

July 25, 2012

Ms. Mary Ramero  
U.S. Army Corps of Engineers, Alaska District  
P.O. Box 6898  
2204 3rd St.  
JBER, AK 99506-0898

**Subject: Request for Approved Jurisdictional Determination of Proposed Mustang Development Project Area, Southern Miluveach Unit, North Slope, Alaska**

Dear Ms. Ramero:

On behalf of Brooks Range Petroleum Corporation (BRPC), OASIS Environmental, Inc., an ERM Company (OASIS), submits this request for an approved jurisdictional determination to the U.S. Army Corps of Engineers (USACE). It covers the wetland delineation conducted by our office in the proposed oil and gas reservoir called the Mustang Field, located in the Southern Miluveach Unit (SMU) and adjacent to the western boundary of the Kuparuk River Unit (KPU) on Alaska's North Slope.

This cover letter and included report follow guidance provided in Special Public Notice (SPN) 2010-45 "Consultant-Supplied Jurisdictional Determination Reports" (January 29, 2010), and summarize our approach and findings. We request USACE confirm that:

- the wetland delineation performed by OASIS complies with USACE methodology;
- there are no other wetlands present within the project area; and
- OASIS has evaluated the jurisdictional status of the project area wetlands appropriately.

As per SPN 2010-45, the following information is provided for reference:

### ***PURPOSE OF THE REQUEST & PROJECT DESCRIPTION***

The purpose of this request is to obtain an approved jurisdictional determination for the wetlands located within the proposed project area. BRPC proposes to develop the Mustang Field, an oil and gas reservoir located in the Southern Miluveach Unit [SMU] and adjacent to the western unit boundary of the Kuparuk River Unit [KRU]. The target horizon is the Kuparuk C sand. The proposed development will include an independent, standalone processing center to produce dry oil for transport and sales to the Alpine common carrier pipeline system. Source water for Mustang reservoir pressure maintenance and waterflood will come from the Alpine source water line via pipeline in the same pipeline corridor as the Alpine common-carrier sales pipeline. Shared wellbores, horizontal drilling technology and long-reach wells will be used to maximize production while minimizing surface impacts. BRPC expects to recover 40 million barrels (bbl) of oil from these accumulations.

The assessment area included all of the areas being considered for project activities (including project alternatives) plus a 250-meter buffer around all proposed design footprints for a total of 2,014 acres. More

specifically, the project area is located in the USGS Quad Harrison Bay A1 & B1; 70.2590 ddN, -150.1840 ddW NAD83 datum; Township 10N, Range 7E; Township 10N, R8E; Township 11N, Range 7E; Township 11N, Range 8E of the Umiat Meridian (UM).

The project area can be accessed via road travel or air. From Prudhoe Bay, the project site can be accessed through the greater Prudhoe Bay road infrastructure. Beginning at the Deadhorse Airport, follow the Spine Road to the wye intersection of the Oliktok and Tarn/Meltwater roads; then follow the Tarn/Meltwater Road until just southwest of the Kuparuk River Unit Drill Site 2 where the proposed Mustang Project access road will leave the Tarn/Meltwater Road and proceed west to the proposed project drilling and production pad. Total road travel is approximately 48 miles from the Deadhorse Airport to reach the proposed Mustang access road.

### **CURRENT PROPERTY OWNER**

State of Alaska, Department of Natural Resources  
Office of the Commissioner  
550 W. 7th Ave., Suite 1400  
Anchorage, AK 99501

### **APPLICANT**

Brooks Range Petroleum Corporation  
Mark Wiggin  
510 L Street, Suite 601  
Anchorage, AK 99516  
(907) 339-9965

### **WETLAND DELINEATOR**

OASIS Environmental, Inc., *an ERM Company*  
Jeannette Blank and Levia Shoutis (Delineators), Dave Trudgen (Contact)  
825 W. 8th Ave.  
Anchorage, AK 99501  
(907) 258-4880

### **LANDOWNER PROPERTY ACCESS PERMISSION**

A letter granting permission to access the project site is provided in Appendix A (signed by landowner and renter). *A drafted letter has been compiled for Brooks Range to use or edit.*

### **REQUEST SUMMARY**

OASIS on behalf of BRPC requests an approved jurisdictional determination for the proposed Mustang Development project area. If you have questions or require additional information, please contact Dave Trudgen or myself at (907) 258-4880.

Sincerely,

**OASIS Environmental, Inc., an ERM company**



MacNamara Shoulders

Project Manager



**MUSTANG DEVELOPMENT PROJECT**

**REQUEST FOR**  
**JURISDICTIONAL DETERMINATION APPROVAL**



July 25, 2012

Prepared for:

**Brooks Range Petroleum Corporation**

510 L St., Suite 601  
Anchorage, AK 99501

Prepared by:



An ERM Company  
825 W. 8th Ave.  
Anchorage, AK 99501



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- C: Wetland Determination Datasheets
- D: Select Photographs of Determination Points
- E: Arctic Coastal Plain Species List
- F: Preliminary JD Form



## ACRONYMS AND ABBREVIATIONS

ACP .....	Arctic Coastal Plain
ACS .....	Alaska Clean Seas
ADF&G.....	Alaska Department of Fish & Game
ADNR.....	Alaska Department of Natural Resources
bgs.....	below ground surface
BLM .....	Bureau of Land Management
BRPC.....	Brooks Range Petroleum Corporation
CAH .....	Central Arctic Caribou Herd
CFR .....	Code of Federal Regulations
USACE Manual .....	1987 USACE of Engineers Wetland Delineation Manual
CWA .....	Clean Water Act
DP.....	Determination Point
GPS .....	Global Positioning System
JD .....	Jurisdictional Determination
MDP .....	Mustang Development Project
NRCS.....	National Resources Conservation Service
NSB .....	North Slope Borough
NWI.....	National Wetlands Inventory
OASIS.....	OASIS Environmental, Inc., an ERM company
PCH .....	Porcupine Caribou Herd
PJD .....	Preliminary Jurisdictional Determination
Regional Supplement	Alaska Regional Supplement to the 1987 USACE Manual
RPW .....	Relatively permanent waters
TCH .....	Teshekpuk Caribou Herd
TNW.....	traditional navigable waters
UM .....	Umiat Meridian
USACE.....	United States Army Corps of Engineers
USDA .....	United States Department of Agriculture
USDOI.....	United States Department of the Interior
USFWS.....	United States Fish & Wildlife Service
USGS.....	United States Geologic Survey
VSM .....	Vertical Support Member
WAH .....	Western Arctic Caribou Herd
WET.....	Wetland Evaluation Technique

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## 1. INTRODUCTION

This report presents the results of wetland delineations, characterizations, and wetland and aquatic habitat mapping for the proposed Mustang Development Project (MDP). The MDP is located in the Arctic Coastal Plain (ACP) ecoregion of Alaska (USGS, 1995), a poorly drained, treeless coastal area that rises gradually from sea level to the northern foothills of the Brooks Range. The nearly level to gently rolling topography is underlain by thick permafrost, one to four feet below ground surface. This relatively impermeable permafrost acts as a shallow aquitard, creating a generally moist to wet environment with numerous ponds and lakes (as observed within the proposed project area).

Brooks Range Petroleum Corporation (BRPC) is proposing to develop the Mustang Field, an oil and gas reservoir located in the Southern Miluveach Unit [SMU] and adjacent to the western boundary of the Kuparuk River Unit [KRU]. The assessment area included all of the areas being considered for project activities (including project alternatives) plus a 250-meter buffer around all proposed design footprints for a total of 2,014 acres. More specifically, the project area is located in the USGS Quad Harrison Bay A1 & B1; 70.2590, -150.1840 decimal degrees in NAD83 datum; Township 10N, Range 7E; Township 10N, R8E; Township 11N, Range 7E; Township 11N, Range 8E of the Umiat Meridian (UM).

Full details of the Mustang Development project are described in the “Mustang Development Project Description” (BRPC 2012).

The Mustang Field will be a development of the same reservoir interval—Kuparuk “C” sand—as is being produced in the Kuparuk River Unit. Maximum oil production rate is predicted will be 15,000 bpd and total expected recovery will be approximately 40 million barrels oil over an expected field life of 15 years. Reservoir water flood and pressure support will employ KRU Seawater Treatment Plant. Surface facility development for the Mustang Field will make provision for up to 38 wells on a minimum of 15-foot well centers. Power for process facilities and non-process infrastructure will be generated onsite with dual-fueled turbine generation packages. All produced gas volumes not used for fuel gas will be re-injected into the productive horizon for pressure support. Lift gas will be the lift mechanism for the field.

The separation process will be a 2-phase separation with inlet heater, inlet separator, and treater followed by crude cooling, crude sales measurement, and shipping pumps to the Alpine Transportation Company pipeline. Well allocations will be accomplished using a test separator configuration at the drill site adjacent to the wells.

### 1.1. Primary Development Elements

The overall scope of the development includes the following major elements: 1) gravel mine development, gravel roads, and production pad; 2) drill site modules, central processing facility modules, and cross country pipelines; 3) non-process buildings and equipment; 4) communications tower and related hardware; 5) injection and production wells; 6) temporary drilling support facilities, vehicles, and equipment. The Mustang oil

field will be developed as a standalone process facility concept, one largely independent of connections to existing North Slope processing facilities. The only process connections between the Mustang facility and existing field process infrastructure will be two pipeline connections; 1) approximately an 6" diameter crude sales pipeline with connection to the Alpine Transportation Company 14" diameter crude sales pipeline, and 2) approximately an 6" diameter water pipeline with connection to the Alpine 12" source water pipeline, both approximately 750 feet from Mustang pad.

## **1.2. Development Elements and Associated Components**

As a standalone, independent oil field, Mustang will necessitate installation of many of the same facility and project components associated with other North Slope oil field developments. The Mustang project will include the following major components:

### **1.2.1. Gravel Mine, Roads and Pad**

(See Appendix A of the 404 Application, "Mustang Gravel Mine Development and Rehabilitation Plan")

- Ice roads to support gravel mine development and pad / road construction in winter-2013 through April-2013;
- A 500 ft by 500 ft wide ice pad to be constructed adjacent to the access road, approximately one mile east of the Mustang production pad, used to support installation of the production facilities during the winter of 2012 and 2013;
- Development of a gravel mine 3,400 feet north of Mustang production pad;
- A 0.67 mile, 32 feet wide, gravel mine access road (4.3 acres) between gravel mine and access road to production pad;
- An approximately 4.4 mile, 32 feet wide production pad access road (29 acres) to connect Mustang Pad to KRU road near KRU Drill Site 2M; and
- Gravel production pad [~19 acres] for wells, central production facilities, and non-process infrastructure.

### **1.2.2. Surface Process Facilities and Cross-Country Pipelines**

- Three-phase central processing facility to produce sales-quality crude;
- Tank Farm;
- Well tie-ins, pipe rack, headers, and well test separation for production allocation;
- Oil pipeline for transport of sales oil to the Alpine Pipeline;
- Water pipeline for seawater transport from the Alpine source water pipe-line to the Mustang Field; and
- Pipe rack and ancillaries for up to 38 production and injection wells and associated well tie-ins.

### **1.2.3. Non-Process Buildings / Equipment**

- Buildings will include:

- Operations / Drilling Camp ~ 120-bed
- Construction Camp ~ 250-bed
- Operations Support Center [OSC]
  - Warehouse
  - Maintenance facility
  - Storage
  - Offices
  - Process Control room
- Construction Support Center [CSC]
  - Warehousing and issue counter
  - Welding
  - Laydown
  - Maintenance
- Non-process equipment and vehicles will potentially include:
  - Rolling stock such as loaders / vac trucks / diesel fuelers
  - Light Plants / portable generation
  - Passenger vehicles / transport buses / work trucks

#### **1.2.4. Communications infrastructure**

- Tower
- Communications Module

#### **1.2.5. Wells**

- Initial 12 producers and 11 injectors on 30 foot well centers with provision for up to 38 wells on 15 foot well centers

### **1.3. Purpose**

The purpose of the wetland delineation and evaluation work is to identify areas of the proposed project that are within the jurisdiction of Section 404 of the Clean Water Act (CWA) as interpreted by the United States Army Corps of Engineers (USACE), Alaska District. These jurisdictional areas require authorizations from USACE prior to development activities in the form of a Section 404 permit for the discharge of dredged or fill material into waters of the U.S., and wetlands. Section 404 jurisdiction includes all "waters of the U.S." as defined in 33 CFR Part 328.3(a)(1 – 8). This report and attached maps and data are provided to assist USACE in developing an approved jurisdictional determination (JD) of wetlands and waters within the assessment area.

The 2,014-acre area investigated for the proposed MDP spans approximately 9 kilometers, and ranges from between 500-1500 meters wide, between the Tarn/Meltwater Road near DS2M and west to the Miluveach River. The assessment

area (wetland mapping area) includes all of the proposed project infrastructure, proposed gravel mine, access roads, as well as potential alternatives, and a surrounding 'buffer area' (extending a minimum of 250-meters from proposed infrastructure centerlines) that may be affected by project activities (See Appendix B, Figures). In addition to the buffered project area, the assessment area also includes a few additional areas, such as the area between the proposed and alternative road alignments, where it was more efficient to map these intermediary areas rather than subsequently clip them out. Note that the proposed and alternative alignments have changed since the original field assessment, and the proposed gravel mine has been added north of the project area, thus there are wetland determination points located outside of the current assessment area.

For the purpose of this report, the entire assessment area has been evaluated for the presence of jurisdictional wetlands and waterways. The following sections describe methods and findings of this evaluation.

The wetland investigation included the following:

- Documentation of the presence of wetlands and waters of the U. S. occurring within the proposed project corridor and alternatives;
- Delineation of the wetland boundaries and uplands occurring within the proposed project corridor and alternatives using accurate field mapping techniques;
- Characterization of vegetation communities and habitats potentially affected by the project;
- Assessment of the function and value of these communities. (Note: the functions and values assessment is described in a separate project report titled the "Mustang Development Project Wetland Functional Assessment and Categorization Report").

This jurisdictional determination report includes:

- A description of the methods used to evaluate project area wetlands and a summary of the important findings;
- A letter from the landowner granting permission to access the site if necessary to assist USACE in the JD evaluation process (Appendix A);
- Wetland classification and mapping (Appendix B) using field data, topographic maps, 1 ft-resolution aerial imagery, and U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) Mapper (<http://www.fws.gov/wetlands/Data/Mapper.html>);
- Supporting figures for jurisdictional determination findings (Appendix B);
- The field survey data (datasheets) used to verify wetland and upland boundaries (Appendix C) and associated photographs (Appendix D);
- A list of plant species observed on site and a list of wildlife species associated with Arctic Coastal Plain habitat (Appendix E); and

- A preliminary jurisdictional determination (PJD) form to assist in the JD evaluation (Appendix F).

The field survey was performed for and under the direction of BRPC by OASIS on August 5th through August 10th of 2011, during the normal growing season when vegetation, soils, and hydrology parameters were obtainable for detailed evaluation. On August 5th and 6th the sites were accessed by helicopter operated by Bristow Helicopters in Deadhorse, AK and on August 7th through the 10th the sites were accessed via pick-up truck on gravel roads from Deadhorse and walking. Project design plans were updated following the 2011 field season which required additional 'desktop' wetland mapping using ArcMap10, and 1 ft resolution aerial imagery.

#### **1.4. Background Information**

The project area is located in the Arctic Coastal Plain (ACP) ecoregion of Alaska (USGS, 1995). The ACP is a poorly drained, treeless coastal area that rises gradually from sea level to the northern foothills of the Brooks Range. The nearly level to gently rolling topography is underlain by thick permafrost, one to four feet below ground surface. This relatively impermeable permafrost acts as a shallow aquitard, creating a generally moist to wet environment with numerous ponds and lakes (as observed within the proposed project area). Average annual precipitation ranges from 100 mm to 150 mm. Average annual temperature ranges from 13°C to -10°C. Freezing can occur in any month of the year. Winds are persistent and are a contributing factor in shaping the vegetation and landforms of the area, although freeze-thaw cycles predominate in shaping the landscape. Microtopographic landscape features that affect soil drainage are also closely connected to the distribution of vegetation communities. As defined by Walker's (1983) Level C classification, there are 16 community types in the assessment area, including 14 wetland vegetation communities, 1 imported gravel area, and 1 upland community (Table 1 and Appendix B).

Rivers and streams within the proposed project area have their headwaters in the ACP. Streams originating in the ACP tend to have low velocities and have one spring peak in their hydrograph, corresponding with spring breakup. Surface water drainage patterns in the project areas are depicted in the Map Atlas (Appendix B)(Alaska Clean Seas 2010, <http://www.alaskacleanseas.org/tech-manual/>).

The ACP provides a diversity of bird habitat that includes large rivers, deltas, barrier islands and lagoons, wetlands, and many lakes and ponds (USACE 1999). These areas are used for molting, nesting, brood rearing, foraging, and as migration staging areas (USDOI, BLM 2004). Large mammals such as caribou, muskoxen and grizzly bear use the proposed project area on a seasonal basis.

The calving and summer range of the Central Arctic Caribou Herd (CAH) encompasses much of the Prudhoe Bay oil fields and the lower reaches of Kuparuk River (Arthur and Del Vecchio 2007). The CAH winters in the northern and southern foothills and mountains of the Brooks Range. The herd's range often overlaps with the Porcupine caribou herd (PCH) on summer and winter range to the east and with the Western Arctic

(WAH) and Teshekpuk (TCH) Herds on summer and winter range to the west. (ADF&G 2001).

Muskoxen are far less common than caribou in the area. Encounters in or near the project area or on roadways are expected to be rare. Current numbers of this re-introduced ACP population are depressed. Recent studies indicate they are vulnerable to calf predation by grizzly bears. Muskoxen generally avoid areas of deep snow in winter (ADF&G 2001). In summer, small herds disperse across the tundra and are often observed to the west in the lower Sagavanirktok river area.

Grizzly bears (*Ursus arctos*) on the Arctic Coastal Plain are at the northern limit of their range in North America and are major predators of both musk ox and caribou (Reynolds et al. 2002). However, the coastal plain is considered marginal bear habitat due to severe climate, short growing season, and limited food resources (Shideler and Hechtel, 2000).

The Miluveach River headwaters are located to the south in the ACP. The Miluveach River contains Dolly Varden (*Salvelinus malma*) and whitefish (undifferentiated species) anadromous fish populations (ADFG, 2011) in the vicinity of the project.

Please refer to the Environmental Report for a more detailed discussion of the wildlife habitat and species use of the proposed project area.

Historic and existing landuse within the proposed project area is minimal. The Tarn/Meltwater road has the only existing gravel in the project area. Approximately 1.8 acres of the road lie within the proposed project area. There is no other prior development within the proposed project area. There are also no known 'environmental concerns' such as contamination or pollutants within the proposed project area.



## 2. METHODS

### 2.1. Wetland Delineation

Wetland determinations were performed by experienced wetland scientists according to the *1987 Corps of Engineers Wetland Delineation Manual* (Corps Manual) (USACE 1987) and the *Alaska Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Alaska Region* (USACE 2007b). The primary tasks included a review of existing maps and ecological information, collection of field data at sample points to determine the presence or absence of wetlands including characterization, and delineation of the boundaries separating uplands and wetlands by habitat type.

Wetlands and waters within the entire assessment area were mapped using a combination of desktop and field techniques. Field data was collected in 2011 to map vegetation community types and boundary locations. Vegetation throughout the assessment area was mapped to Level C of Walker's (1983) hierarchical vegetation classification ("Walker"), which describes communities based on site moisture regime, dominant plant growth form, and physiognomic descriptor. This level of mapping relies on aerial photo interpretation with extensive ground reference data. To groundtruth the desktop vegetation mapping, thirty field determination points (DP) were established within the proposed project corridor and alternate corridor, with consistent spacing ( $\leq 0.8$  km) to provide adequate coverage for mapping. A total of 30 data points were collected in the field. At each determination point, a wetland determination was completed using USACE (1987) standard wetland delineation methods. In an effort to classify vegetation using Walker et al (1987), the following vegetation data was collected at each determination point: plant species and percent cover, dominant growth forms (e.g. sedge, dwarf shrub, forb, etc.), site moisture regimes (dry, moist, wet, or aquatic), and physiognomy (e.g. tundra, sand dunes). Desktop analysis was then used to complete the vegetation mapping effort, and included an analysis of determination point data, existing vegetation mapping, NWI mapping, aerial photographs and surface hydrology data. USFWS NWI (Cowardin 1979) class codes, and hydrologic modifiers, were also assigned to each wetland polygon.

Desktop analysis was used to complete the vegetation mapping effort and included an analysis of determination point data, existing vegetation mapping, NWI mapping, aerial photographs and surface hydrology data. The following data relevant to project vegetation, soils, and hydrology was reviewed by OASIS:

- 1-foot resolution orthophotography;
- 1:6000 topographic mapping;
- Surface hydrology flow vectors (Alaska Clean Seas [ACS, 2010]);
- U.S. Fish & Wildlife Service (USFWS) National Wetlands Inventory (NWI) mapping;
- Field Indicators of Hydric Soils in Alaska (USDA-NRCS, 2005);
- National List of Plant Species That Occur in Wetlands (USFWS)

- Other supporting literature, reference materials and data are listed in the Reference Cited section.

Detailed surface hydrology data (ACS, 2010) were reviewed to determine connections between wetlands and waters within the assessment area. ACS (2010) interpreted surface flow vectors from 1:6,000 topographic maps. These data indicate surface water flow connections between wetlands and waters likely during the early growing season, when the water table is high or possible connections later in the growing season during precipitation events.

USFWS NWI mapping was downloaded from the official NWI web site and reviewed for initial assessment and background information (NWI 2012). These NWI maps, created from aerial photo interpretation with limited ground-truthing, are useful for identifying relatively large and obvious wetland areas for planning purposes. Due to the scale at which available NWI mapping maps were created (typically 1:63,360) and the limited correlation with conditions on the ground, some wetlands could be missed. In addition, the scale of the NWI maps is usually not sufficient to determine accurate wetland boundaries in the field, though it does provide a guide to the location of major wetland areas.

OASIS also collected soils and hydrology data in accordance with the currently accepted methods for wetland determination in Alaska, described in the Regional Supplement. This 'three parameter approach' employed in wetland determination requires the three essential characteristics of wetlands (hydrophytic vegetation, hydric soils, and wetland hydrology) be present to have a positive wetland determination. Wetland delineation data sheets and photo documentation were completed for each sample location visited in 2011. Datasheet from the 2011 field effort are provided in Appendix C and representative photos are provided in Appendix D. The location of wetland determination points and other notable features were recorded with a Trimble GeoXH 2005 series Global Positioning System (GPS) unit.

For the purposes of mapping within the project area, wetland or vegetation types were based on the predominant ecosystem and vegetation of the wetland as a whole and not necessarily narrow bands or inclusions of other wetland/vegetation types or uplands. Most habitat in the project area consisted of mosaics of wetland/vegetation types. Dominant vegetation types were typically used to characterize habitats, but sometimes a combination of vegetation types was used to describe habitat within the project area, with multiple vegetation communities comprising a single wetland type.

## 2.2. Jurisdictional Determination

To determine the potential JD categories appropriate for wetlands and waters within the assessment area, OASIS reviewed existing data including aerial photographs, topography, and detailed surface hydrology inferred from topographic maps (ACS, 2010). This review was performed in consultation with federal guidance, including *Clean Water Act Jurisdiction Following the U.S. Supreme Court's Decision in Rapanos v. United States & Carabell v. United States (June 5, 2007)*; *U.S. Army Corps of Engineers*

*Jurisdictional Determination Form Instructional Guidebook and Approved Jurisdictional Determination Form (May 30, 2007); and SPN 2010-45 (January 29, 2010).*

Per these guidance documents, agencies will assert jurisdiction over the following categories of water bodies:

- Traditional Navigable Waters (TNWs);
- all wetlands adjacent to TNWs;
- non-navigable tributaries to TNWs that are relatively permanent (RPWs)<sup>1</sup>; and
- wetlands that directly abut such tributaries<sup>2</sup>.

Agencies will also assert jurisdiction over every water body that is not an RPW if that water body is determined to have a significant nexus with a TNW. These include the following water bodies:

- non-navigable tributaries that do not typically flow year-round or have continuous flow at least seasonally;
- wetland adjacent to such tributaries; and
- wetlands adjacent to but that do not directly abut a relatively permanent, non-navigable tributary.

TNWs were determined through review of the Alaska Department of Natural Resources (ADNR) Navigable Waters website mapping tool (ADNR, 2010).

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<sup>1</sup> RPWs are tributaries that typically flow year-round or have continuous flow at least seasonally (USACE 2007a).

<sup>2</sup> A wetland abuts a tributary if it is not separated from the tributary by uplands, a berm, dike or similar feature (USACE 2007a).

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### 3. IMPORTANT FINDINGS

Wetlands within the assessment area are classified as Palustrine, Riverine and Lacustrine by the existing USFWS NWI mapping (NWI, 2012). The predominant USFWS (NWI, 2012) classification in the assessment area is PEM1/SS1B with smaller areas of PEM1E, PEM1/SS1E, PEM1/USE, PABH, PUBH, L1UBH and R2US/UB. Wetlands within the assessment area are surrounded by and connected to larger wetland systems. Palustrine systems are connected to the east and south, a riverine system runs south to north immediately west of the assessment area (Miluveach River), and large lacustrine wetlands are located to the north of the assessment area with smaller lacustrine wetlands scattered throughout the central portion of the area.

The following provides a summary of the wetland areas that are likely within the jurisdiction of Section 404 of the CWA. This determination was based on the location of wetlands relative to TNWs and RPWs and their hydrologic linkage to those water bodies.

#### 3.1. Determination and Mapping

A total of 2,014.0 acres were assessed in support of the proposed Mustang Development Project and of this amount, 2,010.8 acres were classified and mapped as wetlands. A pingo, located within the proposed project corridor is classified as upland habitat (1.4 acres) and 1.8 acres of previously placed gravel fill for the Tarn/Meltwater Road are located in the proposed and alternative corridors, which comprise the remaining non-wetland acreage. Wetland features were delineated as distinct vegetation communities following Walker (1983) and are depicted in maps provided in Appendix B. Classified vegetation types are listed in Table 1 with their cumulative area, percent cover mapped within the proposed corridor and pad and the alternative project corridor, as well as a description of the vegetation type and the associated data point(s). Note that the 30 data points were initially distributed throughout the assessment area, however with new revisions of the project area, several data points are now located outside the original assessment area.

