciduous Scrub Shrub, Seasonally Flooded
PEM1/SS1F	Palustrine Persistent Emergent/Broad-Leaved Deciduous Scrub Shrub, Semi-permanently Flooded
PEM1C	Palustrine Persistent Emergent, Seasonally Flooded
PEM1F	Palustrine Persistent Emergent, Semi-permanently Flooded
PSS1/EM1B	Palustrine Broad-Leaved Deciduous Scrub Shrub/ Persistent Emergent, Saturated
PSS1/EM1C	Palustrine Broad-Leaved Deciduous Scrub Shrub/ Persistent Emergent, Seasonally Flooded
PSS1/EM1E	Palustrine Broad-Leaved Deciduous Scrub Shrub/ Persistent Emergent, Seasonally Flooded/Saturated
PSS1C	Palustrine Broad-Leaved Deciduous Scrub Shrub, Seasonally Flooded
PSS1J	Palustrine Broad-Leaved Deciduous Scrub Shrub, Intermittently Flooded
PUBH	Palustrine, Unconsolidated Bottom, Permanently Flooded
R2UB	Riverine, Lower Perennial, Unconsolidated Bottom
R2US	Riverine, Lower Perennial, Unconsolidated Shore
R3UB	Riverine, Upper Perennial, Unconsolidated Bottom
USACE	US Army Corps of Engineers
USFWS	US Fish and Wildlife Service

USGS	US Geological Survey
W	Water

1.0 INTRODUCTION

1.1 PROJECT DESCRIPTION

The Alaska Department of Transportation and Public Facilities (DOT&PF) and the Federal Highway Administration (FHWA), in partnership with the Northwest Arctic Borough (NAB), Native Village of Kivalina, and the City of Kivalina, propose community safety improvements in Kivalina, Alaska, by constructing an evacuation road between Kivalina Island and a site on Kisimigiuqtuq Hill (K-Hill) where a school planned for construction by the NAB would also serve as a safe emergency evacuee assembly site. Figure 1 (Appendix A) displays the location and vicinity of the proposed project.

1.2 SITE LOCATION

The proposed project origin is at the City of Kivalina, located on the southeast tip of the barrier island located between the Chukchi Sea (Arctic Ocean) and Kivalina Lagoon (Figure 1). The project terminus is located on the mainland across the Kivalina Lagoon approximately six -miles northeast at a community selected evacuation site on Kisimigiuqtuq Hill (K-Hill). The Study Area encompasses the Kivalina barrier island, the southern portion of Kivalina Lagoon, and the lower Wulik and Kivalina River drainages.

2.0 BACKGROUND INFORMATION

A proposed inland access route in the Kivalina region has been the subject for study for many years. This wetland verification report is the compilation of at least three years of effort evaluating wetlands for the access alternatives. The intent of this report is to integrate the previous desktop and field efforts to provide one comprehensive wetlands resource.

A desktop only wetland delineation was conducted in 2015 (ASRC 2015) for a smaller Study Area, commissioned by the Northwest Arctic Borough (NAB). Subsequently, at least four field efforts (March/April 2015 [Golder Associates 2015], September 2016 [Stantec 2016], October 2016 [Stantec 2017], August 2017 [USACE 2017 and this report]) were conducted and provide on the ground verification for the initial desktop delineation.

This report updates and expands the ASRC (2015) desktop effort by compiling the field efforts, and generating USACE Wetland Datasheets and photo points. These points document the vegetation, soil, and hydrology characteristics of the area. This report also provides an updated functional assessment using the same method (updated with field data) as the previous desktop assessment. By compiling the previous efforts, this wetland verification report provides the best available information on wetlands in the Study Area.

2.1 EXISTING WETLAND INFORMATION

A desktop *Wetland Delineation and Functions & Values Assessment* was conducted in 2015 by ASRC Energy Services (ASRC 2015). ASRC conducted aerial photography interpretation, using information from:

- *National Wetlands Inventory* (NWI);
- U.S. Geological Survey (USGS) topographic maps;
- Kivalina Evacuation and School Access Road Reconnaissance Study (WHPacific 2014);
- Kivalina Evacuation Road Preliminary Environmental Report (WHPacific 2012a); and
- Kivalina Evacuation Route Significant Biotic Resources Baseline Report and Preliminary, Essential Fish Habitat Analysis (WHPacific 2012b).

ASRC produced wetland pdf maps with polygons classified by the *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin et al. 1979). ASRC also conducted a desktop Functions and Values Assessment using a method they developed, ANSRAM (Arctic North Slope Rapid Assessment Method).

The ASRC wetland report found that the area was composed almost exclusively of high quality wetlands, and that little to no disturbance has taken place on the mainland. The wetlands were of such uniformly high quality, that certain features (e.g. waters and rivers) were elevated from a Category I to a Category I+. This allowed project planners to avoid features of inherent elevated importance when planning features across the landscape.

The lack of field data to support this desktop effort was addressed by at least four field efforts (March/April 2015 [Golder Associates 2015], September 2016 [Stantec 2016], October 2016 [Stantec 2017], August 2017 [USACE 2017 and this report]).

2.2 EXISTING VEGETATION INFORMATION

The Study Area has National Wetland Inventory Cowardin classification mapping available, which was used as a guide in classifications. The previous desktop Wetland Delineation effort also used the Alaska Vegetation Classification (AVC) System (Viereck 1992) to Level III. The Viereck classification system is an Alaskan specific habitat classification system, particularly useful for evaluating wildlife habitat. It is subtly different than Cowardin, and provides a greater level of detail in habitat classifications (e.g. tall, short, dwarf shrubs).

The Stantec site reconnaissance field efforts included vegetation photographs. This involved taking GPS-linked site photographs, and brief notes on wetlands, hydrology, and plant cover. These photographs provide key vegetation cover information for this wetland report. The photographs and notes allow vegetation to be classified on the Cowardin and Viereck systems. Species composition and percent cover can also be assigned from this effort, allowing the completion of USACE Wetland Datasheets.

2.3 EXISTING SOILS INFORMATION

The USDA Soil Survey does not have information available for the Study Area and no such information has been reported on in previous wetland reports.

We developed key soil information from multiple sources. The first soil field effort occurred in March and April of 2015. Golder Associates conducted spring geotechnical investigations primarily around gravel source exploration in the Study Area (Golder Associates 2015). The profiles provide evidence of deep organics and high levels of water content in the soils. This supports both wetland soil and hydrology characteristics.

Second, in October 2016 and August 2017, Stantec and the USACE conducted a cultural and wetland field efforts (Stantec 2016, 2017, USACE 2017). These efforts conducted site testing at multiple sites, providing logs of soil profiles. These soil profiles do not have Munsell color notations (Munsell 2010), but do provide valuable soil information (e.g. organic depths, colors, texture, saturation) about the organic layers in the Study Area.

Cultural resource investigations typically focus on rises, ridges, and uplands; which are common historic gathering places. Areas of standing water and similar polygonal tundra are not high probability landforms to find cultural materials within the region. As a result, soil profiles available from these efforts are most likely upland sites. This underscores their importance, as the relatively rare upland sites the wetland delineation is seeking are the most likely to have soil information available.

2.4 EXISTING HYDROLOGY INFORMATION

Hydrology information in the ASRC report was limited and interpreted solely from aerial photography and online databases. The subsequent field efforts provided important additional hydrology insights needed to map wetlands more accurately.

Site photographs and notes from the Stantec and USACE field efforts made evident that most of the Study Area is seasonally or permanently flooded, and provided evidence of subtle, but critical, hydrological differences (e.g. saturation, seasonally flooded, standing water). This information allowed aerial signatures to be groundtruthed, particularly on flooded low centered polygon complexes which are surrounded by seasonally flooded wetlands.

The Golder Geotechnical field effort (Golder Associates 2015) also had valuable hydrology notations collected during soil profiling (e.g. saturation, ice wedges). These notations allowed the USACE Standard Forms to be completed. Often a shallow water table was not specifically noted (this information is not typically collected during cultural and geotechnical investigations), and had to be assumed.

This report also uses new Light Detection and Ranging (LiDAR) and aerial imagery to understand the important topography and hydrology changes. These allow the tracing of topographic features that were not evident in the ASRC report.

3.0 METHODOLOGY

The wetland verification efforts compiled data from the ASRC wetland report (ASRC 2015); and field datasets: March/April 2015 [Golder Associates 2015], September 2016 [Stantec 2016], October 2016 [Stantec 2017], August 2017 [USACE 2017 and this report]. The data analysis was conducted and report written by Professional Wetland Scientists to provide a comprehensive groundtruthed analysis of wetlands in the Study Area.

Methodology for this wetland verification do not follow the transect methods outlined in the *Corps of Engineers Wetlands Delineation Manual* (USACE, 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Alaska Region (Version 2.0)* (USACE, 2007). Instead, this verification uses the general guidance of the regional supplement to provide a best available information compilation of knowledge of the Study Area.

Mapping in the Study Area is divided into two categories. National Wetlands mapping boundaries was used for the entire Study Area, and classifications were updated with results from the field efforts. Inside the core Study Area (the region studied by the NAB), mapping boundaries and classification was updated in fine scale resolution. This method allowed broad scale alternative evaluation on the entire Study Area, and fine scale mapping for proposed impacts.

3.1 WETLAND VERIFICAITON

<u>Digitizing Existing ASRC Data:</u> The wetland shapefiles from the ASRC report were not available. but the pdfs in the ASRC wetland map had location information electronically embedded in them, allowing the creation of a mosaic of geoTiffs. These were brought into ArcGIS, and wetland polygons were digitized and attributed at 1:3,000 scale. While digitizing the maps, wetland boundaries and Cowardin classifications were updated for polygons as needed, using more recent and high resolution aerial imagery. In addition, field data (photos and soil profiles) were reviewed to further verify wetland boundaries and classifications where available.

<u>Data Compilation:</u> Standard USACE Wetland Determination Data Forms were completed at all locations where sufficient vegetation, soils, and hydrology information could be extrapolated from ground observations. Data forms were completed at 11 locations within the Study Area and are included in Appendix B. Each data form fully documents which field effort the vegetation, soils, and hydrology data came from.

Photo points (Appendix C) allow best professional judgment to apply wetland designations to specific habitats and were completed where vegetation, soils, and hydrology data were partially available, but did not give enough detail to complete full determination forms. Photo points are intended to provide ground observations to confirm desktop mapping for wetland indicators such as saturation, restrictive layers, and hydrophytic vegetation. Each standard and photo point location sampled during the field investigation was collected in a handheld global positioning system (GPS) unit. Photo point forms were completed at 37 locations within the Study Area.

Wetland delineation data form and photo point locations are shown on maps included in Appendix A.

3.2 FUNCTIONAL ASSESSMENT

The ASRC (2015) methodology used a rapid desktop functional assessment (ANSRAM). The methodology and previous datasheets are included in the previous wetland report (ASRC 2015). The ASRC report found that almost all wetlands were Category I, with a few Category II saturated wetlands. For that report, under best professional judgement; all riverine, tidal, estuarine, and lacustrine water bodies, as well as flooded palustrine wetlands were elevated to Category I+. This was done to aid project planners in avoiding important wetlands.

For this report's analysis, we had additional consultation with agencies to determine the functional rankings. Similar to the ASRC report; all ponds, riverine, tidal, estuarine, and lacustrine water bodies were elevated to the Category I+. All saturated wetlands (PSS1/EM1B) were ranked as a Category II, also similar to ASRC.

For this project, the USFWS has indicated that high quality shrub areas are important migratory bird habitat. This habitat was mapped and identified in this report as Closed Low Scrub habitat (II.C.I). This 'low scrub' habitat is the highest vegetation habitat in the region (taller than 'dwarf shrub'). To accommodate this important function, all Closed Low Scrub habitat (II.C.I) was promoted one functional level. PSS1/EM1B wetlands that were bird habitat were upgraded to Category I, the rest of bird habitat was elevated to Category I+. The primary difference between the ASRC (2015) report and this method, was that we did not find all flooded palustrine wetlands to be I+. This value was overstated, when compared to the bird habitat.

4.0 RESULTS AND DISCUSSION

4.1 WETLANDS AND WATERS

Table 1 below summarizes the standard and photo data points.

Table 1: Summary of Standard and Photo Data Points

Type	Point
Standard (Appendix B)	HP40, P7, P12, P14, P16, P20, P27, P32, P37, P45, P56
Photo (Appendix C)	HP1, HP4, HP11, HP15, HP19, HP21, HP22, HP24, HP36, HP37, HP38, HP39, JAJ-17-009, JRH-17-12, P1, P2, P3, P4, P22, P24, P25, P30, P34B, P35, P36, P41A, P41B, P42, P48, P50, P54, P58, P59, USACE1, USACE2, USACE3, WCP1

The majority of habitat within the Study Area is comprised of wetlands (74%) or waters (23%) within the Wulik and Kivalina River drainages (Figure 2). K-Hill, an isolated hill in the northeastern section of the Study Area, is upland. Other uplands are scattered throughout the Study Area, including pingos, relic river banks, and large ice wedges that have been elevated above the surrounding topography.

In general, vegetation and hydrology determined key wetland characteristics. The Study Area is a mostly a pristine ecosystem (99.9% undeveloped lands) with a variety of emergent, dwarf, and low shrub habitats. Rivers, lakes, and ponds are common throughout the Study Area and are defining characteristics of the general landscape. The test pits found shallow saturation, and observations described saturated, seasonal, or permanently flooded regimes. It is important to note that field data were mostly collected in September and October.

4.2 COWARDIN CLASSIFICATIONS

Table 2 summarizes the different wetlands, Waters of the U.S., and upland habitat types found within the Study Area.

Table 2: Summary of Wetlands, Waters of the U.S., and Uplands

Habitat Type		Cowardin	Acres	% Study Area
Wetlands	Palustrine Saturated & Seasonally Flooded	PEM1C	580.9	1.6%
		PEM1/SS1B	296.2	0.7%
		PEM1/SS1C	13,559.8	36.7%
		PSS1/EM1B	6,023.8	16.3%
		PSS1/EM1C	2,042.0	5.5%
		PSS1C	1,391.3	3.8%
	Palustrine Flooded	PEM1F	1,296.6	3.5%
		PEM1/SS1F	581.0	1.6%
		PSS1/EM1E	1,430.6	3.9%
		PSS1J	231.9	0.6%
Total Wetlands			**27434.1**	**74.2%**
Waters of the U.S.				
Estuarine		E1UB	3,686.9	10.0%
		E2US	135.1	0.4%
Lacustrine		L1UB	1,164.3	3.2%
Marine		M1UB	109.1	0.3%
		M2US	73.7	0.2%
Pond		PUBH	949.5	2.6%
Riverine		R2UB	1,378.4	3.7%
		R2US	737.8	2.0%
		R3UB	176.0	0.5%
Total Waters of the US			**8,410.8**	**22.9%**
Uplands		Upland	**1071.5**	2.9%
Total Study Area			**36,916.4**	100.0%

4.2.1 Palustrine Saturated & Seasonally Flooded

Palustrine Saturated & Seasonally Flooded areas consisted of saturated and seasonally flooded wetlands. Cowardin classification within this type include:

- PEM1C: Palustrine Persistent Emergent, Seasonally Flooded
- PEM1/SS1B: Palustrine Persistent Emergent/ Broad-Leaved Deciduous Scrub Shrub, Saturated

- PEM1/SS1C: Palustrine Persistent Emergent/ Broad-Leaved Deciduous Scrub Shrub, Seasonally Flooded
- PSS1/EM1B: Palustrine Broad-Leaved Deciduous Scrub Shrub/ Persistent Emergent, Saturated
- PSS1/EM1C: Palustrine Broad-Leaved Deciduous Scrub Shrub/ Persistent Emergent, Seasonally Flooded
- PSS1C: Palustrine Broad-Leaved Deciduous Scrub Shrub, Seasonally Flooded

Vegetation in saturated wetlands include both shrub and emergent vegetation. Shrub species, such as cranberry (*Vaccinium vitis-idaea*), Labrador Tea (*Rhododendron tomentosum*), Blueberry (*Vaccinium uliginosum*), and small willows, provide limited structure in tundra ecosystems. Grasses and sedges are present, particularly on low centered polygons scattered through the area. Soils consists of Histic Epipedons, with shallow organic layers underlain by dark mineral soils (which have dense roots intermixed in the horizons).

Throughout the Study Area, saturated wetlands can be found on slight rises that border the lagoon or ponds, or are underlain by elevated ice wedges. Hydrology is the key characteristic for this wetland type, controlling the species present and relative ratios of shrubs and emergent plants.

Seasonally flooded wetlands usually have more emergent species (e.g. grasses, sedges, herbaceous plants) due to the soil conditions. Shrubs grow only on local high reliefs, with low points having grasses and sedges growing in standing water. Shrubs include blueberry and willows growing up to a few feet high. The topographic differences driving the hydrologic regime can be traced back to the braided nature of the Wulik and Kivalina River, and the interactions of relic channels and sediment deposits.

4.2.2 Palustrine Flooded

Palustrine flooded wetlands were grouped based on a gradient between permanently flooded and seasonally flooded/saturated Cowardin classifications, including:

- PEM1F: Palustrine Persistent Emergent, Semi-permanently Flooded
- PEM1/SS1F: Palustrine Persistent Emergent/Broad-Leaved Deciduous Scrub Shrub, Semi-permanently Flooded
- PSS1/EM1E: Palustrine Broad-Leaved Deciduous Scrub Shrub/ Persistent Emergent, Seasonally Flooded/Saturated
- PSS1J: Palustrine Broad-Leaved Deciduous Scrub Shrub, Intermittently Flooded

Palustrine flooded wetlands are dominated during the growing season by surface water and grass/sedge interspersion. Often tussocks have developed to elevate root zones above the water level. These can be important habitat for wildlife, providing forage and nesting habitat for shorebirds. Shrubs are rarer in these areas, and typically are the results of periodic flooding, as can be seen in the PEE1/EM1E and PSS1J habitats.

The intermittently flooded scrub shrub (PSS1J) habitat plays a unique ecosystem role in the Study Area, as they generally contain river sloughs that provide habitat for juvenile fishes. These wetlands border riverine areas, and are composed of low shrub as opposed to dwarf shrub species. These areas often have little emergent vegetation, and appear to be willow species of similar age classes. These habitats appear to be subject to spring seasonal floods, which scour the emergent vegetation.

4.2.3 Soils Discussion

For both *Palustrine Saturated & Seasonally Flooded* and *Palustrine Flooded* wetlands, soil profiles were the most difficult to evaluate for primary and secondary wetland characteristics. Munsell colors were not collected for any of the profiles; but descriptions on depth, organics, and texture were available. Soil profiles demonstrated a shallow layer of organics, underlain by a saturated mixture of 'brown…loam' and organic mixture. We interpreted these to be histic epipedons.

While the definition of a histic epipedon is '8-16 inches of organics, underlain by dark mineral soil with chroma of 2 or less;' we included plots with only a few inches of organics. Our observation was that the cultural investigators often defined layers as 'mineral with roots' where wetland biologists would call them 'organic' (extending the thickness to 8 inches).

These wetlands determinations were also supported by the saturation observations. Due to the fact that shallow layers of saturation were described in October (well outside the June – August window), we believe these wetlands are at least saturated throughout the growing season. The USACE Alaska Supplement defines a hydric soil "as a soil that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part." It further states "a soil that meets the definition of a hydric soil is hydric whether or not it exhibits indicators" specifically described in the USACE Alaska Supplement. Because of this, we believe these shallower organics meet the definition of a hydric soil.

4.2.4 Marine and Estuarine

There are many types of Waters of the United States in the Study Area; consisting of Marine, Estuary, Lacustrine, Ponds, and Riverine habitat. Cowardin classifications include:

- E1UB: Estuarine, Subtidal, Unconsolidated Bottom
- E2US: Estuarine, Intertidal, Unconsolidated Shore

- M1UB: Marine, Subtidal, Unconsolidated Bottom
- M2US: Marine, Intertidal, Unconsolidated Shore

The Chukchi Sea provides the marine habitat west of Kivalina. The Chukchi Sea is listed as a traditional navigable water of the United States by the USACE. Separating Kivalina and the mainland is the estuarian habitat of the Kivalina Lagoon. The lagoon, adjacent estuarine wetlands, and Chukchi Sea are frequently used by local residents to engage in subsistence activities and to travel to other villages.

4.2.5 Riverine

Moving inland, the dominate feature within the Study Area is the Wulik and Kivalina River. The Wulik provides an important subsistence transportation route inland for local residents. The Wulik drains the western Brooks Range, and is a listed ADF&G Anadromous Water for Chum Salmon, Coho Salmon, King Salmon, Pink Salmon, Sockeye Salmon, Dolly Varden, and Whitefish (ADFG 2017). Riverine Cowardin classifications include:

- R2UB: Riverine, Lower Perennial, Unconsolidated Bottom
- R2US: Riverine, Lower Perennial, Unconsolidated Shore
- R3UB: Riverine, Upper Perennial, Unconsolidated Bottom

4.2.6 Lacustrine and Ponds

As the Wulik and Kivalina Rivers have meandered throughout the landscape, they have formed many oxbow lakes and relic sloughs, which span the Study Area. These lacustrine environments are scattered throughout the Study Area, and provide important buffering of flood flows.

Lakes and ponds have also developed from the permafrost/ice wedge cycle. This cycle consists of water freezing and expanding cracks in the permafrost during the winter, and water filling in the cracks during the summer. If the ice wedges become exposed, they hold the summer heat, and cause ponds to form. These are present throughout the landscape in various stages of development, and provide important habitat heterogeneity.

Lacustrine and pond Cowardin classifications include:

Cowardin classifications include:

- L1UB: Lacustrine, Limnetic, Unconsolidated Bottom
- PUBH: Palustrine, Unconsolidated Bottom, Permanently Flooded

4.2.7 Uplands

There are a limited number of uplands (3% of the area) scattered throughout the Study Area. K-Hill is the most visually significant to the project, as the adjacent area is the destination for the road. This large cropping dominates the eastern end of the Study Area.

Outside of K-Hill, uplands are isolated, topographic rises above the surrounding wetlands with dryer soil regimes, often bordering lake or riverine systems. These uplands could be the result of relic depositions from the Wulik or Kivalina River, or geologic formations.

Other isolated uplands are scattered throughout the Study Area; including small pingos, which have risen above the surrounding wetlands, elevating the plant communities above the water table. Vegetation differences among uplands/compared to wetlands included larger shrub species, and visible outcroppings or ridgelines. Confirmation of pingos was greatly improved through the LiDAR datasets now available.

4.3 WILDLIFE (VIERECK) HABITAT

Wildlife habitat within the Study Area, as defined by Viereck (1992), is summarized below. In addition, the USFWS found that II.C.1 (Closed Low Scrub) habitat is likely to hold important bird habitat.

Table 3: Summary of wildlife habitat

Habitat Type	Acres	% Study area
Developed	64.8	0.2%
II.C.1 (Closed Low Scrub)	3,228.7	8.7%
II.D.2 (Willow Dwarf Shrub)	9,057.3	24.5%
III.A.2 (Mesic Graminoid Herbaceous)	14,348.7	38.9%
III.A.3 (Wet Graminoid Herbaceous)	1,877.6	5.1%
W (Water)	8,339.3	22.6%
Total Study area	**36,916.4**	**100.0%**

4.3.1 II.C.1 (Closed Low Scrub)

Closed Low Scrub is the classification for all important bird shrub habitat (Figure 3 and 4. Appendix A). These shrubs are 20 cm (centimeter) to 1.5 m (meter) tall, and are often found bordering waterways. They are the highest canopy vegetation available in the Study Area, and provide some of the only perching locations for birds in the area. These provide nesting habitat, elevated above predators, and locations for surveillance. Morning and evening song behavior from perching locations helps to establish territories, and attract mates. This habitat is less common in the Study Area, and was promoted from previous reports/assessments by one functional value (e.g. II to I or I to I+) to account for its local importance.

4.3.2 II.D.2 (Willow Dwarf Shrub)

Willow Dwarf Shrub is shrub dominated habitat (>25% shrub cover), with heights below 20 cm. Willows are the dominant species evident in the field data, although other species such and blueberry are present. The areas tend to have slightly dryer hydrologic regimes compared to emergent habitat allowing the growth of additional species. They can provide important ground nesting bird habitat, along with berry species to support omnivores.

4.3.3 III.A.2 (Mesic Graminoid Herbaceous)

Mesic Graminoid Herbaceous habitat has up to 25% shrub cover, and are moist sites, usually with seasonal flooding but without standing water. Tussocks are present, along with high centered polygons. This microtopographic relief can be used for nesting by shorebirds, and supports important sedges and grasses for herbivores. This habitat is common both in the Study Area and in the region as a whole.

4.3.4 III.A.3 (Wet Graminoid Herbaceous)

Wet Graminoid Herbaceous habitat has standing water present for most of the year, with up to 25% shrub cover. It tends to be dominated by obligate sedges and grasses. The sedges and grasses can provide important forage habitat for herbivores, and shorebirds often feed on invertebrates present in the standing water.

4.3.5 W (Water)

Viereck summarizes all ponds, lakes, rivers, estuaries, and ocean habitat as Water. This habitat comprises about 22% of the Study Area. Water habitats are important fish and wildlife habitat. In particular, deep pools provide overwintering locations for resident fish species.

4.4 FUNCTIONAL ASSESSMENT

This report's functional assessment mirrored the methodology presented in ASRC (2015) to maintain a consistent approach. Similar to the last assessment, wetlands were found to be high ranking (Figure 5, Table 4). Waters of the United States (ponds, riverine, tidal, estuarine, and lacustrine) were promoted to Category I+ to indicate their intrinsic importance. Saturated wetlands (PSS1/EM1B) were ranked as Category II.

Important bird habitat was found to consist of Closed Low Scrub habitat (II.C.I). Upon consultation with the USFWS, all Closed Low Scrub (II.C.I) was promoted one functional level (e.g. II to I or I to I+).

Table 4: Final Functional Assessment Acreage

Habitat Type	Acres	USFWS Bird Shrub Habitat? (II.C.I)	Functional Value/Category
Wetlands			
PEM1/SS1B	296.2	No	II
PEM1/SS1C	71.1	Yes	I+
	13488.7	No	I
PEM1/SS1F	581.0	No	I
PEM1C	17.1	Yes	I+
	563.8	No	I
PEM1F	1296.6	No	I
PSS1/EM1B	150.3	Yes	I
	5873.5	No	II
PSS1/EM1C	857.7	Yes	I+
	1184.3	No	I
PSS1/EM1E	587.4	Yes	I+
	843.2	No	I
PSS1C	1301.7	Yes	I+
	89.6	No	I
PSS1J	172.0	Yes	I+
	59.9	No	I
Total Wetlands	**27434.1**	**-**	**-**
Waters of the U.S.			
E1UB	3686.9	No	I+
E2US	135.1	No	I+
L1UB	1164.3	No	I+
M1UB	109.1	No	I+
M2US	73.7	No	I+
PUBH	949.5	No	I+
R2UB	1378.4	No	I+
R2US	737.8	No	I+
R3UB	176.0	No	I+
Total Waters	**8410.8**		
Uplands			
Upland	**1071.5**	**-**	**-**
Total Study Area	**36916.4**	**-**	**-**

4.4.1 Category I+

Category I+ polygons were reserved for ponds, rivers, lakes, oceans, estuaries, and elevated bird habitat (discussed below). These landscape features have a higher intrinsic value than neighboring wetlands due to their roles in the environment. To aid in project planning, it was determined to be important to raise these features above Category I.

4.4.2 Category I

67% of wetlands (which are not Waters of the US) in the Study Area are Category I. This is due to the low level of disturbance in the ecosystem. Wetlands are relatively pristine, and fully functioning within their natural environment. Few wetlands are providing unique functions or services, and instead work as a large interrelated network extending far beyond the Study Area boundaries.

4.4.3 Category II

Category II habitats comprised the smallest functional category. These were saturated shrub habitat, which provide relatively low levels of flood flow alteration and sediment removal. Saturated wetlands are the least wet, and it is common for them to be the lowest ranked due to their similarities with uplands. These often are on small ridges or pingos, bordering uplands and wetter wetlands.

4.4.4 Bird Habitat

The USFWS has indicated that Low Scrub Habitat (II.C.I) provides important bird habitat in the Study Area. The functional assessment promoted all Low Scrub Habitat one functional level (e.g. II to I, or I to I+) to incorporate these comments. These habitats tended to be near riverine systems.

Due to the slight differences in Viereck and Cowardin Classification systems, bird habitat (II.C.1) is found in a variety of wetland classifications (PEM1/SS1C, PEM1C, PSS1/EM1B, PSS1/EM1C, PSS1/EM1E, PSS1C, PSS1J).

This is particularly important to note, because not all Low Scrub Habitat is ranked as Category I+. The important bird habitat was elevated one level, which depending on the Cowardin classification elevated polygons from II to I or I to I+ (Table 4).

4.5 CONCLUSION AND JURISDICTION

Development activities from construction of the proposed project would likely impact wetlands and/or Waters of the U.S. under the jurisdiction of USACE. Based on the review of existing hydrology information, drainage within the Study Area flows into the Kivalina River, Wulik River, or directly into the Chukchi Sea, a traditional navigable Water of the U.S. The Kivalina River and Wulik River also flows into the Kivalina Lagoon, a tidal estuary of the Chukchi Sea.

Wetlands in the Study Area have a clear direct surface connection to the Kivalina River, Wulik River, Kivalina Lagoon, or Chukchi Sea. For this reason, wetlands and Waters of the U.S. in the Study Area are presumed jurisdictional by the USACE under Section 404 of the CWA and Section III.D.2 of the Jurisdictional Determination Form.

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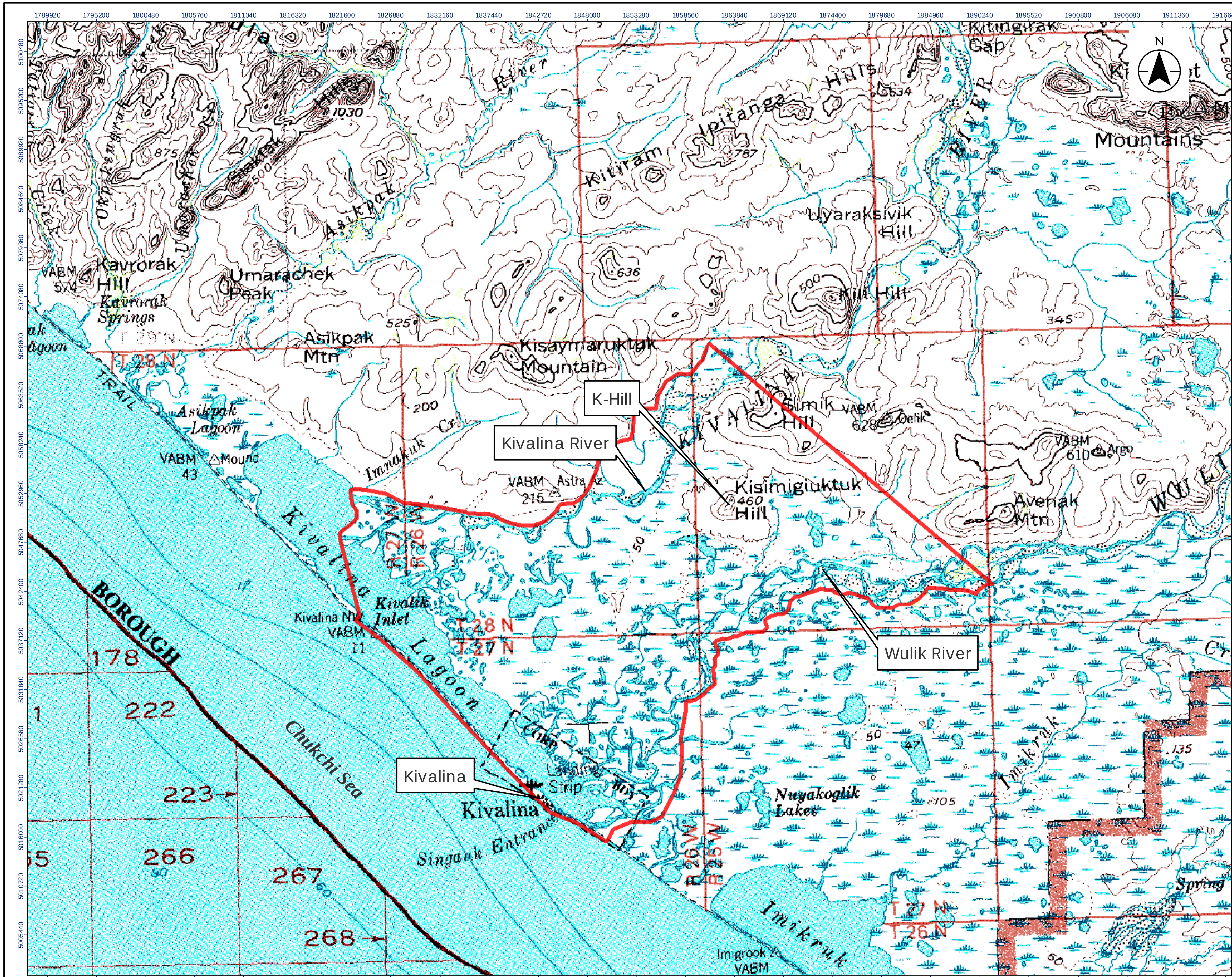
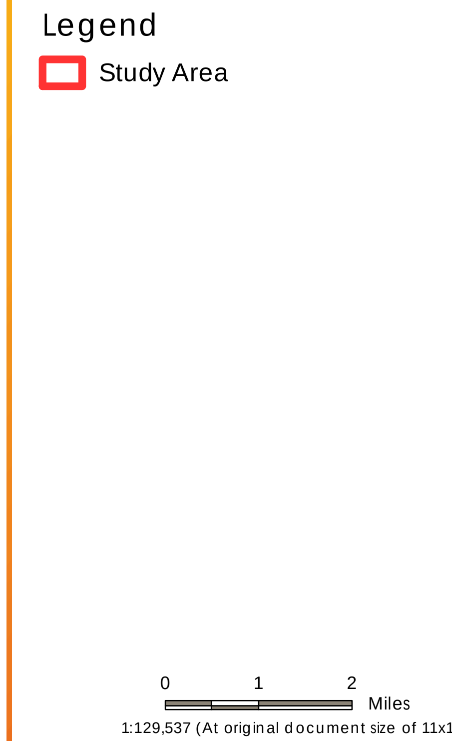
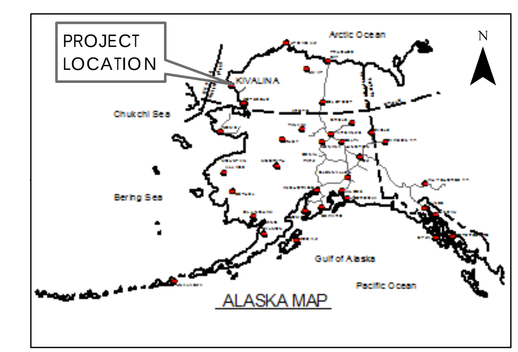
Appendix A SITE MAPS





Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
2. Wetland mapping protocol: NWI boundaries were imported for the entire project. The geoTiffs of the November 2015 ASRC wetland report were brought into GIS, and wetland polygons were hand traced to replace the NWI mapping at 1:3000 scale. Then Stantec used field data to updated the wetland classifications for the entire area. NWI boundaries were retained, except for the smaller ASRC area where they were refined as appropriate.
3. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011, ©AeroMetric Inc., 2013



Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

NFHWYP00162-002(384) REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

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Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
1

Title
Kivalina Evacuation and School Site Access Road - Location & Vicinity Maps

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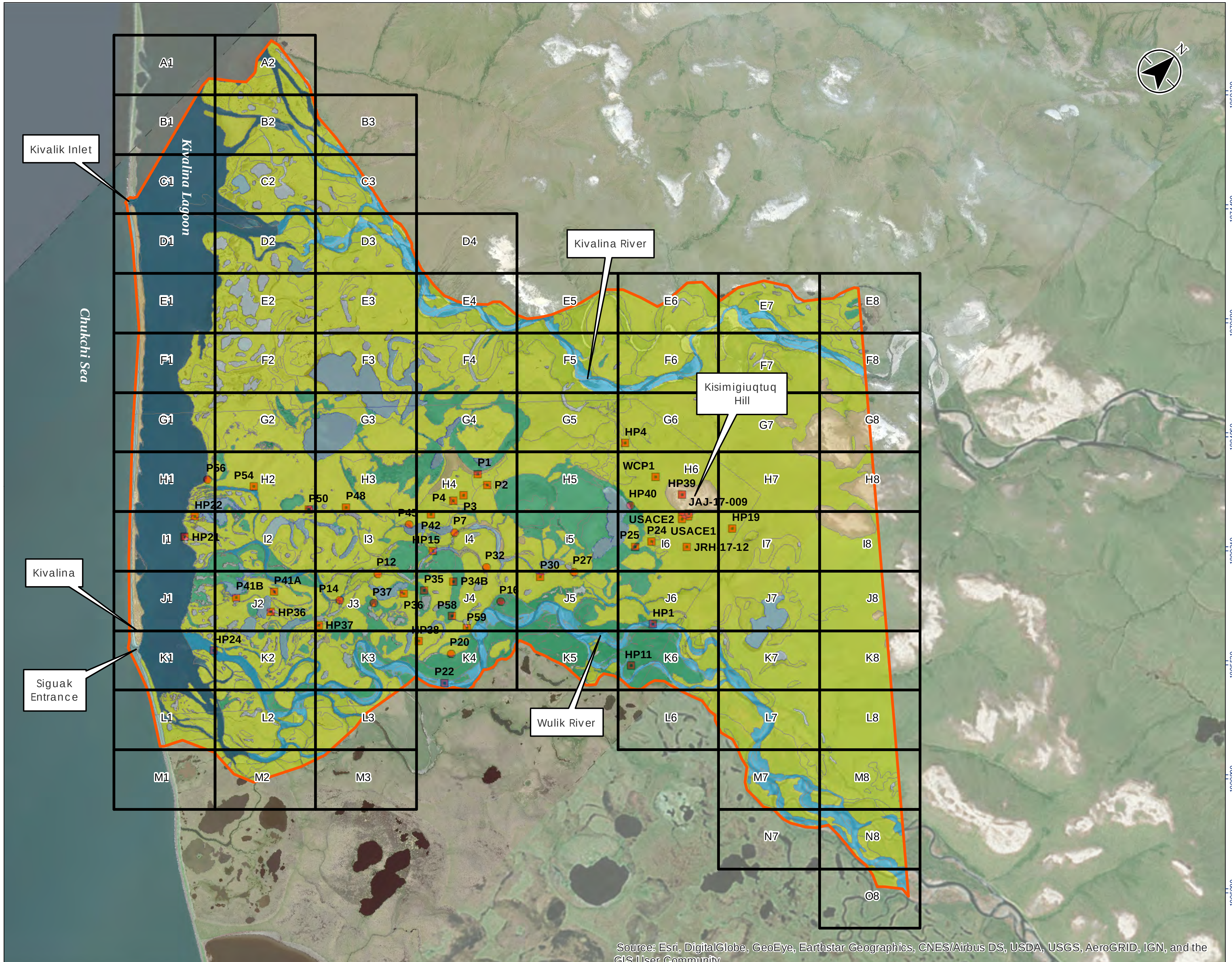
Revised: 2017-09-14 By: cpannone



Stantec

Legend

Data Points (2016)

- Standard Data Point
- Photo Point

Wetlands

- Estuarine
- Lacustrine
- Marine
- Palustrine Flooded
- Palustrine Saturated & Seasonally Flooded
- Pond
- Riverine
- Upland
- Study Area

0 1 2 Miles

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Notes

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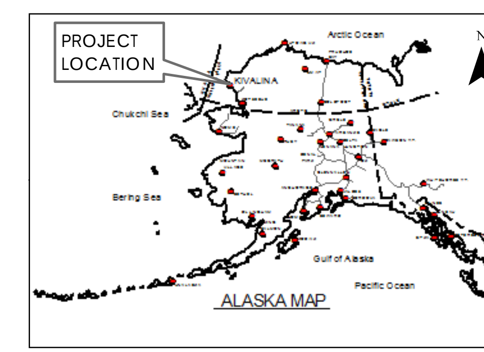

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Kivalina Evacuation and School Site Access Road

Figure No.
2

Title
Kivalina Evacuation and School Site Access Road - Wetlands Overview

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Stantec

Legend

Data Points (2016)

- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
- Pond
- Riverine
- Upland
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Notes

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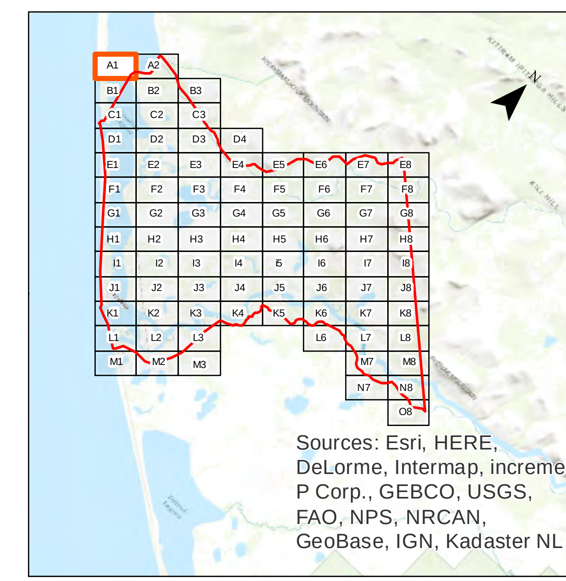

Project Location
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Kateel River Meridian

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Figure No.
2 - A1

Title
Kivalina Evacuation and School Site Access Road - Wetlands

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Feet

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Stantec

Legend

Data Points (2016)

- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
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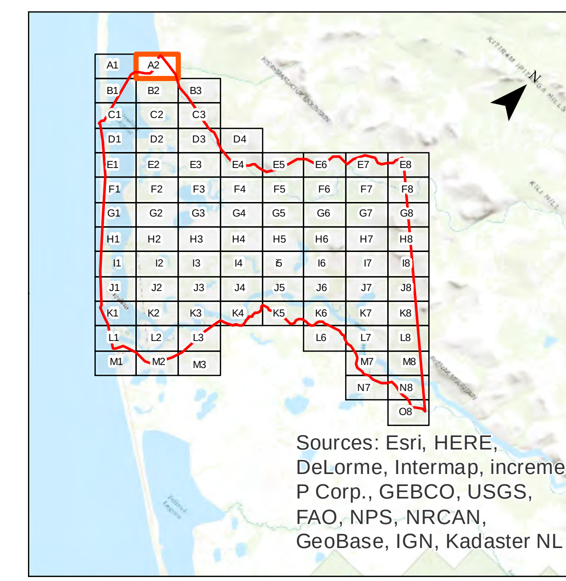

Project Location Project Origin: Kivalina, Alaska Section 21, Township 27N, Range 26W Kateel River Meridian	002(384)/NFHWYP00162 REVA Prepared by CDP on 2017-06-23 Technical Review by ABC on 2017-0X-XX Independent Review by ABC on 2017-0X-XX

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Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - A2

Title
Kivalina Evacuation and School Site Access Road - Wetlands

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Feet

1:6,500 (At original document size of 11x17)

Stantec

Legend

Data Points (2016)

- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
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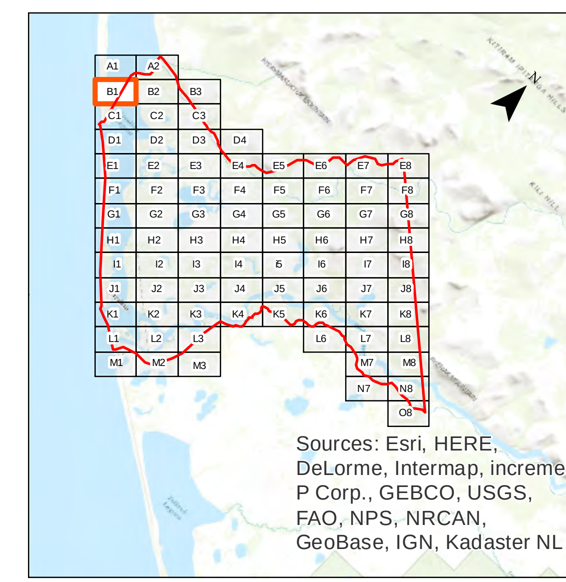

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Kivalina Evacuation and School Site Access Road

Figure No.
2 - B1

Title
Kivalina Evacuation and School Site Access Road - Wetlands

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Legend

Data Points (2016)

- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
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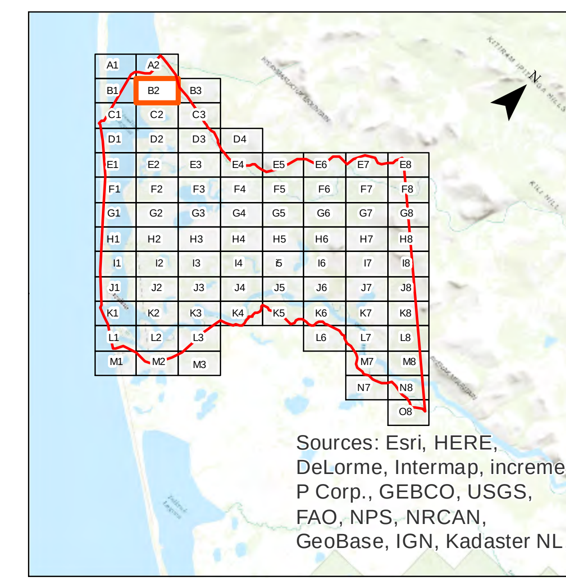

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Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - B2

Title
Kivalina Evacuation and School Site Access Road - Wetlands

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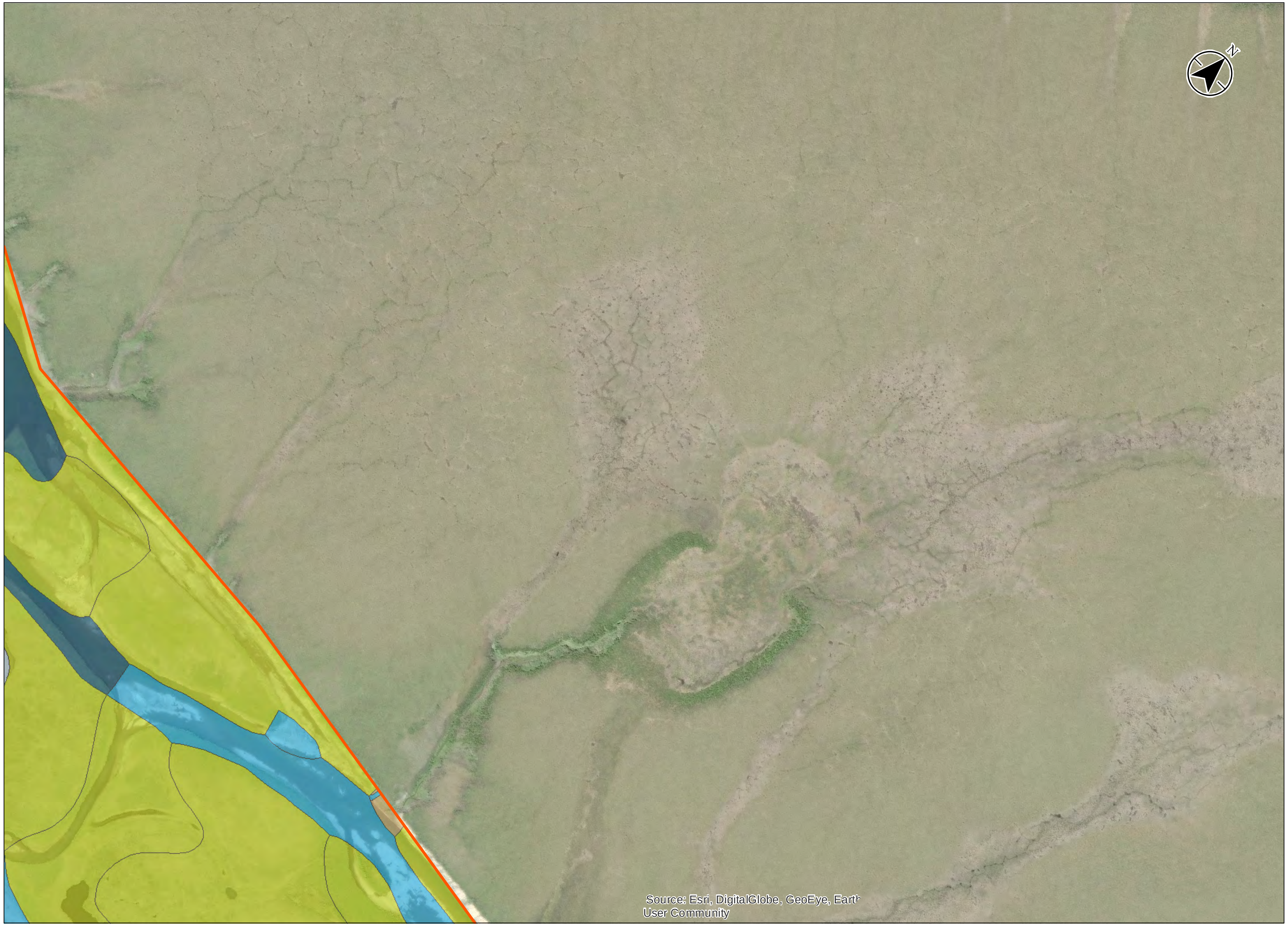

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Stantec

Legend

Data Points (2016)

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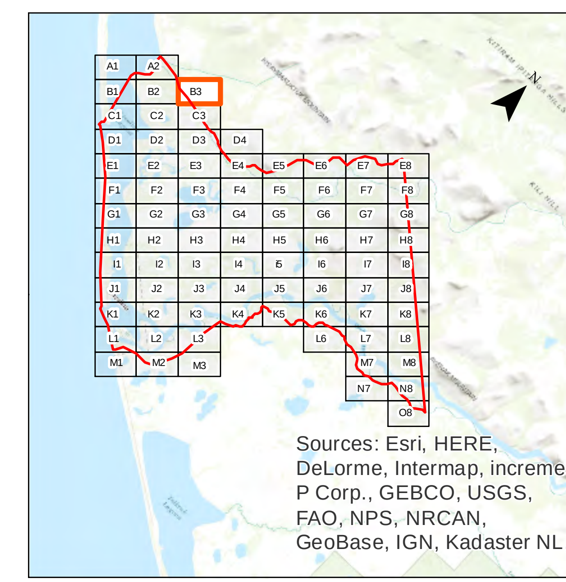

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Kivalina Evacuation and School Site Access Road

Figure No.
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Title
Kivalina Evacuation and School Site Access Road - Wetlands

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Stantec

Legend

Data Points (2016)

- Standard Data Point
- Photo Point

Wetland Type

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- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
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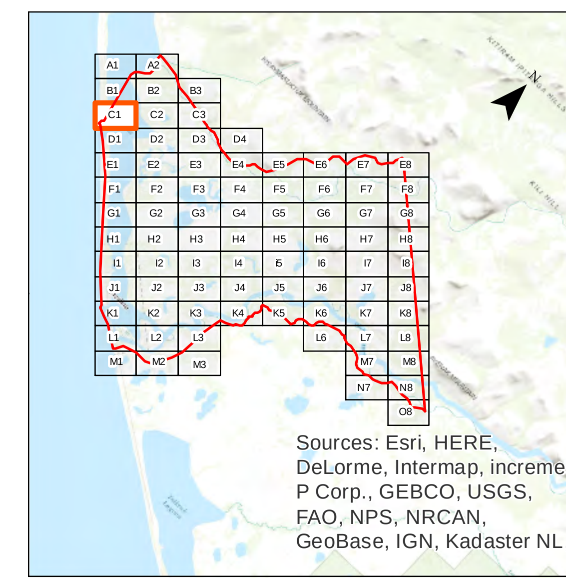

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Figure No.
2 - C1

Title
Kivalina Evacuation and School Site Access Road - Wetlands

0 250 500 1,000 1,500 2,000 Feet

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0 250 500 1,000 1,500 2,000
Feet

1:6,500 (At original document size of 11x17)

Stantec

Legend

Data Points (2016)

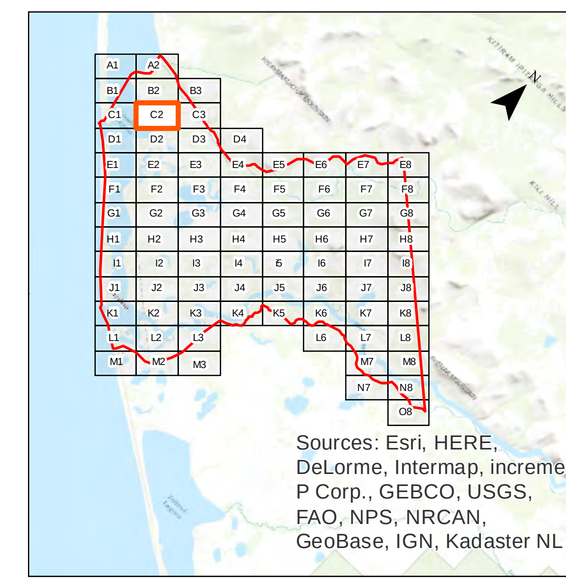
- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
- Pond
- Riverine
- Upland
- Study Area

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
2. Wetland mapping protocol: NWI boundaries were imported for the entire project. The geoTiffs of the November 2015 ASRC wetland report were brought into GIS, and wetland polygons were hand traced to replace the NWI mapping at 1:3000 scale. Then Stantec used field data to updated the wetland classifications for the entire area. NWI boundaries were retained, except for the smaller ASRC area where they were refined as appropriate.
3. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011, ©AeroMetric Inc., 2013



Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

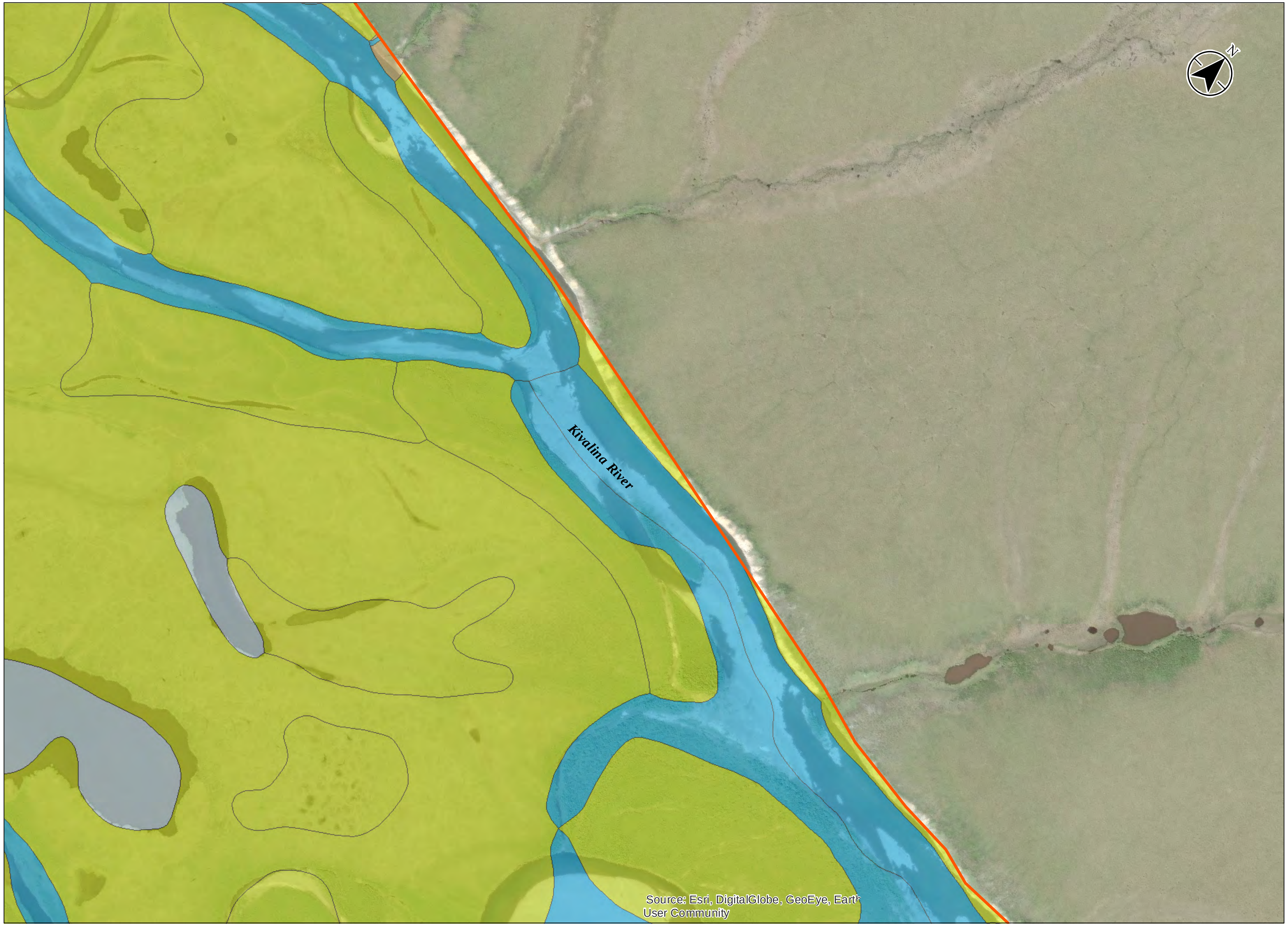
002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - C2

Title
Kivalina Evacuation and School Site Access Road - Wetlands

U:\204765102\GIS\mxd\Wetland Report Figs\Fig_2-1_2-XXX_Cowardin_draft.mxd Revised: 2017-09-14 By: cpannone



0 250 500 1,000 1,500 2,000 Feet

1:6,500 (At original document size of 11x17)

Stantec

Legend

Data Points (2016)

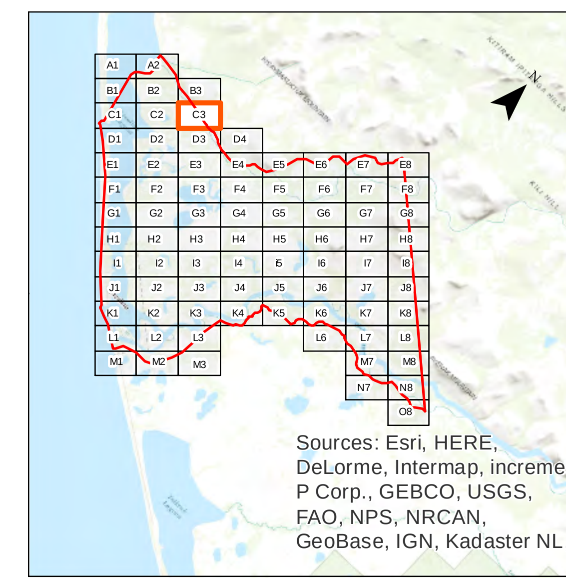
- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
- Pond
- Riverine
- Upland
- Study Area

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
2. Wetland mapping protocol: NWI boundaries were imported for the entire project. The geoTiffs of the November 2015 ASRC wetland report were brought into GIS, and wetland polygons were hand traced to replace the NWI mapping at 1:3000 scale. Then Stantec used field data to updated the wetland classifications for the entire area. NWI boundaries were retained, except for the smaller ASRC area where they were refined as appropriate.
3. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011, ©AeroMetric Inc., 2013



Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - C3

Title
Kivalina Evacuation and School Site Access Road - Wetlands

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0 250 500 1,000 1,500 2,000
Feet

1:6,500 (At original document size of 11x17)

Stantec

Legend

Data Points (2016)

- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
- Pond
- Riverine
- Upland
- Study Area

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
2. Wetland mapping protocol: NWI boundaries were imported for the entire project. The geoTiffs of the November 2015 ASRC wetland report were brought into GIS, and wetland polygons were hand traced to replace the NWI mapping at 1:3000 scale. Then Stantec used field data to updated the wetland classifications for the entire area. NWI boundaries were retained, except for the smaller ASRC area where they were refined as appropriate.
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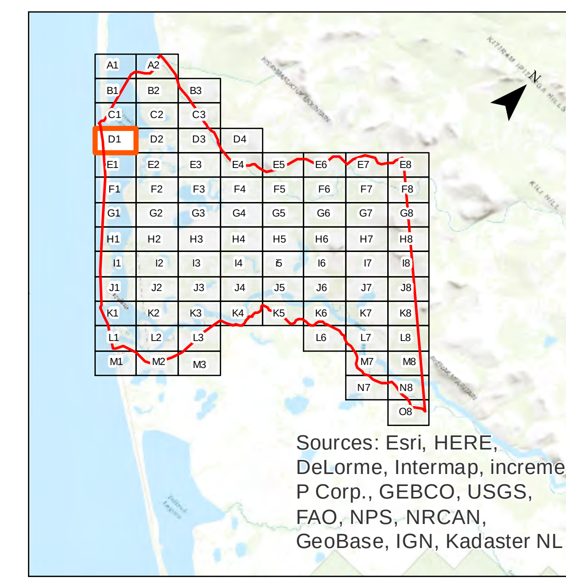

Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - D1

Title
Kivalina Evacuation and School Site Access Road - Wetlands

0 250 500 1,000 1,500 2,000
Feet

1:6,500 (At original document size of 11x17)

Stantec

Legend

Data Points (2016)

- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
- Pond
- Riverine
- Upland
- Study Area

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
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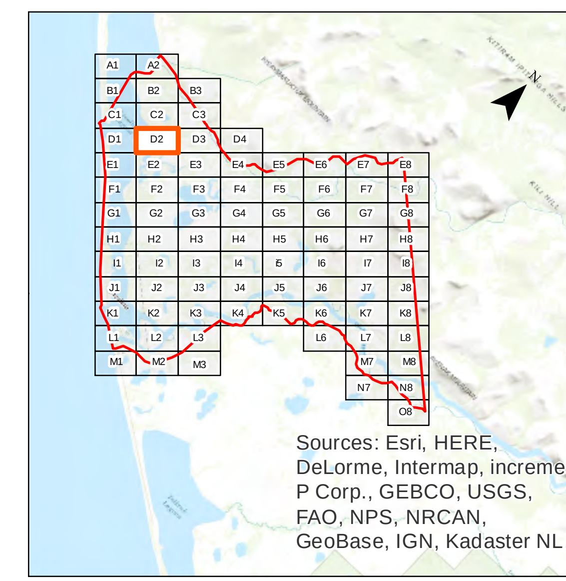


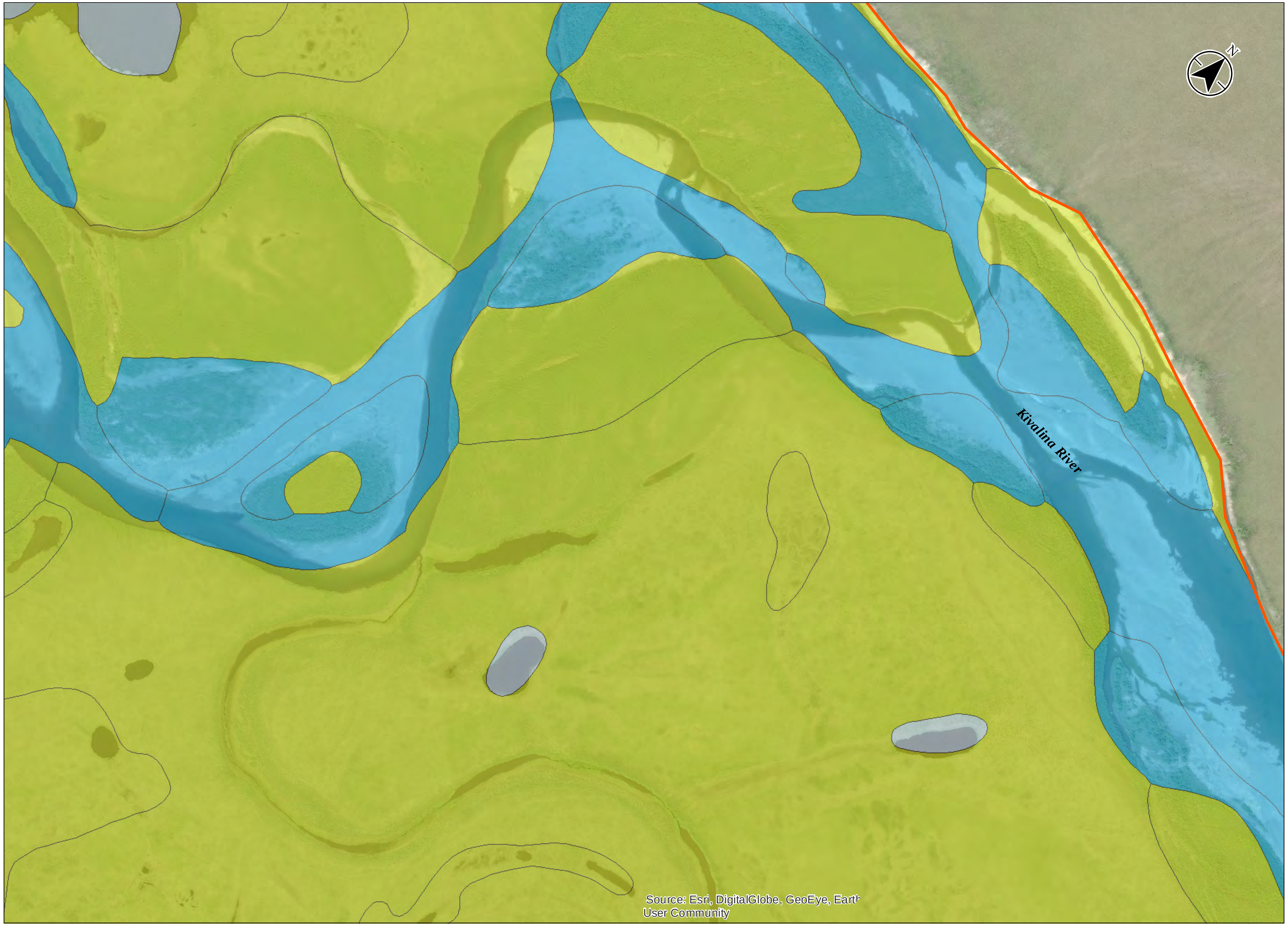
Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - D2

Title
Kivalina Evacuation and School Site Access Road - Wetlands



0 250 500 1,000 1,500 2,000 Feet

1:6,500 (At original document size of 11x17)

Stantec

Legend

Data Points (2016)

- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
- Pond
- Riverine
- Upland
- Study Area

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
2. Wetland mapping protocol: NWI boundaries were imported for the entire project. The geoTiffs of the November 2015 ASRC wetland report were brought into GIS, and wetland polygons were hand traced to replace the NWI mapping at 1:3000 scale. Then Stantec used field data to updated the wetland classifications for the entire area. NWI boundaries were retained, except for the smaller ASRC area where they were refined as appropriate.
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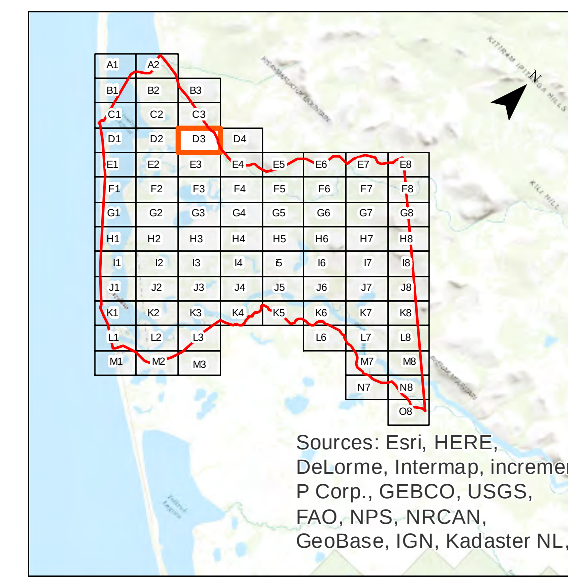


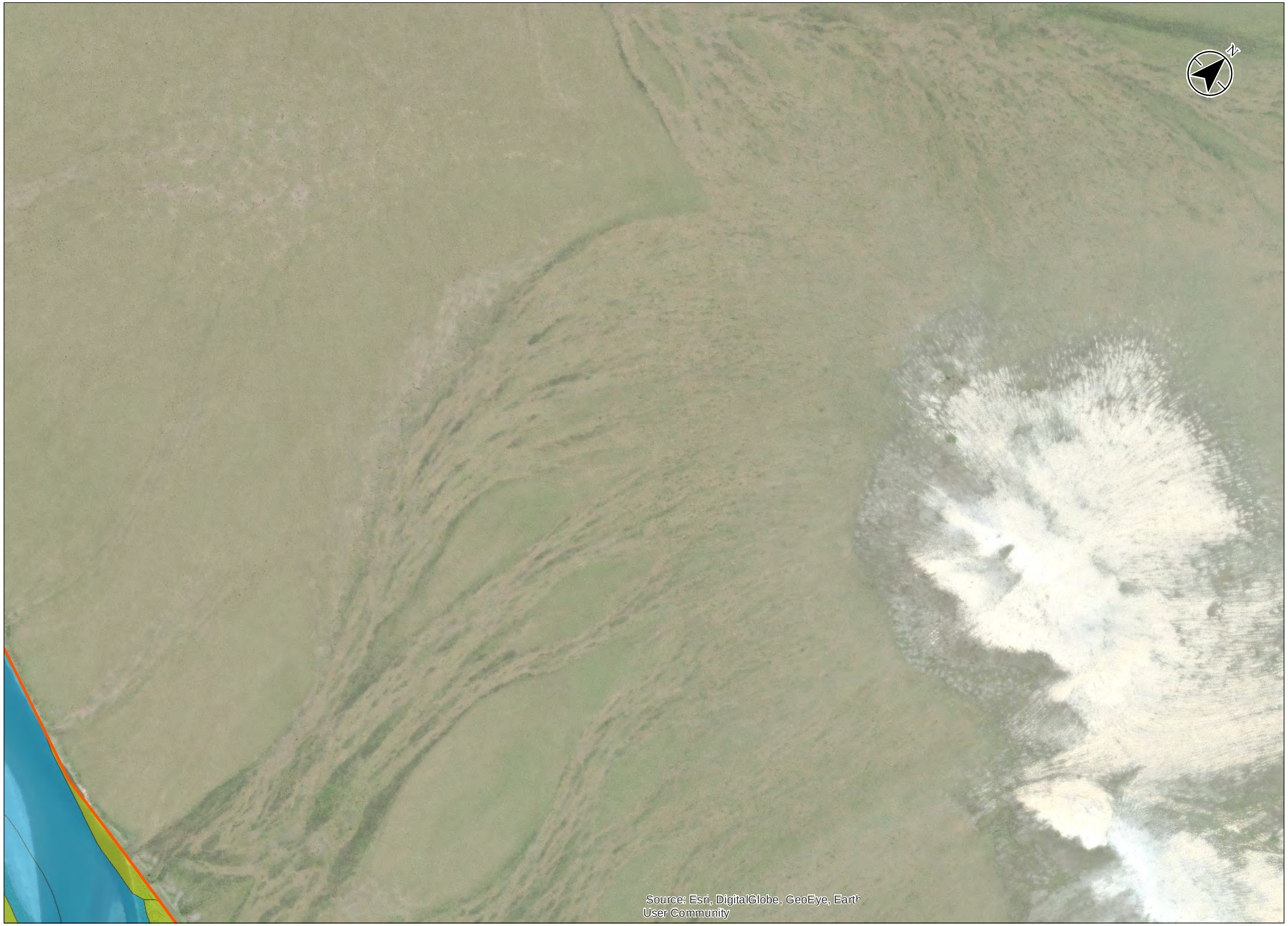
Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - D3

Title
Kivalina Evacuation and School Site Access Road - Wetlands



0 250 500 1,000 1,500 2,000 Feet

1:6,500 (At original document size of 11x17)

Stantec

Legend

Data Points (2016)

- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
- Pond
- Riverine
- Upland
- Study Area

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
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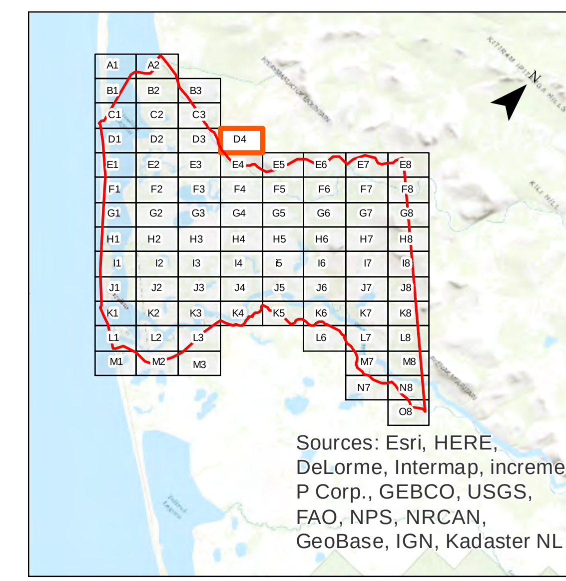

Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - D4

Title
Kivalina Evacuation and School Site Access Road - Wetlands

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Stantec

Legend

Data Points (2016)

- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
- Pond
- Riverine
- Upland
- Study Area

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
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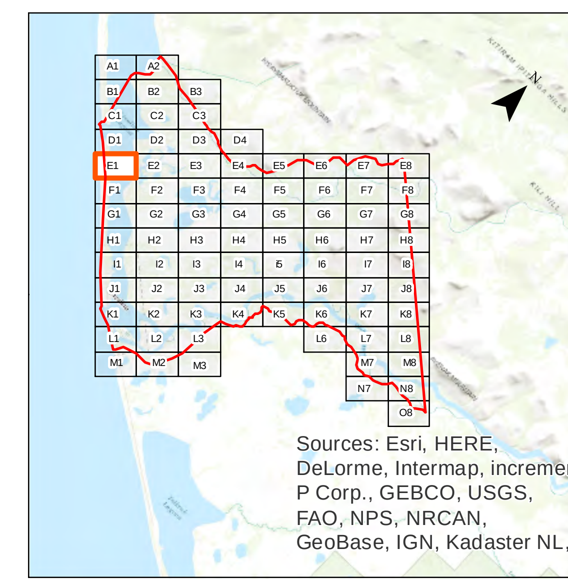
3. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011, ©AeroMetric Inc., 2013



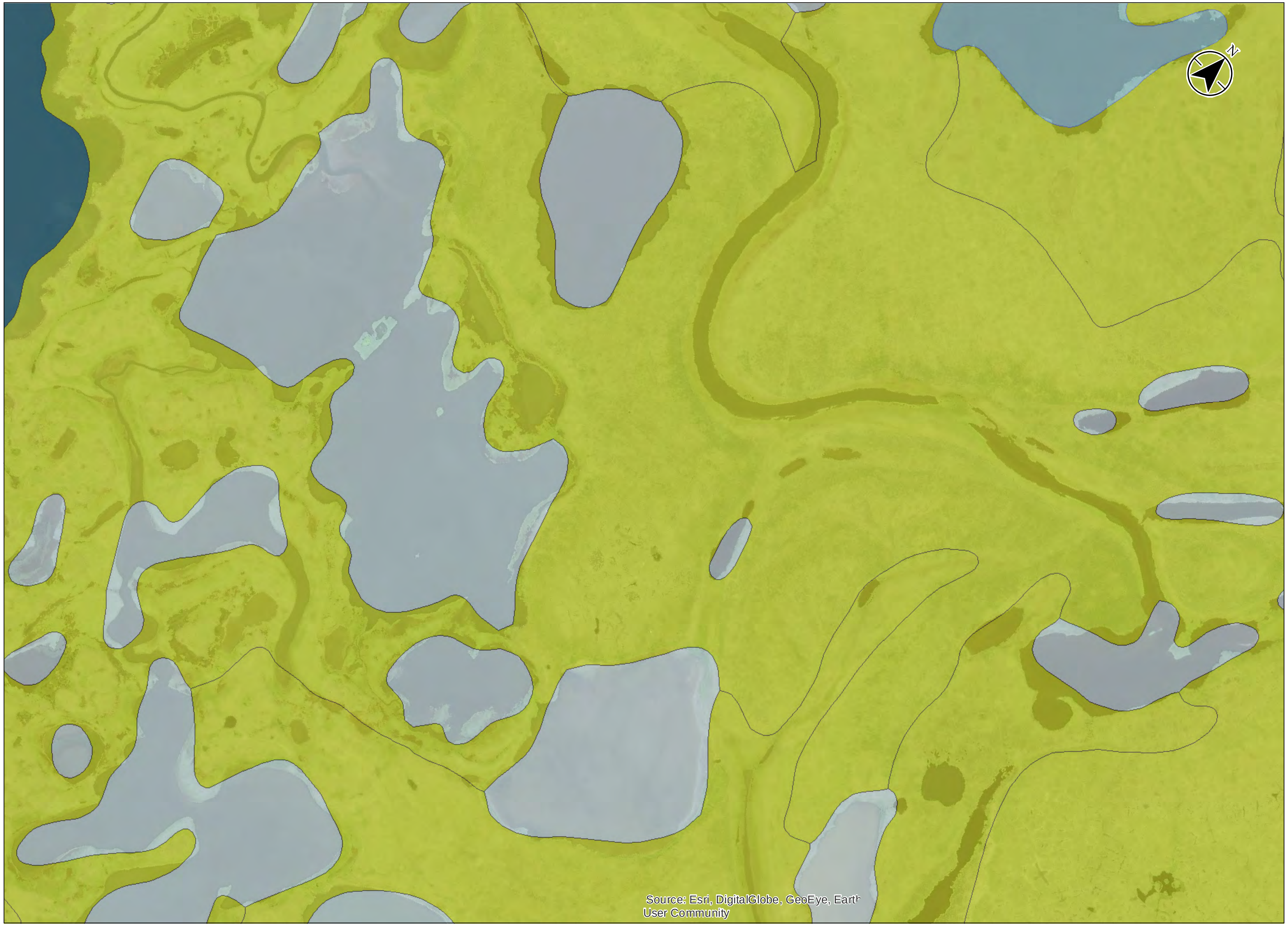
Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - E1

Title
Kivalina Evacuation and School Site Access Road - Wetlands



0 250 500 1,000 1,500 2,000
Feet

1:6,500 (At original document size of 11x17)

Stantec

Legend

Data Points (2016)

- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
- Pond
- Riverine
- Upland
- Study Area

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
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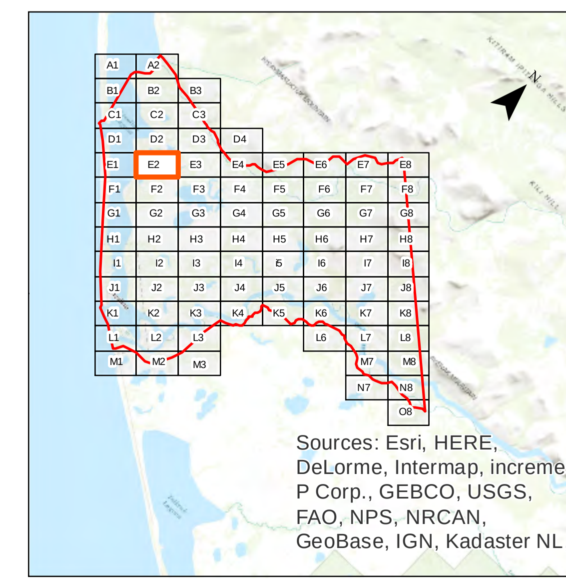


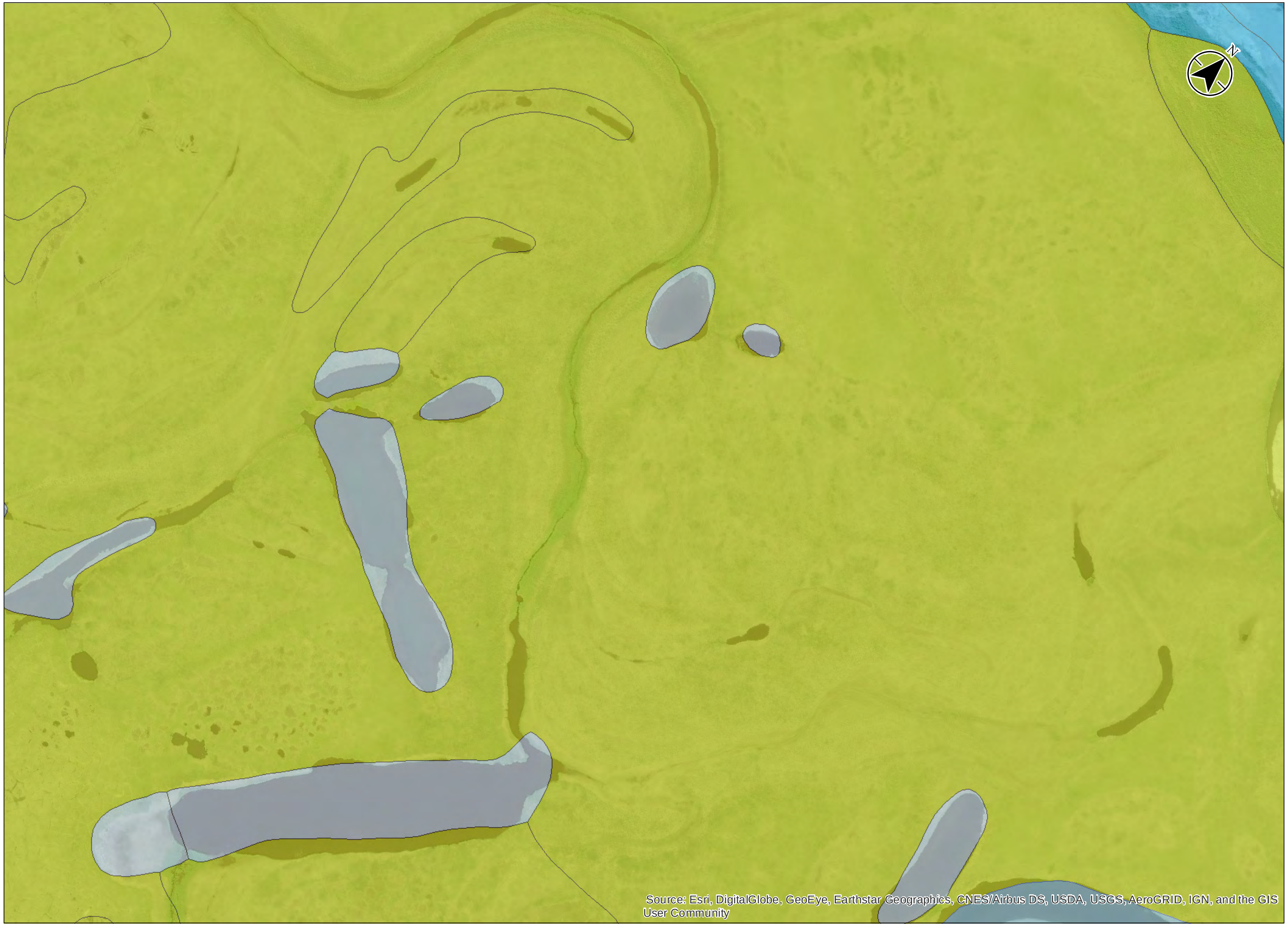
Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - E2

Title
Kivalina Evacuation and School Site Access Road - Wetlands



Stantec

Legend

Data Points (2016)

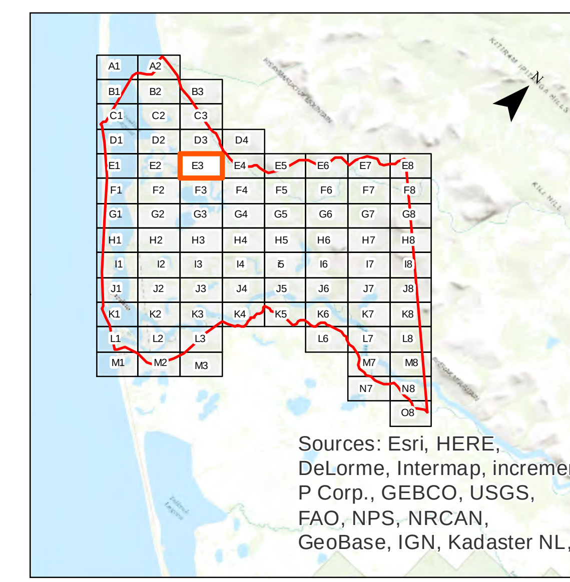
- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
- Pond
- Riverine
- Upland
- Study Area

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
2. Wetland mapping protocol: NWI boundaries were imported for the entire project. The geoTiffs of the November 2015 ASRC wetland report were brought into GIS, and wetland polygons were hand traced to replace the NWI mapping at 1:3000 scale. Then Stantec used field data to updated the wetland classifications for the entire area. NWI boundaries were retained, except for the smaller ASRC area where they were refined as appropriate.
3. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011, ©AeroMetric Inc., 2013



Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - E3

Title
Kivalina Evacuation and School Site Access Road - Wetlands

0 250 500 1,000 1,500 2,000 Feet

1:6,500 (At original document size of 11x17)

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1:6,500 (At original document size of 11x17)

Stantec

Legend

Data Points (2016)

- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
- Pond
- Riverine
- Upland
- Study Area

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
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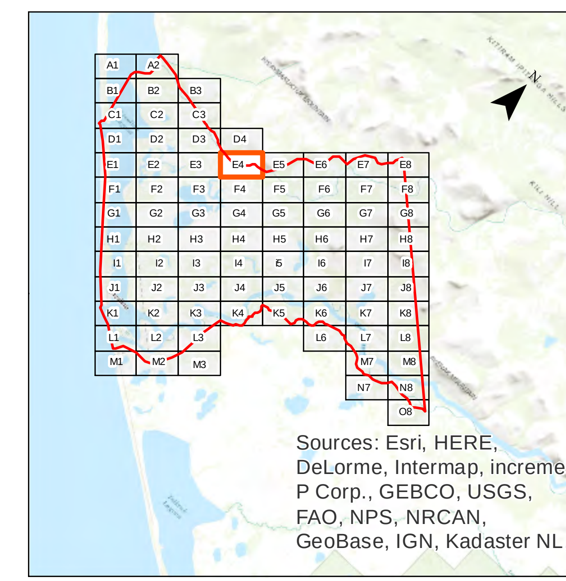

Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - E4

Title
Kivalina Evacuation and School Site Access Road - Wetlands

0 250 500 1,000 1,500 2,000 Feet

1:6,500 (At original document size of 11x17)

Stantec

Legend

Data Points (2016)

- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
- Pond
- Riverine
- Upland
- Study Area

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
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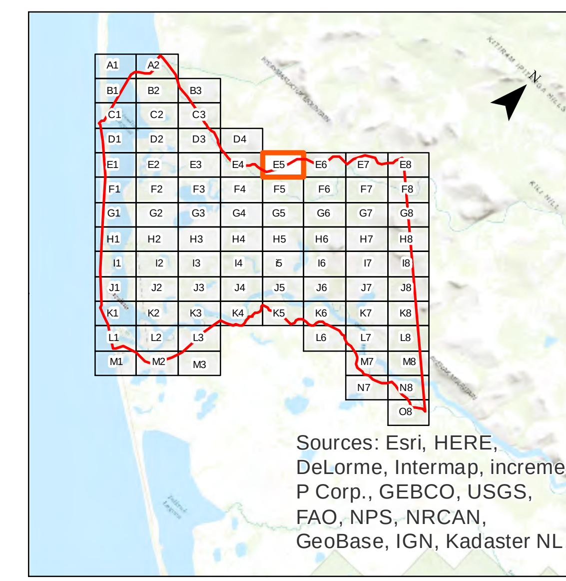

Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - E5

Title
Kivalina Evacuation and School Site Access Road - Wetlands

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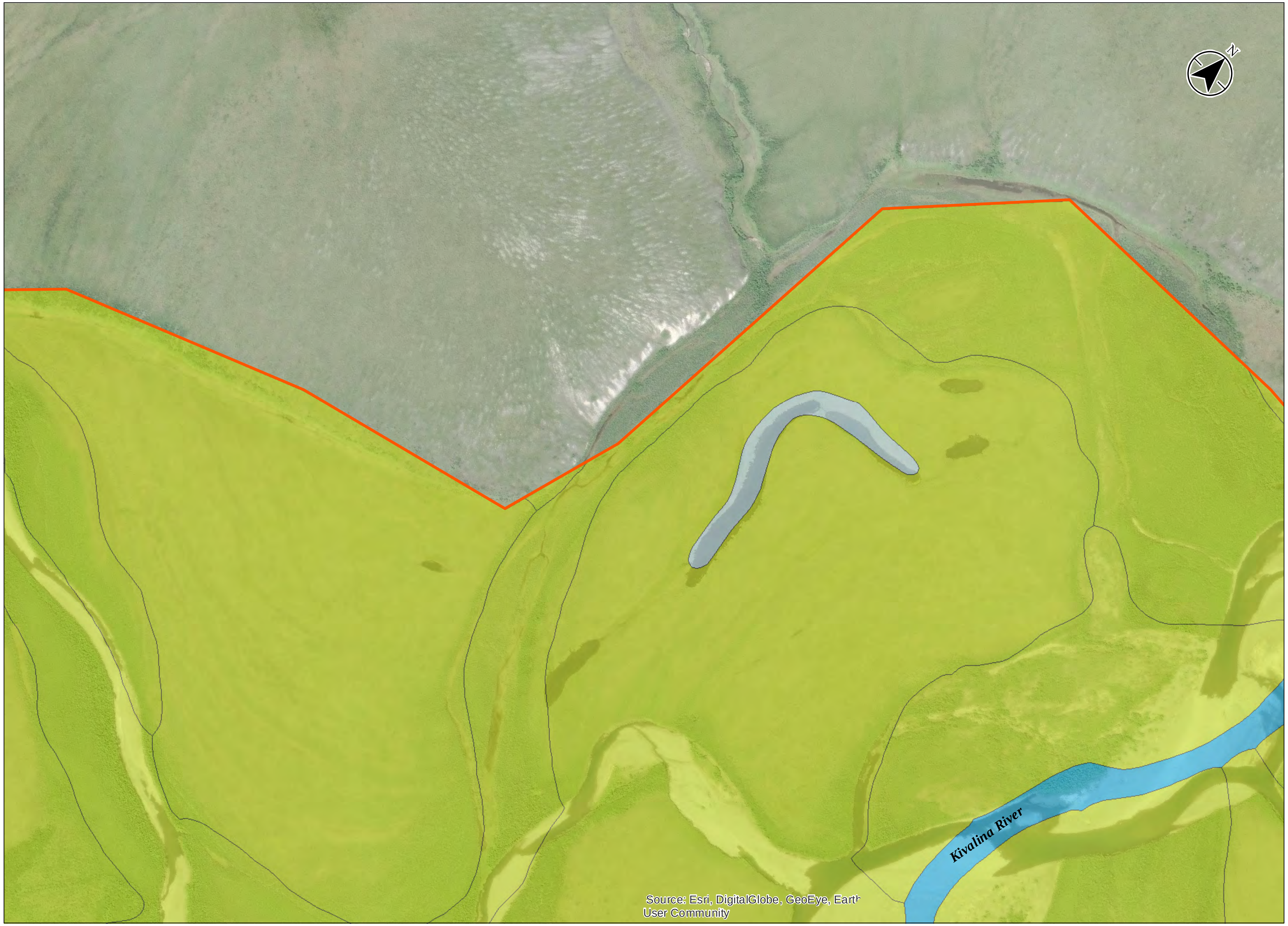

0 250 500 1,000 1,500 2,000
Feet

1:6,500 (At original document size of 11x17)

Stantec

Legend

Data Points (2016)

- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
- Pond
- Riverine
- Upland
- Study Area

Notes

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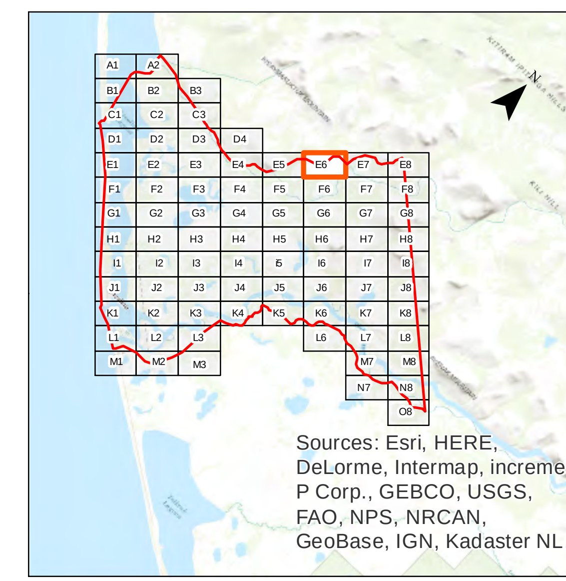


Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

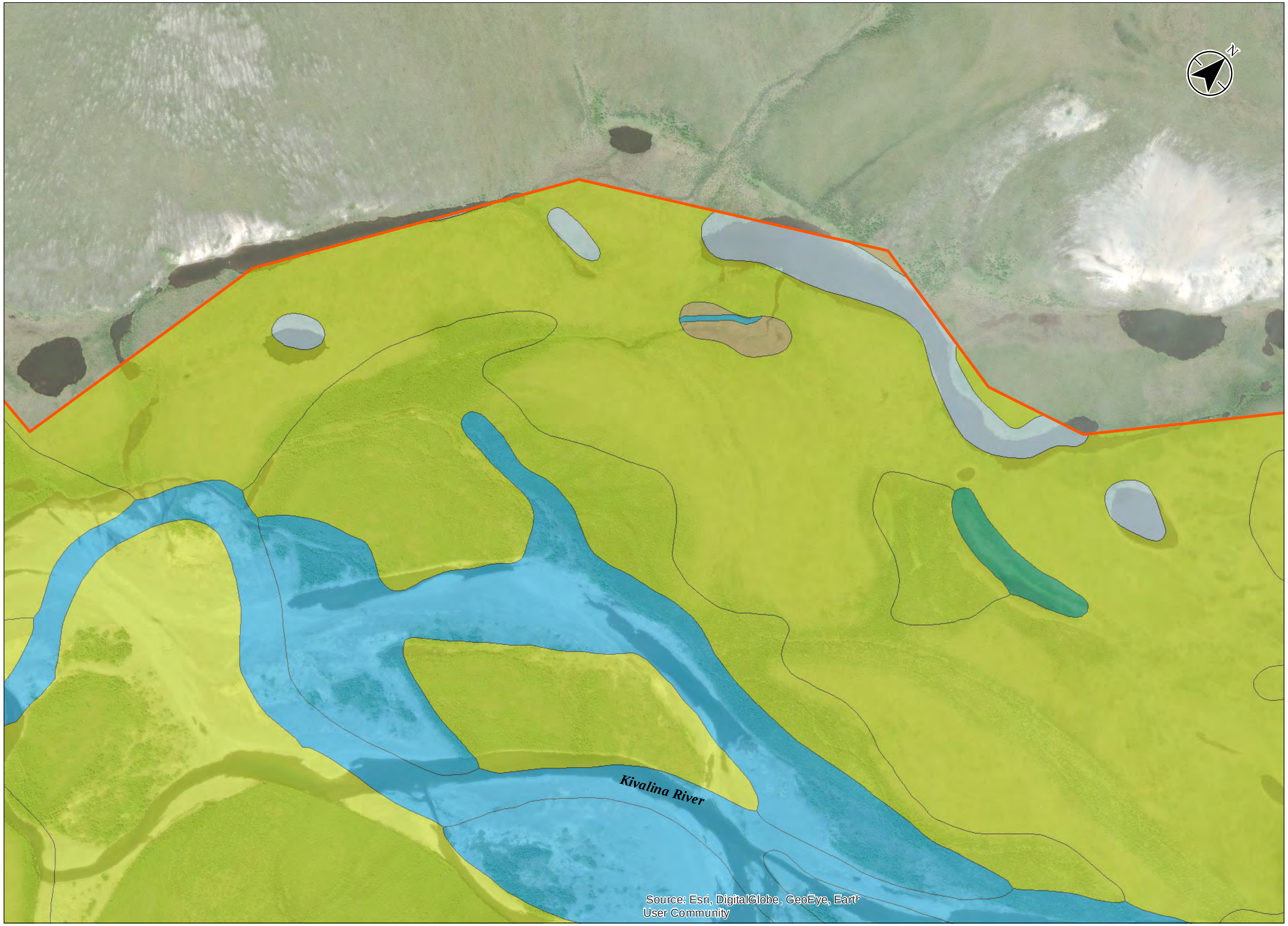
002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - E6

Title
Kivalina Evacuation and School Site Access Road - Wetlands

U:\204765102\GIS\mxd\Wetland Report Figs\Fig_2-1 2-XXX Cowardin draft.mxd Revised: 2017-09-14 By: cpannone



0 250 500 1,000 1,500 2,000 Feet

1:6,500 (At original document size of 11x17)

Stantec

Legend

Data Points (2016)

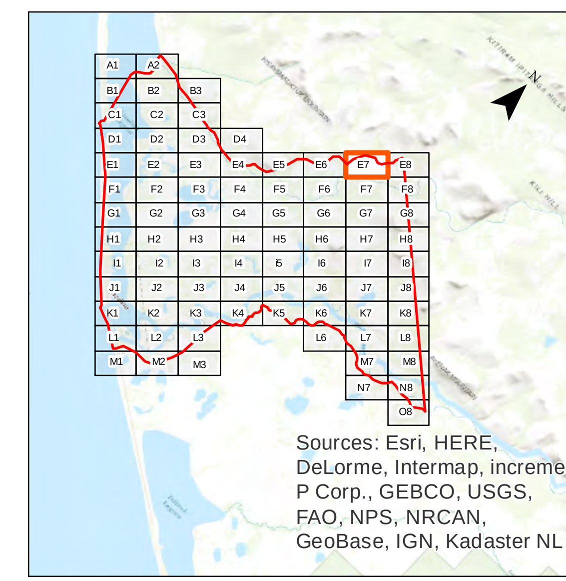
- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
- Pond
- Riverine
- Upland
- Study Area

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
2. Wetland mapping protocol: NWI boundaries were imported for the entire project. The geoTiffs of the November 2015 ASRC wetland report were brought into GIS, and wetland polygons were hand traced to replace the NWI mapping at 1:3000 scale. Then Stantec used field data to updated the wetland classifications for the entire area. NWI boundaries were retained, except for the smaller ASRC area where they were refined as appropriate.
3. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011, ©AeroMetric Inc., 2013



Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - E7

Title
Kivalina Evacuation and School Site Access Road - Wetlands

0 250 500 1,000 1,500 2,000 Feet

1:6,500 (At original document size of 11x17)

Stantec

Legend

Data Points (2016)

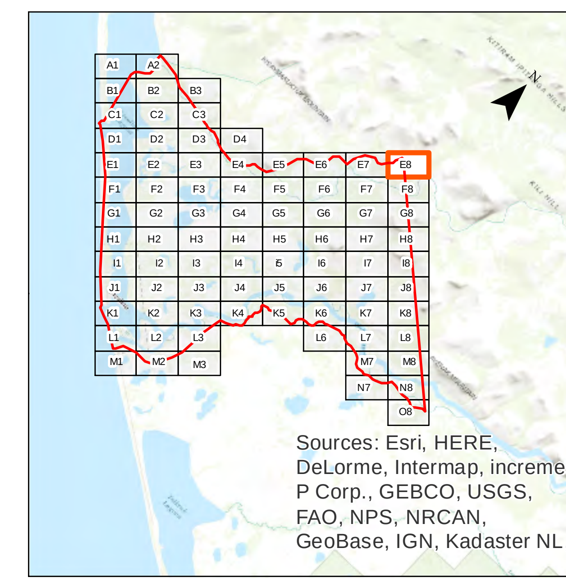
- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
- Pond
- Riverine
- Upland
- Study Area

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
2. Wetland mapping protocol: NWI boundaries were imported for the entire project. The geoTiffs of the November 2015 ASRC wetland report were brought into GIS, and wetland polygons were hand traced to replace the NWI mapping at 1:3000 scale. Then Stantec used field data to updated the wetland classifications for the entire area. NWI boundaries were retained, except for the smaller ASRC area where they were refined as appropriate.
3. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011, ©AeroMetric Inc., 2013



Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - E8

Title
Kivalina Evacuation and School Site Access Road - Wetlands

U:\204705510 2\GIS\mxd\Wetland Report Figs\Fig 2-1 2-XXX Cowardin draft.mxd Revised: 2017-09-14 By: cpannone

0 250 500 1,000 1,500 2,000
Feet

1:6,500 (At original document size of 11x17)

Stantec

Legend

Data Points (2016)

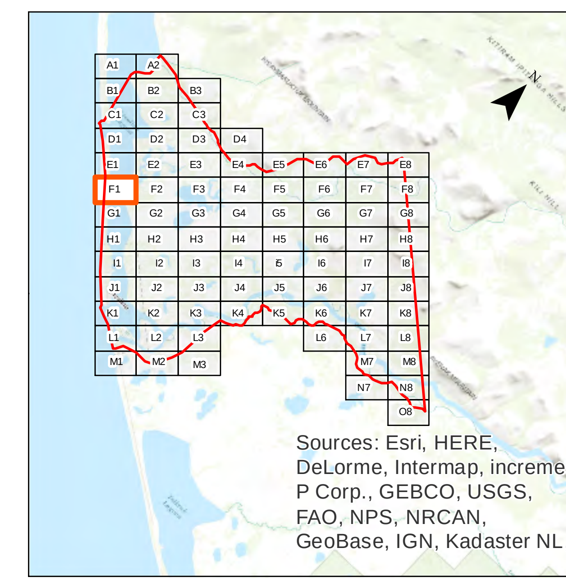
- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
- Pond
- Riverine
- Upland
- Study Area

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
2. Wetland mapping protocol: NWI boundaries were imported for the entire project. The geoTiffs of the November 2015 ASRC wetland report were brought into GIS, and wetland polygons were hand traced to replace the NWI mapping at 1:3000 scale. Then Stantec used field data to updated the wetland classifications for the entire area. NWI boundaries were retained, except for the smaller ASRC area where they were refined as appropriate.
3. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011, ©AeroMetric Inc., 2013



Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

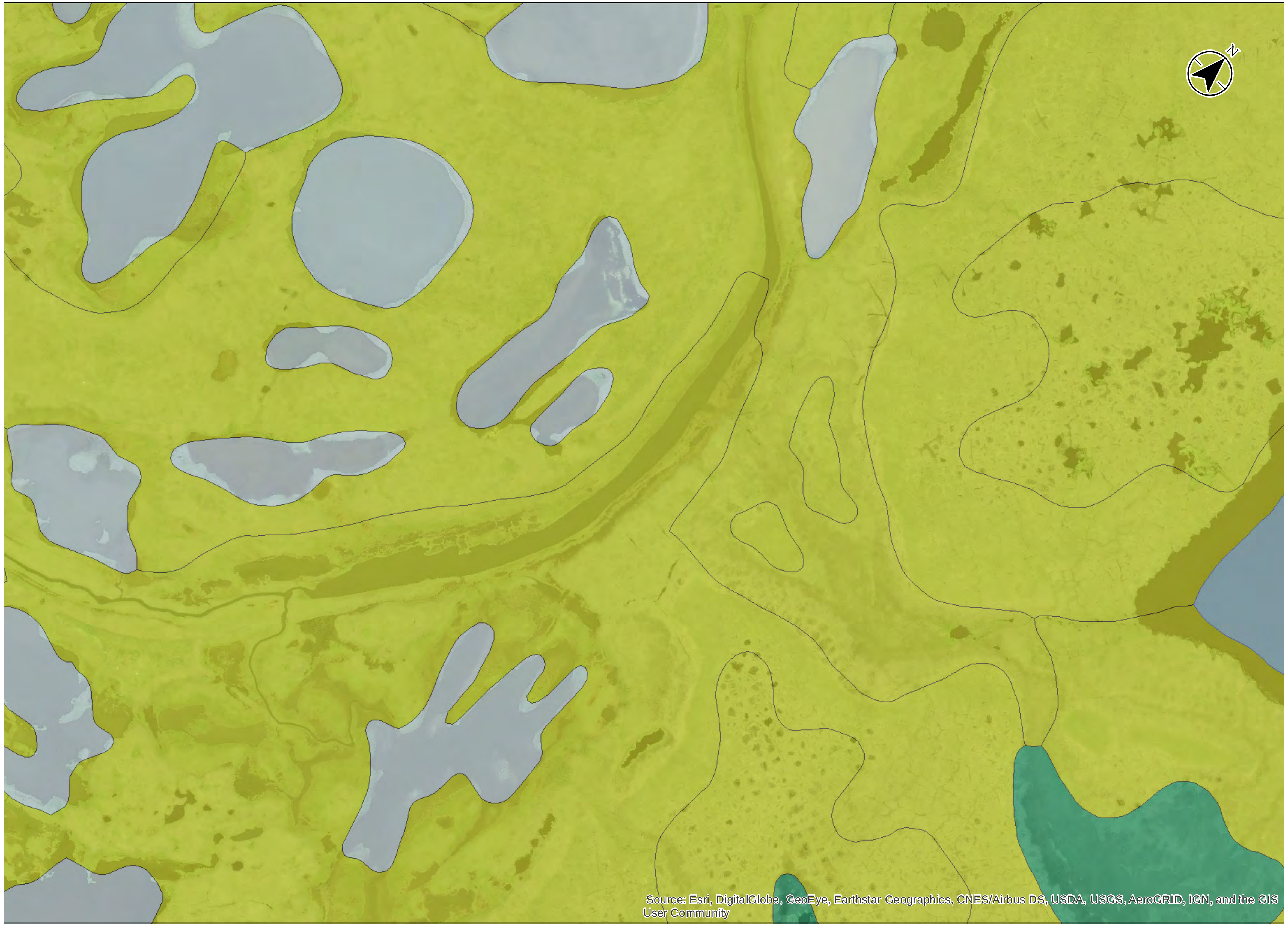
002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - F1

Title
Kivalina Evacuation and School Site Access Road - Wetlands

U:\204765152\GIS\mxd\Wetland Report Figs\Fig_2-1_2-XXX_Cowardin_draft.mxd Revised: 2017-09-14 By: cpannone



0 250 500 1,000 1,500 2,000 Feet

1:6,500 (At original document size of 11x17)

Stantec

Legend

Data Points (2016)

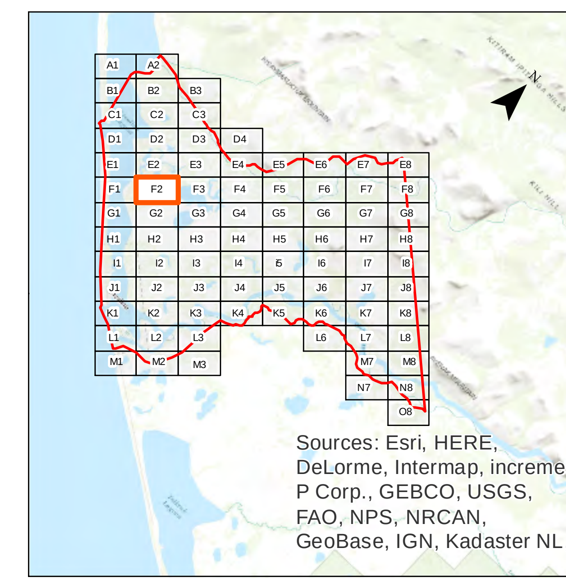
- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
- Pond
- Riverine
- Upland
- Study Area

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
2. Wetland mapping protocol: NWI boundaries were imported for the entire project. The geoTiffs of the November 2015 ASRC wetland report were brought into GIS, and wetland polygons were hand traced to replace the NWI mapping at 1:3000 scale. Then Stantec used field data to updated the wetland classifications for the entire area. NWI boundaries were retained, except for the smaller ASRC area where they were refined as appropriate.
3. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011, ©AeroMetric Inc., 2013



Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - F2

Title
Kivalina Evacuation and School Site Access Road - Wetlands

U:\204705510\2\GIS\mxd\Wetland Report Figs\Fig 2-1 2-XXX Cowardin draft.mxd Revised: 2017-09-14 By: cpannone

1:6,500 (At original document size of 11x17)

Stantec

Legend

Data Points (2016)

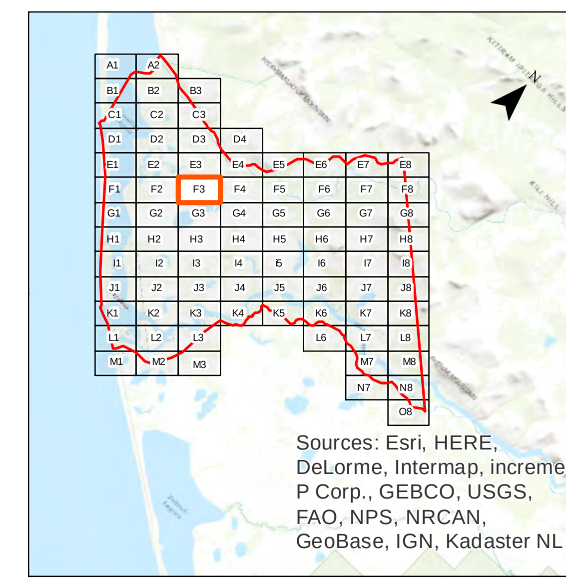
- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
- Pond
- Riverine
- Upland
- Study Area

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
2. Wetland mapping protocol: NWI boundaries were imported for the entire project. The geoTiffs of the November 2015 ASRC wetland report were brought into GIS, and wetland polygons were hand traced to replace the NWI mapping at 1:3000 scale. Then Stantec used field data to updated the wetland classifications for the entire area. NWI boundaries were retained, except for the smaller ASRC area where they were refined as appropriate.
3. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011, ©AeroMetric Inc., 2013



Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - F3

Title
Kivalina Evacuation and School Site Access Road - Wetlands

U:\2047055102\GIS\mxd\Wetland Report Figs\Fig_2-1 2-XXX Cowardin draft.mxd Revised: 2017-09-14 By: cpannone

0 250 500 1,000 1,500 2,000 Feet

1:6,500 (At original document size of 11x17)

Stantec

Legend

Data Points (2016)

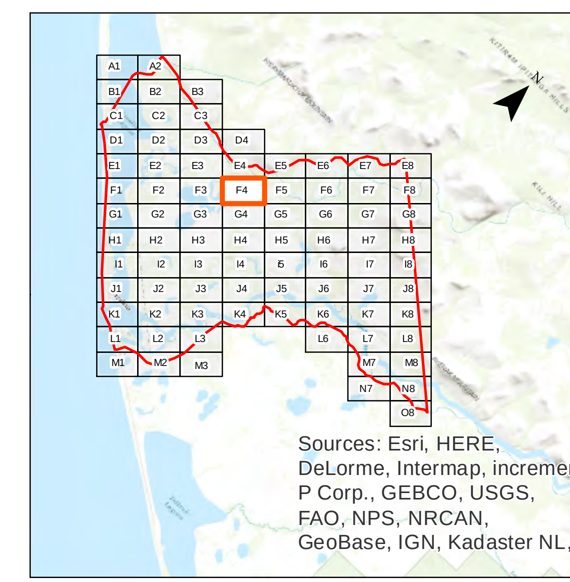
- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
- Pond
- Riverine
- Upland
- Study Area

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
2. Wetland mapping protocol: NWI boundaries were imported for the entire project. The geoTiffs of the November 2015 ASRC wetland report were brought into GIS, and wetland polygons were hand traced to replace the NWI mapping at 1:3000 scale. Then Stantec used field data to updated the wetland classifications for the entire area. NWI boundaries were retained, except for the smaller ASRC area where they were refined as appropriate.
3. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011, ©AeroMetric Inc., 2013



Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - F4

Title
Kivalina Evacuation and School Site Access Road - Wetlands

U:\2047055102\GIS\mxd\Wetland Report Figs\Fig 2-1 2-XXX Cowardin draft.mxd Revised: 2017-09-14 By: cpannone

0 250 500 1,000 1,500 2,000
Feet

1:6,500 (At original document size of 11x17)

Stantec

Legend

Data Points (2016)

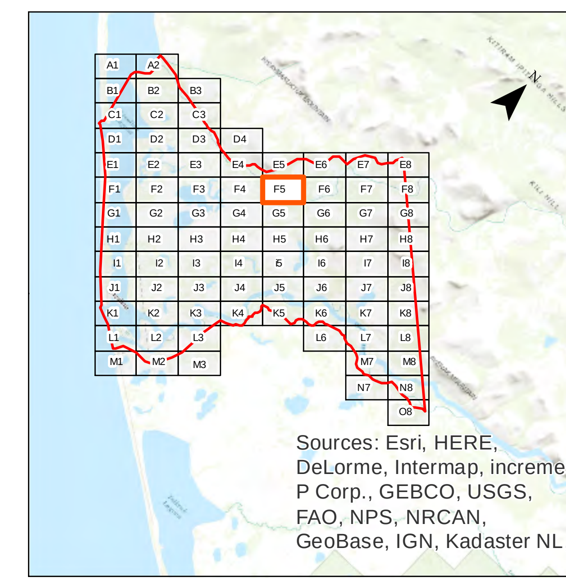
- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
- Pond
- Riverine
- Upland
- Study Area

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
2. Wetland mapping protocol: NWI boundaries were imported for the entire project. The geoTiffs of the November 2015 ASRC wetland report were brought into GIS, and wetland polygons were hand traced to replace the NWI mapping at 1:3000 scale. Then Stantec used field data to updated the wetland classifications for the entire area. NWI boundaries were retained, except for the smaller ASRC area where they were refined as appropriate.
3. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011, ©AeroMetric Inc., 2013



Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - F5

Title
Kivalina Evacuation and School Site Access Road - Wetlands

0 250 500 1,000 1,500 2,000 Feet

1:6,500 (At original document size of 11x17)

Stantec

Legend

Data Points (2016)

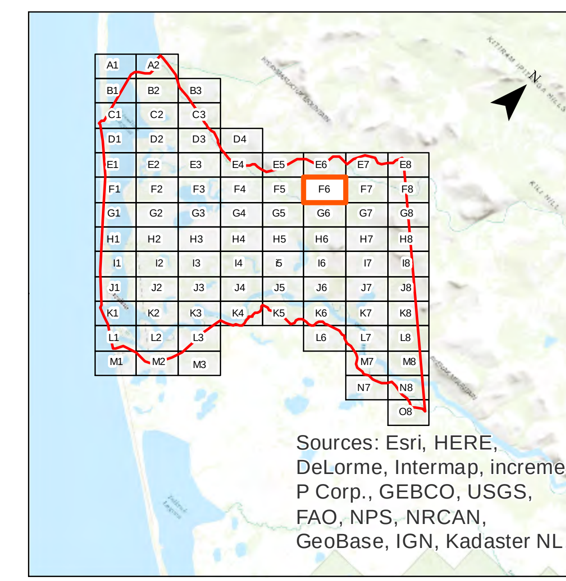
- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
- Pond
- Riverine
- Upland
- Study Area

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
2. Wetland mapping protocol: NWI boundaries were imported for the entire project. The geoTiffs of the November 2015 ASRC wetland report were brought into GIS, and wetland polygons were hand traced to replace the NWI mapping at 1:3000 scale. Then Stantec used field data to updated the wetland classifications for the entire area. NWI boundaries were retained, except for the smaller ASRC area where they were refined as appropriate.
3. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011, ©AeroMetric Inc., 2013



Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - F6

Title
Kivalina Evacuation and School Site Access Road - Wetlands

Stantec

Legend

Data Points (2016)

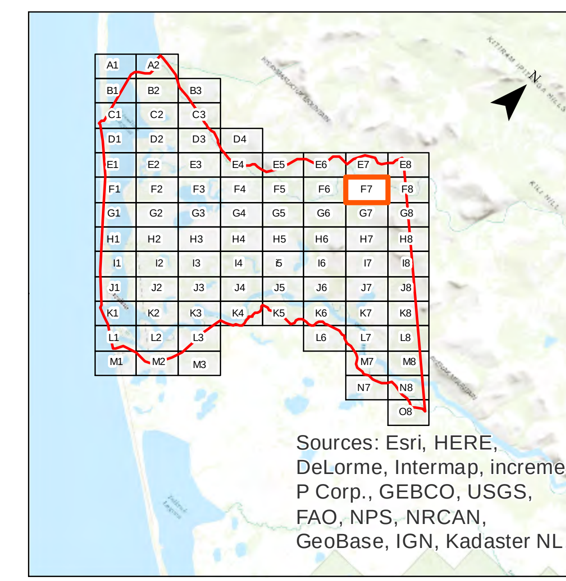
- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
- Pond
- Riverine
- Upland
- Study Area

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
2. Wetland mapping protocol: NWI boundaries were imported for the entire project. The geoTiffs of the November 2015 ASRC wetland report were brought into GIS, and wetland polygons were hand traced to replace the NWI mapping at 1:3000 scale. Then Stantec used field data to updated the wetland classifications for the entire area. NWI boundaries were retained, except for the smaller ASRC area where they were refined as appropriate.
3. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011, ©AeroMetric Inc., 2013



Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

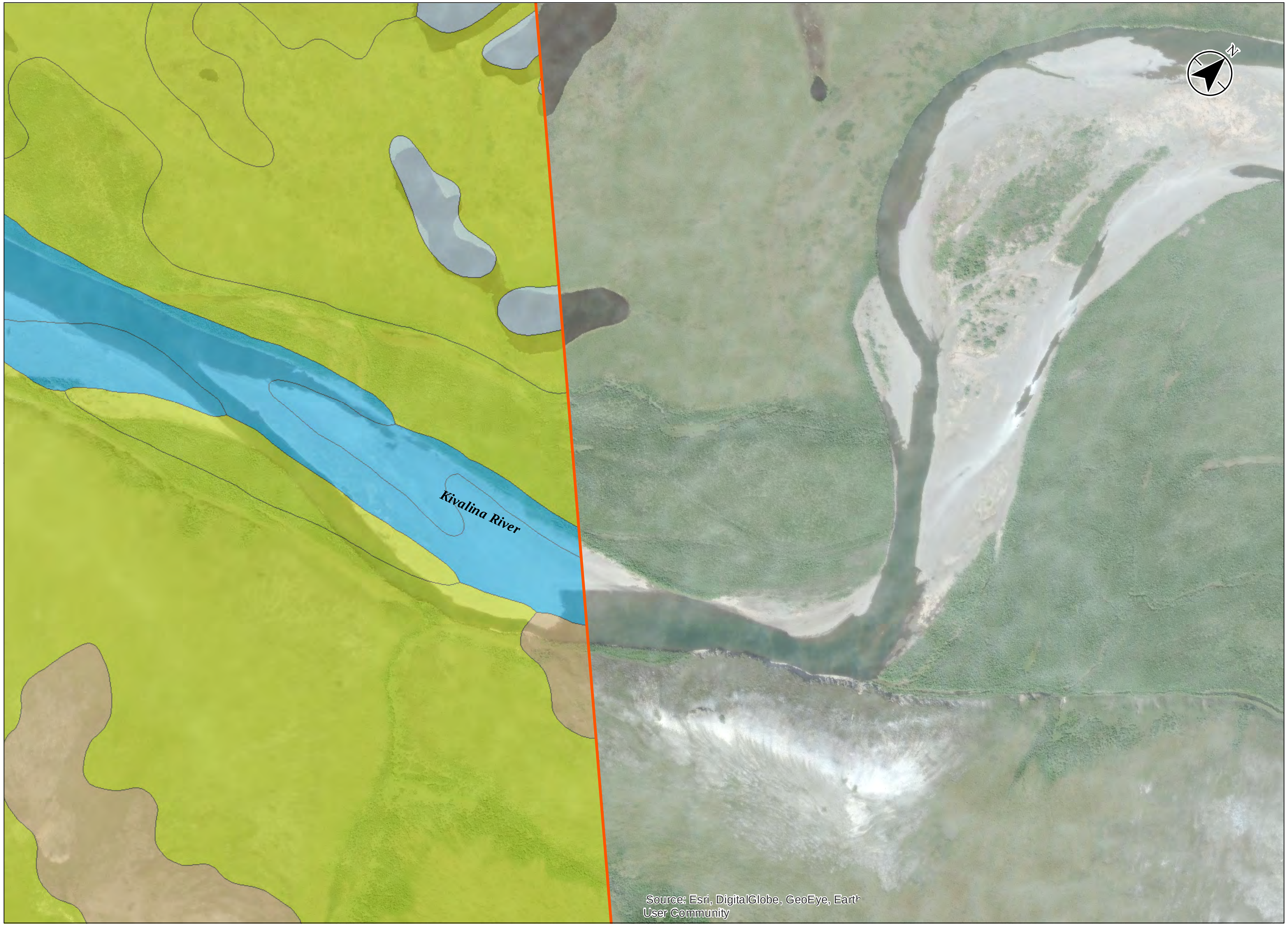
002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - F7

Title
Kivalina Evacuation and School Site Access Road - Wetlands

U:\204765102\GIS\mxd\Wetland Report Figs\Fig_2-1 2-XXX Cowardin draft.mxd Revised: 2017-09-14 By: cpannone



0 250 500 1,000 1,500 2,000 Feet

1:6,500 (At original document size of 11x17)

Stantec

Legend

Data Points (2016)

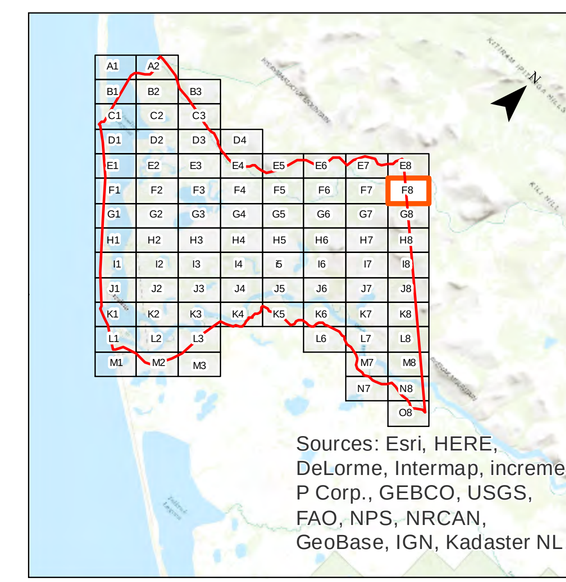
- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
- Pond
- Riverine
- Upland
- Study Area

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
2. Wetland mapping protocol: NWI boundaries were imported for the entire project. The geoTiffs of the November 2015 ASRC wetland report were brought into GIS, and wetland polygons were hand traced to replace the NWI mapping at 1:3000 scale. Then Stantec used field data to updated the wetland classifications for the entire area. NWI boundaries were retained, except for the smaller ASRC area where they were refined as appropriate.
3. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011, ©AeroMetric Inc., 2013



Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - F8

Title
Kivalina Evacuation and School Site Access Road - Wetlands

U:\204765102\GIS\mxd\Wetland Report Figs\Fig. 2-1 2-XX Cowardin draft.mxd Revised: 2017-09-14 By: cpannone

Stantec

Legend

Data Points (2016)

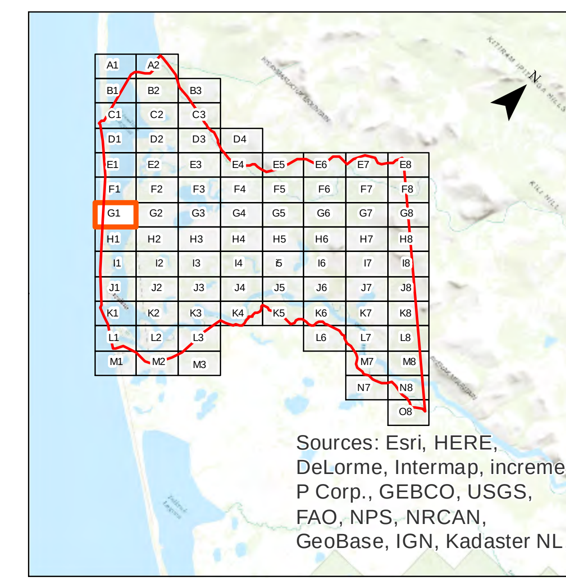
- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
- Pond
- Riverine
- Upland
- Study Area

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
2. Wetland mapping protocol: NWI boundaries were imported for the entire project. The geoTiffs of the November 2015 ASRC wetland report were brought into GIS, and wetland polygons were hand traced to replace the NWI mapping at 1:3000 scale. Then Stantec used field data to updated the wetland classifications for the entire area. NWI boundaries were retained, except for the smaller ASRC area where they were refined as appropriate.
3. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011, ©AeroMetric Inc., 2013



Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

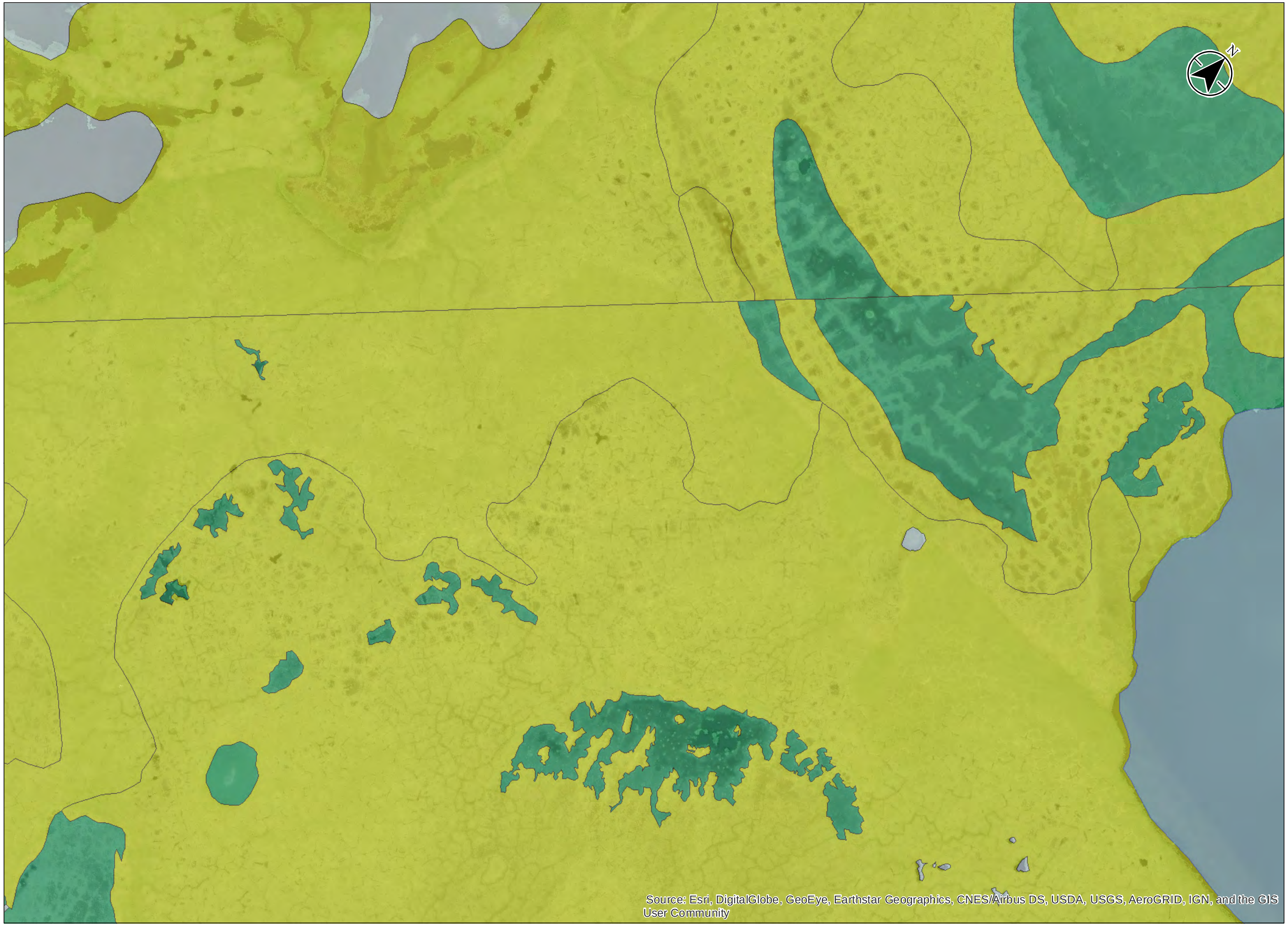
002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - G1

Title
Kivalina Evacuation and School Site Access Road - Wetlands

U:\204765512\GIS\mxd\Wetland Report Figs\Fig_2-1_2-XX_Cowardin_draft.mxd Revised: 2017-09-14 By: cpannone



0 250 500 1,000 1,500 2,000 Feet

1:6,500 (At original document size of 11x17)

Stantec

Legend

Data Points (2016)

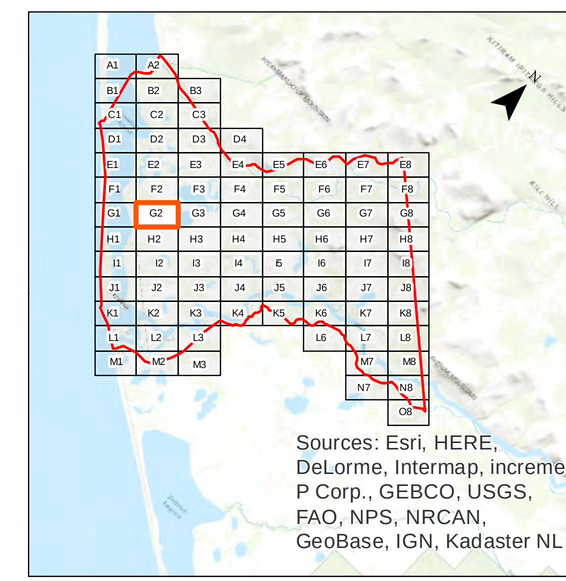
- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
- Pond
- Riverine
- Upland
- Study Area

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
2. Wetland mapping protocol: NWI boundaries were imported for the entire project. The geoTiffs of the November 2015 ASRC wetland report were brought into GIS, and wetland polygons were hand traced to replace the NWI mapping at 1:3000 scale. Then Stantec used field data to updated the wetland classifications for the entire area. NWI boundaries were retained, except for the smaller ASRC area where they were refined as appropriate.
3. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011, ©AeroMetric Inc., 2013



Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - G2

Title
Kivalina Evacuation and School Site Access Road - Wetlands

Stantec

Legend

Data Points (2016)

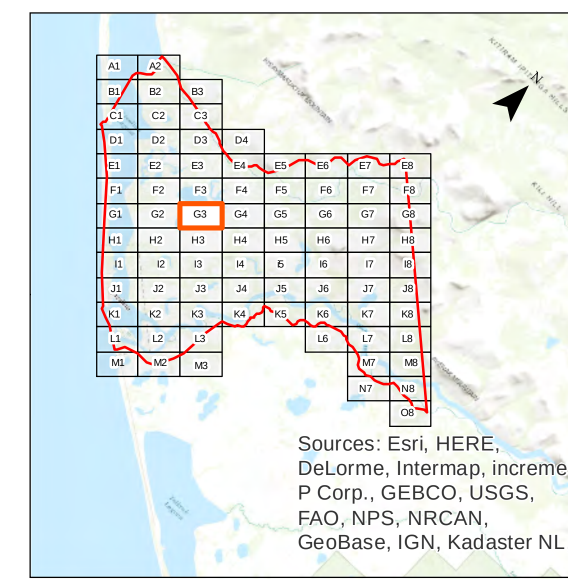
- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
- Pond
- Riverine
- Upland
- Study Area

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
2. Wetland mapping protocol: NWI boundaries were imported for the entire project. The geoTiffs of the November 2015 ASRC wetland report were brought into GIS, and wetland polygons were hand traced to replace the NWI mapping at 1:3000 scale. Then Stantec used field data to updated the wetland classifications for the entire area. NWI boundaries were retained, except for the smaller ASRC area where they were refined as appropriate.
3. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011, ©AeroMetric Inc., 2013



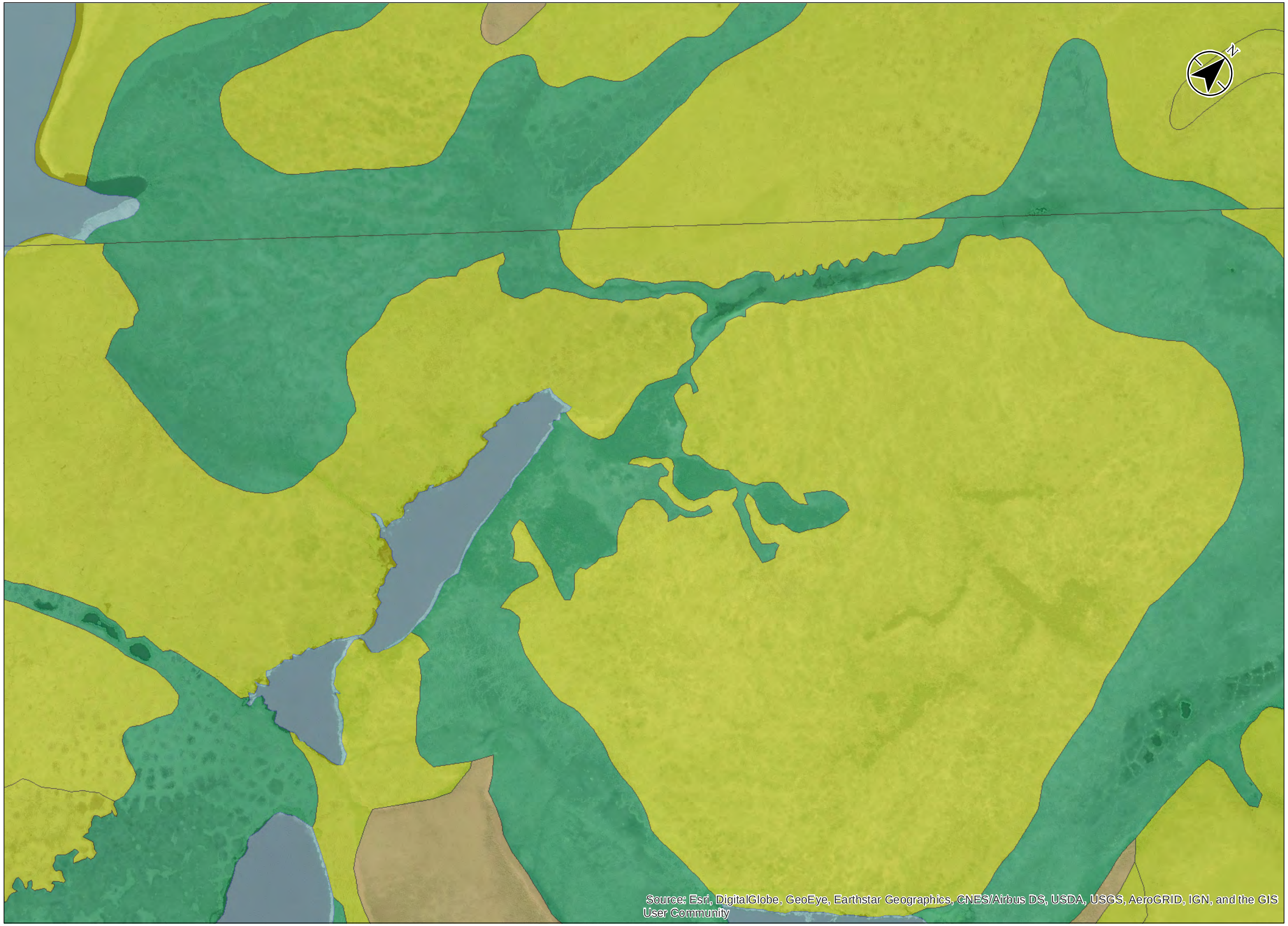
Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - G3

Title
Kivalina Evacuation and School Site Access Road - Wetlands



0 250 500 1,000 1,500 2,000 Feet

1:6,500 (At original document size of 11x17)

Stantec

Legend

Data Points (2016)

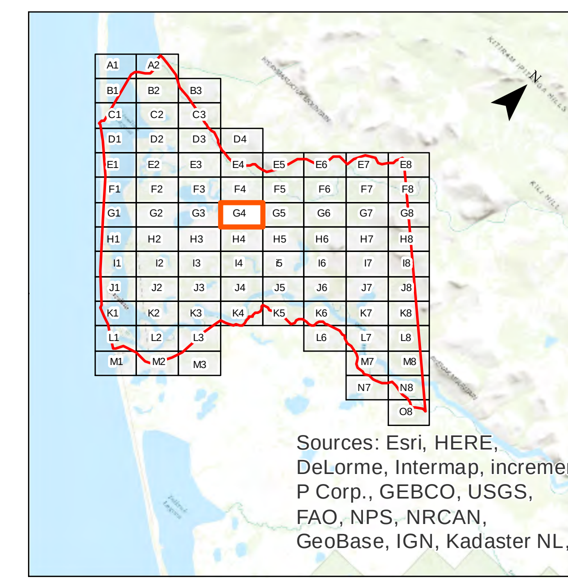
- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
- Pond
- Riverine
- Upland
- Study Area

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
2. Wetland mapping protocol: NWI boundaries were imported for the entire project. The geoTiffs of the November 2015 ASRC wetland report were brought into GIS, and wetland polygons were hand traced to replace the NWI mapping at 1:3000 scale. Then Stantec used field data to updated the wetland classifications for the entire area. NWI boundaries were retained, except for the smaller ASRC area where they were refined as appropriate.
3. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011, ©AeroMetric Inc., 2013



Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - G4

Title
Kivalina Evacuation and School Site Access Road - Wetlands

0 250 500 1,000 1,500 2,000
Feet

1:6,500 (At original document size of 11x17)

Stantec

Legend

Data Points (2016)

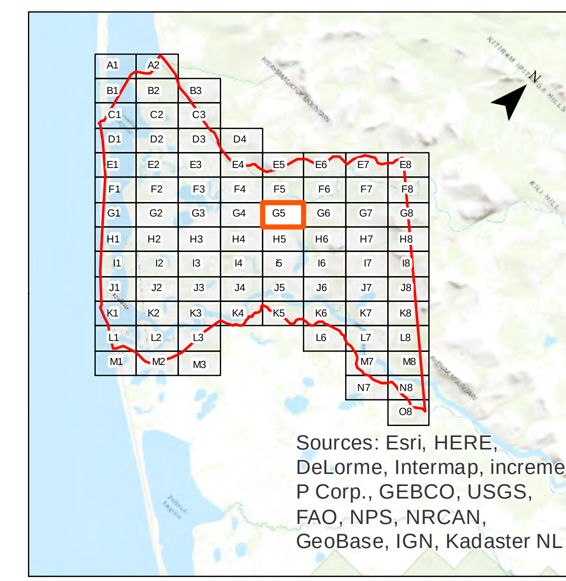
- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
- Pond
- Riverine
- Upland
- Study Area

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
2. Wetland mapping protocol: NWI boundaries were imported for the entire project. The geoTiffs of the November 2015 ASRC wetland report were brought into GIS, and wetland polygons were hand traced to replace the NWI mapping at 1:3000 scale. Then Stantec used field data to updated the wetland classifications for the entire area. NWI boundaries were retained, except for the smaller ASRC area where they were refined as appropriate.
3. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011, ©AeroMetric Inc., 2013



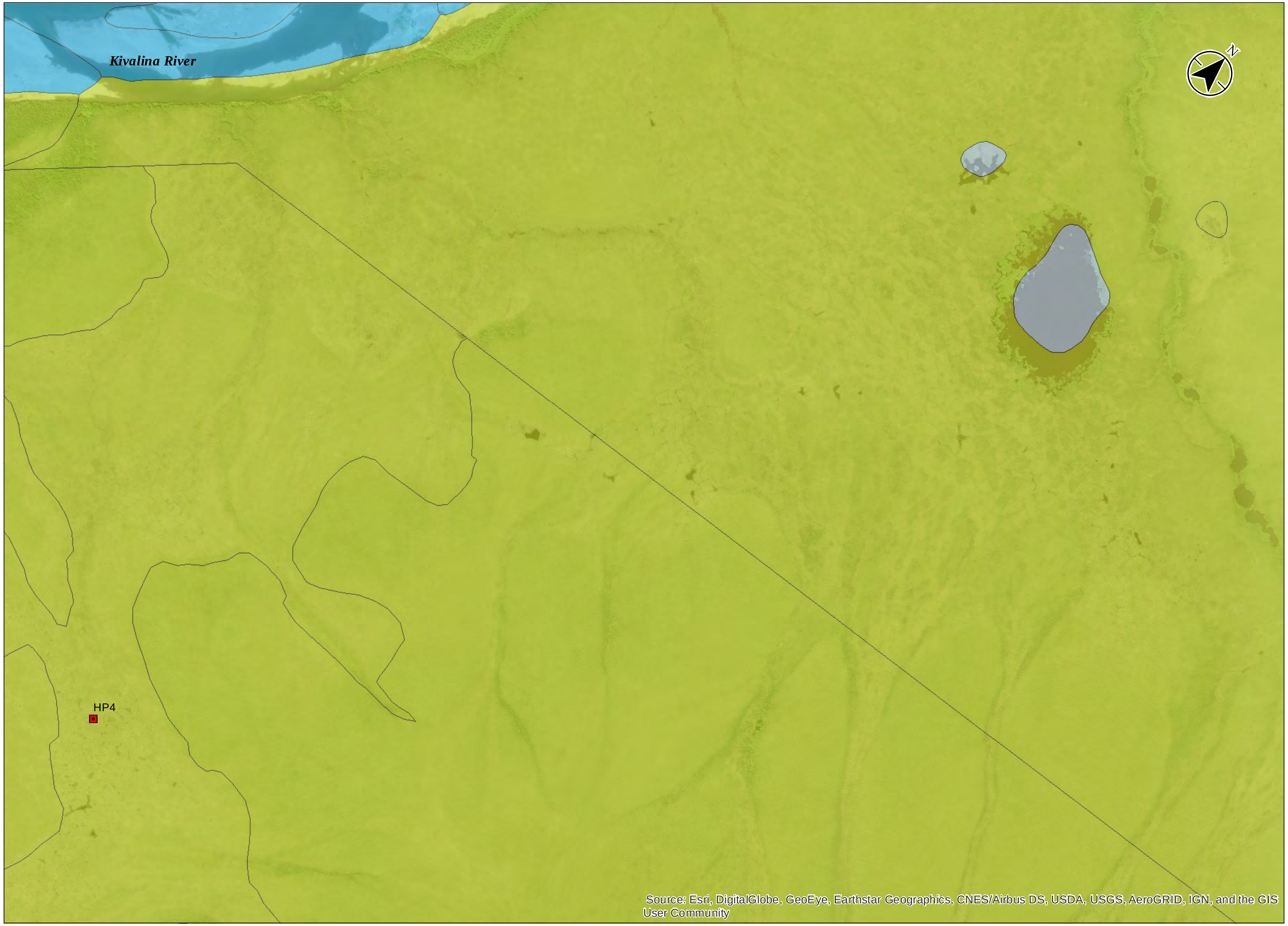
Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - G5

Title
Kivalina Evacuation and School Site Access Road - Wetlands



0 250 500 1,000 1,500 2,000 Feet

1:6,500 (At original document size of 11x17)

Stantec

Legend

Data Points (2016)

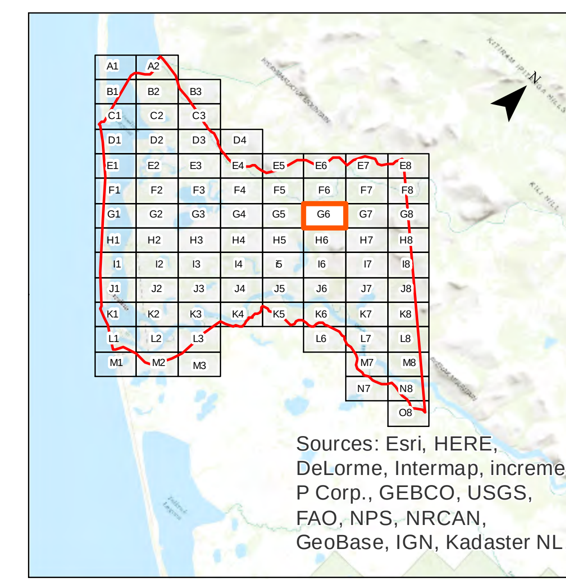
- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
- Pond
- Riverine
- Upland
- Study Area

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
2. Wetland mapping protocol: NWI boundaries were imported for the entire project. The geoTiffs of the November 2015 ASRC wetland report were brought into GIS, and wetland polygons were hand traced to replace the NWI mapping at 1:3000 scale. Then Stantec used field data to updated the wetland classifications for the entire area. NWI boundaries were retained, except for the smaller ASRC area where they were refined as appropriate.
3. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011, ©AeroMetric Inc., 2013



Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - G6

Title
Kivalina Evacuation and School Site Access Road - Wetlands

Page 36 of 87

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0 250 500 1,000 1,500 2,000 Feet

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Stantec

Legend

Data Points (2016)

- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
- Pond
- Riverine
- Upland
- Study Area

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
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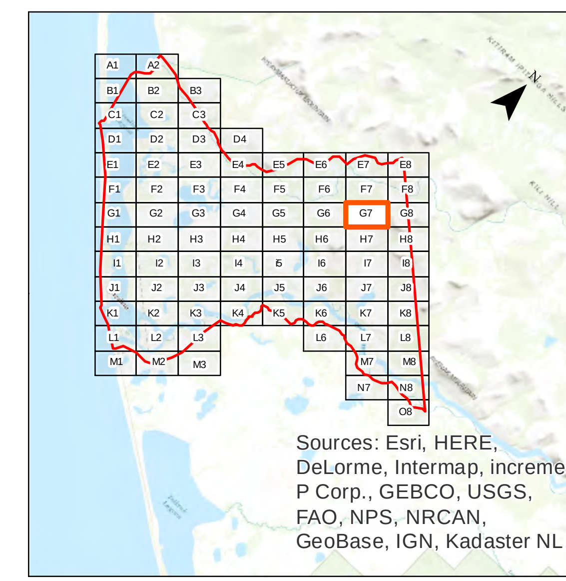

Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - G7

Title
Kivalina Evacuation and School Site Access Road - Wetlands

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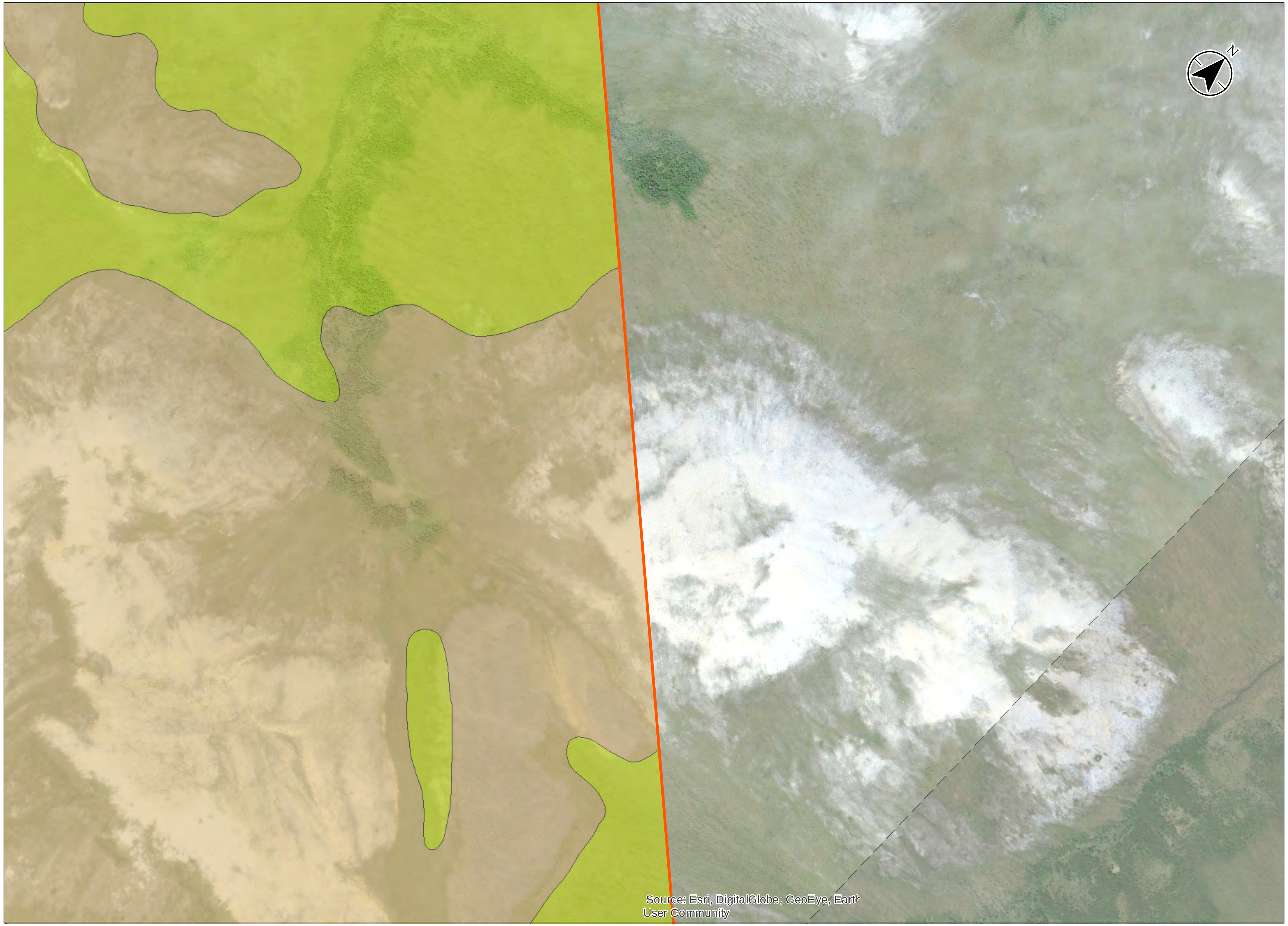

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Stantec

Legend

Data Points (2016)

- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
- Pond
- Riverine
- Upland
- Study Area

Notes

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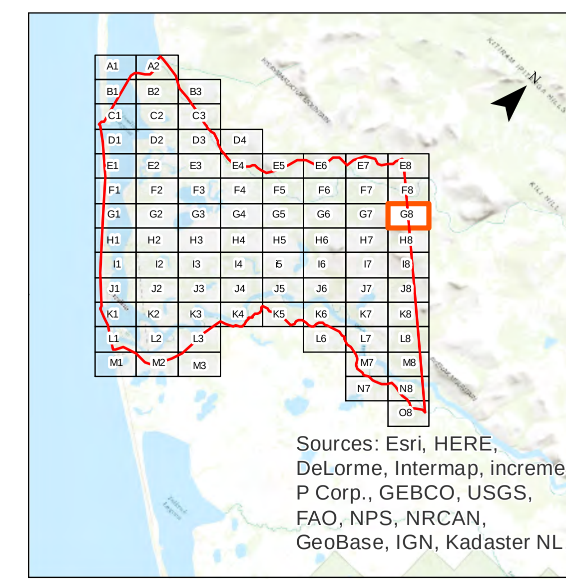

Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - G8

Title
Kivalina Evacuation and School Site Access Road - Wetlands

0 250 500 1,000 1,500 2,000 Feet

1:6,500 (At original document size of 11x17)

Legend

Data Points (2016)

- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
- Pond
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- Upland
- Study Area

Notes

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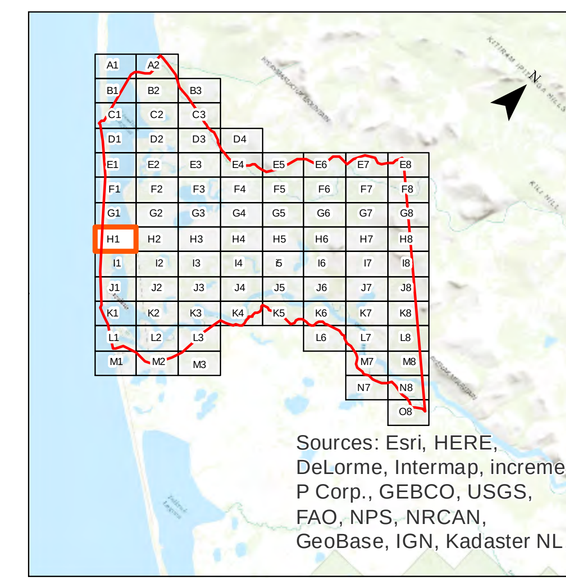

Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - H1

Title
Kivalina Evacuation and School Site Access Road - Wetlands

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0 250 500 1,000 1,500 2,000
Feet

1:6,500 (At original document size of 11x17)

Stantec

Legend

Data Points (2016)

- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
- Pond
- Riverine
- Upland
- Study Area

Notes

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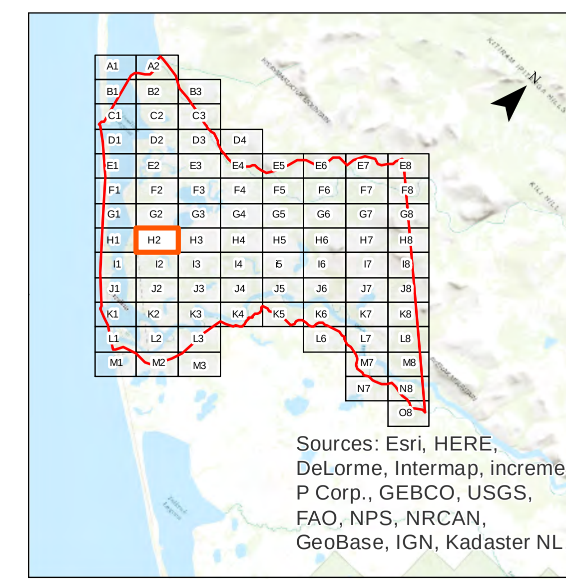

Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - H2

Title
Kivalina Evacuation and School Site Access Road - Wetlands

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0 250 500 1,000 1,500 2,000 Feet

1:6,500 (At original document size of 11x17)

Stantec

Legend

Data Points (2016)

- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
- Pond
- Riverine
- Upland
- Study Area

Notes

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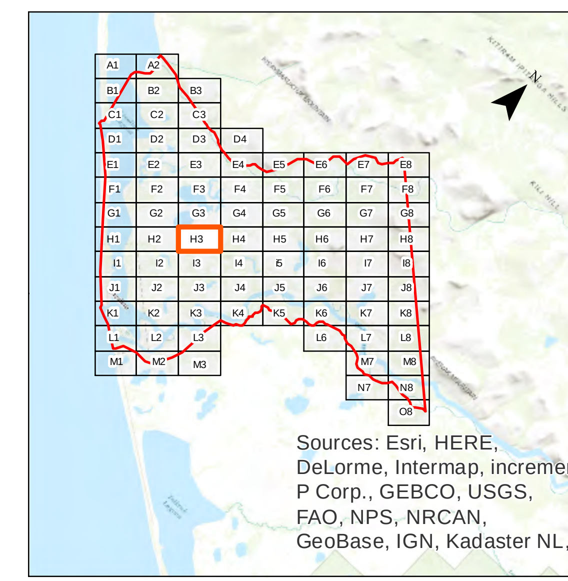

Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - H3

Title
Kivalina Evacuation and School Site Access Road - Wetlands

0 250 500 1,000 1,500 2,000 Feet

1:6,500 (At original document size of 11x17)

Stantec

Legend

Data Points (2016)

- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
- Pond
- Riverine
- Upland
- Study Area

Notes

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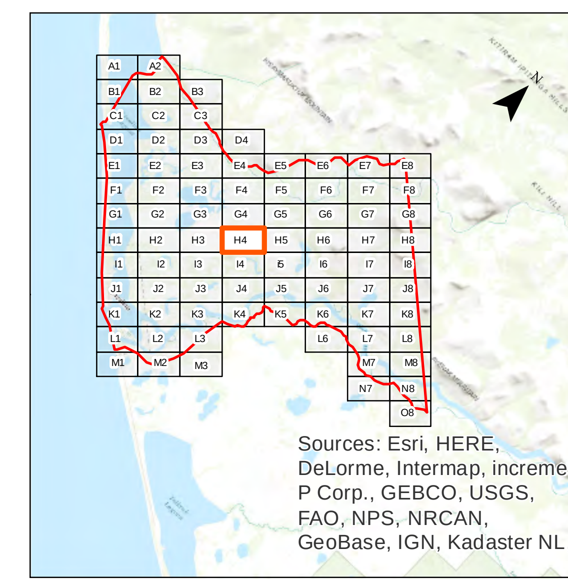

Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - H4

Title
Kivalina Evacuation and School Site Access Road - Wetlands

Stantec

Legend

Data Points (2016)

- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
- Pond
- Riverine
- Upland
- Study Area

Notes

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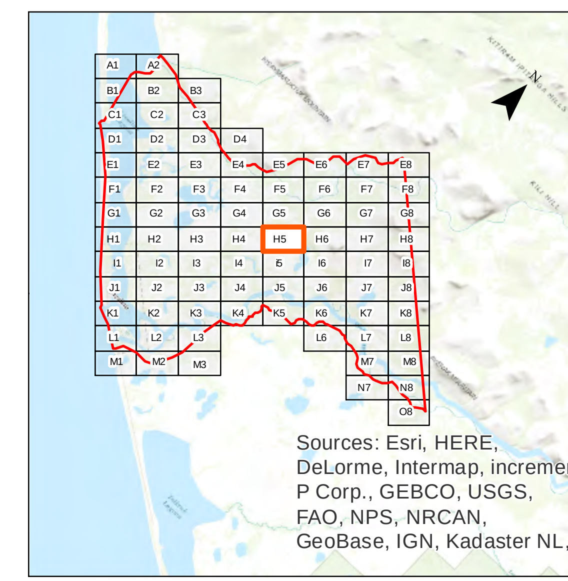

Project Location Project Origin: Kivalina, Alaska Section 21, Township 27N, Range 26W Kateel River Meridian	002(384)/NFHWYP00162 REVA Prepared by CDP on 2017-06-23 Technical Review by ABC on 2017-0X-XX Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - H5

Title
Kivalina Evacuation and School Site Access Road - Wetlands

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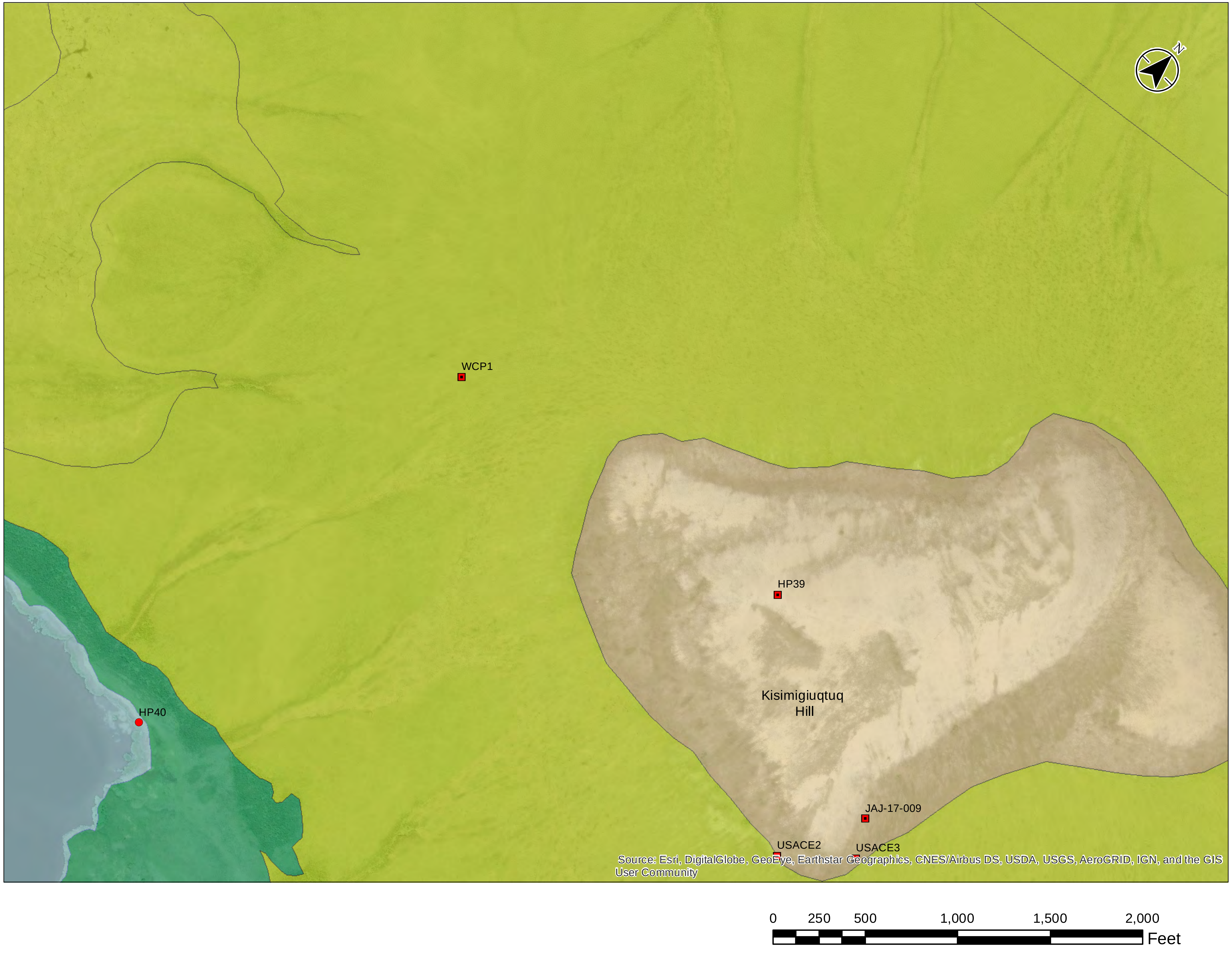

Stantec

Legend

Data Points (2016)

- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
- Pond
- Riverine
- Upland
- Study Area

Notes

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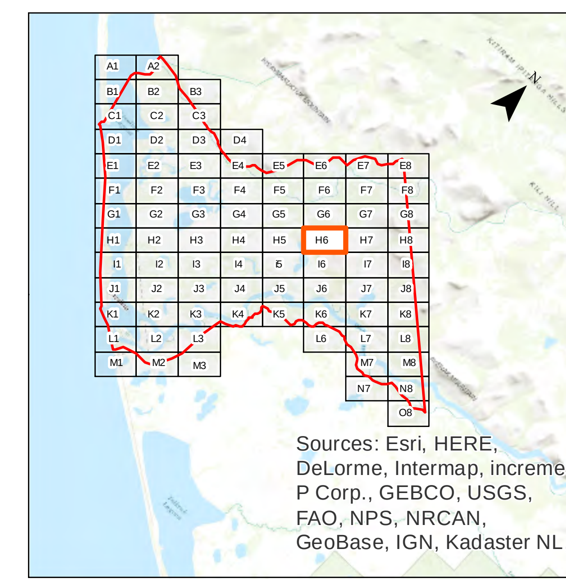

Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - H6

Title
Kivalina Evacuation and School Site Access Road - Wetlands

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0 250 500 1,000 1,500 2,000 Feet

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Stantec

Legend

Data Points (2016)

- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
- Pond
- Riverine
- Upland
- Study Area

Notes

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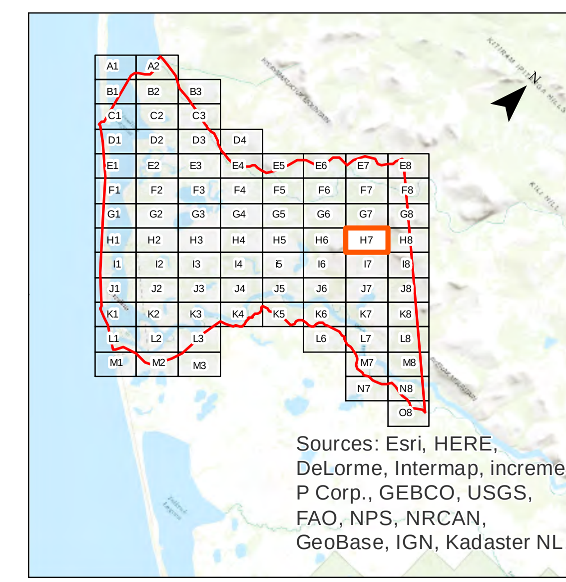


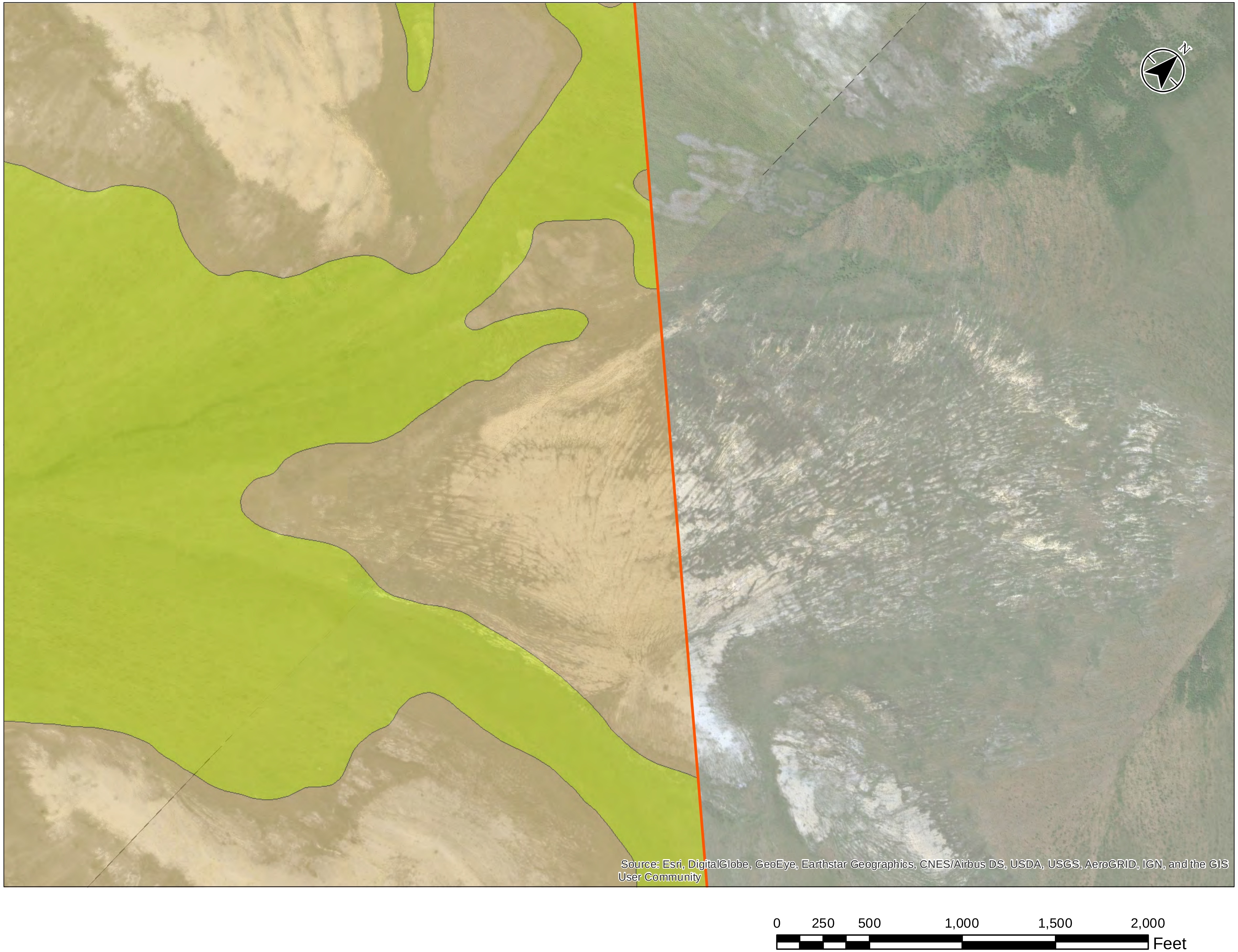
Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - H7

Title
Kivalina Evacuation and School Site Access Road - Wetlands



Stantec

Legend

Data Points (2016)

- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
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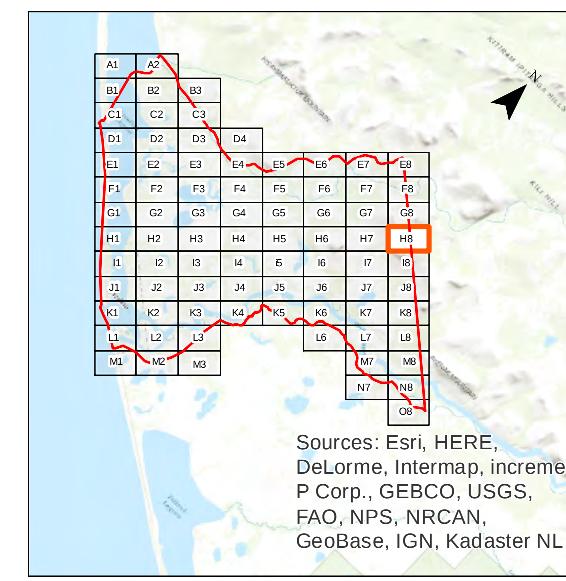

Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - H8

Title
Kivalina Evacuation and School Site Access Road - Wetlands

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Stantec

Legend

Data Points (2016)

- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
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- Study Area

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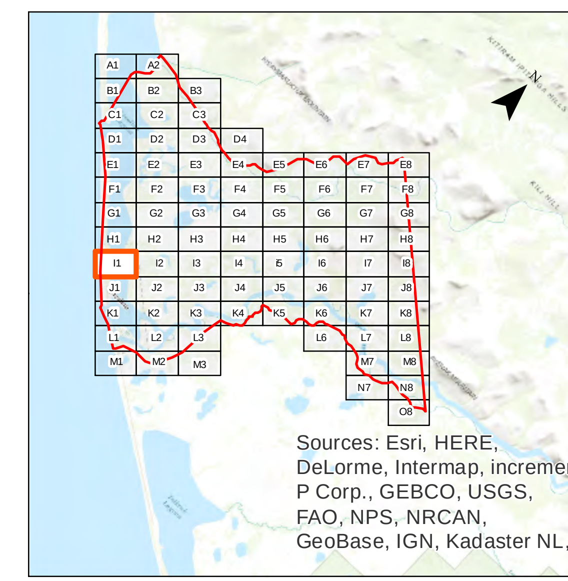

Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - I1

Title
Kivalina Evacuation and School Site Access Road - Wetlands

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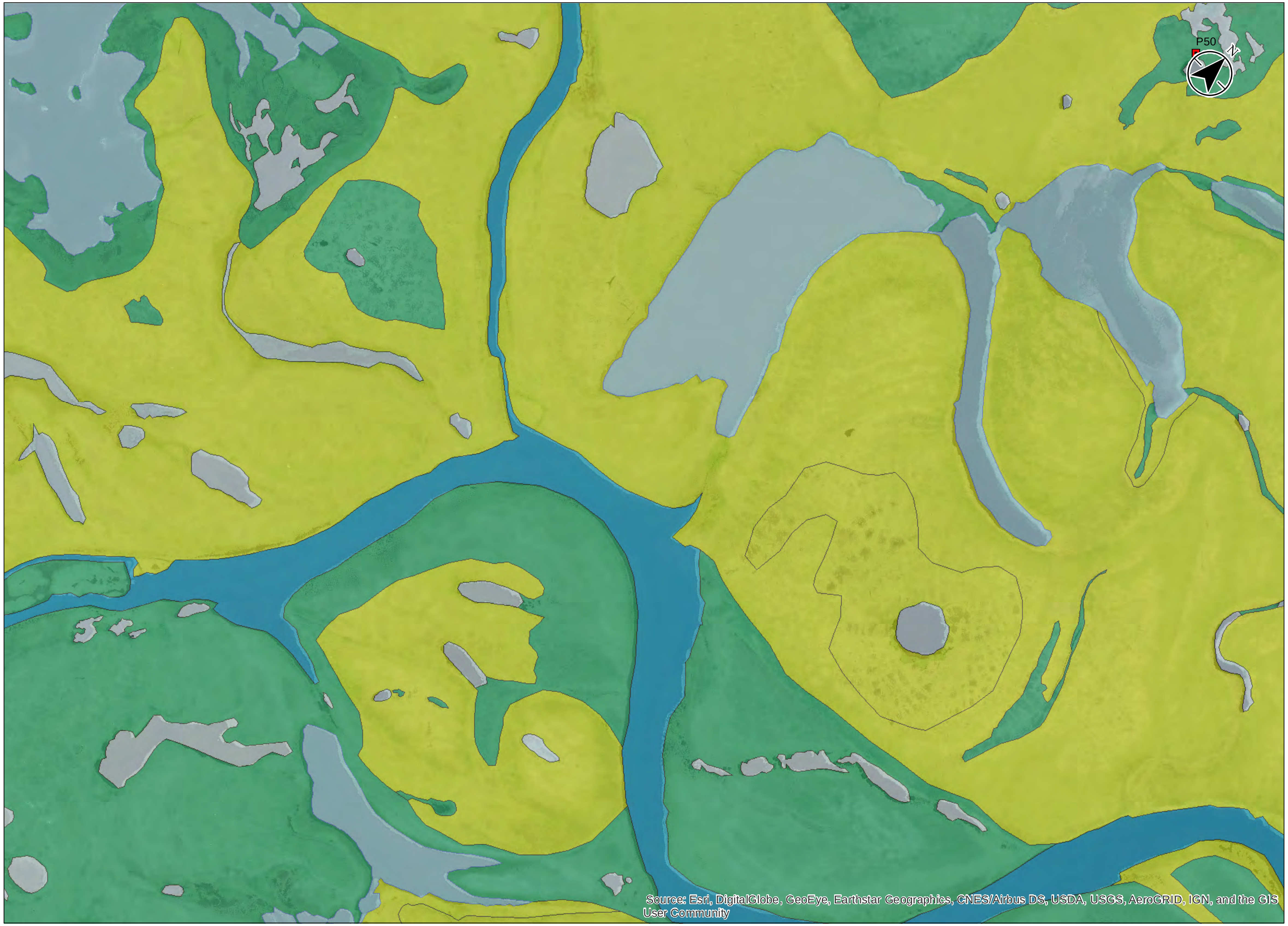

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Feet

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Stantec

Legend

Data Points (2016)

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- Photo Point

Wetland Type

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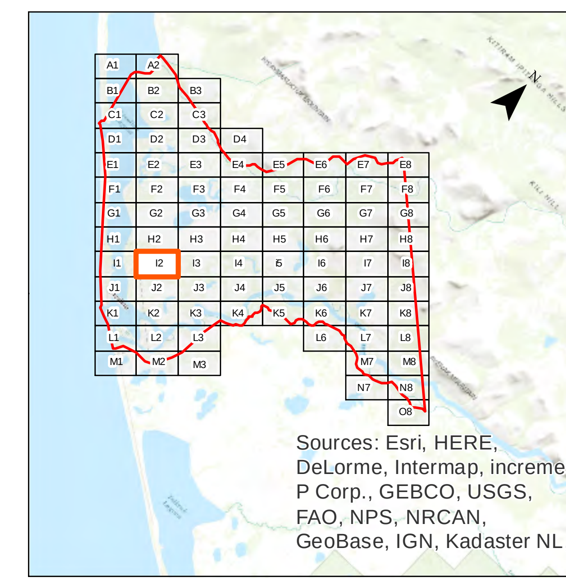

Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
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Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - I2

Title
Kivalina Evacuation and School Site Access Road - Wetlands

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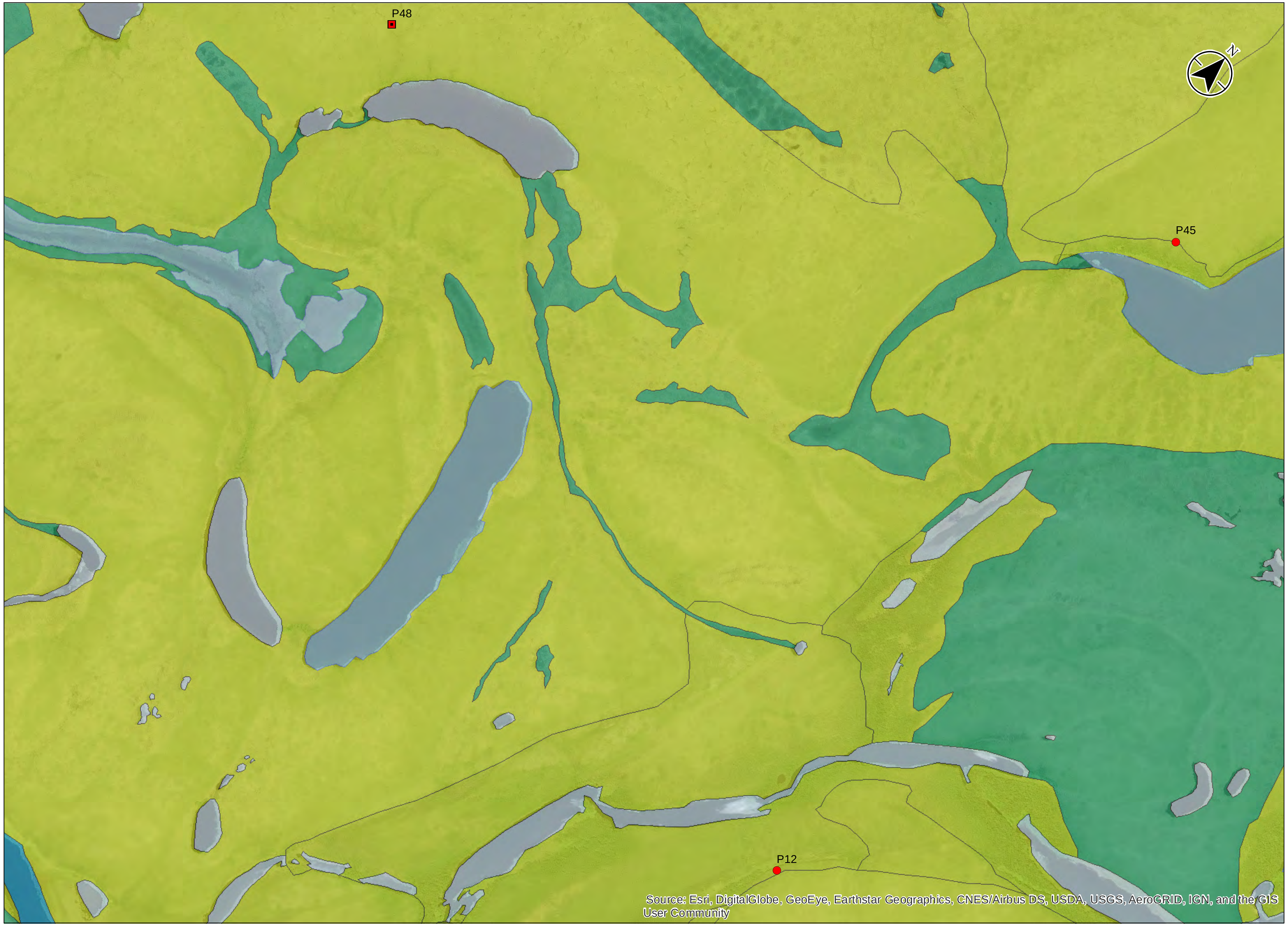

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Feet

1:6,500 (At original document size of 11x17)

Stantec

Legend

Data Points (2016)

- Standard Data Point
- Photo Point

Wetland Type

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- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
- Pond
- Riverine
- Upland
- Study Area

Notes

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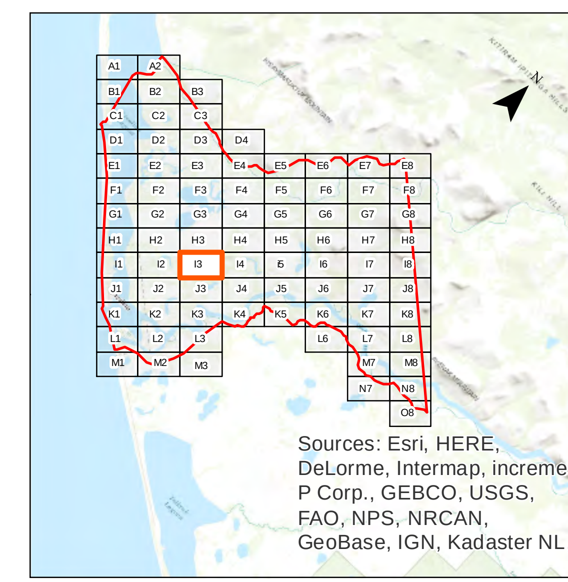

Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

002(384)/NFHWYP00162 REVA
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Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - I3

Title
Kivalina Evacuation and School Site Access Road - Wetlands

U:\204765102\GIS\mxd\Wetland Report Figs\Fig 2-1 2-XXX Cowardin draft.mxd Revised: 2017-09-14 By: cpannone

0 250 500 1,000 1,500 2,000 Feet

1:6,500 (At original document size of 11x17)

Stantec

Legend

Data Points (2016)

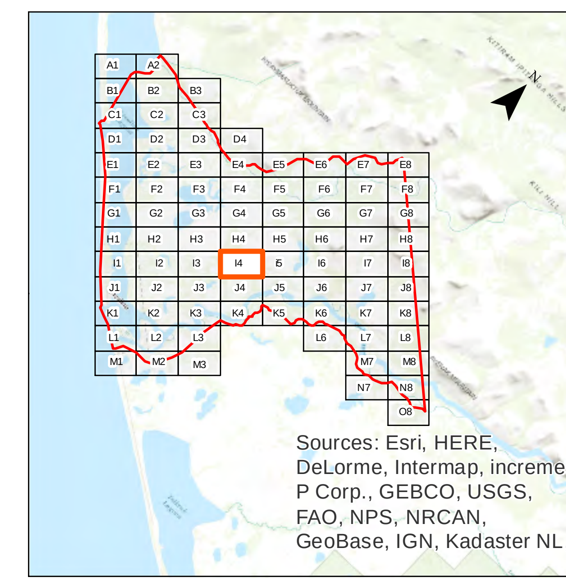
- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
- Pond
- Riverine
- Upland
- Study Area

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
2. Wetland mapping protocol: NWI boundaries were imported for the entire project. The geoTiffs of the November 2015 ASRC wetland report were brought into GIS, and wetland polygons were hand traced to replace the NWI mapping at 1:3000 scale. Then Stantec used field data to updated the wetland classifications for the entire area. NWI boundaries were retained, except for the smaller ASRC area where they were refined as appropriate.
3. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011, ©AeroMetric Inc., 2013



Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - I4

Title
Kivalina Evacuation and School Site Access Road - Wetlands

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1:6,500 (At original document size of 11x17)

Stantec

Legend

Data Points (2016)

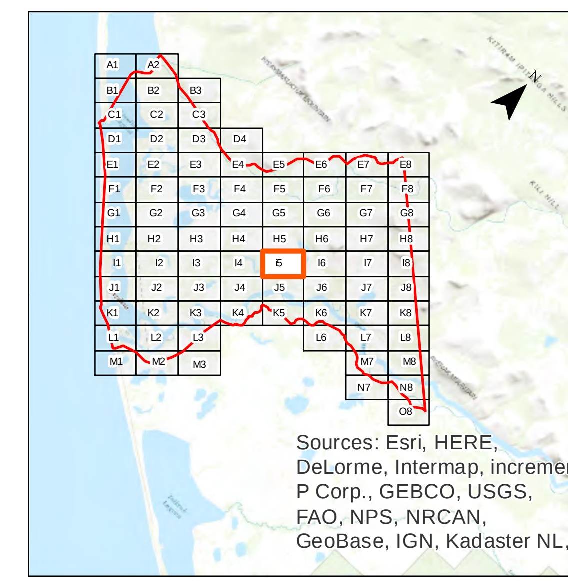
- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
- Pond
- Riverine
- Upland
- Study Area

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
2. Wetland mapping protocol: NWI boundaries were imported for the entire project. The geoTiffs of the November 2015 ASRC wetland report were brought into GIS, and wetland polygons were hand traced to replace the NWI mapping at 1:3000 scale. Then Stantec used field data to updated the wetland classifications for the entire area. NWI boundaries were retained, except for the smaller ASRC area where they were refined as appropriate.
3. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011, ©AeroMetric Inc., 2013



Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - i5

Title
Kivalina Evacuation and School Site Access Road - Wetlands

0 250 500 1,000 1,500 2,000 Feet

1:6,500 (At original document size of 11x17)

Stantec

Legend

Data Points (2016)
- Standard Data Point
- Photo Point

Wetland Type
- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
- Pond
- Riverine
- Upland
- Study Area

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
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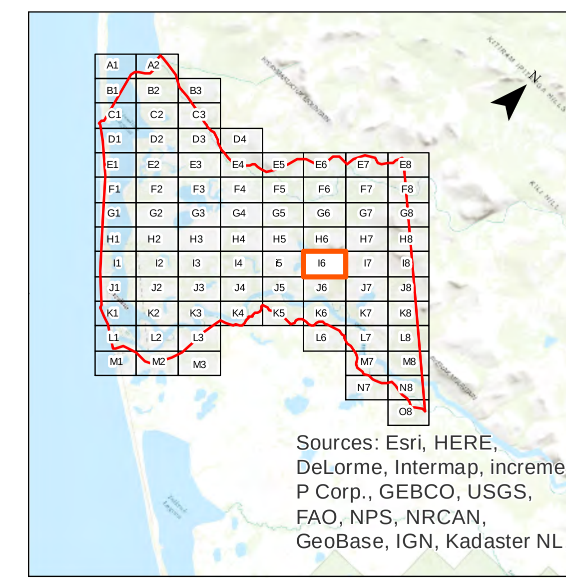

Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - I6

Title
Kivalina Evacuation and School Site Access Road - Wetlands

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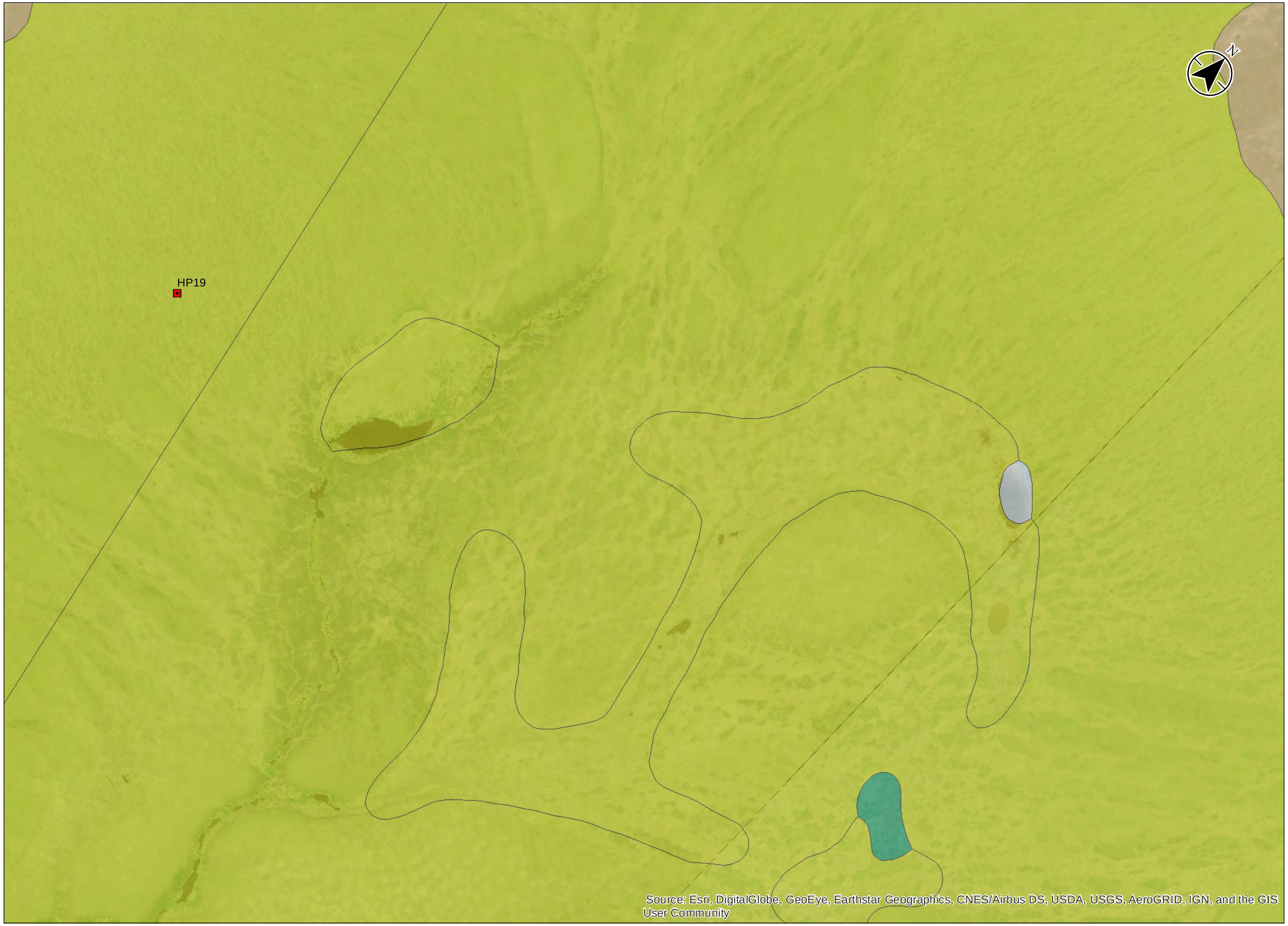

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Stantec

Legend

Data Points (2016)

- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
- Pond
- Riverine
- Upland
- Study Area

Notes

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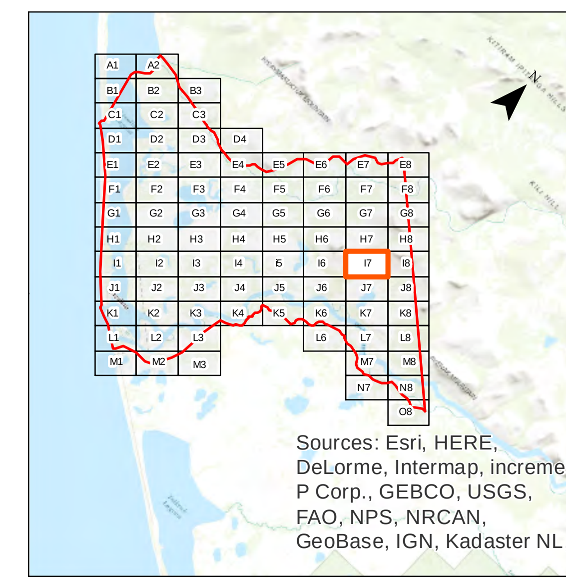


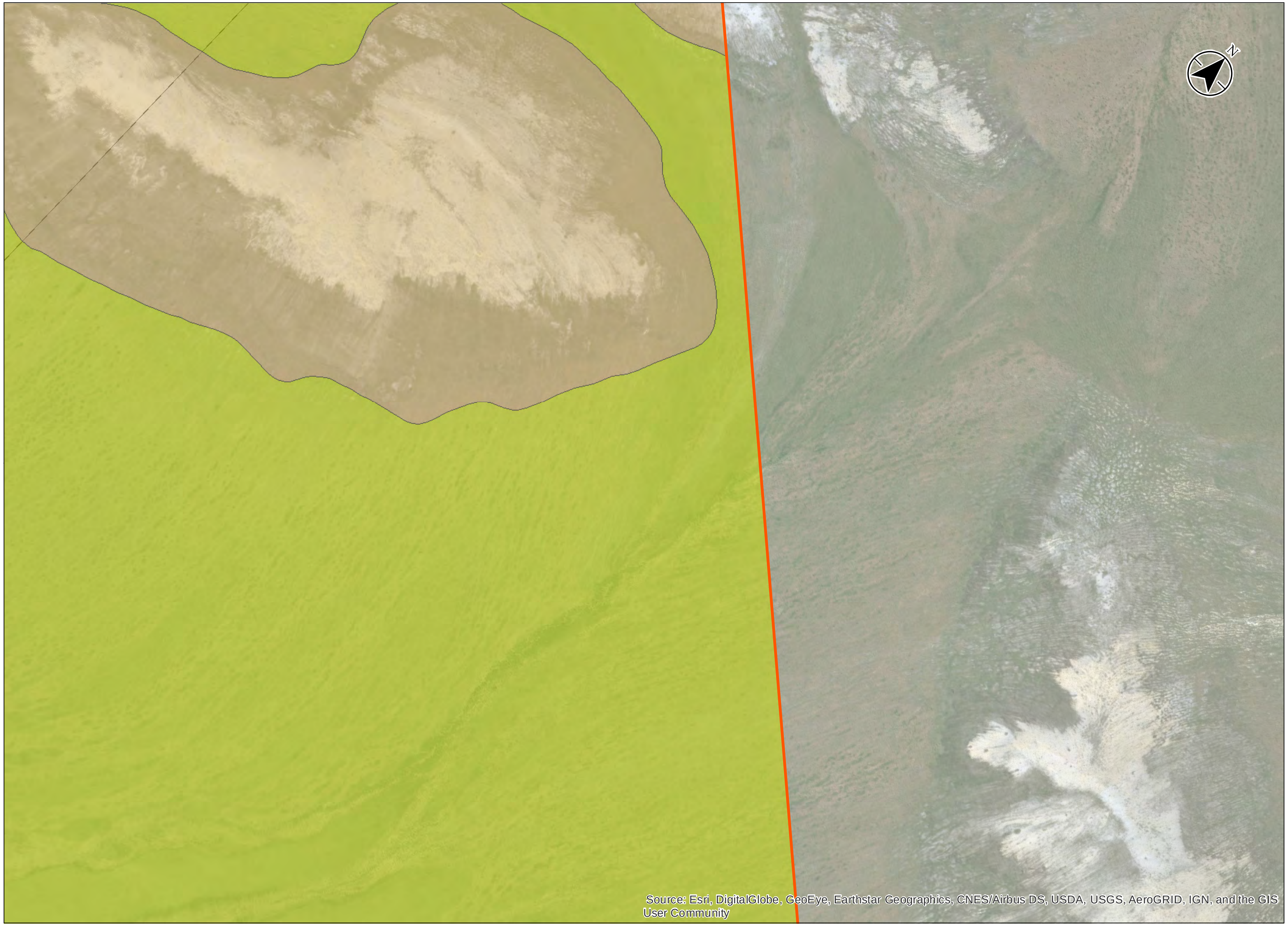
Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - I7

Title
Kivalina Evacuation and School Site Access Road - Wetlands



0 250 500 1,000 1,500 2,000 Feet

1:6,500 (At original document size of 11x17)

Stantec

Legend

Data Points (2016)

- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
- Pond
- Riverine
- Upland
- Study Area

Notes

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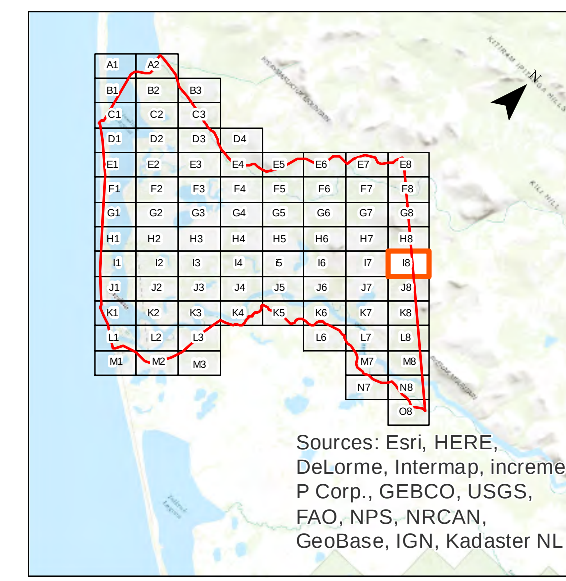

Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - I8

Title
Kivalina Evacuation and School Site Access Road - Wetlands

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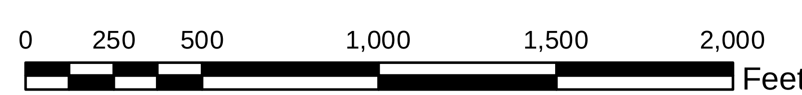

1:6,500 (At original document size of 11x17)

Stantec

Legend

Data Points (2016)

- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
- Pond
- Riverine
- Upland
- Study Area

Notes

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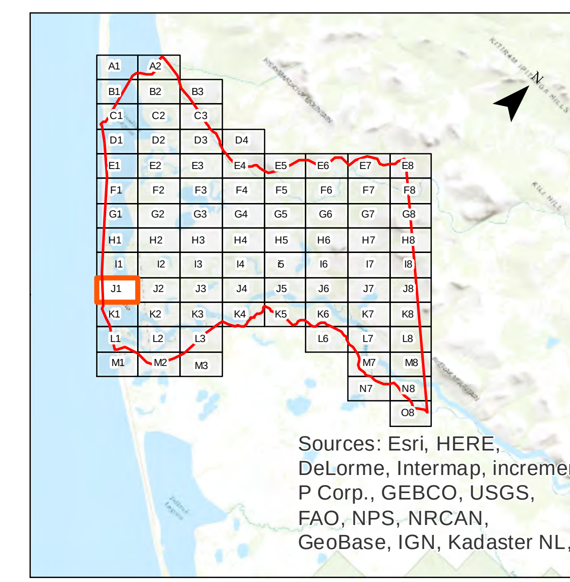


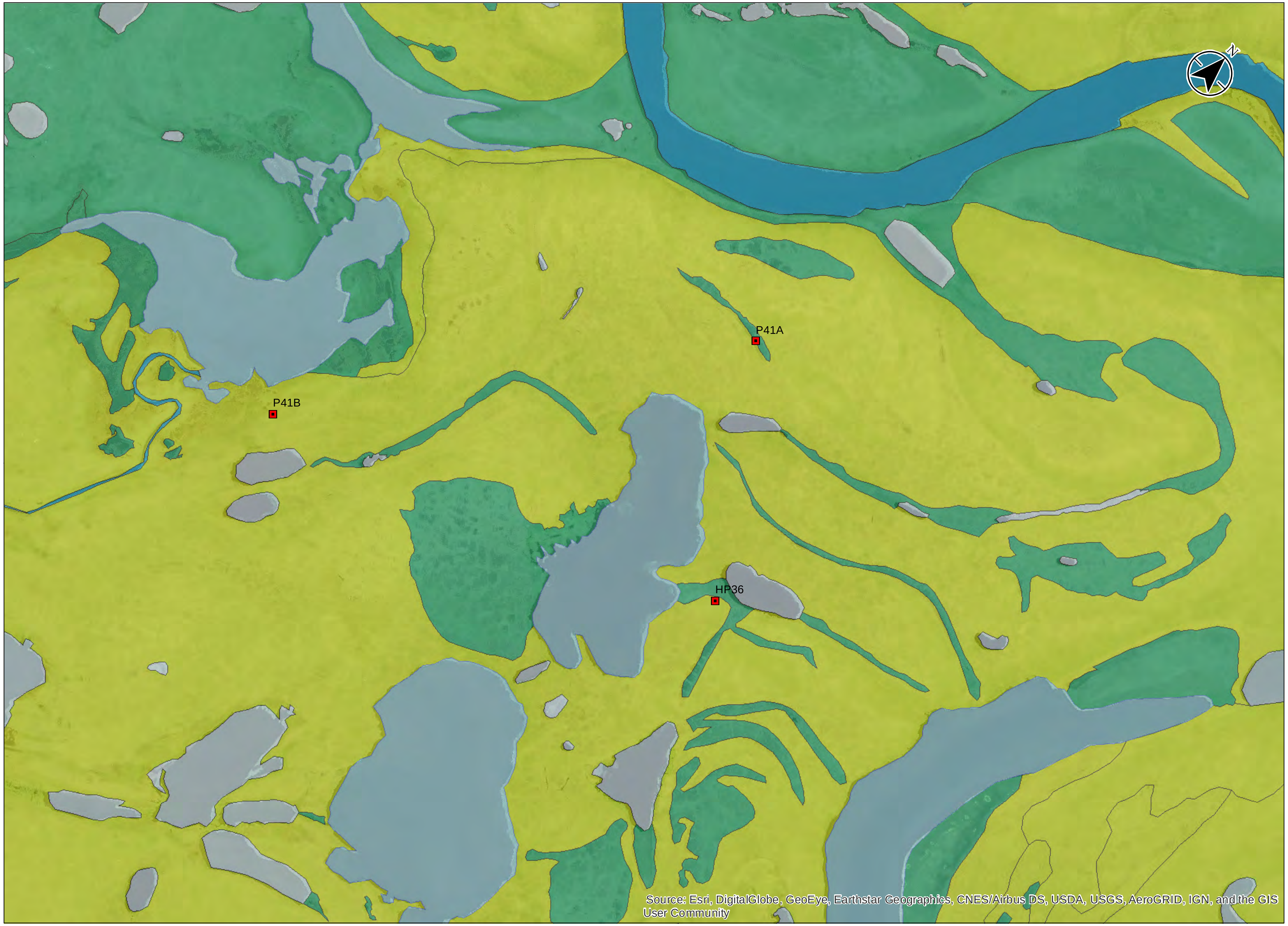
Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - J1

Title
Kivalina Evacuation and School Site Access Road - Wetlands



0 250 500 1,000 1,500 2,000
Feet

1:6,500 (At original document size of 11x17)

Stantec

Legend

Data Points (2016)

- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
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- Study Area

Notes

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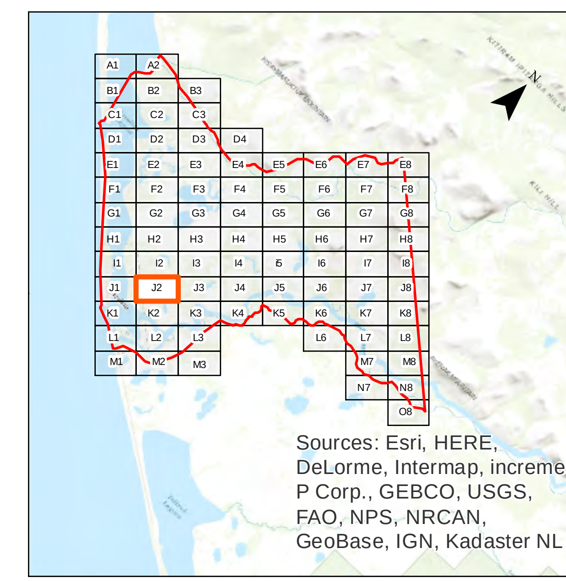

Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - J2

Title
Kivalina Evacuation and School Site Access Road - Wetlands

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Stantec

Legend

Data Points (2016)

- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
- Pond
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- Upland
- Study Area

Notes

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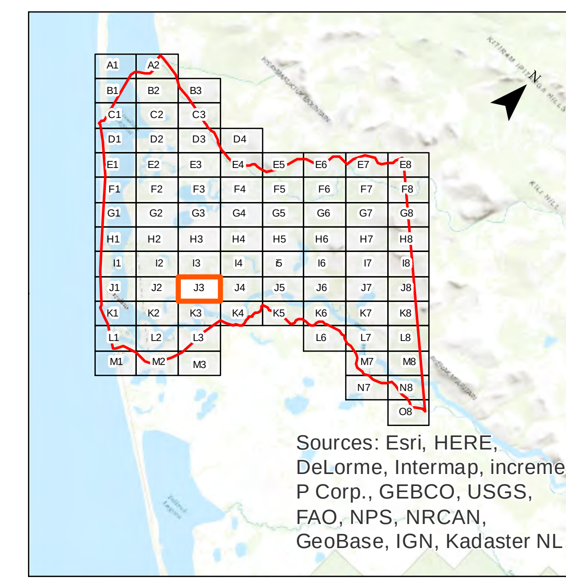

Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - J3

Title
Kivalina Evacuation and School Site Access Road - Wetlands

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Stantec

Legend

Data Points (2016)

- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
- Pond
- Riverine
- Upland
- Study Area

Notes

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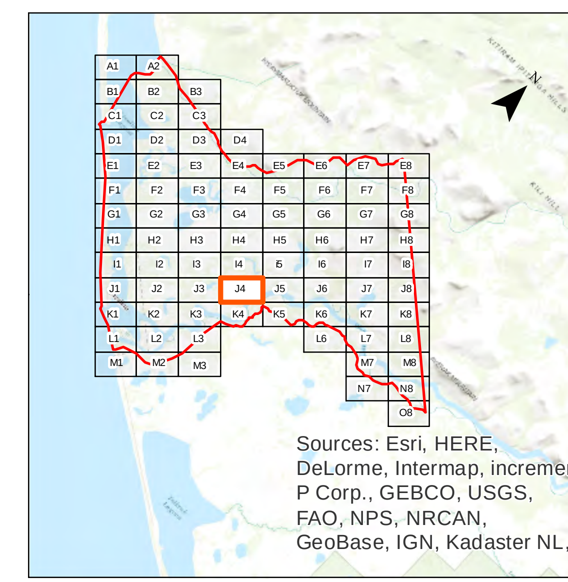

Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - J4

Title
Kivalina Evacuation and School Site Access Road - Wetlands

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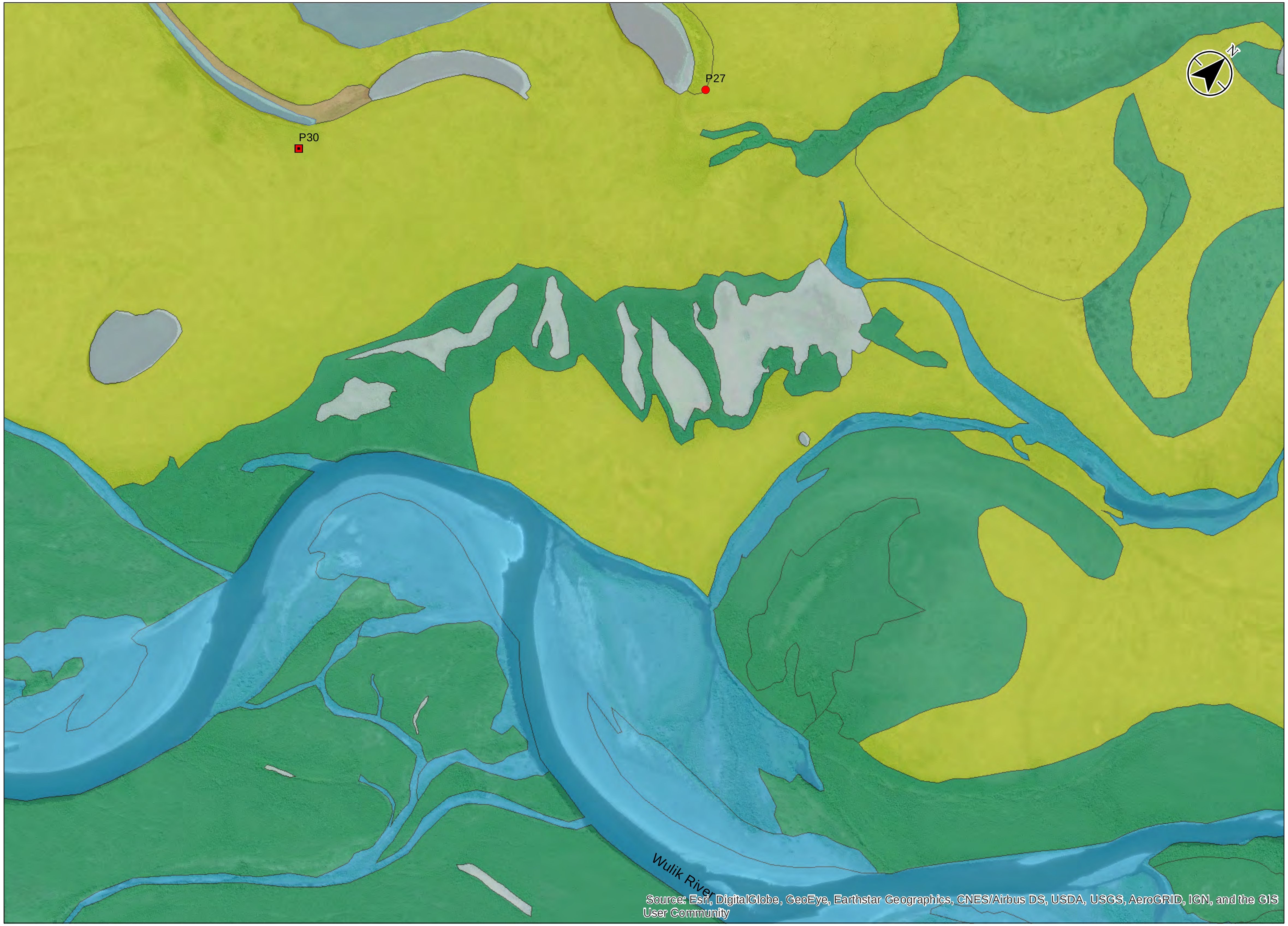

Stantec

Legend

Data Points (2016)

- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
- Pond
- Riverine
- Upland
- Study Area

Notes

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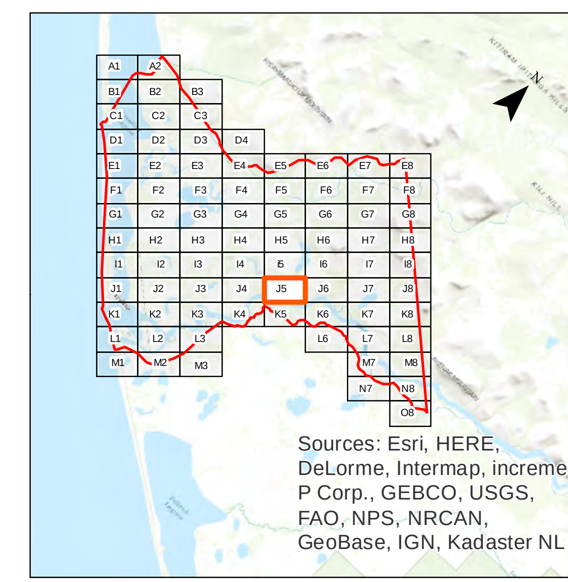

Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - J5

Title
Kivalina Evacuation and School Site Access Road - Wetlands

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0 250 500 1,000 1,500 2,000
Feet

1:6,500 (At original document size of 11x17)

Stantec

Legend

Data Points (2016)

- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
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- Riverine
- Upland
- Study Area

Notes

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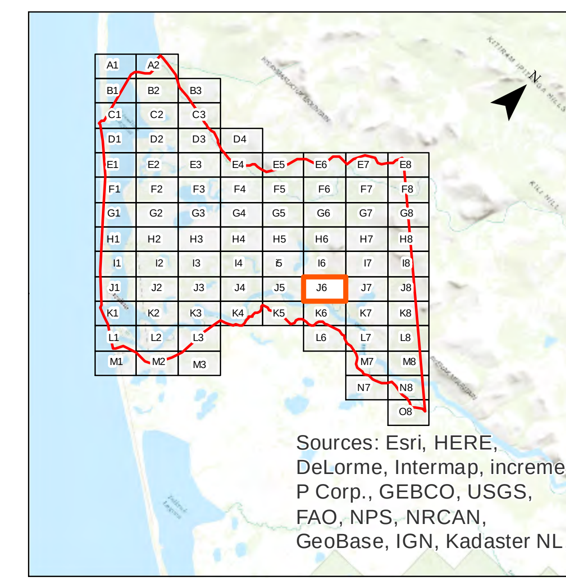


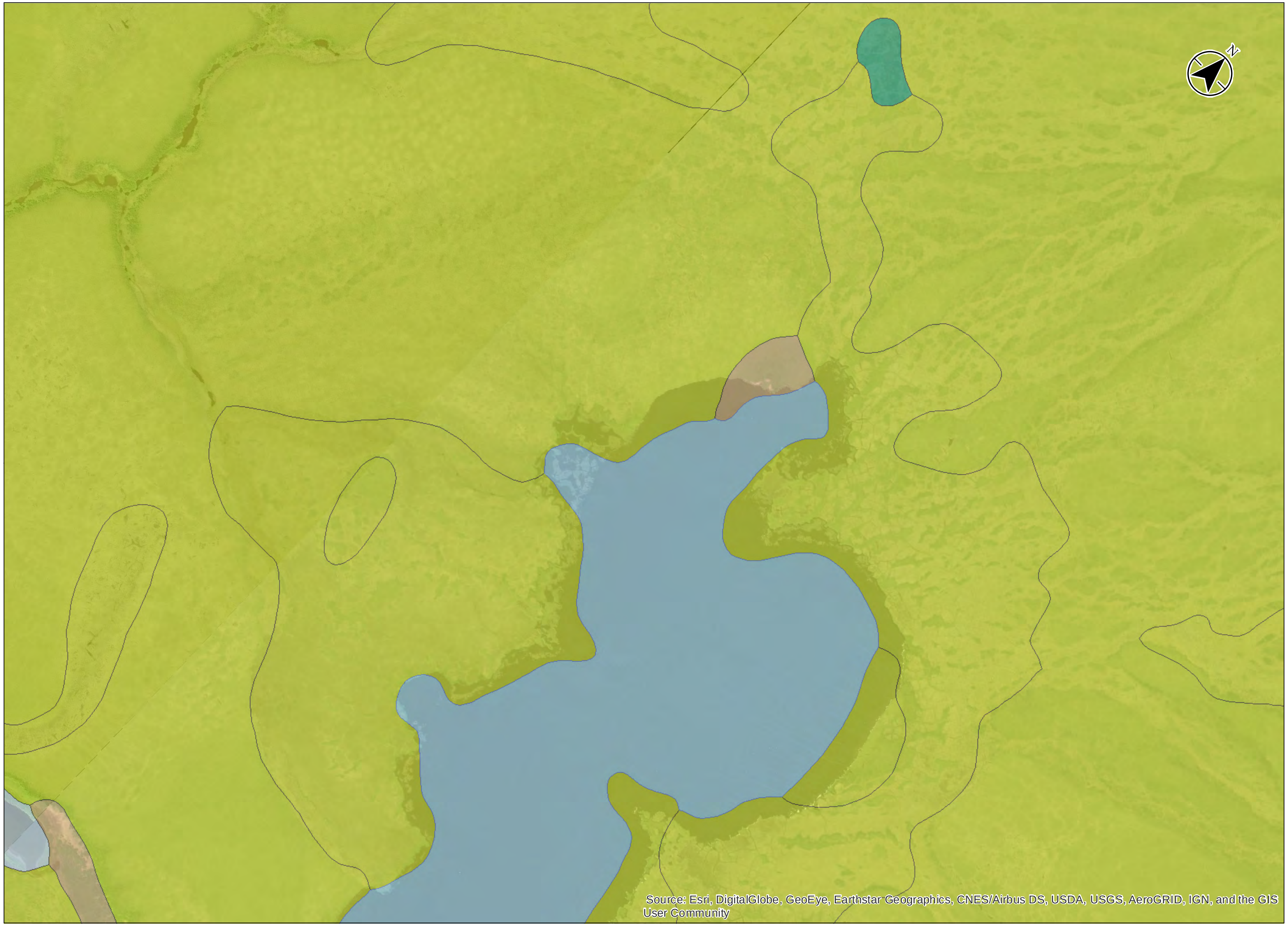
Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - J6

Title
Kivalina Evacuation and School Site Access Road - Wetlands



Stantec

Legend

Data Points (2016)

- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
- Pond
- Riverine
- Upland
- Study Area

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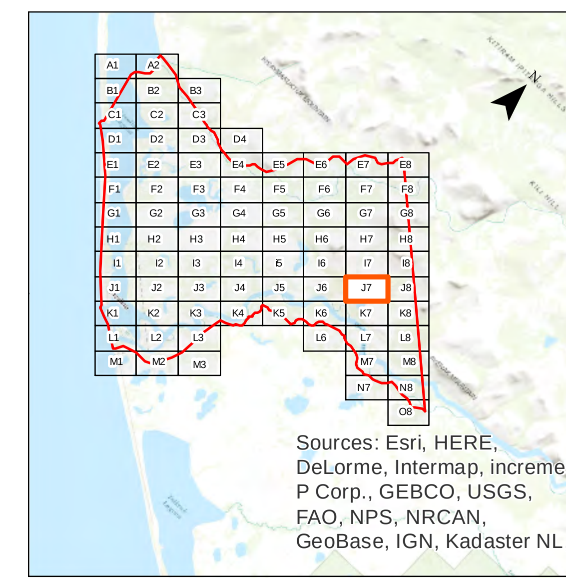

Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - J7

Title
Kivalina Evacuation and School Site Access Road - Wetlands

0 250 500 1,000 1,500 2,000 Feet

1:6,500 (At original document size of 11x17)

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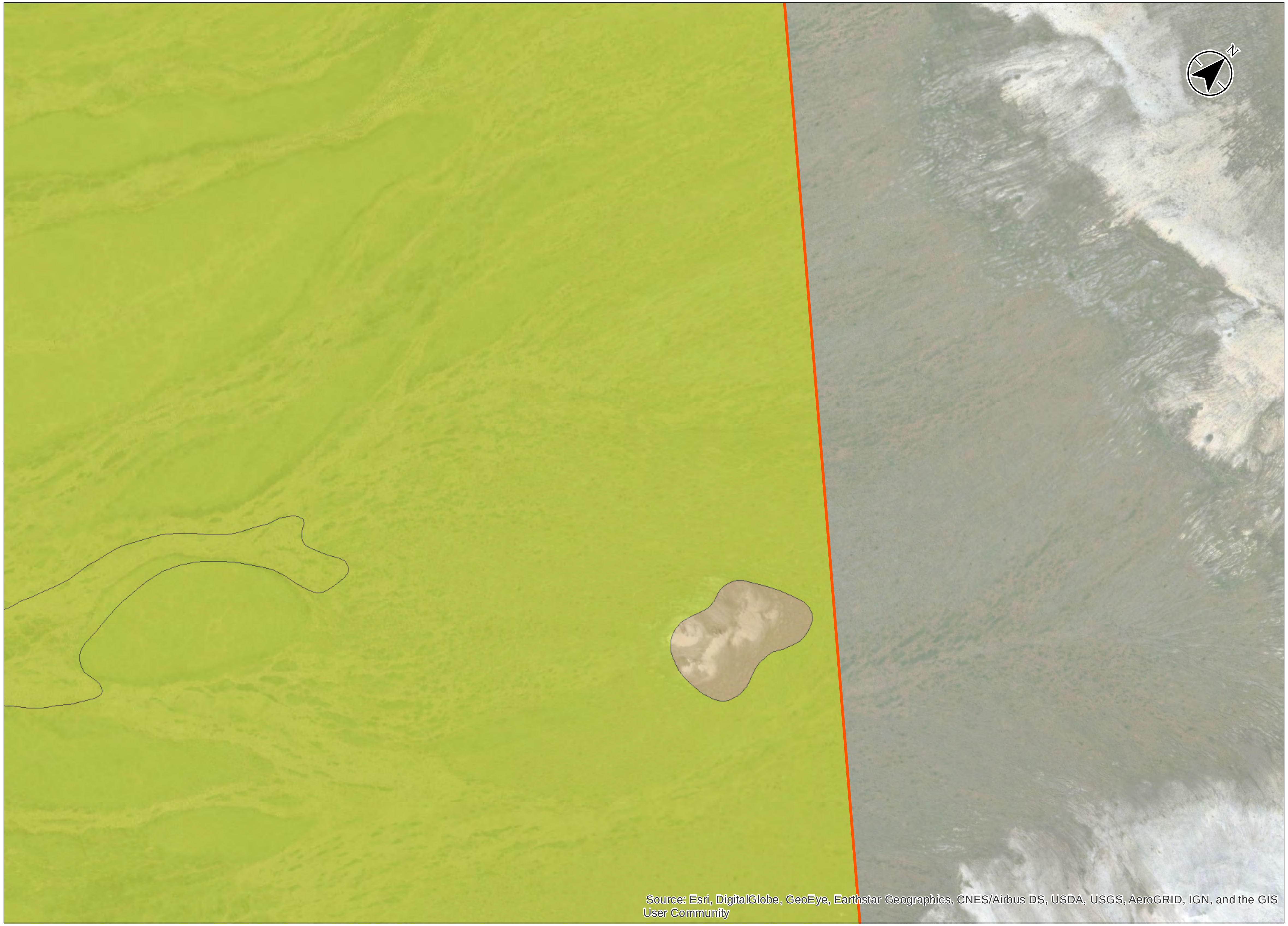

0 250 500 1,000 1,500 2,000 Feet

1:6,500 (At original document size of 11x17)

Stantec

Legend

Data Points (2016)

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- Photo Point

Wetland Type

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Notes

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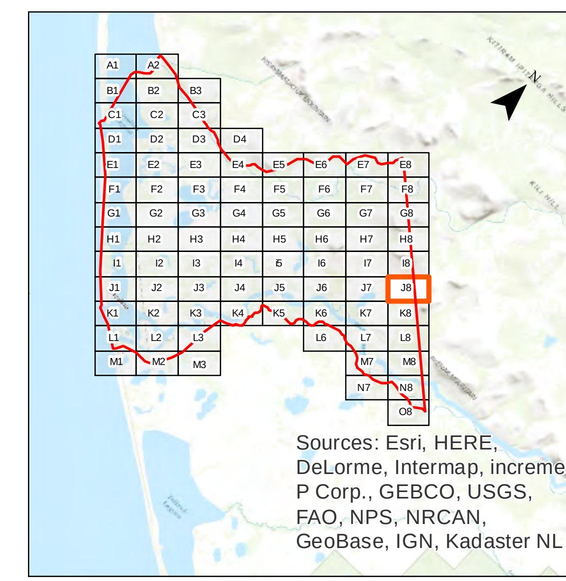

Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - J8

Title
Kivalina Evacuation and School Site Access Road - Wetlands

Page 62 of 87

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0 250 500 1,000 1,500 2,000 Feet

1:6,500 (At original document size of 11x17)

Stantec

Legend

Data Points (2016)

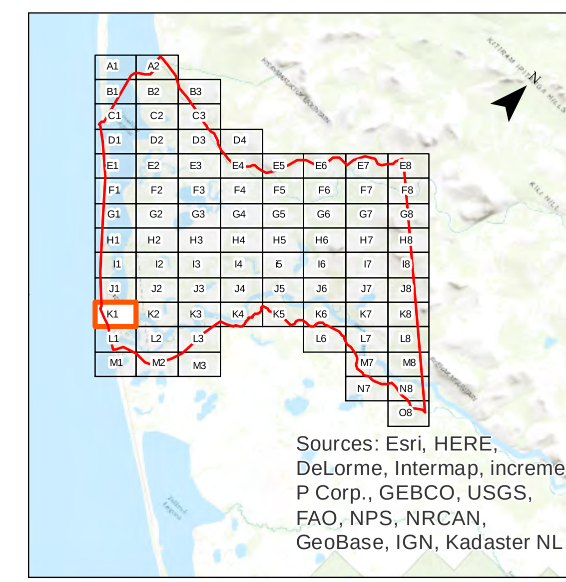
- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
- Pond
- Riverine
- Upland
- Study Area

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
2. Wetland mapping protocol: NWI boundaries were imported for the entire project. The geoTiffs of the November 2015 ASRC wetland report were brought into GIS, and wetland polygons were hand traced to replace the NWI mapping at 1:3000 scale. Then Stantec used field data to updated the wetland classifications for the entire area. NWI boundaries were retained, except for the smaller ASRC area where they were refined as appropriate.
3. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011, ©AeroMetric Inc., 2013



Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

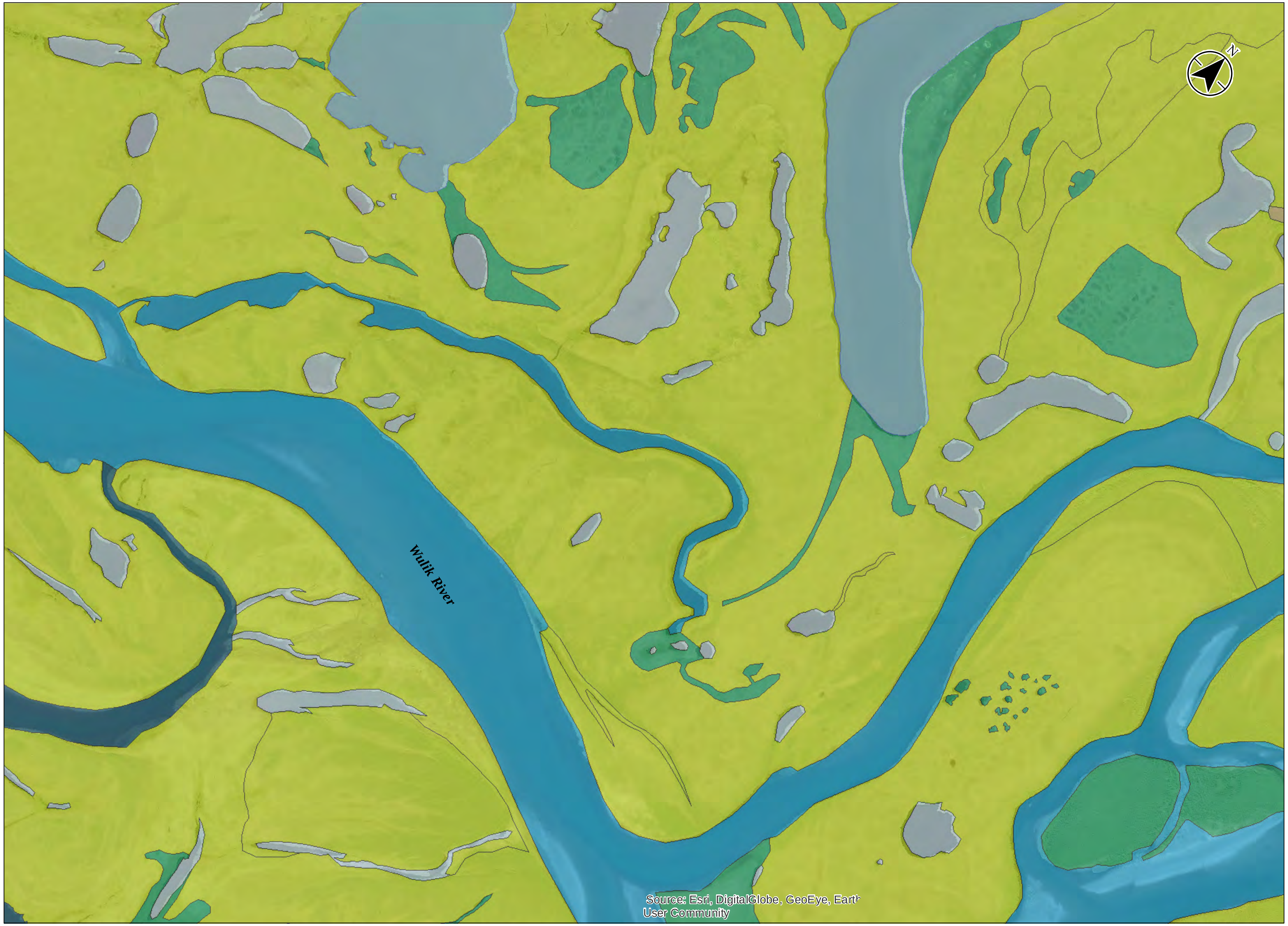
002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - K1

Title
Kivalina Evacuation and School Site Access Road - Wetlands

U:\204765102\GIS\mxd\Wetland Report Figs\Fig 2-1 2-XXX Cowardin draft.mxd Revised: 2017-09-14 By: cpannone



0 250 500 1,000 1,500 2,000
Feet

1:6,500 (At original document size of 11x17)

Stantec

Legend

Data Points (2016)

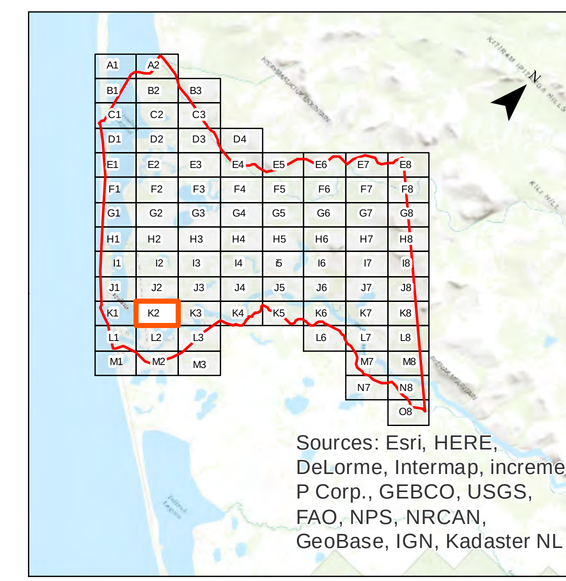
- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
- Pond
- Riverine
- Upland
- Study Area

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
2. Wetland mapping protocol: NWI boundaries were imported for the entire project. The geoTiffs of the November 2015 ASRC wetland report were brought into GIS, and wetland polygons were hand traced to replace the NWI mapping at 1:3000 scale. Then Stantec used field data to updated the wetland classifications for the entire area. NWI boundaries were retained, except for the smaller ASRC area where they were refined as appropriate.
3. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011, ©AeroMetric Inc., 2013



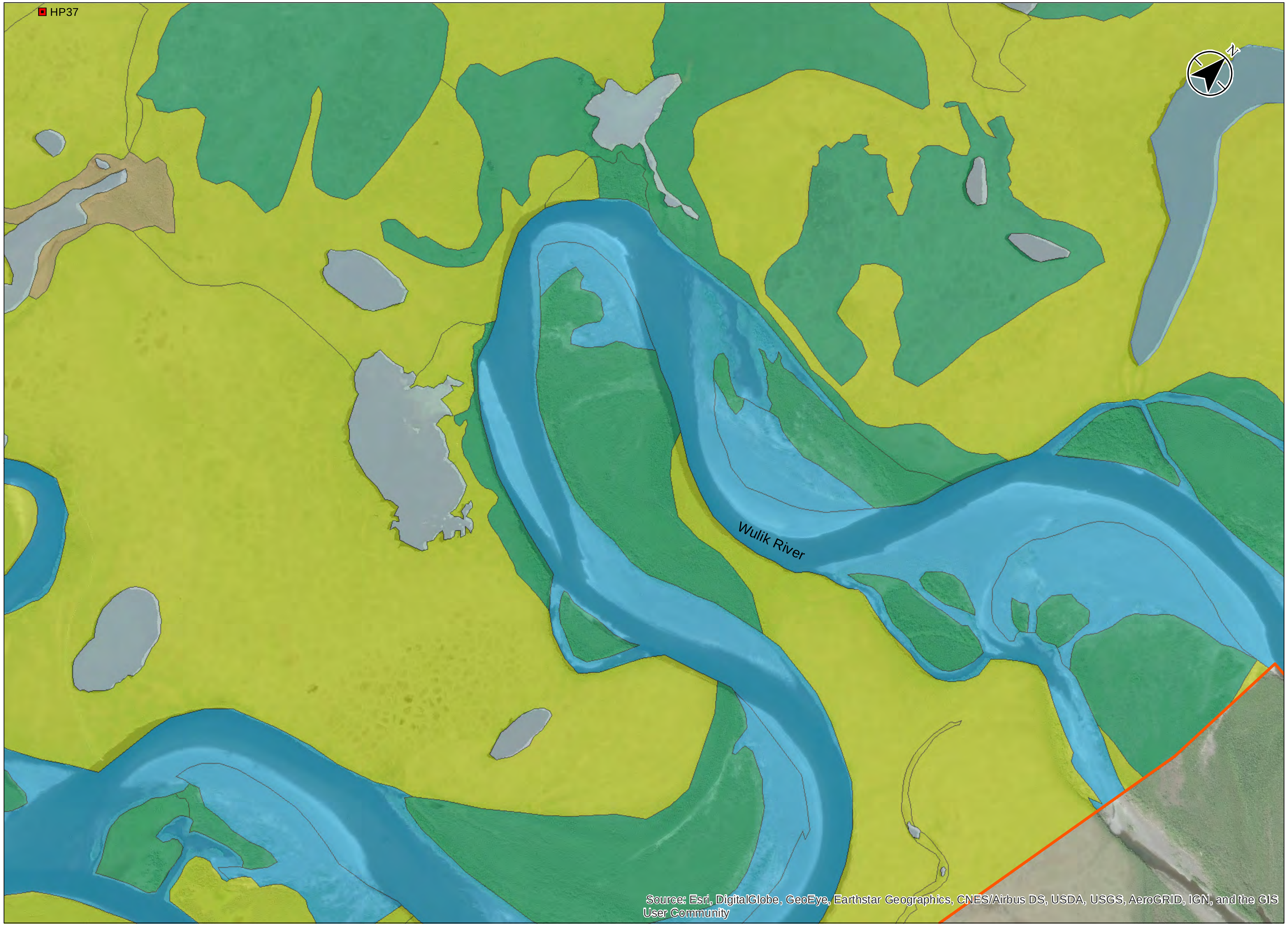
Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - K2

Title
Kivalina Evacuation and School Site
Access Road - Wetlands



1:6,500 (At original document size of 11x17)

Stantec

Legend

Data Points (2016)

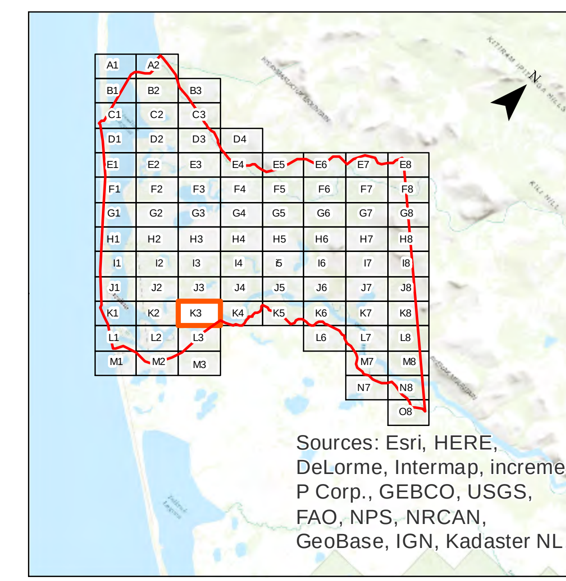
- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
- Pond
- Riverine
- Upland
- Study Area

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
2. Wetland mapping protocol: NWI boundaries were imported for the entire project. The geoTiffs of the November 2015 ASRC wetland report were brought into GIS, and wetland polygons were hand traced to replace the NWI mapping at 1:3000 scale. Then Stantec used field data to updated the wetland classifications for the entire area. NWI boundaries were retained, except for the smaller ASRC area where they were refined as appropriate.
3. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011, ©AeroMetric Inc., 2013



Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - K3

Title
Kivalina Evacuation and School Site Access Road - Wetlands

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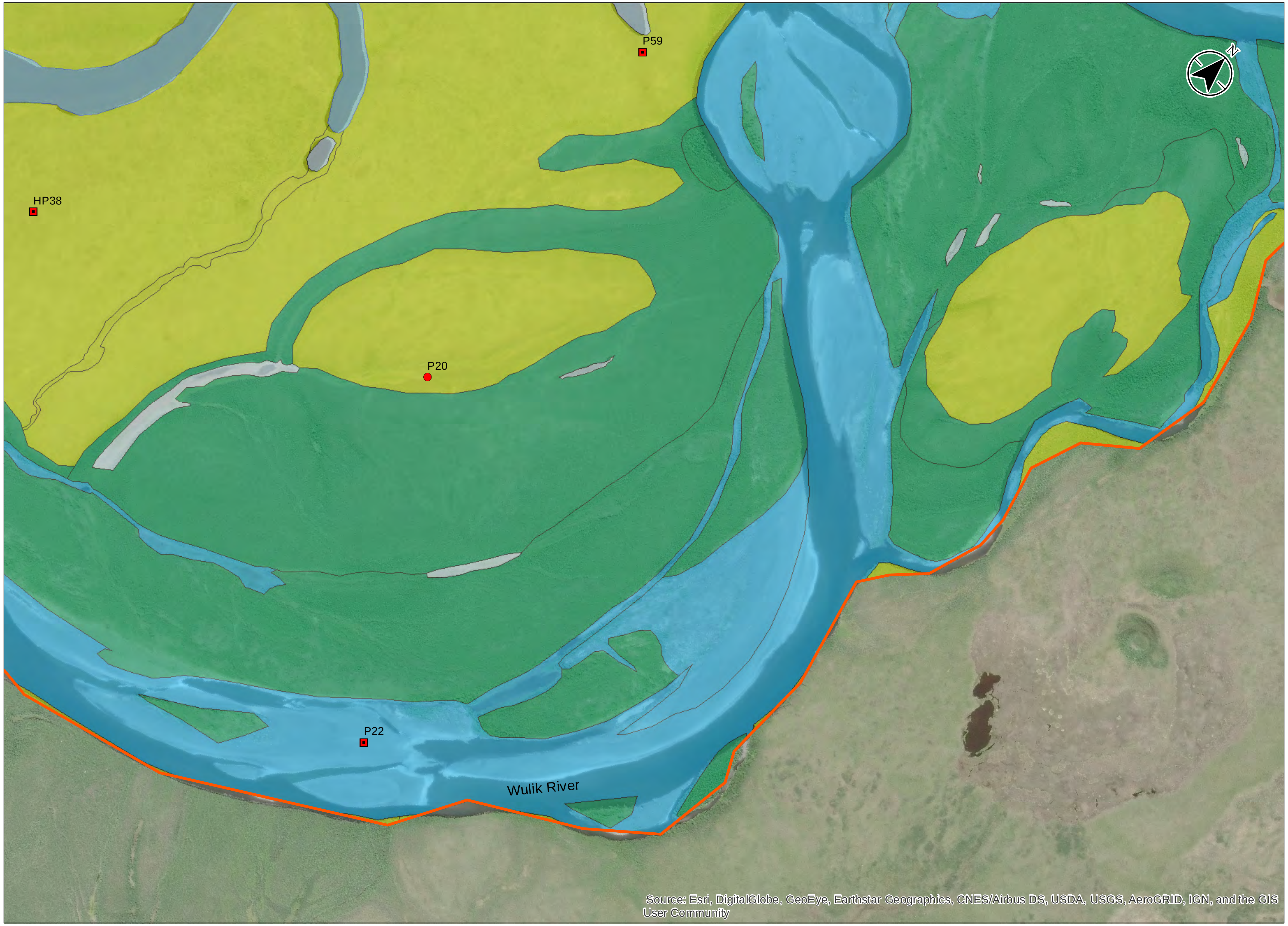

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Stantec

Legend

Data Points (2016)

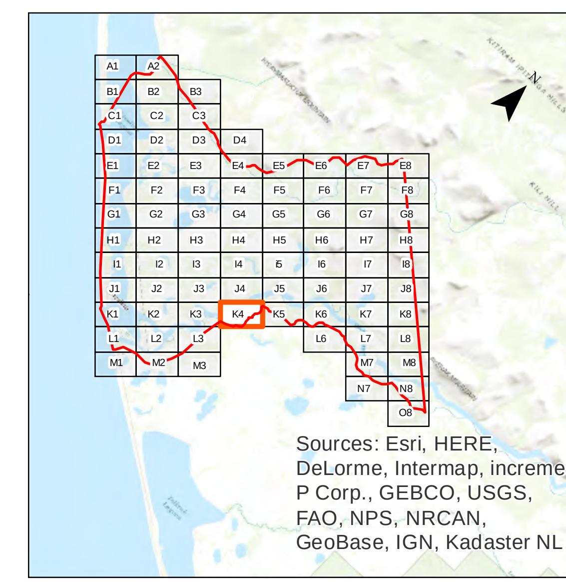
- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
- Pond
- Riverine
- Upland
- Study Area

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
2. Wetland mapping protocol: NWI boundaries were imported for the entire project. The geoTiffs of the November 2015 ASRC wetland report were brought into GIS, and wetland polygons were hand traced to replace the NWI mapping at 1:3000 scale. Then Stantec used field data to updated the wetland classifications for the entire area. NWI boundaries were retained, except for the smaller ASRC area where they were refined as appropriate.
3. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011, ©AeroMetric Inc., 2013



Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

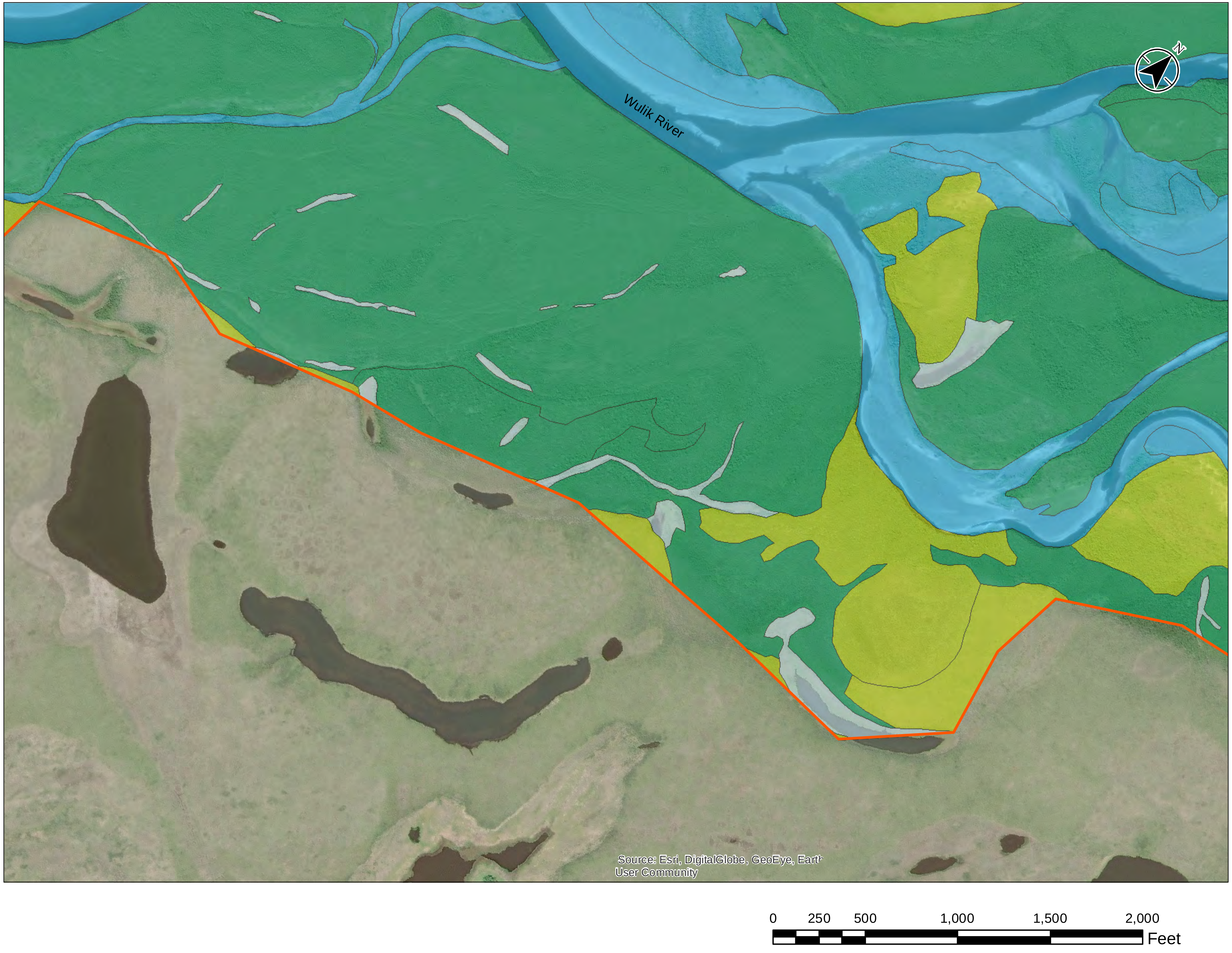
002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - K4

Title
Kivalina Evacuation and School Site Access Road - Wetlands

U:\2047055102\GIS\mxd\Wetland Report Figs\Fig 2-1 2-XXX Cowardin draft.mxd Revised: 2017-09-14 By: cpannone



Stantec

Legend

Data Points (2016)

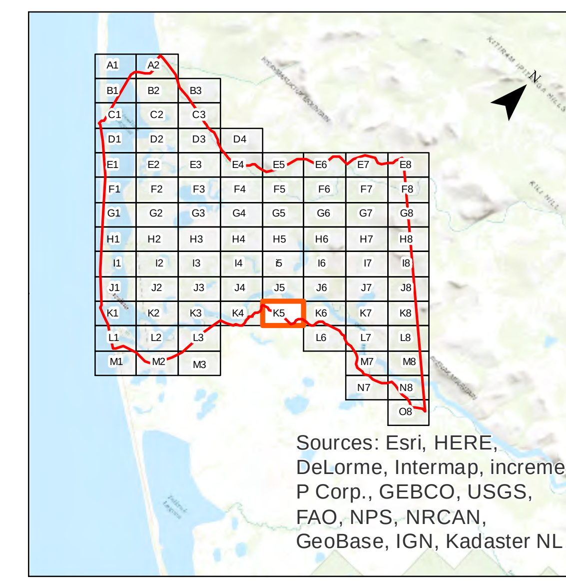
- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
- Pond
- Riverine
- Upland
- Study Area

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
2. Wetland mapping protocol: NWI boundaries were imported for the entire project. The geoTiffs of the November 2015 ASRC wetland report were brought into GIS, and wetland polygons were hand traced to replace the NWI mapping at 1:3000 scale. Then Stantec used field data to updated the wetland classifications for the entire area. NWI boundaries were retained, except for the smaller ASRC area where they were refined as appropriate.
3. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011, ©AeroMetric Inc., 2013



Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

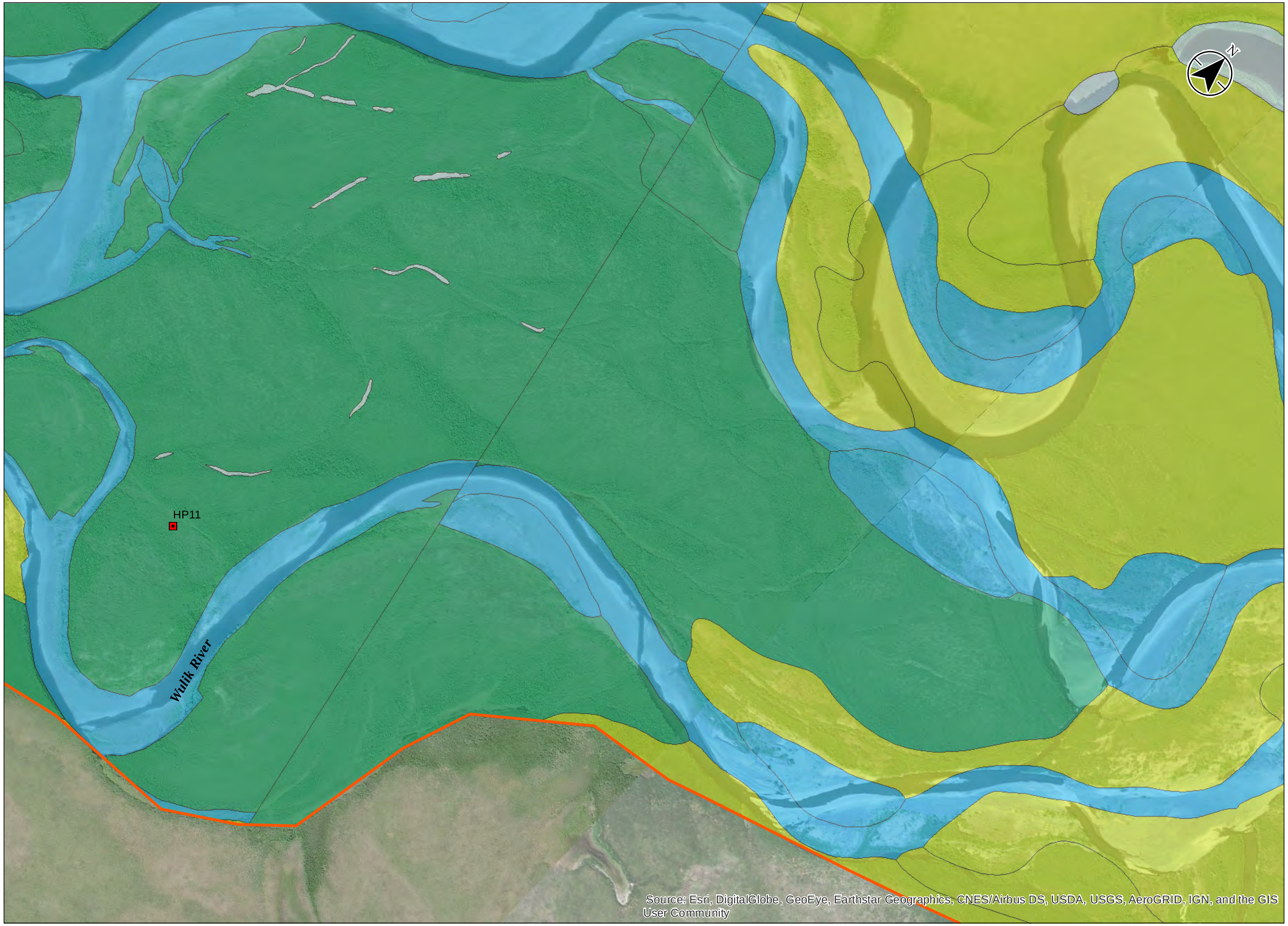
002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - K5

Title
Kivalina Evacuation and School Site Access Road - Wetlands

U:\204705102\GIS\mxd\Wetland Report Figs\Fig 2-1 2-XXX Cowardin draft.mxd Revised: 2017-09-14 By: cpannone



Stantec

Legend

Data Points (2016)

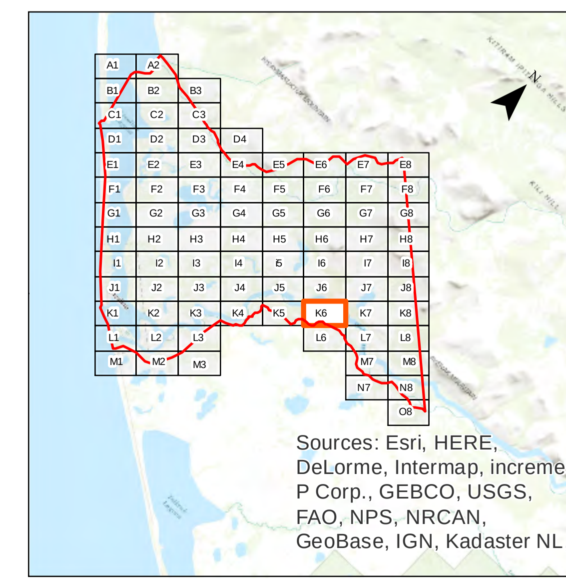
- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
- Pond
- Riverine
- Upland
- Study Area

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
2. Wetland mapping protocol: NWI boundaries were imported for the entire project. The geoTiffs of the November 2015 ASRC wetland report were brought into GIS, and wetland polygons were hand traced to replace the NWI mapping at 1:3000 scale. Then Stantec used field data to updated the wetland classifications for the entire area. NWI boundaries were retained, except for the smaller ASRC area where they were refined as appropriate.
3. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011, ©AeroMetric Inc., 2013



Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

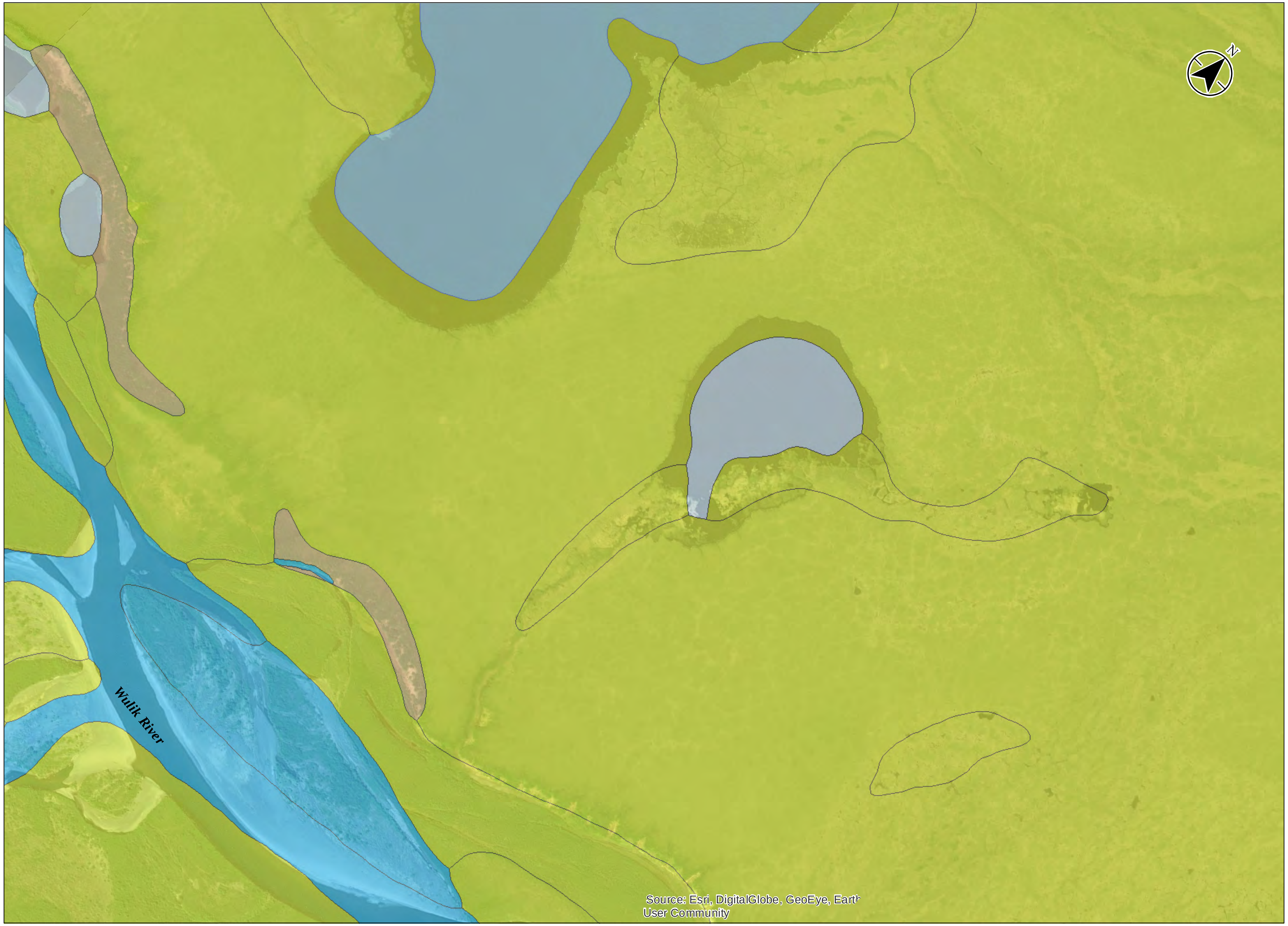
002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - K6

Title
Kivalina Evacuation and School Site Access Road - Wetlands

U:\204765102\GIS\mxd\Wetland Report Figs\Fig_2-1-2-XX_Cowardin_draft.mxd Revised: 2017-09-14 By: cpannone



0 250 500 1,000 1,500 2,000 Feet

1:6,500 (At original document size of 11x17)

Stantec

Legend

Data Points (2016)

- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
- Pond
- Riverine
- Upland
- Study Area

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
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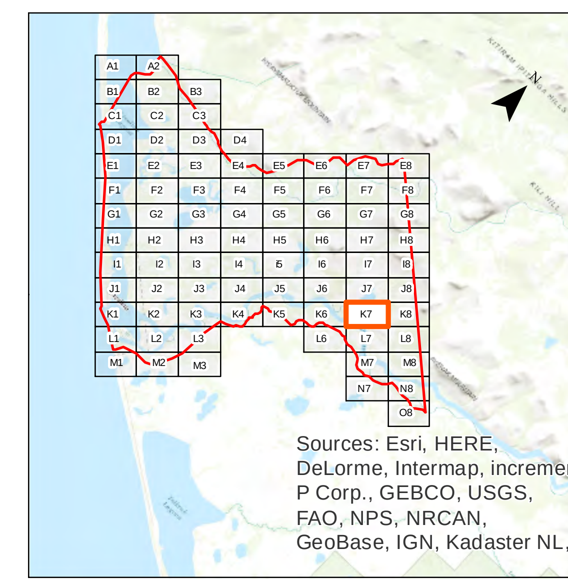
3. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011, ©AeroMetric Inc., 2013



Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

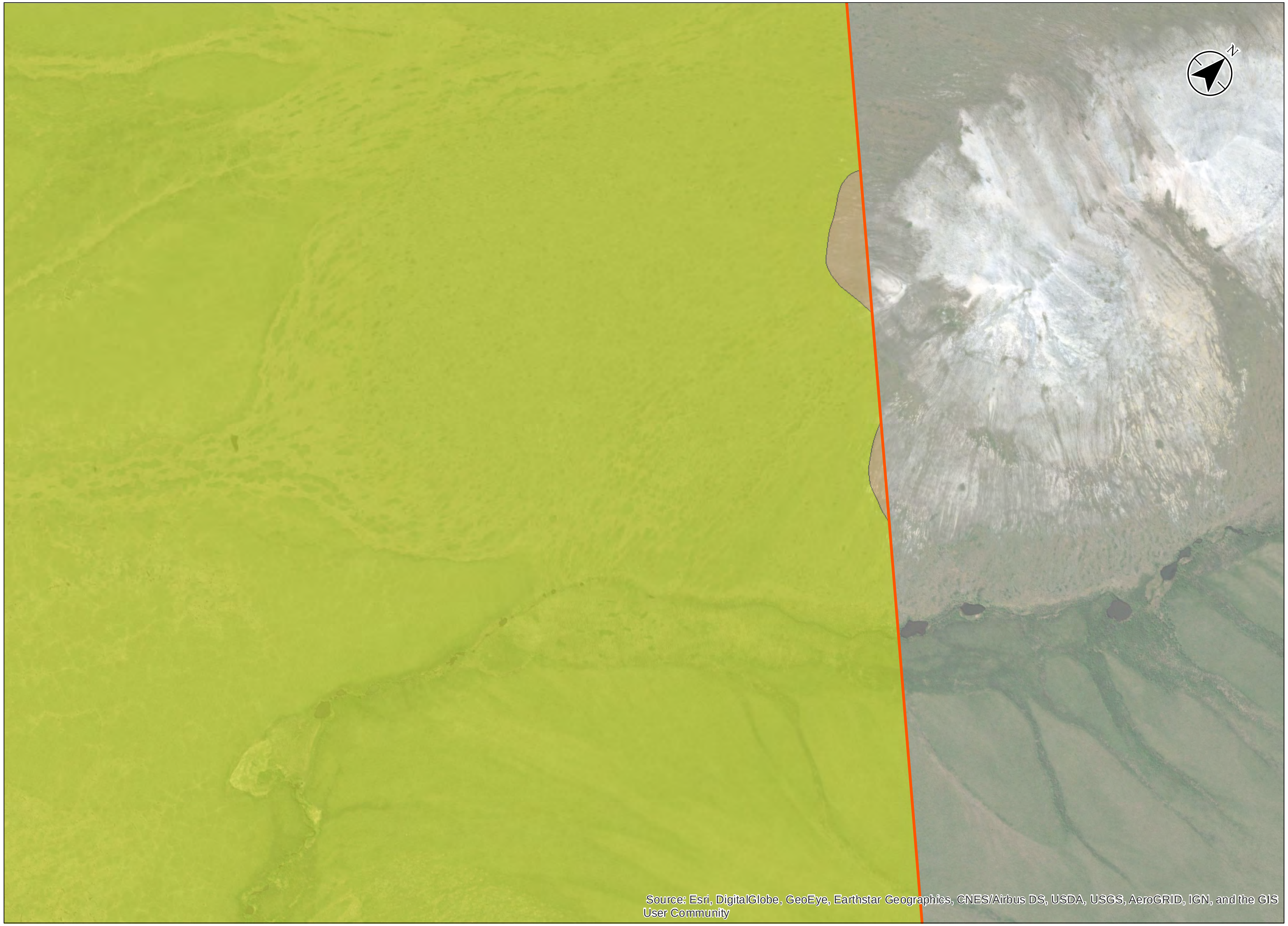
002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - K7

Title
Kivalina Evacuation and School Site Access Road - Wetlands

U:\204765102\GIS\mxd\Wetland Report Figs\Fig_2-1_2-XXX_Cowardin_draft.mxd Revised: 2017-09-14 By: cpannone



0 250 500 1,000 1,500 2,000
Feet

1:6,500 (At original document size of 11x17)

Stantec

Legend

Data Points (2016)

- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
- Pond
- Riverine
- Upland
- Study Area

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
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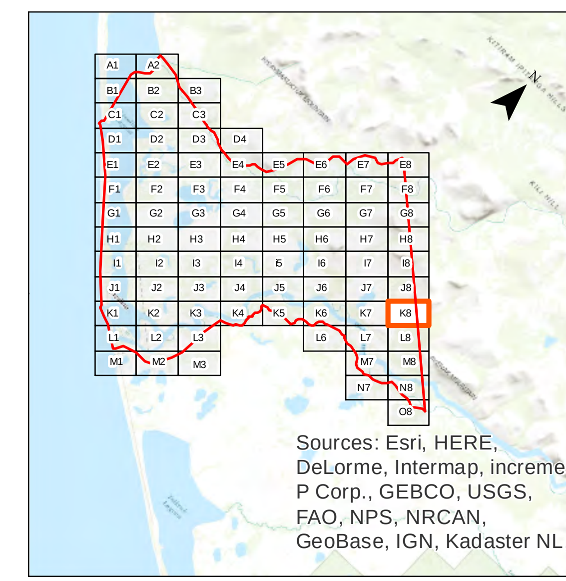
3. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011, ©AeroMetric Inc., 2013



Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - K8

Title
Kivalina Evacuation and School Site Access Road - Wetlands

U:\204765102\GIS\mxd\Wetland Report Figs\Fig_2-1 2-XXX Cowardin draft.mxd Revised: 2017-09-14 By: cpannone

0 250 500 1,000 1,500 2,000 Feet

1:6,500 (At original document size of 11x17)

Stantec

Legend

Data Points (2016)

- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
- Pond
- Riverine
- Upland
- Study Area

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
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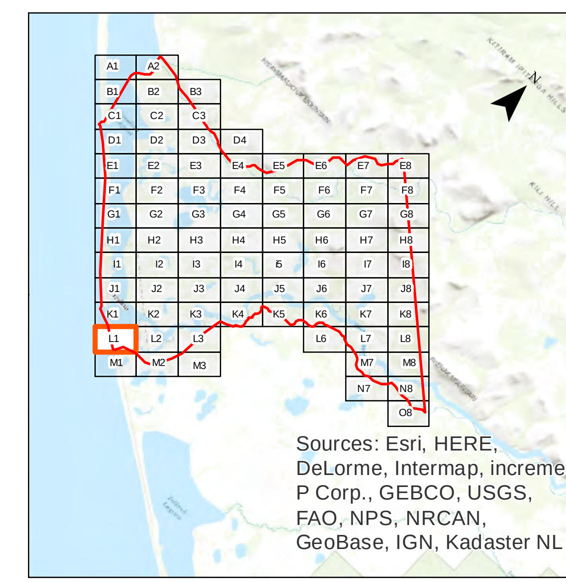


Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

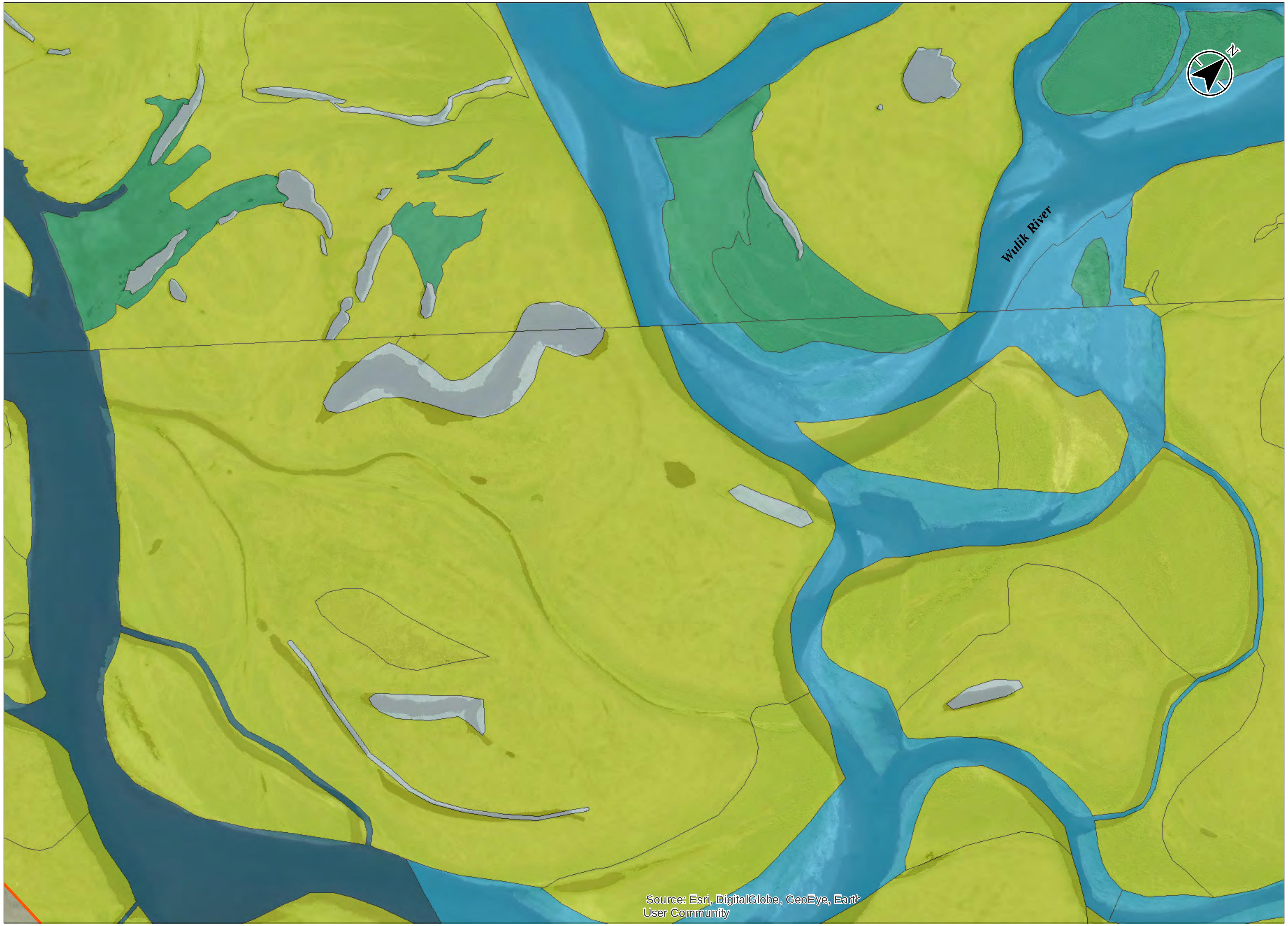
002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - L1

Title
Kivalina Evacuation and School Site Access Road - Wetlands

U:\204705102\GIS\mxd\Wetland Report Figs\Fig 2-1 2-XXX Cowardin draft.mxd Revised: 2017-09-14 By: cpannone



0 250 500 1,000 1,500 2,000 Feet

1:6,500 (At original document size of 11x17)

Stantec

Legend

Data Points (2016)

- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
- Pond
- Riverine
- Upland
- Study Area

Notes

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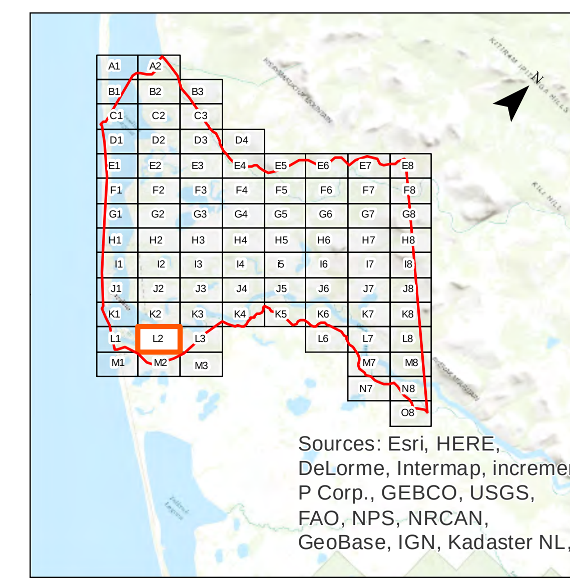

Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - L2

Title
Kivalina Evacuation and School Site Access Road - Wetlands

0 250 500 1,000 1,500 2,000
Feet

1:6,500 (At original document size of 11x17)

Stantec

Legend

Data Points (2016)

- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
- Pond
- Riverine
- Upland
- Study Area

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
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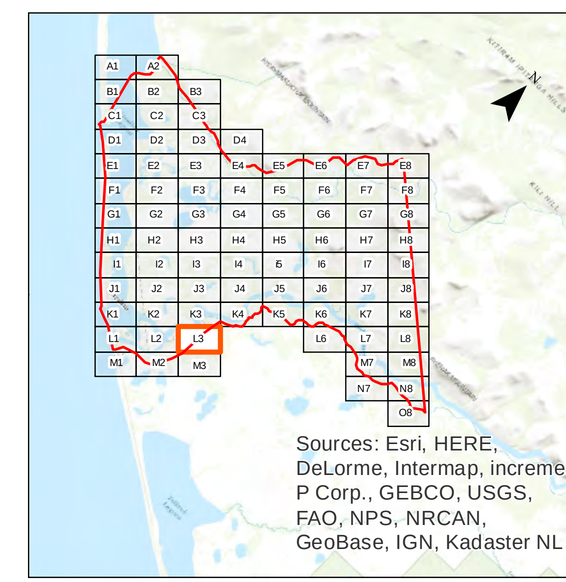

Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - L3

Title
Kivalina Evacuation and School Site Access Road - Wetlands

0 250 500 1,000 1,500 2,000
Feet

1:6,500 (At original document size of 11x17)

Stantec

Legend

Data Points (2016)

- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
- Pond
- Riverine
- Upland
- Study Area

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
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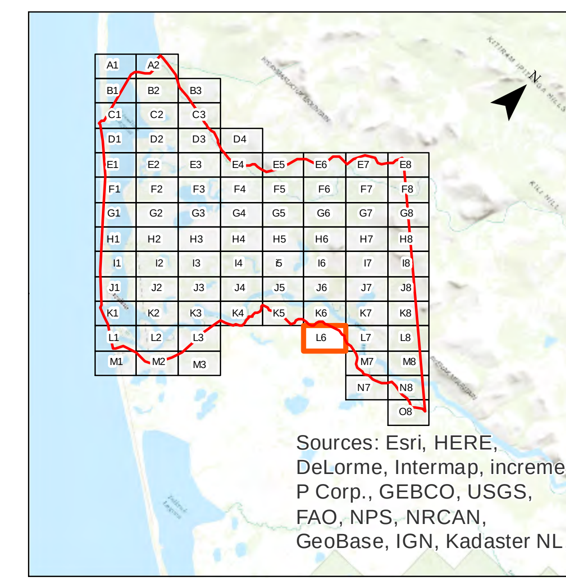

Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - L6

Title
Kivalina Evacuation and School Site Access Road - Wetlands

U:\2047055102\GIS\mxd\Wetland Report Figs\Fig 2-1 2-XXX Cowardin draft.mxd Revised: 2017-09-14 By: cpannone

0 250 500 1,000 1,500 2,000
Feet

1:6,500 (At original document size of 11x17)

Stantec

Legend

Data Points (2016)

- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
- Pond
- Riverine
- Upland
- Study Area

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
2. Wetland mapping protocol: NWI boundaries were imported for the entire project. The geoTiffs of the November 2015 ASRC wetland report were brought into GIS, and wetland polygons were hand traced to replace the NWI mapping at 1:3000 scale. Then Stantec used field data to updated the wetland classifications for the entire area. NWI boundaries were retained, except for the smaller ASRC area where they were refined as appropriate.
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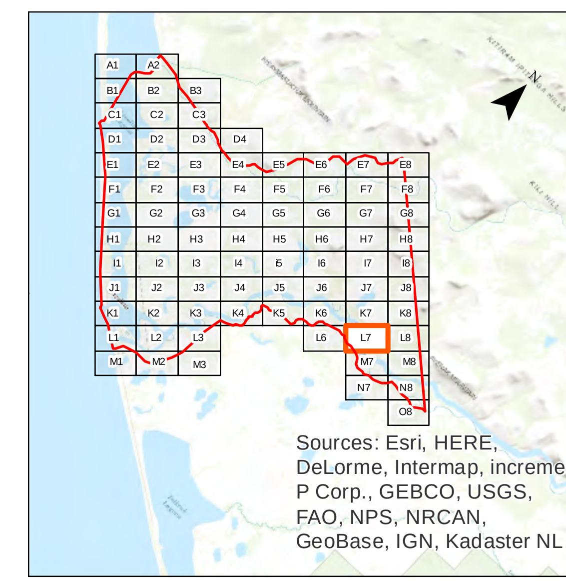

Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - L7

Title
Kivalina Evacuation and School Site Access Road - Wetlands

U:\204765102\GIS\mxd\Wetland Report Figs\Fig_2-1 2-XX Cowardin draft.mxd Revised: 2017-09-14 By: cpannone

0 250 500 1,000 1,500 2,000 Feet

1:6,500 (At original document size of 11x17)

Stantec

Legend

Data Points (2016)

- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
- Pond
- Riverine
- Upland
- Study Area

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
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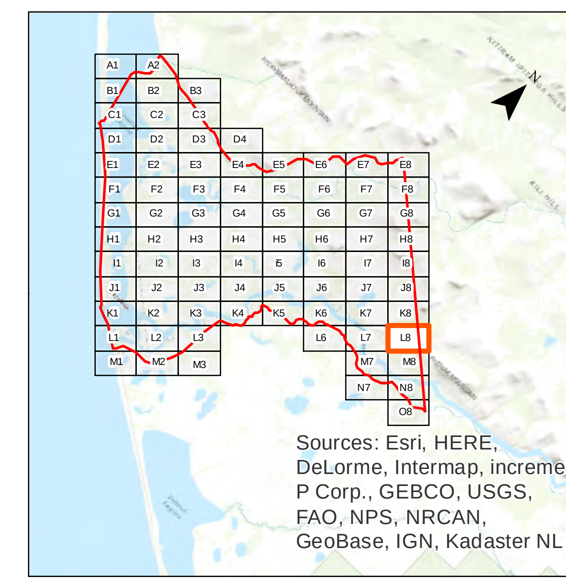
3. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011, ©AeroMetric Inc., 2013



Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - L8

Title
Kivalina Evacuation and School Site Access Road - Wetlands

U:\204765102\GIS\mxd\Wetland Report Figs\Fig. 2-1 2-XXX Cowardin draft.mxd Revised: 2017-09-14 By: cpannone

Stantec

Legend

Data Points (2016)

- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
- Pond
- Riverine
- Upland
- Study Area

Notes

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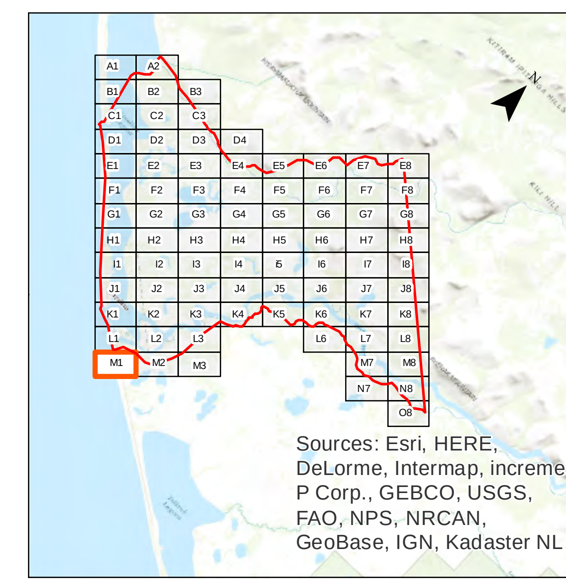

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Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

002(384)/NFHWYP00162 REVA
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Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - M1

Title
Kivalina Evacuation and School Site Access Road - Wetlands

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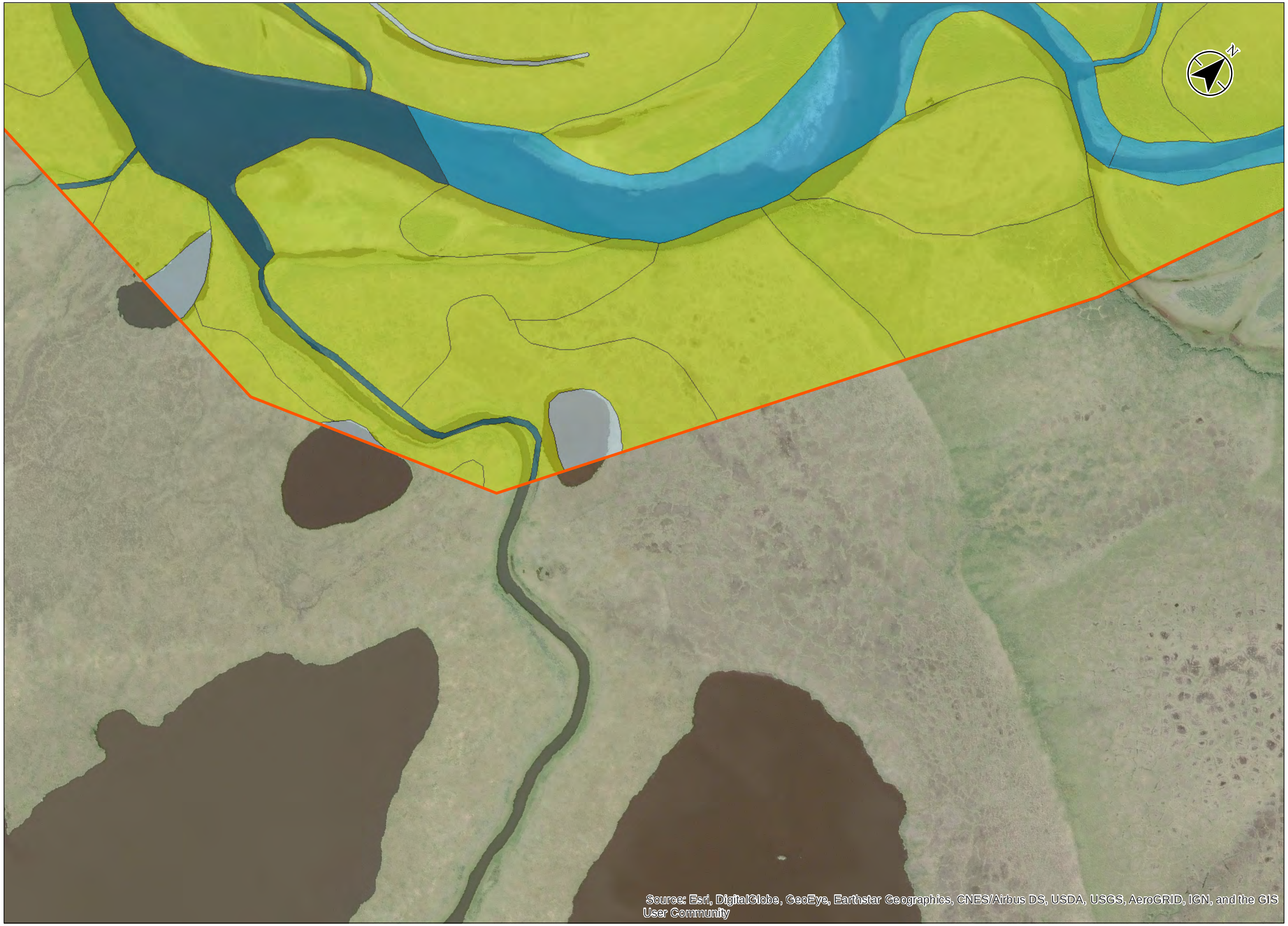

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Stantec

Legend

Data Points (2016)

- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
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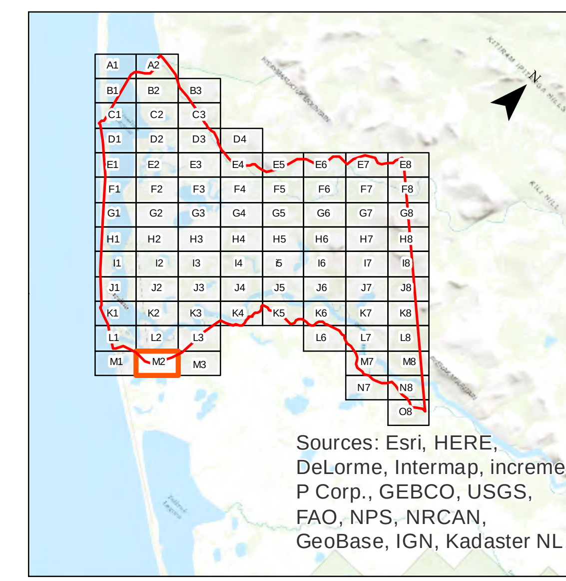


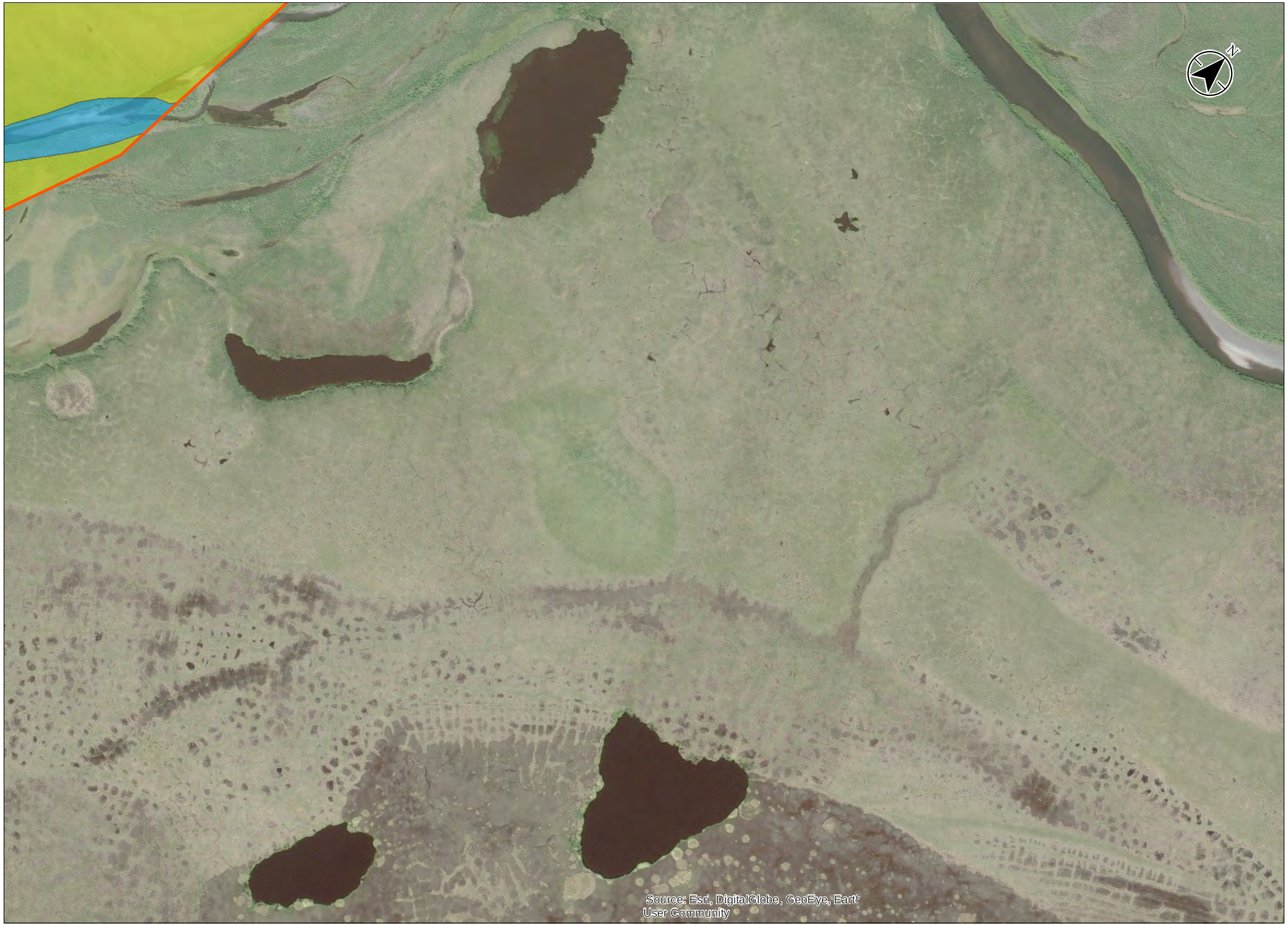
Project Location Project Origin: Kivalina, Alaska Section 21, Township 27N, Range 26W Kateel River Meridian	002(384)/NFHWYP00162 REVA Prepared by CDP on 2017-06-23 Technical Review by ABC on 2017-0X-XX Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - M2

Title
Kivalina Evacuation and School Site Access Road - Wetlands

U:\204705102\GIS\mxd\Wetland Report Figs\Fig 2-1 2-XXX Cowardin draft.mxd Revised: 2017-09-14 By: cpannone



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1:6,500 (At original document size of 11x17)

Stantec

Legend

Data Points (2016)

- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
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- Riverine
- Upland
- Study Area

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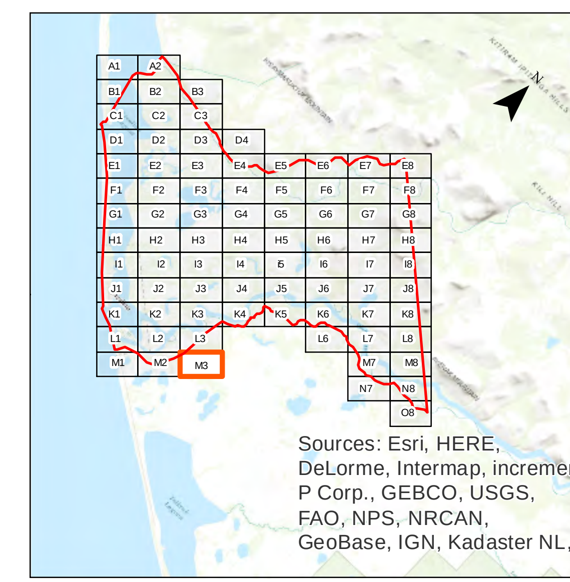


Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

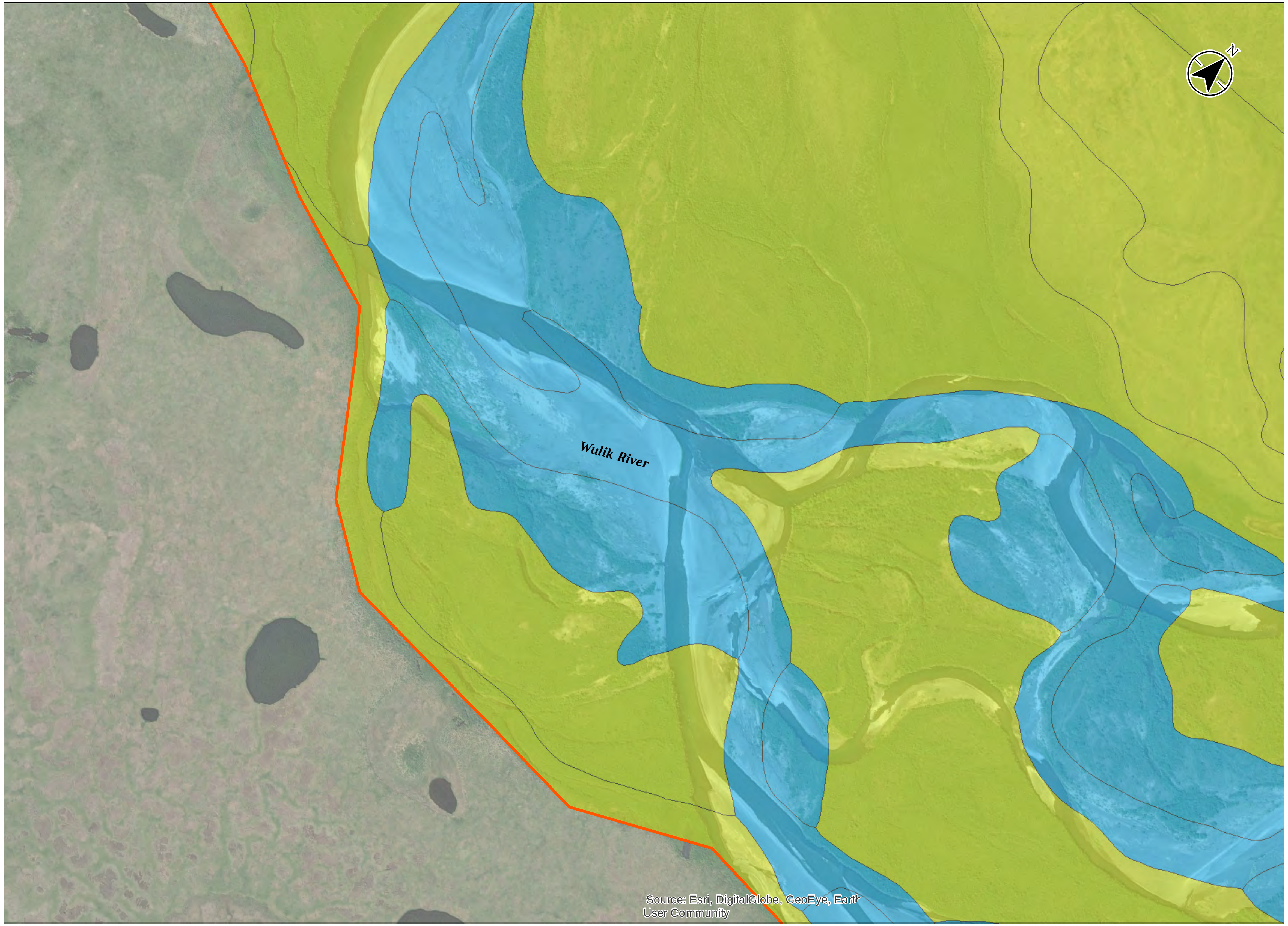
002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - M3

Title
Kivalina Evacuation and School Site Access Road - Wetlands

U:\2047055102\GIS\mxd\Wetland Report Figs\Fig 2-1 2-XXX Cowardin draft.mxd Revised: 2017-09-14 By: cpannone



Stantec

Legend

Data Points (2016)

- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
- Pond
- Riverine
- Upland
- Study Area

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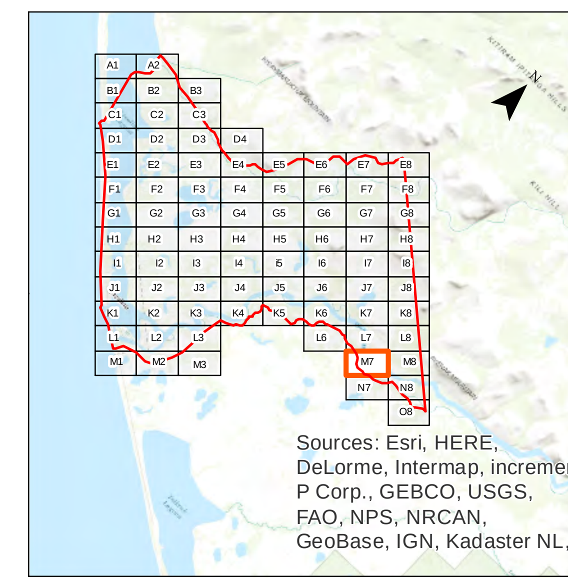

Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
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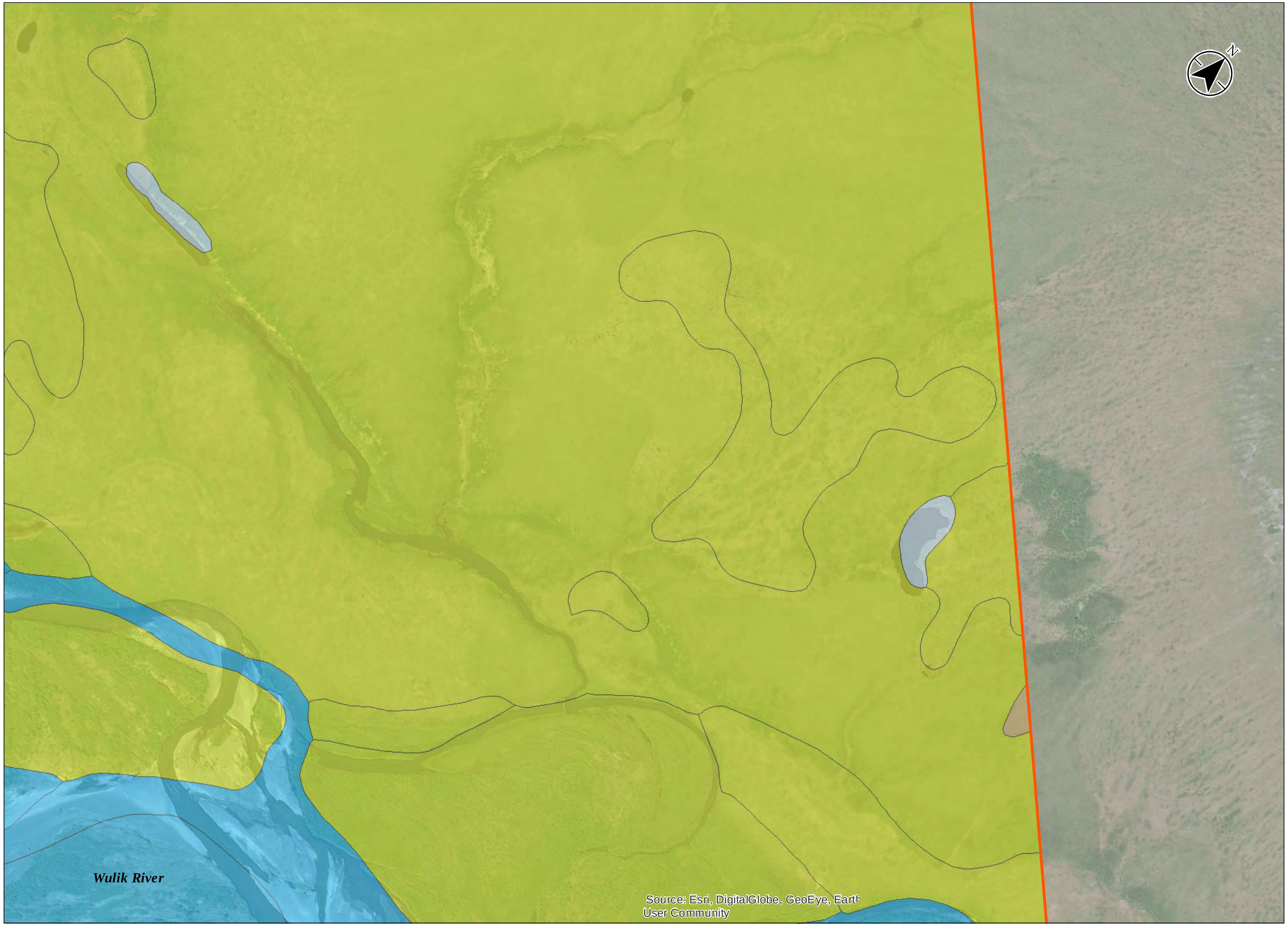
Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - M7

Title
Kivalina Evacuation and School Site Access Road - Wetlands



0 250 500 1,000 1,500 2,000
Feet

1:6,500 (At original document size of 11x17)

Legend

Data Points (2016)

- Standard Data Point
- Photo Point

Wetland Type

- Estuarine
- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
- Pond
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Notes

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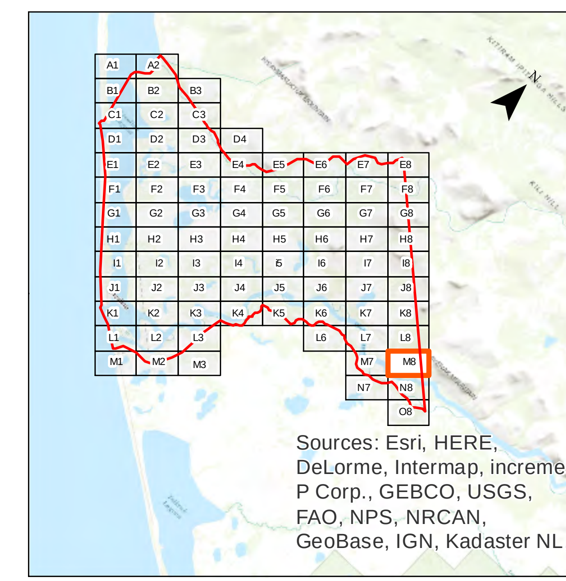


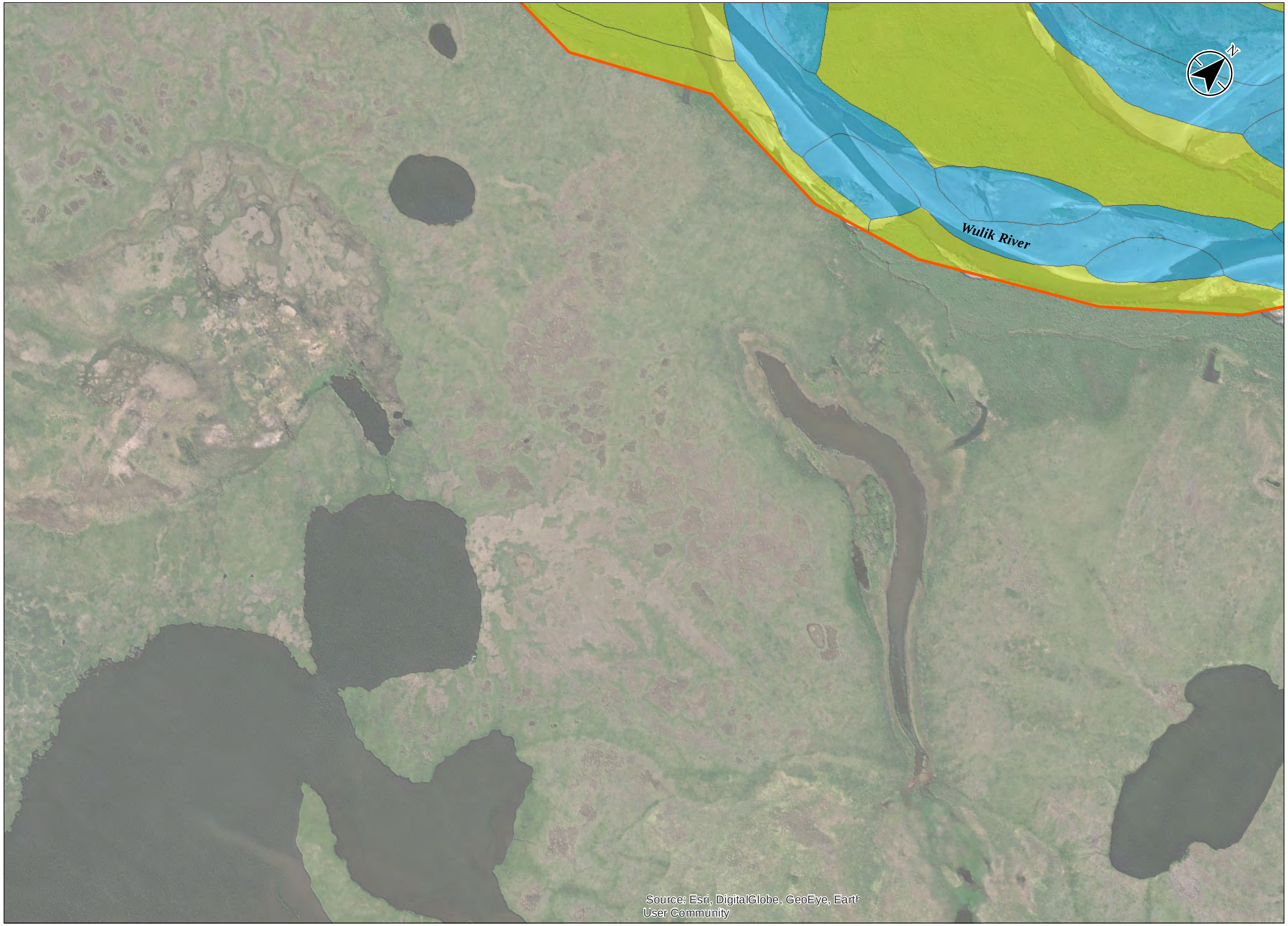
Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - M8

Title
Kivalina Evacuation and School Site Access Road - Wetlands



1:6,500 (At original document size of 11x17)

Stantec

Legend

Data Points (2016)

- Standard Data Point
- Photo Point

Wetland Type

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- Lacustrine
- Marine
- Palustrine_Flooded
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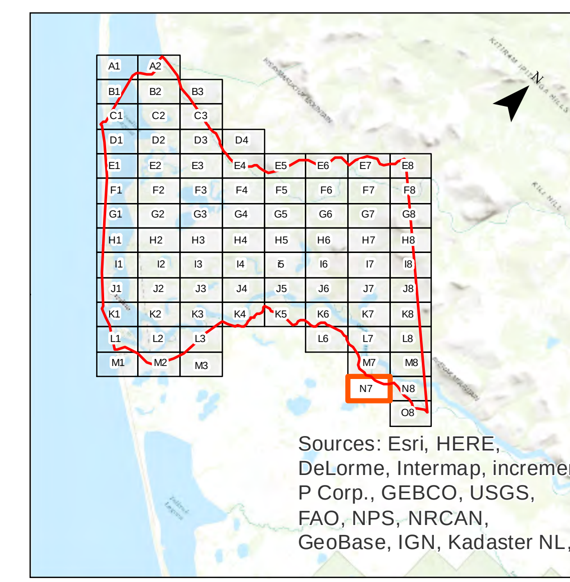

Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
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Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - N7

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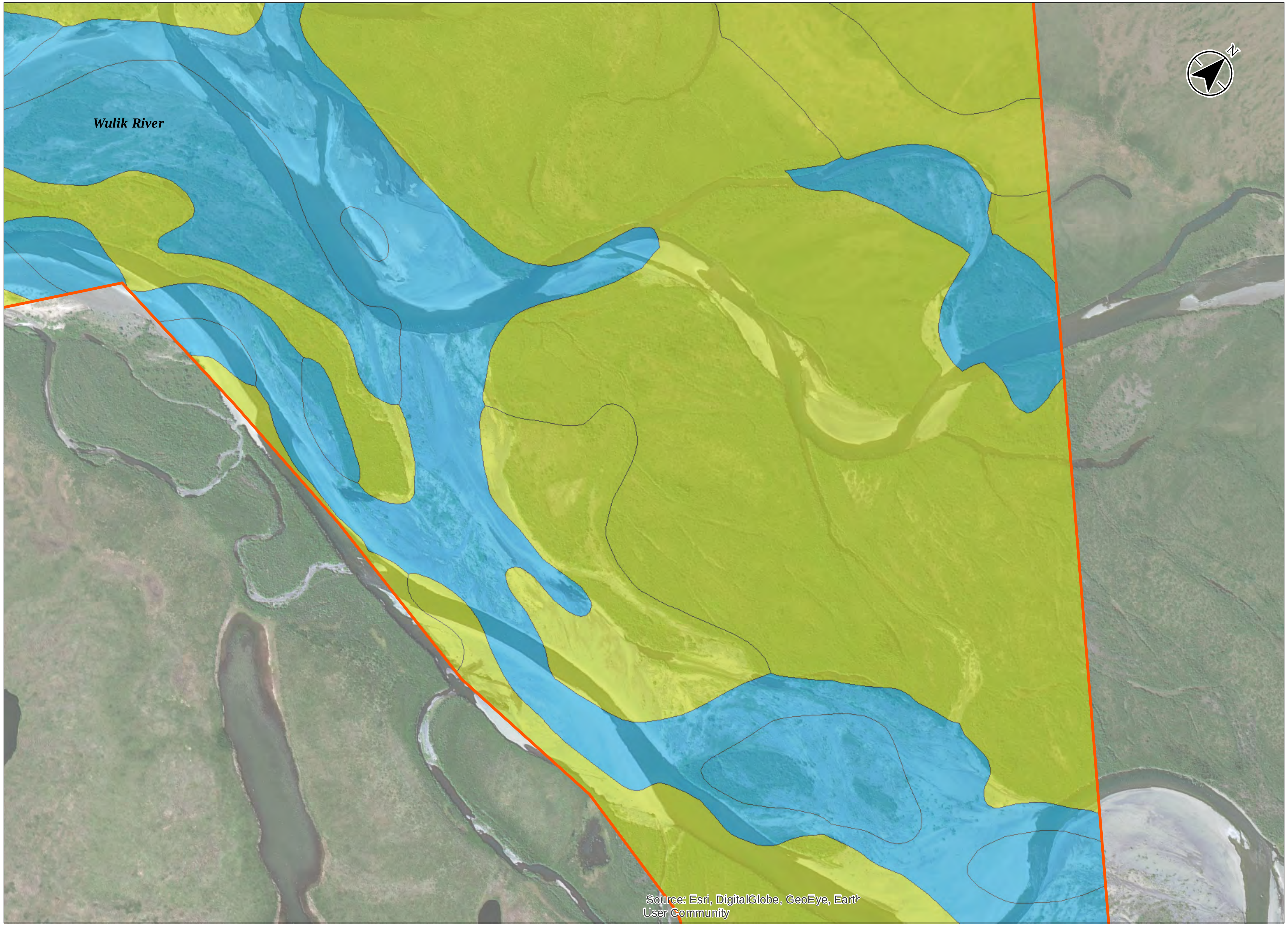
Kivalina Evacuation and School Site Access Road - Wetlands



Stantec

Legend

Data Points (2016)

- Standard Data Point
- Photo Point

Wetland Type

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- Marine
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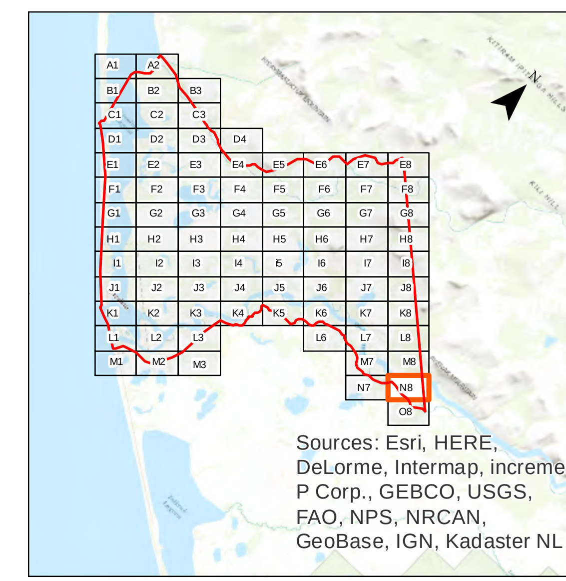

Project Location
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Section 21, Township 27N, Range 26W
Kateel River Meridian

002(384)/NFHWYP00162 REVA
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Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - N8

Title
Kivalina Evacuation and School Site Access Road - Wetlands

0 250 500 1,000 1,500 2,000 Feet

1:6,500 (At original document size of 11x17)

Page 83 of 87

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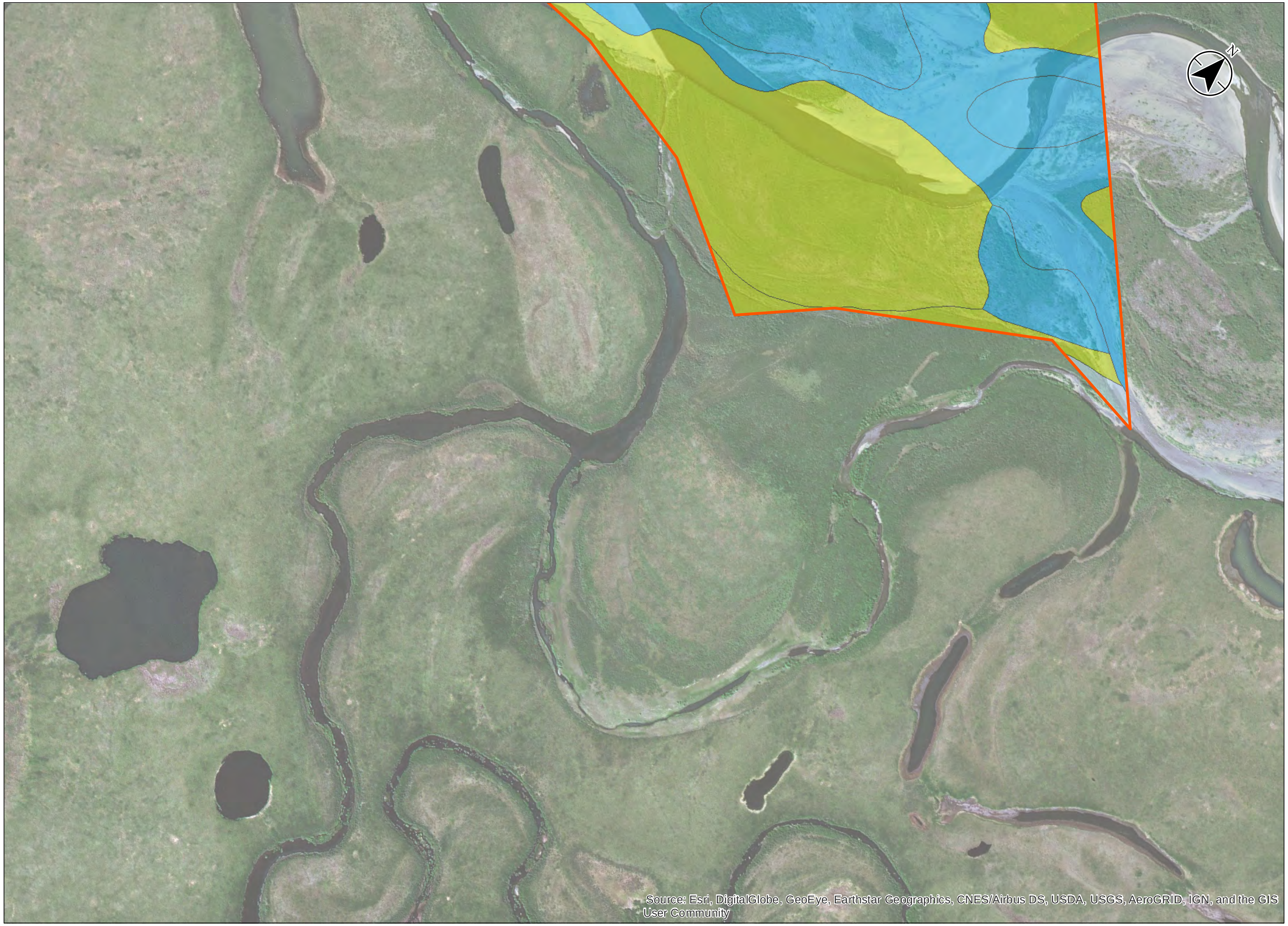

0 250 500 1,000 1,500 2,000 Feet

1:6,500 (At original document size of 11x17)

Stantec

Legend

Data Points (2016)

- Standard Data Point
- Photo Point

Wetland Type

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- Lacustrine
- Marine
- Palustrine_Flooded
- Palustrine_Saturated
- Pond
- Riverine
- Upland
- Study Area

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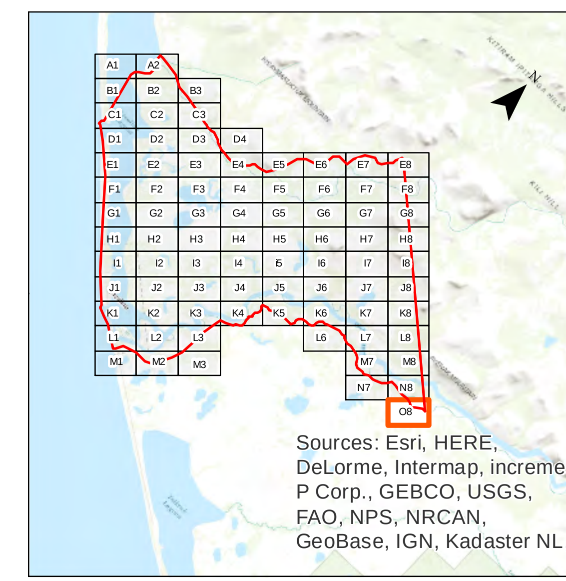

Project Location
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Section 21, Township 27N, Range 26W
Kateel River Meridian

002(384)/NFHWYP00162 REVA
Prepared by CDP on 2017-06-23
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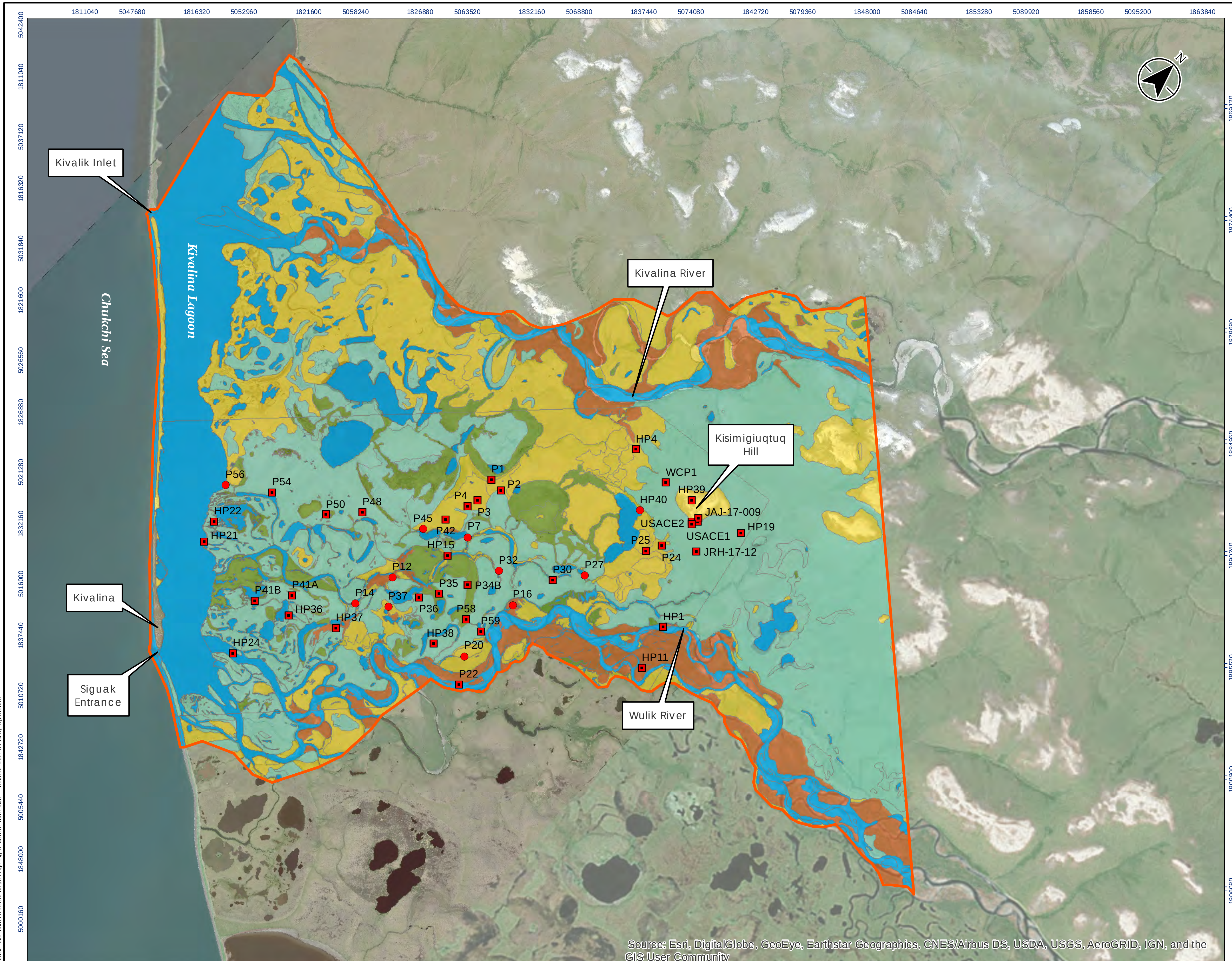
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
2 - O8

Title
Kivalina Evacuation and School Site Access Road - Wetlands



Legend

Data Points (2016)

- Standard Data Point
- Photo Point

Viereck

- Developed
- II.C.1: Closed Low Scrub*
- II.D.2: Willow Dwarf Shrub
- III.A.2: Mesic Graminoid Herbaceous
- III.A.3: Mesic Graminoid Herbaceous
- W: Water
- Study Area

* Closed Low Scrub is considered important bird habitat.

0 1 2 Miles
1:80,000 (At original document size of 11x17)

Notes

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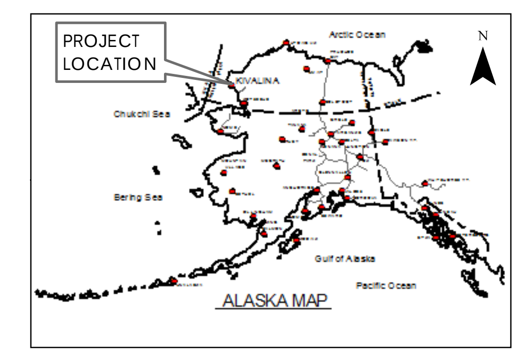


Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

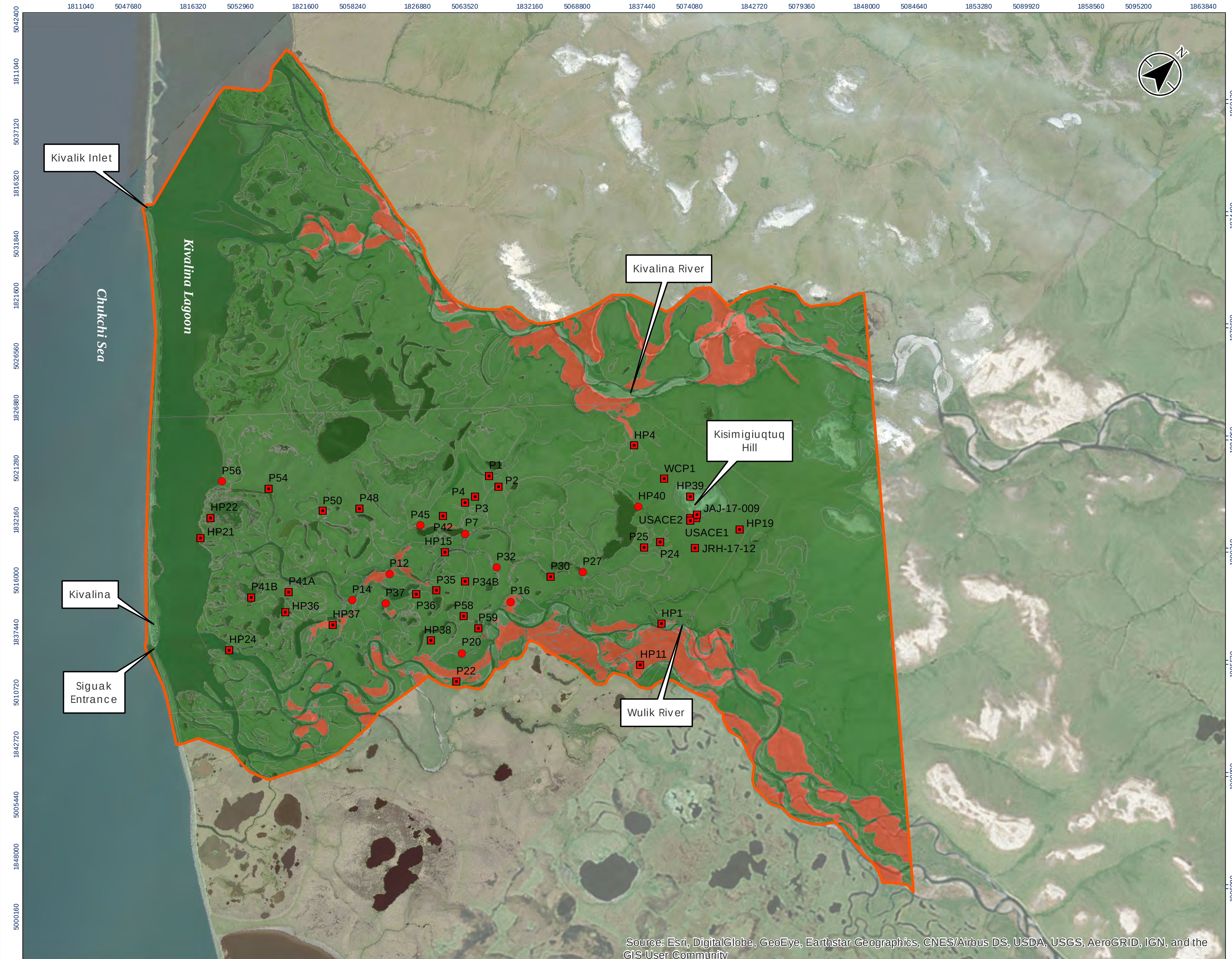
NFHWYP00162-002(384) REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
3

Title
Kivalina Evacuation and School Site Access Road - Wildlife Overview

U:\204785182\GIS\mxd\Wetland Report Figs\Fig_3_Wildlife_draft.mxd Revised: 2017-09-14 By: cpammone



Stantec

Legend

Data Points (2016)

- Standard Data Point
- Photo Point

Bird

- No
- Yes
- Study Area

0 1 2 Miles

1:80,000 (At original document size of 11x17)

Notes

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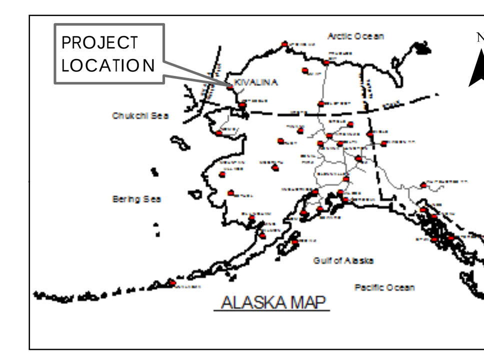


Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

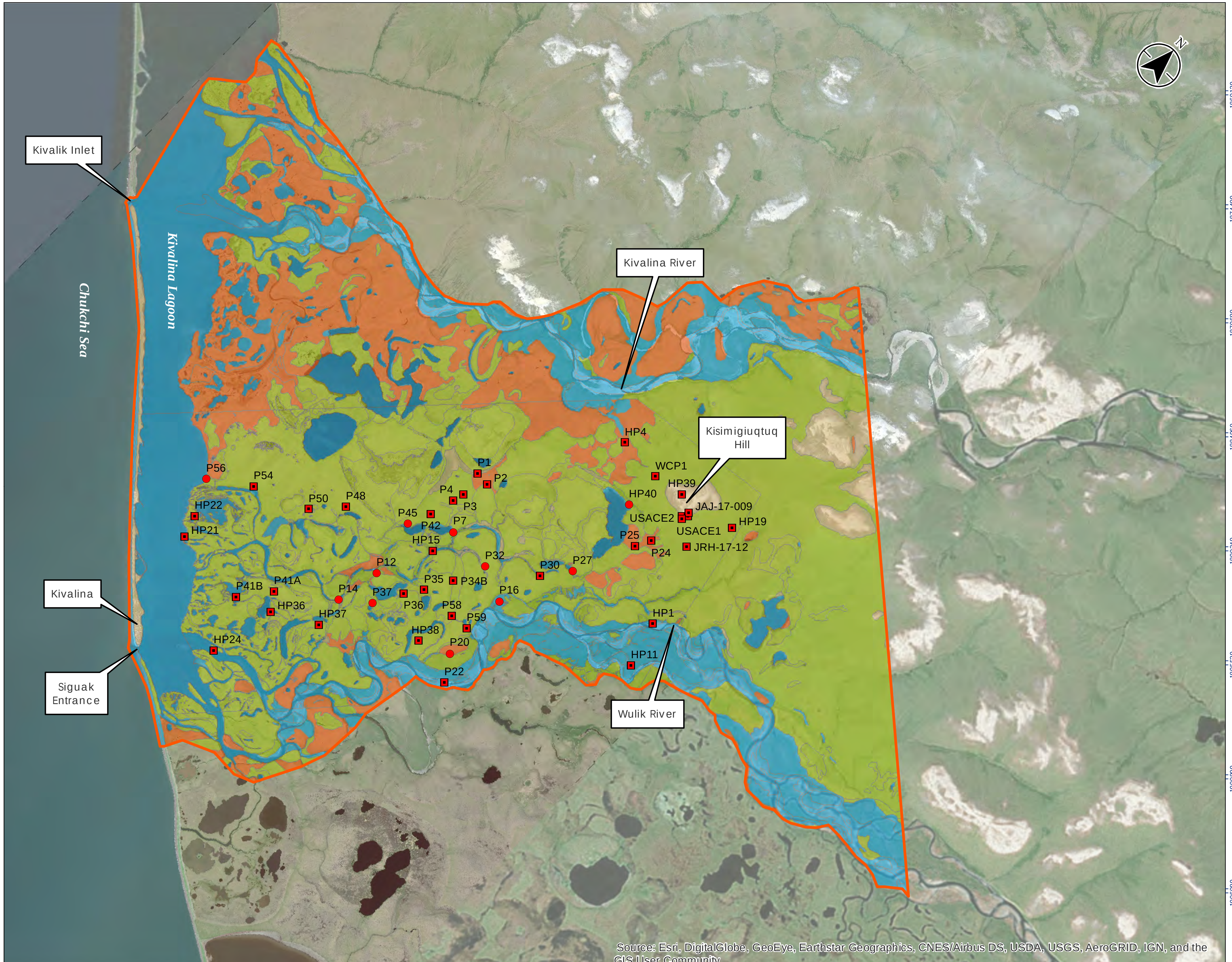
NFHWYP00162-002(384) REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
4

Title
Kivalina Evacuation and School Site Access Road - Bird Overview

U:\204705182\GIS\mxd\Wetland Report Figs\Fig_4_Bird_draft.mxd Revised: 2017-09-14 By: cpamone



Stantec

Legend

Data Points (2016)

- Standard Data Point
- Photo Point

Wetland Function

- I+
- I
- II
- Upland
- Study Area

0 1 2 Miles

1:80,000 (At original document size of 11x17)

Notes

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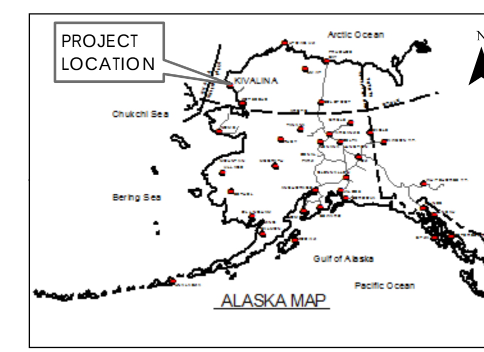

Project Location
Project Origin: Kivalina, Alaska
Section 21, Township 27N, Range 26W
Kateel River Meridian

NFHWYP00162-002(384) REVA
Prepared by CDP on 2017-06-23
Technical Review by ABC on 2017-0X-XX
Independent Review by ABC on 2017-0X-XX

Client/Project
State of Alaska, DOT & PF Northern Region
Wetlands Verification Report
Kivalina Evacuation and School Site Access Road

Figure No.
5

Title
Kivalina Evacuation and School Site Access Road - Function Overview

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U:\204765182\GIS\mxd\Wetland Report Figs\Fig_5_Function_draft.mxd Revised: 2017-09-14 By: cpannone

Appendix B STANDARD WETLAND DELINEATION DATA SHEETS

WETLAND DETERMINATION DATA FORM - Alaska Region

Project/Site: Kivalina Borough/City: NW Arctic Sampling Date: Sept/Oct 2016
Applicant/Owner: DOT&PF Sampling Point HP40
Investigator(s): Stantec Landform (hillside, terrace, hummocks, etc Slight terrace
Local relief (concave, convex, none): convex Slope (%): 0
Subregion: Western Brooks Range Mts Foothills Lat: 67.803448 Long: -164.409217 Datum: NAD83
Soil Map Unit Name: Not Available NWI classification: PSS1/EM1E
Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ___ (If no, explain in Remarks.)
Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? ___ Are "Normal Circumstances" present? Yes x No ___
Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? ___ (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes x No ___	Is the Sampled Area within a Wetland? Yes x No ___
Hydric Soil Present?	Yes x No ___	
Wetland Hydrology Present?	Yes x No ___	

Remarks Larger willows along northeast side of large lake at base of K-hill west. Drainage apparant along paths between willows. This point combines the soil information (from an Oct 2016 cultural investigation) with the site photos of vegetation during a Sept 2016 site visit, conducted by Stantec. We have determined that there was enough information from these investigations to inform the status of the site.

VEGETATION – Use scientific names of plants. List all species in the plot. MUST LIST COVER IN DESECENDING ORDER

	3/3 Abbrev.	Species Name	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum					
1					
2					
3					
4					
		Total Cover:	0		
		50% of total cover: 0	20% of total cover: 0		
Sapling/Shrub Stratum					
1		Salix, Unidentified	80	YES	FAC
2	vaculi	Vaccinium uliginosum	10	NO	FAC
3					
4					
5					
6					
		Total Cover:	90		
		50% of total cover: 45	20% of total cover: 18		
Herb Stratum					
1		Unidentified Grass	100	YES	FAC
2					
3					
4					
5					
6					
7					
8					
9					
10					
		Total Cover:	100		
		50% of total cover: 50	20% of total cover: 20		

Plot size (radius, or length x width) ___ % Bare Ground ___
% Cover of Wetland Bryophytes ___ Total Cover of Bryophytes ___

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 1 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	190	x 3 =	570
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	190 (A)		570 (B)

Prevalence Index = B/A = 3

Hydrophytic Vegetation Indicators:

Yes Dominance Test is >50%
Yes Prevalence Index is ≤3.0
___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes x No ___

Remarks:

SOIL Sampling Point HP40

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-6							Sod	DME-16-008
6-26							Brown silty clay loam	no roots; DME-16-008
								DME-16-008 is the Stantec Cultural Point

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol or Histel (A1)
- x Histic Epipedon (A2)
- ___ Hydrogen Sulfide (A4)
- ___ Thick Dark Surface (A12)
- ___ Alaska Gleyed (A13)
- ___ Alaska Redox (A14)
- ___ Alaska Gleyed Pores (A15)

Indicators for Problematic Hydric Soils[3]:

- ___ Alaska Color Change (TA4)[4]
- ___ Alaska Alpine Swales (TA5)
- ___ Alaska Redox With 2.5Y Hue
- ___ Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
- ___ Other (Explain in Remarks)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed

[4]Give details of color change in Remarks.

Restrictive Layer (if present):

Type: Permafrost

Depth (inches): 72

Hydric Soil Present? **Yes** x **No** ___

Remarks Oct 2016 Stantec Cultural Point DME-16-008 was used for soils. While Munsell colors were not identified, we interpreted 0-6 inches as being organics, 6-26 inches as being a layer of organic/mineral soil mix meeting the definition of a Histic Epipedon ('brown' being chroma 2 or less, 'dense...roots' as organics). Saturation was noted at below 5 inches. As the site was sampled in October, we expect the organics to be saturated during June – August.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- x High Water Table (A2)
- x Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-stained Leaves (B9)
- x Drainage Patterns (B10)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Salt Deposits (C5)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- x Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

	Yes	No	Depth (inches)
Surface Water Present?		x	
Water Table Present?	x		8
Saturation Present? (includes capillary fringe)	x		6

Wetland Hydrology Present? **Yes** x **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: The Oct 2016 Stantec Cultural Point DME-16-008 found 50-75% water saturation at 6 inches. There is no note of a water table, as this information is not typically recorded in a cultural investigation. In our experience in the region, saturation of this degree probably means the water table is near the 8 inch mark during June - August. It is also important to review the secondary characteristics of this site.

Project/Site:	Kivalina	Site No.:	HP40
Applicant/Owner:	DOT&PF	Investigator(s):	Stantec
Date:	9/14/2017	Cowardin:	PSS1/EM1E

Notes: Larger willows along northeast side of large lake at base of K-hill west

Overview of Lake looking south

Overview of Lake looking south

WETLAND DETERMINATION DATA FORM - Alaska Region

Project/Site: Kivalina Borough/City: NW Arctic Sampling Date: Sept/Oct 2016
Applicant/Owner: DOT&PF Sampling Point P7
Investigator(s): Stantec Landform (hillside, terrace, hummocks, etc Old Terrace
Local relief (concave, convex, none): None Slope (%): 0
Subregion: Western Brooks Range Mts Foothills Lat: 67.778212 Long: -164.460604 Datum: NAD83
Soil Map Unit Name: Not Available NWI classification: PEM1/SS1C
Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ___ (If no, explain in Remarks.)
Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? ___ Are “Normal Circumstances” present? Yes x No ___
Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? ___ (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes x No ___	Is the Sampled Area within a Wetland? Yes x No ___
Hydric Soil Present?	Yes x No ___	
Wetland Hydrology Present?	Yes x No ___	

Remarks Old channel and gravel bars with standing water adjacent to south. This point combines the soil information from an Oct 2016 cultural investigation with the site photos of vegetation during a Sept 2016 site visit, both conducted by Stantec. While wetlands data was not taken specifically, at this location we have determined that there was enough information from these investigations to inform the status of the site.

VEGETATION – Use scientific names of plants. List all species in the plot. MUST LIST COVER IN DESECENDING ORDER

3/3 Abbrev.	Species Name	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum				
1				
2				
3				
4				
	Total Cover:	0		
	50% of total cover: 0		20% of total cover: 0	
Sapling/Shrub Stratum				
1 vacvit	Vaccinium vitis-idaea	50	YES	FAC
2 rhotom	Rhododendron tomentosum	50	YES	FACW
3 betnan	Betula nana	10	NO	FAC
4				
5				
6				
	Total Cover:	110		
	50% of total cover: 55		20% of total cover: 22	
Herb Stratum				
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
	Total Cover:	0		
	50% of total cover: 0		20% of total cover: 0	

Plot size (radius, or length x width)___ % Bare Ground ___
% Cover of Wetland Bryophytes ___ Total Cover of Bryophytes ___

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 1 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	50	x 2 =	100
FAC species	60	x 3 =	180
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	110 (A)		280 (B)

Prevalence Index = B/A = 2.5455

Hydrophytic Vegetation Indicators:

Yes Dominance Test is >50%
Yes Prevalence Index is ≤3.0
___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes x No ___

Remarks: Shrubs were present on the microtopographic 'highs'. Also un-identified grasses and sedges are present. VacVit and RhoTom were identified in cultural investigation notes. BetNan appears present in the background of the closeup photo.

SOIL Sampling Point P7

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-2							Moss	JAJ-16-048
2-4							Brown silty clay loam	dense fine to medium roots; JAJ-16-048
4-10							Gray clay no gravels	No roots; JAJ-16-048
								JAJ-16-048 is the Stantec Cultural Point

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol or Histel (A1)
- x Histic Epipedon (A2)
- ___ Hydrogen Sulfide (A4)
- ___ Thick Dark Surface (A12)
- ___ Alaska Gleyed (A13)
- ___ Alaska Redox (A14)
- ___ Alaska Gleyed Pores (A15)

Indicators for Problematic Hydric Soils[3]:

- ___ Alaska Color Change (TA4)[4]
- ___ Alaska Alpine Swales (TA5)
- ___ Alaska Redox With 2.5Y Hue
- ___ Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
- ___ Other (Explain in Remarks)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed

[4]Give details of color change in Remarks.

Restrictive Layer (if present):

Type: None

Depth (inches):

Hydric Soil Present? Yes x No

Remarks Soils information is taken from a Oct 2016 cultural resources investigation. 25-50% saturation was noted at 5-11". While Munsell colors were not identified, we interpreted a 2" layer of moss, at 2-4" a layer of saturated organics (primarily due to the 'dense roots') meeting the definition of a Histic Epipedon, and at 4-10" a layer of mineral soil meeting the definition of a Histic Epipedon ('gray' being chroma 2 or less). This interpretation has been boosted by the site photographs and our regional experience.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- x High Water Table (A2)
- x Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-stained Leaves (B9)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Salt Deposits (C5)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- x Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

	Yes	No	Depth (inches)
Surface Water Present?		x	
Water Table Present?	x		~5
Saturation Present? (includes capillary fringe)	x		5

Wetland Hydrology Present? Yes x No

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

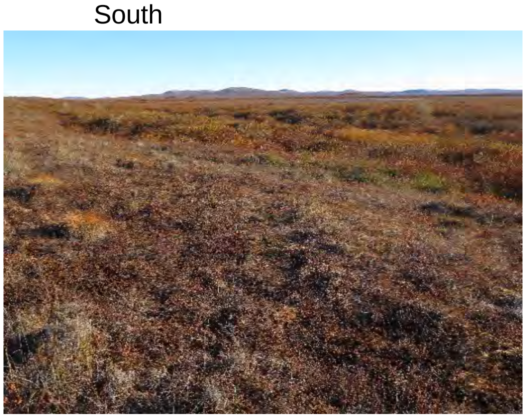
Remarks: The Oct 2016 cultural investigation notes 25-50% water saturation at 5-11 inches. There is no note of a water table, as this information is not typically recorded in a cultural investigation. In our experience in the region, saturation of this degree probably means the water table is near the 5 inch mark.

Project/Site:	Kivalina	Site No.:	P7
Applicant/Owner:	DOT&PF	Investigator(s):	Stantec
Date:	9/15/2016	Cowardin:	PEM1/SS1C

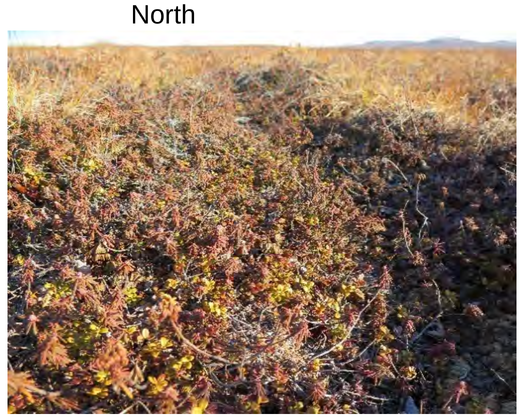
Notes: Old channel and gravel bars with standing water adjacent to south. P7 site vegetation (Low bush cranberry, Labrador tea)

South

North



East



Plant Closeup

Hovering Over P7 (in field notes as HP14)

WETLAND DETERMINATION DATA FORM - Alaska Region

Project/Site: Kivalina — Borough/City: NW Arctic — Sampling Date: Sept/Oct 2016
Applicant/Owner: DOT&PF — Sampling Point P12
Investigator(s): Stantec — Landform (hillside, terrace, hummocks, etc Flat transition of habitat
Local relief (concave, convex, none): Flat — Slope (%): 0
Subregion: Western Brooks Range Mts Foothills — Lat: 67.76341 — Long: -164.473383 — Datum: NAD83
Soil Map Unit Name: Not Available — NWI classification: PSS1/EM1B
Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ___ (If no, explain in Remarks.)
Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? ___ Are "Normal Circumstances" present? Yes x No ___
Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? ___ (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes x No ___	Is the Sampled Area within a Wetland? Yes x No ___
Hydric Soil Present?	Yes x No ___	
Wetland Hydrology Present?	Yes x No ___	

Remarks Edge of geomorphic change. Up raised on south side to less vegetated plateau, shrubs diminishing to the south grading to tussock/grassy. Point combines soil information from an Oct 2016 cultural investigation (point JAJ-16-009) with site photos of vegetation during a Sept 2016 site visit (P12), both conducted by Stantec. While wetlands data was not taken specifically, at this location we have determined that there was enough information from these investigations to inform the status of the site.

VEGETATION – Use scientific names of plants. List all species in the plot. MUST LIST COVER IN DESECENDING ORDER

	3/3 Abbrev.	Species Name	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum					
1					
2					
3					
4					
		Total Cover:	0		
		50% of total cover: 0		20% of total cover:	0
Sapling/Shrub Stratum					
1	salsp	Salix sp (unknown)	80	YES	FAC
2	betnan	Betula nana	25	NO	FAC
3	vaculi	Vaccinium uliginosum	25	NO	FAC
4	rhotom	Rhododendron tomentosum	25	NO	FACW
5					
6					
		Total Cover:	155		
		50% of total cover: 77.5		20% of total cover:	31
Herb Stratum					
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
		Total Cover:	0		
		50% of total cover: 0		20% of total cover:	0

Plot size (radius, or length x width)______ % Bare Ground______
% Cover of Wetland Bryophytes______ Total Cover of Bryophytes______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 1 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	25	x 2 =	50
FAC species	130	x 3 =	390
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	155 (A)		440 (B)

Prevalence Index = B/A = 2.8387

Hydrophytic Vegetation Indicators:

Yes Dominance Test is >50%
Yes Prevalence Index is ≤3.0
___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes** x **No** ___

Remarks: High shrubs are assumed to be willow species. Detailed photo examination also show BetNan, VacUli, and Labrador Tea. Herbs are present, but are too distant to identify, and do not appear to be FACU or UPL species.

SOIL Sampling Point P12

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-2							Sod	JAJ-16-009
2-16							Brown silty clay loam	dense fine to medium roots; JAJ-16-009
								JAJ-16-009 is the Stantec Cultural Point

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol or Histel (A1)
- x Histic Epipedon (A2)
- ___ Hydrogen Sulfide (A4)
- ___ Thick Dark Surface (A12)
- ___ Alaska Gleyed (A13)
- ___ Alaska Redox (A14)
- ___ Alaska Gleyed Pores (A15)

Indicators for Problematic Hydric Soils[3]:

- ___ Alaska Color Change (TA4)[4]
- ___ Alaska Alpine Swales (TA5)
- ___ Alaska Redox With 2.5Y Hue
- ___ Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
- ___ Other (Explain in Remarks)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed
[4]Give details of color change in Remarks.

Restrictive Layer (if present):
Type: Permafrost
Depth (inches): 53

Hydric Soil Present? Yes x No ___

Remarks Soils information is taken from a Oct 2016 cultural resources investigation. 50-75% saturation was noted at 2 to 16 inches in Oct. While Munsell colors were not identified, we interpreted there to be a 2 inch layer of organics, which is probably saturated during the growing season. At 5-40 inches a mixture of organics (due to the 'dense roots') and mineral loam. We assume this meets the definition of a Histic Epipedon, ('brown' being chroma 2 or less). This interpretation has been boosted by the site photographs.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- x High Water Table (A2)
- x Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-stained Leaves (B9)
- x Drainage Patterns (B10)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Salt Deposits (C5)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- x Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

	Yes	No	Depth (inches)
Surface Water Present?		x	
Water Table Present?	x		5
Saturation Present? (includes capillary fringe)	x		2

Wetland Hydrology Present? Yes x No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

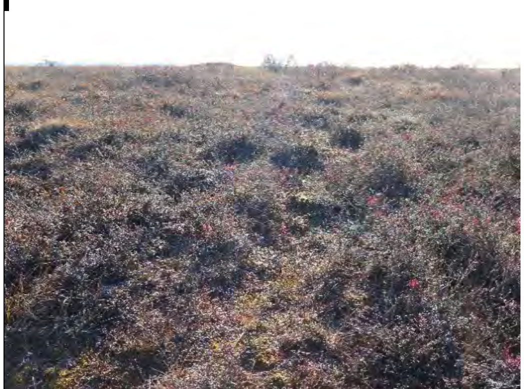
Remarks: The Oct 2016 cultural investigation notes 50-75% water saturation at 2-16 inches. There is no note of a water table, as this information is not typically recorded in a cultural investigation. In our experience in the region, saturation of this degree probably means the water table is near the 5 inch mark. We also note microtopo relief and drainage patterns in the "South" site photos.

Project/Site:	Kivalina	Site No.:	P12
Applicant/Owner:	DOT&PF	Investigator(s):	Stantec
Date:	9/15/2016	Cowardin:	PSS1/EM1B

Notes: Edge of geomorphic change. Up raised on south side to less vegetated plateau, shrubs diminishing to the south grading to tussock/grassy.

Looking North

Looking East



Looking South

Looking West

WETLAND DETERMINATION DATA FORM - Alaska Region

Project/Site: Kivalina | Borough/City: NW Arctic | Sampling Date: Sept/Oct 2016
Applicant/Owner: DOT&PF | Sampling Point P14
Investigator(s): Stantec | Landform (hillside, terrace, hummocks, etc Terrace above wetter area
Local relief (concave, convex, none): Convex | Slope (%): 0
Subregion: Western Brooks Range Mts Foothills | Lat: 67.755301 | Long: -164.477827 | Datum: NAD83
Soil Map Unit Name: Not Available | NWI classification: PSS1/EM1E
Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ___ (If no, explain in Remarks.)
Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? ___ Are "Normal Circumstances" present? Yes x No ___
Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? ___ (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes x No ___	Is the Sampled Area within a Wetland? Yes x No ___
Hydric Soil Present?	Yes x No ___	
Wetland Hydrology Present?	Yes x No ___	

Remarks Edge of second side channel to east. Standing ponds chain. Flat elevated tundra between two side channels. Point combines soil information (from an Oct 2016 cultural investigation and a March/April 2015 Golder geotechnical investigation) with site photos of vegetation during a Sept 2016 site visit, conducted by Stantec. While wetlands data was not taken specifically, at this location we have determined that there was enough information from these investigations to inform the status of the site.

VEGETATION – Use scientific names of plants. List all species in the plot. MUST LIST COVER IN DESECENDING ORDER

	3/3 Abbrev.	Species Name	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum					
1					
2					
3					
4					
		Total Cover:	0		
		50% of total cover: 0		20% of total cover:	0
Sapling/Shrub Stratum					
1	rhotom	Rhododendron tomentosum	75	YES	FACW
2	vacvit	Vaccinium vitis-idaea	75	YES	FAC
3	salsp	Salix sp (unknown species)	50	YES	FAC
4	betnan	Betula nana	10	NO	FAC
5					
6					
		Total Cover:	210		
		50% of total cover: 105		20% of total cover:	42
Herb Stratum					
1	erivag	Eriophorum vaginatum	2	YES	FACW
2					
3					
4					
5					
6					
7					
8					
9					
10					
		Total Cover:	2		
		50% of total cover: 1		20% of total cover:	0.4

Plot size (radius, or length x width) ___ % Bare Ground ___
% Cover of Wetland Bryophytes ___ Total Cover of Bryophytes ___

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 1 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	77	x 2 =	154
FAC species	135	x 3 =	405
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	212	(A)	559 (B)

Prevalence Index = B/A = 2.6368

Hydrophytic Vegetation Indicators:

Yes Dominance Test is >50%
Yes Prevalence Index is ≤3.0
___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes x No ___

Remarks: Shrubs are present throughout the site photos. Small numbers of EriVag seed heads are visible. There is apparent dense shrub cover, which appears to be RhoTom/VacVit or similar.

SOIL Sampling Point P14

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-4							Organics	DME-16-023
4-25	Brown						Silty Sand no gravel	DME-16-023
								DME-16-023 is the Stantec Cultural Point
0-35	Frozen, brown						ORGANIC SILT	10-20% visible ice; Golder K15-13

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol or Histel (A1)
- x Histic Epipedon (A2)
- ___ Hydrogen Sulfide (A4)
- ___ Thick Dark Surface (A12)
- ___ Alaska Gleyed (A13)
- ___ Alaska Redox (A14)
- ___ Alaska Gleyed Pores (A15)

Indicators for Problematic Hydric Soils[3]:

- ___ Alaska Color Change (TA4)[4]
- ___ Alaska Alpine Swales (TA5)
- ___ Alaska Redox With 2.5Y Hue
- ___ Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
- ___ Other (Explain in Remarks)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed

[4]Give details of color change in Remarks.

Restrictive Layer (if present):

Type: Permafrost

Depth (inches): 25

Hydric Soil Present? Yes x No ___

Remarks Oct 2016 Stantec Cultural Point DME-16-023 and a March/April 2015 Golder geotechnical investigation was used for soils (point K15-13). While Munsell colors were not identified, we interpreted 0-4 inches as being organics, 4-25 inches as being a layer of mineral soil meeting the definition of a Histic Epipedon ('brown' being chroma 2 or less). Saturation was noted at 4 inches and below. As the site was sampled in October, we expect the organics to be saturated during June - August

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- x High Water Table (A2)
- x Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-stained Leaves (B9)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Salt Deposits (C5)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- x Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

	Yes	No	Depth (inches)
Surface Water Present?		x	
Water Table Present?	x		4
Saturation Present? (includes capillary fringe)	x		4

Wetland Hydrology Present? Yes x No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: The Oct 2016 Stantec Cultural Point DME-16-023 found 75-100% water saturation at 4 inches. There is no note of a water table, as this information is not typically recorded in a cultural investigation. In our experience in the region, saturation of this degree probably means the water table is near the 4 inch mark during June - August.

Project/Site:	Kivalina	Site No.:	P14
Applicant/Owner:	DOT&PF	Investigator(s):	Stantec
Date:	9/15/2016	Cowardin:	PSS1/EM1E

Notes: Edge of second side channel to east. Standing ponds chain. Flat elevated tundra between two side channels perpendicular to curved lake forming North end.

Looking North

Looking East

Looking South

Looking West

WETLAND DETERMINATION DATA FORM - Alaska Region

Project/Site: Kivalina Borough/City: NW Arctic Sampling Date: Sept/Oct 2016
Applicant/Owner: DOT&PF Sampling Point P16
Investigator(s): Stantec Landform (hillside, terrace, hummocks, etc Flat
Local relief (concave, convex, none): Concave Slope (%): 0
Subregion: Western Brooks Range Mts Foothills Lat: 67.774894 Long: -164.422309 Datum: NAD83
Soil Map Unit Name: Not Available NWI classification: PSS1J
Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ___ (If no, explain in Remarks.)
Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? ___ Are "Normal Circumstances" present? Yes x No ___
Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? ___ (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes x No ___	Is the Sampled Area within a Wetland?	Yes x No ___
Hydric Soil Present?	Yes ___ No ___		
Wetland Hydrology Present?	Yes x No ___		

Remarks This point combines the soil information (from an Oct 2016 cultural investigation) with the site photos of vegetation during a Sept 2016 site visit, conducted by Stantec. We have determined that there was enough information from these investigations to inform the status of the site. Our hypothesis is that these riverine wetlands experience regular flooding during spring highwater. This would provide the wetland hydrology, and the scouring force to prevent a dense herb layer.

VEGETATION – Use scientific names of plants. List all species in the plot. MUST LIST COVER IN DESECENDING ORDER

3/3 Abbrev.	Species Name	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum				
1				
2				
3				
4				
	Total Cover:	0		
	50% of total cover: 0		20% of total cover: 0	
Sapling/Shrub Stratum				
1 salsp	Salix sp (unknown species)	75	YES	FAC
2				
3				
4				
5				
6				
	Total Cover:	75		
	50% of total cover: 37.5		20% of total cover: 15	
Herb Stratum				
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
	Total Cover:	0		
	50% of total cover: 0		20% of total cover: 0	

Plot size (radius, or length x width) ___ % Bare Ground ___
% Cover of Wetland Bryophytes ___ Total Cover of Bryophytes ___

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 1 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	75	x 3 =	225
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	75 (A)		225 (B)

Prevalence Index = B/A = 3

Hydrophytic Vegetation Indicators:

Yes Dominance Test is >50%
Yes Prevalence Index is ≤3.0
___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes x No ___

Remarks: The vegetation consists of tall unidentified willow species. Some unidentified grasses are present in the herb layer. Our hypothesis is that these riverine wetlands experience regular flooding during spring highwater. This would provide the wetland hydrology, and the scouring force to prevent a dense herb layer.

SOIL Sampling Point P16

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-2							Moss/Sod	JAJ-16-013
2-16							Brown silty clay loam	dense fine to medium roots; JAJ-16-013
16-17							Clay	No roots; JAJ-16-013
								JAJ-16-013 is the Stantec Cultural Point

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

___ Histosol or Histel (A1)
___ Histic Epipedon (A2)
___ Hydrogen Sulfide (A4)
___ Thick Dark Surface (A12)
___ Alaska Gleyed (A13)
___ Alaska Redox (A14)
___ Alaska Gleyed Pores (A15)

Indicators for Problematic Hydric Soils[3]:

___ Alaska Color Change (TA4)[4]
___ Alaska Alpine Swales (TA5)
___ Alaska Redox With 2.5Y Hue
___ Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
___ Other (Explain in Remarks)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed
[4]Give details of color change in Remarks.

Restrictive Layer (if present):
Type: None
Depth (inches):

Hydric Soil Present? **Yes** ___ **No** ___

Remarks Oct 2016 Stantec Cultural Point JAJ-16-013 was used for soils. While Munsell colors were not identified, we interpreted 0-2 inches as being organics, 2-16 inches as being a layer of organic/mineral soil mix meeting the definition of a Histic Epipedon ('brown' being chroma 2 or less).We interpreted 'dense...roots' as being evidence of organics. Saturation was noted at below 2 inches. As the site was sampled in October, we expect the organics to be saturated during June - August.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

___ Surface Water (A1)
x High Water Table (A2)
x Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Marl Deposits (B15)
___ Hydrogen Sulfide Odor (C1)
___ Dry-Season Water Table (C2)
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-stained Leaves (B9)
x Drainage Patterns (B10)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Salt Deposits (C5)
___ Stunted or Stressed Plants (D1)
x Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ Microtopographic Relief (D4)
___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No x Depth (inches): ___
Water Table Present? Yes x No ___ Depth (inches): 8
Saturation Present? Yes x No ___ Depth (inches): 2
(includes capillary fringe)

Wetland Hydrology Present? **Yes** x **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Oct 2016 Stantec Cultural Point DME-16-013 found 25-50% water saturation at 2". No note of a water table, this information is not typically recorded in a cultural investigation. In our experience in the region, saturation of this degree probably means the water table is near the 8" mark during June-Aug. It is also important to review the secondary characteristics of this site. We find that this site likely experiences seasonal flooding during spring highwater (note lack of dense herb layer, indicating scouring).

Project/Site:	Kivalina	Site No.:	P16
Applicant/Owner:	DOT&PF	Investigator(s):	Stantec
Date:	9/15/2016	Cowardin:	PSS1J

Notes: Ground vegetation at P16 (sedge and moss). Water slough from Wulik River. Tapers off 500 ft. to east

Looking North

Looking East

Looking South

Looking West

WETLAND DETERMINATION DATA FORM - Alaska Region

Project/Site: Kivalina Borough/City: NW Arctic Sampling Date: Sept/Oct 2016
Applicant/Owner: DOT&PF Sampling Point P20
Investigator(s): Stantec Landform (hillside, terrace, hummocks, etc Tundra
Local relief (concave, convex, none): Concave Slope (%): 0
Subregion: Western Brooks Range Mts Foothills Lat: 67.762042 Long: -164.422233 Datum: NAD83
Soil Map Unit Name: Not Available NWI classification: PSS1/EM1B
Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ___ (If no, explain in Remarks.)
Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? ___ Are "Normal Circumstances" present? Yes x No ___
Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? ___ (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes x No ___	Is the Sampled Area within a Wetland? Yes x No ___
Hydric Soil Present?	Yes x No ___	
Wetland Hydrology Present?	Yes x No ___	

Remarks Largest gravel material site along Wulik River. Little bit higher ground - no standing water. Soil probe sample saturated. Low areas saturated at surface, sedges, moss covered surface, 20% grass, 30% moss. This point combines the soil information (from an Oct 2016 cultural investigation) with the site photos of vegetation during a Sept 2016 site visit, conducted by Stantec. We have determined that there was enough information from these investigations to inform the status of the site.

VEGETATION – Use scientific names of plants. List all species in the plot. MUST LIST COVER IN DESECENDING ORDER

	3/3 Abbrev.	Species Name	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum					
1					
2					
3					
4					
		Total Cover:	0		
		50% of total cover: 0	20% of total cover: 0		
Sapling/Shrub Stratum					
1	salsp	Salix, Unidentified	50	YES	FAC
2	vacvit	Vaccinium vitis-idaea	5	NO	FAC
3					
4					
5					
6					
		Total Cover:	55		
		50% of total cover: 27.5	20% of total cover: 11		
Herb Stratum					
1		Grass, Unidentified	20	YES	FAC
2		Sedge, Unidentified	20	YES	FAC
3					
4					
5					
6					
7					
8					
9					
10					
		Total Cover:	40		
		50% of total cover: 20	20% of total cover: 8		

Plot size (radius, or length x width) ___ % Bare Ground 0
% Cover of Wetland Bryophytes ___ Total Cover of Bryophytes 30

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 1 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	95	x 3 =	285
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	95 (A)		285 (B)

Prevalence Index = B/A = 3

Hydrophytic Vegetation Indicators:

Yes Dominance Test is >50%
Yes Prevalence Index is ≤3.0
___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes x No ___

Remarks:

SOIL Sampling Point P20

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-2							Moss	JAJ-16-46
2-3							Brown/gray clay silt	dense fine to small roots; JAJ-16-46
3-10							Grey clay	No roots, JAJ-16-46
								JAJ-16-46 is the Stantec Cultural Point

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol or Histel (A1)
- x Histic Epipedon (A2)
- ___ Hydrogen Sulfide (A4)
- ___ Thick Dark Surface (A12)
- ___ Alaska Gleyed (A13)
- ___ Alaska Redox (A14)
- ___ Alaska Gleyed Pores (A15)

Indicators for Problematic Hydric Soils[3]:

- ___ Alaska Color Change (TA4)[4]
- ___ Alaska Alpine Swales (TA5)
- ___ Alaska Redox With 2.5Y Hue
- ___ Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
- ___ Other (Explain in Remarks)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed

[4]Give details of color change in Remarks.

Restrictive Layer (if present):

Type: Permafrost

Depth (inches): 10

Hydric Soil Present? Yes x No ___

Remarks Oct 2016 Stantec Cultural Point JAJ-16-466. While Munsell colors were not identified, we interpreted 0-2" as moss/organics, 2-3" as organic/mineral soil mix meeting the definition of a Histic Epipedon ('brown' being interpreted as chroma 2 or less).We interpreted 'dense...roots' as being evidence of organics. 3-10" as clay without organics. 50-75% saturation was noted at 2". As the site was sampled in Oct. we expect saturated organics during June–Aug.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- x High Water Table (A2)
- x Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-stained Leaves (B9)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Salt Deposits (C5)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- x Shallow Aquitard (D3)
- x Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

	Yes	No	Depth (inches)
Surface Water Present?		x	
Water Table Present?	x		8
Saturation Present? (includes capillary fringe)	x		2

Wetland Hydrology Present? Yes x No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: The Oct 2016 Stantec Cultural Point JAJ-16-466 found 50-75% water saturation at 2 inches. The Stantec 9/15/17 field visit notes saturation at the surface.In our experience in the region, saturation of this degree probably means the water table is above or near the 8 inch mark. Micro relief is evident, and we belive the permafrost is present above 24" during the growing season, and able to perch water to within 12 inches.

Project/Site:	Kivalina	Site No.:	P20
Applicant/Owner:	DOT&PF	Investigator(s):	Stantec
Date:	9/15/2017	Cowardin:	PSS1/EM1B

Notes: Largest gravel material site along Wulik River. Little bit higher ground - no standing water. Soil probe sample saturated. Low areas saturated at surface, sedges, moss covered surface, 20% grass, 30% moss

Looking North

Looking East

Looking South

Looking West

WETLAND DETERMINATION DATA FORM - Alaska Region

Project/Site: Kivalina Borough/City: NW Arctic Sampling Date: Sept/Oct 2016
Applicant/Owner: DOT&PF Sampling Point P27
Investigator(s): Stantec Landform (hillside, terrace, hummocks, etc Terrace
Local relief (concave, convex, none): Convex Slope (%): ____
Subregion: Western Brooks Range Mts Foothills Lat: 67.78784 Long: -164.406934 Datum: NAD83
Soil Map Unit Name: Not Available NWI classification: PSS1/EM1B
Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ___ (If no, explain in Remarks.)
Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? ___ Are "Normal Circumstances" present? Yes x No ___
Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? ___ (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes x No ___	Is the Sampled Area within a Wetland? Yes x No ___
Hydric Soil Present?	Yes x No ___	
Wetland Hydrology Present?	Yes x No ___	

Remarks Just south of cluster of 3 ponds. Elevated to north of ponds, on edge of elevated ridge that wraps to the east of the ponds. This point combines the soil information (from an Oct 2016 cultural investigation) with the site photos of vegetation during a Sept 2016 site visit, conducted by Stantec. We have determined that there was enough information from these investigations to inform the status of the site.

VEGETATION – Use scientific names of plants. List all species in the plot. MUST LIST COVER IN DESECENDING ORDER

	3/3 Abbrev.	Species Name	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum					
1					
2					
3					
4					
		Total Cover:	0		
		50% of total cover: 0	20% of total cover: 0		
Sapling/Shrub Stratum					
1	rhotom	Rhododendron tomentosum	50	YES	FACW
2	Vaculi	Vaccinium uliginosum	10	NO	FAC
3		Salix Unidentified	5	NO	FAC
4	arcrub	Arctous ruber	5	NO	FAC
5					
6					
		Total Cover:	70		
		50% of total cover: 35	20% of total cover: 14		
Herb Stratum					
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
		Total Cover:	0		
		50% of total cover: 0	20% of total cover: 0		

Plot size (radius, or length x width)______ % Bare Ground______
% Cover of Wetland Bryophytes______ Total Cover of Bryophytes______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 1 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	50	x 2 =	100
FAC species	20	x 3 =	60
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	70 (A)		160 (B)

Prevalence Index = B/A = 2.2857

Hydrophytic Vegetation Indicators:

Yes Dominance Test is >50%
Yes Prevalence Index is ≤3.0
___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes x No ___

Remarks: The point is taken on a slight convex rise. It primarily consists of grass/sedge (unid) and low shrubs, with a few scattered moderate height willow. Grass tussocks are evident in regular patterns.

SOIL Sampling Point P27

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-2							Sod	JAJ-16-020
2-12							Org and Brown loam	few fine to small roots; JAJ-16-020
								JAJ-16-020 is the Stantec Cultural Point

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol or Histel (A1)
- x Histic Epipedon (A2)
- ___ Hydrogen Sulfide (A4)
- ___ Thick Dark Surface (A12)
- ___ Alaska Gleyed (A13)
- ___ Alaska Redox (A14)
- ___ Alaska Gleyed Pores (A15)

Indicators for Problematic Hydric Soils[3]:

- ___ Alaska Color Change (TA4)[4]
- ___ Alaska Alpine Swales (TA5)
- ___ Alaska Redox With 2.5Y Hue
- ___ Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
- ___ Other (Explain in Remarks)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed

[4]Give details of color change in Remarks.

Restrictive Layer (if present):

Type: None

Depth (inches):

Hydric Soil Present? Yes x No ___

Remarks Oct 2016 Stantec Cultural Point JAJ-16-020 was used for soils. While Munsell colors were not identified, we interpreted 0-2" as organics, 2-12" as a layer of mineral with organics intermixed ('brown' being chroma 2 or less).We interpreted 'few...roots' as organics evidence. Saturation was noted below 2". As the site was sampled in Oct., organics will be saturated during June – August. While the organic is slightly less than typical of a wetland, we interpret this as histic epipedon.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- x Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-stained Leaves (B9)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Salt Deposits (C5)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- x Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

	Yes	No	Depth (inches):
Surface Water Present?		x	
Water Table Present?	x		8
Saturation Present? (includes capillary fringe)	x		2

Wetland Hydrology Present? Yes x No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: The Oct 2016 Stantec Cultural Point JAJ-16-020 25-50% water saturation at 2 inches. There is no note of a water table, as this information is not typically recorded in a cultural investigation. In our experience in the region, saturation of this degree probably means the water table is near the 8 inch mark during June - August. It is also important to review the secondary characteristics of this site.

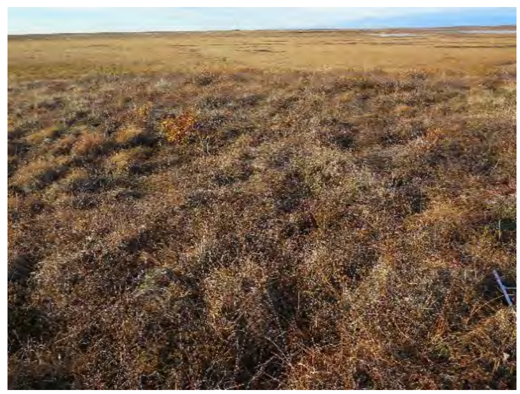
Project/Site:	Kivalina	Site No.:	P27
Applicant/Owner:	DOT&PF	Investigator(s):	Stantec
Date:	9/16/2017	Cowardin:	PSS1/EM1B

Notes: Just south of cluster of 3 ponds. Elevated to north of ponds, on edge of elevated ridge that wraps to the east of the ponds

Looking North

Looking East

Looking South



Looking West

WETLAND DETERMINATION DATA FORM - Alaska Region

Project/Site: Kivalina Borough/City: NW Arctic Sampling Date: Sept/Oct 2016
Applicant/Owner: DOT&PF Sampling Point P32
Investigator(s): Stantec Landform (hillside, terrace, hummocks, etc Flat
Local relief (concave, convex, none): Flat Slope (%): 0
Subregion: Western Brooks Range Mts Foothills Lat: 67.777731 Long: -164.438397 Datum: NAD83
Soil Map Unit Name: Not Available NWI classification: PEM1/SS1C
Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ___ (If no, explain in Remarks.)
Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? ___ Are "Normal Circumstances" present? Yes x No ___
Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? ___ (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes x No ___	Is the Sampled Area within a Wetland? Yes x No ___
Hydric Soil Present?	Yes x No ___	
Wetland Hydrology Present?	Yes x No ___	

Remarks Standing water at surface in current location. Sporadic shrubs, seeding grasses/sedges. This point combines the soil information (from an Oct 2016 cultural investigation and a March/April 2015 Golder geotechnical investigation) with the site photos of vegetation during a Sept 2016 site visit, conducted by Stantec. We have determined that there was enough information from these investigations to inform the status of the site.

VEGETATION – Use scientific names of plants. List all species in the plot. MUST LIST COVER IN DESECENDING ORDER

3/3 Abbrev.	Species Name	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum				
1				
2				
3				
4				
	Total Cover:	0		
	50% of total cover: 0	20% of total cover: 0		
Sapling/Shrub Stratum				
1	Salix Unidentified	50	YES	FAC
2				
3				
4				
5				
6				
	Total Cover:	50		
	50% of total cover: 25	20% of total cover: 10		
Herb Stratum				
1	Carex sp (unidentified)	100	YES	FAC
2 erivag	Eriophorum vaginatum	5	NO	FACW
3				
4				
5				
6				
7				
8				
9				
10				
	Total Cover:	105		
	50% of total cover: 52.5	20% of total cover: 21		

Plot size (radius, or length x width)___ % Bare Ground___
% Cover of Wetland Bryophytes___ Total Cover of Bryophytes___

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 1 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	5	x 2 =	10
FAC species	150	x 3 =	450
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	155 (A)		460 (B)

Prevalence Index = B/A = 2.9677

Hydrophytic Vegetation Indicators:

Yes Dominance Test is >50%
Yes Prevalence Index is ≤3.0
___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes x No ___

Remarks: The vegetation consists primarily of sedges and grasses, with some interspersed willows. Cottongrass is evident, and standing water was reported. While identifying specific species is difficult, indicators are likely to be FAC or wetter.

SOIL Sampling Point P32

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-2							Moss	JAJ-16-30
2-12							Brown silty clay loam	dense fine to medium roots; JAJ-16-30
								JAJ-16-30 is the Stantec Cultural Point
0-240	Frozen, brown to black						ORGANIC SILT	10-30% Ice; Golder K15-21

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- __ Histosol or Histel (A1)
- x Histic Epipedon (A2)
- __ Hydrogen Sulfide (A4)
- __ Thick Dark Surface (A12)
- __ Alaska Gleyed (A13)
- __ Alaska Redox (A14)
- __ Alaska Gleyed Pores (A15)

Indicators for Problematic Hydric Soils[3]:

- __ Alaska Color Change (TA4)[4]
- __ Alaska Alpine Swales (TA5)
- __ Alaska Redox With 2.5Y Hue
- __ Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
- __ Other (Explain in Remarks)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed

[4]Give details of color change in Remarks.

Restrictive Layer (if present):

Type: None

Depth (inches):

Hydric Soil Present? **Yes** x **No** __

Remarks Oct 2016 Stantec Cultural Point JAJ-16-30 and March/April 2015 Golder geotechnical investigation was used for soils (point K15-21). While Munsell colors were not identified, we interpreted 0-2" as organics, 2-12" as a layer of organic/mineral soil mix meeting the definition of a Histic Epipedon ('brown' being chroma 2 or less, 'dense...roots' as being organics). Saturation was noted at below 2 inches. As the site was sampled in October, we expect the organics to be saturated during June – August.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- x Surface Water (A1)
- x High Water Table (A2)
- x Saturation (A3)
- __ Water Marks (B1)
- __ Sediment Deposits (B2)
- __ Drift Deposits (B3)
- __ Algal Mat or Crust (B4)
- __ Iron Deposits (B5)
- __ Surface Soil Cracks (B6)
- __ Inundation Visible on Aerial Imagery (B7)
- __ Sparsely Vegetated Concave Surface (B8)
- __ Marl Deposits (B15)
- __ Hydrogen Sulfide Odor (C1)
- __ Dry-Season Water Table (C2)
- __ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- __ Water-stained Leaves (B9)
- __ Drainage Patterns (B10)
- __ Oxidized Rhizospheres along Living Roots (C3)
- __ Presence of Reduced Iron (C4)
- __ Salt Deposits (C5)
- __ Stunted or Stressed Plants (D1)
- __ Geomorphic Position (D2)
- __ Shallow Aquitard (D3)
- x Microtopographic Relief (D4)
- __ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes x	No __	Depth (inches): 0
Water Table Present?	Yes x	No __	Depth (inches): 0
Saturation Present? (includes capillary fringe)	Yes x	No __	Depth (inches): 0

Wetland Hydrology Present? **Yes** x **No** __

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: The Sept site visit notes standing water. The Oct 2016 Stantec Cultural Point JAJ-16-30 found 75-100% water saturation at 2 inches. There is no note of a water table, as this information is not typically recorded in a cultural investigation. In our experience in the region, saturation of this degree probably means the water table is near the 8 inch mark during June - August. It is also important to review the secondary characteristics of this site.

Project/Site:	Kivalina	Site No.:	P32
Applicant/Owner:	DOT&PF	Investigator(s):	Stantec
Date:	9/16/2016	Cowardin:	PEM1/SS1C

Notes: Dry surface conditions from upper edge of last feature to current location. Short pond ~500 ft to south. Standing water at surface in current location. Sporadic shrubs, seeding grasses/sedges.

Looking North

Looking East

Looking South

Looking West

WETLAND DETERMINATION DATA FORM - Alaska Region

Project/Site: Kivalina Borough/City: NW Arctic Sampling Date: Sept/Oct 2016
Applicant/Owner: DOT&PF Sampling Point P37
Investigator(s): Stantec Landform (hillside, terrace, hummocks, etc Meadow
Local relief (concave, convex, none): Flat Slope (%): 0
Subregion: Western Brooks Range Mts Foothills Lat: 67.759108 Long: -164.46516 Datum: NAD83
Soil Map Unit Name: Not Available NWI classification: PSS1/EM1E
Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ___ (If no, explain in Remarks.)
Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? ___ Are "Normal Circumstances" present? Yes x No ___
Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? ___ (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes x No ___	Is the Sampled Area within a Wetland? Yes x No ___
Hydric Soil Present?	Yes x No ___	
Wetland Hydrology Present?	Yes x No ___	

Remarks Standing water with small open water areas. Base of medium sized elongated rise. Hydrologically connected to pond, near by sedges and taller grasses. This point combines the soil information (from an Oct 2016 cultural investigation and a March/April 2015 Golder geotechnical investigation) with the site photos of vegetation during a Sept 2016 site visit, conducted by Stantec. We have determined that there was enough information from these investigations to inform the status of the site.

VEGETATION – Use scientific names of plants. List all species in the plot. MUST LIST COVER IN DESECENDING ORDER

	3/3 Abbrev.	Species Name	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum					
1					
2					
3					
4					
		Total Cover:	0		
		50% of total cover: 0		20% of total cover: 0	
Sapling/Shrub Stratum					
1					
2					
3					
4					
5					
6					
		Total Cover:	0		
		50% of total cover: 0		20% of total cover: 0	
Herb Stratum					
1	Carsp	Carex sp (unidentified)	100	YES	FACW
2					
3					
4					
5					
6					
7					
8					
9					
10					
		Total Cover:	100		
		50% of total cover: 50		20% of total cover: 20	

Plot size (radius, or length x width)___ % Bare Ground___
% Cover of Wetland Bryophytes___ Total Cover of Bryophytes___

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 1 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	100	x 2 =	200
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	100 (A)		200 (B)

Prevalence Index = B/A = 2

Hydrophytic Vegetation Indicators:

Yes Dominance Test is >50%
Yes Prevalence Index is ≤3.0
___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes x No ___

Remarks: The site has standing water and sedge monoculture. While the specific species is not evident, it is likely to be FACW or OBL.

