DRAFT

GREATER MOOSES TOOTH TWO (GMT2) DEVELOPMENT PROJECT PERMITTEE RESPONSIBLE WETLANDS MITIGATION PLAN

NATIONAL PETROLEUM RESERVE-ALASKA

Prepared for:
ConocoPhillips Alaska, Inc.
Anchorage, AK

ConocoPhillips

March 2018

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APPENDICES

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ACRONYMS LIST

ABR	ABR, Inc.- Environmental Research & Services
ACP	Arctic Coastal Plain
ASA	Aquatic Site Assessment
CFR	Code of Federal Regulations
CPAI	ConocoPhillips Alaska, Inc.
CWA	Clean Water Act
DA	Department of the Army
ESA	Endangered Species Act
GMT 2	Greater Mooses Tooth 2
HDL	Hattenburg Dilley & Linnell
HUC	Hydrologic Unit Code
NPR-A	National Petroleum Reserve- Alaska
NSB	North Slope Borough
NWI	National Wetland Inventory
PRM	Permittee Responsible Mitigation
USACE	U.S. Army Corps of Engineers
USFWS	United States Fish and Wildlife Service
WESTON	Weston Solutions, Inc.
WOUS	Waters of the U.S.

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1.0 INTRODUCTION

ConocoPhillips Alaska, Inc. (CPAI) is seeking a Department of the Army (DA) permit authorization from the U.S. Army Corps of Engineers (USACE) to construct the Greater Mooses Tooth Two (GMT2) development project, consisting of a drill site, access road, pipelines, and ancillary facilities to support development of petroleum reserves within the Greater Mooses Tooth Unit. The proposed work involves the placement of clean fill material on 78.1 acres, 77.9 acres of which are Waters of the U.S. (WOUS). A Vicinity map showing the location of the GMT2 Project is included in Appendix A, Figure 1.

The following sections constitute the Permittee Responsible Mitigation (PRM) Plan that conforms to 33 Code of Federal regulations (CFR) Part 332.4.

2.0 OBJECTIVES

The overall objective of this PRM plan is to demonstrate how CPAI intends to offset unavoidable wetlands impacts at GMT2 through permittee responsible wetlands restoration. The proposed restoration project presented in this PRM plan will provide mitigation for the wetlands impacted at GMT2. The mitigation project will restore important key functions to a riverine wetland system associated with a fresh water access road (Fresh Water Road) in Nuiqsut, Alaska. In addition, the project will provide safe and continuous access to Nuiqsut's fresh water supply reservoir. Safe and continual access to the reservoir is currently jeopardized by recurring flooding and road damage that occurs during breakup.

The current culvert battery crossing associated with the Fresh Water Road is undersized, resulting in ice damming and road over-topping that occurs during spring break up flood events. The gravel road prism over the culverts has been significantly damaged because of the overtopping, and is contributing to gravel deposition and excess sediment load to the riverine system. The undersized culverts and altered flows contribute to degraded aquatic function and altered the system's hydrologic and sediment transport functions.

The Fresh Water Road restoration project will restore important key riverine wetland function to 36.0 acres of lower perennial stream and abutting palustrine wetlands, as well as alleviate ice damming associated with annual break up discharges. This functional uplift will be achieved through restoring natural flows by: 1) upgrading the crossing to reflect natural conditions; 2) removing gravel that has washed downstream; and 3) elevating the road crossing above anticipated spring breakup flood elevations. This restoration project would provide direct benefit to a resident fish bearing stream and abutting wetlands that discharge directly to the Nigliq Channel of the Colville River. These improvements would protect a crucial Nuiqsut transportation corridor providing access to Nuiqsut's fresh water supply. A Restoration Site Overview Map is included in Appendix A, Figure 2.

3.0 SITE SELECTION

The proposed Fresh Water Road restoration site is in the village of Nuiqsut, Alaska. The proposed restoration site is identified on the Vicinity Map (Figure 1), and Overview Map (Figure 2), in Appendix A.

The NSB contracted Hattenburg Dilley, and Linnell (HDL) to complete a Project Analysis Report (PAR) for the crossing in 2016 (HDL 2016). HDL reported the crossing appears within the floodplain of the Colville River, and has undersized culverts that result in the roadway getting overtopped during high spring breakup flows.