Vegetation communities include those associated with rivers, streams, lakes and ponds, and palustrine scrub-shrub/emergent wetlands. Non-wetland (pingo) or unknown/disturbed communities (placed gravel) make up a very small portion of the overall vegetation survey area (less than 1%). Individual Data Forms for Routine Wetland Delineations from each determination point are presented in Appendix B along with select photographs from each determination point in Appendix D.

Additionally, field observations, vegetation characterization, landscape and plot-investigations were used to further describe wetlands. Wetlands were often present as a mixture of vegetation types distributed across a microlandscape; distinct boundaries between wetland types were not always discernable. Using Walker's (1983) classification method, twelve distinct vegetation classifications [and one for gravel fill (Xe)] were identified in the investigation area (Table 1 in Section 3).

## 3.2. Assessment Area Vegetation Classifications

### 3.2.1. Water (1a)

Areas classified as Walker Type 1a account for approximately 70.4 acres, comprising 3.5% of the assessment area. This vegetation type was further parsed into three water codes, streams/rivers (1a2) (4.4 acres, 0.2%), lakes (lentic habitats greater than 20 acres, 1a3) (0.8 acres, 0.04%), and ponds (lentic habitats less than 20 acres, 1a4) (65.1 acres, 3.2%). All of the rivers/streams or riverine habitat are associated with the Miluveach River on the western edge of the assessment area, while the pond and lake communities are located throughout the assessment area. All Walker Type 1a wetlands are permanently flooded during the open water season, although some of the riverine habitats may become dry gravels during dry conditions present late in the summer season. The substrate in this type of habitat is generally unconsolidated with little to no vegetation. No determination points were established in this habitat type.

A long-tailed duck (*Clangula hyemalis*) with a brood of three was observed in this habitat type (lake) and unidentified fish species were observed in the Miluveach River during field investigations.



PHOTOGRAPH 1: OPEN WATER HABITAT LOCATED NEXT TO PROPOSED PRODUCTION PAD SITE  
(ADJACENT TO DP B4)

### 3.2.2. Shallow Water (IIa)

This habitat type occurs sporadically throughout the assessment area and in alternative corridors as shallow lakes and ponds. Total acreage is 26.7 acres, comprising 1.3% of the assessed area. These areas are permanently flooded during the open water season, although edges of the habitat may become exposed mud during dry conditions present late in the summer season. The substrate in this type of habitat is generally unconsolidated with little to no vegetation. No determination points were established in this habitat type.



PHOTOGRAPH 2: SHALLOW WATER HABITAT (LOCATED SOUTH OF DP B21)

### 3.2.3. Water/Tundra Complex (IId)

This habitat type was mapped in one area near the eastern edge of the assessment area adjacent to a large lake, located in a larger depressional basin. Total area is 4.2 acres, comprising 0.2% of the assessed area. Standing water was present throughout with emergent vegetation and small ponds. *Carex aquatilis* was the dominant vegetation with very few species other than this aquatic sedge. Although no determination points were established in this habitat type, it was investigated as part of DP B18 which is located on the fringe of this mapped polygon.

Greater white-fronted geese (*Anser albifrons*), red-necked phalarope (*Phalaropus lobatus*), and glaucous gulls (*Larus hyperboreus*) were observed on-site in this habitat.



PHOTOGRAPH 3: WATER/TUNDRA COMPLEX HABITAT (LOCATED ADJACENT TO DP B18)



### 3.2.4. Wet Sedge Tundra (IIla)

This vegetation community is found in isolated pockets throughout the assessment area. Cumulative acreage of this habitat type is 68.4 acres, comprising 3.4% of the assessed area. It typically contained standing water or super-saturated tundra with emergent vegetation. Sedges (*Carex aquatilis* and *C. saxatilis*) and cotton grass (*Eriophorum angustifolium*) were the dominant plants found in this habitat type with prostrate willows (*Salix* sp.), lousewort (*Pedicularis sedetica*), and avens (*Dryas integrifolia*) occupying topographic micro-highs. The substrate was found to be mostly loam. Determination points B4, B7 and B18 were located in this habitat type.

Caribou (*Rangifer tarandus*), and Lapland longspur (*Calcarius lapponicus*) were observed in this habitat type.



PHOTOGRAPH 4: WET SEDGE TUNDRA HABITAT (LOCATED AT DP B7)

### 3.2.5. Wet Sedge Tundra/Water Complex (IIIc)

This habitat type is common in the assessment area, especially in the central portion, but also found in the floodplain of the Miluveach River. Total area is 344.5 acres, comprising 17.1% of the assessed area. Ponds intermixed with sedge flats typified this community, often with standing water or super-saturated tundra between the ponds, which is found in lower areas (topographically) and broad draws. Cottongrass (*Eriophorum angustifolium*) and sedges (*Carex aquatilis*, *C. saxatilis*, *C. podocarpa*) were dominant plant species with avens (*Dryas integrifolia*) and willows (*Salix reticulate*, *S. arctica*, *S. planifolia*) occupying topographic micro-highs. Determination points B1, B8, B11, B12, B22, and B28 were located in this habitat type.

Caribou (*Rangifer tarandus*), Lapland longspurs (*Calcarius lapponicus*), American golden plover (*Pluvialis dominica*), willow ptarmigan (*Lagopus lagopus*) and parasitic jaegers (*Stercorarius parasiticus*) were observed in this habitat type during site investigations.

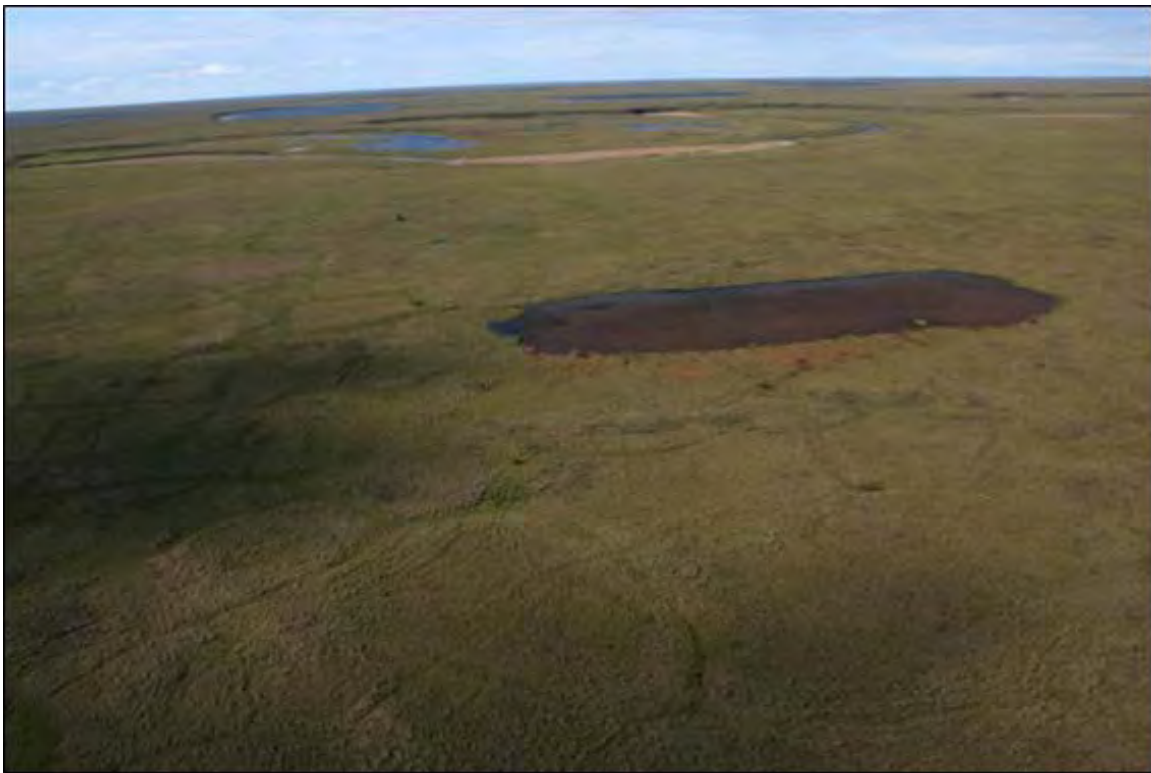


PHOTOGRAPH 5: WET SEDGE TUNDRA/WATER COMPLEX (AT DP B22)

### 3.2.6. Wet Sedge/Moist Sedge Dwarf Shrub Tundra Complex (IIId)

This habitat type is the most common type of habitat mapped in the assessment area. Total area is 670.1 acres, comprising 33.3% of the assessed area. Sedges (*Carex* sp.) intermixed with prostrate willows (*Salix* sp.) and avens (*Dryas* sp.) in a patterned ground complex typified this community. Standing water or super-saturated tundra was commonly present in troughs with drier, slightly elevated areas spaced throughout, although saturated soil conditions were always present within a couple inches of the soil surface (regardless of micro-topography). The soils were typically loamy sand. Determination points B6, B10, B13, B14 and B21 were located in this habitat type.

An unidentified jaeger (*Stercorarius* sp.) was observed hunting in this habitat type and an unidentified vole and semipalmated sandpiper (*Calidris pusilla*) were also observed.



PHOTOGRAPH 6: TYPICAL WET SEDGE/MOIST SEDGE DWARF SHRUB TUNDRA COMPLEX

### 3.2.7. Moist Sedge, Dwarf Shrub/Wet Graminoid Tundra Complex (IVa)

This is a common type of habitat mapped in the assessment area comprising 584.8 acres, or 29.0% of the assessment area, existing mostly as large, broad areas surrounding the wetter and drier tundra areas. A complex vegetation community exists, created by the variable micro-topography and patterned ground that is typical of this habitat within the assessment area. Sedges (*Carex* sp.), cotton grass (*Eriophorum* sp.), and avens (*Dryas* sp.) are the most common types of plants. Soils are typically sandy loams with the water table or permafrost typically around 15 inches of the ground surface. Standing water existed occasionally and sporadically throughout this habitat during the assessment with saturated soils ranging from 0 to 10 inches below the ground surface. Lichens are more common in this community type than in the communities described above. Determination points B17, B19, B20, B24, B29 and B30 were located in this habitat type.

Caribou (*Rangifer tarandus*), parasitic jaeger (*Stercorarius parasiticus*), American golden plover (*Pluvialis dominica*), Lapland longspurs (*Calcarius lapponicus*), greater white-fronted geese (*Anser albifrons*), glaucous gulls (*Larus hyperboreus*), willow ptarmigan (*Lagopus lagopus*), and unidentified microtines were observed in this habitat type.



PHOTOGRAPH 7: MOIST SEDGE, DWARF SHRUB/WET GRAMINOID TUNDRA COMPLEX (LOWER LEFT HALF OF PHOTO – LOCATED SOUTHEAST OF DP B8)

### 3.2.8. Moist Sedge, Dwarf Shrub Tundra (Va)

This moist to dry tundra habitat exists mostly in the eastern and western ends of the assessment area in areas that are relatively well drained. A total of 25.2 acres, or 1.3% of the area assessed was mapped as this community type. The substrate is a mixture of loam, sand, clay and organics. The water table was encountered at least 12 inches below the surface, although isolated surface water was observed in small ponds and trenches. Saturated soils ranged from 0 to 10 inches below the ground surface. Sedges (*Carex* sp.) and cottongrass (*Eriophorum* sp.) were common with prostrate willows (*Salix* sp.) and avens (*Dryas* sp.) comprising a greater percentage of the plant communities than in tundra habitats described above. Determination points B2, B5, B25, and B26 were located in this habitat type.

A brown bear (*Ursus arctos*), caribou (*Rangifer tarandus*), and buff-breasted sandpiper (*Tryngites subruficollis*) were observed in this habitat type.



PHOTOGRAPH 8: MOIST SEDGE, DWARF SHRUB TUNDRA (AT DP 26)

### 3.2.9. Moist Tussock Sedge, Dwarf Shrub Tundra (Vb)

This moist to dry tundra habitat type occurred in large, discrete polygons of the assessment area, and was also a minor component of other complex habitat types. Total area is 196.6 acres, or 9.8% of the assessed area. This community type contains a high degree of micro-topography with tussocks being a dominant feature, created mostly by *Eriophorum vaginatum*. Other common plants were *Dryas integrifolia*, *Cassiope tetragona*, *Salix reticulata*, and grasses (*Calamagrostis purpurascens*, *Poa arctica*). White, crustose lichens were also prevalent on top of micro-highs. Saturated soils were below the soil surface ( $\geq 2$  inches below ground surface [bgs]) and the water table was not encountered in test pits (permafrost ranged from 10 to 16 inches bgs). Soils are typically loamy sand or silt loams. Determination points B3, B9, B16 and B23 were located in this tundra type.

Caribou (*Rangifer tarandus*), buff-breasted sandpiper (*Tryngites subruficollis*), and American golden plover (*Pluvialis dominica*) were observed in this tundra habitat.



PHOTOGRAPH 9: MOIST TUSSOCK SEDGE, DWARF SHRUB TUNDRA (AT DP B9)

### 3.2.10. Dry Dwarf Shrub, Crustose Lichen Tundra (Vc)

This tundra habitat occurs as an upland and wetland habitat and exists infrequently in the assessment area atop a pingo (upland), in the central portion of the assessment area. Total area is 1.4 acres, comprising 0.1% of the assessed area. Soils were relatively dry and well drained with live roots reaching up to 12 inches below ground surface. *Dryas integrifolia* dominated the plant communities and white crustose lichens were prevalent. Determination point B15 was located in this type of tundra habitat.

Multiple fox burrows were identified, especially west of DP B27 along the creek side bluff, and numerous owl (unidentified) pellets were located in this habitat near DP B15, atop the pingo.



PHOTOGRAPH 10: DRY DWARF SHRUB, CRUSTOSE LICHEN TUNDRA (AT DP B15 – ON PINGO)

### 3.2.11. Moist Graminoid, Dwarf Shrub Tundra/Barren Complex (Ve)

A total of 10.4 acres of this dry tundra habitat exists in well drained areas in the eastern portion of the assessment area, comprising 0.5% of the cover. *Dryas integrifolia*, *Carex rotundata*, *Salix reticulata*, and *Alapecurus alpinus* are common plants encountered in this habitat. Crustose and fruticose lichens were also prevelant. The substrate is loamy sand and sandy loam and saturated soils were found about 10 inches below ground surface. Determination point B27 was located in this tundra type.

Many ground squirrel (*Spermophilus parryii*) burrows were found in this type of habitat, especially between DPs B18 and B19, and caribou (*Rangifer tarandus*) were also observed.



PHOTOGRAPH 11: MOIST GRAMINOID, DWARF SHRUB TUNDRA/BARREN COMPLEX (AT DP B27)



### 3.2.12. River Gravels (Xa)

River gravels occurred along the Miluveach River, west of the proposed production pad location and comprised a scant 7.8 acres, or 0.4% of the assessment area. With the exception of an occasional clump of sedges (*Carex* sp.), they were mostly devoid of vegetation. Caribou (*Rangifer tarandus*) tracks were quite common in the river gravels.



PHOTOGRAPH 12: RIVER GRAVELS (WEST OF PROPOSED PAD – MILUVEACH RIVER)

### **3.2.13. Gravel Roads and Pads (Xe)**

Approximately 1.8 acres of previously placed gravel fill exists in the eastern portion of the assessment Area along the Tarn/Meltwater Road. Existing gravel roads and pads cover approximately 0.1% of the assessed area. The vegetation and tundra habitat type beneath the fill are unknown and the gravels are barren of vegetation for the most part.

### **3.2.14. Wet Mud (Xla)**

Small pockets of exposed wet mud are scattered throughout the eastern portion of the assessment area for a total of 1.8 acres, or 0.1% of the assessed area. Areas of exposed mud were largely devoid of vegetation. No data points were taken within this community type.

TABLE 1: VEGETATION AND WETLAND TYPES OF THE MUSTANG DEVELOPMENT PROJECT ASSESSMENT AREA, ALASKA

Walker Classification Level C	Description	NWI Class/ Subclass	NWI Hydro Modifier	Area Mapped (Acres)				Vegetation Community Description & Wetland Datapoints
				Cumulative Assessment Area		Proposed Project Corridor		
				Acres	Percent	Acres	Percent	
Ia2	Rivers/streams	R2UB	H	4.4	0.2%	2.4	0.1%	Streams and rivers upstream from ocean-derived salinity, including reaches subject to tides. <i>Wetland Datapoints: None</i>
Ia3	Lakes: waterbodies >20 acres	L1UB	H	0.8	0.0%	0.0	0.0%	Freshwater lakes greater than 20 acres. <i>Wetland Datapoints: None</i>
Ia4	Ponds: waterbodies > 20 acres, lacking vegetation	PUB	H	65.1	3.2%	19.7	1.0%	Freshwater ponds less than 20 acres. <i>Wetland Datapoints: None</i>
Ila	Shallow water: shallow ponds w/aquatic vegetation	PAB	H	26.7	1.3%	13.5	0.7%	Very wet tundra/shallow ponds or pond margins. Little to no vegetation. <i>Wetland Datapoints: None</i>
Ild	Water/Tundra Complex (pond complex)	PEM1	F	4.2	0.2%	1.5	0.1%	Water/Tundra Complex (inter-connected ponds with emergent vegetation). Lacustrine (L2UB/EM2H) and Palustrine (PUB/EM2H) Complexes of Open Water and Emergent Vegetation. <i>Wetland Datapoints: None</i>
IIla	Wet Sedge Tundra	PEM1	E, F, H	68.4	3.4%	52.9	2.6%	Wet Sedge Tundra Palustrine Saturated Wet Sedge Meadows (PEM1B, PEM1E). Wet Sedge Meadows may be Permanently or Semi-Permanently Flooded (PEM1H, PEM1F). <i>Wetland Datapoints: B4, B7, B18</i>
IIlc	Wet Sedge Tundra/Water Complex (pond complex)	PEM1/AB	F, H	344.5	17.1%	166.2	8.3%	Wet Sedge Tundra/Water Complex (inter-connected ponds). Lacustrine (L2EM2/UBH) and Palustrine (PEM1/UBH) Complexes of Emergent Vegetation and Open Water. <i>Wetland Datapoints: B1, B8, B11, B12, B22, B28</i>
IIld	Wet Sedge/Moist Sedge. Dwarf Shrub Tundra Complex (wet patterned-ground complex)	PEM1/SS1	B, E, F	670.1	33.3%	534.0	26.5%	Wet Sedge/Moist Sedge, Dwarf Shrub Tundra Complex (wet patterned-ground complex). Complexes of Palustrine Scrub Shrub, Wet Sedge Meadows (PSS/EM1B) and Saturated Wet Sedge Meadows (PEM1B, PEM1E). Wet Sedge Meadows may be Permanently or Semi-Permanently Flooded (PEM1H, PEM1F). <i>Wetland Datapoints: B6, B10, B13, B14, B21</i>
IVa	Moist Sedge, Dwarf Shrub/Wet Graminoid Tundra Complex (moist patterned-ground complex)	PEM1/SS1	B, E	584.8	29.0%	368.1	18.3%	Moist Sedge, Dwarf Shrub/Wet Graminoid Tundra Complex (moist patterned-ground complex). Complexes of Palustrine Scrub Shrub, Wet Sedge Meadows (PSS/EM1B) and Saturated Wet Sedge Meadows (PEM1E). Wet Sedge Meadows may be Permanently or Semi-Permanently Flooded (PEM1H, PEM1F). <i>Wetland Datapoints: B17, B19, B20, B29, B30, B24*</i>
Va	Moist Sedge, Dwarf Shrub Tundra	PEM1/SS1	B	25.2	1.3%	25.2	1.3%	Moist Sedge, Dwarf Shrub Tundra. Palustrine Saturated Shrub Emergent Wetlands (PSS/EM1B). <i>Wetland Datapoints: B2, B5, B25*, B26*</i>
Vb	Moist Tussock Sedge, Dwarf Shrub Tundra	PEM1/SS1	B	196.6	9.8%	121.9	6.1%	Moist Tussock Sedge, Dwarf Shrub Tundra. Palustrine Saturated Emergent and Scrub Shrub Wetlands (PEM/SS1B). <i>Wetland Datapoints: B3, B9, B16, B23</i>
Vc	Dry Dwarf Shrub, Crustose Lichen Tundra (Dryas tundra)	U		1.4	0.1%	0.5	0.0%	Dry Dwarf Shrub, Crustose Lichen Tundra ( <i>Dryas</i> tundra, pingos). Uplands or wetlands. <i>Wetland Datapoints: B15</i>
Ve	Moist Graminoid, Dwarf Shrub Tundra/Barren Complex (frost-scar complex)	PSS1/EM1	B	10.4	0.5%	8.6	0.4%	Moist Graminoid, Dwarf Shrub Tundra/Barren Complex (frost-scar tundra complex). Palustrine Saturated Scrub Shrub Emergent Wetlands (PSS/EM1B). <i>Wetland Datapoints: B27*</i>
Xa	River Gravels	R2US	C	7.8	0.4%	4.5	0.2%	River Gravels. Riverine, Seasonally Flooded Areas (R2USC, R3USC). <i>Wetland Datapoints: None</i>
Xe	Gravel Roads and Pads	U		1.8	0.1%	1.8	0.1%	Gravel Roads and Pads. Upland/Unknown. <i>Wetland Datapoints: None</i>
Xla	Wet Mud	PUB	E	1.8	0.1%	0.0	0.0%	Wet, exposed mud. Largely unvegetated. <i>Wetland Datapoints: None</i>
<b>Totals</b>				<b>2014.0</b>	<b>100.0%</b>	<b>1320.8</b>	<b>65.6%</b>	

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### 3.3. Potential Jurisdictional Status

For the purposes of making a JD for the assessment area, only those areas mapped as wetlands were evaluated for their jurisdictional status. All wetlands within the assessment area are believed to fall under potential CWA jurisdiction based on either observation or inference of hydrologic connections linking these wetlands with a TNW via a RPW. The TNW associated with project area wetlands is the Colville River which flows into the Beaufort Sea to the north. The navigability status of the Miluveach River is 'unknown' according to the ADNR Navigable Waters website mapping tool. For the purpose of this report, we are assuming the Miluveach is considered an RPW. Hydrologic data for the Miluveach was not available for this report; however flowing water is readily seen in the project aerials taken on July 10, 2010, which suggests continuous seasonal flow. Figures showing hydrologic connections to TNWs (in Appendix B) and a "Multiple Waters Spreadsheet" and supporting JD information (in Tables attachment) has been prepared to summarize the jurisdictional status of the wetlands and waters within the assessment area. A Preliminary JD Form has also been prepared for the assessment area wetlands as supporting documentation for this report (Appendix F). All wetlands within the assessment area are considered to fall into the following JD category:

- A RPW (Miluveach River) that flows directly into a TNW (Colville River).
- Wetlands abutting an RPW with continuous seasonal flow (Miluveach River) that flows directly into a TNW (Colville River). Assessment area wetlands are contiguous and directly abut the Miluveach River. They have a direct hydrologic connection to the Miluveach River (RPW) and ultimately to the Colville River (TNW) through seasonal flooding, continuous soil saturation, or shallow groundwater.

Detailed surface hydrology data were reviewed to determine connections between assessment area wetlands and the Miluveach River (RPW) and Colville River (TNW) (ACS 2010). ACS technicians manually interpreted surface flow vectors through review of detailed North Slope topography, identifying surface water flow paths between wetlands and waters. ACS surface hydrology data for the assessment area is represented by surface water flow vectors shown on the wetland maps in Appendix A. Data were evaluated beyond the assessment area to determine connections to TNWs. Surface water flow vectors for the western portion of the site are clearly directed toward the Miluveach River, while surface water flow vectors for the eastern portion of the site are more ambiguous and generally trend toward the Miluveach River as it approaches the Colville River. For the purposes of this JD report, we are reporting that all project area wetlands have a primary hydrologic connection to the Miluveach River.

In addition to potential surficial connections, wetlands within the ACP are also expected to have a hydrologic connection to TNWs through adjacent soil saturation. This condition can extend into adjacent wetlands for extended distances before encountering an RPW

or TNW, and can link seemingly “isolated” wetlands to streams and rivers that flow into large TNWs, and eventually the Beaufort Sea.

- Wetlands in the following categories were not identified in the assessment area:
- Wetlands adjacent (not abutting) RPWs that flow directly or indirectly into TNWs\*
- Wetlands adjacent (not abutting) to non-RPWs that flow directly or indirectly into TNWs\*
- Isolated wetlands\*

\* These designations require a significant nexus determination.

Because these categories are not asserted, a technical determination of a significant nexus is not presented.

## 4. CONCLUSIONS

OASIS conducted a wetland delineation on behalf of the Brooks Range Petroleum Company within the proposed Mustang Development project area located in the Southern Miluveach Unit and adjacent to the western boundary of the Kuparuk River Unit. The purpose of the wetland delineation and evaluation work is to identify areas of the proposed project that are within the jurisdiction of Section 404 of the Clean Water Act (CWA) as interpreted by the "Alaska District" U. S. Army Corps of Engineers (Corps). Wetland determinations were performed by experienced wetland scientists according to the 1987 Corps of Engineers Wetland Delineation Manual (Corps Manual) (USACE 1987) and the Alaska Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Alaska Region (USACE 2007b). Field work was conducted in August 2011, and final desktop analysis using GIS and aerial photography was completed in June 2012.

A total of 2,014.0 acres were assessed in support of the proposed Mustang Development Project and of this amount, 2,010.8 acres were classified and mapped as wetlands. Wetlands were mapped to Level C of Walker's (1983) vegetation classification system. It is OASIS's professional opinion that the wetlands within the assessment area fall under the jurisdiction of Section 404 of the Clean Water Act as interpreted by the "Alaska District" U. S. Army Corps of Engineers. This is based on OASIS's JD analysis in which it was determined that 1) the Miluveach River is a RPW with continuous seasonal flow that flows directly to the Colville River, a TNW; and 2) all of the assessment area wetlands abut the Miluveach River. Assessment area wetlands have a direct hydrologic connection to the Miluveach River (RPW) and ultimately to the Colville River (TNW) through seasonal flooding, continuous soil saturation, or shallow groundwater.