SOIL Sampling Point P37

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-2							Sod	JAJ-16-006
2-21	Brown, no gravels						Silty clay loam	Fine to small roots
								JAJ-16-006 is the Stantec Cultural Point
0-18							Frozen peat	Organics; Golder K15-15
18-84	Frozen, dark grayish brown						ORGANIC SILT	40-50% Ice; Golder K15-15

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:
- ___ Histosol or Histel (A1)
- x Histic Epipedon (A2)
- ___ Hydrogen Sulfide (A4)
- ___ Thick Dark Surface (A12)
- ___ Alaska Gleyed (A13)
- ___ Alaska Redox (A14)
- ___ Alaska Gleyed Pores (A15)

Indicators for Problematic Hydric Soils[3]:
- ___ Alaska Color Change (TA4)[4]
- ___ Alaska Alpine Swales (TA5)
- ___ Alaska Redox With 2.5Y Hue
- ___ Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
- ___ Other (Explain in Remarks)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed
[4]Give details of color change in Remarks.

Restrictive Layer (if present):
Type: None
Depth (inches):

Hydric Soil Present? **Yes** x **No** ___

Remarks Golder found peat/organics from 0-18". Oct 2016 Stantec Cultural Point JAJ-16-006 and March/April 2015 Golder geotechnical investigation was used for soils (point K-15-15). While Munsell colors were not identified, we interpreted 0-2" as organics, 2-21" as organics (roots) and a layer of mineral soil meeting the definition of a Histic Epipedon ('brown' being chroma 2 or less). Saturation was noted at below 2".

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)
- x Surface Water (A1)
- x High Water Table (A2)
- x Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)
- ___ Water-stained Leaves (B9)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Salt Deposits (C5)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes x No ___ Depth (inches): 0
Water Table Present? Yes x No ___ Depth (inches): 0
Saturation Present? Yes x No ___ Depth (inches): 0
(includes capillary fringe)

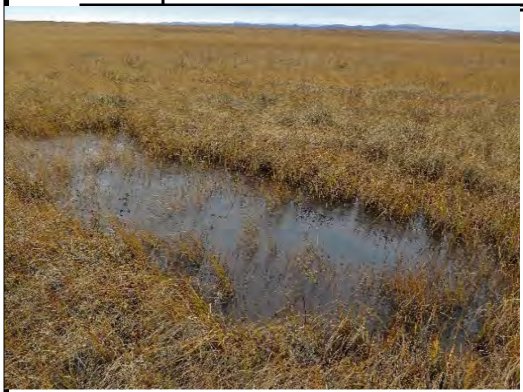
Wetland Hydrology Present? **Yes** x **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: The Oct 2016 Stantec Cultural Point JAJ-16-006 found 25-50% saturation at 2 inches. There is no note of a water table, as this information is not typically recorded in a cultural investigation. In our experience in the region, saturation of this degree probably means the water table is near the 8 inch mark during June - August. The Sept site visit found standing water.

Project/Site:	Kivalina	Site No.:	P37
Applicant/Owner:	DOT&PF	Investigator(s):	Stantec
Date:	9/16/2016	Cowardin:	PSS1/EM1E

Notes: Standing water with small open water areas. Base of medium sized elongated rise. Hydrologically connected to pond, near by sedges and taller grasses.



Looking North

Looking East

Looking South

Looking West

WETLAND DETERMINATION DATA FORM - Alaska Region

Project/Site: Kivalina Borough/City: NW Arctic Sampling Date: Sept/Oct 2016
Applicant/Owner: DOT&PF Sampling Point P45
Investigator(s): Stantec Landform (hillside, terrace, hummocks, etc Hillside
Local relief (concave, convex, none): Slope Slope (%): 5
Subregion: Western Brooks Range Mts Foothills Lat: 67.773729 Long: -164.478786 Datum: NAD83
Soil Map Unit Name: Not Available NWI classification: PSS1/EM1C
Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ___ (If no, explain in Remarks.)
Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? ___ Are "Normal Circumstances" present? Yes x No ___
Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? ___ (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes x No ___	Is the Sampled Area within a Wetland? Yes x No ___
Hydric Soil Present?	Yes x No ___	
Wetland Hydrology Present?	Yes x No ___	

Remarks
Drainage feature towards lake. This point combines the soil information (from an Oct 2016 cultural investigation) with the site photos of vegetation during a Sept 2016 site visit, conducted by Stantec. We have determined that there was enough information from these investigations to inform the status of the site.

VEGETATION – Use scientific names of plants. List all species in the plot. MUST LIST COVER IN DESECENDING ORDER

	3/3 Abbrev.	Species Name	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum					
1					
2					
3					
4					
		Total Cover:	0		
		50% of total cover: 0		20% of total cover: 0	
Sapling/Shrub Stratum					
1	vaculi	Vaccinium uliginosum	75	YES	FAC
2	salsp	Salix sp (unidentified)	50	YES	FAC
3	vacvit	Vaccinium vitis-idaea	40	YES	FAC
4	rhotom	Rhododendron tomentosum	10	NO	FACW
5					
6					
		Total Cover:	175		
		50% of total cover: 87.5		20% of total cover: 35	
Herb Stratum					
1		Unidentified Grass	5	YES	FAC
2					
3					
4					
5					
6					
7					
8					
9					
10					
		Total Cover:	5		
		50% of total cover: 2.5		20% of total cover: 1	

Plot size (radius, or length x width) ___ % Bare Ground ___
% Cover of Wetland Bryophytes ___ Total Cover of Bryophytes ___

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)
Total Number of Dominant Species Across All Strata: 4 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 1 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	10	x 2 =	20
FAC species	170	x 3 =	510
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	180 (A)		530 (B)

Prevalence Index = B/A = 2.9444

Hydrophytic Vegetation Indicators:
Yes Dominance Test is >50%
Yes Prevalence Index is ≤3.0
___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes x No ___

Remarks: A shrub sloping hillside, with dense layers of VacVit and VacUli, and a covering chest high layer of willows.

SOIL Sampling Point P45

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-2							Sod	JAJ-16-016
2-16							Brown/gray clay silty	few fine to small roots; JAJ-16-016
								JAJ-16-016 is the Stantec Cultural Point

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol or Histel (A1)
- x Histic Epipedon (A2)
- ___ Hydrogen Sulfide (A4)
- ___ Thick Dark Surface (A12)
- ___ Alaska Gleyed (A13)
- ___ Alaska Redox (A14)
- ___ Alaska Gleyed Pores (A15)

Indicators for Problematic Hydric Soils[3]:

- ___ Alaska Color Change (TA4)[4]
- ___ Alaska Alpine Swales (TA5)
- ___ Alaska Redox With 2.5Y Hue
- ___ Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
- ___ Other (Explain in Remarks)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed

[4]Give details of color change in Remarks.

Restrictive Layer (if present):

Type: None

Depth (inches):

Hydric Soil Present? **Yes** x **No** ___

Remarks Oct 2016 Stantec Cultural Point JAJ-16-016 was used for soils. While Munsell colors were not identified, we interpreted 0-2" as organics, 2-16" as a layer of organic/mineral soil mix meeting the definition of a Histic Epipedon ('brown' being chroma 2 or less, 'few...roots' as organics). Saturation was noted at below 2". As the site was sampled in October, we expect the organics to be saturated during June – August. Shallow organic layers for histic epipedons are common in Arctic Regions.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- x Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-stained Leaves (B9)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Salt Deposits (C5)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- x Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

	Yes	No	Depth (inches)
Surface Water Present?		x	
Water Table Present?	x		8
Saturation Present? (includes capillary fringe)	x		2

Wetland Hydrology Present? **Yes** x **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: The Oct 2016 Stantec Cultural Point JAJ-16-016 found 25-50% water saturation at 2 inches. There is no note of a water table, as this information is not typically recorded in a cultural investigation. In our experience in the region, saturation of this degree probably means the water table is near the 8 inch mark during June - August. It is also important to review the secondary characteristics of this site.

Project/Site:	Kivalina	Site No.:	P45
Applicant/Owner:	DOT&PF	Investigator(s):	Stantec
Date:	9/17/2016	Cowardin:	PSS1/EM1C

Notes: Drainage feature towards lake. Mid chest high shrub, with a mixture of low shrub and emergent vegetation. Slight microtopographic relief evident.

Looking North

Looking East

Looking South

Looking West

WETLAND DETERMINATION DATA FORM - Alaska Region

Project/Site: Kivalina Borough/City: NW Arctic Sampling Date: Sept/Oct 2016
Applicant/Owner: DOT&PF Sampling Point P56
Investigator(s): Stantec Landform (hillside, terrace, hummocks, etc Terrace
Local relief (concave, convex, none): Concave Slope (%): 0
Subregion: Upper Kobuk, Koyukuk Hills and Val Lat: 67.754557 Long: -164.562484 Datum: NAD83
Soil Map Unit Name: Not Available NWI classification: PSS1/EM1B
Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ___ (If no, explain in Remarks.)
Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? ___ Are "Normal Circumstances" present? Yes x No ___
Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? ___ (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes x No ___	Is the Sampled Area within a Wetland? Yes x No ___
Hydric Soil Present?	Yes x No ___	
Wetland Hydrology Present?	Yes x No ___	

Remarks: Slight rise near shoreline. Location where north/central proposed route would cross lagoon. Small section is slightly drier than surrounding, but is still a wetland. This point combines the soil information (from an Oct 2016 cultural investigation) with the site photos of vegetation during a Sept 2016 site visit, conducted by Stantec. We have determined that there was enough information from these investigations to inform the status of the site.

VEGETATION – Use scientific names of plants. List all species in the plot. MUST LIST COVER IN DESECENDING ORDER

	3/3 Abbrev.	Species Name	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum					
1					
2					
3					
4					
		Total Cover:	0		
		50% of total cover: 0	20% of total cover: 0		
Sapling/Shrub Stratum					
1	vaculi	Vaccinium uliginosum	80	YES	FAC
2	rhotom	Rhododendron tomentosum	75	YES	FACW
3		Salix sp (Unidentified)	10	NO	FAC
4					
5					
6					
		Total Cover:	165		
		50% of total cover: 82.5	20% of total cover: 33		
Herb Stratum					
1		Grass, Unidentified	5	YES	FAC
2					
3					
4					
5					
6					
7					
8					
9					
10					
		Total Cover:	5		
		50% of total cover: 2.5	20% of total cover: 1		

Plot size (radius, or length x width) ___ % Bare Ground ___
% Cover of Wetland Bryophytes ___ Total Cover of Bryophytes ___

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 1 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	75	x 2 =	150
FAC species	95	x 3 =	285
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	170 (A)		435 (B)

Prevalence Index = B/A = 2.5588

Hydrophytic Vegetation Indicators:

Yes Dominance Test is >50%
Yes Prevalence Index is ≤3.0
___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes x No ___

Remarks: Slight terrace along ocean shoreline, rising above surrounding wetter wetlands.

SOIL Sampling Point P56

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-4							Peat Moss	DEM-16-17
4-20							Brown/gray clay silty	Some roots; DEM-16-17
								DEM-16-17 is the Stantec Cultural Point

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol or Histel (A1)
- x Histic Epipedon (A2)
- ___ Hydrogen Sulfide (A4)
- ___ Thick Dark Surface (A12)
- ___ Alaska Gleyed (A13)
- ___ Alaska Redox (A14)
- ___ Alaska Gleyed Pores (A15)

Indicators for Problematic Hydric Soils[3]:

- ___ Alaska Color Change (TA4)[4]
- ___ Alaska Alpine Swales (TA5)
- ___ Alaska Redox With 2.5Y Hue
- ___ Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
- ___ Other (Explain in Remarks)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed

[4]Give details of color change in Remarks.

Restrictive Layer (if present):

Type: Permafrost

Depth (inches): 20

Hydric Soil Present? **Yes** x **No** ___

Remarks Oct 2016 Stantec Cultural Point DME-16-017 was used for soils. While Munsell colors were not identified, we interpreted 0-4" as organics, 4-20" as a layer of organic/mineral soil mix meeting the definition of a Histic Epipedon ('brown' being chroma 2 or less, 'few...roots' as being evidence of organics). Saturation was noted at below 4". As the site was sampled in October, we expect the organics to be saturated during June – August. Shallow organic for epipedon are common in the Arctic.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- x High Water Table (A2)
- x Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-stained Leaves (B9)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Salt Deposits (C5)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- x Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

	Yes	No	Depth (inches)
Surface Water Present?		x	
Water Table Present?	x		8
Saturation Present? (includes capillary fringe)	x		4

Wetland Hydrology Present? **Yes** x **No** ___

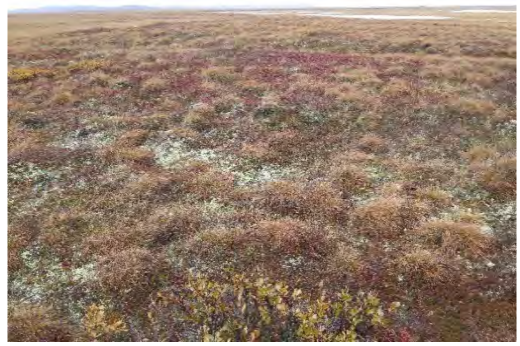
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: The Oct 2016 Stantec Cultural Point DME-16-017 found 25-50% water saturation at 4 inches. There is no note of a water table, as this information is not typically recorded in a cultural investigation. In our experience in the region, saturation of this degree probably means the water table is near the 8 inch mark during June - August. It is also important to review the secondary characteristics of this site.

Project/Site:	Kivalina	Site No.:	P56
Applicant/Owner:	DOT&PF	Investigator(s):	Stantec
Date:	9/17/2016	Cowardin:	PSS1/EM1B

Notes: Location where north/central proposed route would cross lagoon. Slight terrace evident along shoreline, with flatter wetlands evident in the distance.

Looking North



Looking East

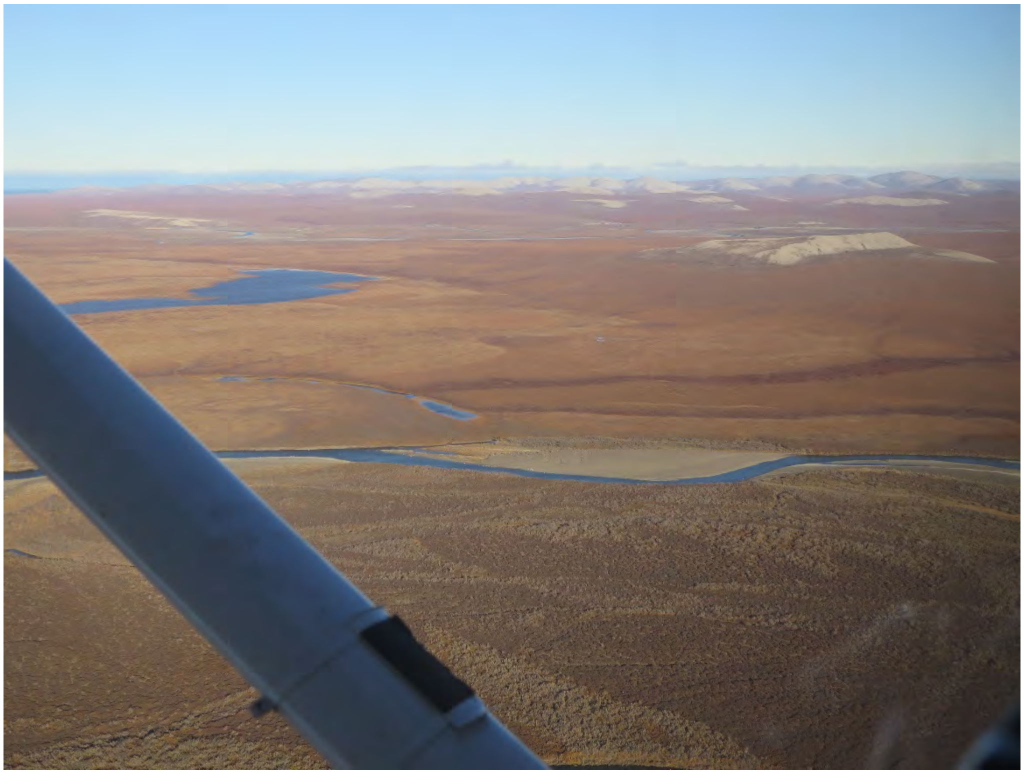
Looking South

Looking West

Appendix C PHOTO POINTS

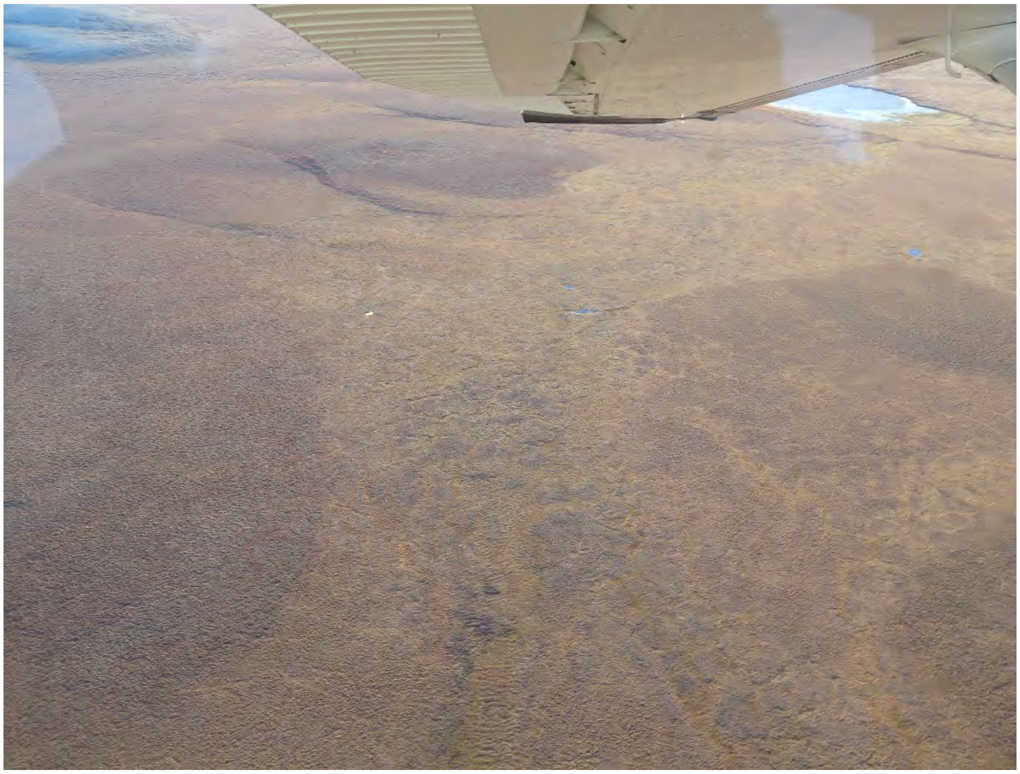
Project/Site:	Kivalina	Site No.:	HP1
Applicant/Owner:	DOT&PF	Investigator(s):	Stantec
Date:	9/14/2017	Cowardin:	R2US

Notes: Aerial photo during Stantec visit (HP1). K-Hill and study area looking north. Small riverine system is evident in the mid-ground, with shrub dominated wetlands in the foregound.



Project/Site:	Kivalina	Site No.:	HP4
Applicant/Owner:	DOT&PF	Investigator(s):	Stantec
Date:	9/14/2017	Cowardin:	PSS1/EM1B

Notes: Ice wedge polygon features. Saturated and seasonally flooded wetland are evident.



Project/Site:	Kivalina	Site No.:	HP11
Applicant/Owner:	DOT&PF	Investigator(s):	Stantec
Date:	9/14/2017	Cowardin:	PSS1/EM1E

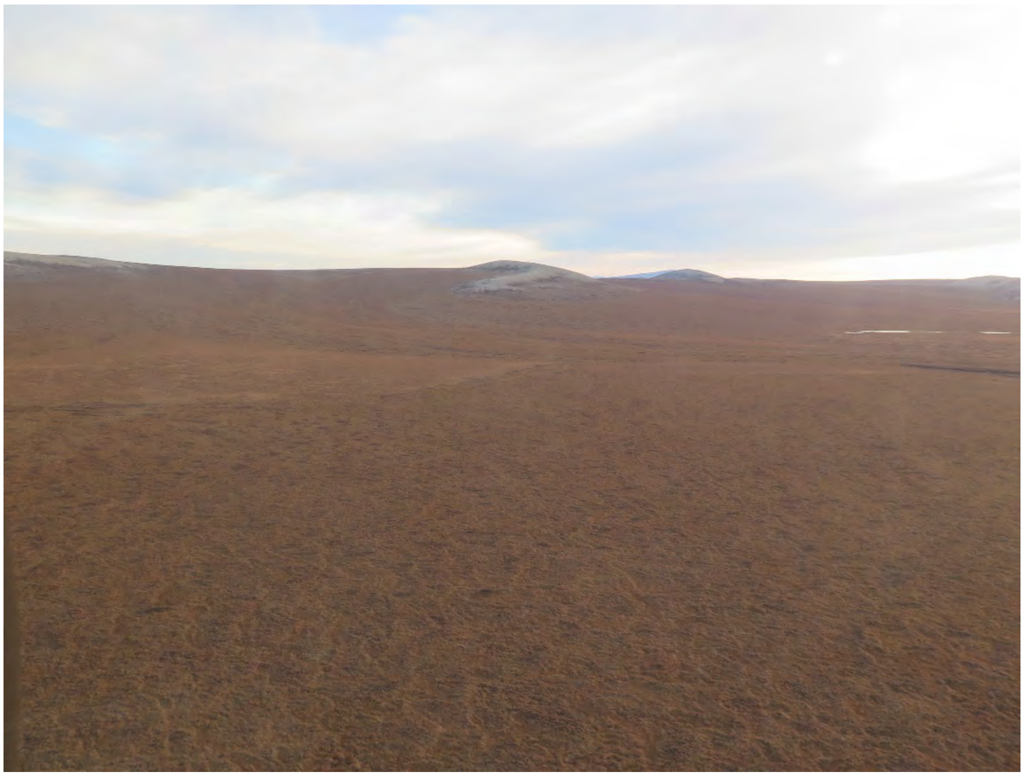
Notes: Wulik River braids. Shrub habitat is evident, along with emergent wetlands in the distance. The shrubs around the river braids appear to be seasonally flooded, as evident from the gravel desposits.

Project/Site:	Kivalina	Site No.:	HP15
Applicant/Owner:	DOT&PF	Investigator(s):	Stantec
Date:	9/15/2017	Cowardin:	L1UB

Notes: Helicopter overview looking west. Shrub habitat is evident near the shoreline, along with emergent wetland habitat and ponds in the distance.

Project/Site:	Kivalina	Site No.:	HP19
Applicant/Owner:	DOT&PF	Investigator(s):	Stantec
Date:	9/16/2017	Cowardin:	PSS1/EM1C

Notes: View of sloping wetlands back up to K-Hill.

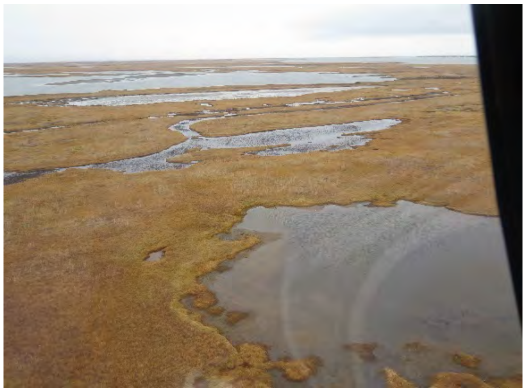


Project/Site:	Kivalina	Site No.:	HP21
Applicant/Owner:	DOT&PF	Investigator(s):	Stantec
Date:	9/16/2017	Cowardin:	PEM1/SS1C

Notes: Photo taken during Stantec Site visit. Shoreline of ocean. Demonstrates a small terrace above the shoreline, with a flat wetland to the background.

Project/Site:	Kivalina	Site No.:	HP22
Applicant/Owner:	DOT&PF	Investigator(s):	Stantec
Date:	9/17/2017	Cowardin:	PEM1/SS1C

Notes: Helicopter overview of potential gravel source near lagoon. Primarily emergent wetland, with a few small shrubs present. Ponds are evident, as is the ocean in the background.

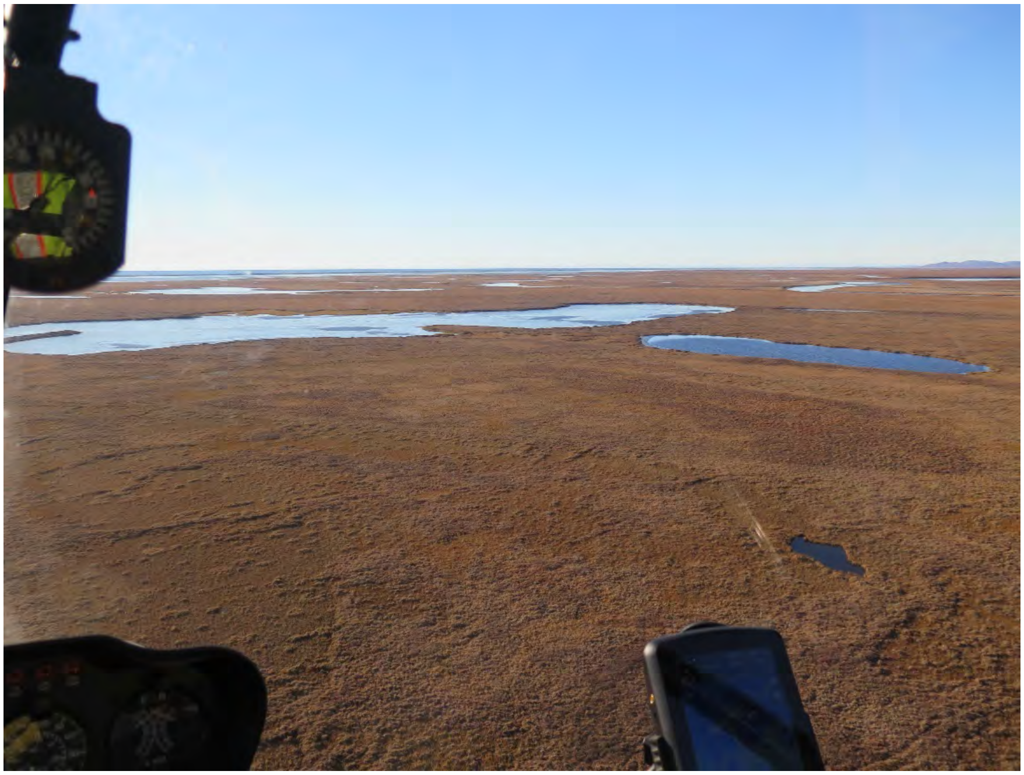


Project/Site:	Kivalina	Site No.:	HP24
Applicant/Owner:	DOT&PF	Investigator(s):	Stantec
Date:	9/14/2017	Cowardin:	R2UB

Notes: Kivalina and south entrance to Kivalina Lagoon/mouth of Wulik River. Pictures give a good understanding of the meandering riverine system and wetland complexes reaching to the ocean. Lakes and ponds are evident in the distance. Along the river banks one can note high shrubs, which may provide important bird habitat.

Project/Site:	Kivalina	Site No.:	HP36
Applicant/Owner:	DOT&PF	Investigator(s):	Stantec
Date:	9/15/2017	Cowardin:	PEM1/SS1C

Notes: Photo taken during Stantec Site visit (HP36). Flat wetland, primarily emergent vegetation with some shrubs present. At least seasonal flooding is evident from vegetation patterns. Lakes and ponds in the background.



Project/Site:	Kivalina	Site No.:	HP37
Applicant/Owner:	DOT&PF	Investigator(s):	Stantec
Date:	9/15/2017	Cowardin:	PEM1/SS1C

Notes: Photo taken during Stantec Site visit (HP37). Scrub Shrub wetland evident, with evidence of prime bird habitat. Lakes and ponds are present in the distance.

Project/Site:	Kivalina	Site No.:	HP38
Applicant/Owner:	DOT&PF	Investigator(s):	Stantec
Date:	9/15/2017	Cowardin:	PEM1/SS1C

Notes: Aerial Photo taken during Stantec Site Visit (HP38). Flat emergent wetland evident, with some shrubs present.

Project/Site: Kivalina

Site No.: HP39

Applicant/Owner: DOT&PF

Investigator(s): Stantec

Date: 9/14/2016

Cowardin: U

Notes: Aerial photos of K-Hill taken by Stantec (HP39). Upland

Project/Site:	Kivalina	Site No.:	P1
Applicant/Owner:	DOT&PF	Investigator(s):	Stantec
Date:	9/15/2016	Cowardin:	U

Notes: Topography change next to lake - start of higher/drier plateau, blueberries, low shrubs, small hummocks, no standing water. P1 site vegetation, Polar grass, blueberry, Labrador tea

North

East

East

Project/Site:	Kivalina	Site No.:	P2
Applicant/Owner:	DOT&PF	Investigator(s):	Stantec
Date:	9/15/2016	Cowardin:	PSS1/EM1B

Notes: Boundary between vegetation and geomorphic change. North -higher/drier, hummocky, some taller grasses. South - flatter, smaller hummocks. Boundary curves around to the east and then south.

Northeast

Southeast

West

North

Project/Site:	Kivalina	Site No.:	P3
Applicant/Owner:	DOT&PF	Investigator(s):	Stantec
Date:	9/15/2017	Cowardin:	PSS1/EM1C

Notes: Vegetation and landscape change, standing water between tussocks on south/flatter side. P3 site vegetation (sedges, cottongrass, Labrador tea)

North

East

South

West

Project/Site: Kivalina

Applicant/Owner: DOT&PF

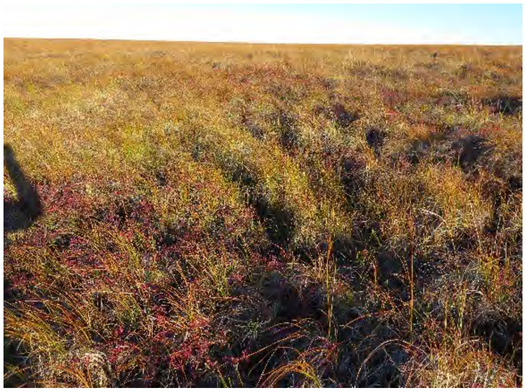
Date: 9/15/2016

Site No.: P4

Investigator(s): Stantec

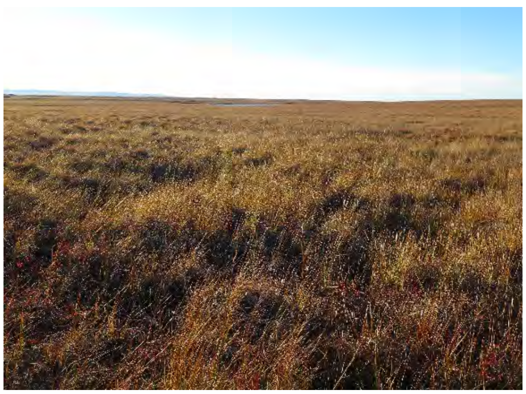
Cowardin: PSS1/EM1C

Notes: Lower lying finger of grassy/less shrub vegetation extending up the hilll. Slight geomorphic change from areas to west and east



North

East



South

West

Project/Site:	Kivalina	Site No.:	P22
Applicant/Owner:	DOT&PF	Investigator(s):	Stantec
Date:	9/15/2017	Cowardin:	R2UB

Notes: Photo taken during Stantec Site visit. Wulik River gravel bar

North

East

South

West

Project/Site:	Kivalina	Site No.:	P24
Applicant/Owner:	DOT&PF	Investigator(s):	Stantec
Date:	9/16/2016	Cowardin:	PSS1/EM1B

Notes: Slope break from sloping area at base of K-Hill to more flat ground extending westward. Transition to more grass/sedge. Smaller tussocks. Walking west, standing water occurs between tussocks. Undulating between low and elevated spots with more shrub or elevated - 0.5 - 1 ft. Undulating bands run North-South for the most part. Not particular drainage paths distinctly. Frozen/frost conditions.

North

East

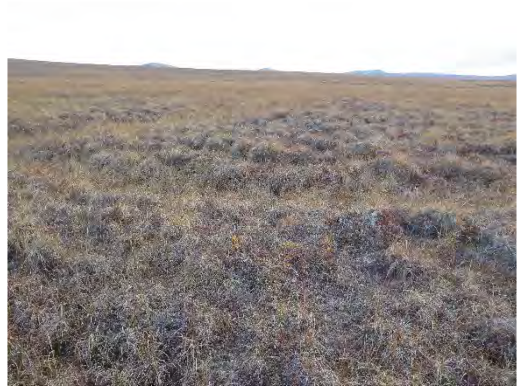
South

West

Project/Site:	Kivalina	Site No.:	P25
Applicant/Owner:	DOT&PF	Investigator(s):	Stantec
Date:	9/16/2016	Cowardin:	PSS1/EM1E

Notes: Standing water, frozen ground, example of wet ground boundary. Cottongrass present in this area

North



East

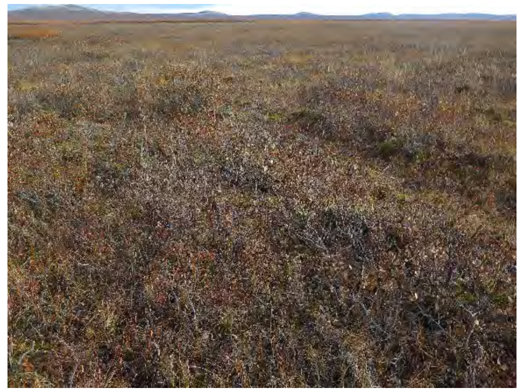
South

West

Project/Site:	Kivalina	Site No.:	P30
Applicant/Owner:	DOT&PF	Investigator(s):	Stantec
Date:	9/16/2016	Cowardin:	PEM1/SS1C

Notes: Increasing dryness, increasing shrubs - 20 - 30% cover. Grasses and moss ground cover, increasing elevation to west slightly

North



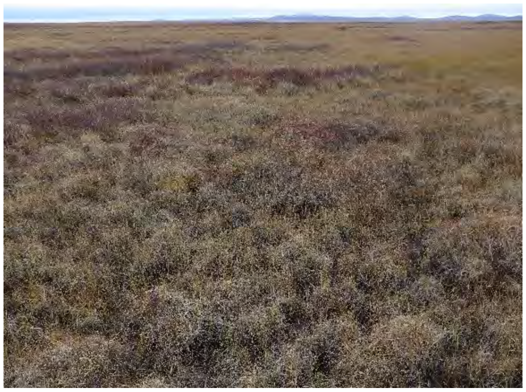
East

South

West

Project/Site:	Kivalina	Site No.:	P34B
Applicant/Owner:	DOT&PF	Investigator(s):	Stantec
Date:	9/16/2016	Cowardin:	PEM1F

Notes: Moving west along potential southern route- wetland with surface water, increasing elevation to west. P33 represents edge of standing surface water



North

East

South

West

Project/Site:	Kivalina	Site No.:	P35
Applicant/Owner:	DOT&PF	Investigator(s):	Stantec
Date:	9/16/2017	Cowardin:	PEM1/SS1F

Notes: Wetland channel feature between pond and longer slough lake. Standing water at surface. No shrubs. Cottongrass present

North

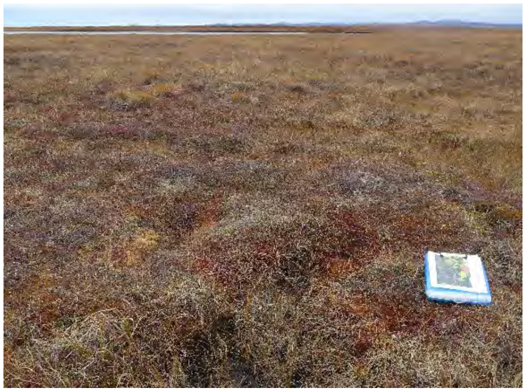
East

South

West

Project/Site:	Kivalina	Site No.:	P36
Applicant/Owner:	DOT&PF	Investigator(s):	Stantec
Date:	9/16/2017	Cowardin:	PEM1/SS1C

Notes: Photo taken during Stantec Site visit. Pockets of standing water wetlands throughout this area. Standing water in current location.



North

East

South

West

Project/Site:	Kivalina	Site No.:	P41A
Applicant/Owner:	DOT&PF	Investigator(s):	Stantec
Date:	9/16/2017	Cowardin:	PEM1/SS1C

Notes: Standing water wetland complex, lateral N-S ridges between

Looking North

Looking East

Looking South

Looking West

Project/Site: Kivalina | Site No.: P41B
Applicant/Owner: DOT&PF | Investigator(s): Stantec
Date: 9/16/2016 | Cowardin: PEM1/SS1C

Notes: Wetland complex, saturated at surface but not standing water at this exact location.

Looking North

Looking East

Looking South

Looking West

Project/Site:	Kivalina	Site No.:	P42
Applicant/Owner:	DOT&PF	Investigator(s):	Stantec
Date:	9/17/2016	Cowardin:	PSS1/EM1C

Notes: Feature on northern proposed route, north of two lakes. Down sloping to west. Small shrubs present (similar to Photo Points P3 and P4), intermixed with grass vegetation and tussocks.

North

East

South

West

Project/Site:	Kivalina	Site No.:	P48
Applicant/Owner:	DOT&PF	Investigator(s):	Stantec
Date:	9/17/2016	Cowardin:	PEM1/SS1C

Notes: Photo taken during Stantec Site visit. Potential drainage feature, standing water. Hummocks widespread, with low emergent and shrub vegetation.

Looking North

Looking East

Looking South

Looking West

Project/Site:	Kivalina	Site No.:	P50
Applicant/Owner:	DOT&PF	Investigator(s):	Stantec
Date:	9/17/2016	Cowardin:	PEM1F

Notes: Saturated area just north of small pond, standing water, grasses/sedges only.

Looking North

Looking East

Looking South

Looking West

Project/Site: Kivalina

Applicant/Owner: DOT&PF

Date: 9/17/2016

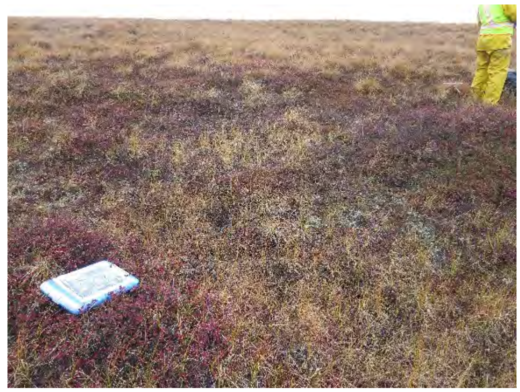
Site No.: P54

Investigator(s): Stantec

Cowardin: PEM1/SS1C

Notes: Drainage/wetland feature sloping to lake, sedges, standing water.

Looking North



Looking East

Looking South

Looking West

Project/Site:	Kivalina	Site No.:	P58
Applicant/Owner:	DOT&PF	Investigator(s):	Stantec
Date:	9/17/2016	Cowardin:	PEM1F

Notes: Small drainage feature. Grass only in this strip as compared to areas around containing more shrubs. Standing water at surface.

North

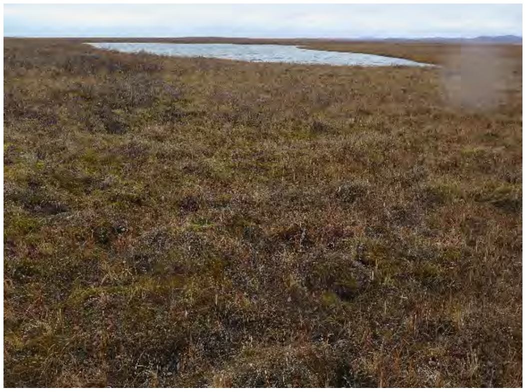
East

South

West

Project/Site:	Kivalina	Site No.:	P59
Applicant/Owner:	DOT&PF	Investigator(s):	Stantec
Date:	9/17/2016	Cowardin:	PEM1/SS1C

Notes: Slope break just off the tip of lake toward river/gravel bar. Moss, lichen, sparse grass and shrubs



North

East

South

West

Project/Site:	Kivalina	Site No.:	USACE 1
Applicant/Owner:	DOT&PF	Investigator(s):	Jeremy Grauf
Date:	8/15/2017	Cowardin:	Wetland

Notes: Wetland. There was a visible vegetative shift from wetlands to uplands (see enclosure 1 figure 1 of 10), and the upland soil consisted of shallow (6 inch) organic layer with gravel and coble layer below. -164.386537, 67.808152 (WGS 1984)

Project/Site:	Kivalina	Site No.:	USACE 2
Applicant/Owner:	DOT&PF	Investigator(s):	Jeremy Grauf
Date:	8/15/2017	Cowardin:	Upland

Notes: Upland. -164.387573, 67.808517 (WGS 1984)

Project/Site:	Kivalina	Site No.:	USACE 3
Applicant/Owner:	DOT&PF	Investigator(s):	Jeremy Grauf
Date:	8/15/2017	Cowardin:	Upland

Notes: Upland. -164.385235, 67.809277 (WGS 1984)

Project/Site:	Kivalina	Site No.:	JAJ-17-009
Applicant/Owner:	DOT&PF	Investigator(s):	Stantec, Justin Junge
Date:	8/16/2017	Cowardin:	Upland

Notes: K-Hill Slope. 0-2cm: Brown silt, 30-50% gravels with small to large sub-rounded to angular pebbles, roots throughout; 2-10cm: brown silty clay loam, >75% gravels with small to very large pebbles and small cobbles, some roots; 10 cmbs terminated due to impassable gravels. 67.809801, -164.386027

Project/Site:	Kivalina	Site No.:	JRH-17-012
Applicant/Owner:	DOT&PF	Investigator(s):	Stantec, John Hemmeter
Date:	8/16/2017	Cowardin:	Wetland

Notes: 0-18cm: Root mat, vegetation layer, brown silty loam, no gravels, rootlets to small roots throughout, loose compaction; 18-38cm grey compacted silt, no gravels, +75% water saturation at 20 cm; 39 cmbs terminated. Permafrost at 40 cmbs. 67.805115, -164.375925

Project/Site:	Kivalina	Site No.:	WCP1
Applicant/Owner:	DOT&PF	Investigator(s):	Stantec, Ross Smith
Date:	8/17/2017	Cowardin:	Wetland

Notes: WCP1 = Wetland Control Point 1. 0-20cm: Saturated active organic mat & organic-rich silt (A/B soil horizons); 20-35cm: Saturated gray silt. Terminated shovel probe at 35 cmbs; soil probe showed no change in sediments before encountering rock at 60 cmbs. 67.810444, -164.409389

APPENDIX I

EFH ASSESSMENT

Page

Essential Fish Habitat Assessment for the Kivalina Evacuation and School Site Access Road

Prepared for:
State of Alaska Department of Transportation and Public Facilities, Northern Region

Prepared by:
Stantec Consulting Services Inc.; Owl Ridge Natural Resource Consultants

September 12, 2017

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Abbreviations

ADF&G	Alaska Department of Fish and Game
AWC	Anadromous Waters Catalog
BMP	Best management practices
CGP	Construction General Permit
CY	Cubic yards
DOT&PF	Department of Transportation and Public Facilities
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
EFHA	Essential Fish Habitat Assessment
ft	Foot/feet
FHWG	Fisheries Hydroacoustic Working Group
FMP	Fisheries Management Plan
K-Hill	Kisimigiuqtuq Hill
MSA	Magnuson-Stevens Fishery Conservation and Management Act
NAB	Northwest Arctic Borough
NMFS	National Marine Fisheries Service
Owl Ridge	Owl Ridge Natural Resource Consultants
Project	Kivalina Evacuation and School Site Access Road
ROW	Right-of-way
SEL	Sound exposure level
Stantec	Stantec Consulting Services Inc.
USACE	U.S. Army Corps of Engineers

1.0 INTRODUCTION AND BACKGROUND

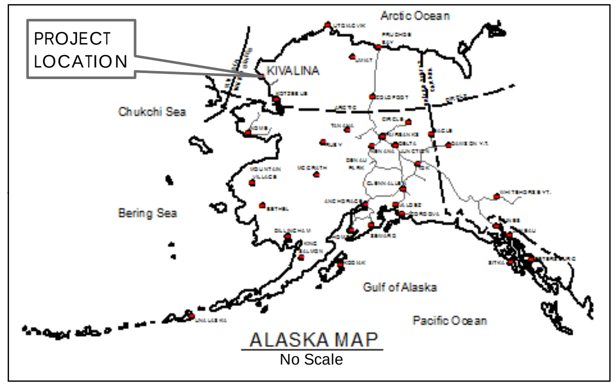
The Alaska Department of Transportation and Public Facilities (DOT&PF) is proposing to construct an all-season road from the Community of Kivalina extending six-miles northeast to a terminus location on Kisimigiuqtuq Hill (K-Hill) (Figure 1). The Kivalina Evacuation and School Site Access Road (the Project) would provide Kivalina residents a safe and reliable evacuation route in the event of a catastrophic storm or ocean surge, allowing evacuees to temporarily mobilize to safe refuge at an assembly site on K-Hill. This site is also identified by the Northwest Arctic Borough (NAB) School District, and approved by the community, as a preferred new location for the community school. If constructed, the school could augment the undeveloped evacuation site by serving as a full-service community emergency shelter with all-season support capabilities.

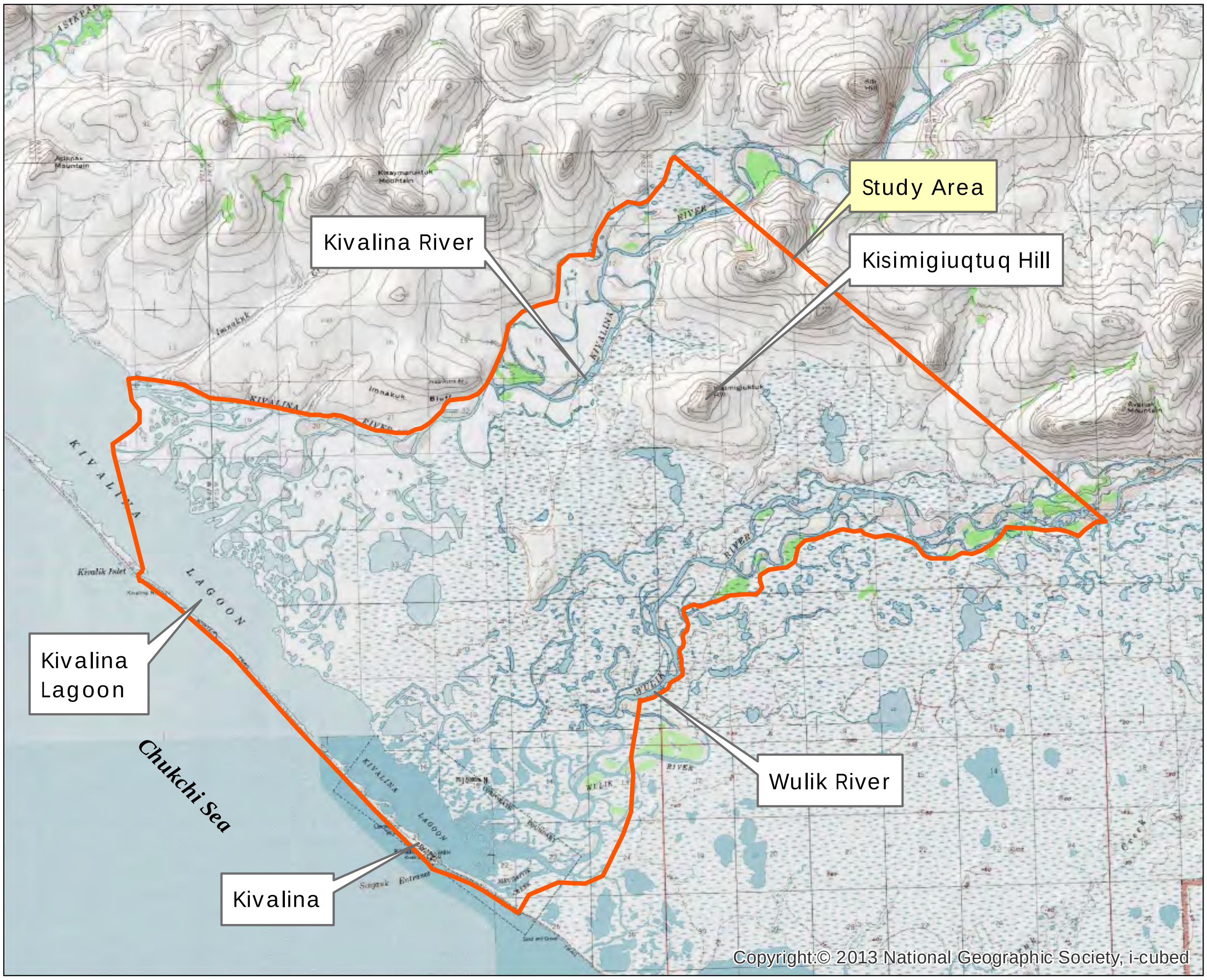
The Study Area encompasses the Kivalina barrier island, the southern portion of Kivalina Lagoon, and the lower Wulik and Kivalina River drainages (Figure 1). The Kivalina River (Anadromous Waters Catalog [AWC] Stream No. 331-00-10044) and the Wulik River (AWC Stream No. 331-00-10060) are both listed as important for the spawning, rearing, and migration of anadromous fish including all five species of Pacific salmon (ADF&G, 2016a). The Kivalina Lagoon is listed in the AWC as Stream No. 331-00-10060-0010 (ADF&G, 2016) and is documented to provide habitat for the same species as the Wulik and Kivalina Rivers. As such, Kivalina Lagoon and the Wulik and Kivalina Rivers are considered Essential Fish Habitat (EFH) under the Federal Management Plan for Pacific Salmon in the Economic Exclusion Zone (EEZ) off the Coast of Alaska (NMFS, 2005; ADF&G, 2016).

The Magnuson-Stevens Fishery Conservation and Management Act (MSA) requires that federal action agencies consult with the National Marine Fisheries Service (NMFS) when taking action that may impact the quality and/or quantity of EFH. To describe how the Proposed Action would affect designated EFH within the Wulik River, Kivalina River, and Kivalina Lagoon, the DOT&PF retained Stantec Consulting Inc. (Stantec) and Owl Ridge Natural Resource Consultants (Owl Ridge) to complete an EFH assessment (EFHA). The objectives of the EFHA are to:

- Describe the Proposed Action and potential construction methods,
- Characterize EFH and EFH species within the Study Area,
- Identify interactions of the Proposed Action with EFH and analyze the effects,
- Identify avoidance and minimization measures specific to the protection of EFH, and
- Summarize the likelihood for the Proposed Action to result in adverse effects to EFH.

Although identified within the Study Area, the Proposed Action does not interact with EFH of the Kivalina River. As such, discussion of EFH within the lower Kivalina River and potential effects is not provided as part of this assessment.





Graphics developed by Stantec Consulting Services, Inc.

Project Origin: City of Kivalina,
Kotzebue Recording District,
Section 21, Township 27N, Range 26W,
Kateel River Meridian

Project Terminus: Kisimigiuqtuq Hill,
Section 19, Township 28N, Range 25W
Kateel River Meridian

0 1.25 2.5 5 Miles

1:142,961 (at original document size of 8.5x11)

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KIVALINA EVACUATION AND SCHOOL SITE ACCESS ROAD

Location & Vicinity Map

DATE: September, 2017	FIGURE **1**

U:\204705102\GIS\mxd\EFH_Assessment\204705102_EFH_Fig-1_Loc-Vic_Map.mxd Revised: 2017-09-15 By: cpannone

2.0 PROPOSED ACTION

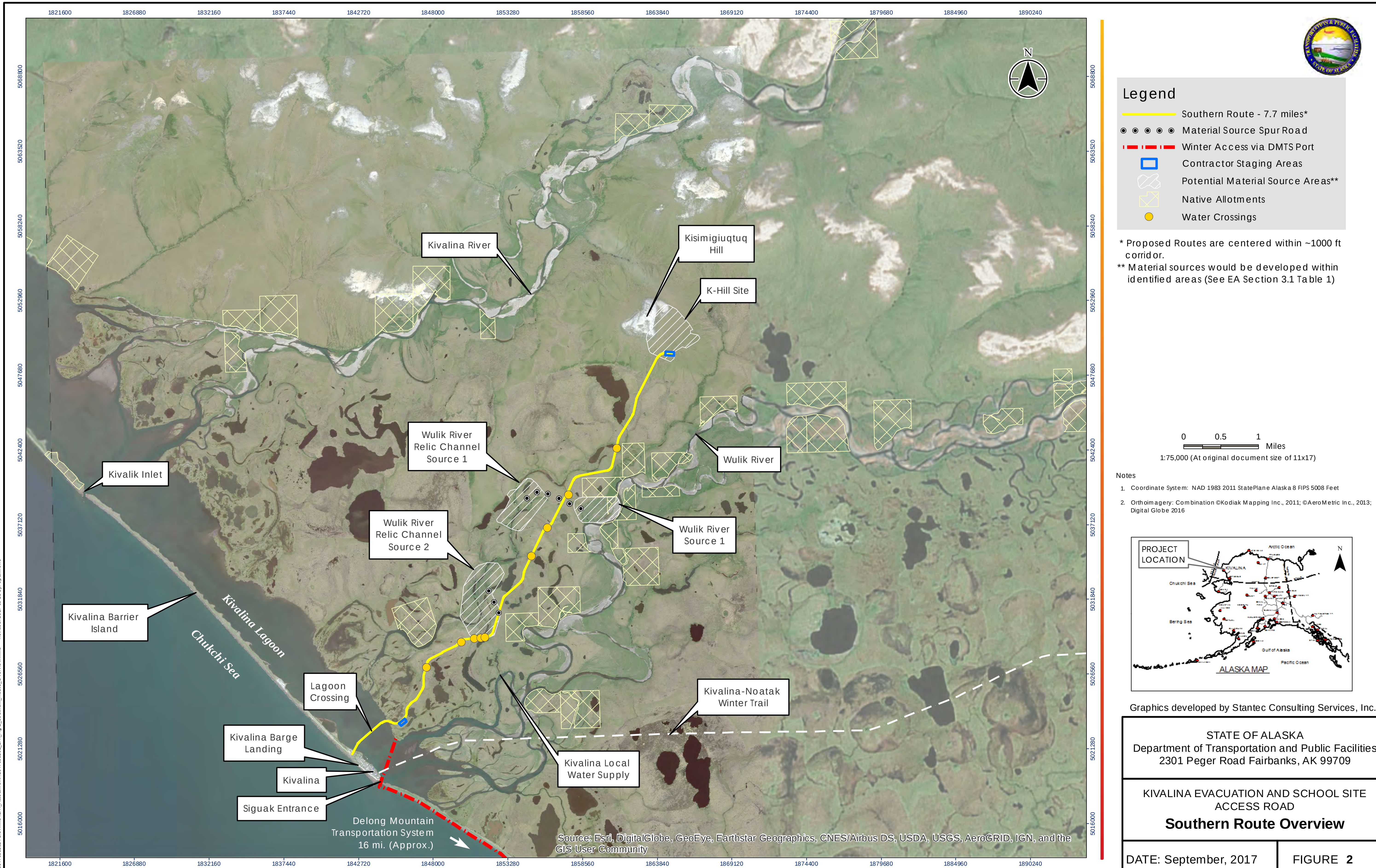
The Proposed Action would construct a safe, reliable, all-season evacuation road between the community of Kivalina and K-Hill. Two route alternatives are being considered, but common to both, are the following actions:

- **Establishment of a safe, reliable, all-season Kivalina Lagoon crossing.** Both alternatives include construction of a causeway across the lagoon that variously incorporate different configurations of hydrological openings including bridge(s), culvert(s), or both.
- **Construction of an all-season gravel access road connecting the Kivalina Lagoon crossing to the K-Hill evacuation site.** The road would be designed to accommodate a wide variety of motorized vehicles over a two-way road with shoulders, multiple turnouts, and side slopes that may include guard rails and other safety features where determined to be necessary and prudent.
- **Development of up to four material sources including the K-Hill Site, Wulik River Source 1, Relic Channel Source 1, and Relic Channel Source 2.** These material sources are anticipated to be suitable local sources of select material to supply the proposed project. Selection and development of viable material sources and haul routes are considered as part of the Proposed Action.

The following sections provide a detailed description of the Proposed Action. Although two route options are being considered, interactions of each with designated EFH in the Kivalina Lagoon and lower Wulik River would be the same. As such, both route options are discussed collectively in Section 2.1. In addition, assumptions were required to complete the EFHA regarding specific design details and construction methods. Where assumptions were made, they have been clearly outlined.

2.1 EVACUATION ROUTE AND LAGOON CROSSING ALTERNATIVES

The Southern Route is approximately 7.7 miles in length and begins adjacent to the Kivalina Airport, immediately crosses the lagoon, and follows lowlands and relic channels of the Wulik River to a 5-acre gravel pad that would serve as an evacuation site on K-Hill (Figure 2). The Combined Route B is approximately 8.9 miles in length and begins adjacent to the Kivalina Airport, immediately cross the lagoon, follows lowlands and relic channels of the Wulik River for approximately 5-miles before shifting northward, following higher ground for approximately 3.9-miles to a 5-acre gravel pad that would serve as an evacuation site on K-Hill (Figure 3). The proposed lagoon crossing for both route alternatives is the same.


Kivalina River
Kisimigiuqtuq Hill
K-Hill Site
Wulik River Relic Channel Source 1
Wulik River
Kivalik Inlet
Wulik River Relic Channel Source 2
Wulik River Source 1
Kivalina Barrier Island
Kivalina Lagoon
Chukchi Sea
Lagoon Crossing
Kivalina-Noatak Winter Trail
Kivalina Barge Landing
Kivalina
Kivalina Local Water Supply
Siguak Entrance
Delong Mountain Transportation System 16 mi. (Approx.)
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
N
Legend
Southern Route - 7.7 miles*
Material Source Spur Road
Winter Access via DMTS Port
Contractor Staging Areas
Potential Material Source Areas**
Native Allotments
Water Crossings
* Proposed Routes are centered within ~1000 ft corridor.
** Material sources would be developed within identified areas (See EA Section 3.1 Table 1)
0 0.5 1 Miles
1:75,000 (At original document size of 11x17)
Notes
1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
2. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011; ©AeroMetric Inc., 2013; Digital Globe 2016
PROJECT LOCATION
ALASKA MAP
Graphics developed by Stantec Consulting Services, Inc.
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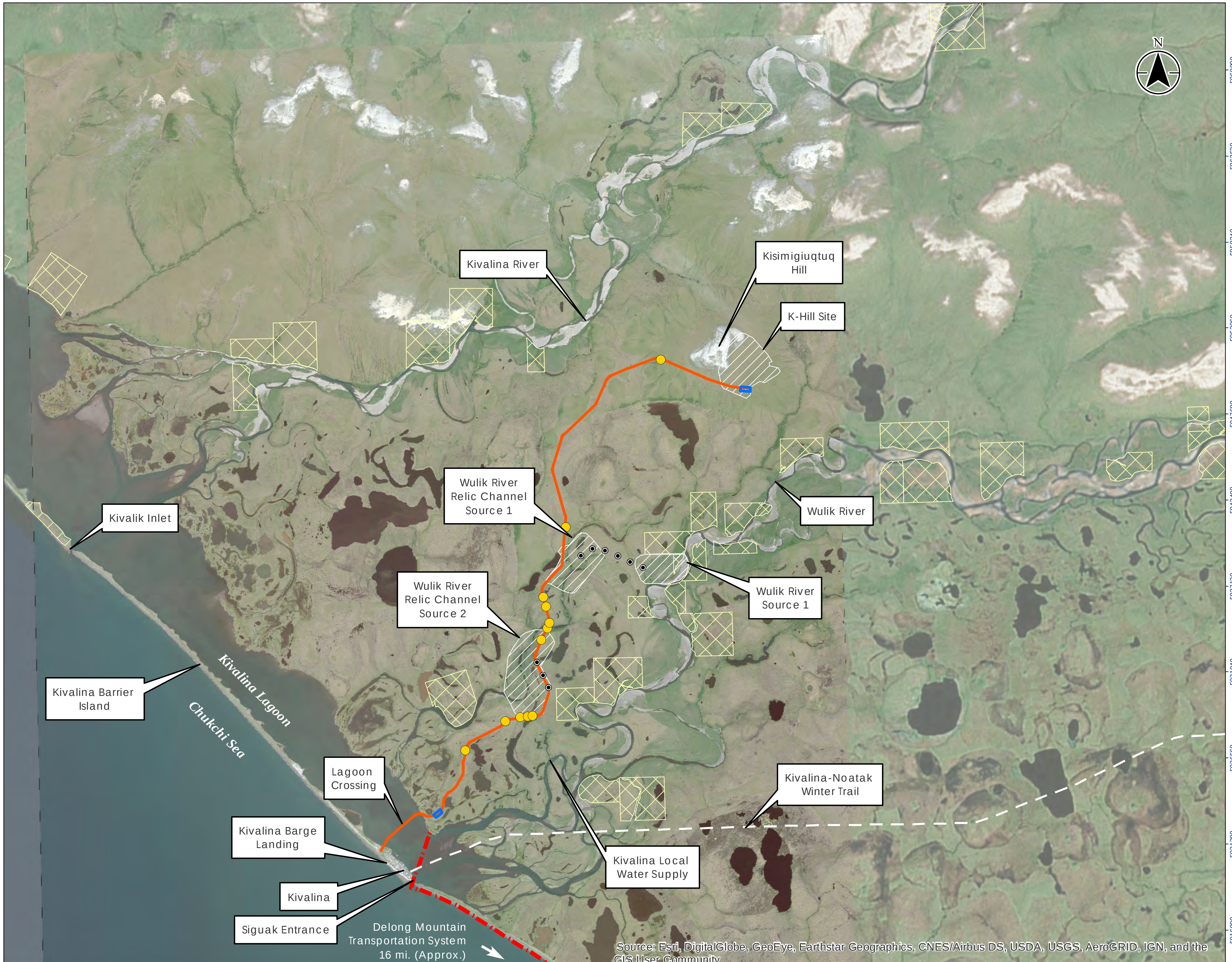
2301 Peger Road Fairbanks, AK 99709
KIVALINA EVACUATION AND SCHOOL SITE ACCESS ROAD
Southern Route Overview
DATE: September, 2017
FIGURE 2



Legend

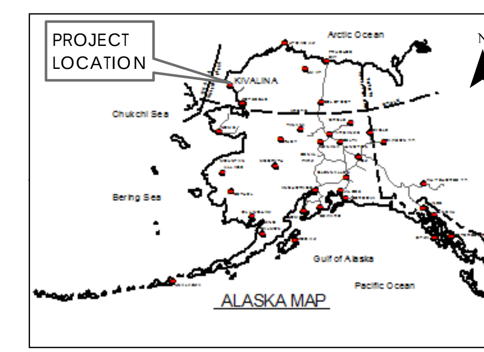
- Combined Route B - 8.9 miles*
- Material Source Spur Road
- Winter Access via DMTS Port
- Contractor Staging Areas
- Potential Material Source Areas**
- Native Allotments
- Water Crossings

* Proposed Routes are centered within ~1000 ft corridor.
** Material sources would be developed within identified areas (See EA Section 3.1 Table 1).

0 0.5 1 Miles
1:75,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
2. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011; ©AeroMetric Inc., 2013; Digital Globe 2016



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KIVALINA EVACUATION AND SCHOOL SITE ACCESS ROAD

Combined Route B Overview

DATE: September, 2017	FIGURE **3**

2.1.1 Lagoon Crossing

The 3200-ft lagoon crossing would require construction of an earthen causeway protected with a layer of armor stone, a bridge, and culverts. The top of the causeway would be at an elevation to accommodate the anticipated maximum potential storm surge and design wave for a 500-year recurrence event (Smith and Nielson, 2017; DOT&PF, 2017). The bridge would be constructed over the existing 110-ft wide lagoon channel, located approximately 160-ft northeast from the barrier island. The bridge would be a piling supported structure with sloped, rock protected earthen abutments or vertical sheet pile walls and be designed to span the entire lagoon channel width to minimize potential impact to natural channel dimensions and function. Large diameter culvert(s), located near the northeast end of the causeway, would accommodate passage of all life-stage fish and maintain flow within a discontinuous channel. Overflow pipes would be placed in even increments along the length of the causeway, at an elevation that would provide additional hydraulic conveyance during high water events to protect the evacuation road and the community from potential flooding.

2.1.2 Evacuation Road

The road would be constructed within a 300-ft right-of-way (ROW) and consist of a 24-ft wide gravel surfaced roadway with edge markers for improved visibility during winter use (Figure 4). The embankment would be constructed with a minimum of 3 (horizontal) to 1 (vertical) side slopes for safety, thermal stability, and to minimize snow drifting. The road would be surfaced with crushed aggregate and side slopes and all other disturbed areas would be seeded with regionally appropriate seed mix that minimizes introduction of noxious weeds. Roadway embankment height would average between 5 and 8-ft above existing ground. Greater embankment thickness would occur at natural grade depressions and over stream crossings. An average embankment thickness of 6-ft would minimize impacts from drifting snow and the thawing of permafrost in the Study Area.

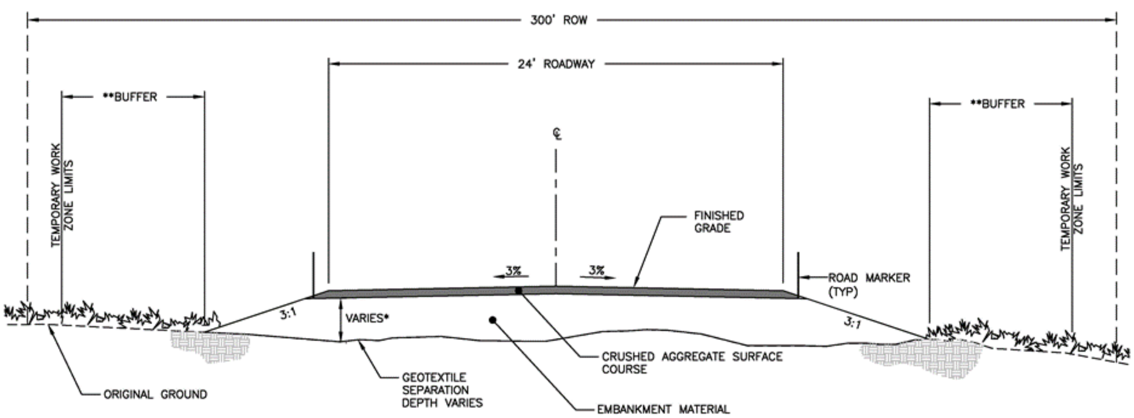


Figure 4 Typical Evacuation Road Cross Section

Culverts would be placed at appropriate locations along the roadway to accommodate cross drainage, with larger culverts placed along identified permanent and intermittent water crossings (see Figure 5 for typical culvert details). Culverts may require outlet aprons with rip rap of various thicknesses in locations with significant flow. Insulation board may be used under culvert crossings and the roadway embankment in areas of degrading permafrost.

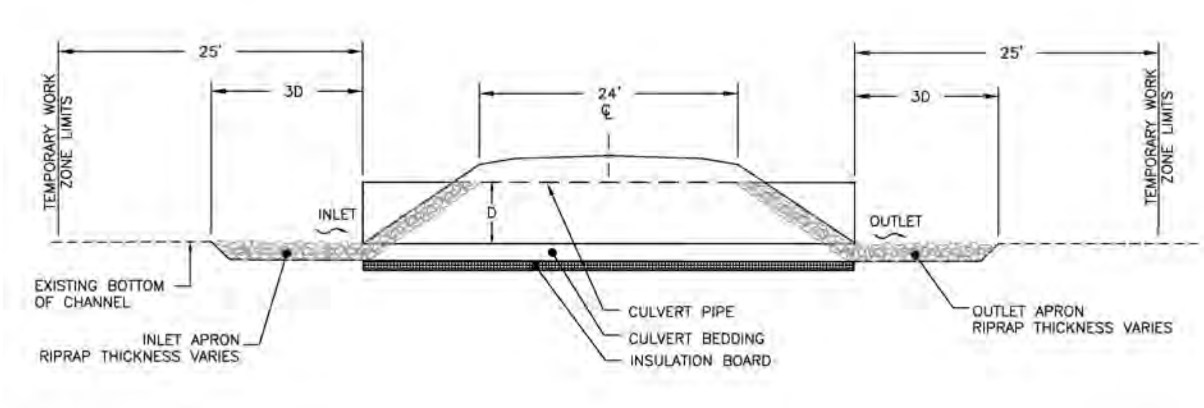


Figure 5 Typical Culvert Detail

Turnouts would be constructed along the road and would consist of a 25-ft wide by 200-ft long area adjacent to either side of the road to accommodate vehicle parking and equipment turnarounds. See Figure 6 for typical vehicle turnout plans.

2.1.3 Material Source

Based on reconnaissance field work and limited subsurface investigations, the following local material sources are expected to supply materials required to construct the proposed project: K-Hill Site, Wulik River Source 1, Relic Channel Source 1, and Relic Channel Source 2 (Figure 2). While all embankment materials are anticipated to be available locally, material may also be barged in from sources outside the Study Area and stockpiled for use. Methods and means used to develop project material sources would be determined by the selected construction contractor.

2.1.4 K-Hill Site

The K-Hill Site is situated adjacent the terminus of the route (Figure 2). K-Hill geology is characterized by exposed limestone and rock rubble at the ground surface. A 100-acre material source in this area would support materials extraction, staging, and a construction camp. This site is expected to produce up to ~1,000,000 cubic yards (CY) of select material suitable for use in the roadway embankment, crushable material for use as roadway surfacing, and rock for potential use as armor stone. Once reclaimed, the developed area could be utilized as a potential evacuation site for the community.

2.1.5 Wulik River Source 1

Wulik River Source 1 is located on a point bar along the west bank of the Wulik River (Figure 2). The source consists of unvegetated and vegetated gravel bars in the floodplain and wetlands outside of the floodplain. A 40-acre material source in this area is expected to produce up to ~240,000 CY of well graded alluvial gravels, suitable for use in the roadway embankment, and roadway surfacing.

2.1.6 Wulik Relic Channel Sources 1 and 2

Wulik Relic Channel Sources 1 and 2 are located within wetlands associated with the relic channels of the Wulik River (Figure 2). Relic Channel Source 1 is a 50-acre material source expected to produce up to ~250,000 CY of gravel and sand deposits, suitable for use in roadway embankment and possibly as crushable material for roadway surfacing. Relic Channel Source 2 is a 40-acrea material source expected to produce ~200,000 CY of gravel and sand deposits, suitable for use in the roadway embankment and possibly as crushable material for roadway surfacing in limited quantities.

3.0 POTENTIAL CONSTRUCTION METHODS

Potential construction methodology may vary depending on timing of construction, contractor specific methods, locations of staging areas, camps, haul routes, and sequencing of activities. This section describes typical construction methods that may be employed for the preferred alternative.

3.1 CONTRACTOR STAGING AND HAUL ROAD DEVELOPMENT

Large equipment and bulk supplies necessary for construction may be flown or barged to the region. Initial mobilization activities may require temporary storage of equipment and fuel in the community of Kivalina or at the DeLong Mountain Transportation System port site (Red Dog Mine). Once sea ice is formed and ground is frozen, equipment could be moved to Kivalina on an ice road (if at the port site) and then inland for development of material sources and construction of roadway embankments.

Construction may require two or more work seasons. In addition to available space near the Kivalina Airport, two staging areas may be constructed, including one on the northeast side of the lagoon for the storage of fuel, equipment and embankment material, and another at the K-Hill Site for a temporary construction camp, material and equipment staging area, and a rock quarry (Figure 2).

3.2 LAGOON CROSSING

Construction of the lagoon crossing may include in-water placement of fill, bridge support pile driving, and placement of culvert(s). Placement of fill is generally done during ice-free conditions, but several construction components associated with the lagoon crossing could be completed in the winter. Grounded ice in shallow depths of the lagoon could be removed allowing placement of the base causeway embankment layer and rock protection with no, or minimal water present, thereby minimizing disturbance of fine sediments. Pile driving would take place on both sides of the bridge opening, and consist of driving piles at each abutment. The final design of the bridge foundation would establish the specific number, size, and depth of the piling.

For evaluating potential impacts, the following assumptions are made:

- Four piles per abutment for a total of eight piles would be required to construct the single span bridge.
- Piles would typically be 3-ft diameter steel pipes, driven roughly 100 to 150-ft deep or to refusal. Each abutment would require roughly 3-5 days to construct.
- Pile driving would occur over approximately 30 days, not continuous, in which the shift duration would be guided by agency recommendations. The contractor's methods could potentially alter the frequency and duration.

Both winter and summer construction activities are anticipated. Pile driving windows and durations would be established to minimize hydraulic and noise impacts when fish, birds, and marine mammals are more abundant. The bridge work would likely utilize cranes and other equipment working from the new causeway fill, or in combination with a temporary work trestle dependent on the contractor's methods. The use of a work trestle would likely require installation of several shallow support pilings.

Best Management Practices (BMPs) to minimize water quality and habitat impacts would be developed and implemented.

3.3 EVACUATION ROAD

For evaluating potential impacts, the following assumptions are made:

- Arctic road construction in areas dominated by tundra underlain with continuous permafrost would begin in the winter after the ground freezes.
- Road and drainage structure construction would continue during summer months and may require temporary bridges and culverts to provide for seasonal drainage.
- A leveling course of gravel may be required under geotextile depending on local ground conditions.
- Vegetative clearing would be limited to brush removal within the roadway footprint, however the existing organic mat would not be removed.

- Temporary construction impacts may occur within a 25-ft area outside the roadway embankment footprint, and would be permitted for use for contractor equipment access, culvert installation, and placement of sediment control (BMPs).
- Water crossings would include placement of appropriately sized drainage structures, with additional cross culverts installed along the roadway as needed to equalize drainage.
- Excavation would be avoided to minimize thermal degradation of subgrade permafrost.
- Installation of larger culverts needing bedding materials for fish passage or for maintaining stream flow would require diverting flow into a temporary channel while constructing the structure.
- The use of temporary bridges, temporary culverts, and pumping may also be employed.
- Disturbed areas outside the roadway footprint would be stabilized.
- The roads would be watered for dust control.

Both winter and summer construction activities are anticipated. Construction windows and durations would be established to minimize impacts when fish, birds and wildlife are more abundant.

3.4 MATERIAL SOURCE DEVELOPMENT

While all embankment materials are anticipated to be available locally, material may also be barged in from sources outside the Study Area and stockpiled for use. Methods and means used to develop project material sources would be determined by the selected construction contractor.

For evaluating potential impacts, the following overall assumptions are made:

- Access to and development of selected material sources may occur year-round.
- Extracted materials not hauled and placed may be stockpiled within a material source or laydown area for later use.
- Construction windows and durations would be established to minimize impacts when fish, birds and wildlife are more abundant.

3.4.1 K-Hill Site

The following assumptions outline the material source development methodology for the K-Hill Site:

- A quarry site on K-Hill would be likely accessed when the ground is frozen and equipment can travel overland.
- The site would be developed by removing overburden and temporarily stockpiling for reclamation activities.
- Materials from the site are expected to be used for constructing staging areas and roadway embankments.
- Ripping, drilling, and blasting would likely be used to remove overburden as well as to produce select material and armor rock from subsurface deposits.
- Quarry excavation would be benched to maintain slope stability, drainage, and access for development and reclamation activities.

3.4.2 Wulik River Source 1

The following assumptions outline the material source development methodology for the Wulik River Source 1:

- A material source would be developed along the west bank of the Wulik River when ground is frozen and water levels are relatively low.
- Excavation may occur below the water table, however a 100-ft buffer would be maintained between the active river channel and the excavation area.
- Source development would require excavation of overburden that may be used for reclamation. Material would be extracted, hauled, and placed using conventional equipment, though blasting may be necessary if permafrost is encountered.
- Material source reclamation would include converting the source into a pond. A fish escapement channel may be connected to the Wulik River to prevent trapping fish.
- A 2,000-ft long spur road would be used to access this source.

3.4.3 Wulik Relic Channel Sources 1 and 2

The following assumptions outline the material source development methodology for the Wulik Relic Channel Source 1 and 2:

- Material sources adjacent to the relic channels of the Wulik River would be developed as a series of deep cells extending below the water table.
- Blasting would likely be required depending on the presence of permafrost, moisture content and types of materials encountered.
- Wulik Relic Channel Sources 1 and 2 would likely require development of a 2,000-ft and 3,000-ft spur roads respectively.
- Sources would be reclaimed by excavating ponds, connected to existing relic channels, that could provide potential overwintering habitat for juvenile fish.

4.0 ESSENTIAL FISH HABITAT

The 1996 Sustainable Fisheries Act reauthorized the MSA (Magnuson-Stevens Act; 16 USC.1801, et seq.), introducing new requirements for the description and identification of EFH in fishery management plans. EFH is defined as waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (50 C.F.R. Part 600). Further, EFH is designated based on best available scientific information and the levels defined by the MSA (NMFS, 2005):

- Level 1 information corresponds to distribution;
- Level 2 information corresponds to density or relative abundance;
- Level 3 information corresponds to growth, reproduction, or survival rates; and
- Level 4 information corresponds to production rates.

The proposed project falls within the following Fisheries Management Plans (FMPs):

- Salmon Fisheries in the EEZ off the Coast of Alaska (Salmon FMP);

- Arctic Management Area (Arctic FMP);

The Salmon FMP has designated all waters offshore of Alaska as EFH for all five species of Pacific salmon. In addition, the FMP designates all waters identified in the ADF&G Catalog of Waters Important for the Spawning, Rearing, or Migration of Anadromous Fishes (ADF&G, 2016) as important for Pacific salmon, as EFH. All EFH for Pacific salmon within the Study Area is based on Level 1 distribution information. The Arctic FMP designated EFH for Arctic cod (*Boreogadus saida*), saffron cod (*Eleginus gracilis*), and opilio (or snow crab, *Chionoecetes opilio*). EFH for Arctic and saffron cod is based on Level 1 distribution information. EFH for crab (e.g. Snow crab [*Chionoecetes opilio*]) is located on the marine side of Kivalina, but habitat inside Kivalina Lagoon is expected to be marginal (NMFS, 2017).

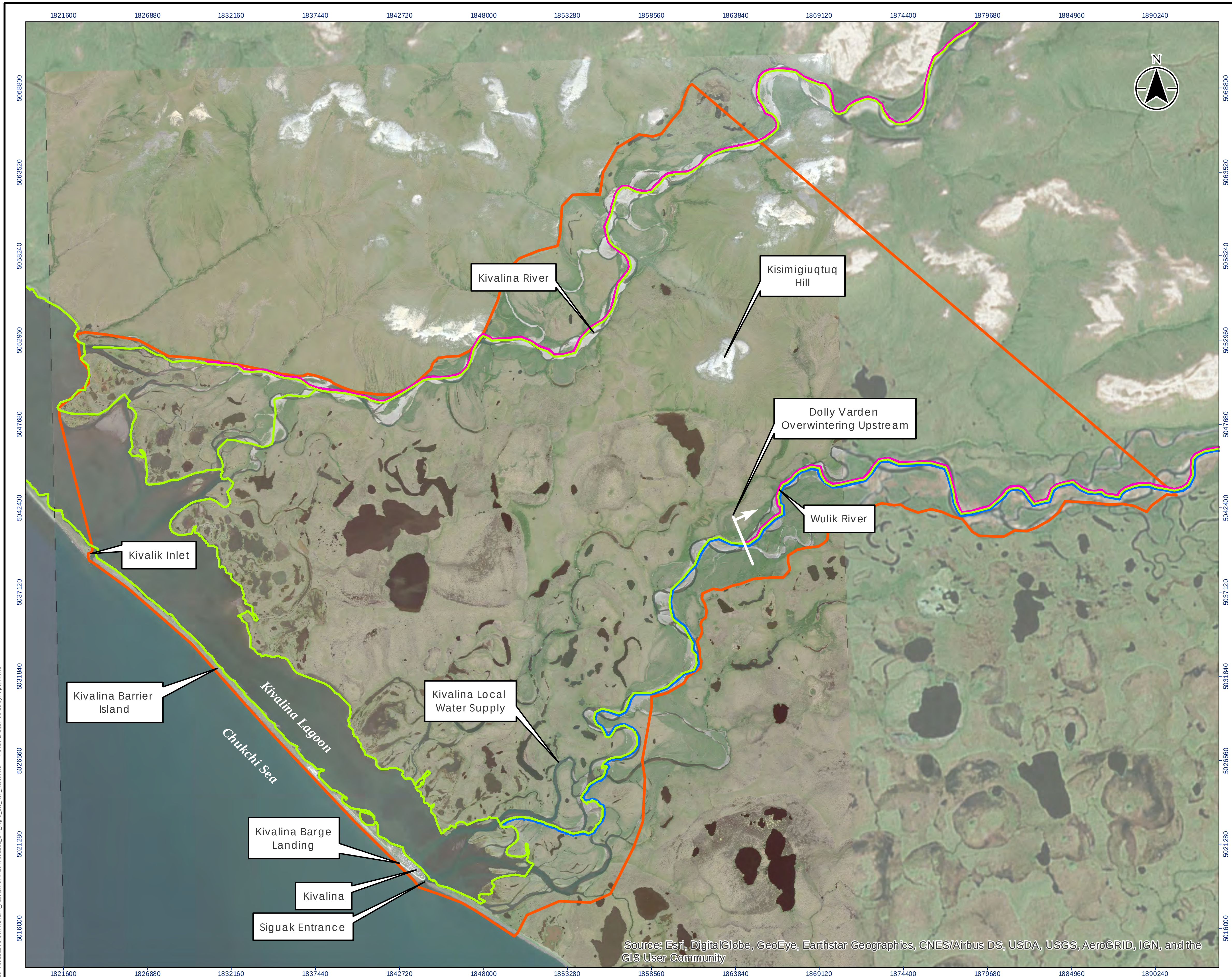
Table 1 describes EFH and the species and life-stage supported within the lower Wulik River and the Kivalina Lagoon. EFH habitat is identified on Figure 6.

Table 1 Water Bodies in the Study Area with Essential Fish Habitat

Water Body Anadromous Waters Catalog No.	Essential Fish Habitat Species								
	Opilio Crab	Arctic Cod	Saffron Cod	Chinook Salmon	Chum Salmon	Coho Salmon	Pink Salmon	Sockeye Salmon	Dolly Varden*
Wulik River 331-00-10060	-	-	-	M	M, S	M	M, S	M	M, S
Kivalina Lagoon 331-00-10060-0010	-	O, R	O, R	R	R	R	R	R	R
Notes: R: documented rearing; S: documented spawning; M: documented migration through the Study Area; O: documented overwintering (ADF&G 2016, USACE, 2007a) “-“: Not present * Dolly Varden are not listed as an EFH species; however, due to their sustenance importance to the residents of Kivalina have been included in this EFHA									

4.1 WULIK RIVER AND RIVER ESTUARY

The Wulik River drains southwest approximately 80 miles from the De Long Mountains to Kivalina Lagoon in the Chukchi Sea. In the lower sections of the Wulik River and within the Study Area, the river is defined by a low gradient (1-2%) meandering glide. Streambed substrate ranges from fines to cobbles and is dominated by small to large gravel. Frequent large gravel bars occur along inside bends of the river with outside bends being characterized by peat cut banks with limited willow growth. Riparian habitat is generally limited. Pools, side channels and embayment’s provide rearing potential for juvenile fish and no barriers to fish migration are present. General site photographs of the Wulik River, specifically near the Wulik River Source 1 material site, are provided in Appendix B.



Legend

- Study Area
- Pacific Salmon Present*
- Pink Salmon Spawning
- Chum Salmon Spawning

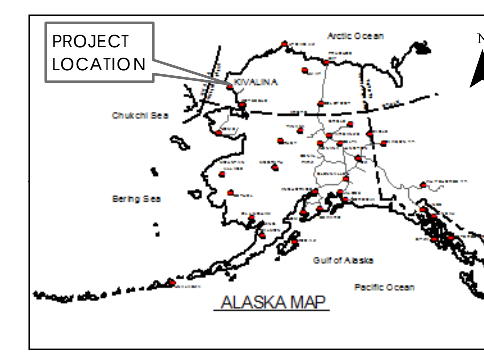
*Arctic cod and saffron cod are present in the Kivalina Lagoon year round.

0 0.5 1 Miles

1:75,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
2. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011; ©AeroMetric Inc., 2013; Digital Globe 2016
3. Essential Fish Habitat Data shown was produced using 2017 Regulatory Mapping Data from the Anadromous Waters Catalog (AWC), acquired from ADF&G website.



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KIVALINA EVACUATION AND SCHOOL SITE ACCESS ROAD

Essential Fish Habitat within the Study Area

DATE: September, 2017	FIGURE 6

The Wulik River supports several EFH species including chum salmon (*Oncorhynchus keta*), Chinook salmon (*O. tshawytscha*), sockeye salmon (*O. nerka*), coho salmon (*O. kisutch*), and pink salmon (*O. gorbuscha*) (ADF&G, 2016). Although Dolly Varden (*Salvelinus malma*) are not listed as an EFH species, they are a main source of subsistence for people of Kivalina, contributing 86% edible weight of all harvested species (ADF&G, 2010). As such, they have been included in this EFHA.

Aerial surveys conducted by the ADF&G along the Wulik River and Ikalukrok Creek (an upstream tributary to the Wulik River located 37 miles upstream of the Kivalina Lagoon) have most consistently identified runs of chum and pink salmon and Dolly Varden, with other salmon species identified in lower numbers and less consistently (Scannell and Ott, 2002). Chum salmon have been observed spawning in the lower portion of Ikalukrok Creek annually since the late 1980s in late July and August (Scannell and Ott, 2002). Since 2006, annual return estimates for chum salmon in lower Ikalukrok Creek have ranged from around 1,000 to 7,000 salmon. Chum salmon spawning has been documented approximately 5 miles upstream from the Kivalina Lagoon in the Wulik River (ADF&G, 2016). The Wulik River also supports a run of pink salmon. Although no direct estimates of returns are available, pink salmon have been observed spawning approximately 5 miles upstream of the Kivalina Lagoon in the Wulik River near the proposed Wulik River Source 1 material site (Figure 2).

Dolly Varden juveniles emerge in the spring after summer/fall spawning in the Wulik River (Ott and Morris, 2007), and spend between one and five years in the Wulik River drainage before migrating to the Chukchi Sea shortly after spring break-up. Most adult Dolly Varden migrate out of the Wulik River in spring after peak break-up flows recede and as water clarity begins to improve. Adults typically re-enter the lagoon in later summer (USACE, 2007), with spawning condition fish entering earlier in the summer than fish migrating to the Wulik to overwinter. Annual surveys conducted between 1979 and 2015 as part of ongoing monitoring for the nearby Red Dog Mine, estimated between 22,000 and 144,000 mixed stock Dolly Varden in the Wulik River in each year (Ott et al., 2016). In most years, greater than 90% of Dolly Varden overwintered downstream from Ikalukrok Creek to approximately 5 miles upstream from the Kavalina Lagoon, in the vicinity of the Wulik River Source 1 material site, while the remaining fish enumerated in the river have been found upstream of Ikalukrok Creek (Ott and Morris, 2012).

The Wulik River estuary (confluence of the Wulik River with the Kivalina Lagoon) is located immediately east of Kivalina. The estuary is characterized by a series of small, low gradient tributary channels across the Wulik River floodplain. A number of relic channels to the Wulik River and isolated lake/pond features are also located in the estuary (northwest of the river confluence). The relic channels have lost connectivity to the mainstem of the Wulik River and their headwaters originate near the base of K-Hill. The Relic Channels are directly connected to the Kivalina Lagoon. Estuary habitat can be important habitat for outmigrating juvenile salmon, Dolly Varden, and numerous marine fishes and invertebrate species (McClelland, 2012). Fish bearing status of the various isolated lake/pond features is unknown; however, these features including the relic channels to the Wulik River are not considered EFH and therefore, are not considered as part of the analysis in this EFHA.

4.2 KIVALINA LAGOON

Kivalina Lagoon is considered EFH for five species of Pacific salmon, saffron cod (*Eleginus gracillis*), and Arctic cod (*Arctogadus glacialus*) (USACE, 2007; NMFS, 2011). The lagoon provides essential rearing habitat for outmigratting juvenile salmon from the Wulik River. Prior to heading offshore and into the Chuckchi Sea, juvenile salmon remain with the nearshore habitats of the lagoon to rear and feed. Pink and chum salmon smolt move downstream into the lagoon during break-up between mid-May and early June. Residency time within the lagoon is unknown, but is likely limited to June. Chinook, coho and sockeye smolt likely move to the lagoon during the same period. Arctic cod (*Boreogadus saida*) and saffron cod (*Eleginus gracilis*) are present year-round (USACE, 2007a). Population estimates and peak timing of use of Arctic and saffron cod within the lagoon is currently unknown.

5.0 ANALYSIS OF EFFECTS TO ESSENTIAL FISH HABITAT

Potential interactions between the Proposed Action and EFH and EFH species are identified in Table 2. Where an interaction was identified, an analysis of effect to EFH and EFH species was conducted.

Table 2 Potential Interactions of the Proposed Action with EFH and EFH Species

Proposed Action	Proposed Project Activity	Potential Interaction with EFH and EFH Species	
		Lower Wulik River	Kivalina Lagoon
Kivalina Lagoon Crossing	Causeway fill placement	×	✓
	Pile driving	×	✓
	Changes to flow and sediment transport	×	✓
Evacuation Road	Water withdrawal	✓	×
	Ice road	×[1]	×
	Water crossings	×[2]	×
Material Source	Gravel mining	✓	×

NOTES

× = No interaction

✓ = Potential interaction

[1] Ice road construction will be required at select sites along the evacuation road route but will not interact with EFH associated with the Wulik River.

[2] Required stream crossings for both the Southern Route (a total of 9 crossings) and the Combined Route B (a total of 12 crossings) do not cross designated EFH.

As noted in Table 2, the Southern Route and Combined Route B do not cross designated EFH habitat. Where water crossings of non-EFH are proposed, most would be crossed using hydraulic design culverts oversized to accommodate flood events or incorporation of hydraulic designed culverts with additional overflow culverts installed in the floodplain. This design approach will maintain water body and road integrity and allow for fish passage. Combined Route B crosses the relic channel, which may contain coho and sockeye salmon. That crossing would be designed as a fish passage culvert which would maintain water body geomorphology and fish passage.

5.1 EVACUATION ROUTE AND LAGOON CROSSING

5.1.1 Lagoon Crossing

Construction of the Kivalina Lagoon crossing would have direct and indirect effects on EFH and EFH species. Direct effects would be limited to the burial of approximately nine acres of benthic habitat during causeway fill placement and the potential for mortality and behavioral disturbance of some EFH species individuals from pile driving induced overpressures and noise in the water column during bridge abutment installation. Indirect effects would be associated with short-term increases in turbidity and suspended solids during fill placement.

5.1.1.1 Causeway Fill Placement

Construction of the causeway would place fill, consisting primarily of large angular aggregate, in approximately nine acres of EFH; about 0.02% of Kivalina Lagoon. While approximately nine acres of soft sediment habitat would be directly removed, it is anticipated that the coarse angular rock fill would increase habitat complexity in the lagoon and provide additional habitat for rearing juvenile salmon (and non-EFH forage species) within the three-dimensional prism of the causeway. Sessile invertebrates could use coarse aggregate habitat for attachment and feeding, while EFH fish species could use it for feeding and cover (Reynolds et al, 2010). Direct burial and mortality of EFH species (as identified in Table 1) is unlikely during aggregate placement as juvenile salmon, saffron cod, and Arctic cod would likely avoid the area due to increased noise and turbidity conditions associated with construction. Additionally, aggregate placement is scheduled to avoid peak outmigration and usage of the lagoon by rearing juvenile salmon.

Placement of fill would cause short term increases in turbidity and suspended solids but increases would be limited to the period of construction. Winter fill placement, while much of the lagoon is frozen to the bed, would avoid most affects to EFH and EFH species. Overall, causeway fill is anticipated to have minimal adverse effects to EFH and EFH species and would be limited to localized avoidance.

5.1.1.2 Pile Driving

Pile driving would be used to install either sheetpile abutment walls or abutment support piles. It is possible that pile driving would occur in winter or summer months and is anticipated to last for approximately 30 days, not continuous, regardless of season. Both vibratory and impact hammers could be used during installation.

The proposed location of the causeway could be in the migration route of adult Pacific salmon returning from the sea and heading for spawning areas in the Wulik and Kivalina Rivers. If fish are in the immediate pile driving area as pile driving commences, direct mortality is possible; however, Mueller-Blenkle et al. (2010) found that Atlantic cod detect noise generated from pile driving at great distances and demonstrated an avoidance response. Salmon or cod may demonstrate similar avoidance responses. Outmigrating juvenile salmon will be passing through the lagoon primarily from mid-May to late June, while returning adult salmon are generally present there between early July and late September. Arctic cod and saffron cod can be present year-round; however, likely in considerably lower numbers during winter months.

In 2015, the Fisheries Hydroacoustic Working Group (FHWG), composed of several state and federal agencies, including NMFS, the Federal Highway Administration, and State highway agencies for California, Oregon, and Washington, completed a technical guidance for assessment and mitigation of the hydroacoustic effects of pile driving on fish (FHWG 2015). The report lays out agreed upon criteria for use during all pile driving projects, that have been identified as a peak sound pressure level of 206 dB and an accumulated sound exposure level (SEL) of 187 dB for all fish weighing 2 grams or larger. For fish less than 2 grams, the criterion for accumulated SEL is 183 dB (FHWG 2015). If the ADF&G determines that pile driving will occur in a location and during a timeframe that significant impacts to EFH species could occur, a noise monitoring and mitigation plan would be required to help mitigate the potential exposure to harmful noise levels as set forth by the working group. Possible mitigation methods may include bubble curtains or physical isolation of the work area from surrounding freewater via artificial freezedown of the work area. Impacts to fish from pile-driving activities during bridge should be minimized if these criteria are followed. Winter installation would avoid the period of highest fish use and would thereby reduce potential affects to EFH species.

5.1.1.3 Changes to Water Quality, Currents and Sediment Transport

Impacts on water quality in the lagoon would primarily be associated with construction-related sediment releases during causeway fill and armor stone placement. Localized effects of sediment-laden runoff following construction are anticipated to be temporary and of short duration with the implementation of BMPs. Other potential impacts to water quality would be associated with accidental spills or leaks from vehicles or heavy equipment during either construction or subsequent use of the evacuation route.

River currents are assumed to pass directly from the river deltas through river channels in lagoon sediment and the inlets into the Chukchi Sea (USACE, 2016). Recent surveys and photography have observed that the Kivalina and Wulik River sediments simply pass through the lagoon and are deposited on the outer shoreline (DOT&PF, 2017). With river water outflow into the lagoon and Chukchi Sea not anticipated to be impacted by the proposed project, sediment transport would also not be impacted, allowing for this accretion of the barrier island on the outer beach to continue and maintain this natural erosion buffering dynamic. As such, there is typically little to no current and sediment transport inside the lagoon except during large surge events (DOT&PF, 2017). A bridge would span the approximately 110-ft wide channel that runs parallel on the inside of the barrier island and is mostly the result of scour during the ebb portion of the surge, thus maintaining that dynamic and allowing for fish passage. Culvert(s) will be placed across the northeast end of the causeway allowing for additional fish passage, with evenly spaced overflow pipes placed along the length of the causeway ensuring maintenance of any low-level energy flow and sediment transport regime in the lagoon. Whereas current speeds may increase through the culverts and under the bridge during storm events, such impacts would be temporary and not measurably affect EFH or EFH species.

5.1.2 Evacuation Route

EFH has not been identified along either the Southern Route or Combined Route B (Figure 2 and Figure 3). As such, direct effects associated with construction and operation of the evacuation route would be limited to water withdrawal associated with summer dust control (assuming water from the Wulik River is used as a source) and ice road construction to support winter activities (Table 2).

5.1.2.1 Water Withdrawal

Water availability during winter will be limited, and the most likely source will be the Wulik River. Screened intake and volume withdrawal criteria will be needed to ensure potential effects to EFH species are mitigated. Volume limitations and use of ADF&G compliant screened intakes would reduce the potential for adverse effects.

During road construction, water withdrawals would be required to create temporary ice/snow roads, dust control and to support road compaction. Water to support these activities would likely be sourced from surface waterbodies along the final selected route alignment. Water withdrawal activities can affect EFH species in multiple ways. Fish could be entrained or entrapped within the pumping system itself or become impinged on the intake structure at the point of withdrawal. Water withdrawal during winter can lead to water levels that reduce habitat quality including inadequate volume to resist freezing and inadequate volume to retain high enough dissolved oxygen concentration for survival of fish. Winter withdrawal could lead to reduced flows in small streams and could affect spawning beds and fish eggs within the gravel as well as impede fish passage to and between important overwintering habitats. Fish overwintering areas can exist as isolated pools or stream reaches that would be highly sensitive to water removal. Summer season withdrawal can also have similar affects to fish and fish habitat if volume removal is too high. Reductions in water levels and flows can increase water temperatures to beyond the thermal tolerances of some fish species, but could also increase productivity for juveniles of others. Any withdrawal that leads to discontinuous surface flows could trap fish. During winter, effects of water withdrawal could persist for the entire winter construction season. Summer withdrawals would have less potential for adverse effects on fish and fish habitat but excessive withdrawal could still lead to minor short-term impacts depending on the timing of the withdrawal.

5.2 MATERIAL SOURCE DEVELOPMENT

A total of four material sources are proposed. Of these, interaction with EFH is limited to the Wulik River Source 1 site (Section 2.2.2; Figure 2; photographs in Appendix B). The Wulik River Source 1 source would be developed along the west bank of the Wulik River when the ground is frozen and could affect EFH and EFH species.

Material extraction sites studied in arctic and subarctic floodplains in Alaska have demonstrated both adverse and beneficial effects on fish and fish habitats depending on the type and size of the river, type of material extraction employed, and the amount of material extracted (Joyce et al. 1980a, Ott et al 2014). Material source development can lead to destabilization of river channels, river channel capture, floodplain widening, increased erosion and sedimentation, increased water velocities, reduced water quality, can lead to aquatic habitat shifts, and in some instances, has been documented to cause surface flows into the gravels creating a barrier to fish passage (Joyce et al 1980a). On the other hand, local fish populations have benefited from gravel mine sites in some locations through the creation of overwintering and productive feeding habitats (Ott et al. 2014). Ott et al. 2014 also found that several gravel mine sites, most constructed as pits, were eventually connected to nearby drainages on Alaska's North Slope, and successfully used for overwintering. Gravel extraction sites in that study provided a habitat that is limited in the Arctic and thus functioned as viable habitat creation.

Blasting at material sources may be required to develop adequate source rock (Kolden and Aimone-Martin, 2013). Blasting has the potential to impact fish from substrate vibration and water overpressure (Kolden and Aimone-Martin, 2013). These can disrupt embryo development, and lead to trauma to adult fish (Kolden and Aimone-Martin, 2013). Kolden and Aimone-Martin (2013) found that current ADF&G (1991) blasting standards appear to sufficiently protect salmonid embryos, juveniles, and adults. Blasting at individual material sources would require site specific mitigation measures to comply with ADF&G guidelines and prevent impacts to fishery resources.

Access to and development of material sources near the Wulik River and its relic channels would likely occur, at least in part, during the winter months when the ground is frozen. Upon completion of the proposed project, material sources would be reclaimed as per permit requirements.

Development of the Wulik River Source 1 could affect EFH and EFH species as described above. The site is located adjacent to the downstream most extent of Dolly Varden overwintering and chum salmon spawning, and pink salmon spawning habitat. Coordination with ADF&G and

NMFS would be conducted during design to develop an adequately sized material site at the selected location, maintain adequate setbacks from the river, and avoid channel capture and destabilization. In addition, the extent of saline intrusion up-river in the Wulik may be needed to check that connecting this site to the river would not produce a saline lake, thereby reducing any potential benefits to EFH and resident fish species. Additional analysis of the Wulik River Material source may be required prior to development to determine if these issues can be addressed through adherence to the guidelines presented in the documents referenced above and permit conditions.

6.0 AVOIDANCE AND MINIMIZATION

Avoidance and mitigation measures to protect fish and fish habitat are outlined in the Kivalina Evacuation and School Site Access Road Draft Environmental Assessment (DOT&PF, 2017). For consistency, avoidance and minimization measures identified in the Environmental Assessment that are specific to protection of EFH and EFH species are summarized below.

Kivalina Lagoon Crossing:

- In-water work associated with the lagoon crossing would be scheduled to reduce impacts to fish.
- Implementation of BMPs that avoid or minimize adverse impacts to water quality and marine habitats.
- Conduct pile driving during periods that limit impacts to salmon juveniles and adults (NMFS, 2017a). If not possible, other options include:
  - Conduct operations at low tide;
  - Use vibratory hammer, or if an impact hammer is required, use a vibratory hammer to the maximum depth possible; or
  - Use the smallest hammer practicable.

Evacuation Road:

- During construction, occurring concurrent with critical timing windows, appropriate measures would be implemented (e.g., construction of a diversion channel) to maintain fish migration and passage.
- DOT&PF and the construction contractor would coordinate with ADF&G to identify and implement appropriate migration measures.

Material Sources:

- Material source selection and site specific mining plan design and reclamation would reduce the potential for adverse impacts and could enhance fish habitats in some drainages, such as the Wulik Relic Channel.

7.0 CONCLUSIONS

Development of the proposed Kivalina Evacuation and School Site Access Road Project will interact with EFH and EFH species; however, as summarized in Table 3, none of the proposed actions are expected to rise to population level effects. As such, the proposed project is **Unlikely to Adversely Affect/Adverse Effects Minimal** to EFH and EFH species.

Table 3 Proposed Project Component Effects Determination Summary and Rational

Proposed Action Component	Effects Determination	Rational
Kivalina Lagoon Crossing	Unlikely to Adversely Affect/Adverse Effects Minimal	Direct effects to EFH include the burial of 9 acres of habitat, or 0.02% of available lagoon habitat, and potential mortality of EFH species during aggregate placement. The addition of coarse angular aggregate will increase habitat complexity and utility for several species including Pacific salmon. Additionally, mortality of EFH species is anticipated to be low based on avoidance tendencies and proposed timing of construction. Population level effects are not anticipated.
Evacuation Road	No Adverse Effects	The primary potential to adversely affect EFH would be from winter water withdrawal from the Wulik River. Screened intakes and winter withdrawal volume limitations required in State of Alaska permits authorizing the withdrawal would minimize the potential for adverse effects to EFH and EFH species in the Wulik River. Crossings of the Wulik Relic channel, though not identified as EFH, would be constructed to pass fish and maintain water body integrity, as required. No population level effects are anticipated for any EFH species using the Wulik River.
Material Sources	May Adversely Affect/Adverse Effects Minor to Moderate	Only Wulik River Source 1 is located within EFH and could have adverse effects on EFH or EFH species. The point bar at this location is dynamic with multiple active highwater channels present. The site would be sized and placed adequately distant from the active channel to reduce the potential for river capture. While river capture would be unlikely, if it were to occur, downstream geomorphic responses to the change in river course could last until a new stable condition is attained. Some pink salmon spawning habitat could be affected. Despite the potential adverse effects associated with river capture, no population level effects to pink salmon are expected.

8.0 REFERENCES

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Appendix A SITE PHOTOGRAPHS

Stantec

Photographic Log

Client:	**Department of Transportation and Public Facilities, Northern Region**	**Project:**	**Kivalina Evacuation and School Site Access Road**
Site Name:	**Wulik River and Relic Channel**	**Site Location:**	**Kivalina**

Photograph ID: 1

Photo Location:
Wulik River

Direction:
Upstream

Survey Date:
8/15/2017

Comments:
Wulik River Source 1 material site high water channel at the furthest inland margin

Photograph ID: 2

Photo Location:
Wulik Relic Channel

Direction:
Cross Channel

Survey Date:
8/15/2017

Comments:
Mouth of the Wulik River Relic Channel

Client:	**Department of Transportation and Public Facilities, Northern Region**	**Project:**	**Kivalina Evacuation and School Site Access Road**
Site Name:	**Wulik River and Relic Channel**	**Site Location:**	**Kivalina**

Photograph ID: 3

Photo Location:
Wulik River

Direction:
Downtream

Survey Date:
8/15/2017

Comments:
Wulik River Source 1 material site view downstream

Photograph ID: 4

Photo Location:
Wulik River

Direction:
Downstream

Survey Date:
8/15/2017

Comments:
Wulik River Source 1 material site looking downstream at high water channels

Client:	Department of Transportation and Public Facilities, Northern Region	Project:	Kivalina Evacuation and School Site Access Road
Site Name:	Wulik River and Relic Channel	Site Location:	Kivalina

Photograph ID: 5 **Photo Location:** Wulik Relic Channel **Direction:** Upstream **Survey Date:** 8/15/2017 **Comments:** Wulik Relic Channel material site area	
Photograph ID: 6 **Photo Location:** Wulik Relic Channel **Direction:** Cross Channel **Survey Date:** 8/15/2017 **Comments:** Wulik Relic Channel material site area	

Client:	**Department of Transportation and Public Facilities, Northern Region**	**Project:**	**Kivalina Evacuation and School Site Access Road**
Site Name:	**Wulik River and Relic Channel**	**Site Location:**	**Kivalina**

Photograph ID: 7	
Photo Location: Wulik Relic Channel	
Direction: Cross Channel	
Survey Date: 8/15/2017	
Comments: Wulik Relic Channel material site area	

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic Atmospheric Administration
National Marine Fisheries Service
P.O. Box 21668
Juneau, Alaska 99802-1668

December 14, 2017

Jonathan Hutchinson, P.E., Engineering Manager
Alaska Department of Transportation and Public Facilities, Northern Region
2301 Peger Road
Fairbanks, Alaska 99709-5316

Re: Kivalina Evacuation Route Draft Environment Assessment and Essential Fish Habitat Assessment, AKSAS #NFHWY00162

Dear Mr. Hutchinson:

The National Marine Fisheries Service (NMFS) has reviewed the Kivalina Evacuation Route Draft Environmental Assessment (DEA) and Essential Fish Habitat (EFH) Assessment (Appendix I of DEA) issued on November 15, 2017. The Alaska Department of Transportation and Public Facilities (ADOT&PF) is proposing to construct an all-season road from the Community of Kivalina, Alaska, extending eight-miles northeast to an evacuation location on Kisimigiuqtuq Hill (K-Hill). While this project may receive Federal funding, it is led by ADOT&PF and they assumed the responsibilities for complying with Federal environmental laws under a Memorandum of Understanding with Federal Highway Administration. We are providing conservation recommendations based on our authorities under of the Essential Fish Habitat (EFH) provisions in Section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA).

Essential Fish Habitat Assessment:
ADOT&PF's EFH Assessment identified EFH for Chinook, chum, coho, pink, and sockeye salmon migrate through or spawn in the Wulik River, which is EFH (Salmon Fishery Management Plan) and saffron cod and Arctic cod overwinter in the Kivalina Lagoon (Arctic Fishery Management Plan). Although early documents discussed effects to the Kivalina River, none of the alternatives presented in the DEA affect this waterbody.

The EFH Assessment concluded that the preferred project as a whole, including the identified avoidance and mitigation measures, is not likely to adversely affect EFH or that adverse effects to EFH would be minimal. However, the EFH Assessment identified that one of the four material sources may adversely affect EFH.

EFH Conservation Recommendations:
NMFS offers the following EFH Conservation Recommendations pursuant to section 305(b)(4)(A) of the MSA:
Material Sources: ADOT&PF identified four material sources. We agree with the EFH

Assessment that the Wulik River Source #1 could have an adverse effect on EFH. To avoid adverse effects to EFH, we recommend using the K-Hill material source because it has the least potential to affect EFH. Relic Wulik Channel Material Source #2 and Wulik Relic Channel Source #1 would also be acceptable sources because of their location on the northwest side of the new evacuation route where the Wulik River would be unlikely to flow. Our recommendation to avoid use of the Wulik River Materials Site #1 is based on the NMFS Gravel Extraction Guidelines (NMFS 2005). If the other three material sites become exhausted, we request that ADOT&PF consult with us on best management practices prior to allowing the contractor to extract material from the Wulik River Source #1.

Kivalina Lagoon Crossing: We agree with ADOT&PF's determination that the crossing would not likely adversely affect EFH. The 110-foot single span bridge is critical to maintaining existing water circulation patterns in the Kivalina Lagoon as it spans a deep, stable channel. If the channel is obstructed, large sections of the lagoon might convert into swampy lowlands and no longer provide EFH for Arctic cod and saffron cod.

The northeastern fish passage structure in the causeway is described as twin culverts of unspecified diameter and length; this description lacks sufficient detail to evaluate its effects to EFH. NMFS recommends that the northeast fish passage structure be designed such that it is easily maintained on an annual basis. If this fish passage structure is not maintained as an open water passage, the causeway will likely create an area of stagnant water leading to material accumulating and resulting in additional loss of EFH. Long-term maintenance is often facilitated by designing an opening large enough to fit a small piece of earth moving equipment.

Section 305(b)(4)(B) of the MSA requires the Federal action agency to provide NMFS with a detailed written response to these EFH Conservation Recommendations. If your response is inconsistent with our recommendations, please explain the reasons for not following our recommendations, including the scientific justification for any disagreements over the anticipated effects of the proposed action and the measures needed to avoid, minimize, mitigate, or offset such effects (50 CFR 600.920(j)).

ADOT&PF is consulting with NMFS on the effects of this project on species listed under the Endangered Species Act. The DEA and the request for consultation letter (Appendix G) does not contain sufficient project detail for NMFS to provide an Endangered Species Act determination. Please continue your communication with Bonnie Easley-Appleyard at (907) 271-5172, bonnie.easley-appleyard@noaa.gov on this subject.

We appreciate the early and frequent communication with ADOT&PF. If you have any questions regarding our EFH Conservation Recommendations, please contact Sean Eagan at (907) 586-7345, sean.eagan@noaa.gov or Samantha Simpson at (907) 271-1301, samantha.simpson@noaa.gov.

Sincerely,

Robert D Mecum

for James W. Balsiger, Ph.D.
Administrator, Alaska Region

Cc: Jonathan Hutchinson, ADOT&PF, jonathan.hutchinson@alaska.gov
Sara Lindberg, Stantec, sara.lindberg@stantec.com
Audra Brase, ADF&G, audra.brase@alaska.gov
Kaithryn Ott, USFWS, kaithryn_ott@fws.gov

References:

Arctic Fishery Management Plan: Fisheries Management Plan for the Fish Resources of the Arctic Area https://www.npfmc.org/wp-content/PDFdocuments/fmp/Arctic/ArcticFMP.pdf

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Salmon Fishery Management Plan: Fishery Management Plan for the Salmon Fisheries in the EEZ off the Coast of Alaska https://www.npfmc.org/wp-content/PDFdocuments/fmp/Salmon/SalmonFMP114.pdf

THE STATE
of ALASKA
GOVERNOR BILL WALKER

Department of Transportation and Public Facilities

NORTHERN REGION
Design and Engineering Services
Preliminary Design and Environmental

2301 Peger Road
Fairbanks, AK 99709-5316
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December 20, 2017

James Balsiger
National Marine Fisheries Service
PO Box 21668
Juneau, Alaska 99802-1668

RE: Kivalina Evacuation Route Draft Environmental Assessment and Essential Fish Habitat Assessment, AKSAS #NFHWY00162

Dear Mr. Balsiger:

The Alaska Department of Transportation and Public Facilities (DOT&PF) has reviewed your conservation recommendations based on the authorities under the Essential Fish Habitat (EFH) provisions in Section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA). We agree with your EHF Conservation Recommendations, and are providing a detailed response below.

Material Sources: NMFS and the EFH Assessment has identified that development of the Wulik River Source #1 could have an adverse effect on EFH. We will follow your recommendation to prioritize use of the material sources on this project, with the K-Hill site and Relic Channel sources given highest priority, and the Wulik River Source used last, if needed, once the other sites have been exhausted of the needed material. We will coordinate with NMFS on best management practices to use when developing the site prior to allowing the contractor to extract material from the Wulik River Source #1.

Kivalina Lagoon Crossing: The northeastern fish passage structure design is still ongoing, as it must also provide important hydrological connectivity through the causeway. DOT&PF designs culverts to accommodate anticipated debris and icing mitigation to prevent flow blockage and these culverts will also be designed to be easily maintained as an open water passage at mean tide, thereby preventing proximate areas of stagnant water during tidal exchange.

We appreciate your recommendations during the consultation process. If you have any questions, please contact me at (907) 451-2238, brett.nelson@alaska.gov.

Sincerely,

Brett O Nelson

Brett Nelson
Northern Region Environmental Manager

cc:
Sean Eagan, NMFS
Samantha Simpson, NMFS
Jonathan Hutchinson, ADOT&PF
Audra Brase, ADF&G
Kaithryn Ott, USFWS

APPENDIX J

FIELD RECORD – LARGE MAMMAL USE OF STUDY AREA

Page

Record of Field Notes: Kivalina Evacuation Road

During multiple years of site investigations, the field crews have taken notes of incidental wildlife observations. These records are presented here as evidence of large mammal use of the area.

Bears

Potential bear excavations have been observed on multiple field trips along the south and east side of Kisimigiuqtuq Hill (K-Hill), one of which may have once been used as a denning site. A potential bear den was photographed during a site visit in 2016 and located again in 2017. Four other excavations were mapped in 2017. Photographs of three excavations were taken on the ground by crews in 2016 and 2017 (Table 1).

A comprehensive bear den survey of the Study Area has not been conducted. When observed, excavations and the potential den site did not appear to have been used recently; and all exhibited some weather-related erosion and/or appeared collapsed.

Individual brown bears have also been observed in the Study Area. In 2017, a sow and two cubs were observed traveling southwest of K-Hill, and another individual was observed on the west side of the Wulik River.

Figure 1: Excavations: The green dot is the potential bear den, and yellow dots are excavations identified in 2017.

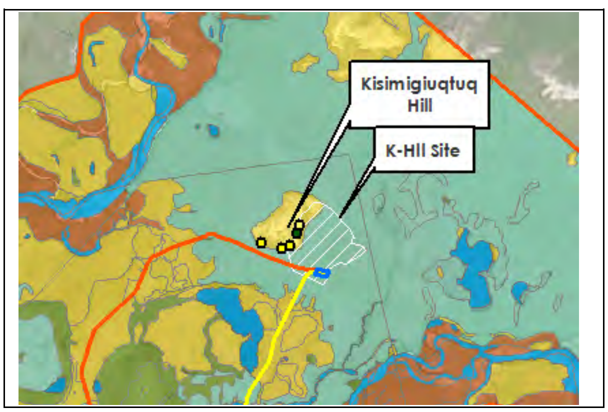


Table 1: Potential Bear Den and Photographs of Three Other Excavations

IMG_5358, 9/14/2016, Possible bear den. No fur or other animal indicators observed. Site does not appear to have been used recently	IMG_1699, 8/15/2017, Excavation. Located on K-Hill.
	
IMG_5363, 9/14/2016, Excavation.	IMG_1703, 8/17/2017, Excavation.
	

Caribou

Caribou sign (e.g. scat, antlers, bones, tracks) have been observed at multiple locations throughout the Study Area in September 2016 and August 2017 (Table 2). Caribou trails were observed around the north and east sides of K-Hill. In 2017, two caribou were observed east of K-Hill on the north side of the Wulik River.

Table 2: Caribou Sign

IMG_5340, 9/14/2016, Caribou antler on the ground near tower. NE side of K-Hill	IMG_5479, 9/15/2016, Caribou Skull, No GPS
	
IMG_5691, P34A, 9/16/2016, Caribou rack, 67.7764, -164.4432 WGS1984	
	

Muskoxen

Muskoxen occupy the Study Area, and were observed during aerial transit between field points in fall of 2016 and fall of 2017. To reduce disturbance, field crews avoid flying near individuals. As a result, documentation of locations has not been included in any field notes. In August 2017, one lone muskox was observed while boating up the Wulik River to the Wulik River Material Source 1.

Table 3: Muskoxen

IMG_5590, 9/15/2016, (4) Musk Ox spotted from air flying from P18 to P19 (Along Wulik River, east of K Hill)


APPENDIX K

SECTION 4(f) DE MINIMIS IMPACT FINDING FOR HISTORIC SITES

Page

Letters in Appendix F – Section 106 Consultation (to reduce duplication)

Section 4(f) *De Minimis* Impact Finding
for

Historic Sites

For NEPA Assignment Program Projects

Project Name: Kivalina Evacuation and School Site Access Road

Project Number (State and Federal): 0002384/NFHWY00162

AHRS Site Number and Site Name: Cape Krusenstern National Historic Landmark

Attachments:

- Copy of the finding letter that notified the SHPO of the intended *de minimis* impact finding and any concurrences received from the SHPO and ACHP (if participating)
- Copies of any consulting party correspondence
- Map showing the 4(f) property boundary in relation to the project area
- Other:

De minimis impacts related to historic sites are limited to the determination of either "no adverse effect" or "no historic properties affected" in compliance with Section 106 of the National Historic Preservation Act. Use a separate form for each site.

The environmental review, consultation, and other actions required by applicable federal environmental laws for this project are being, or have been, carried out by DOT&PF pursuant to 23 U.S.C. 327 and a Memorandum of Understanding dated November 3, 2017, and executed by FHWA and DOT&PF.

I. Project Description:

The Proposed Action would construct a safe, reliable, all-season evacuation road between the community of Kivalina and K-Hill. A range of route alternatives are being considered, but common to all are the following actions:

- **Establishment of a safe, reliable, all-season Kivalina Lagoon crossing**. All alternatives include construction of a causeway across the lagoon that variously incorporate different configurations of hydrological openings including bridge(s), culvert(s), or both;
- **Construction of an all-season access road connecting the Kivalina Lagoon crossing to the K-Hill evacuation site**. The road would be designed to accommodate a wide variety of motorized vehicles over a two-way road with shoulders, multiple turnouts, and side slopes that may include guardrail and other safety features (e.g. signage) where determined to be necessary and prudent; and
- **Development of up to four material sources** including the K-Hill Site, Wulik River Source 1, Relic Channel Source 1, and Relic Channel Source 2. These material sources are anticipated to be suitable local sources of select material to supply the project. Selection and development of viable material sources and haul routes are considered as part of the Proposed Action.

II. Section 4(f) Property Description:

Describe the historic site that is on or eligible for inclusion on the National Register of Historic Places (NRHP). Include type of historic property, the significance criteria and aspects of historic integrity that qualify the property to be eligible, and location of the historic site. Include a map depicting the boundaries and features of the Section 4(f) property in relation to the proposed project. For historic properties, the boundary should be identified during the Section 106 process.

The Proposed Action Study Area (Figure 1) is located entirely on either private lands or State of Alaska owned tidelands within the Cape Krusenstern National Historic Landmark (CKNHL; Figure 3). The CKNHL is a Section 4(f) property managed by the National Park Service (NPS) and is an archaeological district established in

1973 that encompasses a series of 114 marine beach ridges across 70 miles of Chukchi Sea shoreline, contains the cultural remains of peoples who inhabited the beaches for 5,000 or more years, and was established to preserve extensive archaeological resources in the area. The Proposed Action Study Area and relationship to the Section 4(f) property are illustrated on Figure 3.

In 2016, two cultural resources investigations were completed for potential evacuation route and material site alternatives. An archaeological predictive model was developed for the study area, and in the fall of 2016, Stantec conducted an archaeological reconnaissance and assessment of a preliminary study area for this project to contribute to the completion of a draft environmental assessment. The field investigation included pedestrian survey and subsurface testing, including a total of 39 soil probes, 75 shovel test pits, and 5 test units. No archaeological sites or historic properties were identified within the potential evacuation route alignments or material site alternatives that were defined at the time of the investigations.

In August 2017 DOT&PF officially initiated consultation with local, state, and federal consulting parties including the Alaska State Historic Preservation Office (SHPO) and NPS to ensure compliance with the requirements of the National Historic Preservation Act and its implementing regulations. The Area of Potential Effects defined by DOT&PF included additional areas that were not previously assessed during the 2016 predictive modeling or field investigations. A supplemental archaeological resources assessment was conducted by Stantec in August 2017 to address data gaps identified by DOT&PF in coordination with SHPO and NPS. No archaeological or historical resources were identified during pedestrian survey and subsurface testing along the revised alternative route, or within any of the expanded potential material source locations.

III. Project Use of the Section 4(f) Property:
Describe all impacts the project will have on the historic site.

Cape Krusenstern National Historic Landmark: Proposed project alternatives would permanently incorporate a minor portion of the CKNHL (approximately 400 acres of the CKNHL expanse of 500,000 acres), a Section 4(f) property, into a transportation facility; therefore, Section 4(f) of the Department of Transportation Act would apply under criteria 23 CFR 774.17(1).

Pursuant to 36 CFR 800.5(d)(2), implementing regulations of Section 106 of the National Historic Preservation Act, DOT&PF has found, and the NPS and SHPO concurred (on October 6 and 9, 2017, respectively) that the Proposed Action would not adversely affect the CKNHL. Based on the undertaking not adversely affecting the function or historic qualities of the CKNHL and that agreement from the SHPO and NPS has been obtained in writing, the proposed project alternatives appear to meet a de minimis (23 CFR 774.17) use.

Alaska Maritime National Wildlife Refuge: None of the proposed alternatives would include development within the Alaska Maritime National Wildlife Refuge (Refuge), a Section 4(f) property. The closest proposed project alternative would be 0.4 mile from the Refuge which would include construction of a new 24 ft wide road, separated by land and sea. Proposed project alternatives are not anticipated to result in noise or vibration impacts to the Refuge as construction work would be temporary and the community of Kivalina is about the same distance from the Refuge with existing noise generated from vehicular and aircraft traffic. There would be a change in the aesthetic nature of land where the proposed project alternative would be constructed, but the nearest distance to the refuge would be 0.4 mile away. No ecological intrusions would result from proposed project alternatives as the alternatives are not within the Refuge itself. Migratory bird impacts would be reduced by scheduling construction and vegetation clearing activities to occur outside of important nesting periods. The proposed project alternatives would not have a permanent incorporation, adverse temporary occupancy, or constructive use of the Refuge; therefore, it appears that the Proposed Action would not result in a use of the Refuge. The DOT&PF obtained a "No Use Determination," since the proposed activities would not impact the Refuge (Appendix A).

IV. Impact Avoidance, Minimization, and Mitigation or Enhancement Measures to the Section 4(f) Property:
Identify any avoidance, minimization, and mitigation or enhancement measures that are included in the project to address the Section 4(f) use. For the purposes of this de minimis finding, "avoidance" here means avoidance of historic buildings, structures, or objects on the historic site, or avoidance of features and elements that contribute to the aspects of historic integrity that qualify the property to be eligible.

Archaeological surveys were conducted to identify archaeological or historical resources; as none were identified, the following design modifications were implemented to minimize and mitigate adverse impacts to the Section 4(f) property:

- Project elements (e.g. road embankment geometry, vehicle turn outs, water crossings) would be designed to incorporate the minimal dimensions necessary to serve the project purpose and need to minimize required fill placement.
- Project elements would be contained within a 300-foot ROW, the road would be no greater than 24- feet wide with 3:1 side slopes, and embankment height no greater than 8 feet above existing ground.
- Implement an Inadvertent Discovery Plan between DOT&PF, FHWA, SHPO, NPS, and local consulting parties prior to ground disturbing work associated with material site development.
- Monitor vegetation removal and stripping fine-grained sediments, possibly capping buried gravel deposits within Relic Channel Source 1, and north of the exposed gravel bar within the Wulik River Source 1 area. A professional archaeologist would complete monitoring.

V. Consulting Party Involvement:

List all Section 106 consulting parties that were contacted and summarize their comments. Please include contacts that were made even if no response was received.

The following includes a summary of Section 106 consulting party correspondence and responses:

- A Section 106 coordination meeting was held with the SHPO and NPS on July 10, 2017. During the meeting, it was discussed if additional cultural resource survey would be needed, and further discussion would take place following the meeting with DOT&PF, NPS, and SHPO to determine extent of field work needed. Following the meeting NPS would coordinate internally for possible *de minimis* finding.
- Section 106 Consultation Initiation Letters were sent to SHPO, NPS, Native Village of Kivalina, City of Kivalina, Native Village of Noatak, NANA Regional Corporation, Northwest Arctic Borough (NAB), NPS-Western Arctic National Parklands, and Bureau of Indian Affairs (BIA) on September 7, 2017. No responses were received.
- A site visit and project update meeting was held with SHPO and NPS on August 16, 2017. The conclusion of the site visit was that the likelihood of finding in situ buried cultural resources within the APE is low. Due to the location of the project within the Cape Krusenstern National Historic Landmark the extra testing measures conducted within the project APE were both necessary and sufficient to constitute an appropriate level of investigation to assess the project's potential effects on cultural resources.
- Section 106 Consultation No Historic Properties Adversely Affected Letters were sent to SHPO, NPS, Native Village of Kivalina, City of Kivalina, Native Village of Noatak, NANA Regional Corporation, NAB, NPS-Western Arctic National Parklands, and BIA on September 19, 2017.
    - The NPS concurred with the finding of no historic properties adversely affected conditional to include archaeological monitoring and an Inadvertent Discovery Plan on October 6, 2017.
    - SHPO concurred with the finding of no historic properties adversely affected conditional to include archaeological monitoring and an Inadvertent Discovery Plan on October 9, 2017.
- An informational letter was sent to SHPO, NPS, Native Village of Kivalina, City of Kivalina, Native Village of Noatak, NANA Regional Corporation, NAB, NPS-Western Arctic National Parklands, and BIA on December 29, 2017 to respond to comments received from NPS in their October 2017 concurrence letter. The updated letters address two AHRS sites on the periphery of the APE, where visual effects were of greatest concern. No ground disturbing activities are planned for the portions of the APE containing these two sites. The updated letters also include a finalized Inadvertent Discovery Plan.

VI. Coordination:

The State Historic Preservation Officer (SHPO), the Advisory Council on Historic Preservation (ACHP) (if participating), and the National Park Service (if the historic site is within a National Historic Landmark) has been informed in writing of DOT&PF's intent to make a *de minimis* impact finding based on written concurrence of the Section 106 determination. Attach documentation.

YES ☒ NO ☐

Notes:

VII. Signatures:

A. I recommend that DOT&PF find the project's impacts on the Section 4(f) property to be *de minimis*.

Brett D Nelson

[Signature] Regional Environmental Manager

Date: 1-4-18

Brett Nelson

[Print Name] Regional Environmental Manager

B. I have determined that:

1. The process required by Section 106 of the National Historic Preservation Act resulted in the determination of "no adverse effect" or "no historic properties affected" with the written concurrence of the SHPO, the NPS (for a landmark), and the ACHP (if participating);
2. The SHPO, ACHP (if participating in the Section 106 consultation), and NPS (if the historic site is within a National Historic Landmark) was informed of DOT&PF's intent to make a *de minimis* impact finding based on their written concurrence(s) in the Section 106 determination;
3. DOT&PF has considered the views of any consulting parties participating in the Section 106 consultation; and
4. The project will result in a *de minimis* impact on Cape Krusenstern National Historic Landmark

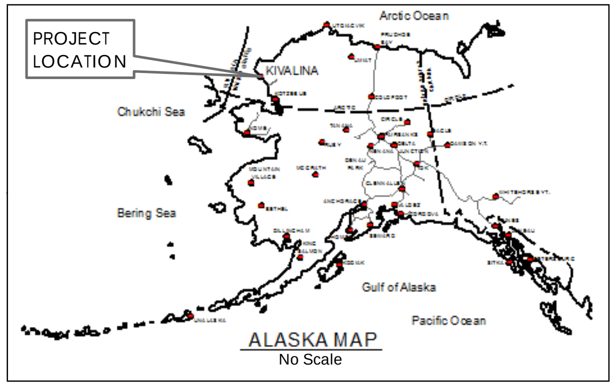
[Signature] NEPA Program Manager

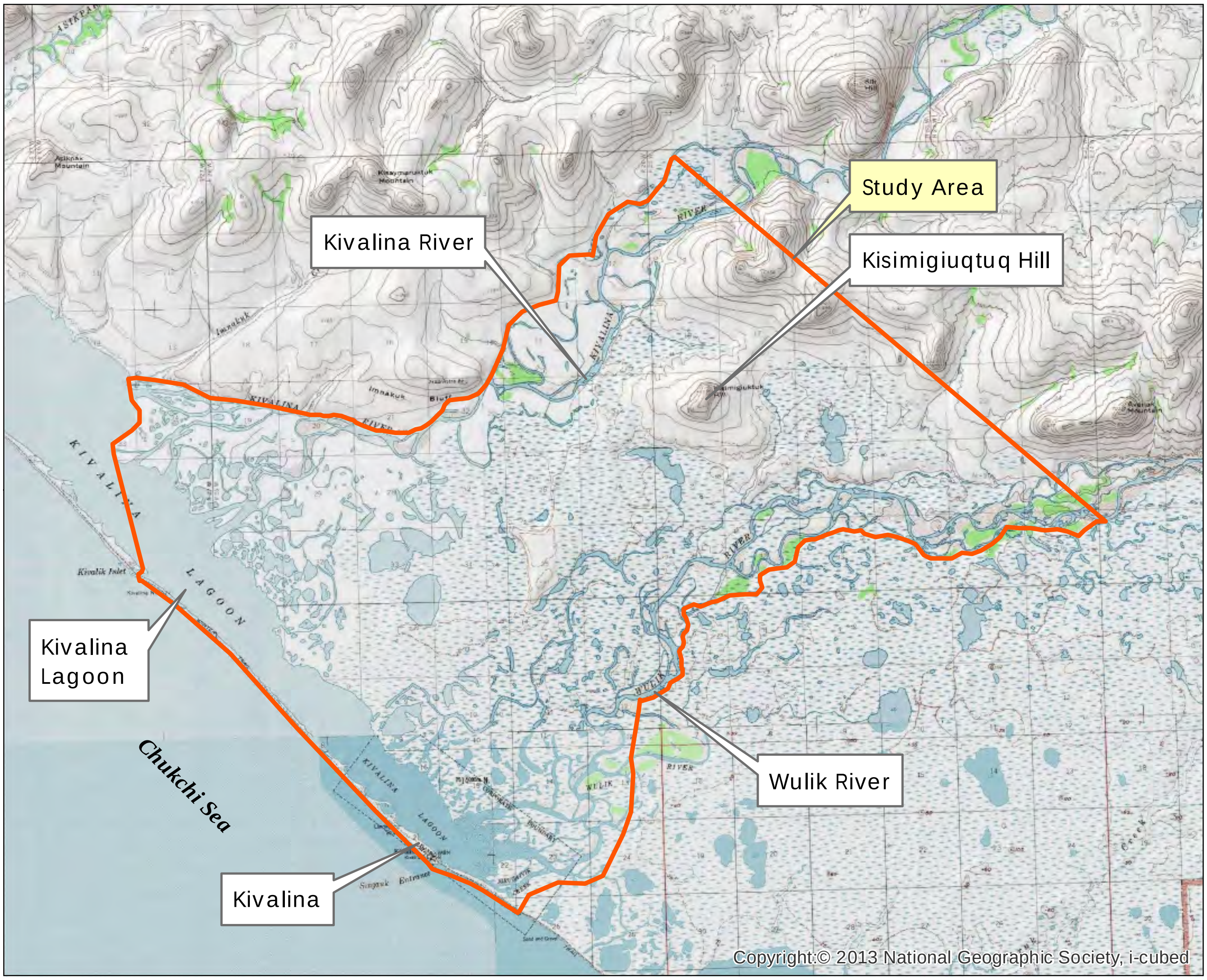
Date: 1/4/2018

Amy L. Sumner

[Print Name] NEPA Program Manager

FIGURES





Graphics developed by Stantec Consulting Services, Inc.

Project Origin: City of Kivalina,
Kotzebue Recording District,
Section 21, Township 27N, Range 26W,
Kateel River Meridian

Project Terminus: Kisimigiuqtuq Hill,
Section 19, Township 28N, Range 25W
Kateel River Meridian

0 1.25 2.5 5 Miles

1:142,961 (at original document size of 8.5x11)

STATE OF ALASKA
Department of Transportation and Public Facilities
2301 Peger Road Fairbanks, AK 99709

KIVALINA EVACUATION AND SCHOOL SITE
ACCESS ROAD

Location and Vicinity Map

DATE: December, 2017	FIGURE **1**

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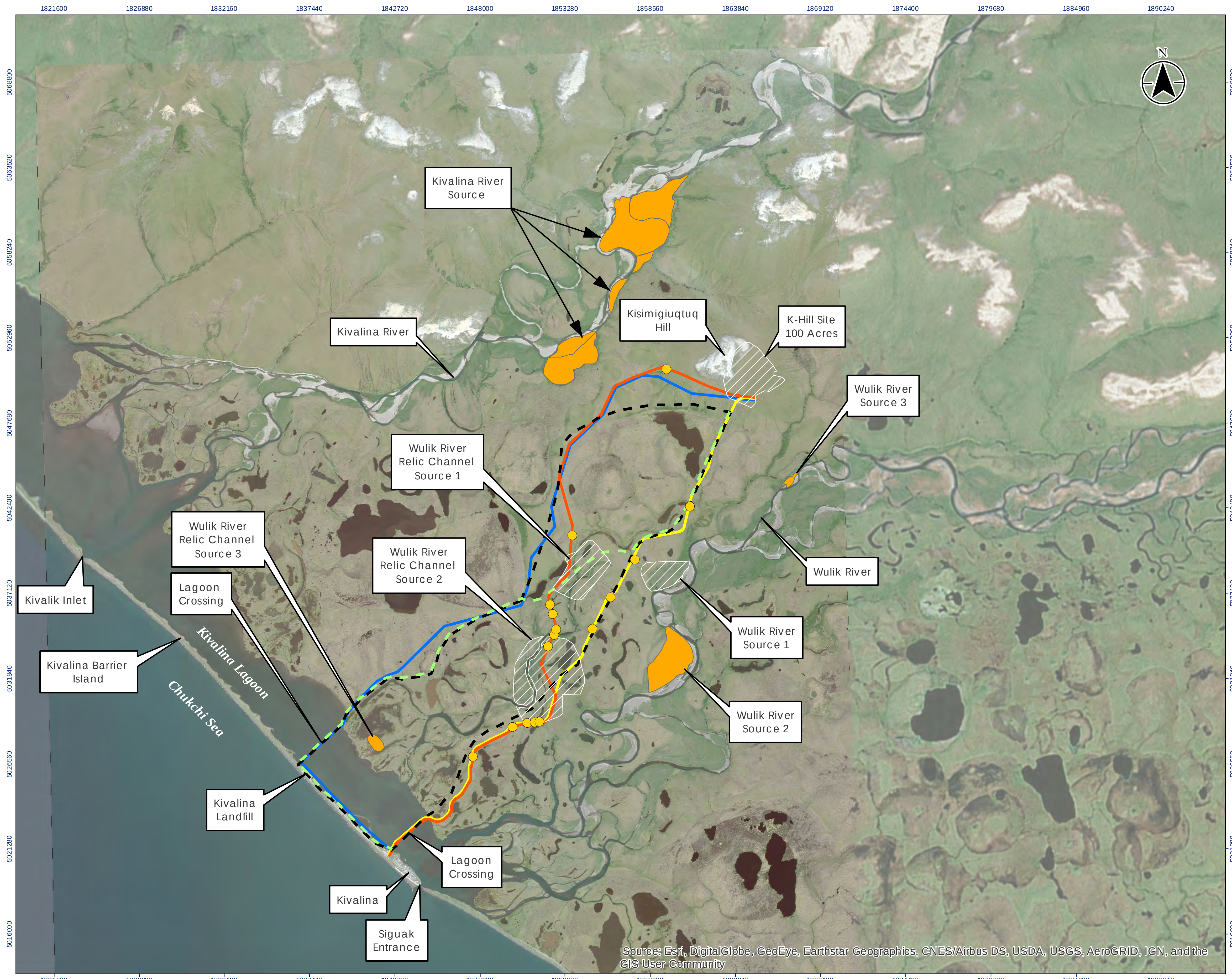


Legend

- Community Proposed Alternatives
- Community Combined Route A
- Northern Route - 9.5 miles*
- Southern Route - 7.7 miles*
- Combined Route B - 8.9 miles*
- Study Area
- Dismissed Material Sites
- Potential Material Source Areas**
- Water Crossings

* Proposed Routes are centered within ~1000 ft corridor.

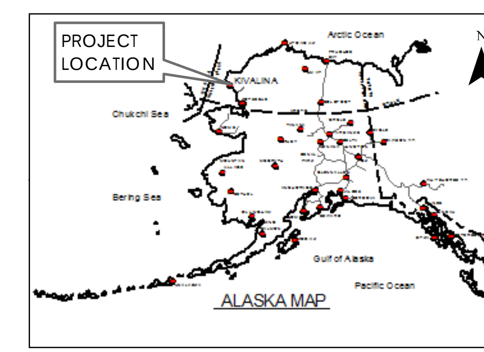
** Material sources would be developed within identified areas (See EA Section 3.1 Table 1).

0 0.5 1 Miles

1:75,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
2. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011; ©AeroMetric Inc., 2013; Digital Globe 2016
3. Ethnohistoric named locations derived from NLURA Cultural Resource Study (January 2016), referenced from published sources (Burch 1994, 1998, 2006).



Graphics developed by Stantec Consulting Services, Inc.

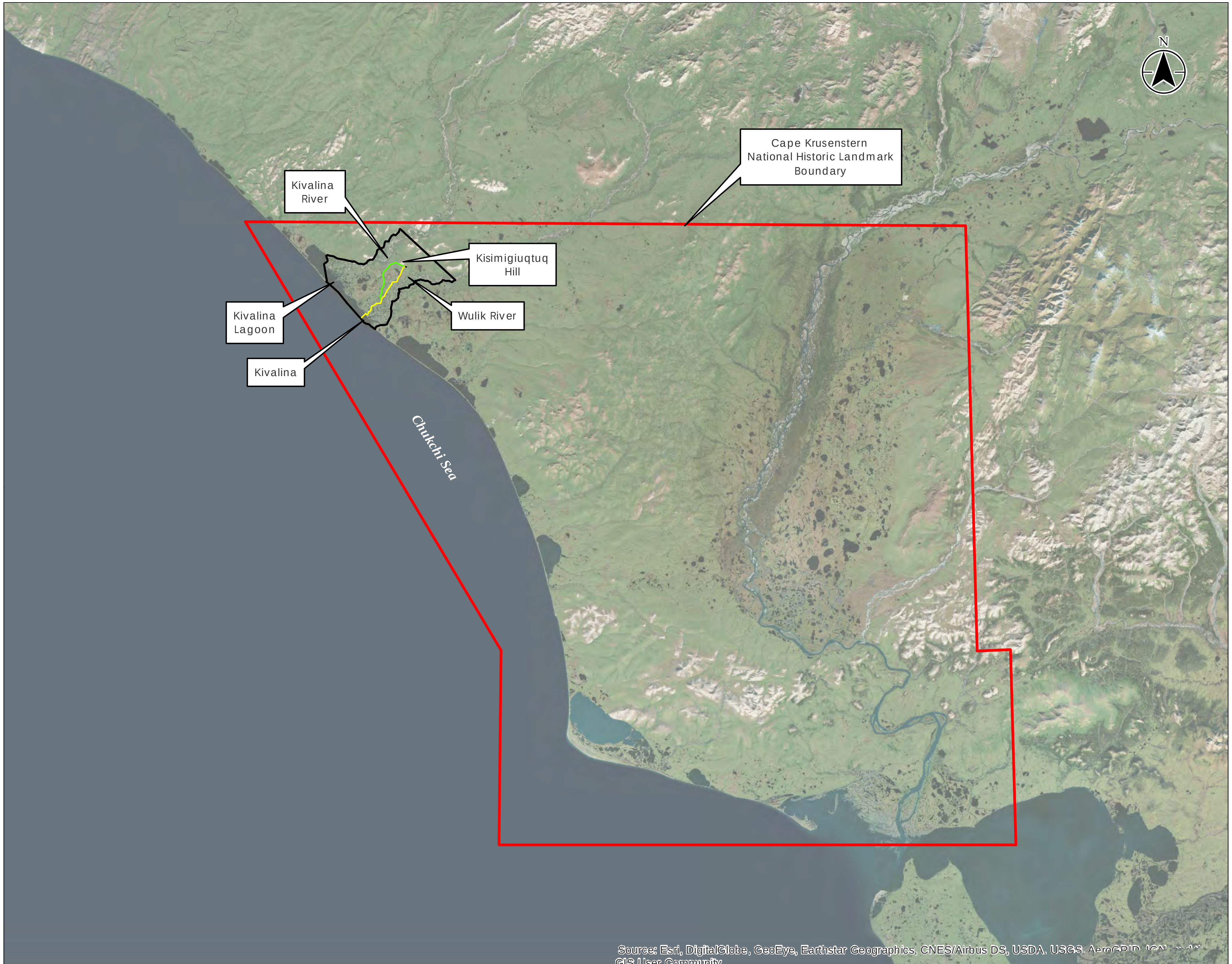
STATE OF ALASKA
Department of Transportation and Public Facilities
2301 Peger Road Fairbanks, AK 99709

KIVALINA EVACUATION AND SCHOOL SITE ACCESS ROAD

Alternatives Considered

DATE: December, 2017 | FIGURE 2

U:\204705510\GIS\mxd\EA\204705510_EA_Fig2_Alternatives Considered.mxd Revised: 2017-12-19 By: cpannone



Legend

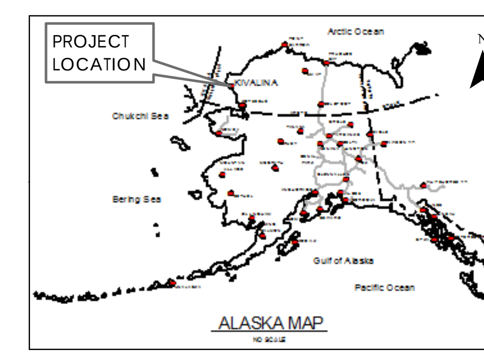
- Study Area
- Cape Krusenstern National Historic Landmark Boundary
- Southern Route - 7.7 miles
- Combined Route B - 8.9 miles

0 5 10 Miles

1:650,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
2. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011; ©AeroMetric Inc., 2013; Digital Globe 2016



STATE OF ALASKA
Department of Transportation and Public Facilities
2301 Peger Road Fairbanks, AK 99709

KIVALINA EVACUATION AND SCHOOL SITE ACCESS ROAD

Cape Krusenstern National Historic Landmark Boundary

DATE: September, 2017	FIGURE 3

U:\12047055102\GIS\mxd\4f\12047055102_4f_Fig-3_Cape Krusenstern.mxd Revised: 2017-09-05 By: cpannone

APPENDIX A

Department of Transportation and Public Facilities

NORTHERN REGION
Design and Engineering Services

2301 Peger Road
Fairbanks, Alaska 99709-5316
Main: 907-451-2273
TDD: 907-451-2363
Fax: 907-451-5126

November 10, 2016

Dear Agency Contact:

Re: Kivalina Evacuation and School Site Access Road
0002384/NFHWY00162
Request for Scoping Comments

The Alaska Department of Transportation and Public Facilities (DOT&PF) and the Federal Highway Administration (FHWA) in partnership with the Northwest Arctic Borough (NAB), Native Village of Kivalina, and the City of Kivalina, are proposing to improve community safety in Kivalina, Alaska by providing an evacuation road between Kivalina Island and a school to be constructed by the NAB that would also serve as a safe emergency evacuee assembly site on Kisimigiuqtuq Hill (K-Hill). Kivalina is located on the southeast tip of a 5.5-mile long barrier island, located between the Chukchi Sea (Arctic Ocean) and Kivalina Lagoon approximately 80 miles northwest of Kotzebue.

DOT&PF is conducting formal scoping to support preparation of an environmental document for the proposed road project in accordance with the National Environmental Policy Act of 1969 (NEPA), as amended. Please identify any environmental, cultural, historic, or subsistence resources you believe may potentially be impacted by the proposed project, and provide any other information you deem valuable to the environmental documentation process. Your responses will help provide us with the necessary inputs to develop and design a proposed final project that avoids and minimizes as many potential adverse environmental and human impacts as possible.

Background

The community of Kivalina has been working for decades with a variety of local, state, and federal agencies to address threats of coastal erosion and flooding. Numerous study, concept, and planning documents exist on potential solutions, which range from: erosion protection around the city; to relocation of the entire community; to a new mainland site. Options involving community relocation have been problematic, as they are neither culturally preferable nor fiscally practical in the foreseeable future. Accordingly, Kivalina has turned to a locally approved approach of facilitating a safe, reliable, and direct means of community evacuation to an acceptable mainland location on K-Hill.

Project Location

The proposed road project origin would be at the City of Kivalina, which lies within the Kotzebue Recording District and is located in Section 21, Township 27 N, Range 26 W, of the Kateel River Meridian. The desired project terminus at K-Hill is located in Section 19, Township 28N, Range 25W, of the Kateel River Meridian. The feasibility of several potential route alignments is currently being evaluated within a project study area encompassing Kivalina Island, the southern portion of Kivalina Lagoon, and the lower Wulik and Kivalina River drainages in Townships 27N and 28N, Ranges 25W, 26W and 27W of the Kateel River Meridian (Figure 1).

Purpose and Need

The Kivalina Evacuation and School Site Access Road project would provide Kivalina residents a safe and reliable evacuation route in the event of a catastrophic storm or ocean surge, allowing evacuees to mobilize to safe refuge at a site on K-Hill also dedicated by the NAB as the preferred new location for the community school. Upon its anticipated construction, the school will augment the undeveloped evacuation site by serving as a full-service community emergency shelter with all-season, longer-term support capabilities.

Recent climate data has indicated that arctic sea ice is forming later in the season, increasing fall and winter storm duration and intensity along the Northwest Arctic coast. Consequently, residents of Kivalina face significant and increasing risks to safety, life and property by storm systems predicted to further intensify over time. The need for a concerted effort to mitigate these risks became more evident during an evacuation event in October 2007 when debris-laden storm waves overtopped the barrier island.

To facilitate community safety in the face of this increased threat, Kivalina needs a safe, stable, and reliable evacuation infrastructure (routing, transportation, shelter) in the event of impending catastrophe. To provide the routing component of this infrastructure will require construction of a road facility over a safe route that allows emergency response vehicles to access a secure location capable of supporting evacuees in times of need.

Proposed Action

Within the project study area, DOT&PF and FHWA are currently reviewing the feasibility of three existing, preliminary route options independently proposed by Kivalina and the NAB (Figure 2). While these routes may provide a useful basis for alternative development during NEPA documentation, additional draft alternatives are anticipated to be identified and considered as a consequence of agency and public scoping. Common to all anticipated alternatives will be the requirement to support the following actions:

- **Establishment of a safe, reliable, all-season Kivalina Lagoon crossing during evacuation mobilization.**
    - Concepts previously studied for their feasibility include construction of an earthen causeway across the lagoon that variously incorporates hydraulic and boat passage options including bridge(s), culvert(s), or both.

- **Construction of an all-season gravel access road between Kivalina Island and the desired K-Hill evacuation site**.

  - The road would be designed to accommodate both general purpose and emergency evacuation vehicles over a two-way road with shoulders, multiple turnouts, and safe side slopes that include guard rails or other safety features as required.

  - Over the last decade, Kivalina and the NAB have evaluated the feasibility of numerous local road routings that could potentially provide for evacuation, school access, or material site development. Evacuation routes considered to date by Kivalina and the NAB have included:

    - An alignment referred to as a *Northern Route* approximately 9.1 miles in length that would originate at the south end of the Kivalina Airport runway, parallel the runway on its east side northward for approximately 1.5 miles, cross the lagoon eastward via a causeway and/or bridge, and follow high ground between the Wulik and Kivalina Rivers to its terminus at K-Hill.

    - An alignment considered a *Southern Route* approximately 6.9 miles in length that would begin at the south end of the Kivalina Airport runway, immediately cross the lagoon eastward via a causeway and/or bridge, and follow lowlands and relic channels of the Wulik River to K-Hill.

    - A *Combined Route* approximately 8.6 miles in length that would follow the Northern route before merging with the Southern route via a one-mile long connecting segment.

- **Identification of Material Sources:** Although project materials would be specified as contractor furnished and development of material sources would not be included in the Proposed Action, analyses of material locations proximate to potential routes would be conducted to determine their feasibility and evaluate environmental impacts of their development. Four locations in the project study area known to contain potentially viable project materials, and currently being evaluated by Kivalina and the NAB, include:

  - *K-Hill*: K- Hill geology is characterized by exposed limestone and rock rubble at the ground surface. It is anticipated that below the surface, larger frost-fractured rocks and boulders may also exist.

  - *Wulik River Deposition Zone*: The Wulik River Deposition Zone is characterized by visible gravel bars and beaches along the river banks that would contain suitable materials to construct the proposed project.

  - *Wulik River Relic Channel*: The Wulik River Relict Channel is characterized by visible gravel and sand at the ground surface. The fluvial material in these areas was likely deposited when the Wulik River was located north of its present location.

- *Kivalina River Deposition Zone:* The Kivalina River is also being evaluated for potential material sources due to the areas visible on gravel bars and beaches that appear to contain suitable material.

Independent preliminary research and review on project study area resources was conducted by Kivalina and the NAB and is summarized in Appendix A. Additionally, a substantial document cache of previous studies and assessments on the project area, potential development projects at Kivalina, and various natural resources are available on the DOT&PF project website at: http://dot.alaska.gov/nreg/KivalinaEvacRd.

Based on additional agency and public input, engineering and environmental analyses and evaluations, and the application of regional Traditional Knowledge, DOT&PF intends to identify issues of environmental, technical and cultural concern, refine the project scope as necessary, and through evaluation of qualified potential routes develop a preferred project alternative that minimizes human and environmental impacts while meeting project purpose and need.

We respectfully request your written comments no later than December 12, 2016. Please mail them to: DOT&PF Attn: Sarah E. Schacher, P.E., 2301 Peger Road Fairbanks, AK, 99709; or you may e-mail comments to me at sarah.schacher@alaska.gov.

Thank you for your attention to this request. If you have any questions regarding the proposed project, please contact me at (907) 451-5361.

Sincerely,

Sarah E. Schacher, P.E.
Preconstruction Engineer

Enclosures: Figure 1 – Location & Vicinity Map
Figure 2 – Study Area and Potential Routes
Appendix A

pk/lmc

Distribution by email:
Alan Bittner, Anchorage Field Manager, U.S. Bureau of Land Management
Judy Bittner, State Historic Preservation Officer, Alaska Dept. of Natural Resources
Audra Brase, Regional Supervisor, Alaska Dept. of Fish & Game
Alan Cavallo, Public Assistance Branch Chief, Alaska Dept. of Military & Veteran Affairs
Sally Cox, Alaska Dept. of Commerce, Community & Economic Development
Jennifer Curtis, Environmental Protection Specialist, U.S. Environmental Protection Agency
Lesley DeWilde, Real Estate Services Chief, Bureau of Indian Affairs
Matthew Eagleton, Regional EFH Coordinator, NOAA-NMFS
Sandra Garcia-Aline, Division Administrator, Federal Highway Administration

Susan Georgette, Refuge Manager, U.S. Fish & Wildlife Service
Jeanne Hanson, Asst. Regional Administrator, NOAA-NMFS
James Helfinstine, Commander, U.S. Coast Guard, JBER
Bob Henszey, Fish & Wildlife Biologist, U.S. Fish & Wildlife Service
Rhea Hood, Archaeologist, U.S. National Park Service
Pete Probasco, Assistant Regional Director, U.S. Fish & Wildlife Service
Jeanne Proulx, Natural Resource Manager, Alaska Dept. of Natural Resources
Mary Romero, Project Manager, U.S. Army Corps of Engineers
James Rypkema, Environmental Program Manager, Alaska Dept. of Environmental Conservation
Glen Stout, Wildlife Biologist, Alaska Dept. of Fish & Game
Ronald Wall, Captain, Alaska State Troopers 'D' Detachment
Kristi Warden, Deputy Division Manager, Federal Aviation Administration
Ryan Winn, Field Office Project Manager, U.S. Army Corps of Engineers

State Parks, Refuges, and Critical Habitat Areas

A review of the Alaska Department of Fish & Game (ADF&G) Conservation Areas website (http://www.adfg.alaska.gov/index.cfm?adfg=protectedareas.locator) on September 26, 2016 revealed no state refuges, sanctuaries, critical habitat areas, or wildlife ranges within the study area.

National Parks, Preserves, Monuments, and Wild and Scenic Rivers, and Private Properties

A review of the National Park Service's website (https://www.nps.gov/hfc/carto/PDF/WEARmap1.pdf) was conducted on September 26, 2016 to determine if any National Parks, Preserves, Monuments, or Wild and Scenic Rivers exist in the study area. Cape Krusenstern National Monument is located approximately 8.5 miles to the south but does extend into the project study area. Noatak National Preserve is located approximately 45 miles to the east. None of these designated sites are within the study area. Kivalina Lagoon includes a small portion of the Alaska Maritime National Wildlife Refuge (Chukchi-Sea Unit); two islands, totaling 75 acres are owned by the Kivalina Sinuakmeut Corporation located directly east of Kivalina at the mouth of the Wulik River http://fws.maps.arcgis.com/apps/webappviewer/index.html?id=3eed8d6b30ea443dafe4380d70d0fa5el). Another 116 acres of the Refuge, owned by the same Corporation, is located 4 miles south and effectively constitutes the land spit separating the Imikruk Lagoon from the Chukchi Sea.

Navigable Waters

All tidal and marine waters are considered navigable, which in this case would include Kivalina Lagoon. Building a causeway over the lagoon would require a U.S. Army Corps of Engineers (USACE) Section 10 permit, and potentially a U.S. Coast Guard (USCG) Bridge permit if applicable. Neither the Kivalina nor the Wulik River are listed as navigable waters (http://www.poa.usace.army.mil/Portals/34/docs/regulatory/NavWat.pdf). DOT&PF and FHWA will coordinate with the USCG on permit requirements, if any.

Floodplain Management

Two rivers flow into Kivalina Lagoon: the Kivalina River at the northern end of the lagoon and the Wulik River at the southern end. The floodplains of both rivers are broad and braided. The Northwest Arctic Borough (NAB) implements flood prevention in code in order for communities, including the City of Kivalina, to participate in the National Flood Insurance Program (NFIP). Although Kivalina does not have a 100-year floodplain identified or mapped by the Federal Emergency Management Agency (FEMA), Flood Hazard Data from the USACE indicates that the limits of the 100-year floodplain is the 30-foot contour on the 1976 ADCRA Community Map. The proposed project area is at or below the 25-foot contour and therefore in the floodplain of the Kivalina and Wulik Rivers. Consideration of floodplain impacts will be included as part of the NAB permitting process for this project.

Water Resources and Water Quality

The Alaska Department of Environmental Conservation (ADEC) has delineated a drinking water protection area (http://www.arcgis.com/home/webmap/viewer.html?webmap=a1196dd615694cccb85fd9088212412e) for the Kivalina Water System which encompasses the Wulik River adjacent areas, including a portion the southern study area (PWSID: AK2340117). Water for the community of Kivalina is obtained from the Wulik River using a seasonal three-mile long surface transmission line (*Evacuation and School Access Road Route Reconnaissance Study, Native Village of Kivalina, 2014*). A search of ADEC data on September 26th, 2016 revealed no impaired waterbodies nor any water quality monitoring locations within the study area (http://www.arcgis.com/home/webmap/viewer.html?webmap=f7e8ca8c14fe4520b9e2e1498e3cdee3).

Wetlands and Vegetation

A search of the U.S. Fish and Wildlife (UFWS) National Wetlands Inventory (NWI) mapper (https://www.fws.gov/wetlands/Data/Mapper.html) identifies most the study area as mapped wetlands. In addition, a previous desktop wetland delineation and functional assessment completed for the NAB in 2015 identifies 95% of the study area as comprised of wetlands and Waters of the United States (*Wetland Delineation and Functions and Values Assessment Kivalina Evacuation Route Wetlands Mapping Study, NAB 2015*). Necessary permitting will be conducted in accordance with Section 404 and 10 of the Clean Water Act for unavoidable wetland impacts.

Fish and Fish Habitat

A diversity of marine and anadromous fish may be found in lagoon and/or rivers within the study area. Both the Kivalina and Wulik Rivers, as well as Kivalina Lagoon and a small connector stream, are identified in the ADF&G Alaska Waters Catalog (AWC) Fish Resource Monitor as anadromous waterbodies within the study area (http://www.adfg.alaska.gov/sf/SARR/AWC/index.cfm?ADFG=maps.interactive). Species identified in these waterbodies are summarized in the table below:

Anadromous Stream Name	Anadromous Stream Number	Species Identified
Kivalina River	331-00-10044	Pink, chum, king, coho, sockeye, Dolly Varden (char)
Wulik River	331-00-10060	Pink, chum, king, coho, sockeye, Dolly Varden (char), whitefish
Kivalina Lagoon	331-00-10060-0010	Pink, chum, king, coho, sockeye, Dolly Varden (char), whitefish
Unnamed reach connecting Kivalina Lagoon and Kivalina River	331-00-10050	Pink, chum, coho, Dolly Varden (char)

Of the several species of anadromous whitefish found in the Wulik River and Kivalina Lagoon, sheefish (inconnu) are the largest. Arctic grayling are sometimes present in the Kivalina Lagoon. Rainbow smelt are indigenous to most all Chukchi Sea lagoons that are open to the sea. Several species of marine fish, some of which are relatively brackish-water tolerant, are found in Kivalina Lagoon and near-shore coastal waters. These include Bering flounder, yellowfin sole, starry flounder, saffron cod, Arctic cod, Pacific herring, sculpin, and capelin. Arctic cod and saffron are documented to appear in Kivalina Lagoon twice a year after freeze-up and in early July (*Subsistence Production in Kivalina, Alaska: A Twenty Year Perspective. Technical Report No. 128 prepared for the ADF&G Division of Subsistence. Juneau, Alaska. Burch, 1985*).

Kivalina residents rely heavily on fish as cultural and nutritional resources. In 2007, Kivalina harvested more than 54,000 fish. Of the estimated 79,000 edible pounds of fish and shellfish harvested, 86% were Dolly Varden. Safron cod, locally known as tomcod, comprised 2%, and salmon species made up 1% of the total. All other species fell below 1% (*Alaska Subsistence Salmon Fisheries 2007 Annual Report Technical Paper No. 346 prepared for the ADF&G Division of Subsistence. Anchorage, Alaska. Fall et al. 2009*). In the Kotzebue area, subsistence salmon fishing has few restrictions other than the general statewide provision. Standard conditions include prohibition of fishing within 300ft of a dam, fish ladder, weir, culvert or other artificial obstructions (Fall et al. 2009).

Essential Fish Habitat

The Arctic Fisheries Management Plan includes the study area in Essential Fish Habitat (EFH) designations for late juvenile and adult saffron and arctic cod, potentially for late juvenile and adult snow crab and arctic cod, and has determined that there is insufficient information for determine EFH for eggs, larvae and early juveniles of arctic cod and saffron cod and for larvae and early juveniles of snow crab. (http://www.npfmc.org/wp-content/PDFdocuments/fmp/Arctic/ArcticFMP.pdf#page=89. A Preliminary EFH Assessment has been completed by WHPacific in 2012. Any outstanding work will be completed and DOT&PF will consult with the National Marine Fisheries Service (NMFS) on effects to EFH and implementation of any proposed conservation measures.

Aquatic Wildlife

The study area is strongly influenced by seasonal ice cover. Ice directly affects the distribution and migration patterns of birds and marine mammals. Ice freezes to the bottom in the fall in shallow nearshore areas and many species of birds and marine mammals migrate south along the coast as sea ice advances. In spring, nutrients and sea ice algae trapped in the ice nourish primary production, resulting in a highly productive estuarine-like nearshore corridor which anadromous and marine fish, shorebirds, waterfowl, and some species of marine mammals take advantage off, including during their migration back north to feed and breed.

Marine Mammals:

Marine mammals are an essential part of the culture and food security in Kivalina year-round with different species occurring at different times of the year (IEA Chapter 4: Important Areas for marine mammals and coastal species). In the coastal area off Kivalina, marine mammal species include beluga whale (*sisuaq, Delphinapterus leucas*), gray whale (*aġviġluaq, Eschrichtius robustus*), bowhead whale (*aġvik, Balaena mysticetus*), bearded seal (*ugruk, Erignathus barbatus*), ringed seal (*natchiq, Phoca hispida*), spotted seal (*qasigiaq, Phoca largha*), and polar bear (*nanuq, Ursus maritimus*). In Kivalina Lagoon, marine mammals most frequently observed are bearded, spotted and ringed seals. Marine mammals that are consistently important for subsistence harvest are beluga, bearded seal and ringed seal (OCS EIS, 2007: http://www.boem.gov/uploadedFiles/BOEM/About_BOEM/BOEM_Regions/Alaska_Region/Environment/Environmental_Analysis/2007-026-Vol%20I.pdf).

All marine mammals are protected under the Marine Mammal Protection Act, and, ringed seals and polar bear are also listed as Threatened under the Endangered Species Act (ESA).

Aquatic Birds:

The area around Kivalina is a staging area for migratory aquatic species in the spring and the fall and more than 100 species of birds, most of which are waterfowl and shorebirds have been identified in this region (*Red Dog Mine Extension Aqqaluk Project Final Supplemental EIS, 2009*), including Canada geese (*Branta canadensis*), greater white-fronted goose (*Anser albifrons*), tundra swan (*Cygnus columbianus*) and all four species of loon. Both Steller's Eider (*Polysticta stelleri*) and the Spectacled eider (*Somateria fischeri*) are also known to be in this area, both of which are listed as Threatened under ESA (*Environmental Assessment and Finding of No Significant Impact: Section 117 Expedited Erosion Control Project, Kivalina, USACE, Alaska District, 2007*). Specifically, the presence of open water and emergent vegetation in the sedge-grass marshes associated with ponds and the riparian low shrub areas along the Kivalina and Wulik river drainages provide suitable inland breeding and molting habitat for species such as the Canada goose. The near-shore areas and lagoon provide habitat for the yellow-billed loon (*Gavia adamsii*), which feeds on fish and invertebrates in the marine environment as well as in freshwater. Yellow-billed loons nest exclusively in coastal and inland low-lying tundra from 62° to 74° N latitude, in association with permanent, fish-bearing lakes. Waterfowl are important birds harvested for subsistence. Migratory aquatic birds are protected under Migratory Bird Treaty Act.

Terrestrial Wildlife

Terrestrial Birds:

More than 100 species of birds migrate from the lower 48 states and Central and South America, to nesting, breeding, and rearing grounds in the State of Alaska. Five species have been identified as species of concern for northern Alaska, including the gyrfalcon (*Falco rusticolus*), snowy owl (*Bubo scandiacus*), gray-cheeked thrush (*Catharus minimus*), Smith's longspur (*Calcarius pictus*), and hoary redpoll (*Acanthis hornemanni*) (BPIF 1999 cited in Red Dog Mine EA). Within the project area, riparian corridors of willow and alder shrubs likely contain the highest diversity of land birds. In addition to these long-distant migrants, the general area also has occurrences of raptors like golden eagles (*Aquila chrysaetos*), gyrfalcon and peregrine falcons (*Falco peregrinus*) (which are known to nest along in the rocky cliffs of the area close to Red Dog Mine (Red Dog Mine Supplemental EIS, 2009). In addition, willow (*Lagopus lagopus*) and rock ptarmigan (*Lagopus muta*) appear to occur in low shrub and tussock tundra in the region, and are considered the most important terrestrial birds for subsistence. Migratory birds are protected under the Migratory Bird Treaty Act. Golden eagles are further protected under the Bald and Golden Eagle Protection Act of 1940.

Terrestrial Mammals:

Five species of large terrestrial mammals are known to occur in the study area: caribou (*Rangifer tarandus*), moose (*Alces alces*), muskox (*Ovibos moschatus*), Dall sheep (*Ovis dalli*), and brown bear (*Ursus arctos*). Caribou, moose, and Dall sheep have historically been and continue to be important subsistence resources for Kivalina. Common furbearers in the project area include wolves (*Canis lupus*), wolverine (*Gulo gulo*), red fox (*Vulpes vulpes*), arctic fox (*Alopex lagopus*), lynx (*Felis lynx*), marten (*Martes americana*), and mink (*Mustela vison*). Many of these species are important to hunters and trappers in the region for their pelts, which are used to make traditional Alaska Native crafts and clothing (Red Dog Mine Supplemental EIS, 2009).

Caribou:

Caribou are the principal terrestrial subsistence animal in the region and are hunted in the tundra hills behind Kivalina. A 1992 ADF&G subsistence survey conducted in the community indicated a harvest of 351 caribou—18.2% of the total subsistence harvest (OCS EIS, 2007). Local caribou are part of the Western Arctic Herd the largest caribou herd in the State of Alaska and one of the largest in the world (Red Dog Mine Supplemental EIS) that migrates annually in large numbers through the region. Most caribou are harvested in the fall when the main migration reaches the Kivalina area, but they are also hunted throughout the winter, as available, and shot opportunistically year-round. Winter distributions, in both numbers and location, are highly variable and may be dependent on local weather conditions (*U.S. Environmental Protection Agency Draft Environmental Impact Statement Red Dog Mine Project Northwest Alaska, February 1984*). Most of the spring migration occurs well to the east of Kivalina (Red Dog Mine Supplemental EIS, 2009).

Other Species:

Moose: Moose in the Kivalina area are part of Game Management Unit 23. During winter, moose are found along the drainages of the Wulik and Kivalina rivers. Compared to other populations in Alaska, moose in this area are considered to be of low density (OCS EIS 2007, Red Dog Mine Supplemental EIS, 2009).

Muskoxen: Reintroduced in 1970, the Cape Thompson population, ranging from the Noatak River north to Cape Lisburne remains fairly small (around 300 animals), and is generally found within 15 miles of the coast (Red Dog Mine Supplemental EIS, 2009).

Dall Sheep: Dall sheep are prized for their meat, fat, sinew, skins, and horns and hunted in the upper Wulik and Kivalina River drainages (OCS EIS, 2007). Kivalina hunters reported taking about 25 Dall sheep in the 25 years prior to 1991.

Brown Bear: Brown bears occur in the area throughout the year, making use of a variety of habitats (Red Dog Mine Supplemental EIS, 2009). In spring, bears use alpine slopes, shifts to lowland or coastal areas during summer, and during fall in particular, can be found around salmon spawning streams.

Protected Species and Habitats

Threatened and endangered species are managed under the ESA, requiring federal agencies to ensure that all activities they "authorize, fund, or carry out" do not jeopardize the continued existence of any threatened or endangered species or designated critical habitat. Migratory birds are protected by the Migratory Bird Treaty Act of 1918. Executive Order 13186 (Responsibilities of Federal Agencies to Protect Migratory Birds), issued in 2001, requires the evaluation of the effects of federal actions on migratory birds, with an emphasis on species of concern. Although eagles are not considered rare in this part of Alaska, another potential regulatory mechanism that applies to wildlife in the study area is the Bald and Golden Eagle Protection Act of 1940. Marine mammals are further protected by the Marine Mammal Protection Act of 1972. Fish and fish habitat have further protection if federally designated under EFH in the Magnuson-Stevens Fishery Conservation and Management Act.

On a State level, water bodies listed in the AWC are considered important to anadromous fish species and are afforded protection under Alaska Statute 16.05.871. For other wildlife, it should be noted that as of August 15, 2011, the Alaska Department of Fish and Game (ADF&G) no longer maintains a Species of Special Concern list. The list has not been reviewed and revised since 1998 and is no longer considered valid. Instead ADF&G currently uses the Alaska Wildlife Action Plan to assess the needs of species with conservation concerns, and to prioritize conservation actions and research.

Species that fall under these formal protections and may occur in the study area include all species of Pacific salmon, ringed, bearded and spotted seals, beluga whales, spectacled and Steller's eider, and all migratory birds (see specific sections above for details).

Historical, Architectural, Archeological, and Cultural Resources

Twenty-nine Alaska Heritage Resource Survey (AHRS) sites are currently located within or directly adjacent to the study area (see Table below). Twenty-four of these are archaeological resources and potential historic structures located within the community of Kivalina. Three sites, including the remains of a camp (NOA-301), meat caches and icehouses (NOA-298), and a reindeer corral and processing site (NOA-302), are located within the study area south of the mouth of the Wulik River. One site, the Ualliik Trail (NOA-304) is mapped outside of the study area but historically followed the east bank of the Wulik River into the study area. Additionally, the boundaries of the Cape Krusenstern National Historic Landmark (NHL), which extends more than 10 miles northwest of the Cape Krusenstern National Monument boundary, encompasses a portion of the south half of the study area.

An archaeological predictive model prepared for this project in January 2016 and results of a reconnaissance investigation completed in September 2016 suggest that locally proposed route corridors and material source areas encompass landforms with increased potential for containing archaeological resources. FHWA and DOT&PF will consult with the State Historic Preservation Officer (SHPO), Tribal entities, and the National Park Service in accordance with Section 106 of the National Historic Preservation Act (NHPA) and Section 4(f) of the DOT Act of 1966 to identify resources that may be adversely affected by the proposed undertaking.

Alaska Heritage Resource Survey (AHRS) sites

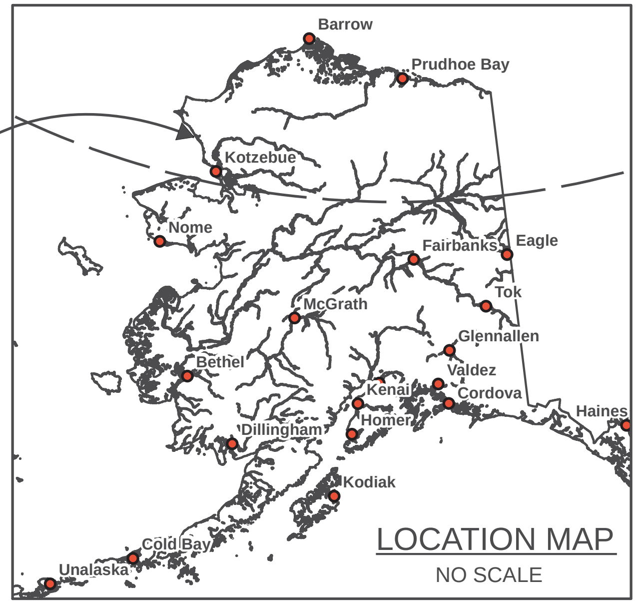
AHRS #	Approx. Location (relative to nearest Proposed Project Element)	Description	DOE Status
NOA-004	0.30 mile SE of Southern Route Causeway	Kivalina Village	Unevaluated
NOA-042	Encompasses southern portions of North/Combined and Southern Routes	Cape Krusenstern Archaeological District	National Historic Landmark
NOA-298	1.60 miles southeast of Southern Route	Meat Caches/Icehouses	NRHP Eligible
NOA-301	1.53 miles southeast of Southern Route	Camp	NRHP Eligible

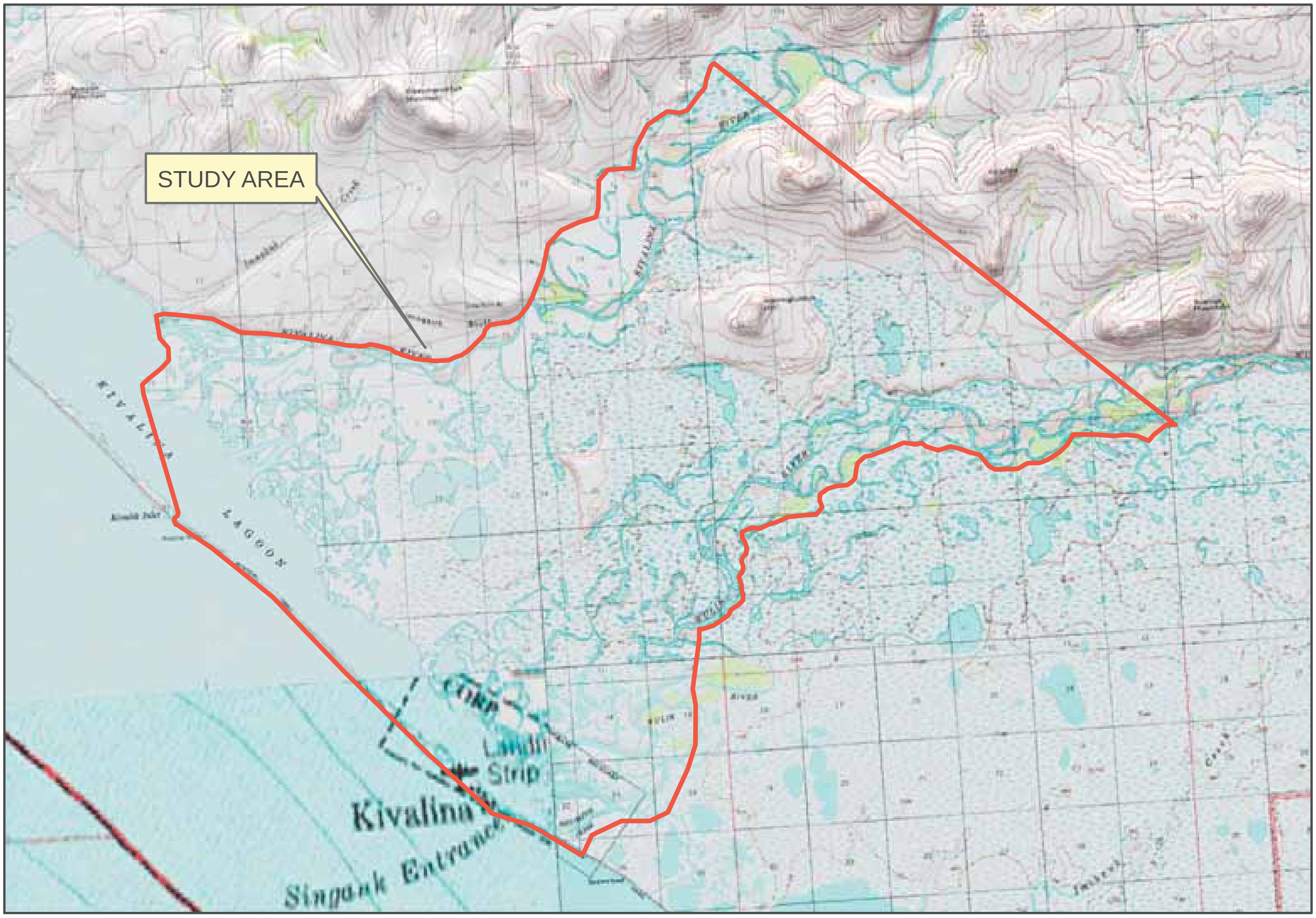
AHRS #	Approx. Location (relative to nearest Proposed Project Element)	Description	DOE Status
NOA-302	1.55 miles southeast of Southern Route	Reindeer Corral and Processing Site	NRHP Eligible
NOA-304	1.80 miles southeast of Southern Route	Ualliik Trail	Unevaluated
NOA-311	0.50 mile southeast of Southern Route Causeway	Single Story Wood Frame Structure	Unevaluated
NOA-312	0.50 mile southeast of Southern Route Causeway	Single Story Wood Frame Structure	Unevaluated
NOA-313	0.45 mile southeast of Southern Route Causeway	Single Story Wood Frame Structure	Unevaluated
NOA-314	0.20 mile southeast of Southern Route Causeway	Two Story Wood Frame Structure	Unevaluated
NOA-315	0.38 mile southeast of Southern Route Causeway	Kivalina Cemetery (used prior to the mid-1940s)	Unevaluated
NOA-316	0.38 mile southeast of Southern Route Causeway	Kivalina Cemetery #2	Unevaluated
NOA-317	0.40 mile southeast of Southern Route Causeway	Eroding Human Remains and Artifacts	Unevaluated
NOA-318	0.50 mile southeast of Southern Route Causeway	Eroding Human Remains and Artifacts	Unevaluated
NOA-319	0.55 mile southeast of Southern Route Causeway	Human Remains	Unevaluated
NOA-320	0.57 mile southeast of Southern Route Causeway	Eroding Human Remains	Unevaluated
NOA-321	0.50 mile southeast of Southern Route Causeway	Human Remains	Unevaluated
NOA-322	0.53 mile southeast of Southern Route Causeway	Possible House Pit Depressions	Unevaluated
NOA-323	0.42 mile southeast of Southern Route Causeway	Possible Gravesite and Historic Sod House	Unevaluated
NOA-324	0.41 mile southeast of Southern Route Causeway	Burial Structure	Unevaluated
NOA-325	0.15 mile southeast of Southern Route Causeway	Human Remains	Unevaluated
NOA-326	0.15 mile southeast of Southern Route Causeway	Human Remains and Burial Box	Unevaluated
NOA-327	0.15 mile southeast of Southern Route Causeway	Artifacts	Unevaluated
NOA-328	0.15 mile southeast of Southern Route Causeway	Historic Sod Houses	Unevaluated
NOA-339	0.48 mile southeast of Southern Route Causeway	Non-human Faunal Remains	Unevaluated
NOA-362	0.40 mile southeast of Southern Route Causeway	Buried Wood Structure; Human Remains	Unevaluated
NOA-587	0.35 mile southeast of Southern Route Causeway	Kivalina Federal Scout Readiness Center	Recommended Not Eligible
NOA-591	0.25 mile southeast of Southern Route Causeway	Artifact Scatter	Unevaluated
NOA-592	0.27 mile southeast of Southern Route Causeway	Possible Historic Sod House	Unevaluated

Hazardous Materials, Pollution Prevention, and Solid Waste

A search of the ADEC *Contaminated Sites Database* identified only one site in the study area. This site, ADEC# AKARNG Kivalina FSA, is recorded as having its cleanup complete. A 6.5- acre Class 3 unpermitted municipal landfill is located within the study area, approximately 0.3 miles north of the Kivalina Airport runway and surrounded by the Chukchi Sea to the west and the Kivalina Lagoon to the east. Possible contaminants at this site include construction and demolition waste, asbestos, and sewage. Honey bucket waste is comingled with solid waste at this site.

PROJECT
LOCATION





0 1.25 2.5 5
Miles

Northwest Arctic Borough
Alaska Department of Transportation
and Public Facilities - Northern Region

Location & Vicinity Map
Project Number: 0002384/NFHWY00162

DATE: November 2016	FIGURE 1

NOTES:

*Access routes shown are from "Evacuation and School Access Road Project, Kivalina, Alaska, Route reconnaissance Study; submitted to Native Village of Kivalina, submitted by WHPacific (revised June 2014).

The imagery background is WV-2 satellite imagery from July 2016.

Legend

- North Access Route*
- Combined Access Route*
- South Access Route*
- Native Allotments
- Potential Material Sources
- Project Study Area

0 0.5 1 2 Miles

DATE: November 2016

FIGURE 2

STUDY AREA AND POTENTIAL SITES
PROJECT NUMBER: 0002384/NFHWY00162

AK SHPO, Scoping Response:

From: Rollins, Mark W (DNR)
Sent: Friday, November 25, 2016 3:10 PM
To: Schacher, Sarah E (DOT)
Cc: Gamza, Thomas A (DOT)
Subject: Kivalina Evacuation and School Site Access Road, Request for Scoping Comments

Hi Sarah,

The Alaska State Historic Preservation Office (AK SHPO) has no additional information regarding identified cultural resources (historic, prehistoric, and archaeological sites, locations, remains, or objects) at this time for the subject project. We look forward to future consultation on additional draft alternatives anticipated to be identified during the NEPA process and recommend DOT&PF include all potential material sources and route alternatives in the area of potential effects (APE). If you have any questions about developing the APE, once alternatives are identified, we are happy to assist you. As you noted in Appendix A of your letter, there are several cultural resources within the study area and potential for archaeological sites along the proposed route corridors, as such we look forward to reviewing the archaeological predictive model and report from the fieldwork completed in September, 2016. Please note that if additional alternatives are located outside of the fieldwork conducted in September, 2016 that additional archaeological investigations may be appropriate. Before further identification is considered, we recommend DOT&PF establish an APE.

As a reminder, The APE should encompass the geographic area within which an undertaking may directly or indirectly affect historic properties. Following the establishment of the APE, any potential historic properties within the APE must be evaluated for eligibility for inclusion to the National Register of Historic Places *(36 CFR § 800.4).* The nature of project effects on any historic properties, including those listed in or eligible for inclusion in the National Register of Historic Places, will need to be assessed *(36 CFR § 800.5).* Adverse effects to eligible historic properties will need to be resolved through mitigation measures developed in consultation with our office *(36 CFR § 800.6).*

As more information becomes available, we will work with DOT&PF and consulting parties to avoid, minimize, and/or mitigate effects to historic properties. We look forward to further consultation with DOT&PF for this project in accordance with the 2014 *Programmatic Agreement… for the Federal-Aid Highway Program in Alaska* and Section 106 of the National Historic Preservation Act.

Thank you for submitting the scoping materials for the subject project for our review and comment. If you have any questions about cultural resources please contact me or Northern region's Professionally Qualified Individual (PQI) Tom Gamza.

Mark W. Rollins

Archaeologist II

Alaska State Historic Preservation Office/ Office of History and Archaeology

550 West 7th Avenue, Suite 1310

Anchorage, AK 99501

(907) 269-8722

National Park Service, Scoping Comments:

From: Hood, Rhea [mailto:rhea_hood@nps.gov]
Sent: Tuesday, November 29, 2016 12:22 PM
To: Schacher, Sarah E (DOT)
Subject: Kivalina Evacuation and School Site Access Road 0002384/NFHWY000162

VIA ELECTRONIC MAIL: NO HARD COPY TO FOLLOW
IN REPLY REFER TO:
8.A.4 (AKRO-RCR)

National Park Service
240 W. 5th Ave.
Anchorage, AK 99501

Sarah E. Schacher, P.E.
2301 Peger Road
Fairbanks, AK 99709

Dear Ms. Schacher,

Thank you for your letter of November 11, 2016, requesting National Park Service preliminary review and comment of the proposed Kivalina Evacuation and School Site Access Road Project.

The NPS administers the National Historic Landmark program for the Secretary of the Interior. The NPS serves as an interested party throughout the Section 106 process to help ensure the integrity of the NHL, which includes consultation prior to an agency making a determination of effect.

Based on the project description you provided, the entire project study area is within the boundary of the Cape Krusenstern Archeological District National Historic Landmark (attachment). Kivalina is part of the NHL because of its evidence of precontact occupation, and because of the understanding that currently submerged lands and wetlands were dry during the Pleistocene and have potential for research on the history of that period. We are interested in the process of identification and evaluation of cultural resources in the study area, activities or construction that will involve ground disturbance in the study area, and mitigation actions during and after construction of the access road.

Please direct questions and correspondence to me at (907) 644-3460 or rhea_hood@nps.gov. We look forward to working with you to minimize harm to this important property.

Sincerely,

/s/ Rhea Hood

Rhea Hood

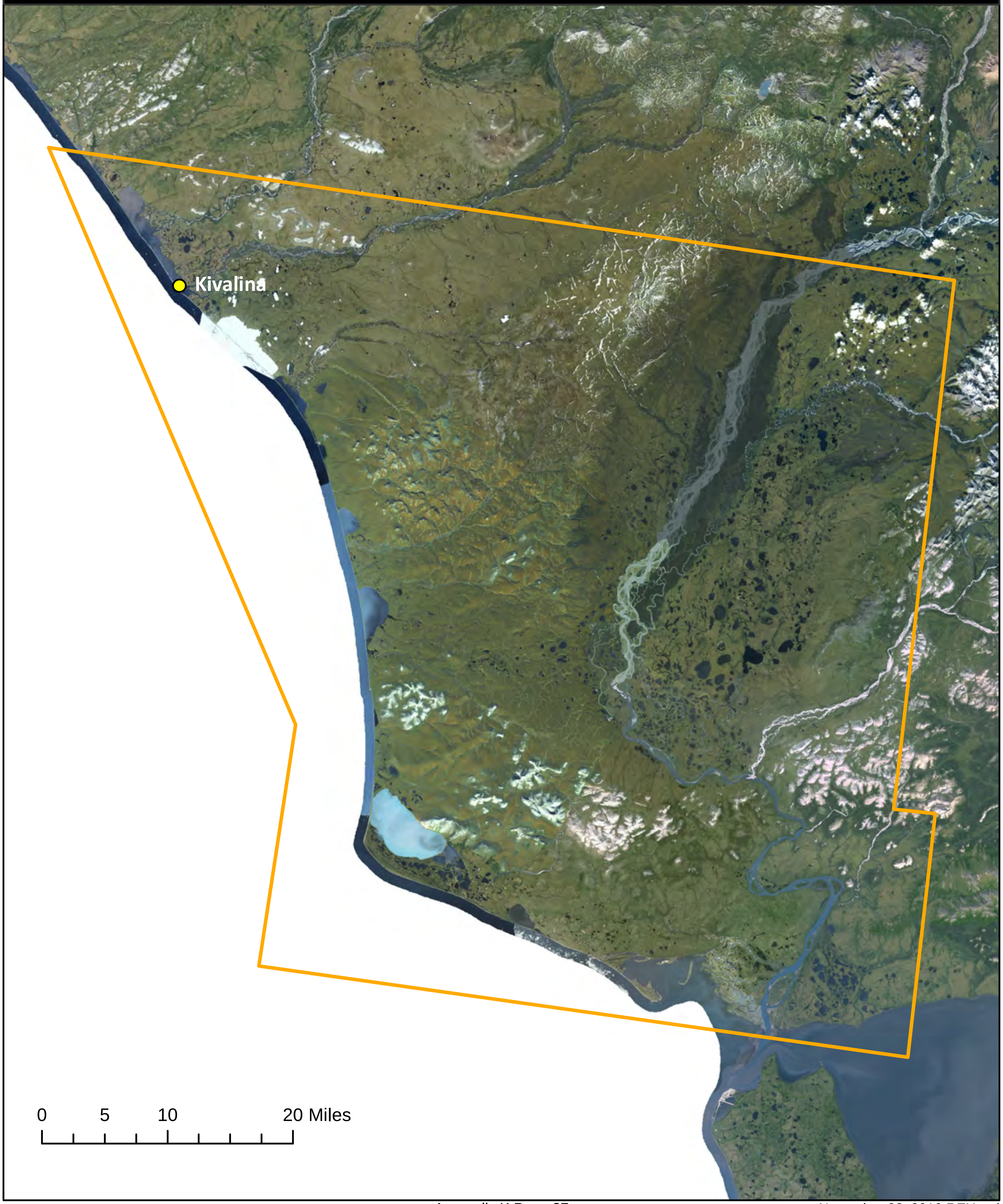
Archeologist, National Register of Historic Places Program

2016 National Park Service. CENTENNIAL

Centennial Goal: Connect with and create the next generation of park visitors, supporters, and advocates.