The factors considered during the mitigation site selection process include consideration of the following:

- Watershed needs,
- Onsite alternatives, and
- Practicability of accomplishing an ecologically self-sustaining mitigation project

3.1 Watershed Needs

The GMT2 impacts occur along the drainage divide between the following 10-digit Hydrologic Unit Code (HUC) watersheds:

- 1906020507 - Outlet Fish Creek
- 1906020506 - Ublutuoch River

The Outlet Fish Creek watershed occupies 137,576.89 acres, and the Ublutuoch River watershed occupies 150,954.37 acres. The GMT2 project will impact 52.3 acres of wetlands in the Outlet Fish Creek, and 25.6 acres of wetlands in the Ublutuoch River watersheds, for a total of 77.9 acres of wetlands impacts. These two watersheds contain very little current development, and are made up almost entirely of jurisdictional WOUS, including wetlands. There are no known opportunities for wetlands restoration or creation projects within these two watersheds.

The proposed restoration project is in the adjacent Colville River Delta-Frontal Harrison Bay watershed (HUC-1906030413). This watershed occupies 303,614.25 acres and contains the village of Nuiqsut and the gravel infrastructure development associated with the village, transportation corridors, and gravel mining. The immediate area around Nuiqsut and the mitigation project site drain to the Nigliq Channel of the Colville River, an important subsistence resource for the area. The mitigation site and the Colville River possess habitat that can be used by Endangered Species Act listed threatened and/or endangered species. The proximity of the mitigation site to Nuiqsut creates an opportunity to provide wetlands and water water-related benefits to the community that is nearest to the GMT2 project, and to wetland and water resources used by the community.

3.2 Onsite Alternatives

Mitigation opportunities at the GMT2 project site were considered for compensatory mitigation. Because of the vast pristine nature of the abutting and adjacent wetlands, no restoration or wetlands creation opportunities are available onsite or in the same watershed.

3.3 Practicability of Results Being Ecologically Self-Sustaining

The proposed improvements to the Fresh Water Road will follow acceptable practices of arctic engineering and design. Regular monitoring, coupled with routine maintenance activities and returning the riverine system to its natural flows, will result in an ecologically self-sustaining restoration project.

4.0 SITE PROTECTION INSTRUMENT

CPAI does not own the land proposed for restoration activities. The site is managed by the local government (NSB). CPAI will discuss the possibility of a site protection instrument with the NSB, but only the NSB can decide to execute a site protection instrument.

5.0 BASELINE INFORMATION

5.1 GMT2 Baseline Information

ABR, Inc.- Environmental Research & Services (ABR) performed wetlands habitat mapping for the GMT2 project and submitted that information to CPAI in a July 2017 wetland delineation and desktop mapping verification report (ABR, 2017). The ABR report (Appendix B) contains detailed wetlands mapping and habitat descriptions for the proposed GMT2 impact area, which is included in a larger immediate study area investigated by ABR.

ABR reported the GMT2 Study Area contains typical tundra habitats composed of dwarf shrub and emergent vascular plants within saturated and seasonally flooded palustrine wetlands. The study area also comprises two shallow open-water pond systems with poor littoral zones. ABR reported the pond systems are likely remnants of drained lake basins, which are prevalent on the North Slope.

The ABR report concludes that the GMT2 project will impact 77.8 acres (rounded to the nearest 0.1 acre) of palustrine wetlands and a 0.1-acre pond habitat for a total of 77.9 acres of jurisdictional WOUS impacted. ABR reports the GMT2 project will also impact 0.2 acres of non-jurisdictional uplands.

CPAI is currently working with the USACE to determine the appropriate Aquatic Site Assessment (ASA) and debit valuation procedure.

5.2 Fresh Water Road Restoration Site Baseline Information

A formal wetland delineation has not been completed for the Fresh Water Road restoration site. The wetlands proposed for restoration were delineated from the desktop using United

States Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI) mapping (USFWS, 2017). NWI mapping was further adapted using current aerial photography and information contained within the 2016 PAR. The extent of the desktop mapping is depicted on Figure 2, Appendix A.

The desktop delineation indicates the Fresh Water Road restoration site currently consists of 35.7 acres of lower perennial riverine habitat (mapped to 20 foot above mean sea level), with palustrine emergent littoral zones and inclusions (R2EM2/UBH). The upstream portion of the system is delineated to the approximate extent of estimated maximum annual break up flooding elevation presented in the 2016 PAR. The downstream portion of the restoration site terminates at another culvert crossing.