OASIS, on behalf of BRPC, requests an Approved Jurisdictional Status Determination by the Corps based on the data and recommendations provided in this report.

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## **TABLES**

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TABLE 2. SPN 2010-45 MULTIPLE WATERS TABLE

Waters_Name	Cowadin_Code	HGM_Code	Measurement_Type	Amount	Units	Waters_Types	Latitude	Longitude	Local_Waterway
Miluveach River	R2UB		AREA	2.66	ACRE	RPW	70.2504	-150.2970	
Miluveach River	R2UB		AREA	1.75	ACRE	RPW	70.2558	-150.3087	
Miluveach River	R2US		AREA	0.14	ACRE	RPW	70.2490	-150.2918	
Miluveach River	R2US		AREA	0.66	ACRE	RPW	70.2480	-150.2942	
Miluveach River	R2US		AREA	3.66	ACRE	RPW	70.2497	-150.2939	
Miluveach River	R2US		AREA	0.11	ACRE	RPW	70.2512	-150.2974	
Miluveach River	R2US		AREA	3.05	ACRE	RPW	70.2553	-150.3087	
Miluveach River	R2US		AREA	0.13	ACRE	RPW	70.2520	-150.3035	
Miluveach River	R2US		AREA	0.03	ACRE	RPW	70.2570	-150.3107	
Miluveach River	L1UB		AREA	0.82	ACRE	RPWWD	70.2535	-150.2252	
Miluveach River	PAB		AREA	0.19	ACRE	RPWWD	70.2708	-150.1364	
Miluveach River	PAB		AREA	0.91	ACRE	RPWWD	70.2480	-150.2702	
Miluveach River	PAB		AREA	1.99	ACRE	RPWWD	70.2681	-150.1672	
Miluveach River	PAB		AREA	1.04	ACRE	RPWWD	70.2531	-150.2190	
Miluveach River	PAB		AREA	0.61	ACRE	RPWWD	70.2430	-150.2801	
Miluveach River	PAB		AREA	0.43	ACRE	RPWWD	70.2442	-150.2782	
Miluveach River	PAB		AREA	1.56	ACRE	RPWWD	70.2455	-150.2833	
Miluveach River	PAB		AREA	0.28	ACRE	RPWWD	70.2484	-150.2964	
Miluveach River	PAB		AREA	0.15	ACRE	RPWWD	70.2507	-150.3014	
Miluveach River	PAB		AREA	0.06	ACRE	RPWWD	70.2545	-150.1662	
Miluveach River	PAB		AREA	0.28	ACRE	RPWWD	70.2551	-150.1650	
Miluveach River	PAB		AREA	0.59	ACRE	RPWWD	70.2554	-150.1753	
Miluveach River	PAB		AREA	0.84	ACRE	RPWWD	70.2557	-150.1627	
Miluveach River	PAB		AREA	0.38	ACRE	RPWWD	70.2572	-150.1573	
Miluveach River	PAB		AREA	1.53	ACRE	RPWWD	70.2577	-150.1524	
Miluveach River	PAB		AREA	0.27	ACRE	RPWWD	70.2479	-150.2492	
Miluveach River	PAB		AREA	0.62	ACRE	RPWWD	70.2487	-150.2478	
Miluveach River	PAB		AREA	0.69	ACRE	RPWWD	70.2485	-150.2452	
Miluveach River	PAB		AREA	0.76	ACRE	RPWWD	70.2499	-150.2359	
Miluveach River	PAB		AREA	0.21	ACRE	RPWWD	70.2503	-150.2418	
Miluveach River	PAB		AREA	0.33	ACRE	RPWWD	70.2512	-150.2386	
Miluveach River	PAB		AREA	0.38	ACRE	RPWWD	70.2514	-150.2367	
Miluveach River	PAB		AREA	1.11	ACRE	RPWWD	70.2603	-150.1666	
Miluveach River	PAB		AREA	0.94	ACRE	RPWWD	70.2608	-150.1641	
Miluveach River	PAB		AREA	0.51	ACRE	RPWWD	70.2620	-150.1641	
Miluveach River	PAB		AREA	1.24	ACRE	RPWWD	70.2627	-150.1607	
Miluveach River	PAB		AREA	0.39	ACRE	RPWWD	70.2639	-150.1659	
Miluveach River	PAB		AREA	0.39	ACRE	RPWWD	70.2646	-150.1676	
Miluveach River	PAB		AREA	0.26	ACRE	RPWWD	70.2652	-150.1551	
Miluveach River	PAB		AREA	0.44	ACRE	RPWWD	70.2672	-150.1569	
Miluveach River	PAB		AREA	0.15	ACRE	RPWWD	70.2675	-150.1580	
Miluveach River	PAB		AREA	2.06	ACRE	RPWWD	70.2591	-150.1642	
Miluveach River	PAB		AREA	0.36	ACRE	RPWWD	70.2599	-150.1675	
Miluveach River	PAB		AREA	2.07	ACRE	RPWWD	70.2637	-150.1908	
Miluveach River	PAB		AREA	0.97	ACRE	RPWWD	70.2688	-150.1640	
Miluveach River	PAB		AREA	0.22	ACRE	RPWWD	70.2696	-150.1556	
Miluveach River	PAB		AREA	0.18	ACRE	RPWWD	70.2650	-150.1459	
Miluveach River	PAB		AREA	0.68	ACRE	RPWWD	70.2558	-150.1942	
Miluveach River	PAB		AREA	0.06	ACRE	RPWWD	70.2555	-150.1908	
Miluveach River	PAB		AREA	0.24	ACRE	RPWWD	70.2554	-150.1774	
Miluveach River	PAB		AREA	0.32	ACRE	RPWWD	70.2699	-150.1145	
Miluveach River	PEM1		AREA	4.23	ACRE	RPWWD	70.2718	-150.1290	
Miluveach River	PEM1		AREA	0.44	ACRE	RPWWD	70.2498	-150.2794	
Miluveach River	PEM1		AREA	44.04	ACRE	RPWWD	70.2487	-150.2283	
Miluveach River	PEM1		AREA	1.66	ACRE	RPWWD	70.2577	-150.1743	
Miluveach River	PEM1		AREA	9.44	ACRE	RPWWD	70.2716	-150.1266	
Miluveach River	PEM1		AREA	0.56	ACRE	RPWWD	70.2719	-150.1402	
Miluveach River	PEM1		AREA	1.14	ACRE	RPWWD	70.2724	-150.1441	
Miluveach River	PEM1		AREA	0.80	ACRE	RPWWD	70.2698	-150.1161	
Miluveach River	PEM1		AREA	2.19	ACRE	RPWWD	70.2713	-150.1347	
Miluveach River	PEM1		AREA	8.10	ACRE	RPWWD	70.2665	-150.1704	
Miluveach River	PEM1		AREA	5.95	ACRE	RPWWD	70.2552	-150.2031	
Miluveach River	PEM1		AREA	7.50	ACRE	RPWWD	70.2574	-150.1812	
Miluveach River	PEM1		AREA	17.60	ACRE	RPWWD	70.2687	-150.1650	

TABLE 2. SPN 2010-45 MULTIPLE WATERS TABLE

Waters_Name	Cowadin_Code	HGM_Code	Measurement_Type	Amount	Units	Waters_Types	Latitude	Longitude	Local_Waterway
Miluveach River	PEM1		AREA	0.20	ACRE	RPWWD	70.2699	-150.1164	
Miluveach River	PEM1		AREA	2.35	ACRE	RPWWD	70.2556	-150.3099	
Miluveach River	PEM1		AREA	4.03	ACRE	RPWWD	70.2533	-150.3059	
Miluveach River	PEM1		AREA	42.73	ACRE	RPWWD	70.2525	-150.2170	
Miluveach River	PEM1		AREA	13.82	ACRE	RPWWD	70.2628	-150.1749	
Miluveach River	PEM1		AREA	6.95	ACRE	RPWWD	70.2646	-150.1674	
Miluveach River	PEM1		AREA	30.66	ACRE	RPWWD	70.2654	-150.1528	
Miluveach River	PEM1		AREA	9.97	ACRE	RPWWD	70.2661	-150.1609	
Miluveach River	PEM1		AREA	44.39	ACRE	RPWWD	70.2454	-150.2847	
Miluveach River	PEM1		AREA	18.12	ACRE	RPWWD	70.2502	-150.2983	
Miluveach River	PEM1		AREA	7.43	ACRE	RPWWD	70.2511	-150.2962	
Miluveach River	PEM1		AREA	0.01	ACRE	RPWWD	70.2596	-150.1576	
Miluveach River	PEM1		AREA	0.59	ACRE	RPWWD	70.2603	-150.1572	
Miluveach River	PEM1		AREA	22.61	ACRE	RPWWD	70.2608	-150.1617	
Miluveach River	PEM1		AREA	72.25	ACRE	RPWWD	70.2599	-150.1908	
Miluveach River	PEM1		AREA	28.12	ACRE	RPWWD	70.2600	-150.3086	
Miluveach River	PEM1		AREA	9.23	ACRE	RPWWD	70.2626	-150.3001	
Miluveach River	PEM1		AREA	8.35	ACRE	RPWWD	70.2496	-150.2887	
Miluveach River	PEM1		AREA	8.45	ACRE	RPWWD	70.2492	-150.2671	
Miluveach River	PEM1		AREA	6.88	ACRE	RPWWD	70.2713	-150.1200	
Miluveach River	PEM1		AREA	1.51	ACRE	RPWWD	70.2569	-150.1658	
Miluveach River	PEM1		AREA	134.71	ACRE	RPWWD	70.2487	-150.2813	
Miluveach River	PEM1		AREA	24.78	ACRE	RPWWD	70.2544	-150.2117	
Miluveach River	PEM1		AREA	8.48	ACRE	RPWWD	70.2660	-150.1632	
Miluveach River	PEM1		AREA	10.23	ACRE	RPWWD	70.2705	-150.1204	
Miluveach River	PEM1		AREA	18.42	ACRE	RPWWD	70.2590	-150.1712	
Miluveach River	PEM1		AREA	167.81	ACRE	RPWWD	70.2485	-150.2666	
Miluveach River	PEM1		AREA	46.65	ACRE	RPWWD	70.2565	-150.2021	
Miluveach River	PEM1		AREA	40.76	ACRE	RPWWD	70.2609	-150.1815	
Miluveach River	PEM1		AREA	0.44	ACRE	RPWWD	70.2722	-150.1261	
Miluveach River	PEM1		AREA	0.80	ACRE	RPWWD	70.2696	-150.1159	
Miluveach River	PEM1		AREA	20.13	ACRE	RPWWD	70.2688	-150.1152	
Miluveach River	PEM1		AREA	275.10	ACRE	RPWWD	70.2663	-150.1393	
Miluveach River	PEM1		AREA	0.99	ACRE	RPWWD	70.2603	-150.1678	
Miluveach River	PEM1		AREA	32.09	ACRE	RPWWD	70.2676	-150.1587	
Miluveach River	PEM1		AREA	18.90	ACRE	RPWWD	70.2637	-150.1834	
Miluveach River	PEM1		AREA	5.88	ACRE	RPWWD	70.2601	-150.1768	
Miluveach River	PEM1		AREA	6.41	ACRE	RPWWD	70.2656	-150.1691	
Miluveach River	PEM1		AREA	11.53	ACRE	RPWWD	70.2700	-150.1540	
Miluveach River	PEM1		AREA	1.94	ACRE	RPWWD	70.2718	-150.1340	
Miluveach River	PEM1		AREA	0.13	ACRE	RPWWD	70.2704	-150.1201	
Miluveach River	PEM1		AREA	0.29	ACRE	RPWWD	70.2699	-150.1220	
Miluveach River	PEM1		AREA	0.04	ACRE	RPWWD	70.2702	-150.1244	
Miluveach River	PEM1		AREA	0.04	ACRE	RPWWD	70.2701	-150.1270	
Miluveach River	PEM1		AREA	2.39	ACRE	RPWWD	70.2671	-150.1302	
Miluveach River	PEM1		AREA	10.35	ACRE	RPWWD	70.2619	-150.3015	
Miluveach River	PEM1		AREA	0.12	ACRE	RPWWD	70.2717	-150.1144	
Miluveach River	PEM1		AREA	0.31	ACRE	RPWWD	70.2710	-150.1156	
Miluveach River	PEM1		AREA	221.96	ACRE	RPWWD	70.2544	-150.2907	
Miluveach River	PEM1		AREA	156.21	ACRE	RPWWD	70.2487	-150.2410	
Miluveach River	PEM1		AREA	64.91	ACRE	RPWWD	70.2580	-150.2029	
Miluveach River	PEM1		AREA	128.39	ACRE	RPWWD	70.2576	-150.1654	
Miluveach River	PEM1		AREA	40.24	ACRE	RPWWD	70.2629	-150.1689	
Miluveach River	PSS1		AREA	1.05	ACRE	RPWWD	70.2722	-150.1335	
Miluveach River	PSS1		AREA	9.00	ACRE	RPWWD	70.2710	-150.1254	
Miluveach River	PSS1		AREA	0.16	ACRE	RPWWD	70.2704	-150.1157	
Miluveach River	PSS1		AREA	0.15	ACRE	RPWWD	70.2708	-150.1140	
Miluveach River	PUB		AREA	0.26	ACRE	RPWWD	70.2523	-150.2069	
Miluveach River	PUB		AREA	5.30	ACRE	RPWWD	70.2676	-150.1704	
Miluveach River	PUB		AREA	1.74	ACRE	RPWWD	70.2718	-150.1410	
Miluveach River	PUB		AREA	1.60	ACRE	RPWWD	70.2578	-150.1744	
Miluveach River	PUB		AREA	2.61	ACRE	RPWWD	70.2631	-150.1959	
Miluveach River	PUB		AREA	1.38	ACRE	RPWWD	70.2499	-150.2803	

TABLE 2. SPN 2010-45 MULTIPLE WATERS TABLE

Waters_Name	Cowadin_Code	HGM_Code	Measurement_Type	Amount	Units	Waters_Types	Latitude	Longitude	Local_Waterway
Miluveach River	PUB		AREA	3.49	ACRE	RPWWD	70.2506	-150.2123	
Miluveach River	PUB		AREA	8.14	ACRE	RPWWD	70.2607	-150.1575	
Miluveach River	PUB		AREA	2.39	ACRE	RPWWD	70.2633	-150.1517	
Miluveach River	PUB		AREA	10.61	ACRE	RPWWD	70.2637	-150.1566	
Miluveach River	PUB		AREA	2.11	ACRE	RPWWD	70.2655	-150.1520	
Miluveach River	PUB		AREA	4.29	ACRE	RPWWD	70.2660	-150.1493	
Miluveach River	PUB		AREA	1.44	ACRE	RPWWD	70.2672	-150.1515	
Miluveach River	PUB		AREA	1.48	ACRE	RPWWD	70.2674	-150.1539	
Miluveach River	PUB		AREA	0.95	ACRE	RPWWD	70.2670	-150.1601	
Miluveach River	PUB		AREA	0.75	ACRE	RPWWD	70.2696	-150.1367	
Miluveach River	PUB		AREA	1.21	ACRE	RPWWD	70.2695	-150.1382	
Miluveach River	PUB		AREA	4.77	ACRE	RPWWD	70.2612	-150.1748	
Miluveach River	PUB		AREA	3.87	ACRE	RPWWD	70.2647	-150.1772	
Miluveach River	PUB		AREA	0.70	ACRE	RPWWD	70.2547	-150.1978	
Miluveach River	PUB		AREA	3.85	ACRE	RPWWD	70.2568	-150.1888	
Miluveach River	PUB		AREA	2.21	ACRE	RPWWD	70.2594	-150.1933	
Miluveach River	PUB		AREA	0.27	ACRE	RPWWD	70.2725	-150.1444	
Miluveach River	PUB		AREA	0.24	ACRE	RPWWD	70.2620	-150.1705	
Miluveach River	PUB		AREA	0.31	ACRE	RPWWD	70.2627	-150.1676	
Miluveach River	PUB		AREA	0.44	ACRE	RPWWD	70.2632	-150.1709	
Miluveach River	PUB		AREA	0.57	ACRE	RPWWD	70.2646	-150.1722	

### Culvert Coordinates

Culvert ID	Associated Road	Distance from Start of Road	Latitude (DD)	Longitude (DD)
Culvert 3+09	Proposed Access Road	309.03	70.2698	-150.1200
Culvert 6+04	Proposed Access Road	604.11	70.2698	-150.1224
Culvert 8+90	Proposed Access Road	890.41	70.2697	-150.1246
Culvert 12+81	Proposed Access Road	1281.43	70.2691	-150.1273
Culvert 17+13	Proposed Access Road	1713.03	70.2682	-150.1295
Culvert 18+81	Proposed Access Road	1881.33	70.2678	-150.1304
Culvert 20+76	Proposed Access Road	2076.46	70.2674	-150.1313
Culvert 22+46	Proposed Access Road	2246.24	70.2671	-150.1322
Culvert 24+55	Proposed Access Road	2455.17	70.2666	-150.1333
Culvert 30+03	Proposed Access Road	3003.08	70.2654	-150.1360
Culvert 34+24	Proposed Access Road	3424.12	70.2646	-150.1382
Culvert 35+71	Proposed Access Road	3571.08	70.2642	-150.1389
Culvert 37+15	Proposed Access Road	3715.04	70.2639	-150.1397
Culvert 41+13	Proposed Access Road	4113.19	70.2631	-150.1417
Culvert 49+51	Proposed Access Road	4951.04	70.2613	-150.1459
Culvert 50+76	Proposed Access Road	5076.40	70.2610	-150.1466
Culvert 52+11	Proposed Access Road	5211.14	70.2608	-150.1473
Culvert 58+80	Proposed Access Road	5880.14	70.2597	-150.1517
Culvert 64+61	Proposed Access Road	6461.18	70.2589	-150.1558
Culvert 68+15	Proposed Access Road	6815.34	70.2585	-150.1583
Culvert 89+25	Proposed Access Road	8925.03	70.2566	-150.1737
Culvert 93+61	Proposed Access Road	9361.06	70.2574	-150.1765
Culvert 108+14	Proposed Access Road	10814.22	70.2585	-150.1867
Culvert 116+71	Proposed Access Road	11671.02	70.2577	-150.1932
Culvert 122+68	Proposed Access Road	12268.29	70.2571	-150.1977
Culvert 130+56	Proposed Access Road	13056.23	70.2563	-150.2037
Culvert 155+06	Proposed Access Road	15506.36	70.2516	-150.2170
Culvert 170+75	Proposed Access Road	17075.16	70.2500	-150.2288
Culvert 201+93	Proposed Access Road	20193.12	70.2479	-150.2526
Culvert 203+30	Proposed Access Road	20330.46	70.2480	-150.2537
Culvert 210+17	Proposed Access Road	21017.26	70.2487	-150.2589
Culvert 213+28	Proposed Access Road	21328.13	70.2490	-150.2613
Culvert 214+98	Proposed Access Road	21498.45	70.2491	-150.2626
Culvert 220+61	Proposed Access Road	22061.22	70.2496	-150.2668
Culvert 227+97	Proposed Access Road	22797.05	70.2494	-150.2727
Culvert M1+71	Proposed Mine Road	171.18	70.2501	-150.2715
Culvert M9+08	Proposed Mine Road	908.48	70.2517	-150.2748
Culvert M17+78	Proposed Mine Road	1778.37	70.2531	-150.2805
Culvert M28+07	Proposed Mine Road	2807.09	70.2547	-150.2873
Culvert M35+08	Proposed Mine Road	3508.20	70.2558	-150.2920

**NOTES:**

- 1) The culverts are listed in order starting on the east end of the proposed road, near the TARN Road and continue south and west to the proposed gravel mine location.
- 2) A total of forty culverts (24" and 36" diameter ) are slated to be installed along the proposed access and mine road.



**WETLAND DATAPOINT SUMMARY TABLE**

Wetland Datapoint ID	Walker Classification Level C	Description	NWI Class/ Subclass	NWI Hydro Modifier	Location	
					Latitude (dd)	Longitude (dd)
B1	IIIc	Wet Sedge Tundra/Water Complex (pond complex)	PEM1/AB	F, H	70.2478	-150.2910
B2	Va	Moist Sedge, Dwarf Shrub Tundra	PEM1/SS1	B	70.2490	-150.2894
B3	Vb	Moist Tussock Sedge, Dwarf Shrub Tundra	PEM1/SS1	B	70.2481	-150.2854
B4	IIIa	Wet Sedge Tundra	PEM1	E, F, H	70.2494	-150.2790
B5	Va	Moist Sedge, Dwarf Shrub Tundra	PEM1/SS1	B	70.2495	-150.2668
B6	IIIId	Wet Sedge/Moist Sedge. Dwarf Shrub Tundra Complex (wet patterned-ground complex)	PEM1/SS1	B, E, F	70.2485	-150.2467
B7	IIIa	Wet Sedge Tundra	PEM1	E, F, H	70.2494	-150.2308
B8	IIIc	Wet Sedge Tundra/Water Complex (pond complex)	PEM1/AB	F, H	70.2541	-150.2179
B9	Vb	Moist Tussock Sedge, Dwarf Shrub Tundra	PEM1/SS1	B	70.2556	-150.2087
B10	IIIId	Wet Sedge/Moist Sedge. Dwarf Shrub Tundra Complex (wet patterned-ground complex)	PEM1/SS1	B, E, F	70.2606	-150.1983
B11	IIIc	Wet Sedge Tundra/Water Complex (pond complex)	PEM1/AB	F, H	70.2631	-150.1895
B12	IIIc	Wet Sedge Tundra/Water Complex (pond complex)	PEM1/AB	F, H	70.2593	-150.1869
B13	IIIId	Wet Sedge/Moist Sedge. Dwarf Shrub Tundra Complex (wet patterned-ground complex)	PEM1/SS1	B, E, F	70.2567	-150.1774
B14	IIIId	Wet Sedge/Moist Sedge. Dwarf Shrub Tundra Complex (wet patterned-ground complex)	PEM1/SS1	B, E, F	70.2572	-150.1666
B15	Vc	Dry Dwarf Shrub, Crustose Lichen Tundra (Dryas tundra)	U		70.2596	-150.1729
B16	Vb	Moist Tussock Sedge, Dwarf Shrub Tundra	PEM1/SS1	B	70.2657	-150.1636
B17	IVa	Moist Sedge, Dwarf Shrub/Wet Graminoid Tundra Complex (moist patterned-ground complex)	PEM1/SS1	B, E	70.2701	-150.1464
B18	IIIa	Wet Sedge Tundra	PEM1	E, F, H	70.2709	-150.1263
B19	IVa	Moist Sedge, Dwarf Shrub/Wet Graminoid Tundra Complex (moist patterned-ground complex)	PEM1/SS1	B, E	70.2695	-150.1264

**WETLAND DATAPOINT SUMMARY TABLE**

Wetland Datapoint ID	Walker Classification Level C	Description	NWI Class/ Subclass	NWI Hydro Modifier	Location	
					Latitude (dd)	Longitude (dd)
B20	IVa	Moist Sedge, Dwarf Shrub/Wet Graminoid Tundra Complex (moist patterned-ground complex)	PEM1/SS1	B, E	70.2633	-150.1412
B21	IIIId	Wet Sedge/Moist Sedge, Dwarf Shrub Tundra Complex (wet patterned-ground complex)	PEM1/SS1	B, E, F	70.2598	-150.1540
B22	IIIc	Wet Sedge Tundra/Water Complex (pond complex)	PEM1/AB	F, H	70.2447	-150.2817
B23	Vb	Moist Tussock Sedge, Dwarf Shrub Tundra	PEM1/SS1	B	70.2451	-150.2641
B24*	IVa	Moist Sedge, Dwarf Shrub/Wet Graminoid Tundra Complex (moist patterned-ground complex)	PEM1/SS1	B, E	70.2393	-150.2501
B25*	Va	Moist Sedge, Dwarf Shrub Tundra	PEM1/SS1	B	70.2333	-150.2388
B26*	Va	Moist Sedge, Dwarf Shrub Tundra	PEM1/SS1	B	70.2268	-150.2317
B27*	Ve	Moist Graminoid, Dwarf Shrub Tundra/Barren Complex (frost-scar complex)	PSS1/EM1	B	70.2689	-150.0964
B28	IIIc	Wet Sedge Tundra/Water Complex (pond complex)	PEM1/AB	F, H	70.2624	-150.1741
B29	IVa	Moist Sedge, Dwarf Shrub/Wet Graminoid Tundra Complex (moist patterned-ground complex)	PEM1/SS1	B, E	70.2624	-150.1788
B30	IVa	Moist Sedge, Dwarf Shrub/Wet Graminoid Tundra Complex (moist patterned-ground complex)	PEM1/SS1	B, E	70.2692	-150.1371

\*Datapoint was located within the original assessment area, but is not located within the smaller, revised assessment area.

## **APPENDIX A**

### **Landowner Permission Letter**

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July 25, 2012

Ms. Mary Ramero  
U.S. Army Corps of Engineers  
Alaska District  
PO Box 6898  
2204 3<sup>rd</sup> Street  
JBER, AK 99506-0898

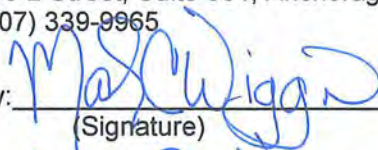
RE: LANDOWNER PERMISSION TO ACCESS PROPERTY ASSOCIATED WITH JURISDICTIONAL DETERMINATION  
REQUEST FOR THE MUSTANG DEVELOPMENT PROJECT

Dear Ms. Ramero,

This landowner permission letter is being submitted in support of the approved jurisdictional determination request for the Mustang Field development project. Brooks Range Petroleum Company (BPRC) grants access to the U.S. Army Corps of Engineers to the Mustang Field project area for the purpose of reviewing the parcel for the approved jurisdictional determination. This letter grants permission to access the following location: USGS Quad Harrison Bay A1 and B1; 70.2590 N, -150.1840 W NAD83 datum; Township 10N, Range 7E; Township 10N, R8E; Township 11N, Range 7E; Township 11N, Range 8E of the Umiat Meridian (UM). The project area can be accessed via road travel or air. From Prudhoe Bay, the project site can be accessed through the greater Prudhoe Bay road infrastructure. Beginning at the Deadhorse Airport, follow the Spine Road to the wye intersection of the Oliktok and Tarn/Meltwater roads; then follow the Tarn/Meltwater Road until just southwest of the Kuparuk River Unit Drill Site 2 where the proposed Mustang Project access road will leave the Tarn/Meltwater Road and proceed west to the proposed project drilling and production pad. Total road travel is approximately 48 miles from the Deadhorse Airport to reach the proposed Mustang access road.