Cape Krusenstern Archeological District National Historic Landmark Boundary NOA-00042

National Park Service
Alaska Regional Office
Cultural Resources



November 28, 2016 REHood

Kivalina Evacuation and School Site Access Road
Project Number: 0002384/NFHWY00162
Combined NPS and ADNR/OHA-SHPO Agency Scoping Meeting
NPS Building, Anchorage, AK
12/20/16

Attendees:
NPS:
Rhea Hood, Archaeologist, NPS National Register of Historic Places Program
Andrew Tremayne, NPS Alaska Regional Office Archaeologist

SHPO:
Mark Rollins, OHA Archaeologist
Alan Depew, OHA Archaeologist

DOT&PF:
Paul Karczmarczyk, AK DOT&PF
Sara Schacher, AK DOT&PF

OTHERS:
Katherine Keith, Remote Solutions
John Baker, Remote Solutions
Sara Lindberg, Stantec
Ross Smith, Stantec

DOT&PF provided a brief project summary, review of work completed to date, and opened the meeting up to discuss NPS and SHPO questions, comments, and concerns. The following summarizes the meeting discussion by topic.

Section 106 Process and Impacts to Cultural Resources

Question from Rhea: What is the general approach to impacts to cultural resources? Has this been discussed with the community of Kivalina? What will you do if you find human remains? Has an inadvertent discovery plan been completed for Kivalina?

> Sarah S: Our Standard Contract Provisions will be included in the construction contract documents. That is, if anything in the field is discovered, work would stop, and the contractor would need to contact SHPO, and then proceed as determined. This will be discussed with community of Kivalina during the Section 106 consultation process, and we'd also develop an inadvertent discovery plan.

Mark: It will be important for DOT&PF to identify an appropriate Area of Potential Effect (APE) for consideration by SHPO. While the study area boundary you show is good, an APE could stay the same size or get smaller. SHPO will defer to Tom Gamza (DOT&PF Environmental Analyst/Professionally Qualified Archeologist) to determine if enough work has been done within the resulting APE.

Paul: And we also assume we'll need inadvertent discovery plans in place and require monitoring during any ground disturbance. There is a still a long way to go with the project before we get to that point, and there is still a lot of room for avoidance and minimization. And remember that no NEPA-qualified alternative has been proposed yet, so we have lots of flexibility with design…within engineering parameters of course.

Question from Andrew: What is your project timeline?

Sarah S: We need to start the 106 process with an initiation of consultation letter as soon as possible. We will approach FHWA next month for a Class of Action call, and expect to complete the environmental document next year.

Question from Andrew: Do you anticipate preparing a Memorandum of Agreement (MOA)?

Sarah S: If there is something to mitigate, then we would.

Paul: Any mitigation measures, including an MOA, if needed, would be captured in the construction contract specifications. For example, as Sarah mentioned the inadvertent discovery plan developed during consultation would likely result in an MOA with the Native Village of Kivalina regarding a process to follow should human remains be discovered.

Mark: The DOT Statewide programmatic agreement for handing cultural resources could meet the requirements for this project. This agreement has appendices with templates that help in the development of construction monitoring and inadvertent discovery plans. If a determination of adverse effect was completed for this project it would trigger a need for an MOA. Another option is, if you can't do sufficient identification beforehand, you could do a Programmatic Agreement (PA) with protocols on how to proceed with construction and what would be done if something was encountered. Also, if SHPO was not able to make a finding of effect but wanted to keep the process moving, you could do a PA.

National Historic Landmark (NHL) Boundary/4(f) concerns

DOT&PF provided a brief overview of Section 4(f) and its elements for NPS staff, and conveyed concerns on anticipated actual and potentially perceived impacts to the NHL by NPS and the public.

Question from Sarah S: One of our questions is about the NHL boundary, where it is and how it will affect Section 106 consultation. The SHPO and NPS have two different boundary maps. The AHRS website shows the study area partially within the NHL, but the NPS map shows a different coverage.

Andrew: Based on our map, the whole study area is within the landmark boundary. We can provide SHPO with the latest GIS files for the correct boundary mapping. However, no matter where the boundary is, the NPS position on the project would not change. The Park Service offers technical assistance to SHPO and DOT&PF to ensure any cultural sites within the boundary do not get damaged. It sounds like DOT&PF is doing everything right in your approach. One thing we would like to see is a description of how you will deal with mitigating sites during construction if they are encountered.

Alan: It will depend on if they are contributing sites that are encountered. There might not be any contributing sites within the landmark boundary. Because the entire project is within the landmark boundary, there will not be a finding of no historic properties effected. Rather, we will be looking at either a finding of adverse effect, or no adverse effect. The question is whether there are resources within that boundary that are being affected.

Mark: The National Historic Landmark is considered a historic property, so you can never have a "no effect" determination, it is either a no adverse or adverse effect.

Section 4f Consultation

Question from Paul: Given the extent of the NHL, there would be no practicable alternative to going through the landmark as it encompasses the entire study area, the community of Kivalina, and the evacuation road terminus. Will the presence of a road necessarily have an adverse effect on the landmark by its own right? For example, in terms of setting, viewshed, historical context?

Mark: DOT&PF will need to do the analysis to determine that there is no alternative to going through the landmark to make sure you are minimizing going through it. There will be a public notice process and the Park Service has final jurisdiction on the Landmark. The NPS will receive consultations for a non-objection for both the 4(f) evaluation and the Section 106 process.

Question from Paul: Any ideas on mitigation?

Alan: Mitigation will be consulting party driven. The Park Service would also be involved in that process.

Andrew: We will bring in Janet Clemens in as a Section 106 reviewer for the Park Service.

Action Items:

- DOT&PF/Remote Solutions/Stantec complete the cultural resources survey report
- Depending on consultation &/or proposed routing differences, consider add'l 2017 field survey effort.

Kivalina Evacuation and School Site Access Road Project Update
Project Number: 0002384/NFHWY00162
OHA/NPS Section 106 Meeting
Stantec Office, Anchorage, AK
July 10, 2017

ATTENDEES

State of Alaska Office of History and Archaeology: Shina Duvall, Mark Rollins; **National Park Service**: Rhea Hood; **NANA**: Jeff Nelson; **DOT&PF**: Paul Karczmarczyk, Jonathan Hutchinson, Tom Gamza, Amy Sumner; **Remote Solutions**: John Baker; **Stantec**: Sara Lindberg, Ross Smith.

DOT&PF provided a project overview and update on the preliminary design progress, project components, EA alternative being evaluated, and the plan for completing geotechnical drilling at material sites. Stantec provided a summary of the cultural resource survey work completed to date, and the level of coverage for the project components being evaluated in the EA. The team discussed an approach for completing a separate Section 106 process for the geotechnical drilling program for the Proposed project.

The team discussed potential findings of effects outcomes and the tradeoff between completing more cultural resource survey work now, or completing a phased approach Memorandum of Agreement (MOA) now, so the Section 106 process could be completed and the EA could move forward. OHA said that there is nothing precluding them from continuing to consult on Section 106 during or after the EA is complete, but DOT&PF expressed the anticipation that FHWA would likely require the Section 106 process be completed before the Draft EA was released for public comment.

The team agreed that if more field work was warranted, it would be better to complete that quickly now, rather than hold off and go through an MOA process. Tom Gamza will review the survey work completed to date with Ross Smith and make a determination whether additional field work is warranted prior to Findings, and follow up with OHA and NPS.

TAKE AWAY NEAR TERM TASKS

- **TASK:** DOT&PF, NPS, and OHA will meet to discuss the extent of field work needed, if any, and articulate a path forward before August 1st.
- **TASK:** Tom to send NPS and OHA the revised Cultural Resources report for review and comment.
- **TASK:** Jeff Nelson, NANA should be appraised of all helicopter work on NANA lands planned for the fall. Paul will coordinate locally in Kotzebue for any Title 9 permitting requirements for the survey efforts.
- **TASK**: Rhea will coordinate internally at the Park Service on the 4(f) call and possible *De Minimis* finding.

TAKE AWAY LONG TERM TASKS

- **TASK**: Agency site visits are schedule for mid-August. Team to check on availability and travel authorizations.

Kivalina Evacuation and School Site Access Road Project Update
Project Number: 0002384/NFHWY00162
DOT&PF, OHA/SHPO, NPS Section 106 Coordination Meeting
NPS Regional Office, Anchorage, AK
August 2, 2017

ATTENDEES

State of Alaska Office of History and Archaeology: Judith Bittner, Shina Duvall, Alan DePew; **National Park Service**: Rhea Hood; **DOT&PF**: Tom Gamza; **Stantec**: Ross Smith.

DOT&PF provided large-scale maps of the APE and stated that the purpose of the meeting was to develop a consensus regarding the survey approach and priorities for subsurface testing. Stantec provided verbal description of locations within possible material sources for additional subsurface investigations and described proposed sampling methods:

- pedestrian survey of revised alignment between K-Hill and the floodplain
- soil probe testing to characterized sediments and determine permafrost elevation,
- shovel testing in settings with increased potential for near-surface or buried archaeological resources, such as elevated landforms above the flood plain (terrace edges and pingos), and riverine landforms (levees along current and relic channel margins)

The team agreed to the proposed survey strategy and DOT&PF requested a mark-up copy of the APE maps from Stantec illustrating the proposed survey and subsurface sampling areas that were presented and discussed in the meeting.

The team discussed potential findings of effects outcomes and whether NPS had faced similar situations for transportation projects proposed within National Historic Landmarks (NHL). DOT&PF and NPS agreed to review projects that had previously been proposed and completed in archaeological NHLs to determine if there was precedent for findings following negative surveys efforts.

The team agreed to coordinate sending agency representatives to Kivalina to visit the project area during the archaeological field investigations proposed in mid-August.

TAKE AWAY NEAR TERM TASKS

- **TASK:** Stantec to provide APE maps with proposed survey areas to DOT&PF to distributed to NPS, SHPO.
- **TASK:** Rhea Hood will request travel authorization from NPS to visit the project area during archaeological field investigations in mid-August.
- **TASK:** OHA to request travel authorization to send staff (Mark Rollins) to Kivalina to visit the project area during archaeological field investigations in mid-August.
- **TASK:** Rhea will review project outcomes in other NHLs to determine if there is precedent for NPS findings in a similar situation.

Department of Transportation and Public Facilities

THE STATE of ALASKA

GOVERNOR BILL WALKER

Northern Region
Design and Engineering Services
Preliminary Design and Environmental Section

2301 Peger Road
Fairbanks, Alaska 99709-5316
Main: 907-451-2237
Toll free: 800-451-2363
Fax: 907-451-5126

In Reply Refer To:
Kivalina Evacuation and School Site Access Road
Federal/State Project No. 0002384/NFHWY00162
Consultation Initiation

August 7, 2017

Ms. Judith Bittner
State Historic Preservation Officer
Alaska Office of History and Archaeology
550 W. 7th Avenue, Suite 1310
Anchorage, Alaska 99501-3565

Dear Ms. Bittner:

The Alaska Department of Transportation and Public Facilities (DOT&PF) is proposing to construct an evacuation road between Kivalina Island and a site on Kisimigiuqtuq Hill (K-Hill) (Figure 1). The project location is legally described in Table 1 below:

Table 1: Project Location

Section(s)	Township	Range	Meridian	USGS Quad
1, 2, 10, 11, 15, 16, 21	027N	026W	Kateel River	Noatak C-5
19. 20, 29, 30, 31	028N	026W	Kateel River	Noatak C-5
25, 26, 35, 36	029N	025W	Kateel River	Noatak C-5

Consultation is being conducted in accordance with the 2014 *Programmatic Agreement...for the Federal-Aid Highway Program in Alaska.* For purposes of the National Historic Preservation Act, we are initiating this consultation with you to assist us in identifying historic properties that may be affected by the proposed project.

Project Description

The proposed project origin would be at the City of Kivalina and the project terminus would be at K-Hill which is the evacuation site selected by the community. Originally three routes were

under consideration for the evacuation road location within the initial project Study Area. This has now been reduced to two potential route alignments which are currently being evaluated within the Preliminary Area of Potential Effect shown on Figure 1. Common to all route alternatives are the following actions:

- Construction of a causeway across the lagoon that may incorporate different hydrological openings including bridge(s), culvert(s), or both.
- Construction of an all-season gravel access road between Kivalina Island and the K-Hill evacuation site. The road would be designed to accommodate both general purpose and emergency evacuation vehicles over a two-way road with shoulders, multiple turnouts, and safe side slopes that may include guard rails and other safety features.
- Testing, analysis and development of material locations proximate to potential routes within the Preliminary APE to determine their feasibility and evaluate environmental impacts of their development (Figures 1-5).

Preliminary Area of Potential Effect (APE)
The Preliminary APE encompasses the direct footprint of the project, including two alternative route alignments, staging areas, and potential material sources that are variously located on NANA Regional Corporation, City of Kivalina, and DOT&PF-managed lands. The final APE will be defined after comments are received from your agency and other consulting parties.

Identification Efforts
A search of the Alaska Heritage Resources Survey (AHRS) database identified one site within the Preliminary APE which is described in table 2 below:

Table 2. AHRS Site Located within the Study Area

Site Number	Site Name	Site Description	Determination of Eligibility?
NOA-00042	Cape Krusenstern Archaeological District National Monument (NHL)	This district covers over 2 million acres, extending along the beach 8 miles and varying in width from 1-3 miles. 114 parallel marine beach ridges, formed at an average of 60 years each, are the main features. These former coastal margins contain houses, burials, cache pits, and other remains of the peoples who have occupied these beaches progressively for at least 5,000 years. This horizontal stratigraphy includes virtually the entire range of known cultural history in NW Alaska. Near the beach ridges, on unglaciated uplands, are two older sites dated from BP 11,000-6,000. The lower Noatak Valley, an important avenue between the coast and the interior for millennia, contains a number of archaeological sites. The villages of Noatak and Kivalina are within the district. The number of sites listed here includes only those cited as "important sites" in the Final Environmental Statement on Cape Krusenstern National Monument published in 1974. Other reports break down these major sites into many others. Includes	National Register Listed 05/03/1974

		NOA-00002, NOA-00078, NOA-00138, and NOA-00139.	

A literature review identified sixteen reports describing the results of cultural resource surveys conducted from the 1970s through 2016 within the initial Study Area. There are known archaeological and historical resources within the community of Kivalina south of the project origin, and south of the Wulik River mouth outside of the Study Area; however, no resources have been identified inland of Kivalina Lagoon within the Preliminary APE. The Preliminary APE is located within the boundaries of the Cape Krusenstern Archaeological District National Historic Landmark (NOA-00042). In January 2016, an archaeological predictive model was developed for the Study Area, and an archaeological survey of alternative route alignments and proposed material sites was conducted in September-October 2016. This field investigation involved pedestrian survey and subsurface testing at potentially sensitive locations identified in the predictive model and during the pedestrian survey along the three routes originally under consideration. The results of the field investigation are included in the *Kivalina Evacuation and School Site Access Road* report produced by Stantec for DOT&PF (Attachment 1). Testing locations along the abandoned northern route are shown on Figure 1. The entire northern route is shown on Figure one of Appendix D of the report. No archaeological sites or historic properties were identified along the three alternative routes, or within the material sites that were defined at that time.

DOT&PF intends to send a cultural resource survey team in the summer of 2017 to conduct addition fieldwork within the preliminary APE. The results of this work will be provided to the State Historic Preservation Officer and National Park Service for review upon its completion.

Under the Alaska Historic Roads Programmatic Agreement Interim Guidance, a group of Alaska roads has been identified which are being treated as eligible for the National Register of Historic Places (NRHP). This project does not affect any of these roads.

Consultation Efforts

The following consulting parties are being contacted regarding this project: the Alaska State Historic Preservation Officer (SHPO); the National Park Service (NPS); the Native Village of Kivalina; the City of Kivalina; the Native Village of Noatak; NANA Regional Corporation; the Northwest Arctic Borough; NPS-Western Arctic National Parklands; and the Bureau of Indian Affairs (BIA).

If you have questions or comments related to this proposed project, or corrections and/or additions to the contact list, I can be reached at the address above, by telephone at 907-451-5293, or by e-mail at *thomas.gamza@alaska.gov*.

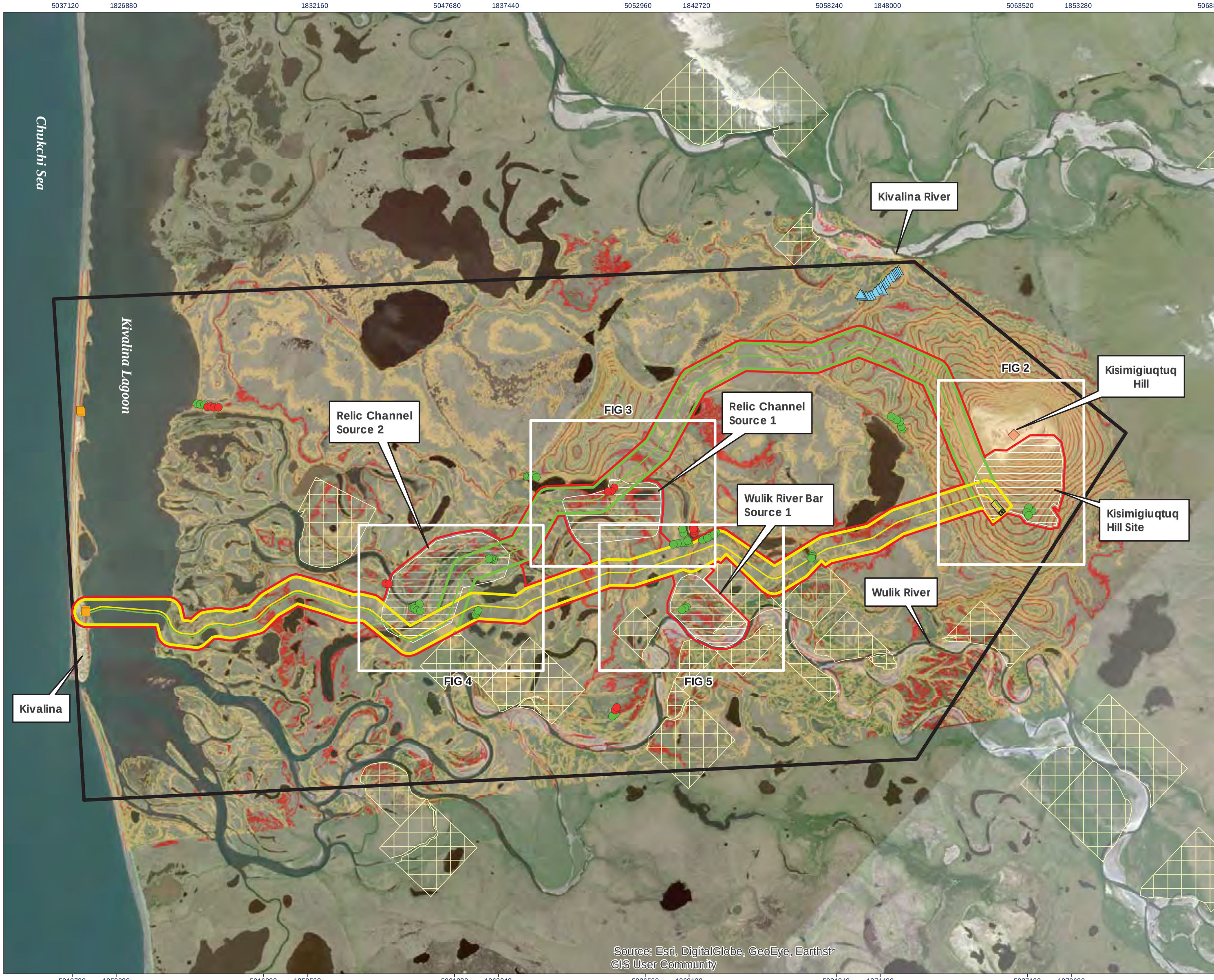
We request your input on our proposal so that we can incorporate your concerns into project development. Your timely response will greatly assist our compliance efforts and the preparation of any required environmental documentation. For that purpose, we request that you respond within thirty days of your receipt of this correspondence.

Sincerely,

Thomas A. Gamza
Cultural Resource Specialist-Archaeologist (PQI)
State of Alaska DOT&PF, Northern Region

Figure 1: Location and Vicinity Map
Figures 2-5 Proposed Material Site Investigation APE
Attachment 1: OHA Coversheet and Report: *Kivalina Evacuation and School Site Access Road*

Electronic cc w/ enclosures:
Michael Cain, FHWA Alaska Division, Northern Region Area Engineer
Jonathan Hutchinson, P.E., DOT&PF Northern Region, Project Manager
Paul Karczmarczyk, DOT&PF Northern Region, Environmental Impact Analyst
Brett Nelson, DOT&PF Northern Region, Regional Environmental Manager
Kathy Price, DOT&PF, Statewide Cultural Resources Manager
Amy Sumner, DOT&PF Statewide Environmental NEPA Manager



Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
2. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011; ©AeroMetric Inc., 2013; Digital Globe 2016

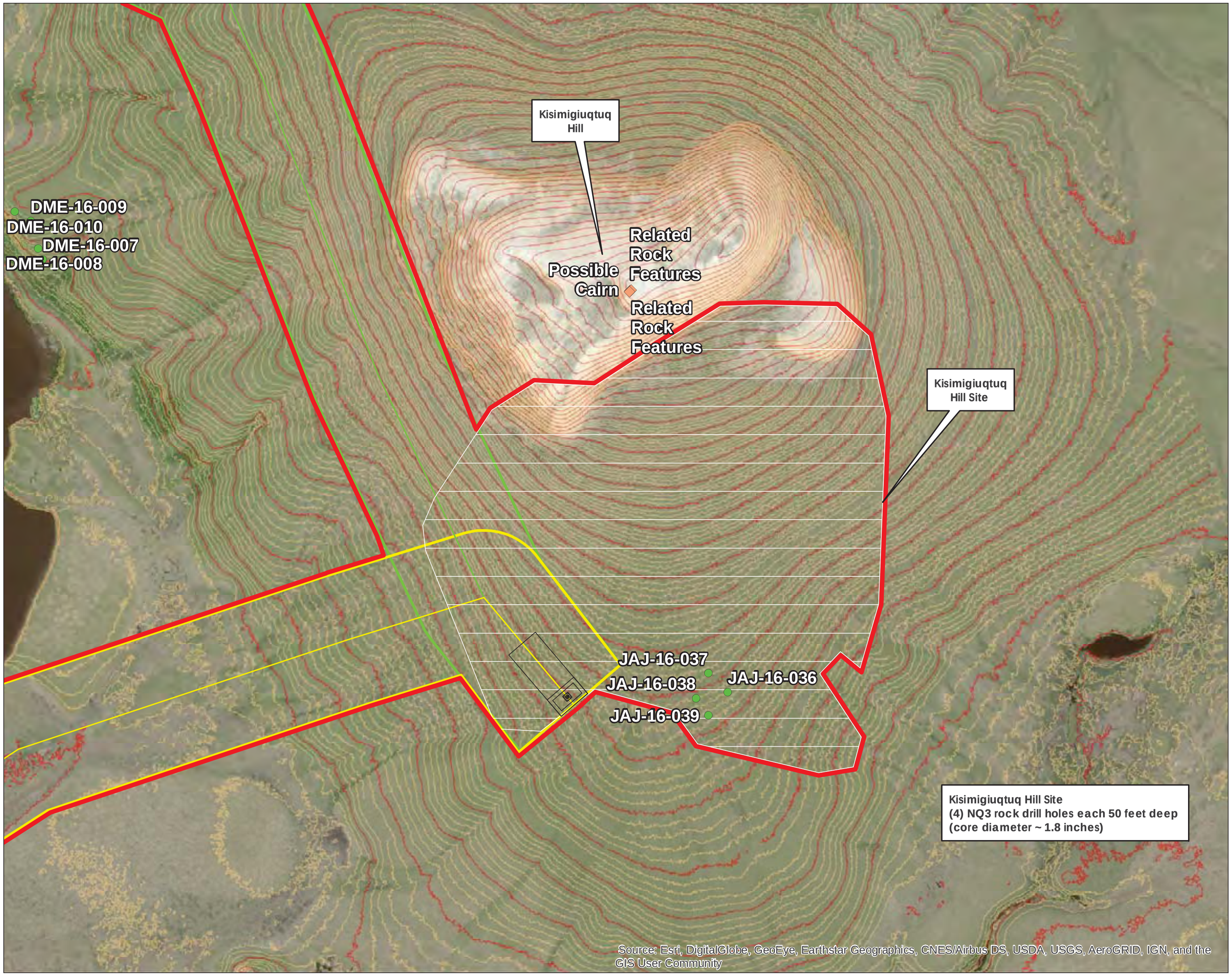
STATE OF ALASKA
Department of Transportation and Public Facilities
2301 Peger Road Fairbanks, AK 99709

KIVALINA EVACUATION AND SCHOOL SITE ACCESS ROAD

Area of Potential Effect - Overview

DATE: August, 2017 | FIGURE 1

Disclaimer: Stantec assumes no responsibility for data supplied in electronic format. The recipient accepts full responsibility for verifying the accuracy and completeness of the data. The recipient releases Stantec, its officers, employees, consultants and agents, from any and all claims arising in any way from the content or provision of the data.



Legend

- Area of Potential Effect (APE)
- Southern Route - 7.7 miles
- Combined Route B- 8.9 Miles
- Potential Material Source
- Native Allotments
- Shovel Test Probe - Local
- Shovel Test Probe - Probability
- Assessed Feature
- Soil Probe
- Test Unit

0 600 1,200 Feet

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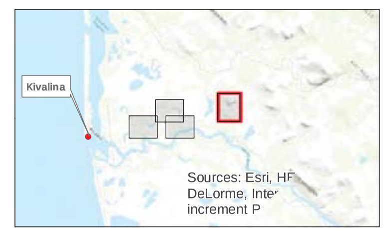
Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
2. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011;' ©AeroMetric Inc., 2013; Digital Globe 2016



STATE OF ALASKA
Department of Transportation and Public Facilities
2301 Peger Road Fairbanks, AK 99709

KIVALINA EVACUATION AND SCHOOL SITE ACCESS ROAD

Area of Potential Effect

DATE: August, 2017 | FIGURE 2

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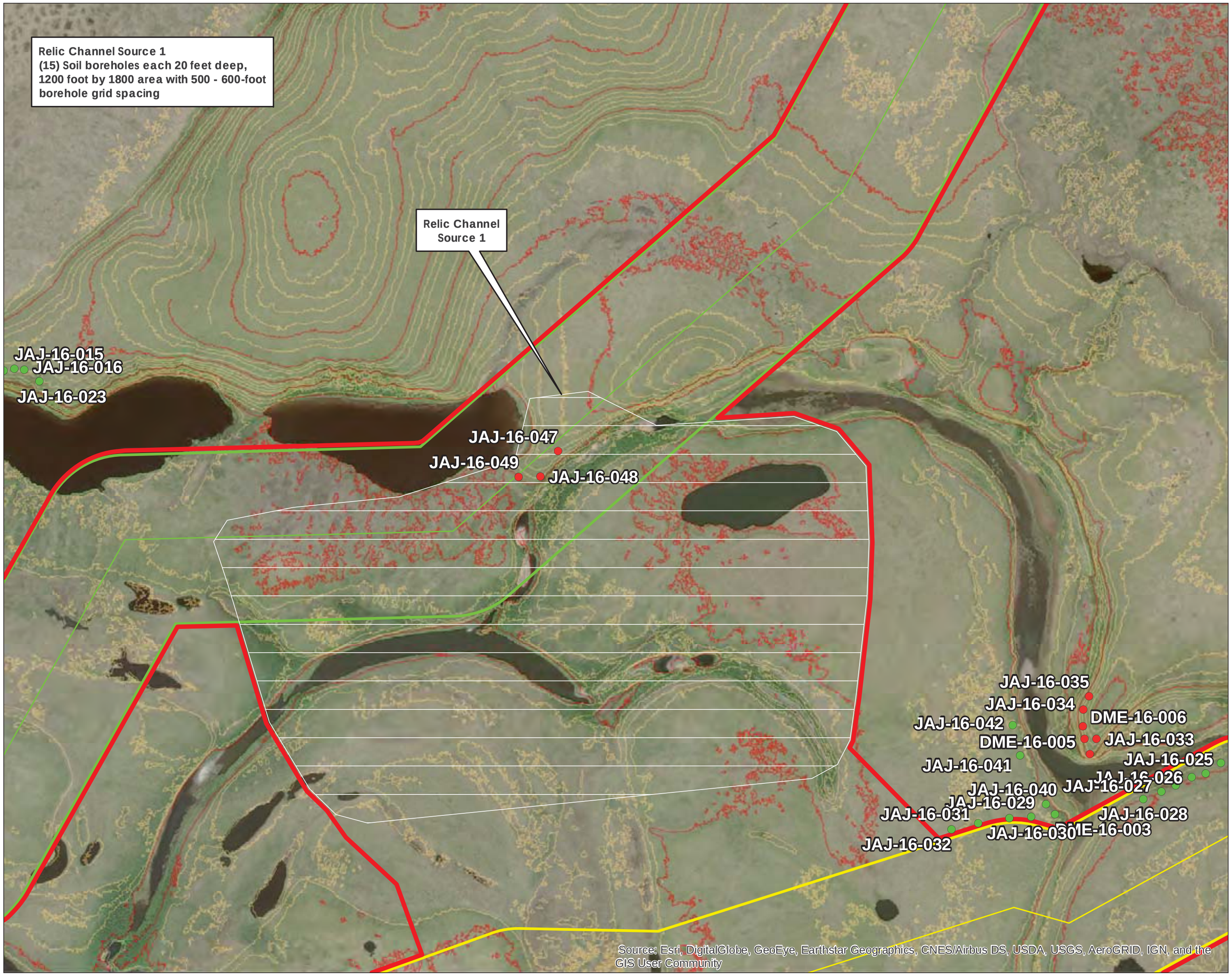

Legend

- Area of Potential Effect (APE)
- Southern Route - 7.7 miles
- Combined Route B- 8.9 Miles
- Potential Material Source
- Native Allotments
- Shovel Test Probe - Local
- Shovel Test Probe - Probability
- Assessed Feature
- Soil Probe
- Test Unit

0 475 950 Feet

1:7,200 (At original document size of 11x17)

Notes

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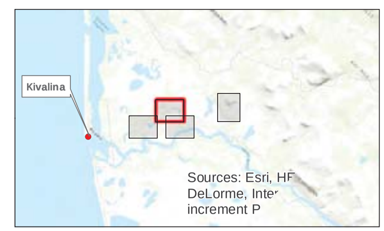
2. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011;' ©AeroMetric Inc., 2013; Digital Globe 2016



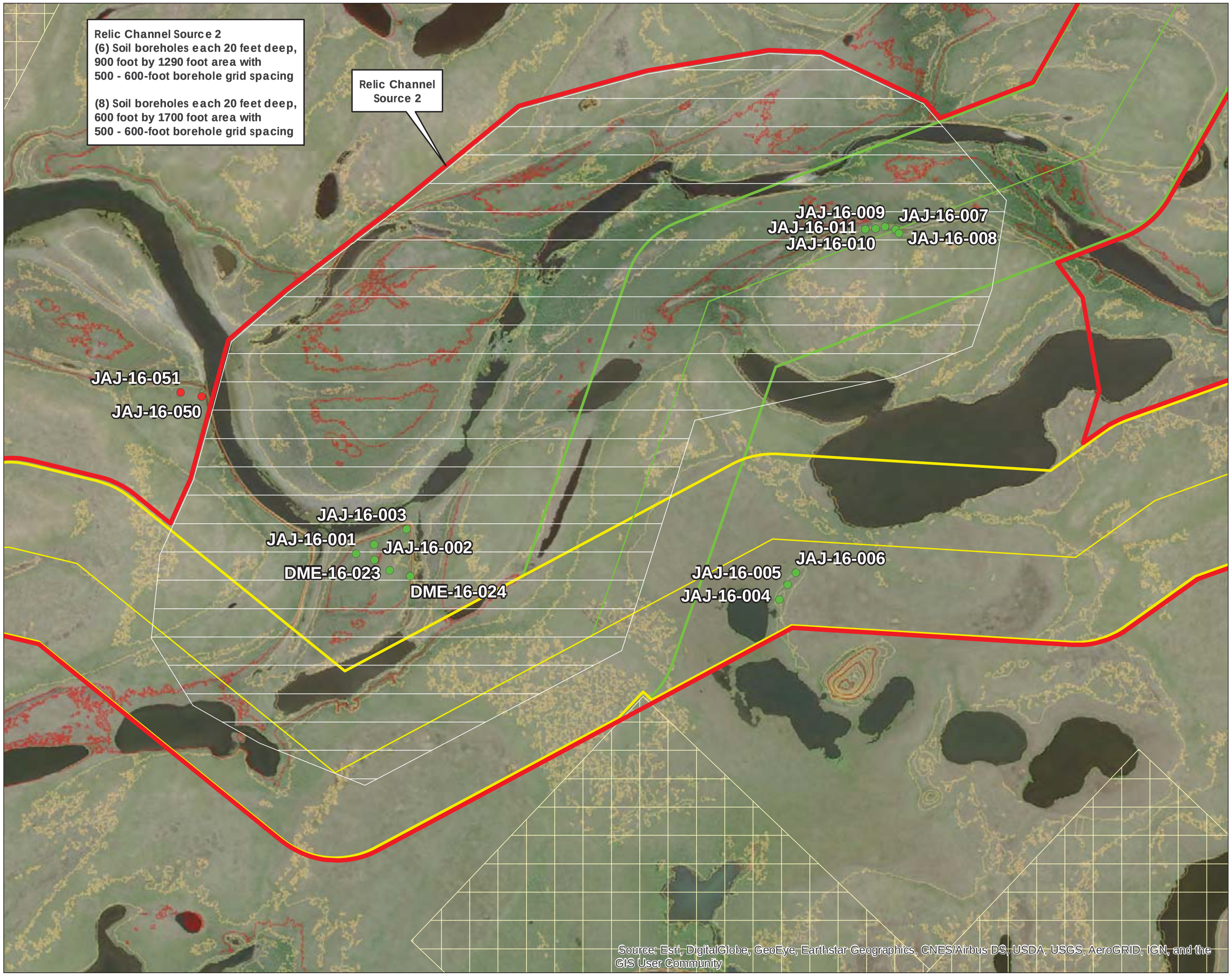
STATE OF ALASKA
Department of Transportation and Public Facilities
2301 Peger Road Fairbanks, AK 99709

KIVALINA EVACUATION AND SCHOOL SITE ACCESS ROAD

Area of Potential Effect

DATE: August, 2017 | FIGURE 3

Disclaimer: Stantec assumes no responsibility for data supplied in electronic format. The recipient accepts full responsibility for verifying the accuracy and completeness of the data. The recipient releases Stantec, its officers, employees, consultants and agents, from any and all claims arising in any way from the content or provision of the data.



Legend

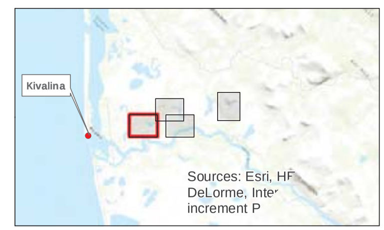
- Area of Potential Effect (APE)
- Southern Route - 7.7 miles
- Combined Route B- 8.9 Miles
- Potential Material Source
- Native Allotments
- Shovel Test Probe - Local
- Shovel Test Probe - Probability
- Assessed Feature
- Soil Probe
- Test Unit

0 475 950 Feet

1:7,200 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
2. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011;' ©AeroMetric Inc., 2013; Digital Globe 2016



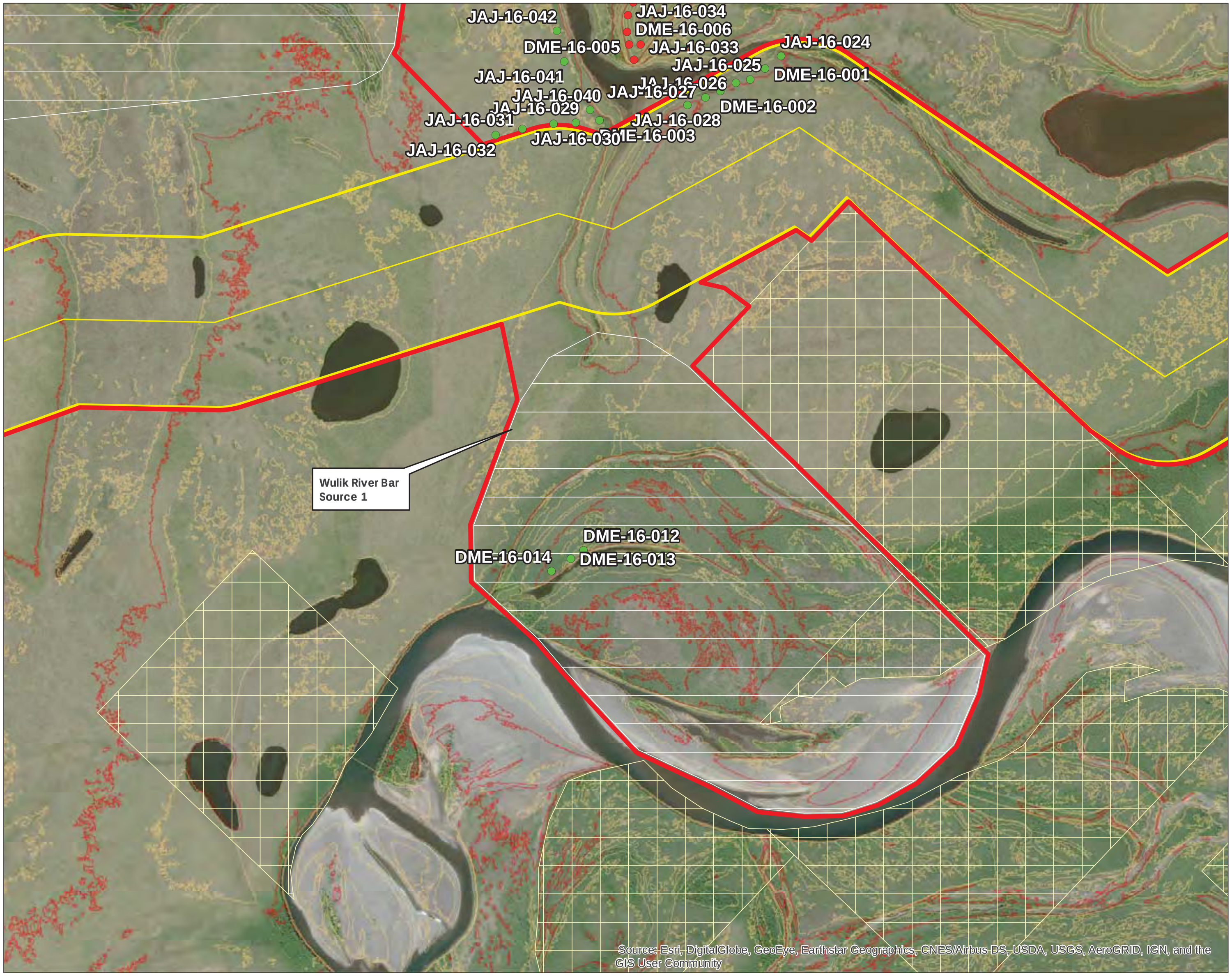
STATE OF ALASKA
Department of Transportation and Public Facilities
2301 Peger Road Fairbanks, AK 99709

KIVALINA EVACUATION AND SCHOOL SITE ACCESS ROAD

Area of Potential Effect

DATE: August, 2017

FIGURE 4



Legend

- Area of Potential Effect (APE)
- Southern Route - 7.7 miles
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- Shovel Test Probe - Probability
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0 475 950 Feet

1:7,200 (At original document size of 11x17)

Notes

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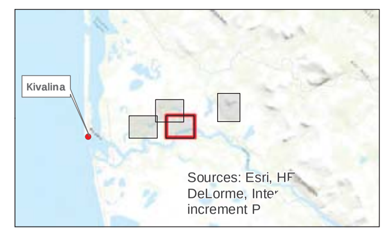

STATE OF ALASKA
Department of Transportation and Public Facilities
2301 Peger Road Fairbanks, AK 99709

KIVALINA EVACUATION AND SCHOOL SITE
ACCESS ROAD

Area of Potential Effect

DATE: August, 2017 | FIGURE **5**

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THE STATE of ALASKA

GOVERNOR BILL WALKER

Department of Transportation and Public Facilities

Northern Region
Design and Engineering Services
Preliminary Design and Environmental Section

2301 Peger Road
Fairbanks, Alaska 99709-5316
Main: 907-451-2237
Toll free: 800-451-2363
Fax: 907-451-5126

In Reply Refer To:
Kivalina Evacuation and School Site Access Road
Federal/State Project No. 0002384/NFHWY00162
Consultation Initiation

August 7, 2017

Bert Frost
Regional Director
Alaska Regional Office
National Park Service
240 West 5th Avenue
Anchorage, AK 99501

Dear Mr. Frost:

The Alaska Department of Transportation and Public Facilities (DOT&PF) is proposing to construct an evacuation road between Kivalina Island and a site on Kisimigiuqtuq Hill (K-Hill) (Figure 1). The project location is legally described in Table 1 below:

Table 1: Project Location

Section(s)	Township	Range	Meridian	USGS Quad
1, 2, 10, 11, 15, 16, 21	027N	026W	Kateel River	Noatak C-5
19. 20, 29, 30, 31	028N	026W	Kateel River	Noatak C-5
25, 26, 35, 36	029N	025W	Kateel River	Noatak C-5

Consultation is being conducted in accordance with the 2014 *Programmatic Agreement…for the Federal-Aid Highway Program in Alaska.* For purposes of the National Historic Preservation Act, we are initiating this consultation with you to assist us in identifying historic properties that may be affected by the proposed project.

"Keep Alaska Moving through service and infrastructure."

Project Description
The proposed project origin would be at the City of Kivalina and the project terminus would be at K-Hill which is the evacuation site selected by the community. Originally three routes were under consideration for the evacuation road location within the initial project Study Area. This has now been reduced to two potential route alignments which are currently being evaluated within the Preliminary Area of Potential Effect shown on Figure 1. Common to all route alternatives are the following actions:

- Construction of a causeway across the lagoon that may incorporate different hydrological openings including bridge(s), culvert(s), or both.
- Construction of an all-season gravel access road between Kivalina Island and the K-Hill evacuation site. The road would be designed to accommodate both general purpose and emergency evacuation vehicles over a two-way road with shoulders, multiple turnouts, and safe side slopes that may include guard rails and other safety features.
- Testing, analysis and development of material locations proximate to potential routes within the Preliminary APE to determine their feasibility and evaluate environmental impacts of their development (Figures 1-5).

Preliminary Area of Potential Effect (APE)
The Preliminary APE encompasses the direct footprint of the project, including two alternative route alignments, staging areas, and potential material sources that are variously located on NANA Regional Corporation, City of Kivalina, and DOT&PF-managed lands. The final APE will be defined after comments are received from your agency and other consulting parties.

Identification Efforts
A search of the Alaska Heritage Resources Survey (AHRS) database identified one site within the Preliminary APE which is described in table 2 below:

Table 2. AHRS Site Located within the Study Area

Site Number	Site Name	Site Description	Determination of Eligibility?
NOA-00042	Cape Krusenstern Archaeological District National Monument (NHL)	This district covers over 2 million acres, extending along the beach 8 miles and varying in width from 1-3 miles. 114 parallel marine beach ridges, formed at an average of 60 years each, are the main features. These former coastal margins contain houses, burials, cache pits, and other remains of the peoples who have occupied these beaches progressively for at least 5,000 years. This horizontal stratigraphy includes virtually the entire range of known cultural history in NW Alaska. Near the beach ridges, on unglaciated uplands, are two older sites dated from BP 11,000-6,000. The lower Noatak Valley, an important avenue between the coast and the interior for millennia, contains a number of archaeological sites. The villages of Noatak and Kivalina are within the district. The number of sites listed here includes only those cited as	National Register Listed 05/03/1974

		"important sites" in the Final Environmental Statement on Cape Krusenstern National Monument published in 1974. Other reports break down these major sites into many others. Includes NOA-00002, NOA-00078, NOA-00138, and NOA-00139.	

A literature review identified sixteen reports describing the results of cultural resource surveys conducted from the 1970s through 2016 within the initial Study Area. There are known archaeological and historical resources within the community of Kivalina south of the project origin, and south of the Wulik River mouth outside of the Study Area; however, no resources have been identified inland of Kivalina Lagoon within the Preliminary APE. The Preliminary APE is located within the boundaries of the Cape Krusenstern Archaeological District National Historic Landmark (NOA-00042). In January 2016, an archaeological predictive model was developed for the Study Area, and an archaeological survey of alternative route alignments and proposed material sites was conducted in September-October 2016. This field investigation involved pedestrian survey and subsurface testing at potentially sensitive locations identified in the predictive model and during the pedestrian survey along the three routes originally under consideration. The results of the field investigation are included in the *Kivalina Evacuation and School Site Access Road* report produced by Stantec for DOT&PF. Testing locations along the abandoned northern route are shown on Figure 1. No archaeological sites or historic properties were identified along the three alternative routes, or within the material sites that were defined at that time.

DOT&PF intends to send a cultural resource survey team in the summer of 2017 to conduct addition fieldwork within the preliminary APE. The results of this work will be provided to the State Historic Preservation Officer and National Park Service for review upon its completion.

Under the Alaska Historic Roads Programmatic Agreement Interim Guidance, a group of Alaska roads has been identified which are being treated as eligible for the National Register of Historic Places (NRHP). This project does not affect any of these roads.

Consultation Efforts
The following consulting parties are being contacted regarding this project: the Alaska State Historic Preservation Officer (SHPO); the National Park Service (NPS); the Native Village of Kivalina; the City of Kivalina; the Native Village of Noatak; NANA Regional Corporation; the Northwest Arctic Borough; NPS-Western Arctic National Parklands; and the Bureau of Indian Affairs (BIA).

If you have questions or comments related to this proposed project, or corrections and/or additions to the contact list, I can be reached at the address above, by telephone at 907-451-5293, or by e-mail at *thomas.gamza@alaska.gov*.

We request your input on our proposal so that we can incorporate your concerns into project development. Your timely response will greatly assist our compliance efforts and the preparation of any required environmental documentation. For that purpose, we request that you respond within thirty days of your receipt of this correspondence.

Sincerely,

Thomas A. Gamza
Cultural Resource Specialist-Archaeologist (PQI)
State of Alaska DOT&PF, Northern Region

Figure 1: Location and Vicinity Map
Figures 2-5 Proposed Material Site Investigation APE

Electronic cc w/ enclosures:
Michael Cain, FHWA Alaska Division, Northern Region Area Engineer
Jonathan Hutchinson, P.E., DOT&PF Northern Region, Project Manager
Paul Karczmarczyk, DOT&PF Northern Region, Environmental Impact Analyst
Brett Nelson, DOT&PF Northern Region, Regional Environmental Manager
Kathy Price, DOT&PF, Statewide Cultural Resources Manager
Amy Sumner, DOT&PF Statewide Environmental NEPA Manager

Department of Transportation and Public Facilities

THE STATE of ALASKA

GOVERNOR BILL WALKER

Northern Region
Design and Engineering Services
Preliminary Design and Environmental Section

2301 Peger Road
Fairbanks, Alaska 99709-5316
Main: 907-451-2237
Toll free: 800-451-2363
Fax: 907-451-5126

In Reply Refer To:
Kivalina Evacuation and School Site Access Road
Federal/State Project No. 0002384/NFHWY00162
No Historic Properties Adversely Affected
ATTENTION: This finding contains no DOE's

September 19, 2017

Ms. Judith E. Bittner
State Historic Preservation Officer
Alaska Office of History and Archaeology
550 W. 7th Avenue, Suite 1310
Anchorage, Alaska 99501-3565

Dear Ms. Bittner:

The Alaska Department of Transportation and Public Facilities (DOT&PF) has assumed the responsibilities of the Federal Highway Administration under 23 U.S.C.§ 326, and is proposing to construct a safe, reliable, all-season evacuation road between the community of Kivalina and a site on Kisimigiuqtuq Hill (K-Hill) (Figure 1). The Kivalina Evacuation and School Site Access Road (the Project) location is legally described in Table 1 below:

Table 1: Project Location

Section(s)	Township	Range	Meridian	USGS Quad
1, 2, 10, 11, 15, 16, 21	027N	026W	Kateel River	Noatak C-5
19. 20, 29, 30, 31	028N	026W	Kateel River	Noatak C-5
25, 26, 35, 36	029N	025W	Kateel River	Noatak C-5

Consultation for this project is being conducted in accordance with the 2014 *Programmatic Agreement... for the Federal-Aid Highway Program in Alaska.* The DOT&PF, acting as a Federal agency, finds no adverse effect on historic properties by the proposed project pursuant to 36 CFR 800.5(b), implementing regulations of Section 106 of the National Historic Preservation

Act. This submission provides documentation in support of this finding, as required at 36 CFR 800.11(e).

Project Description

The proposed Project origin is at the City of Kivalina, located on the southeast tip of the barrier island located between the Chukchi Sea (Arctic Ocean) and Kivalina Lagoon (Figure 1). The project terminus is located on the mainland across the Kivalina Lagoon approximately six miles northeast at a community selected evacuation site on K-Hill. A range of route alternatives were considered within the project Study Area. This has now been reduced to two potential route alignments, the Combined Route B and the Southern Route, which are currently being considered as the Area of Potential Effect shown on Figure 2. Common to both route alternatives are the following actions:

- Construction of a 3,200-foot long causeway across the lagoon that may incorporate different hydrological openings including bridge(s), culvert(s), or both.
- Construction of an all-season two-way 24-foot wide gravel access road, either 7.7 miles or 8.9 miles long depending on the route selected, between Kivalina Island and the desired K-Hill evacuation site. Road construction would be within a 300-foot right-of-way (ROW) and include shoulders, multiple turnouts and 3:1 side slopes that may include guard rails and other safety features.
- Testing, analysis and development of material locations proximate to potential routes within the APE to determine their feasibility and evaluate environmental impacts of their development (Figures 2-6).

Area of Potential Effect (APE)

Potential direct and indirect effects were considered prior to the creation of the proposed APE. The APE, as presented, is a 2000-foot corridor encompasses the direct footprint of the project, including two alternative route alignments, staging areas, and potential material sites that are located on variously managed lands and allows for in-field construction adjustments. One final route APE will be defined with the completion of the environmental assessment.

The Kivalina Evacuation and School Site Access Road project would provide Kivalina residents a safe and reliable evacuation route in the event of a catastrophic storm or ocean surge, allowing evacuees to temporarily mobilize to safe refuge at an assembly site on K-Hill. This site is also identified by the Northwest Arctic Borough School District, and approved by the community, as a preferred new location for the community school. If constructed in the future, the school could augment the undeveloped evacuation site by serving as a full-service community emergency shelter with all-season support capabilities. No other viable potential future actions are identified at this time. While community relocation has been discussed for some time, it is not considered reasonably foreseeable. At present, the community supports construction of an evacuation road due to the immediate threat of storm events.

Kivalina relies on the currently existing airstrip adjacent to the city for a majority of its transportation and outside goods. Currently, DOT&PF has a project, Kivalina Airport Erosion Control (Z638720000), which is planning to construct a runway embankment erosion control

feature. Initiation of Consultation letters were sent in February of 2017 for the Kivalina Airport Erosion Control project and a cultural resource investigation was conducted in August of 2017.

Several Alaska Native allotments lie adjacent to the APE and development of these and other private lands may occur consequent to road development. However, the DOT&PF believes that if this were to occur it will be limited to increased access to currently used traditional subsistence locations by people in the community. In addition, material sites developed in support of this project may be further developed or expanded for community use but this expansion will likely occur within the boundary of the current APE.

The potential viewshed effects of the creation of the road were also considered. The DOT&PF believes the minimal elevation and the limited width and method of construction of the road will not have an effect on the current viewshed of open tundra.

In order for the community of Kivalina to consider a future relocation move to a location along the evacuation road, near or at the evacuation road terminus or any place else, extensive planning, land transfers and the securing of significant funding would have to be in place. At this time those actions are neither reasonably foreseeable nor considered a cumulative impact of the proposed project. The DOT&PF does not believe that this action would be directly caused by the Project

Identification Efforts

A search of the Alaska Heritage Resources Survey (AHRS) database identified one site within the APE which is described in table 2 below:

Table 2. AHRS Site Located within the APE

Site Number	Site Name	Site Description	Determination of Eligibility?
NOA-00042	Cape Krusenstern Archaeological District National Monument National Historic Landmark (NHL)	This district covers over 2 million acres, extending along the beach 8 miles and varying in width from 1-3 miles. 114 parallel marine beach ridges, formed at an average of 60 years each, are the main features. These former coastal margins contain houses, burials, cache pits, and other remains of the peoples who have occupied these beaches progressively for at least 5,000 years. This horizontal stratigraphy includes virtually the entire range of known cultural history in NW Alaska. Near the beach ridges, on unglaciated uplands, are two older sites dated from BP 11,000-6,000. The lower Noatak Valley, an important avenue between the coast and the interior for millennia, contains a number of archaeological sites. The villages of Noatak and Kivalina are within the district. The number of sites listed here includes only those cited as "important sites" in the Final Environmental Statement on Cape Krusenstern National Monument published in 1974. Other reports break down these major sites into many others. Includes	National Register of Historic Places Listed 05/03/1974

		NOA-00002, NOA-00078, NOA-00138, and NOA-00139.	

A literature review identified sixteen reports describing the results of cultural resource surveys conducted from the 1970s through 2016 within the initial Study Area. There are known archaeological and historical resources within the community of Kivalina south of the project origin, and south of the Wulik River mouth outside of the APE Area; however, no resources have been identified inland of Kivalina Lagoon within the APE. The APE is located within the boundaries of the Cape Krusenstern Archaeological District National Historic Landmark (NOA-00042). In January 2016, an archaeological predictive model was developed for the Study Area, and an archaeological survey of alternative route alignments and proposed material sites was conducted in September-October 2016. This field investigation involved pedestrian survey and subsurface testing at potentially sensitive locations identified in the predictive model and during the pedestrian survey along the three routes originally under consideration. The results of the field investigation are included in the *Kivalina Evacuation and School Site Access Road* report produced by Stantec for DOT&PF (Attachment 1). Testing locations along the abandoned northern route are shown on Figure 2. The entire northern route is shown on Figure 1 of Appendix D of the report. No archaeological sites or historic properties were identified along the three alternative routes, or within the material sites that were defined at that time.

DOT&PF sent a cultural resource survey team in the August of 2017 to conduct addition fieldwork within the APE which now includes potential material site locations. The results of the field investigation are provided in a memo from Stantec entitled *Archaeological Assessment Update for the Kivalina Evacuation and School Site Access Road* (Attachment 2).

Under the Alaska Historic Roads Programmatic Agreement Interim Guidance, a group of Alaska roads has been identified which are being treated as eligible for the National Register of Historic Places (NRHP). This project does not affect any of these roads.

Finding of Effect

NOA-00042 Cape Krusenstern Archaeological District National Monument National Historic Landmark (NHL)

Cape Krusenstern Archaeological District National Historic Landmark (NHL) was designated November 7, 1973 prior to the establishment if the National Monument which was designated on December 1, 1978. Properties designated as National Historic Landmarks are automatically listed in the NRHP CFR36§65.2(b). The primary reason for the designation of both the Archaeological District and National Monument was the overall significance of the region to the understanding the prehistory of the Arctic based on the positive results of archaeological investigations that took place between the late 1940's and early 1970's and continue today. At first, the boundary of the National Monument, which is restricted to the archaeologically rich beach ridge complex, was used for the boundaries for the NHL under National Landmark Criteria 36CFR§64.4(a)(6). It was later expanded to include areas, such as the Project location, which had not had any archaeological investigation conducted at the time.

The archaeological investigations conducted over the 2016 and 2017 field seasons did not result in the identification any elements which contribute to our continuing understanding of the prehistory or history of the Arctic within the Project's APE which is located within the boundaries of NHL. As such, the proposed construction of the Evacuation and School Site Access Road will not have an adverse effect on the integrity of the NHL or its continuing eligibility for the NRHP as no contributing elements have been identified. Due to the Project being located within the NHL boundary the DOT&PF is submitting monitoring and inadvertent discovery plan to be implemented during the continued planning and execution of the Project (Attachment 3). In the event that cultural resources are encountered this plan will be implemented and all identified parties will be contacted. As the proposed routes, the Project terminus and the potential material site locations have only one historic property located within their boundaries the potential effect for all were addressed in one evaluation.

Overall, the DOT&PF has determined that the activities proposed for the Kivalina Evacuation and School Site Access Road Project will result in **no historic properties adversely affected** and seeks the Alaska SHPO's concurrence with this finding of effect.

Section 4(f)
It is the DOT&PF's intent to make a Section 4(f) de minimis impact finding premised on your written concurrence that the project **will not adversely affect** NOA-00042 Cape Krusenstern Archaeological District National Monument National Historic Landmark (NHL).

Consultation Efforts
On July 10, 2017 a meeting was among Agency cultural resource staff. The DOT&PF Northern Region PQI, staff from the Office of History and Archaeology and the Alaska State Historic Preservation Officer (SHPO) and the National Park Service Archaeologist for the National Register of Historic Places Program, Alaska Region. Initiation of Consultation letters were sent out to the identified consulting parties on August 7, 2017. A response was received from the SHPO office on August 22, 2017 stating there was no objection to the proposed Study Area or level of identification at this time (Attachment 4). No other responses to the Section 106 Initiation of Consultation letters were received.

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In addition to the Alaska State Historic Preservation Officer (SHPO), other parties being contacted regarding the findings for this project are: the National Park Service (NPS); the Native Village of Kivalina; the City of Kivalina; the Native Village of Noatak; NANA Regional Corporation; the Northwest Arctic Borough; NPS-Western Arctic National Parklands; the Bureau of Indian Affairs (BIA); and the Advisory Council on Historic Preservation.

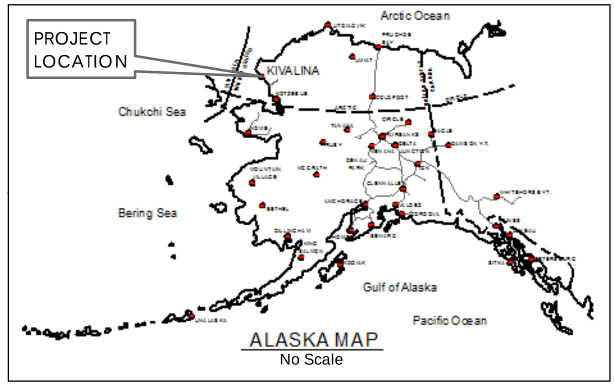
Please direct your concurrence or comments to me at the address above, by telephone at 907-451-5293, or by e-mail at *thomas.gamza@alaska.gov*.

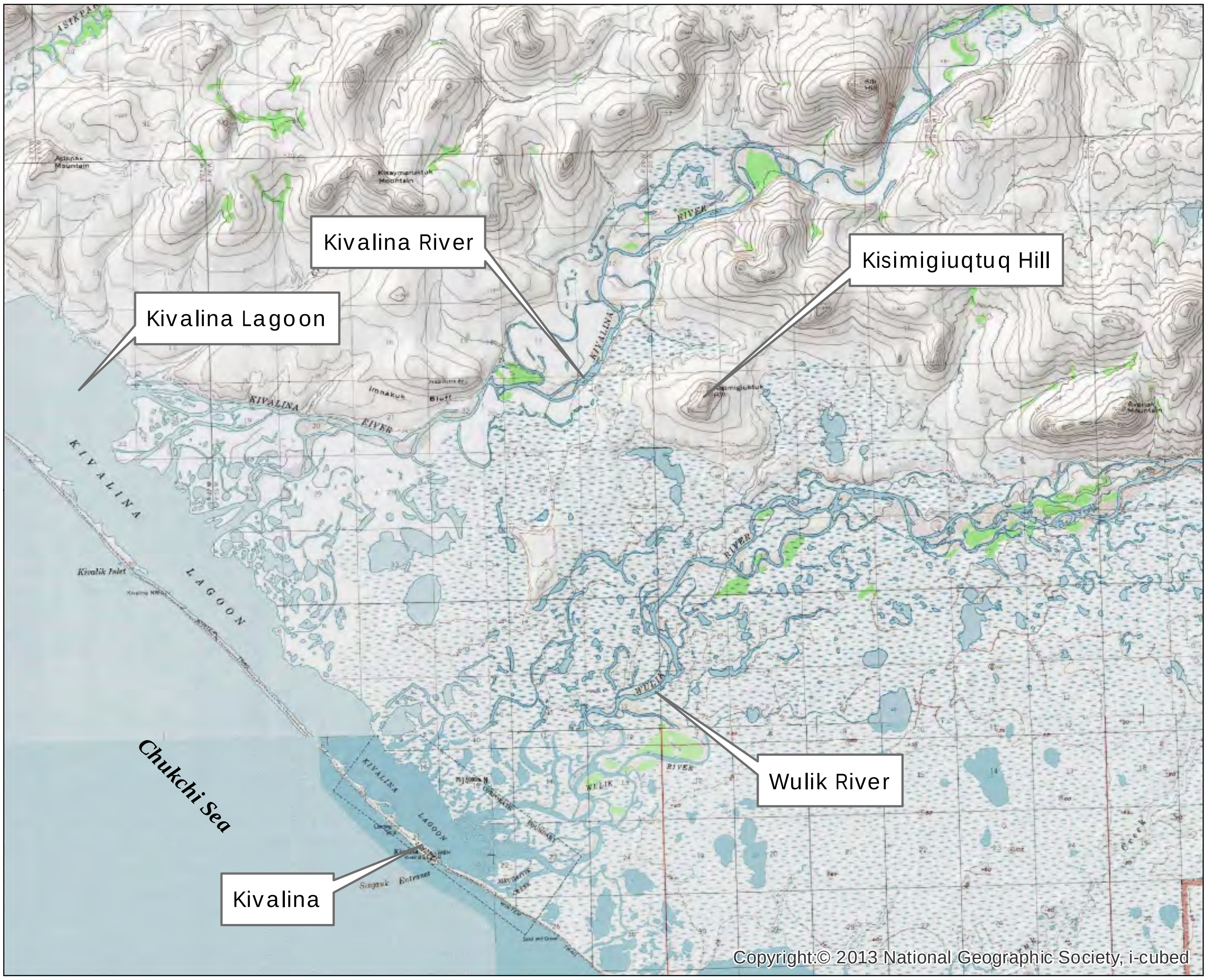
Sincerely,

Thomas A. Gamza
Cultural Resource Specialist-Archaeologist (PQI)
State of Alaska DOT&PF, Northern Region

Figure 1: Location and Vicinity Map
Figure 2: Area of Potential Effect-Overview
Figures 3-6 Proposed Material Site Investigation APE
Attachment 1: Report: *Kivalina Evacuation and School Site Access Road*
Attachment 2: OHA Coversheet and Report: *Archaeological Assessment Update for the Kivalina Evacuation and School Site Access Road*
Attachment 3: Draft Inadvertent Discovery Plan – Kivalina Evacuation and School Site Access Road
Attachment 4: August 22, 2017 response from the SHPO to August 7, 2017 Initiation of Consultation Letter

Electronic cc w/ enclosures:
Michael Cain, FHWA Alaska Division, Northern Region Area Engineer
Jonathan Hutchinson, P.E., DOT&PF Northern Region, Project Manager
Paul Karczmarczyk, DOT&PF Northern Region, Environmental Impact Analyst
Brett Nelson, DOT&PF Northern Region, Regional Environmental Manager
Kathy Price, DOT&PF, Statewide Cultural Resources Manager
Amy Sumner, DOT&PF Statewide Environmental NEPA Manager





Graphics developed by Stantec Consulting Services, Inc.

Project Origin: City of Kivalina,
Kotzebue Recording District,
Section 21, Township 27N, Range 26W,
Kateel River Meridian

Project Terminus: Kisimigiuqtuq Hill,
Section 19, Township 28N, Range 25W
Kateel River Meridian

0 1.25 2.5 5 Miles
1:142,961 (at original document size of 8.5x11)

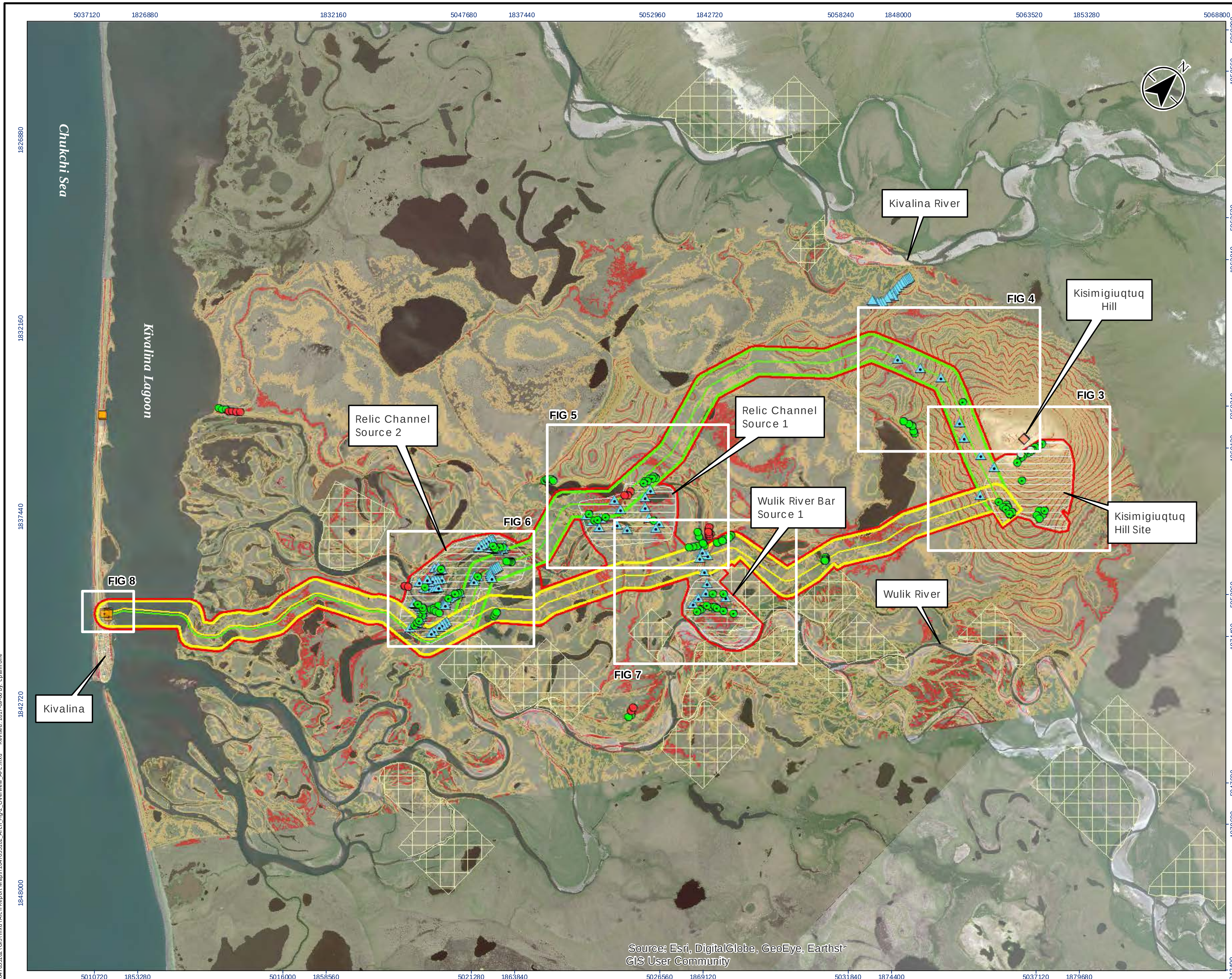
STATE OF ALASKA
Department of Transportation and Public Facilities
2301 Peger Road Fairbanks, AK 99709

KIVALINA EVACUATION AND SCHOOL SITE ACCESS ROAD

Location & Vicinity Map

DATE: September, 2017	FIGURE 1

U:\2047055102\GIS\mxd\Section 106\2047055102_Sec106_Fig-1_Loc-Vic_Map.mxd Revised: 2017-09-06 By: cpannone



Legend

- Area of Potential Effect (APE)
- Southern Route - 7.7 miles
- Combined Route B - 8.9 Miles
- Potential Material Source
- Native Allotments

Data Points (2017)

- Bear Den
- Shovel Test Probe
- Soil Probes
- Test Unit

Data Points (2016)

- Shovel Test Probe - Local
- Shovel Test Probe - Probability
- Assessed Feature
- Soil Probe
- Test Unit

0 0.4 0.8 Miles

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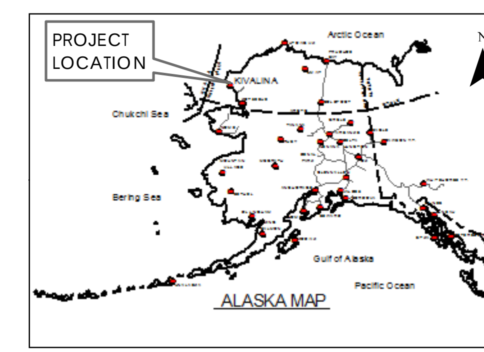
Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
2. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011; ©AeroMetric Inc., 2013; Digital Globe 2016



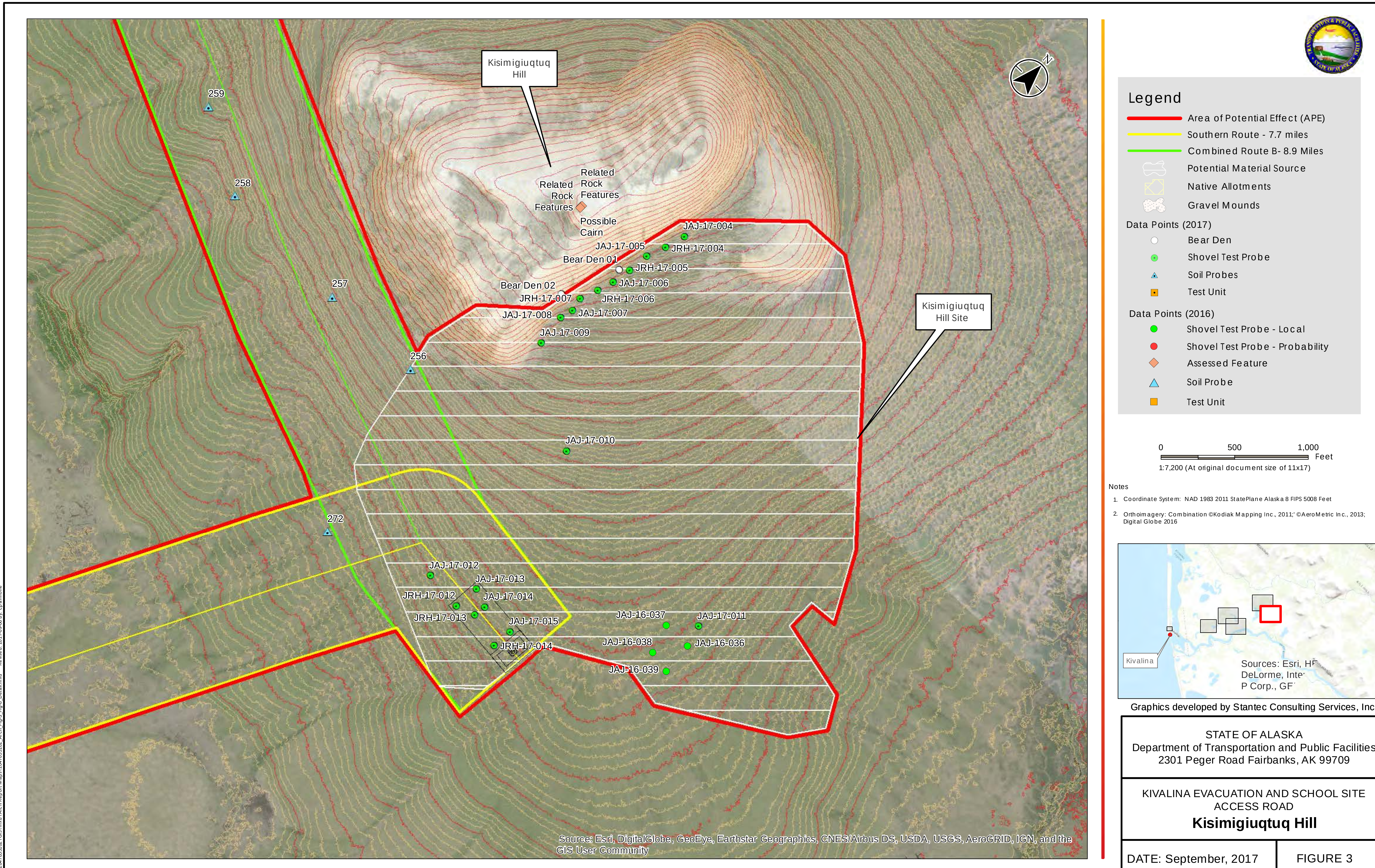
Graphics developed by Stantec Consulting Services, Inc.

STATE OF ALASKA
Department of Transportation and Public Facilities
2301 Peger Road Fairbanks, AK 99709

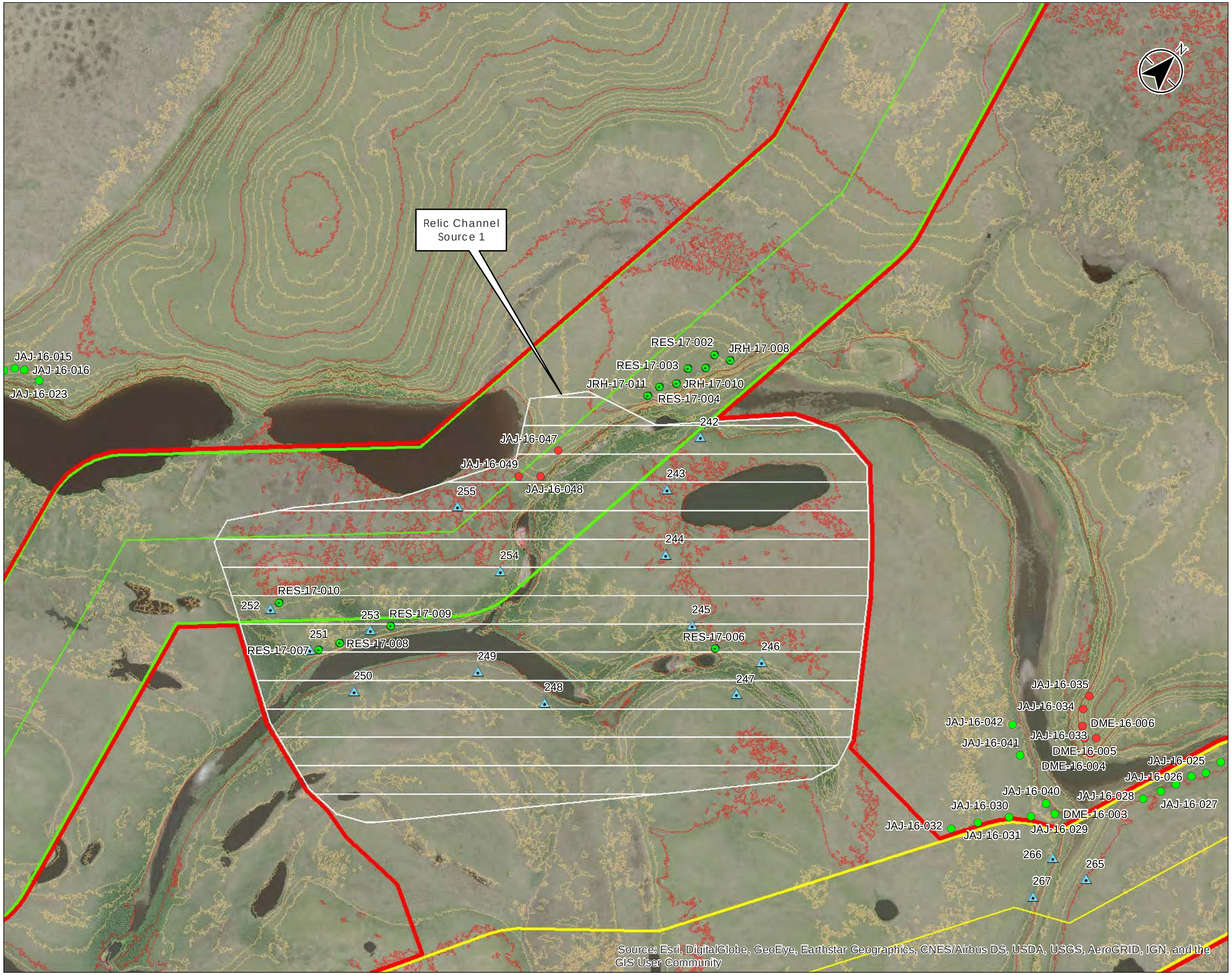
KIVALINA EVACUATION AND SCHOOL SITE ACCESS ROAD

Area of Potential Effect - Overview

DATE: September, 2017 | FIGURE 2



Kisimigiuqtuq Hill
259
258
257
256
272
Related Rock Features
Related Rock Features
Possible Cairn
JAJ-17-004
JAJ-17-005
JRH-17-004
Bear Den 01
JRH-17-005
Bear Den 02
JAJ-17-006
JRH-17-007
JRH-17-006
JAJ-17-008
JAJ-17-007
JAJ-17-009
Kisimigiuqtuq Hill Site
JAJ-17-010
JAJ-17-012
JAJ-17-013
JRH-17-012
JAJ-17-014
JRH-17-013
JAJ-17-015
JRH-17-014
JAJ-16-037
JAJ-17-011
JAJ-16-038
JAJ-16-036
JAJ-16-039
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
Legend
Area of Potential Effect (APE)
Southern Route - 7.7 miles
Combined Route B- 8.9 Miles
Potential Material Source
Native Allotments
Gravel Mounds
Data Points (2017)
Bear Den
Shovel Test Probe
Soil Probes
Test Unit
Data Points (2016)
Shovel Test Probe - Local
Shovel Test Probe - Probability
Assessed Feature
Soil Probe
Test Unit
0 500 1,000 Feet
1:7,200 (At original document size of 11x17)
Notes
1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
2. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011; ©AeroMetric Inc., 2013; Digital Globe 2016
Kivalina
Sources: Esri, HE
DeLorme, Inte
P Corp., GE
Graphics developed by Stantec Consulting Services, Inc.
STATE OF ALASKA
Department of Transportation and Public Facilities
2301 Peger Road Fairbanks, AK 99709
KIVALINA EVACUATION AND SCHOOL SITE ACCESS ROAD
Kisimigiuqtuq Hill
DATE: September, 2017
FIGURE 3



Legend

- Area of Potential Effect (APE)
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- Shovel Test Probe - Probability
- Assessed Feature
- Soil Probe
- Test Unit

0 500 1,000 Feet

1:7,200 (At original document size of 11x17)

Notes

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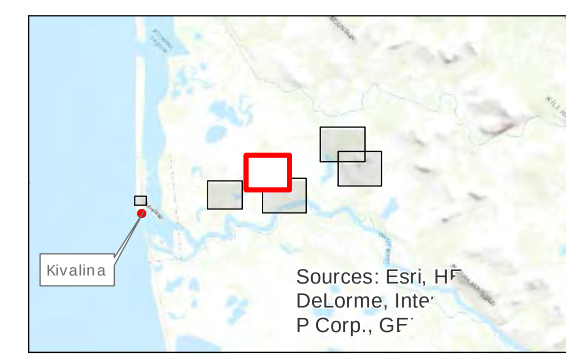

Graphics developed by Stantec Consulting Services, Inc.

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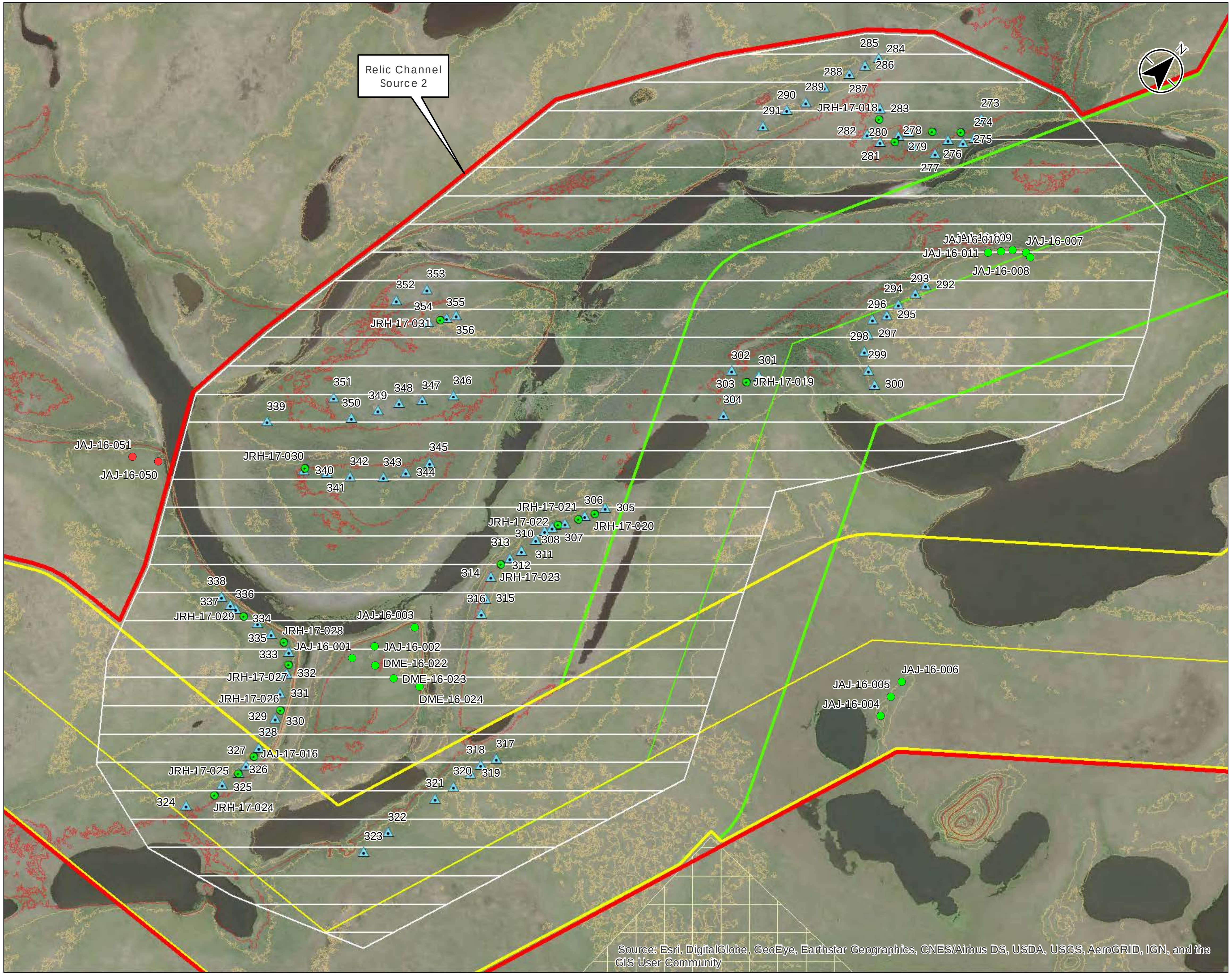
Department of Transportation and Public Facilities
2301 Peger Road Fairbanks, AK 99709

KIVALINA EVACUATION AND SCHOOL SITE ACCESS ROAD

Relic Channel Source 1

DATE: September, 2017 | FIGURE 4



Legend

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- Test Unit

Data Points (2016)

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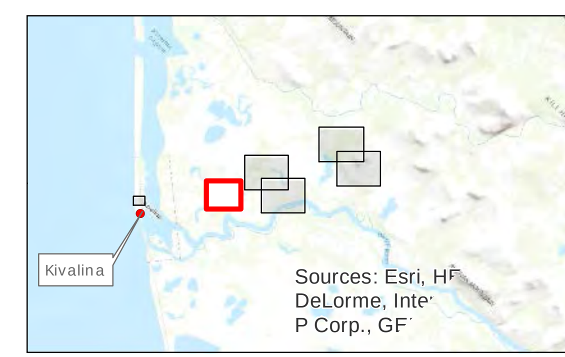
- Assessed Feature
- Soil Probe
- Test Unit

0 400 800
Feet

1:5,760 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
2. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011; ©AeroMetric Inc., 2013; Digital Globe 2016



Graphics developed by Stantec Consulting Services, Inc.

STATE OF ALASKA
Department of Transportation and Public Facilities
2301 Peger Road Fairbanks, AK 99709

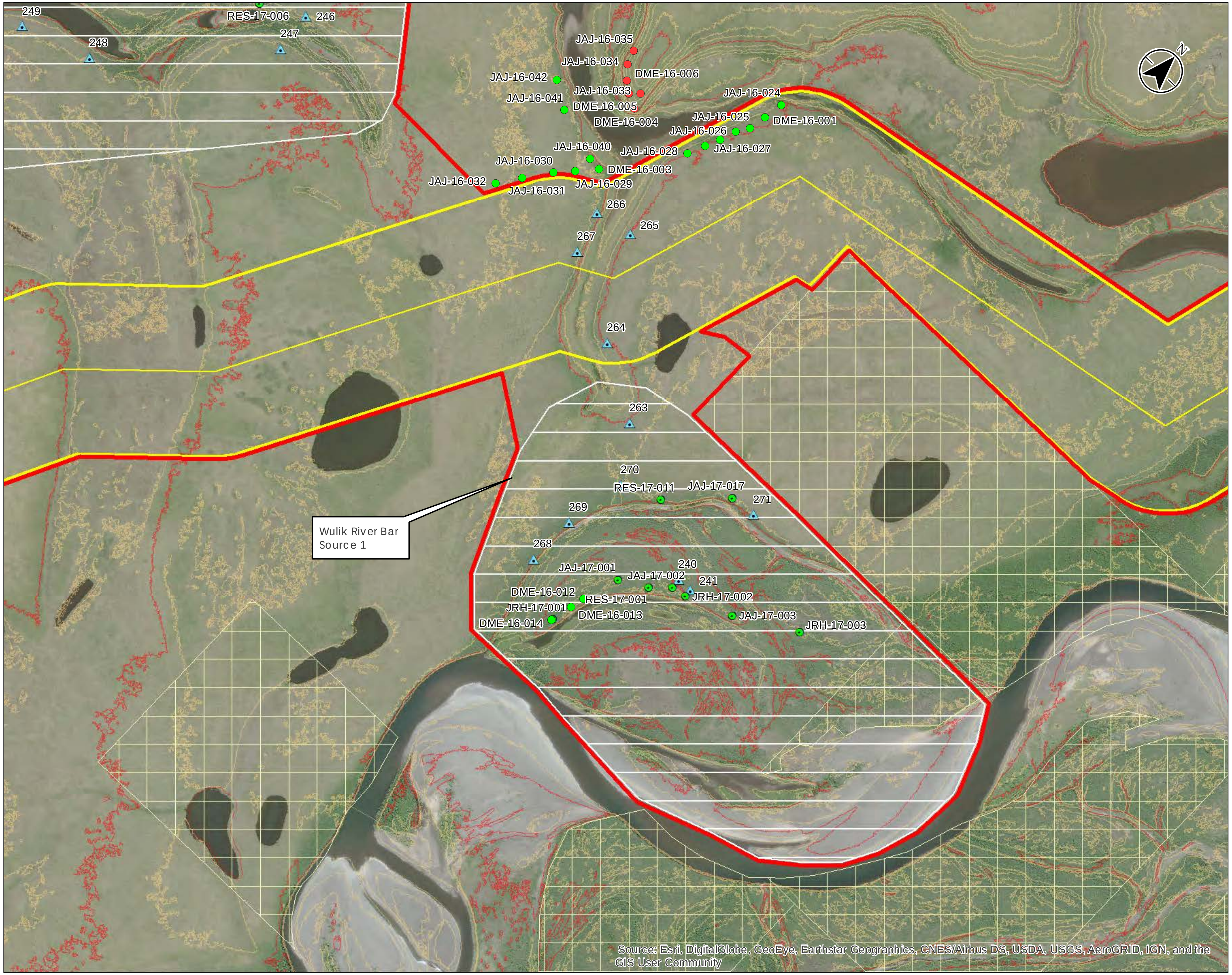
KIVALINA EVACUATION AND SCHOOL SITE ACCESS ROAD

Relic Channel Source 2

DATE: September, 2017

FIGURE 5

U:\204755102\GIS\mxd\Arch Report Maps\204755102_Arch_Fig-3_Fig-8_Detail.mxd Revised: 2017-09-06 By: cpamone



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- Soil Probe
- Test Unit

0 500 1,000 Feet

1:7,200 (At original document size of 11x17)

Notes

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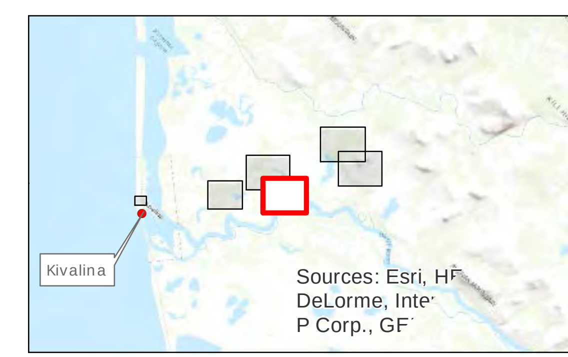

Graphics developed by Stantec Consulting Services, Inc.

STATE OF ALASKA
Department of Transportation and Public Facilities
2301 Peger Road Fairbanks, AK 99709

KIVALINA EVACUATION AND SCHOOL SITE ACCESS ROAD

Wulik River Bar Source 1

DATE: September, 2017	FIGURE 6

Department of Transportation and Public Facilities

THE STATE of ALASKA

GOVERNOR BILL WALKER

Northern Region
Design and Engineering Services
Preliminary Design and Environmental Section

2301 Peger Road
Fairbanks, Alaska 99709-5316
Main: 907-451-2237
Toll free: 800-451-2363
Fax: 907-451-5126

In Reply Refer To:
Kivalina Evacuation and School Site Access Road
Federal/State Project No. 0002384/NFHWY00162
No Historic Properties Adversely Affected
ATTENTION: This finding contains no DOE's

September 19, 2017

Bert Frost, Regional Director
Alaska Regional Office
National Park Service
240 West 5th Avenue
Anchorage, AK 99501

Dear Mr. Frost:

The Alaska Department of Transportation and Public Facilities (DOT&PF) has assumed the responsibilities of the Federal Highway Administration under 23 U.S.C.§ 326, and is proposing to construct a safe, reliable, all-season evacuation road between the community of Kivalina and a site on Kisimigiuqtuq Hill (K-Hill) (Figure 1). The Kivalina Evacuation and School Site Access Road (the Project) location is legally described in Table 1 below:

Table 1: Project Location

Section(s)	Township	Range	Meridian	USGS Quad
1, 2, 10, 11, 15, 16, 21	027N	026W	Kateel River	Noatak C-5
19. 20, 29, 30, 31	028N	026W	Kateel River	Noatak C-5
25, 26, 35, 36	029N	025W	Kateel River	Noatak C-5

Consultation for this project is being conducted in accordance with the 2014 *Programmatic Agreement... for the Federal-Aid Highway Program in Alaska.* The DOT&PF, acting as a Federal agency, finds no adverse effect on historic properties by the proposed project pursuant to 36 CFR 800.5(b), implementing regulations of Section 106 of the National Historic Preservation

Act. This submission provides documentation in support of this finding, as required at 36 CFR 800.11(e).

Project Description

The proposed Project origin is at the City of Kivalina, located on the southeast tip of the barrier island located between the Chukchi Sea (Arctic Ocean) and Kivalina Lagoon (Figure 1). The project terminus is located on the mainland across the Kivalina Lagoon approximately six miles northeast at a community selected evacuation site on K-Hill. A range of route alternatives were considered within the project Study Area. This has now been reduced to two potential route alignments, the Combined Route B and the Southern Route, which are currently being considered as the Area of Potential Effect shown on Figure 2. Common to both route alternatives are the following actions:

- Construction of a 3,200-foot long causeway across the lagoon that may incorporate different hydrological openings including bridge(s), culvert(s), or both.
- Construction of an all-season two-way 24-foot wide gravel access road, either 7.7 miles or 8.9 miles long depending on the route selected, between Kivalina Island and the desired K-Hill evacuation site. Road construction would be within a 300-foot right-of-way (ROW) and include shoulders, multiple turnouts and 3:1 side slopes that may include guard rails and other safety features.
- Testing, analysis and development of material locations proximate to potential routes within the APE to determine their feasibility and evaluate environmental impacts of their development (Figures 2-6).

Area of Potential Effect (APE)

Potential direct and indirect effects were considered prior to the creation of the proposed APE. The APE, as presented, is a 2000-foot corridor encompasses the direct footprint of the project, including two alternative route alignments, staging areas, and potential material sites that are located on variously managed lands and allows for in-field construction adjustments. One final route APE will be defined with the completion of the environmental assessment.

The Kivalina Evacuation and School Site Access Road project would provide Kivalina residents a safe and reliable evacuation route in the event of a catastrophic storm or ocean surge, allowing evacuees to temporarily mobilize to safe refuge at an assembly site on K-Hill. This site is also identified by the Northwest Arctic Borough School District, and approved by the community, as a preferred new location for the community school. If constructed in the future, the school could augment the undeveloped evacuation site by serving as a full-service community emergency shelter with all-season support capabilities. No other viable potential future actions are identified at this time. While community relocation has been discussed for some time, it is not considered reasonably foreseeable. At present, the community supports construction of an evacuation road due to the immediate threat of storm events.

Kivalina relies on the currently existing airstrip adjacent to the city for a majority of its transportation and outside goods. Currently, DOT&PF has a project, Kivalina Airport Erosion Control (Z638720000), which is planning to construct a runway embankment erosion control

feature. Initiation of Consultation letters were sent in February of 2017 for the Kivalina Airport Erosion Control project and a cultural resource investigation was conducted in August of 2017.

Several Alaska Native allotments lie adjacent to the APE and development of these and other private lands may occur consequent to road development. However, the DOT&PF believes that if this were to occur it will be limited to increased access to currently used traditional subsistence locations by people in the community. In addition, material sites developed in support of this project may be further developed or expanded for community use but this expansion will likely occur within the boundary of the current APE.

The potential viewshed effects of the creation of the road were also considered. The DOT&PF believes the minimal elevation and the limited width and method of construction of the road will not have an effect on the current viewshed of open tundra.

In order for the community of Kivalina to consider a future relocation move to a location along the evacuation road, near or at the evacuation road terminus or any place else, extensive planning, land transfers and the securing of significant funding would have to be in place. At this time those actions are neither reasonably foreseeable nor considered a cumulative impact of the proposed project. The DOT&PF does not believe that this action would be directly caused by the Project

Identification Efforts
A search of the Alaska Heritage Resources Survey (AHRS) database identified one site within the APE which is described in table 2 below:

Table 2. AHRS Site Located within the APE

Site Number	Site Name	Site Description	Determination of Eligibility?
NOA-00042	Cape Krusenstern Archaeological District National Monument National Historic Landmark (NHL)	This district covers over 2 million acres, extending along the beach 8 miles and varying in width from 1-3 miles. 114 parallel marine beach ridges, formed at an average of 60 years each, are the main features. These former coastal margins contain houses, burials, cache pits, and other remains of the peoples who have occupied these beaches progressively for at least 5,000 years. This horizontal stratigraphy includes virtually the entire range of known cultural history in NW Alaska. Near the beach ridges, on unglaciated uplands, are two older sites dated from BP 11,000-6,000. The lower Noatak Valley, an important avenue between the coast and the interior for millennia, contains a number of archaeological sites. The villages of Noatak and Kivalina are within the district. The number of sites listed here includes only those cited as "important sites" in the Final Environmental Statement on Cape Krusenstern National Monument published in 1974. Other reports break down these major sites into many others. Includes	National Register of Historic Places Listed 05/03/1974

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If you wish to comment on this finding, I can be reached at the address above, by telephone at 907-451-5293, or by e-mail at *thomas.gamza@alaska.gov*. Your timely response will greatly assist us in incorporating your concerns into project development. For that purpose, we respectfully request that you respond within thirty days of your receipt of this correspondence.

Sincerely,

Thomas A. Gamza
Cultural Resource Specialist-Archaeologist (PQI)
State of Alaska DOT&PF, Northern Region

Figure 1: Location and Vicinity Map
Figure 2: Area of Potential Effect-Overview
Figures 3-6 Proposed Material Site Investigation APE

Attachment 1: Draft Inadvertent Discovery Plan – Kivalina Evacuation and School Site Access Road
Attachment 2: August 22, 2017 response from the SHPO to August 7, 2017 Initiation of Consultation Letter

Electronic cc w/ enclosures:
Michael Cain, FHWA Alaska Division, Northern Region Area Engineer
Jonathan Hutchinson, P.E., DOT&PF Northern Region, Project Manager
Paul Karczmarczyk, DOT&PF Northern Region, Environmental Impact Analyst
Brett Nelson, DOT&PF Northern Region, Regional Environmental Manager
Kathy Price, DOT&PF, Statewide Cultural Resources Manager
Amy Sumner, DOT&PF Statewide Environmental NEPA Manager

United States Department of the Interior

NATIONAL PARK SERVICE
Alaska Region
240 West 5th Avenue, Room 114
Anchorage, Alaska 99501

IN REPLY REFER TO:
8.A.4 (AKRO-CR)20171002

OCT 0 6 2017

Thomas A. Gamza
State of Alaska DOT&PF, Northern Region
2301 Peger Road
Fairbanks, AK 99709-5316

Subject: Kivalina Evacuation and School Site Access Road. Federal/State Project No. 0002384/NFHWY00162, Section 106 Determination

Dear Mr. Gamza:

Thank you for providing project information for the proposed Kivalina Evacuation and School Site Access Road, Federal/State Project No. 0002384/NFHWY00162. The National Park Service has served as a consulting party for this project under Section 106 of the National Historic Preservation Act of 1966 (54 U.S.C. § 306108) to help ensure the integrity of Cape Krusenstern Archeological District National Historic Landmark (NHL).

We appreciate the Alaska Department of Transportation and Public Facilities (DOT&PF) providing NPS with the results of the cultural resource assessment survey, accommodating a site visit by NPS archeologist Rhea Hood on August 16, 2017, answering follow-up questions, as well as consulting with other interested parties including the Native Village of Kivalina.

As described, the project consists of building a causeway spanning approximately 0.6 miles across Kivalina Lagoon, constructing a 7.7 to 8.9 mile evacuation road east of Kivalina, and development of up to four different material sites in the same project area. The causeway construction will include pile driving at each abutment and the final bridge design and construction could cause additional ground disturbance near previously recorded sites that are within the Area of Potential Effect (APE). We understand that the two AHRS sites, NOA-00325 and NOA-00327, are documented for human burials and archaeological artifacts respectively and that these sites are within the APE but are over 100 meters away from the western end of the causeway abutment, and therefore the proposed project activity will not harm these sites.

Based on the *Kivalina Evacuation and School Site Access Road Cultural Resources Assessment Report* and the following September 2017 update, and the August 2017 project site visit, we understand that the cultural resources investigations did not reveal any new significant

archeological resources. Since Kivalina was included in the NHL for encompassing "sites evidencing prehistoric occupation," we recognize that there is still the potential for discovery as the project is implemented.

We concur with DOT&PF's finding of "no historic properties adversely affected" (36 CFR 800.5 (b)(1)) conditional to include archaeological monitoring and an Inadvertent Discovery Plan that allows for "reasonable efforts to avoid, minimize or mitigate adverse effects" and that covers post-Section 106 review discoveries of cultural resources.

Given that there is some potential for finding cultural resources and human remains within the NHL, we would appreciate receiving a copy of the Inadvertent Discovery Plan with the specific archaeological monitoring plan, as well as any information that arises as a result of inadvertent discoveries.

We appreciate DOT&PF's inclusion of NPS throughout this Section 106 process. If you have questions about our comments or concerns, please contact Rhea Hood at 907-644-3460 or rhea_hood@nps.gov.

Sincerely,

Herbert C. Frost, Ph.D.
Regional Director

cc: Rhea Hood, Archeologist, NPS Alaska Region
Jennifer Pederson Weinberger, Cultural Resources Program Manager, NPS Alaska Region
Maija Lukin, Superintendent, Western Arctic Parklands
Mark Rollins, Review and Compliance, Alaska State Historic Preservation Office

THE STATE of ALASKA

GOVERNOR BILL WALKER

Department of Natural Resources

DIVISION OF PARKS & OUTDOOR RECREATION
Office of History & Archaeology

550 West 7th Ave., Suite 1310
Anchorage, Alaska 99501-3565
Main: 907.269.8721
http://dnr.alaska.gov/parks/oha

SENT BY E-MAIL
DATE 10/9/17

October 9, 2017

File No.: 3130-1R FHWA/ 2016-01460

Subject: Kivalina Evacuation and School Site Access Road, 0002384/ NFHWY00162

Thomas Gamza
Department of Transportation & Public Facilities
2301 Peger Road
Fairbanks, AK 99709-5316

Dear Mr. Gamza,

The Alaska State Historic Preservation Office (AK SHPO) received your letter (dated September 19, 2017) and reports, titled *Kivalina Evacuation and School Site Access Road Cultural Resources Assessment Report* and the *Archaeological Assessment Update for the Kivalina Evacuation and School Site Access Road,* on September 24, 2017. Following our review of the documentation provided, pursuant to Section 106 of the National Historic Preservation Act, we concur with your finding of **no historic properties adversely affected** for the subject project. Furthermore, we concur that the project will not adversely affect NOA-00042 Cape Krusenstern Archaeological District National Monument National Historic Landmark (NHL). This concurrence is conditional to include archaeological monitoring and an Inadvertent Discovery Plan for the subject project. We look forward to receiving the final draft of the Inadvertent Discovery Plan for our records.

Please note that 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 comment letter does not end the 30-day review period provided to other consulting parties. Should unidentified cultural 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.

The AK SHPO appreciates your consultation efforts for the subject project and for including a staff member in a site visit on August 16, 2017. Please contact Mark Rollins at 269-8722 or mark.rollins@alaska.gov if you have any questions or if we can be of further assistance.

Sincerely,

Joan M. Antonson

Judith E. Bittner
Deputy State Historic Preservation Officer

JEB:mwr

Cc: Rhea Hood, National Park Service, rhea_hood@nps.gov

From:	Sumner, Amy L (DOT)
To:	Nelson, Brett D (DOT)
Cc:	Karczmarczyk, Paul F (DOT)
Subject:	SEO Sect. 4(f) No Use Determination FW: Kivalina Evac Road Sec 4f Applicability - AK Maritime NWR -updated
Date:	Tuesday, December 19, 2017 3:20:50 PM
Attachments:	image001.png Kivalina Evac Rd Sec 4f app AK MNWR.PDF

Brett,

4(f) Applicability Determination

Based on the information provided in the attached, I agree that the **Kivalina Evacuation and School Site Access Road (NFHWY00162)** project will not use/affect the Alaska Maritime National Wildlife Refuge, a Section 4(f) protected resource.

"The proposed project will not use this Section 4(f) property. DOT&PF has determined that Section 4(f) does not apply."

Please ensure a copy of this email is placed in the project file.

Thank you,

Amy L. Sumner
NEPA Program Manager
Statewide Environmental Office
Dept. of Transportation and Public Facilities
907-465-2985

The environmental review, consultation, and other actions required by applicable Federal environmental laws for this project are being, or have been, carried out by DOT&PF pursuant to 23 U.S.C. 327 and a Memorandum of Understanding dated November 3, 2017 and executed by FHWA and DOT&PF

From: Nelson, Brett D (DOT)
Sent: Monday, December 18, 2017 4:10 PM
To: Sumner, Amy L (DOT) <amy.sumner@alaska.gov>
Cc: Karczmarczyk, Paul F (DOT) <paul.karczmarczyk@alaska.gov>
Subject: Kivalina Evac Road Sec 4f Applicability - AK Maritime NWR -updated

Hi Amy,

Please review the attached updated applicability.

Thanks,
Brett

From: Nelson, Brett D (DOT)
Sent: Monday, December 18, 2017 3:52 PM
To: Sumner, Amy L (DOT) <amy.sumner@alaska.gov>
Cc: Karczmarczyk, Paul F (DOT) <paul.karczmarczyk@alaska.gov>
Subject: Kivalina Evac Road Sec 4f Applicability - AK Maritime NWR

Hi Amy,

Can you please review the attached project Section 4(f) applicability for the AK Maritime NWR. Let me know if you have questions or need additional information.

Thanks,
Brett

Brett Nelson
Northern Region Environmental Manager
Alaska Dept. of Transportation & Public Facilities
Office (907)451-2238
Fax (907)451-5126

Kivalina Evacuation and School Site Access Road

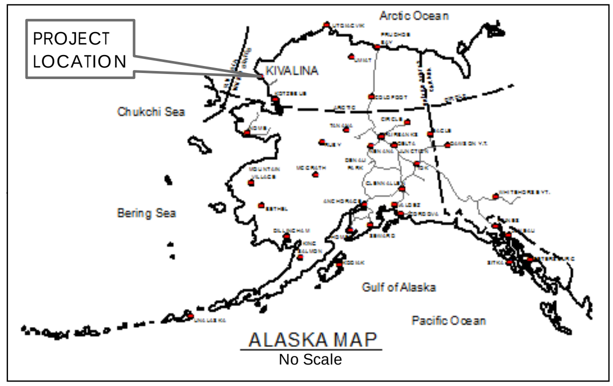
Project Number: 0002384/NFHWY00162
Section 4(f) Applicability

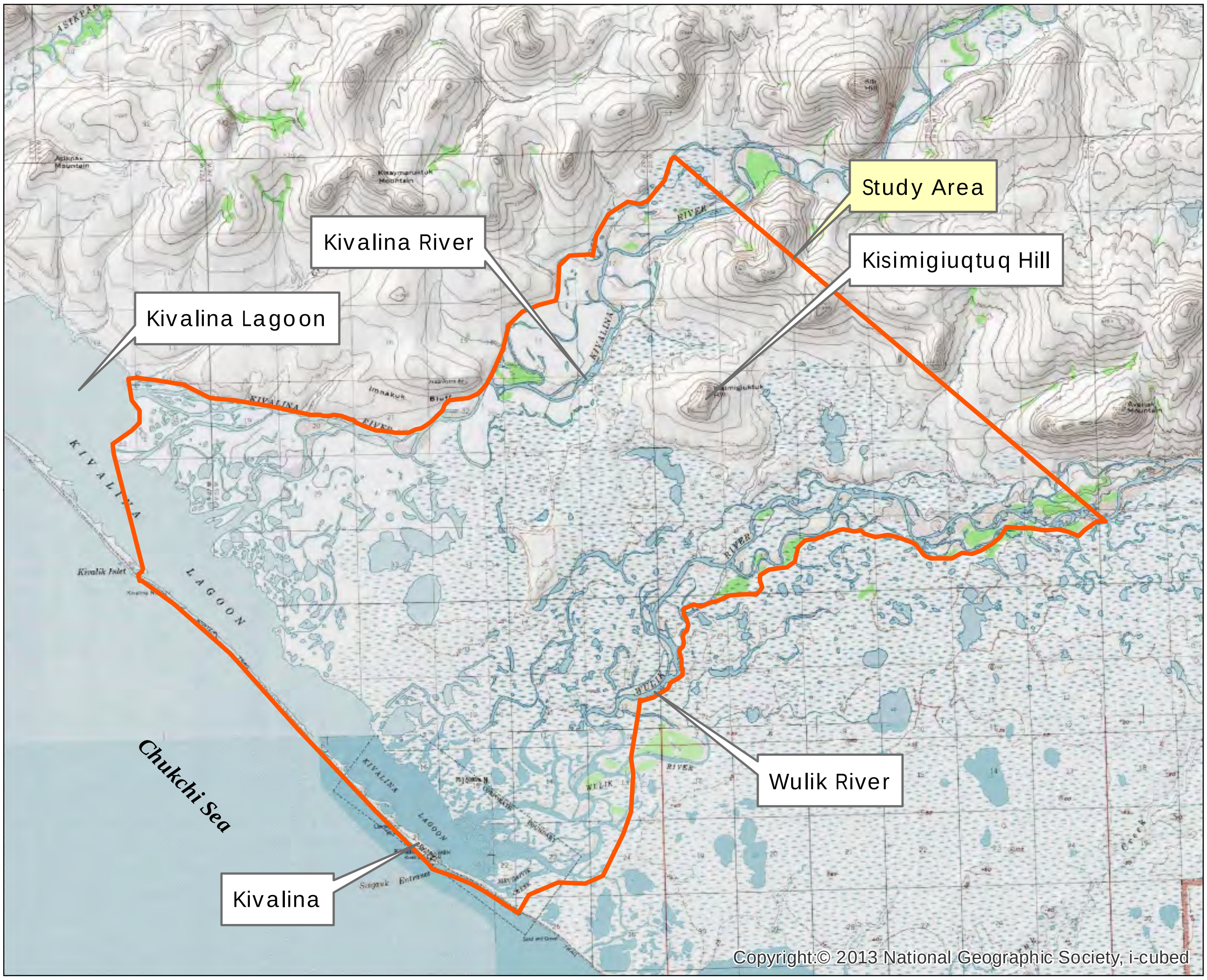
The Alaska Department of Transportation and Public Facilities (DOT&PF) has assumed the responsibilities of the Federal Highway Administration under 23 U.S.C. 327, and is proposing to construct an approximately 6-10 mile long evacuation and school site access road from the City of Kivalina, Alaska (Figure 1) to Kisimigiuqtuq Hill (K-Hill). The proposed route would originate at the City of Kivalina, cross Kivalina Lagoon with a causeway including a bridge section and culverts, route alternatives would then continue through areas of tidally-influenced lowland and tundra wetlands before meeting up again and terminating at a lower southwest slope of K-Hill located NNE of the community (Figure 2). In the project vicinity are a couple small island components of the Alaska Maritime National Wildlife Refuge (Refuge), a Section 4(f) property. The closest project route alternative is approximately 0.4 miles from the Refuge (Figure 3), which is located across the Wulik River and on the east end of the Kivalina Lagoon.

Description/Function: The Refuge was established in 1980 as part of ANILCA to conserve marine mammals, seabirds and other migratory birds, and the marine resources upon which they rely.

Ownership/Access: The Refuge is managed by the United States Fish and Wildlife Service. Overall, the Refuge covers 3.4 million acres and includes units in the Chukchi Sea, Bering Sea, Gulf of Alaska, Aleutian Islands, and the Alaska Peninsula. The Refuge islands in the project vicinity are approximately 75 acres in size and owned by the NANA Regional Corporation.

Effects: The project scope is limited to work within the proposed route alternatives, and as such, no work will occur within the Section 4(f) property. As a result this project will not cause any direct effects to the Refuge. Proposed project alternatives are not anticipated to result in noise or vibration impacts to the Refuge as construction work would be temporary and the community of Kivalina is about the same distance from the Refuge with existing noise generated from vehicular and aircraft traffic. There would be a change in the aesthetic nature of land where the proposed project alternative would be constructed, but the nearest distance to the refuge would be 0.4 miles away. No ecological intrusions would result from proposed project alternatives as the alternatives are not within the Refuge itself. Migratory bird impacts would be reduced by scheduling construction and vegetation clearing activities to occur outside of important nesting periods. The proposed project alternatives would not have a permanent incorporation, adverse temporary occupancy, or constructive use of the Refuge; therefore, the Kivalina Evacuation and School Site Access Road project would not result in a use of the Alaska Maritime National Wildlife Refuge.





Graphics developed by Stantec Consulting Services, Inc.

DRAFT

Project Origin: City of Kivalina,
Kotzebue Recording District,
Section 21, Township 27N, Range 26W,
Kateel River Meridian

Project Terminus: Kisimigiuqtuq Hill,
Section 19, Township 28N, Range 25W
Kateel River Meridian

0 1.25 2.5 5 Miles
1:142,961 (at original document size of 8.5x11)

STATE OF ALASKA
Department of Transportation and Public Facilities
2301 Peger Road Fairbanks, AK 99709

KIVALINA EVACUATION AND SCHOOL SITE ACCESS ROAD

Location & Vicinity Map

DATE: September, 2017	FIGURE **1**

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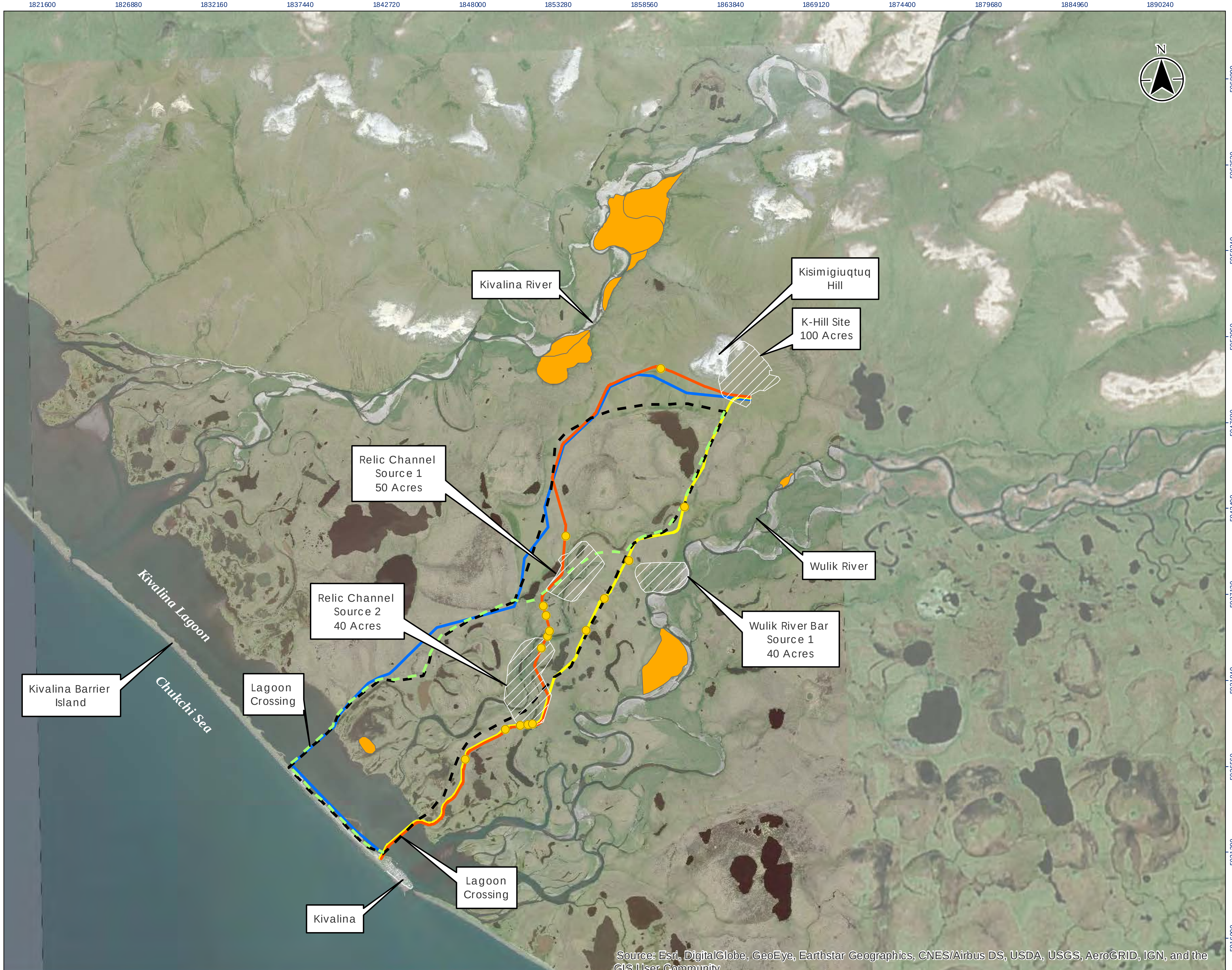


DRAFT

Legend

- Community Proposed Alternatives
- Community Combined Route A
- Northern Route - 9.5 miles*
- Southern Route - 7.7 miles*
- Combined Route B - 8.9 miles*
- Dismissed Material Sites
- Potential Material Source Areas**
- Water Crossings

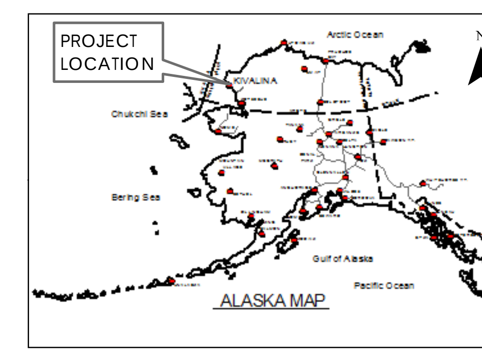
* Proposed Routes are centered within ~1000 ft corridor.
** Material sources would be developed within identified areas.

0 0.6 1.2 Miles

1:75,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
2. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011; ©AeroMetric Inc., 2013; Digital Globe 2016



STATE OF ALASKA
Department of Transportation and Public Facilities
2301 Peger Road Fairbanks, AK 99709

KIVALINA EVACUATION AND SCHOOL SITE ACCESS ROAD
Alternatives Considered

DATE: September, 2017 | FIGURE 2

Alaska Maritime NWR - Chukchi Sea Unit parcel near Kivalina

Figure 3

THE STATE of ALASKA
GOVERNOR BILL WALKER

Department of Transportation and Public Facilities

Northern Region
Design and Engineering Services
Preliminary Design and Environmental Section

2301 Peger Road
Fairbanks, Alaska 99709-5316
Main: 907-451-2237
Toll free: 800-451-2363
Fax: 907-451-5126

In Reply Refer To:
Kivalina Evacuation and School Site Access Road
Federal/State Project No. 0002384/NFHWY00162
Addendum: NOA-00325 & NOA-00327

December 29, 2017

Ms. Judith E. Bittner
State Historic Preservation Officer
Alaska Office of History and Archaeology
550 W. 7th Avenue, Suite 1310
Anchorage, Alaska 99501-3565

Dear Ms. Bittner:

The Alaska Department of Transportation and Public Facilities (DOT&PF) has assumed the responsibilities of the Federal Highway Administration (FHWA) under 23 U.S.C. 327, and is proposing to construct a safe, reliable, all-season evacuation road between the community of Kivalina and a site on Kisimigiuqtuq Hill (K-Hill) (Figure 1). The Kivalina Evacuation and School Site Access Road (the Project) location is legally described in Table 1 below:

Table 1: Project Location

Section(s)	Township	Range	Meridian	USGS Quad
1, 2, 10, 11, 15, 16, 21	027N	026W	Kateel River	Noatak C-5
19. 20, 29, 30, 31	028N	026W	Kateel River	Noatak C-5
25, 26, 35, 36	029N	025W	Kateel River	Noatak C-5

The environmental review, consultation, and other actions required by applicable Federal environmental laws for this project are being, or have been, carried out by DOT&PF pursuant to 23 U.S.C. 327 and a Memorandum of Understanding dated November 3, 2017, and executed by FHWA and DOT&PF.

The proposed project origin is at the City of Kivalina, located on the southeast tip of the barrier island located between the Chukchi Sea (Arctic Ocean) and Kivalina Lagoon (Figure 1). The project terminus is located on the mainland across the Kivalina Lagoon approximately six miles northeast at a community selected evacuation site on K-Hill.

Background

On September 19, 2017 DOT&PF made a finding of No Historic Properties Adversely Affected (Findings Letter) for the proposed project. The National Park Service (NPS) responded on October 6, 2017 (Attachment 1); their response included the detail that two Alaska Heritage Resources Survey (AHRS) sites, NOA-00325 and NOA-00327, appear to be within the proposed project's Area of Potential Effect (APE) but that they would not be affected by the project's activities. These two sites did not appear in the Findings Letter or in the SHPO concurrence to those Findings on October 9, 2017 (Attachment 2). This informational update addresses those two sites. DOT&PF's original finding of effect has not changed.

NOA-00325 and NOA-00327

Both NOA-00325 and NOA-00327 were assigned AHRS numbers in the 2005 *Cultural Resources Survey of Proposed Sewage and Water Systems Improvements in Kivalina, Alaska* report by Northern Land Use Research, Inc.

Table 2. Site Details from AHRS Database

Site Number	Site Name	Site Description	Determination of Eligibility?
NOA-00325	KIV-HR-05	Informant reported to cultural resource investigators in 2005 that human remains discovered during construction of house in 1990s. No information regarding their handling.	No Determination of Eligibility
NOA-00327	NOA-00327	Local informant reported to other cultural resource investigators in 2004 that artifacts had been found near location when they were a child.	No Determination of Eligibility

The site numbers were assigned based on information from local residents who recalled that in one location (NOA-00325) human remains had been found during the construction of a house foundation in the 1970s. It was not determined at the time of the 2005 interview if the remains were left in place or re-interred in the current cemetery. Another local resident noted that at the other location (NOA-00327) artifacts had been found and he played with them when he was a child. Based on these interviews, AHRS numbers were assigned for the general locations. As of 2017, no extant physical materials have been identified in relation to either of these two sites.

This letter is being sent to acknowledge that the AHRS-reported locations for NOA-00325 and NOA-00327 are within the APE for this project. Their omission from the Findings Letter (September 19, 2017) was a clerical error and DOT&PF does not anticipate ground disturbing activities in the reported site locations that would require a re-evaluation of the finding of effect for this project. The APE for the project was drawn broadly to evaluate potential visual effects as well as any ground disturbing effects the project may have on the surrounding land and community. The AHRS-reported locations for these two sites are on the periphery of the APE where visual effects were the greatest concern due to the presence of standing structures. No ground-disturbing activity is planned for the portions of the APE containing these sites.

Section 4(f)
As stated in in September 19, 2017 Findings Letter it is the DOT&PF's intent to make a Section 4(f) *de minimis* impact finding for this project and NOA-00042, the Cape Krusenstern National Historic Landmark. Section 4(f) findings have not changed with the inclusion of NOA-00325 and NOA-00327 within the project APE as there will be no use of these sites.

Inadvertent Discovery Plan
Additionally, please find attached the finalized Inadvertent Discovery Plan (Attachment 3), as stipulated and required, for this project as presented in the DOT&PF Findings Letters of September 19, 2017 and a full set of the figures for the entire project APE (Figures 1-8).

Consultation Summary
On July 10, 2017 a meeting among Agency cultural resource staff was held in Anchorage. The DOT&PF Northern Region Cultural Resource Specialist-Archaeologist PQI, Office of History and Archaeology staff, the Alaska SHPO, and the NPS Archaeologist for the NRHP Program, Alaska Region were in attendance. Initiation of Consultation letters were sent out to the identified consulting parties on August 7, 2017. A response was received from the SHPO office on August 22, 2017 stating there was no objection to the proposed Study Area or level of identification. No other responses to the Section 106 Initiation of Consultation letters were received. A response to the September 19, 2017 Findings Letter was received from the NPS on October 6, 2017 and SHPO concurrence with the DOT&PF findings was received on October 9, 2017. No responses were received from the other consulting parties.

In addition to the Alaska State Historic Preservation Officer (SHPO), other parties being contacted with this informational update and Inadvertent Discovery Plan for this project are: the National Park Service (NPS); the Native Village of Kivalina; the City of Kivalina; the Native Village of Noatak; NANA Regional Corporation; the Northwest Arctic Borough; NPS-Western Arctic National Parklands; and the Bureau of Indian Affairs (BIA).

Please direct your questions or comments to me at the address above, by telephone at 907-451-5293, or by e-mail at *thomas.gamza@alaska.gov*.

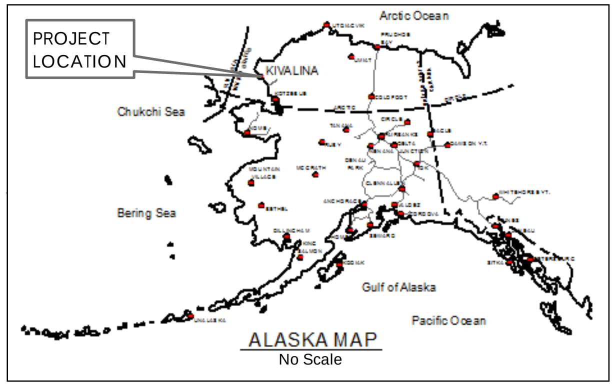
Sincerely,

Thomas A. Gamza
Cultural Resource Specialist-Archaeologist (PQI)
State of Alaska DOT&PF, Northern Region

Figure 1: Location and Vicinity Map
Figures 2-7: Project APE Enlarged Sections
Figure 8: Locations of NOA-00325 and NOA-00327 in Western Terminus Enlarged Section

Attachment 1: National Park Service response to the DOT&PF Findings October 6, 2017
Attachment 2: SHPO concurrence with No Historic Properties Adversely Affected Determination October 9, 2017
Attachment 3: Final Inadvertent Discovery Plan – Kivalina Evacuation and School Site Access Road

Electronic cc w/ enclosures:
Jonathan Hutchinson, P.E., DOT&PF Northern Region, Project Manager
Paul Karczmarczyk, DOT&PF Northern Region, Environmental Impact Analyst
Brett Nelson, DOT&PF Northern Region, Regional Environmental Manager
Kathy Price, DOT&PF, Statewide Cultural Resources Manager
Amy Sumner, DOT&PF Statewide Environmental NEPA Manager



Graphics developed by Stantec Consulting Services, Inc.

Project Origin: City of Kivalina,
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STATE OF ALASKA
Department of Transportation and Public Facilities
2301 Peger Road Fairbanks, AK 99709

KIVALINA EVACUATION AND SCHOOL SITE ACCESS ROAD

Location & Vicinity Map

DATE: September, 2017	FIGURE 1

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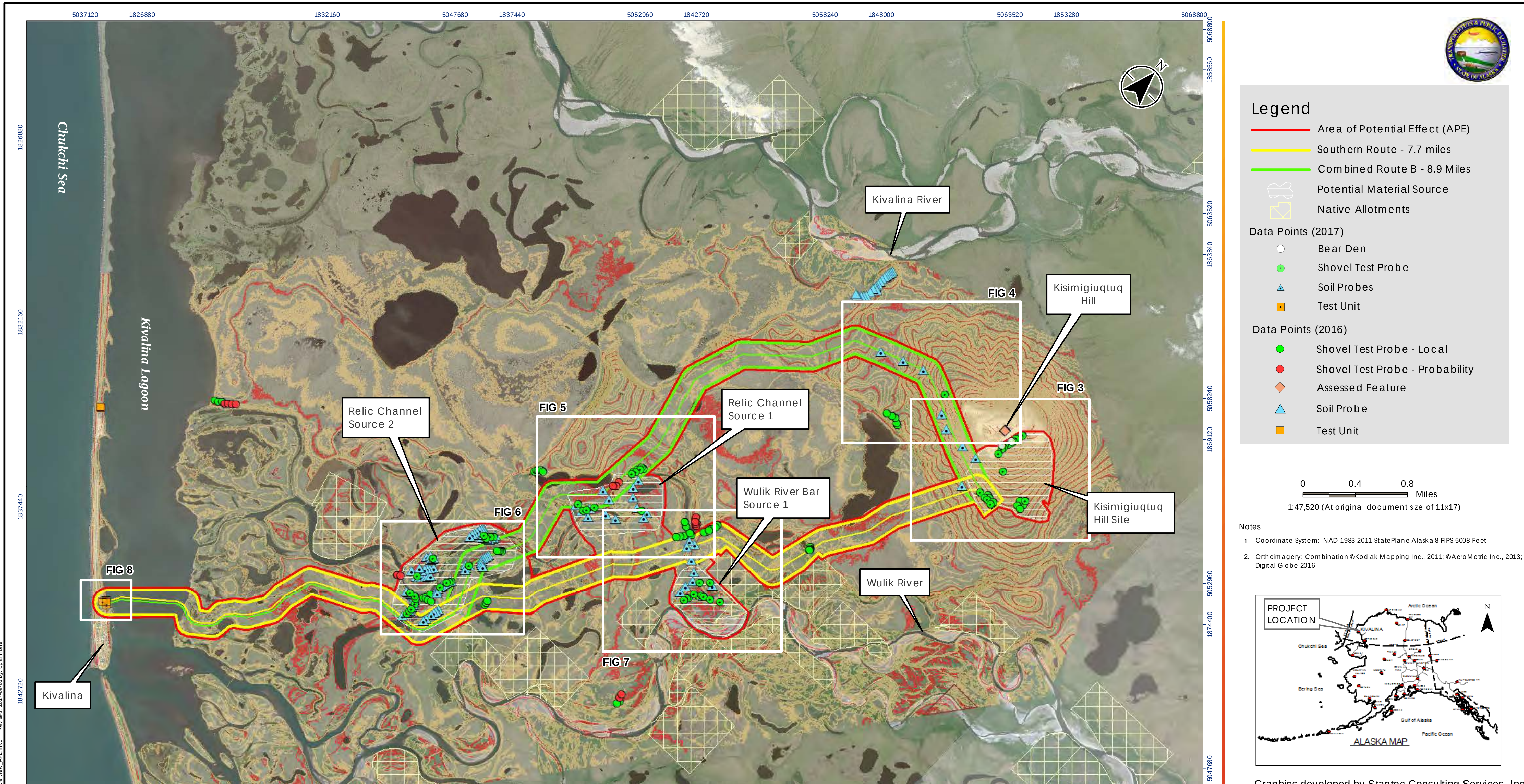


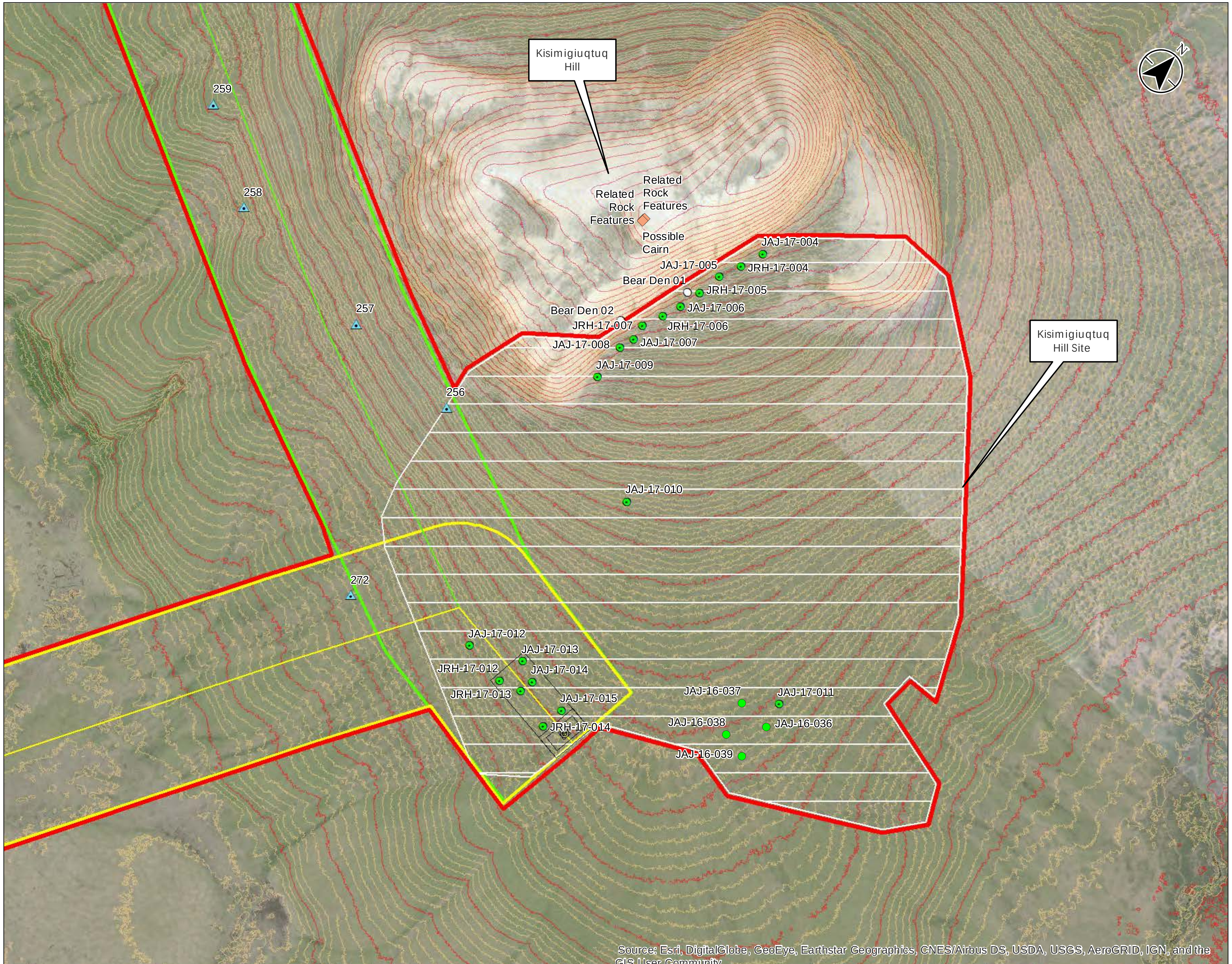
STATE OF ALASKA
Department of Transportation and Public Facilities
2301 Peger Road Fairbanks, AK 99709

KIVALINA EVACUATION AND SCHOOL SITE ACCESS ROAD

Area of Potential Effect - Overview

DATE: September, 2017

FIGURE 2



Legend

- Area of Potential Effect (APE)
- Southern Route - 7.7 miles
- Combined Route B- 8.9 Miles
- Potential Material Source
- Native Allotments
- Gravel Mounds

Data Points (2017)

- Bear Den
- Shovel Test Probe
- Soil Probes
- Test Unit

Data Points (2016)

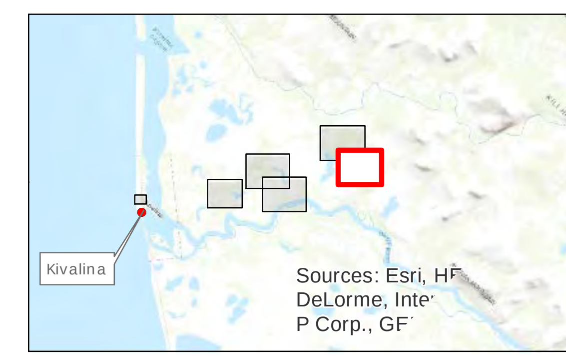
- Shovel Test Probe - Local
- Shovel Test Probe - Probability
- Assessed Feature
- Soil Probe
- Test Unit

0 500 1,000 Feet

1:7,200 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
2. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011; ©AeroMetric Inc., 2013; Digital Globe 2016



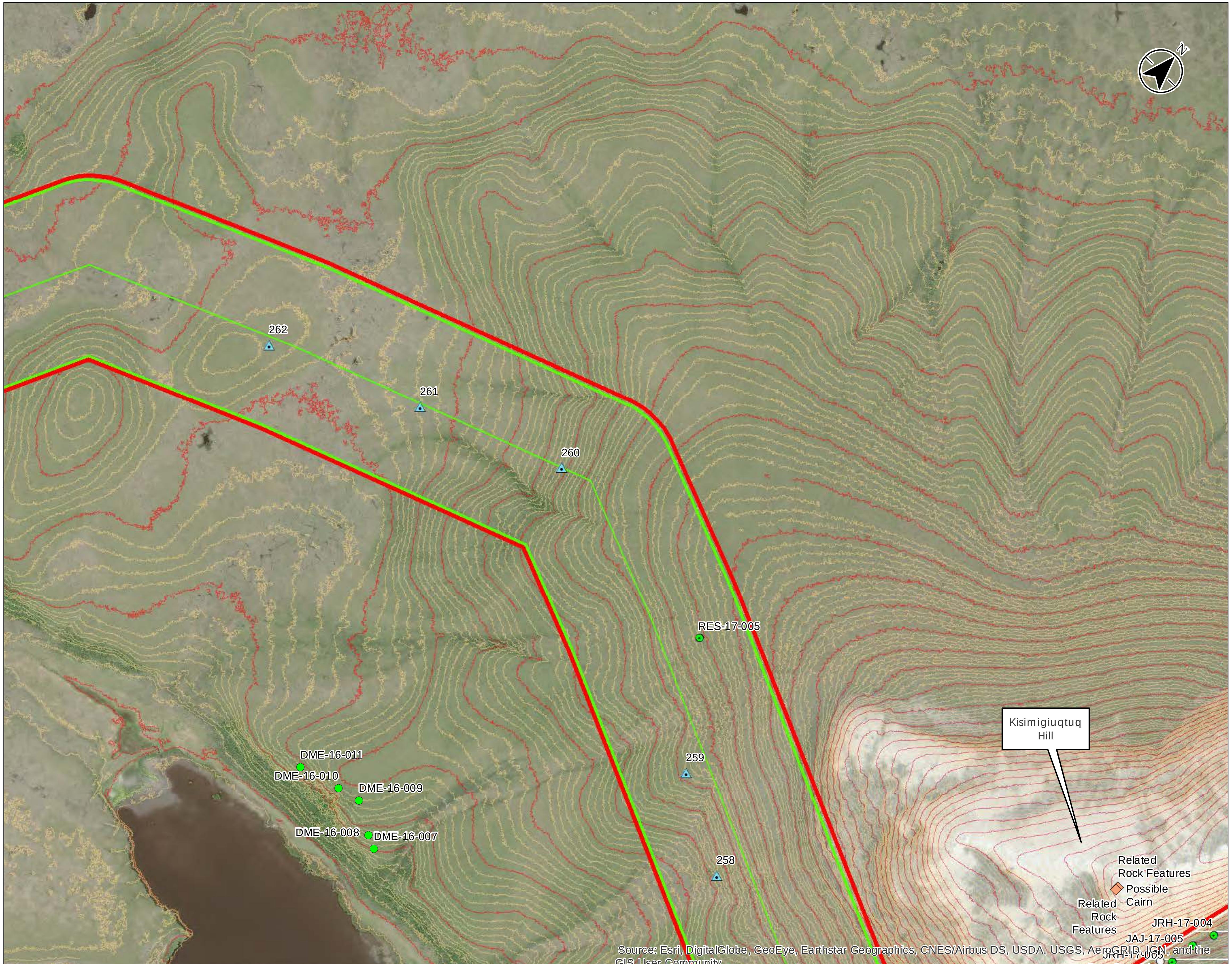
Graphics developed by Stantec Consulting Services, Inc.

STATE OF ALASKA
Department of Transportation and Public Facilities
2301 Peger Road Fairbanks, AK 99709

KIVALINA EVACUATION AND SCHOOL SITE ACCESS ROAD

Kisimigiuqtuq Hill

DATE: September, 2017	FIGURE 3



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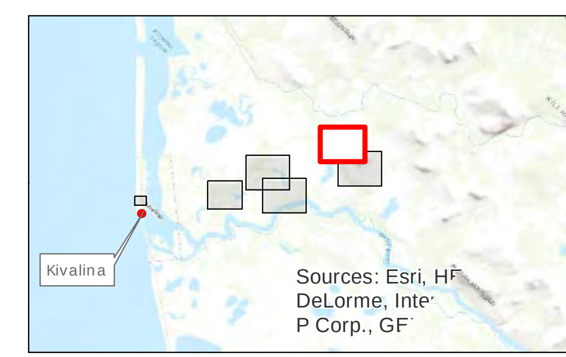
2. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011; ©AeroMetric Inc., 2013; Digital Globe 2016



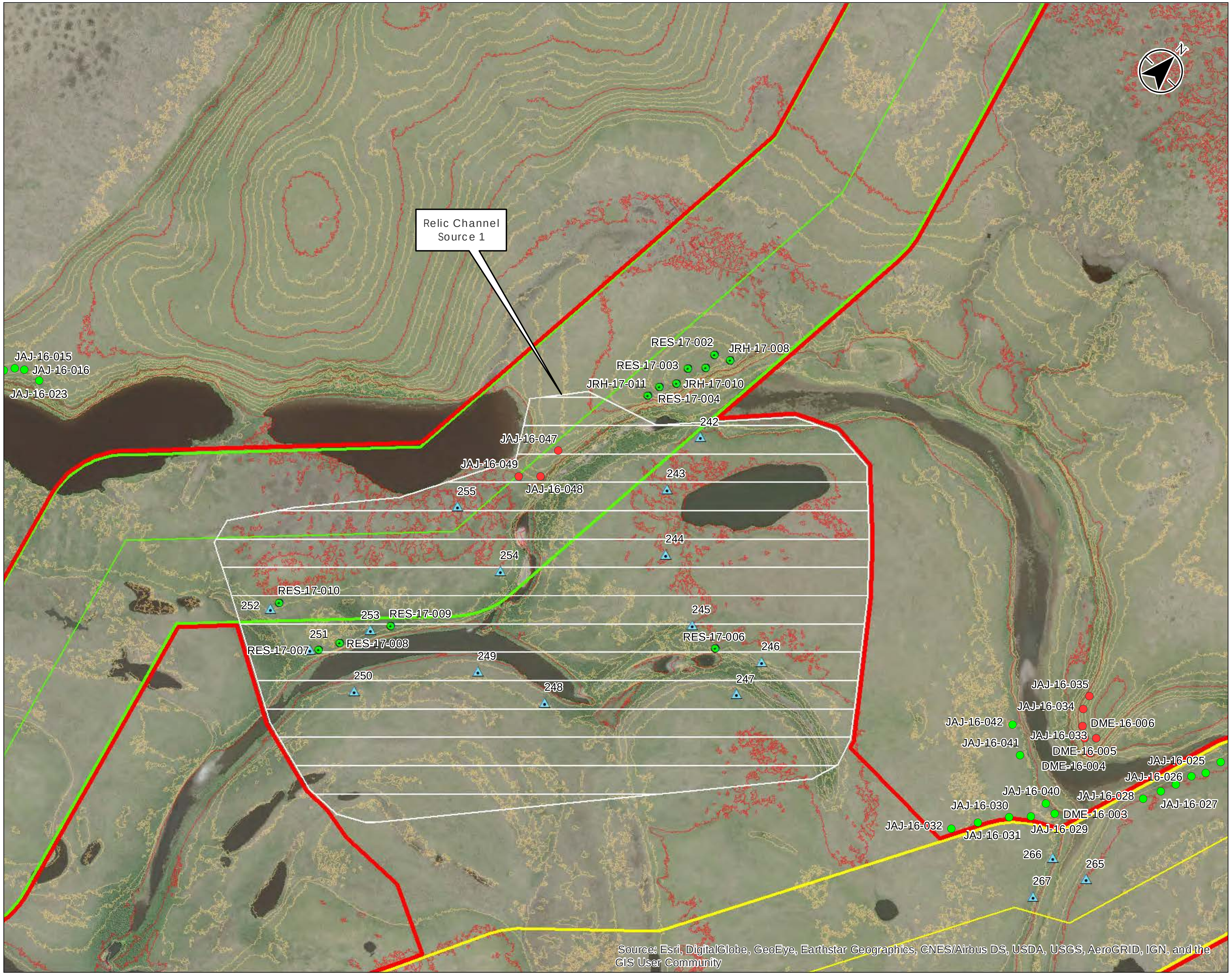
Graphics developed by Stantec Consulting Services, Inc.

STATE OF ALASKA
Department of Transportation and Public Facilities
2301 Peger Road Fairbanks, AK 99709

KIVALINA EVACUATION AND SCHOOL SITE ACCESS ROAD

Revised Combined Route Alignment

DATE: September, 2017 | FIGURE 4



Legend

- Area of Potential Effect (APE)
- Southern Route - 7.7 miles
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- Potential Material Source
- Native Allotments
- Gravel Mounds

Data Points (2017)

- Bear Den
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- Test Unit

Data Points (2016)

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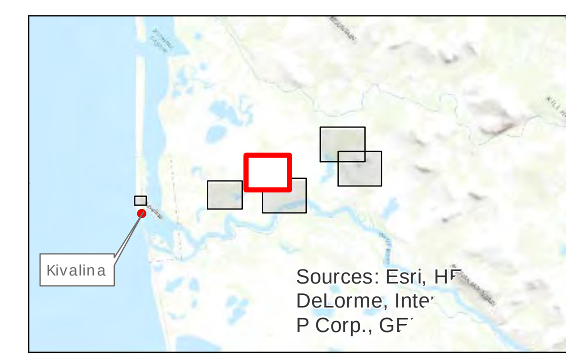
0 500 1,000 Feet

1:7,200 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
2. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011; ©AeroMetric Inc., 2013; Digital Globe 2016



Graphics developed by Stantec Consulting Services, Inc.

STATE OF ALASKA
Department of Transportation and Public Facilities
2301 Peger Road Fairbanks, AK 99709

KIVALINA EVACUATION AND SCHOOL SITE ACCESS ROAD

Relic Channel Source 1

DATE: September, 2017	FIGURE 5

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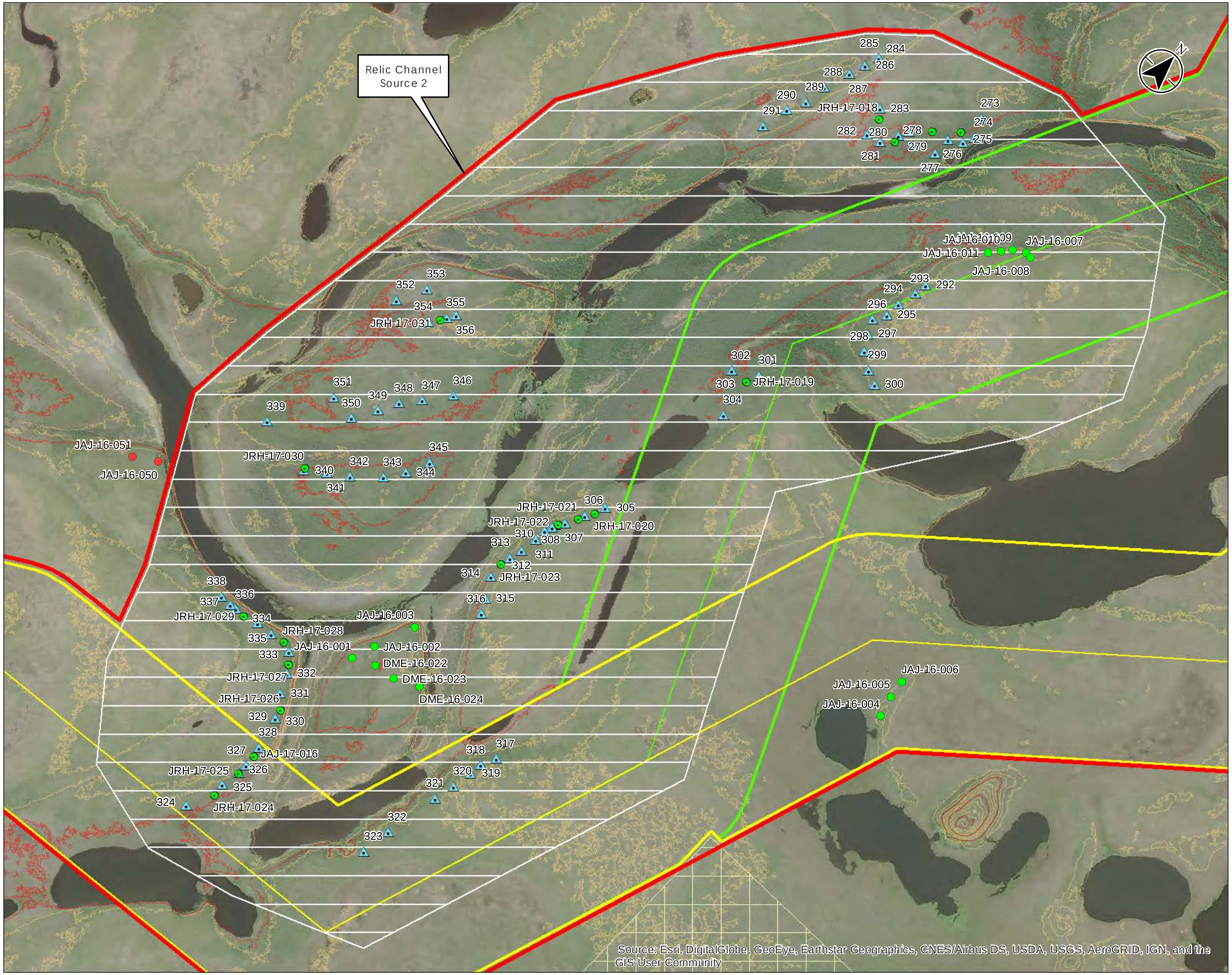

Legend

- Area of Potential Effect (APE)
- Southern Route - 7.7 miles
- Combined Route B- 8.9 Miles
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- Native Allotments
- Gravel Mounds

Data Points (2017)

- Bear Den
- Shovel Test Probe
- Soil Probes
- Test Unit

Data Points (2016)

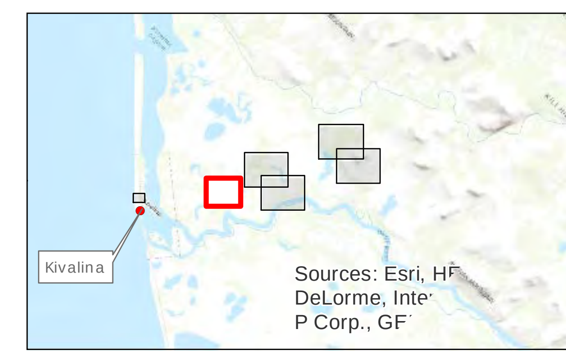
- Shovel Test Probe - Local
- Shovel Test Probe - Probability
- Assessed Feature
- Soil Probe
- Test Unit

0 400 800 Feet

1:5,760 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
2. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011; ©AeroMetric Inc., 2013; Digital Globe 2016



Graphics developed by Stantec Consulting Services, Inc.

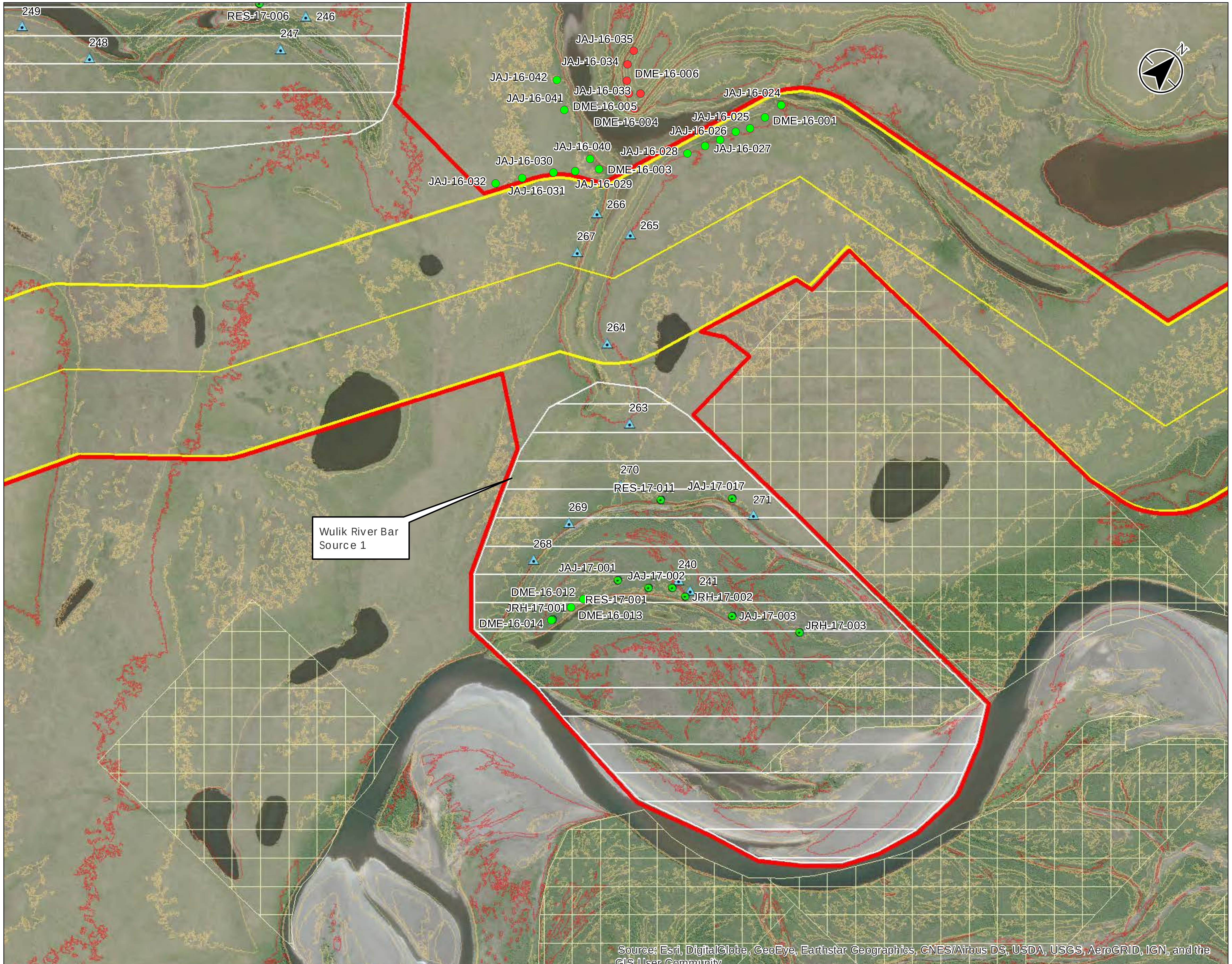
STATE OF ALASKA
Department of Transportation and Public Facilities
2301 Peger Road Fairbanks, AK 99709

KIVALINA EVACUATION AND SCHOOL SITE ACCESS ROAD

Relic Channel Source 2

DATE: September, 2017 | FIGURE 6

U:\204705510\2 GIS\mxd\Arch Report Maps\204705510 2_Arch_Fig-3_Fig-8_Detail.mxd Revised: 2017-09-06 By: cpamnone



Legend

- Area of Potential Effect (APE)
- Southern Route - 7.7 miles
- Combined Route B- 8.9 Miles
- Potential Material Source
- Native Allotments
- Gravel Mounds

Data Points (2017)

- Bear Den
- Shovel Test Probe
- Soil Probes
- Test Unit

Data Points (2016)

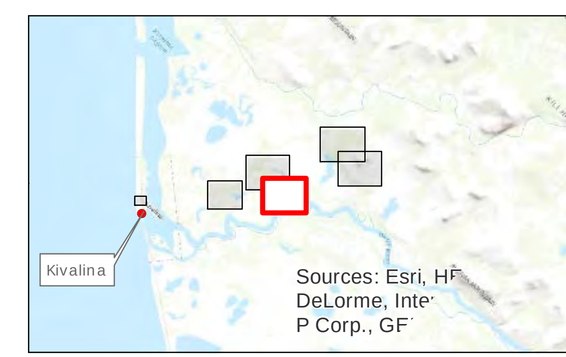
- Shovel Test Probe - Local
- Shovel Test Probe - Probability
- Assessed Feature
- Soil Probe
- Test Unit

0 500 1,000 Feet

1:7,200 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
2. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011; ©AeroMetric Inc., 2013; Digital Globe 2016



Graphics developed by Stantec Consulting Services, Inc.

STATE OF ALASKA
Department of Transportation and Public Facilities
2301 Peger Road Fairbanks, AK 99709

KIVALINA EVACUATION AND SCHOOL SITE ACCESS ROAD

Wulik River Bar Source 1

DATE: September, 2017	FIGURE 7

U:\204705510\GIS\mxd\Arch Report Maps\204705510Z_Arch_Fig-3_Fig-8_Detail.mxd Revised: 2017-09-06 By: cpammone

Legend

- Area of Potential Effect (APE)
- Southern Route - 7.7 miles
- Combined Route B- 8.9 Miles
- Potential Material Source
- Native Allotments
- Gravel Mounds

Data Points (2017)

- Bear Den
- Shovel Test Probe
- Soil Probes
- Test Unit

Data Points (2016)

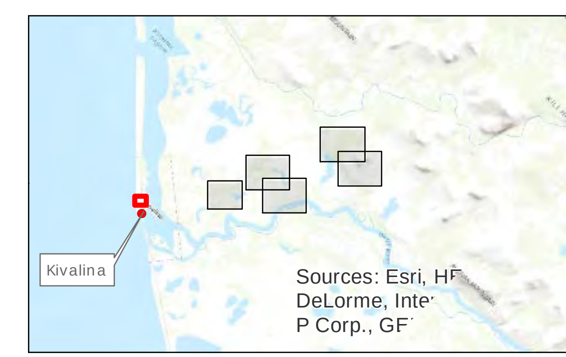
- Shovel Test Probe - Local
- Shovel Test Probe - Probability
- Assessed Feature
- Soil Probe
- Test Unit

0 140 280 Feet

1:2,030 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Alaska 8 FIPS 5008 Feet
2. Orthoimagery: Combination ©Kodiak Mapping Inc., 2011; ©AeroMetric Inc., 2013; Digital Globe 2016



Graphics developed by Stantec Consulting Services, Inc.

STATE OF ALASKA
Department of Transportation and Public Facilities
2301 Peger Road Fairbanks, AK 99709

KIVALINA EVACUATION AND SCHOOL SITE ACCESS ROAD

Western Causeway Terminus

DATE: September, 2017	FIGURE 8

Attachment 1

United States Department of the Interior

NATIONAL PARK SERVICE
Alaska Region
240 West 5th Avenue, Room 114
Anchorage, Alaska 99501

IN REPLY REFER TO:
8.A.4 (AKRO-CR)20171002

OCT 0 6 2017

Thomas A. Gamza
State of Alaska DOT&PF, Northern Region
2301 Peger Road
Fairbanks, AK 99709-5316

Subject: Kivalina Evacuation and School Site Access Road. Federal/State Project No. 0002384/NFHWY00162, Section 106 Determination

Dear Mr. Gamza:

Thank you for providing project information for the proposed Kivalina Evacuation and School Site Access Road, Federal/State Project No. 0002384/NFHWY00162. The National Park Service has served as a consulting party for this project under Section 106 of the National Historic Preservation Act of 1966 (54 U.S.C. § 306108) to help ensure the integrity of Cape Krusenstern Archeological District National Historic Landmark (NHL).

We appreciate the Alaska Department of Transportation and Public Facilities (DOT&PF) providing NPS with the results of the cultural resource assessment survey, accommodating a site visit by NPS archeologist Rhea Hood on August 16, 2017, answering follow-up questions, as well as consulting with other interested parties including the Native Village of Kivalina.

As described, the project consists of building a causeway spanning approximately 0.6 miles across Kivalina Lagoon, constructing a 7.7 to 8.9 mile evacuation road east of Kivalina, and development of up to four different material sites in the same project area. The causeway construction will include pile driving at each abutment and the final bridge design and construction could cause additional ground disturbance near previously recorded sites that are within the Area of Potential Effect (APE). We understand that the two AHRS sites, NOA-00325 and NOA-00327, are documented for human burials and archaeological artifacts respectively and that these sites are within the APE but are over 100 meters away from the western end of the causeway abutment, and therefore the proposed project activity will not harm these sites.

Based on the *Kivalina Evacuation and School Site Access Road Cultural Resources Assessment Report* and the following September 2017 update, and the August 2017 project site visit, we understand that the cultural resources investigations did not reveal any new significant

archeological resources. Since Kivalina was included in the NHL for encompassing "sites evidencing prehistoric occupation," we recognize that there is still the potential for discovery as the project is implemented.

We concur with DOT&PF's finding of "no historic properties adversely affected" (36 CFR 800.5 (b)(1)) conditional to include archaeological monitoring and an Inadvertent Discovery Plan that allows for "reasonable efforts to avoid, minimize or mitigate adverse effects" and that covers post-Section 106 review discoveries of cultural resources.

Given that there is some potential for finding cultural resources and human remains within the NHL, we would appreciate receiving a copy of the Inadvertent Discovery Plan with the specific archaeological monitoring plan, as well as any information that arises as a result of inadvertent discoveries.

We appreciate DOT&PF's inclusion of NPS throughout this Section 106 process. If you have questions about our comments or concerns, please contact Rhea Hood at 907-644-3460 or rhea_hood@nps.gov.

Sincerely,

Herbert C. Frost, Ph.D.
Regional Director

cc: Rhea Hood, Archeologist, NPS Alaska Region
Jennifer Pederson Weinberger, Cultural Resources Program Manager, NPS Alaska Region
Maija Lukin, Superintendent, Western Arctic Parklands
Mark Rollins, Review and Compliance, Alaska State Historic Preservation Office

THE STATE of ALASKA

GOVERNOR BILL WALKER

Department of Natural Resources

DIVISION OF PARKS & OUTDOOR RECREATION
Office of History & Archaeology

550 West 7th Ave., Suite 1310
Anchorage, Alaska 99501-3565
Main: 907.269.8721
http://dnr.alaska.gov/parks/oha

October 9, 2017

SENT BY E-MAIL
DATE 10/9/17

File No.: 3130-1R FHWA/ 2016-01460

Subject: Kivalina Evacuation and School Site Access Road, 0002384/ NFHWY00162

Thomas Gamza
Department of Transportation & Public Facilities
2301 Peger Road
Fairbanks, AK 99709-5316

Dear Mr. Gamza,

The Alaska State Historic Preservation Office (AK SHPO) received your letter (dated September 19, 2017) and reports, titled *Kivalina Evacuation and School Site Access Road Cultural Resources Assessment Report* and the *Archaeological Assessment Update for the Kivalina Evacuation and School Site Access Road,* on September 24, 2017. Following our review of the documentation provided, pursuant to Section 106 of the National Historic Preservation Act, we concur with your finding of **no historic properties adversely affected** for the subject project. Furthermore, we concur that the project will not adversely affect NOA-00042 Cape Krusenstern Archaeological District National Monument National Historic Landmark (NHL). This concurrence is conditional to include archaeological monitoring and an Inadvertent Discovery Plan for the subject project. We look forward to receiving the final draft of the Inadvertent Discovery Plan for our records.

Please note that 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 comment letter does not end the 30-day review period provided to other consulting parties. Should unidentified cultural 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.

The AK SHPO appreciates your consultation efforts for the subject project and for including a staff member in a site visit on August 16, 2017. Please contact Mark Rollins at 269-8722 or mark.rollins@alaska.gov if you have any questions or if we can be of further assistance.

Sincerely,

Joan M. Antonson

Judith E. Bittner
Deputy State Historic Preservation Officer

JEB:mwr

Cc: Rhea Hood, National Park Service, rhea_hood@nps.gov

Attachment 3

Archaeological Monitoring Procedures and Inadvertent Discovery Plan – Kivalina Evacuation and School Site Access Road

I. Introduction

These procedures will be followed if cultural resources, including human remains, are encountered during ground disturbing activities at the Kivalina Evacuation and School Site Access Road in Kivalina, Alaska. This plan also includes procedures for archaeological monitoring at selected locations within the project area. Monitoring and discovery protocols contained herein are derived from Appendix F, "Archaeological Monitoring and Discovery Plan," of the *First Amended Programmatic Agreement Among the Federal Highway Administration, the Advisory Council on Historic Preservation, the Alaska State Historic Preservation Officer, and the Alaska Department of Transportation and Public Facilities Regarding Implementation of Section 106 of the National Historic Preservation Act for the Federal-Aid Highway Program in Alaska.*

Project Background

The proposed project origin is at the City of Kivalina, located on the southeast tip of the barrier island located between the Chukchi Sea (Arctic Ocean) and Kivalina Lagoon (Figure 1). The project terminus is located on the mainland across the Kivalina Lagoon approximately six miles northeast of the city at a community selected evacuation site on Kisimigiuqtuq Hill (K-Hill). The proposed project includes part of the Kivalina barrier island, the southern portion of Kivalina Lagoon, and the lower Wulik and Kivalina River drainages.

The Proposed Action would construct a safe, reliable, all-season evacuation road between the community of Kivalina and K-Hill. A range of route alternatives are being considered (Figure 2), but common to all are the following actions:

- **Establishment of a safe, reliable, all-season Kivalina Lagoon crossing.** All alternatives include construction of a causeway across the lagoon that variously incorporate different configurations of hydrological openings including bridge(s), culvert(s), or both.

- **Construction of an all-season access road connecting the Kivalina Lagoon crossing to the K-Hill evacuation site**. The road would be designed to accommodate a wide variety of motorized vehicles over a two-way road with shoulders, multiple turnouts, and side slopes that may include guard rails and other safety features where determined to be necessary and prudent.

- **Development of up to four material sites including the K-Hill Site, Wulik River Source 1, Relic Channel Source 1, and Relic Channel Source 2.** These material sites are anticipated to be suitable local sources of select material to supply the project. Selection and development of viable material sources and haul routes are considered as part of the Proposed Action.

Potential construction methodology may vary depending on timing of construction, contractor methods, locations of staging areas, camps, haul routes, and sequencing of activities.

Construction of the lagoon crossing may include in-water placement of fill, bridge support pile driving, and placement of culvert(s). Placement of fill is generally done during ice-free conditions, but several construction components associated with the lagoon crossing could be completed in the winter.

Grounded ice in shallow depths of the lagoon could be removed allowing placement of the base causeway embankment layer and rock protection with no, or minimal water present, thereby minimizing disturbance of fine sediments. Pile driving would take place on both sides of the bridge opening, and consist of driving piles at each abutment. The final design of the bridge foundation would establish the specific number, size, and depth of the pilings.

II. Archaeological Monitoring

Background

Archaeological monitoring is the stationing of an archaeologist on a construction site to watch for evidence of archaeological remains as the construction proceeds. Archaeological monitoring for the Kivalina project is planned for select activities in defined geographic areas. Monitoring requirements will be implemented during subsurface, ground disturbing activities. Archaeological monitoring was a condition of the SHPO's concurrence with DOT&PF's Finding of No Adverse Effect (SHPO Concurrence Letter, October 9, 2017).

Archaeological monitoring is to be carried out by or under the direct supervision of a person or persons meeting at a minimum the *Secretary of the Interior's Professional Qualifications Standards for Archaeologists* (48 FR 44738-44739). The Archaeological Monitor(s) will conduct on-site monitoring of ground-disturbing activities that extend into cultural resource sensitive areas identified through Section 106 consultation for the project.

Areas Planned for Monitoring

Archaeological monitoring is planned for the west side of the Lagoon Crossing/Causeway construction area (in the city of Kivalina), the evacuation road terminus at K-Hill, and the proposed material site locations DOT&PF will ensure a Secretary of the Interior (SOI) qualified professional archaeologist will be present to monitor for potential cultural resources during all ground disturbing activities in the above monitoring locations.

Monitoring Procedures

Before work begins on the project, the DOT&PF Project Engineer, the DOT&PF Professionally Qualified Individual (PQI), and the Archaeological Monitor(s) will conduct a pre-construction meeting with the Construction Contractor to explain any Section 106 terms or conditions for the project and the procedures to follow if archaeological materials or human remains are found, as well as the role of the Archaeological Monitor. The PQI will provide copies of the contact list contained in this document (Appendix 1) to be used in the event of a cultural resource discovery.

The on-site supervising Archaeological Monitor is authorized to halt construction in a specific location if any previously unidentified cultural resources are encountered during earth-moving activities.

Monitoring Reporting

The Archaeological Monitor will provide a summary construction monitoring memo on a weekly basis to the DOT&PF Project Engineer and the PQI. When the construction monitoring is complete, the Archaeological Monitor will provide to the Project Engineer and PQI draft and final summary reports detailing the construction monitoring activities. The report is to meet contemporary professional standards and the Secretary of the Interior's Standards and Guidelines for Archaeological Documentation (FR Vol. 48, No. 190, pp. 44734-44737). The PQI will provide the summary report to SHPO and other consulting parties

III. Protocols for Discovery of Cultural Resources

Cultural resources may include evidence of pre-contact or historic activities, artifacts such as formed stone or bone tools, tool-making debris, fire-modified rock, organic materials such as charcoal and faunal remains, historic debris scatters, and features such as hearths, pits, privies, post-holes or post- molds, foundations, and other evidence of structural remains. The following procedures must be adhered to in the event of a discovery of cultural resources during any project activities.

These procedures will be followed for a discovery during archaeological monitoring at the required monitoring locations *and* must also be followed if an unexpected discovery is made during project activities which were not required to have a monitor.

On-Site Procedures at the Time of Discovery

In the unlikely event that archaeological materials, features, and other potentially sensitive cultural resources are encountered during construction activities or the material site development in association with the project, all work at and adjacent to the discovery must stop. If an Archaeological Monitor is present, they will examine the discovery to determine if it is a cultural resource. If it is determined to not be a cultural resource, work may proceed with no further delay. If it is determined to be a cultural resource, the discovery site is to be secured by the Contractor. If no Archaeological Monitor is present, the discovery site is to be secured by the Contractor until such time as a qualified professional archaeologist can examine the discovery. The discovery area and a surrounding buffer zone shall be delineated with flags tied to stakes that will be driven into the ground. These stakes shall not be removed except by the PQI or Archaeological Monitor(s) at the conclusion of the cultural resource work. The buffer zone established around the discovery zone shall be large enough to allow ground disturbance activities to resume outside the buffer. If human remains are encountered, treat them with dignity and respect, and follow the protocols outlined below in Protocol for Discovery of Human Remains.

The Project Engineer may direct construction away from cultural resources to work in other areas prior to contacting the discovery notification consulting parties. The Project Engineer will coordinate with the Archaeological Monitor (if one is present) to contact the PQI or Regional Environmental Manager (REM).

The PQI or REM will notify the DOT&PF Statewide Environmental Office NEPA Program Manager, the SHPO, the National Park Service (NPS), the Native Village of Kivalina, City of Kivalina, NANA Regional Corporation, and the Native Village of Noatak; contact information for these parties is listed in Appendix 1. The PQI (or REM) must contact these parties within 48 hours of the discovery in accordance with 36 CFR 800.13.

Evaluation of Cultural Resource Materials

The PQI will be the DOT&PF point of contact for consultation with the FHWA, the SHPO, Tribes, and other consulting parties as appropriate to ensure that the previously unidentified resource or unanticipated effect is evaluated, and an appropriate treatment plan is developed.

For evaluating the resource: If the discovery occurs during archaeological monitoring the monitor will perform the following steps in collaboration with the PQI. If the discovery occurs during project activities not subject to monitoring, the Project Engineer, the PQI, and the Contractor will coordinate to procure archaeological services.

- As a streamlining measure, after a qualified archaeologist confirms that the find is cultural and establishes the boundaries of the discovery site, the PQI may assume an archaeological resource is eligible for inclusion in the National Register of Historic Places (National Register) under Criterion D.

- Alternatively, if the find is confirmed as cultural, the PQI may opt to have the cultural resource formally assessed for eligibility to the National Register using established National Register criteria (36 CFR 800.4(c)) and will provide the National Register evaluation report to the SHPO, Tribes, and other consulting parties as appropriate. The PQI will determine National Register eligibility in consultation with the SHPO and Tribes.

For properties deemed to be eligible for the National Register, the PQI will apply the criteria of adverse effect (36 CFR 800.5) in consultation with the SHPO and the Tribes.
Any treatment plan resulting from the discovery will be developed in consultation with the PQI, SHPO, NPS, and other consulting parties. The PQI will coordinate with the Project Engineer and the Construction Contractor to ensure that the treatment plan is implemented.

Curation and Documentation

If any pre-contact or historic archaeological materials are recovered from lands managed by the State of Alaska, these materials and any associated documentation will be curated at the University of Alaska Museum of the North (UAMN) in accordance with the provisions of an existing Memorandum of Understanding between the DOT&PF and UAMN (Appendix 2). Archaeological resources recovered from City of Kivalina lands will be remanded to the City of Kivalina. Archaeological resources recovered from NANA Regional Corporation, Inc. lands will be transferred to the Assistant Director of Lands, who will coordinate with the Native Village of Kivalina and the Native Village of Noatak regarding the final disposition of the recovered materials.

All documentation, testing and treatment plan, evaluation, data recovery, and reporting of cultural resource materials as described for these procedures will follow and meet the contemporary professional standards and the Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation (48 FR 44716).

Proceeding with Construction

Project construction outside the discovery site may continue as directed by the Project Engineer and the Construction Contractor while documentation and assessment of the cultural resources at the discovery site proceeds. When the PQI ensures that recovery of cultural resource materials as outlined above is satisfied and complete, and the PQI determines that compliance with State and federal laws is complete, the Project Engineer may allow construction at the discovery site to resume.

IV. Protocol for Discovery of Human Remains

If human remains are identified at any time during this project, any excavation or other project activities in the area of the discovery will cease and the location will be secured, and protected from further disturbance. The Project Engineer on Site will immediately initiate the notification process established by the OHA (see Appendix 1: Guidelines Laws and Protocols Pertaining to the Discovery of Human Remains in Alaska), and notify the designated representatives of the DOT&PF, the SHPO, the NPS, and NANA Regional Corporation, Inc., the City of Kivalina, the Native Village of Kivalina, and the Native Village of Noatak.

GUIDELINES

Laws and Protocols Pertaining to the Discovery of Human Remains in Alaska

The treatment of human remains following inadvertent discovery is governed by state and federal laws, land status, postmortem interval (time since death), and biological/cultural affiliation. First and foremost, the site of discovered remains should be regarded a potential "crime scene" until a person with appropriate expertise and authority determines otherwise.

State Laws:

Several State laws are applicable to the discovery of human remains in Alaska. The State Medical Examiner (SME) has jurisdiction over all human remains in the state (with rare exceptions, such as military aircraft deaths), regardless of age.

AS 12.65.5 requires immediate notification of a peace officer of the state (police, Village Public Safety Officer, or Alaska State Trooper [AST]) and the State Medical Examiner when death has "been caused by <u>unknown</u> or criminal means, during the commission of a crime, or by suicide, accident, or poisoning."

<u>In this regard, contact the Alaska State Trooper/Missing Persons Bureau first</u>. (See list of contacts on following page.) The AST has interpreted notification procedures as applicable to all remains, including ancient remains.

AS 11.46.482(a)(3), which applies to <u>all</u> lands in Alaska, makes the "intentional and unauthorized destruction or removal of any human remains or the intentional disturbance of a grave" a class C felony.

AS 41.35.200, which applies only to <u>State</u> lands, makes the disturbance of "historic, prehistoric and archeological resources" (including graves, per definition) a class A misdemeanor.

AS 18.50.250, which applies to <u>all</u> lands in Alaska, requires permits for the disinterment, transport, and reinterment of human remains. Guidance and permits are available from the Bureau of Vital Statistics (see attached list of contacts).

Federal Laws:

On Federal lands and Federal trust lands, the unauthorized destruction or removal of <u>archaeological</u> human remains (i.e., more than 100 years old) is a violation of **16 USC 470ee** (Archeological Resources Protection Act). If human remains on federal or federal trust lands are determined to be Native American, their treatment and disposition are also governed by the Native American Graves and Repatriation Act (NAGPRA) of 1990 (**PL 101-601; 25 USC 3001-30013**; 104 Stat. 3048-3058; 43 CFR 10). NAGPRA also applies to Native American human remains from <u>any</u> lands <u>if</u> the remains are curated in any institution that receives federal funds.

<u>General Guidance:</u>

<u>Your first contacts should be the AST/Missing Persons Bureau, the Alaska State Medical Examiner's Office, local law enforcement, the Alaska Office of History and Archaeology, and the landowner.</u>

In many instances, the field archaeologist must make a judgement call regarding the age of the remains, his/her level of confidence in the evaluation, and whether further investigation by a specialist is warranted. While notification under State Law is required, peace officers and the SME generally regard archaeologists competent to make these type determinations and welcome input that may assist with the investigation. With regard to ancient remains (> 100 years old), the SME and AST will generally defer to the opinion of the field archaeologist and require no further criminal investigation. However, the remains and a surrounding buffer area should not be disturbed until appropriate reporting and consultation have occurred.

Dr. Richard VanderHoek, State Archaeologist
Alaska Office of History and Archaeology
550 W. 7th Avenue, Suite 1310
Anchorage, AK 99501
(907) 269-8728 or richard.vanderhoek@alaska.gov

Department of Transportation & Public Facilities
Brett Nelson
DOT&PF Environmental Coordinator
2301 Peger Road
Fairbanks, AK 99701
Phone: (907) 451-2238
Email: brett.nelson@alaska.gov

State Medical Examiner's Office
5455 Dr. Martin Luther King Jr. Ave Q
Anchorage, AK 99507
Reporting Hotline (Death Hotline):
Phone: (907) 334-2356
1-888-332-3273 (Outside Anchorage)
Stephen Hoage, Operations Administrator Phone: (907) 334-2202
Fax: (907) 334-2216
Email: stephen.hoage@alaska.gov
Dr. Gary Zientek, Chief Medical Examiner Phone: (907) 334-2200
Fax: (907) 334-2216
Email: gary.zientek@alaska.gov

State Bureau of Vital Statistics
Heidi Lengdorfer, Chief
5441 Commercial Blvd.
P.O. Box 110675
Juneau, AK 99801
Phone: (907) 465-8643
Email: heidi.lengdorfer@alaska.gov
For questions regarding burial transit permits
Margo Meyer:
Phone: (907) 465-8610
Email: margo.meyer@alaska.gov

State Troopers
Missing Persons Bureau
Phone: (909) 269-5477
Fax: (907) 338-7243
Sgt. Kid Chan
Phone: (907) 269-5058
Email: choong.chan@alaska.gov
Stephanie Johnson
Phone: (907) 269-5497
Email: stephanie.johnson2@alaska.gov
(Please send email to Sgt. Chan w/cc to Stephanie, with relevant information and photos)

DNR Office of History and Archaeology
Judith E. Bittner
State Historic Preservation Officer (SHPO) Phone: (907) 269-8721
Fax: (907) 269-8908
Email: judy.bittner@alaska.gov
Dr. Richard VanderHoek
State Archaeologist/Deputy SHPO
Phone: (907) 329-8728
Fax: (907) 269-8908
Email: richard.vanderhoek@alaska.gov

Native Village of Kivalina
Millie Hawley, President
PO Box 50051
Kivalina, AK 99750
Phone: (907) 645-2153
Email: tribeadmin@kivaliniq.org

City of Kivalina
Austin Swan Sr., Mayor
PO Box 50079
Kivalina, AK 99750
Phone: (907) 645-2137
Email: atchugunnaq@gmail.com

NANA Regional Corporation, Inc.
Jeffrey Nelson, Assistant Director of Lands
909 West 9th Avenue
Anchorage, AK 99501
Phone: (907) 442-3301
Email: Jeffrey.Nelson@nana.com

National Park Service- Alaska Regional Office
Rhea Hood, Archeologist
240 West 5th Avenue
Anchorage, AK 99501
Phone: (907) 644-3460
Email: rhea_hood@nps.gov

Native Village of Noatak
Vernon Adams, Sr., President
PO Box 89
Noatak, AK 99761
Phone: (907) 485-2173
Email: tribaladmin@nautaaq.org

Appendix 2

MEMORANDUM OF UNDERSTANDING
BETWEEN
THE DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
AND
THE UNIVERSITY OF ALASKA MUSEUM OF THE NORTH
FAIRBANKS, ALASKA

THIS MEMORANDUM OF UNDERSTANDING (Agreement) is hereby entered into by and between the Alaska Department of Transportation and Public Facilities (DOT&PF) Statewide Environmental Office, representing the three DOT&PF regions (i.e., Central, Northern, and Southeast), and the University of Alaska Museum of the North, Fairbanks, Alaska, herein referred to as the Museum.

WHEREAS, the purpose of this Agreement is to provide the framework for the effective museum curation and storage of cultural material collected or excavated during the development of DOT&PF sponsored projects in accordance with the stipulations outlined below.

WHEREAS, the DOT&PF administers federally funded projects that are subject to Section 106 of the National Historic Preservation Act of 1966, as amended (36 CFR 800 Protection of Historic Properties) and State funded projects subject to the Alaska Historic Preservation Act of 1970 (specifically AS 41.35.070 Preservation of Historic, Prehistoric, and Archaeological Resources Threatened by Public Construction); and

WHEREAS, the development of said projects can result in certain cultural material recovered during archaeological survey, excavation, and data recovery, and the creation of associated field records (herein called Collections); and

WHEREAS, DOT&PF as the sponsor for federal and State funded projects has the responsibility under federal and State law to ensure proper care of Collections; and

WHEREAS, the Museum is an accredited institution that has requisite facilities that meet and operate in accordance with the federal standards published in 36 CFR 79 to provide physical security and a controlled environment for Collections, has an established Collection Management Policy that provides procedures and requirements to curate archaeological collections for future research, exhibit, and instruction, and has qualified Museum professionals with the expertise for the curation of Collections; and

WHEREAS, the Parties hereto recognize the mutual benefits to be derived by having Collections from DOT&PF suitably housed and maintained by the Museum; and

WHEREAS, the Parties hereto recognize the continued State legal title to Collections from lands owned or controlled by the State (pursuant to AS 41.35.020 and 11 AAC 16.020) and the responsibility to ensure that the Collections are suitably managed and preserved for the public good; and

WHEREAS, the Parties hereto recognize that DOT&PF sponsored surveys and archaeological excavations on properties not owned or controlled by the State require a separate Right-of-Entry agreement with the land owner or managing entity; and

WHEREAS, Right-of Entry agreements will identify the party holding legal title to the cultural materials, and contain terms and conditions to ensure proper care and curation of any recovered Collections; and

NOW THEREFORE, the DOT&PF and the Museum as signatories to this Agreement mutually agree to promote a unified approach to preservation and protection of cultural materials in accordance with the following stipulations until this Agreement expires or is terminated.

STIPULATIONS

I. RESPONSIBILITIES

A. The Museum
1. In accordance with the Museum's Collections Management Policy, the Museum agrees to act as repository for appropriately accessioned and cataloged cultural material, and to provide proper space, facilities and personnel for curation, storage and maintenance of the materials.
2. Collections made on State lands remain the property of the State, while the Right-of-Entry agreements will contain the terms and conditions of Collections from properties not owned or controlled by the State. The Museum shall not transfer or discard a State Collection without written permission of the State. The Museum may not sell any State Collection.
3. The Museum assumes no responsibility for cultural specimens from DOT&PF sponsored projects that have not been accessioned and cataloged according to the Museum's Curation Guidelines accession system and that have not been physically deposited in the Museum. The Museum reserves the right to refuse to accept a Collection.

B. The DOT&PF
1. In accordance with the Museum's Curation Guidelines, the DOT&PF will be responsible to coordinate with the Museum for the proper accessioning and cataloging and processing for long-term museum storage of Collections from DOT&PF sponsored projects that are to be deposited with the Museum. This will be accomplished by a qualified consultant(s) under contract to the DOT&PF.
2. All associated records will be deposited at the Museum at the same time as the Collection(s). These records will include (but not necessarily be limited to) catalog ledgers and copies of all reports, papers, field notes, photographs, profiles, etc. In accordance with applicable federal and State laws, the Museum will restrict access to information about the location of heritage resource sites from which DOT&PF Collections are obtained.

II. ADMINISTRATION

A. Duration of Agreement: The Agreement shall remain in effect for a period of ten (10) years after the date it takes effect. The Museum and the DOT&PF will review this Agreement in five (5) years and make any necessary adjustments unless it is terminated prior to that time. If there are no objections from the parties, the term of the Agreement will automatically be extended for an additional ten (10) years. The procedures, terms and conditions of this Agreement may be modified at any time by joint written consent of the parties.

B. Fees: The DOT&PF and the Museum recognize that fees will be required for the DOT&PF sponsored Collections when they are transferred for deposition and organization at the Museum. The fees for these services will be in accordance with the Museum's Curation Guidelines.

C. Amendment: Parties to this Agreement may at any time propose amendments, whereupon the parties will consult to consider such amendment. This Agreement may be amended only upon written concurrence of the signatory parties. Amendments go into effect on the date of the last signature.

D. Termination: This Agreement becomes effective when final signature is received. A party may terminate this Agreement at any time by giving written notice to the other parties not less than one hundred twenty (120) days in advance of the effective date of termination. If any party proposes termination of this Agreement, the party proposing termination will consult with the other parties to seek alternatives to termination. Should such consultation result in an agreement on an alternative to termination, the parties will proceed in accordance with that agreement.

THE PARTIES HERETO have executed this Memorandum of Understanding.

UNIVERSITY OF ALASKA MUSEUM, FAIRBANKS

By: ______________________ Date: 1/27/14
Josh Reuther, Ph.D., Curator of Archaeology

By: ______________________ Date: 1/27/14
Aldona Jonaitis, Ph.D., Museum Director

By: ______________________ Date: 1/31/14
Rosemary Madnick, Grant and Contract Services Director

ALASKA DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES

By: ______________________ Date: 12/12/13
Roger Healy, P.E., Chief Engineer

THE STATE of ALASKA

GOVERNOR BILL WALKER

Department of Transportation and Public Facilities

Northern Region
Design and Engineering Services
Preliminary Design and Environmental Section

2301 Peger Road
Fairbanks, Alaska 99709-5316
Main: 907-451-2237
Toll free: 800-451-2363
Fax: 907-451-5126

In Reply Refer To:
Kivalina Evacuation and School Site Access Road
Federal/State Project No. 0002384/NFHWY00162
Addendum: NOA-00325 & NOA-00327

December 29, 2017

Bert Frost, Regional Director
Alaska Regional Office
National Park Service
240 West 5th Avenue
Anchorage, AK 99501

Dear Mr. Frost:

The Alaska Department of Transportation and Public Facilities (DOT&PF) has assumed the responsibilities of the Federal Highway Administration (FHWA) under 23 U.S.C. 327, and is proposing to construct a safe, reliable, all-season evacuation road between the community of Kivalina and a site on Kisimigiuqtuq Hill (K-Hill) (Figure 1). The Kivalina Evacuation and School Site Access Road (the Project) location is legally described in Table 1 below:

Table 1: Project Location

Section(s)	Township	Range	Meridian	USGS Quad
1, 2, 10, 11, 15, 16, 21	027N	026W	Kateel River	Noatak C-5
19. 20, 29, 30, 31	028N	026W	Kateel River	Noatak C-5
25, 26, 35, 36	029N	025W	Kateel River	Noatak C-5

The environmental review, consultation, and other actions required by applicable Federal environmental laws for this project are being, or have been, carried out by DOT&PF pursuant to 23 U.S.C. 327 and a Memorandum of Understanding dated November 3, 2017, and executed by FHWA and DOT&PF.