The 2016 PAR identified the restoration site as a culverted crossing over a series of kettle ponds that provides access to the community's water supply located 1.2 miles south of Nuiqsut. HDL reported a 16-foot wide gravel roadway crosses the unnamed drainage. HDL also reported the culverts were installed after a previous bridge failed. The crossing consists of three 48-inch diameter by 40-foot long galvanized corrugated steel culverts, armored at the inlets and outlets with sandbags. The crossing primarily drains 9.5 square miles, and conveys snowmelt and permafrost thaw. The stream has a mild hydraulic gradient of 0.4% and connects with the main channel of an unnamed stream that is approximately 500 feet downstream of the road crossing. The unnamed stream drains to the Nigliq Channel of the Colville River. HDL reported the road crossing at the proposed restoration site experiences regular overtopping caused by high spring breakup flows, ice damming, and currently undersized culverts.

This flooding has contributed to road damage which results in excess gravel and sediment deposition downstream of the crossing. This deposition has resulted in channel constriction downstream of the culverts and removal of shoreline vegetation and wetlands habitat. Additional impacts resulting from repeated inundation may be experienced upstream to the limit of reported flood elevations. The upstream portion also discharges from Nuiqsut airport; therefore, flooding could jeopardize the runaway during spring break up.

Photographs of the restoration site taken during the summer of 2017 are below:

Photo 1. View along roadway and crossing, looking south.

Photo 2. View along roadway and crossing, looking north.

Photo 3. View looking south at upstream side of culverts.

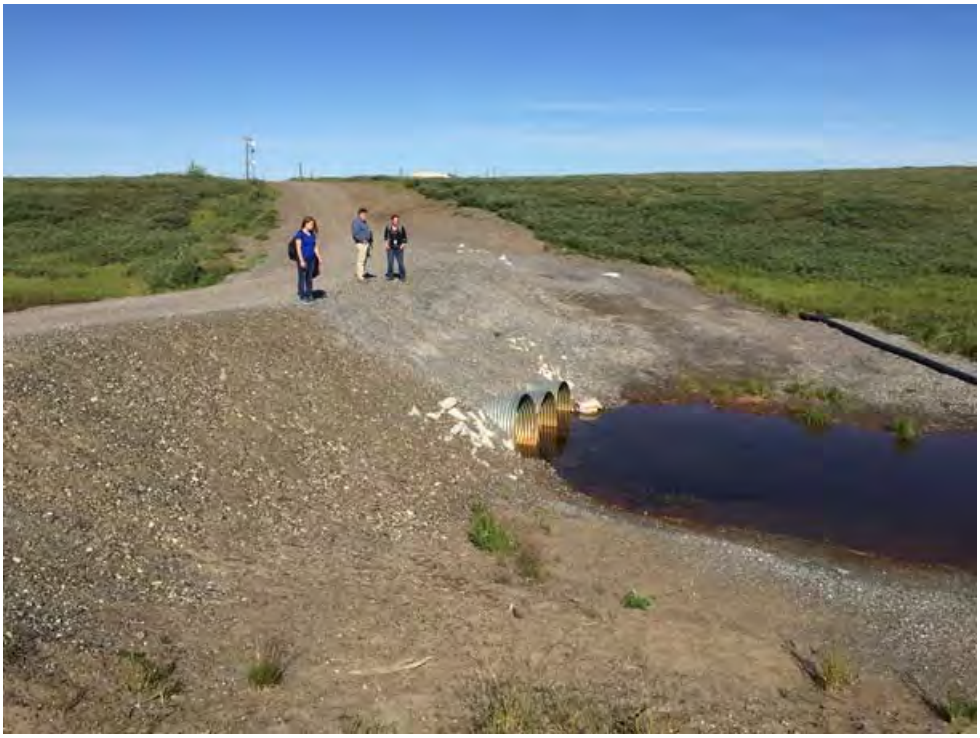

Photo 4. Looking north at downstream side of culverts. The gravel in the stream is from road washouts.

Photo 5. View of upstream side of culverts and sand bag armoring in creek and road embankment.

Photo 6. View downstream from road surface with gravel in stream.

6.0 RESTORATION CREDIT

The Fresh Water Road restoration project would benefit 36.0 acres of lower perennial stream channel and abutting wetlands. Mitigation would be provided by removing the gravel that has been washed downstream and restoring the crossing to natural flow conditions. The crossing restoration will involve widening the stream to its pre-disturbance ordinary high-water width. The restoration project will provide an approximate 0.30-acre increase in wetland surface area over the existing 35.7-acre habitat. The gravel removal will allow shore line palustrine wetlands to form.