BPRC leases the Mustang Field property from the State of Alaska Department of Natural Resources. Per the terms of the lease agreement, BPRC can authorize access to the property without written consent from the State. As such, the leasee signature below provides authorization for agents representing the U.S. Army Corps of Engineers to access the Mustang Field property for the purpose stated above.

Signed,  
Mark Wiggin  
Engineering and Development Manager  
Brooks Range Petroleum Company  
510 L Street, Suite 601, Anchorage, AK 99516  
(907) 339-9965

By:   
(Signature)

MARK C. WIGGIN  
(Printed Name)



## **APPENDIX B**

### **Wetlands, Waters and Vegetation Map Set**

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## TNW and Assessment Area Map Supporting Information

- See Table 1. Wetland Summary Table and Table 2. SPN 2010-45 Multiple Waters Table in main report for a summary of wetland types, sizes, locations and relationship with TNW.
- Watershed size: Lower Colville River HUC is 19060304, the area is 2,764,148 acres
- Average annual precipitation ranges from 100 mm to 150 mm. Average annual temperature ranges from 13°C to -10°C. Freezing can occur in any month of the year.
- There are no existing culverts
- Tributaries on site: Miluveach River
  - 15-20 river miles to nearest TNW (Colville River)
  - 5-10 aerial miles to nearest TNW (Colville River)
  - Miluveach substrate is gravel/cobble with sands.

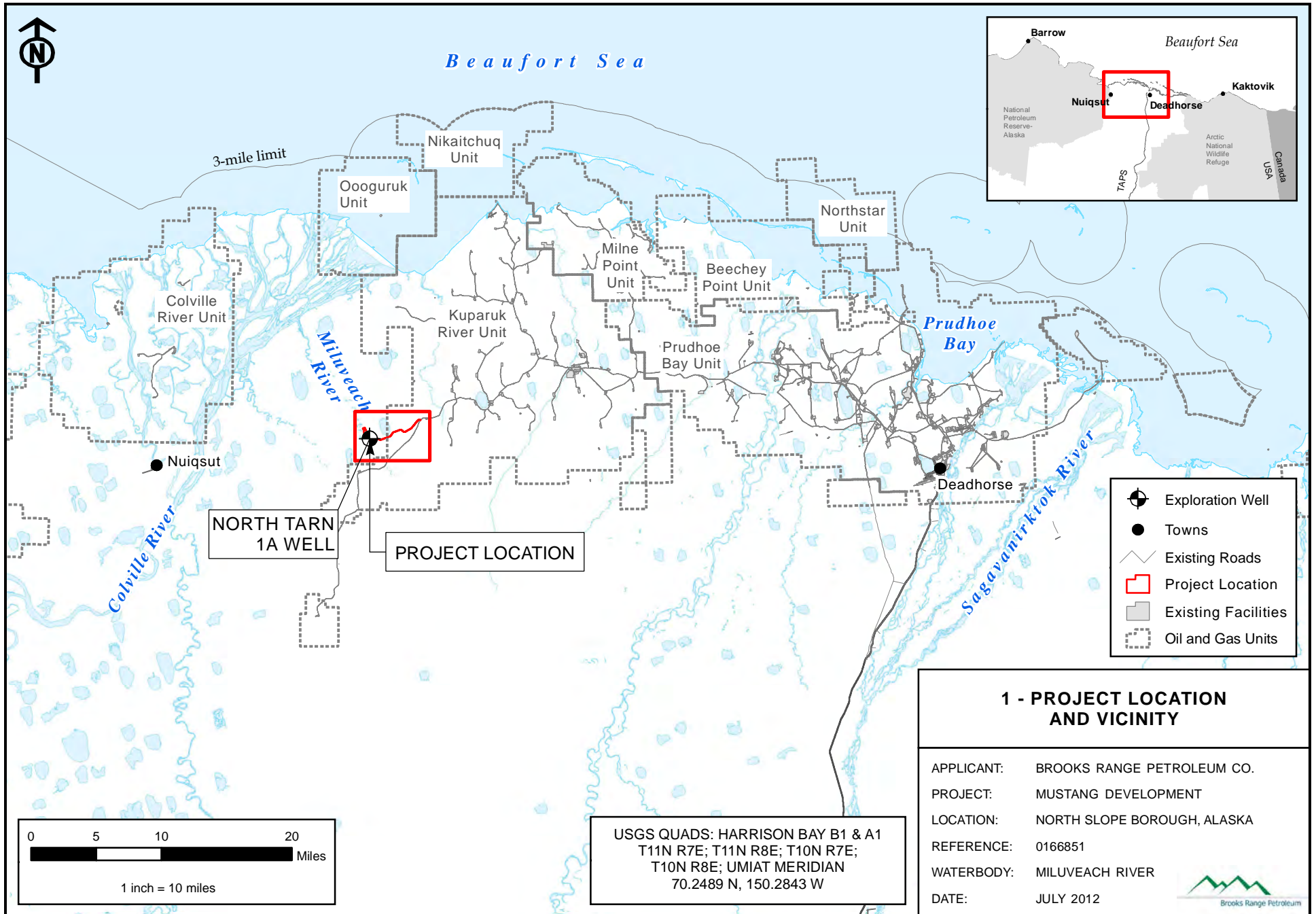
**WETLAND DATAPPOINT SUMMARY TABLE**

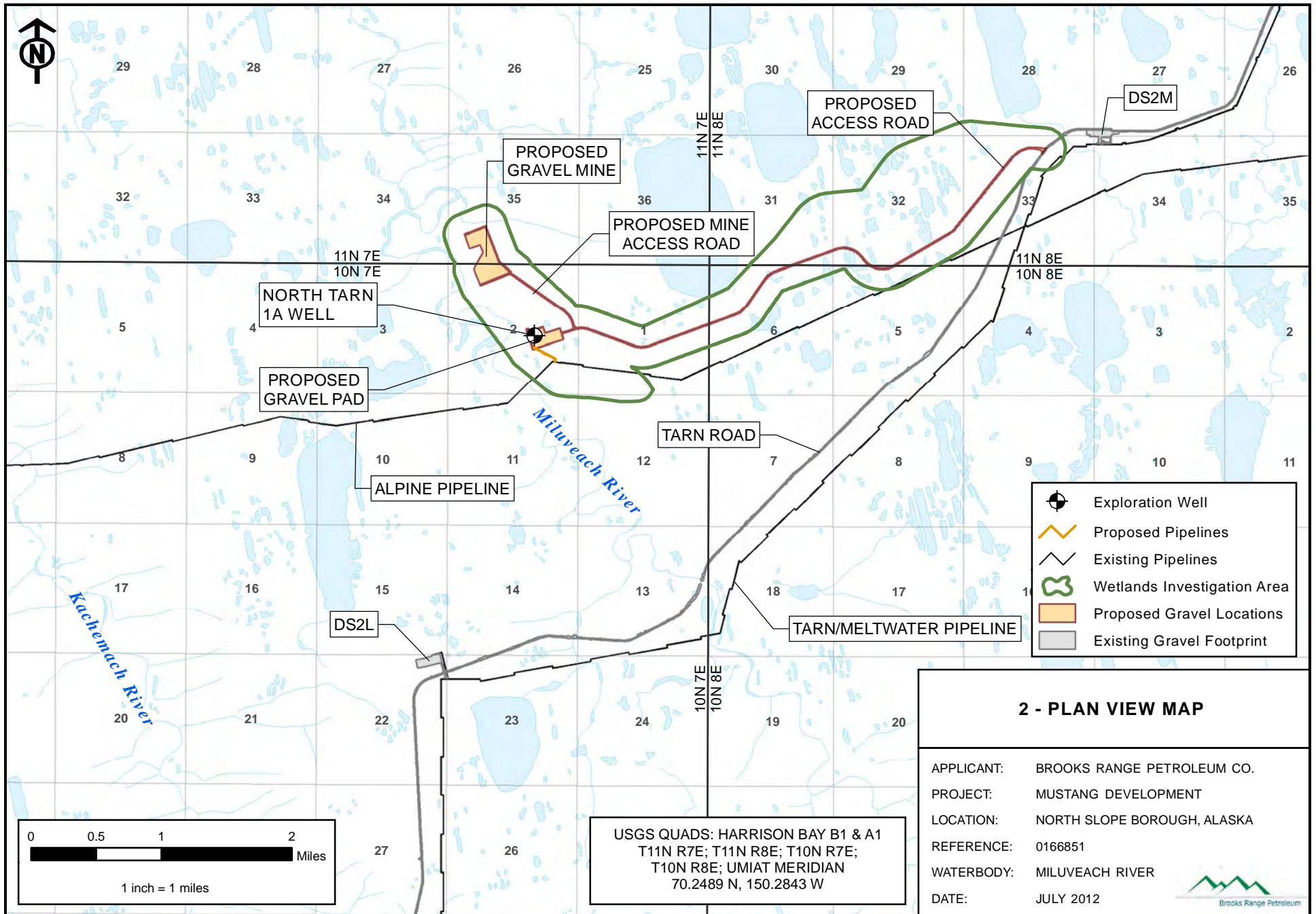
Wetland Datapoint ID	Walker Classification Level C	Description	NWI Class/ Subclass	NWI Hydro Modifier	Location	
					Latitude (dd)	Longitude (dd)
B1	IIlc	Wet Sedge Tundra/Water Complex (pond complex)	PEM1/AB	F, H	70.2478	-150.2910
B2	Va	Moist Sedge, Dwarf Shrub Tundra	PEM1/SS1	B	70.2490	-150.2894
B3	Vb	Moist Tussock Sedge, Dwarf Shrub Tundra	PEM1/SS1	B	70.2481	-150.2854
B4	IIIa	Wet Sedge Tundra	PEM1	E, F, H	70.2494	-150.2790
B5	Va	Moist Sedge, Dwarf Shrub Tundra	PEM1/SS1	B	70.2495	-150.2668
B6	IIId	Wet Sedge/Moist Sedge. Dwarf Shrub Tundra Complex (wet patterned-ground complex)	PEM1/SS1	B, E, F	70.2485	-150.2467
B7	IIIa	Wet Sedge Tundra	PEM1	E, F, H	70.2494	-150.2308
B8	IIlc	Wet Sedge Tundra/Water Complex (pond complex)	PEM1/AB	F, H	70.2541	-150.2179
B9	Vb	Moist Tussock Sedge, Dwarf Shrub Tundra	PEM1/SS1	B	70.2556	-150.2087
B10	IIId	Wet Sedge/Moist Sedge. Dwarf Shrub Tundra Complex (wet patterned-ground complex)	PEM1/SS1	B, E, F	70.2606	-150.1983
B11	IIlc	Wet Sedge Tundra/Water Complex (pond complex)	PEM1/AB	F, H	70.2631	-150.1895
B12	IIlc	Wet Sedge Tundra/Water Complex (pond complex)	PEM1/AB	F, H	70.2593	-150.1869
B13	IIId	Wet Sedge/Moist Sedge. Dwarf Shrub Tundra Complex (wet patterned-ground complex)	PEM1/SS1	B, E, F	70.2567	-150.1774
B14	IIId	Wet Sedge/Moist Sedge. Dwarf Shrub Tundra Complex (wet patterned-ground complex)	PEM1/SS1	B, E, F	70.2572	-150.1666
B15	Vc	Dry Dwarf Shrub, Crustose Lichen Tundra (Dryas tundra)	U		70.2596	-150.1729
B16	Vb	Moist Tussock Sedge, Dwarf Shrub Tundra	PEM1/SS1	B	70.2657	-150.1636

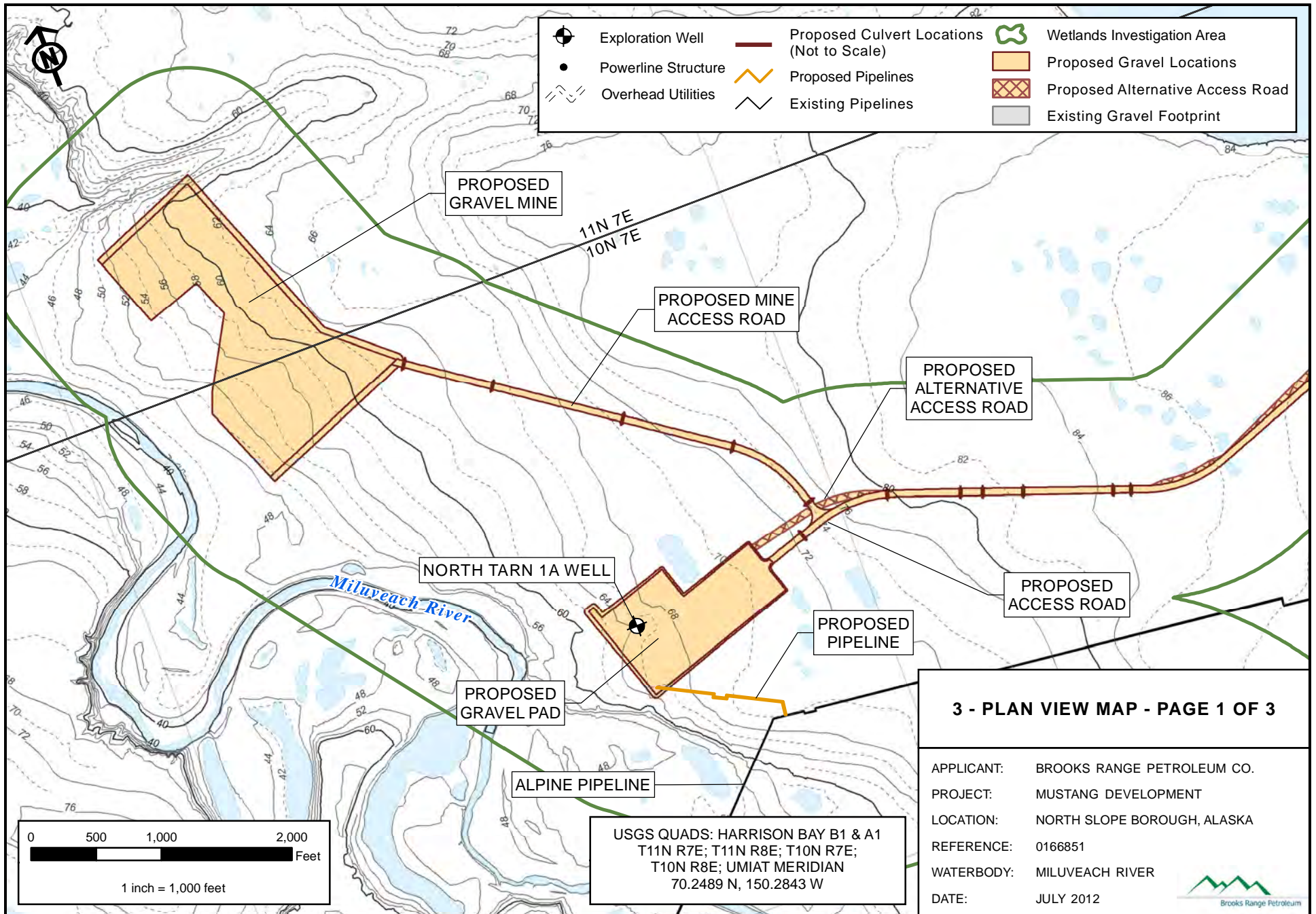
**WETLAND DATAPOINT SUMMARY TABLE (CONT.)**

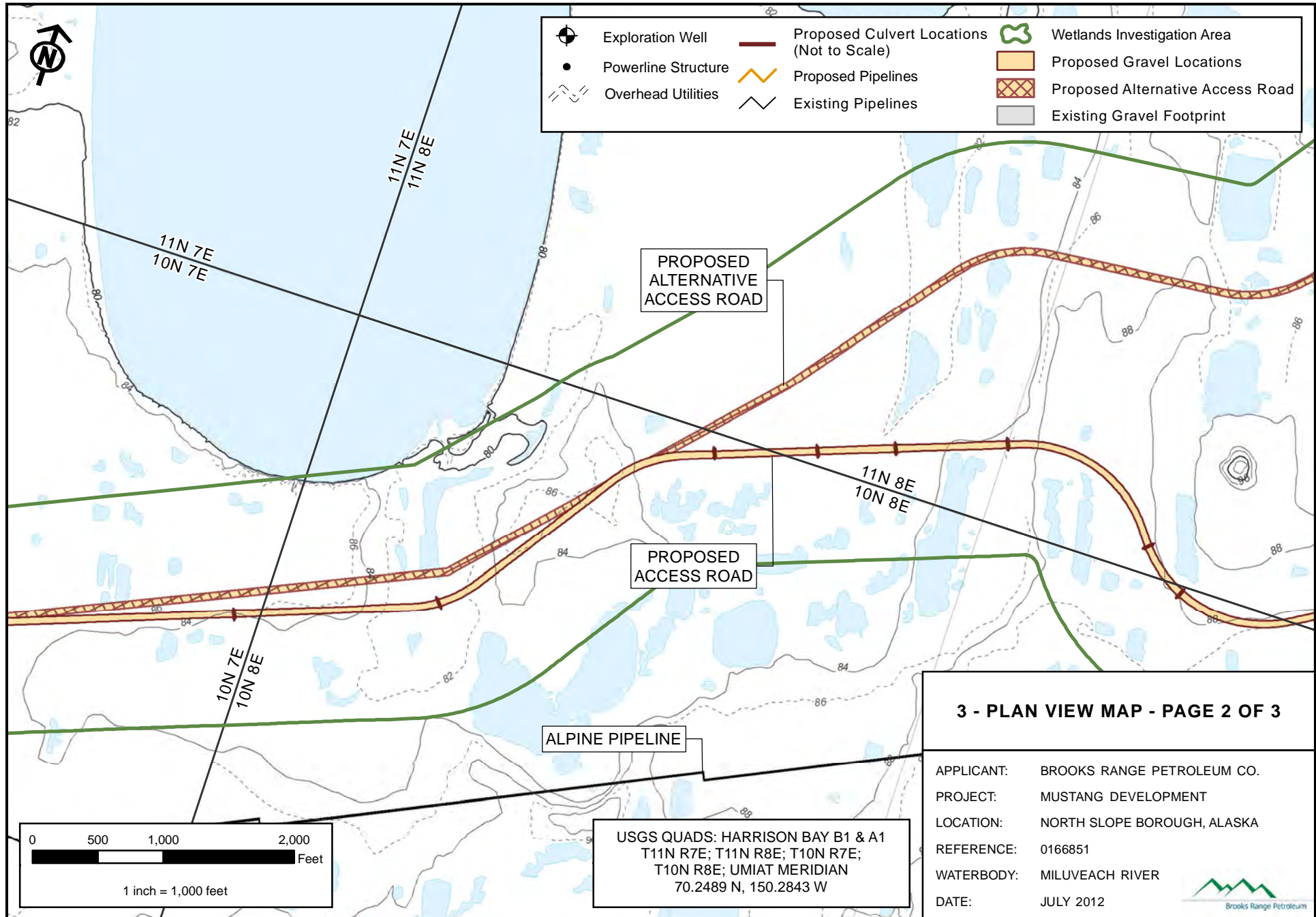
Wetland Datapoint ID	Walker Classification Level C	Description	NWI Class/ Subclass	NWI Hydro Modifier	Location	
					Latitude (dd)	Longitude (dd)
B17	IVa	Moist Sedge, Dwarf Shrub/Wet Graminoid Tundra Complex (moist patterned-ground complex)	PEM1/SS1	B, E	70.2701	-150.1464
B18	IIIa	Wet Sedge Tundra	PEM1	E, F, H	70.2709	-150.1263
B19	IVa	Moist Sedge, Dwarf Shrub/Wet Graminoid Tundra Complex (moist patterned-ground complex)	PEM1/SS1	B, E	70.2695	-150.1264
B20	IVa	Moist Sedge, Dwarf Shrub/Wet Graminoid Tundra Complex (moist patterned-ground complex)	PEM1/SS1	B, E	70.2633	-150.1412
B21	IIId	Wet Sedge/Moist Sedge, Dwarf Shrub Tundra Complex (wet patterned-ground complex)	PEM1/SS1	B, E, F	70.2598	-150.1540
B22	IIIc	Wet Sedge Tundra/Water Complex (pond complex)	PEM1/AB	F, H	70.2447	-150.2817
B23	Vb	Moist Tussock Sedge, Dwarf Shrub Tundra	PEM1/SS1	B	70.2451	-150.2641
B24*	IVa	Moist Sedge, Dwarf Shrub/Wet Graminoid Tundra Complex (moist patterned-ground complex)	PEM1/SS1	B, E	70.2393	-150.2501
B25*	Va	Moist Sedge, Dwarf Shrub Tundra	PEM1/SS1	B	70.2333	-150.2388
B26*	Va	Moist Sedge, Dwarf Shrub Tundra	PEM1/SS1	B	70.2268	-150.2317
B27*	Ve	Moist Graminoid, Dwarf Shrub Tundra/Barren Complex (frost-scar complex)	PSS1/EM1	B	70.2689	-150.0964
B28	IIIc	Wet Sedge Tundra/Water Complex (pond complex)	PEM1/AB	F, H	70.2624	-150.1741
B29	IVa	Moist Sedge, Dwarf Shrub/Wet Graminoid Tundra Complex (moist patterned-ground complex)	PEM1/SS1	B, E	70.2624	-150.1788
B30	IVa	Moist Sedge, Dwarf Shrub/Wet Graminoid Tundra Complex (moist patterned-ground complex)	PEM1/SS1	B, E	70.2692	-150.1371

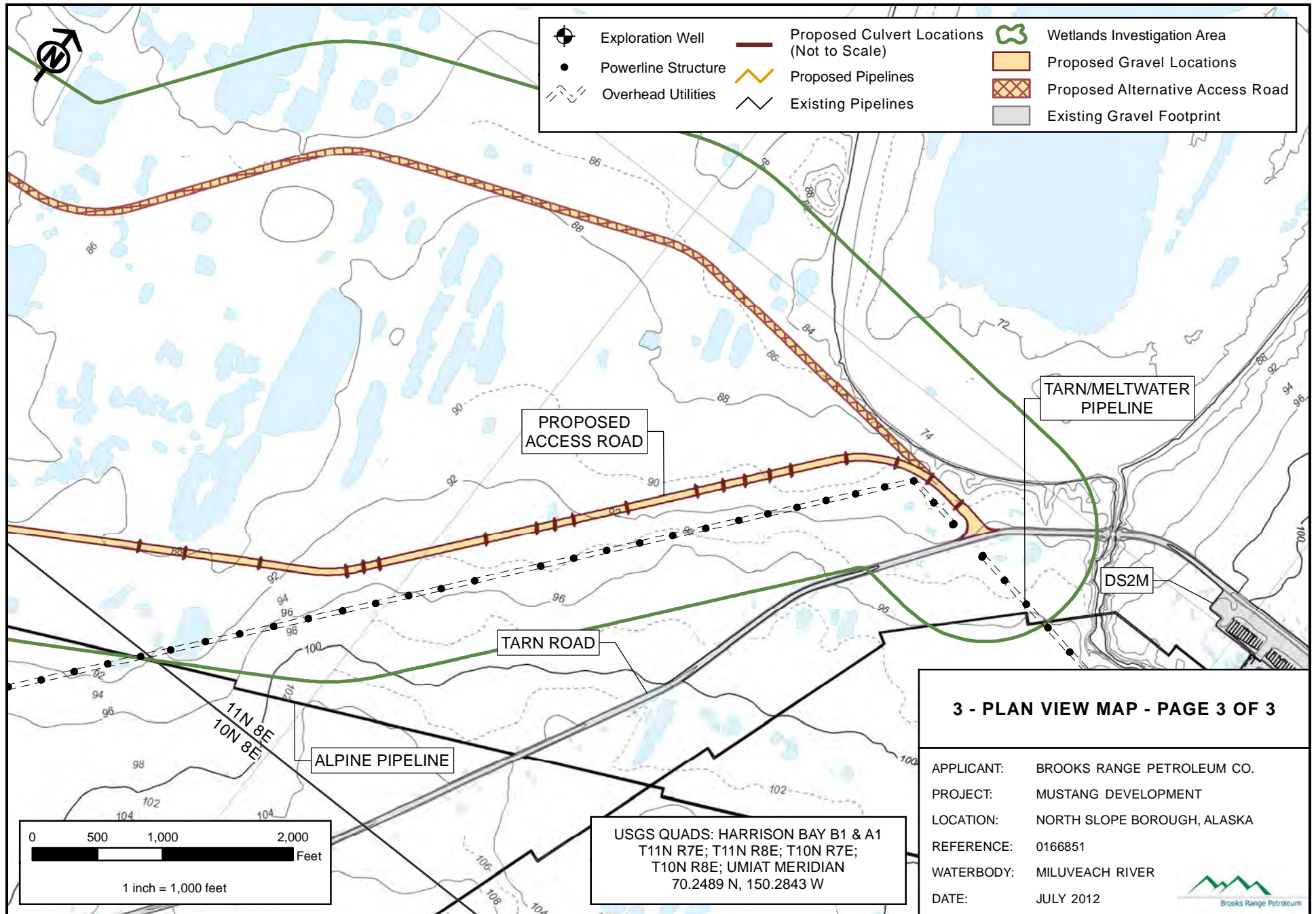
\*Datapoint was located within the original assessment area, but is not located within the smaller, revised assessment are