The proposed project origin is at the City of Kivalina, located on the southeast tip of the barrier island located between the Chukchi Sea (Arctic Ocean) and Kivalina Lagoon (Figure 1). The project terminus is located on the mainland across the Kivalina Lagoon approximately six miles northeast at a community selected evacuation site on K-Hill.

Background

On September 19, 2017 DOT&PF made a finding of No Historic Properties Adversely Affected (Findings Letter) for the proposed project. The National Park Service (NPS) responded on October 6, 2017 (Attachment 1); their response included the detail that two Alaska Heritage Resources Survey (AHRS) sites, NOA-00325 and NOA-00327, appear to be within the proposed project's Area of Potential Effect (APE) but that they would not be affected by the project's activities. These two sites did not appear in the Findings Letter or in the SHPO concurrence to those Findings on October 9, 2017 (Attachment 2). This informational update addresses those two sites. DOT&PF's original finding of effect has not changed.

NOA-00325 and NOA-00327

Both NOA-00325 and NOA-00327 were assigned AHRS numbers in the 2005 *Cultural Resources Survey of Proposed Sewage and Water Systems Improvements in Kivalina, Alaska* report by Northern Land Use Research, Inc.

Table 2. Site Details from AHRS Database

Site Number	Site Name	Site Description	Determination of Eligibility?
NOA-00325	KIV-HR-05	Informant reported to cultural resource investigators in 2005 that human remains discovered during construction of house in 1990s. No information regarding their handling.	No Determination of Eligibility
NOA-00327	NOA-00327	Local informant reported to other cultural resource investigators in 2004 that artifacts had been found near location when they were a child.	No Determination of Eligibility

The site numbers were assigned based on information from local residents who recalled that in one location (NOA-00325) human remains had been found during the construction of a house foundation in the 1970s. It was not determined at the time of the 2005 interview if the remains were left in place or re-interred in the current cemetery. Another local resident noted that at the other location (NOA-00327) artifacts had been found and he played with them when he was a child. Based on these interviews, AHRS numbers were assigned for the general locations. As of 2017, no extant physical materials have been identified in relation to either of these two sites.

This letter is being sent to acknowledge that the AHRS-reported locations for NOA-00325 and NOA-00327 are within the APE for this project. Their omission from the Findings Letter (September 19, 2017) was a clerical error and DOT&PF does not anticipate ground disturbing activities in the reported site locations that would require a re-evaluation of the finding of effect for this project. The APE for the project was drawn broadly to evaluate potential visual effects as well as any ground disturbing effects the project may have on the surrounding land and community. The AHRS-reported locations for these two sites are on the periphery of the APE where visual effects were the greatest concern due to the presence of standing structures. No ground-disturbing activity is planned for the portions of the APE containing these sites.

Section 4(f)

As stated in in September 19, 2017 Findings Letter it is the DOT&PF's intent to make a Section 4(f) *de minimis* impact finding for this project and NOA-00042, the Cape Krusenstern National Historic Landmark. Section 4(f) findings have not changed with the inclusion of NOA-00325 and NOA-00327 within the project APE as there will be no use of these sites.

Inadvertent Discovery Plan

Additionally, please find attached the finalized Inadvertent Discovery Plan (Attachment 3), as stipulated and required, for this project as presented in the DOT&PF Findings Letters of September 19, 2017 and a full set of the figures for the entire project APE (Figures 1-8).

Consultation Summary

On July 10, 2017 a meeting among Agency cultural resource staff was held in Anchorage. The DOT&PF Northern Region Cultural Resource Specialist-Archaeologist PQI, Office of History and Archaeology staff, the Alaska SHPO, and the NPS Archaeologist for the NRHP Program, Alaska Region were in attendance. Initiation of Consultation letters were sent out to the identified consulting parties on August 7, 2017. A response was received from the SHPO office on August 22, 2017 stating there was no objection to the proposed Study Area or level of identification. No other responses to the Section 106 Initiation of Consultation letters were received. A response to the September 19, 2017 Findings Letter was received from the NPS on October 6, 2017 and SHPO concurrence with the DOT&PF findings was received on October 9, 2017. No responses were received from the other consulting parties.

In addition to the Alaska State Historic Preservation Officer (SHPO), other parties being contacted with this informational update and Inadvertent Discovery Plan for this project are: the National Park Service (NPS); the Native Village of Kivalina; the City of Kivalina; the Native Village of Noatak; NANA Regional Corporation; the Northwest Arctic Borough; NPS-Western Arctic National Parklands; and the Bureau of Indian Affairs (BIA).

Please direct your questions or comments to me at the address above, by telephone at 907-451-5293, or by e-mail at *thomas.gamza@alaska.gov*.

Sincerely,

Thomas A. Gamza

Thomas A. Gamza
Cultural Resource Specialist-Archaeologist (PQI)
State of Alaska DOT&PF, Northern Region

Figure 1: Location and Vicinity Map
Figures 2-7: Project APE Enlarged Sections
Figure 8: Locations of NOA-00325 and NOA-00327 in Western Terminus Enlarged Section

Attachment 1: National Park Service response to the DOT&PF Findings October 6, 2017
Attachment 2: SHPO concurrence with No Historic Properties Adversely Affected Determination October 9, 2017
Attachment 3: Final Inadvertent Discovery Plan – Kivalina Evacuation and School Site Access Road

Electronic cc w/ enclosures:
Jonathan Hutchinson, P.E., DOT&PF Northern Region, Project Manager
Paul Karczmarczyk, DOT&PF Northern Region, Environmental Impact Analyst
Brett Nelson, DOT&PF Northern Region, Regional Environmental Manager
Kathy Price, DOT&PF, Statewide Cultural Resources Manager
Amy Sumner, DOT&PF Statewide Environmental NEPA Manager

Kivalina Lagoon Bridge Permit Application

Project Number: 0002384/NFHWY00162
July 20, 2018

The environmental review, consultation, and other actions required by applicable federal environmental laws for this project are being, or have been, carried out by DOT&PF pursuant to 23 U.S.C. 327 and a Memorandum of Understanding dated November 3, 2017, and executed by FHWA and DOT&PF.

Attachment 5. Kivalina Evacuation and School Site Access Road project ADEC Water Quality Standard Certificate of Reasonable Assurance

THE STATE of ALASKA
GOVERNOR BILL WALKER

Department of Environmental Conservation
DIVISION OF WATER
Wastewater Discharge Authorization Program

555 Cordova Street
Anchorage, Alaska 99501-2617
Main: 907.269.6285
Fax: 907.334.2415
www.dec.alaska.gov/water/wwdp

April 30, 2018

Alaska Department of Transportation and Public Facilities (ADOT&PF)
Attention: Mr. Brett Nelson
2301 Peger Road
Fairbanks, AK 99709

Re: ADOT&PF, Kivalina Evacuation Road
POA-2012-124, Kivalina Lagoon

Dear Mr. Nelson:

In accordance with Section 401 of the Federal Clean Water Act of 1977 and provisions of the Alaska Water Quality Standards, the Department of Environmental Conservation (DEC) is issuing the enclosed Certificate of Reasonable Assurance for placement of dredged and/or fill material in waters of the U.S., including wetlands and streams, associated with the construction of an evacuation road in Kivalina, Alaska.

DEC regulations provide that any person who disagrees with this decision may request an informal review by the Division Director in accordance with 18 AAC 15.185 or an adjudicatory hearing in accordance with 18 AAC 15.195 – 18 AAC 15.340. An informal review request must be delivered to the Director, Division of Water, 555 Cordova Street, Anchorage, AK 99501, within 15 days of the permit decision. Visit http://dec.alaska.gov/commish/ReviewGuidance.htm for information on Administrative Appeals of Department decisions.

An adjudicatory hearing request must be delivered to the Commissioner of the Department of Environmental Conservation, 410 Willoughby Avenue, Suite 303, PO Box 111800, Juneau, AK 99811-1800, within 30 days of the permit decision. If a hearing is not requested within 30 days, the right to appeal is waived.

By copy of this letter we are advising the U.S. Army Corps of Engineers of our actions and enclosing a copy of the certification for their use.

Sincerely,

James Rypkema
James Rypkema
Program Manager, Storm Water and Wetlands

Enclosure: 401 Certificate of Reasonable Assurance

cc: (with encl.)
Janet Post, USACE, Anchorage
Jack Winters, ADF&G
USFWS Field Office Fairbanks
Matt LaCroix, EPA Operations, Anchorage

STATE OF ALASKA
DEPARTMENT OF ENVIRONMENTAL CONSERVATION
CERTIFICATE OF REASONABLE ASSURANCE

In accordance with Section 401 of the Federal Clean Water Act (CWA) and the Alaska Water Quality Standards (18 AAC 70), a Certificate of Reasonable Assurance, is issued to ADOT&PF, attention: Mr. Brett Nelson, at 2301 Peger Road, Fairbanks, AK 99709, for placement of dredged and/or fill material in waters of the U.S. including wetlands and streams in association with the construction of an evacuation road in Kivalina, Alaska.

ADOT&PF's stated purpose is to construct a safe, reliable, all season evacuation road between the community of Kivalina and K-Hill. The Kivalina Evacuation Road project would provide Kivalina residents an evacuation route in the event of a catastrophic storm or ocean surge, allowing evacuees to temporarily mobilize to take refuge at an assembly site on K-Hill.

PROPOSED WORK:

- Placement of 195,000 cubic yards of clean gravel, rock, and rip rap into 8.2 acres in the Kivalina Lagoon to construct:
  - 110 foot long x 27 foot wide x 25 foot high bridge.
  - 3,900 foot long x 22 foot high x 30 foot wide surface x 120 foot base (toe-to-toe) approach.
- Placement of 518,000 cubic yards of clean gravel and silts into 66 acres of wetlands to construct:
  - 7.5 mile long x 60 foot wide (toe-to-toe) two lane gravel road with side slopes 3:1 from end of approach to K-Hill;
  - Two permanent staging pads: a 300 foot x 630 foot terminal pad (4.3 acres) and a 290 foot x 490 foot approach staging pad (3.3 acres).
- Placement of 52,800 cubic yards of gravel and silts into 7.2 acres of wetlands to construct four spur roads to material sites:
  - Four spur roads are: 1500 feet x 50 feet, 2900 feet x 50 feet, 1800 feet x 50 feet, and 275 feet x 50 feet.
- Up to Four Material sites with excavation not to exceed 297.3 acres of wetlands.

A state issued water quality certification is required under Section 401 because the proposed activity will be authorized by a U.S. Army Corps of Engineers permit (POA-2012-124) and a discharge of pollutants to waters of the U.S. located in the State of Alaska may result from the proposed activity. Public notice of the application for this certification was given as required by 18 AAC 15.180 in the Corps Public Notice POA-2012-124 posted from February 22, 2018 to March 26, 2018.

The proposed activity begins within Section 21, T. 27 N., R. 26 W., Kateel River Meridian, Latitude 67.7301° N., Longitude – 164.5442° W., and ends Section 20, T. 28 N., R. 25 W., Kateel River Meridian; Latitude 67.8031° N., Longitude -164.3873° W., in Kivalina, Alaska.

The Department of Environmental Conservation (DEC) reviewed the application and certifies that there is reasonable assurance that the proposed activity, as well as any discharge which may result, will comply with applicable provisions of Section 401 of the CWA and the Alaska Water Quality Standards, 18 AAC 70, provided that the following additional measures are adhered to.

1. Reasonable precautions and controls must be used to prevent incidental and accidental discharge of petroleum products or other hazardous substances. Fuel storage and handling activities for equipment must be sited and conducted so there is no petroleum contamination of the ground, subsurface, or surface waterbodies.

2. During construction, spill response equipment and supplies such as sorbent pads shall be available and used immediately to contain and cleanup oil, fuel, hydraulic fluid, antifreeze, or other pollutant spills. Any spill amount must be reported in accordance with Discharge Notification and Reporting Requirements (AS 46.03.755 and 18 AAC 75 Article 3). The applicant must contact by telephone the DEC Area Response Team for Northern Alaska at (907) 451-2121 during work hours or 1-800-478-9300 after hours. Also, the applicant must contact by telephone the National Response Center at 1-800-424-8802.

3. Runoff discharged to surface water (including wetlands) from a construction site disturbing one or more acres must be covered under Alaska's General Permit for Storm Water Discharges from Large and Small Construction Activities in Alaska (AKR100000). This permit requires a Storm Water Pollution Prevention Plan (SWPPP). For projects that disturb more than five acres, this SWPPP must also be submitted to DEC (William Ashton, 907-269-6283) prior to construction.

4. Construction equipment shall not be operated below the high tide line or the ordinary high water mark if equipment is leaking fuel, oil, hydraulic fluid, or any other hazardous material. Equipment shall be inspected and recorded in a log on a daily basis for leaks. If leaks are found, the equipment shall not be used and pulled from service until the leak is repaired.

5. All work areas, material access routes, and surrounding wetlands involved in the construction project shall be clearly delineated and marked in such a way that equipment operators do not operate outside of the marked areas.

6. Natural drainage patterns shall be maintained, to the extent practicable, without introducing ponding or drying.

7. Excavated or fill material, including overburden, shall be placed so that it is stable, meaning after placement the material does not show signs of excessive erosion. Indicators of excess erosion include: gullying, head cutting, caving, block slippage, material sloughing, etc. The material must be contained with siltation best management practices (BMPs) to preclude reentry into any waters of the U.S., which includes wetlands.

8. Include the following BMPs to handle storm water and total storm water volume discharges as they apply to the site:

    a. Divert storm water from off-site around the site so that it does not flow onto the project site and cause erosion of exposed soils;

    b. Slow down or contain storm water that may collect and concentrate within a site and cause erosion of exposed soils;

c. Place velocity dissipation devices (e.g., check dams, sediment traps, or riprap) along the length of any conveyance channel to provide a non-erosive flow velocity. Also place velocity dissipation devices where discharges from the conveyance channel or structure join a water course to prevent erosion and to protect the channel embankment, outlet, adjacent stream bank slopes, and downstream waters.

9. Fill material must be clean sand, gravel or rock, free from petroleum products and toxic contaminants in toxic amounts.

10. Any disturbed ground and exposed soil not covered with fill must be stabilized and re-vegetated with endemic species, grasses, or other suitable vegetation in an appropriate manner to minimize erosion and sedimentation, so that a durable vegetative cover is established in a timely manner.

This certification expires five (5) years after the date the certification is signed. If your project is not completed by then and work under U.S Army Corps of Engineers Permit will continue, you must submit an application for renewal of this certification no later than 30 days before the expiration date (18 AAC 15.100).

Date: April 30, 2018

James Rypkema

James Rypkema, Program Manager
Storm Water and Wetlands

Invoice

State of Alaska
Department of Environmental Conservation
Division of Water Quality
410 Willoughby Ave, Suite 303
PO Box 111800
Juneau, AK 99811-1800

Invoice Date	Invoice Number
May 01, 2018	WQ6045

DEC Use Inv Code: ***48918***
DEC'S EIN#: 92-6001185 DUNS#: 809386857

SOA Transportation & Public Facilities
Kivalina Lagoon Evacuation Road ADOT
ATTN Accounts Payable, ATTN Mr. Brett Nelson
2301 Peger Rd
Fairbanks, AK 99709

Permit #: WQPOA2012124:NPSONETIME
Facility: Kivalina Lagoon Evacuation Road ADOT
Client ID: 4570
Facility ID: 4570-561
DEC PJ Name: WQ Kivalina Lagoon Evacuation Road ADOT

Permit Type: Wetland Permit (401)

A ITI Transaction is not on-line yet for this invoice. For interagency payments please email dec.adec.userfees@alaska.gov and indicate the invoice number and your PVN.

Detach top portion with your payment.
Please include Permit # and Invoice # with

Date	Employee	Description	Units	Rate	Amount
Other Charges					
5/1/18		WQ 404 PJ Disturbing > 20 acres - 18 AAC 72.957 (a)(5)(B)(v) - Individual Permit One-time Application fee for certification under 33 U.S.C 1341 of a dredge or fill permit issued under 33 U.S.C. 1344 (Clean Water Act, sec 404) for Other projects or department activities for project disturbing greater than 20 acres.	1.00	$2,375.00	$2,375.00

Total Non-Labor Charges **$2,375.00**

Invoice Balance Due **$2,375.00**

If you have questions regarding this one time fee for your Wetland Permit (401) please contact William Ashton at 907-269-6283. Thank You.

If you have any questions or wish to make special arrangements for payment, contact dec.water.billing.help@alaska.gov.

To pay online by check or credit card, visit: http://alaska.gov/go/SXPT
Or you may complete this form and mail it to the address shown above, or fax it to 907-465-1338, or call 907-465-5089.

If you are paying by Credit Card and would like a confirmation receipt faxed or mailed please check this box: ☐ **Code:** 48918
Invoice: WQ6045 **Permit:** WQPOA2012124:NPSONETIME - WQ Kivalina Lagoon Evacuation Road ADOT

Credit Card Type: ☐ VISA ☐ MasterCard ☐ Discover Expiration Date (MM/YY): ________ Amount to be Charged: ________

Printed Name on Card: ____________________ Phone Number: ____________ Fax Number: ____________

Card Number ____________________ CVV Code: ______ Signature ____________________

Kivalina Lagoon Bridge Permit Application

Project Number: 0002384/NFHWY00162
July 20, 2018

The environmental review, consultation, and other actions required by applicable federal environmental laws for this project are being, or have been, carried out by DOT&PF pursuant to 23 U.S.C. 327 and a Memorandum of Understanding dated November 3, 2017, and executed by FHWA and DOT&PF.

Attachment 6. Kivalina Evacuation and School Site Access Road project USACE Section 404 permit POA-2012-124

DEPARTMENT OF THE ARMY
ALASKA DISTRICT, U.S. ARMY CORPS OF ENGINEERS
REGULATORY DIVISION
P.O. BOX 6898
JBER, AK 99506-0898

July 9, 2018

Regulatory Division
POA-2012-124

Alaska Department of Transportation and Public Facilities (ADOT)
Att: Brett Nelson
2301 Peger Road
Fairbanks, AK 99709

Dear Mr. Nelson:

Enclosed is Department of the Army permit POA-2014-124, Kivalina Lagoon, which would authorize construction of a road, an approach, 2 gravel pads, 2 spur roads and 3 material sites. The beginning of the project is located within Section 21, T. 27N., R. 26 W., Kateel Meridian; USGS Quad Map Noatak C-5; Latitude 67.7301º N., Longitude 164.5442º W.; in Kivalina, Alaska. The end of the project is located within Section 20, T. 28N., R. 25W., Kateel Meridian; USGS Quad Map Noatak D-5; Latitude 67.8031º N., Longitude 164.3873º W.; near Kivalina, Alaska. Also enclosed is a Notice of Authorization which should be posted in a prominent location near the authorized work.

If changes to the plans or location of the work are necessary for any reason, plans must be submitted to us immediately. Federal law requires approval of any changes before construction begins.

Nothing in this letter excuses you from compliance with other Federal, State, or local statutes, ordinances, or regulations.

Please contact me via email at janet.l.post@usace.army.mil, by mail at the address above, by phone at (907) 753-2831, or toll free from within Alaska at (800) 478-2712, if you have questions. For more information about the Regulatory Program, please visit our website at www.poa.usace.army.mil/Missions/Regulatory.

Sincerely,

Janet Post

Janet Post
Project Manager

Enclosures

This notice of authorization must be conspicuously displayed at the site of work.

United States Army Corps of Engineers
KIVALINA LAGOON

A permit to: CONSTRUCT A ROAD, AN APPROACH, 2 GRAVEL PADS, 2 SPUR ROADS AND 3 MATERIAL SITES

at: WITHIN SECTION 21, T. 27N., R. 26 W., KATEEL MERIDIAN; USGS QUAD MAP NOATAK C-5; LATITUDE 67.7301º N., LONGITUDE 164.5442º W.; AND WITHIN SECTION 20, T. 28N., R. 25W., KATEEL MERIDIAN; USGS QUAD MAP NOATAK D-5; LATITUDE 67.8031º N., LONGITUDE 164.3873º W.; NEAR KIVALINA, ALASKA.

has been issued to: ALASKA DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES(ADOT)

on: July 9, 2018 and expires: June 30, 2023

Address of Permittee: ADOT, 2301 PEGER ROAD FAIRBANKS, AK 99709

Permit Number:

POA-2012-124

Janet Post

FOR: ***District Commander***
Janet Post
Project Manager
REGULATORY DIVISION

ENG FORM 4336, Jul 81 (33 CFR 320-330) EDITION OF JUL 70 MAY BE USED (Proponent: CECW-O)

BCF:

tribeadmin@kivaliniq.org
james.rypkema@alaska.gov
shannon.dewandel@alaska.gov
audra.brase@alaska.gov
Ronald.Benkert@alaska.gov
jeanne.proulx@alaska.gov
Michael.walton@alaska.gov
julie.smith@alaska.gov
Clifford.larson@alaska.gov
oha.revcomp@alaska.gov
AOOARU.R10@epamail.epa.gov
HCD.Anchorage@noaa.gov
FW7_POANotices@fws.gov

DEPARTMENT OF THE ARMY PERMIT

Permittee: Alaska Department of Transportation (ADOT)

Permit No.: POA-2012-124

Issuing Office: U.S. Army Engineer District, Alaska

NOTE: The term "you" and its derivatives, as used in this permit, means the permittee or any future transferee. The term "this office" refers to the appropriate district or division office of the Corps of Engineers having jurisdiction over the permitted activity or the appropriate official of that office acting under the authority of the commanding officer.

You are authorized to perform work in accordance with the terms and conditions specified below.

Project Description:

Placement of 195,000 cubic yards of clean gravel, rock, and rip rap into 8.2 acres in the Kivalina Lagoon, a navigable water, to construct: A 3,900 foot long x 22 foot high x 30 foot wide surface x 120 foot base (toe-to-toe) approach.

Placement of 518,000 cubic yards of clean gravel and silts into 66 acres of wetlands to construct: 7.5 mile long x 60 foot wide (toe-to-toe) two lane gravel road with side slopes 3:1 from end of approach to K-Hill; Two permanent staging pads: a 300 foot x 630 foot terminal pad and a 290 foot x 490 foot approach staging pad.

Placement of 17,600 cubic yards of gravel and silts into 2.4 acres of wetlands to construct 2 spur roads to material sites.

Mechanized land clearing to create 3 material sites not to exceed 134.8 acres. The sites are designated: K-Hill Western Site (93.3 acres), Wulik River Relic Channel Source 2-1 (20.3 acres) and Wulik River Relic Channel Source 2-2 (21.2 acres).

Discharge of fill material to rehabilitate 3 material sites: Wulik River Relic Channel Source 2-1 (20.3 acres), Wulik River Relic Channel Source 2-2 (21.2 acres), and K-Hill Western Site (93.3 acres).

All work will be performed in accordance with the attached plan, sheets 1-33, dated June 29, 2018.

Project Location: The beginning of the project is located within Section 21, T. 27N., R. 26 W., Kateel Meridian; USGS Quad Map Noatak C-5; Latitude 67.7301° N., Longitude 164.5442° W.; in Kivalina, Alaska. The end of the project is located within Section 20, T. 28N., R. 25W., Kateel Meridian; USGS Quad Map Noatak D-5; Latitude 67.8031° N., Longitude 164.3873° W.; near Kivalina, Alaska.

Permit Conditions:

General Conditions:

1. The time limit for completing the work authorized ends on **June 30, 2023**

If you find that you need more time to complete the authorized activity, submit your request for a time extension to this office for consideration at least one month before the above date is reached.

2. You must maintain the activity authorized by this permit in conformance with the terms and conditions of this permit. You are not relieved of this requirement if you abandon the permitted activity, although you may make a good faith transfer to a third party in compliance with General Condition 4 below. Should you wish to cease to maintain the authorized activity or should you desire to abandon it without a good faith transfer, you must obtain a modification of this permit from this office, which may require restoration of the area.

3. If you discover any previously unknown historic or archeological remains while accomplishing the activity authorized by this permit, you must immediately notify this office of what you have found. We will initiate the Federal and State coordination required to determine if the remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

4. If you sell the property associated with this permit, you must obtain the signature of the new owner in the space provided and forward a copy of the permit to this office to validate the transfer of this authorization.

5. If a conditioned water quality certification has been issued for your project, you must comply with the conditions specified in the certification as special conditions to this permit. For your convenience, a copy of the certification is attached if it contains such conditions.

6. You must allow representatives from this office to inspect the authorized activity at any time deemed necessary to ensure that it is being or has been accomplished in accordance with the terms and conditions of your permit.

Special Conditions:

1. No stockpiling of fill materials shall occur in wetlands or other waters of the U.S. that do not have DA authorization in accordance to the drawings pages 1-33 dated June 29, 2018.
2. Prior to commencement of construction activities within waters of the U.S., the permittee shall clearly identify the permitted limits of disturbance at the project site with highly visible markers (e.g. construction fencing, flagging, silt barriers, etc.). The permittee shall properly maintain such identification until construction is complete and the soils have been stabilized. The permittee is prohibited from conducting any unauthorized Corps-regulated activity outside of the permitted limits of disturbance.
3. Rehabilitation of the material sites shall be performed in accordance with the Kivalina Evacuation Road Rehabilitation Plan (attached). Rehabilitation monitoring reports for K-Hill Western Site and Wulik Relic Channels 2-1 and 2-2 shall be submitted by the permittee yearly, until site rehabilitation is complete and satisfactory to the Corps of Engineers. The reports should include pictures of the area taken between June and August and a brief narrative on visual observations of the area.

   These reports should be addressed to:

US Army Corps of Engineers, North Section
CEPOA-RD
PO Box 6898 JBER, Alaska 99506

4. Natural drainage patterns shall be maintained using appropriate culverts and other measures to ensure hydrology is not altered.
5. The Permittee shall use only clean fill material for this project. The fill material shall be free from soils containing any toxic substance in toxic amounts.
6. Your use of the permitted activity must not interfere with the public's right to free navigation on all navigable waters of the United States.
7. The permittee understands and agrees that, if future operations by the United States require the removal, relocation, or other alteration, of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army or his authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the permittee will be required, upon due notice from the Corps of Engineers (Corps), to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration.
8. Within 60 days of completion of the work authorized by this permit, the Permittee shall complete the attached "Self-Certification Statement of Compliance" form and submit it to the Corps. In the event that the completed work deviates in any manner from the authorized work, the Permittee shall describe the deviations between the work authorized by this permit and the work as constructed on the "Self-Certification Statement of Compliance" form. The description of any deviations on the "Self-Certification Statement of Compliance" form does not constitute approval of any deviations by the Corps.

Further Information:

1. Congressional Authorities: You have been authorized to undertake the activity described above pursuant to:

(X) Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403).

(X) Section 404 of the Clean Water Act (33 U.S.C. 1344).

2. Limits of this authorization.

a. This permit does not obviate the need to obtain other Federal, State, or local authorization required by law.

b. This permit does not grant any property rights or exclusive privileges.

c. This permit does not authorize any injury to the property or rights of others.

d. This permit does not authorize interference with any existing or proposed Federal project.

3. Limits of Federal Liability. In issuing this permit, the Federal Government does not assume any liability for the following:

a. Damages to the permitted project or uses thereof as a result of other permitted or unpermitted activities or from natural causes.

b. Damages to the permitted project or uses thereof as a result of current or future activities undertaken by or on behalf of the United States in the public interest.

c. Damages to persons, property, or to other permitted or unpermitted activities or structures caused by the activity authorized by this permit.

d. Design or construction deficiencies associated with the permitted work.

e. Damage claims associated with any future modification, suspension, or revocation of this permit.

4. Reliance on Applicant's Data: The determination of this office that issuance of this permit is not contrary to the public interest was made in reliance on the information you provided.

5. Reevaluation of Permit Decision. This office may reevaluate its decision on this permit at any time the circumstances warrant. Circumstances that could require a revaluation include, but are not limited to, the following:

a. You fail to comply with the terms and conditions of this permit.

b. The information provided by you in support of your permit application proves to have been false, incomplete, or inaccurate (See 4 above).

c. Significant new information surfaces which this office did not consider in reaching the original public interest decision.

Such a reevaluation may result in a determination that it is appropriate to use the suspension, modification, and revocation procedures contained in 33 CFR 325.7 or enforcement procedures such as those contained in 33 CFR 326.4 and 326.5. The referenced enforcement procedures provide for the issuance of an administrative order requiring you to comply with the terms and conditions of your permit and for the initiation of legal action where appropriate. You will be required to pay for any corrective measures ordered by this office, and if you fail to comply with such directive, this office may in certain situations (such as those specified in 33 CFR 209.170) accomplish the corrective measures by contract or otherwise and bill you for the cost.

6. Extensions. General Condition 1 establishes a time limit for the completion of the activity authorized by this permit. Unless there are circumstances requiring either a prompt completion of the authorized activity or a reevaluation of the public interest decision, the Corps will normally give favorable consideration to a request for an extension of this time limit.

Your signature below, as permittee, indicates that you accept and agree to comply with the terms and conditions of this permit.

Brett D [illegible] Env. Manager 7-9-18

(PERMITTEE) AND TITLE (DATE)

This permit becomes effective when the Federal official, designated to act for the Secretary of the Army, has signed below.

Janet Post
FOR (DISTRICT COMMANDER)
Colonel Michael S. Brooks
Janet Post, Project Manager
North Branch, Regulatory Division

7-9-18
(DATE)

When the structures or work authorized by this permit are still in existence at the time the property is transferred the terms and conditions of this permit will continue to be binding on the new owner(s) of the property. To validate the transfer of this permit and the associated liabilities associated with compliance with its terms and conditions have the transferee sign and date below.

(TRANSFEREE)

(DATE)

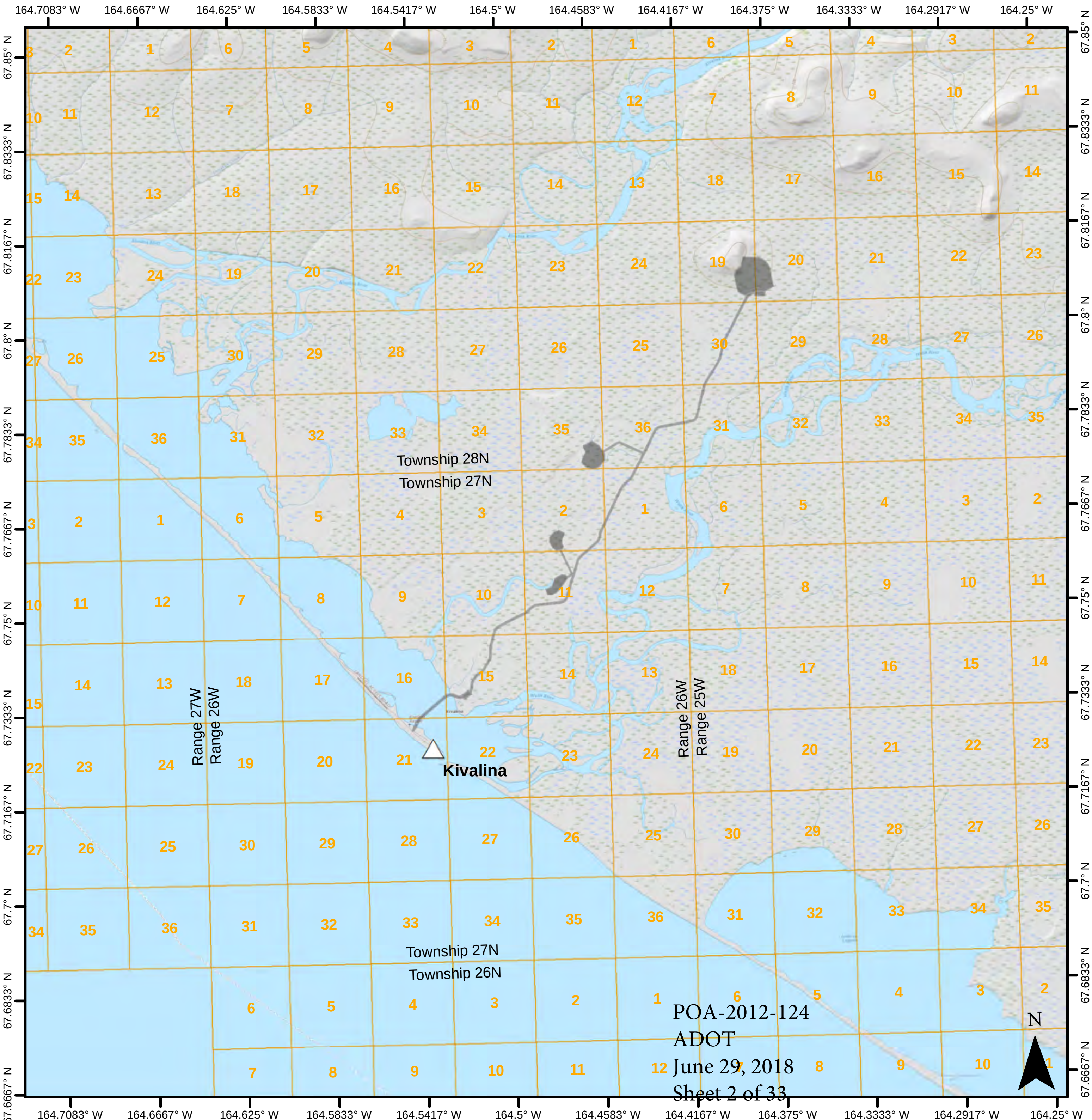
Kivalina Evacuation and School Site Access Road

POA-2012-124

Section 10/404 Permit Application

Detail and Plan View Figures

List of Sheet



Populated Place

Project Area

Public Land Survey Section

Kateel River Meridian

Township 27N, Range 25W, Section 6
Township 27N, Range 26W, Sections 1,2,10,11,15,16,21
Township 28N, Range 25W, Sections 19,20,30,31
Township 28N, Range 26W, Sections 35,36

0 1 2 Miles

Project Vicinity

Applicant: STATE OF ALASKA
Department of Transportation and Public Facilities
2301 Peger Rd. Fairbanks, AK 99709

Kivalina Evacuation and School Site Access Road

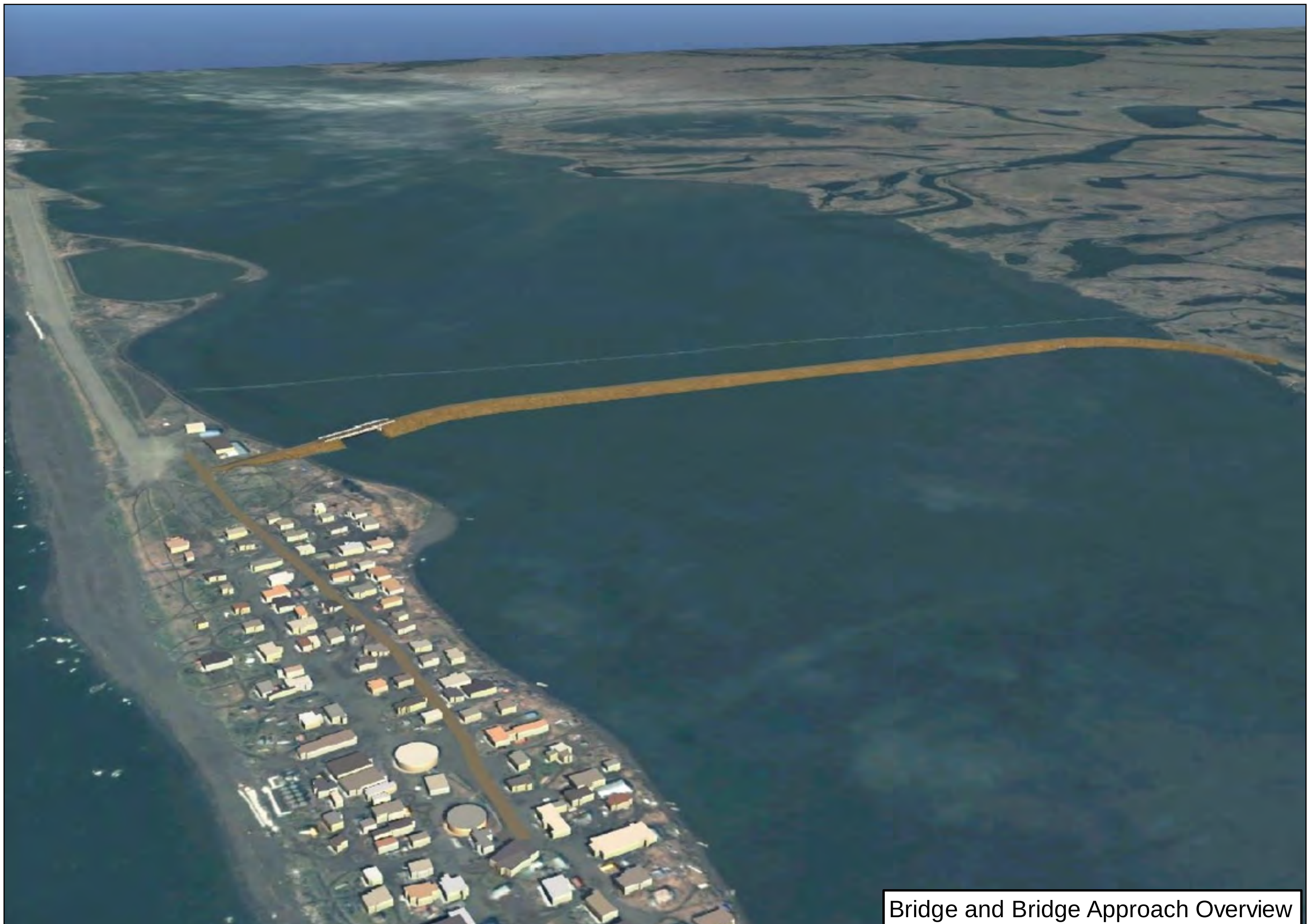
File No.: POA-2012-124

Waterway: Kivalina Lagoon

Proposed Activity: WOUS Fill for Roadway

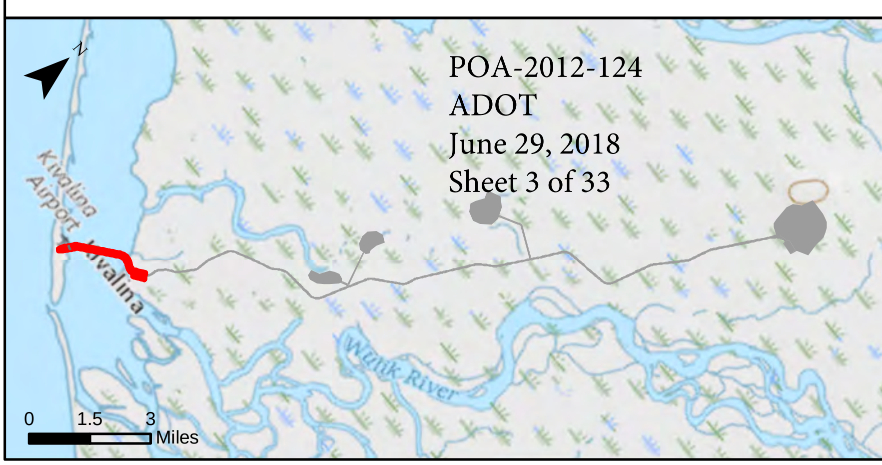
Date: June 15, 2018

Sheet 1 of 32


Bridge and Bridge Approach Overview


Bridge and Bridge Approach From SE


Bridge and Bridge Approach From NW



Bridge and Bridge Approach 3D Render

Applicant: STATE OF ALASKA
Department of Transportation and Public Facilities
2301 Peger Rd. Fairbanks, AK 99709

Kivalina Evacuation and School Site Access Road

File No.: POA-2012-124

Waterway: Kivalina Lagoon

Proposed Activity: WOUS Fill for Roadway

Date: June 15, 2018

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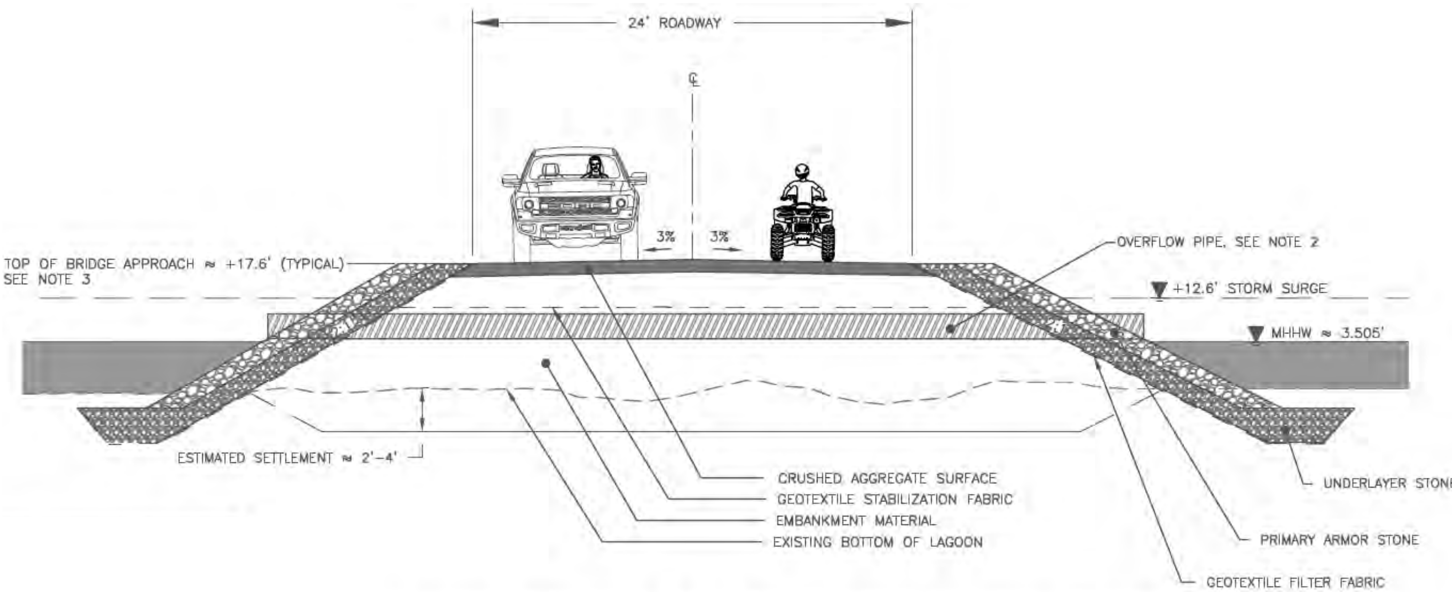

LAGOON CROSSING D: SOLID BRIDGE APPROACH TYPICAL SECTION

NOTES:

1. LAGOON CROSSING D CONSISTS OF SOLID BRIDGE APPROACHES WITH TWO PRIMARY OPENINGS CONSISTING OF A BRIDGE, AND LARGE STRUCTURAL PLATE PIPES. THIS FIGURE DETAILS THE SOLID PORTION OF THE LAGOON CROSSING.
2. OVERFLOW PIPES TO BE PLACED ABOVE MHHW INCREMENTALLY WITHIN THE EMBANKMENT OVER THE LENGTH OF THE BRIDGE APPROACHES.
3. TOP OF BRIDGE APPROACH ELEVATION VARIES FROM APPROX. 17.6-25' TO ACCOMMODATE DRAINAGE STRUCTURES/FEATURES. ELEVATIONS ARE APPROXIMATE AND BASED ON THE NAVD88 VERTICAL DATUM

POA-2012-124
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June 29, 2018
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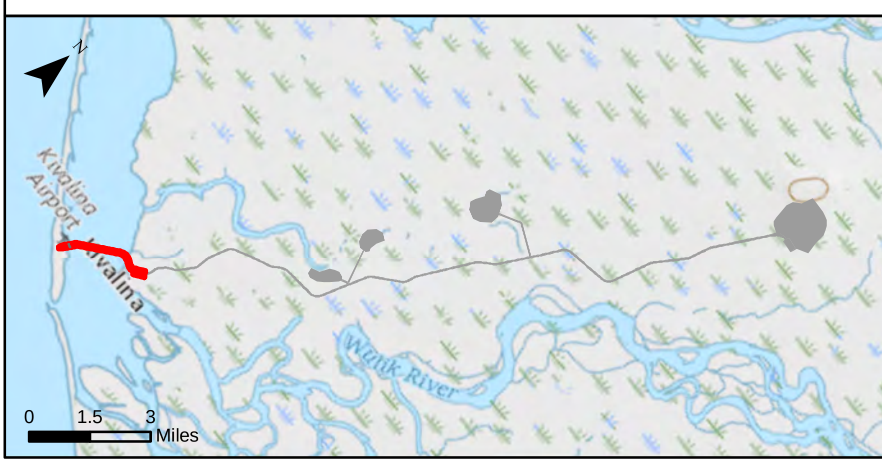

Bridge Approach Detail

Applicant: STATE OF ALASKA
Department of Transportation and Public Facilities
2301 Peger Rd. Fairbanks, AK 99709

Kivalina Evacuation and School Site Access Road

File No.: POA-2012-124

Waterway: Kivalina Lagoon

Proposed Activity: WOUS Fill for Roadway

Date: June 15, 2018

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Single-span steel girder bridge

Approximately 180ft single span bridge over 110ft lagoon channel.
12ft clearance at high water for recreational boats.
8 piles, up to 4ft diameter, placed within bridge approach footprint.
No piles in channel.

Example Bridge:

Grayling Creek Bridge Number 1298

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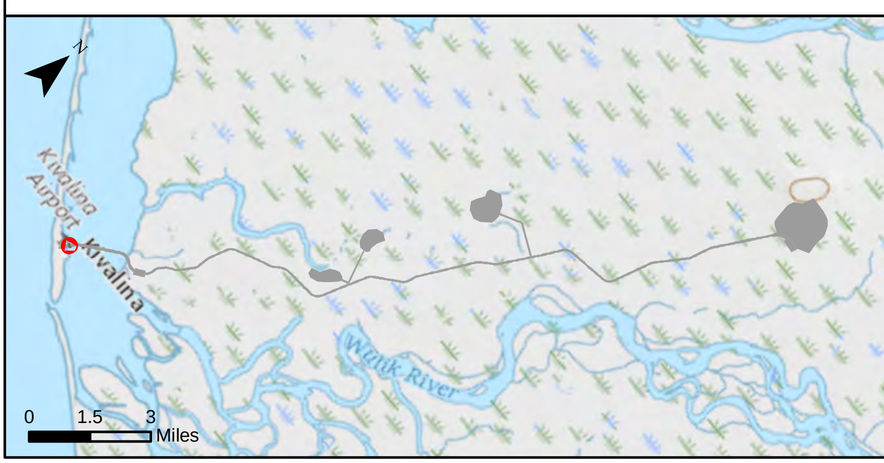

Bridge Specifications

Applicant: STATE OF ALASKA
Department of Transportation and Public Facilities
2301 Peger Rd. Fairbanks, AK 99709

Kivalina Evacuation and School Site Access Road

File No.: POA-2012-124

Waterway: Kivalina Lagoon

Proposed Activity: WOUS Fill for Roadway

Date: June 15, 2018

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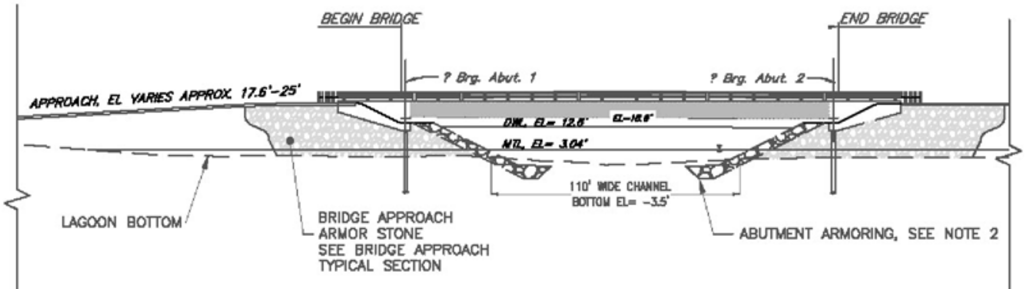
BRIDGE APPROACH AND BRIDGE PROFILE VIEW

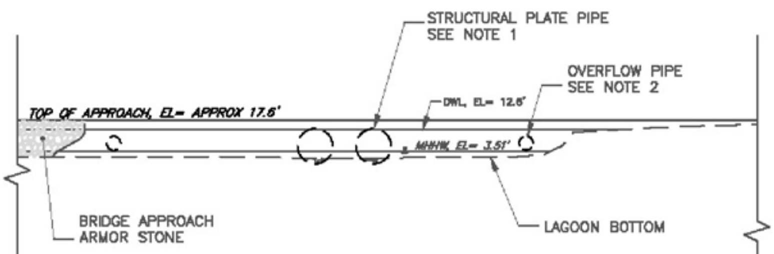
NTS



BRIDGE PROFILE DETAIL

NOTE:

1. BRIDGE TO BE CONSTRUCTED OVER EXISTING 110' WIDE LAGOON CHANNEL, CENTERED APPROXIMATELY 225' EAST OF THE BARRIER ISLAND.
2. BRIDGE ABUTMENTS & FOUNDATION TO CONSIST OF SLOPED EARTHEN EMBANKMENT ARMORED WITH ROCK, OR VERTICAL SHEET PILE WALL, AND BE DESIGNED TO SPAN ENTIRE 110' LAGOON CHANNEL.
3. LOCATION AND DIMENSIONS OF ROCK ARMORING ALONG ABUTMENTS ARE APPROXIMATE, AND WILL BE DESIGNED TO CLOSELY MAINTAIN NATURAL CHANNEL DIMENSIONS TO THE FURTHEST EXTENT PRACTICABLE.
4. ELEVATIONS ARE APPROXIMATE AND BASED ON NAVD88 VERTICAL DATUM



BRIDGE APPROACH CULVERT DETAIL

NOTE:

1. LARGE CULVERT(S) TO BE LOCATED ADJACENT EAST END OF SOLID BRIDGE APPROACH. PIPE INVERTS TO BE RECESSED BELOW BOTTOM OF LAGOON AND FILLED WITH 2'-4' THICK ROCK SUBSTRATE.
2. OVERFLOW PIPE(S) INVERTS TO BE PLACED ABOVE MHHW AND SPACED INCREMENTALLY OVER LENGTH OF SOLID BRIDGE APPROACH TO PROVIDE CONVEYANCE DURING HIGH WATER EVENTS.

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June 29, 2018
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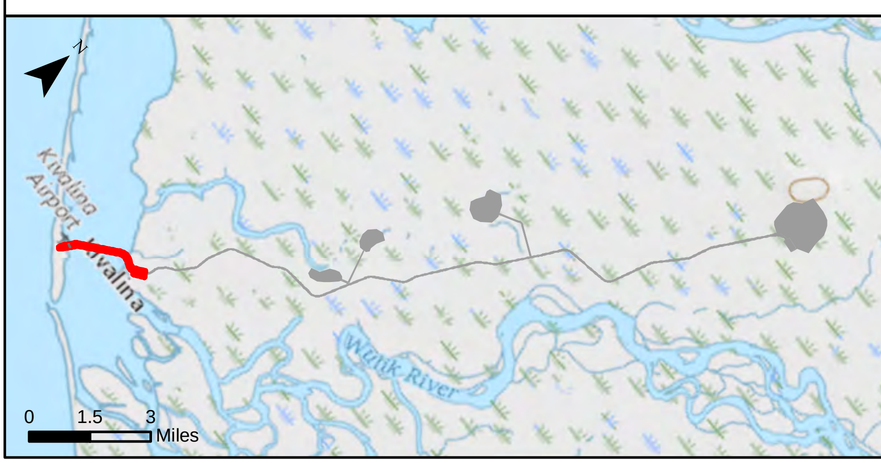

Bridge and Bridge Approach Profile

Applicant: STATE OF ALASKA
Department of Transportation and Public Facilities
2301 Peger Rd. Fairbanks, AK 99709

Kivalina Evacuation and School Site Access Road

File No.: POA-2012-124

Waterway: Kivalina Lagoon

Proposed Activity: WOUS Fill for Roadway

Date: June 15, 2018

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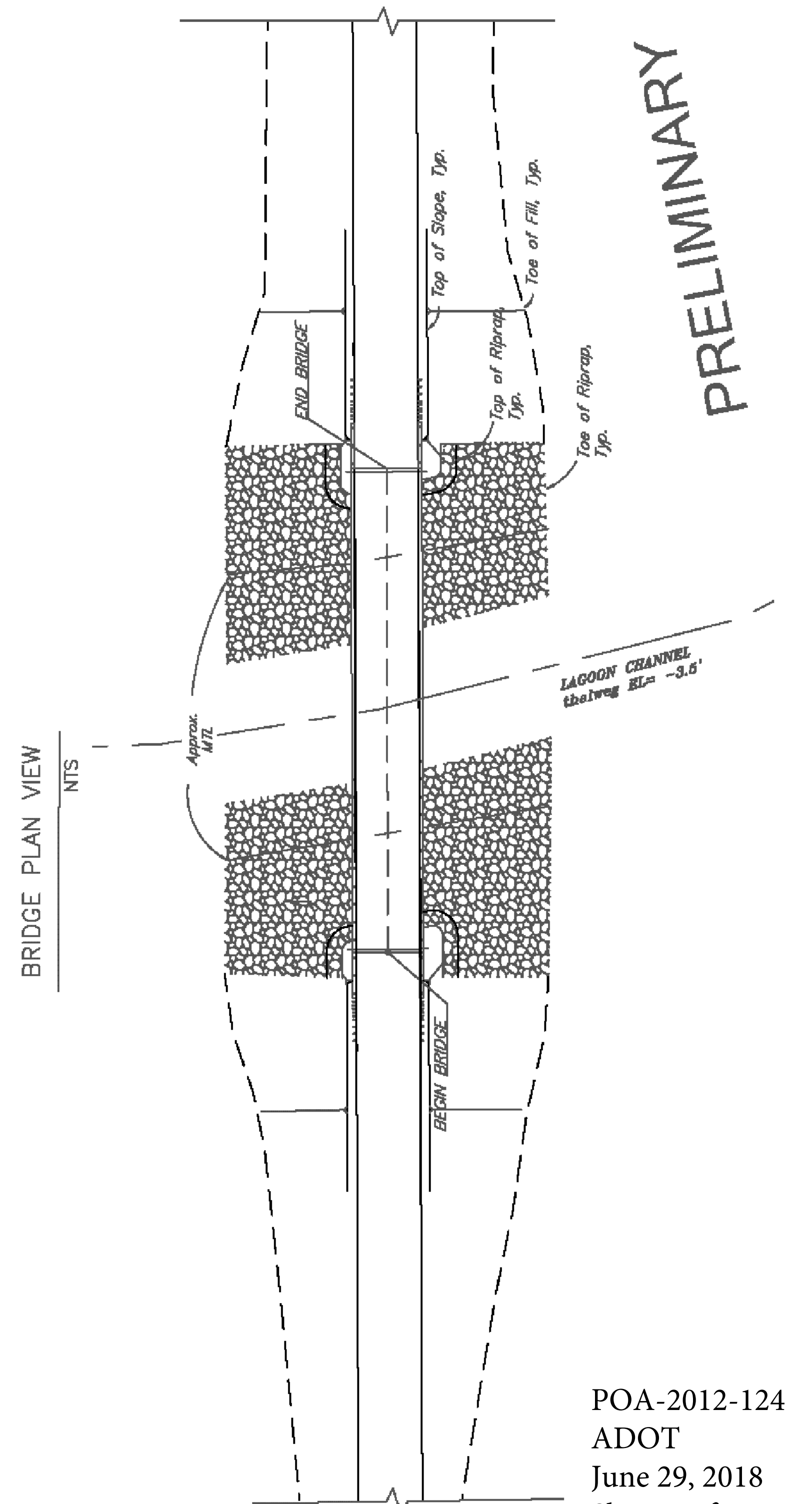

POA-2012-124
ADOT
June 29, 2018
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Bridge Plan Detail

Applicant: STATE OF ALASKA
Department of Transportation and Public Facilities
2301 Peger Rd. Fairbanks, AK 99709

Kivalina Evacuation and School Site Access Road

File No.: POA-2012-124

Waterway: Kivalina Lagoon

Proposed Activity: WOUS Fill for Roadway

Date: June 15, 2018

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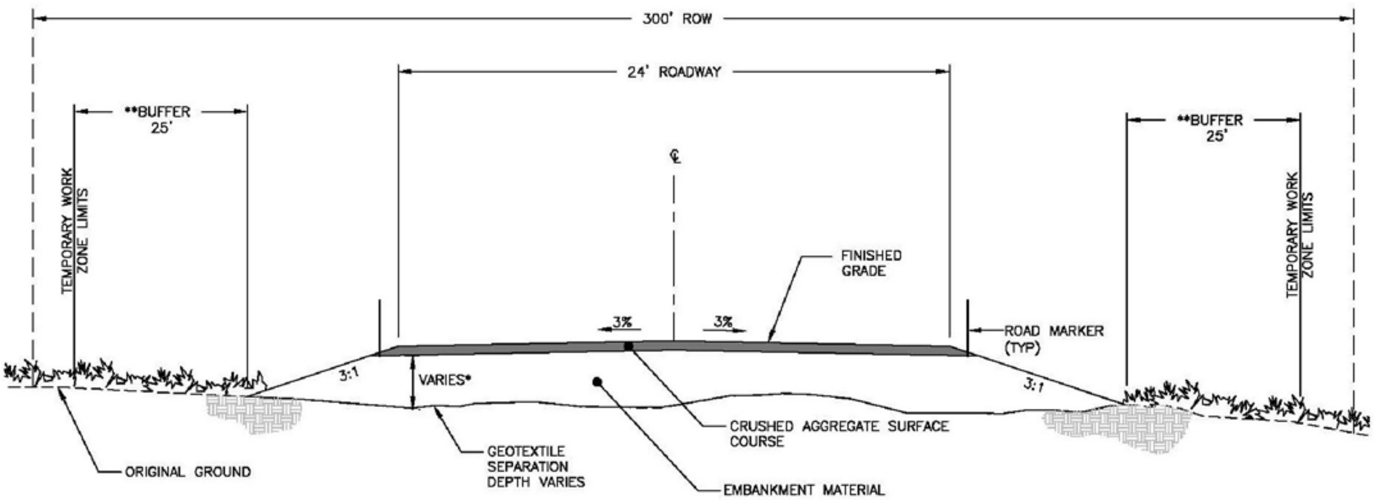

MAINLAND ROAD: TYPICAL SECTION
NOT TO SCALE

* EMBANKMENT HEIGHT WILL AVERAGE BETWEEN 5 TO 8 FEET. MINIMUM EMBANKMENT HEIGHT OF 6' MAY BE USED IN AREAS OF POTENTIAL SNOW DRIFTING AND IN AREAS WHERE THERE IS CONCERN OF THAWING UNDERLYING PERMAFROST.

**BUFFER ZONE EXTENDS OUTWARD 25' FROM THE EMBANKMENT TOE. THIS AREA WILL BE USED DURING CONSTRUCTION FOR TEMPORARY EQUIPMENT ACCESS AND WILL ALSO SERVE AS A NATURAL VEGETATIVE SCREEN.

POA-2012-124
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June 29, 2018
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Roadway Detail

Applicant: STATE OF ALASKA
Department of Transportation and Public Facilities
2301 Peger Rd. Fairbanks, AK 99709

Kivalina Evacuation and School Site Access Road

File No.: POA-2012-124

Waterway: Kivalina Lagoon

Proposed Activity: WOUS Fill for Roadway

Date: June 15, 2018

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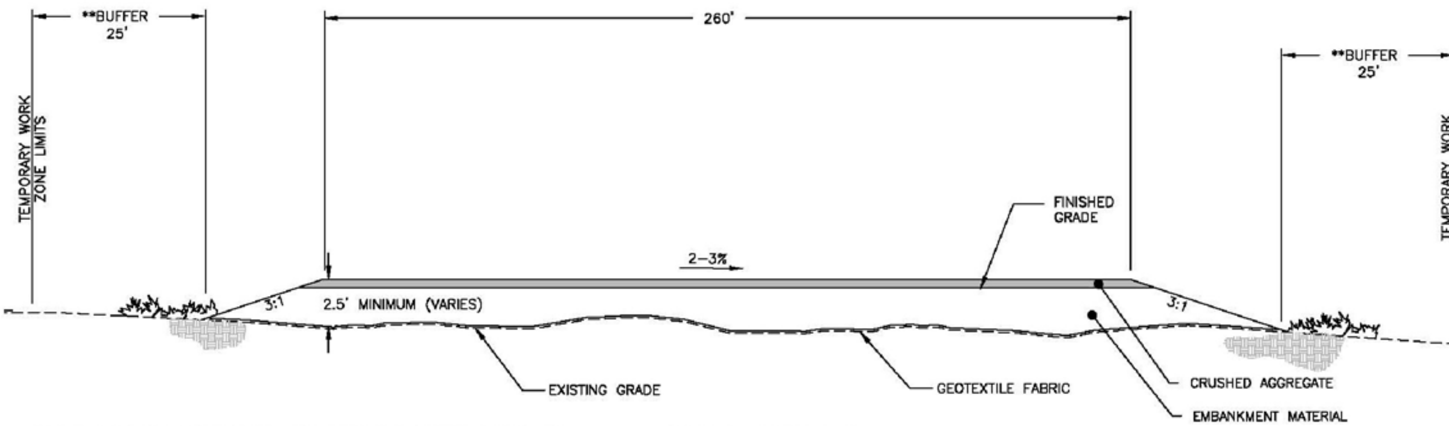
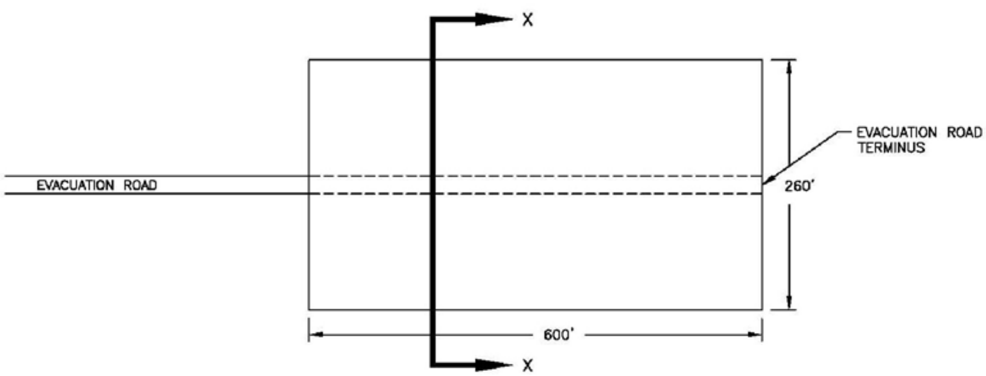


**BUFFER ZONE EXTENDS OUTWARD 25' FROM THE EMBANKMENT TOE. THIS AREA WILL BE USED DURING CONSTRUCTION FOR TEMPORARY EQUIPMENT ACCESS AND WILL ALSO SERVE AS A NATURAL VEGETATIVE SCREEN.

TYPICAL SECTION
SECTION X–X'
NOT TO SCALE



PLAN
NOT TO SCALE

POA-2012-124
ADOT
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Terminus Detail

Applicant: STATE OF ALASKA
Department of Transportation and Public Facilities
2301 Peger Rd. Fairbanks, AK 99709

Kivalina Evacuation and School Site Access Road

File No.: POA-2012-124

Waterway: Kivalina Lagoon

Proposed Activity: WOUS Fill for Roadway

Date: June 15, 2018

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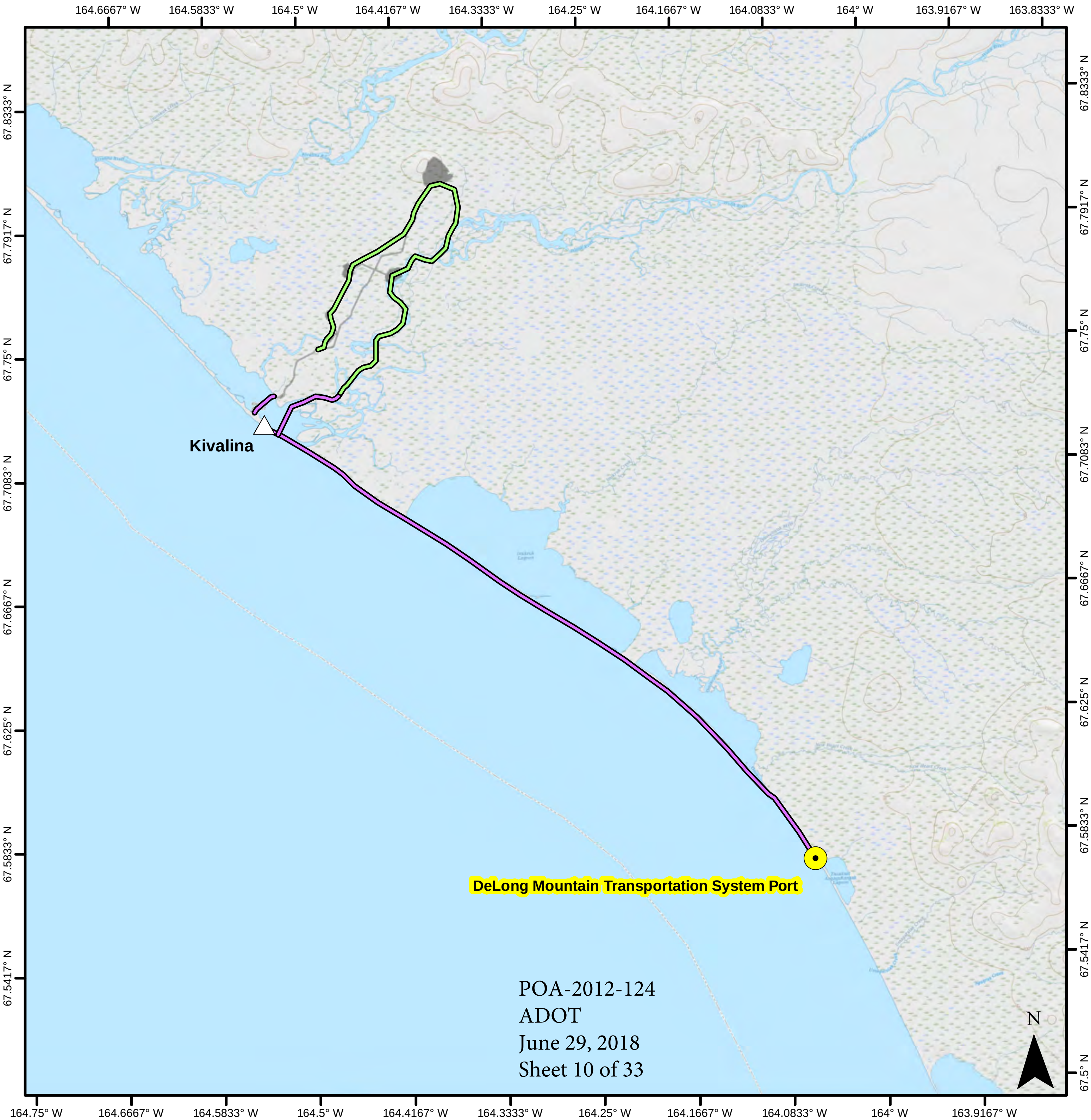

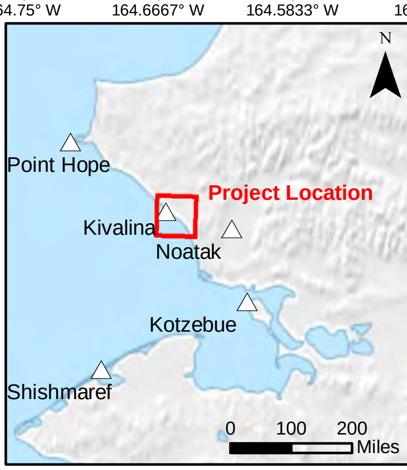

Legend
Populated Place
Facility
Pontential Ice Road (Section 10)
Pontential Ice Road (Non-jurisdictional)
Project Area

0 2 4 Miles

Ice Road Plan View

Applicant: STATE OF ALASKA
Department of Transportation and Public Facilities
2301 Peger Rd. Fairbanks, AK 99709

Kivalina Evacuation and School Site Access Road

File No.: POA-2012-124

Waterway: Kivalina Lagoon

Proposed Activity: WOUS Fill for Roadway

Date: June 15, 2018

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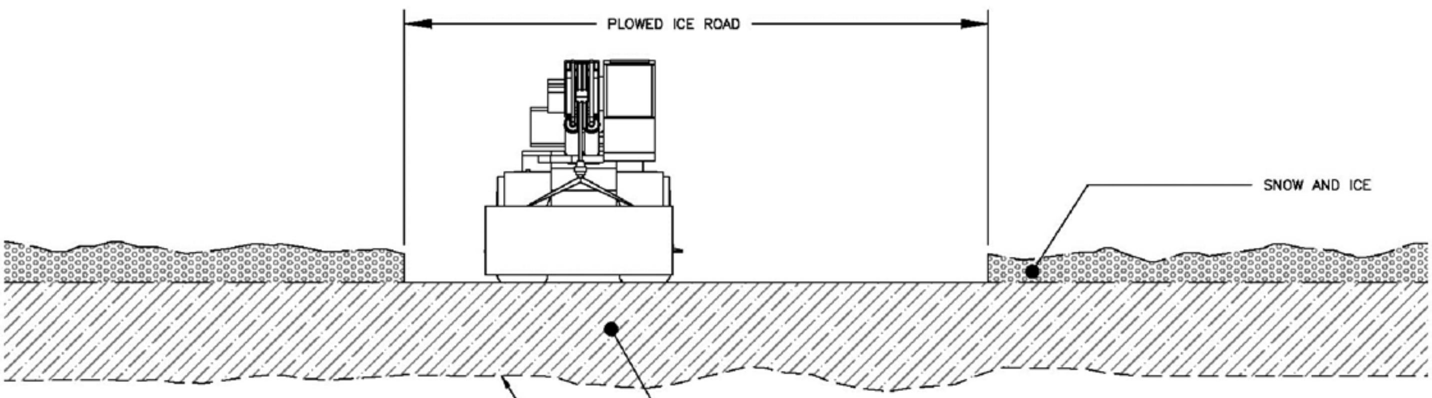

ICE ROAD TYPICAL SECTION

NOTES:

1. ICE ROAD CONSISTS OF PLOWED SURFACE OF BOTTOM-FAST ICE (ICE FROZEN TO LAGOON/OCEAN BOTTOM)
2. BERMS WILL BE IN PLACE IF PLOWING OF ICE SURFACE IS NECESSARY
3. NO FILL PLACED

POA-2012-124
ADOT
June 29, 2018
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Ice Road Detail

Applicant: STATE OF ALASKA
Department of Transportation and Public Facilities
2301 Peger Rd. Fairbanks, AK 99709

Kivalina Evacuation and School Site Access Road

File No.: POA-2012-124

Waterway: Kivalina Lagoon

Proposed Activity: WOUS Fill for Roadway

Date: June 15, 2018

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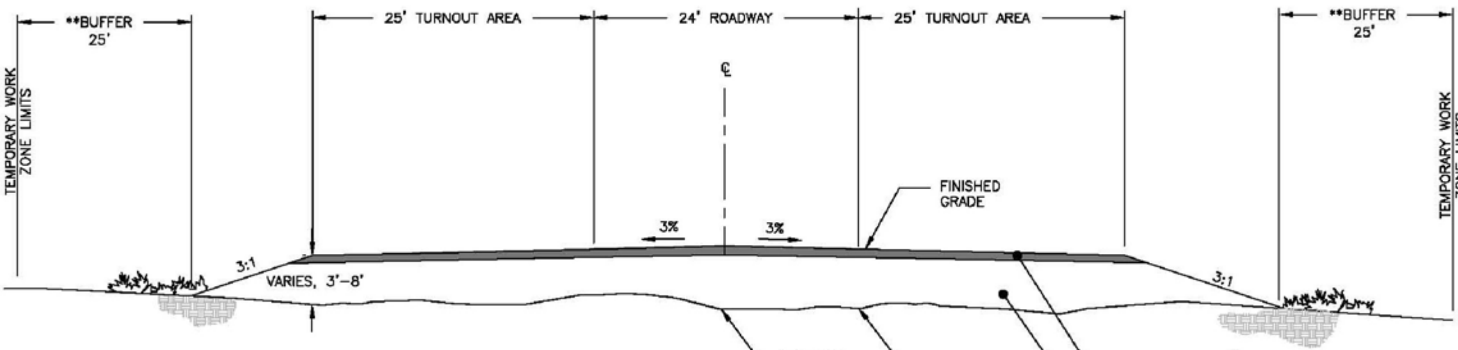
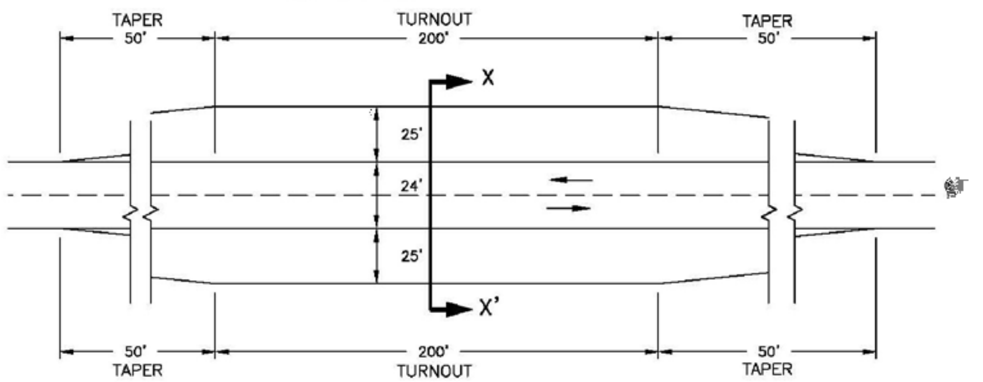


**BUFFER ZONE EXTENDS OUTWARD 25' FROM THE EMBANKMENT TOE. THIS AREA WILL BE USED DURING CONSTRUCTION FOR TEMPORARY EQUIPMENT ACCESS AND WILL ALSO SERVE AS A NATURAL VEGETATIVE SCREEN.

TYPICAL SECTION
SECTION X–X'
NOT TO SCALE



NOTE:
TURNOUT LOCATIONS AND NUMBER VARY.

PLAN
NOT TO SCALE

POA-2012-124
ADOT
June 29, 2018
Sheet 12 of 33

Turnout Detail

Applicant: STATE OF ALASKA
Department of Transportation and Public Facilities
2301 Peger Rd. Fairbanks, AK 99709

Kivalina Evacuation and School Site Access Road

File No.: POA-2012-124

Waterway: Kivalina Lagoon

Proposed Activity: WOUS Fill for Roadway

Date: June 15, 2018

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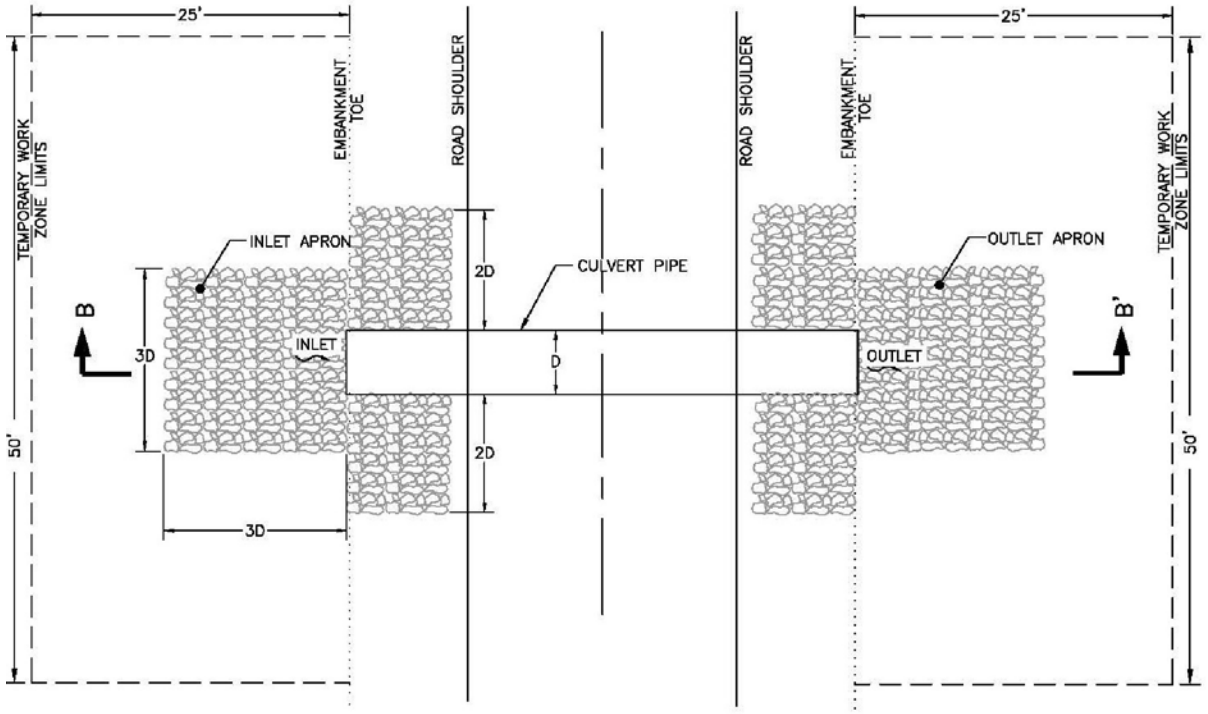
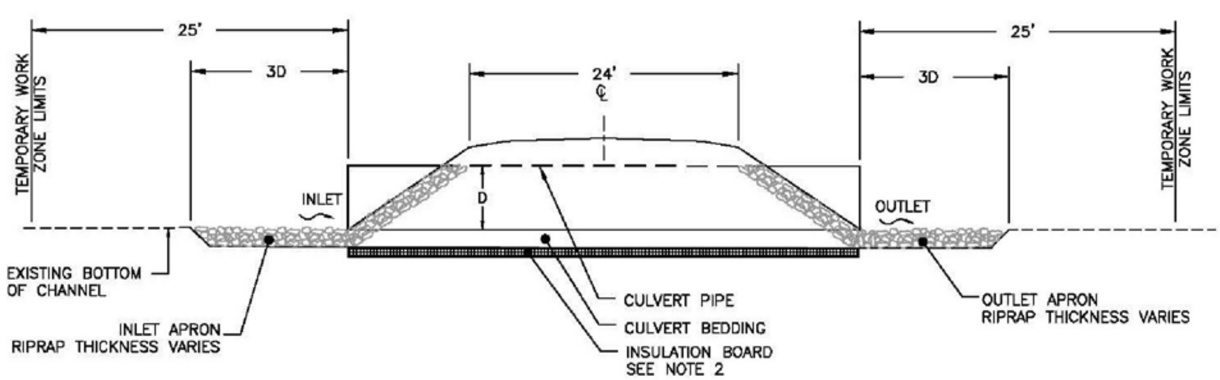


TYPICAL CULVERT APRON DETAIL
NOT TO SCALE



SECTION B–B'
NOT TO SCALE

NOTES:

1. THIS TYPICAL SECTION IS FOR CONVEYANCE STRUCTURES NOT INTENDED FOR FISH PASSAGE. LOCATIONS AND SIZE VARY.
2. INSULATION BOARD TO BE USED IN AREAS OF PERMAFROST
3. INLET, OUTLET, AND FORESLOPE RIPRAP TO BE INSTALLED IN AREAS WHERE EROSION AT CULVERT INVERTS IS A CONCERN. DIMENSIONS ARE APPROXIMATE.
4. FOR ENHANCED HYDRAULIC DESIGN CULVERTS, INVERTS TO BE RECESSED BELOW EXISTING BOTTOM OF CHANNEL TO PROMOTE FISH PASSAGE.

POA-2012-124
ADOT
June 29, 2018
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Non-Fish Passage Culvert Detail

Applicant: STATE OF ALASKA
Department of Transportation and Public Facilities
2301 Peger Rd. Fairbanks, AK 99709

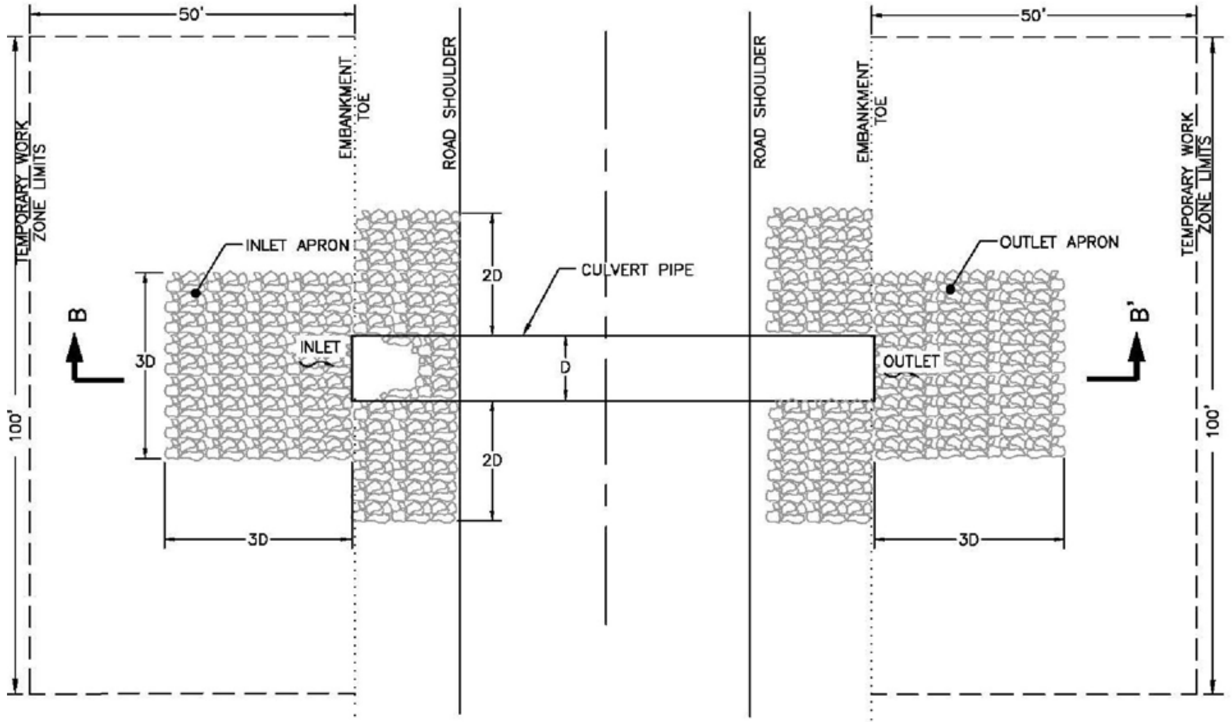
Kivalina Evacuation and School Site Access Road

File No.: POA-2012-124

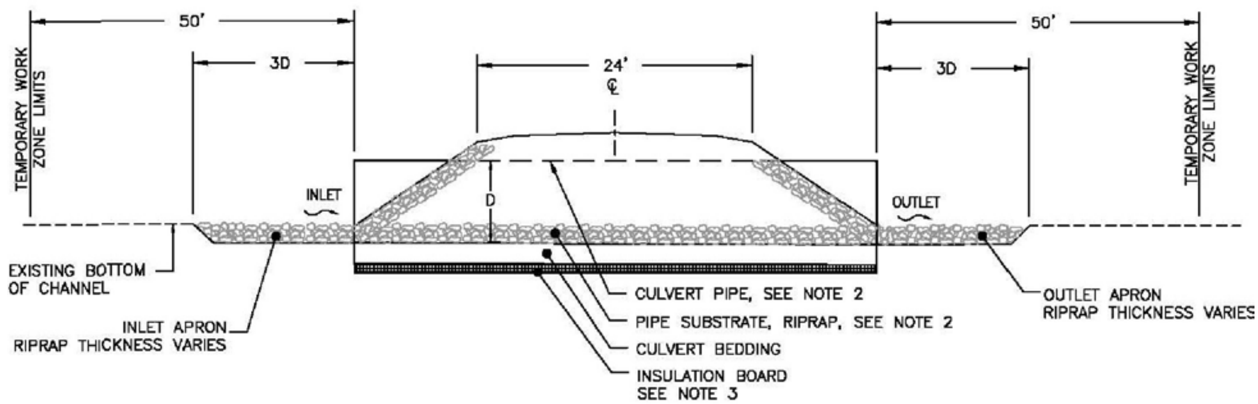
Waterway: Kivalina Lagoon

Proposed Activity: WOUS Fill for Roadway

Date: June 15, 2018 | Sheet 13 of 32



TYPICAL FISH PASSAGE CULVERT APRON DETAIL
NOT TO SCALE



SECTION B–B'
NOT TO SCALE

NOTES:

1. THIS TYPICAL SECTION IS FOR CONVEYANCE STRUCTURES INTENDED FOR FISH PASSAGE. LOCATIONS AND SIZE VARY.
2. CULVERT INVERTS ARE DEPRESSED BELOW THE BOTTOM OF THE EXISTING CHANNEL, AND FILLED WITH RIPRAP SUBSTRATE THROUGH THE LENGTH OF CULVERT TO PROVIDE FISH PASSAGE. THICKNESS VARIES.
3. INSULATION BOARD TO BE USED IN AREAS OF PERMAFROST.
4. INLET, OUTLET, AND FORESLOPE RIPRAP DIMENSIONS SHOWN ARE APPROXIMATE.

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ADOT
June 29, 2018
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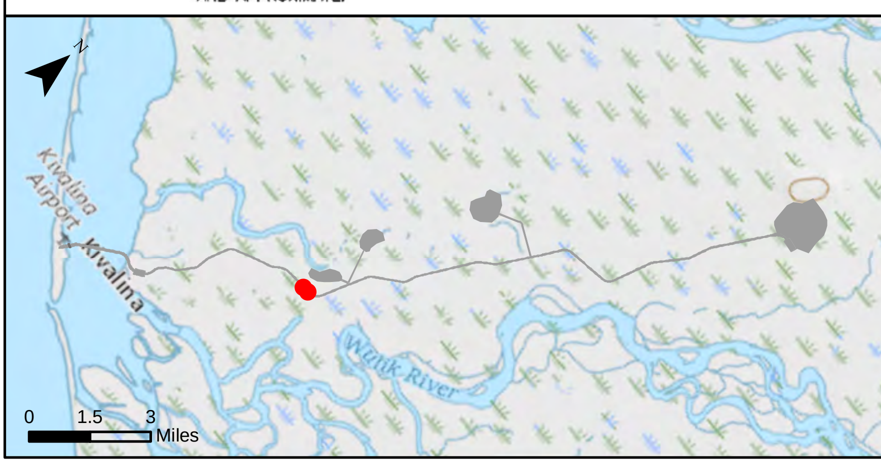


Fish Passage Culvert Detail

Applicant: STATE OF ALASKA
Department of Transportation and Public Facilities
2301 Peger Rd. Fairbanks, AK 99709

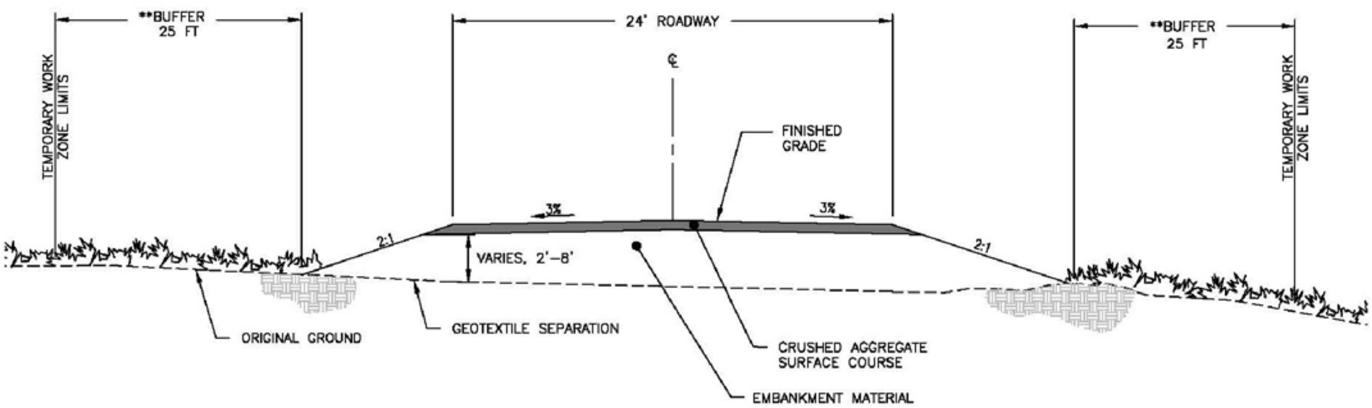
Kivalina Evacuation and School Site Access Road

File No.: POA-2012-124

Waterway: Kivalina Lagoon

Proposed Activity: WOUS Fill for Roadway

Date: June 15, 2018 | Sheet 14 of 32



MATERIAL SOURCE SPUR ROAD TYPICAL SECTION

NOT TO SCALE

**BUFFER ZONE EXTENDS OUTWARD 25' FROM THE EMBANKMENT TOE. THIS AREA WILL BE USED DURING CONSTRUCTION FOR TEMPORARY EQUIPMENT ACCESS AND WILL ALSO SERVE AS A NATURAL VEGETATIVE SCREEN.

POA-2012-124
ADOT
June 29, 2018
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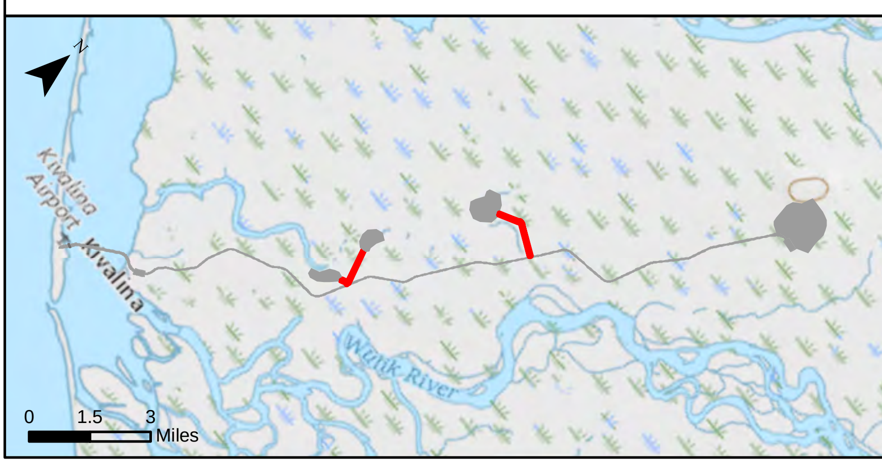


Spur Road Detail

Applicant: STATE OF ALASKA
Department of Transportation and Public Facilities
2301 Peger Rd. Fairbanks, AK 99709

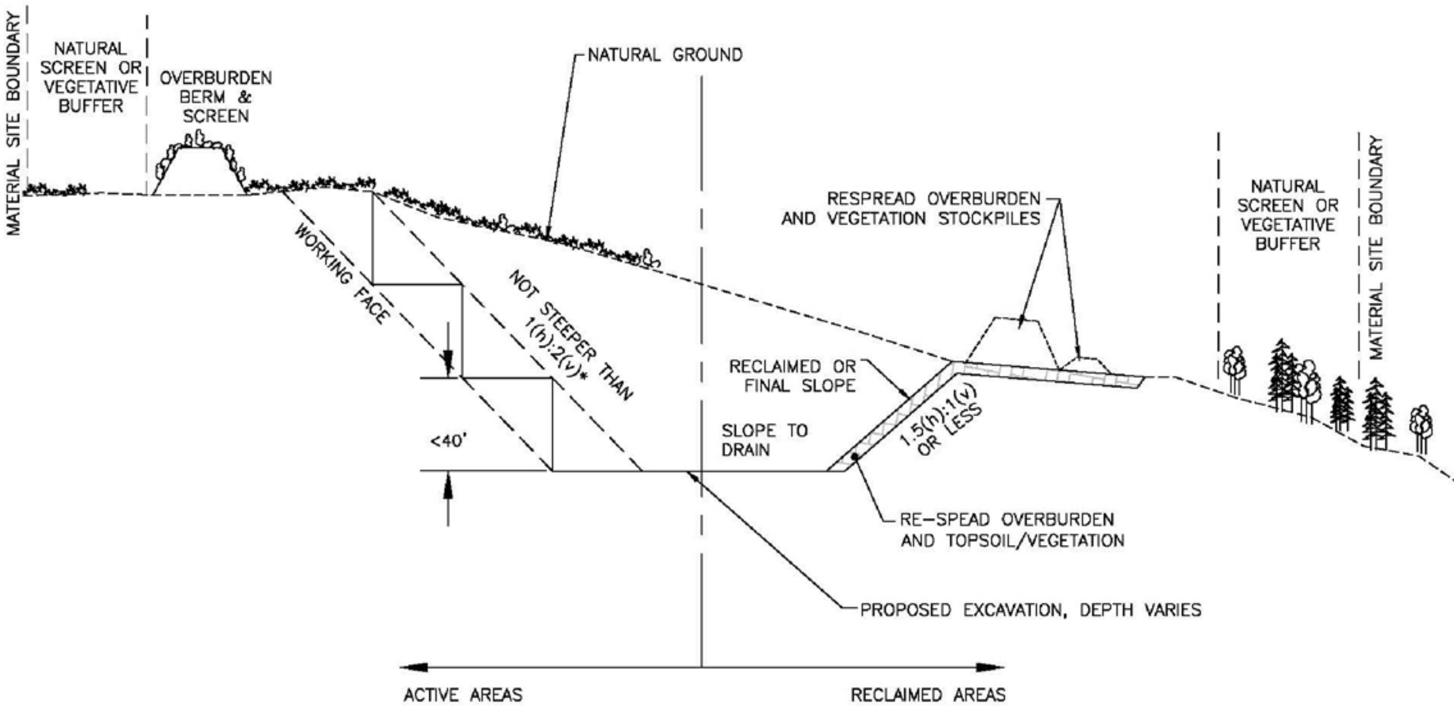
Kivalina Evacuation and School Site Access Road

File No.: POA-2012-124

Waterway: Kivalina Lagoon

Proposed Activity: WOUS Fill for Roadway

Date: June 15, 2018 | Sheet 15 of 32



TYPICAL MINING/REC SECTION FOR K-HILL SITE
NOT TO SCALE

* MAXIMUM SLOPE ANGLE DEPENDS ON SITE-SPECIFIC PARAMETERS AND WILL BE DETERMINED BY THE CONTRACTOR.

**PRIMARY MINING METHOD WITHIN UPLANDS QUARRY SITE WOULD INVOLVE BLASTING AND RIPPING OF ROCK AND CONSOLIDATED MATERIAL.

PRELIMINARY

POA-2012-124
ADOT
June 29, 2018
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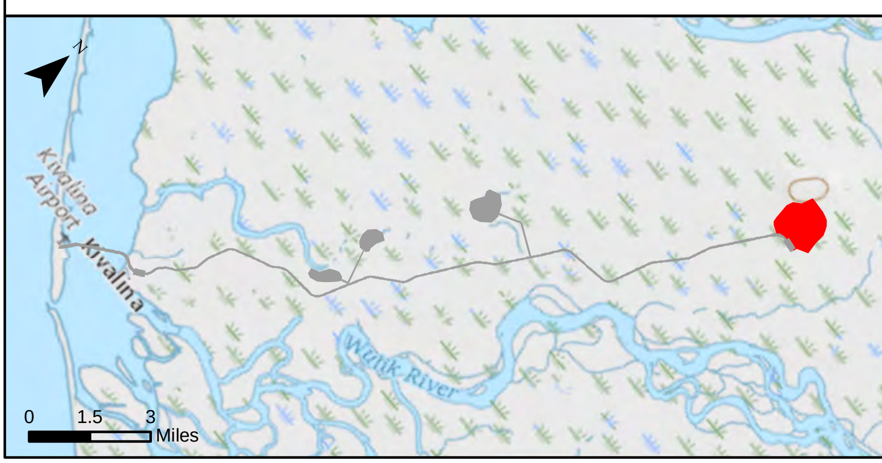

K-Hill Material Site Detail

Applicant: STATE OF ALASKA
Department of Transportation and Public Facilities
2301 Peger Rd. Fairbanks, AK 99709

Kivalina Evacuation and School Site Access Road

File No.: POA-2012-124

Waterway: Kivalina Lagoon

Proposed Activity: WOUS Fill for Roadway

Date: June 15, 2018

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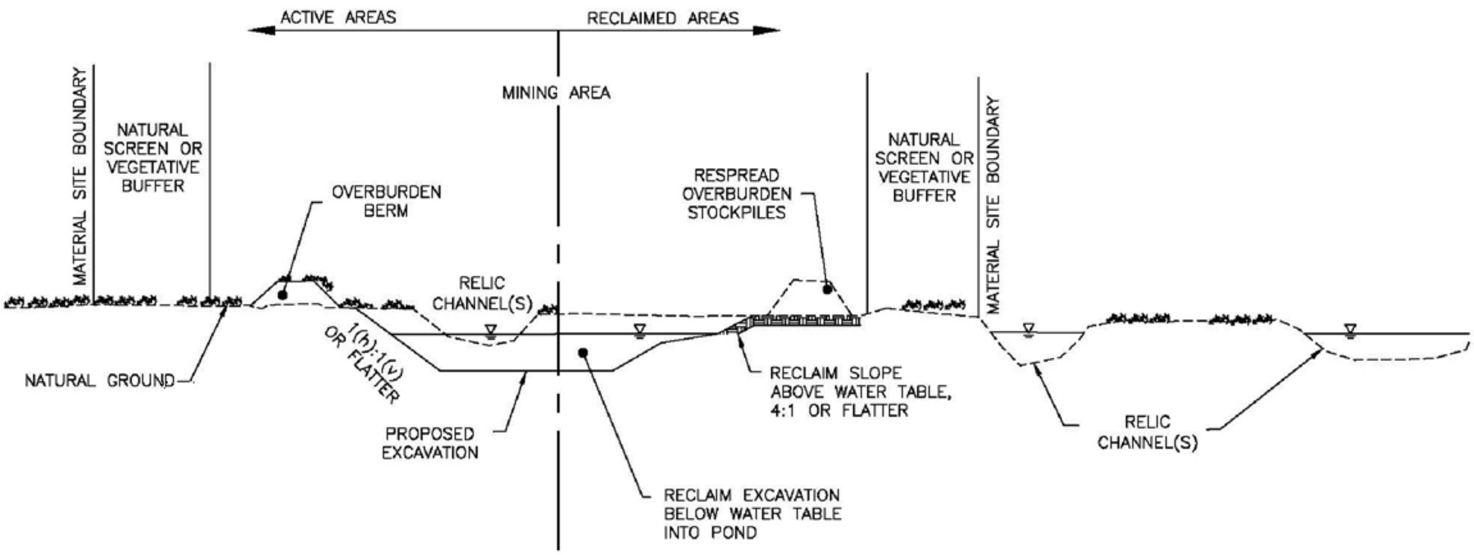

TYPICAL MINING/REC SECTION: WULIK RELIC CHANNEL SOURCES 1 & 2
NOT TO SCALE

NOTES:
1. MINING ACTIVITIES TO OCCUR WITHIN AND ADJACENT TO RELIC CHANNEL(S) ABOVE AND BELOW THE WATER TABLE.

2. MINED AREAS TO BE RECLAIMED INTO DEEP WETLAND PONDS TO IMPROVE FISH OVERWINTERING HABITAT. RECLAIMED PONDS MAY BE CONNECTED TO EXISTING RELIC CHANNELS TO PROVIDE POTENTIAL OVERWINTERING HABITAT FOR JUVENILE FISH.

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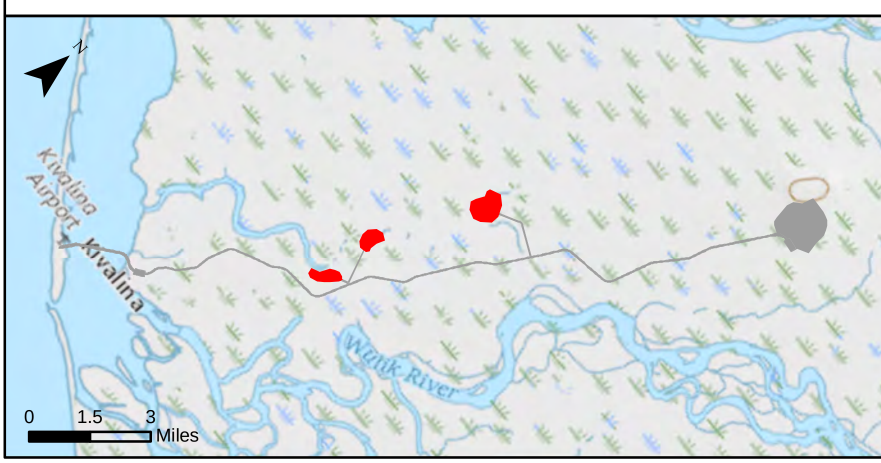

Wulik Relic Channel Material Site Detail

Applicant: STATE OF ALASKA
Department of Transportation and Public Facilities
2301 Peger Rd. Fairbanks, AK 99709

Kivalina Evacuation and School Site Access Road

File No.: POA-2012-124

Waterway: Kivalina Lagoon

Proposed Activity: WOUS Fill for Roadway

Date: June 15, 2018

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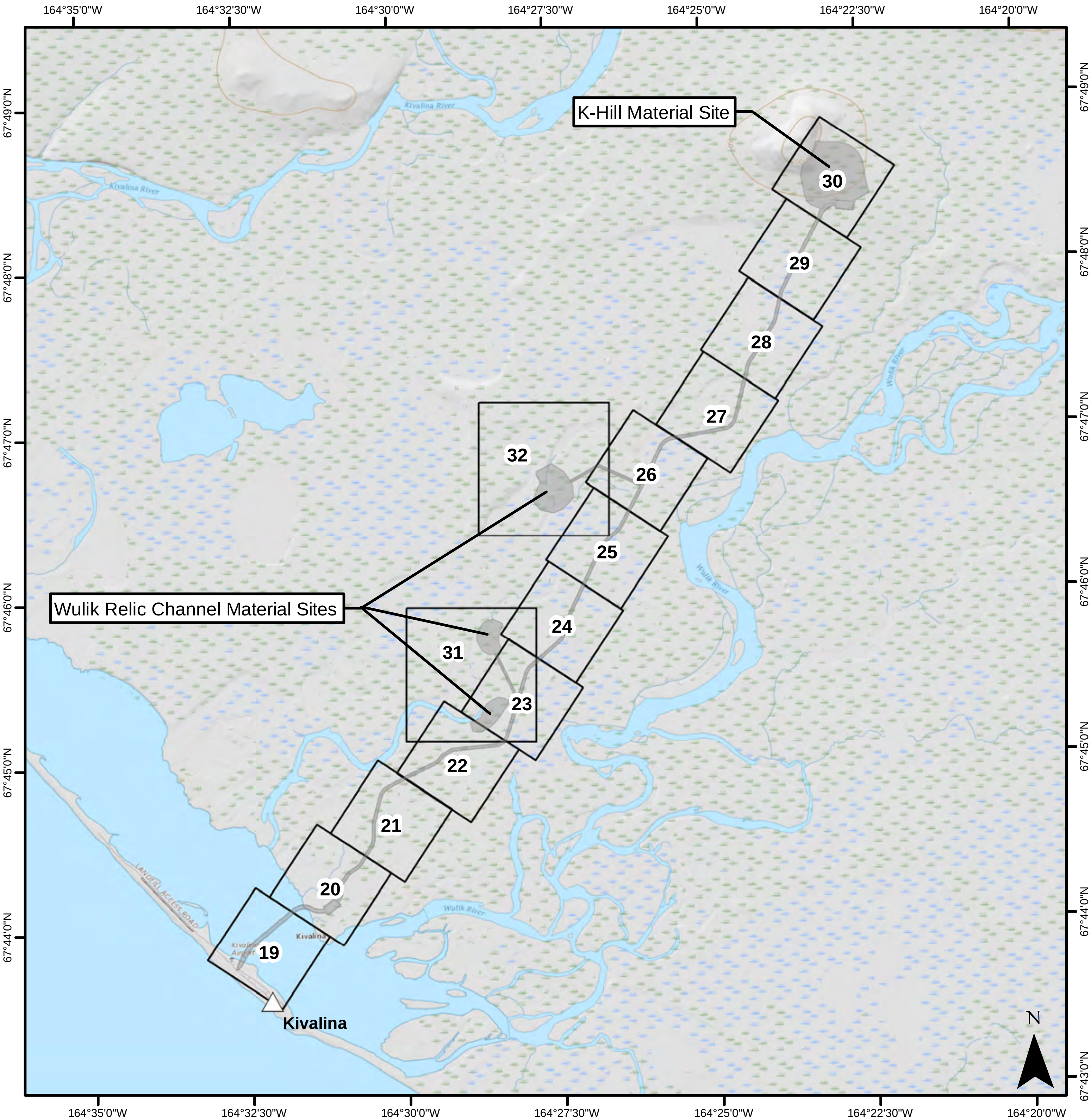

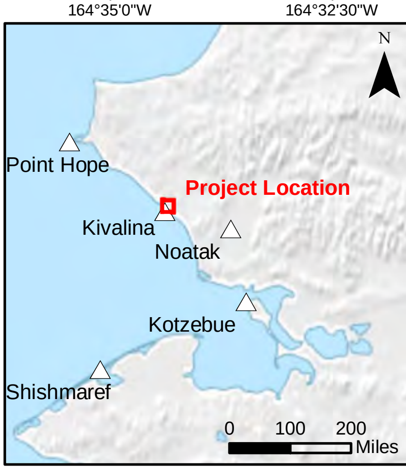

Populated Place

Project Area

Sheet Index

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ADOT
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0 0.5 1 Miles

Plan View Index

Applicant: STATE OF ALASKA
Department of Transportation and Public Facilities
2301 Peger Rd. Fairbanks, AK 99709

Kivalina Evacuation and School Site Access Road

File No.: POA-2012-124

Waterway: Kivalina Lagoon

Proposed Activity: WOUS Fill for Roadway

Date: June 15, 2018

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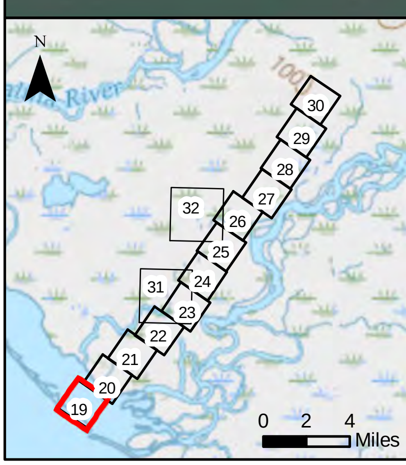

Culvert Location

Road Centerline

Impact Type

Roadway & Bridge Approach Cut/Fill

Material Site Cut/Fill

Work Area

Wetland Mapping

Wetland

Water

Upland

0 400 800 Feet

Plan View

Applicant: STATE OF ALASKA
Department of Transportation and Public Facilities
2301 Peger Rd. Fairbanks, AK 99709

Kivalina Evacuation and School Site Access Road

File No.: POA-2012-124

Waterway: Kivalina Lagoon

Proposed Activity: WOUS Fill for Roadway

Date: June 15, 2018

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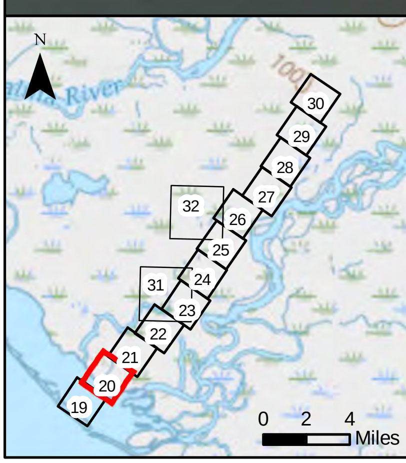

Culvert Location

Road Centerline

Impact Type

Roadway & Bridge Approach Cut/Fill

Material Site Cut/Fill

Work Area

Wetland Mapping

Wetland

Water

Upland

0 400 800 Feet

Plan View

Applicant: STATE OF ALASKA
Department of Transportation and Public Facilities
2301 Peger Rd. Fairbanks, AK 99709

Kivalina Evacuation and School Site Access Road

File No.: POA-2012-124

Waterway: Kivalina Lagoon

Proposed Activity: WOUS Fill for Roadway

Date: June 15, 2018

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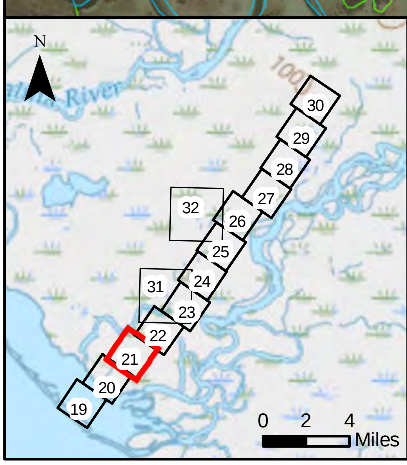

Culvert Location

Road Centerline

Impact Type

Roadway & Bridge Approach Cut/Fill

Material Site Cut/Fill

Work Area

Wetland Mapping

Wetland

Water

Upland

0 400 800 Feet

Plan View

Applicant: STATE OF ALASKA
Department of Transportation and Public Facilities
2301 Peger Rd. Fairbanks, AK 99709

Kivalina Evacuation and School Site Access Road

File No.: POA-2012-124

Waterway: Kivalina Lagoon

Proposed Activity: WOUS Fill for Roadway

Date: June 15, 2018

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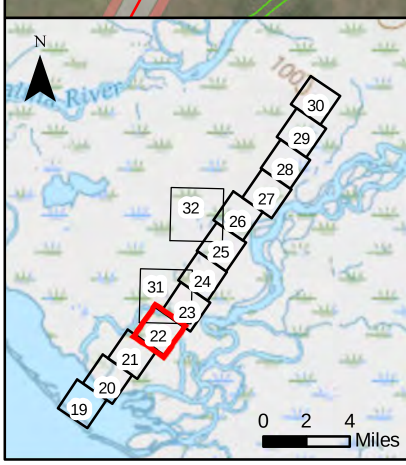

Culvert Location

Road Centerline

Impact Type

Roadway & Bridge Approach Cut/Fill

Material Site Cut/Fill

Work Area

Wetland Mapping

Wetland

Water

Upland

POA-2012-124
ADOT
June 29, 2018
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0 400 800
Feet

Plan View

Applicant: STATE OF ALASKA
Department of Transportation and Public Facilities
2301 Peger Rd. Fairbanks, AK 99709

Kivalina Evacuation and School Site Access Road

File No.: POA-2012-124

Waterway: Kivalina Lagoon

Proposed Activity: WOUS Fill for Roadway

Date: June 15, 2018

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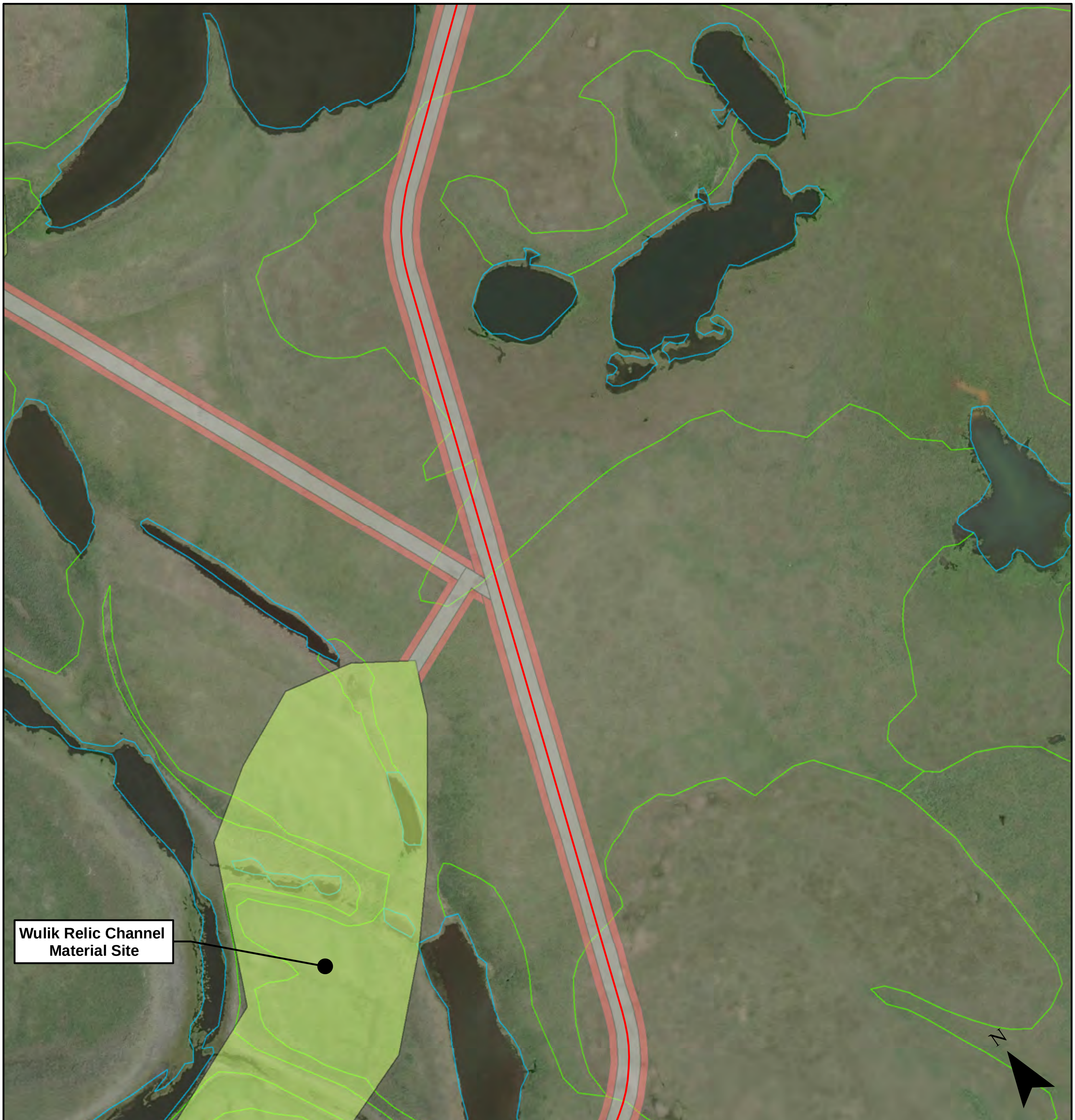

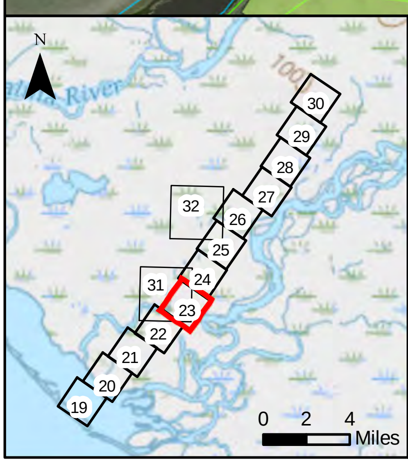

Culvert Location

Road Centerline

Impact Type

Roadway & Bridge Approach Cut/Fill

Material Site Cut/Fill

Work Area

Wetland Mapping

Wetland

Water

Upland

POA-2012-124
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June 29, 2018
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0 400 800 Feet

Plan View

Applicant: STATE OF ALASKA
Department of Transportation and Public Facilities
2301 Peger Rd. Fairbanks, AK 99709

Kivalina Evacuation and School Site Access Road

File No.: POA-2012-124

Waterway: Kivalina Lagoon

Proposed Activity: WOUS Fill for Roadway

Date: June 15, 2018

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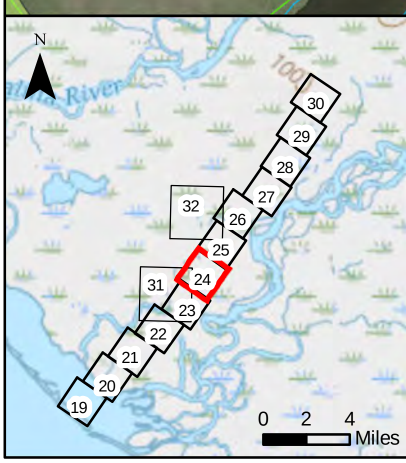

Culvert Location

Road Centerline

Impact Type

Roadway & Bridge Approach Cut/Fill

Material Site Cut/Fill

Work Area

Wetland Mapping

Wetland

Water

Upland

POA-2012-124
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0 400 800 Feet

Plan View

Applicant: STATE OF ALASKA
Department of Transportation and Public Facilities
2301 Peger Rd. Fairbanks, AK 99709

Kivalina Evacuation and School Site Access Road

File No.: POA-2012-124

Waterway: Kivalina Lagoon

Proposed Activity: WOUS Fill for Roadway

Date: June 15, 2018

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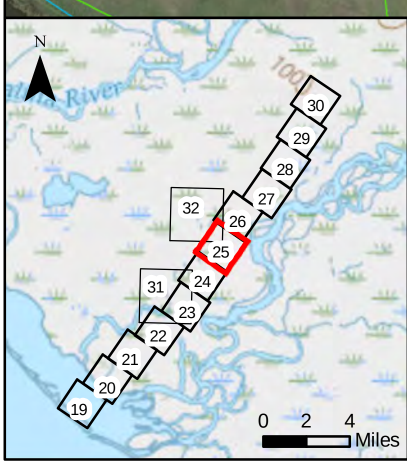

Culvert Location

Road Centerline

Impact Type

Roadway & Bridge Approach Cut/Fill

Material Site Cut/Fill

Work Area

Wetland Mapping

Wetland

Water

Upland

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0 400 800 Feet

Plan View

Applicant: STATE OF ALASKA
Department of Transportation and Public Facilities
2301 Peger Rd. Fairbanks, AK 99709

Kivalina Evacuation and School Site Access Road

File No.: POA-2012-124

Waterway: Kivalina Lagoon

Proposed Activity: WOUS Fill for Roadway

Date: June 15, 2018

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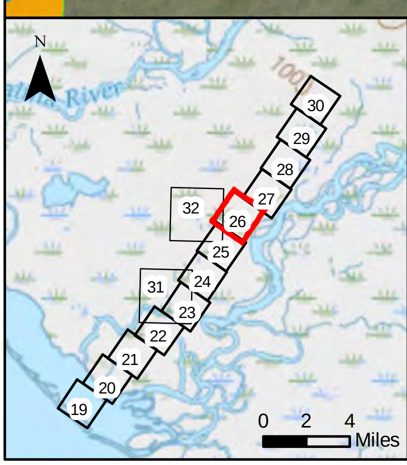

- Culvert Location
- Road Centerline

Impact Type

- Roadway & Bridge Approach Cut/Fill
- Material Site Cut/Fill
- Work Area

Wetland Mapping

- Wetland
- Water
- Upland

POA-2012-124
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0 400 800 Feet

Plan View

Applicant: STATE OF ALASKA
Department of Transportation and Public Facilities
2301 Peger Rd. Fairbanks, AK 99709

Kivalina Evacuation and School Site Access Road

File No.: POA-2012-124

Waterway: Kivalina Lagoon

Proposed Activity: WOUS Fill for Roadway

Date: June 15, 2018

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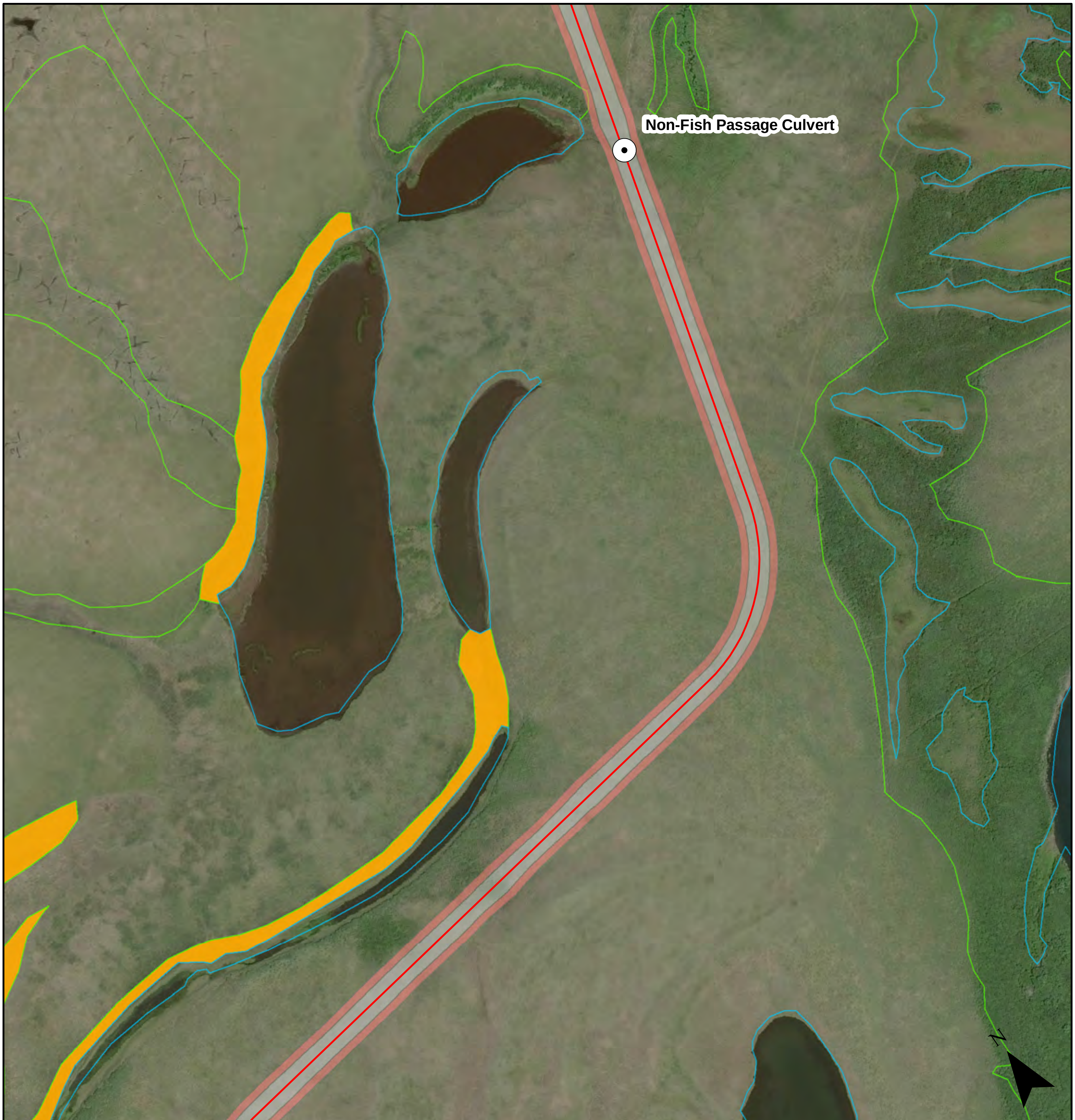

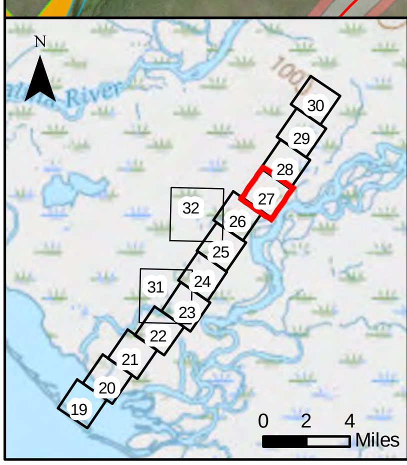

Culvert Location

Road Centerline

Impact Type

Roadway & Bridge Approach Cut/Fill

Material Site Cut/Fill

Work Area

Wetland Mapping

Wetland

Water

Upland

POA-2012-124
ADOT
June 29, 2018
Sheet 27 of 33

0 400 800 Feet

Plan View

Applicant: STATE OF ALASKA
Department of Transportation and Public Facilities
2301 Peger Rd. Fairbanks, AK 99709

Kivalina Evacuation and School Site Access Road

File No.: POA-2012-124

Waterway: Kivalina Lagoon

Proposed Activity: WOUS Fill for Roadway

Date: June 15, 2018

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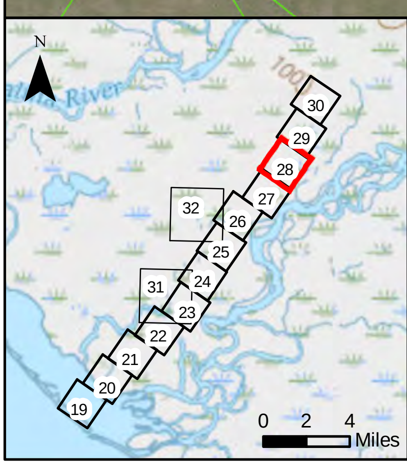

Culvert Location

Road Centerline

Impact Type

Roadway & Bridge Approach Cut/Fill

Material Site Cut/Fill

Work Area

Wetland Mapping

Wetland

Water

Upland

POA-2012-124
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June 29, 2018
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0 400 800 Feet

Plan View

Applicant: STATE OF ALASKA
Department of Transportation and Public Facilities
2301 Peger Rd. Fairbanks, AK 99709

Kivalina Evacuation and School Site Access Road

File No.: POA-2012-124

Waterway: Kivalina Lagoon

Proposed Activity: WOUS Fill for Roadway

Date: June 15, 2018

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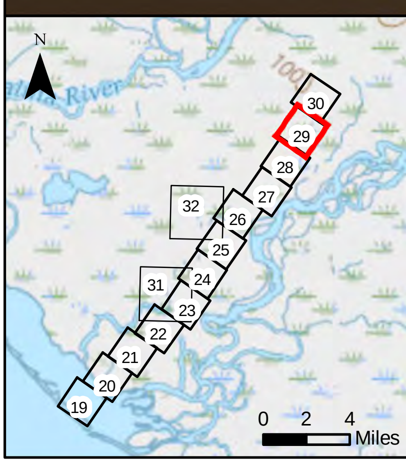

Culvert Location

Road Centerline

Impact Type

Roadway & Bridge Approach Cut/Fill

Material Site Cut/Fill

Work Area

Wetland Mapping

Wetland

Water

Upland

POA-2012-124
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0 400 800 Feet

Plan View

Applicant: STATE OF ALASKA
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2301 Peger Rd. Fairbanks, AK 99709

Kivalina Evacuation and School Site Access Road

File No.: POA-2012-124

Waterway: Kivalina Lagoon

Proposed Activity: WOUS Fill for Roadway

Date: June 15, 2018

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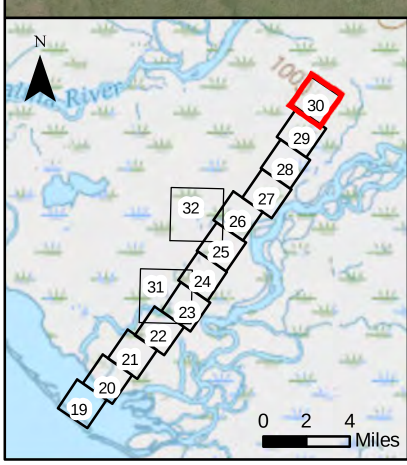

Culvert Location

Road Centerline

Impact Type

Roadway & Bridge Approach Cut/Fill

Material Site Cut/Fill

Work Area

Wetland Mapping

Wetland

Water

Upland

POA-2012-124
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0 400 800 Feet

Plan View

Applicant: STATE OF ALASKA
Department of Transportation and Public Facilities
2301 Peger Rd. Fairbanks, AK 99709

Kivalina Evacuation and School Site Access Road

File No.: POA-2012-124

Waterway: Kivalina Lagoon

Proposed Activity: WOUS Fill for Roadway

Date: June 15, 2018

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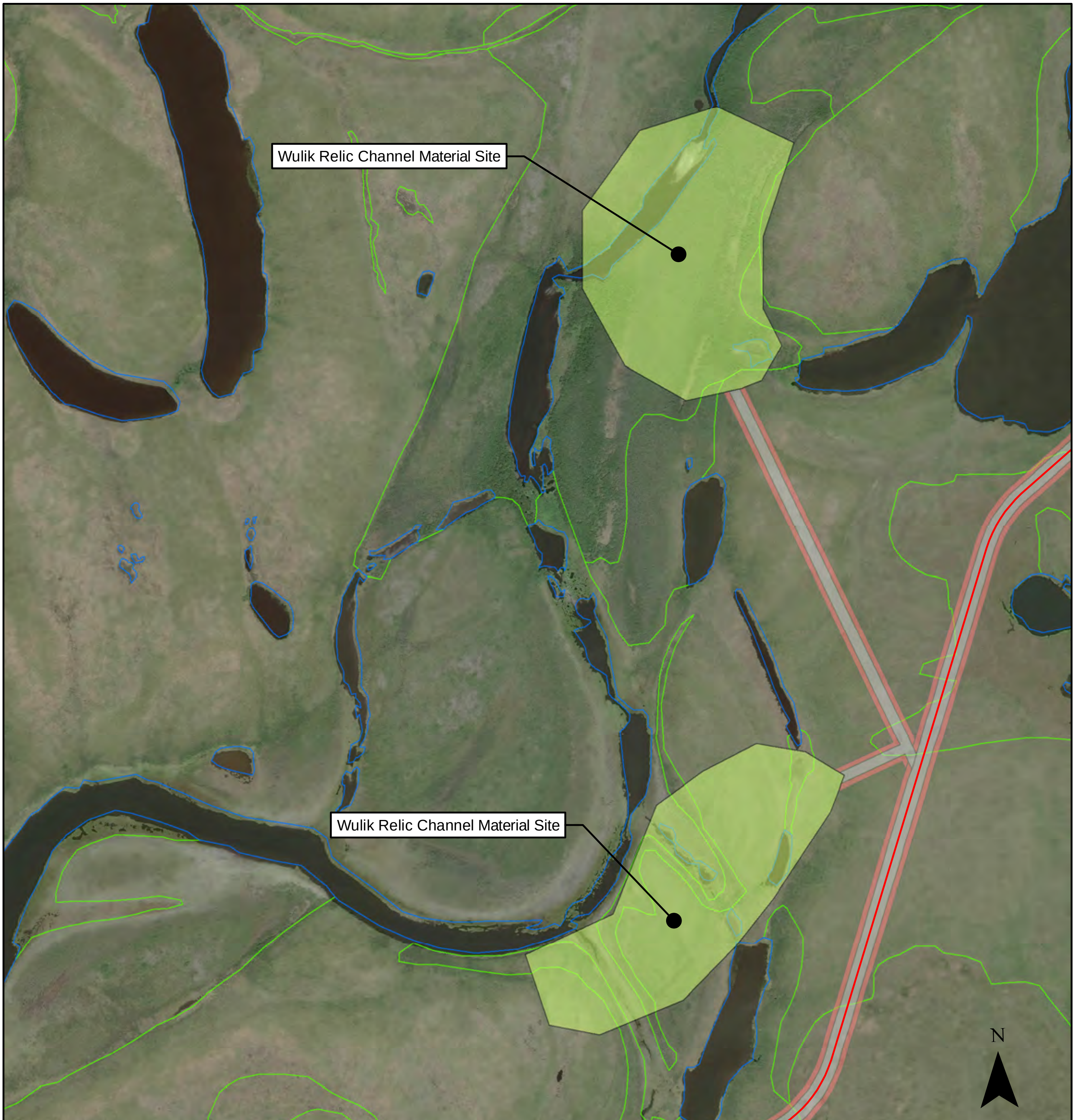

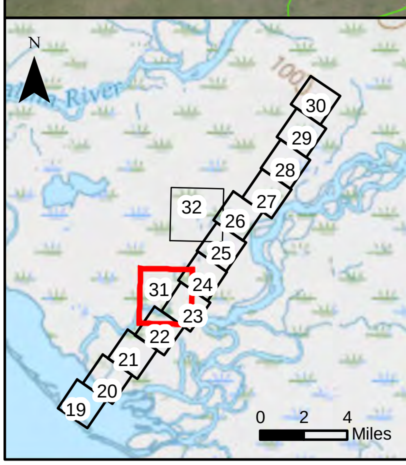

Culvert Location

Road Centerline

Impact Type

Roadway & Bridge Approach Cut/Fill

Material Site Cut/Fill

Work Area

Wetland Mapping

Wetland

Water

Upland

POA-2012-124
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June 29, 2018
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0 500 1,000 Feet

Plan View

Applicant: STATE OF ALASKA
Department of Transportation and Public Facilities
2301 Peger Rd. Fairbanks, AK 99709

Kivalina Evacuation and School Site Access Road

File No.: POA-2012-124

Waterway: Kivalina Lagoon

Proposed Activity: WOUS Fill for Roadway

Date: June 15, 2018

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THIS SHEET IS INTENTIONALLY BLANK

THE STATE of ALASKA

GOVERNOR BILL WALKER

Department of Environmental Conservation

DIVISION OF WATER
Wastewater Discharge Authorization Program

555 Cordova Street
Anchorage, Alaska 99501-2617
Main: 907.269.6285
Fax: 907.334.2415
www.dec.alaska.gov/water/wwdp

April 30, 2018

Alaska Department of Transportation and Public Facilities (ADOT&PF)
Attention: Mr. Brett Nelson
2301 Peger Road
Fairbanks, AK 99709

Re: ADOT&PF, Kivalina Evacuation Road
POA-2012-124, Kivalina Lagoon

Dear Mr. Nelson:

In accordance with Section 401 of the Federal Clean Water Act of 1977 and provisions of the Alaska Water Quality Standards, the Department of Environmental Conservation (DEC) is issuing the enclosed Certificate of Reasonable Assurance for placement of dredged and/or fill material in waters of the U.S., including wetlands and streams, associated with the construction of an evacuation road in Kivalina, Alaska.

DEC regulations provide that any person who disagrees with this decision may request an informal review by the Division Director in accordance with 18 AAC 15.185 or an adjudicatory hearing in accordance with 18 AAC 15.195 – 18 AAC 15.340. An informal review request must be delivered to the Director, Division of Water, 555 Cordova Street, Anchorage, AK 99501, within 15 days of the permit decision. Visit http://dec.alaska.gov/commish/ReviewGuidance.htm for information on Administrative Appeals of Department decisions.

An adjudicatory hearing request must be delivered to the Commissioner of the Department of Environmental Conservation, 410 Willoughby Avenue, Suite 303, PO Box 111800, Juneau, AK 99811-1800, within 30 days of the permit decision. If a hearing is not requested within 30 days, the right to appeal is waived.

By copy of this letter we are advising the U.S. Army Corps of Engineers of our actions and enclosing a copy of the certification for their use.

Sincerely,

James Rypkema

James Rypkema
Program Manager, Storm Water and Wetlands

Enclosure: 401 Certificate of Reasonable Assurance

cc: (with encl.)
Janet Post, USACE, Anchorage
Jack Winters, ADF&G
USFWS Field Office Fairbanks
Matt LaCroix, EPA Operations, Anchorage

STATE OF ALASKA
DEPARTMENT OF ENVIRONMENTAL CONSERVATION
CERTIFICATE OF REASONABLE ASSURANCE

In accordance with Section 401 of the Federal Clean Water Act (CWA) and the Alaska Water Quality Standards (18 AAC 70), a Certificate of Reasonable Assurance, is issued to ADOT&PF, attention: Mr. Brett Nelson, at 2301 Peger Road, Fairbanks, AK 99709, for placement of dredged and/or fill material in waters of the U.S. including wetlands and streams in association with the construction of an evacuation road in Kivalina, Alaska.

ADOT&PF's stated purpose is to construct a safe, reliable, all season evacuation road between the community of Kivalina and K-Hill. The Kivalina Evacuation Road project would provide Kivalina residents an evacuation route in the event of a catastrophic storm or ocean surge, allowing evacuees to temporarily mobilize to take refuge at an assembly site on K-Hill.

PROPOSED WORK:

- Placement of 195,000 cubic yards of clean gravel, rock, and rip rap into 8.2 acres in the Kivalina Lagoon to construct:
    - 110 foot long x 27 foot wide x 25 foot high bridge.
    - 3,900 foot long x 22 foot high x 30 foot wide surface x 120 foot base (toe-to-toe) approach.
- Placement of 518,000 cubic yards of clean gravel and silts into 66 acres of wetlands to construct:
    - 7.5 mile long x 60 foot wide (toe-to-toe) two lane gravel road with side slopes 3:1 from end of approach to K-Hill;
    - Two permanent staging pads: a 300 foot x 630 foot terminal pad (4.3 acres) and a 290 foot x 490 foot approach staging pad (3.3 acres).
- Placement of 52,800 cubic yards of gravel and silts into 7.2 acres of wetlands to construct four spur roads to material sites:
    - Four spur roads are: 1500 feet x 50 feet, 2900 feet x 50 feet, 1800 feet x 50 feet, and 275 feet x 50 feet.
- Up to Four Material sites with excavation not to exceed 297.3 acres of wetlands.

A state issued water quality certification is required under Section 401 because the proposed activity will be authorized by a U.S. Army Corps of Engineers permit (POA-2012-124) and a discharge of pollutants to waters of the U.S. located in the State of Alaska may result from the proposed activity. Public notice of the application for this certification was given as required by 18 AAC 15.180 in the Corps Public Notice POA-2012-124 posted from February 22, 2018 to March 26, 2018.

The proposed activity begins within Section 21, T. 27 N., R. 26 W., Kateel River Meridian, Latitude 67.7301° N., Longitude – 164.5442° W., and ends Section 20, T. 28 N., R. 25 W., Kateel River Meridian; Latitude 67.8031° N., Longitude -164.3873° W., in Kivalina, Alaska.

The Department of Environmental Conservation (DEC) reviewed the application and certifies that there is reasonable assurance that the proposed activity, as well as any discharge which may result, will comply with applicable provisions of Section 401 of the CWA and the Alaska Water Quality Standards, 18 AAC 70, provided that the following additional measures are adhered to.

1. Reasonable precautions and controls must be used to prevent incidental and accidental discharge of petroleum products or other hazardous substances. Fuel storage and handling activities for equipment must be sited and conducted so there is no petroleum contamination of the ground, subsurface, or surface waterbodies.

2. During construction, spill response equipment and supplies such as sorbent pads shall be available and used immediately to contain and cleanup oil, fuel, hydraulic fluid, antifreeze, or other pollutant spills. Any spill amount must be reported in accordance with Discharge Notification and Reporting Requirements (AS 46.03.755 and 18 AAC 75 Article 3). The applicant must contact by telephone the DEC Area Response Team for Northern Alaska at (907) 451-2121 during work hours or 1-800-478-9300 after hours. Also, the applicant must contact by telephone the National Response Center at 1-800-424-8802.

3. Runoff discharged to surface water (including wetlands) from a construction site disturbing one or more acres must be covered under Alaska's General Permit for Storm Water Discharges from Large and Small Construction Activities in Alaska (AKR100000). This permit requires a Storm Water Pollution Prevention Plan (SWPPP). For projects that disturb more than five acres, this SWPPP must also be submitted to DEC (William Ashton, 907-269-6283) prior to construction.

4. Construction equipment shall not be operated below the high tide line or the ordinary high water mark if equipment is leaking fuel, oil, hydraulic fluid, or any other hazardous material. Equipment shall be inspected and recorded in a log on a daily basis for leaks. If leaks are found, the equipment shall not be used and pulled from service until the leak is repaired.

5. All work areas, material access routes, and surrounding wetlands involved in the construction project shall be clearly delineated and marked in such a way that equipment operators do not operate outside of the marked areas.

6. Natural drainage patterns shall be maintained, to the extent practicable, without introducing ponding or drying.

7. Excavated or fill material, including overburden, shall be placed so that it is stable, meaning after placement the material does not show signs of excessive erosion. Indicators of excess erosion include: gullying, head cutting, caving, block slippage, material sloughing, etc. The material must be contained with siltation best management practices (BMPs) to preclude reentry into any waters of the U.S., which includes wetlands.

8. Include the following BMPs to handle storm water and total storm water volume discharges as they apply to the site:

   a. Divert storm water from off-site around the site so that it does not flow onto the project site and cause erosion of exposed soils;

   b. Slow down or contain storm water that may collect and concentrate within a site and cause erosion of exposed soils;

c. Place velocity dissipation devices (e.g., check dams, sediment traps, or riprap) along the length of any conveyance channel to provide a non-erosive flow velocity. Also place velocity dissipation devices where discharges from the conveyance channel or structure join a water course to prevent erosion and to protect the channel embankment, outlet, adjacent stream bank slopes, and downstream waters.

9. Fill material must be clean sand, gravel or rock, free from petroleum products and toxic contaminants in toxic amounts.

10. Any disturbed ground and exposed soil not covered with fill must be stabilized and re-vegetated with endemic species, grasses, or other suitable vegetation in an appropriate manner to minimize erosion and sedimentation, so that a durable vegetative cover is established in a timely manner.

This certification expires five (5) years after the date the certification is signed. If your project is not completed by then and work under U.S Army Corps of Engineers Permit will continue, you must submit an application for renewal of this certification no later than 30 days before the expiration date (18 AAC 15.100).

Date: April 30, 2018

James Rypkema

James Rypkema, Program Manager
Storm Water and Wetlands

Kivalina Evacuation Road

Rehabilitation Plan

POA-2012-124

June 7, 2018

Kisimigiuqtuq Hill (K-Hill) Western Site

The Kisimigiuqtuq Hill (K-Hill) Western site totaling 93.3 acres is anticipated to provide materials for armor rock and crushed surfacing material. Rehabilitation will include land contouring and revegetation.

The site shall be rehabilitated as follows:

- Reduce high walls to stable slopes: No slopes exceed 3H:1V.
- Remove or reclaim temporary storm water control structure(s).
- Reestablish natural drainage ways to minimize erosion.
- Reestablish natural vegetation to achieve long-term stability and rehabilitation. Plant species shall include ‘Arctared’ RedFescue (Festuca rubraand), ‘Norcoast’ Bering Hairgras (Deschampsia beringensis) and Annual Rye (Lolium multiflorum) in the following mixture: 50% Red Fescue, 30% Bering Hairgrass, and 20% Annual Rye. Broadcast State of Alaska approved seed mixtures at a rate of 40 pounds per acre with a standard.
- 20-20-20 Nitrogen-Phosphorous-Potassium (N:P:K) fertilizer (fertilizer rate of 450 pounds per acre).
- Overburden/top soil will be redistributed as evenly as possible to help promote successful revegetation.
- Vehicle and/or equipment use on newly graded slopes and reseeded areas will be discouraged using signage and flagging where practicable.

Wulik Relic Channels

Wulik Relic Channel Source 2-1 and 2-2 total 41.5 acres and would provide material for embankment construction. Rehabilitation will include land contouring, revegetation, flooding for creation of ponds and wetlands, and pond littoral margin habitat improvement for fish and wildlife enhancement.

The site shall be rehabilitated as follows:

- Each cell will be allowed to flood and a habitat enhancement project initiated to rehabilitate the site.
- A littoral zone will be created around outer edges of each pond to create a diversity of wildlife habitats.
- Twenty percent of the final pond surface area will be less than 3 feet in depth to create areas suitable for shallow water emergent vegetation to develop for waterfowl nesting and rearing.
- Side slopes into the ponds will be gradually tapered so no abrupt drop off occurs around the pond periphery.
- Ponds, and any islands within them will be irregularly shaped to increase edge habitat.
- All work areas will be graded to encourage natural variation of wetland hydrology, and native shrub recruitment and regrowth, as observed along river bars of the Kivalina and Wulik Rivers.

Figure 1: Wulik Relic Channel Rehabilitation

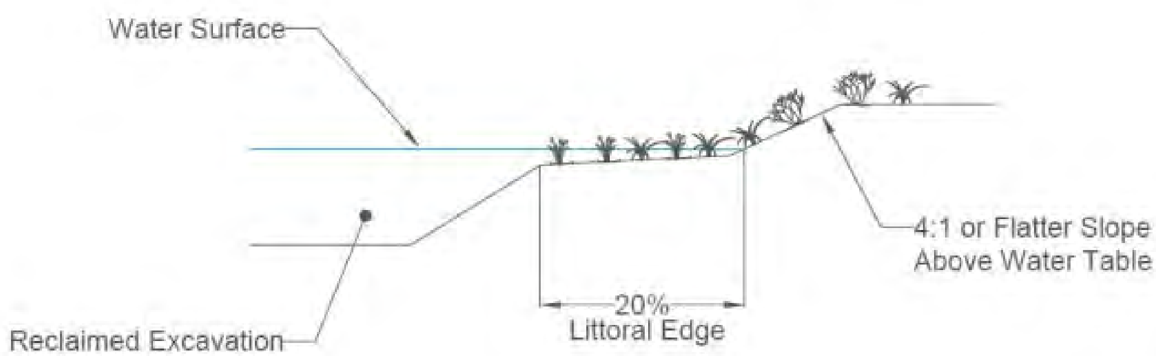
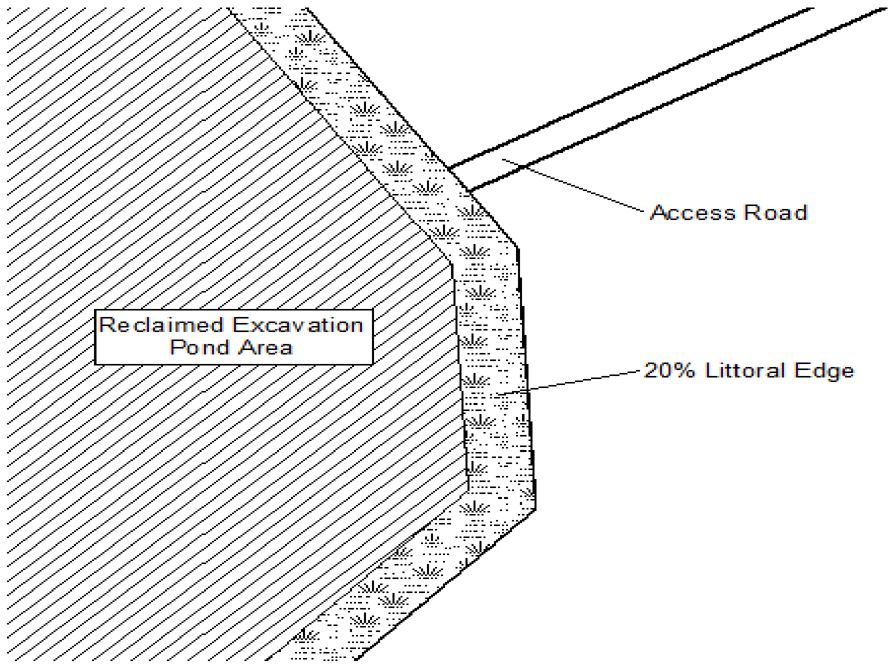


Figure 2: Wulik Relic Channel Rehabilitation



Evacuation Road

- Road side slopes will be broadcasted with State of Alaska approved seed mixtures to create grassy side slopes.

Monitoring Reports

- Monitoring reports for K-Hill Western Site and Wulik Relic Channels 2-1 and 2-2 shall be submitted annually by the permittee until site rehabilitation is complete and satisfactory to the Corps of Engineers. The reports should include pictures of the area taken between June and August of each year and a brief narrative on visual observations of the area.

  These reports should be addressed to:

  US Army Corps of Engineers
  North Section
  CEPOA-RD
  PO Box 6898

The environmental review, consultation, and other actions required by applicable federal environmental laws for this project are being, or have been, carried out by DOT&PF pursuant to 23 U.S.C. 327 and a Memorandum of Understanding dated November 3, 2017, and executed by FHWA and DOT&PF.

Attachment 7. Kivalina Lagoon Crossing Causeway and Bridge Design Report. USACE, June 2016

Kivalina Lagoon Crossing

Planning Assistance to States

Causeway & Bridge Design Report

Kivalina, Alaska

June 2016

**U.S. Army Corps
of Engineers**

Alaska District

EXECUTIVE SUMMARY

This report provides the design basis for a concept project to construct an access road across Kivalina Lagoon from the community of Kivalina to the opposite shore near the mouth of the Wulik River. The primary purpose of this road would be to allow the residents of Kivalina to evacuate the barrier island where they are located in the event of a storm that threatens to overtop the island. The road would also serve as primary construction access to the mainland for further development of an evacuation route and support facilities. This road may also serve as an access route to a new school should one be constructed at the location requested by the community.

The concept project includes two earthen causeways, a concrete bridge, a dredged bridge basin, and a storage pad on the mainland. The southeast causeway would connect to the Kivalina road system near the airport maintenance hangar. This causeway would project 250 feet to the northwest, ending at the edge of a naturally deep channel in the lagoon. A 500-foot-long, one-lane concrete bridge consisting of four 125-foot spans of decked bulb tee girders would span this channel and adjacent area, and terminate on the northeast causeway. The lagoon under the bridge would be dredged to -6 feet mean lower low water (MLLW), and a scour apron would be placed under the bridge to provide better conveyance of water during storm events and protect the structure from undermining. The northeast causeway would angle slightly to the north and extend 2,450 feet across the lagoon to terminate on the mainland shore. The causeway would connect to a 350-foot by 350-foot material storage pad.

The effects of this causeway and other designs on water levels and currents in Kivalina Lagoon were studied using an ADCIRC model. The model showed that high velocity currents would be produced through smaller openings that presented higher risk of failure during an evacuation event than the concept project. Analysis of wind and wave conditions at Kivalina also showed that the causeway embankments would require armored revetments to prevent erosion damage from local wave action.

A construction analysis of the project features suggested that bridge construction would take a minimum of 4 years to complete and require multiple mobilization cycles. Most of the material for the project would need to be imported from a rock quarry capable of producing 700-pound stone that remains competent after multiple freeze-thaw cycles. Temporary facilities required to construct the bridge were also investigated, including navigation access to the work site and work platforms for pile driver and crane activities. Cost analysis of these construction requirements show that the concept project would cost $79 million.

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1. INTRODUCTION

1.1 Purpose

This report describes the environmental setting, design considerations, and project features of a proposed evacuation route from Kivalina (Figure 1) to the mainland across Kivalina Lagoon. The primary purpose of this route is to provide safe passage for residents of Kivalina to transit to the mainland by ground vehicle during a storm event that threatens to cause, or is causing, flooding in the community of Kivalina. This report provides the environmental and engineering background information needed for determining the cost of major construction features including causeways, bridges, channel improvements, and coastal protection. This report focuses on a single concept plan to construct two earth and rock fill causeways connected by a single lane bridge across Kivalina Lagoon between the community and the mainland. The alignment for this concept starts south of the airport apron, near the current location of material stockpiles, and makes landfall across the lagoon to the north of the mouth of the Wulik River. The point of landfall on the mainland was determined by a previous report by WH Pacific, which evaluated alternative routes between Kivalina and Kisimigiuqtuq Hill. Among the alternatives considered, the community selected the southern route, and that route defines the general landfall point for the lagoon crossing. The scope of this report is limited to providing an evacuation route that crosses Kivalina Lagoon. The portion of the route on the mainland and the final evacuation site is beyond the scope of this report.

1.2 Project Purpose and Needs Assessment

The following objectives were identified for an evacuation road for Kivalina residents.

a. Provide a safe route for residents of Kivalina to evacuate to a site on the mainland across Kivalina Lagoon during a storm event.

b. Provide passage for local skiff traffic under the proposed evacuation route while avoiding impairment of water quality and circulation, and avoid disrupting the movement and migration of marine species.

c. Provide access for development of the mainland portion of the route and the final evacuation site.

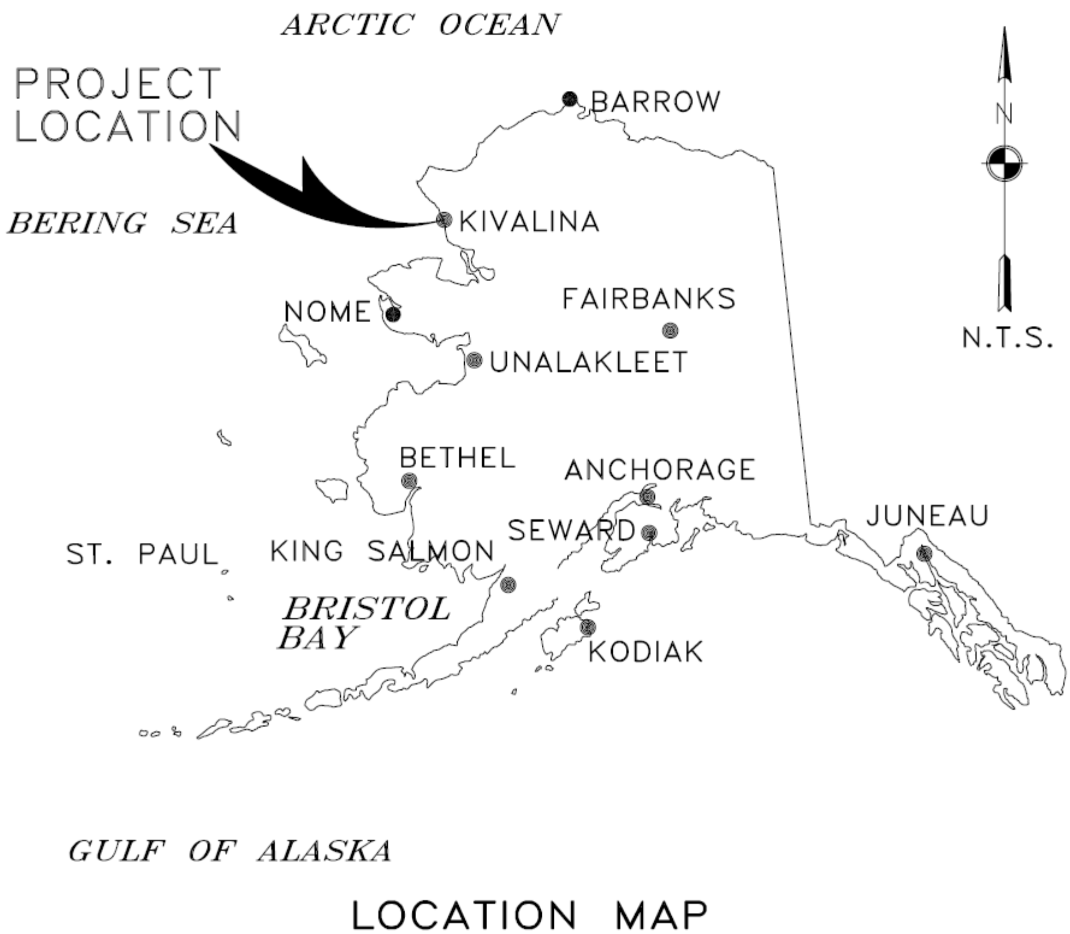

Figure 1: Kivalina location map

2. ENVIRONMENTAL SETTING

Kivalina is a community of approximately 374 people (2010 census) located on the Chukchi Sea coast, approximately 80 miles northwest of Kotzebue and 625 miles northwest of Anchorage (Figure 1). The coastline in this region is characterized by a sandy beach that runs southeast to northwest. The community is built on the southeastern end of a 5-mile-long barrier island that separates Kivalina Lagoon from the Chukchi Sea (Figure 2). The portion of the island where Kivalina is located has been stabilized from erosion by a rock revetment built by the U.S. Army Corps of Engineers (USACE) in 2009. Two rivers drain into Kivalina Lagoon: the Wulik River near Kivalina and the Kivalina River to the north. Kivalina Lagoon is a shallow body of water approximately 10 miles long that ranges in width from 3,000 feet near the mouth of the Wulik River to 8,000 feet north of the Kivalina River (Figure 3).

Figure 2: Aerial view of Kivalina looking from the southeast. The community is located at the southeast end of a barrier island between the Chukchi Sea and Kivalina Lagoon.

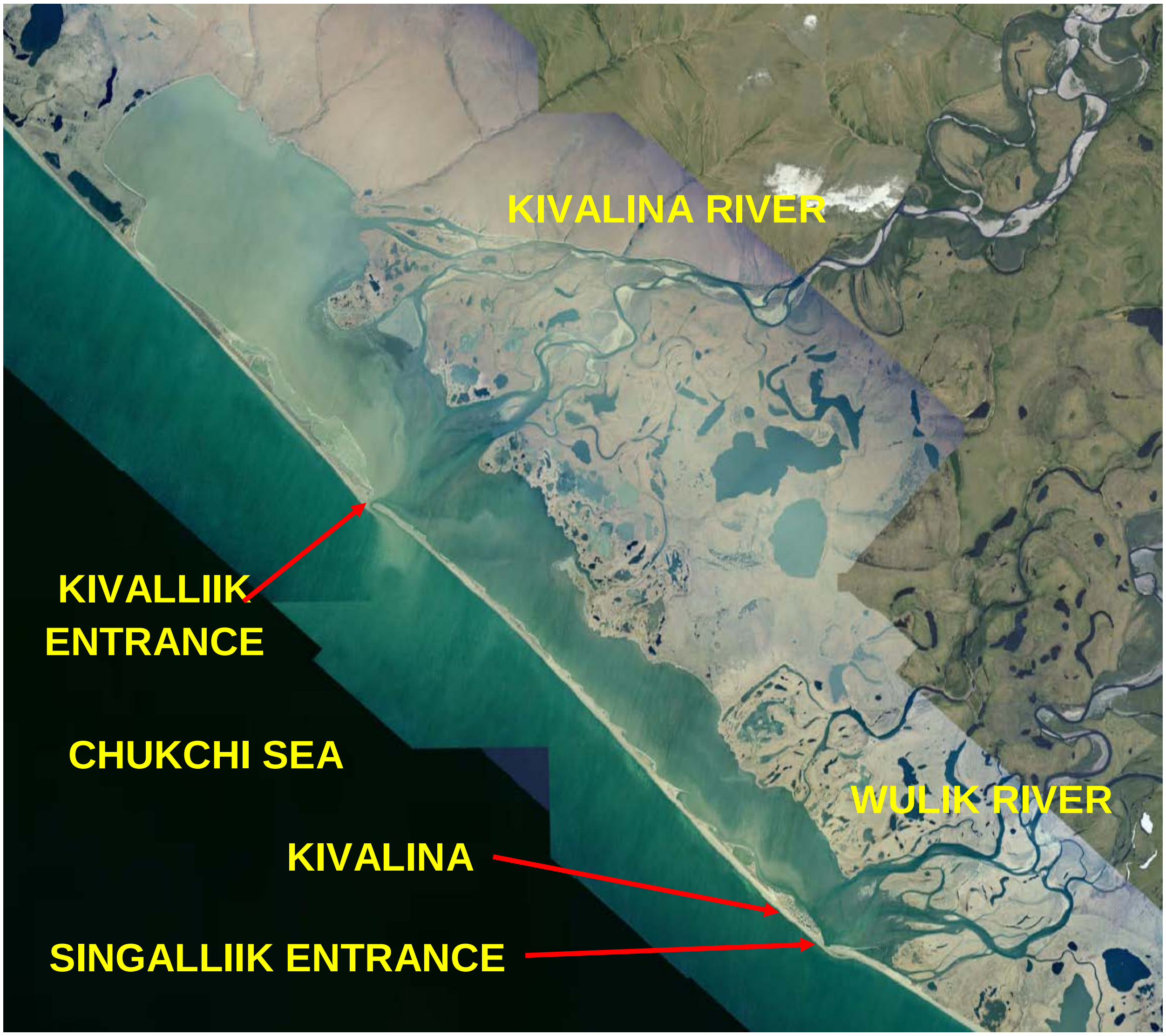

Figure 3: Kivalina Lagoon Vicinity. The lagoon is approximately 10 miles from end to end along the long axis.

2.1 Climate

Although Kivalina is located on a barrier island offshore, its climate is more continental than maritime, in large part because the Chukchi Sea is icebound for more than half the year.

Kivalina is in the transitional subarctic continental climate zone, with cool summers and no dry season. Winters are long and harsh, and summers are short and cool. The Chukchi Sea is seasonally ice-free and open to boat traffic from mid-June to the first of November. Temperatures typically range from -12 °F in the winter to 55 °F in the summer, and are rarely below -33 ^{o}F or above 65 ^{o}F. The warm season lasts from early June to late September, with an average daily high temperature above 45 °F. The hottest day of the year generally occurs in mid-July, with an average high of 55 °F and low of 46 °F. The cold season lasts from early December to early April, with an average daily high temperature colder than 13 °F. The coldest day of the year generally occurs at the end of January, with an average low of -12 °F and high of 2 °F. Maximum and minimum recorded temperatures range from 96 °F (2004) to -54 °F (2012).

Climate change is affecting Kivalina. Historically, sea ice shielded the village from cold weather storm waves and surges, but the ice is forming later and melting sooner, leaving Kivalina vulnerable. As a result, the barrier island where the village is located is experiencing near-continuous erosion.

Materials used for a project in Kivalina should be able to perform under a temperature range of 150 degrees.

2.2 Daylight

The length of the day varies significantly over the course of the year. The shortest day is December 21 with no hours of daylight; the longest day is June 20 with 24 hours of daylight.

Due to its extreme latitude, Kivalina experiences polar day (also known as the midnight sun) during summer and polar night during winter. The precise start and end dates of polar day and night vary from year to year and depend on the precise location and elevation of the observer, and the local topography.

In summer, the sun is continuously above the horizon for 46 days, generally from May 28 to July 13. In winter, the sun is continuously below the horizon for 17 days, generally from December 12 to December 29.

2.3 Precipitation

Average annual snowfall is 57 inches, and average annual rainfall is 8.6 inches.

Precipitation is most likely to occur around the end December and least likely around the middle of June.

Snow is most likely to occur between the end of December and the first week in January. Rain is most likely to occur around the end of August.

During the warm season, there is an average of 48 percent chance that precipitation will be observed at some point during a given day. When precipitation does occur, it is most often in the form of light rain (70% of days with precipitation), moderate rain (16%), and light snow (9%). During the cold season, there is an average of 56 percent chance that precipitation will be observed at some point during a given day. When precipitation does occur, it is most often in the form of moderate snow (47% of days with precipitation), light snow (46%), and heavy snow (6%).

2.4 Winds

Over the course of the year, typical wind speeds vary from 2 mph to 23 mph (light air to moderate breeze, using the Beaufort wind force scale), and rarely exceeding 36 mph (fresh breeze). The highest average wind speed of 15 mph (gentle breeze) occurs around late December, at which time the average daily maximum wind speed is 23 mph (moderate breeze). The lowest average wind speed of 9 mph (light breeze) occurs around the middle of June, at which time the average daily maximum wind speed is 15 mph (gentle breeze). The wind is most often out of the north (18% of the time), northeast (17% of the time), and east (14% of the time). The wind is least often out of the southwest (4% of the time).

2.5 Water Levels

2.5.1 Tides

Water levels are not directly measured at Kivalina. The tidal monitoring station is at the Red Dog Mine Dock (Portsite), located 16 miles to the south of Kivalina (Table 1).

Table 1: Tidal data for Red Dog Mine Dock, Alaska

Published tidal data for Red Dog Dock, Alaska (ft)

Highest Observed Water Level (2/25/2011)	+7.41
Mean Higher High Water (MHHW)	+0.88
Mean High Water (MHW)	+0.79
Mean Tide Level (MTL)	+0.46
Mean Sea Level (MSL)	+0.44
Mean Low Water (MLW).............................	+0.12
Mean Lower Low Water (MLLW)..................	0.0 (datum)
Lowest Observed Water Level (11/09/2005)	-5.78

Source: NOAA NOS, Tidal Epoch 1983-2001, published 7/21/2011.

Kivalina experiences mixed semidiurnal tides, with two unequal high tides and two unequal low tides each lunar day. Tidal measurements used for construction of the revetment built by the USACE Alaska District in 2009 found similar tides at Kivalina with an estimated mean higher high water (MHHW) of 0.9 foot and an estimated Mean Tide Level of 0.43 foot. For the purposes of this report, tides at Kivalina are assumed to have the same elevations as the tides at Red Dog Mine Dock.

2.5.2 Storm Surge

Water levels in the region are continuously measured at two gages: Nome and Red Dog Mine Dock. The period of record for these gages begins in 1992 and 2003, respectively. The gage data does not have sufficient period of record to establish frequency of occurrence relationships for water levels in the region. Probabilistic water levels for the western coast of Alaska were modeled using hindcast storm information applied to an ADCIRC long-wave model (USACE, 2014). The study grid was established to determine frequency occurrence relationships for 17 points along the western Alaska coast. Kivalina is the northern-most reported point in this study. These data show modeled storm surge residuals, which is the local water level deviation from the predicted tide level. Maximum water surface elevations for this report were calculated by adding the storm surge residual to the elevation of (MHHW). Storm surge residuals and peak water surface elevations for Kivalina are shown in Table 2. The data shows the 1 percent annual exceedance probability (AEP) water level with a 100-year return period to be 7.3 feet above mean lower low water (MLLW).

Table 2: Summary of frequency-of-occurrence relationships for hindcast storm induced water level at Kivalina, Alaska

Annual Exceedance Probability	Modeled Storm Surge Residual (feet)	Peak Water Surface Elevation (feet, MLLW)
0.2	3.5	4.4
0.1	4.3	5.2
0.05	5.4	6.3
0.04	5.6	6.5
0.02	6.2	7.1
0.01	6.4	7.3

2.5.3 Sea Level Change

The USACE requires that planning studies and engineering designs consider alternatives that are formulated and evaluated for the entire range of possible future rates of sea level change (SLC). Guidance for addressing SLC is in Engineer Circular EC 1165-2-212. Three scenarios of “low,” “intermediate,” and “high” SLC are evaluated over the project life cycle.

The closest tide station at Red Dog Mine Dock does not have the recommended 40-year period of record for the relative sea level change (RSLC) value. The Red Dog Mine Dock tide station has a 10-year period of record (Figure 4). The record shows that storm systems have a much greater effect on water level than astronomical tides. Over the short period of record, long-term trends in the tidal signal are not identifiable.

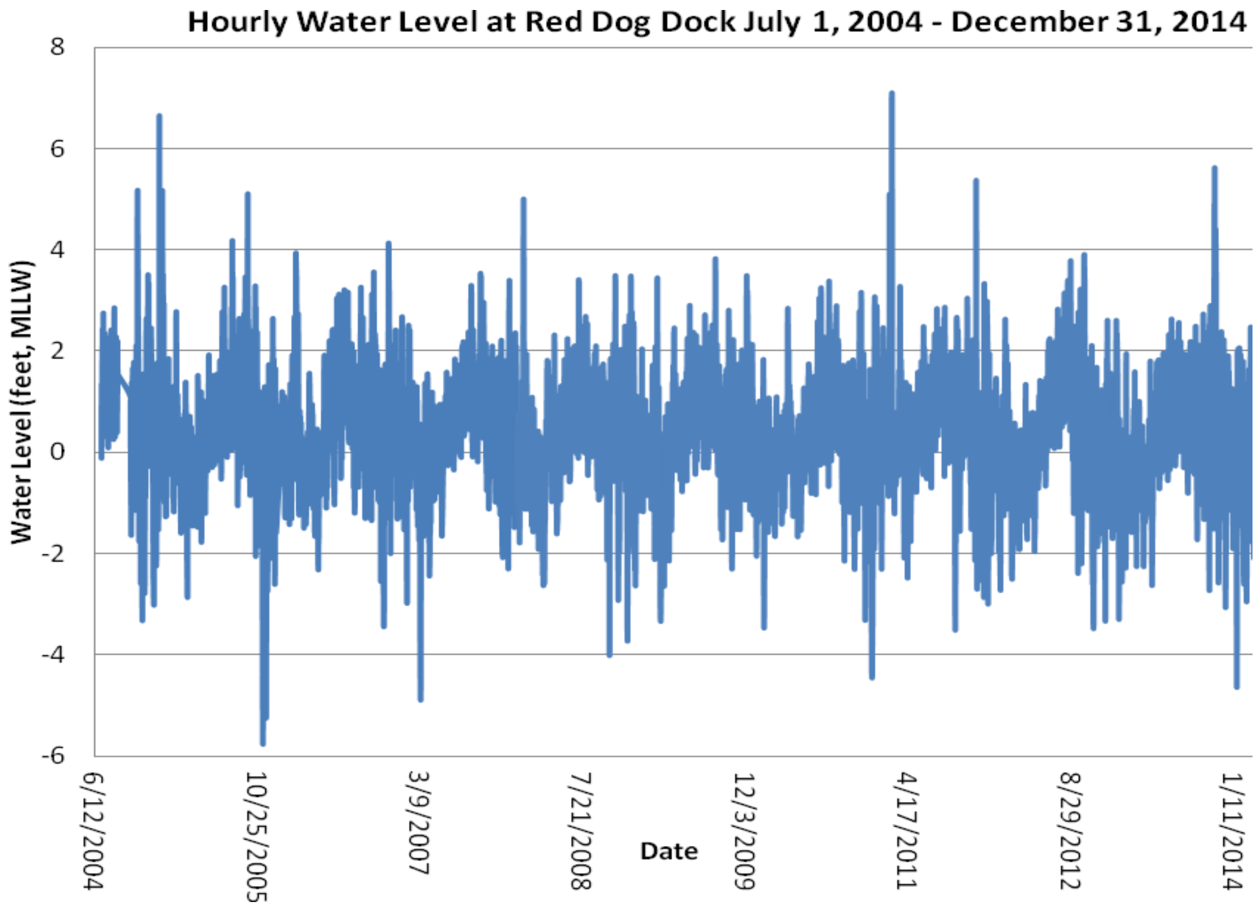

Figure 4: Recorded Water Levels at Red Dog Dock

In the absence of better data, the global mean sea level (GMSL) rate was used to model sea level change at Kivalina (Table 3).

Table 3: Sea Level Rise Prediction for a 50-Year Project Life.

Scenario	Low (Historic)	Intermediate (Curve I)	High (Curve III)
GMSL	+0.28 feet	+0.75 feet	+2.24 feet

2.6 Socio-Economics

2.6.1 People

For more than 1,500 years, the barrier island where Kivalina is located has been a stopping-off place for seasonal travelers between the arctic coastal areas and the Kotzebue Sound region (NANA 2015).

According to elder knowledge, the original permanent settlement was located on the coast of the mainland, a few miles north of Kivalliik Channel. The people of Kivalina, like the Ipiutak before them, utilized the barrier island only as seasonal hunting grounds, making camp there in warm-weather months.

The first recorded “Western” history of Kivalina occurred in 1847, when a Russian naval officer mistook a seasonal hunting camp at the north end of Kivalina Lagoon—a few miles from the location of modern-day Kivalina—as a permanent settlement, the name of which he logged as “Kivualinagmut.” From 1896 to 1902, U.S. Federal programs transported reindeer to the Kivalina area and funded the training of some residents as reindeer herders.

The first post office in this new Kivalina was established in 1940. The first airstrip was built in 1960. Kivalina incorporated as a city in 1969. During the 1970s, a wave of new houses, a new school, and a modern electric system were constructed in the village. Today, Kivalina is notable as the only village in the Kotzebue Sound region whose inhabitants hunt the bowhead whale.

The original population of the community now known as Kivalina consisted of survivors of the aboriginal Kivalinarmiut Society, who inhabited the original Kivalina along with displaced Iñupiaq from the Shishmaref and Noatak Valley regions, who were induced by the Bureau of Indian Affairs School to relocate to the barrier reef village.

Starvation and disease brought by outsiders wiped out more than 70 percent of Kivalina’s original population in the early 1900s. In 1920, Kivalina was estimated to have 87 residents, down from 350 to 400 in 1906. In 1970, the population had more than doubled to 188. The 2000 census reported 377 residents, and the 2010 census reported 374 residents. By 2013, 382 people resided in Kivalina, marking a hard-won return to its historic population level; 96.26 percent of Kivalina residents are Iñupiaq Eskimos.

2.6.2 Economy

Kivalina's economy is based on subsistence hunting and fishing. Traditional game include bowhead whale, walrus, bearded seal, caribou, salmon, Dolly Varden char, codfish, and whitefish. Full and part-time jobs supplement the local economy. The largest employer in the village is the Northwest Arctic Borough School District. The second largest is the Native Store in Kivalina. Other employers include the Red Dog Mine, which is located 52 miles east of Kivalina; Maniilaq Association, and NANA Regional Corporation. The U.S Postal Service, regional airlines, the IRA tribal council, and local stores provide additional jobs. A few residents have commercial fishing permits. Local artisans specialize in carving ivory and producing jewelry from caribou hooves and whalebones.

2.6.3 Transportation Services

Northwest Alaska has no major highway system as compared with the highway systems found in the "lower 48" contiguous states. The only roads in northwestern arctic Alaska are the 52-mile-long Red Dog Mine gravel road, the 26 miles of gravel roads around Kotzebue, about 20 miles of gravel road near Barrow, and several hundred miles of gravel road linking Nome with Teller, Council, and the Kougarok River. Most of the communities have no improved roads or roads that connect with the other rural communities. Northwest Alaska has no highway connection to the rest of the State and no railroad system.

The basic modes of transportation to and from Kivalina are plane, small boat and snowmobile. No roads connect the village with the rest of Alaska.

While the three economic hubs of Kotzebue, Nome, and Barrow have daily jet service from Anchorage and/or Fairbanks, Kivalina (and most other communities) relies on a shorter gravel airstrip designed for small aircraft. Few of these gravel airstrips are able to handle DC-6s. Transportation between the communities is almost entirely by aircraft and boat during the open water season, and by small aircraft and snowmobile when waters are frozen.

Northwest Alaska has no deep-water ports or fully developed harbors. There are shallow-draft port facilities at Red Dog Mine's Portsite and a small boat harbor farther away in Nome. Essentially, all goods are transported by sea or air. Since most of the rural communities are near water, both marine and riverine communities receive most of their goods by beaching shallow-draft barges near the community. Ice limits marine commerce to about 4 to 6 months of the year. The ice goes out on most rivers and lakes in May or June and on the Chukchi Sea in June or July. Rivers and lakes begin freezing in late September, and waterborne transportation ends in both freshwater areas and the Chukchi Sea by about the end of October.

A state-owned airstrip, 3,000 feet long by 60 feet wide, is constructed of gravel atop metal matting. It services daily round-trip flights from Kotzebue and twice-weekly flights from Point Hope. Bering Air and Ravn Air both provide regularly scheduled passenger air service to Kivalina. Along with Ryan Air, both Bering and Ravn also fly cargo into Kivalina from Kotzebue.

Northland Services barges fuel, automobiles, groceries, household goods, and general supplies to Kivalina during the narrow annual window of July and August. Shipping containers, which can hold up to 60,000 pounds of cargo, can be shipped from Anchorage or Seattle.

Historically, the Chukchi Sea has been open to small boat traffic from mid-June to early November, although global climate trends are pushing the annual thaw earlier and freeze-up later. Small boats are used for inter-village travel, hauling cargo, fishing and hunting.

Apart from a few cars and trucks, which are driven in Kivalina and its immediate environs, residents utilize all-terrain vehicles for land transportation in the summer and snowmobiles in the winter. Two main hunting trails lead out of Kivalina along the Kivalina and Wulik Rivers.

2.6.4 Housing

There are 86 residential buildings in Kivalina; all are occupied. Most are single-family dwellings, with a few duplexes and trailers. The average household is 5.5 persons. Median home value in Kivalina is $56,000. Median rent is $544/month. The Northwest Iñupiat Housing Authority provides construction services based on HUD contracts.

2.7 Local Governmental Services

2.7.1 Water

Kivalina's public water source is the Wulik River. Water is pumped from the river via a 3-mile surface transmission line to a pair of storage tanks. One holds 500,000 gallons of water, the other 670,000 gallons. Along the way it is chlorinated and fluoridated. Kivalina operates on a "fill-and-draw" system, meaning water is pumped and stored during July and August for use during the winter. In warm-weather months, residents haul and treat their own water. The public tanks store a 6-month supply to last from December through May. Residents haul water from the tanks during these months, which can be difficult—hills of drifted snow in the village reach 20 to 30 feet high. A few residents have tanks that supply water to their kitchens, but private homes in Kivalina lack full indoor plumbing. There is only a public washeteria with three showers available. The village school and health clinic are fully plumbed.

2.7.2 Sewer

As is common in cold climates where installing running water can be difficult, expensive, and subject to freezing-related pipe breakage, households utilize honey buckets for toilets. To empty the honey buckets, they are hauled by hand to one of four disposal bunkers located throughout the community and are then transported to the landfill for disposal.

2.7.3 Solid Waste Disposal

Residents transport solid waste to a landfill 1.25 miles from town. The dump site lacks a perimeter fence and often draws wild animals, including bears and foxes. Seagulls and crows that forage for food at the landfill are a threat to incoming planes.

2.7.4 Public Safety

Kivalina does not have a Village Public Safety Officer. Serious incidents are handled by the Alaska State Troopers based in Kotzebue.

2.8 Biological Resources

2.8.1 Biogeographic Regions and Ecoregions

The Alaska Department of Environmental Conservation (ADEC) places Kivalina in the Brooks Foothills ecological region (Nowacki et al. 2001). Ecoregions can be defined as large areas of land and water containing vegetation communities that share species and ecological dynamics, environmental conditions, and interactions that are critical for their long-term persistence.

The Brooks Foothills are composed of gently rolling hills and broad, exposed ridges. This area extends from Point Hope at the Chukchi Sea eastward, parallel to and north of the Brooks Range, almost to the Canadian border. Long, linear ridges, buttes, and mesas composed of tightly-folded sedimentary rocks divide narrow alluvial valleys and glacial moraines. Above a thick, continuous layer of permafrost are ice-related features, such as gelifluction lobes (tongue-shaped deposits of flowing waterlogged soil material orientated downslope that tend to form on slopes of between 10° and 20°), pingos (mound of earth-covered ice), and ice-wedge polygon networks. Because permafrost impedes drainage, soils in the area are usually saturated and have fairly thick organic horizons. Lakes in the region are infrequent, but many swift streams and rivers originating in the Brooks Range cross through the foothills, occasionally braiding across gravel flats. Some rivers and streams (including the Kivalina River) freeze solid each winter, often creating extensive sheets of aufeis (ice) that can last well into summer.

The Alaska Department of Environmental Conservation (ADEC) has also placed Kivalina in the Wildlife Habitats of Species of Greatest Conservation Need (SGCN) in Alaska's Western Biogeographic Region, a framework used by many in the state to describe the distribution of birds (Armstrong 2015) and mammals (McDonald and Cook 2009). This framework aligns fairly closely with the North American Bird Conservation Initiative's (NABCI) Bird Conservation Regions defined in Alaska (NABCI 2000) as well as the Landscape Conservation Cooperative (LCC) planning areas in Alaska.

2.8.2 Tundra

Tundra refers to a cold-climate landscape that has vegetation but is devoid of trees. The absence of trees is typically related to regional climatic conditions. Alaska has three major types of tundra that can be generally described by the topographical and geographical location in which they occur. They include: (1) arctic (high latitude) tundra, (2) alpine (high altitude) tundra, and (3) the maritime tundra present on Alaska's western and southwestern coast. The dominant plant species of tundra habitats are sedges, low and dwarf shrubs, and graminoids interspersed with forbs, in addition to mat and cushion-forming plants and scattered bryophytes (nonvascular plants).

Alaska's tundra climates are characterized by a short growing season, long, cold, dark winters, and low precipitation with strong, bitter, dry winds. Snow accumulation, where present, provides an insulating layer to the ground surface benefitting plant and animal communities. The arctic tundra is represented by a low diversity of plant species and low plant biomass, with most of the biomass concentrated in the root system. These characteristics, combined with a short growing season, slow rates of growth, and vegetative reproduction, result in delayed recovery from disturbance (Oceanographic Institute of Washington 1979).

Arctic tundra is generally distributed above the latitudinal tree line in Alaska, in an area extending from the crest of the Brooks Range northward to the Arctic Ocean (i.e., Arctic Slope). The Arctic Slope includes the north side of the mountains, northern foothills, and the flat coastal plain. Arctic tundra persists under cold air with low moisture-holding capacity, combined with minimal precipitation. The dominant vegetation type across the foothills and much of the coastal plain is tussock tundra, with willows in the small drainages, wet sedge tundra in old drained lakes, and *Dryas*-lichen tundra on drier ridges. Tussocks are formed of cottongrass and other sedges and forbs, with scattered dwarf shrubs. Prostrate woody shrubs, mosses, sedges, and lichen cover the mountainsides and valleys. The flat areas of the coastal plain are sporadically covered with small thaw lakes and ponds and tundra polygons. Trees are generally unable to become established in arctic tundra habitats due to an underlying impermeable permafrost layer coupled with thin soils.

Arctic tundra plant communities found in mesic (moist) and hydric (wet) soil conditions include wet graminoid herbaceous types dominated by sedges or grasses. Areas of drier soils along the riverbanks, lakes, and coastal bluffs support dwarf shrub communities. Typical mesic sedge communities are dominated by water sedge and tall cottongrass. Grass communities are dominated by tundra grass and alpine foxtail, with the emergent pendent grass prevailing where surface water is 6 to 80 inches deep. In addition, mesic graminoid herbaceous communities dominated by tussock-forming sedges are widespread. Typical species include tussock cottongrass and Bigelow sedge.

2.8.3 Wetlands

The concept of wetland definition has been nearly constant since at least 1977, though slightly different definitions for scientific and jurisdictional purposes have evolved.

The scientific definition developed by Lewis M. Cowardin for the U.S. Fish and Wildlife Service has been approved by the Federal Geographic Data Committee as a standard for non-jurisdictional wetland classification and is used by the U.S. Fish and Wildlife Service for the scientific classification of wetlands in the National Wetlands Inventory and by the U.S. Department of Agriculture (USDA) in the National Resources Inventory (Cowardin et al. 1979).

The U.S. Army Corps of Engineers and U.S. Environmental Protection Agency define jurisdictional wetlands as “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 generally include swamps, marshes, bogs, and similar areas” (USACE 1987). These guidelines are somewhat more complex in arctic environments with the inclusion of permafrost (USACE, 2007). This definition is referred to as a “three parameter” test under which wetlands are characterized by hydrology (water at or near the surface for a sufficient time), hydrophytic vegetation (plants adapted to saturated soils), and hydric soils (specified soils and conditions).

A jurisdictional wetland, under Clean Water Act standards, must exhibit all three of these characteristics, while the scientific definition of a wetland may only require that one characteristic be present. The regulatory definition deals strictly with vegetated wetlands, while the scientific definition includes both vegetated and non-vegetated areas. Yet both definitions are essentially the same for vegetated wetlands. All of these definitions include one or more of four essential factors: integration of physical, chemical, and biophysical aspects in the environment as an ecosystem; the central role of water as a defining feature; the presence of substrate or soils formed under saturated conditions (hydric soils); and the presence of vegetation adapted for saturated conditions (hydrophytic vegetation).

Alaska’s wetlands occupy 43.3 percent of the state’s 403,247,700 acres (USACE, 2007). This contrasts with the lower 48 states, where only 5.2 percent of the 1.9-billion-acre land surface is wetland. Nearly 99 percent of Alaska’s wetlands are classified as palustrine, of which approximately 67 percent are scrub/shrub, 25 percent are emergent, and 8 percent are forested. Wetland habitats in Alaska are numerous and complex. Wetland habitats can be isolated, ephemeral, or located in riparian areas hydrologically connected to surface waters of rivers, streams, and lakes. Small wetlands, even those without visible surface connections, are joined to stream systems by groundwater, subsurface flows of water, and periodic surface flows, such as spring runoff. Significant wetlands also occur along the coastline and adjacent to river deltas, and within forests throughout the state.

Except for the beaches and berms in the Kivalina area that are well drained, the wetlands surrounding Kivalina are a combination of freshwater forested swamps, shrub bogs, herbaceous marsh, fen, swale and wet meadow (Figure 5). These areas are characterized by poor drainage, areas of standing water, and saturated soils that support a variety of hydrophytic vegetation.