Road integrity will be restored by strengthening the embankments and raising the road grade to above anticipated flood elevations, which will reduce existing effects the road has on the channel. Upstream channel deformation will likely subside given that excessive ponding from ice damming would be mitigated. Sediment transport function downstream will also be realized once natural flows and channel dimensions are restored at the crossing.

7.0 MITIGATION WORK PLAN

7.1 Fresh Water Road Restoration Work Plan

CPAI proposes to enter into a contractual agreement with the NSB, and plans to complete the Fresh Water Road restoration project by October 2020. The work will include removal of the existing culvert battery and restoring the stream to natural flow patterns. The project will include raising the road grade to above the anticipated flood stage level, and armoring slopes where necessary. The actual design of the crossing will be completed by December 31, 2018 and submitted to the Corps for approval.

The nature of the work and soils in the area lend themselves to construction during multiple seasons. CPAI will mobilize and demobilize materials and equipment for all construction activities. Ice roads will be used during winter activities. CPAI will work closely with the NSB and Nuiqsut for specific construction activity timing.

The excess gravel deposited downstream because of the recent flood events will be removed as part of this effort. The gravel, depending on the quality, could be reused in road grade improvements. Vegetation along the shoreline will be allowed to develop naturally where gravel is removed.

8.0 MAINTENANCE PLAN

Land at the Fresh Water Road restoration site is owned and managed by the NSB. CPAI is working with the NSB to develop the appropriate maintenance plan and schedule. A copy of the letter agreement documenting CPAI's discussions with the NSB is provided as Appendix D to this Mitigation Plan.

9.0 PERFORMANCE STANDARDS

The design will restore natural flows, and remove the excess sedimentation downstream of the crossing. Upstream portions of the stream will experience a reduction in flood elevations and ice damming during breakup. This will alleviate the potential for shoreline erosion and ice gouging.

Most importantly, an improved crossing would also provide year-round community access to the fresh water supply south of the crossing. The threat of flooding to the airport runway will be reduced. Any other use of the road crossing, such as for access to subsistence or recreational activities, will also be improved.

10.0 MONITORING PLAN

CPAI will work with the NSB to finalize the appropriate monitoring plan prior to permit issuance. Generally, we expect the plan to include the performance of a certain number of weekly spring break-up inspections after construction to ensure the crossing and repaired road sections are operating effectively and in accordance with the objectives of this Plan. The data collected during the inspections would document the performance of the crossing repair. The findings of each inspection, including notes and photographs, would be provided to USACE each year.

11.0 LONG-TERM MANAGEMENT

CPAI is currently working with the NSB to develop the appropriate long-term management strategy given that the road is a public road and is subject to NSB maintenance.

12.0 ADAPTIVE MANAGEMENT

As with Section 11.0 above, CPAI is currently working with the NSB to develop the appropriate adaptive management strategy.

13.0 FINANCIAL ASSURANCE

CPAI will ensure the project, as explained in this document, is executed. CPAI will work with the USACE to finalize Financial Assurance language prior to permit issuance.

14.0 REFERENCES

ABR, Inc.- Environmental Research & Services (ABR). 2017. Wetland Delineation and Desktop Mapping Verification for the Greater Mooses Tooth 2 Development Project, Alternative A-2015. 2017.

Hattenburg Dilley & Linnell (HDL). 2016. Project Analysis Report, Nuiqsut Repair Bridge Crossings. 2016.

United States Fish & Wildlife Service (USFWS). 2017 Nation.al Wetland Inventory Mapping website. 2017. https://www.fws.gov/wetlands/data/Mapper.html.