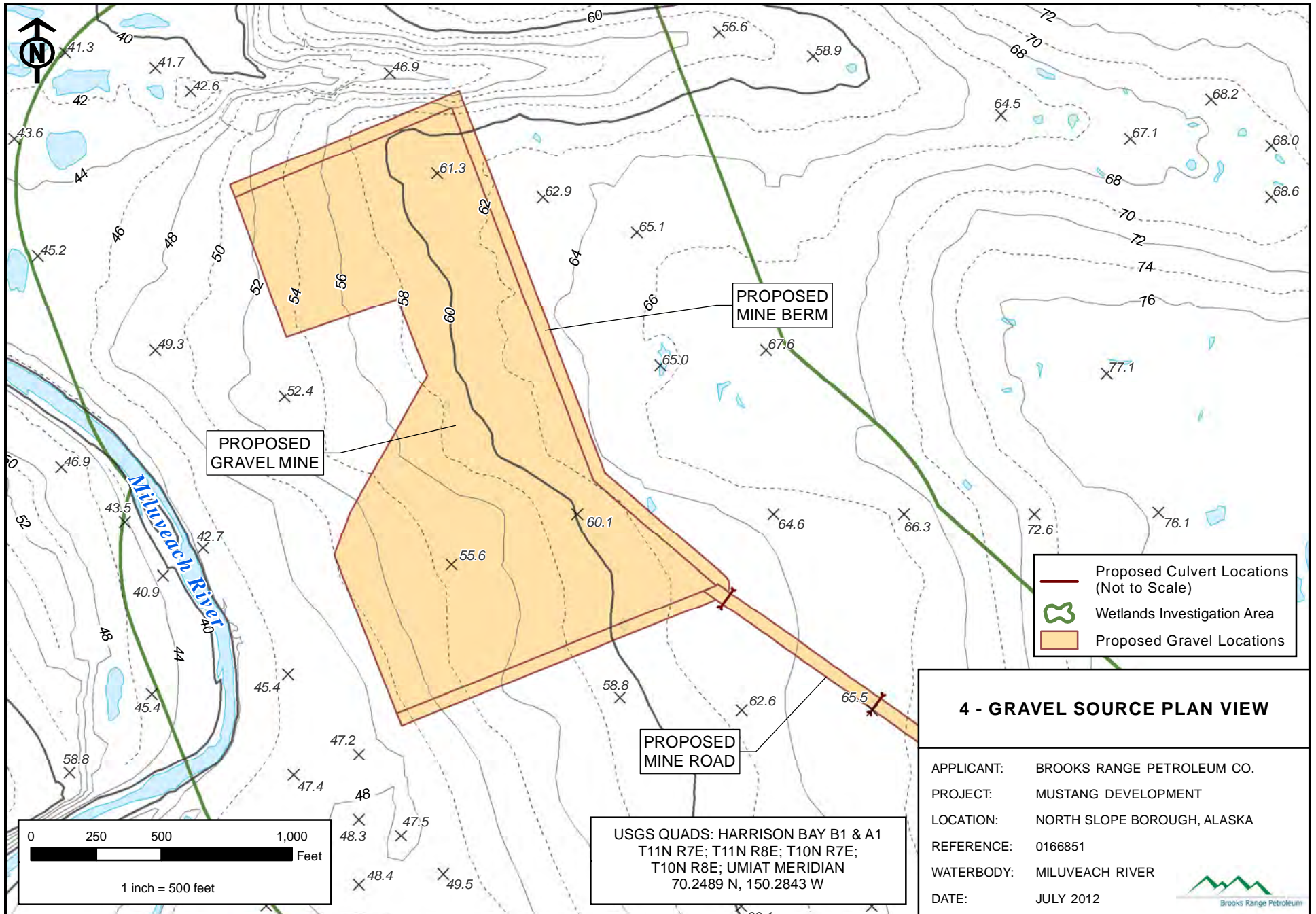




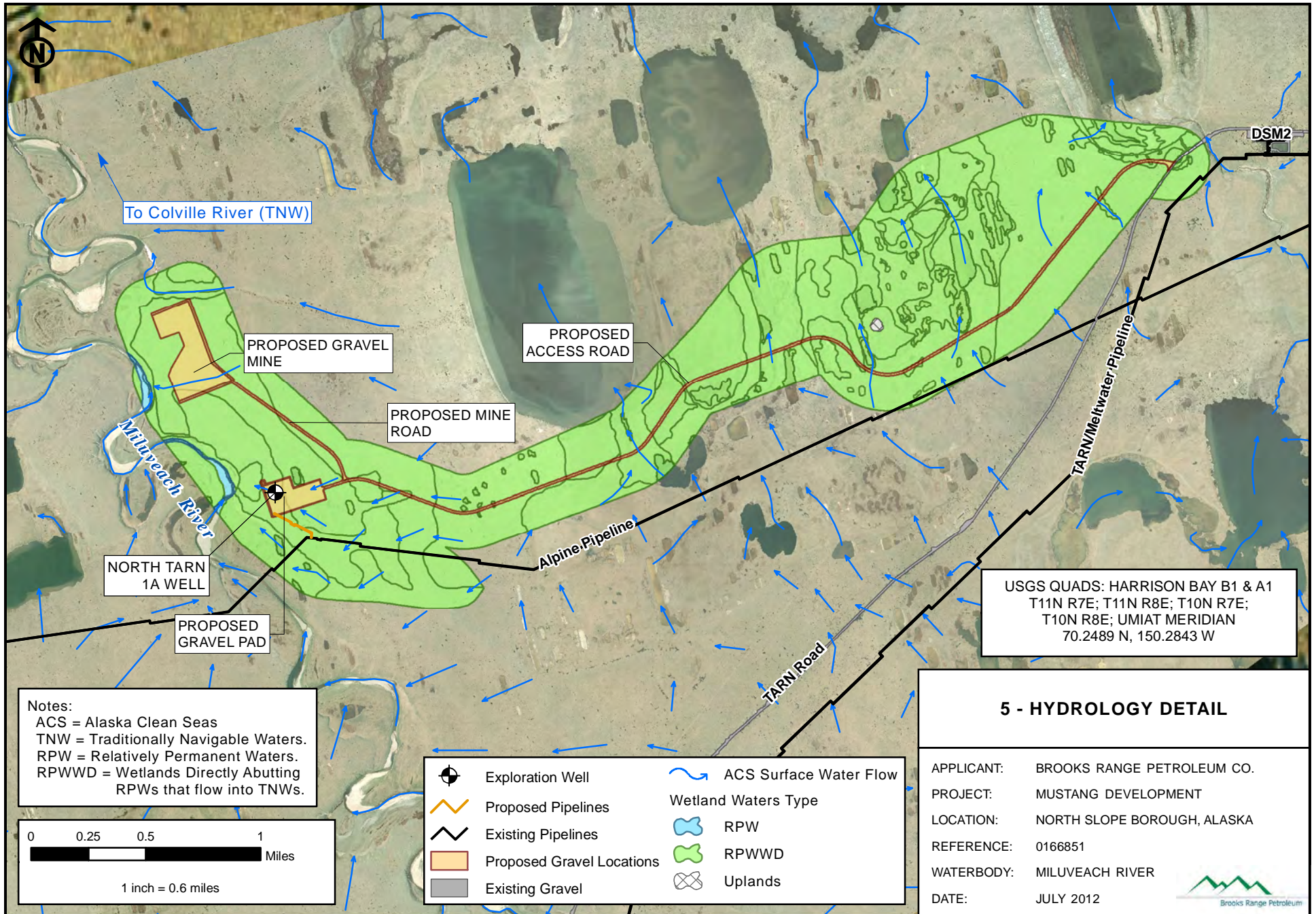


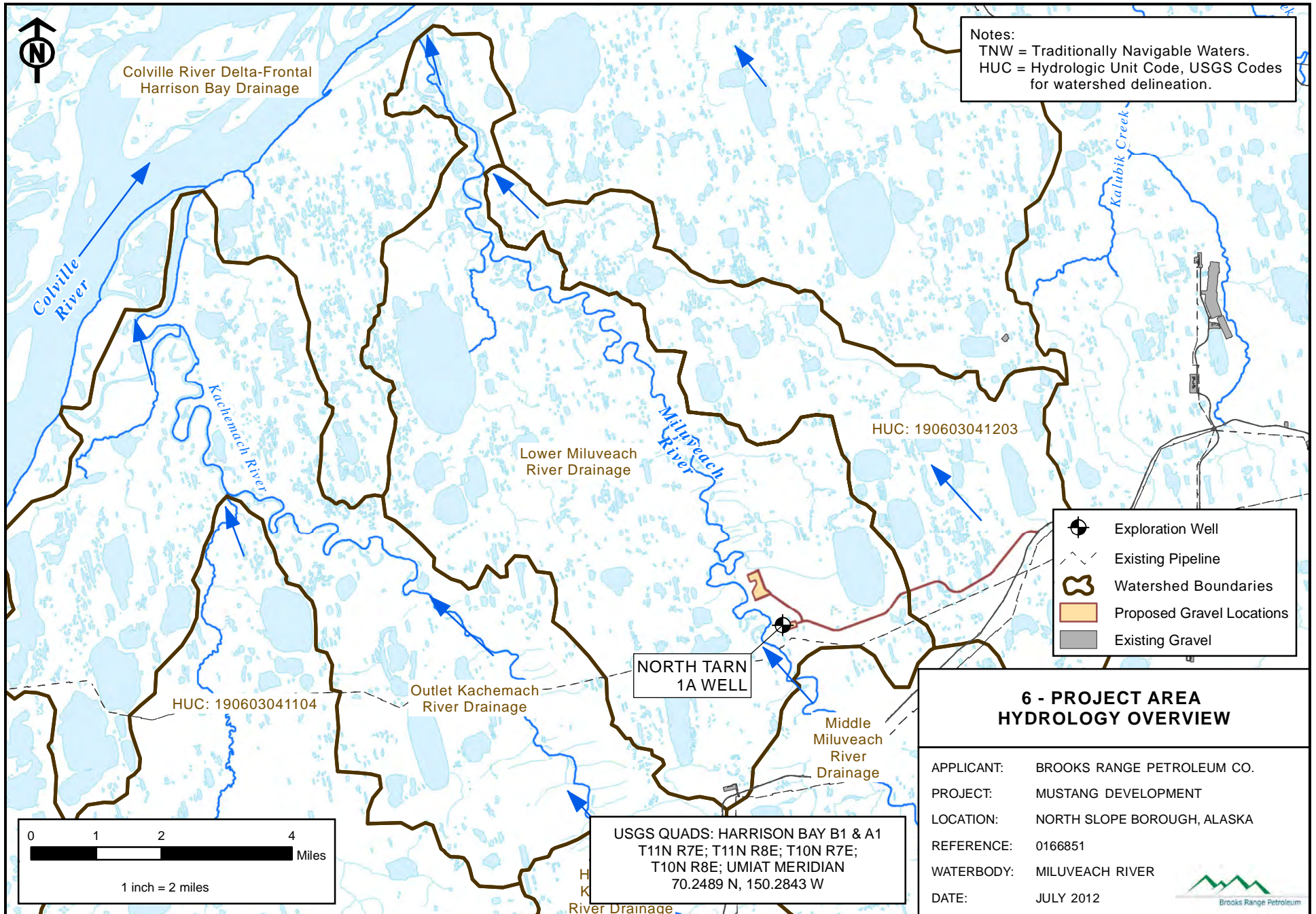


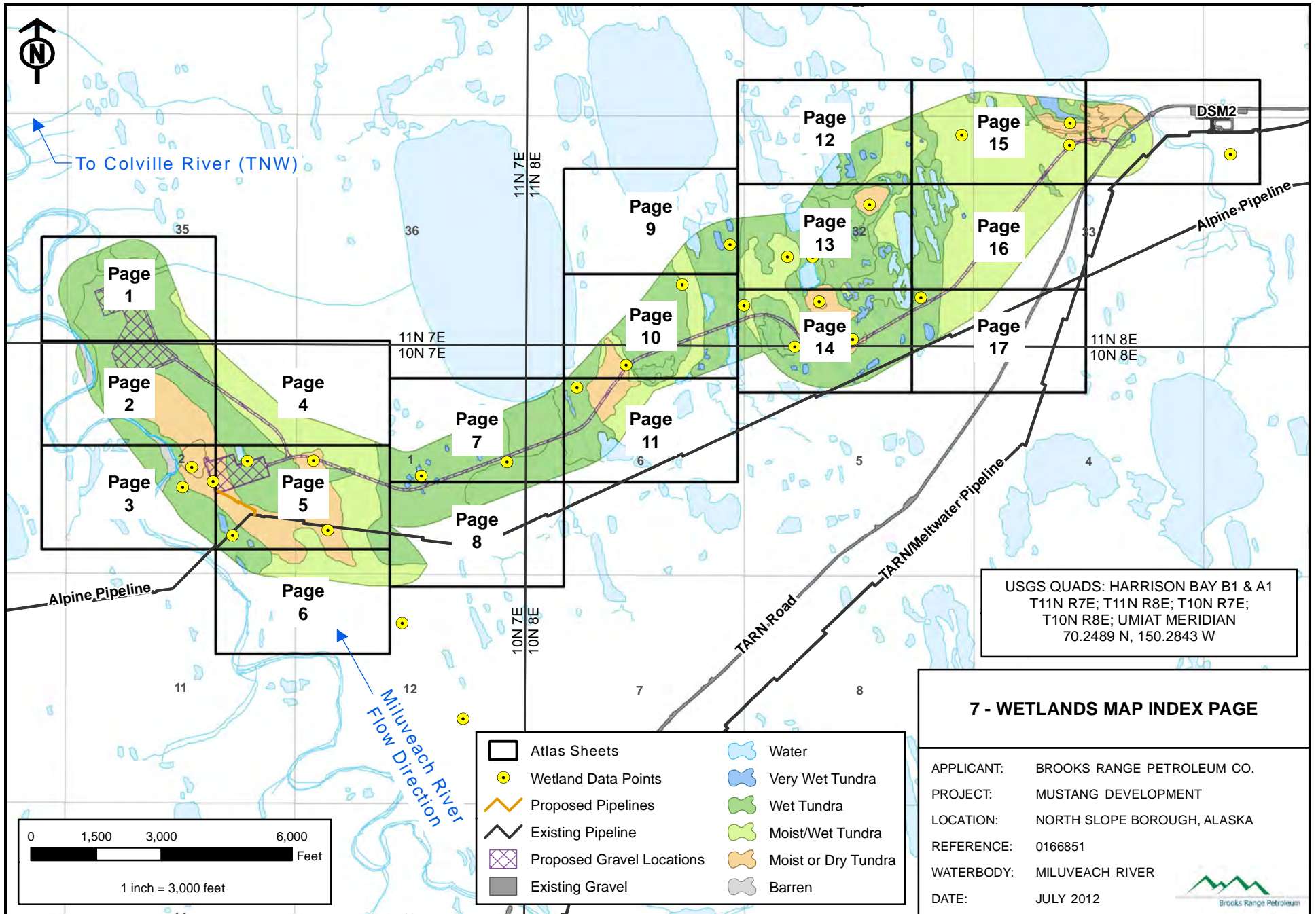


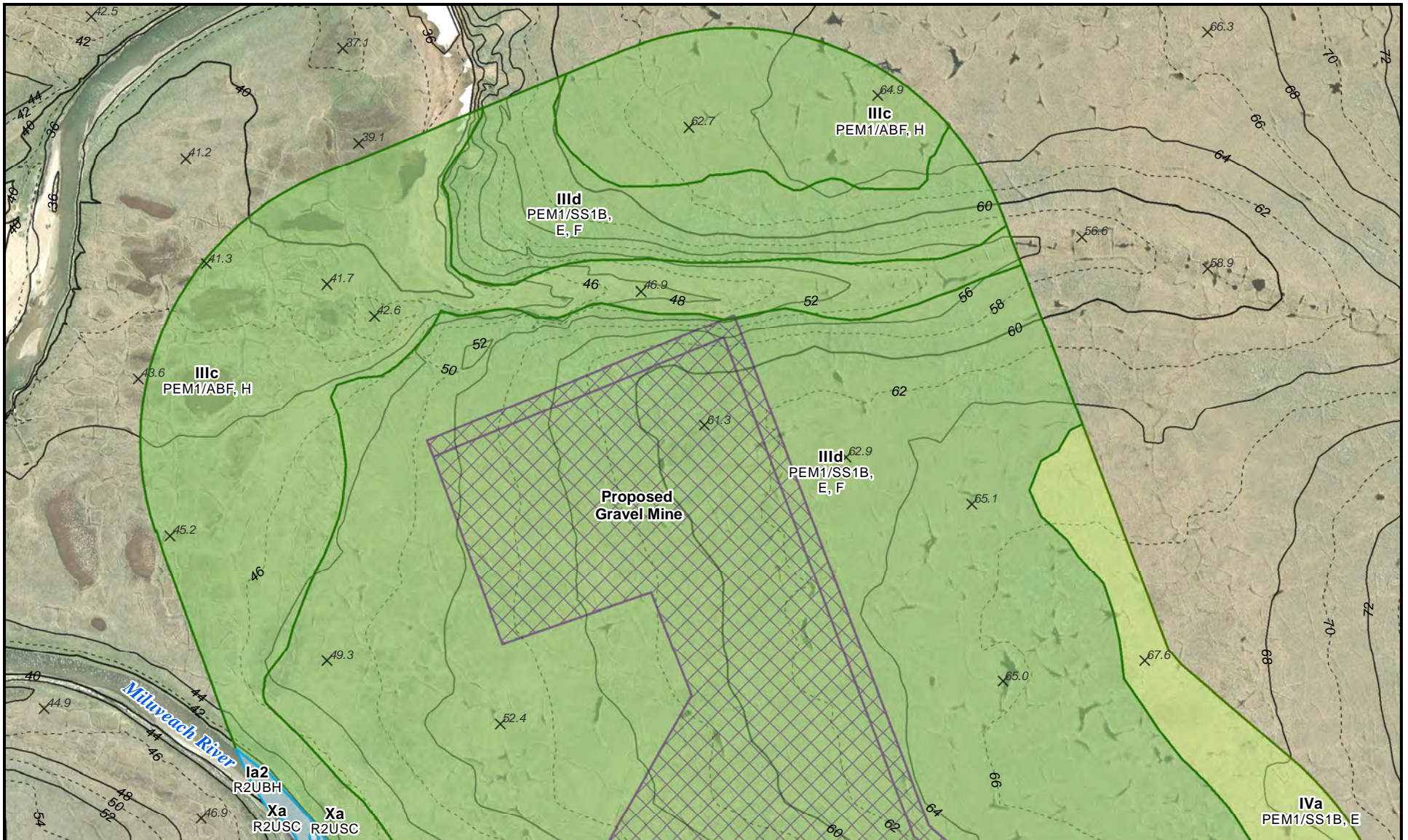












0 100 200 400  
Feet

1 inch = 400 feet



- Wetland Data Points
- Existing Pipeline
- Proposed Gravel Fill

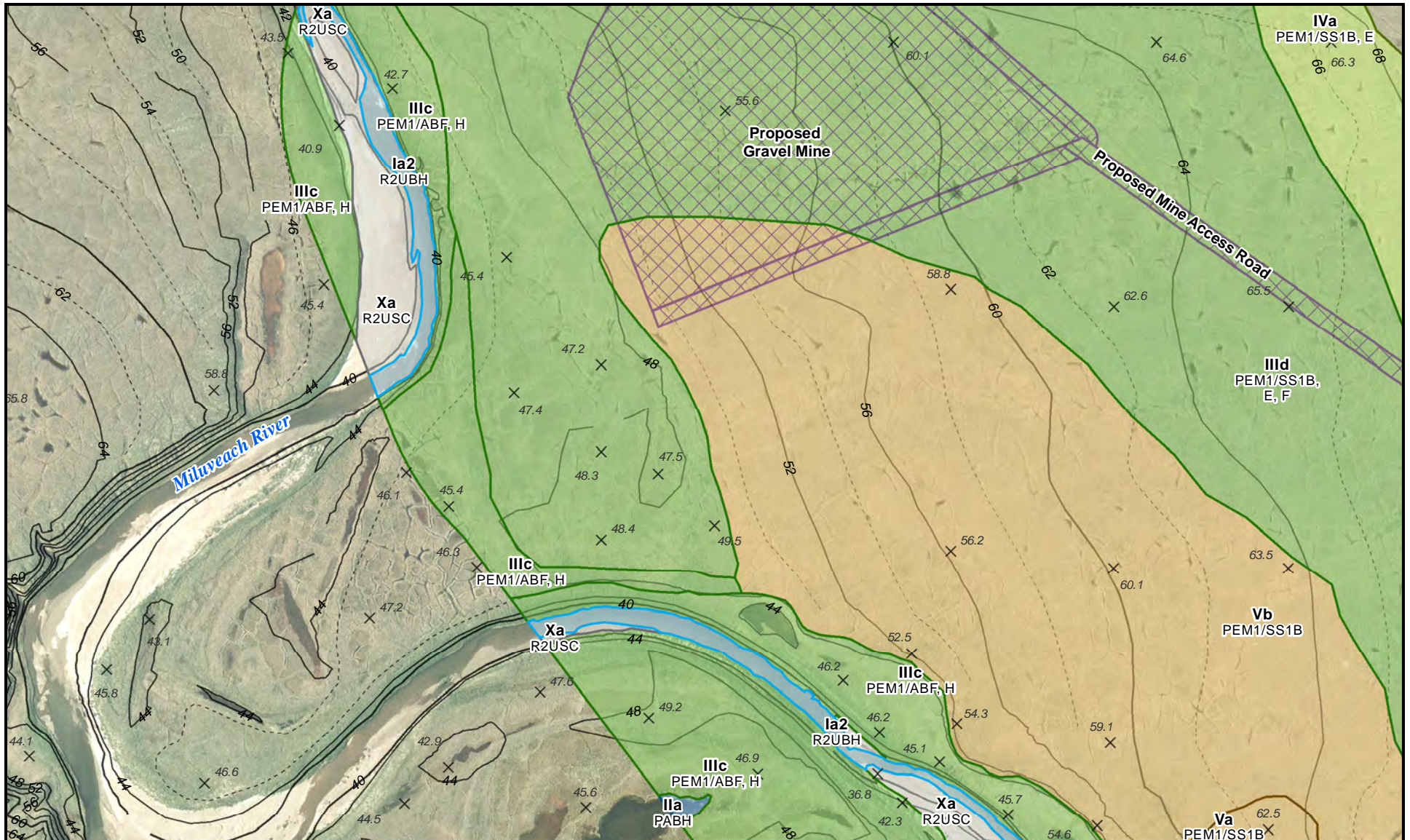
- Water
- Very Wet Tundra
- Wet Tundra

- Moist/Wet Tundra
- Moist or Dry Tundra
- Barren

**7 - WETLANDS MAP ATLAS - PAGE 1 OF 18**

APPLICANT: BROOKS RANGE PETROLEUM CO.  
 PROJECT: MUSTANG DEVELOPMENT  
 LOCATION: NORTH SLOPE BOROUGH, ALASKA  
 REFERENCE: 0166851  
 WATERBODY: MILUVEACH RIVER  
 DATE: JULY 2012














0 100 200 400  
Feet

1 inch = 400 feet



-  Wetland Data Points
-  Existing Pipeline
-  Proposed Gravel Fill

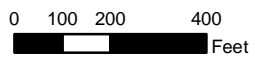
-  Water
-  Very Wet Tundra
-  Wet Tundra

-  Moist/Wet Tundra
-  Moist or Dry Tundra
-  Barren

**7 - WETLANDS MAP ATLAS - PAGE 2 OF 18**

APPLICANT: BROOKS RANGE PETROLEUM CO.  
 PROJECT: MUSTANG DEVELOPMENT  
 LOCATION: NORTH SLOPE BOROUGH, ALASKA  
 REFERENCE: 0166851  
 WATERBODY: MILUVEACH RIVER  
 DATE: JULY 2012





1 inch = 400 feet



- Wetland Data Points
- Existing Pipeline
- Proposed Gravel Fill

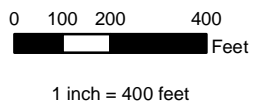
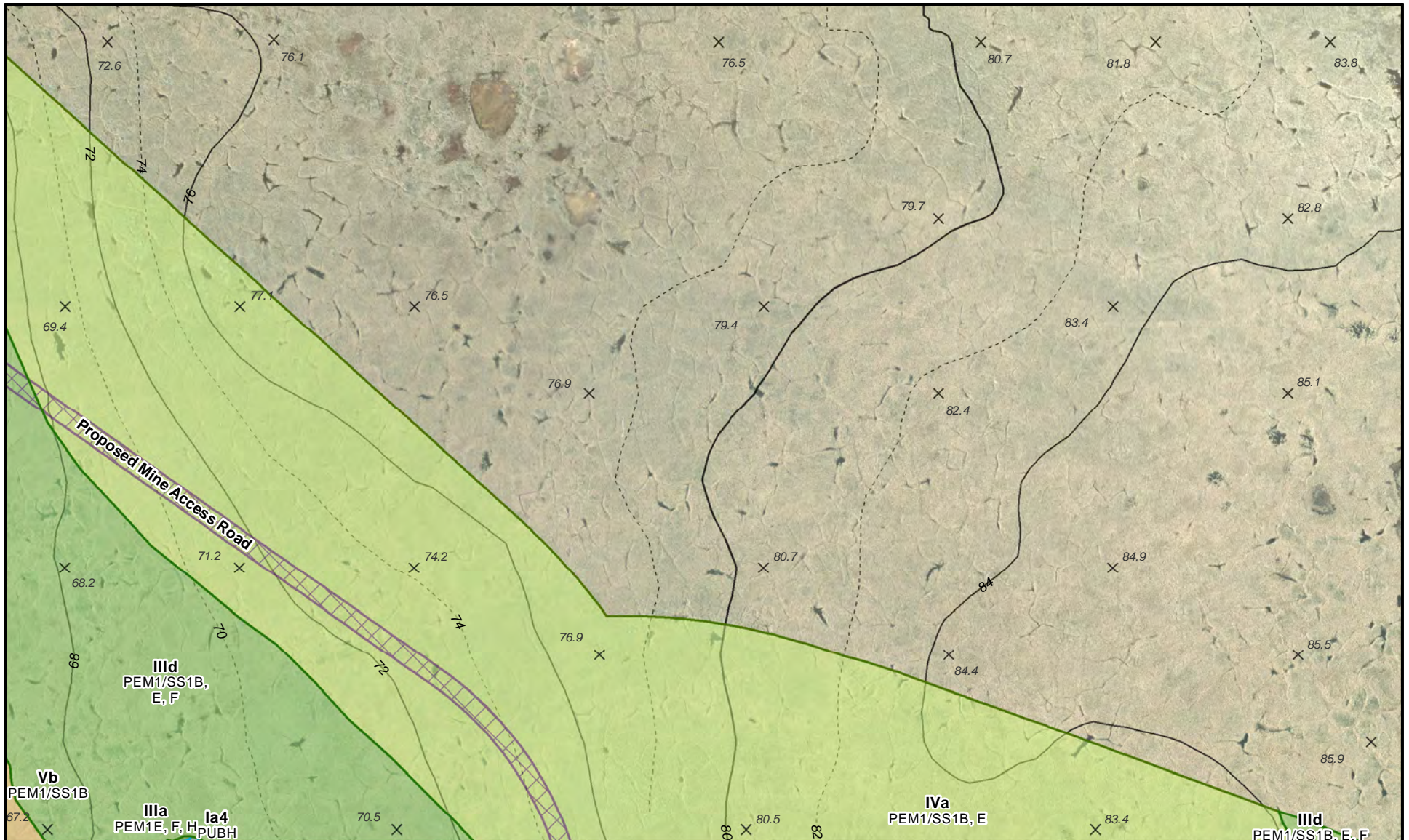
- Water
- Very Wet Tundra
- Wet Tundra