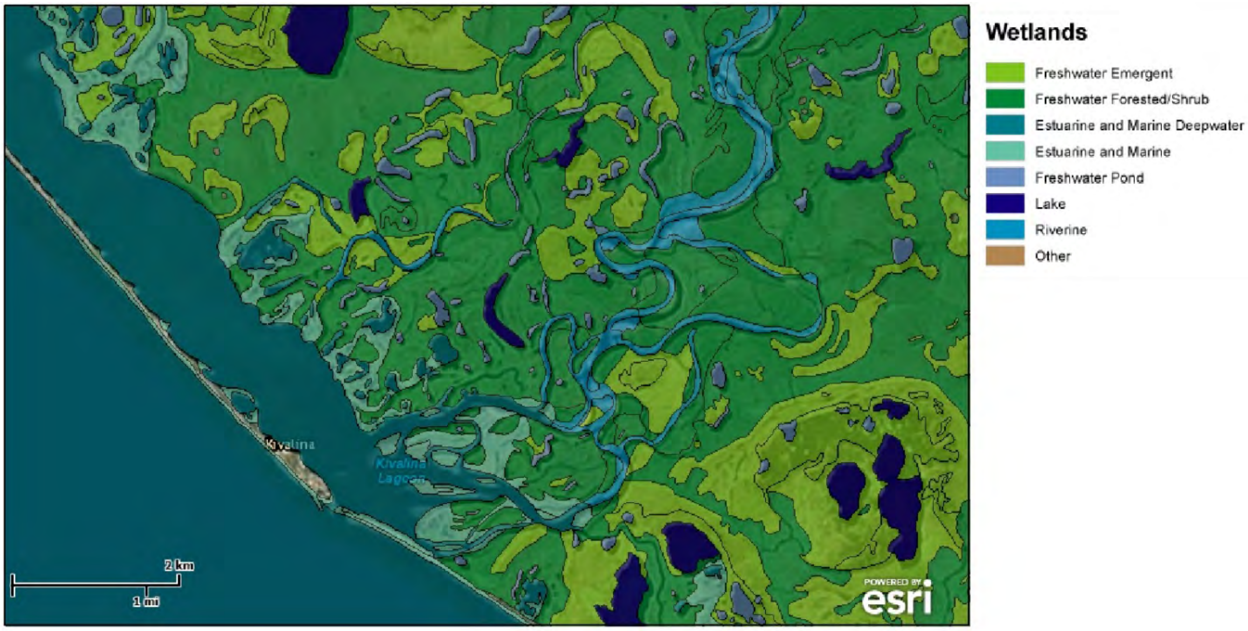

Figure 5: Wetlands in the Kivalina Area

2.8.4 Vegetation

Land vegetation communities in the Kivalina area include tall-grass herbaceous growth on beach berms, transitioning to a mosaic of low shrub tussock tundra, sedge-grass tundra, wet meadow, marsh, and wetland herbaceous zones. As land elevations increase inland, mat and cushion alpine tundra communities are predominant, culminating with sparse or vegetation free zones at the highest elevated inland areas. *Elymus* grasses dominate vegetation on the beach berm, and sedge grasses dominate inland tundra. Areas of low and tall shrub also exist in riparian and upland areas. Higher elevations are dominated by dwarf shrub, mat, and cushion tundra where vegetation is present.

2.8.5 Marine Mammals

The primary mammals of concern in the northwestern arctic near Kivalina are marine mammals, such as bearded seal, ringed seal, Pacific walrus, beluga whale, bowhead whale, minke whale, and polar bear. The following paragraphs summarize important information on each of these mammals relationship to Kivalina.

2.8.5.1 Bearded seal

Bearded seals (*Erignathus barbatus*) migrate through the Bering Straits and Chukchi Sea during the spring and fall migrations due to the retreat or advance of ice. Bearded seals are usually found in areas of thin and broken ice along the thaw leads that typically form 3 to 4 miles or more offshore of Kivalina.

2.8.5.2 Ringed seal

Ringed seals (*Pusa hispida*) migrate with the advancing and retreating ice through the Chukchi Sea and Bering Straits. Ringed seals are found closer to shore, usually within ¾ of a mile, but leave the Kivalina area shortly after breakup.

2.8.5.3 Pacific walrus

Pacific walrus (*Odobenus rosmarus divergens*) migrate through the Chukchi Sea in June along the receding pack ice. They usually do not come closer to Kivalina than 30 to 40 miles or more offshore.

2.8.5.4 Beluga whale

Beluga whales (*Delphinapterus leucas*) migrate through the Chukchi Sea at different times and routes, depending upon what stock is involved. The two stocks (Beaufort Sea and Chukchi Sea) potentially are impacted. During the northward migration, the Beaufort Sea stock usually migrates in leads that form 3 or more miles offshore. The Chukchi Sea stock may migrate close along the beach for at least part of its northward migration. However, the Beaufort Sea stock takes a far westerly route in the Chukchi Sea near Russia during the southward migration. Some of the Chukchi Sea stock returns south down the Alaskan coast, resulting in Kivalina hunters occasionally killing beluga whales in August or September.

2.8.5.5 Bowhead whale

Bowhead whales (*Balaena mysticetus*) migrate through the Chukchi Sea to the Beaufort Sea from March to June, with the heaviest concentrations in April and May. They usually migrate well offshore, following leads that are usually 3 or more miles offshore.

2.8.5.6 Marine Invertebrates

The Chukchi Sea and Kivalina Lagoon floor contains a multitude of marine invertebrates including worms, clams, sea stars, and isopods, other non-mobile or slow-moving species, and species that are more mobile, such as crabs, amphipods, krill, shrimp, and other mobile marine invertebrates. Red king crabs (*Paralithodes camtschaticus*) are found in the Chukchi Sea and are an important subsistence species.

2.8.5.7 Fish

Three categories of fish are found in the Kivalina area: marine, freshwater, and anadromous (i.e. fish born in fresh water, spends most of its life at sea, and returns to freshwater to spawn).

Of the 20 marine species found in various historical sampling efforts (beach seine, ocean seine, fyke net, and trawl), the most abundant species included starry flounder (*Platichthys stellatus*), Arctic flounder (*Liopsetta glacialis*), rainbow smelt (*Osmerus mordax*), saffron cod (*Eleginus gracilis*), Pacific herring (*Clupea pallasii*), Atka mackerel (*Pleurogrammus monopterygius*), yellowfin sole (*Limanda aspera*), and Alaska plaice (*Pleuronectes quadrituberculatus*). Some of these species are important food for the ringed and bearded seals, which are two of the important subsistence marine mammals.

Freshwater species found in the area include: Arctic grayling (*Thymallus arcticus*), whitefish (*Coregonus nelsonii*), burbot (*Lota lota*), northern pike (*Esox lucius*), Alaska blackfish (*Dallia pectoralis*), nine-spine stickleback (*Pungitius pungitius*), and freshwater sculpins (Cottidae). Artic grayling is important as a subsistence fish.

Anadromous or semi-anadromous fish found in the area include salmon, smelts, whitefishes, and ciscoes. Dolly Varden char is the principal fish species in the Wulik River drainage. Whitefish and Dolly Varden char are important to the local subsistence economy. Other anadromous fish resources that are either known or expected to utilize the proposed project area include:

- Arctic char (*Salvelinus alpinus*)
- Dolly Varden char (*S. malma*)
- Pink salmon (*Oncorhynchus gorbuscha*)
- Chum salmon (*O. keta*)
- Arctic cisco (*Coregonus autumnalis*)
- Humpback whitefish (*C. pidschian*)
- Sheefish (*Stenodus nelma*)
- Longfin smelt (*Spirinchus thaleichthys*)
- Rainbow smelt (*Osmerus mordax*)

2.8.5.8 Terrestrial Mammals

Terrestrial mammals found in proximity to Kivalina include inland species such as caribou, moose, ptarmigan, Dall sheep, grizzly (brown) bear, muskoxen, red fox, wolves, and wolverine. Small mammals, such as lemmings, voles, shrews, and Arctic ground squirrels are found in the tundra surrounding Kivalina. Caribou and moose are the principal terrestrial mammals hunted in the area, and these two species will likely be identified as resources of special concern during the NEPA compliance process.

2.8.5.9 Birds

Because of the wetness of this environment, waterfowl and shorebirds dominate the avian community, and passerines are scarce. The most abundant breeding birds include northern pintail, king eider, oldsquaw, American golden-plover, semipalmated sandpiper, pectoral sandpiper, red-necked phalarope, and Lapland longspur. Several Old World species, including the Arctic warbler and bluethroat, penetrate the region from the west. Taiga passerines, such as gray-cheeked thrush and yellow warbler, reach the region along drainage systems, and raptors, including gyrfalcon and rough-legged hawk, commonly nest along major rivers. Few bird species winter in the region. Other birds found in the Kivalina area include waterfowl such as geese, ducks, and loons; raptors such as hawks, falcons, and owls; gulls and terns; cormorants; grouse; and cranes.

Most of the bird species are transitory and are only present seasonally, but pintail and widgeon ducks, and Canada geese are known to nest in the riparian habitat near the lagoon. Flocks of Canada geese, swans, and ducks have been observed migrating inland from the coast during both spring and fall migrations. However, for the thousands of birds using the Chukchi Sea as a primary migratory route, specific routes have not been well documented for the spring and fall migrations.

2.8.5.10 Threatened and Endangered Species

The threatened Steller's eider (*Polysticta stelleri*) and spectacled eider (*Somateria fischeri*) were identified as being potentially present in the project area; the spectacled eider migration routes are 8 to 20 miles offshore, while the Steller's eider migration routes are not well documented. The closest critical habitat for spectacled eider is at Ledyard Bay, which is about 80 miles north of Kivalina.

The threatened polar bear (*Ursus maritimus*) was also identified as being potentially present. Polar bears are found along the coast of the Chukchi Sea during the winter following migrating ringed seals. However, with breakup, polar bears leave the area.

2.8.5.11 Migratory Bird Treaty Act Species

Avian species that may be present in the project area and protected under the Migratory Bird Treaty Act (MBTA) include Arctic tern (*Sterna paradisaea*), bar-tailed godwit (*Limosa lapponica*), dunlin (*Calidris alpina arcticola*), Kittlitz's murrelet (*Brachyramphus brevirostris*), peregrine falcon (*Falco peregrinus*), red-throated loon (*Gavia stellate*), semipalmated sandpiper (*Calidris pusilla*), short-eared owl (*Asio flammeus*), whimbrel (*Numenius phaeopus*), yellow-billed loon (Gavia adamsii), and red knot (*Calidris canutus* ssp. *Roselaari*).

2.9 Cultural Resources

The Kivalina area was part of Beringia during the late Pleistocene Era. Current archaeological theory believes this was the route people followed as they colonized the Americas about 11,000 years ago. The recovery of Pleistocene mammoth and mastodon tusk fragments from the floor of the Alaska continental shelf has strengthened the idea that people would have followed large grazing animals across the vast steppe tundra.

The proposed project area is encompassed by Alaska Historic Resources Survey (AHRS) site NOA-042: the Cape Krusenstern Archaeological District National Monument National Historic Landmark (NHL). This district covers more than 2 million acres and encompasses the region around Cape Krusenstern on the coast from north of Kivalina Lagoon, south and east to beyond the mouth of Noatak River, and inland to a point northwest of Maiyumerak Mountains. NOA-

042 is listed on the National Register of Historic Places (NRHP) under Criterion D for its potential to provide additional information on the continuous habitation of Cape Krusenstern over the past 11,000 years. First excavated in the late 1950's by Louis Giddings, a pioneering arctic archaeologist, 114 beach ridges at Cape Krusenstern were found to contain the remains of prehistoric peoples. The 114 parallel marine beach ridges, formed at an average of 60 years each, are the main features of the landscape between Cape Krusenstern and Kivalina. These former coastal margins contain houses, burials, cache pits, and other remains of the peoples who have occupied these beaches progressively for at least 5,000 years. Older sites that dated from 11,000 to 6,000 years before present (BP) were identified on unglaciated uplands near the beach ridges. Prehistoric arctic cultures represented within the NHL include Western Thule (BP 1000), Birnirk (BP 1300), Ipiutak (BP 2000), Norton (BP 2500), Choris (BP 3000), Old Whaling (BP 3800) and Denbigh (BP 5000-4500). The sites with the NHL represent virtually the entire range of known prehistoric cultures in northwestern Alaska, in a "horizonal stratification" that has improved understanding of the sequence of these cultures. An estimated 29 cultural sites are identified within and around the village of Kivalina. The lower Noatak Valley, an important avenue between the coast and the interior for millennia, also contains a number of archaeological sites that have the potential to provide important information about early migrations.

Because of the multitude of significant cultural sites identified within NOA-042, and a long-standing tradition of subsistence use at Kivalina, there is a high probability for uncovering unidentified cultural materials during this project's undertaking (Figure 6). Prehistoric house pits (NOA-328), historically significant buildings (NOA-314, etc), lithic scatters (NOA-327 and NOA-328), village sites, and burials (NOA-326 and NOA-328) are reported throughout the potential project area. Numerous resources have also been identified in proximity to Kivalina village, including aquatic resources in the Wulik and Kivalina Rivers and Kivalina Lagoon, terrestrial resources on the tundra, and marine resources in the Chukchi Sea. Considering the fact that Kivalina has been utilized as a traditional subsistence use area for thousands of years, areas of high probability for archaeological resources include the Kivalina Spit, Kivalina Lagoon, and areas along Wulik and Kivalina Rivers, and Igrugaivuk Creek.

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Figure 6: Cultural sites in the Kivalina area (AHRS database accessed October 6, 2015)

2.10 Subsistence

2.10.1 Introduction

Subsistence is defined as the non-commercial hunting, fishing, and gathering of wild renewable resources for direct personal or family consumption as food, shelter, fuel, clothing, tools, and handicrafts, and for trade, barter, or sharing. Subsistence harvests may be authorized by Federal regulations or state permits for personal use, sport hunting, sport fishing, or trapping, or may be based in some other regulation or custom. Besides the use of traditional ecological knowledge, subsistence information comes from multiple other sources, including subsistence data gathered by state, Federal, and other agencies, hunters' reports to agencies, and from conversations with the people of northwestern Alaska. Subsistence resources that are likely of special interest are listed in Table 4.

Table 4: Subsistence Resources of Special Interest

Marine Mammals	Fish	Birds	Terrestrial Mammals
Bearded seal	Char	Ducks	Caribou
Walrus	Grayling	Geese	Moose
Beluga whale	Salmon	Ptarmigan	Dall sheep
Bowhead whale	Whitefish		
Ringed seal	Cod		
Polar bear			

The following paragraphs describe subsistence species that may be affected by a possible project. They include Alaska Native views regarding the potential impacts to the harvesting of subsistence resources as well as harvest numbers for the above species of special interest.

2.10.1.1 Beluga Whale

According to Native hunters, the summer after the dock and trestle was constructed at Red Dog Mine's Portsite, not one beluga whale migrated along the shoreline in the summer. This observation is repeated by the traditional knowledge in the other villages of northwestern Alaska and the Chukotka Peninsula that beluga whales are sensitive to noise and, consequently, the noise from the Portsite's operations forces the whales to move out to sea, rather than follow the shoreline past Kivalina. Data collected on the beluga whale harvest since the 1987–1988 season indicates that Kivalina hunters have shifted their prime harvest of belugas from the summer stock (Eastern Chukchi Sea) to the spring stock (Beaufort Sea).

2.10.1.2 Bowhead Whale

Very few bowhead whales are harvested for subsistence; Kivalina hunters harvested only three bowheads between 1991 and 2002. Traditional knowledge also indicates that bowhead whales are sensitive to noise, and Native hunters are very careful about making any noise when hunting bowheads.

2.10.1.3 Polar Bear

Alaska Natives are the only U.S. citizens authorized by the Federal Government to kill polar bears for subsistence. Polar bears are usually taken when the hunters are seeking beluga and bowhead whales. The skins and hair of polar bears are used in Native culture for clothing, crafts, and artwork. The mean harvest of the Chukchi Sea stock of polar bears was 49 per year between 1996 and 2000.

2.10.1.4 Bearded and Ringed Seals

According to traditional knowledge, ringed seals continue to be an important subsistence species but have lost some of their importance as a subsistence resource. Most of the traditional uses of the ringed seal have been taken over by modern goods and the snowmobile. However, they still are important as meat for Native hunters while living in subsistence camps for extended stays. Bearded seals have surpassed ringed seals in the amount and importance as a subsistence resource. They are five times heavier than a ringed seal, and thus, make a greater dietary contribution to Alaska Natives. Bearded seals also are used for seal oil, which is used for dietary and trading purposes with other communities. During the 1991–1992 harvest, Kivalina hunters took 139 bearded and 110 ringed seals.

2.10.1.5 Pacific Walrus

Native hunters harvest few Pacific walrus in the Kivalina area. Because most of the walrus are far offshore, Native hunters may travel 30 to 40 miles to harvest them and have been known to travel as far as 300 miles. The walrus is used for its meat, its ivory tusks for artwork, and its tough skin for traditional skin boats. Kivalina hunters took only 15 walruses between 1998 and 2005.

2.10.1.6 Fish

The subsistence harvest statistics show that the vast majority of fish taken by Kivalina residents are Dolly Varden char. Other important subsistence species are saffron cod, salmon, whitefish, and Arctic grayling. Salmon, char, and whitefish are usually caught with gillnets or seine nets, while Arctic grayling and saffron cod are caught with hook and line. Fish caught for subsistence are either frozen, dried, or cooked and eaten fresh. During the 1991–1992 subsistence harvest, about 70,000 pounds of Dolly Varden char, 6,000 pounds of cod, 5,000 pounds of salmon, and about 4,600 pounds of whitefish were taken. Only about 650 pounds of Arctic grayling were taken during this same harvest period.

2.10.1.7 Terrestrial Mammals

Caribou, moose, and Dall sheep are the predominant terrestrial mammals hunted for subsistence. Caribou are harvested year round, but most are taken during the migration in the fall when they come near Kivalina. Caribou are taken in the greatest numbers, and the average family in Kivalina needs 12 caribou in support of their dietary requirements. During the 1991–1992 harvest season, Kivalina hunters took 351 caribou. Moose are usually taken in the fall and winter when they congregate around the riverbanks. Moose fat is sometimes mixed with berries in the diets of Alaska Natives. Though moose are much larger than caribou, far fewer moose are taken (17 during the 1991–1992 season) in general because caribou meat is preferred over moose meat. Dall sheep, which are found in the DeLong and Baird mountains, are usually taken when hunters are fishing for char. However, very few Dall sheep are taken for subsistence with none taken in the 1991–1992 season.

2.10.1.8 Birds

Ducks, geese (black brant), and sometimes swans are primary subsistence birds in the Kivalina area. Both the adult birds and eggs are eaten. Ptarmigan are also taken in the fall, winter, and early spring. Birds are hunted with shotguns or rifles. Birds are preserved using traditional methods of freezing or cooking or are eaten fresh. During the 1991–1992 subsistence harvest season, Kivalina hunters took 944 geese, 609 ducks, and 637 ptarmigan.

2.10.2 Importance of Subsistence

Kivalina residents are strongly tied to subsistence gathering, and as such, depend on these resources to a great degree due to the economic conditions that prevail for many residents in northwestern Alaska. Especially for the residents of communities outside the more diversified economic hubs (Kotzebue, Nome and Barrow), high unemployment, low incomes and high rates of poverty persist. Subsequently, subsistence is a primary source of food for many people and is at the center of tradition and culture.

3. KIVALINA LAGOON

Kivalina Lagoon is a shallow body of water. Cross sectional surveys of the lagoon show that most of the lagoon is shallow with bottom depths between -1 foot MLLW and -3 feet MLLW. The northeast shoreline is dominated by the deltas of the Kivalina and Wulik Rivers. Both rivers flow through the lagoon and normally have separate outlets through the barrier island to the Chukchi Sea. Sediment transport along the Chukchi Sea Coast occasionally blocks these entrances; however, these blockages are temporary. After a blockage occurs, flow from the rivers elevates the water level in the lagoon until it passes over the opening and a new channel is formed as the flow head cuts through the sand deposits.

3.1 Waves and Currents

Currents have not been measured in Kivalina Lagoon. It is assumed that during storm event conditions, currents are fully controlled by the passing weather system and baseline conditions during non-storm conditions would not be detectable. River currents are assumed to pass directly from the river deltas on the mainland shore of the lagoon through the river openings. Defined river channels can be seen in aerial imagery of the lagoon and were verified by hydrographic survey of the project area. A tidal current is evident in the bathymetry by the channel that runs along the lagoon shore of the barrier island. This channel is likely the result of ebb tides impinging the shoreline, though it could also be a relic channel of the Wulik River.

Waves in Kivalina Lagoon are primarily generated by local winds. Waves from the Chukchi Sea are primarily blocked by the barrier islands. Wave energy entering the lagoon through the river openings is dissipated by sand bars of material deposited by the rivers and through interaction with the current of the rivers. Wind speed analysis was performed using the airport records from 1999 through 2015 to determine frequency of occurrence relationships for wind speed at

Kivalina. The analysis was filtered by direction; winds from the northwest and southeast were considered separately for this analysis to correspond with wave growth along the long axis of the lagoon. Wave heights were calculated using these winds and the methodology prescribed in EM 1110-2-1100 Part II Chapter, 2 which resulted in a design wave height of 4.3 feet inside the lagoon.

3.2 Hydrology

The Wulik River and Kivalina River provide significant flow into Kivalina Lagoon. The Wulik River has a gage that has been in operation since 1984. A bulletin 17B analysis of the gage record in 1997 estimated a 100-year flow event of approximately 55,000 cubic feet per second (cfs). In August of 2012, an event of approximately 50,000 cfs was measured at the gage (Figure 7). The Kivalina River is not gaged, but can be assumed to follow the same discharge patterns as the Wulik River; when the Wulik River runs high, the Kivalina River would run high was well. Regional regression equations published by the U.S. Geological Survey consider only basin area when estimating peak flows of rivers in the northwest arctic region. Based on a comparison of basin areas, the Kivalina River would be expected to produce approximately 75 percent of the discharge of the Wulik River. Both rivers drain into low lying ground on the mainland side of Kivalina Lagoon. The size of the lagoon and the low ground elevation on the mainland provide a large area for storage when the rivers rise out of their banks. Also, the lagoon drains directly into the ocean and inflow is passed through to the ocean with little change in water surface elevation. As a result, high flows on the rivers will be distributed over the surface of the lagoon and floodplain causing only minor changes to the water level of the lagoon.

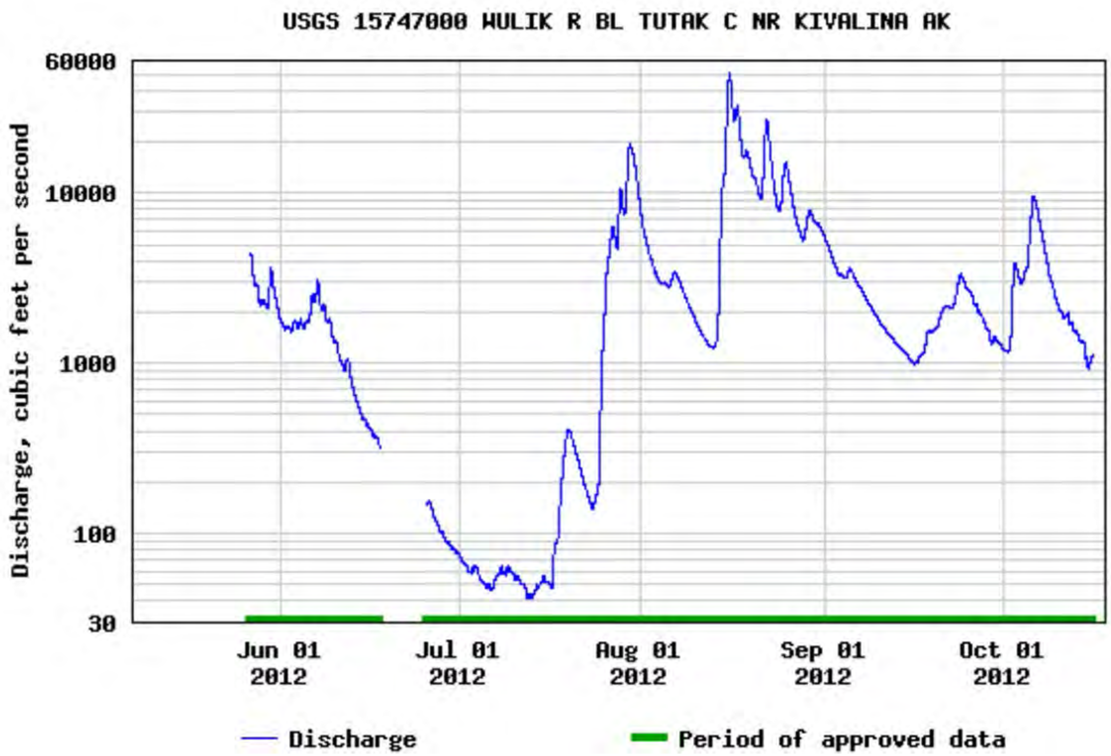

Figure 7: Gage record of the Wulik River for 2012. The maximum peak value recorded in August 2012 was 50,400 cfs.

3.3 Contaminants

Much of the arctic environment is receiving pollutants, including heavy metals such as cadmium and mercury, and persistent organic pollutants (POP) such as polychlorinated biphenyls (PCB) and pesticides from areas outside the arctic. A significant method of transport to the arctic ecosystem is upper-atmosphere winds originating in the industrial areas of Asia and Europe. The Brooks Range in Alaska has huge naturally-mineralized areas that for eons have been contributing heavy metals (including lead, zinc, and cadmium) to sediments in the Chukchi Sea and Arctic Ocean through the natural process of erosion by wind, water, and ice. However, most local contaminants introduced to Alaskan arctic waters are quickly dispersed and diluted to below threshold levels, assimilated by living organisms, or chelated (bonded with other elements or compounds) into inert forms where they eventually end up in the sediments on the seafloor.

4. CONCEPT PROJECT FEATURES

The project concept features two rock fill and earthen causeways connected by a single lane bridge over a dredged bridge basin (Figure 8). The southwest terminus of the causeway will be between the community of Kivalina and the airport. The northeast terminus will be a 200-foot by 300-foot earthen pad constructed near the shoreline of Kivalina Lagoon. The causeways will have 30-foot-wide road surface at an elevation of +13 feet MLLW and will be traversable during a storm event that inundates the barrier island. Causeway embankment slopes will be built at 1.5H:1V and protected from erosion with 700-pound armor stones. The bridge will have a 14-foot at a minimum elevation of +20 feet MLLW. The bridge will be sloped for drainage and provide a minimum of 12 feet of overhead clearance for marine traffic passing below. A basin will be dredged beneath all spans of the bridge to increase conveyance of water during a storm event and reduce current velocities. The concept alignment follows the southern route From WHPacific's Evacuation Road study dated 2014 (Figure 9).

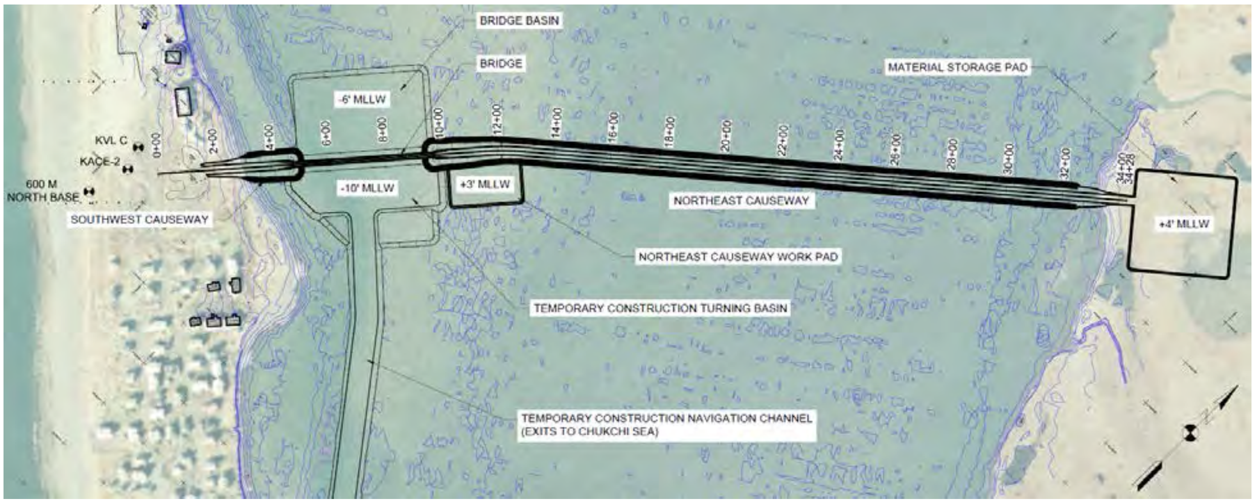

Figure 8: Plan view of the concept project.

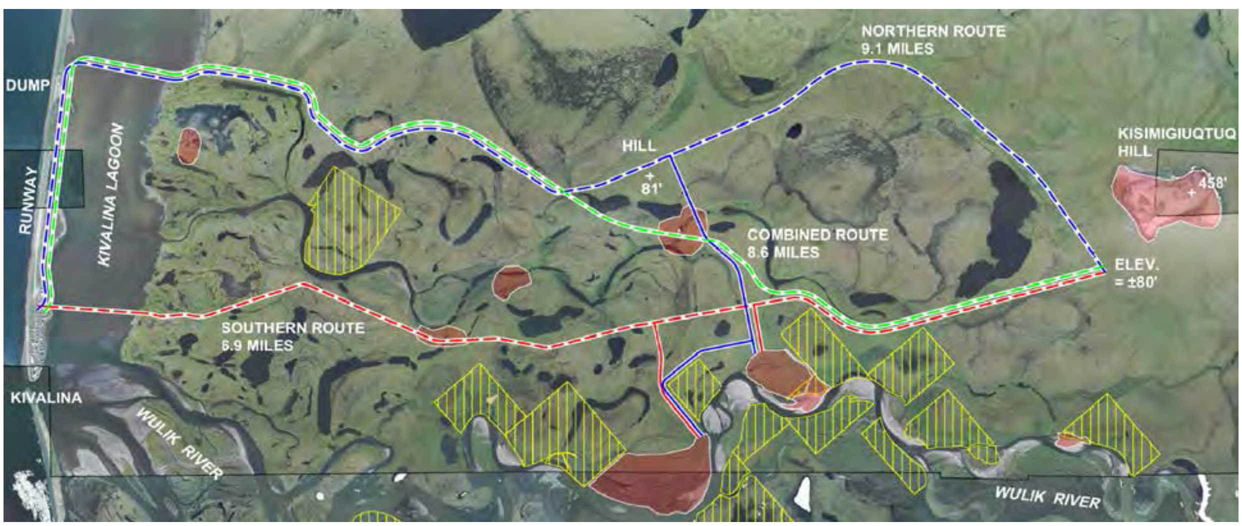

Figure 9: Detail of evacuation routes studied by WHPacific in 2014. The concept project follows the southern alignment over the lagoon shown in red.

5. ENVIRONMENTAL CONSIDERATION

The concept project is expected to require fill in Waters of the U.S., and to have potential impacts to navigable waters; therefore, a Department of the Army permit will be required under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899. Since issuance of a permit is considered a Federal action, an environmental assessment and/or environmental impact statement prepared under the National Environmental Policy Act (NEPA) will be required.

5.1 NATIONAL ENVIRONMENTAL POLICY ACT OF 1969

In accordance with the National Environmental Policy Act (NEPA), the President's Council on Environmental Quality (CEQ) Regulations at 40 CFR 1500 et seq., and the USACE's Procedures for Implementing NEPA (ER 200-2-2), all Federal agencies are required to give appropriate consideration to the environmental effects of proposed actions during their planning and decision making processes, and to document those considerations, and the resulting recommendations, for major Federal actions that may significantly affect the quality of the human environment. This documentation generally takes the form of either an environmental assessment (EA) or an environmental impact statement (EIS). The preparation of an EA is usually undertaken to determine the extent of the probable environmental effects of a proposed action and to decide whether or not those impacts are significant. The EA ultimately determines whether or not an EIS is required (i.e., the probable impacts are significant), or whether a finding of no significant impact (FONSI) is appropriate.

Based on an initial review and evaluation of the probable impacts that may accrue to each of the proposed project's alternatives, supported with communications with the various Federal and state resource agencies, it is anticipated that the proposed action will not likely have a significant impact, and that an EA/FONSI will be adequate to ensure compliance with NEPA.

In order to support that determination, more extensive coordination will be held during the next planning phase with the various Federal and state resource agencies, interested third parties, as well as the public. Although a formal scoping meeting is not expected to be required, as an EIS will not likely be required; community scoping meetings will be scheduled to discuss all environmental concerns and obtain local information sufficient to complete the EA. Collectively, these discussions will include factors related to achieving compliance with the following:

5.2 CLEAN WATER ACT

The purpose of the Clean Water Act (CWA), and specifically the Section 404(b)(1) Guidelines (40 CFR 230), is to maintain and restore the chemical, physical, and biological integrity of the waters of the U.S. through the control of discharges of dredged or fill material. Except as provided under CWA Section 404(b)(2), no discharge of dredged or fill material will be permitted if there is a practicable alternative to the proposed discharge that would have less adverse impact on the aquatic ecosystem, as long as the alternative does not have other significant adverse environmental consequences.

The potential short-term and long-term effects of a proposed placement of fill material on the physical, chemical, and biological components of the Kivalina Lagoon aquatic environment will be formally determined during the next planning phase. Several alternatives were developed for the Kivalina evacuation road over the Kivalina Lagoon, varying primarily in the lengths of the two causeways and inter-connecting bridge, and therefore, in the amount of fill material required.

A single, solid–fill causeway (e.g., no bridge) would separate Kivalina Lagoon into two separate bodies of water, and likely result in a significant impairment of fish and marine mammal movement between the two bodies. Water quality in the southern end of the northern section of Kivalina Lagoon may also be impaired, and the volume at times significantly reduced or even fully-drained by wind action from the southeast. As a result, this alternative would likely result in the greatest impacts to the chemical, physical, and biological integrity of Kivalina Lagoon.

Bridge Alternative 1, employing a 115-foot-long bridge over the tidal circulation channel, would require the most fill in waters of the U.S. of the four alternatives that incorporate a bridge that connects two separate causeways, In addition to having a larger volume of fill, this alternative would also result in the greatest velocities under the bridge, creating a velocity barrier (2.9 meters per second) that would likely impact fish and mammal survival as they were carried through the narrow and shallow passageway between the bridge abutments.

The preferred alternative, Bridge Alternative 4, would require the least amount of fill material for causeway construction, and minimize water velocities under the bridge and is therefore likely to be determined to be the least environmental damaging practicable alternative (LEDPA) under the 404(b)(1) Guidelines.

5.3 Rivers and Harbors Act

Section 10 of the Rivers and Harbors Act (RHA) of 1899 prohibits the unauthorized obstruction or alteration of any navigable water of the U.S. This section provides that the construction of any structure in or over any navigable water of the U.S., or accomplishment of any other work affecting the course, location, condition, or physical capacity of such waters, is unlawful unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of the Army. The Secretary's approval authority has since been delegated to the Chief of Engineers. The Chief of Engineers determination during the next planning phase, will be the final decision as it relates to the proposed project's compliance with Section 10 of the RHA.

5.4 Endangered Species Act

The purpose of the Endangered Species Act (ESA) is to protect and recover imperiled species and the ecosystems upon which they depend. The Act is administered cooperatively by the

USFWS and the National Marine Fisheries Service (NMFS). The USFWS has primary responsibility for terrestrial and freshwater organisms, while the responsibilities of NMFS are mainly marine wildlife such as whales and anadromous fish. Under the ESA, species may be listed as either endangered or threatened. “Endangered” means a species is in danger of extinction throughout all or a significant portion of its range. “Threatened” means a species is likely to become endangered within the foreseeable future. All species of plants and animals, except pest insects, are eligible for listing as endangered or threatened. For the purposes of the ESA, Congress defined species to include subspecies, varieties, and for vertebrates, distinct population segments. As discussed in paragraph 3.6.5.10, three threatened species are expected to be present in the project area - the threatened Steller’s eider (*Polysticta stelleri*), spectacled eider (*Somateria fischeri*), and polar bear (*Ursus maritimus*); while the final determination of “may effect” will be made during the next phase of project planning, formal consultation with the USFWS under the ESA is not anticipated.

5.5 Marine Mammal Protection Act

The Marine Mammal Protection Act (MMPA) provides protection to marine mammals in both state waters (within 3 miles from the coastline) and the ocean waters beyond. As specified in the MMPA, USFWS is responsible for the management of polar bears, walrus, and sea otters; NMFS is responsible for all other marine mammals such as whales, porpoises, and seals. The USACE is required to coordinate with these agencies on potential impacts to species covered by this act and must address these agencies’ concerns and recommendations. Coordination with NMFS with regards to MMPA species will occur during the next planning phase, and appropriate measures will be adopted to avoid and minimize potential harm to any marine mammals encountered in the project area.

5.6 Migratory Bird Treaty Act

The essential provision of the Migratory Bird Treaty Act makes it 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 USACE is required to avoid a taking under this act during construction of the proposed project.

5.7 Magnuson-Stevens Fishery Conservation and Management Act Fishery Conservation Amendments of 1996

The Magnuson-Stevens Fishery Conservation and Management Act provides for the conservation and management of all fishery resources between 3 and 200 nautical miles offshore. The 1996 amendments to this act require regional fisheries management councils, with assistance from the NMFS, to delineate Essential Fish Habitat (EFH) in Fishery Management Plans (FMPs) for all managed species. EFH is defined as an area that consists of “waters and substrate necessary for spawning, breeding, feeding or growth to maturity” for certain fish species. Federal 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. An Essential Fish Habitat (EFH) assessment will be developed in the next planning phase.

5.8 Anadromous Streams

Anadromous streams are water bodies that support some life function of an anadromous fish species (e.g., salmon, trout, char, whitefish, sturgeon). Anadromous fishes are likely to be a significant environmental consideration for this project since each of the alternatives involves placement of fill material in lagoon waters in the vicinity of the confluence with the Wulik River. The Alaska Department of Fish and Game (ADFG) maintains the state’s anadromous waters data as well as all revisions to and publication of the “Catalog of Waters Important for the Spawning, Rearing or Migration of Anadromous Fishes.”

5.9 National Historic Preservation Act

Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended December 2000, and its implementing regulations (36 CFR §800) require all Federal agencies to consider the effects of their undertakings on historic properties. Undertakings include “a project, activity, or program funded in whole or in part under the direct or indirect jurisdiction of a Federal agency” [36 CFR §800.16(y)]; this includes undertakings requiring a Federal permit, license, or approval. Based on the nature of the archaeological sites within NOA-042 and the high probability of additional sites existing near Kivalina, it is the recommendation of the USACE archaeologist that a Section 106 investigative survey be conducted in areas that will be impacted by construction of the Kivalina causeway. Furthermore, intensive archaeological investigations should focus on potential locations where the causeway will tie in to the spit and the mainland, and where the future road will lead to the new village site. Although construction of the roadway and buildup of the new village site will be outside the proposed project scope and not a USACE undertaking, the road and village site are considered to be a result of the causeway construction. If the layout of the proposed evacuation road and new village become known during the course of the USACE project, it would be prudent to extend the Section 106 investigative survey to include those areas.

5.10 State Lands and Waters

Coordination with the Alaska Department of Natural Resources (ADNR) will be necessary for any work within the Kivalina Lagoon. Permits will need to be obtained from ADNR as necessary.

5.11 Hazardous, Toxic, and Radioactive Waste (HTRW)

Contaminated sediments in the lagoon are not expected to be an issue. Further investigation of sediment and water quality will need to be conducted during the next planning phase to confirm this determination.

6. REFERENCES

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7. ATTACHMENTS

Causeway and Bridge Design Report

Evacuation Bridge and Causeway Concept Plans

Geotechnical Investigation

Western Alaska Storm Surge Modeling Study: Kivalina Lagoon Causeway

Kivalina Lagoon Crossing
Planning Assistance to States Study

Causeway & Bridge Design Report

Kivalina, Alaska

April 2016

U.S. Army Corps
of Engineers

Alaska District

EXECUTIVE SUMMARY

This report provides the design basis for a concept project to construct an access road across Kivalina Lagoon from the community of Kivalina to the opposite shore near the mouth of the Wulik River. The primary purpose of this road would be to allow the residents of Kivalina to evacuate the barrier island where they are located in the event of a storm that threatens to overtop the island. The road would also serve as primary construction access to the mainland for further development of the evacuation route and facilities.

The concept project includes two earthen causeways, a concrete bridge, a dredged bridge basin and a storage pad on the mainland. The southeast causeway would connect to the Kivalina road system near the airport maintenance hangar. This causeway would project 250 feet to the northwest ending at the edge of a naturally deep channel in the lagoon. A 500 foot long one lane concrete bridge consisting of four 125 foot spans of decked bulb tee girders would span this channel and adjacent area and terminate on the northeast causeway. The lagoon under the bridge would be dredged to -6 feet MLLW and a scour apron would be placed under the bridge to provide better conveyance of water during storm events and protect the structure from undermining. The northeast causeway would angle slightly to the north extent 2450 feet across the lagoon to terminate on the mainland shore. The causeway would connect to a 350 foot by 350 foot material storage pad.

The effects of this causeway and other designs on water levels and currents in Kivalina Lagoon were studied using an ADCIRC model. The model showed that high velocity currents would be produced if an opening of less than 500 feet is used, which presents a higher risk of failure during an evacuation event than the concept project. Analysis of wind and wave conditions at Kivalina also showed that the causeway embankments would require armored revetments to prevent erosion damage from local wave action.

A construction analysis of the project features showed that project construction will take four years at a minimum and require multiple mobilization cycles. Most of the material for this project would need to be imported from a rock quarry capable of producing 700 pound stone that remains competent after multiple freeze-thaw cycles. Temporary facilities required to construct the bridge were investigated including navigation access to the work site and work platforms for pile driver and crane activities. Cost analysis of these construction requirements show that the concept project would cost $79,000,000.

CONTENTS

1. INTRODUCTION

1.1 Report Purpose

This report describes the design considerations and project features of a proposed evacuation route from Kivalina to the mainland across Kivalina Lagoon. The primary purpose of this route is to provide safe passage for residents of Kivalina to transit to the mainland by ground vehicle during a storm event that threatens or is causing flooding in the community of Kivalina. This report provides the engineering background information for determining the cost of major construction features including causeways, bridges, channel improvements, and coastal protection. This study focuses on a single concept plan to construct two earth and rock fill causeways connected by a single lane bridge across Kivalina Lagoon between the community and the mainland. The alignment for this concept starts south of the airport apron near the current location of material stockpiles and makes landfall across the lagoon to the north of the mouth of the Wulik River. The scope of this report is limited to the extents of the evacuation route crossing Kivalina Lagoon. The portion of the route on the mainland and the final evacuation site is beyond the scope of this report.

1.2 Project Purpose and Needs Assessment

The following objectives were identified for the evacuation road for Kivalina.

a. Provide a safe route for residents of Kivalina evacuate to a site on the mainland across Kivalina Lagoon during a storm event.

b. Provide passage for local skiff traffic and winter traffic under the proposed evacuation route.

c. Provide access for development of the mainland portion of the route and the final evacuation site.

Figure 1: Kivalina location map

2. SITE DESCRIPTION

Kivalina is a community of approximately 374 people located on the Chukchi Sea coast approximately 80 miles northwest of Kotzebue and 625 miles northwest of Anchorage (Figure 1). The coastline in this region is characterized by a sandy beach that runs in a southeast to northwest direction. The community is built on the southeastern end of a five-mile-long barrier island that separates Kivalina Lagoon from the Chukchi Sea (Figure 2). The island has been partially stabilized from erosion at Kivalina by a rock revetment built by the U.S. Army Corps of Engineers (USACE) in 2009. Two rivers drain into Kivalina Lagoon; the Wulik River near Kivalina and the Kivalina River to the north. Kivalina Lagoon is a shallow body of water approximately 10 miles long that ranges in width from 3000 feet near the mouth of the Wulik River to 8000 feet north of the Kivalina River (Figure 3).

Figure 2: Aerial view of Kivalina looking from the southeast. The community is located at the southeast end of a barrier island between the Chukchi Sea and Kivalina Lagoon.

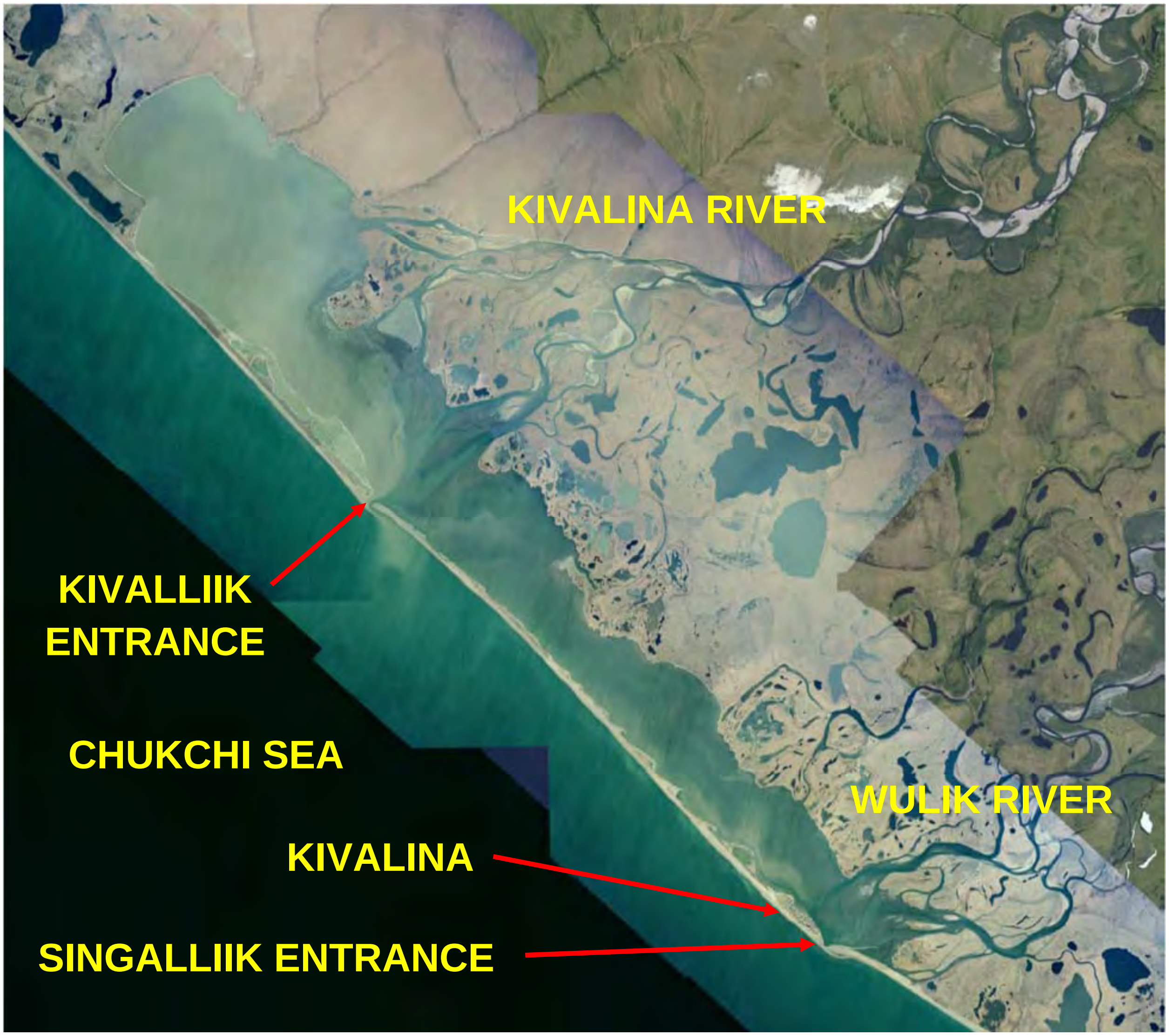

Figure 3: Kivalina Lagoon Vicinity. The lagoon is approximately 10 miles from end to end along the long axis.

2.1 Climatology

Kivalina falls within the arctic climate zone, characterized by seasonal extremes in temperature. Winters are long and harsh, and summers are short but warm. The Chukchi Sea is typically ice-free and open to boat traffic from mid-June to the first of November. Temperatures typically range from -33°F in the winter to 65°F in the summer. Maximum and minimum recorded temperatures range from 90°F to -53°F. Materials used for a project in Kivalina must be able to perform throughout the full range of temperature extremes.

2.2 Water Levels

2.2.1 Tides

Water levels are not directly measured at Kivalina. The closest tidal recording station to the site is at the Red Dog Mine Dock, located 16 miles to the south of Kivalina (Table 1).

Table 1: Tidal data for Red Dog Dock, Alaska

Published tidal data for Red Dog Dock, Alaska (ft)

Highest Observed Water Level (2/25/2011)	+7.41
Mean Higher High Water (MHHW)	+0.88
Mean High Water (MHW)	+0.79
Mean Tide Level (MTL)	+0.46
Mean Sea Level (MSL)	+0.44
Mean Low Water (MLW)..............................	+0.12
Mean Lower Low Water (MLLW)..................	0.0 (datum)
Lowest Observed Water Level (11/09/2005)	-5.78

Source: NOAA NOS, Tidal Epoch 1983-2001, published 7/21/2011.

Tidal measurements used for construction of the revetment built by the US Army Corps of Engineers Alaska District in 2009 found similar tides at Kivalina with an estimated Mean Higher High water of 0.9 feet and an estimated Mean Tide Level of 0.43 feet. For the purposes of this study, tides at Kivalina are assumed to have the same elevations as the tides at Red Dog Dock.

2.2.2 Storm Surge

Water levels in the region are measured at two gages: Nome and Red Dog Dock. The period of record for these gages begins in 1992 and 2003, respectively. The gage data does not have sufficient period of record to establish frequency of occurrence relationships for water levels in the region. Probabilistic water levels for the western coast of Alaska were modeled using hindcast storm information applied to an ADCIRC long-wave model (USACE, 2014). The study grid was established to determine frequency occurrence relationships for 17 points along the western Alaska coast. Kivalina is the northern-most reported point in this study. This data shows modeled storm surge residuals which is the local water level deviation from the predicted tide level. Maximum water surface elevations for this design were calculated by adding the storm surge residual to the elevation of Mean Higher High Water. Storm surge residuals and peak water surface elevations for Kivalina are shown in Table 2. The data shows the 1 percent annual exceedance probability (AEP) water level with a 100 year return period to be 7.3 feet above Mean Lower Low Water.

Table 2: Summary of frequency-of-occurrence relationships for hindcast storm induced water level at Kivalina, Alaska

Annual Exceedance Probability	Modeled Storm Surge Residual (feet)	Peak Water Surface Elevation (feet, MLLW)
0.2	3.5	4.4
0.1	4.3	5.2
0.05	5.4	6.3
0.04	5.6	6.5
0.02	6.2	7.1
0.01	6.4	7.3

2.2.3 Sea Level Change

The Corps of Engineers requires that planning studies and engineering designs consider alternatives that are formulated and evaluated for the entire range of possible future rates of sea level change (SLC). Guidance for addressing SLC is in Engineer Circular EC 1165-2-212 and detailed below. Three scenarios of “low,” “intermediate,” and “high” SLC are evaluated over the project life cycle. According to the EC, the SLC “low” rate is the historic SLC. The “intermediate” and “high” rates are computed using the following:

> Estimate the “intermediate” rate of local mean sea-level change using the modified National Research Council (NRC) Curve I and the NRC equations. Add those to the local historic rate of vertical land movement.
>
> Estimate the “high” rate of local mean SLC using the modified NRC Curve III and NRC equations. Add those to the local rate of vertical land movement. This “high” rate exceeds the upper bounds of Intergovernmental Panel on Climate Change (IPCC) estimates from both 2001 and 2007 to accommodate potential rapid loss of ice from Antarctica and Greenland.

NRC Equations

The 1987 NRC described these three scenarios using the following equation:

$$E(t) = 0.0012t + bt^2$$

in which t represents years, starting in 1986, b is a constant, and $E(t)$ is the eustatic sea level change, in meters, as a function of t. The NRC committee recommended “projections be updated approximately every decade to incorporate additional data.” At the time the NRC report was prepared, the estimate of global mean sea level change was approximately 1.2 mm/year. Using the current estimate of 1.7 mm/year for GMSL change, as presented by the IPCC (IPCC 2007), results in this equation being modified to be:

$$E(t) = 0.0017t + bt^2$$

The three scenarios proposed by the NRC result in global eustatic sea level rise values, by the year 2100, of 0.5 meter, 1.0 meter, and 1.5 meters. Adjusting the equation to include the historic GMSL change rate of 1.7 mm/year and the start date of 1992 (which corresponds to the midpoint of the current National Tidal Datum Epoch of 1983-2001), results in updated values for the variable b being equal to 2.71E-5 for modified NRC Curve I, 7.00E-5 for modified NRC Curve II, and 1.13E-4 for modified NRC Curve III. The three GMSL rise scenarios are shown in Figure 4 (Figure 5 from EC 1165-2-212).

Manipulating the equation to account for the fact that it was developed for eustatic sea level rise starting in 1992, while projects will actually be constructed at some date after 1992, results in the following equation:

$$E(t_2) - E(t_1) = 0.0017(t_2 - t_1) + b(t_2^2 - t_1^2)$$

where t_1 is the time between the project's construction date and 1992 and t_2 is the time between a future date at which one wants an estimate for sea level change and 1992 (or $t_2 = t_1$ + number of years after construction) . For the three scenarios proposed by the NRC, b is equal to 2.71E-5 for Curve 1, 7.00E-5 for Curve 2, and 1.13E-4 for Curve 3.

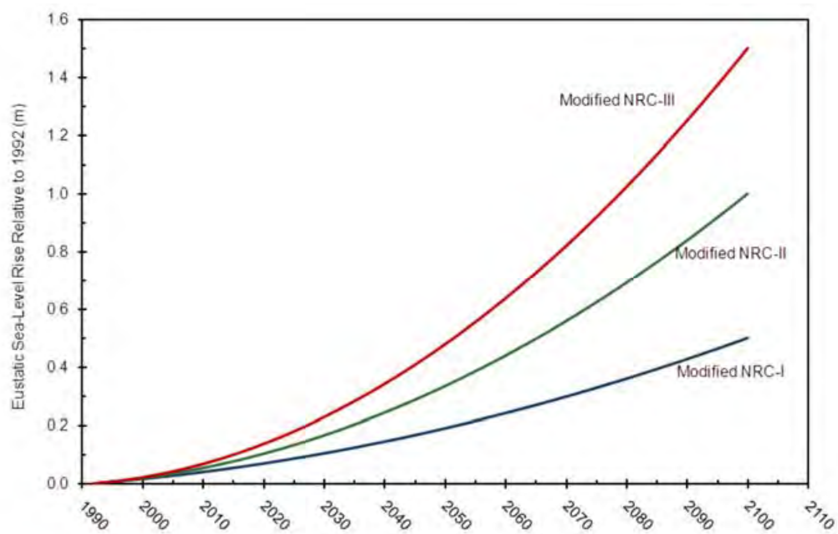

Figure 4: (Figure 5 from EC 1165-2-212). Scenarios for GMSL Rise (based on updates to NRC 1987 equation).

The closest tide station at Red Dog Dock does not have the recommended 40-year period of record for the relative sea level change (RSLC) value. The Red Dog Dock tide station has a 10-year period of record (Figure 5). The record shows that storms systems have a much greater effect on water level than astronomical tides. Over the short period of record, long term trends in the tidal signal are not identifiable.

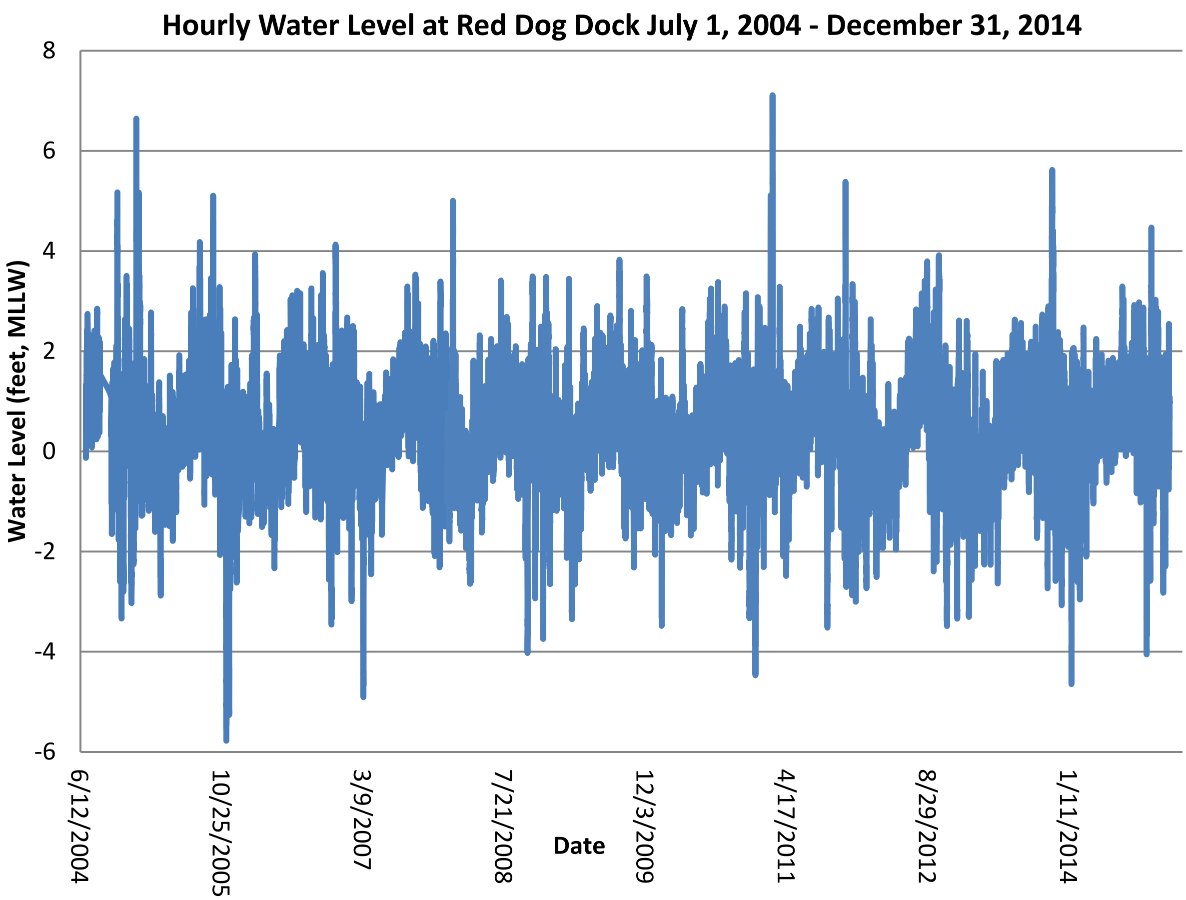

Figure 5: Recorded Water Levels at Red Dog Dock

Per the guidance recommendation, a U.S. tide station with a 40-year period of record was investigated for use as the RSCL value. The nearest U.S. tide station with the required 40-year period of record is the Seldovia, Alaska station, roughly 700 miles from the site. It has a historic relative sea level change (RSLC) of -9.45 mm/yr. Due to the distance from Kivalina, the Seldovia gage was not further investigated. In the absence of better data, the GMSL rate was used to model sea level change at Kivalina (Table 3).

Table 3: (Table 3 per EC 1165-2-212). Sea Level Rise Prediction for a 50-Year Project Life.

Scenario	Low (Historic)	Intermediate (Curve I)	High (Curve III)
GMSL	+0.28 feet	+0.75 feet	+2.24 feet

3. KIVALINA LAGOON

Kivalina Lagoon is a shallow body of water. Cross sectional surveys of the lagoon show that most of the lagoon is shallow with bottom elevations between -1 foot MLLW and -3 feet MLLW. The northeast shoreline is dominated by the deltas of the Kivalina and Wulik Rivers. Both rivers flow through the lagoon and normally have separate outlets through the barrier island to the Chukchi Sea. Sediment transport along the Chukchi Sea Coast occasionally blocks these entrances, however these blockages are temporary. After a blockage occurs, flow from the rivers elevates the water level in the lagoon until it passes over the opening and a new channel is formed as the flow head cuts through the sand deposits.

3.1 Waves and Currents

3.1.1 Currents

Currents have not been measured in Kivalina Lagoon. It is assumed that during storm event conditions, currents are fully controlled by the passing weather system and baseline conditions during non-storm conditions would not be detectable. River currents are assumed to pass directly from the river deltas on the mainland shore of the lagoon through the river openings. Defined river channels can be seen in aerial imagery of the lagoon and were verified by hydrographic survey of the project area. A tidal current is evident in the bathymetry by the channel that runs along the lagoon shore of the barrier island. This channel is likely the result of ebb tides impinging the shoreline, though it could also be a relic channel of the Wulik River.

3.1.2 Wind and Wave Climate

Waves in Kivalina Lagoon are primarily generated by local winds. Waves from the Chukchi Sea are primarily blocked by the barrier islands. Wave energy entering the lagoon through the river openings is dissipated by sand bars of material deposited by the rivers and through interaction with the current of the rivers. Wind speed for this analysis was collected from the US Air Force 14th Weather Squadron which analyzed the airport records from 1999 through 2015 to determine frequency of occurrence relationships for wind speed at Kivalina. The analysis was filtered by direction; winds from the northwest and southeast were considered separately for this analysis to correspond with wave growth along the long axis of the lagoon (Table 4 and Table 5).

Table 4: One Hour Sustained Wind Extreme Value Analysis, Kivalina, AK (PAVL) – Northwest Winds

RETURN PERIOD (YRS)	1.1	1.25	2	5	10	20	50	100	1000	10000
VARIATE 1 Hour Sustained Winds (Knots)	29.1	30.8	33.5	35.6	36.4	37.0	37.5	37.8	38.5	38.8
VARIATE 1 Hour Sustained Winds (m/s)	14.9	15.8	17.3	18.3	18.7	19.0	19.3	19.5	19.8	19.9

Table 5: One Hour Sustained Wind Extreme Value Analysis, Kivalina, AK (PAVL) – Southeast Winds

RETURN PERIOD (YRS)	1.1	1.25	2	5	10	20	50	100	1000	10000
VARIATE 1 Hour Sustained Winds (Knots)	36.3	37.2	39.8	43.8	46.4	49.0	52.2	54.5	62.1	69.4
VARIATE 1 Hour Sustained Winds (m/s)	18.7	19.1	20.5	22.5	23.9	25.2	26.8	28.0	31.9	35.7

Local waves were assumed to be limited by fetch and were estimated using the methodology prescribed in EM 1110-2-1100 Part II Chapter 2. Fetch lengths were determined using the measurement from the project site to the farthest shoreline of the lagoon along the long axis. The southeast fetch was estimated to have a length of 1 mile and the northwest fetch was estimated to have a length of 9 miles. Even though higher wind speeds were found from the southeast, larger waves were estimated by winds from the northwest due to the longer fetch length. Wave breaking was investigated due to the shallow depth of the lagoon, however this was found not to be a limiting factor for wave generation. Numerical modeling described in this report showed elevated water levels in the lagoon as the storms that generate the northwest and southeast winds pass over the site.

Table 6: Fetch-limited wave heights in Kivalina Lagoon.

Wind Direction	Return Period (years)	Wind Speed (knots)	Wave height (feet)
Southeast	20	49.0	2.0
Southeast	50	52.2	2.1
Southeast	100	54.5	2.2
Northwest	20	37.0	4.2
Northwest	50	37.5	4.2
Northwest	100	37.8	4.3

Very little difference was seen between wind speeds and corresponding wave heights for the 20, 50 and 100 year return periods. This may be due to the short period of record at the airport. For design purposes, a 4.3 foot wave height was used to calculate the minimum size for armor on the side slopes of the causeway.

3.2 Hydrology

The Wulik River and Kivalina River provide significant flow into Kivalina Lagoon. The Wulik River has a gage that has been in operation since 1984. A bulletin 17B analysis of the gage record in 1997 estimated a 100 year flow event of approximately 55,000 cubic feet per second.

In August of 2012, an event of approximately 50,000 cfs was measured at the gage (Figure 6). The Kivalina River is ungaged, but can be assumed to follow the same discharge patterns as the Wulik River; when the Wulik River runs high, the Kivalina River would run high was well. Regional regression equations published by the US Geological Survey consider only basin area when estimating peak flows of rivers in the northwest arctic region. Based on a comparison of basin areas, the Kivalina River would be expected to produce approximately 75% of the discharge of the Wulik River. Both rivers drain into low lying ground on the mainland side of Kivalina lagoon. The size of the lagoon and the low ground elevation on the mainland provide a large area for storage when the rivers rise out of their banks. Also, the lagoon drains directly into the ocean and inflow is passed through to the ocean with little change in water surface elevation. As a result, high flows on the rivers will be distributed over the surface of the lagoon and floodplain causing only minor changes to the water level of the lagoon.

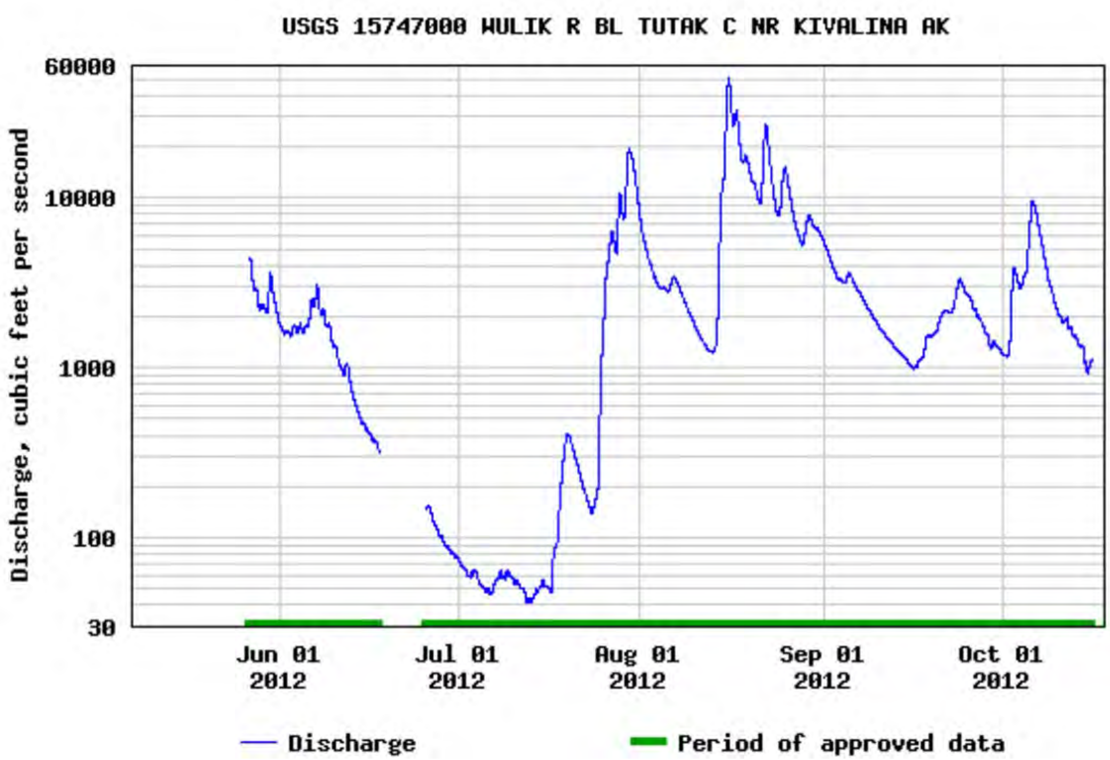

Figure 6: Gage record of the Wulik River for 2012. The maximum peak value recorded in August 2012 was 50,400 cfs.

4. DESIGN CONSIDERATIONS

4.1 Navigation Clearances

Navigation under the bridge was a design consideration for the road profile. Vessel traffic under the bridge requires sufficient clearance to minimize the risk of vessel and bridge damage for marine traffic passing from Kivalina to the northeast portion of the lagoon. Vessels transiting to the northwestern end of the lagoon were assumed to be open hulled skiffs with super structures not exceeding 6 feet above the waterline. Due to shoaling at the mouth of the Wulik River and the generally shallow bathymetry of Kivalina Lagoon, it is assumed that larger vessels such as tugs, barges and fishery support vessels do not enter Kivalina Lagoon and do not require navigation under the bridge. Navigation clearance under the bridge constrains the elevation of the bottom chord of the bridge.

A design water level for Kivalina Lagoon was established to ensure sufficient navigation clearance under the bridge. The water level record at Red Dog Dock was used for Kivalina Lagoon. The sites are approximately 16 miles apart and the coastline at both sites is oriented in a northwest-southeast direction. This makes it likely that water levels at Kivalina will respond similar to the water level at Red Dog Dock in response to storm systems that affect the region. Water levels at Red Dog Dock were analyzed from June 1, 2004 to December 31, 2014 to determine the frequency of exceedance relationship. The data was binned at 0.5 foot elevation increments and plotted against percent exceedance (Figure 7). For the purpose of clearance under the bridge, a water surface elevation of +2 feet MLLW was selected which roughly corresponds to a 5% level of exceedance. This elevation was found to be a break point on the exceedance curve; higher elevations have only marginal decreases in exceedance times. It is also assumed that there will be little to no navigation under the bridge when waters exceed +2 feet MLLW due to rough waters caused by the high speed winds that cause the water level to surge above this elevation.

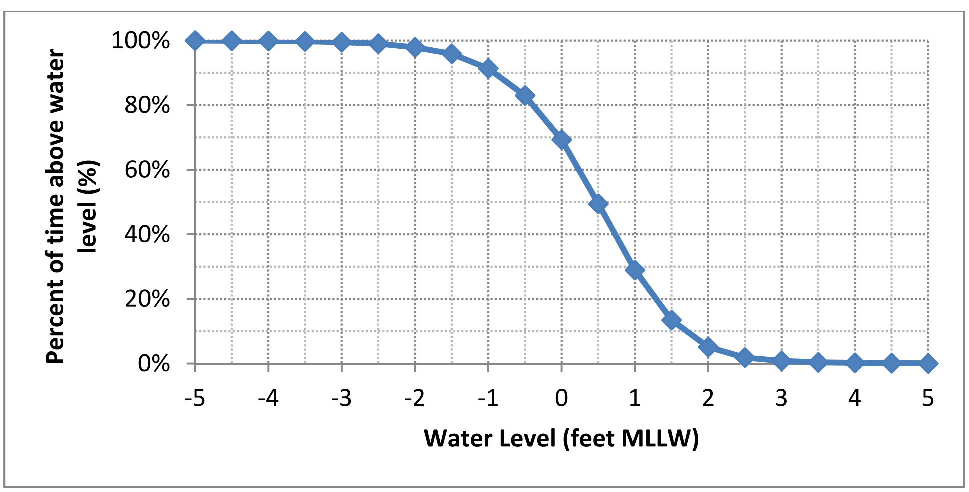

Figure 7: Frequency of water levels at Red Dog Dock, Alaska from July 1, 2004 to December 31, 2014.

Estimates of sea level change could have a moderate impact on navigation. The historic rate of sea level change would produce a 0.3 foot increase in design water level which would be a negligible reduction in overhead. Intermediate and high projected rates produce water levels 0.8

and 2.2 feet higher than the design water level. If the design water level were to increase over time, overhead clearances would be reduced.

4.2 Ice Considerations

Ice forces were assumed not to be a factor in the design of the causeway and bridge. Kivalina Lagoon is a small body of water separated from the open ocean by barrier islands. The forces generated by wind stress over large sheets of ice on the ocean cannot be developed inside the lagoon. Also, due to the shallow bathymetry of the lagoon, it is assumed that the ice in the lagoon becomes bottom fast in the winter and remains static through breakup. Should the ice float off the bottom of the lagoon, the maximum thickness would be around 4 feet due to the bathymetry. Flow of ice under the bridge during breakup is also not considered to be a major concern; both the Wulik River and Kivalina River have direct outlets to the ocean at most times. Ice near these rivers will exit directly out into the Chukchi Sea during breakup.

Ice may be a factor in scour under the bridge if a storm were to occur while ice was present in the lagoon. Floating ice has the potential to block one or more bridge openings and increase velocity under the bridge during a storm event. This could result in more scour at the piers and abutments than estimated in this report.

4.3 Traffic Loads

The design purpose for the causeway and bridge is to evacuate the community of Kivalina to the mainland in advance of a storm that would inundate the island. Other uses for the bridge include access to the mainland for subsistence purposes during non-storm events and access to the mainland for construction of the remainder of the evacuation route and evacuation facilities.

4.3.1 Evacuation Event Traffic Loads

Traffic is expected to be primarily one-way during the event with residents of the community traversing the causeway from the island to the mainland. A 100% rate of evacuation would constitute approximately 400 people using the bridge over the course of a day with some residents sharing vehicles to make the crossing. For the purpose of this analysis, it is assumed that 150 vehicles will be used to evacuate the population of Kivalina and will cross the bridge over the course of 6 hours. Average daily use of the causeway and bridge during non-events will be much lower.

The vehicles currently available in Kivalina for evacuation are primarily ATV's which have different size, speed and weight characteristics than typical highway vehicles. Operational speeds for ATV's is highly dependent upon the driver. An arbitrary minimum speed of 15 miles per hour is considered for traffic on the causeway and bridge. Vehicles travelling at this speed would take approximately 10 minutes to cross the lagoon. The causeway embankments have a top width of 30 feet with roughly 24 feet of driving surface width. This width is sufficient for faster moving traffic to pass slower traffic. The main constriction will be the bridge which will only have 12 feet of driving width. ATV's are small enough to allow passing over the bridge, however the confined width will require faster moving vehicles to slow down. Any traffic returning to the island during an evacuation event would severely limit the ability of evacuees from passing each other en route to the mainland and would likely cause delays to the evacuation.

Traffic loads during an evacuation are assumed to be less than standard highway lane loading; trucks are not present in Kivalina and heavy equipment is unlikely to be used to evacuate residents from the island.

4.3.2 Evacuation Route Development Access

Upon completion of the bridge and causeway portion of the evacuation route, construction activities would continue on the mainland to complete the evacuation route and construct evacuation facilities at the route terminus. Construction equipment and materials mobilized to the road alignment will most likely be delivered to the Chukchi coastline between the community and airport then driven across the causeways and bridge to the mainland construction sites. This equipment can be assumed to be loaders, graders and other wheeled equipment that would drive across the lagoon as well as track mounted equipment such as excavators and bulldozers which would be loaded on trailers and driven across the lagoon to the construction site. Such construction traffic would not occur in conjunction with a standard lane load over this bridge; the deck width prevents two way traffic when equipment is passing over the bridge. A live load conforming to HS-25-44 (Figure 8) was used for prescriptive sizing of bridge girders. Loads greater than the HS-25-44 design load would be evaluated as overloads and considered on an individual basis as the need arises. Full design of the bridge deck or foundations is not included in this report. Additional investigations of the subsurface need to be completed prior to performing a detailed bridge design.

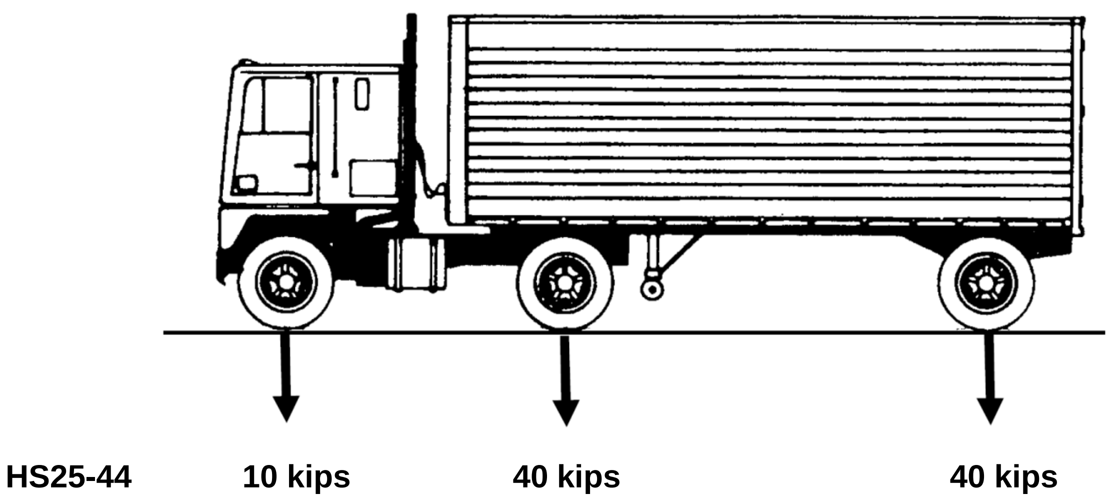

Figure 8: AASHTO HS-20 standard load. Distance between the front axles is typically 14 feet and distance between the rear axles varies depending upon design trailer length.

4.4 Foundation Design

A geotechnical investigation of sub-surface conditions under the causeway alignment was performed between March 14 and March 21 of 2015. Drilling was conducted using a track-mounted Geoprobe 6712DT drill rig. A total of six boreholes were drilled, two 50-foot boreholes near the barrier island and four 30-foot holes on the alignment towards the mainland (Figure 9). Samples were collected with a split-barrel sampler in accordance with ASTM D 1586. 72 samples were collected and sent to a laboratory for classification. Full details of the investigation are attached to this report.

Interpretation of the results shows that coarser material was encountered at the surface from the barrier island to the tidal circulation channel that runs along the lagoon shore of the island. Towards the mainland, the sand deposits are covered with fine material. The thickness of the fine material appears to increase from the barrier island to the mainland shore of the lagoon. Blow counts of the holes show zones of very loose material.

The geotechnical investigation was planned under the assumption that shallow sheet pile foundations would be adequate for the bridge. Hydraulic modeling of the bridge has shown that longer spans than initially planned will be required and that deep pipe pile foundations will be needed to support the bridge. Further investigation will be required to determine the depth of the pile foundations. For the purpose of this report, pile tip elevations are assumed to be -200 feet MLLW. This depth is also assumed to be sufficient to resist frost jacking which may occur at this site.

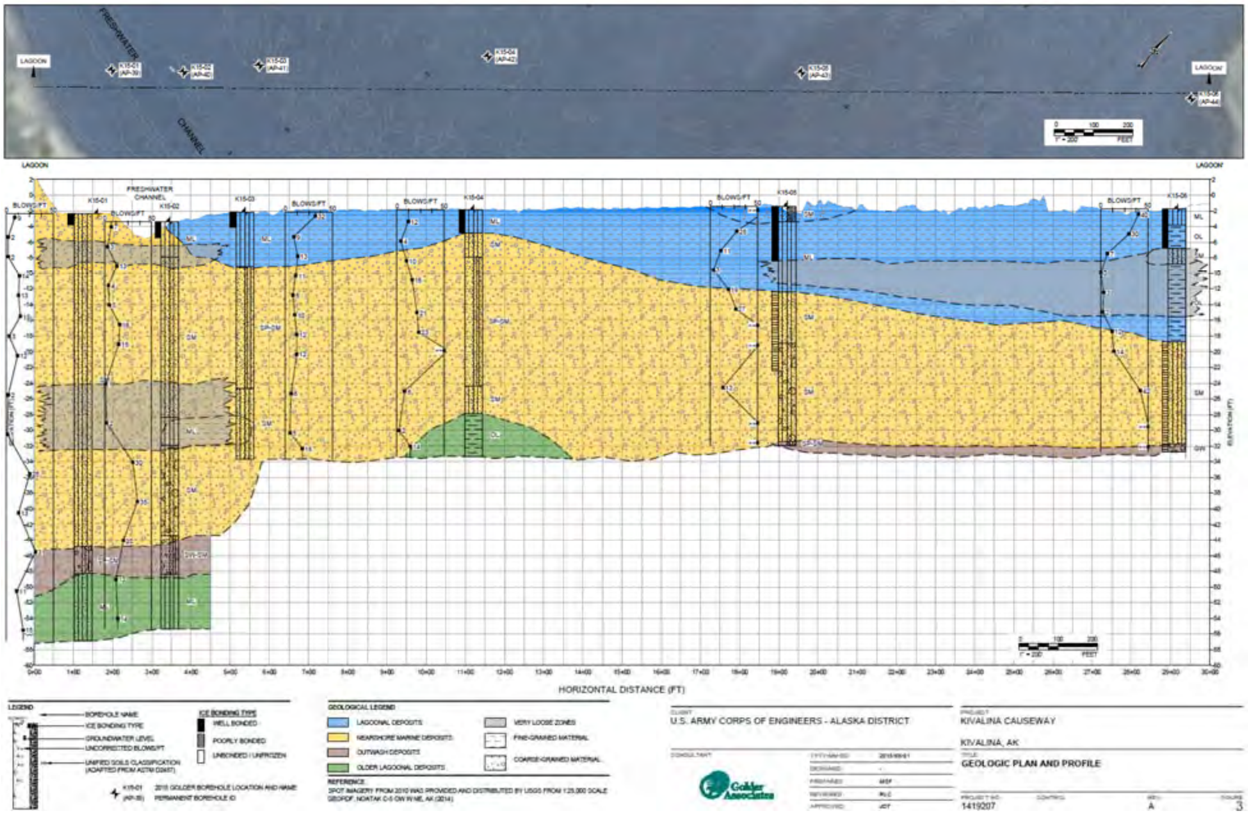

Figure 9: Geologic plan and profile of boreholes along the causeway alignment. The blue zone represents lagoonal deposits, the yellow area represents nearshore matrine deposits, the red zone represents outwash deposits, and the green zone represents older lagoonal deposits. The brown overlay areas in the lagoonal and nearshore marine deposits show zones of very loose material. In general, the figure shows the lagoonal and older lagoonal deposits to be composed of fine material and the nearshore marine and outwash deposits to be coarse grained material. The full sheet is located in the geotechnical report attached to this report.

5. ADCIRC MODELLING

The U.S. Army Corps of Engineers Alaska District has an ongoing study at the Coastal Hydraulics Laboratory to estimate water levels on the western coast of Alaska titled, " The Storm-Induced Water Level Prediction Study for the Western Coast of Alaska". As part of this study, ADCIRC (Luettich et al. 1992) is applied to estimate wind and atmospheric pressure forced storm surge water levels. The ADCIRC model, additional information related to ADCIRC including a detailed description of the model, model documentation, and descriptions of the model's application can be obtained at (http://www.adcirc.org). It is important to note that the ADCIRC model runs at Mean Tide Level (MTL) and does not include a tidal signal. The model output is a modeled storm surge residual; the local change in water level caused by the modeled storm systems. To determine maximum water surface elevation, residuals computed by the model must be added to the elevation of a still water level. For this project, the base still water was taken to be Mean Higher High Water (MHHW) which is +0.9 feet MLLW at Kivalina.

The ADCIRC model used in the water level study was modified with additional survey data of Kivalina Lagoon to develop hydrodynamic model simulation information of extreme water levels and currents in support of bridge and causeway design at Kivalina, AK. The model was initially used to determine what effect a causeway across the lagoon would have on water levels at Kivalina. Initial runs found that the storm surge estimates for Kivalina were not materially affected by the construction a bridge and causeway for emergency evacuation of the island. Once this was established, the model was used to estimate the velocity of the flow around and between four bridge and causeway configurations.

5.1 Design Storms

Several of the largest storms to cause surge at Kivalina were used to model currents under the bridge. It was found that the storms that produce the largest storm surge at Kivilana were not the same storms that produced the highest current velocities through the bridge openings. This is likely due to the fact that the causeway and bridge are oriented roughly perpendicular to the shoreline. Maximum surge at Kivalina is caused by on-shore winds that blow from the ocean to the shoreline. This wind direction is parallel to the causeway and bridge and does not directly force a water surface difference across the causeway. Winds from the northwest or southeast were found to cause the greatest currents through the bridge openings. Furthermore, due to the tracks that storms in the area follow, the winds from the southeast were found to be significantly higher than winds from the northwest and higher current velocities were consistently generated from the southeast. As storms approach the shoreline at Kivalina, the edge of the storm to first affect the lagoon blows from the southeast. The center of the storm is over water during this phase and the storm can maintain its energy. By the time the storm produces northwest winds at Kivalina, the center of the storm is over land and the storm has weakened (Figure 10). Also, storms that move north offshore will also produce high southeast winds as the edge sweeps past the lagoon.

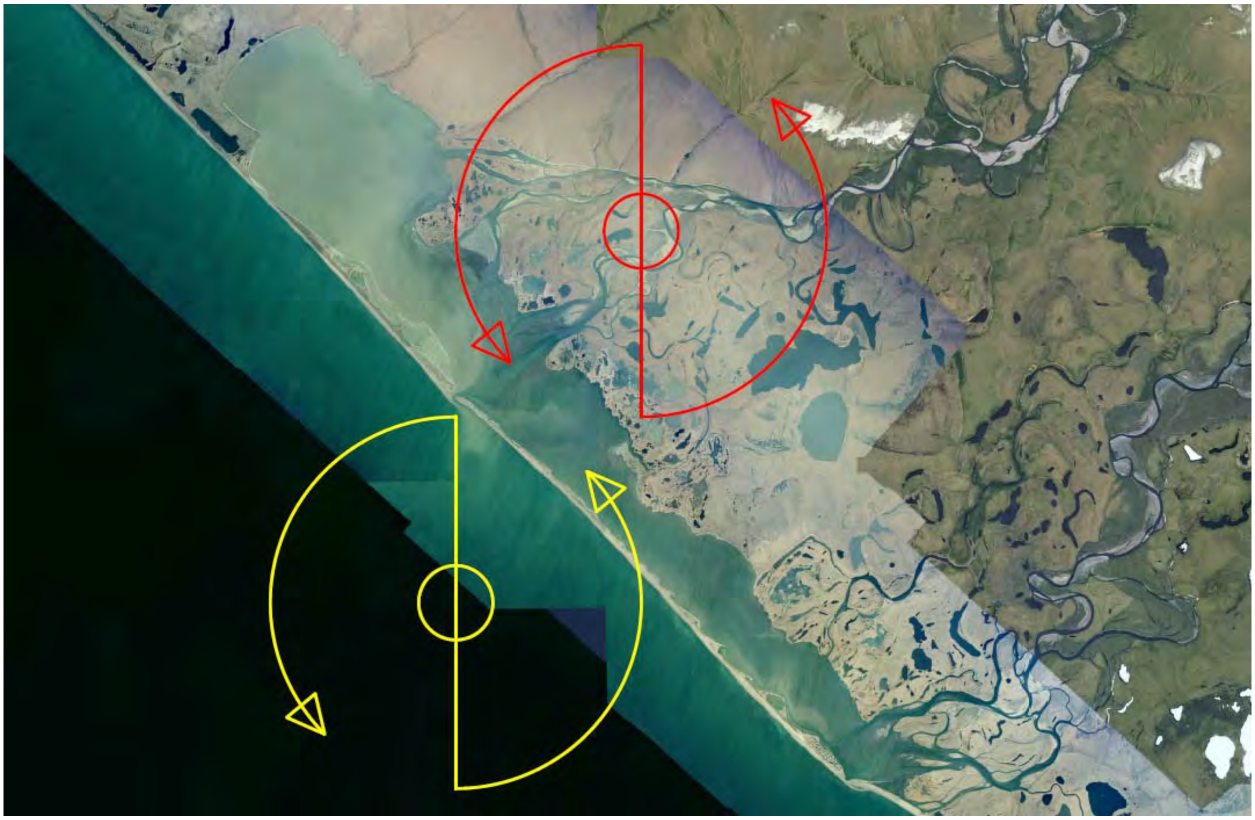

Figure 10: Wind direction in Kivalina Lagoon as a storm moves inland. Winds are stronger when the center of the storm is offshore (yellow figure) and weaker when the center is over land (red figure).

5.2 Sensitivity Check on Water Levels

Prior to modeling bridge openings, the sensitivity of modeled water levels in Kivalina Lagoon was checked by comparing the modeled storm surge residuals found in the WAK production model against the new Kivalina grid. Simulation comparisons of the original model and the Kivalina model with no obstructions placed in the lagoon produce nearly identical modeled storm surge residuals (Figure 11).

Before modeling the effects of bridge openings on water levels, a sensitivity check was performed by adding a solid fill causeway across Kivalina Lagoon along the evacuation road alignment. The largest increase in modeled storm surge residuals in the lagoon were found to be less than 0.2 meters, or about eight inches when compared to water levels in an open lagoon. The maximum increase in water levels was found during the modeled 1966 storm which does not produce maximum water surface elevations in the lagoon. During the 1974 storm, which models the largest storm surge residuals, the difference between an open lagoon and a blocked lagoon is on the order of 0.1 meter or about 4 inches.

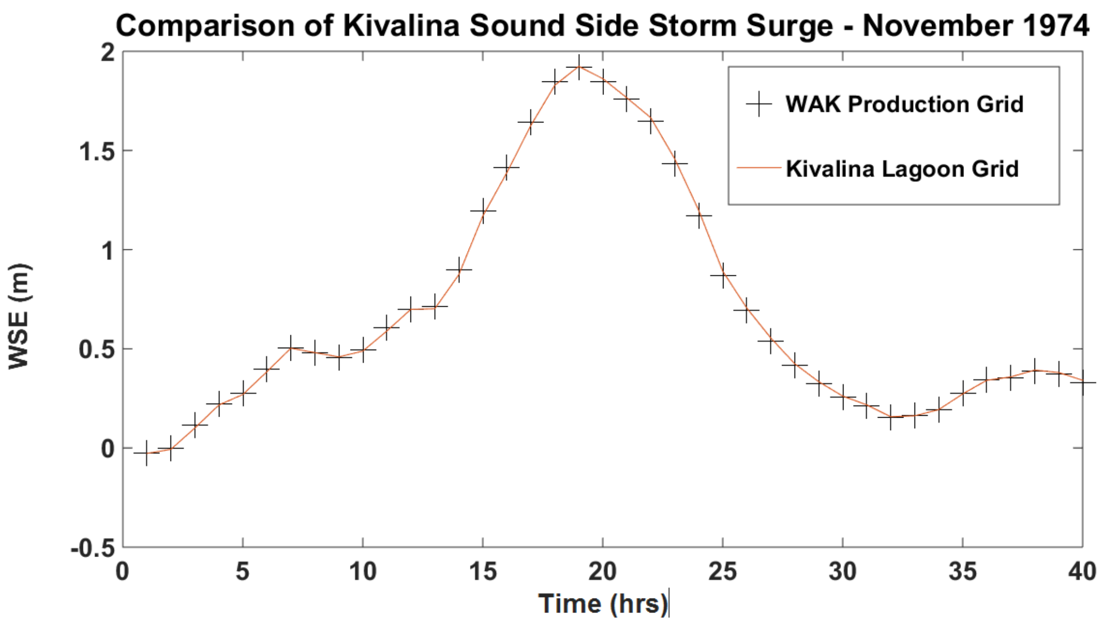

Figure 11: Comparison of modeled storm surge residuals between WAK production model and Kivalina Lagoon model. Water level response to storm systems is nearly identical.

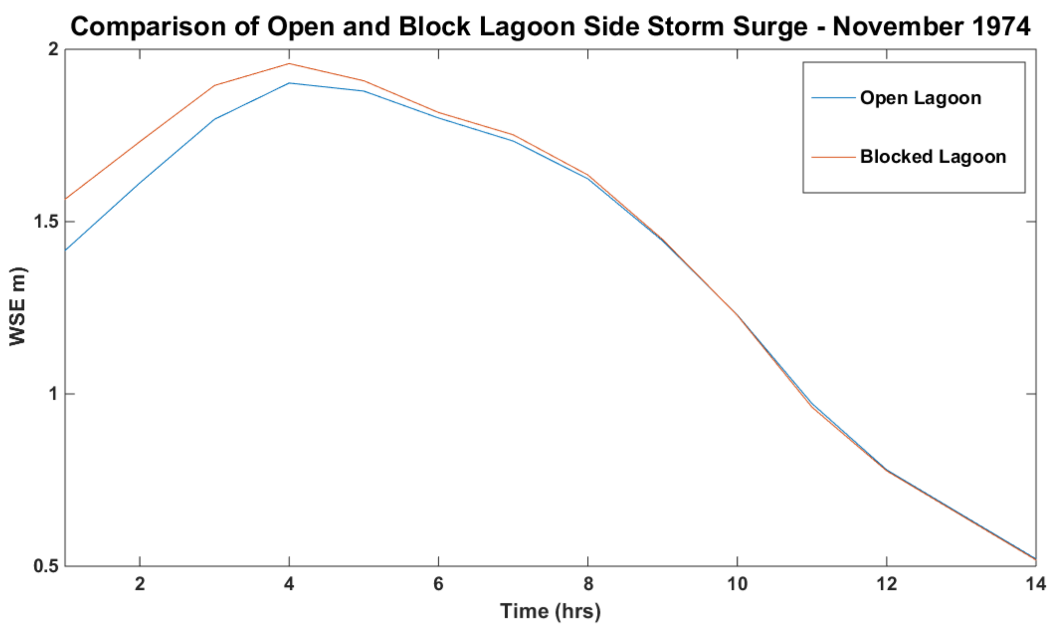

Figure 12: Largest modeled storm surge residuals found with a fully blocked lagoon (red) compared to maximum water level found with an open lagoon (blue).

5.3 Scour Criteria

A velocity criterion of 1 meter per second was used as a threshold for tolerable scour under and around the bridge. Currents of this magnitude can be expected to mobilize the existing bed material of the lagoon, but scour can be prevented by constructing rock spall aprons. Additionally, higher velocities were also found to have larger areas where scour could occur.

Some of these areas had the potential to cause damage to the shoreline at the community and the airport.

Scour potential of the soil was considered in this criterion; suggested maximum velocities for erodible bed material can be found in water resource textbooks (Table 7). The following values were used as indicator velocities for erosion. The geotechnical investigation revealed that surface materials consisted of fine sand near the barrier island and bridge location, and silt deposits towards the mainland. These materials are expected to mobilize in currents exceeding 0.5 meters per second to 1.1 meters per second. Generally, due to the turbulent nature of the flow during a storm event, the lower velocity thresholds for the materials were used to indicate erosion. For the Kivalina shoreline, erosion may occur in velocities exceeding 0.5 meters per second.

Table 7: Suggested Maximum Velocities for Erodible Bed Material

	Maximum Permissible Velocities (m/sec)		
Soil Type or Lining (earth; no vegetation)	Clear Water	Water Carrying Fine Silts	Water Carrying Sand and Gravel
fine sand (noncolloidal)	0.5	0.8	0.5
sandy loam (noncolloidal)	0.5	0.8	0.6
silt loam (noncolloidal)	0.6	0.9	0.6
ordinary firm loam	0.8	1.1	0.7
volcanic ash	0.8	1.1	0.6
fine gravel	0.8	1.5	1.1
stiff clay (very colloidal)	1.1	1.5	0.9
graded, loam to cobbles (noncolloidal)	1.1	1.5	1.5
graded, silt to cobbles (colloidal)	1.2	1.7	1.5
alluvial silts (noncolloidal)	0.6	1.1	0.6
alluvial silts (colloidal)	1.1	1.5	0.9
coarse gravel (noncolloidal)	1.2	1.8	2.0
cobbles and shingles	1.5	1.7	2.0
shale and hard pans	1.8	1.8	1.5

Source: Special Committee on Irrigation Research (ASCE, 1926)

The model used to estimate scour is run over a static bed meaning that the movement of be material cannot be predicted. Qualitatively, the current velocities indicate relative severity of scour, however the exact locations where scour will occur is not possible to predict due to uncertainties in current distribution and soil conditions.

The high current velocities shown by the model results are caused by storm winds forcing large volumes of water through a constricted opening area. As the current moves past the restriction of the bridge opening, more conveyance area is available to move the water and velocities are reduced. Higher velocities seen down-current of the bridge during the storm events are partially caused by water moving over the shallow bathymetry of the lagoon. Generally speaking, when a high velocity current encounters material small or loose enough to be moved, scour will occur until enough conveyance area is created for the current velocity to be low enough to not cause additional scour.

Scour at the bridge piers and abutments can be reduced by placing rock spall or riprap scour aprons around the bridge. The more scour resistant rock spalls prevent the material adjacent to the bridge foundations from being mobilized. Scour aprons are susceptible to head cutting similar to a river bed. If scour occurs at the edge of the apron, material under the rock can be lost and cause the edge of the apron to fall into the hole. As the process continues, the edge of the scour apron would retreat up-current until an equilibrium velocity is found. The distance of head cutting would be dependent on the current velocity and the erodibility of the material down current and beneath the scour apron.

5.4 Bridge Alternatives

Four different bridge alternatives were modeled with ADCIRC to estimate maximum current velocities and scour potential (Table 8). Alternatives investigated included a single span 115 foot bridge over the tidal circulation channel near the barrier island, a two span 230 foot bridge with the second span to the northeast of the channel, a two span 290 foot bridge over the channel with a basin dredged to -10 ft MLLW under the bridge opening, and a four span 480 foot bridge with a basin dredged to -6 ft MLLW under the bridge. Modeling showed bridge alternatives 3 and 4 meet minimum velocity requirements, however only the fourth configuration is recommended for further development due to sedimentation concerns with the deeper dredged basin.

Table 8: Summary of bridge alternative configurations

Alternative	Number of Spans	Opening Width (ft)	Average Opening Depth (ft, MLLW)	Notes
1	1	115	-5.5	Vertical sheet pile abutments
2	2	230	-4.25	Vertical Sheet pile Abutments and pier cell
3	2	290	-10	vertical sheet pile abutments and pile pier
4	4	480	-6	sloping armored abutments and pile piers

5.5 Bridge Alternative 1 and Results

The initial configuration of the project was intended to be a low cost bridge opening between two earthen causeways. The bridge opening between abutments was 115 feet and is centered over a natural channel near the barrier island (Figure 13). The channel under the span reaches a depth of about -6 feet MLLW. The design was intended to mimic the bridge over the causeway breach at the Port of Nome. This bridge is a single span steel girder bridge resting on Open Cell© sheet pile abutments. Maximum velocity was found using a simulated October 2004 storm event. This scenario estimated a maximum storm surge residual of 1.3 meters above predicted tide levels and produced a 0.5 meter head drop across the bridge opening. The current velocity produced by this was 2.9 meters per second immediately downstream of the bridge (Figure 14). High velocities were found in a wide area as flow constricted at the bridge opening and concentrated on the downstream side of the bridge. The area of expected initial erosion in this scenario was very large and the risk of damage to the shoreline of the barrier island was estimated to be high. Scour in this scenario also poses a high risk of undermining the bridge abutments causing a structural failure during a storm event. This current velocity was deemed to be unacceptable and the short span alternative was rejected for further consideration.

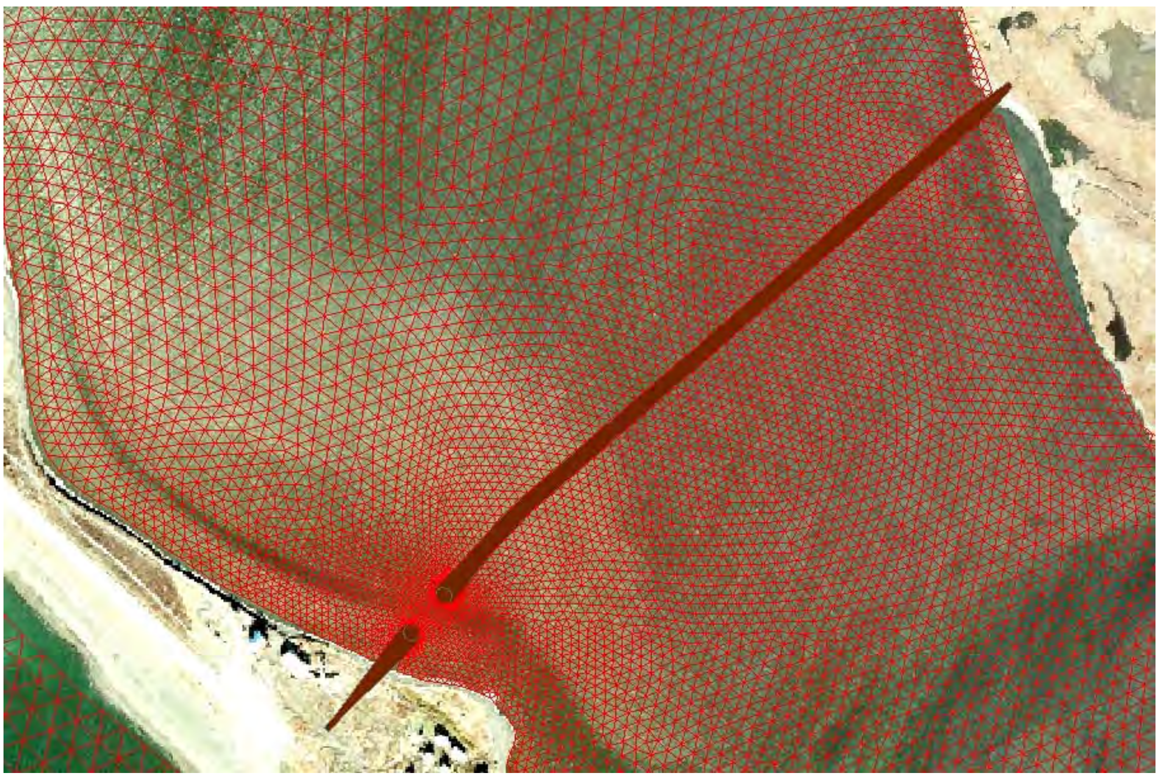

Figure 13: Alternative 1 bridge configuration.

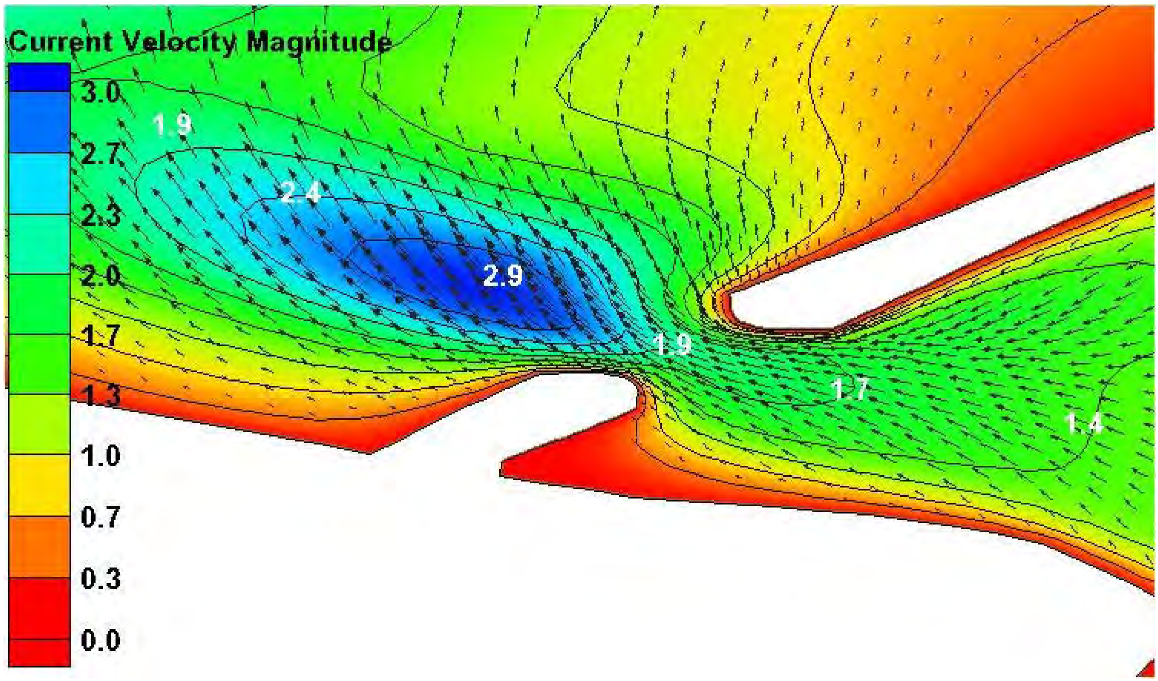

Figure 14: Alternative 1 maximum current (m/s) October 2004 event.

5.6 Bridge Alternative 2 and Results

The second configuration added a second 115 foot opening to the north of the opening used for Alternative 1. There is no channel under the second span and the depth of the bottom is approximately -3 feet MLLW. The spans were supported by sheet pile abutments and a closed cell sheet pile pier between spans. This configuration reduced the maximum storm residual to 1.2 meters above predicted water level and the maximum head drop was reduced to 0.4 meters. This resulted in a maximum velocity of 1.6 meters per second near the bridge spans. While the maximum velocity was lower, the area of potential bed movement was still very large. These velocities also had the potential to cause head cutting of scour aprons and undermining of the pier cell and abutments. The down-current velocity also indicates a potential to cause erosion damage to the shoreline of Kivalina and the airport.

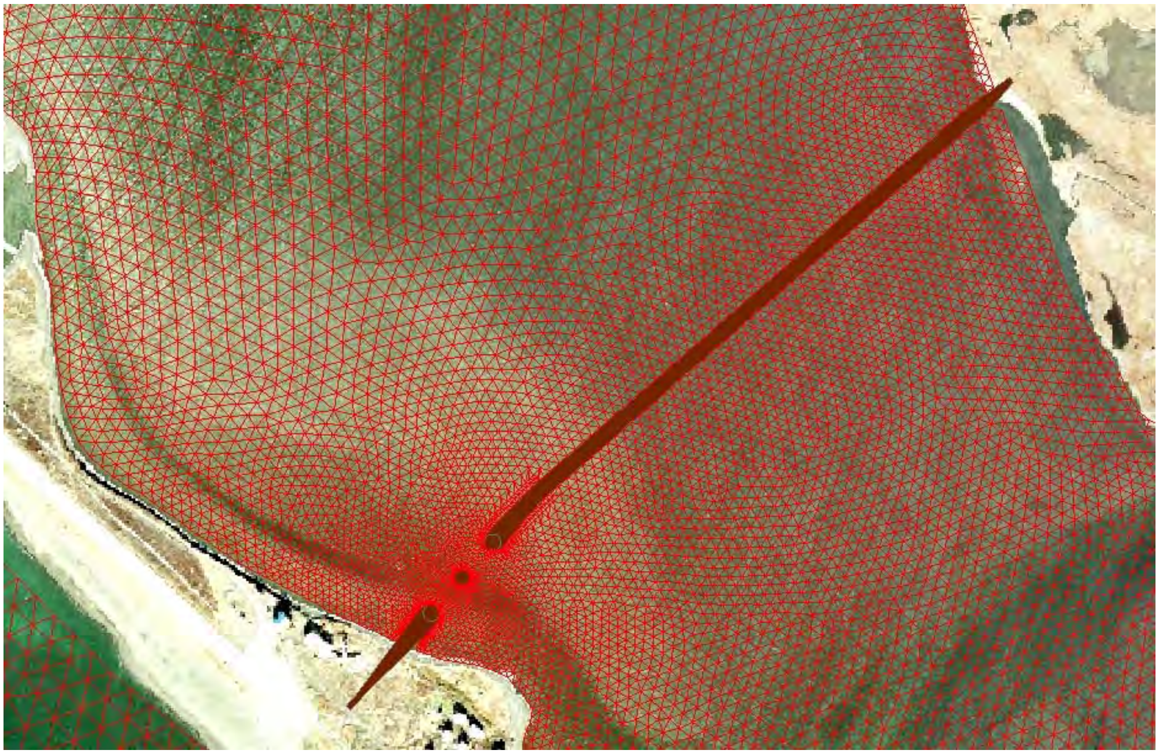

Figure 15: Alternative 2 bridge and causeway configuration.

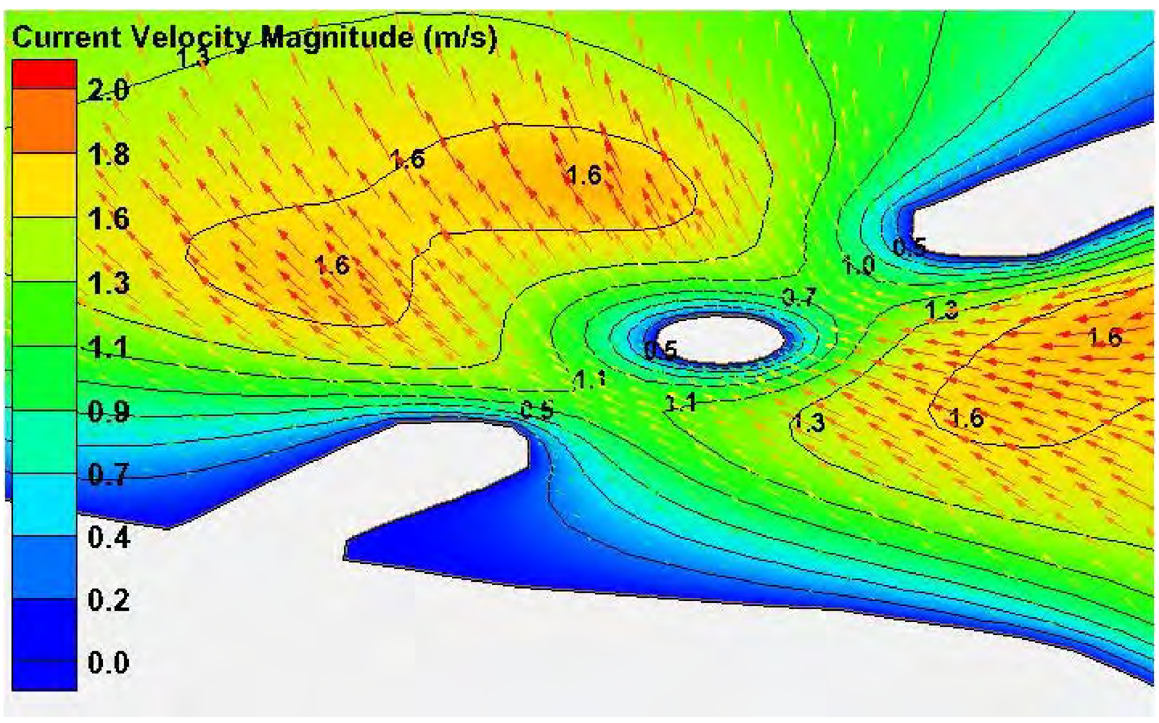

Figure 16: Alternative 2 maximum current (m/s) October 2004 event.

5.7 Bridge Alternative 3 and Results

The third configuration was an iteration of Alternative 2 to maximize the conveyance area between the abutments. The center pier cell was replaced with a steel pile group and the entire area under the bridge was dredged to -10 feet MLLW with side slopes of 3H:1V. This significantly increased the area available for water to flow under the bridge resulting in lower velocities (Figure 18).

The velocity plot shows significant reduction in current under the bridge, but higher velocities up-current and down-current of the bridge. This is caused by the differences in bathymetry; as water is forced to flow over the shallow bathymetry of the lagoon, it moves at high velocity over the shallow bathymetry. When the current reaches the bridge and the deep basin, there is more area available for the water to move through and the current velocity drops to maintain the rate of flow entering the basin. As the flow leaves the basin, it encounters shallow bathymetry again and velocities increase. This is shown as high velocity fields at the edges of the dredged basin. During a storm, erosion is expected to occur at the basin edges which would increase the basin length. It is uncertain whether material would be deposited in the basin or flushed through and deposited on the down-current side. Eventually, the basin would form a separate channel sized to move flow generated from storm events.

While velocities under this bridge configuration were acceptable, the deep dredged area beneath the bridge was 4 feet below the deepest natural bathymetry in the area and 7 feet below the predominant bottom elevation of -3 feet MLLW. This would cause water velocities under non-design storm conditions to be significantly lower than the surrounding area and would cause sedimentation to occur in the basin whenever the bed material of the lagoon would be mobilized. It is likely that the conveyance offered by this dredged basin would be significantly reduced over time and larger velocities would occur during a design level storm event unless maintenance dredging of the bridge basin were performed on a regular basis. This alternative was also rejected from further consideration due to uncertainties with sedimentation effects to the design over time.

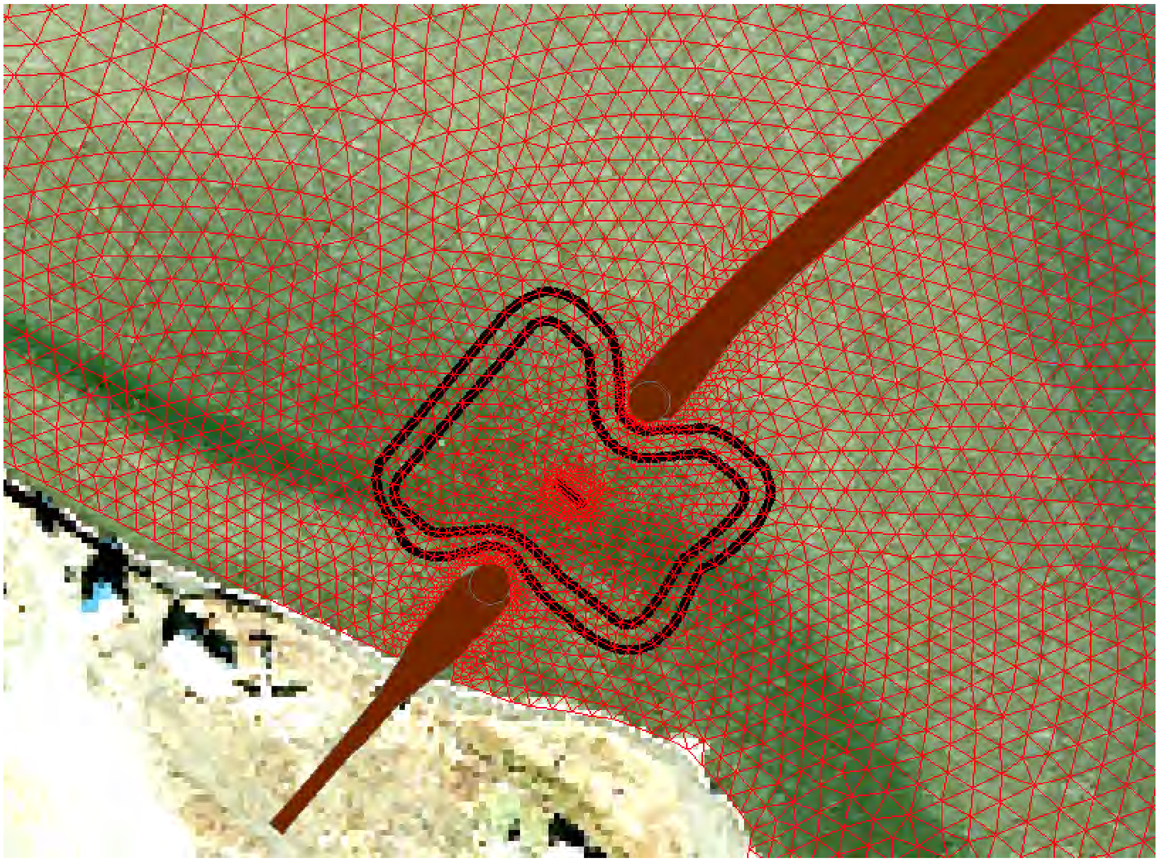

Figure 17: Alternative 3 bridge and causeway configuration.

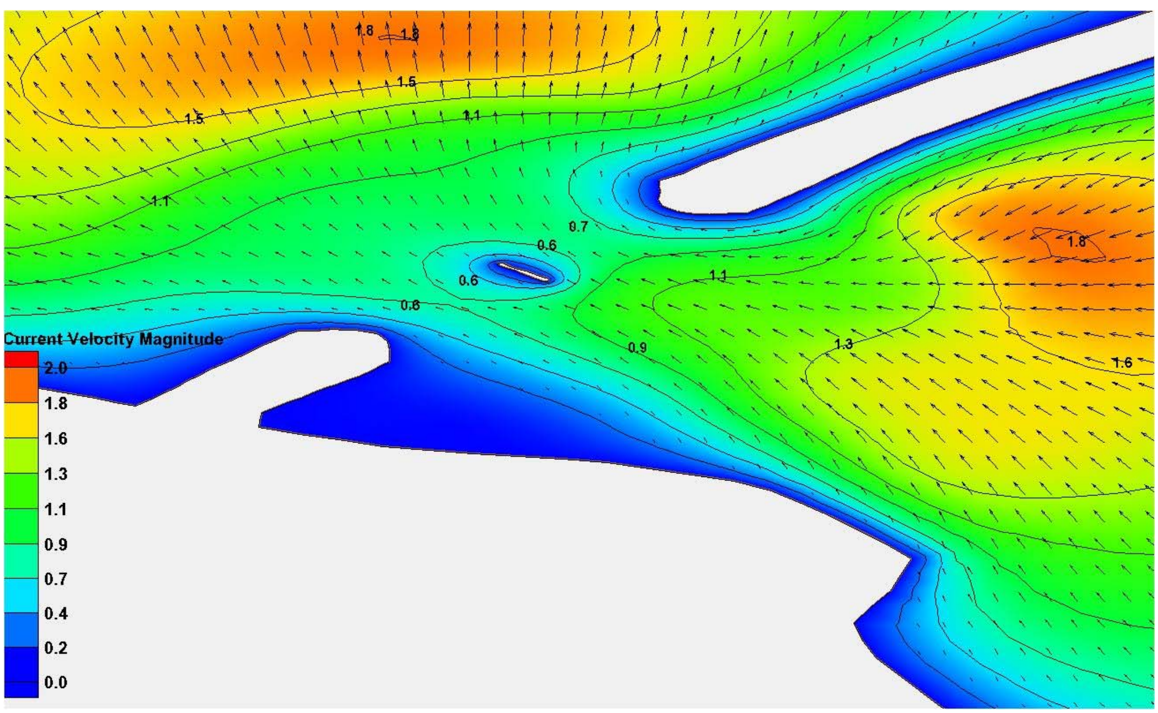

Figure 18: Alternative 3 maximum current (m/s) October 2004 event.

5.8 Bridge Alternative 4 and Results

The fourth configuration increased the distance between abutments to 500 feet and employed an area dredged to -6 feet MLLW to increase the conveyance area under the bridge. Side slopes for this area were 5H:1V to help produce a smoother velocity transition from the dredged basin to natural bathymetry (Figure 19). The bridge abutments were also changed from vertical sheet pile abutments to sloping rock armored abutments. This produces more boundary effects in the outside spans and concentrated flow away from the abutments. Maximum velocity through this bridge opening was less than 1 meter per second (Figure 20) and the basin configuration better matches the natural bathymetry of the lagoon than alternative 3.

It should be noted that this alternative does not entirely reduce velocity in the lagoon below 1 meter per second, but does achieve this in the vicinity of the bridge. The shallow bathymetry of the lagoon and the constriction formed by the causeway produces currents in excess of 1 meter per second beyond the extents of the dredged basin. These velocities are directed from the east and to the north of the bridge.

Some extent of channelization as described for Alternative 3 is likely to occur to move water under the bridge more efficiently. A duration analysis of velocity under the bridge suggests that peak velocities do not occur for long periods of time which would limit the amount of material that could be moved during a storm event. The analysis shows that velocities exceed 0.5 meters per second for about 10 percent of the event time, which is about 5 hours for the 2004 event. The extent to which erosion will occur will depend on both the wind intensity and duration.

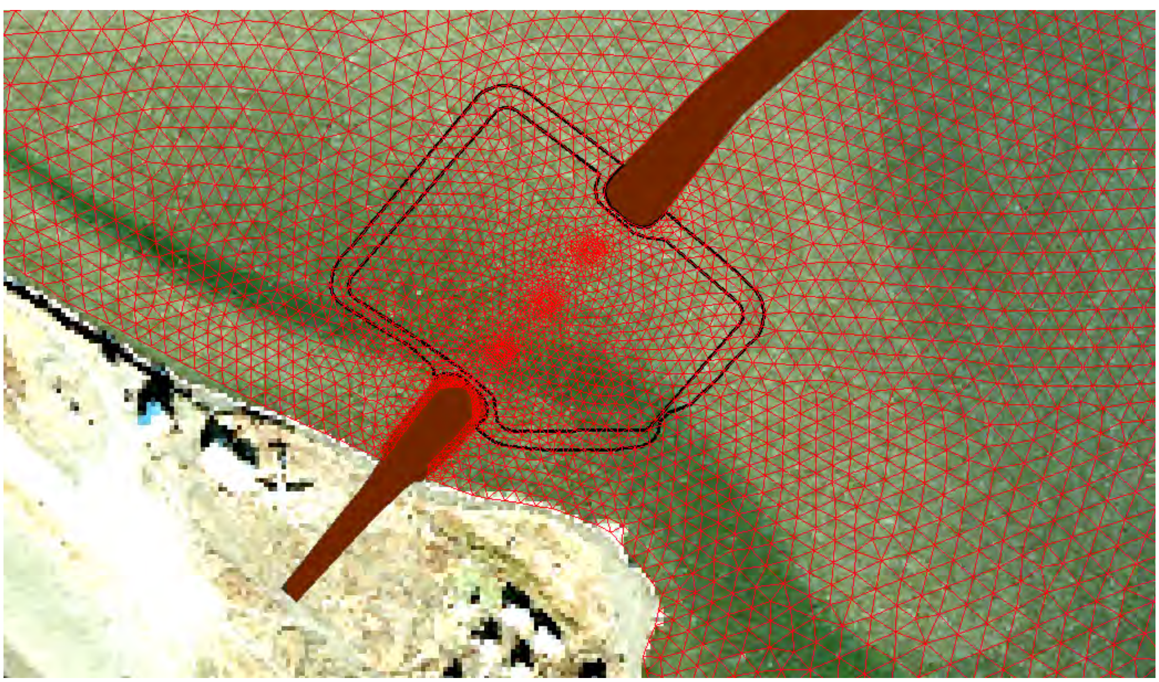

Figure 19: Alternative 4 bridge and causeway configuration.

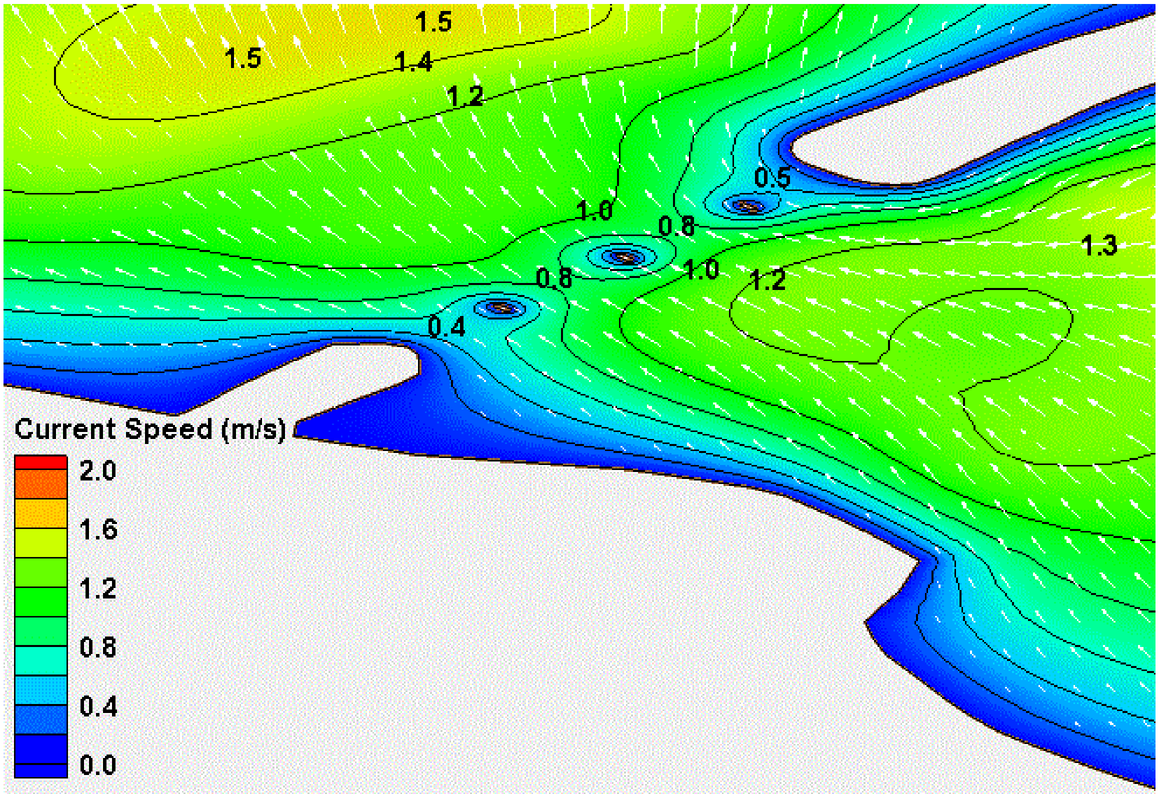

Figure 20: Alternative 4 maximum current (m/s) October 2004 event.

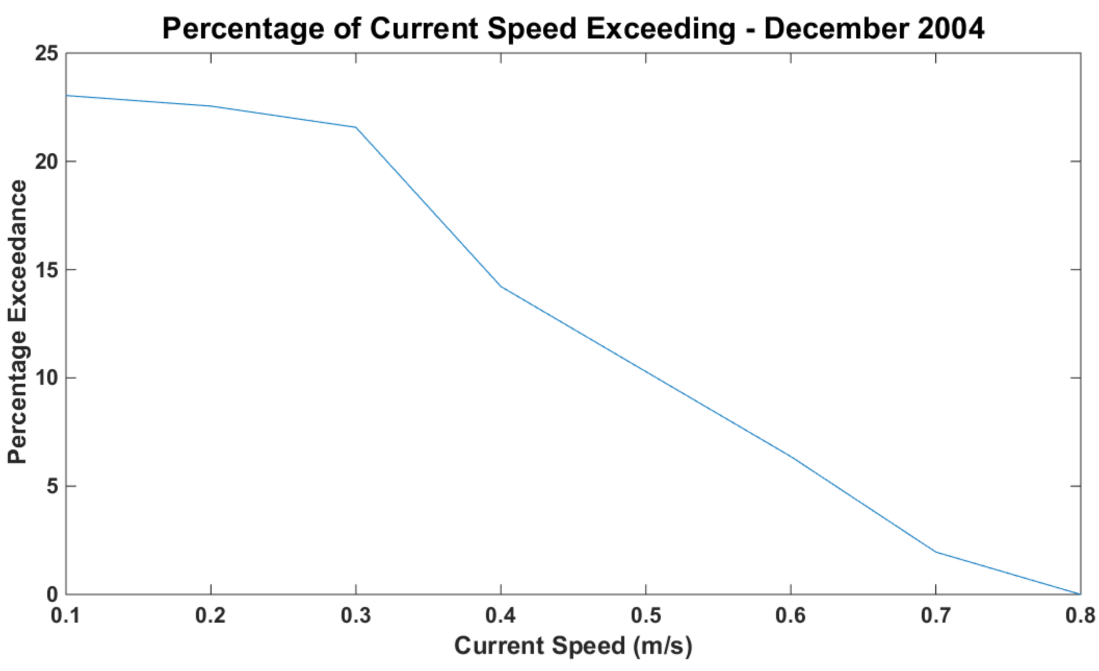

Figure 21: Duration analysis of current speed under the bridge during the 2004 event.

6. BRIDGE SCOUR ANALYSIS

Four bridge openings were investigated in the course of this design process. All use the same causeway alignment and are subject to the same wave forces. Each bridge opening was studied using the ADCIRC model for western Alaska with a refined grid for Kivalina Lagoon to determine water velocities through the bridge openings during storm events. Several different storm events were simulated with the bridge openings to determine maximum velocities. These velocities were then used to determine the likely depth of scour and size of riprap needed to prevent scour from occurring. Riprap sizing was performed in accordance with the coastal engineering manual EM 1110-2-1100 Part VI.

6.1 Depth of Scour

Scour calculations follow procedures outlined in the Federal Highway Administration's Hydraulic Engineering Circular 18 (HEC-18). Depth of scour around the bridge piers was calculated using the HEC-18 scour equation 7.1 for each applicable alternative. This method relates the depth of scour to the pier geometry and the Froude number of water flowing past the pier. Since Alternative 1 does not have a bridge pier, this calculation was not applicable. Scour estimates according to this method are shown in Table 9. Pier scour was considerably higher around the closed cell sheet pile pier in alternative 2 than the pipe pile piers in the other alternatives.

Table 9: Bridge pier scour estimation using HEC-18

Alternative	Velocity (ft/s)	Depth of Inflow (ft)	Pier Width (ft)	Depth of pier scour (ft)
2	5.2	3	60	35.2
3	3.3	10	4	5.9
4	3.3	6	4	5.5

Depth of scour around the abutments was analyzed using Froehlich's abutment scour equation (HEC-18 equation 8.1). This equation was designed to calculate scour caused by a contraction in flow where abutments obstruct overbank flow of a river. Scour depth calculated by this method is sensitive to the obstruction length. Using an obstruction length of 2000 feet indicated scour depths of 38 to 99 feet depending on the alternative. This seems unreasonable for the storm events considered in this analysis. Part of the reason for this is that Kivalina Lagoon has a relief opening through the Wulik River where water can flow out of the system to the Chukchi Sea. Overbank flow would be fully confined to the river system in most cases. Also, the storm systems inducing flow through the bridge is a transient system lasting only a few days while contracted flow through a river will be a constant occurrence. For comparison purposes, abutment scour estimates were calculated using an arbitrary obstruction length of 150 feet. Abutment scour is shown in Table 10. The table shows that the selected alternative is expected to experience significantly less scour at the abutments than the other three alternatives. This is primarily due to the slope of the abutments. Alternatives 1 through three have vertical sheet pile abutments whereas alternative 4 has sloping abutments.

Table 10: Abutment scour estimation assuming a 150 foot obstruction length

Alternative	Velocity (ft/s)	Depth of Inflow (ft)	Length of Flow Obstruction (ft)	Depth of Scour (ft)
1	6.6	5	150	33.1
2	5.2	3	150	25.3
3	3.3	10	150	26.3
4	3.3	6	150	13.1

6.2 Scour Apron Design

A scour apron was designed for Alternative 4 to prevent erosion adjacent to the bridge foundations. Riprap sizing was performed in accordance with the coastal engineering manual EM 1110-2-1100 Part VI. Using a maximum velocity under the bridge of 3.3 feet per second and a depth of 6 feet, it was found that a riprap gradation with a d_{30} dimension of 1 inch would be sufficient to resist scour forces. This indicates that a rock spall blanket will be sufficient to protect the bridge foundations for the concept project. The engineering manual also provides geometric guidance for minimum extent of riprap. Around piers, minimum extents should be 1.5 times the pier diameter perpendicular to the flow and 4 times the pier diameter in the direction of the flow. This would indicate scour aprons 47 feet long and 16 feet wide around each pier. This would allow scour of the lagoon bed between piers and could lead to unraveling of the blanket over successive storm events. The apron was expanded to a full length blanket of rock spalls 60 feet wide centered on the bridge centerline. This will promote uniform flow under the bridge during storm events and provide protection to the toes of the abutments as well as the piers. The blanket would be a 2 foot thick layer of rock spalls conforming to ASTM D 6092 gradation FS-3 (Table 11). The d_{30} particle size of this material is around 2.5 inches.

Table 11: Gradation of ASTM D 6092 FS-3 rock spalls

Sieve Size	Percent Finer by Weight (%)
6 1/2	100
4 1/2	85 to 100
2 1/2	15 to 50
No. 16	0 to 15

7. CONCEPT PROJECT FEATURES

The project concept features two rock fill and earthen causeways connected by a single lane bridge over a dredged bridge basin (Figure 22). The southwest terminus of the causeway will be between the community of Kivalina and the airport. The northeast terminus will be a 350 foot by 350 foot earthen pad constructed near the shoreline of Kivalina Lagoon. The causeways will have 30 foot wide road surface at an elevation of +13 feet MLLW and will be traversable during a storm event that inundates the barrier island. Causeway embankment slopes will be built at 1.5H:1V and protected from erosion with 700 pound armor stones. The bridge will have a 14 foot deck width at a minimum elevation of +20 feet MLLW. The bridge will be sloped for drainage and provide a minimum of 12 feet of overhead clearance for marine traffic passing below. A basin will be dredged beneath all spans of the bridge to increase conveyance of water during a storm event and reduce current velocities. The concept alignment follows the southern route From WHPacific's Evacuation Road study dated 2014 (Figure 23).

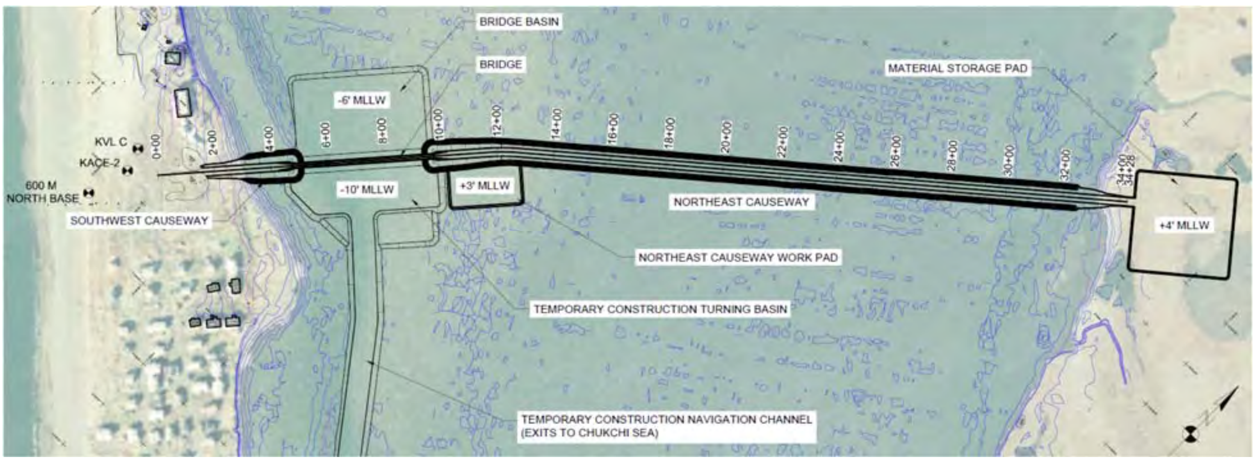

Figure 22: Plan view of the concept project.

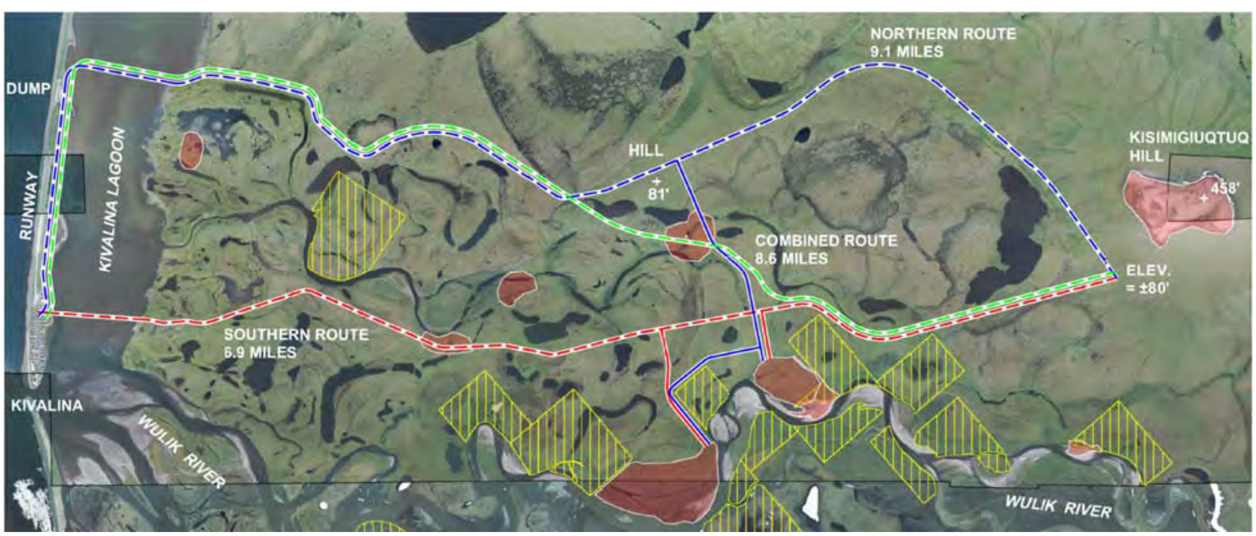

Figure 23: Detail of evacuation routes studied by WHPacific in 2014. The concept project follows the southern alignment over the lagoon shown in red.

8. CAUSEWAY DESIGN

The Kivalina terminus of the crossing is to the south of the airport maintenance hangar. The mainland terminus is near the mouth of the Wulik River. The alignment runs nearly directly across the lagoon with a slight bend to clear the channel along the barrier island. Most of the causeway is constructed in shallow water with depths in the range of -1 foot to -3 feet MLLW. The channel reaches depths of -5 feet to -6 feet where it crosses the causeway alignment.

8.1 Embankment Fill

The embankment fill of the causeway would be constructed from rock spalls to a depth of +3 feet MLLW. Above this, select borrow would be placed in lifts no greater than 6 inches and compacted to a minimum of 95% maximum laboratory density.

8.2 Embankment Revetments

The entire length of the causeway will be subject to waves and requires stone armor to prevent erosion. Methods described in the CEM using Hudson's equation were used to determine armor stone sizes for the outer armor layer using the significant wave height of 4.3 feet, embankment side slopes of 1.5H:1V, and a K_d value of 3.5 for random stone placement and a breaking wave condition. A stone specific gravity of 2.65 was assumed for the calculations. Armor stone (A-rock) with a range of sizes from 875-pound maximum weight, 700-pound average weight to 525-pound minimum weight would be used on the side slopes of the causeway. Secondary stone (B-rock) would range from 90-pound maximum weight, 70-pound average weight to 40-pound minimum weight. Core stone (C-rock) would range from 5-pound maximum weight, 3-pound average weight to 1-pound minimum weight. Armor stone layer would be 3.5 feet thick, secondary stone layer would be 1.5 feet thick and core stone layer would be 0.5 feet thick.

8.3 Embankment Geometry

The crest elevation of the causeway is designed to be +13 feet MLLW. Maximum storm surge elevations at Kivalina are estimated to be +7.3 feet MLLW. As waves impact the causeway, water is expected to run up the side to an elevation of +11.7 feet MLLW from this water level. The top of A rock is approximately +9.5 feet MLLW, B rock extends to +11.0 feet MLLW and C rock reaches +11.5. While the top of armor stone is below the maximum design run up elevation on the causeway, the southwest winds that produce maximum surge blow across the short axis of the lagoon and do not produce large waves that impact the causeway. The winds that blow down the axis in the lagoon have peak water levels of 5.1 feet MLLW which corresponds to maximum run up of +9.0 feet MLLW.

8.4 Impact of Estimated Sea Level Change

Estimated sea level changes would have an impact on wave protection. The historic rate of sea level change would produce a 0.3 foot increase in expected maximum run up to +9.3 feet MLLW based on a design water level of +5.1 feet MLLW, which is in the A-Rock. The intermediate projected rate produces a water level 0.8 and feet higher than the design water level which would increase expected run up to +9.9 feet MLLW which would be in the B-Rock. This not expected to result in significant damage since most of the wave energy will be dissipated in the A-Rock. The high projected rates produce a water level 2.2 and feet higher than the design water level which would increase expected run up to +11.7 feet MLLW exposing the roadway section to run up and wave action during a storm event. While run up is still not expected to overtop the causeways in this scenario, erosion of the road section is possible and the effective driving width of the road may be reduced.

8.5 Roadway Design

The roadway would be built on top of the causeway section. To achieve proper filtering of wave energy, the B-rock and C-rock layers would be wrapped over the top of the A-rock extents and a separation geotextile placed below the road materials (Figure 24). A one foot layer of subbase material of AKDOT&PF gradation A would be placed over the geotextile in 6 inch lifts compacted to 95% maximum laboratory density and a 6 inch course of aggregate surface material conforming to AKDOT&PF gradation E-1 would be placed as the road surface and compacted to 98% maximum laboratory density. The road structure would be placed to have a 2% crown slope for drainage.

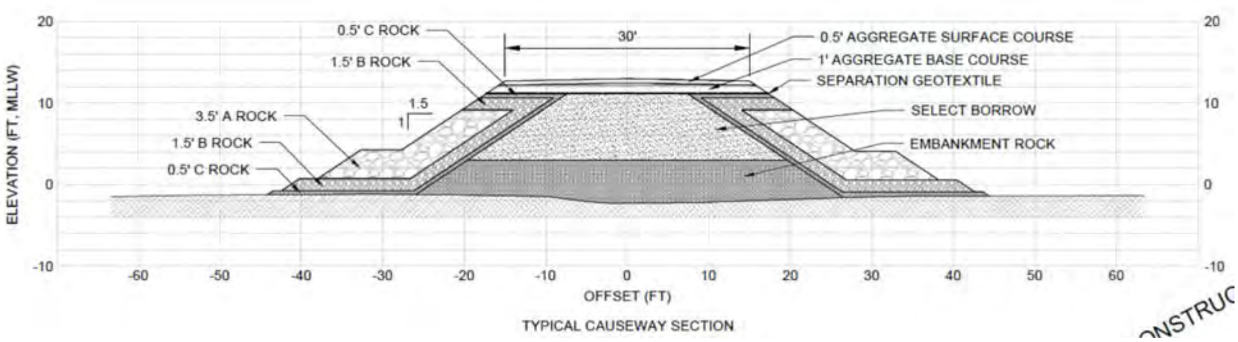

Figure 24: Detail from sheet S101, typical causeway cross section

9. BRIDGE DESIGN

The results of the ADCIRC modeling showed that a 480 foot bridge opening with sloping abutments would provide sufficient conveyance between the causeways to keep velocities at a manageable level. This width of opening requires four spans approximately 125 feet long each. Spans would be supported on pile foundations.

9.1 Bridge Deck Geometry

The bridge deck is designed as a one lane road for highway traffic. The driving width would be a single ten foot wide lane with 2 foot shoulders between the edge of the lane and concrete barriers on the side of the bridge deck. The barriers would have a base thickness of 2 feet each. Overall, the bridge deck would be 18 feet wide to accommodate this design. Vertical geometry would include a 2 percent grade sloping towards the bridge abutments and a 250 foot long vertical curve in the two center spans. The slope would provide drainage from the center of the bridge towards the abutments and is intended to minimize ponding and ice formation on the bridge deck. This would be accomplished by casting the two end spans as flat beams and the center spans as beams with camber. The bridge deck would also be cast with a 2% cross slope with a crown along the bridge centerline. This would improve drainage by allowing water to drain off the edges of the bridge deck through drainage notches in the jersey barriers. The deck surface of the bridge would also be cast with incised transverse groves similar to a runway texture to improve traction on a wet surface and further improve drainage.

9.2 Piers

The bridge piers would be two four foot diameter pipe piles with a precast concrete pile cap. The pipe piles would be fitted with a conical plate steel driving tip with a minimum thickness of 3/4 inch then driven to the design depth. The pipe piles for the piers would be galvanized from -20 feet MLLW to the top of pile to reduce corrosion. Galvanizing would be accomplished by spray metalizing. Additional sacrificial zinc anodes would be attached to the piles at depths from -5 feet MLLW to 0 feet MLLW. Once driven to depth, piles would be reinforced with spiral a deformed bar cage and filled with concrete to -10 feet MLLW. Precast concrete pile caps would be designed with oversized pile sockets to allow a pile placement tolerance of ±2 inches from the designed center of pile location. Pile caps would be made from marine concrete with a compressive strength of 8000 psi. Once placed, concrete would be injected into a port in the pile cap to fill the annular space between the pipe pile and pile cap.

9.3 Abutments

The abutment foundations would be three 1.5 foot diameter pipe piles with cast in place reinforced concrete abutments constructed at the ends of the causeways. The pipe piles would be fitted with a conical plate steel driving tip with a minimum thickness of 1/2 inch then driven to the design depth. Since these piles would be completely buried in the causeway embankments, rates of corrosion are expected to be low and galvanizing would not be required. The concrete abutments would be cast in place with 6000 psi concrete reinforced with deformed steel bars.

9.4 Bearings

Bridge girder bearings would be placed on the pile caps and abutments. Steel base plates would be embedded into the precast pile caps and abutments. Two inch thick elastomeric bearings would be fitted to these base plates. Contact plates would be cast into the bridge girders to accept the elastomeric pads.

9.5 Girders and Bridge Deck

The girders and bridge deck would be constructed as precast, prestressed concrete bulb tee sections. These sections integrate the bridge deck and girder into a single section. The girders were sized according to load-span charts for highway loads published by Concrete Technology Corporation. A 53 inch deep section would be required for the 125 foot spans of this bridge.

The section incorporates a 6 inch thick bridge deck. The road section would be formed with a 2 percent crown to drain to the edges of the bridge. Each bridge span would require three girders with 6 foot wide deck sections. Each bulb tee section would weigh approximately 67 tons. Diaphragms would be constructed as structure steel braces. Embedded tabs for these braces would be cast into the girders. The bridge deck would also include embedded anchor bolts for placement of jersey barriers at the edge of the deck. All reinforcing steel used in the construction of the bulb tee sections would be hot-dipped galvanized to reduce the risk of corrosion in the marine environment. High strength marine concrete with a minimum compressive strength of 8000 psi would be used in girder and deck construction to reduce rates of corrosion.

9.6 Jersey Barriers

The edges of the bridge deck and approach sections would be protected with 42 inch high precast Jersey Barriers. The jersey barriers would be made in 10 foot lengths with hold down ducts in the feet of the barriers. The barriers would be placed onto the anchor bolts and held in place with nuts. The Jersey Barriers would be cast with drainage notches in the base to allow for drainage over the side of the bridge deck.

10. CONSTRUCTION ANALYSIS

Construction of the bridge and causeway requires specific sequencing to accomplish successfully. A preliminary analysis of the task sequencing shows that the minimum construction duration for this project would be four years. Most years would include a seasonal demobilization with caretaker activities required over the winter. The typical summer construction window is assumed to occur from June 15 through September 15. Winter excavation and delivery of materials is assumed to take place between January and March. The following tasks must be completed in order to provide access for subsequent tasks.

1. Initial Mobilization (year 1)
2. Temporary Construction Causeway (year 1)
3. Temporary Construction Navigation Channel (year 1)
4. Pile Foundation Construction (year 1)
5. Temporary Construction Causeway Removal (year 1)
6. Bridge Basin Dredging (year 2)
7. Partial Scour Apron Construction (year 2)
8. Construction of Causeways to +3’ MLLW (year 2)
9. Winter excavation of select borrow and delivery to site (year 2 winter)
10. Construction of Southeast and Northwest Causeways to final grade (year 3)
11. Maintenance dredging of temporary navigation channel (year 4)
12. Pile cap and abutment construction (year 4)
13. Girder Placement and Bridge Deck Construction (year 4)
14. Complete Scour Apron (year 4)
15. Final Cleanup and Demobilization (year 4)

10.1 Initial Mobilization

Initial mobilization would be the first task accomplished in the first year of construction. Materials and equipment to construct the causeway and bridge are not locally available. A contractor constructing this project will be required to mobilize cranes, earth moving equipment, dredging equipment, bridge components, rock and work camp facilities from other locations. Initial access for delivering equipment and material is likely the beach along the Chukchi Sea coast. Currently, cargo deliveries appear to be made on the beach between the community and the airport. This will require small to medium landing craft due to the shallow bathymetry of the coastline. Initial mobilization will be for the minimum equipment and materials required to create access improvements to the site needed to bring in heavier equipment and bridge components.

10.2 Temporary Construction Causeway

The construction causeway would be built in the first year of construction. To place the pile foundations, the crane and pile driver need a stable foundation from which to work. Bathymetry of the lagoon is not deep enough to allow a floating barge to serve as a work platform. Since the bathymetry is shallow, it was assumed that it would be efficient to construct a temporary causeway adjacent to the pile locations to provide crane access to the site. This causeway would be constructed from rock spalls to an elevation of +3 feet MLLW. This elevation is sufficient to be above water except during a storm. Since high winds would prevent pile driving operations, this was deemed to be acceptable. This causeway would only extent to the northeastern bridge abutment where a temporary turnaround pad would be constructed to facilitate movement of equipment. The causeway would be 30 feet wide at the top and have 1.5H:1V side slopes.

It is assumed that rock spalls will be sufficient to withstand the wave environment over a single construction season, but would be moved during storm events which are likely to occur during the fall. This will require periodic maintenance of the causeway until completion of the pile installation. Once piles are installed, the causeway across the channel can be removed; however the work pad to the northeast of the piles will remain to act as a staging area for construction of the northeast causeway.

Construction of this causeway would be with land based equipment starting at the Kivalina terminus of the project. Material would be stockpiled near the airport as needed during construction of the temporary causeway.

10.3 Temporary Construction Navigation Channel

A temporary construction channel would be required to deliver the bridge girders to the site. This channel would be first dredged in the first year of construction to facilitate delivery of the heavy cranes and pile foundation material to the site. The channel is assumed to be 80 feet wide at the bottom at a depth of -10 feet MLLW. The channel sides would be sloped at 3H:1V. A turning basin would be constructed at the bridge location. Dredging is assumed to be performed by a cutterhead suction dredge which discharges to a pipeline. A 2000 foot long pipeline would be run from the dredge in the lagoon across the barrier island through Kivalina to the Chukchi Sea coast. Portions of this pipeline would be on floats to maintain the connection between the dredge and the discharge site. In the community, the pipeline would be trenched and buried under the roads in the community. Conflicts with underground utilities may require a shallow depth of burial with a protective berm over the pipeline. Material would be discharged onto the beach adjacent to the airport to reduce erosion along the side of the runway. The pipeline would be left in place to facilitate maintenance dredging of the navigation channel as the need arises until completion of the project.

10.4 Pile Foundation Construction

Heavy cranes would be brought to the site to begin pile driving once the temporary access facilities have been completed. This would occur in the first year of construction. It is assumed two 150 ton cranes would be required to advance the twelve pile foundations to their design depth within the remaining construction window for the year.

10.5 Temporary Construction Causeway Removal

The temporary causeway would be removed in the first year after pile installation was completed. Removal would be from the barrier island towards the northeast bridge abutment; material would be excavated and transported to the causeway alignment and re-used as embankment rock for the staging area for the northeast causeway.

10.6 Bridge Basin Dredging

The second year of construction would start with dredging of the bridge basin would begin once the temporary causeway had been removed.. The basin would be dredged with a cutterhead dredge similar to the navigation channel. The basin would be dredged to -6 feet MLLW. With a 100 foot wide section under the bridge dredged to -8 feet MLLW. The portion of the basin dredged to -10 feet MLLW the previous year would remain at depth. Additional dredging would be performed as required to provide sufficient depth for barge access for construction activities.

10.7 Partial Scour Apron Construction

Upon completion of the bridge basin, the scour apron under the bridge would be constructed from the bridge centerline to the northwest edge. The scour apron consists of rock spalls and would be placed by excavator or clamshell operating from a small barge. Future dredging of the turning basin for delivery of bridge girders prevents full construction of the scour apron in the second year of construction. Final placement of the scour apron is expected after the bridge deck has been completed.

10.8 Construction of Causeways to +3’ MLLW

Causeway construction would be phased; causeways would be constructed to +3’ MLLW in the second construction year including complete construction of the rock toes of the causeways. This constitutes the in-water portion of causeway construction as materials for the embankment and armor would be placed underwater. Construction is expected to be performed with land based equipment using the staging area and the remnants of the construction causeway as working surfaces. The northeast causeway would be built from the temporary work pad towards the mainland shoreline of Kivalina Lagoon. Material for this causeway would be delivered to the work pad next to the turning basin by barge and hauled to the far end of the causeway for placement. Placement of armor stone would follow from the work pad towards the shoreline. Placement of the armor layers at the toe of the northwest abutment will require partial relocation of the work pad; all embankment rock will be removed from the abutment area and the work pad will be shifted to the southeast of the abutment to ensure that the embankment rock is not mixed in to the A and B rock gradations. The top of the armored toe elevation varies with bathymetry and is around +4 feet MLLW along most of the length of the northeast causeway. Completion of the armored toe sections is critical to the survivability of the partial construction over the fall storm season and winter.

10.9 Winter Excavation of Select Borrow Material

During the winter of the second year of construction, the remaining embankment material would be excavated from borrow sites along the Wulik River and stockpiled at the mainland terminus of the northeast causeway. Winter excavation includes removal of material by bulldozer with ripper teeth, and hauling over ice roads. Borrow sites identified in the WHPacific study of the evacuation route are located on the Wukik River approximately 5 miles from Kivalina (Figure 25). Sufficient material will need to be produced to account for storage and settling of the material during the following breakup prior to placement on the causeways.

Figure 25: Location of borrow sources from WHPacific Study (2014)

10.10 Construct Causeways to Final Grade

The causeways will be completed in the third year of construction by placing the select borrow, finishing the armored slopes and constructing the aggregate pavement section. Construction techniques will employ standard road building techniques for placing and compacting material in lifts. All material will be placed in lifts no greater than six inches and compacted to the required density. Access to the staging area at the bridge abutment will be adjusted to allow placement of armor stone on the causeway sides. Access ramps to the staging area will be constructed from select borrow placed on top of the finished armor layer.

10.11 Temporary Navigation Channel Maintenance Dredging

Activities for the fourth year of construction require barge access to the bridge site for placement of the girders. At the start of the construction season, the channel would be dredged again to -10 feet MLLW. Some shoaling is expected and the entrance through the Chukchi Sea coastline will need to be dredged to depth immediately prior to delivery of the bridge girders. It is expected that sediment movement in the Chukchi Sea will completely fill in any prior dredging in the ocean by this time.

10.12 Pile Cap and Abutment Construction

Concrete abutments would be cast in place at the tops of the foundation piles. Precast pile caps would be placed on the piers followed by installation of pier pile reinforcement. Concrete for the work would be shipped to the site in super sacks of dry-batched concrete and mixed on site in a mixing truck. It is assumed that three mixing trucks would be needed to maintain the rate of supply required for concrete placement. Concrete would be placed by a concrete pump truck with a long boom.

10.13 Girder Placement and Bridge Deck Construction

Once the abutments and pile cap connections had cured, the bulb tee girders would be lifted into place. The girders will be delivered to the bridge site on a barge through the navigation channel and stage in the turning basin. It is expected that three girders would be loaded on a barge and placed one span at a time. This requires four separate deliveries of girders to the work site, but provides time for the cranes to move from span to span between girder deliveries. It is likely that girders will be cast the prior year and staged in Nome to ensure efficient delivery to the work site. Cranes operating from barges will pick the girders off the barge and place them on their bearings. The girders weigh approximately 67 tons each and it is expected that the lift will require the use of two 150 ton cranes. Once the bridge deck is in place, the bridge deck would be post tensioned and steel diaphragms would be constructed under the deck and approach slabs would be cast in place to match the final grade of the bridge deck. Jersey barrier placement would follow completion of the diaphragms and approach slab curing.

10.14 Completion of Scour Apron

The scour apron under the bridge would be completed after the girders have been lifted into place. Placement would include any maintenance dredging required to bring the depth under the piers to -8 feet MLLW out to 35 feet from the bridge centerline. This area is likely to be dredged to -10 feet MLLW for delivery of the girders and only minimal dredging around the toes of the abutments is expected. The scour apron will be filled to -6 feet MLLW with rock spalls. Exposed edge of the scour apron will be placed at a 1.5H:1V slope to the bottom of the turning basin. Once completed, the basin will be filled to -6' MLLW with embankment rock from the northeast causeway staging area as a part of site cleanup or material from the lagoon.

10.15 Final Cleanup and Demobilization

Bridge construction would conclude in the fourth year with clean up of the work site and removal of temporary access facilities. This includes the staging area at the northeast abutment. Embankment rock from the staging area would be used to fill the bridge basin to -6 feet MLLW with the remainder of the material being stockpiled adjacent to the airport hangar for future use.

10.16 Construction Site Logistics

Construction of the bridge will require long term facilities and services to be in placed to accomplish the work. A work camp will be required to provision the work force building the bridge. The camp would be sited near the airport for the duration of the project and may require removal of any empty containers that are currently stored between the community and the airport. Starting in the second year of construction, the majority of the work site will require a ferry service for workers and equipment to reach the northeast causeway site. A small barge or landing craft would be required full time on site from the second to fourth year of construction to maintain access.

11. ESTIMATED CONSTRUCTION QUANTITIES

An estimate of construction quantities required to build the concept project was performed. Quantities were broken out in separate tables by construction year to illustrate the delivery schedule for materials and equipment to construct this project.

Table 12: Year 1 Construction Quantities

ITEM	QUANTITY	UNIT OF MEASURE	NOTES
Mob/Demob	1	EA	
Embankment Rock	13000	CY	Temporary causeway built to +3' MLLW
Dredging	68000	CY	Dredge Channel and Turning Basin with cutter head pipeline dredge
48" x 1" steel pipe pile	1320	LF	6 piles driven to 200' embedment, conical driving tip
18" x 1/2" steel pipe pile	1320	LF	6 piles driven to 200' embedment, conical driving tip
Embankment Rock	6000	CY	Remove temp construction causeway, reuse material to make northeast causeway work pad. No new material produced.

Table 13: Year 2 Construction Quantities

ITEM	QUANTITY	UNIT OF MEASURE	NOTES
Mob/Demob	1	EA	
Dredging	23000	CY	Dredge Bridge Basin with cutter head pipeline dredge
Rock Spalls	1500	CY	Rock spalls placed from centerline to northwest edge of apron, 500' x' 35' x 2'
Embankment Rock	28000	CY	Embankment rock fill to +3' MLLW
C Rock	4500	CY	Rock for the causeway toes
B Rock	7000	CY	Rock for the causeway toes
A Rock	7500	CY	Rock for the causeway toes
Embankment Rock	1000	CY	Reshape work pad and access ramps as work progresses
Select Borrow	30000	CY	Winter excavation of select borrow, stockpile 27000 CY at northeast terminus, 3000 CY near Kivalina airport

Table 14: Year 3 Construction Quantities

ITEM	QUANTITY	UNIT OF MEASURE	NOTES
Mob/Demob	1	EA	
Select Borrow	22000	CY	Embankment fill to +10.5 MLLW. Place in 6" lifts and compact to 95% max. density. 8000 CY remains at northeast terminus.
C Rock	4500	CY	Completion of causeway rock work
B Rock	7000	CY	Completion of causeway rock work
A Rock	7500	CY	Completion of causeway rock work
Geotextile	4000	SY	Geotextile placed on top of rock work and select borrow
Subbase	4000	CY	Roadway subbase, place in 6" lifts, compact to 95% max. density
Surface	1700	CY	Roadway surface, place in 6" lift, compact to 98" max. density
Embankment Rock	1000	CY	Reshape northeast causeway work pad and access ramps as work progresses

Table 15: Year 4 Construction Quantities

ITEM	QUANTITY	UNIT OF MEASURE	NOTES
Mob/Demob	1	EA	
Dredging	10000	CY	Maintenance dredging of channel and turning basin
Pier Pile reinforcement		CY	concrete placed to -15' MLLW inside pier pies, #6 spiral reinforcement
Pier Pile Caps	3	EA	precast concrete pile cap
Abutments	2	EA	cast in place abutments, reinforced concrete
Girders and Deck	12	EA	125' x 53" decked bulb tee bridge girder, 6' wide deck sections 67 tons ea.
Diaphragms	768	LF	16 steel diaphragms, C12x30 members, 6.5 foot max length, bolted assembly
Jersey Barriers	120	EA	precast jersey barriers, 10' x 42" high
Road approach slabs	2	EA	approx 4 CY each, reinforced concrete slab #6 @ 18" OC each way
Rock Spalls	1500	CY	Rock spalls placed from centerline to northwest edge of apron, 500' x' 35' x 2'

12. REFERENCES

Federal Highway Administration. 2012. “Evaluating Scour at Bridges.” Publication No. FHWA-HIF-12-003 Hydraulic Engineering Circular No. 18, Fifth Ed.

U.S. Army Corps of Engineers (USACE). 2008. “Coastal Engineering Manual” Part II. Engineer Manual EM 1110-2-1100.

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USACE. 2011. “Sea-Level Change Considerations for Civil Works Programs,” Engineer Circular EC 1165-2-212.

USACE. 2009. “Storm-Induced Water Level Prediction Study for the Western Coast of Alaska,” ERDC/CHL Letter Report.

USGS. 2003. “Estimating the Magnitude and Frequency of Peak Streamflows for Ungaged Sites on Streams in Alaska and Conterminous Basins in Canada,” Water-Resources Investigation Report 03-4188.

WHPacific. 2014. “Evacuation and School Access Road Project Kivalina, Alaska,” Route Reconnaissance Study.

13. ATTACHMENTS

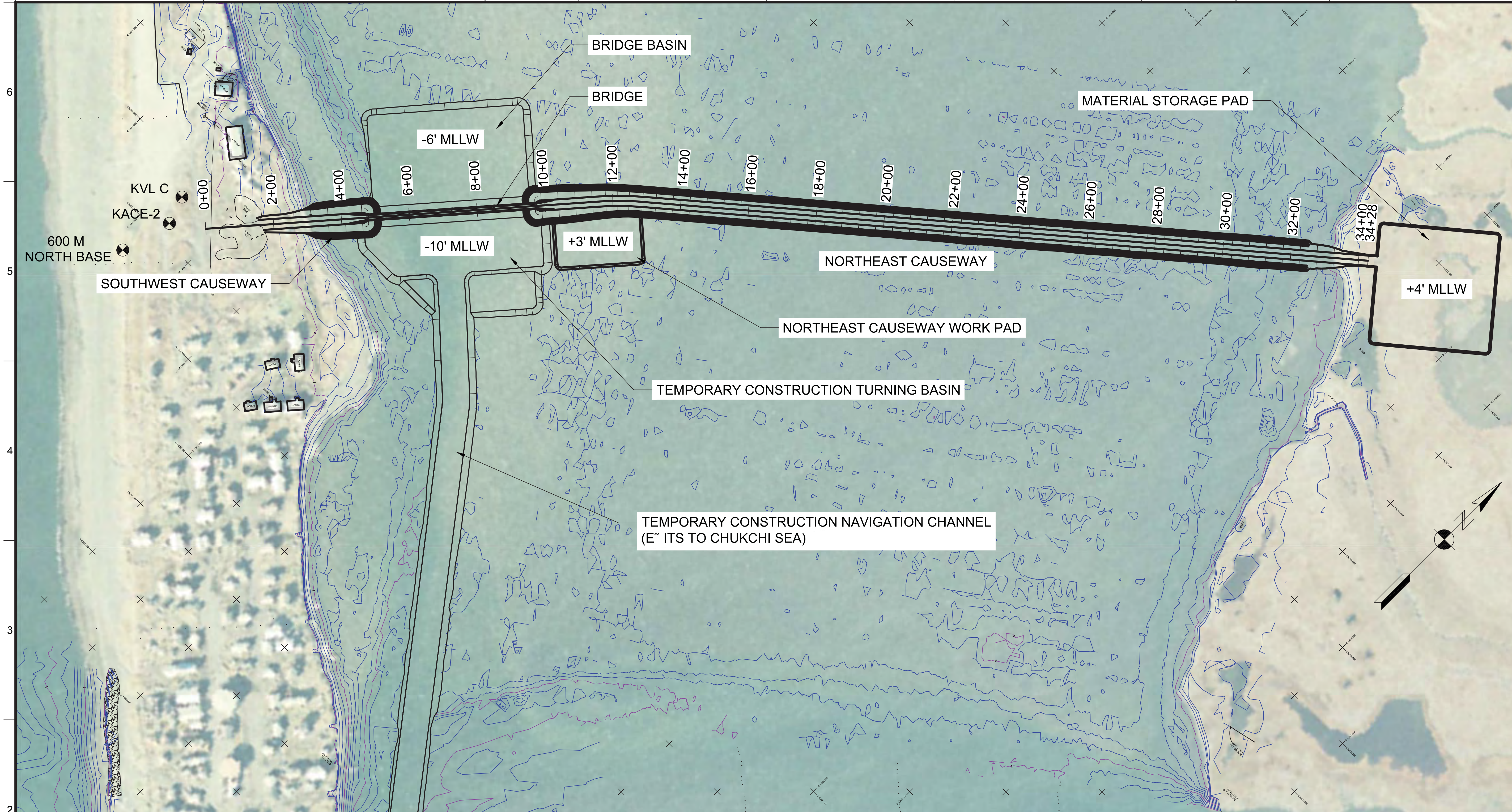
Evacuation Bridge and Causeway Concept Plans

Cost Estimate

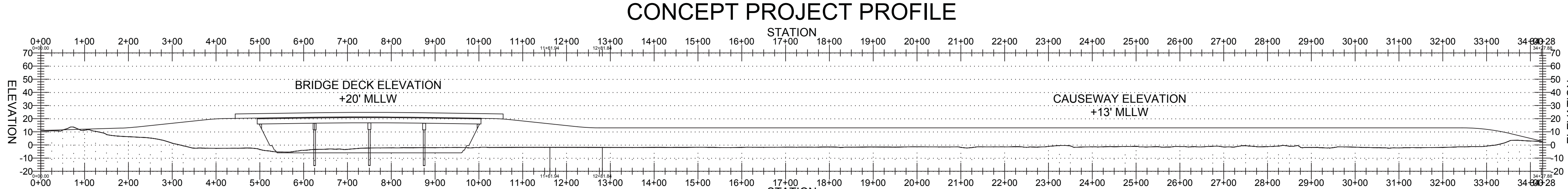
Western Alaska Storm Surge Modeling Study: Kivalina Lagoon Causeway

Geotechnical Investigation

Drawing O:_Projects by Location\Kivalina\Kivalina Causeway\DWG\C-101 CAUSEWAY PLAN.dwg last saved on 10/25/2015 4:09 PM was plotted by Epps, Lewis N POA on 10/25/2015 4:09 PM



CONCEPT PROJECT PROFILE



NOT FOR CONSTRUCTION

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ALASKA DISTRICT

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CORPS OF ENGINEERS
ANCHORAGE, ALASKA

Date: 12 FEB 2015

KVLXXX

KIVALINA, ALASKA
EVACUATION ROAD

CONCEPT PROJECT PLAN

Re˜erence number:
C101

Drawing O:_Projects by Location\Kivalina\Kivalina Causeway\DWG\C-102 TEMP ACCESS.dwg last saved on 10/25/2015 1:22 PM was plotted by Epps, Lewis N POA on 10/25/2015 1:22 PM

NOTES:

1. THIS SHEET SHOWS MAJOR PROJECT FEATURES AND ACTIVITIES DURING THE FIRST YEAR OF CONSTRUCTION.
2. THE TEMPORARY CONSTRUCTION CAUSEWAY IS TO PROVIDE PILE DRIVING EQUIPMENT A WORK PLATFORM FROM WHICH TO DRIVE THE BRIDGE PIER AND ABUTMENT FOUNDATION PILES TO DESIGN DEPTH. AT THE CONCLUSION OF PILE DRIVING, THIS CAUSEWAY WILL BE REMOVED. THE EXCAVATED MATERIAL FROM THE CAUSEWAY WILL BE USED TO INCREASE THE SIZE OF THE NORTHEAST CAUSEWAY WORK PAD AND PLACED AS EMBANKMENT ROCK ALONG THE ALIGNMENT OF THE NORTHEAST CAUSEWAY.
3. THE CONSTRUCTION NAVIGATION CHANNEL IS A TEMPORARY FEATURE TO ALLOW THE BRIDGE GIRDERS TO BE DELIVERED TO THE SITE. THIS ASSUMES THAT GIRDERS WILL BE PICKED OFF A BARGE BY CRANES ON THE CONSTRUCTION CAUSEWAY AND PLACED ON THEIR BEARINGS ON THE PIERS. THIS CHANNEL WILL NOT BE MAINTAINED BY A GOVERNMENT AGENCY FOR PUBLIC NAVIGATION AND WILL BE ALLOWED TO SHOAL TO A NATURAL DEPTH UPON COMPLETION OF THE PROJECT.
4. TOPOGRAPHIC SURVEY LIMITS DO NOT SHOW BATHYMETRY TO -10' MLLW IN THE CHUKCHI SEA. IT IS ASSUMED THAT A CHANNEL OF SIMILAR DIMENSIONS WILL BE REQUIRED FROM THE CHUKCHI SEA TO THE WULIK RIVER ENTRANCE TO PROVIDE ACCESS FOR BARGES TO THE BRIDGE SITE.
5. DREDGING OF THE TEMPORARY CONSTRUCTION NAVIGATION CHANNEL AND TURNING BASIN WOULD BE ACCOMPLISHED BY CUTTER HEAD SUCTION DREDGE. DREDGE SLURRY WOULD BE PUMPED THROUGH A PIPELINE TO THE BEACH OF THE CHUKCHI SHORE WHERE MATERIAL WOULD BE PLACED ADJACENT TO THE RUNWAY TO HELP PROTECT THE AIRPORT FROM FUTURE EROSION DAMAGES.
6. BRIDGE PILES ARE ASSUMED TO BE DRIVEN TO A DEPTH OF -200' MLLW. FURTHER GEOTECHNICAL INVESTIGATIONS OF THE SITE ARE NEEDED TO DETERMINE THE MINIMUM REQUIRED DEPTH OF PILE FOUNDATIONS FOR THIS PROJECT.

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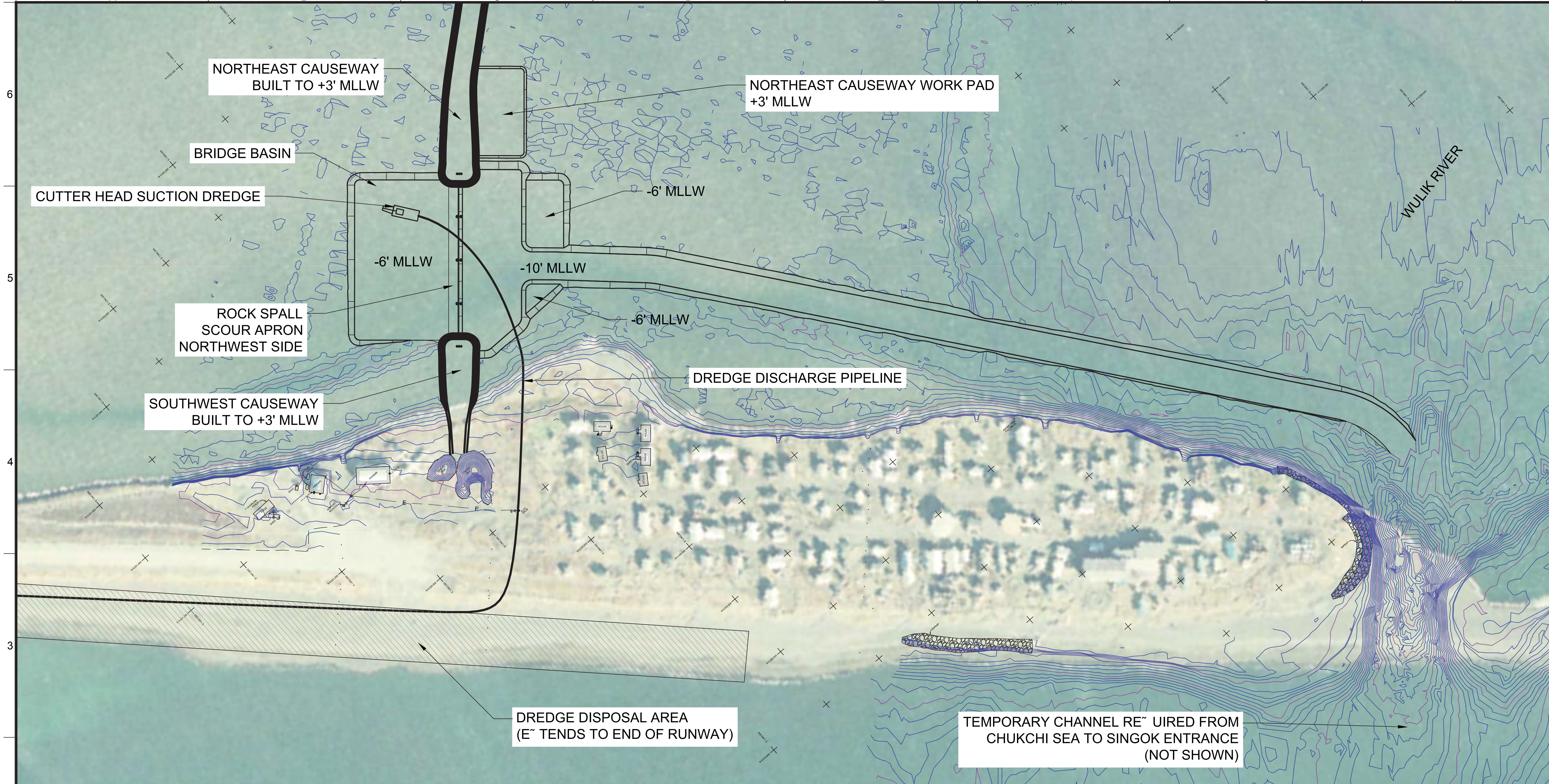
KIVALINA, ALASKA
EVACUATION ROAD

BRIDGE FOUNDATION CONSTRUCTION AND
TEMPORARY ACCESS FACILITIES

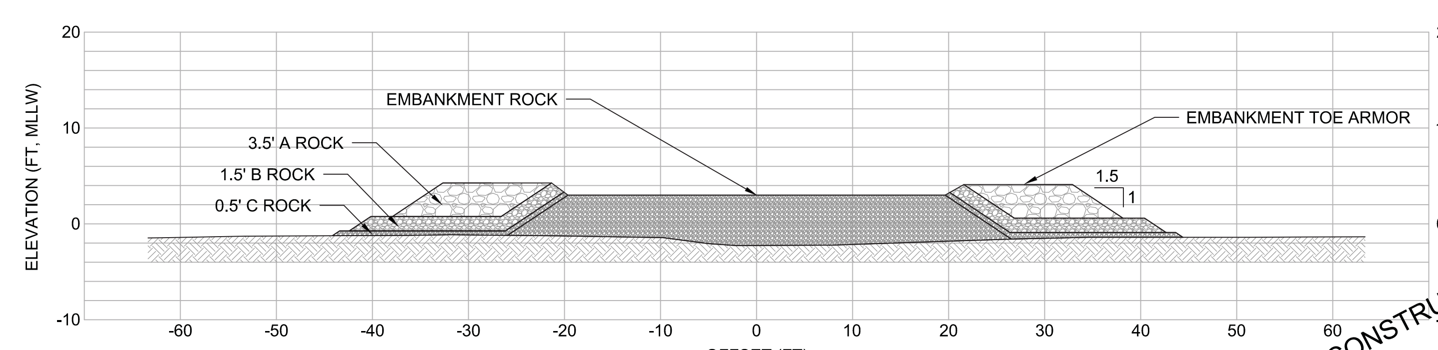
Re˜erence
number:
C102

Sheet o˜ X



NOTES:

1. THIS DRAWINGS SHOWS PROJECT FEATURES AND MAJOR ACTIVITIES DURING THE SECOND YEAR OF CONSTRUCTION.
2. DREDGING THE BRIDGE BASIN WOULD BE ACCOMPLISHED WITH A CUTTER HEAD SUCTION DREDGE.
3. DISCHARGE SLURRY WOULD BE PLACED BY PIPELINE ON THE BEACH OF THE CHUKCHI SHORELINE ADJACENT TO THE RUNWAY.
4. MAINTENANCE DREDGING MAY BE REQUIRED FOR CONTINUED ACCESS TO THE TEMPORARY CONSTRUCTION NAVIGATION CHANNEL AND TURNING BASIN.
5. THE SOUTHWEST AND NORTHEAST CAUSEWAYS WOULD BE CONSTRUCTED TO +3' MLLW. THIS WOULD INCLUDE PLACEMENT OF ALL EMBANKMENT ROCK AND CONSTRUCTION OF C, B, AND A ROCK LAYERS AT THE TOES OF THE CAUSEWAYS.
6. THE SCOUR APRON WOULD BE CONSTRUCTED FROM THE CENTERLINE OF THE BRIDGE ALIGNMENT TO THE NORTHEAST EDGE.



TYPICAL PARTIAL CAUSEWAY SECTION

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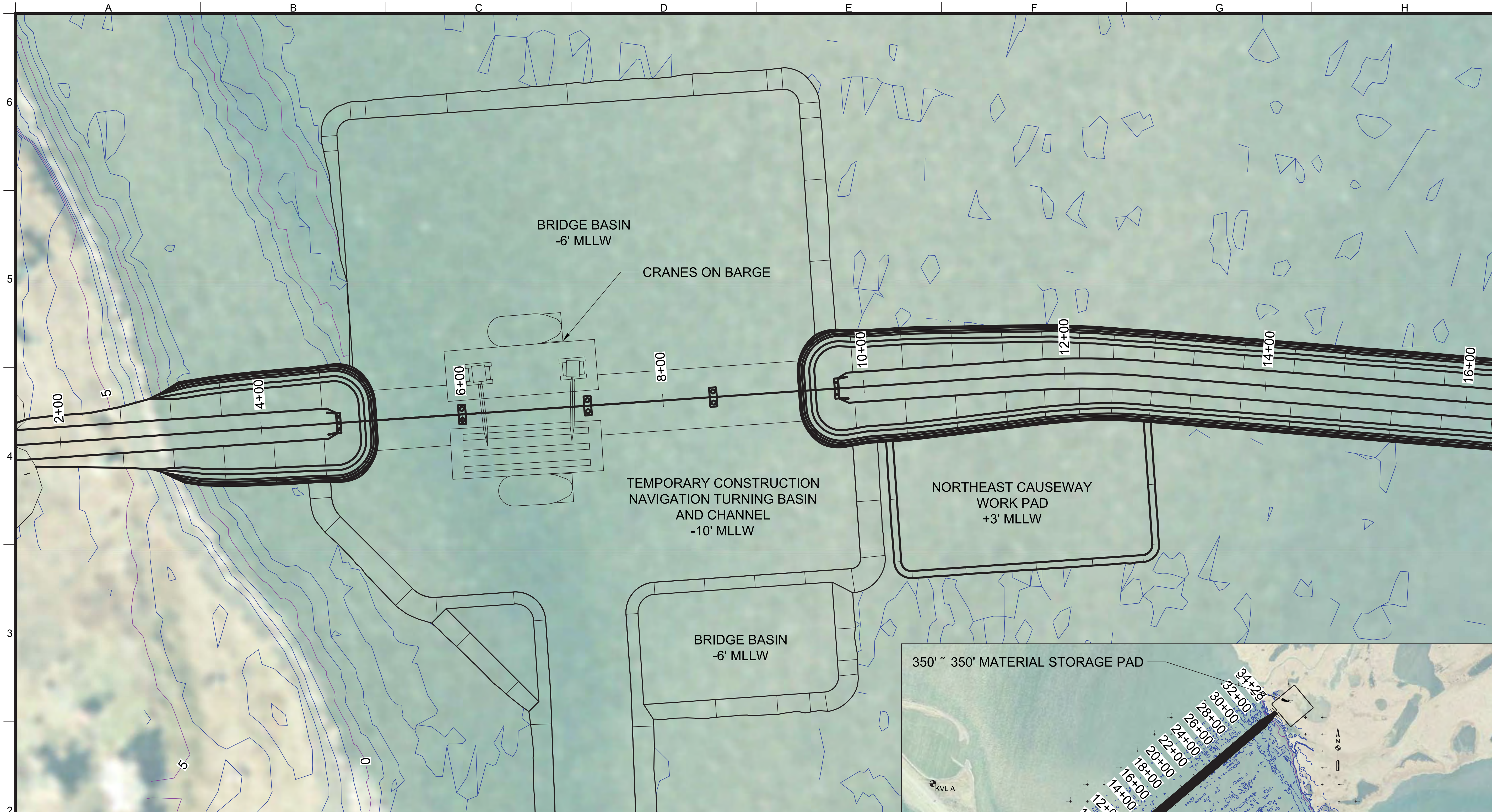
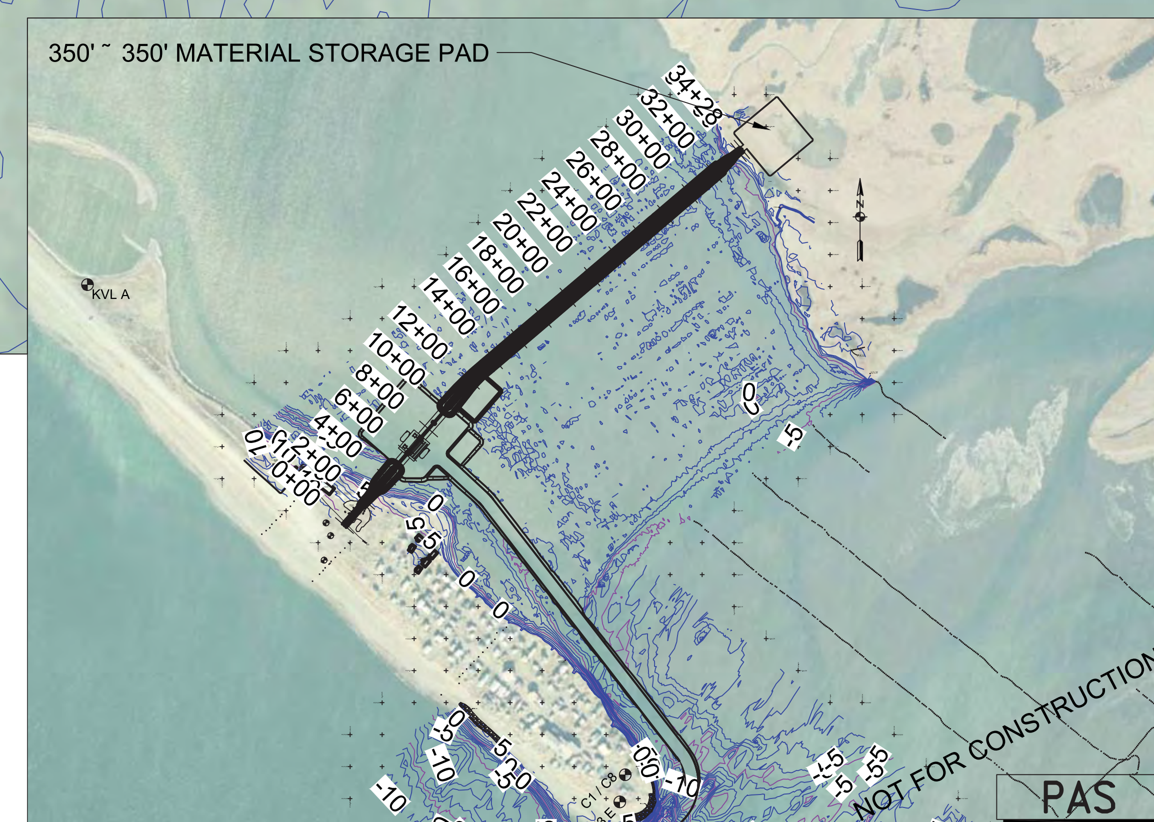
KIVALINA, ALASKA
EVACUATION ROAD

BRIDGE BASIN AND WINTER STOCKPILE

Re˜erence number:
C103

Sheet o˜ X





NOTES:

1. THIS DRAWING SHOWS PROJECT FEATURES AND MAJOR ACTIVITIES IN THE FOURTH YEAR OF CONSTRUCTION.
2. GIRDER PLACEMENT WOULD BE ACCOMPLISHED BY CRANES OPERATING FROM BARGES
3. BASIN DREDGING WOULD BE MODIFIED TO ACCOMMODATE THE BARGES AS RE˜UIRED.