APPENDICES

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APPENDIX A
FIGURES

GMT2 Compensatory Mitigation

Vicinity

Figure 1

151°40'0"W 151°30'0"W 151°20'0"W 151°10'0"W 151°0'0"W 150°50'0"W

70°20'0"N 70°15'0"N 70°10'0"N

Atigaru Point-Frontal Harrison Bay #1906020509

Atigaru Point-Frontal Harrison Bay #1906020509

Outlet Fish Creek #1906020507

Fish Creek Iqalliqpik

Tingmiaqsiugvik River Ublutuoch

Nechelik Channel Niglig

Niglvik Channel

Sakoonang Channel

Colville River Kuukpik

Putu Channel

T11N R2E T11N R3E T11N R4E T11N R5E

T10N R2E T10N R3E T10N R4E T10N R5E

NPR-A

CD1 CD2 CD4 CD5

GMT1

GMT2

Greater Mooses Tooth Unit

Ublutuoch River #1906020506

Colville River Delta-Frontal Harrison Bay #1906030413

Colville River Unit

Pikka Unit

Nuiqsut

Fresh Water Road Restoration Project

Outlet Itkillik River #1906030410

Hydrologic Restoration
- Nuiqsut Freshwater Restoration

USGS Hydrologic Units
- HUC 10

Proposed/Permitted
- GMT1/GMT2 Pipeline
- GMT2 Road
- GMT2 Pad

Infrastructure
- Pipeline
- Road
- Pad

Land Administration
- BLM (NPR-A)

Oil and Gas Unit
- Unit

Map Extent

NPR-A

N

0 1 2 Miles

ConocoPhillips Alaska, Inc.

March 5, 2018

Document Name: GMT2_ComMit_Nuiqsut_Freshwater_Restoration_Fig1_Vicinity.mxd

151°3'0"W 151°2'0"W 151°1'0"W 151°0'0"W 150°59'0"W

70°13'0"N

70°12'30"N

70°12'0"N

Nuiqsut

Airstrip

R2EM2/UBH

151°2'0"W 151°1'0"W 151°0'0"W 150°59'0"W

GMT2
Compensatory Mitigation

Nuiqsut Freshwater Road Restoration Site Overview

Figure 2

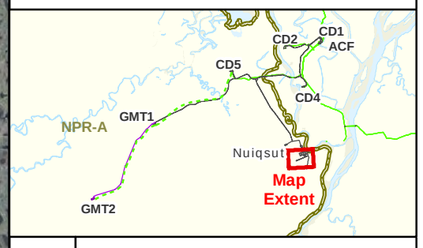
Hydrologic Restoration

Hydrologic Restoration Area

National Wetlands Inventory

NWI Wetland (Adapted)

Note:
The map extent falls within Hydrologic Unit 10 #1906030413.



N

0 500 1,000 Feet

ConocoPhillips Alaska, Inc.

March 5, 2018

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APPENDIX B
ABR GMT2 WETLANDS DELINEATION

WETLAND DELINEATION AND DESK-TOP MAPPING VERIFICATION FOR THE GREATER MOOSE'S TOOTH 2 DEVELOPMENT PROJECT, ALTERNATIVE A—2015

FINAL REPORT

Prepared for

ConocoPhillips Alaska, Inc.
P.O. Box 100360
Anchorage, Alaska 99510-0360

Prepared by

ABR, Inc.—Environmental Research & Services
P.O. Box 240268
Anchorage, AK 99518

July 2017

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INTRODUCTION

ConocoPhillips Alaska, Inc., (CPAI) is proposing to extend a road and pipeline from the Greater Moose's Tooth 1 (GMT1) project to a new drill site, Greater Moose's Tooth 2 (GMT2) (Figure 1). This report describes the results of an office-based wetland mapping delineation and a brief 1-day field wetland survey to verify the mapping.

STUDY AREA

The extent of the study area described in this report was developed to meet the specific needs of U.S. Army Corps of Engineers (USACE) in identifying the Least Environmentally Damaging Practicable Alternative (LEDPA); supporting the determination of jurisdictional status for a Clean Water Act (CWA) and Section 404 wetland permit for Alternative A. Gravel project components including the road, drill pad and roadway pullouts were buffered by 300 ft and the pipeline alignments were buffered by 150 ft (Figure 1). Location coordinates for the study area center point are -151.588681, 70.209001, NAD 83, UTM Zone 5. The legal description of the wetlands study area is Umiat Meridian:

- TWP 10N, RNG 2E Sections 1, 11, 12, 14, 22, 23, 27, 32, 33, 34
- TWP 11N, RNG 3E Section 31
- TWP 10N, RNG 3E Section 6

METHODS

FIELD SURVEY

On 21 July 2015, a single-day map-verification survey was conducted at 9 sites within the GMT2 mapped area (Figure 2) by Wendy Davis and Erin Johnson (both of ABR). Standard wetland determination forms (USACE 2007a) were completed at each site to confirm both wetland status and classification of the mapped polygons. Using the Ecological Land Survey (ELS) mapping, which was refined to represent wetland types in the study area (see Wetland Mapping and Classification below), the wetland determination plots were preselected within wetland polygons where the underlying aerial photo-signatures did not clearly indicate wetland type boundaries or where landscape changes may have occurred since the original ELS mapping

was conducted in 2003. Field plots were also selected to confirm that well-known and distinct photosignatures represented the wetland types currently mapped in the study area.