- Moist/Wet Tundra
- Moist or Dry Tundra
- Barren




**7 - WETLANDS MAP ATLAS - PAGE 3 OF 18**




APPLICANT: BROOKS RANGE PETROLEUM CO.  
 PROJECT: MUSTANG DEVELOPMENT  
 LOCATION: NORTH SLOPE BOROUGH, ALASKA  
 REFERENCE: 0166851  
 WATERBODY: MILUVEACH RIVER  
 DATE: JULY 2012





-  Wetland Data Points
-  Existing Pipeline
-  Proposed Gravel Fill

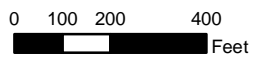
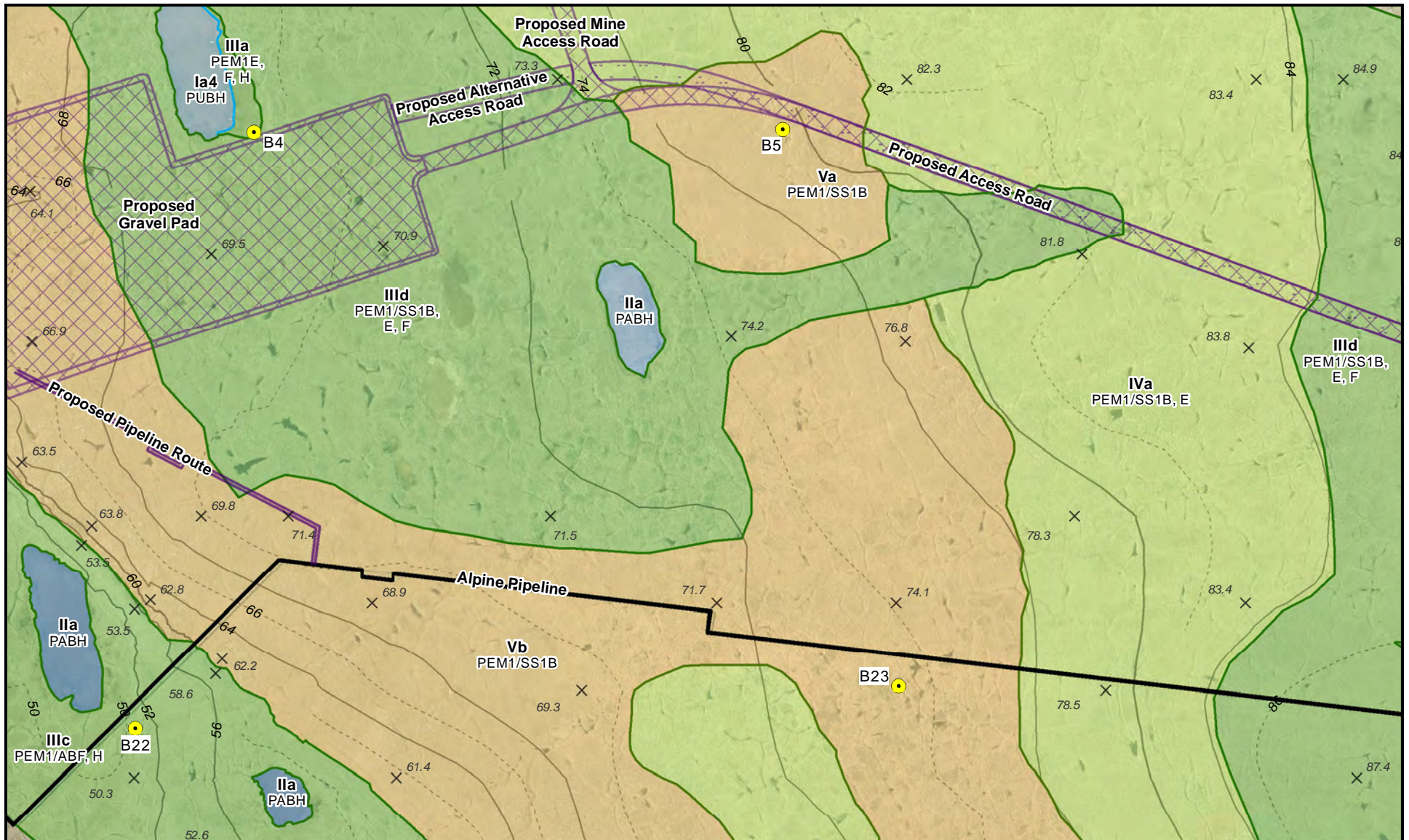
-  Water
-  Very Wet Tundra
-  Wet Tundra

-  Moist/Wet Tundra
-  Moist or Dry Tundra
-  Barren

**7 - WETLANDS MAP ATLAS - PAGE 4 OF 18**

APPLICANT: BROOKS RANGE PETROLEUM CO.  
 PROJECT: MUSTANG DEVELOPMENT  
 LOCATION: NORTH SLOPE BOROUGH, ALASKA  
 REFERENCE: 0166851  
 WATERBODY: MILUVEACH RIVER  
 DATE: JULY 2012





1 inch = 400 feet



Wetland Data Points



Existing Pipeline



Proposed Gravel Fill



Water



Very Wet Tundra



Wet Tundra



Moist/Wet Tundra



Moist or Dry Tundra



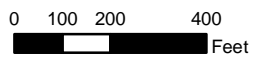
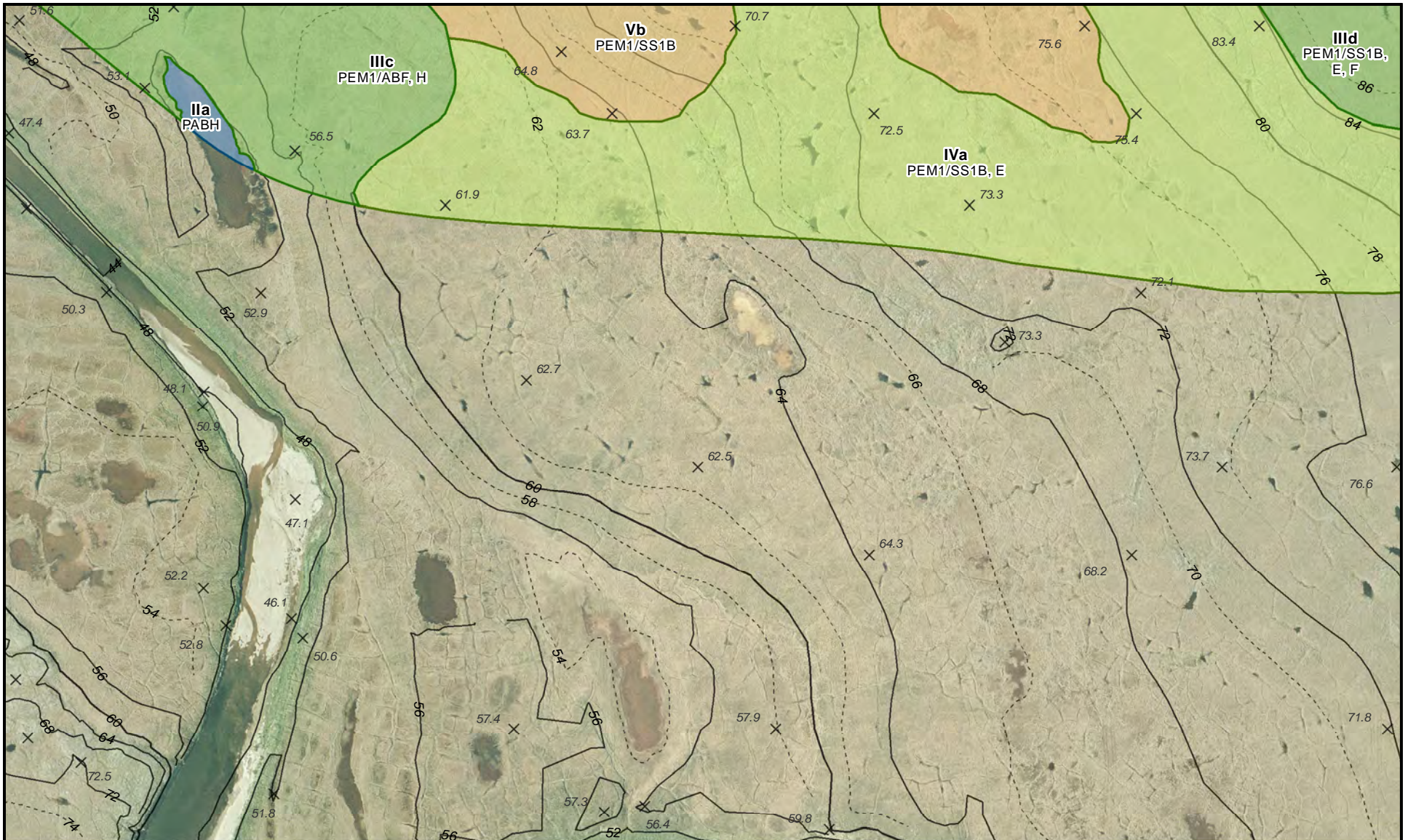
Barren

### 7 - WETLANDS MAP ATLAS - PAGE 5 OF 18

APPLICANT: BROOKS RANGE PETROLEUM CO.  
PROJECT: MUSTANG DEVELOPMENT  
LOCATION: NORTH SLOPE BOROUGH, ALASKA  
REFERENCE: 0166851  
WATERBODY: MILUVEACH RIVER  
DATE: JULY 2012







1 inch = 400 feet



Wetland Data Points



Existing Pipeline



Proposed Gravel Fill



Water



Very Wet Tundra



Wet Tundra



Moist/Wet Tundra



Moist or Dry Tundra



Barren

**7 - WETLANDS MAP ATLAS - PAGE 6 OF 18**

APPLICANT: BROOKS RANGE PETROLEUM CO.  
 PROJECT: MUSTANG DEVELOPMENT  
 LOCATION: NORTH SLOPE BOROUGH, ALASKA  
 REFERENCE: 0166851  
 WATERBODY: MILUVEACH RIVER  
 DATE: JULY 2012





0 100 200 400  
Feet

1 inch = 400 feet



Wetland Data Points



Existing Pipeline



Proposed Gravel Fill

Water



Very Wet Tundra



Wet Tundra

Moist/Wet Tundra



Moist or Dry Tundra

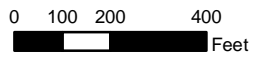
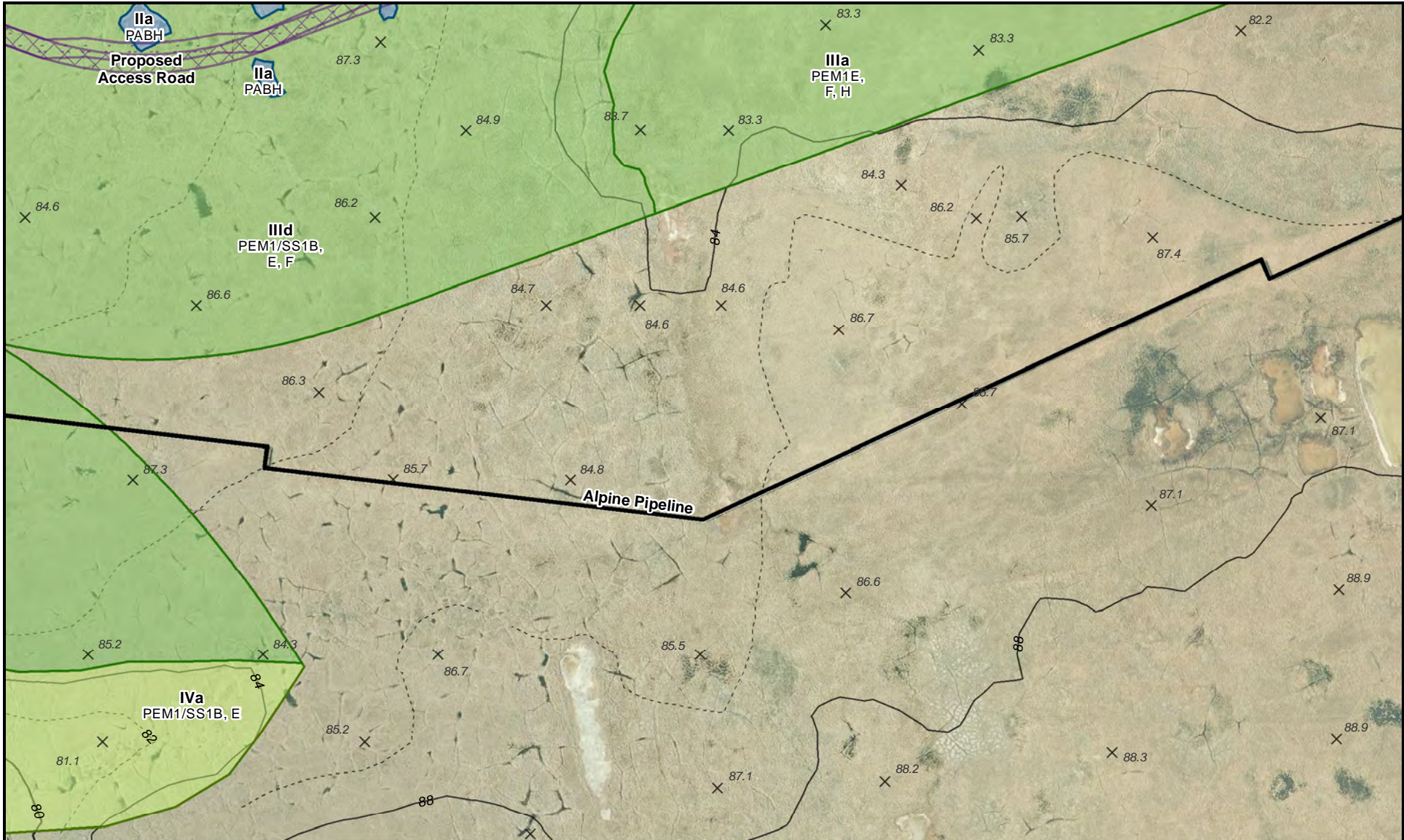


Barren

**7 - WETLANDS MAP ATLAS - PAGE 7 OF 18**




APPLICANT: BROOKS RANGE PETROLEUM CO.  
PROJECT: MUSTANG DEVELOPMENT  
LOCATION: NORTH SLOPE BOROUGH, ALASKA  
REFERENCE: 0166851  
WATERBODY: MILUVEACH RIVER  
DATE: JULY 2012











1 inch = 400 feet



-  Wetland Data Points
-  Existing Pipeline
-  Proposed Gravel Fill

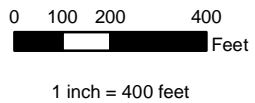
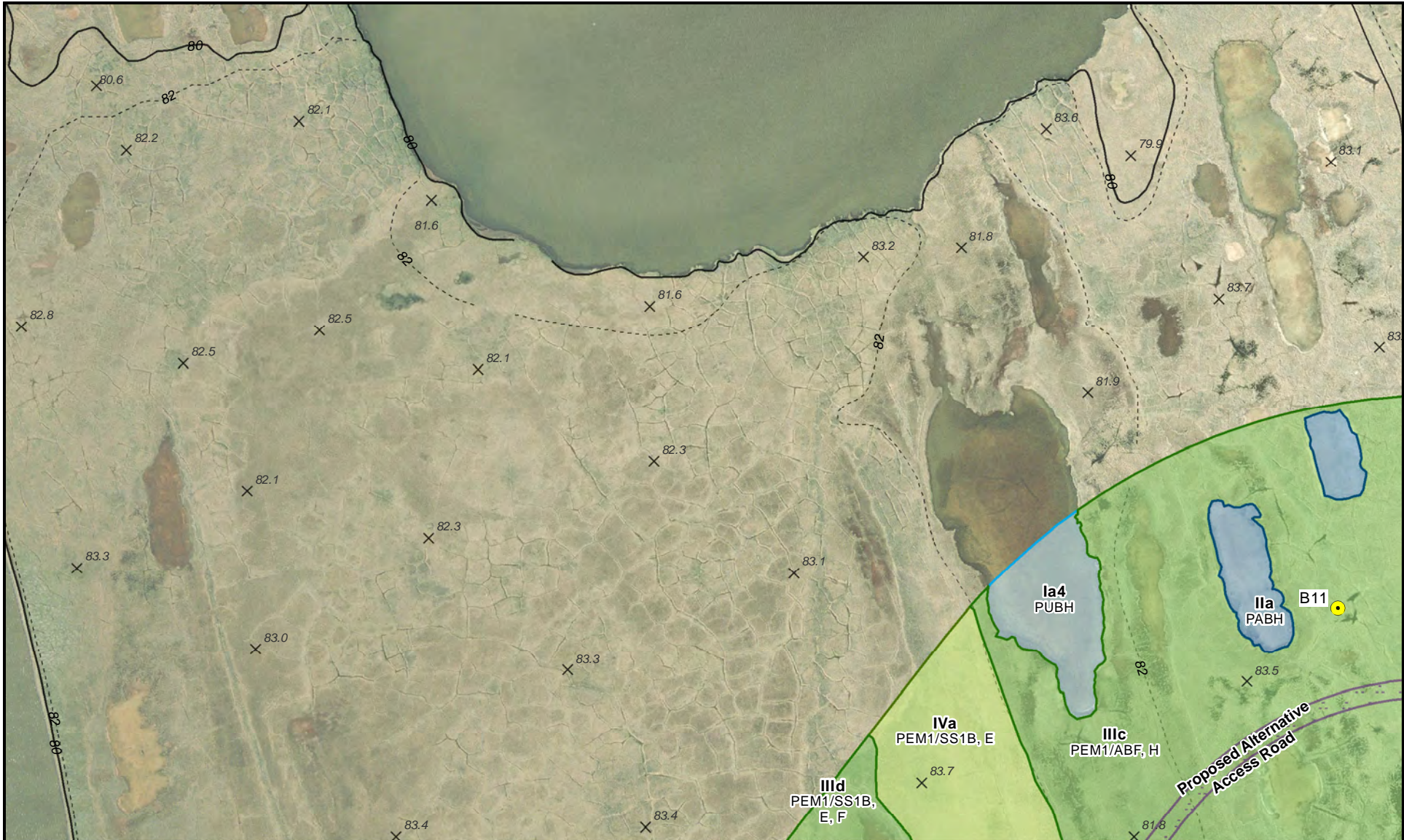
-  Water
-  Very Wet Tundra
-  Wet Tundra




-  Moist/Wet Tundra
-  Moist or Dry Tundra
-  Barren




**7 - WETLANDS MAP ATLAS - PAGE 8 OF 18**




APPLICANT: BROOKS RANGE PETROLEUM CO.  
 PROJECT: MUSTANG DEVELOPMENT  
 LOCATION: NORTH SLOPE BOROUGH, ALASKA  
 REFERENCE: 0166851  
 WATERBODY: MILUVEACH RIVER  
 DATE: JULY 2012





-  Wetland Data Points
-  Existing Pipeline
-  Proposed Gravel Fill

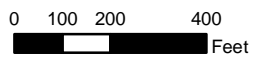
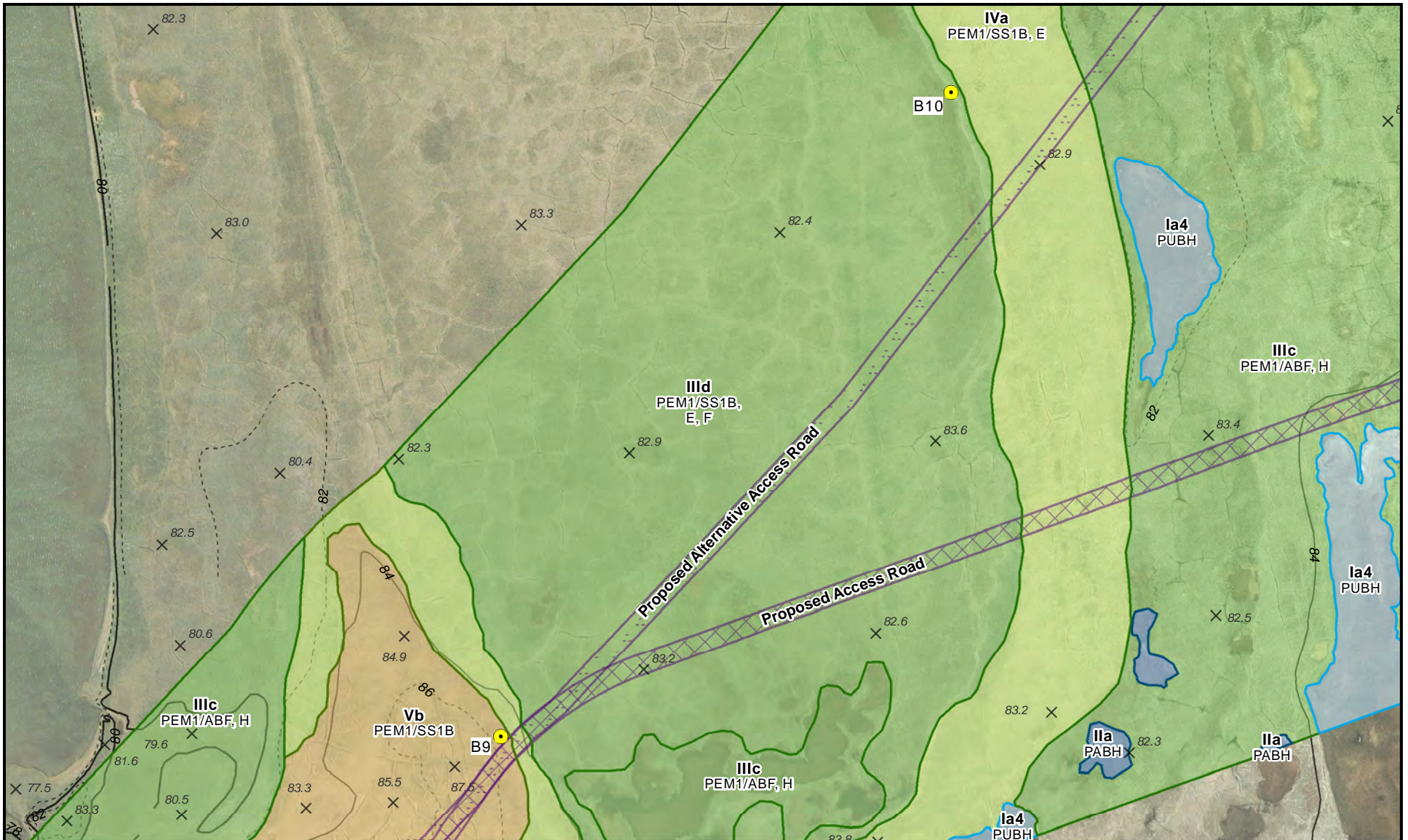
-  Water
-  Very Wet Tundra
-  Wet Tundra

-  Moist/Wet Tundra
-  Moist or Dry Tundra
-  Barren

**7 - WETLANDS MAP ATLAS - PAGE 9 OF 18**

APPLICANT: BROOKS RANGE PETROLEUM CO.  
 PROJECT: MUSTANG DEVELOPMENT  
 LOCATION: NORTH SLOPE BOROUGH, ALASKA  
 REFERENCE: 0166851  
 WATERBODY: MILUVEACH RIVER  
 DATE: JULY 2012