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Date: 12 FEB 2015

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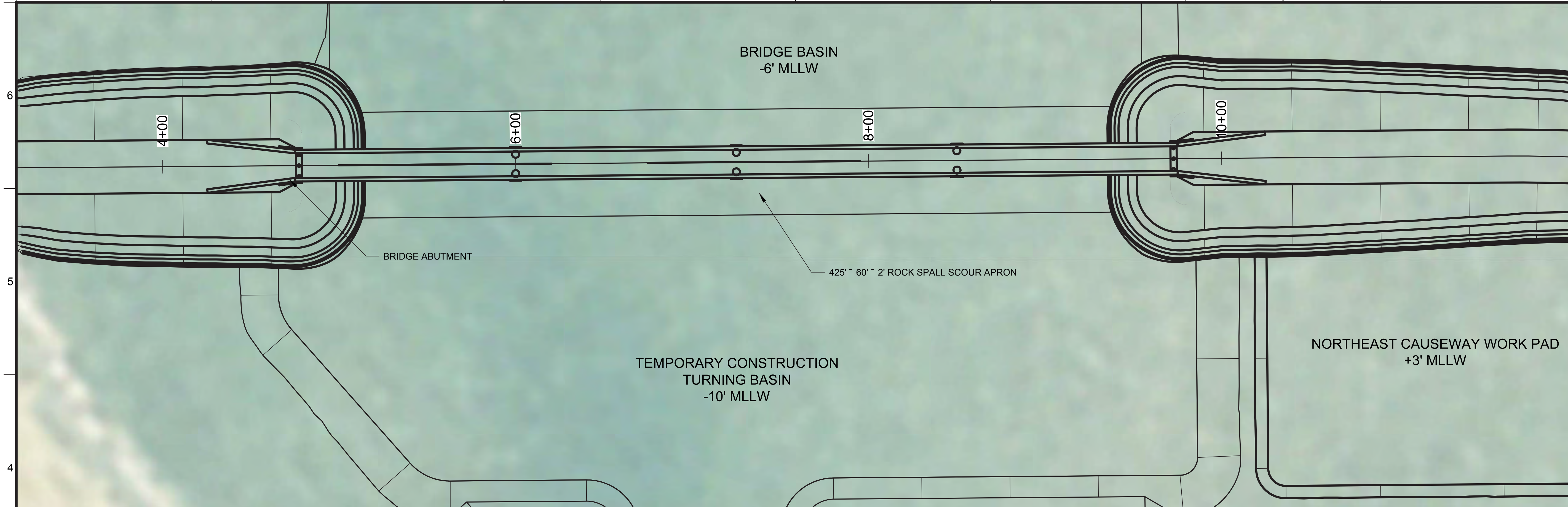
BRIDGE DECK CONSTRUCTION

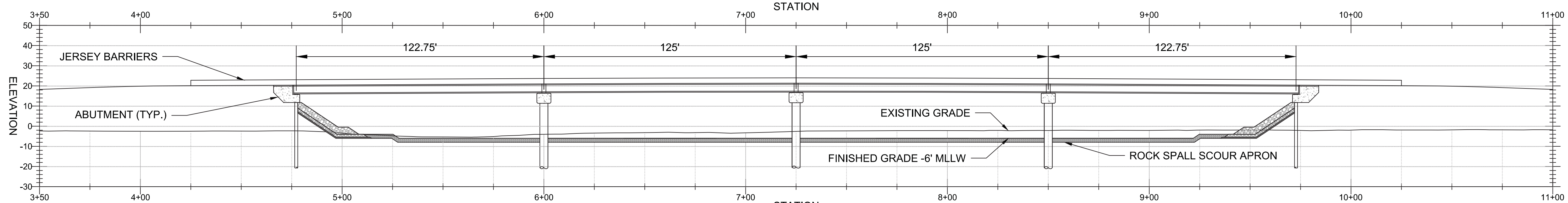
Re˜erence number:
C104

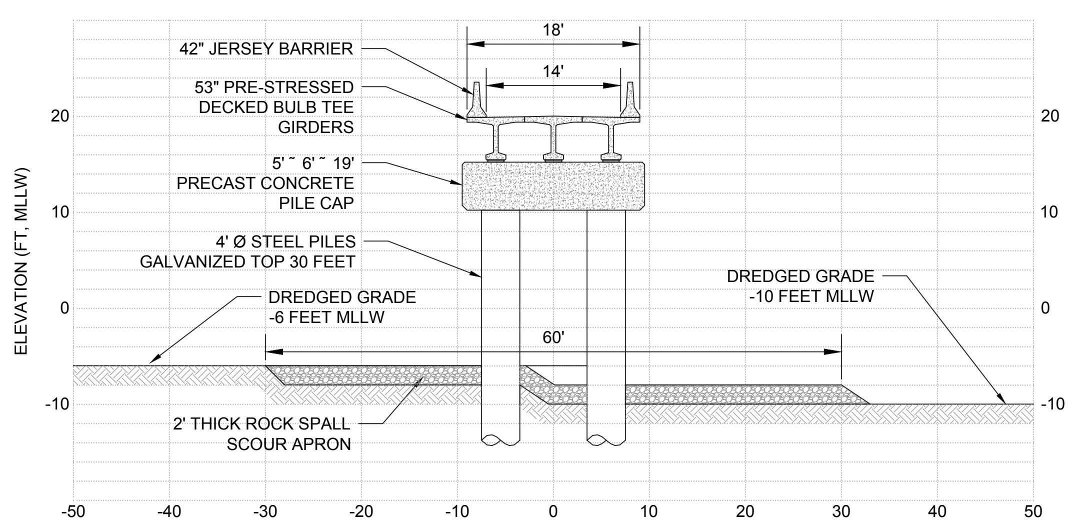
Sheet o˜ X

Drawing O:_Projects by Location\Kivalina\Kivalina Causeway\DWG\S-101 BRIDGE PLAN.dwg last saved on 10/25/2015 3:09 PM was plotted by Epps, Lewis N POA on 10/25/2015 3:10 PM

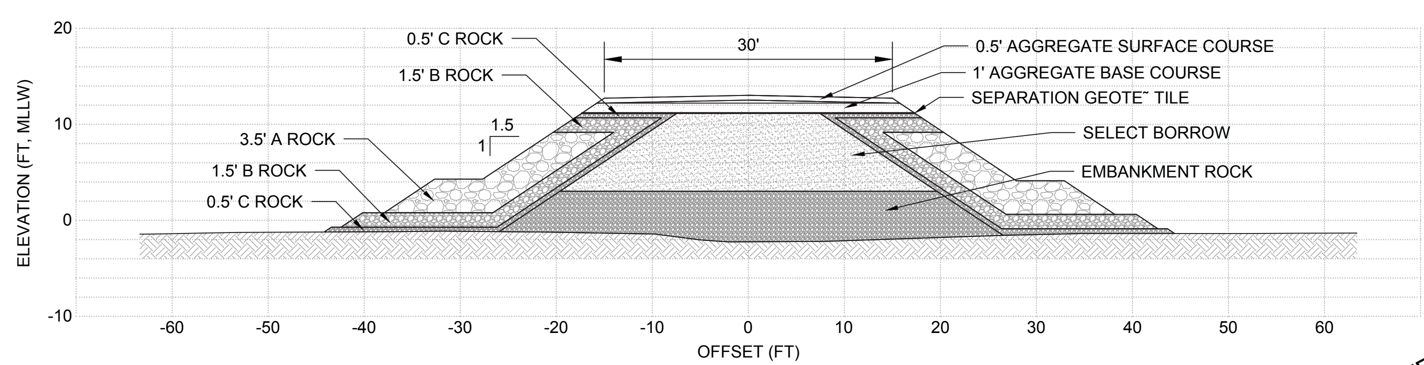


BRIDGE PROFILE





TYPICAL BRIDGE SECTION



TYPICAL CAUSEWAY SECTION

NOT FOR CONSTRUCTION

PAS

US ARMY CORPS OF ENGINEERS
ALASKA DISTRICT

Date: 12 FEB 2015

KVLXXX

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
ANCHORAGE, ALASKA

KIVALINA, ALASKA
EVACUATION ROAD

BRIDGE PLAN

Reference number:
S101

REPORT

KIVALINA CAUSEWAY GEOTECHNICAL REPORT, KIVALINA, ALASKA

Submitted To: US Army Corps of Engineers, Alaska District
ATTN: CEPOA-EN-G (John Rajek)
P.O. BOX 6898
JBER, AK 99506-0898

Submitted By: Golder Associates Inc.
2121 Abbott Road, Suite 100
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Distribution:
6 Copies + 6 CD's – US Army Corps of Engineers, Alaska District
2 Copies – Golder Associates Inc.

August 14, 2015 **1419207**

Golder Associates

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1.0 INTRODUCTION

1.1 Project Description

Golder Associates Inc. (Golder) has been contracted by the US Army Corps of Engineers, Alaska District (USACE) to perform a subsurface exploration program for the Kivalina Evacuation Road Project in Kivalina, Alaska. The community of Kivalina is located on a barrier island that lies between the Kivalina Lagoon and the Chukchi Sea along the northwest coast of Alaska. Kivalina is located approximately 80 miles northwest of the community of Kotzebue, Alaska, and 75 miles southeast of the community of Point Hope, Alaska. The project location is depicted in the Vicinity Map, Figure 1.

The project consists of an emergency evacuation road crossing the Kivalina Lagoon. The road will incorporate a system of abutments/piers, bridge structures, causeways, and approach roads. At the time of this report, final grades, elevations, spans, and specific design details are not known.

This report provides the results of Golder's review of existing data, geotechnical site exploration, laboratory testing, and discussion of findings. This work was done in accordance with the Statement of Work (SoW) provided by USACE (Statement of Work Revision 10 February 2015 – Contract No. W911KB-13-D-0009), and with the USACE approved Quality Control Plan, Health and Safety Plan, and Geotechnical Work Plan.

1.2 Purpose and Scope

Our scope of work consisted of performing a geotechnical site investigation and characterizing the subsurface conditions for the proposed Kivalina Evacuation Road. Golder's findings and geotechnical considerations will support additional engineering design, permitting, and construction cost estimates, all of which will be developed by others. Our scope of services did not include developing geotechnical engineering designs, recommendations, or bid-ready construction documents. Golder's scope of work included:

- Reviewing readily available historical geotechnical explorations within and near the project area.
- Planning and executing a geotechnical drilling program to explore the subsurface soil and thermal conditions along the proposed road alignment up to 50 feet below grade.
- Performing Laboratory testing on samples collected during the geotechnical exploration.
- Providing results of the subsurface exploration and laboratory testing programs in a written Geotechnical Data Report.

Subsurface conditions were characterized by performing a subsurface exploration that included advancing boreholes, collecting soil samples, and laboratory testing. Based on the findings from the field study and laboratory testing, as well as our understanding of the site geology and regional seismic hazards, we are providing a discussion of our analysis.

1.3 Project Team

The Golder Project Team consisted of a Project Director, Project Manager, and Team Lead. Mr. Tom Krzewinski, PE, was Project Director and provided senior oversight for the project, while Mr. John Thornley, PE, the Project Manager, was accountable for project planning, monitoring, and closure. Mr. Ryan Campbell was the Team Lead and managed the field exploration program. Drilling services were provided by Discovery Drilling Inc. (Discovery) of Anchorage, Alaska. Logistics and billeting were provided by Remote Site Services Inc. (RSSI) of Anchorage, Alaska.

2.0 GEOTECHNICAL SITE INVESTIGATION

2.1 Subsurface Drilling and Sampling

The purpose of the drilling program was to explore the subsurface conditions within the project site to determine the physical and engineering characteristics of the soils. The drilling program was conducted between March 14, 2015 and March 21, 2015. Drilling was conducted using a track-mounted Geoprobe 6712DT drill rig, owned and operated by Discovery. A total of six (6) boreholes, identified as K15-01 through K15-06 (Permanent Borehole Numbers AP-39 through AP-44), were advanced at the site, as shown on the Borehole Location Map, Figure 2. The boreholes consisted of two 50-foot boreholes at proposed abutment locations and four 30-foot boreholes along the proposed causeway alignment for a total of 220 linear feet. Each borehole was drilled from the surface of the lagoon ice. The lagoon ice was ground fast at the time the boreholes were drilled.

Drilling was accomplished using hollow-stem auger methods. The augers used during the exploration have an inner diameter of 3.25 inches and an outer diameter of 6.625 inches. Samples were obtained using a 2.0-inch outside diameter (O.D.) split-barrel sampler driven by a 140-pound automatic hammer following the procedures outlined in the American Society of Testing and Materials (ASTM) D1586, "Standard Test Method for Penetration Test and Split Barrel Sampling of Soils." In general, drive samples were collected at 2.5-foot intervals to 17.5 feet, and at 5-foot intervals thereafter to proposed test borehole depths, or at major soil type transitions. In the frozen near surface materials encountered in Boreholes K15-01 (AP-39) and K15-04 (AP-42) where insufficient penetration and material recovery was obtained using the equipment required by the ASTM D1586 test method, a modified penetration test was performed. The modified penetration test included a 3.0-inch O.D. split-barrel sampler and automatic drop hammer set to drop a 340-pound weight a distance of 30 inches.

Samplers were driven into the soil using a 140-pound automatic hammer free-falling a vertical distance of 30 inches. The number of hammer blows or blow counts generally required to drive the sampler in four 6-inch segments were recorded during sampling. The combined blow count for the middle two 6-inch segments is referred to as the uncorrected SPT N-value. Sampling procedures employed in the field were consistent with those described by the American Society for Testing and Materials, ASTM D1586, "Standard Test Method for Penetration Test and Split Barrel Sampling" (2011) with the exception of use of the larger spoon and hammer. Advancement of the SPT sampler was ceased when blow counts to drive the sampler reached 50 blows, in six inches, or more (refusal). Individual blow counts for each sample can be found in the Appendix A, Borehole logs.

Heave was encountered in Borehole K15-01 (AP-39) and K15-04 (AP-42) near the surface at five feet bgs and four feet bgs respectively and was controlled by using the auger wash method. This method uses water poured into the augers to increase the head pressure, to maintain bit circulation while drilling. In all the boreholes the auger wash method was used to prevent heave. The term “AW” was recorded on the borehole log and sample summary when auger wash methods were used and is indicated on the individual borehole logs and can be found in Appendix A, Borehole Logs.

Each soil sample collected in the field was classified in accordance with ASTM D2488, “Description and Identification of Soils (Visual-Manual Procedure).” Where frozen conditions were encountered, soil samples were also classified in accordance with ASTM D-4083, “Frozen Soil Classification.” Collected soil samples were handled in accordance with ASTM D4220, “Standard Practices of Preserving and Transporting Soil Samples.” The borehole logs are presented in Appendix A. Boundaries between different soil types presented on the logs are approximate because actual transition between layers may be gradual.

2.1.1 Site Contamination Screening

Collected soil samples were placed in plastic bags and warmed to at least 50 degrees Fahrenheit (°F) before beginning the screening process. After about 30 minutes, the samples were screened with a Photoionization Detector (PID) to estimate the presence of volatile organic compound (VOC) levels. The PID used was equipped with a 10.2-electron-volt (eV) lamp. After warming and prior to testing, each sample was shaken or agitated for 15 seconds at the beginning and end of the vapor development period to assist volatilization. After vapor development, the PID sampling probe was inserted to about one-half the headspace depth and the highest meter reading was recorded, which was normally between two and five seconds after probe insertion. Care was taken when inserting the sampling probe into the bag to avoid uptake of any moisture or soil particles. The PID was calibrated at the beginning of every field day with 100-parts per million (ppm) isobutylene calibration gas. As stated in the project’s Final Work Plan[1], soils with PID readings above 20 ppm, stained, or emitting odors were considered contaminated. Based on the field screenings, no contaminated soils were observed during the exploration.

2.1.2 Completion of Boreholes

Upon completion of drilling, a one-inch diameter, schedule 120 polyvinyl chloride (PVC) pipe was installed in select boreholes to allow for subsurface ground temperature measurements. The annular space between the PVC pipe and the sidewall of the boreholes was backfilled with non-contaminated drill cuttings. In compliance with Golder’s Health and Safety plan, boreholes were not left open overnight without barriers and/or guarding. Horizontal locations were collected using Trimble Geo7x global positioning system (GPS) unit and differentially corrected by post-processing using Trimble GPS Pathfinder software. Post process position accuracy on the observations is between 0 and 50 cm. The borehole locations and elevations are presented in Table 1 below and shown on the Borehole Location

[1] Kivalina Evacuation Road Project, Final Work Plan. Submitted to USACE - Alaska District by Golder Associates Inc. March 6, 2015. Project Number 1419207

Map, Figure 2. Borehole elevations are assumed from bathymetric data provided by USACE on April 30, 2015.

Table 1: Borehole Locations and Mudline Elevations

Borehole	Northing (AK83-8F)	Easting (AK83-8F)	Latitude (WGS84)	Longitude (WGS84)	Elevation (Feet)[1]
K15-01 (AP-39)	5021268.196	1842645.871	67.73054419	-164.5427967	-2.34
K15-02 (AP-40)	5021391.276	1842782.222	67.73087171	-164.5417937	-3.38
K15-03 (AP-41)	5021535.562	1842911.126	67.73125763	-164.5408408	-2.14
K15-04 (AP-42)	5021952.875	1843319.69	67.73237149	-164.5378269	-1.85
K15-05 (AP-43)	5022472.143	1843929.111	67.73375086	-164.5333484	-1.4
K15-06 (AP-44)	5023107.386	1844698.75	67.73543656	-164.5276952	-1.77

Notes: Vertical Control is Mean Lower Low Water (MLLW = 0.0' NAVD-88)
[1] Assumed elevations from bathymetric data provided by USACE.

2.2 Subsurface Temperature Measurements

Subsurface temperatures were measured in Boreholes K15-01 (AP-39), K15-02 (AP-40), and K15-06 (AP-44) over the period of 30 days following the completion of drilling and recorded as the temperatures stabilized. Subsurface temperatures were measured using a Temperature Acquisition Cable (TAC) with sensor depth spacing of 2.5 feet from the ground surface to 20 feet bgs, and five (5) foot spacing from 20 to 50 feet bgs. Data was recorded on a TAC datalogger that was retrieved by RSSI employee Alex Hawley. Results are presented in Temperature Data Recordings, Appendix C.

2.3 Laboratory Testing

A total of 72 representative soil samples were selected for laboratory testing and tested by DOWL of Anchorage, Alaska, a USACE validated geotechnical laboratory. The laboratory testing was performed for the following purposes:

- Substantiating visual field classifications – ASTM D2488
- Classification of Soils (USCS) – ASTM D2487
- Particle-Size Analysis of Soils – ASTM D422
- Moisture Content – ASTM D2216
- Atterberg Limits – ASTM D4318
- Moisture, Ash, and Organic Matter of Peat and Other Organic Soils – ASTM D2974
- Salinity Testing – DOWL In-house procedure
  - (Place 100g of material and place in 250ml beaker. Record weight and add equal amount of distilled water and record weight again. Stir samples and let stand

overnight. Determine type of environment samples were recovered from and utilize standard most representative of environment. Stir sample and read temperature and conductivity with conductivity meter.)

Results of laboratory testing are presented in the Laboratory Test Summary, Appendix B. Select laboratory testing results are also presented on the borehole logs in Appendix A.

3.0 SITE CONDITIONS

3.1 Regional Setting

Kivalina is within the Arctic Foothills Physiographic Province, which is generally characterized by rolling hills and gentle slopes. The Community of Kivalina; however, is located on the southern end of Kivalina Island, a barrier island that separates Kivalina Lagoon on the east from the Chukchi Sea on the west. The Kivalina River and the Wulik River both flow into Kivalina Lagoon, which in turn discharges into the open sea through the Kivalik Inlet and the Sinauk Entrance.

Kivalina Island is generally less than 20 feet above sea level, is almost flat, and consists of geologically modern beach-sand deposits. Some gravel is present at each end of the island, but historically most granular construction material has been brought in from the Wulik River floodplain. We understand that the only significant source of locally available granular material is from the floodplains and deltas of the two major drainages east of the Kivalina Lagoon.

The Chukchi Sea has a major weather impact on the local climate, but because the Chukchi Sea is frozen for over half the year, Kivalina has a climate that is transitional between Maritime and Continental. The mean annual temperature is about 20°F with an average precipitation rate of less than 10 inches per year. Snowfall is on the order of three feet per year and persistent winter winds can result in significant drifting. Permafrost is present throughout the mainland area east of the Kivalina Lagoon.

Tidal influence in the Kivalina Lagoon is unknown at this time, but the nearest official tide recording station to Kivalina is located at the Red Dog Port, approximately 17 miles to the south. The mean range of tides at the Red Dog Port (9491094) is 0.66 feet from mean sea level according to the National Oceanic and Atmospheric Administration (NOAA)[2].

3.2 Regional Geology

Bedrock is seldom exposed in the project area except in isolated hills, especially those northwest of the Kivalina floodplain. These hills are topped with rock rubble and outcrops of limestone have been reported. DMA, 2007 see Section 3.3. Kisimigiuktuk Hill, the only hill in or near the project area, is rubble covered.

Although Pleistocene glaciation did not extend to the coast, it has had a major impact on the surficial geology in the Kivalina area. Sea level fluctuation has resulted in the accumulation of sandy beach deposits at various locations both offshore and inland from the presently established coastline. These deposits are similar in composition to present beach deposits, but in many cases they have been partially or totally eroded away or buried by newer fine grained material.

[2] NOAA Tide and Current Data, http://tidesandcurrents.noaa.gov/map/

The drainage patterns of the Wulik and Kivalina Rivers have controlled much of the post-glacial deposition of local sediments. Glacial deposits in the headwaters have been reworked by stream and river action and are the source of gravelly sand and sandy gravel deposits in the modern floodplains. Wind-blown silt and sand is often present as a near-surface veneer that, with surface vegetation, forms the present tundra cover. Along the eastern edge of Kivalina Lagoon, between the two rivers, a vegetation covered and tidally influenced zone extends as much as two miles inland.

Beneath one to two feet of seasonally thawed material, the mainland east of the lagoon is almost universally underlain by permafrost. Horizontally layered ice masses are common and near vertical ice wedges that have developed in soil contraction cracks often result in a surficial feature known as polygonal patterned ground. This segregated ice is generally confined to the fine-grained, organic-rich surface material, but under some conditions ice wedges have penetrated into the underlying granular material.

3.3 Existing Geotechnical Data

Golder has conducted geotechnical investigations in Kivalina since the 1990's for infrastructure development projects. Most of our in-house geotechnical data is not located near the proposed evacuation road alignment, although important information about the general subsurface conditions in the area may be applicable. Key elements from our review of historic geotechnical data near the proposed improvements are summarized below.

- **Golder Associates Inc. (Golder) Geotechnical Findings and Conceptual Recommendations, Kivalina Evacuation Road, 2013.** Golder was subcontracted by WHPacific to perform a geotechnical field exploration and provide conceptual-level geotechnical recommendations and considerations for a light-duty, double-lane unpaved roadway. Two roadway alignments, the northern and southern route, were investigated during this program. Based on probe and shallow drill hole data, the southern route was identified as the most viable for the construction of the roadway. The subsurface conditions along the southern alignment generally consisted of approximately 0.5 to 1.5 feet of unfrozen organic mat (PT) overlying approximately two to four feet of frozen silty sand (SM). Five granular material sources for construction of the roadway were also identified.
- **Duane Miller and Associates (DMA), Material Source Desktop Study, 2007.** In 2007 DMA issued a desktop investigation report on potential material targets in and around the Kivalina area. Sandy gravel and sand deposits were identified within the modern floodplains of the Wulik drainage as potential areas for aggregate material assessments. Old beach lines and associated back beach sand dunes were also identified as potential targets for unclassified granular material areas. Rock and rock rubble deposits from bedrock ridges were also identified as potential sources for crushed material.
- **DMA (and others), Permafrost and Wetlands Report, National Guard Armories, Western and Northern Alaska, 2006.** In August 2006, DMA probed for potential active layer depths at the armory in Kivalina. A 30-foot by 30-foot grid was established on the armory site and shallow hand-dug test pits were excavated at two of the grid nodes. Beneath a thin organic mat of grasses and roots, sand with trace fine gravel was

observed to a test pit termination depth of three feet. Frozen ground was not encountered with a five-foot probe in August, although permafrost is expected to be present below the five-foot depth.

- **US Army Corps of Engineers (USACE), Relocation Planning Project 2005.** In December 2005, USACE identified seven potential locations for the relocation of the Village of Kivalina. The purpose of the report was to provide residents and stakeholders with the information necessary to make an informed decision regarding the best solution for the community. Kivalina residents voted several times to choose the new village town site, but could not come to a conclusion as to where the new site would be located.
- **AKDOT & PF, Engineering Geology and Soils Report, Kivalina Airport, 1984.** In August 1984, nine boreholes were drilled in support of a runway expansion in Kivalina. The subsurface profile consisted of a surficial organic mat 0.5 feet thick, underlain by sand to 8 to 14 feet deep. An organic silt layer at least five feet thick was encountered beneath the sand. The active layer was observed at four to six feet below the ground surface and was underlain by permafrost to the depths explored.

3.4 Subsurface Conditions

Based on findings from the current geotechnical study, the subsurface conditions along the causeway alignment generally consist of three different sedimentary horizons: 1) lagoonal deposits, 2) nearshore marine deposits, and 3) outwash deposits. The majority of the soils observed in these deposits consisted of silt, organic silt, sandy silt, and silty sand. General soil properties measured in the laboratory for each sedimentary horizon is presented in Table 2. Each sedimentary horizon is discussed in detail in the following section. A geologic cross section along the proposed causeway alignment is shown in Figure 3.

Table 2: Generalized Soil Properties

		Sedimentary Horizons		
		Lagoonal Deposits	**Nearshore Deposits**	**Outwash Deposits**
USCS Soil Classification (see Note 1)		OL, ML	SP-SM, SM, ML	GW, SW-SM
Organic Content (%)	Average	7	4.5	NA
	Minimum	5.8	4	NA
	Maximum	7.5	5.1	NA
Moisture Content (%)	Average	42	26	15
	Minimum	32	11	6
	Maximum	63	53	31
Salinity (ppt)	Average	8.3	5.7	10.8
	Minimum	2.3	2.7	10.8
	Maximum	15.6	8.6	10.8

Notes: 1. Refer to Appendix A, Figure A-1 for USCS Classification abbreviations.

3.4.1 Lagoonal Deposits

Lagoonal deposits generally consist of organic-rich silts, silts with organics, and minor lenses of sand that have been deposited in protected lagoon and bay environments. Locally, the surface layer consists of very soft to firm non-plastic sandy silt ranging from 3 to 17 feet thick and thickening towards the mainland. However, silty sand was encountered at the surface in Boreholes K15-01 (AP-39) and K15-05 (AP-43). The surface layer at Borehole K15-01 (AP-39) may be part of the near shore marine horizon, as a fresh water channel located between Borehole K15-01 (AP-39) and Borehole K15-02 (AP-40) is connected to the Wulik River. Fine grained, organic-rich deposits observed near the bottom of Boreholes K15-01 (AP-39), K15-02 (AP-40), and K15-04 (AP-42) may be older Lagoonal deposits.

3.4.2 Nearshore Marine Deposits

Nearshore Marine deposits generally consist of unstructured mixtures of silty sands and sandy silts that have been reworked by grounding sea ice. Locally, Nearshore Marine deposits underlie the surface Lagoonal deposits, and are very loose to dense silty sands interbedded with sandy silt up to 46 feet thick. The Nearshore Marine deposits were the predominant soil types observed in boreholes.

3.4.3 Outwash Deposits

Generally, Outwash deposits consist of fluvial and glaciofluvial interbedded gravel and sand with minor silty lenses. These deposits tend to be well-graded sand and gravels with low fines content. Locally, these deposits are dense to very dense well-graded gravel and well-graded sand with silt and gravel. These deposits were observed near the bottom of Boreholes K15-01 (AP-39), K15-02 (AP-40), K15-05 (AP-43) and K15-06 (AP-44), and ranged in thickness from 3.5 to 12.5 feet thick. The Outwash deposits were underlain by older Pleistocene-age Lagoonal deposits.

3.4.4 Very Loose Zones

Three very loose zones were encountered during the geotechnical investigation. These very loose zones have SPT blow counts ranging from 0 to 3 blows per foot. Two of the zones are projected between Boreholes K15-01 (AP-39) and K15-02 (AP-40). The first very loose zone is located near the surface approximately 4.5 to 7 feet below mudline and coincides with the fresh water channel. The second very loose zone was encountered at a deeper depth from approximately 22 to 30 feet bgs. The third very loose zone ranges from 7 to 11 feet bgs at Borehole K15-05 (AP-43) and increases in thickness to 5 to 15 feet bgs as it approaches the mainland at Borehole K15-06 (AP-44).

3.4.5 Salinity

Salinity was measured in Boreholes K15-03 (AP-41) and K15-06 (AP-44). The salinity measurements in Borehole K15-03 (AP-41), located approximately 500 feet west of the village of Kivalina, ranged from 2.3 to 8.4 parts per thousand (ppt). No permafrost was found in this borehole. The salinity measurements in Borehole K15-06 (AP-44), located approximately 80 feet from the mainland, ranged from 5.2 to 15.6 ppt.

Permafrost was encountered in this borehole from 17 to 31 feet with salinity measurements ranging from 5.2 to 10.8 ppt. In comparison, seawater has a salinity of about 33 ppt and freezes at about 28.7°F.

3.4.6 Permafrost

Permafrost was encountered in Boreholes K15-05 (AP-43) and K15-06 (AP-44) within the underlying silty sands at approximate depths of 11 to 21 feet and 17 to 31 feet bgs, respectively. The permafrost is considered poorly-bonded. The measured moisture content in the permafrost soils ranged from 6 to 41 percent and was observed in the field to contain excess non-visible ice. The permafrost encountered in both boreholes may be considered relict permafrost. Relict permafrost is permafrost that has remained from the last sub-aerial exposure of the existing seafloor. During the Pleistocene epoch, 10,000 to 2.6 million years ago, the shallow lagoon may have been exposed to the sub aerial environment during glacial maximums. In addition, the fine grained and organic soils may have insulated the underlying permafrost even after the lagoon was inundated with seawater.

3.4.7 Free Water at Depth

Free water at depth was encountered in all of the boreholes while drilling and ranged from 3.0 to 7.0 feet bgs. See Table 3 for individual free water depths per borehole. A fresh water channel was observed flowing between boreholes K15-01 (AP-39) and K15-02 (AP-40) and appears to be an extension of the Wulik River.

Table 3: Free Water Depths Encountered at Time of Drilling

Borehole	**K15-01 (AP-39)**	**K15-02 (AP-40)**	**K15-03 (AP-41)**	**K15-04 (AP-42)**	**K15-05 (AP-43)**	**K15-06 (AP-44)**
Depth bgs (ft)	3.0	3.5	7.0	3.5	7.0	6.5

4.0 LIMITATIONS AND USE OF REPORT

This report has been prepared exclusively for the U.S. Army Corps of Engineers (USACE), Alaska District, for the Kivalina Causeway Geotechnical Project in Kivalina, Alaska. The findings, conclusions, and discussion presented in this report are based on visual inspection of the site conditions and limited subsurface exploration data. This report and related work program was prepared in a manner consistent with the level of care and skill ordinarily exercised by other members of the geotechnical engineering profession in the State of Alaska currently practicing under similar conditions and subject to the time limits and financial, physical, and other constraints applicable to the scope of work. No warranty expressed or implied is made.

The construction process is an integral design component with respect to the geotechnical aspects of a project. Geotechnical engineering is not an exact science because of the variability of natural processes. Only a very small portion of the soils that affect the performance of the project have been sampled or observed; thus, variations in subsurface conditions may be present between the shallow explorations authorized under this scope of work and unsampled areas. Variations may also occur with time. Therefore, inspection and testing by a qualified geotechnical engineer should be included during construction to provide corrective recommendations adapted to the conditions revealed during the work. If there are significant changes to the subsurface conditions presented in this report, we should be notified so that we may review our conclusions and provide a written modification or verification of the changes.

The USACE has the responsibility to see that all future parties to the project, including the designer, contractor, subcontractors, etc., are made aware of this report in its entirety. This report contains information that may be useful in the preparation of contract specifications and contractor cost estimates. However, this report is not written as a specification document and may not contain sufficient information for this use without proper modification.

5.0 CLOSING

We appreciate the opportunity to provide this report. We are available to provide additional recommendations or comments as necessary. Please contact us at 907-344-6001 if you have questions or comments.

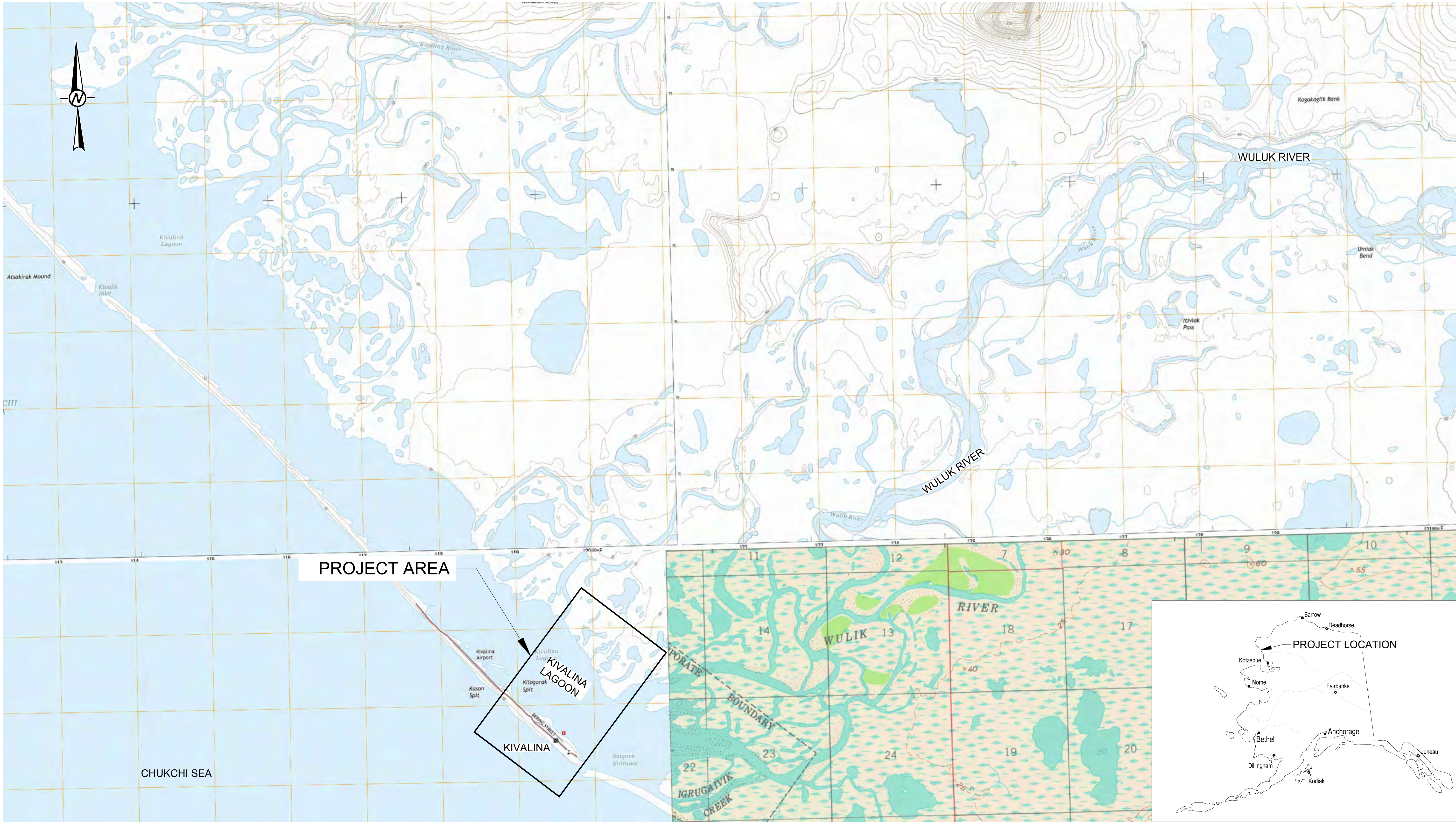
GOLDER ASSOCIATES INC.

Ryan L. Campbell
Project Engineering Geologist

John D. Thornley, PE
Senior Geotechnical Engineer

RLC/JDT/SLA/mlp

FIGURES



REFERENCE
TOPOGRAPHIC MAPS WERE PRODUCED AND DISTRIBUTED BY USGS. 1:25,000 SCALE QUADRANGLES USED INCLUDE NOATAK C-5 OW W NE, AK (2014), NOATAK D-5 SW, AK (2014), NOATAK D-6 SE, AK (2014). 1:63,360 SCALE QUADRANGLE USED NOATAK (C-5), ALASKA (1982).

CLIENT
U.S. ARMY CORPS OF ENGINEERS - ALASKA DISTRICT

CONSULTANT
Golder Associates

YYYY-MM-DD	2015-06-01
DESIGNED	-
PREPARED	MSF
REVIEWED	RLC
APPROVED	JDT

PROJECT
KIVALINA CAUSEWAY

KIVALINA, AK

TITLE
VICINITY MAP

PROJECT NO.	CONTROL	REV.	FIGURE
1419207		A	1

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

LEGEND

K15-01 2015 GOLDER BOREHOLE LOCATION AND NAME
(AP-39) PERMANENT BOREHOLE ID

REFERENCE/NOTES

1. SPOT IMAGERY FROM 2010 WAS PROVIDED AND DISTRIBUTED BY USGS FROM 1:25,000 SCALE GEOPDF, NOATAK C-5 OW W NE, AK (2014)
2. SURFACE/BATHYMETRIC ELEVATION DATA PROVIDED BY USACE ON APRIL 30, 2015
3. VERTICAL CONTROL IS MEAN LOWER LOW WATER (MLLW=0.0') BASED ON NAVD88 LOCAL CONTROL VALUES
4. HORIZONTAL CONTROL IS AK83-8F
5. CONTOUR INTERVAL IS 1' & 5'
6. PROPOSED ROAD LOCATIONS PROVIDED BY WHPACIFIC SUMMER 2013

CLIENT
U.S. ARMY CORPS OF ENGINEERS - ALASKA DISTRICT

CONSULTANT
Golder Associates

YYYY-MM-DD	2015-06-01
DESIGNED	-
PREPARED	MSF
REVIEWED	RLC
APPROVED	JDT

PROJECT
KIVALINA CAUSEWAY

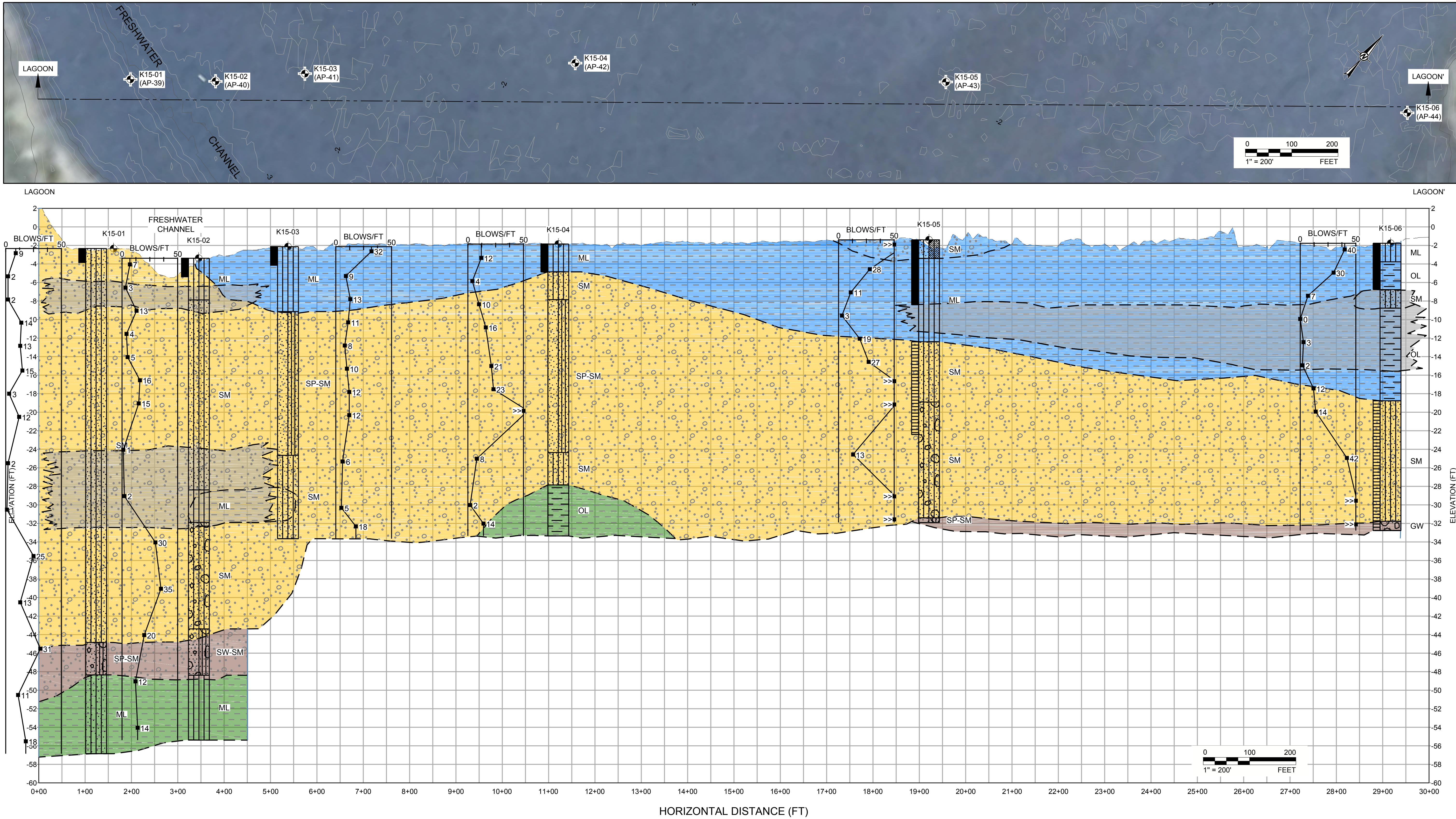
KIVALINA, AK

TITLE
BOREHOLE LOCATION MAP

PROJECT NO.	CONTROL	REV.	FIGURE
1419207		A	2

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

Path: \\anchorage\Public\Geomatics\USACE\Kivalina\99_PROJECTS\1419207 USACE Kivalina Evac Road AK\200 REPORT\02_PRODUCTION\DWG\ | File Name: 1419207.002_Lagoon.dwg



LEGEND

- BOREHOLE NAME
- ICE BONDING TYPE
- GROUNDWATER LEVEL
- UNCORRECTED BLOWS/FT
- UNIFIED SOILS CLASSIFICATION (ADAPTED FROM ASTM D2487)

ICE BONDING TYPE

- WELL BONDED
- POORLY BONDED
- UNBONDED / UNFROZEN

K15-01 (AP-39) — 2015 GOLDER BOREHOLE LOCATION AND NAME / PERMANENT BOREHOLE ID

GEOLOGICAL LEGEND

- LAGOONAL DEPOSITS
- NEARSHORE MARINE DEPOSITS
- OUTWASH DEPOSITS
- OLDER LAGOONAL DEPOSITS
- VERY LOOSE ZONES
- FINE-GRAINED MATERIAL
- COARSE-GRAINED MATERIAL

REFERENCE

SPOT IMAGERY FROM 2010 WAS PROVIDED AND DISTRIBUTED BY USGS FROM 1:25,000 SCALE GEOPDF, NOATAK C-5 OW W NE, AK (2014).

CLIENT
U.S. ARMY CORPS OF ENGINEERS - ALASKA DISTRICT

CONSULTANT
Golder Associates

YYYY-MM-DD	2015-06-01
DESIGNED	-
PREPARED	MSF
REVIEWED	RLC
APPROVED	JDT

PROJECT
KIVALINA CAUSEWAY

KIVALINA, AK

TITLE
GEOLOGIC PLAN AND PROFILE

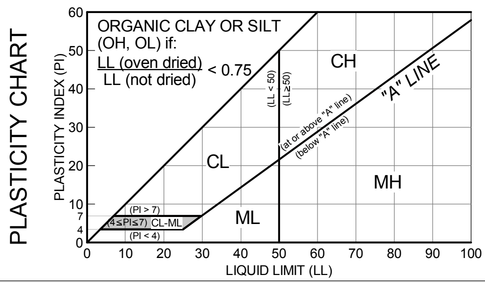
PROJECT NO.	CONTROL	REV.	FIGURE
1419207		A	3

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

APPENDIX A
BOREHOLE LOGS

UNIFIED SOIL CLASSIFICATION (adapted from ASTM D2487)

MATERIAL TYPES	CRITERIA FOR ASSIGNING SOIL GROUP NAMES AND GROUP SYMBOLS USING LABORATORY TESTS			GROUP SYMBOL	SOIL GROUP NAMES & LEGEND	
COARSE-GRAINED SOILS >50% RETAINED ON NO. 200 SIEVE	GRAVELS >50% OF COARSE FRACTION RETAINED ON NO 4. SIEVE	CLEAN GRAVELS <5% FINES	$C_U \geq 4$ AND $1 \leq C_C \leq 3$	GW	WELL-GRADED GRAVEL	If soil contains ≥15% sand, add "with sand"
			$C_U < 4$ AND/OR [$C_C < 1$ OR $C_C > 3$]	GP	POORLY GRADED GRAVEL	
		GRAVELS WITH FINES >12% FINES	FINES CLASSIFY AS ML OR MH	GM	SILTY GRAVEL	
			FINES CLASSIFY AS CL OR CH	GC	CLAYEY GRAVEL	
	SANDS ≥50% OF COARSE FRACTION PASSES ON NO 4. SIEVE	CLEAN SANDS <5% FINES	$C_U \geq 6$ AND $1 \leq C_C \leq 3$	SW	WELL-GRADED SAND	If soil contains ≥15% gravel, add "with gravel"
			$C_U < 6$ AND/OR [$C_C < 1$ OR $C_C > 3$]	SP	POORLY GRADED SAND	
		SANDS AND FINES >12% FINES	FINES CLASSIFY AS ML OR MH	SM	SILTY SAND	
			FINES CLASSIFY AS CL OR CH	SC	CLAYEY SAND	
FINE-GRAINED SOILS >50% PASSES NO. 200 SIEVE	SILTS AND CLAYS LIQUID LIMIT <50	PLASTICITY CHART		CL	LEAN CLAY	If soil contains 15% to 29%, add "with sand" or "with gravel" for whichever type is prominent, or for ≥30%, add "sandy" or "gravelly"
				ML	SILT	
				OL	ORGANIC CLAY OR SILT	
	SILTS AND CLAYS LIQUID LIMIT ≥50			CH	FAT CLAY	
				MH	ELASTIC SILT	
				OH	ORGANIC CLAY OR SILT	
HIGHLY ORGANIC SOILS		PRIMARILY ORGANIC MATTER, DARK IN COLOR, AND ORGANIC ODOR		PT	PEAT	



NOTES: $C_U = \frac{D_{60}}{D_{10}}$ $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$

Gravels or sands with 5% to 12% fines require dual symbols (GW-GM, GW-GC, GP-GM, GP-GC, SW-SM, SW-SC, SP-SM, SP-SC) and add "with clay" or "with silt" to group name. If fines classify as CL-ML for GM or SM, use dual symbol GC-GM or SC-SM. $D_{(X\%)}$ is soil particle diameter where X% is % finer. *Optional Abbeviations:* Lower case "s" after USCS group symbol denotes either "sandy" or "with sand" while "g" denotes either "gravelly" or "with gravel"

RELATIVE DENSITY / CONSISTENCY ESTIMATE USING STANDARD PENETRATION TEST (SPT) VALUES
(adapted from Terzaghi and Peck 1967)

COHESIONLESS SOILS [a]		COHESIVE SOILS[b]		
RELATIVE DENSITY	$(N_1)_{60}$ (blows/ft)[c]	CONSISTENCY	$(N_1)_{60}$ (blows/ft)[c]	UNCONFINED COMPRESSIVE STRENGTH (TSF)[d]
VERY LOOSE	0 - 4	VERY SOFT	0 - 2	0 - 0.25
LOOSE	4 - 10	SOFT	2 - 4	0.25 - 0.50
COMPACT	10 - 30	FIRM	4 - 8	0.50 - 1.0
DENSE	30 - 50	STIFF	8 - 15	1.0 - 2.0
VERY DENSE	OVER 50	VERY STIFF	15 - 30	2.0 - 4.0
		HARD	OVER 30	OVER 4.0

(a) Soils consisting of gravel, sand, and silt, either separately or in combination possessing no characteristics of plasticity, and exhibiting drained behavior.
(b) Soils possessing the characteristics of plasticity, and exhibiting undrained behavior.
(c) Refer to ASTM D1586 for a definition of N value. $(N_1)_{60}$ is the N value corrected for hammer energy and overburden pressure, and is detailed in ASTM D6066. N values may be affected by a number of factors including: material size, sampler size, hammer weight and type, depth, drilling method, and borehole disturbance. **N values are only an approximate guide for frozen soil or cohesive soil.**
(d) Undrained shear strength, s_u= 1/2 unconfined compression strength, U_c. Note that Torvane (TV) measures s_u and pocket penetrometer (PP) measures U_c

CRITERIA FOR DESCRIBING MOISTURE CONDITION
(adapted from ASTM D2488)

DRY	ABSENCE OF MOISTURE, DUSTY, DRY TO THE TOUCH
MOIST	DAMP BUT NO VISIBLE WATER
WET	VISIBLE FREE WATER, USUALLY SOIL IS BELOW WATER TABLE

COMPONENT DEFINITIONS BY GRADATION

COMPONENT	SIZE RANGE
BOULDERS	GREATER THAN 12 in.
COBBLES	12 in. to 3 in.
GRAVEL	3 in. to #4 Sieve (4.76 mm)
COARSE GRAVEL	3 in. to 3/4 in.
FINE GRAVEL	3/4 in. to #4 (4.76 mm)
SAND	#4 (4.76 mm) to #200 (0.074 mm)
COARSE SAND	#4 (4.76 mm) to #10 (2.0 mm)
MEDIUM SAND	#10 (2.0 mm) to #40 (0.42 mm)
FINE SAND	#40 (0.42 mm) to #200 (0.074 mm)
SILT & CLAY (FINES)	SMALLER THAN #200 (0.074 mm)

SAMPLER ABBREVIATIONS

SS	SPT Sampler (2 in. OD, 140 lb hammer)	**C**	Core (Diamond Bit)
HD	Heavy Duty Split Spoon (3 in. OD, 340 lb hammer)	**TW**	Thin Wall (Shelby Tube)
-BL	Brass Liners used in Split Spoon	**TP**	Thin Wall Piston Sampler
CA	Continous Core (Soil in Hollow-Stem Auger)	**MS**	Modified Shelby
GS	Grab Sample from Surface / Testpit	**MC**	Geoprobe Macro-Core
AC	Auger Charge	**RC**	Air Rotary Cuttings
AW	Auger Wash	**AG**	Auger Cuttings

DESCRIPTIVE TERMINOLOGY FOR PERCENTAGES (ASTM D2488)

DESCRIPTIVE TERMS	RANGE OF PROPORTION
TRACE	0 - 5%
FEW	5 - 10%
LITTLE	10 - 25%
SOME	30 - 45%
MOSTLY	50 - 100%

LABORATORY TEST AND NOTES ABBREVIATIONS / SYMBOLS

Con	Consolidation	**PID**	Photoionization Detector	**TXCD**	Triaxial, Consolidated Drained
Dd	Dry Density	**PM**	Modified Proctor (D1557)	**TXCU**	Triaxial, Consolidated Undrained
K	Thermal Conductivity	**PP**	Pocket Penetrometer (Field)	**TXUU**	Triaxial, Unconsolidated Undrained
MA	Sieve and Hydrometer	**PTLD**	Point Load	W_C	Liquid Limit (LL)
NP	Non-plastic	**SA**	Sieve Analysis	W_P	Plastic Limit (PL)
OLI	Organic Loss	**SpG**	Specific Gravity	Ω	Soil Resistivity (Res.)
P200	Passing #200 Sieve (D1140)	**TC**	Thaw Consolidation/Strain	▼	Water Level
pH	Soil pH	**TV**	Torvane (Field)	▽	Water Level While Drilling

FROZEN SOIL CLASSIFICATION (ASTM D4083)

1. DESCRIBE SOIL INDEPENDENT OF FROZEN STATE	CLASSIFY SOIL BY THE UNIFIED SOIL CLASSIFICATION SYSTEM			
	MAJOR GROUP		SUBGROUP	
	DESCRIPTION	DESIGNATION	DESCRIPTION	DESIGNATION
2. MODIFY SOIL DESCRIPTION BY DESCRIPTION OF FROZEN SOIL	Segregated ice not visible by eye	N	Poorly bonded of friable	Nf
			Well bonded: No excess ice	Nbn
			Well bonded: Excess ice	Nbe
	Segregated ice visible by eye (ice less than 25 mm thick)	V	Individual ice crystals or inclusions	Vx
			Ice coatings on particles	Vc
			Random or irregularly oriented ice formations	Vr
			Stratified or distinctly oriented ice formations	Vs
			Uniformly distributed ice	Vu
3. MODIFY SOIL DESCRIPTION BY DESCRIPTION OF SUBSTANTIAL ICE STRATA	Ice greater than 25 mm thick	ICE	Ice with soil inclusions	ICE+soil type
			Ice without soil inclusions	ICE

FROST DESIGN SOIL CLASSIFICATION (1)

FROST GROUP(2)	GENERAL SOIL TYPE	% FINER THAN 0.02 mm BY WEIGHT	TYPICAL USCS SOIL CLASS
NFS(3) [MOA NFS]	(a) Gravels Crushed stone Crushed rock	0 to 1.5	GW, GP
	(b) Sands	0 to 3	SW, SP
PFS(4) [MOA NFS]	(a) Gravels Crushed stone Crushed rock	1.5 to 3	GW, GP
[MOA F2]	(b) Sands	3 to 10	SW, SP
S1 [MOA F1]	Gravelly soils	3 to 6	GW, GP GW-GM, GP-GM, GW-GC, GP-GC
S2 [MOA F2]	Sandy soils	3 to 6	SW, SP SW-SM, SP-SM, SW-SC, SP-SC
F1 [MOA F1]	Gravelly soils	6 to 10	GM, GC, GM-GC, GW-GM, GP-GM, GW-GC, GP-GC
F2 [MOA F2]	(a) Gravelly soils	10 to 20	GW, GP GW-GM, GP-GM, GW-GC, GP-GC
	(b) Sands	6 to 15	SM, SW-SM, SP-SM, SC, SW-SC, SP-SC, SM-SC
F3 [MOA F3]	(a) Gravelly soils	Over 20	GM, GC, GM-GC
	(b) Sands, except very fine silty sands	Over 15	SM, SC, SM-SC
	(c) Clays, PI>12	--	CL, CH
F4 [MOA F4]	(a) Silts	--	ML, MH, ML-CL
	(b) Very fine silty sands	Over 15	SM, SC, SM-SC
	(c) Clays, PI<12	--	CL, ML-CL
	(d) Varved clays or other fine-grained banded sediments	--	CL or CH layered with ML, MH, ML-CL, SM, SC, or SM-SC

(1) From U.S. Army Corps of Engineers (USACE), EM 1110-3-138, "Pavement Criteria for Seasonal Frost Conditions," April 1984
(2) USACE frost groups directly correspond to frost groups listed in Municipality of Anchorage (MOA) design criteria manual (DCM), 2007; except as noted.
(3) Non-frost susceptible
(4) Possibly frost susceptible, requires lab test for void ratio to determine frost design soil classification. Gravel with void ratio > 0.25 would be NFS; Gravel with void ratio < 0.25 would be S1; Sands with void ratio > 0.30 would be NFS; Sands with void ratio < 0.30 would be S2 or F2

ICE BONDING SYMBOLS

No ice-bonded soil observed

Poorly bonded or friable

Well bonded

DEFINITIONS

Candled Ice is ice which has rotted or otherwise formed into long columnar crystals, very loosely bonded together.

Clear Ice is transparent and contains only a moderate number of air bubbles.

Cloudy Ice is translucent, but essentially sound and non-pervious

Friable denotes a condition in which material is easily broken up under light to moderate pressure.

Granular Ice is composed of coarse, more or less equidimensional, ice crystals weakly bonded together.

Ice Coatings on particles are discernible layers of ice found on or below the larger soil particles in a frozen soil mass. They are sometimes associated with hoarfrost crystals, which have grown into voids produced by the freezing action.

Ice Crystal is a very small individual ice particle visible in the face of a soil mass. Crystals may be present alone or in a combination with other ice formations.

Ice Inclusions are individual ice masses visible in the face of a soil mass. Inclusions may be present alone or in a combination with other ice formations.

Ice Lenses are lenticular ice formations in soil occurring essentially parallel to each other, generally normal to the direction of heat loss and commonly in repeated layers.

Ice Segregation is the growth of ice as distinct lenses, layers, veins and masses in soils, commonly but not always oriented normal to direction of heat loss.

Massive Ice is a large mass of ice, typically nearly pure and relatively homogeneous.

Poorly-bonded signifies that the soil particles are weakly held together by the ice and that the frozen soil consequently has poor resistance to chipping or breaking.

Porous Ice contains numerous voids, usually interconnected and usually resulting from melting at air bubbles or along crystal interfaces from presence of salt or other materials in the water, or from the freezing of saturated snow. Though porous, the mass retains its structural unity.

Thaw-Stable frozen soils do not, on thawing, show loss of strength below normal, long-time thawed values nor produce detrimental settlement.

Thaw-Unstable frozen soils show on thawing, significant loss of strength below normal, long-time thawed values and/or significant settlement, as a direct result of the melting of the excess ice in the soil.

Well-Bonded signifies that the soil particles are strongly held together by the ice and that the frozen soil possesses relatively high resistance to chipping or breaking.

RECORD OF BOREHOLE K15-01 (AP-39)

PROJECT: Kivalina Causeway
PROJECT NUMBER: 1419207
LOCATION: Kivalina, AK

CLIENT: USACE
DRILLING DATE: 3-14-15
EQUIPMENT: Geoprobe 6712 DT

DATUM: NAD83, AK State Plane Zone 8, NAVD-88
APPROX. ELEVATION: -2.34 ft
APPROX. COORDS: N: 1,842,646 E: 5,021,268

VEGETATION: sea ice (ground fast) lagoon
ICE DEPTH: 2.5 ft.

BORING METHOD: 6.625-in. OD Hollow Stem Auger

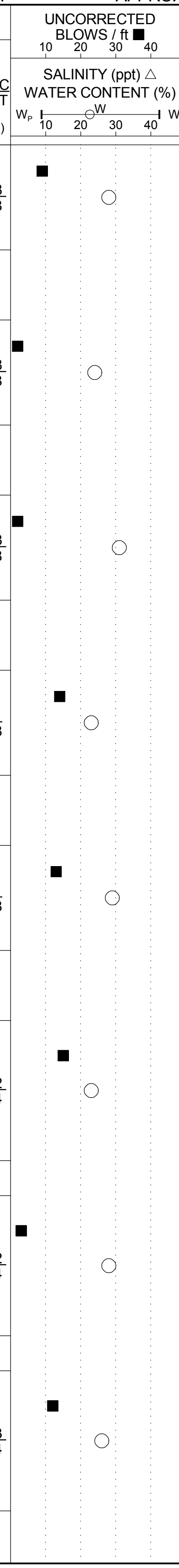
SOIL PROFILE

DEPTH (ft)	DESCRIPTION	USCS
0.0 - 42.5	Very loose to medium dense, wet, black, SILTY SAND; medium to coarse-grained sand, little to some silt, trace rounded gravel up to .75 inch diameter, frozen from 0-1.5' with 5% ice by volume as inclusions, well bonded (SM)	SM
3	3 feet-Free water at depth	

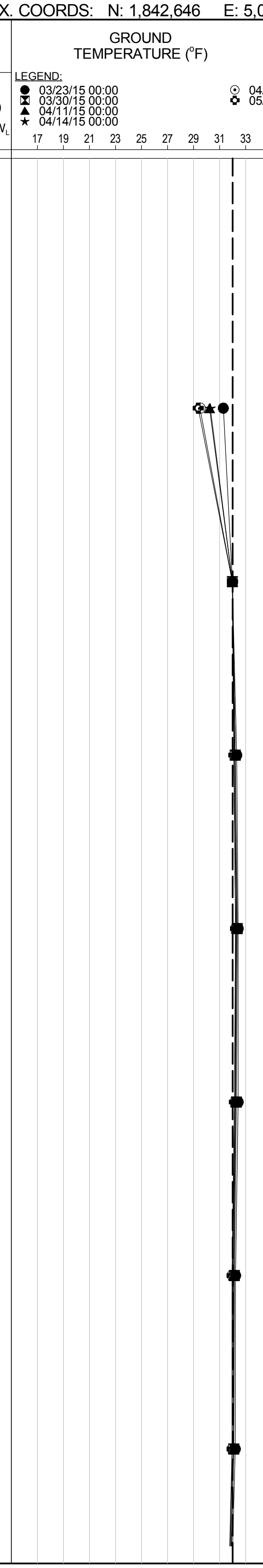
SAMPLES

NUMBER	TYPE	BLOWS / 6 in.	REC / ATT (in.)	NOTES / TESTS / WATER LEVELS
1	HD	4 6 3	18/18	PID=0.4 ppm; Gravel = 1%, Sand = 80%, Fines = 19%
2	HD	1 1 1	18/18	PID=0.2 ppm
3	HD	1 1 1	18/18	5 feet of heave; PID=0.3 ppm
4	SS-AW	4 7 7	9/18	Restart Drill hole on 3/19/2015 PID=0.1 ppm
5	SS-AW	4 6 7	9/18	PID=0.1 ppm; Gravel = 0%, Sand = 81%, Fines = 19%
6	SS-AW	5 5 10 7	12/24	PID=0.1 ppm
7	SS-AW	5 1 2 3	12/24	PID=0.2 ppm
8	SS-AW	6 6 6 8	13/24	PID=0.3 ppm; Gravel = 4%, Sand = 70%, Fines = 26%

UNCORRECTED BLOWS / ft ■ — SALINITY (ppt) △ — WATER CONTENT (%)



GROUND TEMPERATURE (°F)



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DEPTH SCALE: 1 inch to 2.5 feet
DRILLING CONTRACTOR: Discovery Drilling Inc.
DRILLER: Derek Dell

LOGGED: R. Campbell
CHECKED: H. Weston
CHECK DATE: 5/10/2015

Golder Associates

Figure A-3

RECORD OF BOREHOLE K15-01 (AP-39)

PROJECT: Kivalina Causeway
PROJECT NUMBER: 1419207
LOCATION: Kivalina, AK

CLIENT: USACE
DRILLING DATE: 3-14-15
EQUIPMENT: Geoprobe 6712 DT

DATUM: NAD83, AK State Plane Zone 8, NAVD-88
APPROX. ELEVATION: -2.34 ft
APPROX. COORDS: N: 1,842,646 E: 5,021,268

VEGETATION: sea ice (ground fast) lagoon
ICE DEPTH: 2.5 ft.

BORING METHOD: 6.625-in. OD Hollow Stem Auger

DEPTH (ft)	DESCRIPTION	USCS	SAMPLE NUMBER	TYPE	BLOWS / 6 in.	REC/ATT (in.)	NOTES / TESTS
20	0.0 - 42.5 Very loose to medium dense, wet, black, SILTY SAND; medium to coarse-grained sand, little to some silt, trace rounded gravel up to .75 inch diameter, frozen from 0-1.5' with 5% ice by volume as inclusions, well bonded (SM) *(Continued)*	SM					
			9	SS-AW	1 1 1 3	4/24	PID=0.1 ppm
25							
			10	SS-AW	1 0 1 0	9/24	PID=0.3 ppm
30							
			11	SS-AW	12 13 12 13	24/24	PID=0.0 ppm; Gravel = 4%, Sand = 48%, Fines = 48%
35							
			12	SS-AW	4 7 6 3	6/24	PID=0.1 ppm
40							

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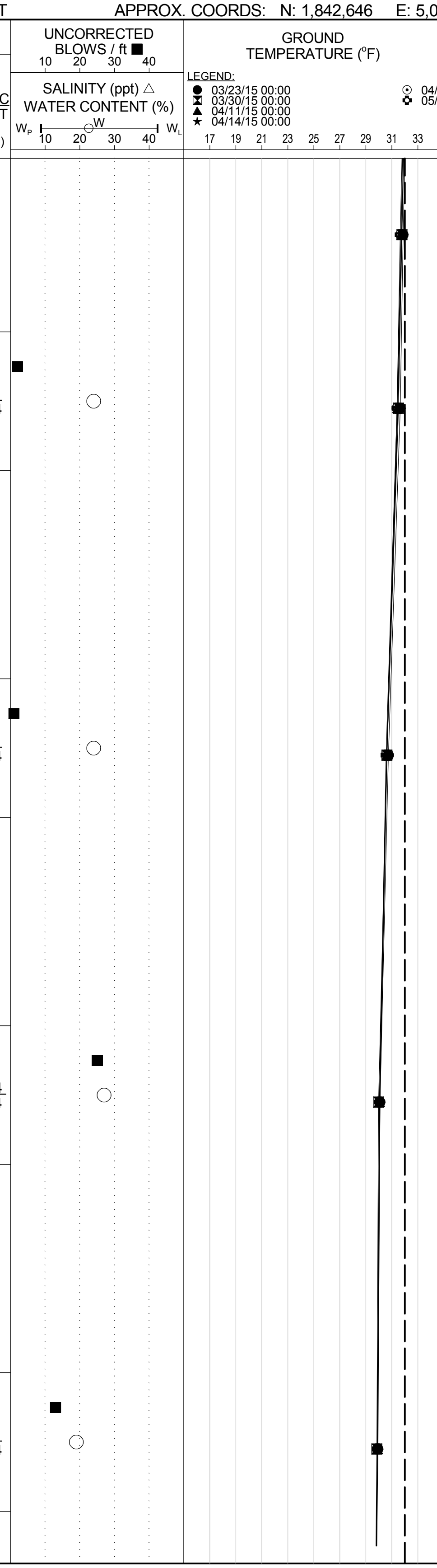


Golder Associates

DEPTH SCALE: 1 inch to 2.5 feet
DRILLING CONTRACTOR: Discovery Drilling Inc.
DRILLER: Derek Dell

LOGGED: R. Campbell
CHECKED: H. Weston
CHECK DATE: 5/10/2015

Figure A-3

RECORD OF BOREHOLE K15-01 (AP-39)

PROJECT: Kivalina Causeway
PROJECT NUMBER: 1419207
LOCATION: Kivalina, AK

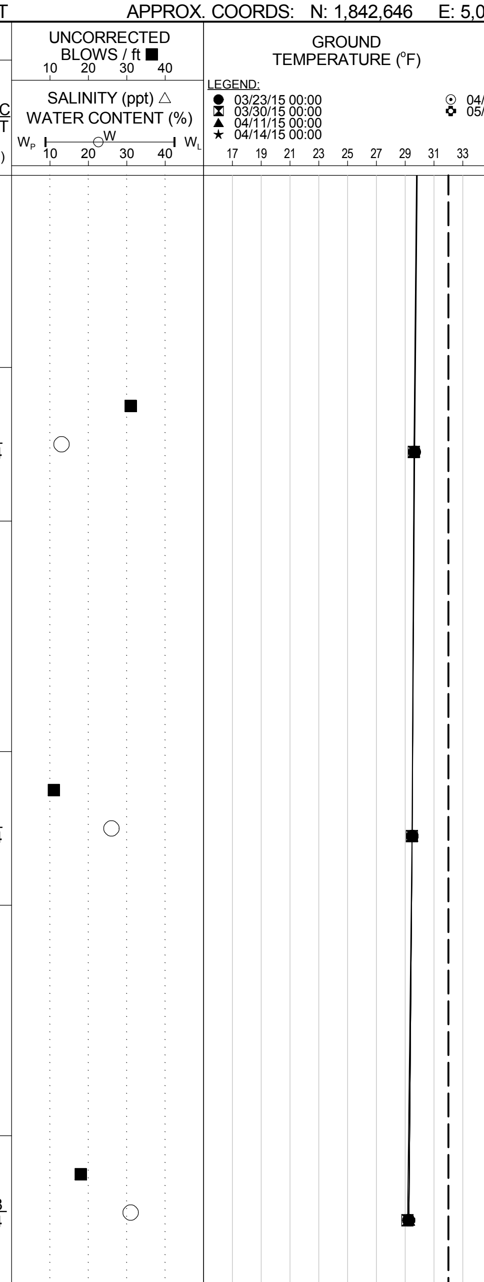
CLIENT: USACE
DRILLING DATE: 3-14-15
EQUIPMENT: Geoprobe 6712 DT

DATUM: NAD83, AK State Plane Zone 8, NAVD-88
APPROX. ELEVATION: -2.34 ft
APPROX. COORDS: N: 1,842,646 E: 5,021,268

VEGETATION: sea ice (ground fast) lagoon
ICE DEPTH: 2.5 ft.

BORING METHOD: 6.625-in. OD Hollow Stem Auger

DEPTH (ft)	DESCRIPTION	USCS	ELEV. / DEPTH (ft)	SAMPLE NUMBER	TYPE	BLOWS / 6 in.	REC/ATT (in.)	NOTES / TESTS / WATER LEVELS
40	0.0 - 42.5 Very loose to medium dense, wet, black, SILTY SAND; medium to coarse-grained sand, little to some silt, trace rounded gravel up to .75 inch diameter, frozen from 0-1.5' with 5% ice by volume as inclusions, well bonded (SM) *(Continued)*	SM	-44.8 / 42.5					
	42.5 - 46.0 Dense, wet, black, poorly graded SAND with silt and gravel; fine to medium-grained sand, some fine-grained gravel up to 1 inch diameter, few silt (SP-SM)	SP-SM	-48.3 / 46.0	13	SS-AW	19, 17, 14, 14	9/24	PID=0.0 ppm; Gravel = 36%, Sand = 56%, Fines = 8%
45								
	46.0 - 54.5 Firm to stiff, wet, black, sandy SILT; little to some fine-grained sand, trace rounded gravel up to .75 inch diameter, trace organics (ML)	ML		14	SS-AW	11, 6, 5, 5	8/24	PID=0.2 ppm; OLI = 4%
50								
			-56.8	15	SS-AW	7, 7, 11, 9	18/24	PID=0.0 ppm
55	Borehole completed at 54.5 ft.							
60								



Notes:
1) Backfilled with cuttings
2) 340-pound hammer with 30 inch drop used for first three sample intervals
3) 1 inch Sch 120 PVC installed to depth
4) Borehole drilled from ground fast ice

DEPTH SCALE: 1 inch to 2.5 feet
DRILLING CONTRACTOR: Discovery Drilling Inc.
DRILLER: Derek Dell

LOGGED: R. Campbell
CHECKED: H. Weston
CHECK DATE: 5/10/2015

Golder Associates

Figure A-3

RECORD OF BOREHOLE K15-02 (AP-40)

PROJECT: Kivalina Causeway
PROJECT NUMBER: 1419207
LOCATION: Kivalina, AK

CLIENT: USACE
DRILLING DATE: 3-19-15
EQUIPMENT: Geoprobe 6712 DT

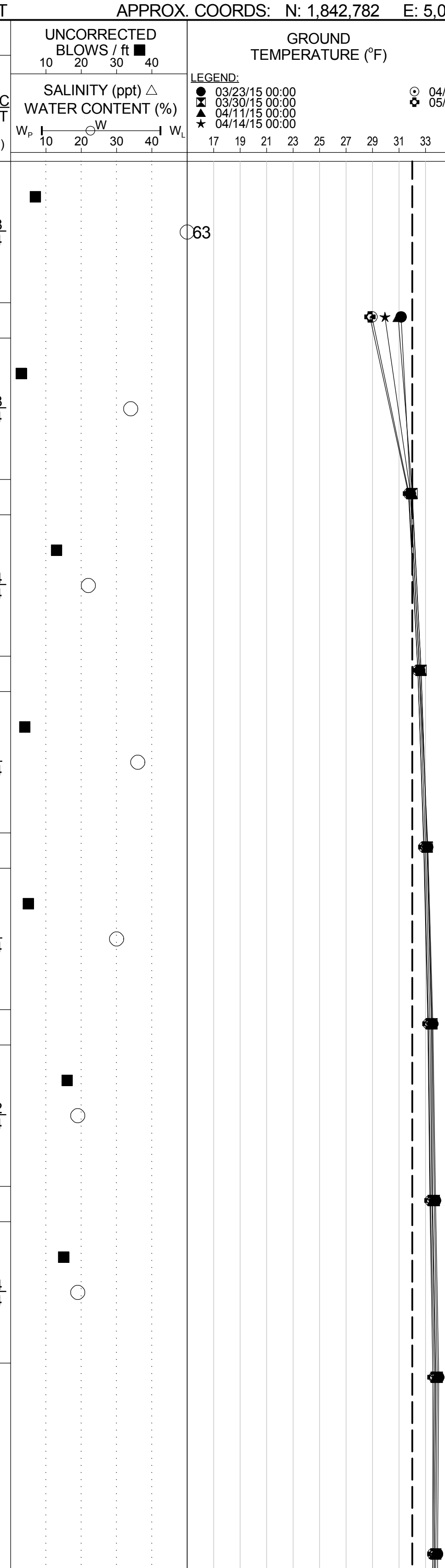
DATUM: NAD83, AK State Plane Zone 8, NAVD-88
APPROX. ELEVATION: -3.38 ft
APPROX. COORDS: N: 1,842,782 E: 5,021,391

VEGETATION: sea ice (ground fast) lagoon
ICE DEPTH: 3.6 ft.

BORING METHOD: 6.625-in. OD Hollow Stem Auger

DEPTH (ft)	DESCRIPTION	USCS	ELEV. / DEPTH (ft)
0.0 - 4.5	Very soft to firm, wet, black, sandy SILT; little to some fine-grained sand, frozen from 0-2' with visible ice as irregularly oriented formations, well bonded (ML)	ML	
	3.5 feet-Free water at depth		
4.5 - 25.0	Very loose to loose, wet, black, SILTY SAND; fine to coarse-grained sand, little to some silt, trace to few subrounded up to 3/8 inch diameter, silt content varies with depth (SM)	SM	-7.9 / 4.5

NUMBER	TYPE	BLOWS / 6 in.	REC / ATT (in.)	Water content (%)	NOTES / TESTS / WATER LEVELS
1	SS	6 6 1 1	18/24	63	PID=0.3 ppm
2	SS	1 1 2 4	18/24		PID=0.2 ppm
3	SS-AW	1 7 6 4	24/24		PID=0.3 ppm; Gravel = 5%, Sand = 87%, Fines = 8%
4	SS-AW	0 0 4 6	9/24		7.5 feet-rods fell 1' into sample interval PID=0.4 ppm
5	SS-AW	2 2 3 4	8/24		PID=0.1 ppm; Gravel = 0%, Sand = 76%, Fines = 25%
6	SS-AW	4 9 7 7	12/24		PID=0.0 ppm
7	SS-AW	7 8 7 5	14/24		PID=0.0 ppm; Gravel = 9%, Sand = 82%, Fines = 9%



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DEPTH SCALE: 1 inch to 2.5 feet
DRILLING CONTRACTOR: Discovery Drilling Inc.
DRILLER: Derek Dell

LOGGED: R. Campbell
CHECKED: H. Weston
CHECK DATE: 5/10/2015

Figure A-4

RECORD OF BOREHOLE K15-02 (AP-40)

PROJECT: Kivalina Causeway
PROJECT NUMBER: 1419207
LOCATION: Kivalina, AK

CLIENT: USACE
DRILLING DATE: 3-19-15
EQUIPMENT: Geoprobe 6712 DT

DATUM: NAD83, AK State Plane Zone 8, NAVD-88
APPROX. ELEVATION: -3.38 ft
APPROX. COORDS: N: 1,842,782 E: 5,021,391

VEGETATION: sea ice (ground fast) lagoon
ICE DEPTH: 3.6 ft.

BORING METHOD: 6.625-in. OD Hollow Stem Auger

DEPTH (ft)	DESCRIPTION	ICE BOND	USCS	ELEV. / DEPTH (ft)	SAMPLE NUMBER	TYPE	BLOWS / 6 in.	REC/ATT (in.)	NOTES / TESTS / WATER LEVELS
20	4.5 - 25.0 Very loose to loose, wet, black, SILTY SAND; fine to coarse-grained sand, little to some silt, trace to few subrounded up to 3/8 inch diameter, silt content varies with depth (SM) *(Continued)*		SM		8	SS-AW	3, 1, 0, 0	5/24	PID=0.2 ppm; Gravel = 1%, Sand = 69%, Fines = 30%; 20 feet-sampler fell in one blow 0.5-2 feet
25	25.0 - 28.5 Very soft to soft, wet, black, sandy SILT; some fine-grained sand, trace organics, with a very strong peat odor (ML)		ML	-28.4 / 25.0	9	SS-AW	3, 1, 1, 2	18/24	PID=0.3 ppm; OLI = 5%
	28.5 - 40.0 Medium dense, wet, black, SILTY SAND with gravel; medium to coarse-grained sand, trace to little rounded gravel up to 3/4 inch diameter, little silt (SM)		SM	-31.9 / 28.5					
30					10	SS-AW	10, 15, 15, 12	12/24	PID=0.1 ppm; Gravel = 24%, Sand = 59%, Fines = 17%
35					11	SS-AW	11, 17, 18, 13	18/24	PID=0.0 ppm
40				-43.4					

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UNCORRECTED BLOWS / ft ■ (10 20 30 40); SALINITY (ppt) △; WATER CONTENT (%) W_P —○W— W_L (10 20 30 40)

GROUND TEMPERATURE (°F) (17 19 21 23 25 27 29 31 33)
LEGEND: ● 03/23/15 00:00; ⧗ 03/30/15 00:00; ▲ 04/11/15 00:00; ★ 04/14/15 00:00; ⊙ 04/26/15 00:00; ✧ 05/02/15 00:00

RECORD OF BOREHOLE K15-02 (AP-40)

PROJECT: Kivalina Causeway
PROJECT NUMBER: 1419207
LOCATION: Kivalina, AK

CLIENT: USACE
DRILLING DATE: 3-19-15
EQUIPMENT: Geoprobe 6712 DT

DATUM: NAD83, AK State Plane Zone 8, NAVD-88
APPROX. ELEVATION: -3.38 ft
APPROX. COORDS: N: 1,842,782 E: 5,021,391

VEGETATION: sea ice (ground fast) lagoon
ICE DEPTH: 3.6 ft.

BORING METHOD: 6.625-in. OD Hollow Stem Auger

DEPTH (ft)	DESCRIPTION	ICE BOND	USCS	ELEV. / DEPTH (ft)	SAMPLE NUMBER	TYPE	BLOWS / 6 in.	REC / ATT (in.)	NOTES / TESTS / WATER LEVELS
40	40.0 - 45.0 Medium dense, wet, black, well-graded SAND with silt and gravel; medium to coarse-grained sand, some fine-grained rounded gravel up to 3/4 inch diameter, few silt (SW-SM)		SW-SM	40.0	12	SS-AW	7, 10, 10, 10	10/24	PID=0.4 ppm; Gravel = 41%, Sand = 51%, Fines = 8%
45	45.0 - 52.0 Firm to stiff, wet, black, sandy SILT; some fine to coarse-grained sand (ML)		ML	-48.4 / 45.0	13	SS-AW	10, 5, 7, 7	13/24	PID=0.1 ppm
50					14	SS-AW	5, 5, 9, 7	18/24	PID=0.2 ppm; OLI = 5%
52	Borehole completed at 52.0 ft.			-55.4					

Notes:
1) Backfilled with cuttings
2) 1 inch Sch 120 PVC installed to depth
3) Borehole drilled from ground fast ice

UNCORRECTED BLOWS / ft ■ (10, 20, 30, 40); SALINITY (ppt) △; WATER CONTENT (%) W_P — W — W_L (10, 20, 30, 40)

GROUND TEMPERATURE (°F) (17, 19, 21, 23, 25, 27, 29, 31, 33)
LEGEND:
● 03/23/15 00:00
⧗ 03/30/15 00:00
▲ 04/11/15 00:00
★ 04/14/15 00:00
⊙ 04/26/15 00:00
✧ 05/02/15 00:00

RECORD OF BOREHOLE K15-03 (AP-41)

PROJECT: Kivalina Causeway
PROJECT NUMBER: 1419207
LOCATION: Kivalina, AK

CLIENT: USACE
DRILLING DATE: 3-20-15
EQUIPMENT: Geoprobe 6712 DT

DATUM: NAD83, AK State Plane Zone 8, NAVD-88
APPROX. ELEVATION: -2.14 ft
APPROX. COORDS: N: 1,842,911 E: 5,021,536

BORING METHOD: 6.625-in. OD Hollow Stem Auger

VEGETATION: sea ice (ground fast) lagoon
ICE DEPTH: 2.5 ft.

SOIL PROFILE

DEPTH (ft)	DESCRIPTION	USCS	ELEV. / DEPTH (ft)
0.0 - 7.0	Frozen to firm, wet, black, SILT; few to some fine-grained sand, 0.5 feet - 6 inch ice layer., well bonded visible ice as stratified formations and inclusions (ML, Vs-Vx)	ML	
7.0	7 feet-Free water at depth		-9.1 / 7.0
7.0 - 22.5	Very loose to loose, wet, black, poorly graded SAND with silt; fine to medium-grained sand, few to little silt, trace to few fine-grained subrounded gravel, silt content varies with depth (SP-SM)	SP-SM	

SAMPLES

NUMBER	TYPE	BLOWS / 6 in.	REC / ATT (in.)	NOTES / TESTS
1	SS	4, 17, 15	18/18	PID=0.2 ppm
2	SS	6, 5, 4, 5	24/24	PID=0.1 ppm
3	SS	4, 7, 6, 6	15/24	PID=0.3 ppm
4	SS-AW	2, 5, 6, 6	24/24	PID=0.1 ppm; Gravel = 9%, Sand = 83%, Fines = 8%
5	SS-AW	5, 6, 2, 1	24/24	PID=0.4 ppm
6	SS-AW	3, 4, 6, 7	12/24	PID=0.1 ppm; Gravel = 3%, Sand = 85%, Fines = 12%
7	SS-AW	6, 6, 6, 9	11/24	PID=0.2 ppm
8	SS-AW	7, 8, 4, 7	18/24	PID=0.4 ppm; Gravel = 8%, Sand = 82%, Fines = 10%

UNCORRECTED BLOWS / ft ■ (10, 20, 30, 40)
SALINITY (ppt) △
WATER CONTENT (%) W_P —○W— W_L (10, 20, 30, 40)
Sample 1 water content: 51

GROUND TEMPERATURE (°F) LEGEND: 17 19 21 23 25 27 29 31 33

DEPTH (ft): 0, 5, 10, 15, 20

Log continued on next page

DEPTH SCALE: 1 inch to 2.5 feet
DRILLING CONTRACTOR: Discovery Drilling Inc.
DRILLER: Derek Dell

LOGGED: R. Campbell
CHECKED: H. Weston
CHECK DATE: 5/10/2015

Golder Associates

Figure A-5

RECORD OF BOREHOLE K15-03 (AP-41)

PROJECT: Kivalina Causeway
PROJECT NUMBER: 1419207
LOCATION: Kivalina, AK

CLIENT: USACE
DRILLING DATE: 3-20-15
EQUIPMENT: Geoprobe 6712 DT

DATUM: NAD83, AK State Plane Zone 8, NAVD-88
APPROX. ELEVATION: -2.14 ft
APPROX. COORDS: N: 1,842,911 E: 5,021,536

VEGETATION: sea ice (ground fast) lagoon
ICE DEPTH: 2.5 ft.

BORING METHOD: 6.625-in. OD Hollow Stem Auger

DEPTH (ft)	DESCRIPTION	ICE BOND	USCS	ELEV. / DEPTH (ft)	NUMBER	TYPE	BLOWS / 6 in.	REC / ATT (in.)	NOTES / TESTS / WATER LEVELS
20	7.0 - 22.5 Very loose to loose, wet, black, poorly graded SAND with silt; fine to medium-grained sand, few to little silt, trace to few fine-grained subrounded gravel, silt content varies with depth (SP-SM) *(Continued)*		SP-SM	-24.6 / 22.5					
	22.5 - 31.5 Loose to medium dense, wet, black, SILTY SAND; medium to coarse-grained sand, little silt, with a 1 foot layer of silt at 25 feet (SM)		SM		9	SS-AW	9 4 2 1	11/24	PID=0.2 ppm
25									
					10	SS-AW	7 2 3 4	12/24	PID=0.2 ppm Gravel = 6%, Sand = 64%, Fines = 30%
30					11	SS-AW	6 9 9 1	11/24	PID=0.1 ppm Gravel = 1%, Sand = 80%, Fines = 19%
				-33.6					

Borehole completed at 31.5 ft.

Notes:
1) Backfilled with cuttings
2) Borehole drilled from ground fast ice

UNCORRECTED BLOWS / ft ■ (10, 20, 30, 40)
SALINITY (ppt) △
WATER CONTENT (%) W_P —○W— W_L (10, 20, 30, 40)

GROUND TEMPERATURE (°F)
LEGEND:
17 19 21 23 25 27 29 31 33

Depth scale: 20, 25, 30, 35, 40

DEPTH SCALE: 1 inch to 2.5 feet
DRILLING CONTRACTOR: Discovery Drilling Inc.
DRILLER: Derek Dell

LOGGED: R. Campbell
CHECKED: H. Weston
CHECK DATE: 5/10/2015

Golder Associates

RECORD OF BOREHOLE K15-04 (AP-42)

PROJECT: Kivalina Causeway
PROJECT NUMBER: 1419207
LOCATION: Kivalina, AK

CLIENT: USACE
DRILLING DATE: 3-14-15
EQUIPMENT: Geoprobe 6712 DT

DATUM: NAD83, AK State Plane Zone 8, NAVD-88
APPROX. ELEVATION: -1.85 ft
APPROX. COORDS: N: 1,843,320 E: 5,021,953

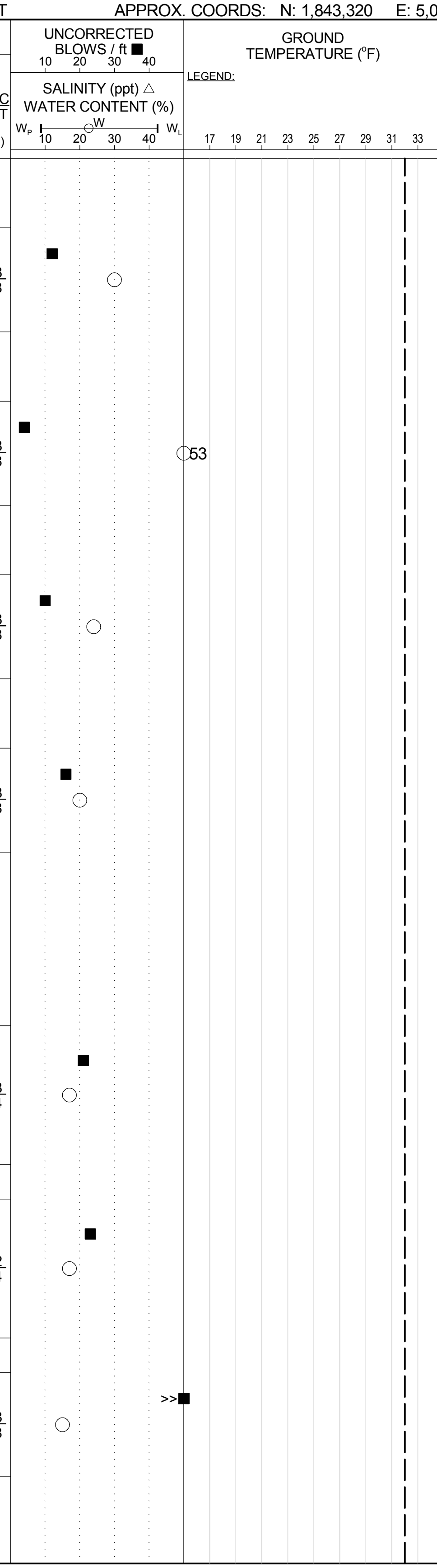
BORING METHOD: 6.625-in. OD Hollow Stem Auger

VEGETATION: sea ice (ground fast) lagoon
ICE DEPTH: 2.4 ft.

DEPTH (ft)	DESCRIPTION	ICE BOND	USCS	ELEV. / DEPTH (ft)
0 – 3.0	0.0 - 3.0 Frozen, black, sandy SILT; some fine-grained sand, well bonded with approximately less than 5% visible ice by volume as inclusions (ML, Vx)	Bonded	ML	-4.9 / 3.0
3.0 – 6.0	3.0 - 6.0 Loose, moist to wet, black, SILTY SAND; medium to coarse-grained sand, little to some silt (SM) 3.5 feet-Free water at depth		SM	-7.9 / 6.0
6.0 – 22.5	6.0 - 22.5 Medium dense to very dense, wet, black, poorly graded SAND with silt; fine to medium-grained sand, few silt, trace to few fine-grained gravel (SP-SM)		SP-SM	

Log continued on next page

NUMBER	TYPE	BLOWS / 6 in.	REC / ATT (in.)
1	HD	6 6 6	18 / 18
2	HD	4 3 1	18 / 18
3	HD	2 3 7	18 / 18
4	HD	1 6 10	18 / 18
5	SS-AW	6 10 11 17	18 / 24
6	SS-AW	7 13 10 8	12 / 24
7	SS-AW	10 14 40	18 / 18



NOTES / TESTS / WATER LEVELS:
- PID=0.1 ppm
- PID=0.1 ppm
- 4 feet of heaving sand
- Gravel = 5%, Sand = 75%, Fines = 20%
- PID=0.2 ppm
- Gravel = 0%, Sand = 91%, Fines = 8%
- PID=0.3 ppm
- Gravel = 9%, Sand = 85%, Fines = 6%
- Restart Drill hole on 3/21/2015
- PID=0.1 ppm
- PID=0.2 ppm
- Gravel = 12%, Sand = 77%, Fines = 11%
- PID=0.2 ppm

Golder Associates

DEPTH SCALE: 1 inch to 2.5 feet
DRILLING CONTRACTOR: Discovery Drilling Inc.
DRILLER: Derek Dell

LOGGED: R. Campbell
CHECKED: H. Weston
CHECK DATE: 5/10/2015

Figure A-6

KIVALINA LOGS.GPJ LIBRARY-ANC(7-15-15).GLB [ANC BOREHOLE W/ THERMISTOR] RLCampbell 8/6/15

RECORD OF BOREHOLE K15-04 (AP-42)

PROJECT: Kivalina Causeway
PROJECT NUMBER: 1419207
LOCATION: Kivalina, AK

CLIENT: USACE
DRILLING DATE: 3-14-15
EQUIPMENT: Geoprobe 6712 DT

DATUM: NAD83, AK State Plane Zone 8, NAVD-88
APPROX. ELEVATION: -1.85 ft
APPROX. COORDS: N: 1,843,320 E: 5,021,953

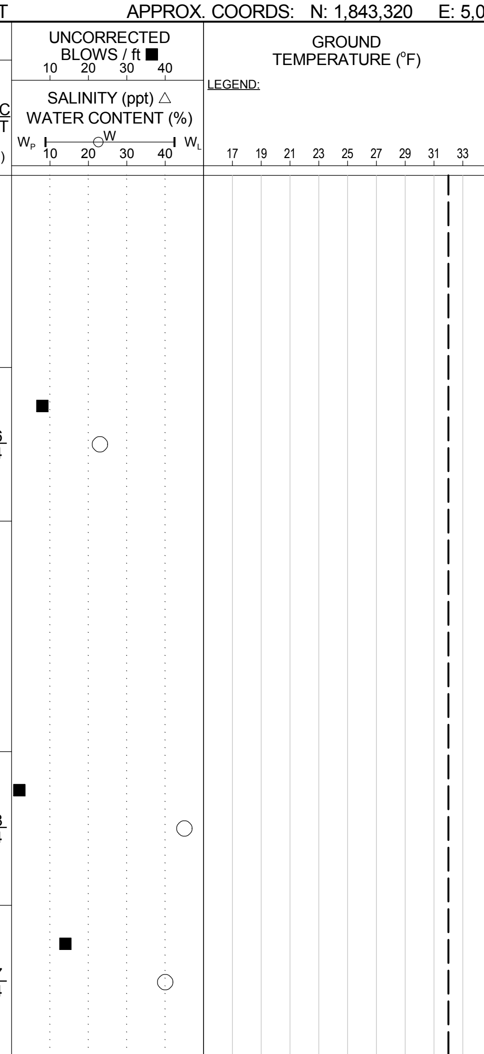
VEGETATION: sea ice (ground fast) lagoon
ICE DEPTH: 2.4 ft.

BORING METHOD: 6.625-in. OD Hollow Stem Auger

DEPTH (ft)	DESCRIPTION	ICE BOND	USCS	ELEV. / DEPTH (ft)	NUMBER	TYPE	BLOWS / 6 in.	REC/ATT (in.)	NOTES / TESTS / WATER LEVELS
20	6.0 - 22.5 Medium dense to very dense, wet, black, poorly graded SAND with silt; fine to medium-grained sand, few silt, trace to few fine-grained gravel (SP-SM) *(Continued)*		SP-SM	-24.4 / 22.5					
	22.5 - 26.0 Loose, wet, black, SILTY SAND; fine to medium-grained sand, little silt, trace fine-grained gravel, trace organics (SM) 24 feet-4 inch organic layer		SM		8	SS-AW	10 1 7 7	16/24	PID=0.5 ppm Gravel = 4%, Sand = 72%, Fines = 24%, OLI = 4%
25				-27.9 / 26.0					
	26.0 - 31.5 Very soft to stiff, wet, black, ORGANIC SILT; some fine-grained sand, little organics (OL)		OL		9	SS-AW	0 1 1 1	18/24	27.5 feet - rod sank 6 inches (sand at top of spoon) PID=0.4 ppm
30				-33.4	10	SS-AW	7 4 10 8	17/24	PID=0.3 ppm OLI = 15%
35									
40									

Borehole completed at 31.5 ft.

Notes:
1) Backfilled with cuttings
2) 340-pound hammer with 30 inch drop used for first four sample intervals
3) Borehole drilled from ground fast ice



DEPTH SCALE: 1 inch to 2.5 feet
DRILLING CONTRACTOR: Discovery Drilling Inc.
DRILLER: Derek Dell

LOGGED: R. Campbell
CHECKED: H. Weston
CHECK DATE: 5/10/2015

Figure A-6

RECORD OF BOREHOLE K15-05 (AP-43)

PROJECT: Kivalina Causeway
PROJECT NUMBER: 1419207
LOCATION: Kivalina, AK

CLIENT: USACE
DRILLING DATE: 3-21-15
EQUIPMENT: Geoprobe 6712 DT

DATUM: NAD83, AK State Plane Zone 8, NAVD-88
APPROX. ELEVATION: -1.4 ft
APPROX. COORDS: N: 1,843,929 E: 5,022,472

BORING METHOD: 6.625-in. OD Hollow Stem Auger

VEGETATION: sea ice (ground fast) lagoon
ICE DEPTH: 2.7 ft.

DEPTH (ft)	DESCRIPTION	USCS	ELEV. / DEPTH (ft)
0	0.0 - 2.0 Frozen, gray, SILTY SAND; fine-grained sand, little silt, trace fine-grained gravel, with a 4-inch thick ice lens at 0.5', well bonded with approximately 20-30% visible ice by volume as stratified formations and inclusions (SM, Vs-Vx)	SM	-3.4 / 2.0
2.0	2.0 - 11.0 Frozen from 2'-7' to very soft, moist, black, sandy SILT; little fine-grained sand, well bonded with no excess ice (ML, Nbn) 7 feet-Free water at depth	ML	-12.4 / 11.0
11.0	11.0 - 17.5 Frozen, wet, black, SILTY SAND; fine to medium-grained sand, some silt, poorly bonded (SM)	SM	-18.9 / 17.5
17.5	17.5 - 30.0 Frozen from 17.5'-21',loose to very dense, wet, black, SILTY SAND with gravel; fine to medium-grained sand, little silt, little to some subrounded gravel up to .75 inch diameter, gravel from 25-30.5', poorly bonded (SM)	SM	

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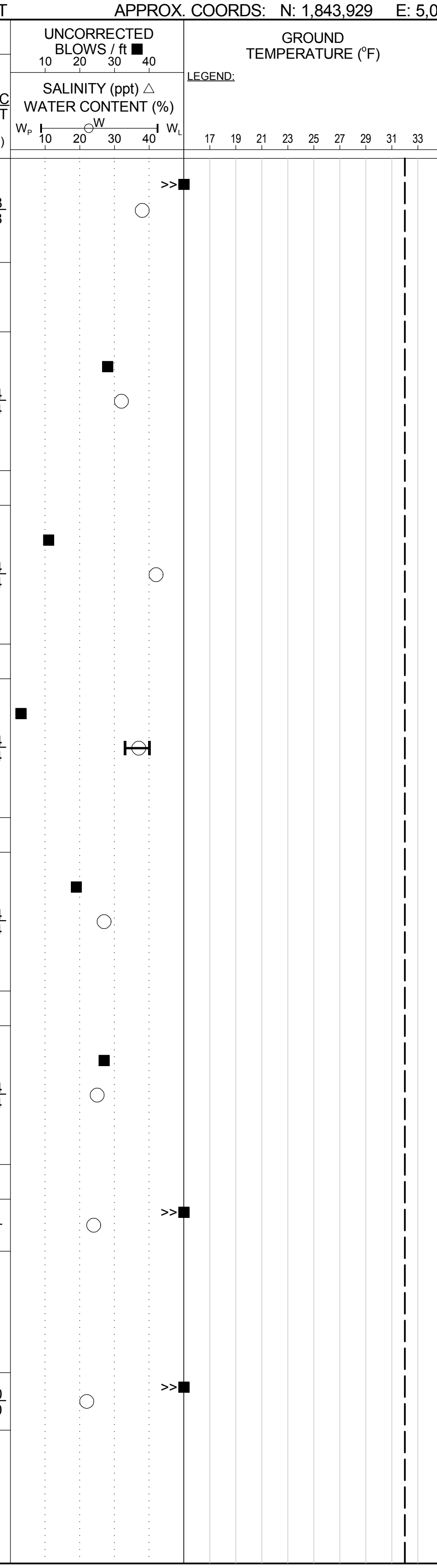
SAMPLE NUMBER	TYPE	BLOWS / 6 in.	REC / ATT (in.)	NOTES / TESTS / WATER LEVELS
1	SS	8, 33, 28	18/18	PID=0.2 ppm; Gravel = 1%, Sand = 74%, Fines = 25%
2	SS	11, 16, 12, 19	24/24	PID=0.3 ppm
3	SS	5, 4, 7, 5	24/24	PID=0.5 ppm; unfrozen at 7 feet
4	SS-AW	0, 1, 2, 3	24/24	7.5 feet - rod sank 4-6 inches; PID=0.2 ppm
5	SS-AW	7, 10, 9, 9	24/24	PID=0.1 ppm; Gravel = 0%, Sand = 69%, Fines = 31%
6	SS-AW	9, 13, 14, 20	24/24	PID=0.2 ppm
7	SS-AW	13, 38/3"	9/9	PID=0.2 ppm
8	SS-AW	11, 39/4"	10/10	Gravel = 16%, Sand = 67%, Fines = 17%; PID=0.3 ppm



DEPTH SCALE: 1 inch to 2.5 feet
DRILLING CONTRACTOR: Discovery Drilling Inc.
DRILLER: Derek Dell

LOGGED: R. Campbell
CHECKED: H. Weston
CHECK DATE: 5/10/2015

Golder Associates

Figure A-7

RECORD OF BOREHOLE K15-05 (AP-43)

PROJECT: Kivalina Causeway
PROJECT NUMBER: 1419207
LOCATION: Kivalina, AK

CLIENT: USACE
DRILLING DATE: 3-21-15
EQUIPMENT: Geoprobe 6712 DT

DATUM: NAD83, AK State Plane Zone 8, NAVD-88
APPROX. ELEVATION: -1.4 ft
APPROX. COORDS: N: 1,843,929 E: 5,022,472

VEGETATION: sea ice (ground fast) lagoon
ICE DEPTH: 2.7 ft.

BORING METHOD: 6.625-in. OD Hollow Stem Auger

DEPTH (ft)	DESCRIPTION	USCS	ELEV. / DEPTH (ft)	NUMBER	TYPE	BLOWS / 6 in.	REC / ATT (in.)	NOTES / TESTS / WATER LEVELS
20	17.5 - 30.0 Frozen from 17.5'-21',loose to very dense, wet, black, SILTY SAND with gravel; fine to medium-grained sand, little silt, little to some subrounded gravel up to .75 inch diameter, gravel from 25-30.5', poorly bonded (SM) *(Continued)*	SM						
				9	SS-AW	9 4 9 10	12/24	PID=0.1 ppm
25								25 feet - drill rig chatter
				10	SS-AW	40 30/1"	7/7	Gravel = 38%, Sand = 47%, Fines = 15% PID=0.0 ppm
								PID=0.0 ppm
30	30.0 - 30.5 Very dense, wet, black, poorly graded SAND with silt and gravel; medium to coarse-grained sand, some fine-grained gravel up to 3/4 inch diameter, few silt (SP-SM)	SP-SM	-31.4 / 30.0 -31.9	11	SS-AW	50/6"	6/6	Gravel = 46%, Sand = 48%, Fines = 6%

Borehole completed at 30.5 ft.

Notes:
1) Backfilled with cuttings
2) Borehole drilled from ground fast ice

Depth scale marks: 20, 25, 30, 35, 40

UNCORRECTED BLOWS / ft ■ (10 20 30 40); SALINITY (ppt) △; WATER CONTENT (%) W_P — W — W_L (10 20 30 40)

GROUND TEMPERATURE (°F) LEGEND: 17 19 21 23 25 27 29 31 33

RECORD OF BOREHOLE K15-06 (AP-44)

PROJECT: Kivalina Causeway
PROJECT NUMBER: 1419207
LOCATION: Kivalina, AK

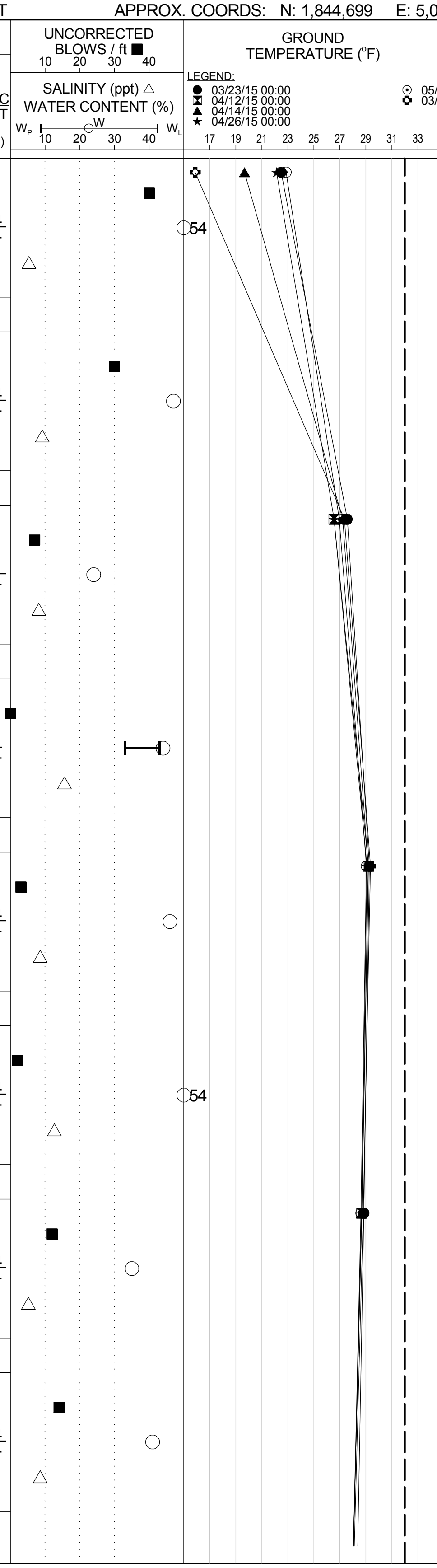
CLIENT: USACE
DRILLING DATE: 3-21-15
EQUIPMENT: Geoprobe 6712 DT

DATUM: NAD83, AK State Plane Zone 8, NAVD-88
APPROX. ELEVATION: -1.77 ft
APPROX. COORDS: N: 1,844,699 E: 5,023,107

BORING METHOD: 6.625-in. OD Hollow Stem Auger

VEGETATION: sea ice (ground fast) lagoon
ICE DEPTH: 2.5 ft.

DESCRIPTION	ICE BOND	USCS	ELEV. / DEPTH (ft)	NUMBER	TYPE	BLOWS / 6 in.	REC / ATT (in.)	NOTES / TESTS / WATER LEVELS
0.0 - 2.0 Frozen, black, sandy SILT; little fine-grained sand, well bonded with approximately 5% visible ice by volume as irregularly oriented formations (ML, Vr)		ML	-3.8 / 2.0	1	SS	15 23 17 20	24/24	PID=0.1 ppm
2.0 - 5.0 Frozen, black, ORGANIC SILT; little sand, few organics, well bonded with no excess ice (OL, Nbn)		OL	-6.8 / 5.0	2	SS	20 15 15 11	24/24	PID=0.1 ppm OLI = 6%
5.0 - 7.0 Very loose to loose, wet, black, SILTY SAND; fine to coarse-grained sand, little silt, little fine-grained gravel, with organics (SM) 6.5 feet-Free water at depth		SM	-8.8 / 7.0	3	SS	5 6 1 0	11/24	PID=0.0 ppm Gravel = 12%, Sand = 65%, Fines = 23%
7.0 - 17.0 Very soft to firm, wet, black, ORGANIC SILT; little fine-grained sand, few organics (OL)		OL	-18.8 / 17.0	4	SS-AW	1 0 0 0	4/24	7.5 feet - one blow for 2 feet PID=0.3 ppm OLI = 9%
				5	SS-AW	0 1 2 2	24/24	10 feet - sampler fell 8 inches with wieght of rod OLI = 7%
				6	SS-AW	1 1 1 1	24/24	PID=0.4 ppm PID=0.2 ppm OLI = 6%
				7	SS-AW	3 5 7 5	24/24	PID=0.4 ppm OLI = 8%
17.0 - 30.0 Frozen, wet, black, SILTY SAND; fine to coarse-grained sand, little to some silt, trace to little fine-grained gravel, with organics at 17.5', poorly bonded (SM)		SM		8	SS-AW	3 6 8 25	24/24	PID=0.5 ppm Gravel = 0%, Sand = 62%, Fines = 38%



DEPTH (ft): 0, 5, 10, 15, 20

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Golder Associates

DEPTH SCALE: 1 inch to 2.5 feet
DRILLING CONTRACTOR: Discovery Drilling Inc.
DRILLER: Derek Dell

LOGGED: R. Campbell
CHECKED: H. Weston
CHECK DATE: 5/10/2015

Figure A-8

RECORD OF BOREHOLE K15-06 (AP-44)

PROJECT: Kivalina Causeway
PROJECT NUMBER: 1419207
LOCATION: Kivalina, AK

CLIENT: USACE
DRILLING DATE: 3-21-15
EQUIPMENT: Geoprobe 6712 DT

DATUM: NAD83, AK State Plane Zone 8, NAVD-88
APPROX. ELEVATION: -1.77 ft
APPROX. COORDS: N: 1,844,699 E: 5,023,107

VEGETATION: sea ice (ground fast) lagoon
ICE DEPTH: 2.5 ft.

BORING METHOD: 6.625-in. OD Hollow Stem Auger

DEPTH (ft)	DESCRIPTION	USCS	ELEV. / DEPTH (ft)	NUMBER	TYPE	BLOWS / 6 in.	REC / ATT (in.)	NOTES / TESTS / WATER LEVELS
20	17.0 - 30.0 Frozen, wet, black, SILTY SAND; fine to coarse-grained sand, little to some silt, trace to little fine-grained gravel, with organics at 17.5', poorly bonded (SM) *(Continued)*	SM						
				9	SS-AW	14 17 25 7	16/24	PID=0.2 ppm
25								
				10	SS-AW	21 50/4"	8/10	PID=0.1 ppm; Gravel = 11%, Sand = 64%, Fines = 25%
30	30.0 - 31.0 Frozen, wet, black, well-graded GRAVEL with sand; fine-grained gravel up to 3/4 inch diameter, some fine to coarse-grained sand, trace silt, poorly bonded (GW)	GW	-31.8 / 30.0; -32.8	11	SS-AW	13 37/6"	12/12	PID=0.0 ppm; Gravel = 55%, Sand = 42%, Fines = 4%

Borehole completed at 31.0 ft.

Notes:
1) Backfilled with cuttings
2) 1 inch Sch 120 PVC installed to depth
3) Borehole drilled from ground fast ice

UNCORRECTED BLOWS / ft ■ (10, 20, 30, 40); SALINITY (ppt) △; WATER CONTENT (%) W_P — W — W_L (10, 20, 30, 40)

GROUND TEMPERATURE (°F) (17, 19, 21, 23, 25, 27, 29, 31, 33)
LEGEND: ● 03/23/15 00:00; ⧗ 04/12/15 00:00; ▲ 04/14/15 00:00; ★ 04/26/15 00:00; ⊙ 05/03/15 00:00; ✧ 03/30/15 00:00

Depth scale: 20, 25, 30, 35, 40

Golder Associates

DEPTH SCALE: 1 inch to 2.5 feet
DRILLING CONTRACTOR: Discovery Drilling Inc.
DRILLER: Derek Dell

LOGGED: R. Campbell
CHECKED: H. Weston
CHECK DATE: 5/10/2015

Figure A-8

APPENDIX B
LABORATORY DATA

Testing Report Summary

Date Sample Recv'd	4/6/2015		
Client	Golder Associates	W.O. #	34316
Project	USACE Kivalina Causeway	Lab #	Varies
Location	See below		

All results will be posted to the website for your access and convenience. Samples will be kept for 30 days before being disposed. Please contact us if you would like the remaining material returned.

Lab ID	Sample ID	Test Performed	Test Method	Results	
324	K15-01, Sample 15, Depth 52.5-54.5'	Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils	ASTM D4318	Liquid Limit	----
				Plastic Limit	----
				Plasticity Index	Nonplastic
				USCS	Silt
325	K15-02, Sample 11, Depth 0-2'			Liquid Limit	----
				Plastic Limit	----
				Plasticity Index	Nonplastic
				USCS	Silt
327	K15-02, Sample 3, Depth 5-7'			Liquid Limit	----
				Plastic Limit	----
				Plasticity Index	Nonplastic
				USCS	Silt
339	K15-03, Sample 1, Depth 0-1.5'			Liquid Limit	----
				Plastic Limit	----
				Plasticity Index	Nonplastic
				USCS	Silt
350	K15-04, Sample 1, Depth 1-2.5'			Liquid Limit	----
				Plastic Limit	----
				Plasticity Index	Nonplastic
				USCS	Silt
361	K15-05, Sample 2, Depth 2.5-4.5'			Liquid Limit	----
				Plastic Limit	----
				Plasticity Index	Nonplastic
				USCS	Silt
363	K15-05, Sample 4, Depth 7.5-9.5'			Liquid Limit	40
				Plastic Limit	33
				Plasticity Index	7
				USCS	Silt or Organic Silt

continued on next page

4040 B Street, Anchorage, Alaska 99503 -- 907-562-2000

Testing Report Summary (cont'd)

Date Sample Recv'd	4/6/2015		
Client	Golder Associates	W.O. #	34316
Project	USACE Kivalina Causeway	Lab #	Varies
Location	See below		

Lab ID	Sample ID	Test Performed	Test Method	Results	
371	K15-06, Sample 1, Depth 0-2'	Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils	ASTM D4318	Liquid Limit	-
				Plastic Limit	-
				Plasticity Index	Nonplastic
				USCS	Silt
374	K15-06, Sample 4, Depth 7.5-9.5'			Liquid Limit	43
				Plastic Limit	33
				Plasticity Index	10
				USCS	Silt or Organic Silt
377	K15-06, Sample 7, Depth 15-17'			Liquid Limit	----
				Plastic Limit	----
				Plasticity Index	Nonplastic
				USCS	Silt

If you have questions regarding this summary report or the test procedures, please contact us.

Maria

Maria E. Kampsen, P.E.
Laboratory Supervisor

Testing Report Summary

Date Sample Recv'd	4/6/2015
W.O. #	34316
Lab #	see below

Client	Golder Associates
Project	USACE Kivalina Causeway
Location	Varies

All results will be posted to the website for your access and convenience. Samples will be kept for 30 days before being disposed. Please contact us if you would like the remaining material returned.

Sample ID	Test Performed	Test Method	Organic %
K15-01 Depth 47.5-49.5' (Lab No. 323)	Moisture, Ash & Organic Matter of Peat Materials	ASTM D2974	4.1
K15-02 Depth 25-27' (Lab No. 333)			5.1
K15-02 Depth 50-52' (Lab No. 338)			4.7
K15-04 Depth 22.5-24.5' (Lab No. 357)			4.0
K15-04 Depth 29.5-31.5' (Lab No. 359)			15.2
K15-06 Depth 2.5-4.5' (Lab No. 372)			5.8
K15-06 Depth 7.5-9.5' (Lab No. 374)			8.5
K15-06 Depth 10-12' (Lab No. 375)			6.5
K15-06 Depth12.5-14.5' (Lab No. 376)			6.3
K15-06 Depth 15-17' (Lab No. 377)			7.5

Maria

Maria E. Kampsen, P.E.
Laboratory Supervisor

4040 B Street, Anchorage, Alaska 99503 -- 907-562-2000

Visual Classification ASTM D-2488

Test Summary Report

DOWL

Reporting Worksheet

Sample Date: 4/6/2015

Client: Golder Associates

W.O.#: 34316

Project: USACE Kivalina Causeway

Lab No.: varies

Location: Varies

Lab #	Boring		Depth		Percent			Grain					USCS						Moisture		
	TH	SA	From (Feet)	To (Feet)	Gravel	Sand	#200	Max	Shape	Sand	Dry Str.	PI	Symbol	Color	Free Water	Organics	Ice	Remarks	Wet	Dry	%
310	K15-01	1	0	1.5	1	80	19	1/4"	-	M	M	NP	SM	Black		Trace		1.13	34.02	26.89	28
311	K15-01	2	2.5	4	0	80	20	S	-	M	M	NP	SM	Black		Trace		1.15	62.9	51.14	24
312	K15-01	3	5	6.5	5	80	15	3/8"	-	M	-	NP	SM	Black		Trace		1.16	20.8	16.15	31
313	K15-01	4	7.5	9	5	80	15	1/4"	-	M	M	NP	SM	Black		Trace		1.15	37.05	30.27	23
314	K15-01	5	10	11.5	0	81	19	S	-	M	L	NP	SM	Black		None		1.17	33.05	25.95	29
315	K15-01	6	12.5	14.5	0	85	15	S	-	M	L	NP	SM	Black		None		1.15	30.63	25.03	23
316	K15-01	7	15.0	17	0	85	15	1/4"	-	M	L	NP	SM	Black		None		1.17	26.99	21.42	28
317	K15-01	8	17.5	19.5	4	70	26	1/4"	-	M	L	NP	SM	Black		Trace		1.18	22.64	18.25	26
318	K15-01	9	22.5	24.5	0	85	15	1/4"	-	M	H	NP	SM	Black		None		1.15	24.74	20.12	24
319	K15-01	10	27.5	29.5	0	85	15	1/4"	-	M	L	NP	SM	Black		None		1.16	30.47	24.85	24
320	K15-01	11	32.5	34.5	4	48	48	1/4"	-	F/M	H	NP	SM	Black		None		1.15	26.62	21.17	27
321	K15-01	12	37.5	39.5	25	60	15	1"	-	F/M	L	NP	SM	Black		None		1.16	24.97	21.18	19
322	K15-01	13	42.5	44.5	36	56	8	1"	-	F/M	L	NP	SP-SM	Black		None		1.15	16.97	15.15	13
323	K15-01	14	47.5	49.5	15	35	50	1/2"	-	F/M	VH	M	CL	Gray		None		1.15	21.19	17.03	26
324	K15-01	15	52.5	54.5	0	5	95	S	-	F/M	H	NP	ML	Gray		None		1.17	17.62	13.69	31

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Visual Classification ASTM D-2488

Test Summary Report (cont'd)

Reporting Worksheet

Client	Golder Associates	Sample Date	4/6/2015
Project	USACE Kivalina Causeway	W.O.#	34316
Location	See below	Lab No.	varies

Lab #	Boring TH	Boring SA	Depth From	Depth To	Percent Gravel	Percent Sand	Percent -#200	Grain Max	Grain Shape	Grain Sand	Dry Str.	PI	USCS Symbol	Color	Free Water	Organics	Ice	Remarks	Moisture Wet	Moisture Dry	Moisture %
325	K15-02	1	0	2	0	5	95	S	-	F	M	NP	ML	Black/Brown		None		1.16	15.88	10.19	63
326	K15-02	2	2.5	4.5	0	20	80	S	-	F	H	NP	ML	Gray		None		1.15	20.15	15.36	34
327	K15-02	3	5	7	5	87	8	1/4"	-	F/M	L	NP	SP-SM	Black		None		1.16	26.66	22.04	22
328	K15-02	4	7.5	9.5	0	50	50	S	-	F	M	NP	ML	Black		None		1.13	20.09	15.1	36
329	K15-02	5	10	12	0	75	25	S	-	F	L	NP	SM	Black		None		1.13	27.58	21.49	30
330	K15-02	6	12.5	14.5	15	50	35	1/4"	-	F/M	L	NP	SM	Black		None		1.14	17.23	14.64	19
331	K15-02	7	15.0	17	9	82	9	1/4"	-	F/M	L	NP	SP-SM	Black		None		1.14	36.65	31.08	19
332	K15-02	8	20.0	22	1	69	30	S	-	F	L	NP	SM	Black		None		1.16	15.39	11.55	37
333	K15-02	9	25	27	0	25	75	S	-	F	M	NP	ML	Black		None		1.17	24.07	17.32	42
334	K15-02	10	30	32	24	59	17	F/C	-	F/M	L	NP	SM	Black		None		1.16	28.03	19.57	46
335	K15-02	11	35	37	50	35	15	F/C	-	F/M	L	NP	GM	Black		None		1.15	30.79	27.68	12
336	K15-02	12	40	42	41	51	8	F/C	-	F/M	L	NP	SW-SM	Black		None		1.17	23.74	21.5	11
337	K15-02	13	45	47	20	30	50	F/C	-	F/M	H	NP	GM	Gray		None		1.17	29.56	22.83	31
338	K15-02	14	50	52	0	5	95	S	-	M	VH	L	ML	Gray		None		1.17	21.73	17.47	26
339	K15-03	1	0	1.5	0	15	85	S	-	M	M	NP	ML	Black/Brown		None		1.14	12.1	8.39	51

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Visual Classification ASTM D-2488

Test Summary Report (cont'd)

Reporting Worksheet

Client	Golder Associates	W.O.#	34316
Project	USACE Kivalina Causeway	Lab No.	varies
Location	See below	Sample Date	4/6/2015

Lab #	Boring		Depth		Percent			Grain					USCS						Moisture		
	TH	SA	From	To	Gravel	Sand	-#200	Max	Shape	Sand	Dry Str.	PI	Symbol	Color	Free Water	Organics	Ice	Remarks	Wet	Dry	%
340	K15-03	2	2.5	4.5	0	15	85	S	-	M	M	NP	ML	Black/Brown		None		1.16	27.26	20.07	38
341	K15-03	3	5	7	5	75	20	1/4"	-	F/M	L	NP	SM	Black		None		1.15	38.15	31.43	22
342	K15-03	4	7.5	9.5	9	83	8	1/4"	-	F/M	L	NP	SP-SM	Black		None		1.15	25.66	21.74	19
343	K15-03	5	10	12	25	50	25	1/4"	-	F/M	L	NP	ML	Black/Brown		None		1.13	18.73	15.16	25
344	K15-03	6	12.5	14.5	3	85	12	1/4"	-	F/M	L	NP	SP-SM	Black/Brown		None		1.13	17.41	14.57	21
345	K15-03	7	15.0	17	5	80	15	1/4"	-	F/M	L	NP	SM	Brown		None		1.16	20.81	16.83	25
346	K15-03	8	17.5	19.5	8	82	10	1/4"	-	F/M	L	NP	SW-SM	Black/Brown		None		1.16	14.7	12.48	20
347	K15-03	9	22.5	24.5	10	60	30	1/2"	-	F/M	L	NP	SM	Black		None		1.14	15.65	12.47	28
348	K15-03	10	27.5	29.5	6	64	30	1/4"	-	F/M	M	NP	SM	Black		None		1.16	23.5	19.1	25
349	K15-03	11	29.5	31.5	1	80	19	S	-	S	M	NP	SM	Black		None		1.15	24.71	19.27	30
350	K15-04	1	1	2.5	5	10	85	1/4"	-	S	H	L	ML	Black		None		1.16	29.4	22.93	30
351	K15-04	2	3.5	5	5	75	20	1/4"	-	F/M	L	NP	SM	Black		None		1.14	28.47	19.06	53
352	K15-04	3	6	7.5	1	91	10	1/4"	-	F/M	L	NP	SP-SM	Black		None		1.16	13.32	10.98	24
353	K15-04	4	8.5	10	9	85	6	3/58'	-	F/M	L	NP	SP-SM	Black		None		1.15	17.47	14.76	20
354	K15-04	5	12.5	14.5	10	85	5	1/4"	-	F/M	L	NP	SP	Black		None		1.15	19.41	16.7	17

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Visual Classification ASTM D-2488

Test Summary Report (cont'd)

Reporting Worksheet

Sample Date 4/6/2015

Client: Golder Associates — W.O.# 34316

Project: USACE Kivalina Causeway — Lab No. varies

Location: See below

Lab #	Boring TH	Boring SA	Depth From	Depth To	Percent Gravel	Percent Sand	Percent -#200	Grain Max	Grain Shape	Grain Sand	Dry Str.	PI	USCS Symbol	Color	Free Water	Organics	Ice	Remarks	Moisture Wet	Moisture Dry	Moisture %
355	K15-04	6	15	17	12	77	11	1/2"	-	F/M	L	NP	SW-SM	Brown		None		1.14	20.96	18.05	17
356	K15-04	7	17.5	19	15	80	5	3/8"	-	F/M	L	NP	SP	Black		None		1.15	15.25	13.41	15
357	K15-04	8	22.5	24.5	4	72	24	3/8"	-	F/M	M	NP	SM	Black		None		1.14	27.36	22.51	23
358	K15-04	9	27.5	29.5	0	5	95	S	-	M	H	NP	ML	Black		None		1.16	23.93	16.88	45
359	K15-04	10	29.5	31.5	0	5	95	S	-	M	M	NP	ML	Black		Trace		1.15	14.29	10.53	40
360	K15-05	1	0.0	1.5	1	74	25	S	-	M	L	NP	SM	Black		Trace		1.15	15.66	11.64	38
361	K15-05	2	2.5	4.5	0	5	95	S	-	M	H	L	ML	Gray		None		1.15	23.34	17.99	32
362	K15-05	3	5.0	7	0	5	95	S	-	M	M	L	ML	Gray		None		1.17	21.48	15.52	42
363	K15-05	4	7.5	9.5	0	5	95	S	-	M	VH	L	ML	Gray		None		1.15	31.72	23.43	37
364	K15-05	5	10	12	0	69	31	S	-	M	L	NP	SM	Black		None		1.15	30.72	24.39	27
365	K15-05	6	12.5	14.5	10	50	40	3/4"	-	F/M	M	NP	SM	Black		None		1.15	18.49	15.05	25
366	K15-05	7	15	17	20	40	40	1/4"	-	F/M	L	NP	SM	Brown		None		1.15	26.53	21.69	24
367	K15-05	8	17.5	19.5	16	67	17	1/4"	-	F/M	L	NP	SM	Brown		None		1.14	24.16	19.98	22
368	K15-05	9	22.5	24.5	0	50	50	S	-	M	M	NP	ML	Black		None		1.16	17.12	13.5	29
369	K15-05	10	27.5	28.1	38	47	15	1"	-	F/M	H	NP	SM	Black		None		1.15	20.45	17.56	18

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Visual Classification ASTM D-2488

Test Summary Report

Reporting Worksheet

Client	Golder Associates	Sample Date	4/6/2015
Project	USACE Kivalina Causeway	W.O.#	34316
Location	See below	Lab No.	varies

Lab #	Boring TH	Boring SA	Depth From	Depth To	Percent Gravel	Percent Sand	Percent -#200	Grain Max	Grain Shape	Grain Sand	Dry Str.	PI	USCS Symbol	Color	Free Water	Organics	Ice	Remarks	Moisture Wet	Moisture Dry	Moisture %
370	K15-05	11	30	30.5	46	48	6	3/4"	-	M	L	NP	SP-SM	Brown		None		1.14	20	18.07	11
371	K15-06	1	0	2	0	5	95	S	-	M	M	NP	ML	Black		None		1.14	13.72	9.31	54
372	K15-06	2	2.5	4.5	0	5	95	S	-	M	L	NP	ML	Black		None		1.14	18.6	12.98	47
373	K15-06	3	5	7	12	65	23	1/4"	-	F/M	M	NP	SM	Black		None		1.16	34.69	28.22	24
374	K15-06	4	7.5	9.5	0	5	95	S	-	M	H	L	ML	Gray		None		1.16	22.33	15.83	44
375	K15-06	5	10.0	12	0	5	95	S	-	M	VH	L	ML	Gray		None		1.15	15.97	11.33	46
376	K15-06	6	12.5	14.5	0	5	95	S	-	M	VH	L	ML	Gray		None		1.13	14.89	10.09	54
377	K15-06	7	15.0	17	0	5	95	S	-	M	H	NP	ML	Gray		None		1.16	18.93	14.31	35
378	K15-06	8	17.5	19.5	0	62	38	S	-	M	L	NP	SM	Black		None		1.15	22.34	16.15	41
379	K15-06	9	22.5	24.5	5	75	20	1/4"	-	F/M	L	NP	SM	Black/Brown		None		1.17	11.07	8.78	30
380	K15-06	10	27.5	28.3	11	64	25	3/8"	-	F/M	L	NP	SM	Black		None		1.14	21.45	16.82	30
381	K15-06	11	30	31	55	41	4	1"	-	F/M	L	NP	GW	Brown		None		1.14	11.26	10.66	6

If you have questions regarding this summary report or the test procedures, please contact us.

Maria

Maria E. Kampsen, P.E.
Laboratory Supervisor

Conductivity Report Summary

Date Sample Recv'd	6/9/2014		
Client	Golder Associates	W.O. #	33956
Project	USACE Kivalina Causeway	Lab #	Varies
Location	See below		

Lab ID	Sample ID	Test Performed	Test Method	Parts Per Thousand (ppt)
339	K15-03, Sample 1, 0'-1.5'	Conductivity	In House Procedure	4.5
340	K15-03, Sample 2, 2.5'-4.5'			2.3
341	K15-03, Sample 3, 5'-7'			3.3
342	K15-03, Sample 4, 7.5'-9'			2.7
343	K15-03, Sample 5, 10'-12'			4.9
344	K15-03, Sample 6, 12.5'-14.5'			3.9
345	K15-03, Sample 1, 15'-17'			4.4
346	K15-03, Sample 1, 17.5'-19.5'			5.5
347	K15-03, Sample 9, 22.5'-24.5'			4.9
348	K15-03, Sample 10, 27.5'-29.5'			8.4
349	K15-03, Sample 11, 29.5'-31.5'			8.0
371	K15-06, Sample 1, 0'-2'			5.3
372	K15-06, Sample 2, 2.5'-4.5'			9.2
373	K15-06, Sample 3, 5'-7'			8.2
374	K15-06, Sample 4, 7.5'-9.5'			15.6
375	K15-06, Sample 5, 10'-12'			8.6
376	K15-06, Sample 6, 12.5'-14.5'			12.7
377	K15-06, Sample 7, 15'-17'			5.2
378	K15-06, Sample 8, 17.5'-19.5'			8.6
379	K15-06, Sample 9, 22.5'-24.5'			7.1

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4040 B Street, Anchorage, Alaska 99503 -- 907-562-2000

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Conductivity Report Summary (cont'd)

		Date Sample Recv'd	6/9/2014
Client	Golder Associates	W.O. #	33956
Project	USACE Kivalina Causeway	Lab #	Varies
Location	See below		

Lab ID	Sample ID	Test Performed	Test Method	Parts Per Thousand (ppt)
380	K15-06, Sample 10, 27.5'-28.3'	Conductivity	In House Procedure	7.8
381	K15-06, Sample 11, 30'-31'			10.8

If you have questions regarding this summary report or the test procedures, please contact us.

Maria

Maria E. Kampsen, P.E.
Laboratory Supervisor

4040 B Street, Anchorage, Alaska 99503 -- 907-562-2000

DOWL HKM

Client: Golder Associates Inc.
Project: USACE Kivalina Causeway
Work Order: A34316

Particle Size Distribution

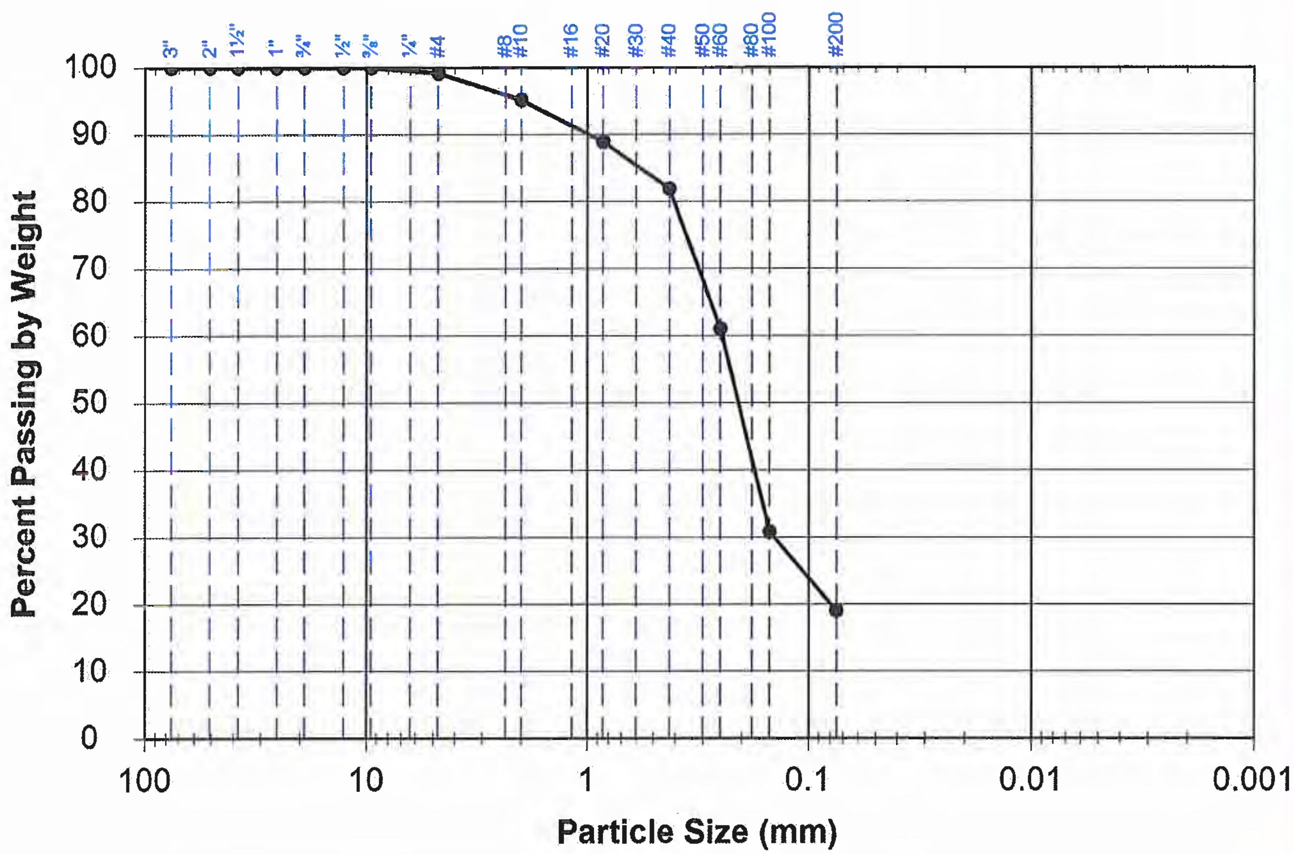
ASTM D422

Lab Number	2015-310
Received	4/6/2015
Reported	4/21/2015

Location: Test Borehole K15-01
Sample 1
Depth 0'-1.5'

Engineering Classification: Silty Sand, SM

Frost Classification: Not Measured



Size	Passing	Specification
3"	100%	
2"	100%	
1½"	100%	
1"	100%	
¾"	100%	
½"	100%	
⅜"	100%	
#4	99%	
Total Weight of Sample 725g		
#10	95%	
#20	89%	
#40	82%	
#60	61%	
#100	31%	
#200	19.1%	
Total Weight of Fine Fraction 307.6g		

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DOWL HKM

Client: Golder Associates Inc.
Project: USACE Kivalina Causeway
Work Order: A34316

Particle Size Distribution

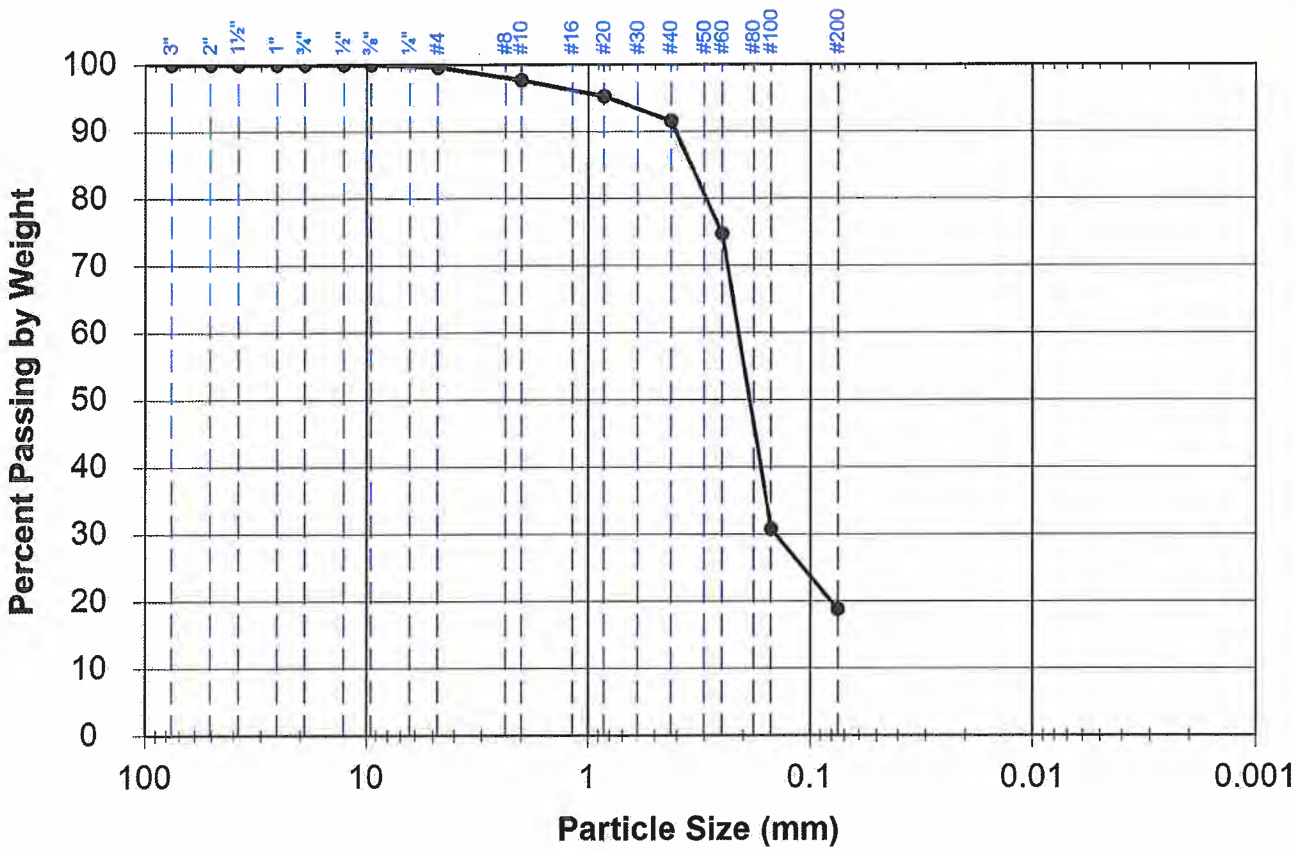
ASTM D422

Lab Number	2015-314
Received	4/6/2015
Reported	4/21/2015

Location: Test Borehole K15-01
Sample 5
Depth 10'-11.5'

Engineering Classification: Silty Sand, SM

Frost Classification: Not Measured



Size	Passing	Specification
3"	100%	
2"	100%	
1½"	100%	
1"	100%	
¾"	100%	
½"	100%	
⅜"	100%	
#4	100%	
Total Weight of Sample 292.5g		
#10	98%	
#20	95%	
#40	92%	
#60	75%	
#100	31%	
#200	18.8%	
Total Weight of Fine Fraction 291.4g		

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DOWL HKM

Client: Golder Associates Inc.
Project: USACE Kivalina Causeway
Work Order: A34316

Particle Size Distribution

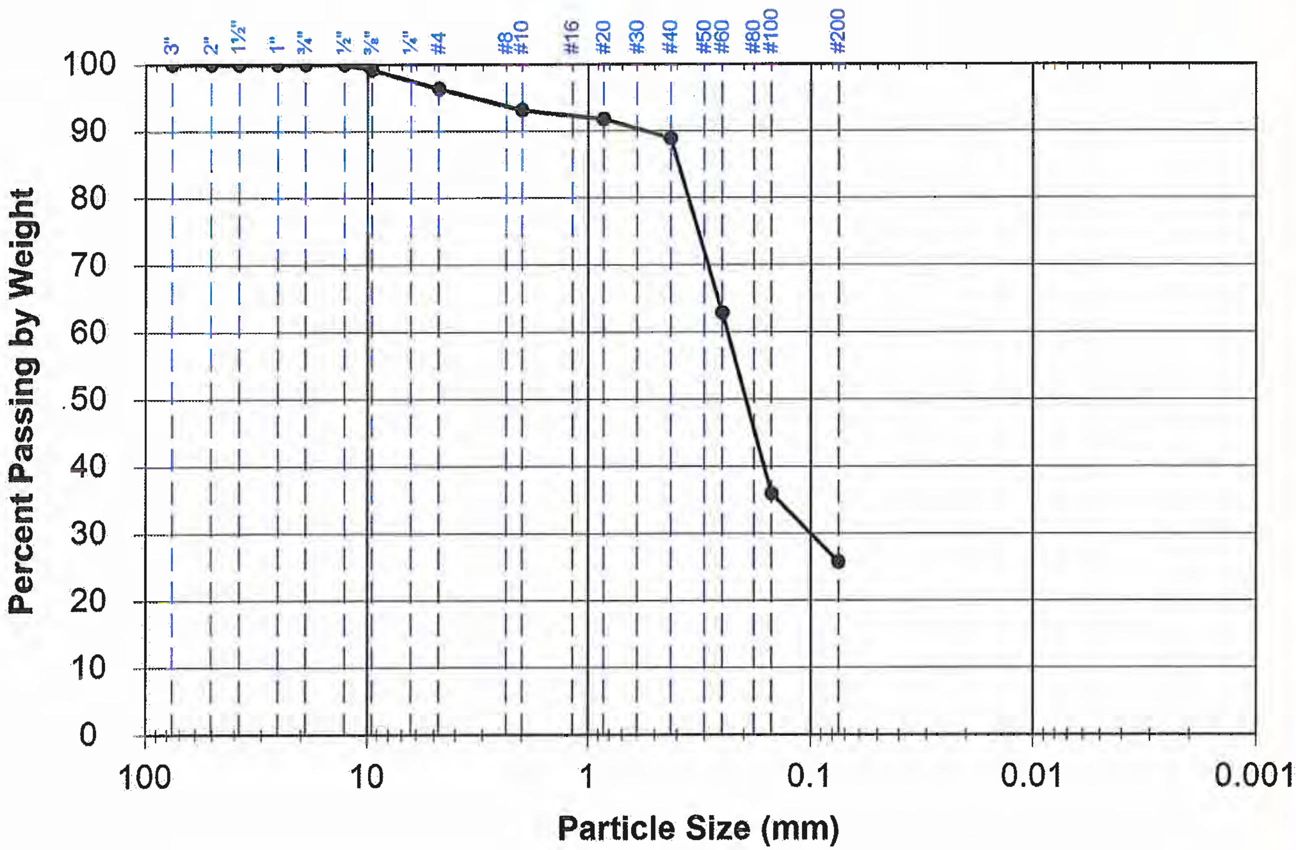
ASTM D422

Lab Number	2015-317
Received	4/6/2015
Reported	4/21/2015

Location: Test Borehole K15-01
Sample 8
Depth 17.5'-19.5'

Engineering Classification: Silty Sand, SM

Frost Classification: Not Measured



Size	Passing	Specification
3"	100%	
2"	100%	
1½"	100%	
1"	100%	
¾"	100%	
½"	100%	
⅜"	99%	
#4	96%	
Total Weight of Sample 465.9g		
#10	93%	
#20	92%	
#40	89%	
#60	63%	
#100	36%	
#200	25.8%	
Total Weight of Fine Fraction 448.9g		

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DOWL HKM

Client: Golder Associates Inc.
Project: USACE Kivalina Causeway
Work Order: A34316

Particle Size Distribution

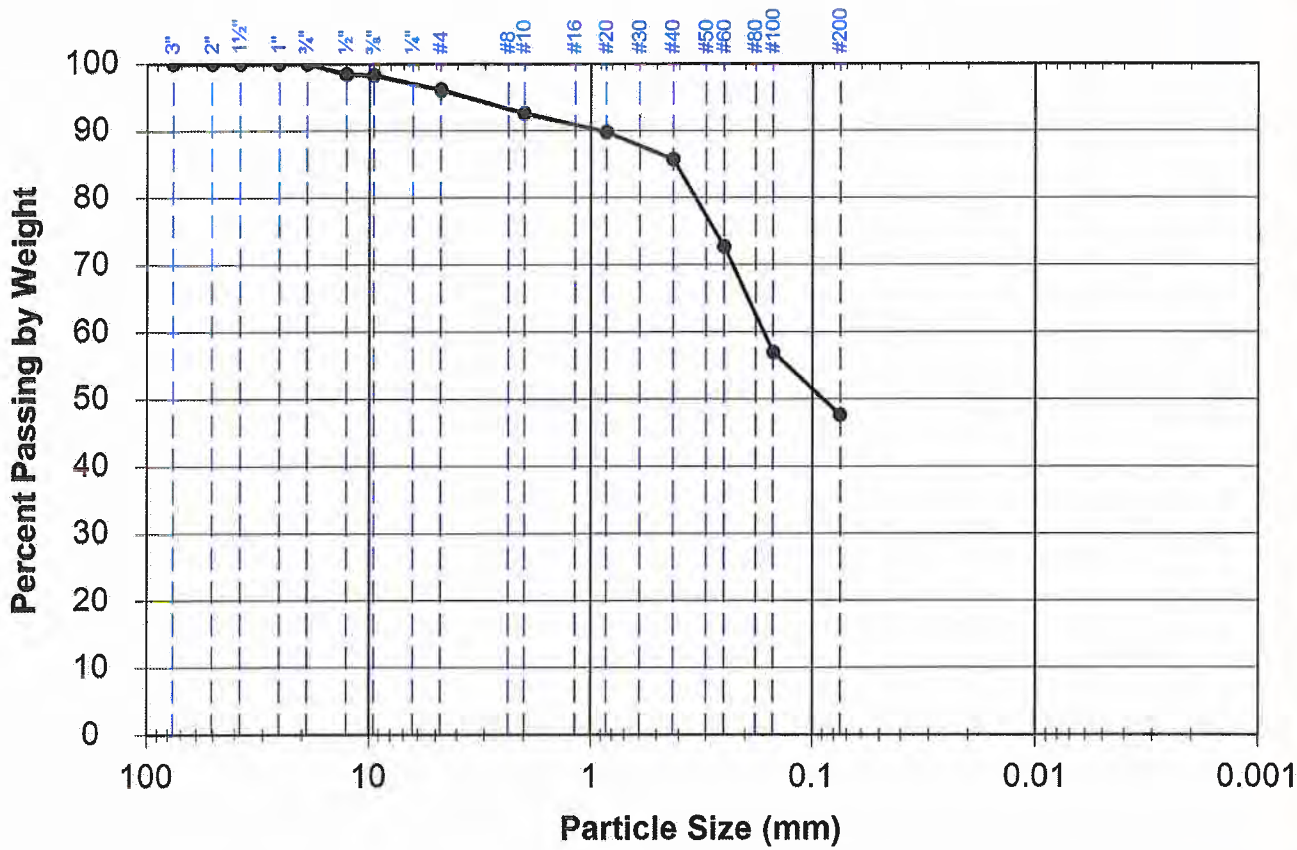
ASTM D422

Lab Number	2015-320
Received	4/6/2015
Reported	4/21/2015

Location: Test Borehole K15-01
Sample 11
Depth 32.5'-34.5'

Engineering Classification: Silty Sand, SM

Frost Classification: Not Measured



Size	Passing	Specification
3"	100%	
2"	100%	
1½"	100%	
1"	100%	
¾"	100%	
½"	98%	
⅜"	98%	
#4	96%	
Total Weight of Sample 772.7g		
#10	93%	
#20	90%	
#40	86%	
#60	73%	
#100	57%	
#200	47.6%	
Total Weight of Fine Fraction 305.6g		

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DOWL HKM

Client: Golder Associates Inc.
Project: USACE Kivalina Causeway
Work Order: A34316

Particle Size Distribution

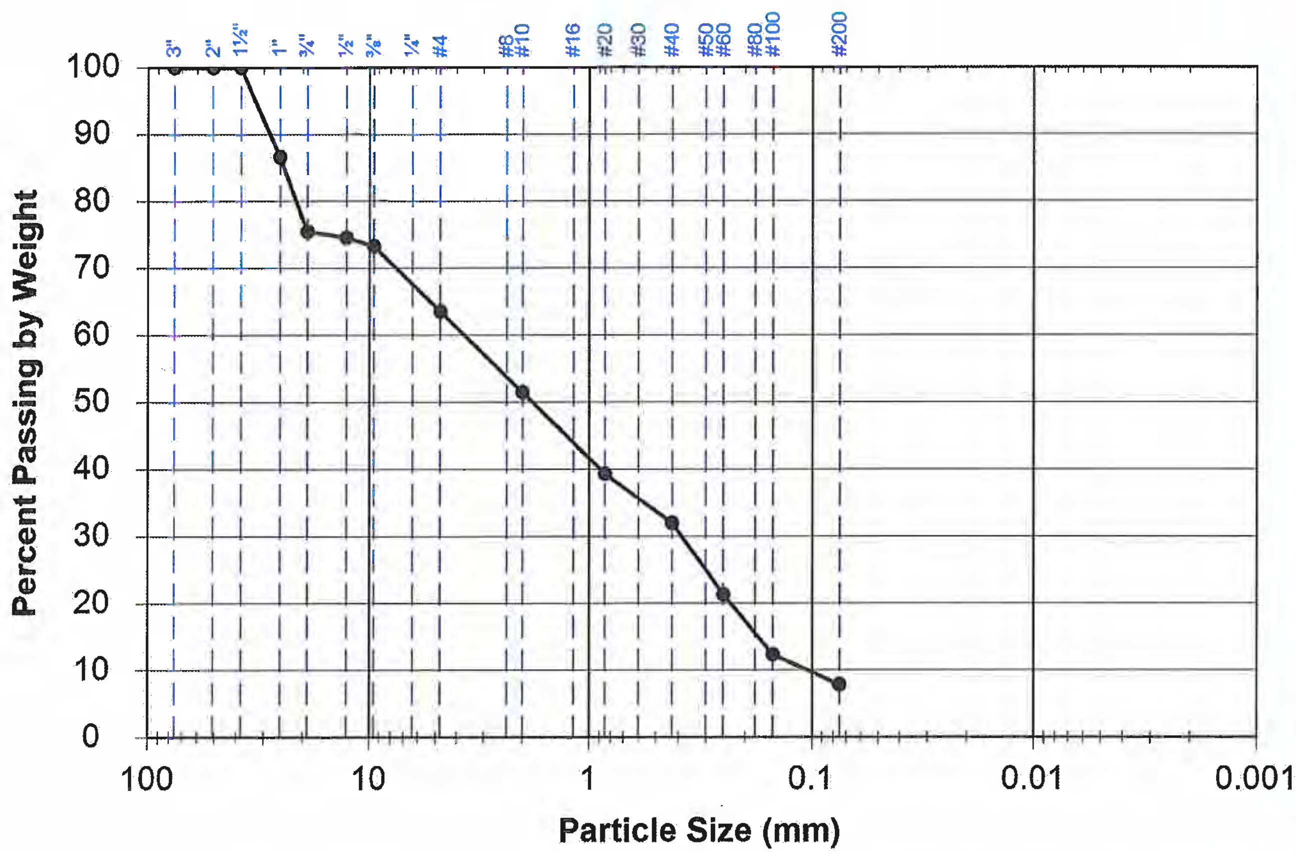
ASTM D422

Lab Number	2015-322
Received	4/6/2015
Reported	4/21/2015

Location: Test Borehole K15-01
Sample 13
Depth 42.5'-44.5'

Engineering Classification: **Poorly Graded Sand with Silt and Gravel, SP-SM**

Frost Classification: **Not Measured**



Size	Passing	Specification
3"	100%	
2"	100%	
1½"	100%	
1"	87%	
¾"	75%	
½"	75%	
⅜"	73%	
#4	64%	
Total Weight of Sample 508.3g		
#10	51%	
#20	39%	
#40	32%	
#60	21%	
#100	12%	
#200	7.9%	
Total Weight of Fine Fraction 322.6g		

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DOWL HKM

Client:	Golder Associates Inc.
Project:	USACE Kivalina Causeway
Work Order:	A34316

Particle Size Distribution

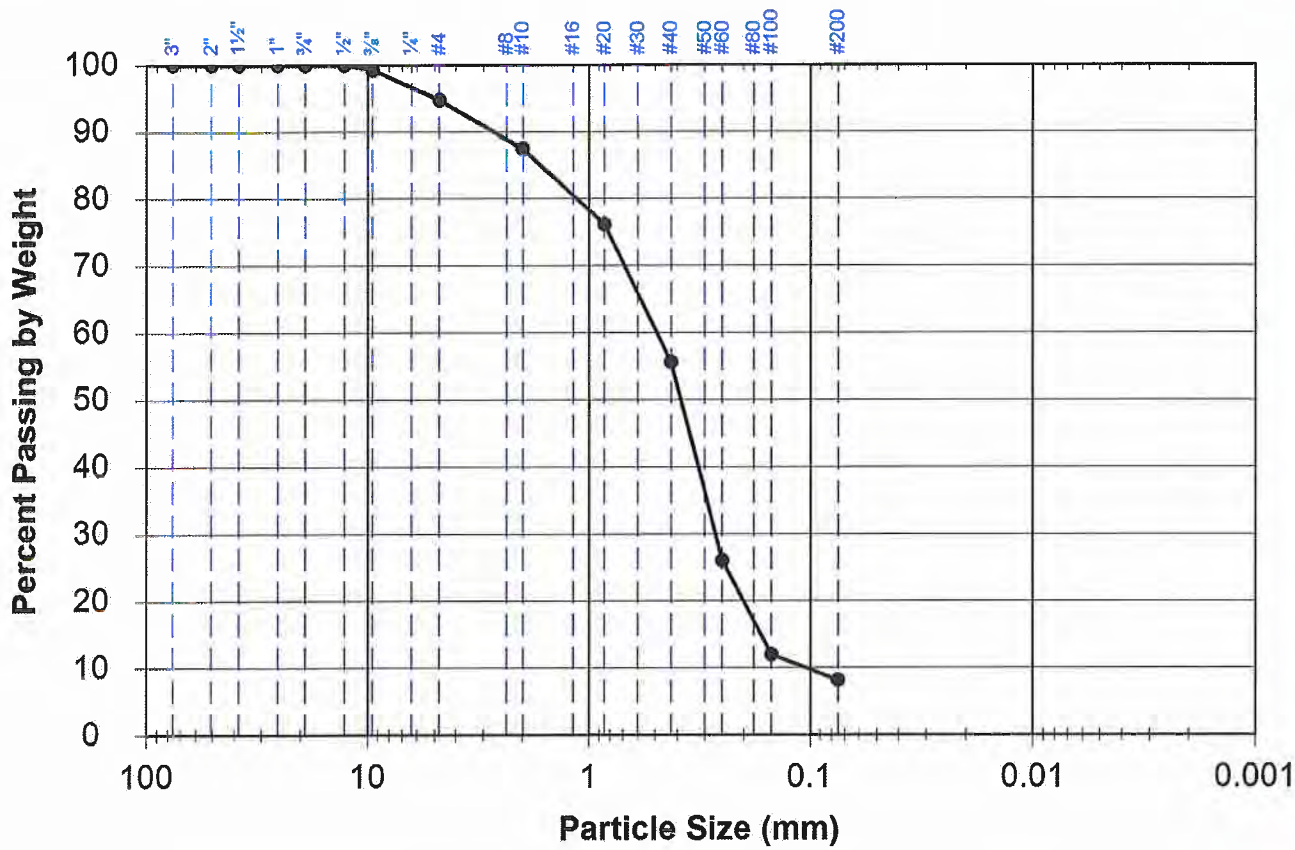
ASTM D422

Lab Number	2015-327
Received	4/6/2015
Reported	4/21/2015

Location: Test Borehole K15-02
Sample 3
Depth 5'-7'

Engineering Classification: **Poorly Graded Sand with Silt, SP-SM**

Frost Classification: **Not Measured**



Size	Passing	Specification
3"	100%	
2"	100%	
1½"	100%	
1"	100%	
¾"	100%	
½"	100%	
⅜"	99%	
#4	95%	
Total Weight of Sample 663.2g		
#10	87%	
#20	76%	
#40	56%	
#60	26%	
#100	12%	
#200	8.2%	
Total Weight of Fine Fraction 315.9g		

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Client: Golder Associates Inc.
Project: USACE Kivalina Causeway
Work Order: A34316

Particle Size Distribution

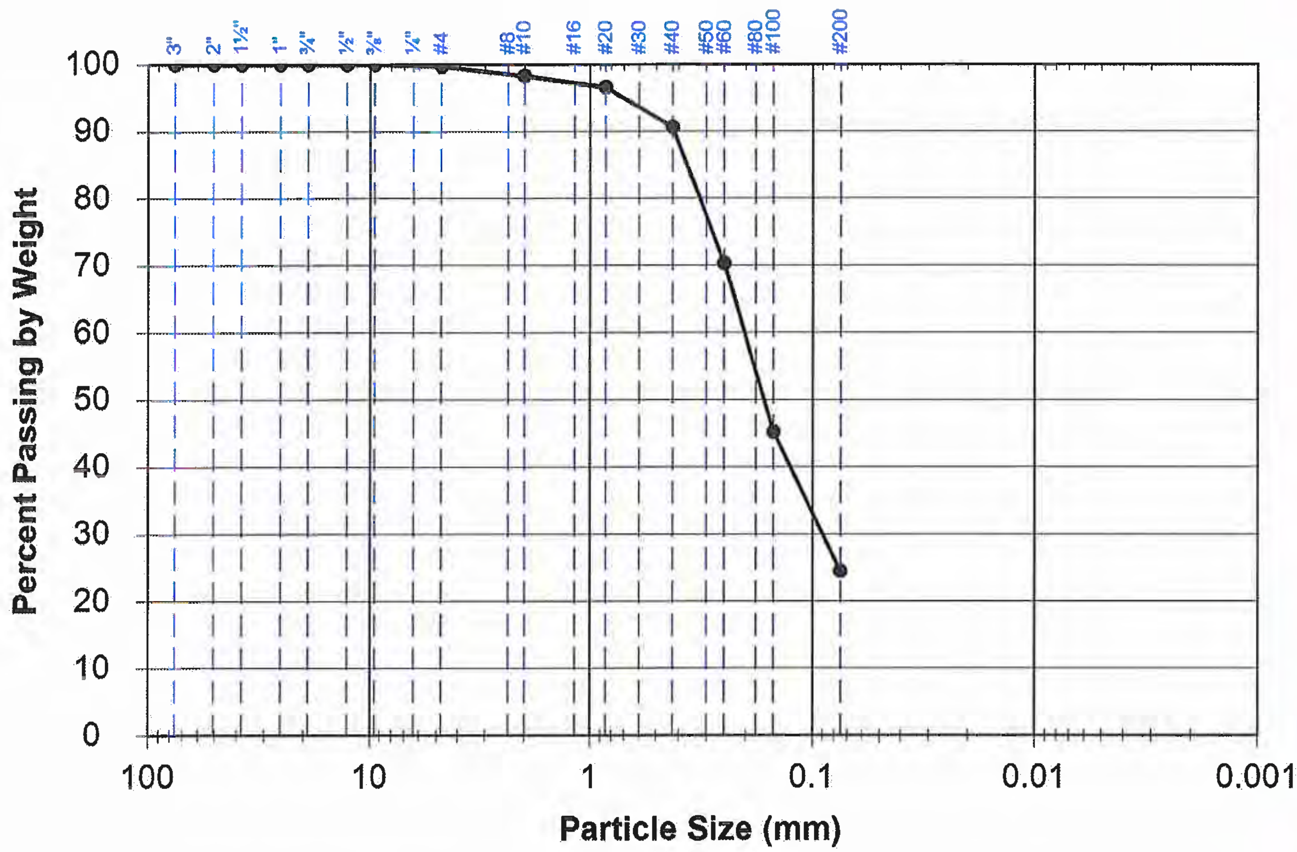
ASTM D422

Lab Number	2015-329
Received	4/6/2015
Reported	4/21/2015

Location: Test Borehole K15-02
Sample 5
Depth 10'-12'

Engineering Classification: Silty Sand, SM

Frost Classification: Not Measured



Size	Passing	Specification
3"	100%	
2"	100%	
1½"	100%	
1"	100%	
¾"	100%	
½"	100%	
⅜"	100%	
#4	100%	
Total Weight of Sample 537.6g		
#10	98%	
#20	97%	
#40	91%	
#60	70%	
#100	45%	
#200	24.5%	
Total Weight of Fine Fraction 535.5g		

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Client: Golder Associates Inc.
Project: USACE Kivalina Causeway
Work Order: A34316

Particle Size Distribution

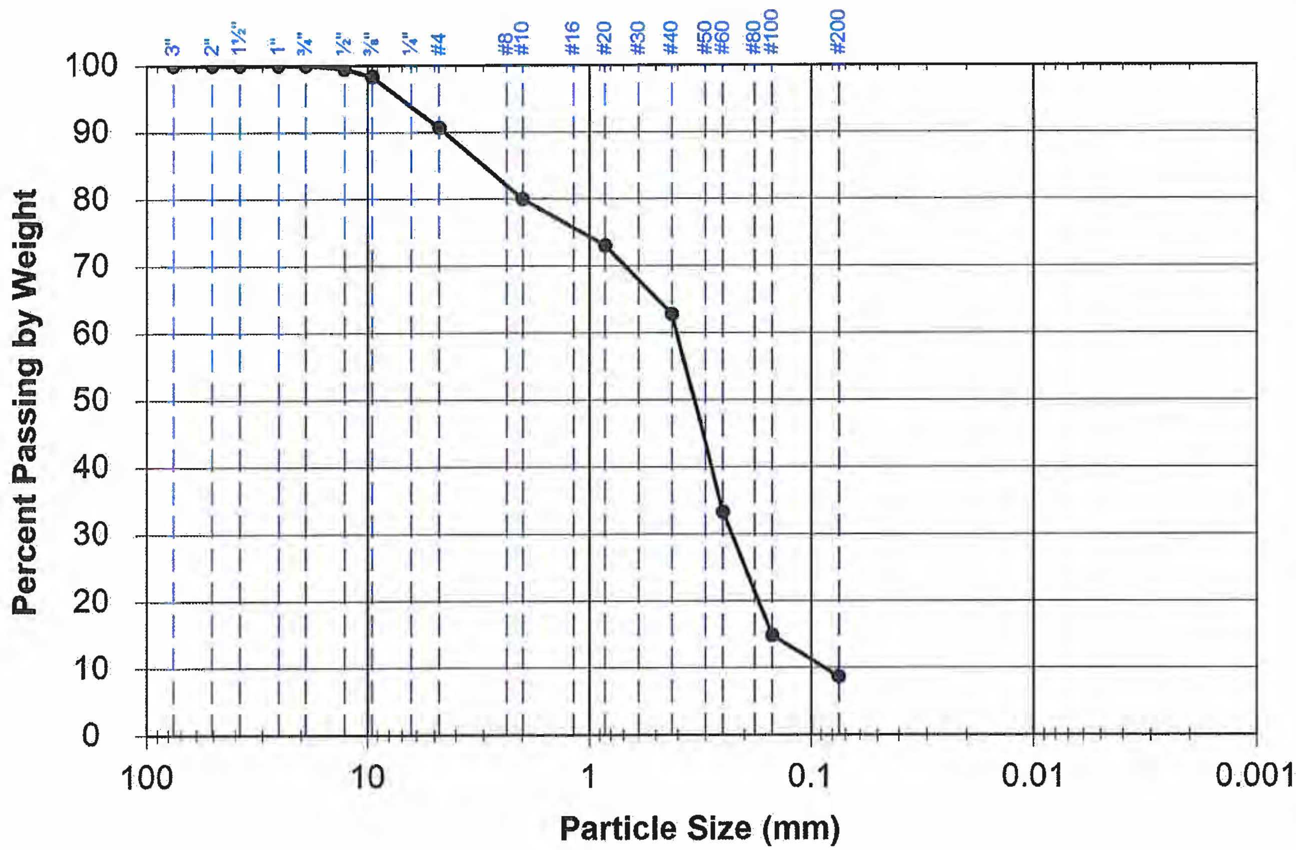
ASTM D422

Lab Number	2015-331
Received	4/6/2015
Reported	4/21/2015

Location: Test Borehole K15-02
Sample 7
Depth 15'-17'

Engineering Classification: **Poorly Graded Sand with Silt, SP-SM**

Frost Classification: **Not Measured**



Size	Passing	Specification
3"	100%	
2"	100%	
1½"	100%	
1"	100%	
¾"	100%	
½"	100%	
⅜"	98%	
#4	91%	
Total Weight of Sample 553.7g		
#10	80%	
#20	73%	
#40	63%	
#60	33%	
#100	15%	
#200	8.7%	
Total Weight of Fine Fraction 501.5g		

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Project: USACE Kivalina Causeway
Work Order: A34316

Particle Size Distribution

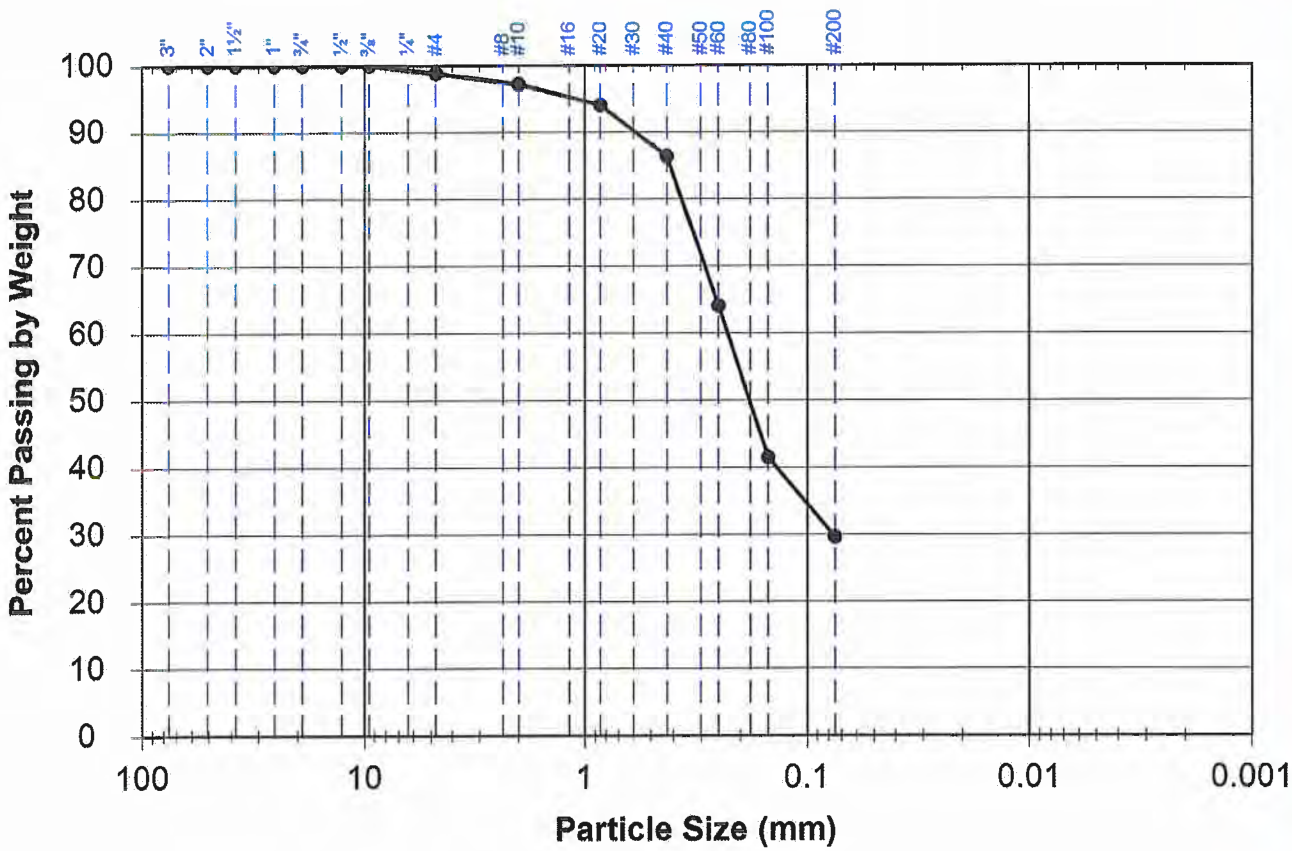
ASTM D422

Lab Number	2015-332
Received	4/6/2015
Reported	4/21/2015

Location: Test Borehole K15-02
Sample 8
Depth 20'-22'

Engineering Classification: Silty Sand, SM

Frost Classification: Not Measured



Size	Passing	Specification
3"	100%	
2"	100%	
1½"	100%	
1"	100%	
¾"	100%	
½"	100%	
⅜"	100%	
#4	99%	
Total Weight of Sample 213.3g		
#10	97%	
#20	94%	
#40	86%	
#60	64%	
#100	41%	
#200	29.7%	
Total Weight of Fine Fraction 210.3g		

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Project: USACE Kivalina Causeway
Work Order: A34316

Particle Size Distribution

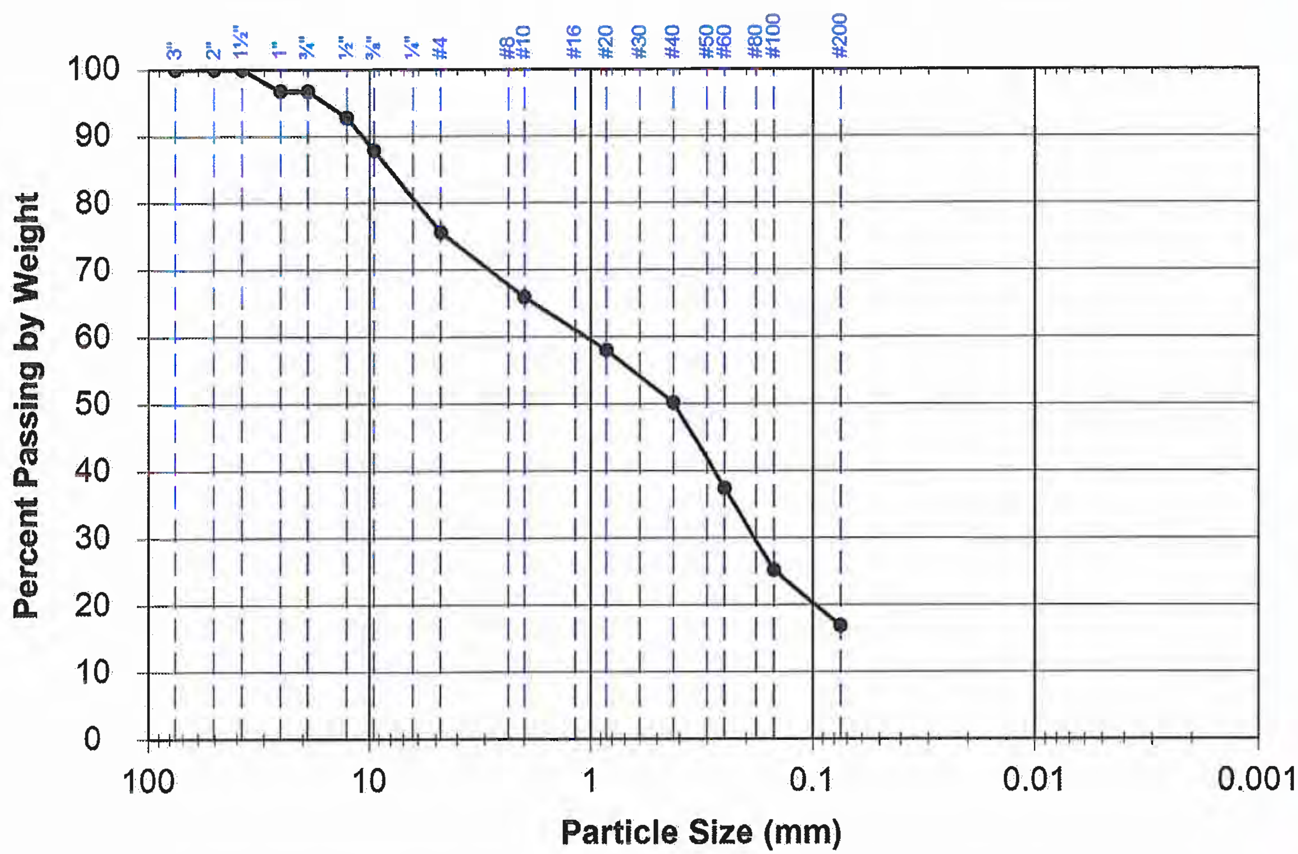
ASTM D422

Lab Number	2015-334
Received	4/6/2015
Reported	4/21/2015

Location: Test Borehole K15-02
Sample 10
Depth 30'-32'

Engineering Classification: Silty Sand with Gravel, SM

Frost Classification: Not Measured



Size	Passing	Specification
3"	100%	
2"	100%	
1½"	100%	
1"	97%	
¾"	97%	
½"	93%	
⅜"	88%	
#4	76%	
Total Weight of Sample 744.8g		
#10	66%	
#20	58%	
#40	50%	
#60	37%	
#100	25%	
#200	16.9%	
Total Weight of Fine Fraction 561.7g		

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Client: Golder Associates Inc.
Project: USACE Kivalina Causeway
Work Order: A34316

Particle Size Distribution

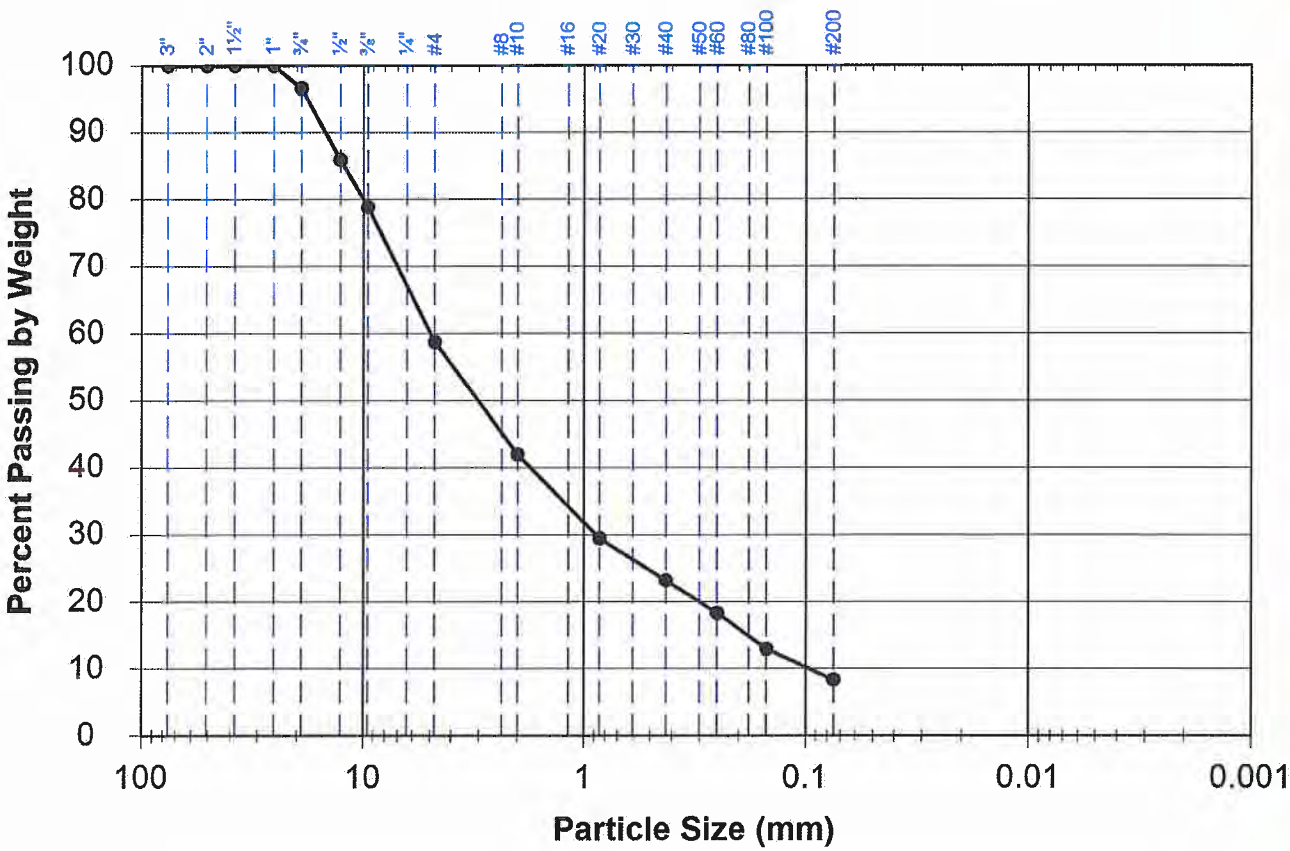
ASTM D422

Lab Number	2015-336
Received	4/6/2015
Reported	4/21/2015

Location: Test Borehole K15-02
Sample 12
Depth 40'-42'

Engineering Classification: **Well Graded Sand with Silt and Gravel, SW-SM**

Frost Classification: **Not Measured**



Size	Passing	Specification
3"	100%	
2"	100%	
1½"	100%	
1"	100%	
¾"	97%	
½"	86%	
⅜"	79%	
#4	59%	
Total Weight of Sample 522.3g		
#10	42%	
#20	29%	
#40	23%	
#60	18%	
#100	13%	
#200	8.3%	
Total Weight of Fine Fraction 306.4g		

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Client: Golder Associates Inc.
Project: USACE Kivalina Causeway
Work Order: A34316

Particle Size Distribution

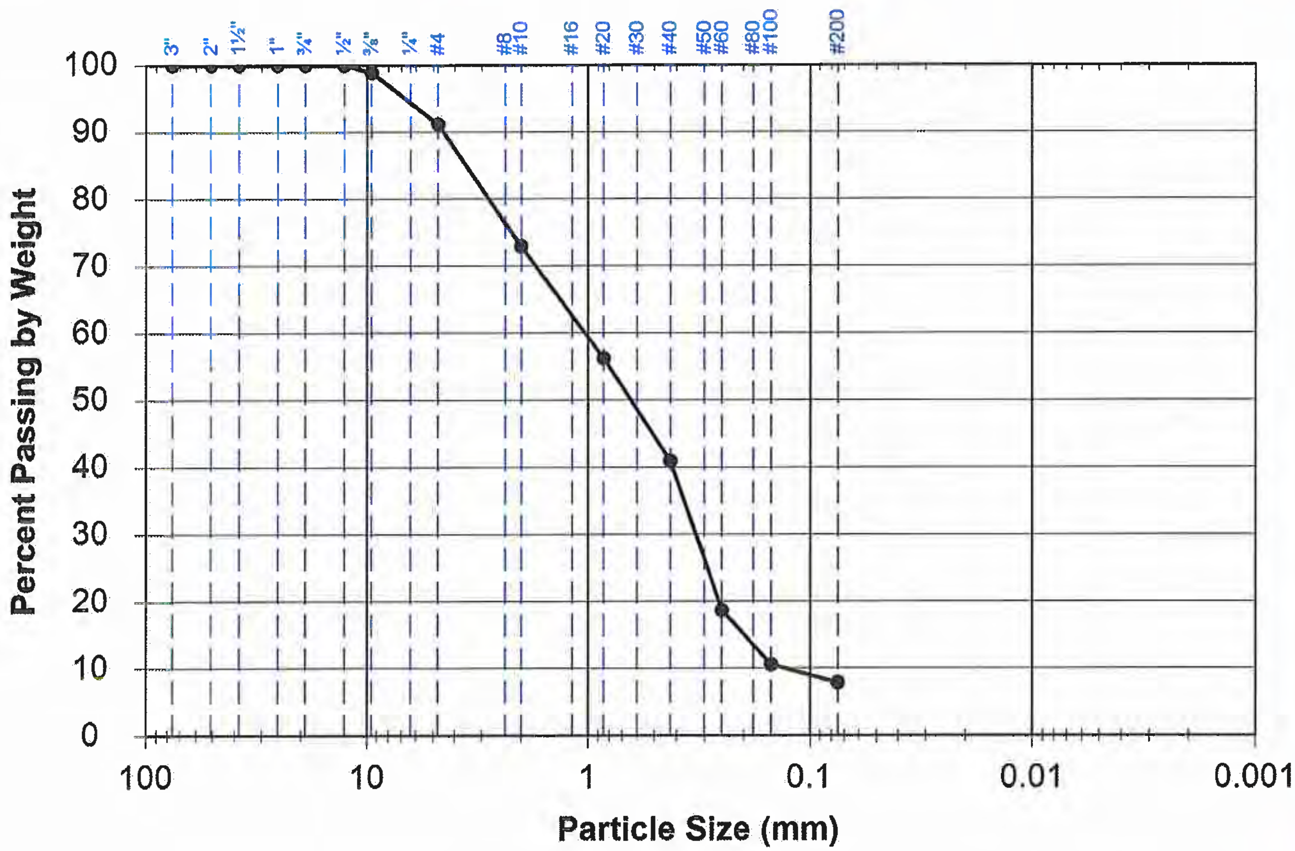
ASTM D422

Lab Number	2015-342
Received	4/6/2015
Reported	4/21/2015

Location: Test Borehole K15-03
Sample 4
Depth 7.5'-9.5'

Engineering Classification: Poorly Graded Sand with Silt, SP-SM

Frost Classification: Not Measured



Size	Passing	Specification
3"	100%	
2"	100%	
1½"	100%	
1"	100%	
¾"	100%	
½"	100%	
⅜"	99%	
#4	91%	
Total Weight of Sample 614.1g		
#10	73%	
#20	56%	
#40	41%	
#60	19%	
#100	11%	
#200	7.9%	
Total Weight of Fine Fraction 558.6g		

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Particle Size Distribution

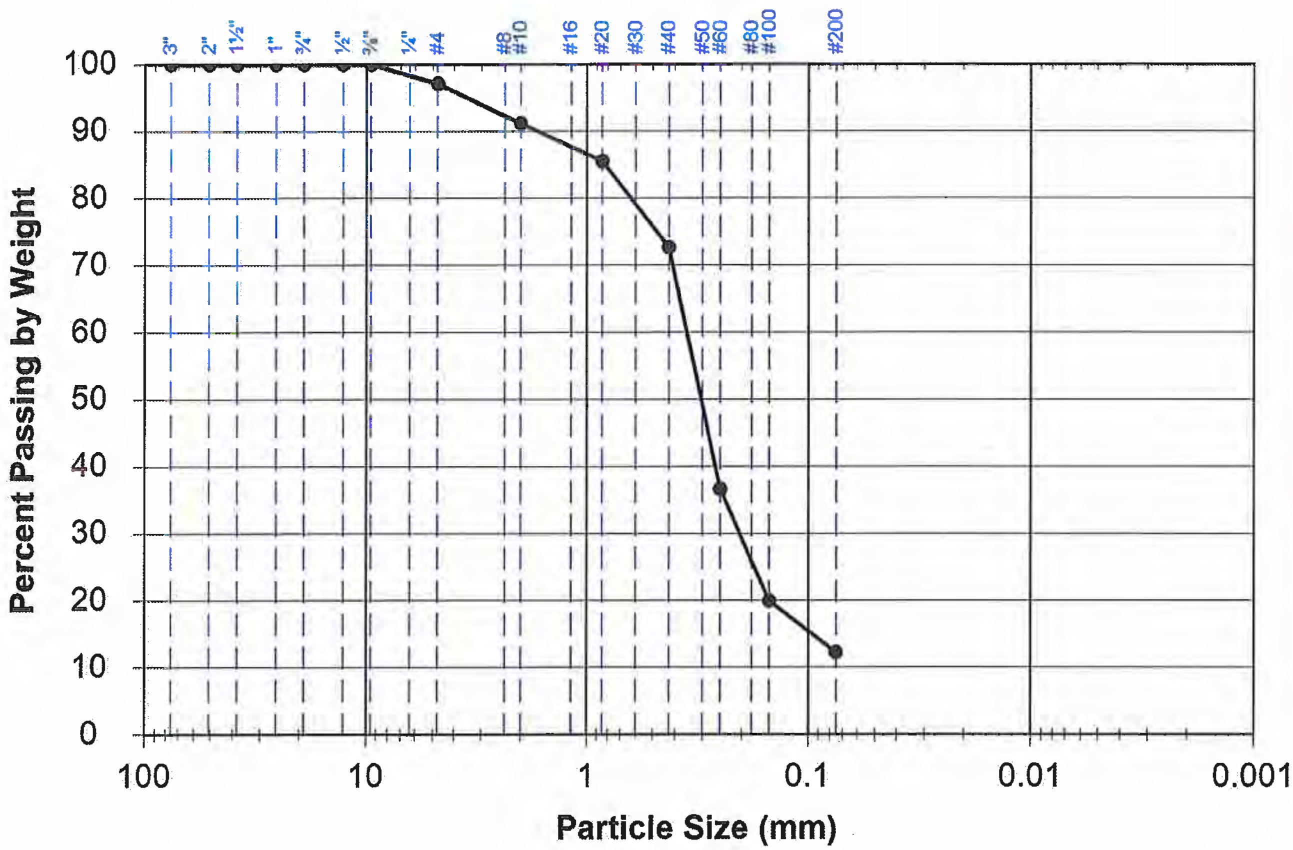
ASTM D422

Lab Number	2015-344
Received	4/6/2015
Reported	4/21/2015

Location: Test Borehole K15-03
Sample 6
Depth 12.5'-14.5'

Engineering Classification: **Poorly Graded Sand with Silt, SP-SM**

Frost Classification: **Not Measured**



Size	Passing	Specification
3"	100%	
2"	100%	
1½"	100%	
1"	100%	
¾"	100%	
½"	100%	
⅜"	100%	
#4	97%	
Total Weight of Sample 537.3g		
#10	91%	
#20	85%	
#40	73%	
#60	37%	
#100	20%	
#200	12.3%	
Total Weight of Fine Fraction 521.3g		

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Project: USACE Kivalina Causeway
Work Order: A34316

Particle Size Distribution

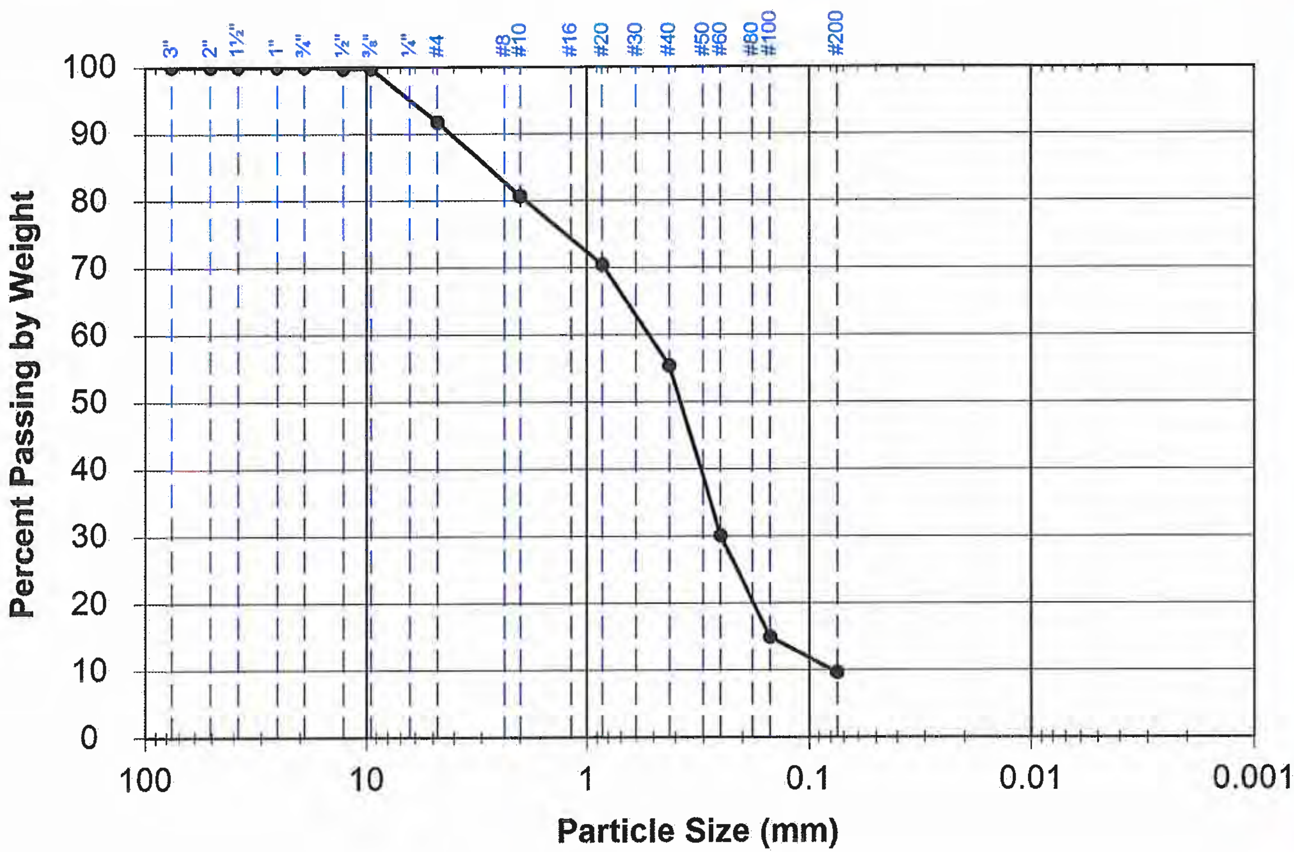
ASTM D422

Lab Number	2015-346
Received	4/6/2015
Reported	4/21/2015

Location: Test Borehole K15-03
Sample 8
Depth 17.5-19.5'

Engineering Classification: **Well Graded Sand with Silt, SW-SM**

Frost Classification: **Not Measured**



Size	Passing	Specification
3"	100%	
2"	100%	
1½"	100%	
1"	100%	
¾"	100%	
½"	100%	
⅜"	100%	
#4	92%	
Total Weight of Sample 741.3g		
#10	81%	
#20	70%	
#40	55%	
#60	30%	
#100	15%	
#200	9.7%	
Total Weight of Fine Fraction 378g		

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Project: USACE Kivalina Causeway
Work Order: A34316