At each site, routine wetland determinations were performed following the USACE three-parameter approach (Environmental Laboratory 1987, USACE 2007a). To be classified as a wetland, a site must be dominated by hydrophytic plants, have hydric soils, and show evidence of a wetland hydrologic regime. A mobile *Trimble® Nomad™* series GPS unit was used to record the wetlands data (using the *WetForm* database) and GPS location for each plot, and provided field access to aerial imagery for the study area. *WetForm* is a commercially developed relational database (Ecotone Corp.) used to enter wetlands site data in the field; it also facilitates the preparation of electronic copies of the 2007 Regional Supplement dataform for each wetland determination plot. Site photos and photos of soils and vegetation were taken at each wetland determination plot. Field wetland determination data forms and photographs are provided in Appendix A.

WETLAND MAPPING AND CLASSIFICATION

The existing, fine-scale ELS maps and associated data for the northeast NPR-A (Jorgenson et al. 2003) were used as the basis for the wetlands mapping. The ELS maps (mapped at a scale of 1:10,000) delineate ecotypes, or local-scale ecosystems, that include information on geomorphology, surface forms, microtopography, and vegetation in the study area. Geomorphology data are represented, in part, by geomorphic (terrain) units that incorporate landform and soil characteristics developed for Alaska by Kreig and Reger (1982) and the Alaska Division of Geological and Geophysical Survey (1983). Geomorphic units incorporate physiography, slope and watershed position, and connections to adjacent waters. For geomorphology, surficial deposits also were emphasized, as they have the most influence on ecological processes. Surface forms (macrotopography) were developed for the North Slope by Jorgenson et al. (2003) based on a system modified by Schoeneberger et al. (1998), and the microtopography classification used follows Washburn's (1973) system for periglacial environments. Vegetation classes were modified from the system developed by Viereck et al. (1992).

For the initial, office-based wetland mapping effort, the ELS ecotypes were crosswalked to Cowardin et al. (1979) wetland types using standard NWI annotation (Dahl et al. 2009). This

crosswalk was applied to the ELS data for the northeast NPR-A and the GIS line work was refined as necessary to provide a fine-scale (1:2,000) map for wetlands permitting. A minimum map unit size of 0.1 acre was applied for permanently to seasonally flooded/saturated wetlands and a minimum map unit size of 0.5 acre was applied for saturated to seasonally flooded wetlands and non-wetlands. After the field survey was completed, the wetlands mapping was modified, as needed, to include the new information obtained on-site.

PROPOSED JURISDICTIONAL STATUS

Wetlands and waters within the study area were assessed to determine if they met the definition of a water of the U.S., subject to jurisdiction under Section 404 of the CWA, and/or a navigable water of the U.S., which is subject to jurisdiction under Section 10 of the Rivers and Harbors Act. "Navigable waters of the U.S." are defined as "those waters subject to the ebb and flow of the tide shoreward to the mean high water mark and/or are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce. A determination of navigability, once made, applies laterally over the entire surface of the waterbody, and is not extinguished by later actions or events which impede or destroy navigable capacity" (33 CFR 329). "Waters of the U.S." are defined as Traditional Navigable Waters of the U.S. (TNW); tributaries to navigable waters of the U.S. that are relatively permanent (RPW); and other waters of the U.S. that include: intermittent streams that are not relatively permanent, wetlands, lakes, and ponds adjacent to navigable waters or their tributaries (40 CFR 230.3[s]). The CWA definitions are further defined by two Supreme Court decisions; SWANCC and *Rapanos,* which provide guidance on interstate commerce and significant nexus respectively. A significant nexus test is required for some waters of the U.S. that do not meet the criteria for navigability, adjacency, and permanence.

A procedure to define connectivity of waters to TNWs through the classification of waters as tributaries, adjacent wetlands, or significant nexus is described in the *U.S. Army Corps of Engineers Jurisdictional Determination Form Instructional Guidebook* (USACE 2007b). This guidance was used to classify wetlands and waters within the study area and to provide an initial recommendation on the jurisdictional status of the wetlands identified.