1 inch = 400 feet



Wetland Data Points



Existing Pipeline



Proposed Gravel Fill



Water



Very Wet Tundra



Wet Tundra



Moist/Wet Tundra



Moist or Dry Tundra

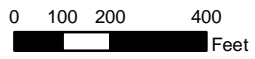
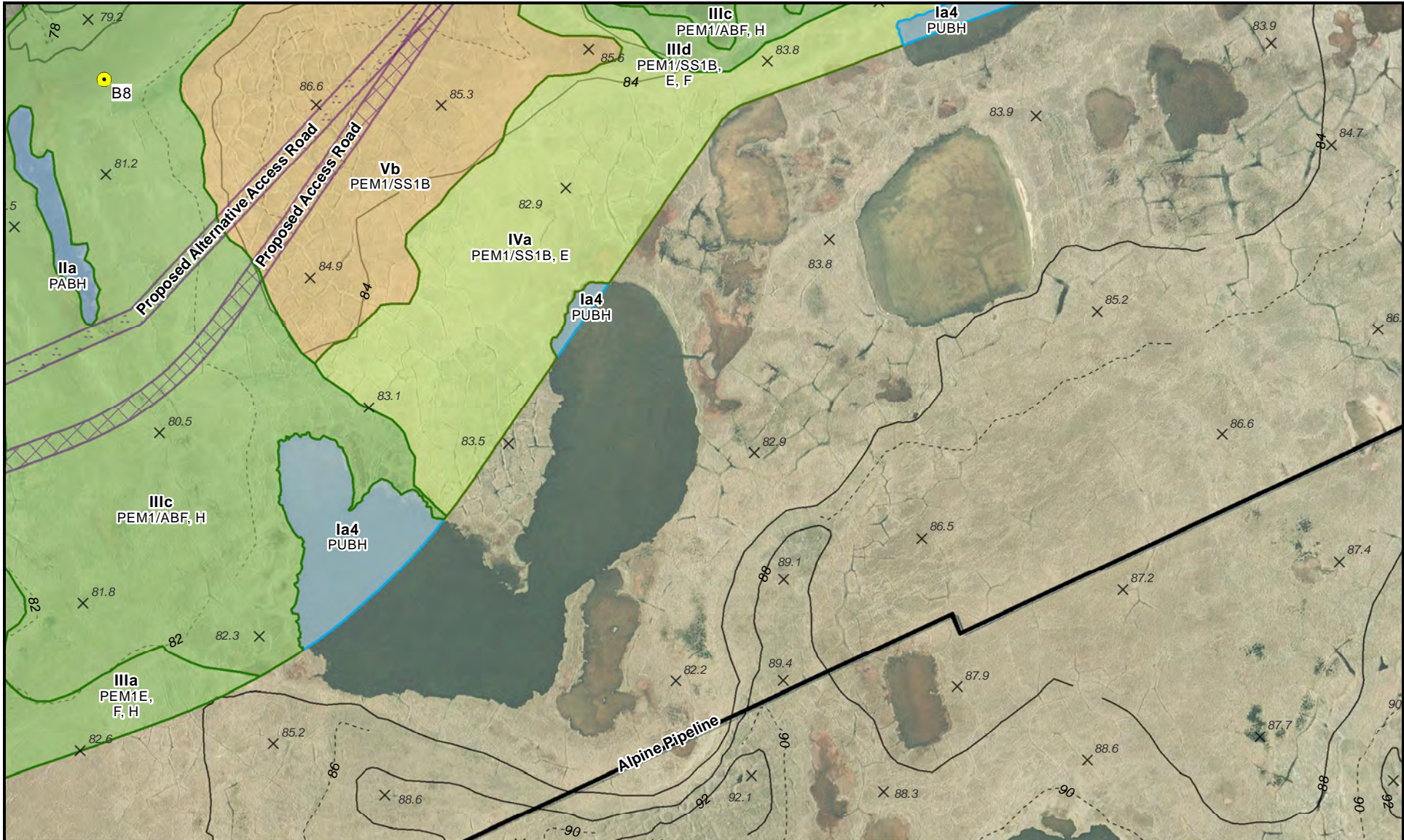


Barren

**7 - WETLANDS MAP ATLAS - PAGE 10 OF 18**

APPLICANT: BROOKS RANGE PETROLEUM CO.  
 PROJECT: MUSTANG DEVELOPMENT  
 LOCATION: NORTH SLOPE BOROUGH, ALASKA  
 REFERENCE: 0166851  
 WATERBODY: MILUVEACH RIVER  
 DATE: JULY 2012





1 inch = 400 feet



Wetland Data Points



Existing Pipeline



Proposed Gravel Fill



Water



Very Wet Tundra



Wet Tundra



Moist/Wet Tundra



Moist or Dry Tundra

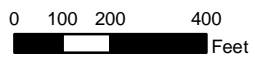


Barren

**7 - WETLANDS MAP ATLAS - PAGE 11 OF 18**

APPLICANT: BROOKS RANGE PETROLEUM CO.  
 PROJECT: MUSTANG DEVELOPMENT  
 LOCATION: NORTH SLOPE BOROUGH, ALASKA  
 REFERENCE: 0166851  
 WATERBODY: MILUVEACH RIVER  
 DATE: JULY 2012





1 inch = 400 feet



Wetland Data Points



Existing Pipeline



Proposed Gravel Fill



Water



Very Wet Tundra



Wet Tundra



Moist/Wet Tundra



Moist or Dry Tundra

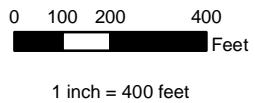
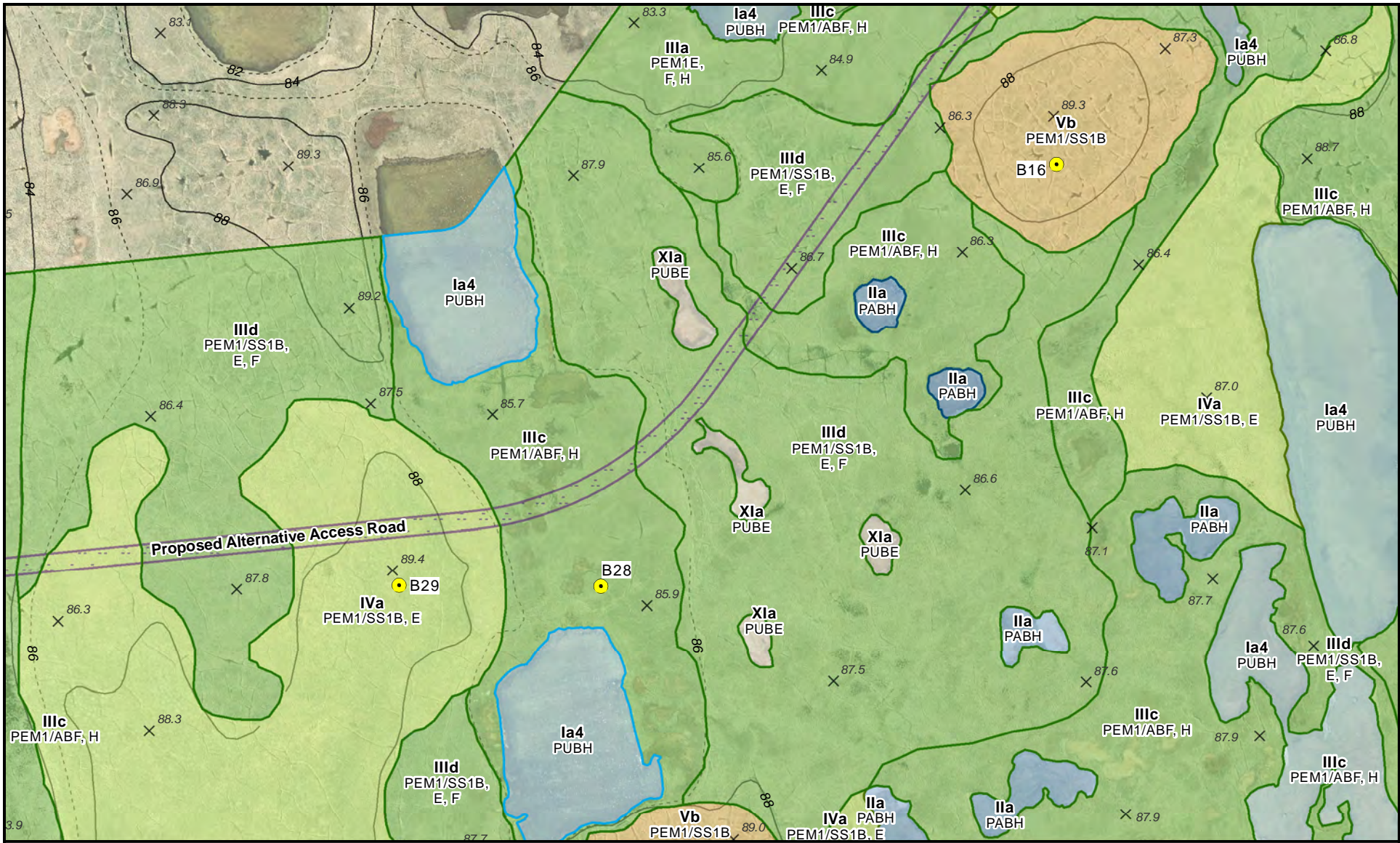





Barren




**7 - WETLANDS MAP ATLAS - PAGE 12 OF 18**




APPLICANT: BROOKS RANGE PETROLEUM CO.  
 PROJECT: MUSTANG DEVELOPMENT  
 LOCATION: NORTH SLOPE BOROUGH, ALASKA  
 REFERENCE: 0166851  
 WATERBODY: MILUVEACH RIVER  
 DATE: JULY 2012





-  Wetland Data Points
-  Existing Pipeline
-  Proposed Gravel Fill

-  Water
-  Very Wet Tundra
-  Wet Tundra

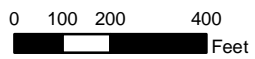
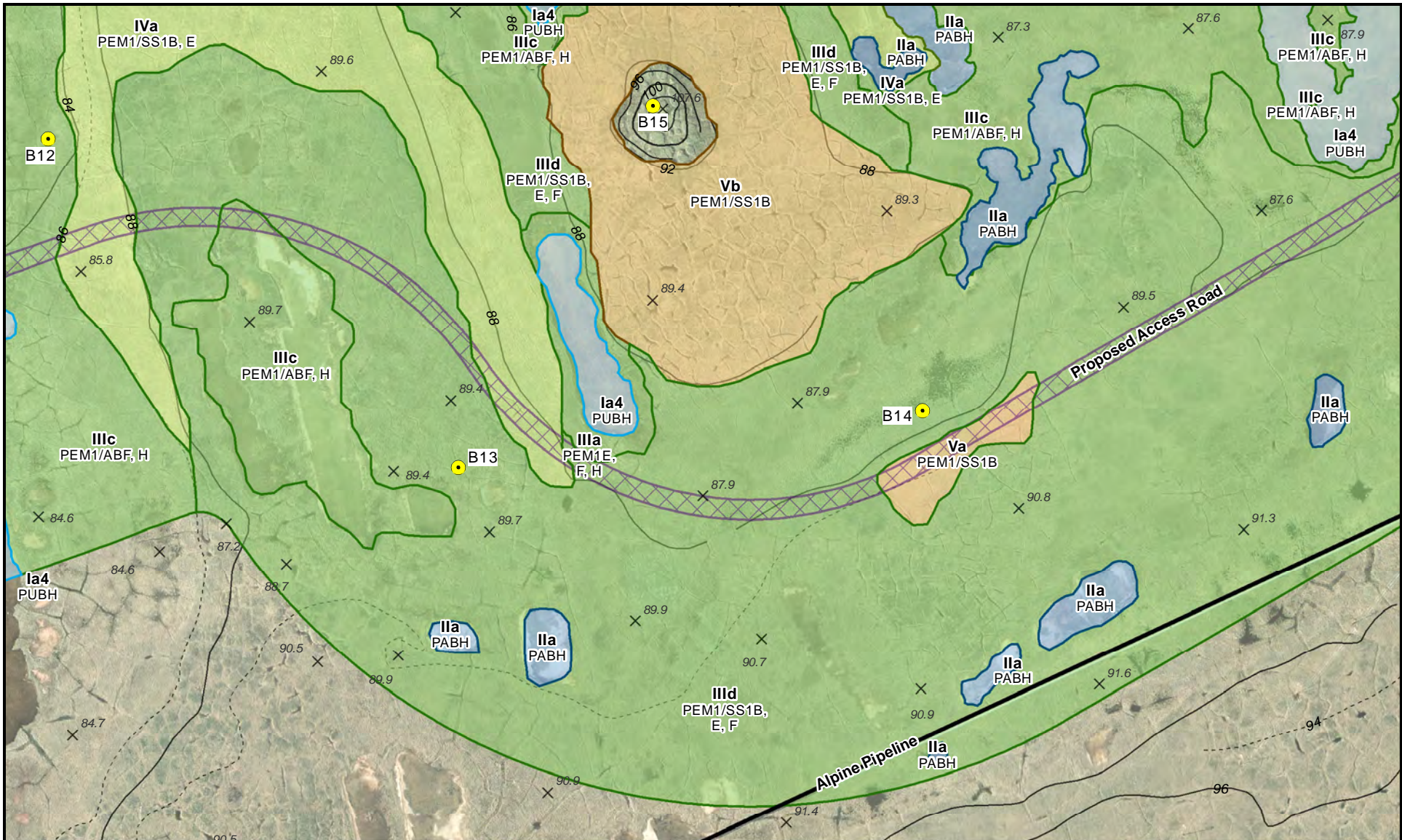
-  Moist/Wet Tundra
-  Moist or Dry Tundra
-  Barren

**7 - WETLANDS MAP ATLAS - PAGE 13 OF 18**

APPLICANT: BROOKS RANGE PETROLEUM CO.  
 PROJECT: MUSTANG DEVELOPMENT  
 LOCATION: NORTH SLOPE BOROUGH, ALASKA  
 REFERENCE: 0166851  
 WATERBODY: MILUVEACH RIVER  
 DATE: JULY 2012







1 inch = 400 feet



- Wetland Data Points
- Existing Pipeline
- Proposed Gravel Fill

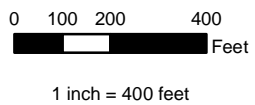
- Water
- Very Wet Tundra
- Wet Tundra




- Moist/Wet Tundra
- Moist or Dry Tundra
- Barren




**7 - WETLANDS MAP ATLAS - PAGE 14 OF 18**




APPLICANT: BROOKS RANGE PETROLEUM CO.  
 PROJECT: MUSTANG DEVELOPMENT  
 LOCATION: NORTH SLOPE BOROUGH, ALASKA  
 REFERENCE: 0166851  
 WATERBODY: MILUVEACH RIVER  
 DATE: JULY 2012





-  Wetland Data Points
-  Existing Pipeline
-  Proposed Gravel Fill

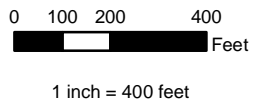
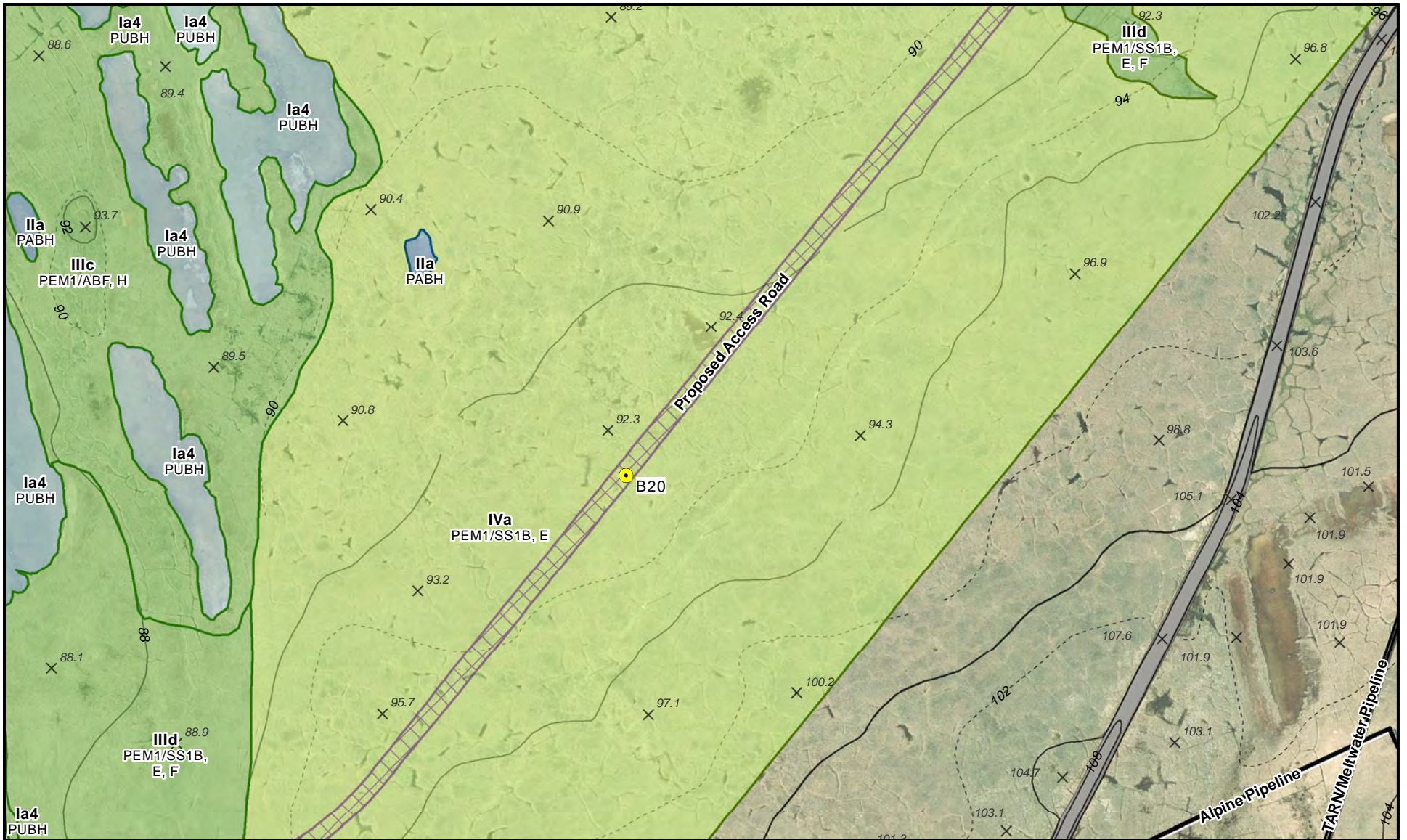
-  Water
-  Very Wet Tundra
-  Wet Tundra

-  Moist/Wet Tundra
-  Moist or Dry Tundra
-  Barren

**7 - WETLANDS MAP ATLAS - PAGE 15 OF 18**

APPLICANT: BROOKS RANGE PETROLEUM CO.  
 PROJECT: MUSTANG DEVELOPMENT  
 LOCATION: NORTH SLOPE BOROUGH, ALASKA  
 REFERENCE: 0166851  
 WATERBODY: MILUVEACH RIVER  
 DATE: JULY 2012





- Wetland Data Points
- Existing Pipeline
- Proposed Gravel Fill

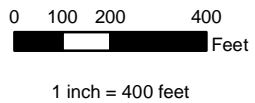
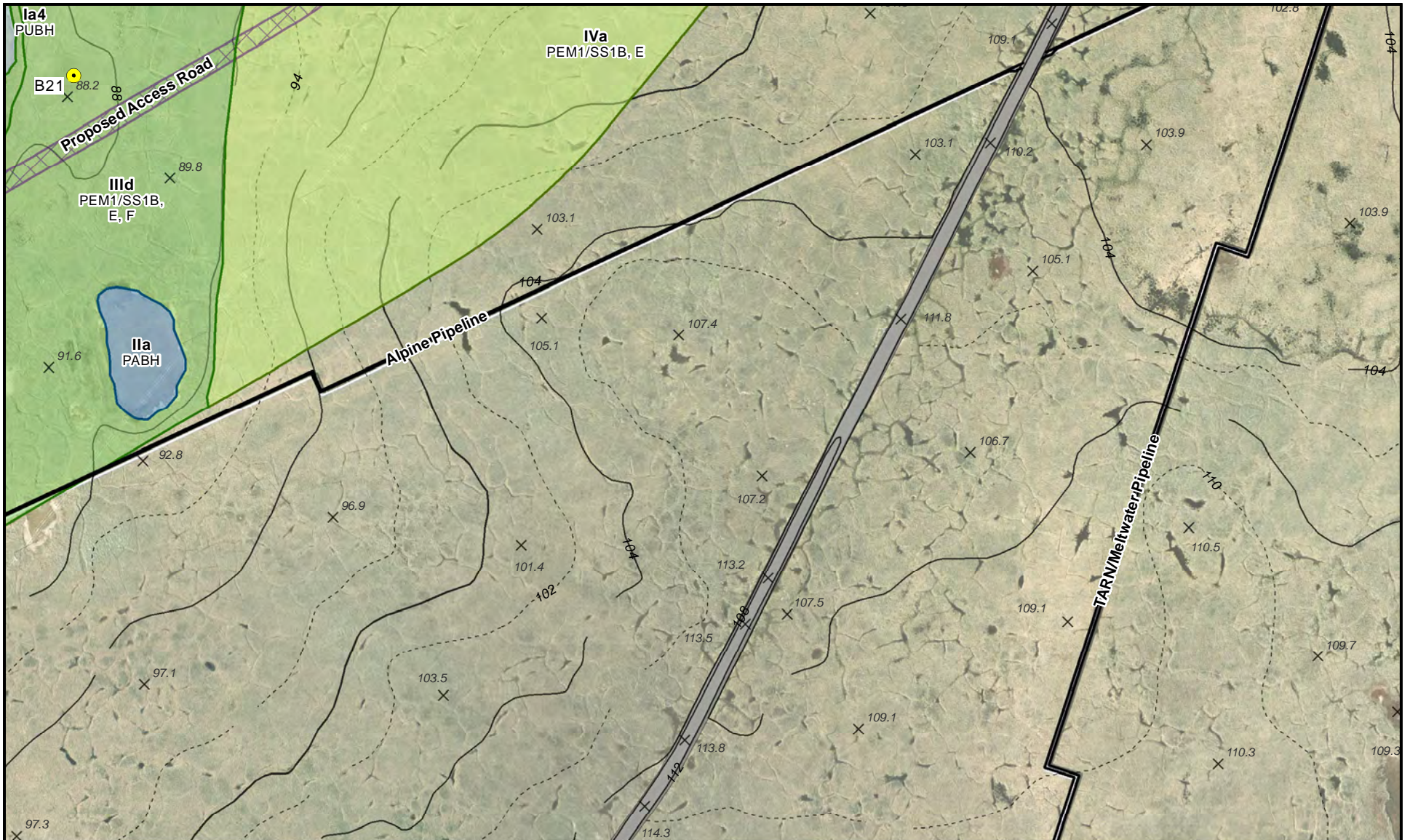
- Water
- Very Wet Tundra
- Wet Tundra




- Moist/Wet Tundra
- Moist or Dry Tundra
- Barren




**7 - WETLANDS MAP ATLAS - PAGE 16 OF 18**




APPLICANT: BROOKS RANGE PETROLEUM CO.  
 PROJECT: MUSTANG DEVELOPMENT  
 LOCATION: NORTH SLOPE BOROUGH, ALASKA  
 REFERENCE: 0166851  
 WATERBODY: MILUVEACH RIVER  
 DATE: JULY 2012





-  Wetland Data Points
-  Existing Pipeline
-  Proposed Gravel Fill

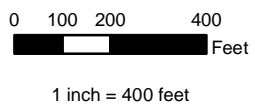
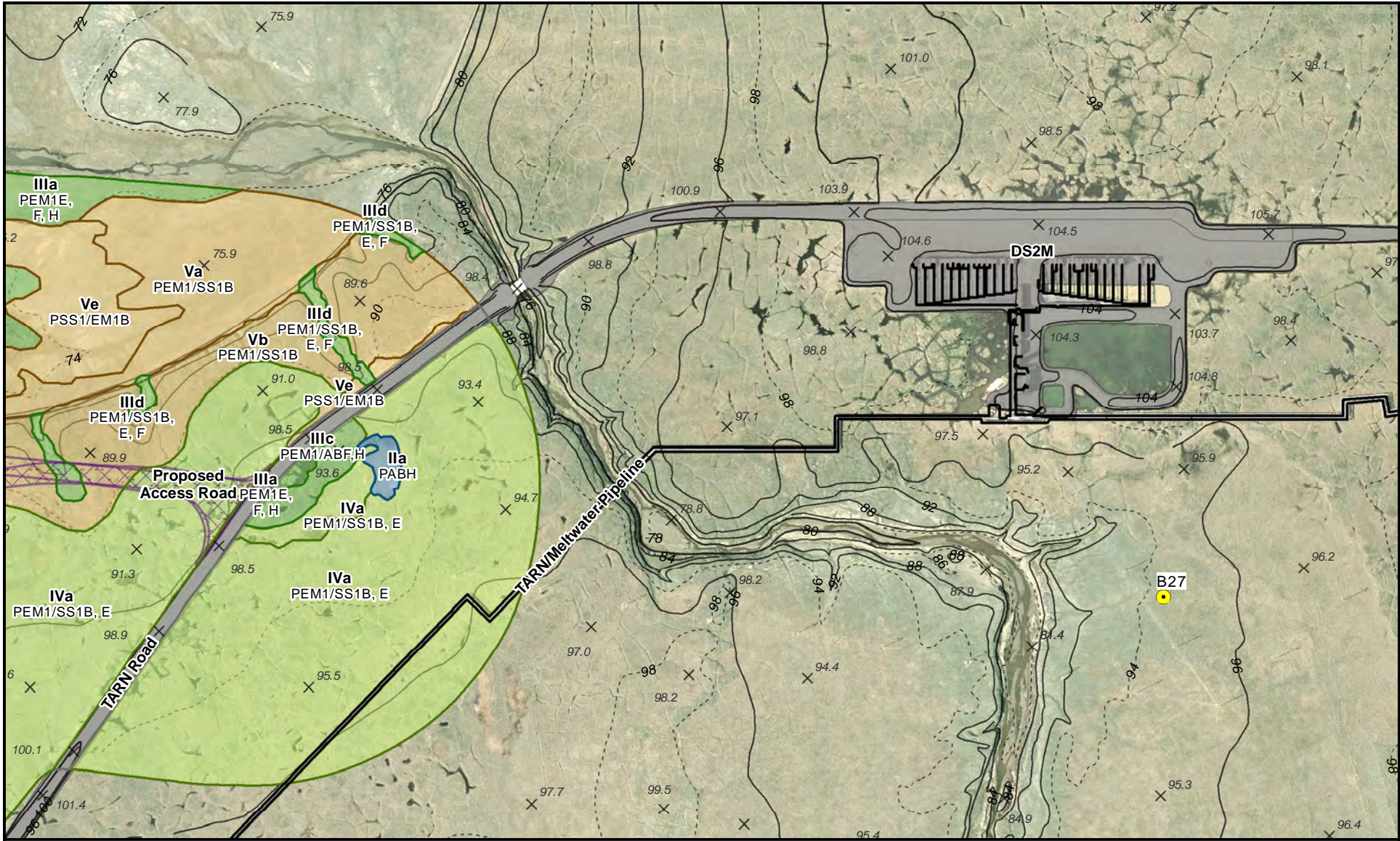
-  Water
-  Very Wet Tundra
-  Wet Tundra