Particle Size Distribution

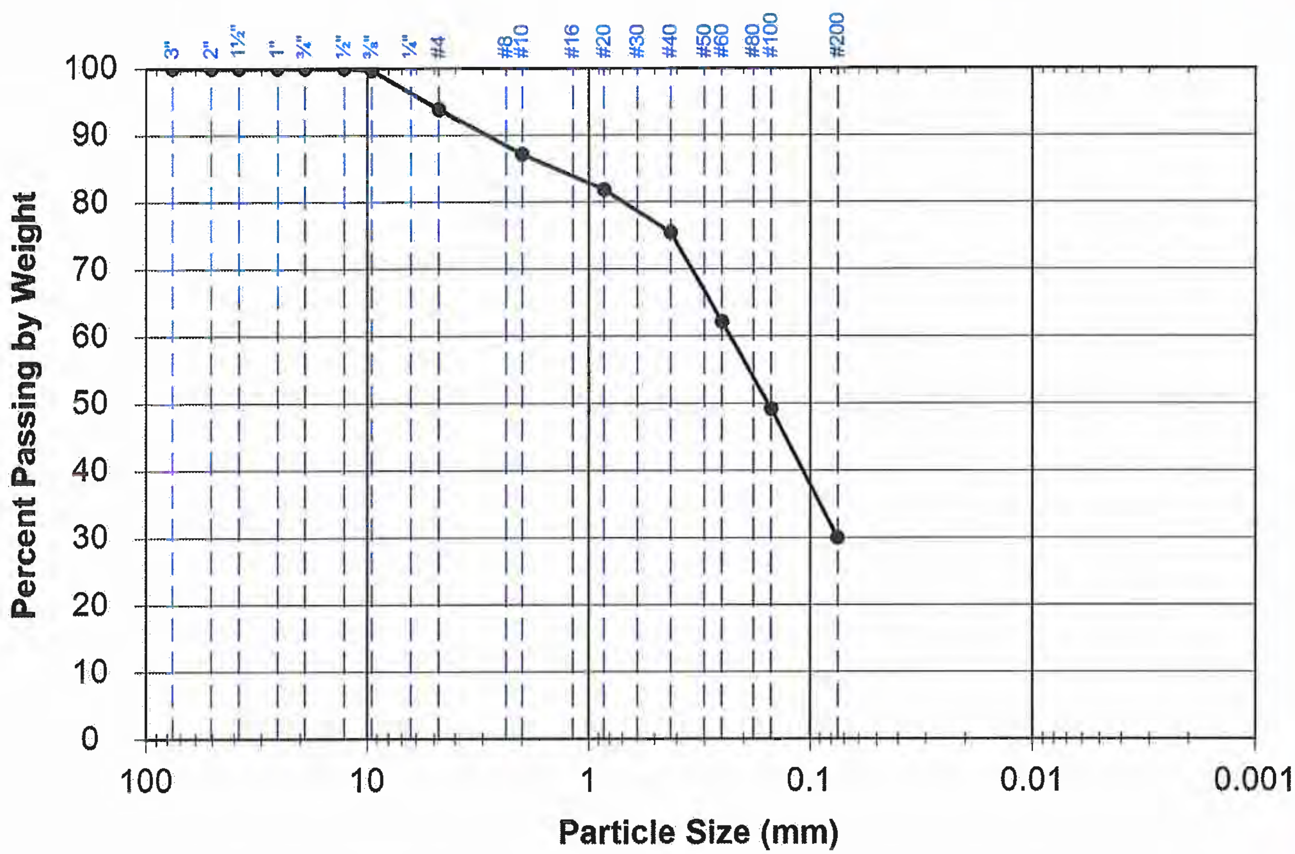
ASTM D422

Lab Number	2015-348
Received	4/6/2015
Reported	4/21/2015

Location: Test Borehole K15-03
Sample 10
Depth 27.5'-29.5'

Engineering Classification: Silty Sand, SM

Frost Classification: Not Measured



Size	Passing	Specification
3"	100%	
2"	100%	
1½"	100%	
1"	100%	
¾"	100%	
½"	100%	
⅜"	100%	
#4	94%	
Total Weight of Sample 459.7g		
#10	87%	
#20	82%	
#40	75%	
#60	62%	
#100	49%	
#200	30.0%	
Total Weight of Fine Fraction 430.9g		

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Project: USACE Kivalina Causeway
Work Order: A34316

Particle Size Distribution

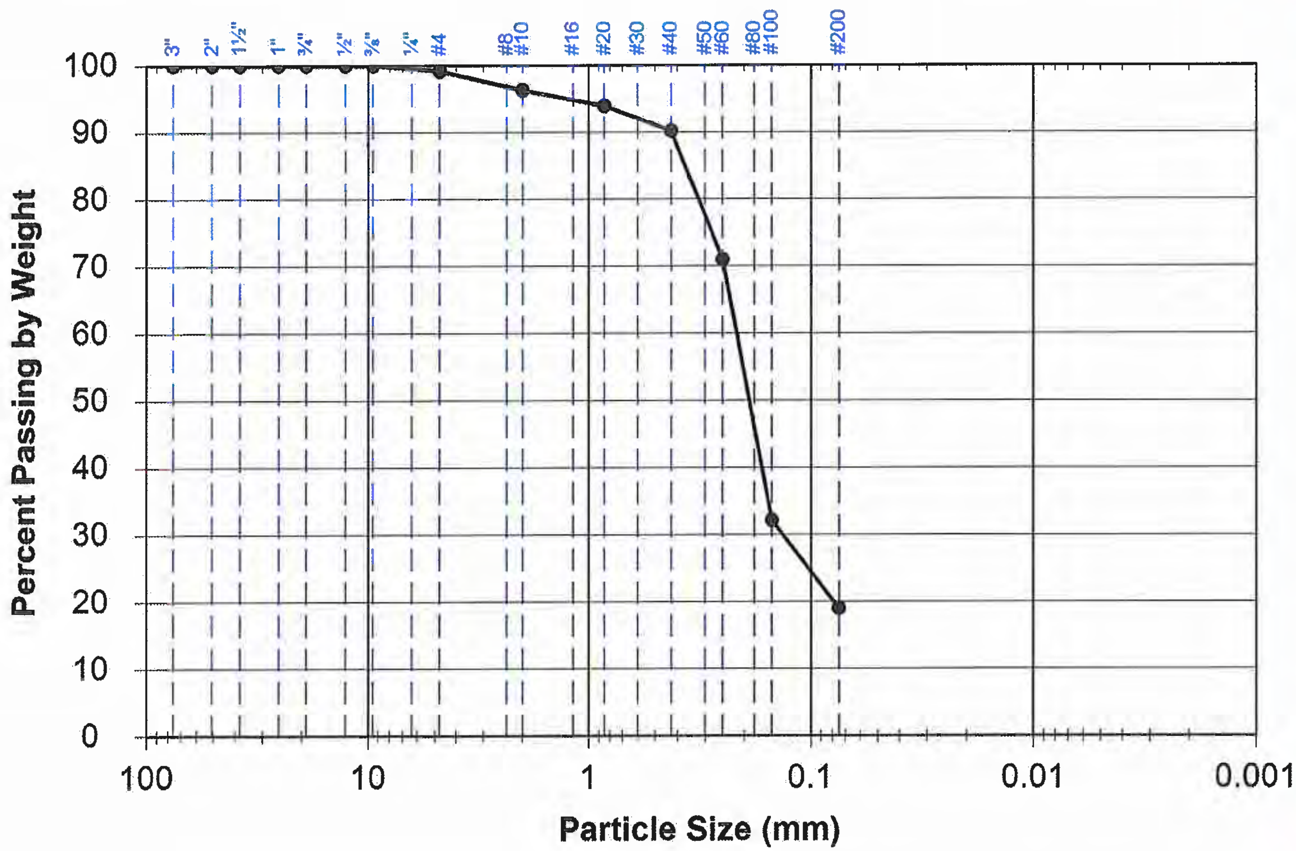
ASTM D422

Lab Number	2015-349
Received	4/6/2015
Reported	4/21/2015

Location: Test Borehole K15-03
Sample 11
Depth 29.5'-31.5'

Engineering Classification: Silty Sand, SM

Frost Classification: Not Measured



Size	Passing	Specification
3"	100%	
2"	100%	
1½"	100%	
1"	100%	
¾"	100%	
½"	100%	
⅜"	100%	
#4	99%	
Total Weight of Sample 525.1g		
#10	96%	
#20	94%	
#40	90%	
#60	71%	
#100	32%	
#200	19.0%	
Total Weight of Fine Fraction 519.9g		

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Client: Golder Associates Inc.
Project: USACE Kivalina Causeway
Work Order: A34316

Particle Size Distribution

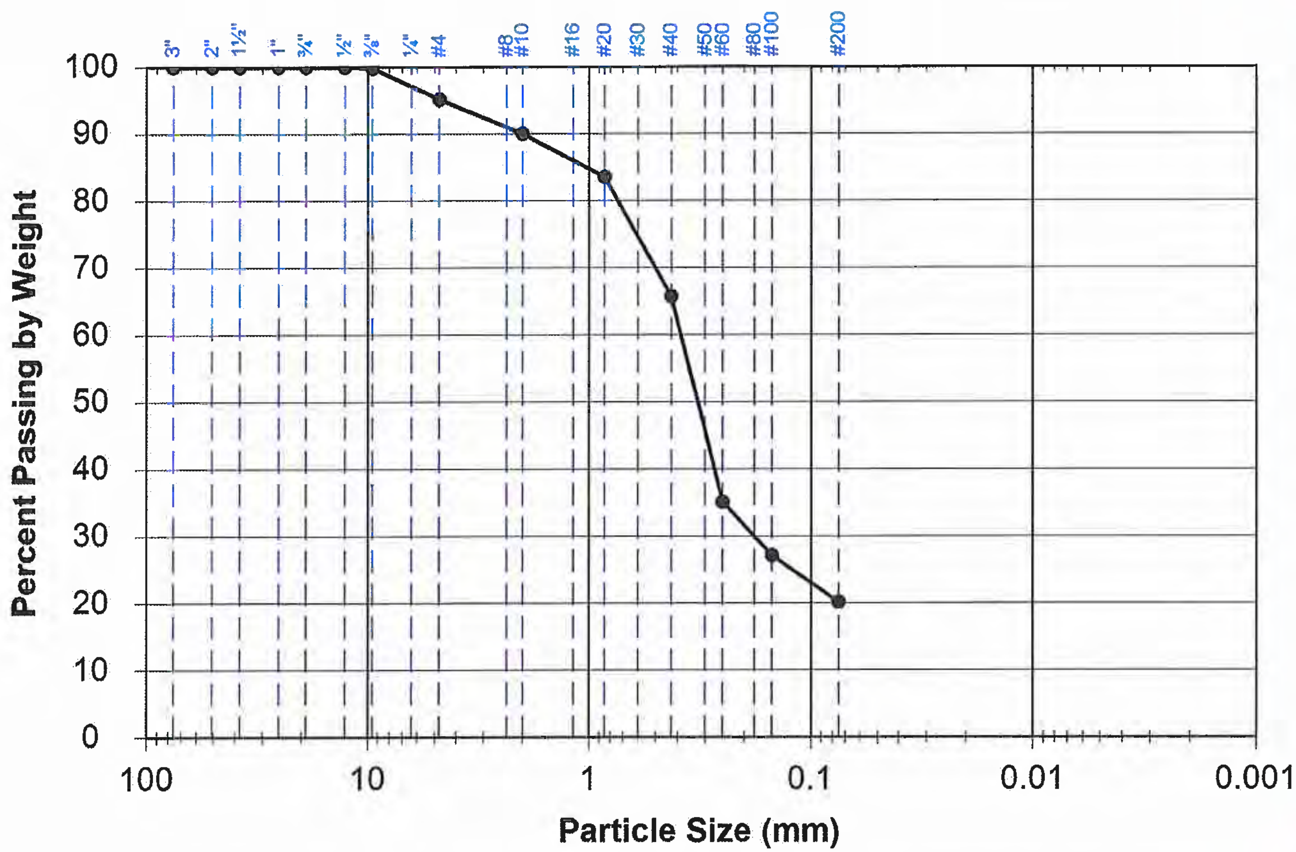
ASTM D422

Lab Number	2015-351
Received	4/6/2015
Reported	4/21/2015

Location: Test Borehole K15-04
Sample 2
Depth 3.5'-5'

Engineering Classification: Silty Sand, SM

Frost Classification: Not Measured



Size	Passing	Specification
3"	100%	
2"	100%	
1½"	100%	
1"	100%	
¾"	100%	
½"	100%	
⅜"	100%	
#4	95%	
Total Weight of Sample 918.7g		
#10	90%	
#20	84%	
#40	66%	
#60	35%	
#100	27%	
#200	20.2%	
Total Weight of Fine Fraction 392.4g		

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Project: USACE Kivalina Causeway
Work Order: A34316

Particle Size Distribution

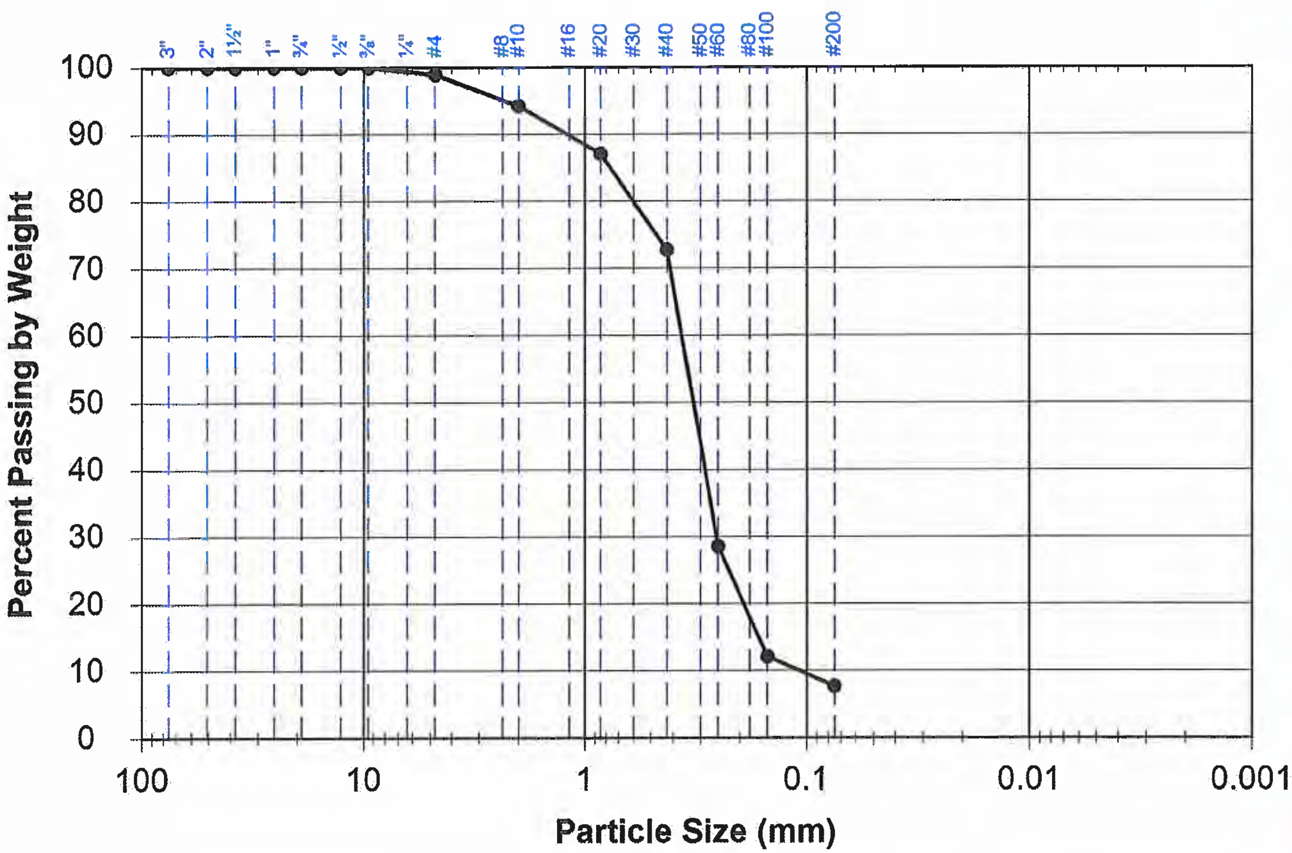
ASTM D422

Lab Number	2015-352
Received	4/6/2015
Reported	4/21/2015

Location: Test Borehole K15-04
Sample 3
Depth 6'-7.5'

Engineering Classification: Poorly Graded Sand with Silt, SP-SM

Frost Classification: Not Measured



Size	Passing	Specification
3"	100%	
2"	100%	
1½"	100%	
1"	100%	
¾"	100%	
½"	100%	
⅜"	100%	
#4	99%	
Total Weight of Sample 864.1g		
#10	94%	
#20	87%	
#40	73%	
#60	29%	
#100	12%	
#200	7.7%	
Total Weight of Fine Fraction 429.4g		

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Client: Golder Associates Inc.
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Work Order: A34316

Particle Size Distribution

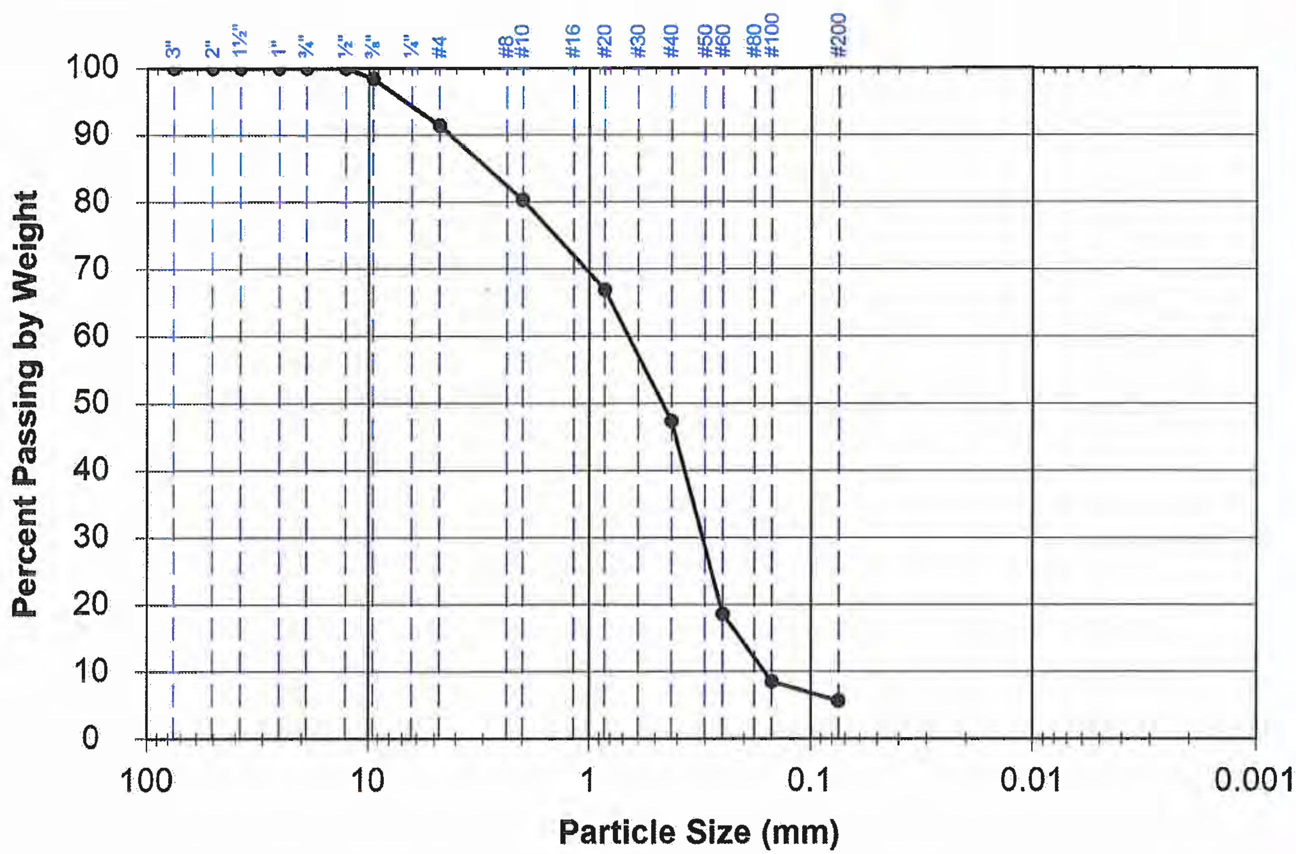
ASTM D422

Lab Number	2015-353
Received	4/6/2015
Reported	4/21/2015

Location: Test Borehole K15-04
Sample 4
Depth 8.5'-10'

Engineering Classification: **Poorly Graded Sand with Silt, SP-SM**

Frost Classification: **Not Measured**



Size	Passing	Specification
3"	100%	
2"	100%	
1½"	100%	
1"	100%	
¾"	100%	
½"	100%	
⅜"	98%	
#4	91%	
Total Weight of Sample 1148.6g		
#10	80%	
#20	67%	
#40	47%	
#60	19%	
#100	9%	
#200	5.7%	
Total Weight of Fine Fraction 512.9g		

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Particle Size Distribution

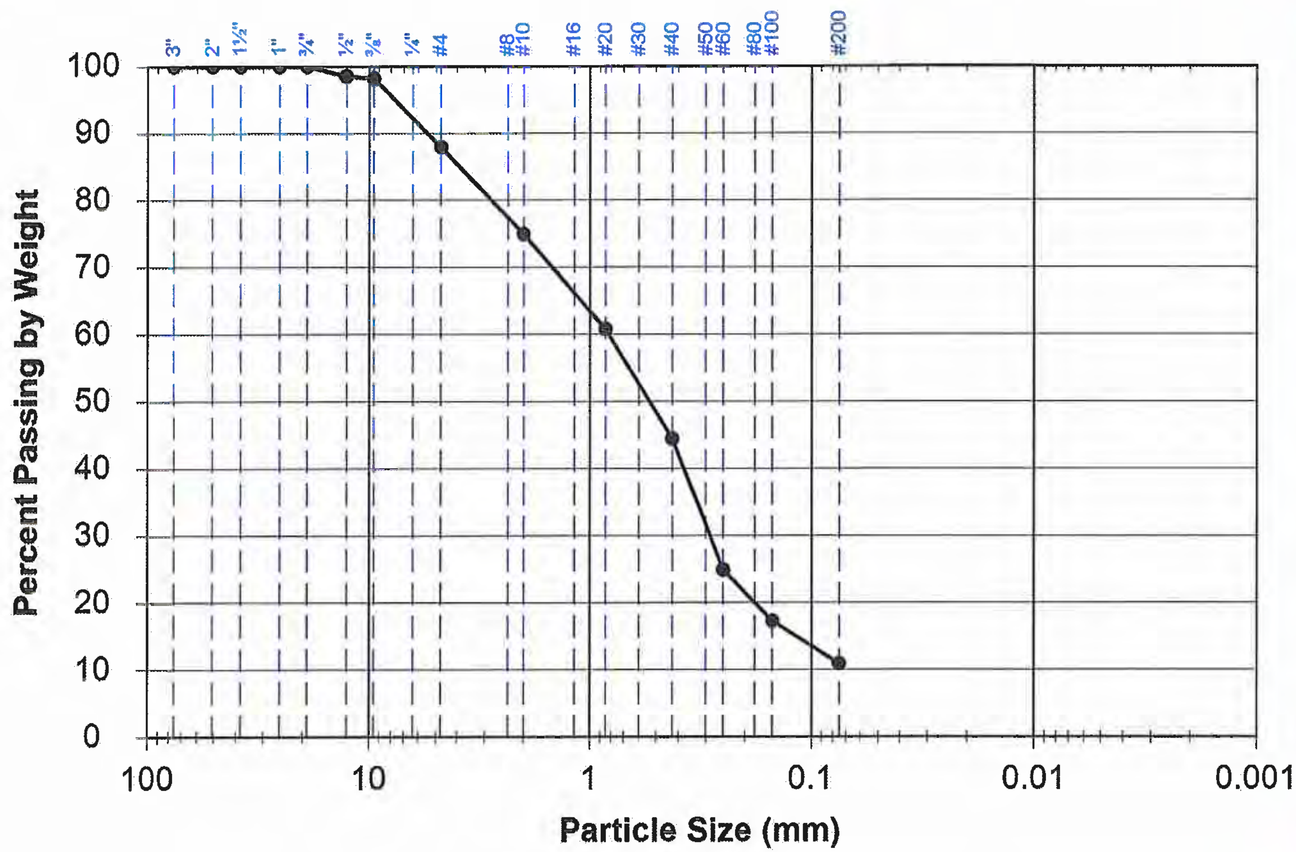
ASTM D422

Lab Number	2015-355
Received	4/6/2015
Reported	4/21/2015

Location: Test Borehole K15-04
Sample 6
Depth 15'-17'

Engineering Classification: Well Graded Sand with Silt, SW-SM

Frost Classification: Not Measured



Size	Passing	Specification
3"	100%	
2"	100%	
1½"	100%	
1"	100%	
¾"	100%	
½"	99%	
⅜"	98%	
#4	88%	
Total Weight of Sample 539.4g		
#10	75%	
#20	61%	
#40	44%	
#60	25%	
#100	17%	
#200	10.9%	
Total Weight of Fine Fraction 473.3g		

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Work Order: A34316

Particle Size Distribution

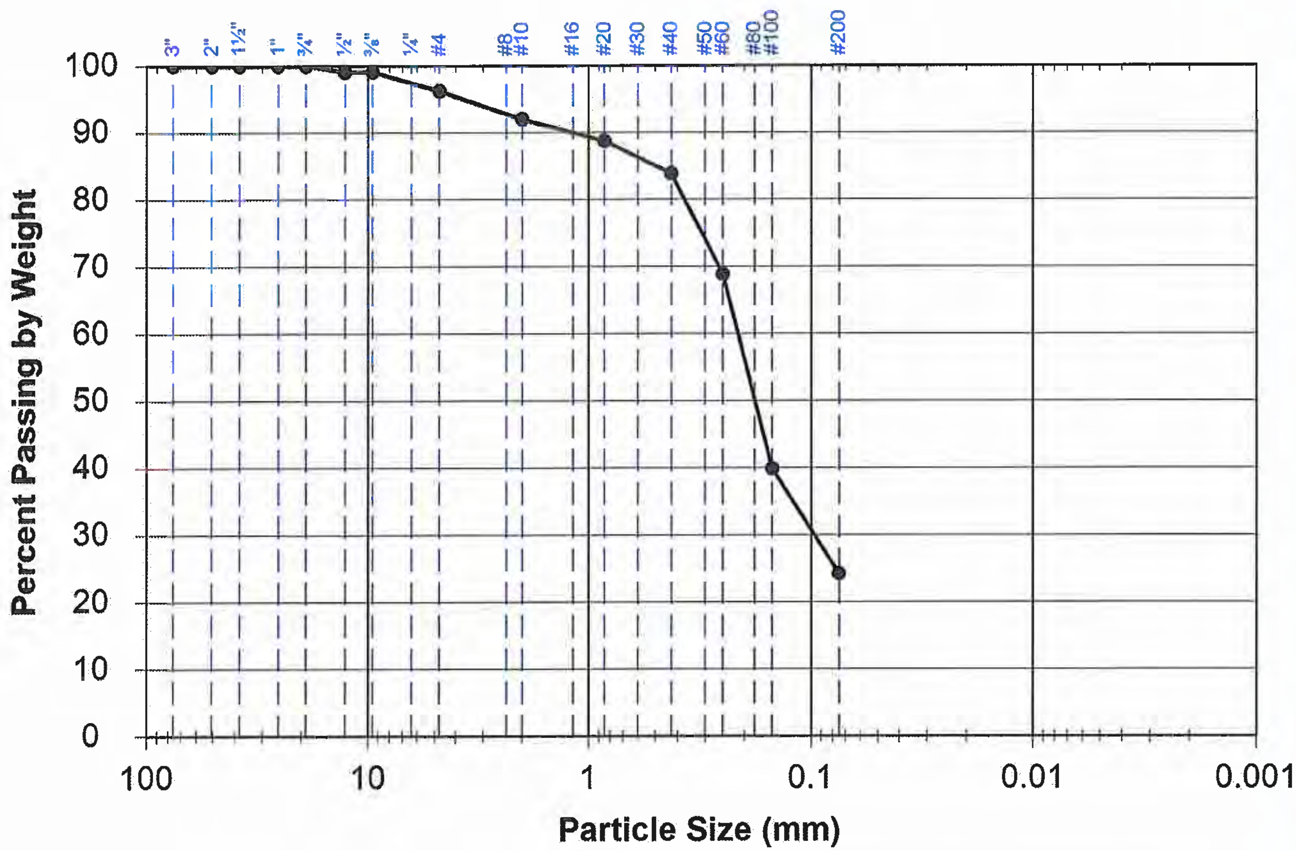
ASTM D422

Lab Number	2015-357
Received	4/6/2015
Reported	4/21/2015

Location: Test Borehole K15-04
Sample 8
Depth 22.5'-24.5'

Engineering Classification: Silty Sand, SM

Frost Classification: Not Measured



Size	Passing	Specification
3"	100%	
2"	100%	
1½"	100%	
1"	100%	
¾"	100%	
½"	99%	
⅜"	99%	
#4	96%	
Total Weight of Sample 365g		
#10	92%	
#20	89%	
#40	84%	
#60	69%	
#100	40%	
#200	24.3%	
Total Weight of Fine Fraction 351.6g		

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Work Order: A34316

Particle Size Distribution

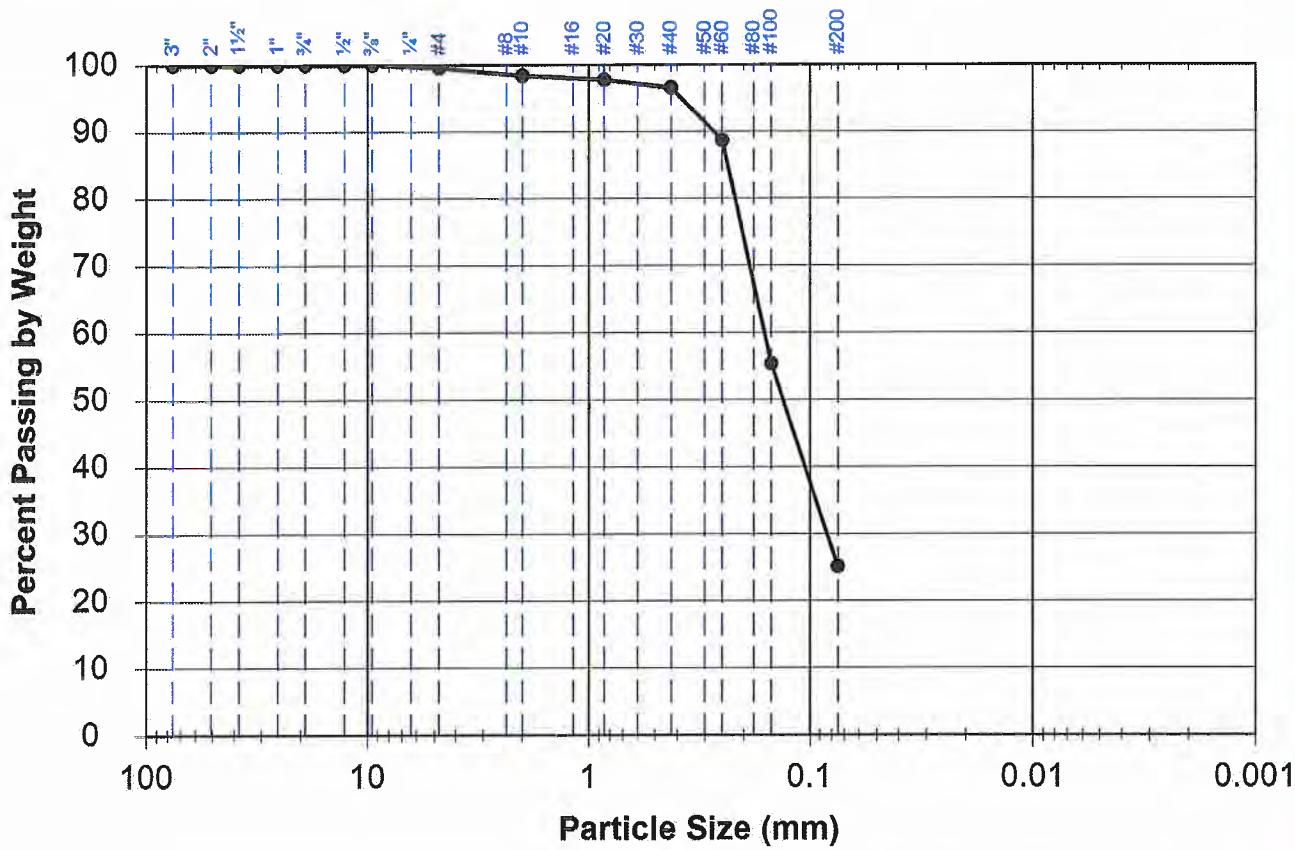
ASTM D422

Lab Number	2015-360
Received	4/6/2015
Reported	4/21/2015

Location: Test Borehole K15-05
Sample 1
Depth 0'-1.5'

Engineering Classification: **Silty Sand, SM**

Frost Classification: **Not Measured**



Size	Passing	Specification
3"	100%	
2"	100%	
1½"	100%	
1"	100%	
¾"	100%	
½"	100%	
⅜"	100%	
#4	99%	
Total Weight of Sample 339.9g		
#10	98%	
#20	98%	
#40	97%	
#60	89%	
#100	55%	
#200	25.2%	
Total Weight of Fine Fraction 338.2g		

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DOWL HKM

Client: Golder Associates Inc.
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Work Order: A34316

Particle Size Distribution

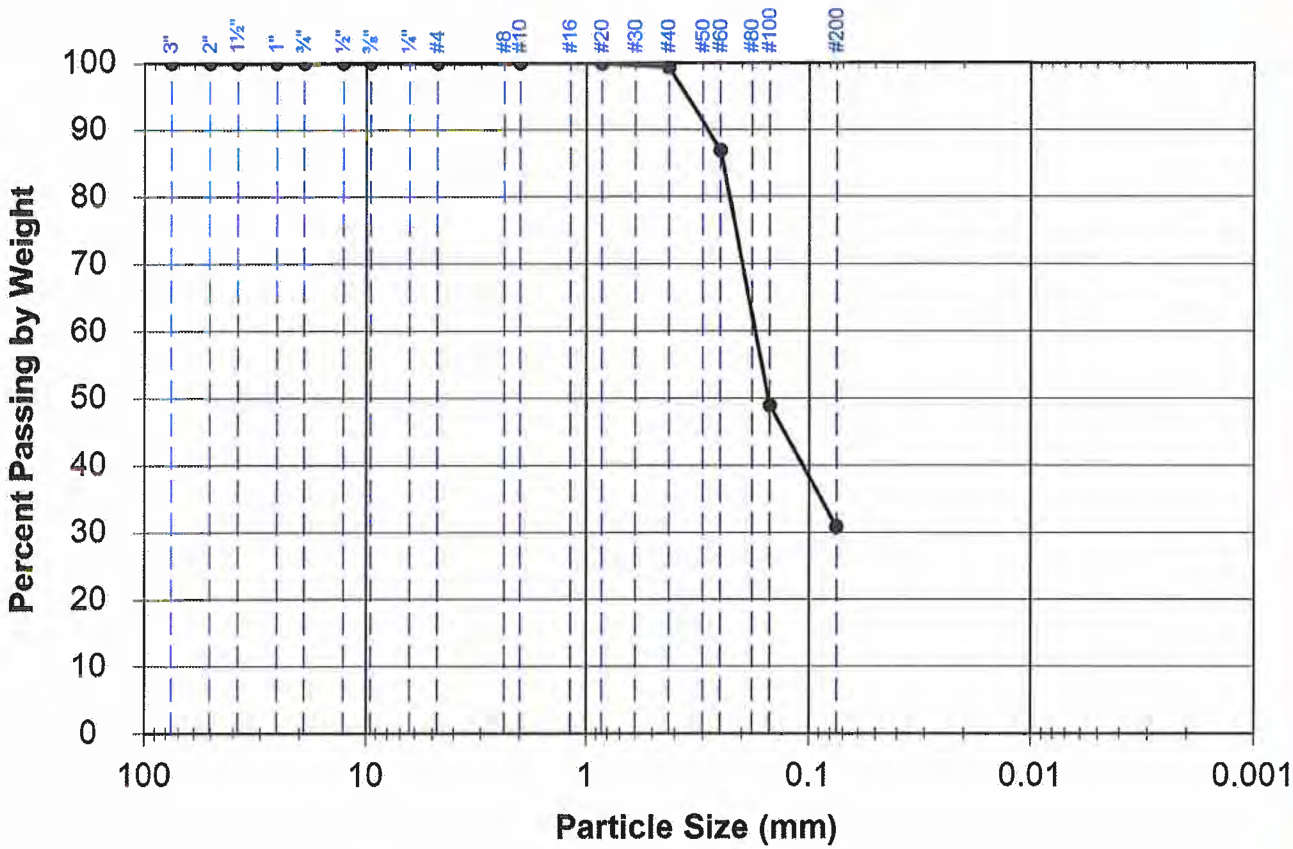
ASTM D422

Lab Number	2015-364
Received	4/6/2015
Reported	4/21/2015

Location: Test Borehole K15-05
Sample 5
Depth 10'-12'

Engineering Classification: Silty Sand, SM

Frost Classification: Not Measured



Size	Passing	Specification
3"	100%	
2"	100%	
1½"	100%	
1"	100%	
¾"	100%	
½"	100%	
⅜"	100%	
#4	100%	
Total Weight of Sample 378.2g		
#10	100%	
#20	100%	
#40	99%	
#60	87%	
#100	49%	
#200	30.9%	
Total Weight of Fine Fraction 378.2g		

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Client: Golder Associates Inc.
Project: USACE Kivalina Causeway
Work Order: A34316

Particle Size Distribution

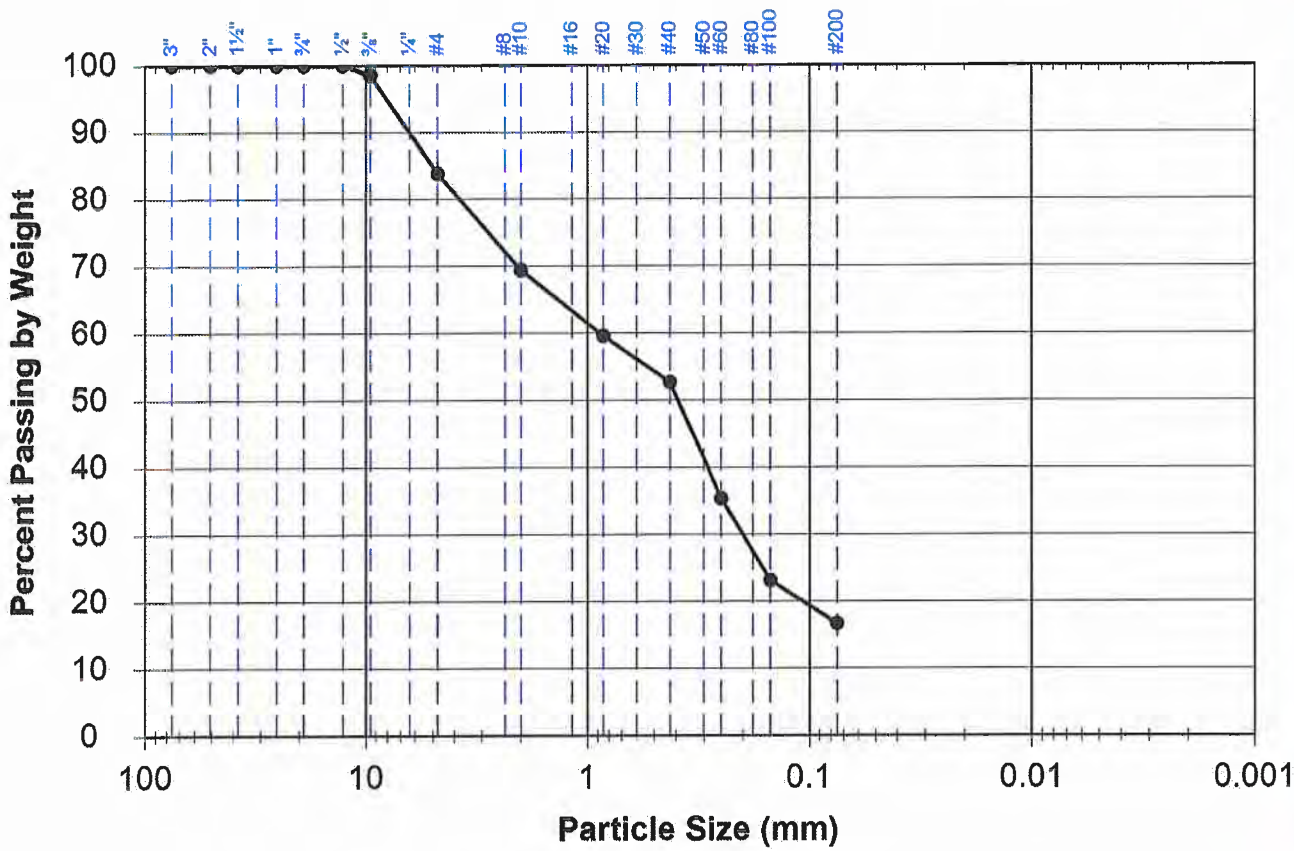
ASTM D422

Lab Number	2015-367
Received	4/6/2015
Reported	4/21/2015

Location: Test Borehole K15-05
Sample 8
Depth 17.5'-19.5'

Engineering Classification: **Silty Sand with Gravel, SM**

Frost Classification: **Not Measured**



Size	Passing	Specification
3"	100%	
2"	100%	
1½"	100%	
1"	100%	
¾"	100%	
½"	100%	
⅜"	99%	
#4	84%	
Total Weight of Sample 394g		
#10	69%	
#20	60%	
#40	53%	
#60	35%	
#100	23%	
#200	16.7%	
Total Weight of Fine Fraction 329.7g		

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DOWL HKM

Client: Golder Associates Inc.
Project: USACE Kivalina Causeway
Work Order: A34316

Particle Size Distribution

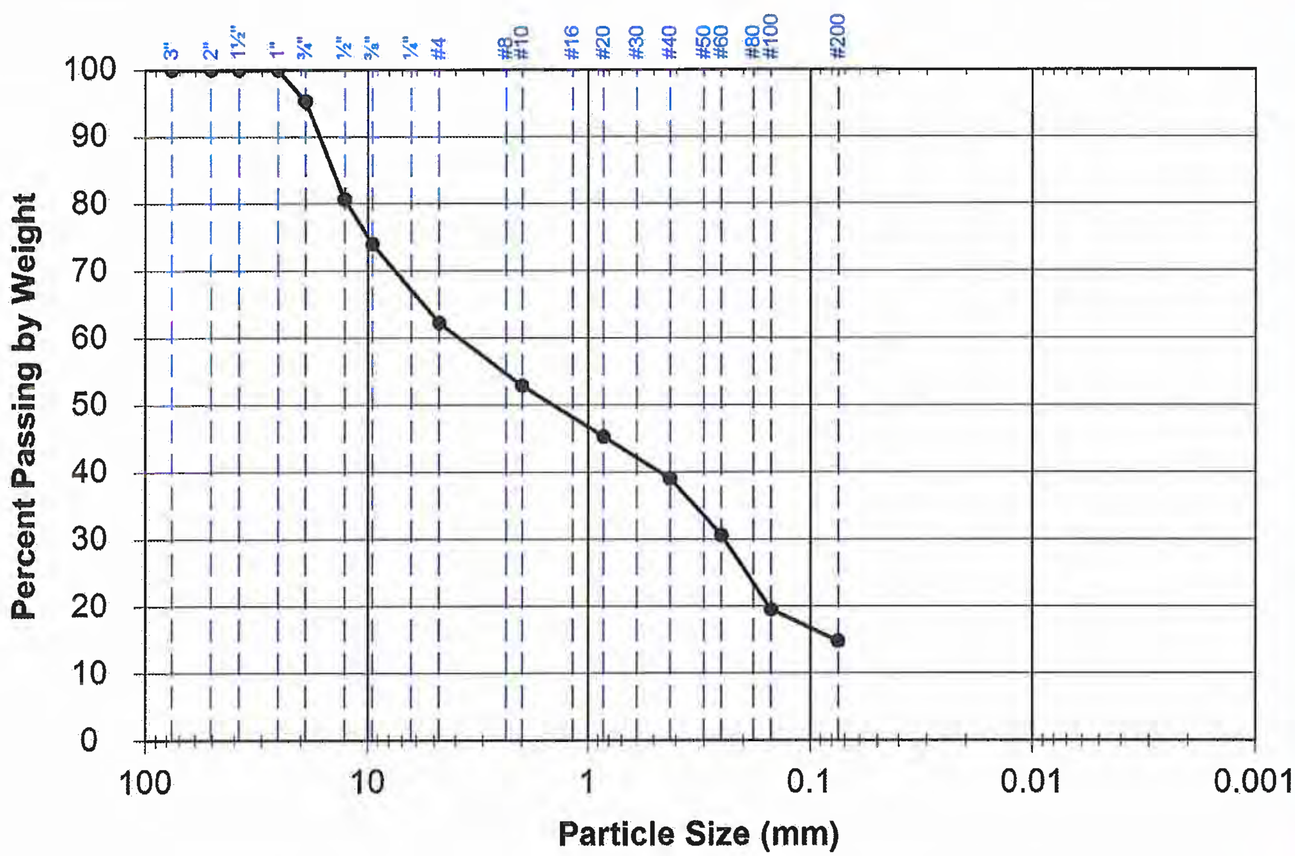
ASTM D422

Lab Number	2015-369
Received	4/6/2015
Reported	4/21/2015

Location: Test Borehole K15-05
Sample 10
Depth 27.5'-28.1'

Engineering Classification: **Silty Sand with Gravel, SM**

Frost Classification: **Not Measured**



Size	Passing	Specification
3"	100%	
2"	100%	
1½"	100%	
1"	100%	
¾"	95%	
½"	81%	
⅜"	74%	
#4	62%	
Total Weight of Sample 280.2g		
#10	53%	
#20	45%	
#40	39%	
#60	31%	
#100	20%	
#200	14.8%	
Total Weight of Fine Fraction 174.3g		

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Client: Golder Associates Inc.
Project: USACE Kivalina Causeway
Work Order: A34316

Particle Size Distribution

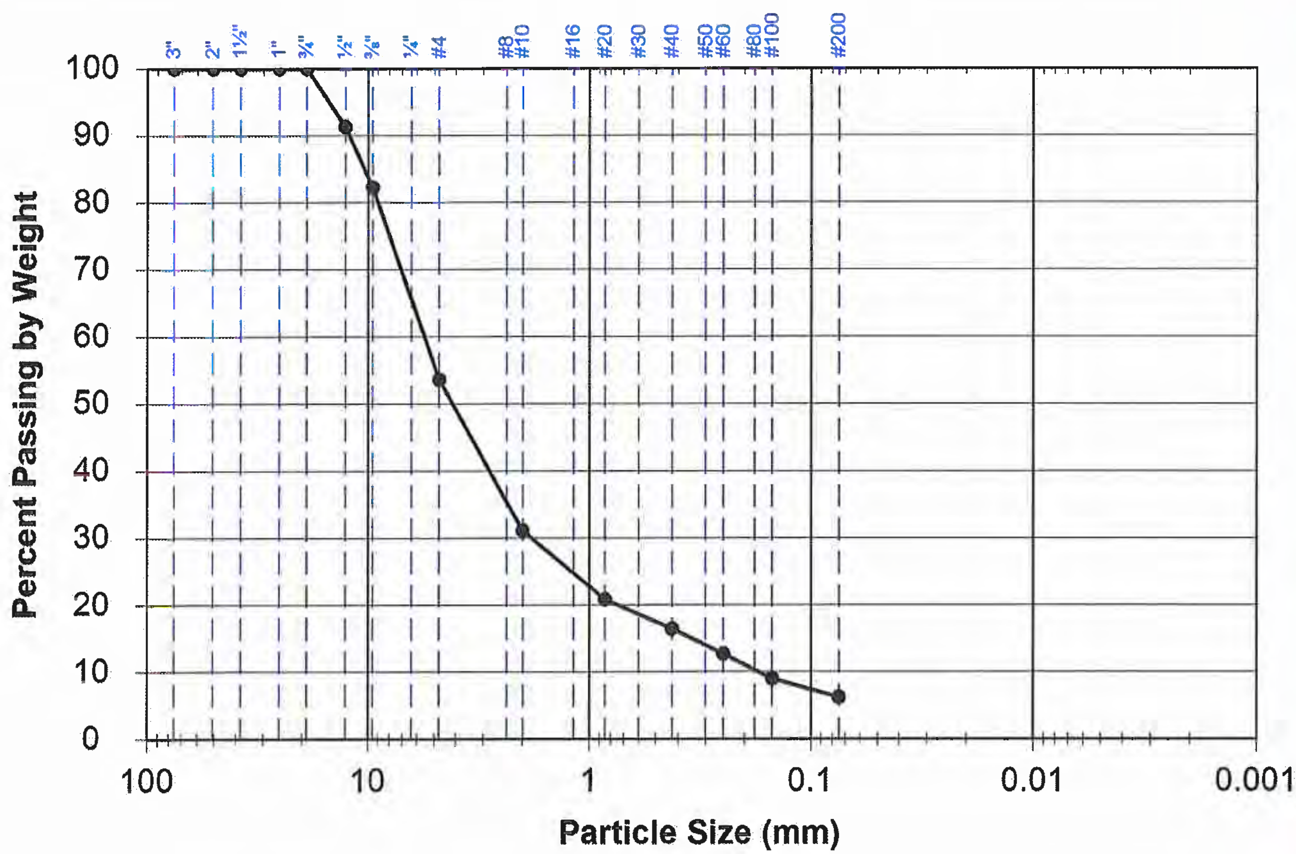
ASTM D422

Lab Number	2015-370
Received	4/6/2015
Reported	4/21/2015

Location: Test Borehole K15-05
Sample 11
Depth 30'-30.5'

Engineering Classification: **Poorly Graded Sand with Silt and Gravel, SP-SM**

Frost Classification: **Not Measured**



Size	Passing	Specification
3"	100%	
2"	100%	
1½"	100%	
1"	100%	
¾"	100%	
½"	91%	
⅜"	82%	
#4	54%	
Total Weight of Sample 253.1g		
#10	31%	
#20	21%	
#40	16%	
#60	13%	
#100	9%	
#200	6.3%	
Total Weight of Fine Fraction 135.6g		

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Client: Golder Associates Inc.
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Work Order: A34316

Particle Size Distribution

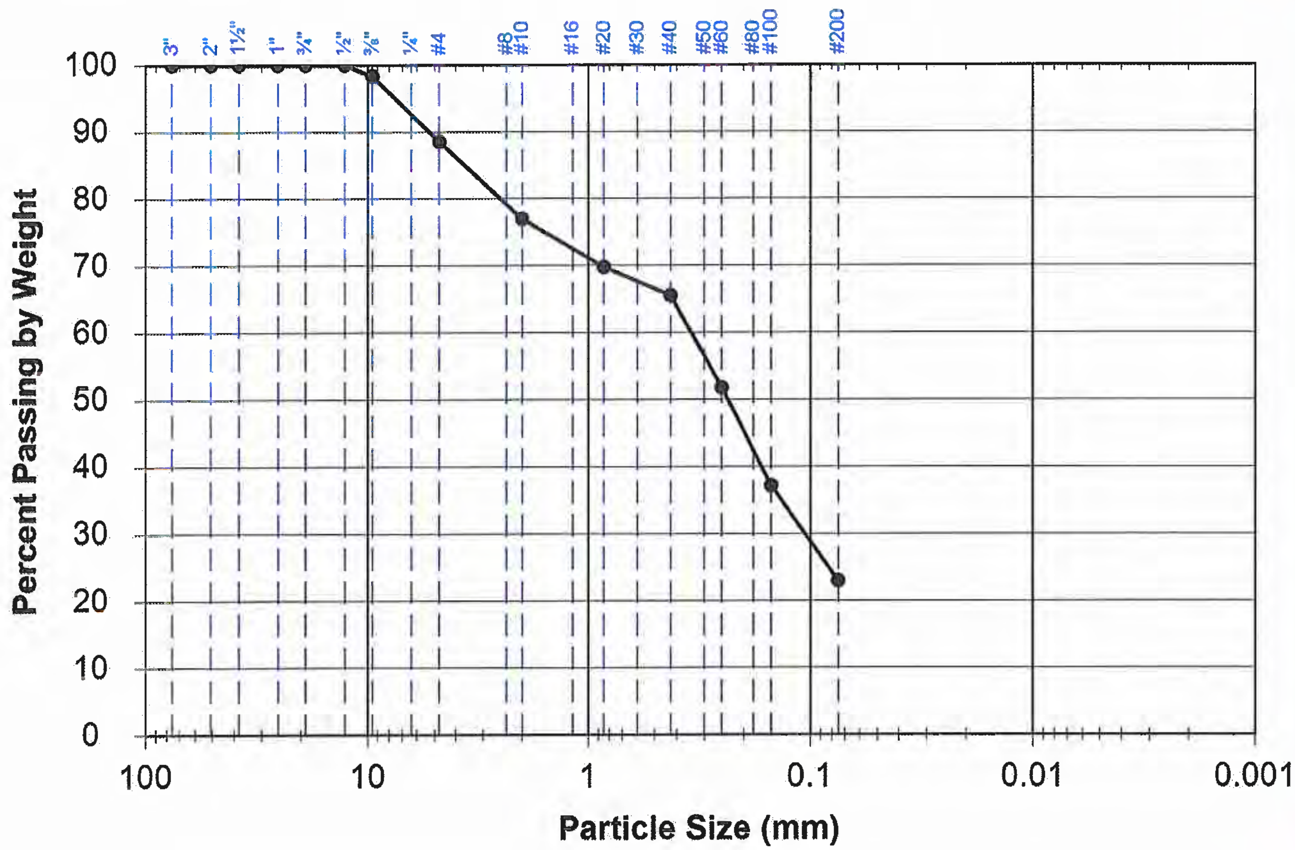
ASTM D422

Lab Number	2015-373
Received	4/6/2015
Reported	4/21/2015

Location: Test Borehole K15-06
Sample 3
Depth 5'-7'

Engineering Classification: Silty Sand, SM

Frost Classification: Not Measured



Size	Passing	Specification
3"	100%	
2"	100%	
1½"	100%	
1"	100%	
¾"	100%	
½"	100%	
⅜"	98%	
#4	88%	
Total Weight of Sample 404.3g		
#10	77%	
#20	70%	
#40	66%	
#60	52%	
#100	37%	
#200	23.0%	
Total Weight of Fine Fraction 357.8g		

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Client: Golder Associates Inc.
Project: USACE Kivalina Causeway
Work Order: A34316

Particle Size Distribution

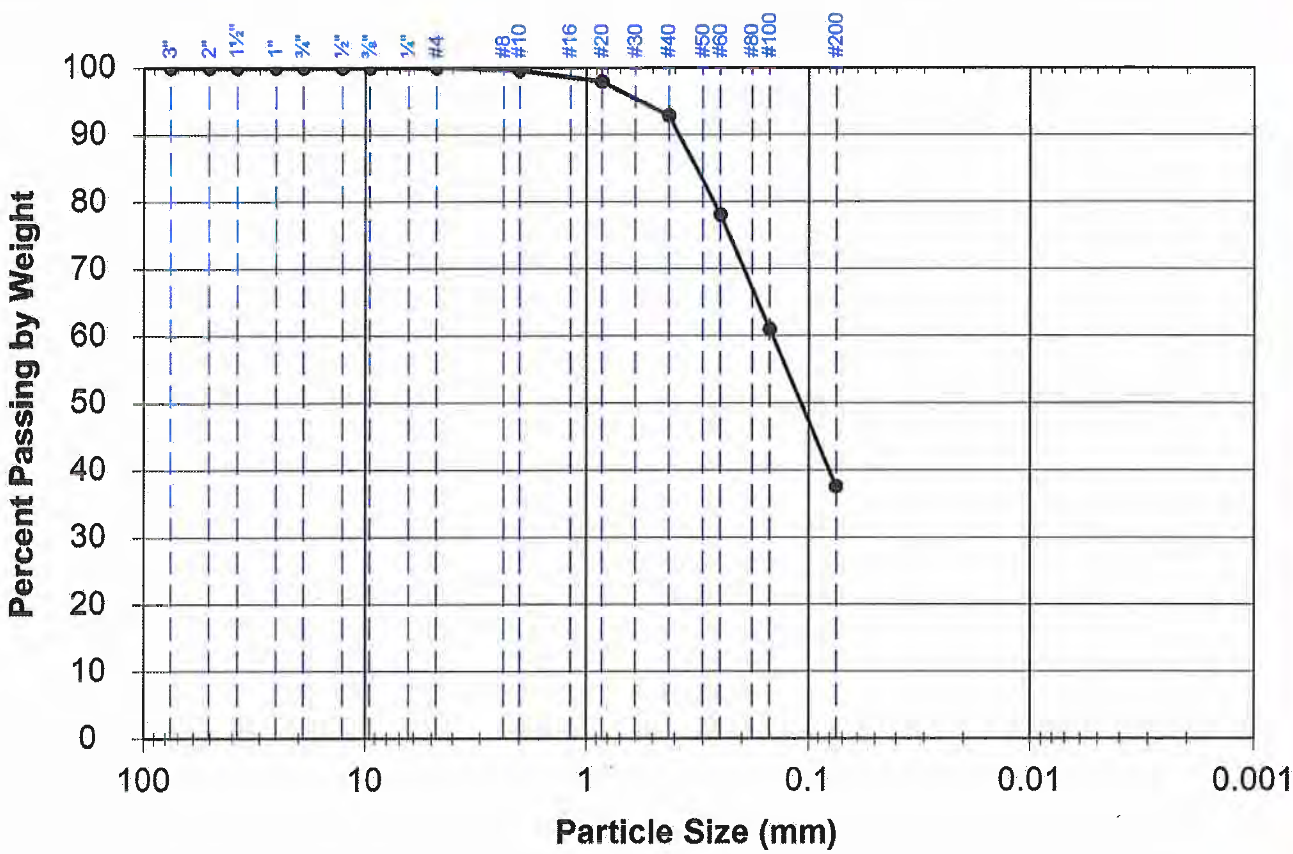
ASTM D422

Lab Number	2015-378
Received	4/6/2015
Reported	4/21/2015

Location: Test Borehole K15-06
Sample 8
Depth 17.5'-19.5'

Engineering Classification: Silty Sand, SM

Frost Classification: Not Measured



Size	Passing	Specification
3"	100%	
2"	100%	
1½"	100%	
1"	100%	
¾"	100%	
½"	100%	
⅜"	100%	
#4	100%	
Total Weight of Sample 473.6g		
#10	100%	
#20	98%	
#40	93%	
#60	78%	
#100	61%	
#200	37.6%	
Total Weight of Fine Fraction 473.6g		

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Client: Golder Associates Inc.
Project: USACE Kivalina Causeway
Work Order: A34316

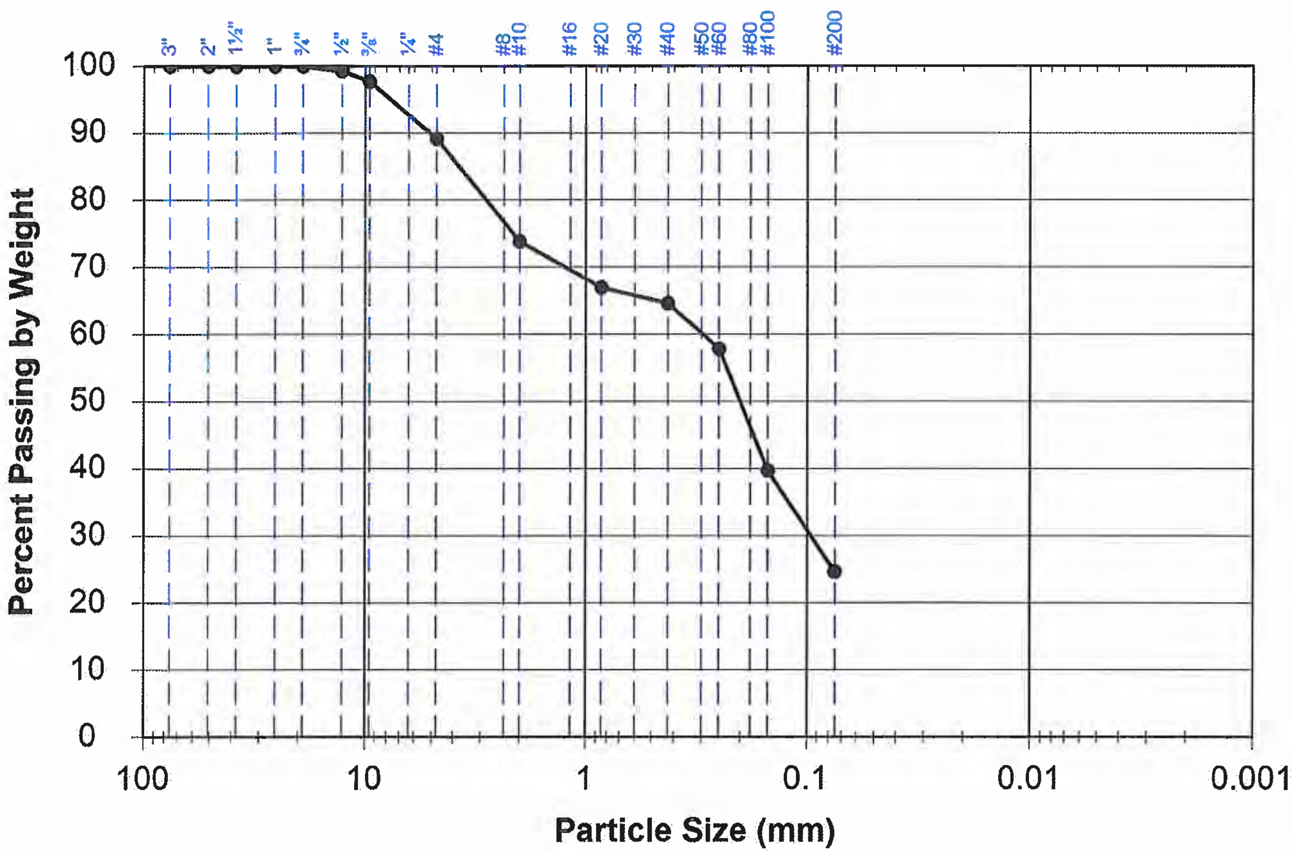
Particle Size Distribution

ASTM D422

Lab Number	2015-380
Received	4/6/2015
Reported	4/21/2015

Location: Test Borehole K15-06
Sample 10
Depth 27.5'-28.3'

Engineering Classification: Silty Sand, SM
Frost Classification: Not Measured



Size	Passing	Specification
3"	100%	
2"	100%	
1½"	100%	
1"	100%	
¾"	100%	
½"	99%	
⅜"	98%	
#4	89%	
Total Weight of Sample 380.8g		
#10	74%	
#20	67%	
#40	65%	
#60	58%	
#100	40%	
#200	24.7%	
Total Weight of Fine Fraction 338.9g		

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DOWL HKM

Client: Golder Associates Inc.
Project: USACE Kivalina Causeway
Work Order: A34316

Particle Size Distribution

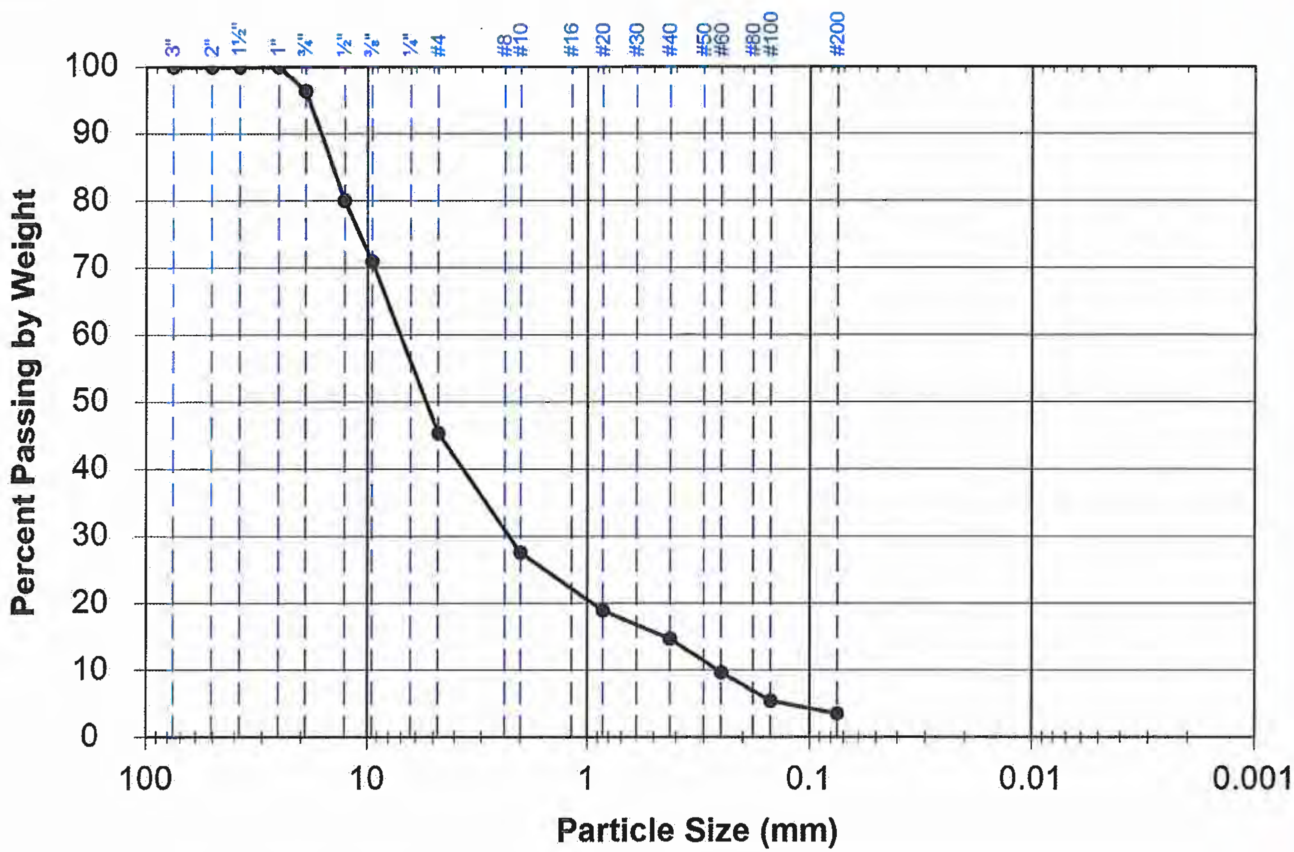
ASTM D422

Lab Number	2015-381
Received	4/6/2015
Reported	4/21/2015

Location: Test Borehole K15-06
Sample 11
Depth 30'-31'

Engineering Classification: **Well Graded Gravel with Sand, GW**

Frost Classification: **Not Measured**



Size	Passing	Specification
3"	100%	
2"	100%	
1½"	100%	
1"	100%	
¾"	96%	
½"	80%	
⅜"	71%	
#4	45%	
Total Weight of Sample 375.8g		
#10	28%	
#20	19%	
#40	15%	
#60	10%	
#100	5%	
#200	3.5%	
Total Weight of Fine Fraction 170.5g		

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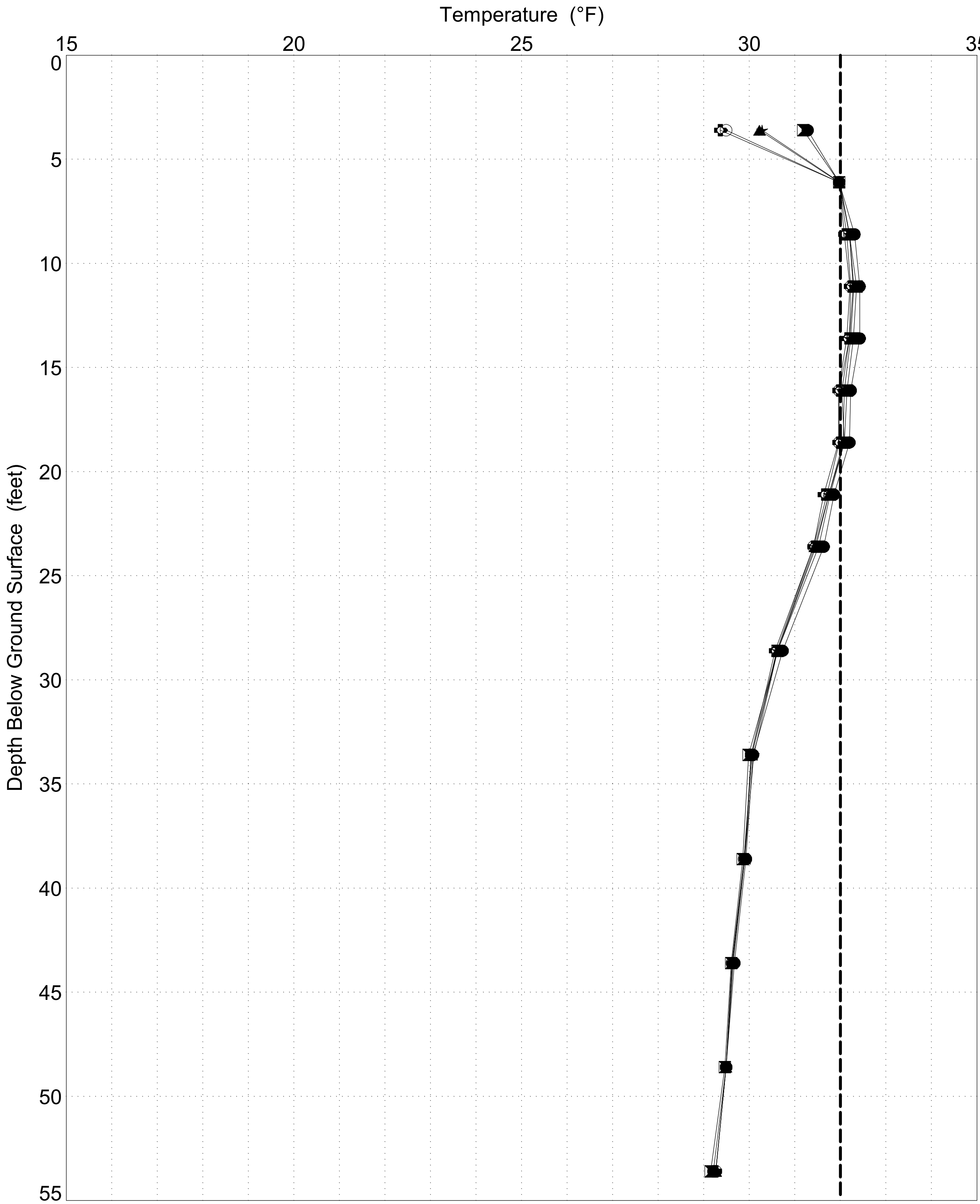
APPENDIX C
GROUND TEMPERATURE DATA



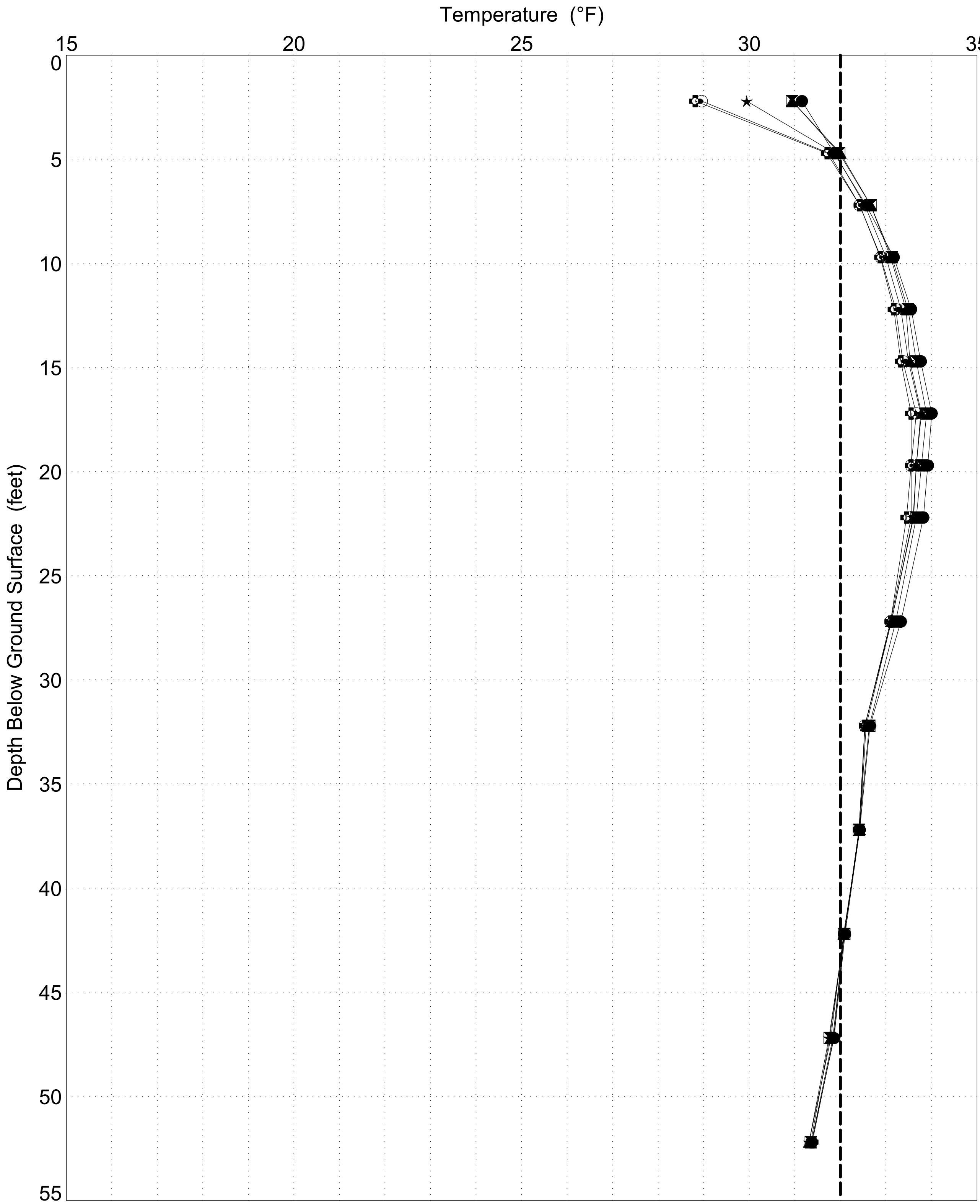
● **K15-01 (AP-39)** 03/23/15
▲ **K15-01 (AP-39)** 04/11/15
⊙ **K15-01 (AP-39)** 04/26/15
⧗ **K15-01 (AP-39)** 03/30/15
★ **K15-01 (AP-39)** 04/14/15
✪ **K15-01 (AP-39)** 05/02/15

CLIENT USACE		PROJECT KIVALINA CAUSEWAY KIVALINA, AK	
CONSULTANT Golder Associates	YYYY-MM-DD: 2015-08-06 PREPARED: RLCampbell DESIGN: N/A REVIEW: Howard Weston APPROVED: John Thornley	TITLE **MEASURED GROUND TEMPERATURES**	
		PROJECT No. 1419207	CONTROL; Rev. ----; FIGURE C-1

KIVALINA LOGS.GPJ LIBRARY-ANC(7-15-15).GLB [ANC THERMISTOR] RLCampbell 8/6/15

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI A

1 in.
0



● **K15-02 (AP-40)** 03/23/15
▲ **K15-02 (AP-40)** 04/11/15
⊙ **K15-02 (AP-40)** 04/26/15
⧗ **K15-02 (AP-40)** 03/30/15
★ **K15-02 (AP-40)** 04/14/15
✿ **K15-02 (AP-40)** 05/02/15

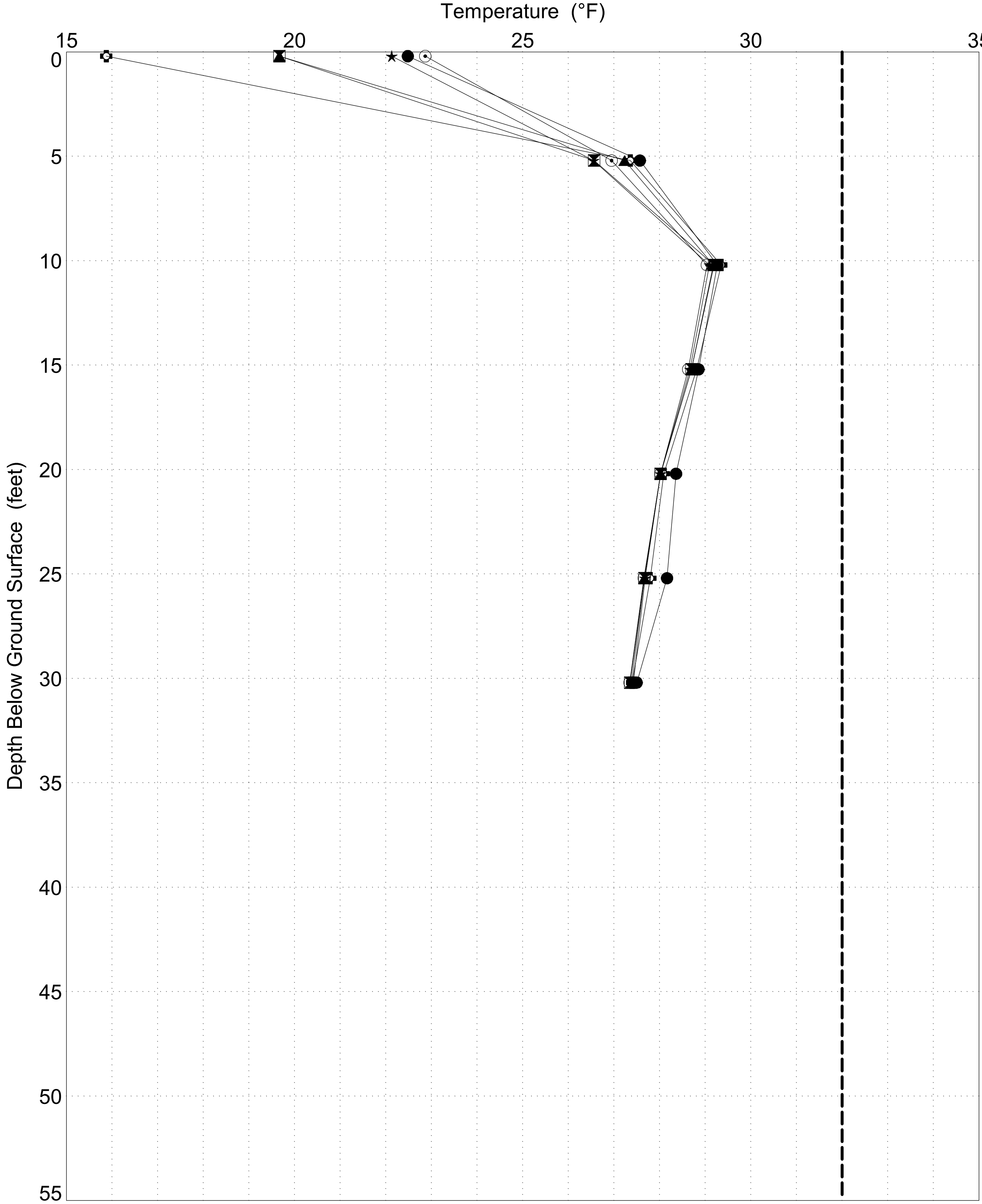
CLIENT USACE		PROJECT KIVALINA CAUSEWAY KIVALINA, AK	
CONSULTANT Golder Associates	YYYY-MM-DD: 2015-08-06 PREPARED: RLCampbell DESIGN: N/A REVIEW: Howard Weston APPROVED: John Thornley	TITLE **MEASURED GROUND TEMPERATURES**	
		PROJECT No. 1419207	CONTROL / Rev. ---- / FIGURE C-2

KIVALINA LOGS.GPJ LIBRARY-ANC(7-15-15).GLB [ANC THERMISTOR] RLCampbell 8/6/15

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI A

1 in.

0



● **K15-06 (AP-44)** 03/23/15
▲ **K15-06 (AP-44)** 04/14/15
⊙ **K15-06 (AP-44)** 05/03/15
⧗ **K15-06 (AP-44)** 04/12/15
★ **K15-06 (AP-44)** 04/26/15
✿ **K15-06 (AP-44)** 03/30/15

CLIENT
USACE

PROJECT
KIVALINA CAUSEWAY

KIVALINA, AK

CONSULTANT

Golder Associates

YYYY-MM-DD	2015-08-06
PREPARED	RLCampbell
DESIGN	N/A
REVIEW	Howard Weston
APPROVED	John Thornley

TITLE
MEASURED GROUND TEMPERATURES

PROJECT No.	CONTROL	Rev.	FIGURE
1419207		----	C-3

KIVALINA LOGS.GPJ LIBRARY-ANC(7-15-15).GLB [ANC THERMISTOR] RLCampbell 8/6/15

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI A

1 in.

0

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Fax: 907-344-6011

Engineering Earth's Development, Preserving Earth's Integrity

ERDC/CHL Letter Report

Coastal and Hydraulics Laboratory

US Army Corps
of Engineers®
Engineer Research and
Development Center

Storm Damage and Flooding Evaluation

Western Alaska Storm Surge Modeling Study: Kivalina Lagoon Causeway

Raymond S. Chapman and David J. Mark

October 2015

Western Alaska Storm Surge Modeling Study: Kivalina Lagoon Causeway

Raymond S. Chapman and David J. Mark

Coastal and Hydraulics Laboratory
U.S. Army Engineer Research and Development Center
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

Draft

Prepared for U.S. Army Engineer District, Alaska

Abstract

The U.S. Army Engineers District, Alaska (CEPOA) has a number of ongoing and potential projects located along the western coast of Alaska. At the request of CEPOA, the U.S. Army Engineer Research and Development Center, Coastal and Hydraulics Laboratory (ERDC/CHL) is providing technical assistance in assessing storm-generated regional wind and atmospheric forced water levels at selected coastal sites. This letter report is one of a series documenting updates to the "The Storm-Induced Water Level Prediction Study for the Western Coast of Alaska". The purpose of this study is to provide hydrodynamic simulations information in support of alternative design evaluation for a bridge and causeway crossing the Kivalina Lagoon.

Preface

The U.S. Army Engineers District, Alaska (CEPOA) has a number of ongoing and potential projects located along the western coast of Alaska. At the request of CEPOA, the U.S. Army Engineer Research and Development Center, Coastal and Hydraulics Laboratory (ERDC/CHL) is providing technical assistance in assessing storm-generated regional wind and atmospheric forced water levels at selected sites. This letter report is one of a series documenting updates to "The Storm-Induced Water Level Prediction Study for the Western Coast of Alaska". This phase of the study provided hydrodynamic simulations information in support of alternative design evaluation for a bridge and causeway crossing the Kivalina Lagoon.

CEPOA technical contacts were Mr. Nathan Epps and Mr. Kenneth Eisses. Mr. David W. Williams was the project manager. This investigation was conducted at the U.S. Army Engineer Research and Development Center (ERDC) Coastal and Hydraulic Laboratory (CHL) by Dr. Raymond S. Chapman, Coastal Processes Branch and Mr. David J. Mark, Estuarine Engineering Branch.

The work was performed under the general direction of Mr. Jose Sanchez, Director, CHL, Dr. Ty V. Wamsley, Chief, Flood and Storm Protection Division, and Mr. Mark B. Gravens, Chief, Coastal Processes Branch.

Dr. Jeffery P. Holland was Director of ERDC, and COL Jeffrey Eckstein was Commander and Executive Director.

Contents

Unit Conversion Factors

Multiply	By	To Obtain
Feet	0.3048	Meters
Knots	0.5144444	Meters Per Second
Miles (Nautical)	1,852	Meters
Miles (U.S. Statute)	1,609.347	Meters
Miles Per Hour	0.44704	Meters Per Second

Introduction

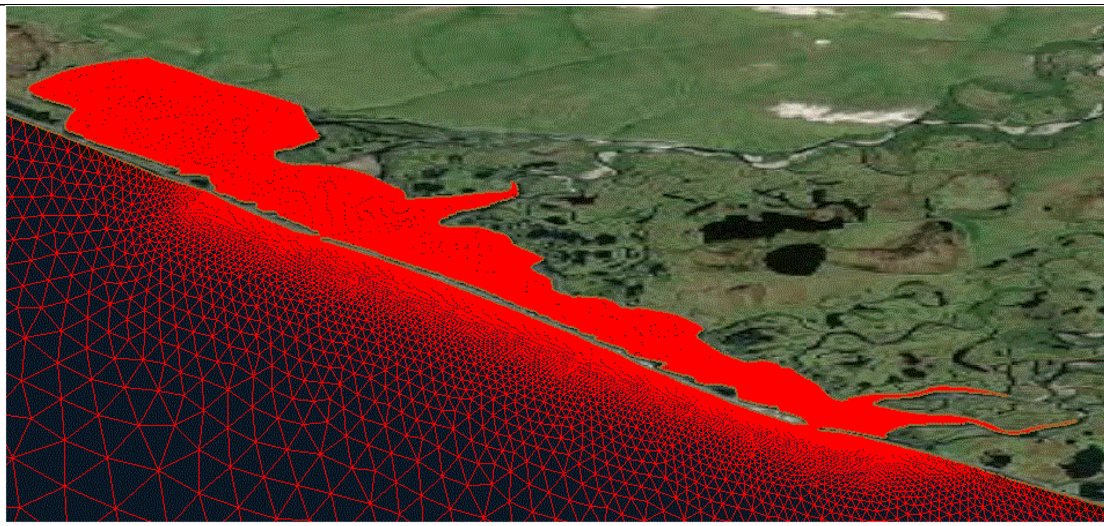
The U. S. Army Engineers District, Alaska (CEPOA) has ongoing, " The Storm-Induced Water Level Prediction Study for the Western Coast of Alaska" . As part of this study, ADCIRC (Luettich et al. 1992) is being applied to estimate wind and atmospheric pressure forced storm surge water levels. The ADCIRC model, additional information related to ADCIRC including a detailed description of the model, model documentation, and descriptions of the model's application can be obtained at (http://www.adcirc.org). The purpose of the present study was to develop hydrodynamic model simulation information of extreme water levels and currents in support of bridge and causeway design at Kivalina, AK (Figures 1 and 2). Originally, storm event simulations were to be performed for purposes of updating extreme water level estimates. Subsequent to initial storm surge simulations, it was concluded that the storm surge estimates for Kivalina were not materially affected by the construction a bridge and causeway for emergency evacuation of the island. At that time, the focus of the project was directed towards providing hydrodynamic information on the flow around and between the various causeway alternatives.

Figure 1 Kivalina study site

Figure 2 Kivalina Lagoon

Kivalina Grid Modifications and Initial Model Evaluation Simulations

The most recent WAK model grid (Chapman and Mark, 2014) was updated to include Kivalina Lagoon, the inlet channels to Kotzebue Sound, Kivalina River and the Wulik River (Figure 3). Transect and multi-beam bathymetric survey data (Figure 4) provided by the District were incorporated into the updated grid to approximate the conveyance area of the inlets and represent the shallow depths within the lagoon. For areas outside of the survey, the bathymetry was idealized ranging from 0.73 m along the shoreline to 2.0 m along the channel.



. **Figure 3 Updated Kivalina Lagoon Grid**

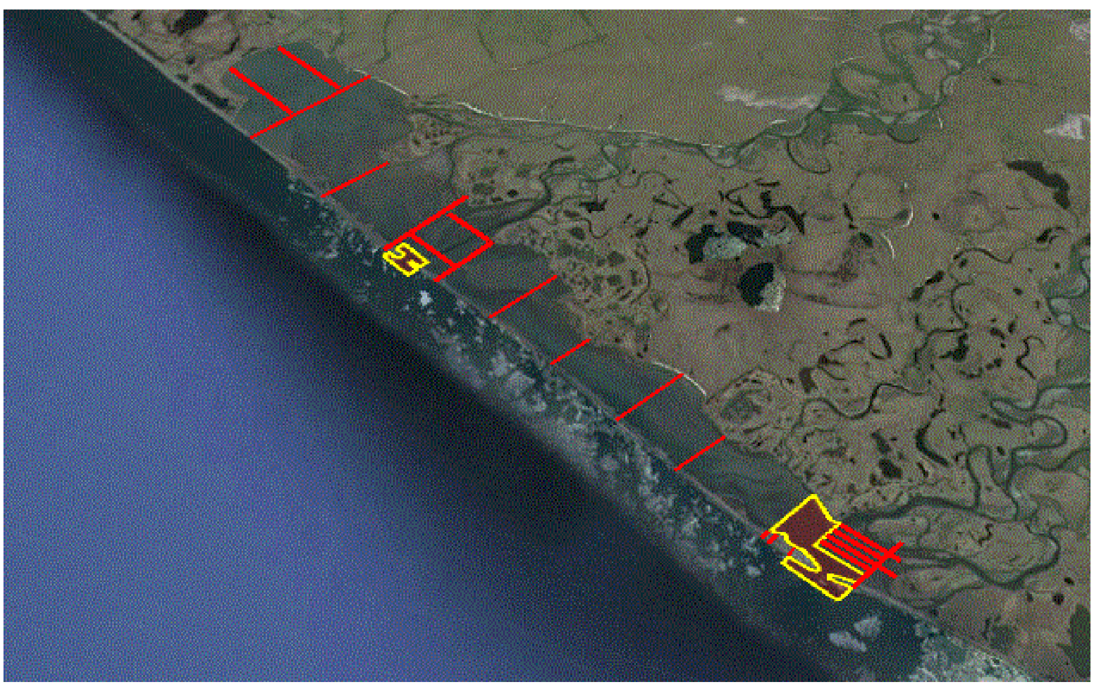


Figure 4 Multi-beam (Yellow) and Transect (Red) Bathymetry Coverage

Storm surge sensitivity simulations were performed to examine the effect of adding the Kivalina Lagoon to the WAK production grid. The number one or top ranked November 1974 storm event (Appendix A) is presented in Figure 5 where it is seen that the water surface elevation response, or departure from still water level, with and without the Lagoon in the grid are nearly identical.

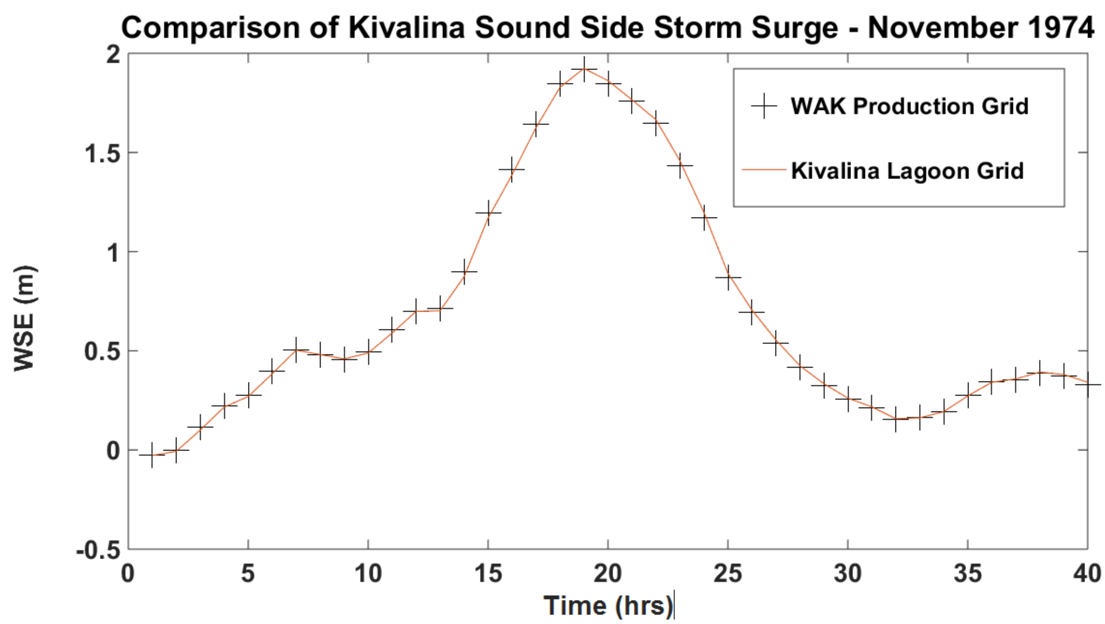


Figure 5 Comparison of Kivalina Sound Side Storm Surge With and Without the Lagoon – November 1974

The possibility of Lagoon side flooding due to the construction of the bridge and causeway was tested by simulating a causeway without bridge spans. This configuration is shown in Figure 6. The top five storm events were simulated, November 1974, October 1996, November 1970, December 2004, and November 1966 for an open and completely blocked lagoon. A point on the lagoon side of the village was selected for comparison of storm surge responses, Figure 7.

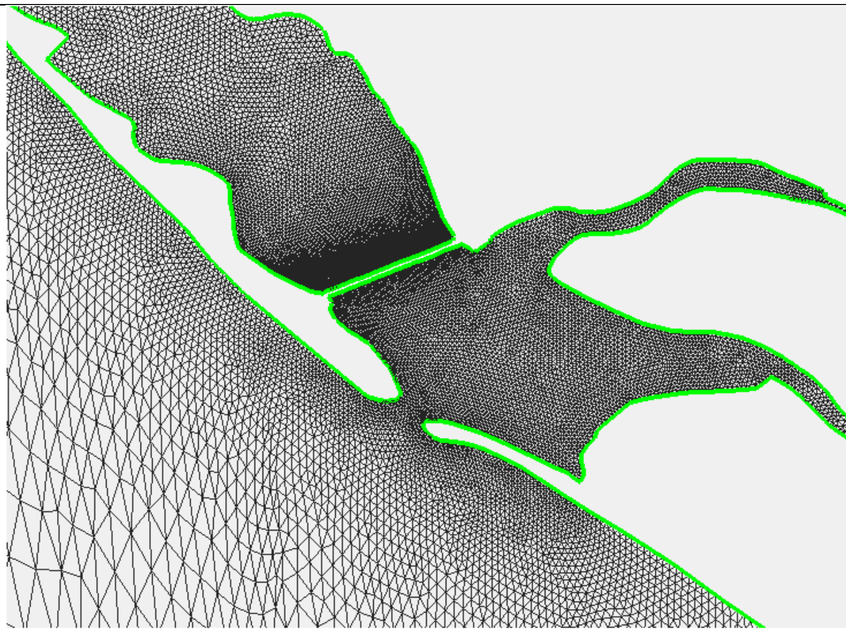


Figure 6 Lagoon With Complete Blockage

Figure 7 Village Storm Surge Comparison Point

Figure 8 presents the November 1966 event, in which it is seen that the greatest increase in the storm water surface elevation due to blockage is less than 0.2 m. This difference is well within range of accuracy of the model bathymetry and meteorological forcing. In addition, the November 1966 event is the fifth ranked storm event of the five events analyzed and the blocked surge elevation is less than that of the open lagoon surge for the top four ranked storms. The comparison results of all five events are presented in Appendix B.

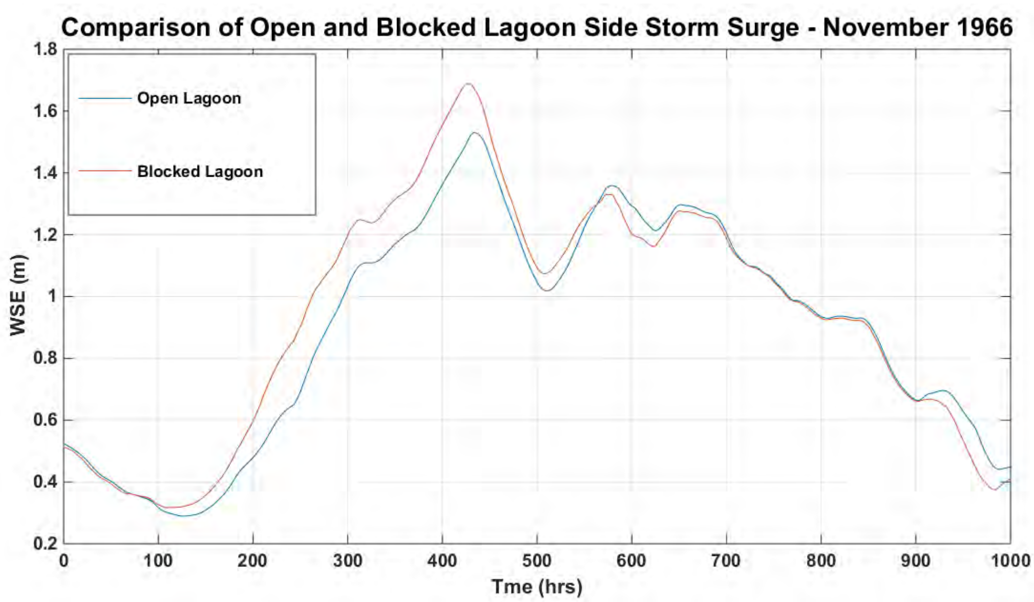


Figure 8 November 1966 Comparison of Open and Blocked Lagoon Side Storm Surge

Bridge and Causeway Design Alternatives

Four alternative designs were evaluated using the top six Kivalina storm surge events. The general layout of the causeway and bridge structure an island departure causeway approximately 60 m in length with one or more bridge spans connecting with the shoreward section of the causeway. The shoreward section of the causeway ranged in length from about 820 m down to 725 m. The details of each alternative are presented in Table 1 along with images of the alternatives, Figures 9 - 14.

Table 1 Bridge and Causeway Alternative Designs

Alternatives	General Design
1	A single 35m bridge span connecting the island reach of the causeway extending approximately 60 m into the Lagoon. The span connects with the shoreward section portion, which is approximately 820 m in length.
2	Two 35 m bridge spans supported by an 18 m diameter circular sheet pile. The second span connects with the shoreward section, which is approximately 770 m in length.
3	Two 44 m bridge spans supported by a 1.2 m wide by 13 m long pile group with a 3 m dredged footprint
4	Four 38 m bridge spans supported by three 1.2 m wide by 5 m long four pile groups with a 1.8 m dredged footprint

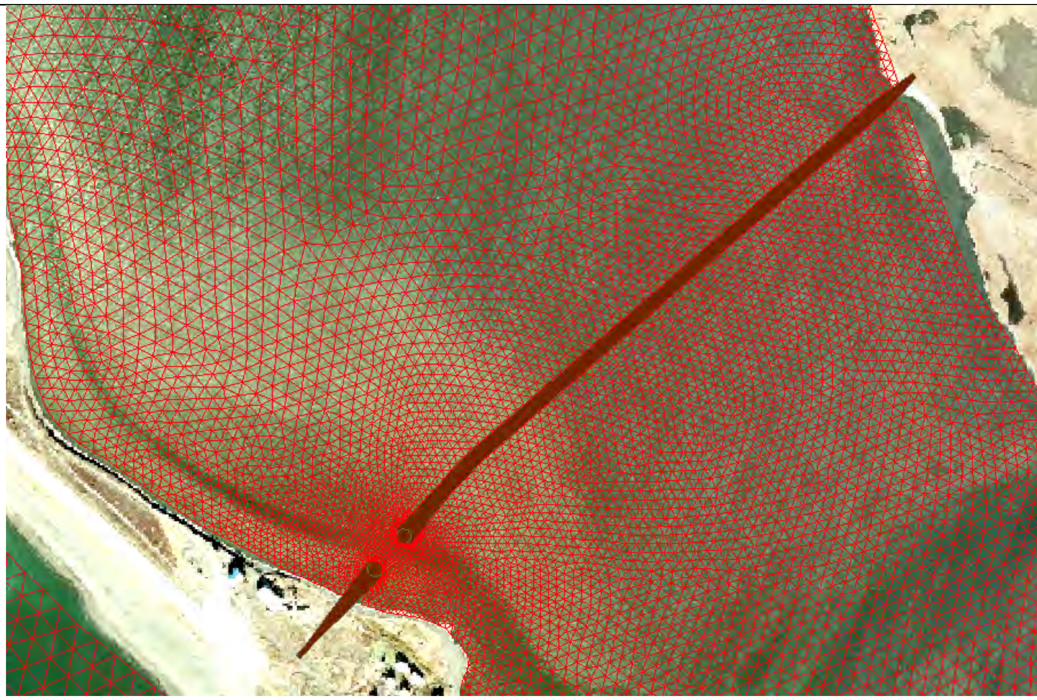


Figure 9 Alternative 1

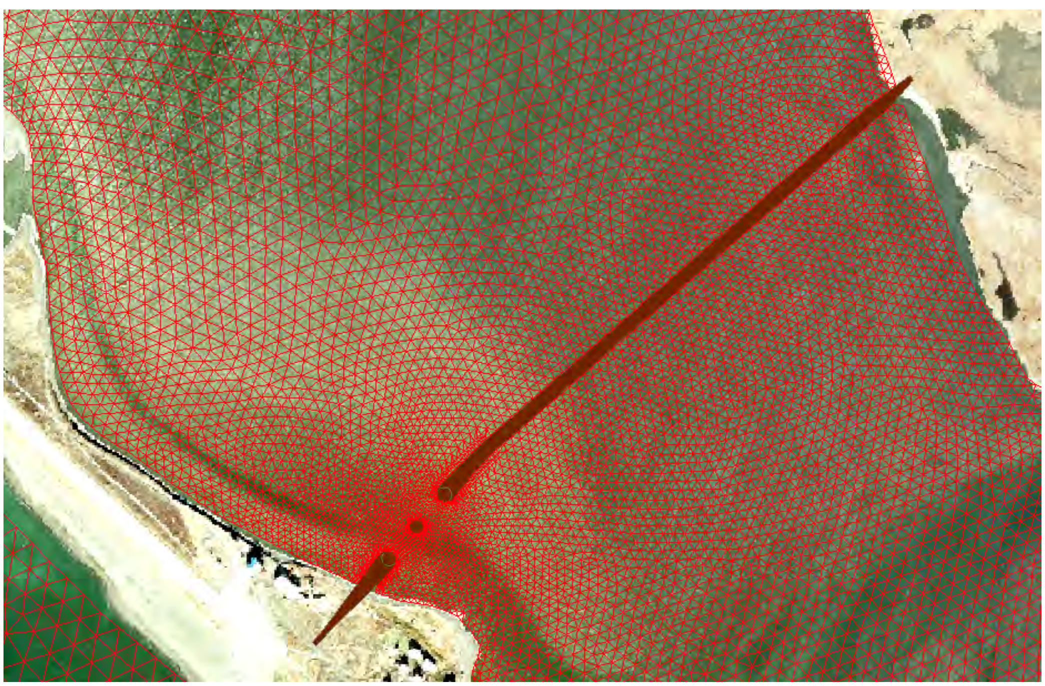


Figure 10 Alternative 2

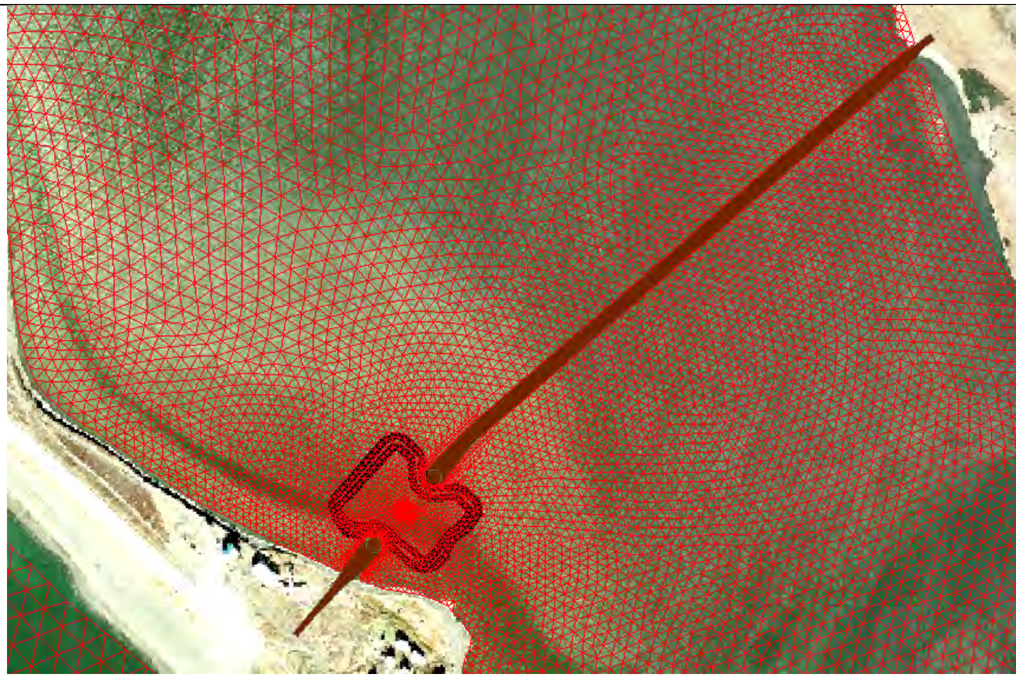


Figure11 Alternative 3

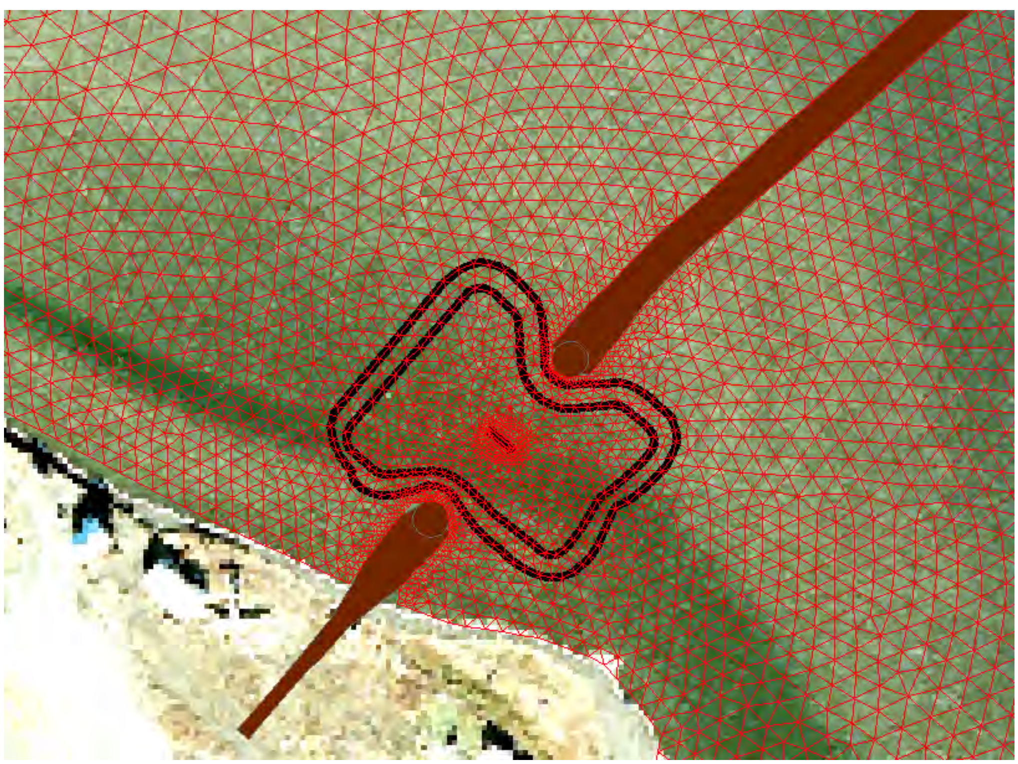


Figure 12 Alternative 3 Close

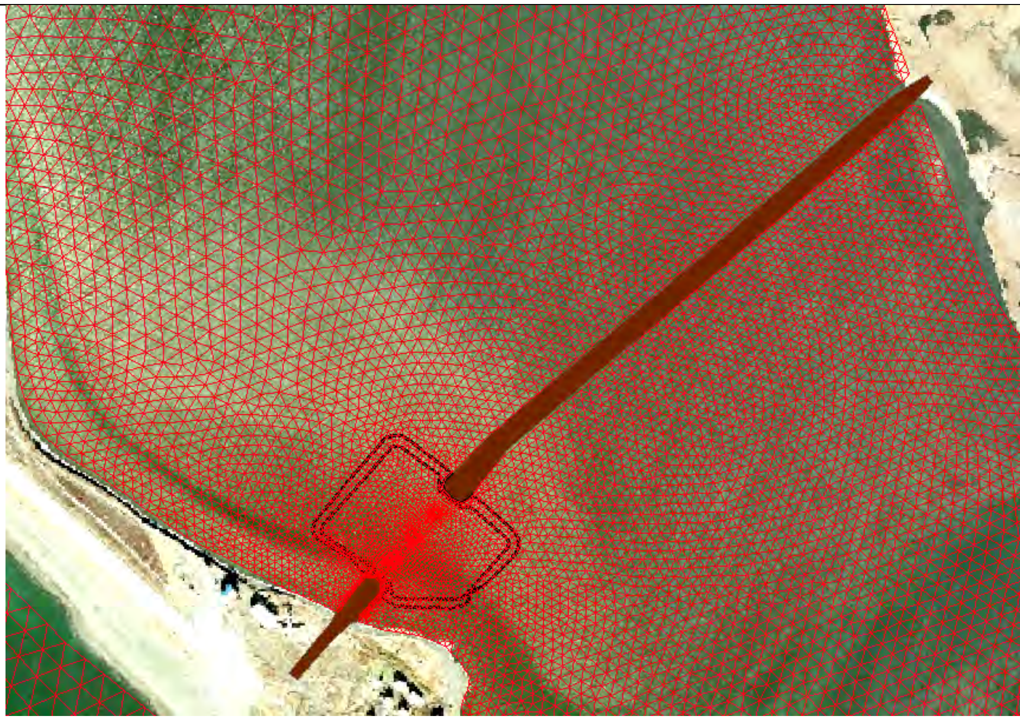


Figure 13 Alternative 4

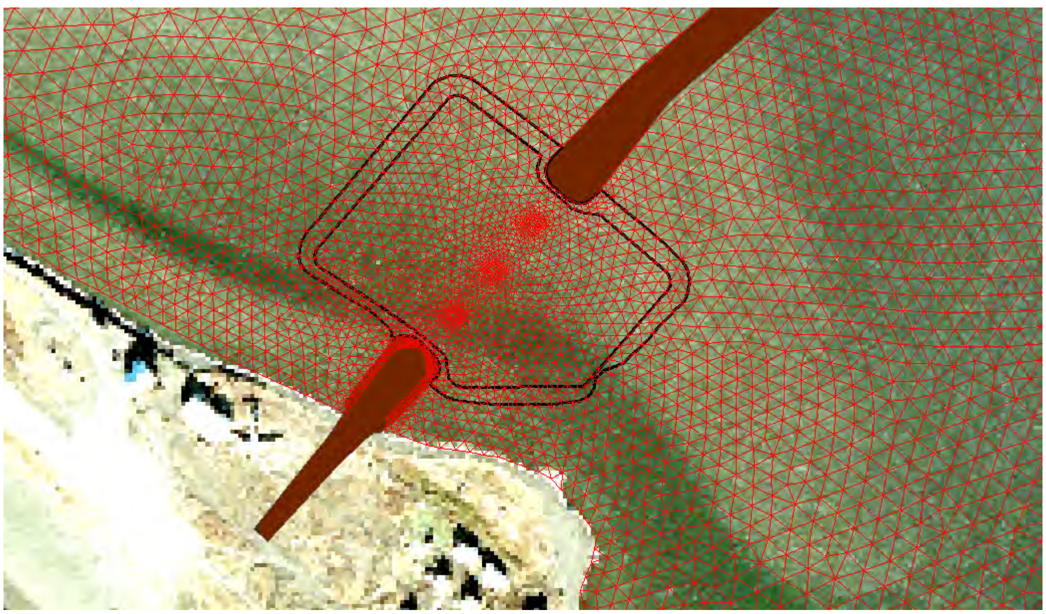


Figure 14 Alternative 4

Storm Event Simulations

All 4 design alternatives were simulated for 5 of the top 10 ranked storm events. Analysis of current speeds for all alternatives showed that maximum current speed occurred when the wind direction was from the East and Southeast, as such, the October 2004 event was added. Physically, this makes sense in that the strong southeasterly events at Kivalina occur when the storm center of pressure is to the south and over water.

For design purpose, the maximum current between and around the causeway abutments needed to be less than 1 m/s. It is shown in Appendix B that Alternative 3 satisfied this requirement, however, the 3 m dredged footprint was considered too deep. As seen below, Alternative 4 satisfies the 1 m/s restriction with an approximate 1.8 m dredged footprint.

Maximum current and percentage exceedance plots are presented in Figures 15 – 26 for the storm events simulated in increasing order of rank. It must be kept in mind that the maximum current shown is an output interval value and are not necessarily representative of the persistence of the maximum value. As a result, percent exceedance plots and tables of the maximum current speed at the midpoint between pile groups were prepared. It is seen in the percentage exceedance plots that maximum currents in excess of 0.7 m/s occur less than 5 % of the time during storm events that lasted 1 to 3 days. The data used in generating the percentage exceedance plots are presented in Tables C-1 – 6 in Appendix C.

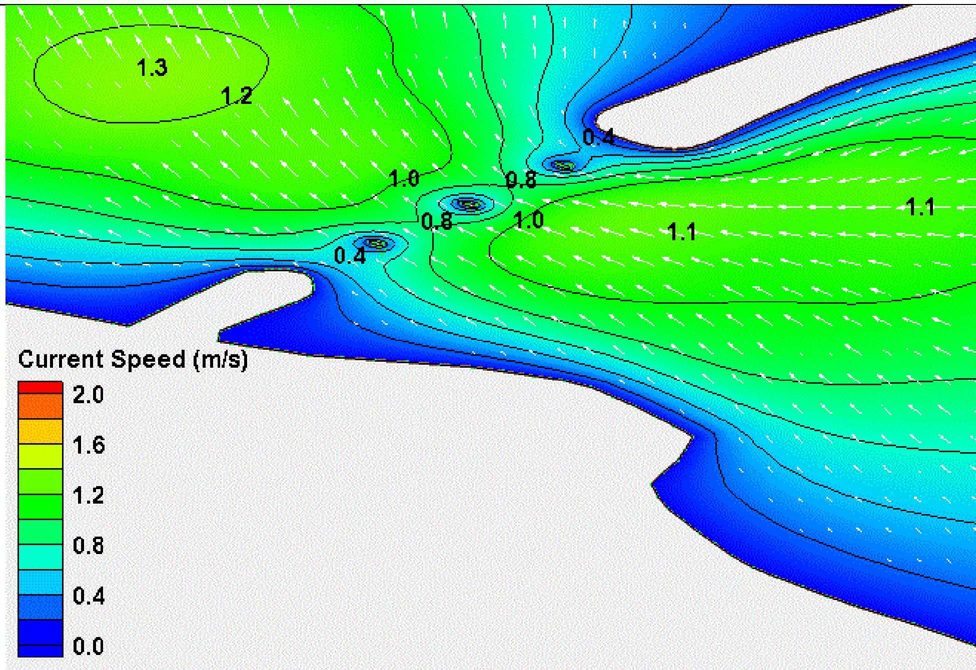


Figure 15 Maximum Current November 1974 SE Event Alt 4

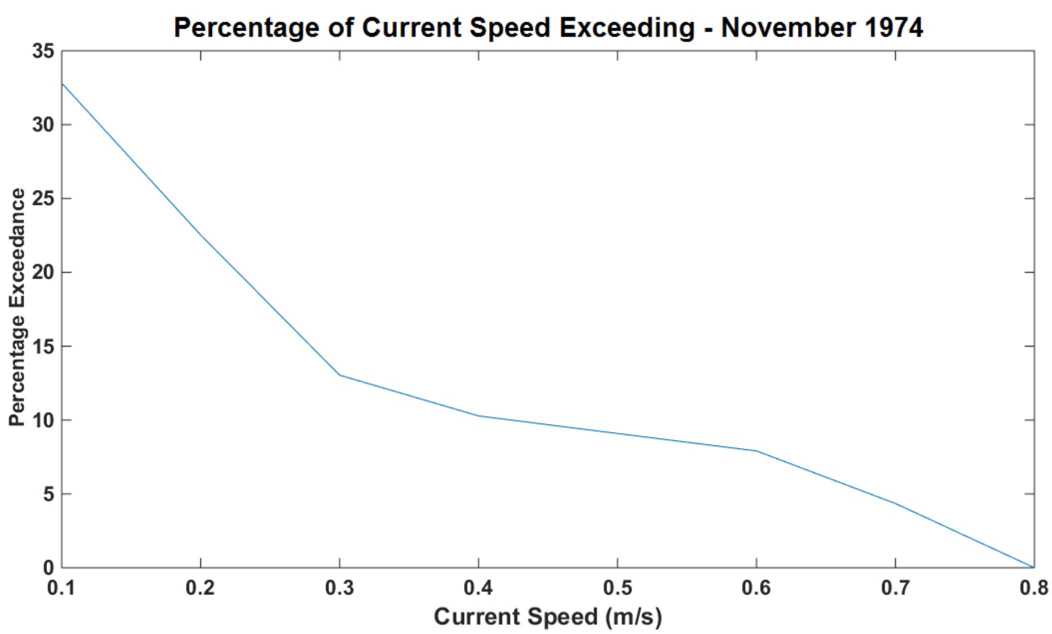


Figure 16 Percentage Exceedance of Current Speed - November 1974 SE Event Alt 4

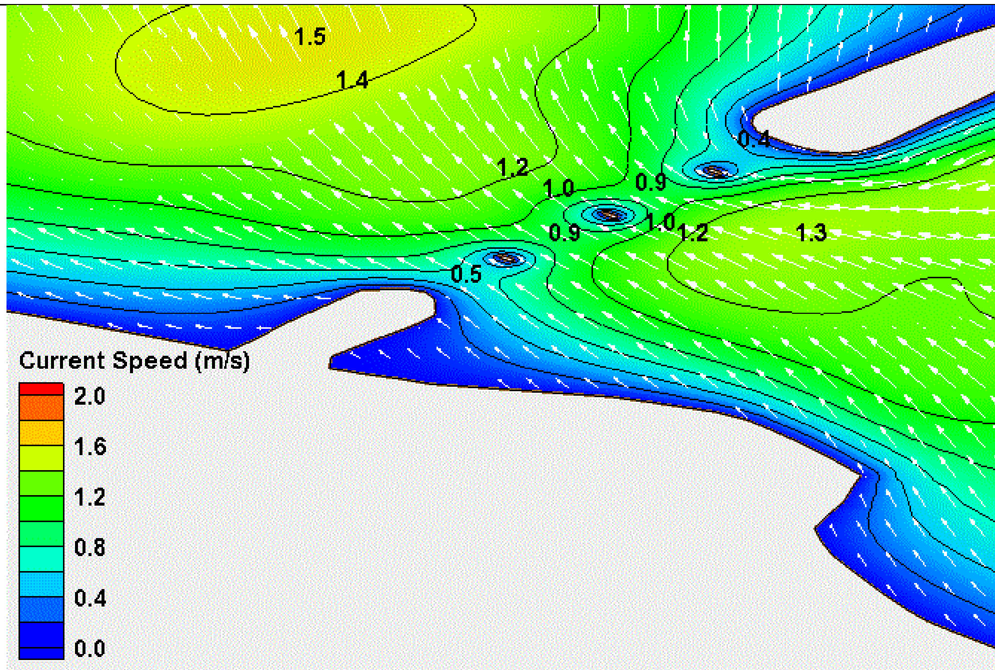


Figure 17 Maximum Current October 1996 SE Event Alt 4

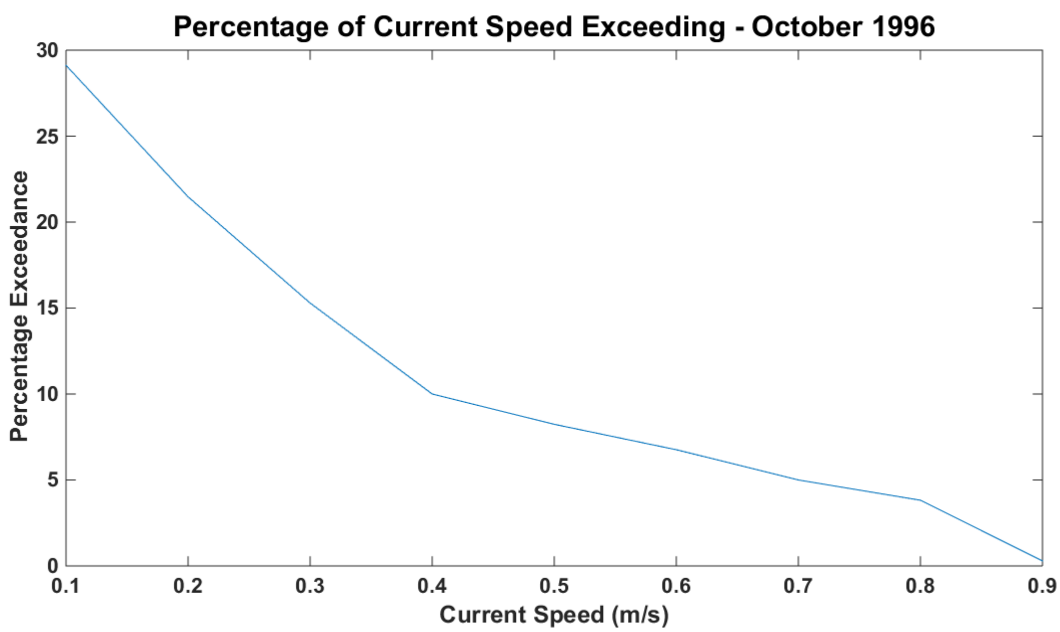


Figure 18 Percentage Exceedance of Current Speed - October 1996 SE Event Alt 4

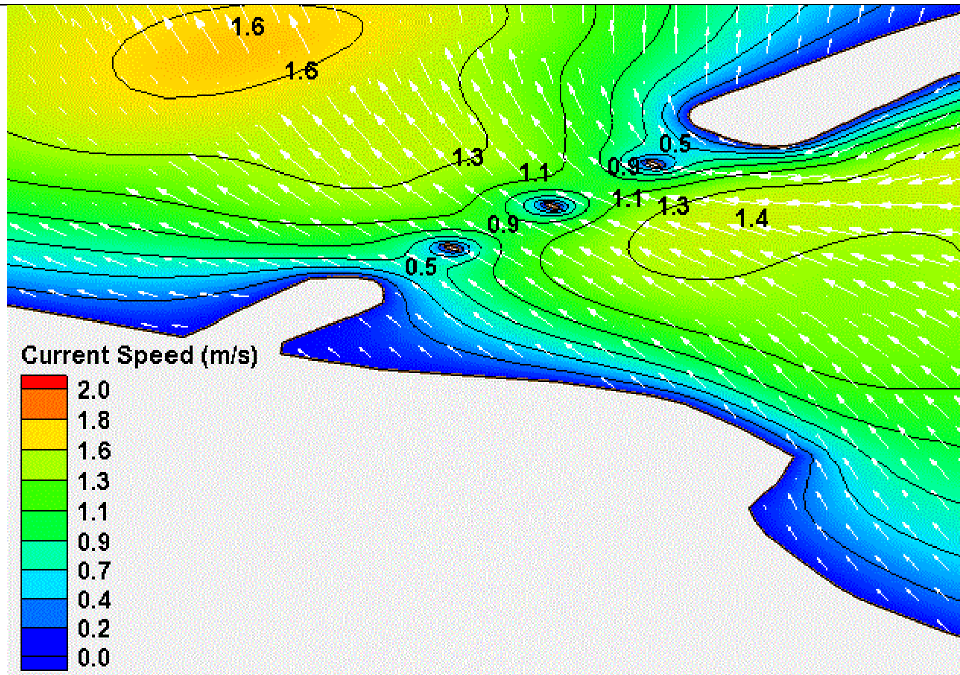


Figure 19 Maximum Current November 1970 SE Event Alt 4

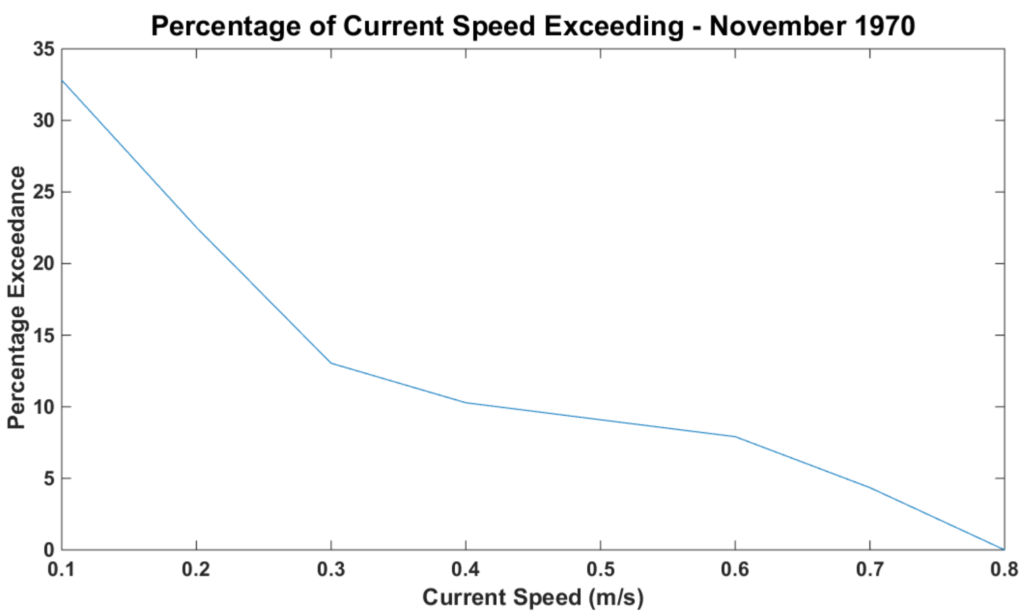


Figure 20 Percentage Exceedance of Current Speed - November 1970 SE Event Alt 4

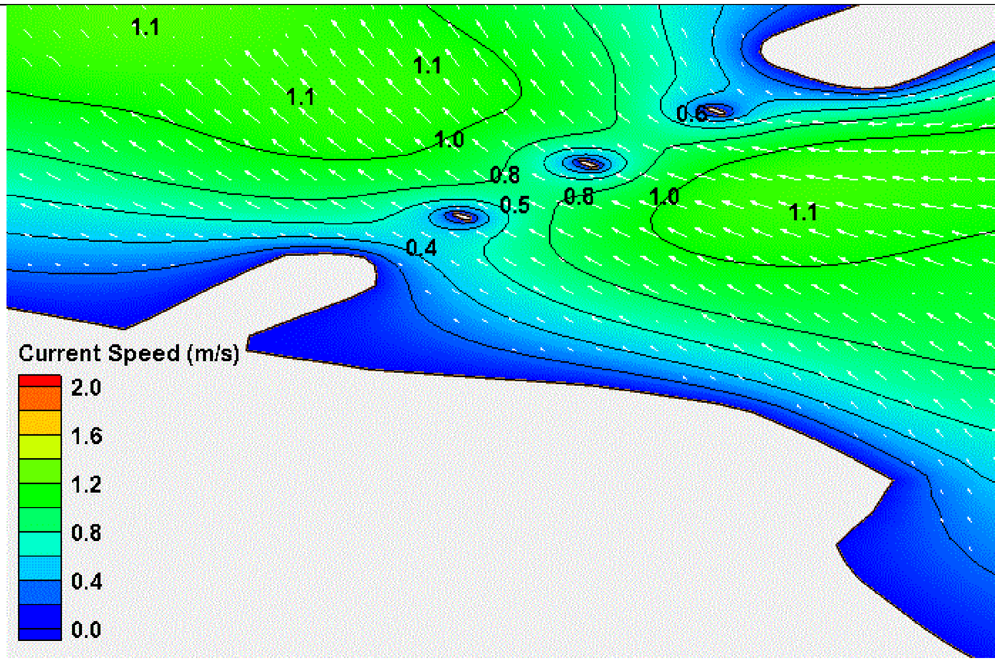


Figure 21 Maximum Current December 2004 SE Event Alt 4

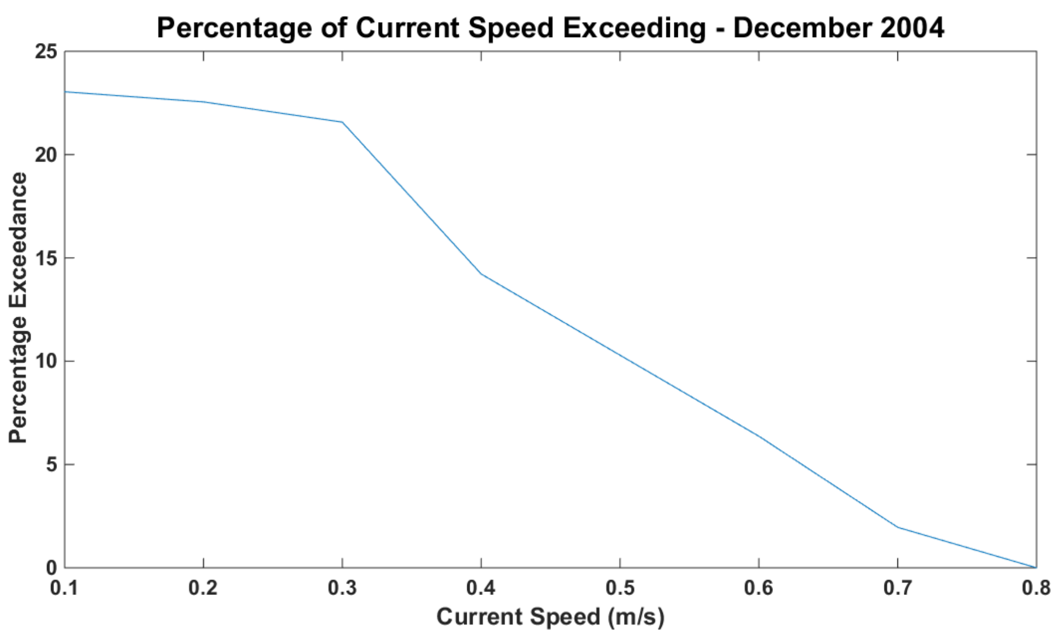


Figure 22 Percentage Exceedance of Current Speed - December 2004 SE Event Alt 4

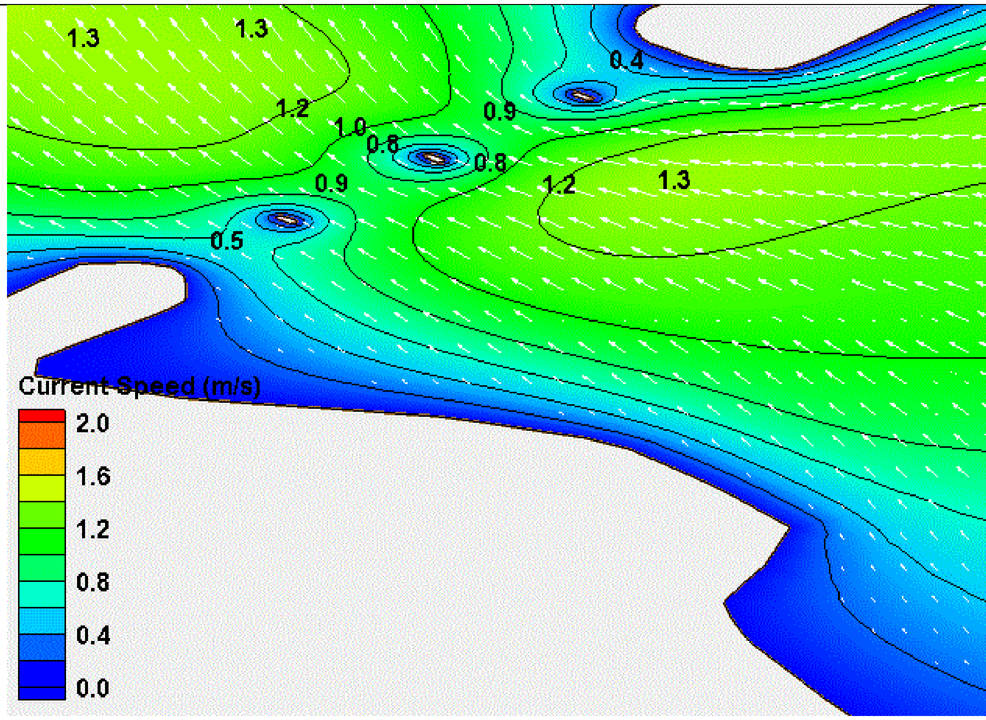


Figure 23 Maximum Current November 1966 SE Event Alt 4

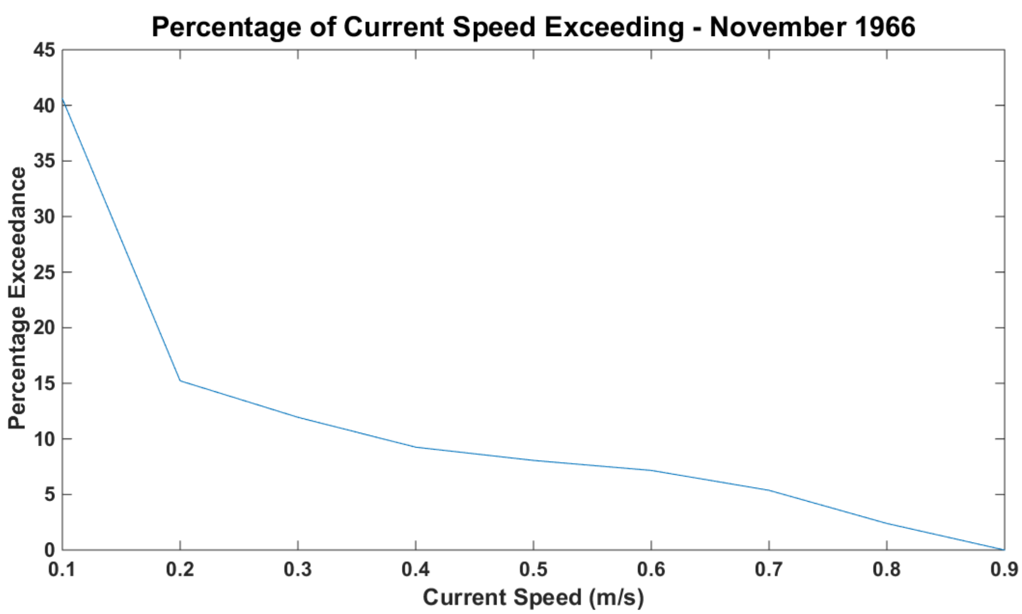


Figure 24 Percentage Exceedance of Current Speed – November 1966 SE Event Alt 4

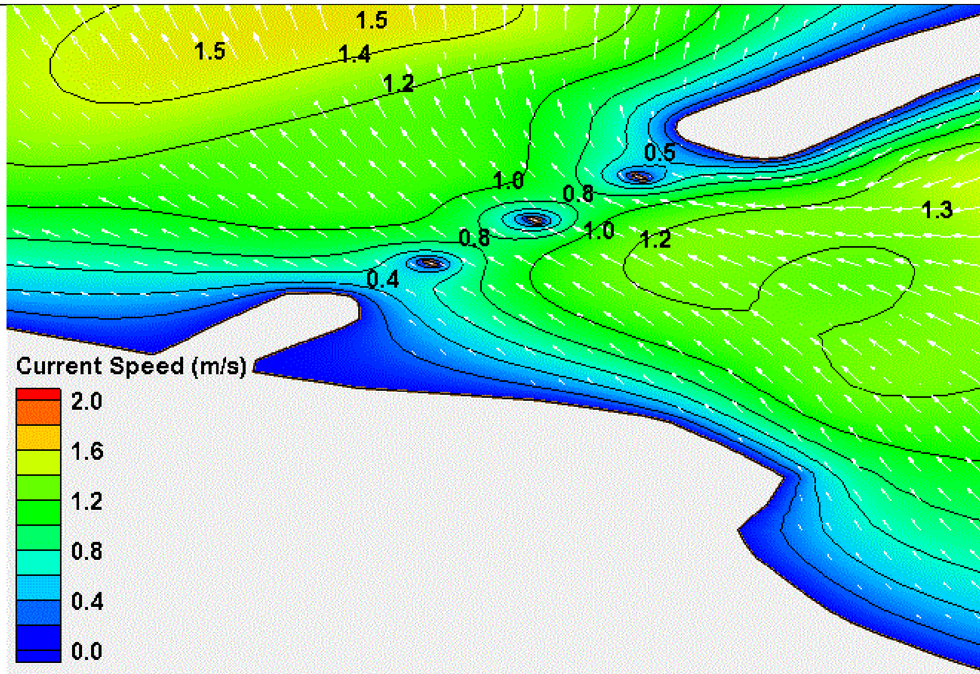


Figure 25 Maximum Current October 2004 SE Event Alt 4

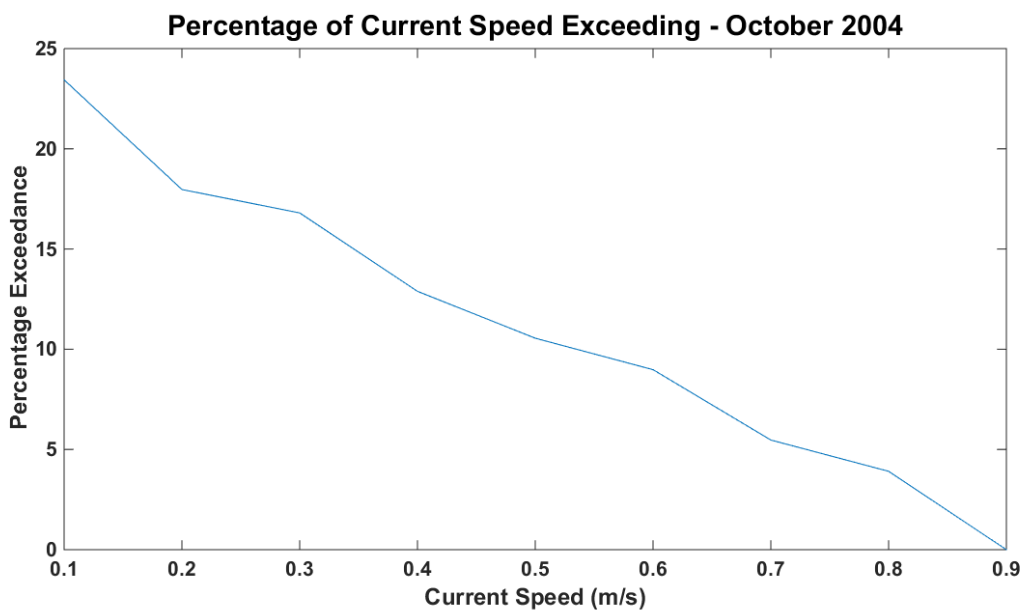


Figure 26 Percentage Exceedance of Current Speed – October 2004 SE Event Alt 4

For purposes of comparison with Alternatives 1 - 3, the maximum storm surge and head drop across the causeway, respectively, for the October 2004 event are shown in Figures 27 and 28. The maximum storm surge shown in Figure 27 is the predicted departure from model elevation 0.0 m or the initial still water level. It is seen in Figure 27 that there are minor changes in the maximum surge distribution due to the altered conveyance, which is wider but shallower than Alternative 3. Figure 28 indicates that the altered conveyance results in a small decrease in the head drop across the structure which results in decreased current speeds.

Similarly, comparing Figure 29 with Figure B8 in Appendix B, it is seen that the reduced current speeds during November 1996 Northwest wind events Alternative 3 are further reduced be roughly a factor of 2.

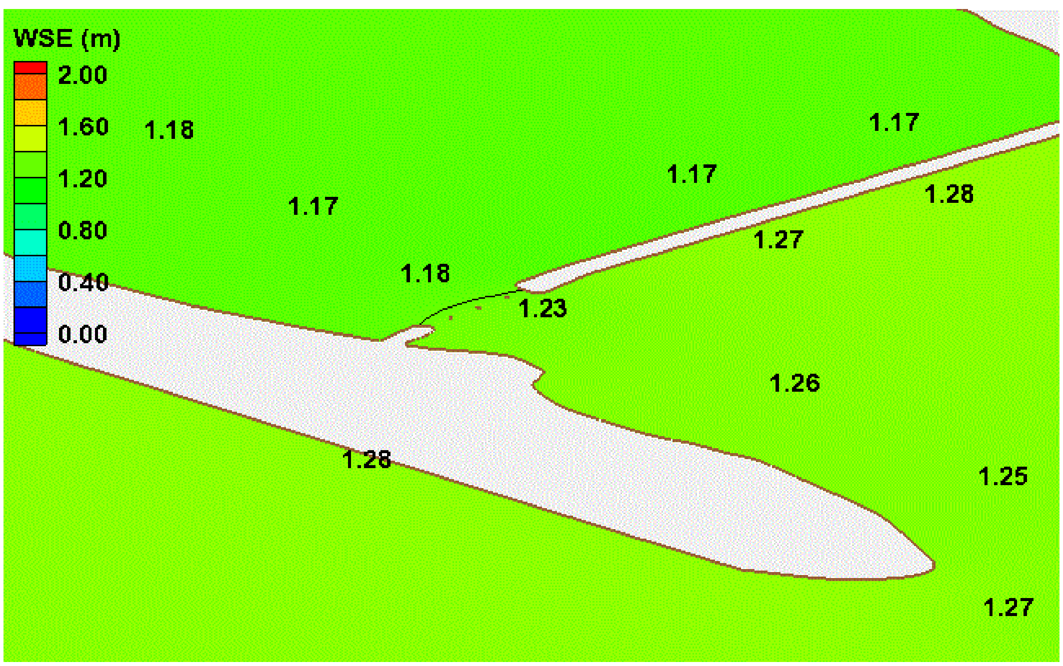


Figure 27 Maximum Surge Water Surface Elevation – October 2004 SE Event Alt 4

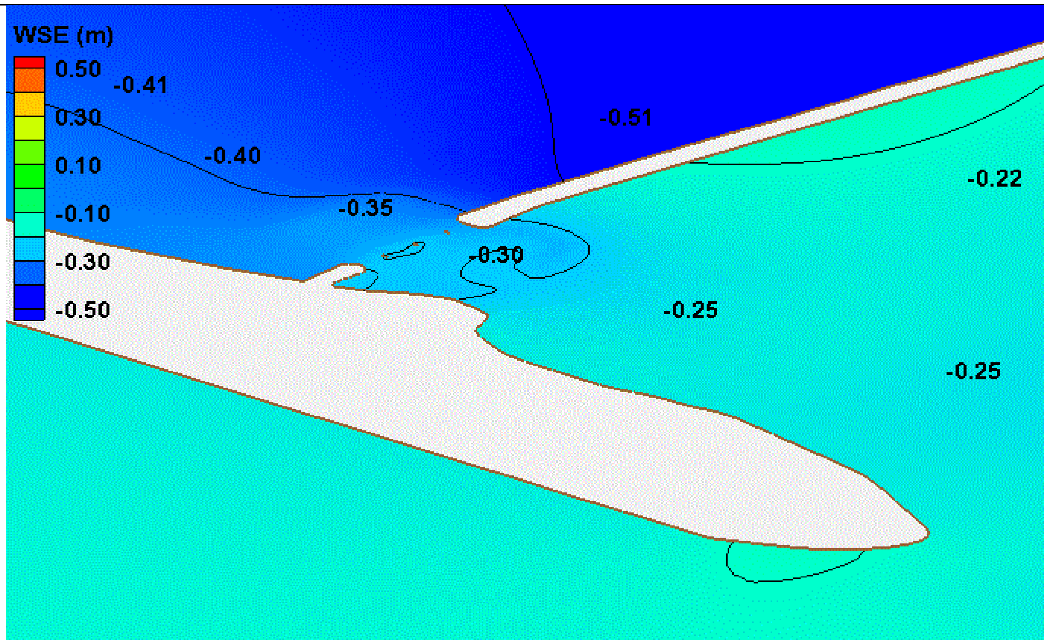


Figure 28 Maximum Head Drop – October 2004 SE Event Alt 4

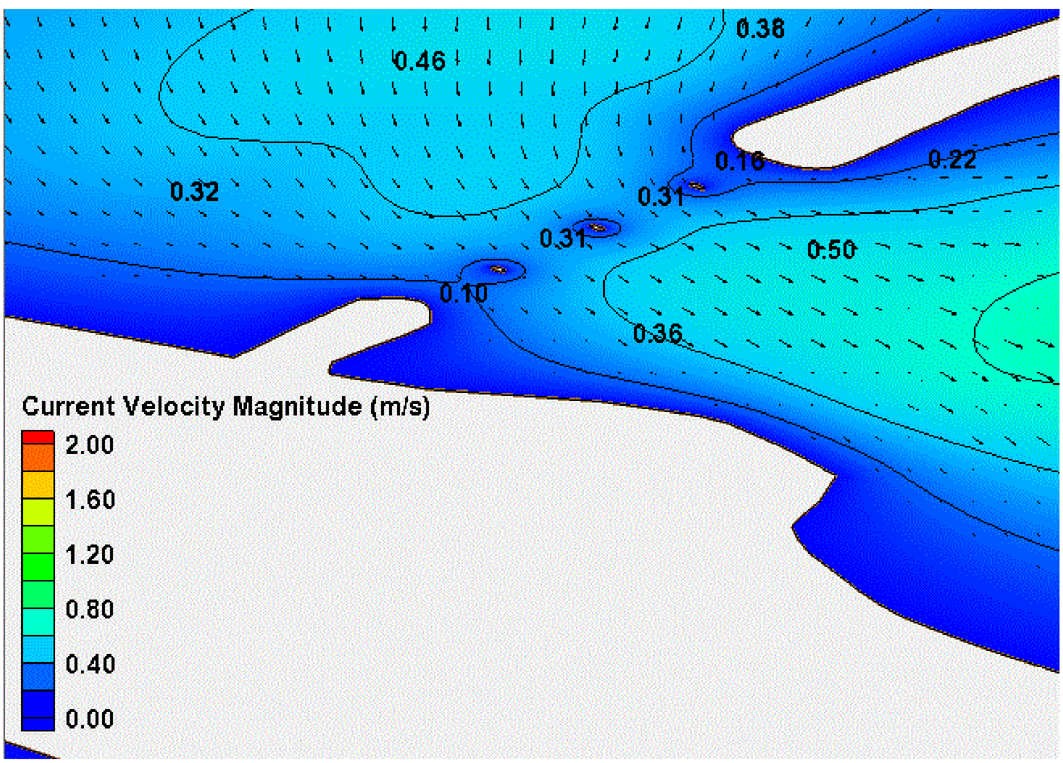


Figure 29 Maximum Current Speed (m/s) November 1996 NW Event Alt 4

Summary

The original purpose of this study was to perform hydrodynamic simulations to produce extreme water level and current estimates for selected bridge and causeway designs. Storm event simulations were performed for purposes of updating extreme water level data base. Subsequent to initial storm surge simulations, it was concluded that the storm surge estimates for Kivalina were not materially affected by the presence of a bridge and causeway structure. At that time, the focus of the project was redirected towards providing hydrodynamic information on current velocities around and between the various causeway alternatives. The top 5 storm events and the October 2004 event for Kivalina were simulated to determine if the design alternative satisfied a maximum current speed limit of 1 m/s. Alternatives 1 and 2 failed under all storm conditions. Alternative 3 with a with a 3 m deep dredged footprint satisfied the maximum current limit, however, the 3 m deep dredged footprint was determined to be unsuitable given habitat constraints. Alternative 4, which decreased the dredged footprint to 1.8 m while increasing the total span length from approximately 90 to 150 m, satisfied the current speed limit of 1 m/s during all storm events simulated. In addition, currents greater than 0.7 m/s occur less than 5% of the time during each event.

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Chapman, R. S. and D. J. Mark (2014). “Western Alaska Storm Surge Modeling Study: Bering Sea and Bristol Bay Site Calibration and 2005-2011 Extreme Water Level Statistics” Draft Report to POA, U.S. Army Engineers Waterways Experiment Station, Vicksburg, MS.

Chapman, R. S., Kim. S-K and D. J. Mark (2011) “Storm-Induced Water Level Prediction Study for Shaktoolik Alaska”, Draft Report to POA, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

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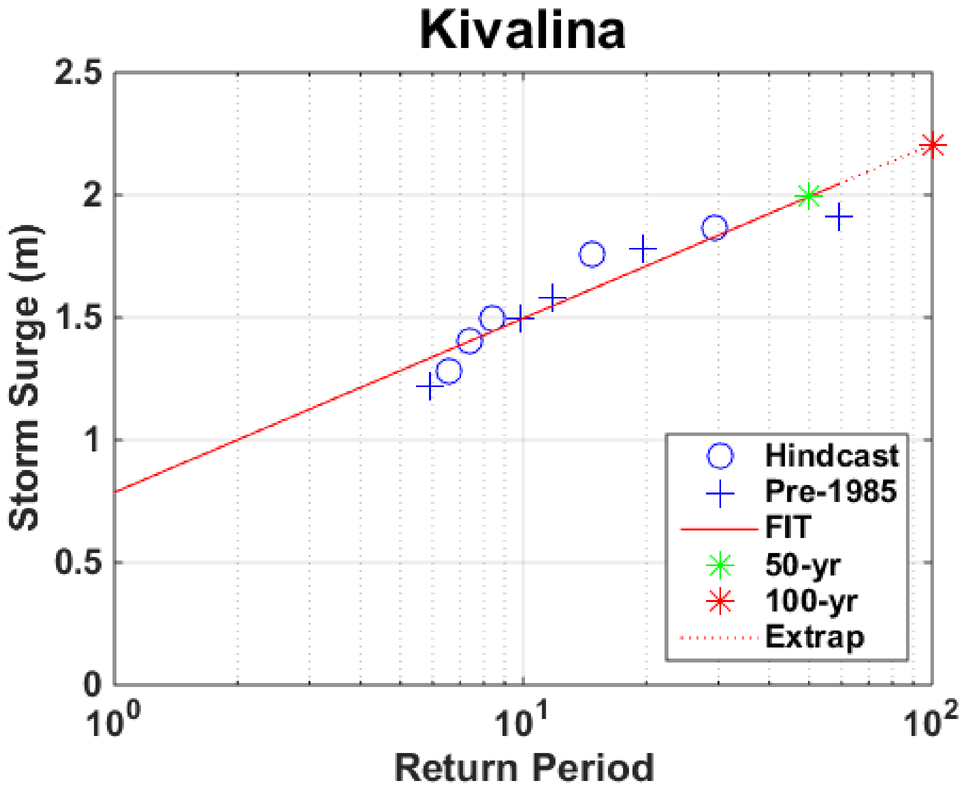
Luettich, R.A., Jr., Westerink, J.J., and N.W. Scheffner (1992) “ADCRIC: An Advanced Three-Dimensional Circulation Model for Shelves, Coasts and Estuaries”, Technical Report DRP-92-6, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

Oceanweather, Inc. (2011) “Wind, Pressure and Ice Concentration Fields for Alaska Long-term Climatology”, Contract Report to the U.S. Army Engineer Research and Development Center, Vicksburg, MS.

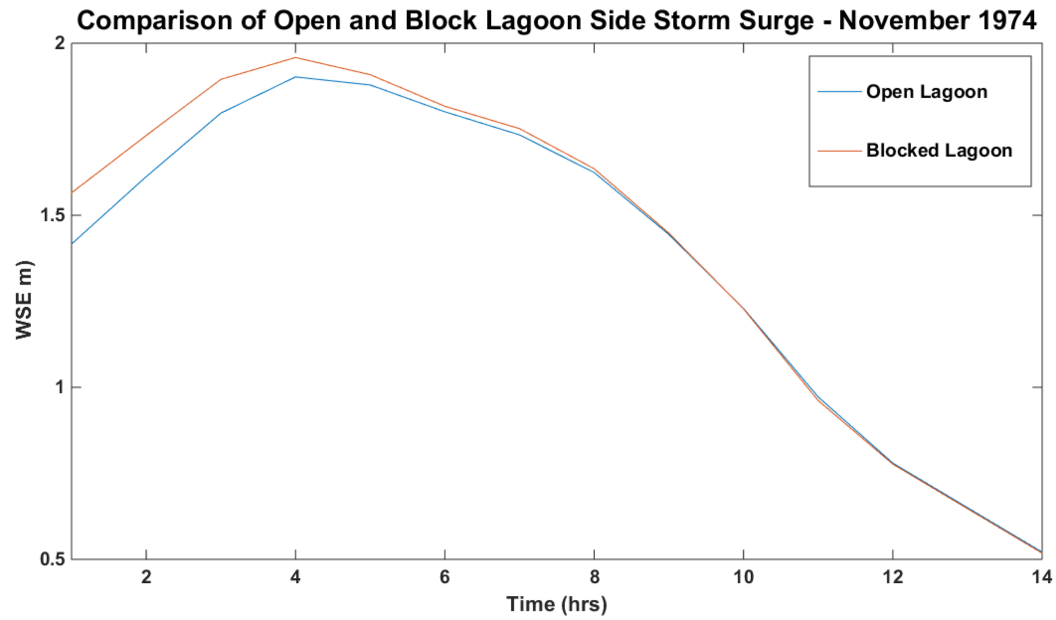
Oceanweather, Inc. (2006) “Wind, Pressure and Ice Concentration Fields for Alaska Long-term Climatology”, Contract Report to the U.S. Army Engineer Research and Development Center, Vicksburg, MS.

Appendix A: Top Ten Storm Events, EST Frequency of Occurrence and Ranked Occurrence Plot

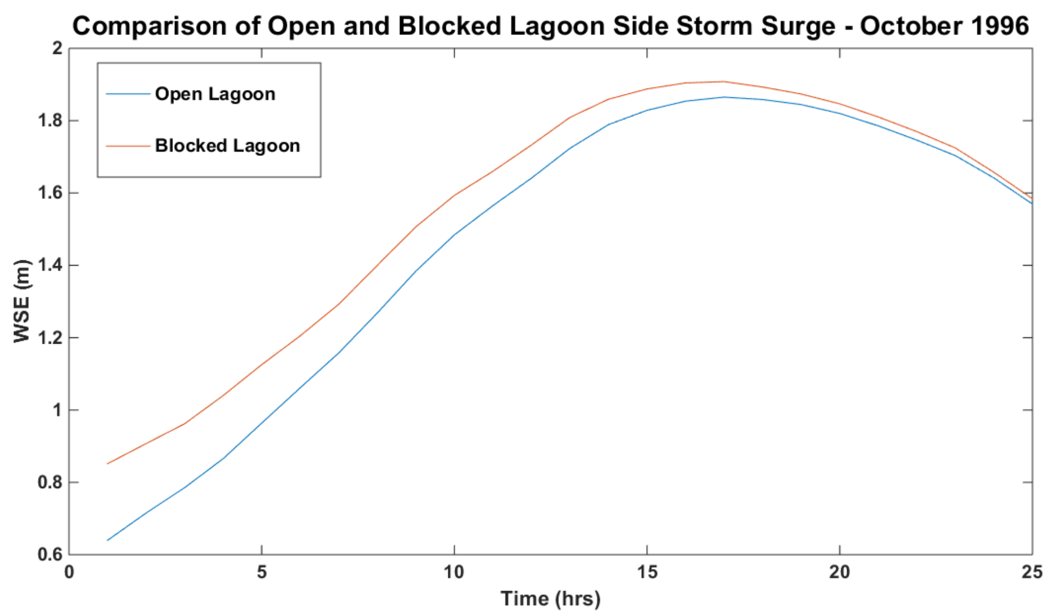
<table>
<tr><th colspan="4">Kivalina</th></tr>
<tr><th rowspan="2">Date</th><th rowspan="2">Maximum Surge (m)</th><th colspan="2">Frequency of Occurrence EST</th></tr>
<tr></tr>
<tr><td>Nov 1974</td><td>1.9</td><td rowspan="3">Return Period (Years)</td><td rowspan="3">Surge (m)</td></tr>
<tr><td>Oct 1996</td><td>1.9</td></tr>
<tr><td>Nov 1970</td><td>1.8</td></tr>
<tr><td>Dec 2004</td><td>1.8</td><td>5</td><td>1.1</td></tr>
<tr><td>Nov 1966</td><td>1.6</td><td>10</td><td>1.3</td></tr>
<tr><td>Nov 1978</td><td>1.5</td><td>15</td><td>1.5</td></tr>
<tr><td>Nov 2011</td><td>1.5</td><td>20</td><td>1.6</td></tr>
<tr><td>Sept 2005</td><td>1.4</td><td>25</td><td>1.7</td></tr>
<tr><td>Oct 2004</td><td>1.3</td><td>50</td><td>1.9</td></tr>
<tr><td>Jun 1961</td><td>1.2</td><td>100</td><td>2.0</td></tr>
</table>


Kivalina
Storm Surge (m)
Return Period
2.5
2
1.5
1
0.5
0
10^0
10^1
10^2
Hindcast
Pre-1985
FIT
50-yr
100-yr
Extrap

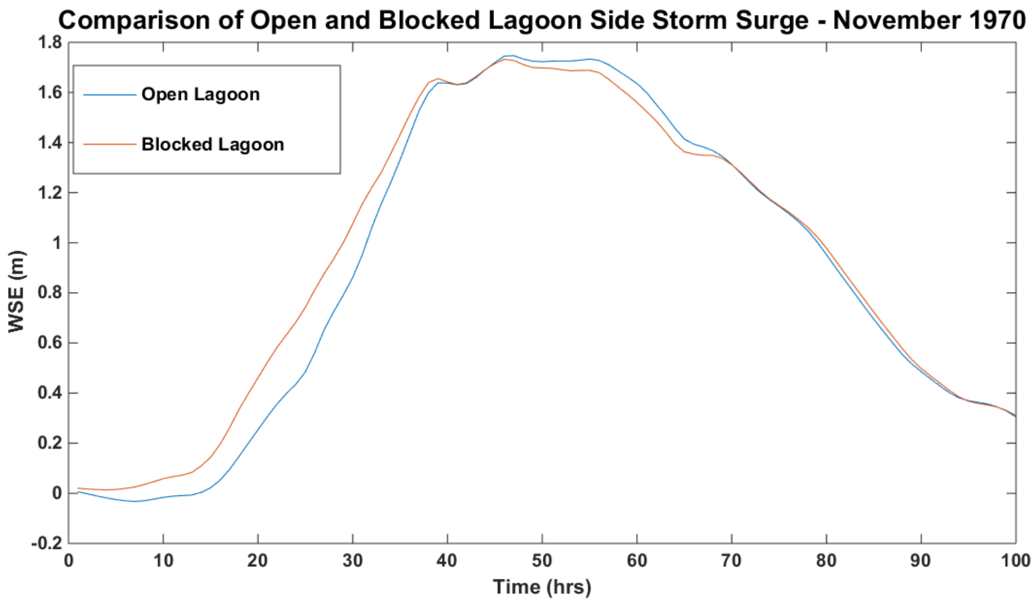
Appendix B: Comparison of Storm Surge Water Surface Elevation of an Open Verses Blocked Lagoon.



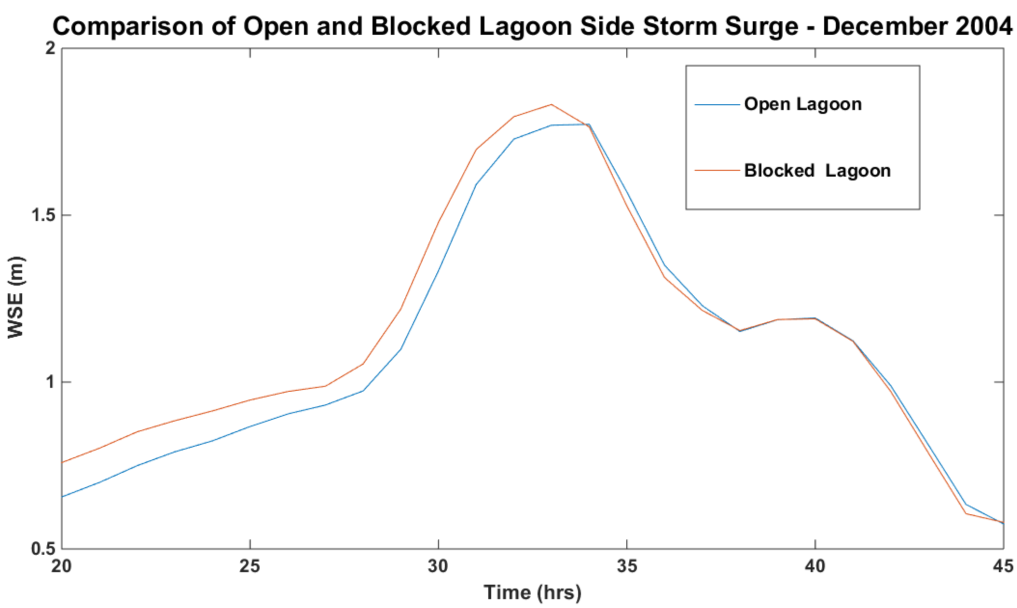
A1 – November 1974



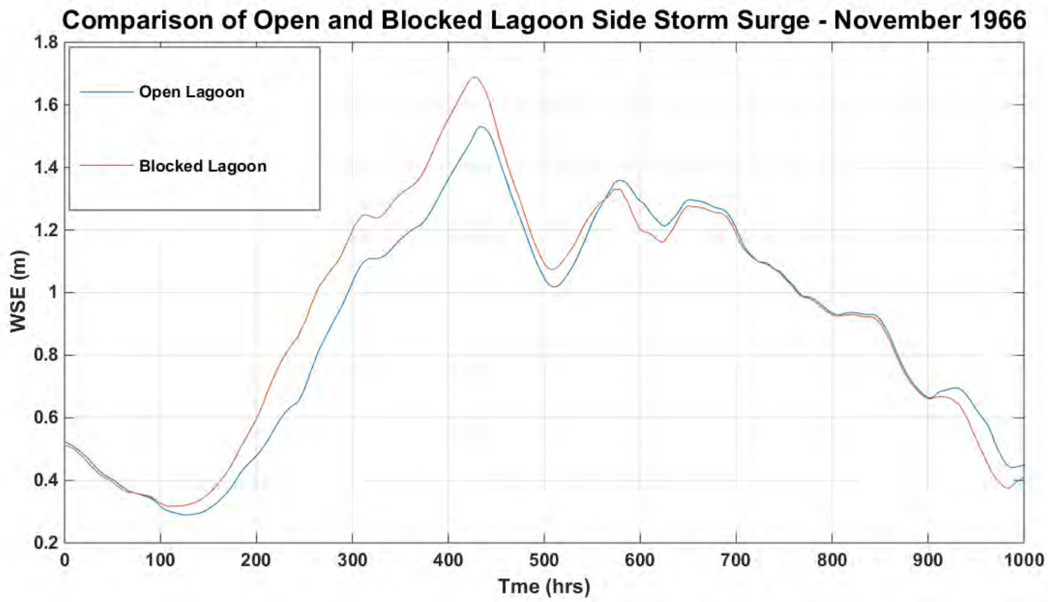
A2 – October 1996



A3 – November 1970

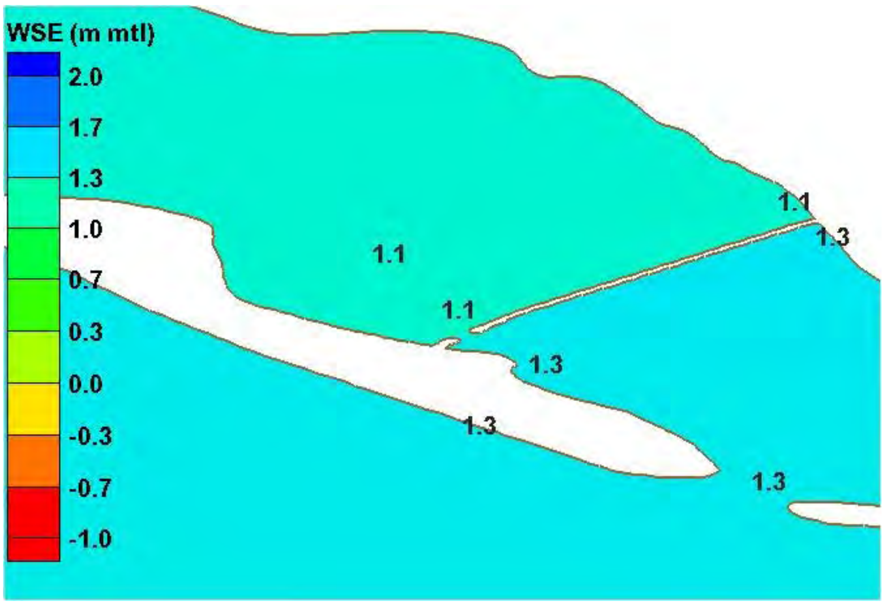


A4 – December 2004

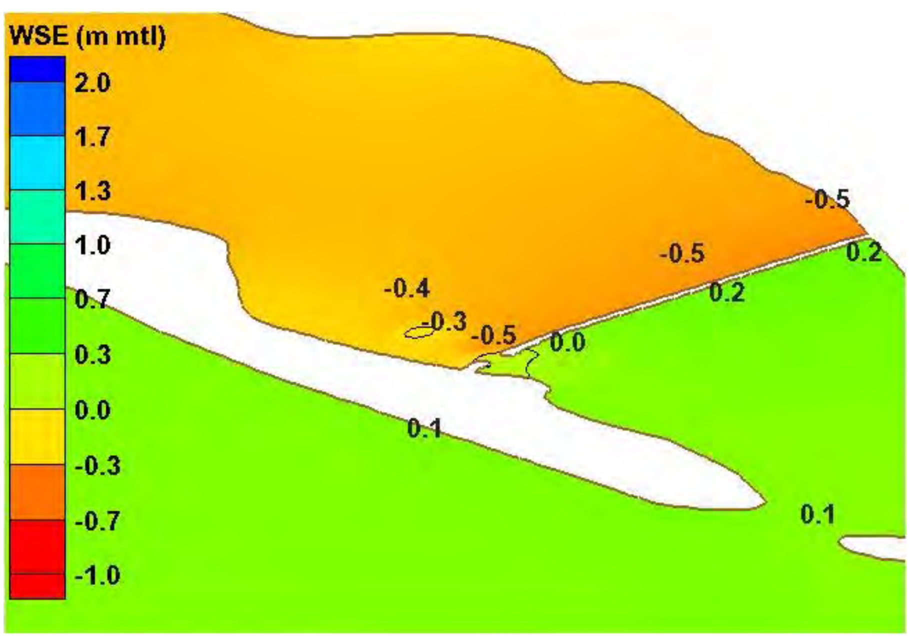


A5 – November 1966

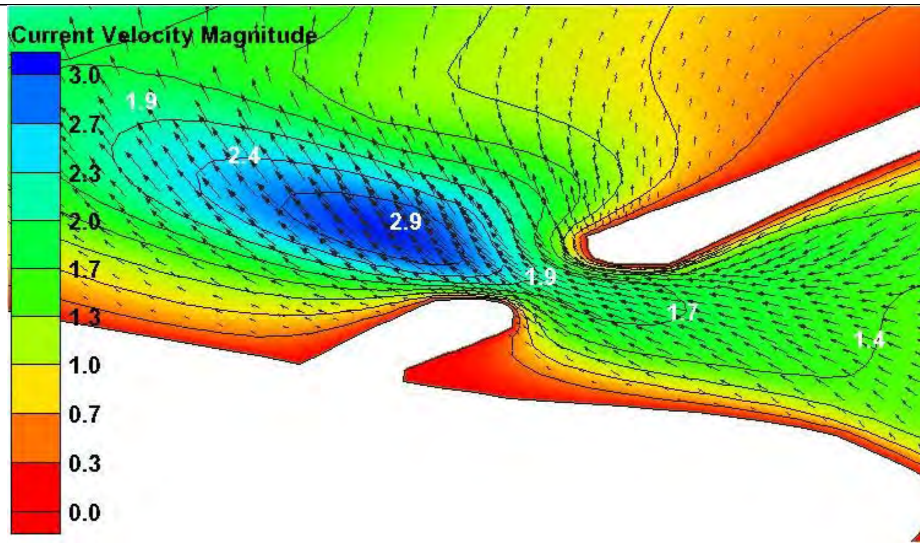
Appendix C: Alternatives 1 – 3 Analysis Figures



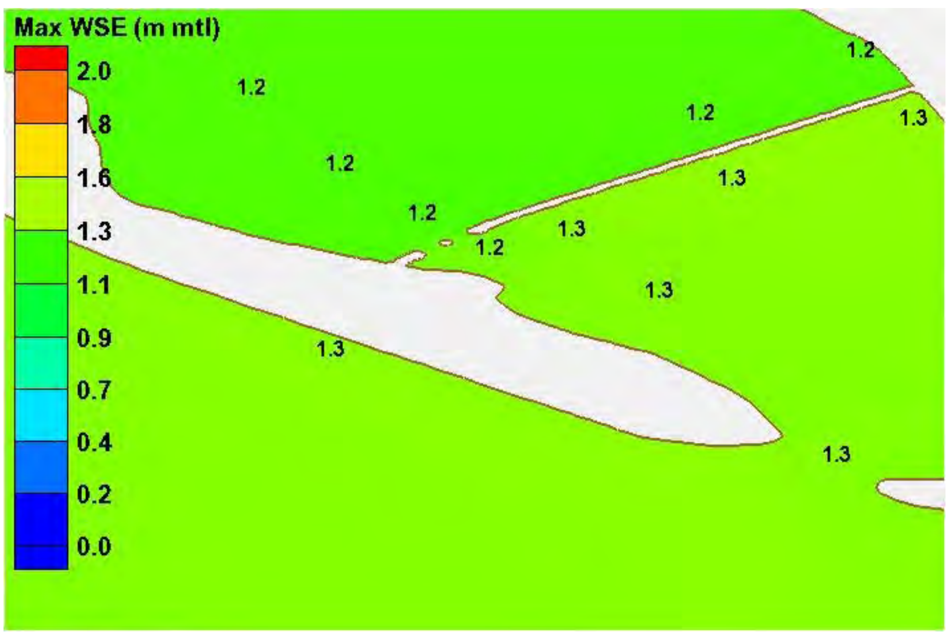
B1 - Maximum Surge October 2004 SE Event Alt 1



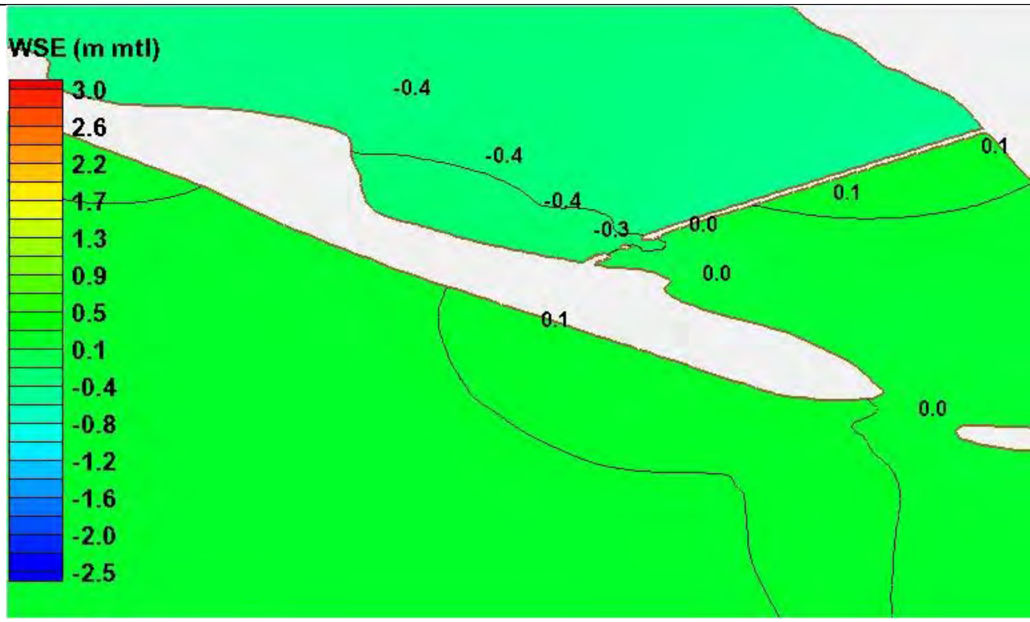
B2 - Maximum Surge Head Drop October 2004 SE Event Alt 1



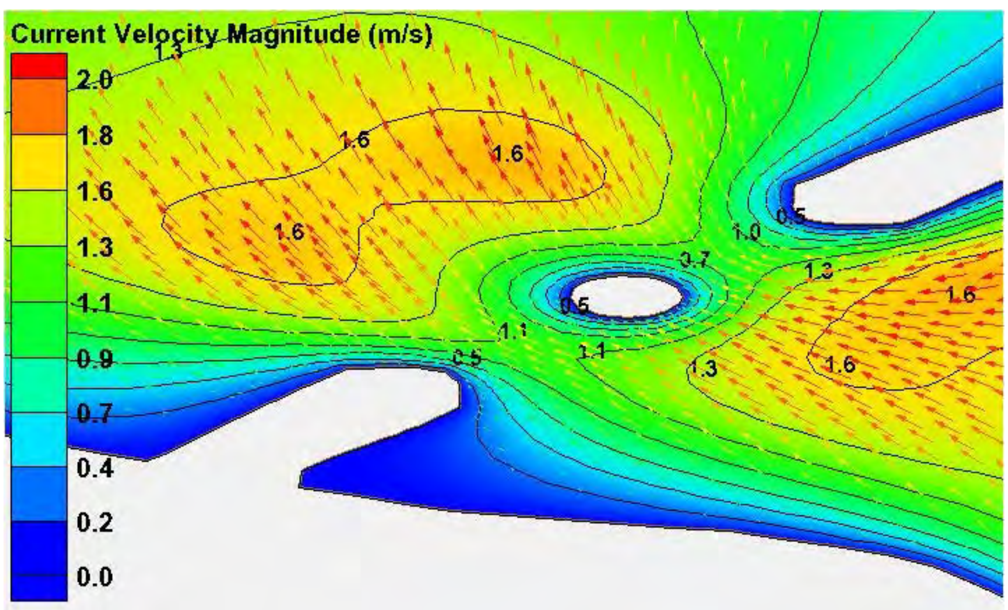
B3- Maximum Current (m/s) October 2004 SE Event Alt 1



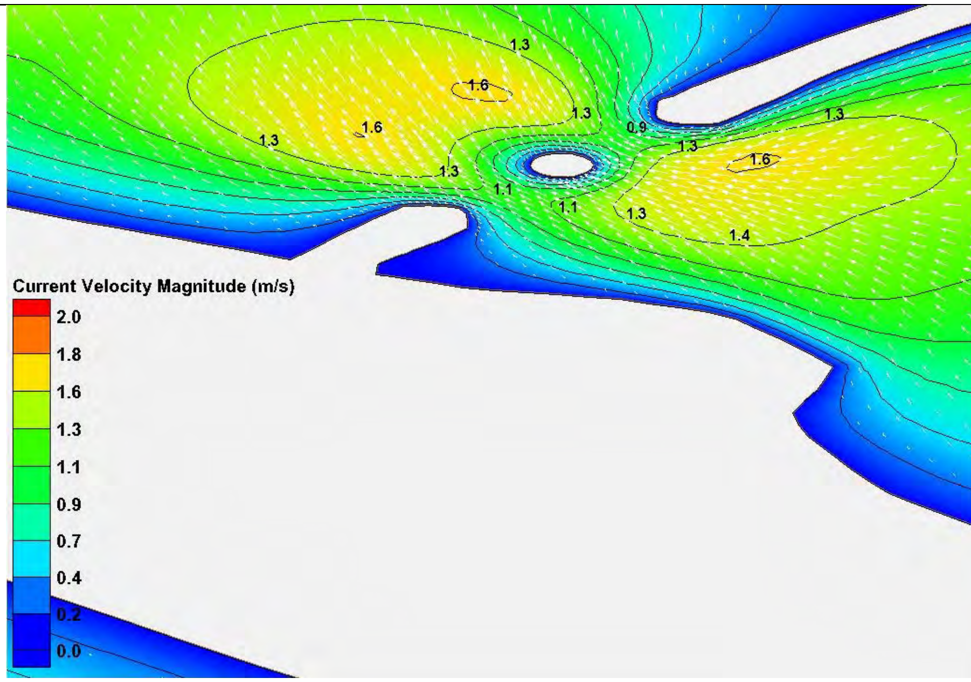
B4 - Maximum Surge October 2004 SE Event Alt 2



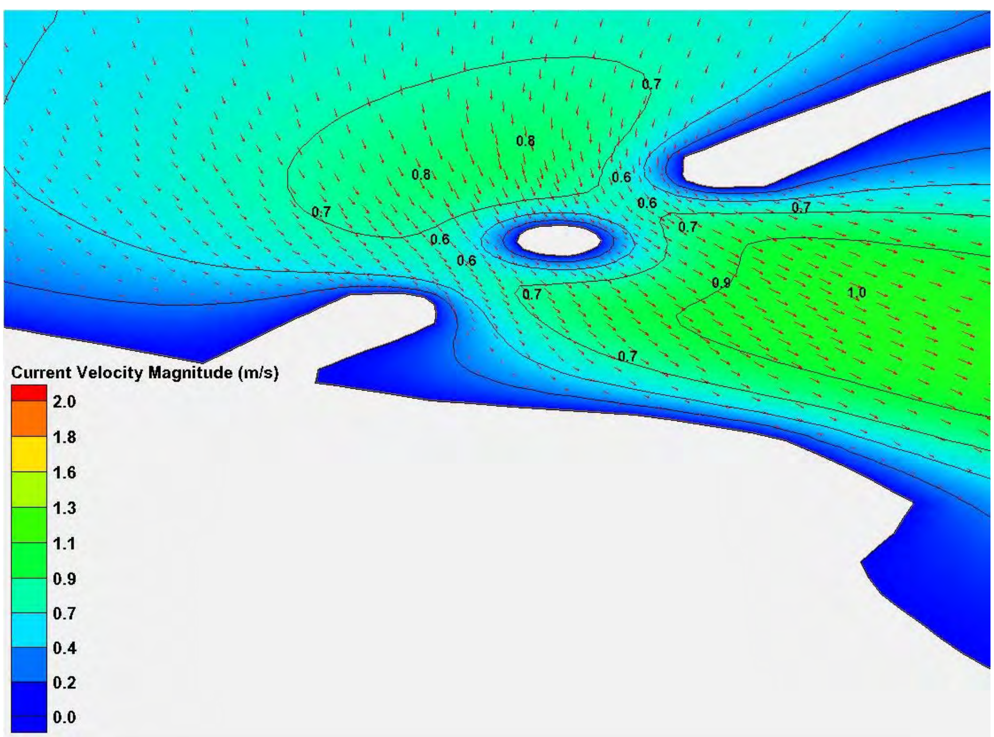
B5 - Maximum Surge Head Drop October 2004 SE Alternative 2



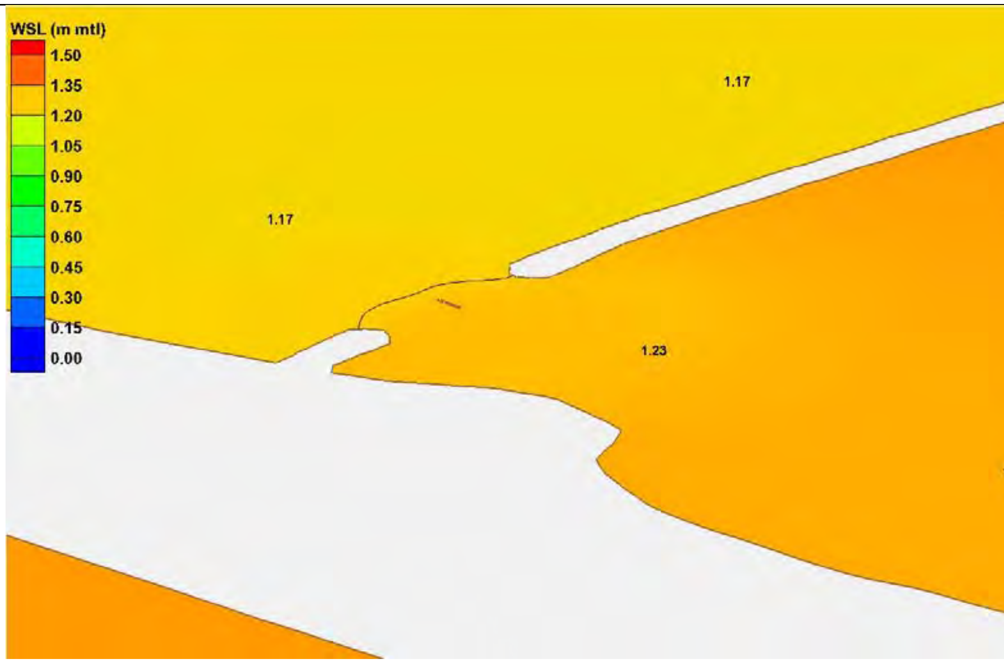
B6- Maximum Current (m/s) October 2004 SE Event Alt 2



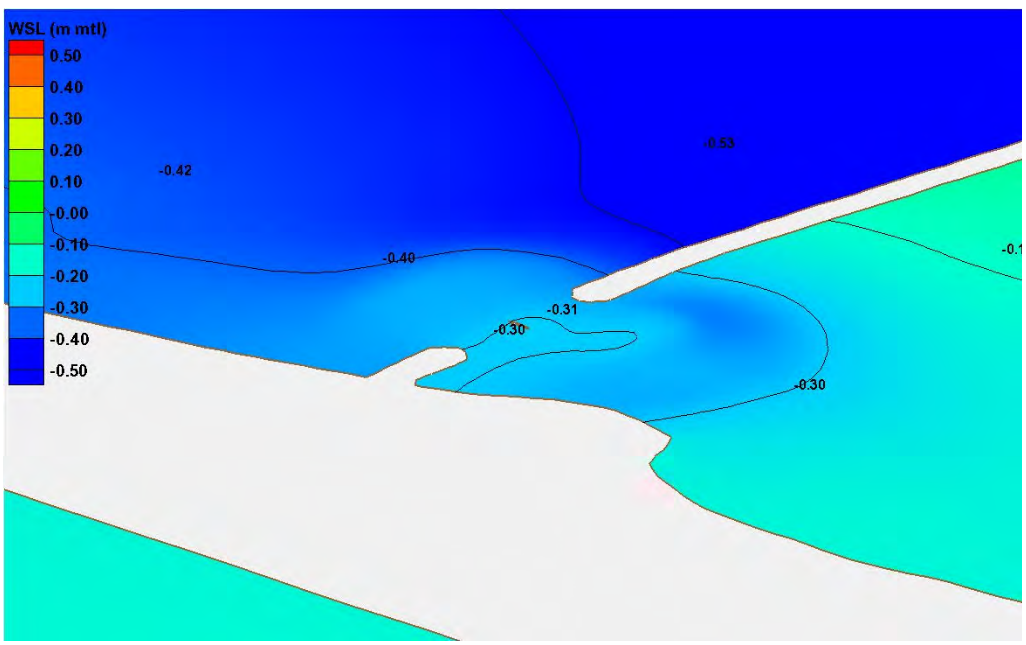
B7- Maximum Current (m/s) November 1996 SE Event Alt 2



B8- Maximum Current (m/s) November 1996 NW Event Alt 2

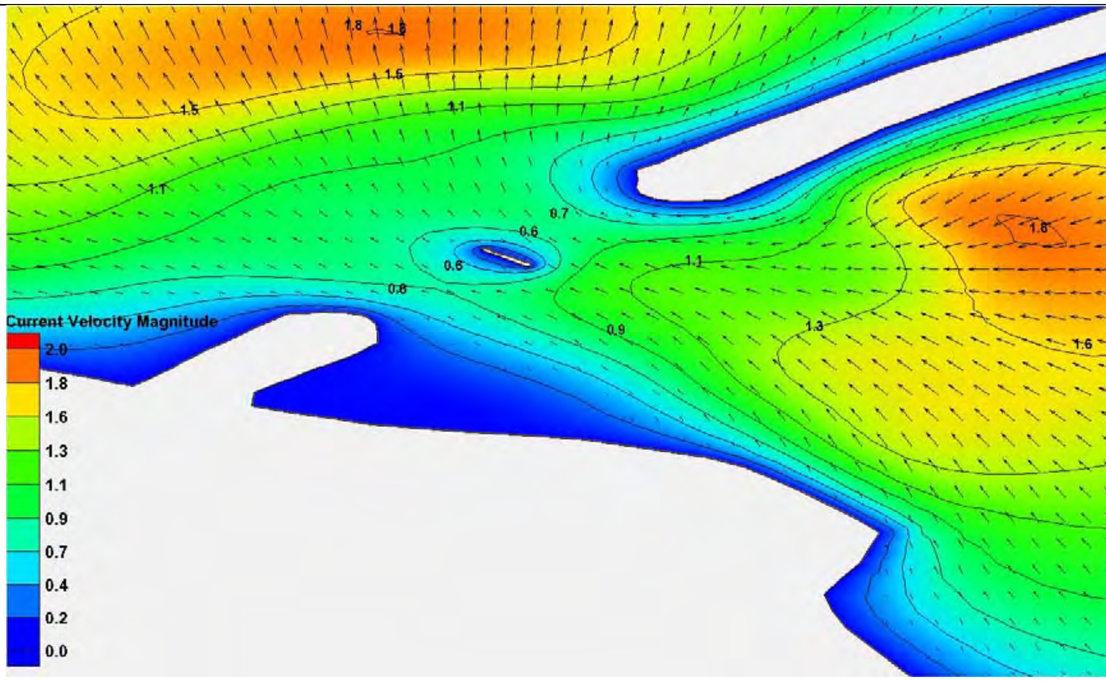


B9 - Maximum Surge October 2004 SE Event Alt 3



B10 - Maximum Surge Head Drop October 2004 SE Event Alt 3

200



B11- Maximum Current (m/s) October 2004 SE Event Alt 3

Appendix D: Percentage Current Speed Exceedance Tables

Percent	Current Speed Exceeding (m/s)
100.00	0.0
32.81	0.1
22.53	0.2
13.04	0.3
10.28	0.4
9.09	0.5
7.91	0.6
4.35	0.7
0.00	0.8
0.00	0.9
0.00	1.0

Table C-1 November 1974

Percent	Current Speed Exceeding (m/s)
100.00	0.0
29.12	0.1
21.47	0.2
15.29	0.3
10.00	0.4
8.24	0.5
6.76	0.6
5.00	0.7
3.82	0.8
0.29	0.9
0.00	1.0

Table C-2 October 1996

Percent	Current Speed Exceeding (m/s)
100.00	0.0
32.66	0.1
27.02	0.2
12.50	0.3
8.87	0.4
6.85	0.5
4.03	0.6
3.63	0.7
2.82	0.8
1.61	0.9
0.00	1.0

Table C-3 November 1970

Percent	Current Speed Exceeding (m/s)
100.00	0.0
23.04	0.1
22.55	0.2
21.57	0.3
14.22	0.4
10.29	0.5
6.37	0.6
1.96	0.7
0.00	0.8
0.00	0.9
0.00	1.0

Table C-4 December 2004

Percent	Current Speed Exceeding (m/s)
100.00	0.0
40.60	0.1
15.22	0.2
11.94	0.3
9.25	0.4
8.06	0.5
7.16	0.6
5.37	0.7
2.39	0.8
0.00	0.9
0.00	1.0

Table C-5 November 1966

Percent	Current Speed Exceeding (m/s)
100.00	0.0
23.44	0.1
17.97	0.2
16.80	0.3
12.89	0.4
10.55	0.5
8.98	0.6
5.47	0.7
3.91	0.8
0.00	0.9
0.00	1.0

Table C-6 October 2004