RESULTS

FIELD SURVEY

The GMT2 mapped study area contains 5 NWI wetland types and 1 naturally occurring non-wetland (upland) (Figure 2a-e). No new NWI wetland types were identified as a result of the field survey but some map polygons were re-attributed around 2 upland field plots and adjustments were made to the hydrologic regime of some mapped wetland polygons based on the field observations.

WETLAND MAPPING AND CLASSIFICATION

WATERS

One waters wetland type was mapped and verified within the mapped study area (PUBH). Ponds were delineated separately if greater than 0.1 acres surface area and if they were relatively distinct from surrounding wetland complex types. The ponds within the GMT2 mapped study area are predominantly shallow waterbodies with absent or poorly developed lacustrine fringe types. Often they are a part of drained lake basin wetland complexes. During the field survey 2 ponds were documented. The first at GMT2-03 (Figure 2a, Appendix A) was a very small waterbody that was recently drained or dried and that was mapped within the overall surrounding wetland complex. The second, GMT2-05 (Figure 2b, Appendix A) was a larger pond that was delineated separately but also had undergone some drying since originally mapped in 2003.

WETLANDS

Permanently Flooded Emergent Marsh (PEM1H) occurs throughout the GMT2 mapped study area. During the field survey overflight we did not observe any PEM1H types dominated by Arctic pendant grass (*Arctophila fulva*). The emergent marshes are more typically mapped within drained and drying lake basins with complexes of small patches of open water and interspersed with permanently flooded zones with aquatic sedges such as water sedge (*Carex aquatilis*). Semi-permanently Flooded Wet Graminoid Meadow (PEM1F) occurs in similar geomorphic positions to PEM1H and was sampled 1 time during the field survey at GMT2-04 (Figure 2a, Appendix A). At that location it occupied large low center polygons within a drained basin, supporting aquatic sedges such as *C. aquatilis*, round sedge (*C. rotundata*), and tall cottongrass (*Eriophorum angustifolium*).

The majority of the mapped area was dominated by Seasonally Flooded/Saturated Graminoid/Shrub Meadow (PEM1/SS1E) and Saturated Graminoid/Shrub Meadow (PEM1/SS1B). Both types support typical tussock tundra but PEM1/SS1E is differentiated by the presence of 10% or greater cover of open surface water in thermokarst troughs and a mixture of low and high center polygons whereas PEM1/SS1B has very little surface water present and is often characterized by a non-patterned surface on gently convex rolling terrain. PEM1/SS1E supports a variety of dwarf shrubs including diamond willow (*Salix pulchra*), dwarf birch (*Betula nana*), marsh Labrador tea (*Rhododendron tomentosum*), and lingonberry (*Vaccinium vitis-idaea*). The dominant herb is tussock-forming cottongrass (*Eriophorum vaginatum*) but codominants also include obligate wetland sedges such as *C. aquatilis*. PEM1/SS1B has a similar common flora but with less prevalence of obligate wetland plant species.

UPLANDS

The mapped GMT2 study area is undisturbed and no areas of upland fill are present at this time. During the field survey naturally occurring uplands were documented at 2 locations: GMT2-06 (Figure 2b) and GMT2-09 (Figure 2d, Appendix A). Both upland sites were located on very shallow convex banks next to drained lake basins. The plant community in these well-drained areas is more diverse than observed in wet or saturated areas and includes low shrubs such as Richardson's willow (*Salix richardsonii*), *Betula nana*, and *Salix pulchra*. Common dwarf shrubs include *R. tomentosum*, *V. vitis idaea*, least willow (*S. rotundifolia*), and entireleaf mountain-avens (*Dryas integrifolia*). The dominant herb is *E. vaginatum* forming tussocks but in the dryer well drained areas Bigelow's sedge (*Carex bigelowii*) may be recolonizing older tussocks. Soils are well-drained loams to sandy loams with buried organic layers but no hydric soil indicators evident. No primary or secondary hydrology indicators were observed at either location.

PROPOSED JURISDICTIONAL STATUS

The closest TNW to the study area is the Bering Sea located approximately 20 miles to the north east (ADNR 2017). Wetlands in the study area are immediately adjacent to either Fish Creek or the Ublutuoch River, both of which are perennial non-navigable waterways draining directly to the Bering Sea. As described in the Wetlands section (above) wetlands in the area