-  Moist/Wet Tundra
-  Moist or Dry Tundra
-  Barren

**7 - WETLANDS MAP ATLAS - PAGE 17 OF 18**

APPLICANT: BROOKS RANGE PETROLEUM CO.  
 PROJECT: MUSTANG DEVELOPMENT  
 LOCATION: NORTH SLOPE BOROUGH, ALASKA  
 REFERENCE: 0166851  
 WATERBODY: MILUVEACH RIVER  
 DATE: JULY 2012





- Wetland Data Points
- Existing Pipeline
- Proposed Gravel Fill

- Water
- Very Wet Tundra
- Wet Tundra

- Moist/Wet Tundra
- Moist or Dry Tundra
- Barren

**7 - WETLANDS MAP ATLAS - PAGE 18 OF 18**

APPLICANT: BROOKS RANGE PETROLEUM CO.  
 PROJECT: MUSTANG DEVELOPMENT  
 LOCATION: NORTH SLOPE BOROUGH, ALASKA  
 REFERENCE: 0166851  
 WATERBODY: MILUVEACH RIVER  
 DATE: JULY 2012





## **APPENDIX C**

### **Wetland Determination Datasheets**

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**WETLAND DETERMINATION DATA FORM - Alaska Region**

Project Site: Mustang Development Project Borough/City: North Slope Sampling Date: Aug 5, 2011  
 Applicatee/Owner: Brooks Range Petroleum Sampling Point: B-1  
 Investigator(s): JBrekken, JO'Brien Landform (hillside, terrace, Hummock, etc): Hummocks  
 Local Relief (concave, convex, none): Concave Slope (%): 2-3  
 Subregion: \_\_\_\_\_ Lat: \_\_\_\_\_ Long: \_\_\_\_\_ Datum: \_\_\_\_\_

Are climate/hydrologic conditions on the site typical for this time of year? Yes

Are Vegetation?, No Soil? No or Hydrocarbon? No significantly disturbed? Are "Normal Circumstances" Present? Yes  
 Are Vegetation?, No Soil? No or Hydrocarbon? No 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 Is the Sampled Area within a Wetland? Yes  
 Hydric Soils Present? Yes  
 Wetland Hydrology Present? Yes

Remarks: Located on floodplain terrace of Miluvach River

**VEGETATION (List all species in plot)**

Tree Stratum (Use scientific names)	Absolute %Cover	Dominant Species	Indicator Status	Dominance Test worksheet	
1.				Number of Dominant Species That Are OBL, FACW, or FAC:	3 (A)
2.				Total Number of Dominant Species Across All Strata:	4 (B)
3.				Percent of Dominant Species That Are OBL, FACW, FAC:	75 (A/B)
4.				<b>Prevalence Index:</b>	
Total Cover:				Total % Cover of: Multiplied by:	
Sampling/Shrub Stratum		50% of total cover:	20% of total cover:	OBL Species	30 x 1 = 30
1. <u>Salix reticulata</u>	3	Yes	FAC	FACW Species	63 x 2 = 126
2. <u>Salix planifolia</u>	2		FACW	FAC Species	4 x 3 = 12
3. <u>Dryas integrifolium</u>	10	Yes	FACU	FACU Species	10 x 4 = 40
4.				UPL Species	0 x 5 = 0
5.				Column Totals:	107 (A) 208 (B)
6.				Prevalence Index = B/A = 1.94	
Total Cover: 15				<b>Hydrophytic Vegetation Indicators:</b>	
Herb Stratum		50% of total cover:	20% of total cover:	<input checked="" type="checkbox"/> Dominance Test is >50%	
1. <u>Carex aquatilis</u>	5		OBL	<input checked="" type="checkbox"/> Prevalence Test is ≤3.0	
2. <u>Carex saxatilis</u>	60	Yes	FACW	<input type="checkbox"/> Morphological Adaptions' (Provide supporting data in Remarks or on a spererate sheet)	
3. <u>Eriophorum angustifolium</u>	25	Yes	OBL	<input type="checkbox"/> Problematic Hydrophytic Vegetation' Explain)	
4. <u>Pedicularis sudetica</u>	1		FACW	<i>' Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.</i>	
5. <u>Polygonum viviparum</u>	1		FAC		
6.					
7.					
8.					
Total Cover: 92				Hydrophytic Vegetation Present? <input checked="" type="checkbox"/> Yes	
Plot size (radius, or length x width) <u>15' radius</u>		50% of total cover:	20% of total cover:		
		46	18.4		
% Bare Ground: 0					
% Cover of Wetland Bryophytes:		Total Cover of Bryophytes:			
		10			

Remarks: \_\_\_\_\_

**SOIL**

Sampling Point: B-1

**Profile Description: (Describe to the depth needed to document the indicator.)**

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>	Texture Remarks	Remarks
0-4								Organics
4-17	10YR2/1	100					loamy sand	Organics/soil mix

<sup>1</sup>Type: C=Concentrations, D=Depletions, RM=Reduced Matrix.      <sup>2</sup>Location: PL=Pore Linings, RC=Root Channel, M=Matrix

<p><b>Hydric Soil Indicators:</b></p> <p><input checked="" type="checkbox"/> Histosol or Histel (A1)</p> <p><input type="checkbox"/> Histlic Epipedon (A2)</p> <p><input type="checkbox"/> Hydrogen Sulfide (A4)</p> <p><input type="checkbox"/> Thick Dark Surface (A12)</p> <p><input type="checkbox"/> Alaska Gleyed (A13)</p> <p><input type="checkbox"/> Alaska Redox (A14)</p> <p><input type="checkbox"/> Alaska Gleyed Pores (A15)</p>	<p><b>Indicators for Problematic Hydric Soils:</b></p> <p><input type="checkbox"/> Alaska Color Change (TA4)<sup>4</sup></p> <p><input type="checkbox"/> Alaska Alpine Swales (TA5)</p> <p><input type="checkbox"/> Alaska Redox With 2.5Y Hue</p> <p><input type="checkbox"/> Alaska Gleyed Without Hue 5Y or Redder Underlying Layer</p> <p><input type="checkbox"/> Other (Explain in Remarks)</p> <p><sup>3</sup>One Indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.</p> <p><sup>4</sup>Give details of color change in Remarks.</p>	
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<p>Restrictive Layer (if present): <b>Frozen</b></p> <p>Depth: <u>17" bgs</u></p>	<p>Hydric Soils Present?      <b>Yes</b></p>
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Remarks:

**HYDROLOGY**

<p><b>Wetland Hydrology Indicators:</b></p> <p><u>Primary Indicators (any one indicator is sufficient)</u></p> <p><input type="checkbox"/> Surface Water (A1)</p> <p><input checked="" type="checkbox"/> High Water Table (A2)</p> <p><input checked="" type="checkbox"/> Saturation (A3)</p> <p><input type="checkbox"/> Water Marks (B1)</p> <p><input type="checkbox"/> Sediment Deposits (B2)</p> <p><input type="checkbox"/> Drift Deposits (B3)</p> <p><input type="checkbox"/> Mat of Crust of Algae or Marl (B4)</p> <p><input type="checkbox"/> Iron Deposits (B5)</p> <p><input type="checkbox"/> Surface Soil Cracks (B6)</p> <p><input type="checkbox"/> Inundations Visible on Aerial Imagery (B7)</p> <p><input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)</p> <p><input type="checkbox"/> Hydrogen Sulfide Odor (C1)</p> <p><input type="checkbox"/> Dry Season Water Table (C2)</p> <p><input type="checkbox"/> Other (Explain in Remarks)</p>	<p><u>Secondary Indicators (2 or more required)</u></p> <p><input type="checkbox"/> Water Stained Leaves (B9)</p> <p><input type="checkbox"/> Drainage Patterns (B10)</p> <p><input type="checkbox"/> Salt Deposits (C5)</p> <p><input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3)</p> <p><input type="checkbox"/> Presence of Reduced Iron (C4)</p> <p><input type="checkbox"/> Stunted or Stressed Plants (D1)</p> <p><input checked="" type="checkbox"/> Shallow Aquitard (D3)</p> <p><input type="checkbox"/> Geomorphic Position (D2)</p> <p><input checked="" type="checkbox"/> Microtopographic Relief (D4)</p> <p><input checked="" type="checkbox"/> FAC-Neutral Test (D5)</p>
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<p><b>Field Observations:</b></p> <p>Surface Water Present? <span style="border: 1px solid black; padding: 2px;">No</span></p> <p>Water Table Present? <span style="border: 1px solid black; padding: 2px;">Yes</span></p> <p>Saturation Present? (includes capillary fringe) <span style="border: 1px solid black; padding: 2px;">Yes</span></p>	<p>Depth (inches): <u>        </u></p> <p>Depth (inches): <u>12</u></p> <p>Depth (inches): <u>0</u></p>	<p>Wetland Hydrology Present?      <b>Yes</b></p>
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Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

### WETLAND DETERMINATION DATA FORM - Alaska Region

Project Site: Mustang Development Project Borough/City: North Slope Sampling Date: Aug 5, 2011  
 Applicate/Owner: Brooks Range Petroleum Sampling Point: B-2  
 Investigator(s): JBrekken, JO'Brien Landform (hillside, terrace, Hummock, etc): Hummocks  
 Local Relief (concave, convex, none): Swale-like/concave Slope (%): 2  
 Subregion: \_\_\_\_\_ Lat: \_\_\_\_\_ Long: \_\_\_\_\_ Datum: \_\_\_\_\_

Are climate/hydrologic conditions on the site typical for this time of year? Yes

Are Vegetation?, No Soil? No or Hydrocarbon? No significantly disturbed? Are "Normal Circumstances" Present? Yes  
 Are Vegetation?, No Soil? No or Hydrocarbon? No 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 Is the Sampled Area within a Wetland? Yes  
 Hydric Soils Present? Yes  
 Wetland Hydrology Present? Yes

Remarks: Swale-like landform with some moderately defined polygonal features. Weakly defined swale leading towards the Milu beach River

**VEGETATION (List all species in plot)**

Tree Stratum (Use scientific names)	Absolute %Cover	Dominant Species	Indicator Status	Dominance Test worksheet
1.				Number of Dominant Species That Are OBL, FACW, or FAC: <u>3</u> (A)  Total Number of Dominant Species Across All Strata: <u>4</u> (B)  Percent of Dominant Species That Are OBL, FACW, FAC: <u>75</u> (A/B)
2.				
3.				
4.				
Total Cover:				<b>Prevalence Index:</b> Total % Cover of: Multiplied by: OBL Species <u>2</u> x 1 = <u>2</u> FACW Species <u>62</u> x 2 = <u>124</u> FAC Species <u>44</u> x 3 = <u>132</u> FACU Species <u>5</u> x 4 = <u>20</u> UPL Species <u>0</u> x 5 = <u>0</u> Column Totals: <u>113</u> (A) <u>278</u> (B)  Prevalence Index = B/A = <u>2.46</u>
50% of total cover: 20% of total cover:				
1. <u>Salix reticulata</u>	<u>3</u>	<u>Yes</u>	<u>FAC</u>	
2. <u>Salix planifolia</u>	<u>2</u>		<u>FACW</u>	
3. <u>Dryas integrifolia</u>	<u>5</u>	<u>Yes</u>	<u>FACU</u>	
4.				
5.				
Total Cover: 10				
50% of total cover: 5 20% of total cover: 2				
<b>Herb Stratum</b>				<b>Hydrophytic Vegetation Indicators:</b> <input checked="" type="checkbox"/> Dominance Test is >50% <input checked="" type="checkbox"/> Prevalence Test is ≤3.0 <input type="checkbox"/> Morphological Adaptions' (Provide supporting data in Remarks or on a spererate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation' Explain)  <u>' Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.'</u>
1. <u>Eriophorum vaginatum</u>	<u>10</u>		<u>FACW</u>	
2. <u>Carex saxatilis</u>	<u>50</u>	<u>Yes</u>	<u>FACW</u>	
3. <u>Eriophorum angustifolium</u>	<u>2</u>		<u>OBL</u>	
4. <u>Carex bigelowii</u>	<u>40</u>	<u>Yes</u>	<u>FAC</u>	
5. <u>Polygonum viviparum</u>	<u>1</u>		<u>FAC</u>	
6.				
7.				
Total Cover: 103				
50% of total cover: 51.5 20% of total cover: 20.6				
Plot size (radius, or length x width) <u>15' radius</u> % Bare Ground: <u>0</u>				
% Cover of Wetland Bryophytes: _____ Total Cover of Bryophytes: <u>10</u>				
Hydrophytic Vegetation Present?			<u>Yes</u>	

Remarks: \_\_\_\_\_

**SOIL**

Sampling Point: **B-2**

**Profile Description: (Describe to the depth needed to document the indicator.)**

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>	Texture	Remarks	Remarks
0-6									Organics
6-15	10YR2/2	100					loamy sand		Organics/soil mix

<sup>1</sup>Type: C=Concentrations, D=Depletions, RM=Reduced Matrix.      <sup>2</sup>Location: PL=Pore Linings, RC=Root Channel, 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:**

- Alaska Color Change (TA4)<sup>4</sup>
- Alaska Alpine Swales (TA5)
- Alaska Redox With 2.5Y Hue
- Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
- Other (Explain in Remarks)

<sup>3</sup>One Indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.

<sup>4</sup>Give details of color change in Remarks.

Restrictive Layer (if present): **Frozen**

Depth: 15" bgs

Hydric Soils Present? **Yes**

Remarks:

**HYDROLOGY**

**Wetland Hydrology Indicators:**

Primary Indicators (any one indicator is sufficient)

- Surface Water (A1)
- High Water Table (A2)
- Saturation (A3)
- Water Marks (B1)
- Sediment Deposits (B2)
- Drift Deposits (B3)
- Mat of Crust of Algae or Marl (B4)
- Iron Deposits (B5)
- Surface Soil Cracks (B6)
- Inundations Visible on Aerial Imagery (B7)
- Sparsely Vegetated Concave Surface (B8)
- 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)
- Salt Deposits (C5)
- Oxidized Rhizospheres on Living Roots (C3)
- Presence of Reduced Iron (C4)
- Stunted or Stressed Plants (D1)
- Shallow Aquitard (D3)
- Geomorphic Position (D2)
- Microtopographic Relief (D4)
- FAC-Neutral Test (D5)

**Field Observations:**

Surface Water Present?  No      Depth (inches): \_\_\_\_\_

Water Table Present?  Yes      Depth (inches): 15

Saturation Present?  Yes      Depth (inches): 0  
(includes capillary fringe)

Wetland Hydrology Present? **Yes**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

### WETLAND DETERMINATION DATA FORM - Alaska Region

Project Site: Mustang Development Project Borough/City: North Slope Sampling Date: Aug 5, 2011  
 Applicate/Owner: Brooks Range Petroleum Sampling Point: B-3  
 Investigator(s): JBrekken, JO'Brien Landform (hillside, terrace, Hummock, etc): Tussocks  
 Local Relief (concave, convex, none): Convex Slope (%): 2-3  
 Subregion: \_\_\_\_\_ Lat: \_\_\_\_\_ Long: \_\_\_\_\_ Datum: \_\_\_\_\_

Are climate/hydrologic conditions on the site typical for this time of year? Yes  
 Are Vegetation?, No Soil? No or Hydrocabon? No significantly disturbed? Are "Normal Circumstances" Present? Yes  
 Are Vegetation?, No Soil? No or Hydrocabon? No 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 Is the Sampled Area within a Wetland? Yes  
 Hydric Soils Present? Yes  
 Wetland Hydrology Present? Yes

Remarks: \_\_\_\_\_

**VEGETATION (List all species in plot)**

Tree Stratum (Use scientific names)	Absolute %Cover	Dominant Species	Indicator Status	Dominance Test worksheet
1.				Number of Dominant Species That Are OBL, FACW, or FAC: <u>1</u> (A) Total Number of Dominant Species Across All Strata: <u>2</u> (B) Percent of Dominant Species That Are OBL, FACW, FAC: <u>50</u> (A/B)
2.				
3.				
4.				
Total Cover:				<b>Prevalence Index:</b> Total % Cover of: Multiplied by: OBL Species <u>0</u> x 1 = <u>0</u> FACW Species <u>35</u> x 2 = <u>70</u> FAC Species <u>14</u> x 3 = <u>42</u> FACU Species <u>13</u> x 4 = <u>52</u> UPL Species <u>0</u> x 5 = <u>0</u> Column Totals: <u>62</u> (A) <u>129</u> (B) Prevalence Index = B/A = <u>2.65</u>
<b>Sampling/Shrub Stratum</b>	50% of total cover:	20% of total cover:		
1. <u>Salix reticulata</u>	<u>2</u>		<u>FAC</u>	
2. <u>Salix arctica</u>	<u>2</u>		<u>FAC</u>	
3. <u>Dryas integrifolium</u>	<u>10</u>	<u>Yes</u>	<u>FACU</u>	
4. <u>Cassiope tetragona</u>	<u>3</u>		<u>FACU</u>	
Total Cover: <u>17</u>				
<b>Herb Stratum</b>	50% of total cover:	20% of total cover:		
1. <u>Polygonum bistorta</u>	<u>5</u>		<u>FAC</u>	
2. <u>Saussurea angustifolia</u>	<u>5</u>		<u>FAC</u>	
3. <u>Eriophorum vaginatum</u>	<u>35</u>	<u>Yes</u>	<u>FACW</u>	
4. <u>Calamagrostis purpurascens</u>	<u>35</u>	<u>Yes</u>	<u>NI</u>	
Total Cover: <u>80</u>				
50% of total cover: <u>40</u> 20% of total cover: <u>16</u>				
Plot size (radius, or length x width) <u>15' radius</u> % Bare Ground: <u>0</u>				
% Cover of Wetland Bryophytes: _____ Total Cover of Bryophytes: <u>20</u>				
				<b>Hydrophytic Vegetation Indicators:</b> <input checked="" type="checkbox"/> Dominance Test is >50% <input checked="" type="checkbox"/> Prevalence Test is ≤3.0 <input type="checkbox"/> Morphological Adaptions' (Provide supporting data in Remarks or on a spererate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation' Explain) <u>' Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.</u>
				Hydrophytic Vegetation Present? <span style="border: 1px solid black; padding: 2px;">Yes</span>

Remarks: Micro-topography in form of hummocks/tussocks with Cassiope and Dryas species occupying the higher/drier areas and graminoids in lower/wetter areas.

**SOIL**

Sampling Point: B-3

**Profile Description: (Describe to the depth needed to document the indicator.)**

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>	Texture	Remarks	Remarks
0-2									Organics
2-8	7.5 YR 2.5/1	100					loam		Organics/soil mix
8-12	7.5 YR 3/2	90	5 YR 5/8	10	RM	M	clay loam		Organics/soil mix
12-16	10 YR 2/1	100					loamy sand		

<sup>1</sup>Type: C=Concentrations, D=Depletions, RM=Reduced Matrix.      <sup>2</sup>Location: PL=Pore Linings, RC=Root Channel, M=Matrix

Hydric Soil Indicators:	Indicators for Problematic Hydric Soils:
<input type="checkbox"/> Histosol or Histel (A1) <input checked="" type="checkbox"/> Histic Epipedon (A2) <input type="checkbox"/> Hydrogen Sulfide (A4) <input type="checkbox"/> Thick Dark Surface (A12) <input type="checkbox"/> Alaska Gleyed (A13) <input type="checkbox"/> Alaska Redox (A14) <input type="checkbox"/> Alaska Gleyed Pores (A15)	<input type="checkbox"/> Alaska Color Change (TA4) <sup>4</sup> <input type="checkbox"/> Alaska Alpine Swales (TA5) <input type="checkbox"/> Alaska Redox With 2.5Y Hue  <sup>3</sup> One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present. <sup>4</sup> Give details of color change in Remarks.

Restrictive Layer (if present): <b>Frozen</b>	Hydric Soils Present? <b>Yes</b>
Depth: 16" bgs	

Remarks:

**HYDROLOGY**

Wetland Hydrology Indicators:	Secondary Indicators (2 or more required)
<b>Primary Indicators (any one indicator is sufficient)</b> <input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> High Water Table (A2) <input checked="" type="checkbox"/> Saturation (A3) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Mat of Crust of Algae or Marl (B4) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Inundations Visible on Aerial Imagery (B7) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Dry Season Water Table (C2) <input type="checkbox"/> Other (Explain in Remarks)	<input type="checkbox"/> Water Stained Leaves (B9) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Salt Deposits (C5) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input checked="" type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Geomorphic Position (D2) <input checked="" type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)

<b>Field Observations:</b> Surface Water Present? <input type="checkbox"/> No      Depth (inches): _____ Water Table Present? <input type="checkbox"/> Yes      Depth (inches): 16 Saturation Present? <input type="checkbox"/> Yes      Depth (inches): 10 (includes capillary fringe)	Wetland Hydrology Present? <b>Yes</b>
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Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

### WETLAND DETERMINATION DATA FORM - Alaska Region

Project Site: Mustang Development Project Borough/City: North Slope Sampling Date: Aug 5, 2011  
 Applicate/Owner: Brooks Range Petroleum Sampling Point: B-4  
 Investigator(s): JBrekken, JO'Brien Landform (hillside, terrace, Hummock, etc): Terrace near pond  
 Local Relief (concave, convex, none): Concave Slope (%): <1  
 Subregion: \_\_\_\_\_ Lat: \_\_\_\_\_ Long: \_\_\_\_\_ Datum: \_\_\_\_\_

Are climate/hydrologic conditions on the site typical for this time of year? Yes

Are Vegetation?, No Soil? No or Hydrocabon? No significantly disturbed? Are "Normal Circumstances" Present? Yes  
 Are Vegetation?, No Soil? No or Hydrocabon? No 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 Is the Sampled Area within a Wetland? Yes  
 Hydric Soils Present? Yes  
 Wetland Hydrology Present? Yes

Remarks: \_\_\_\_\_

**VEGETATION (List all species in plot)**

Tree Stratum (Use scientific names)	Absolute %Cover	Dominant Species	Indicator Status	Dominance Test worksheet:
1.				Number of Dominant Species That Are OBL, FACW, or FAC: <u>1</u> (A)
2.				Total Number of Dominant Species Across All Strata: <u>1</u> (B)
3.				Percent of Dominant Species That Are OBL, FACW, FAC: <u>100</u> (A/B)
4.				
Total Cover:				<b>Prevalence Index:</b>
Sampling/Shrub Stratum		50% of total cover:	20% of total cover:	Total % Cover of: Multiplied by:
1. <u>Salix reticulata</u>	<u>1</u>		<u>FAC</u>	OBL Species <u>20</u> x 1 = <u>20</u>
2. <u>Salix planifolia</u>	<u>1</u>		<u>FACW</u>	FACW Species <u>82</u> x 2 = <u>164</u>
3.				FAC Species <u>1</u> x 3 = <u>3</u>
4.				FACU Species <u>0</u> x 4 = <u>0</u>
5.				UPL Species <u>0</u> x 5 = <u>0</u>
6.				Column Totals: <u>103</u> (A) <u>187</u> (B)
Total Cover: included w/ herb stratum				Prevalence Index = B/A = <u>1.82</u>
Herb Stratum		50% of total cover:	20% of total cover:	<b>Hydrophytic Vegetation Indicators:</b>
1. <u>Pedicularis sudetica</u>	<u>1</u>		<u>FACW</u>	<input checked="" type="checkbox"/> Dominance Test is >50%
2. <u>Carex saxatilis</u>	<u>80</u>	<u>Yes</u>	<u>FACW</u>	<input checked="" type="checkbox"/> Prevalence Test is ≤3.0
3. <u>Eriophorum angustifolium</u>	<u>20</u>		<u>OBL</u>	<input type="checkbox"/> Morphological Adaptions' (Provide supporting data in Remarks or on a spererate sheet)
4.				<input type="checkbox"/> Problematic Hydrophytic Vegetation' Explain)
5.				<i>' Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.</i>
6.				
7.				
8.				
Total Cover: 103				Hydrophytic Vegetation Present? <span style="border: 1px solid black; padding: 2px;">Yes</span>
Plot size (radius, or length x width) <u>15'</u> radius		50% of total cover: <u>51.5</u>	20% of total cover: <u>20.6</u>	
% Cover of Wetland Bryophytes: _____		% Bare Ground: <u>0</u>		
		Total Cover of Bryophytes: <u>10</u>		

Remarks: \_\_\_\_\_

**SOIL**

Sampling Point: **B-4**

**Profile Description: (Describe to the depth needed to document the indicator.)**

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>	Texture	Remarks	Remarks
0-3									Organic layer
3-14	10 YR 2/2	100					clay loam		Organics/soil mix
14-19	10 YR 2/1	90	5B 4/1 (Gley Chart)	50	RM	M	loamy sand		Organics/soil mix

<sup>1</sup>Type: C=Concentrations, D=Depletions, RM=Reduced Matrix.      <sup>2</sup>Location: PL=Pore Linings, RC=Root Channel, M=Matrix

Hydric Soil Indicators:	Indicators for Problematic Hydric Soils:
<input checked="" type="checkbox"/> Histosol or Histel (A1)	<input type="checkbox"/> Alaska Color Change (TA4) <sup>4</sup>
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Alaska Alpine Swales (TA5)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Alaska Redox With 2.5Y Hue
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
<input type="checkbox"/> Alaska Gleyed (A13)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Alaska Redox (A14)	<sup>3</sup> One Indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.
<input type="checkbox"/> Alaska Gleyed Pores (A15)	<sup>4</sup> Give details of color change in Remarks.

Restrictive Layer (if present): <b>Frozen</b>	Hydric Soils Present? <b>Yes</b>
Depth: <u>19" bgs</u>	

Remarks:

**HYDROLOGY**

Wetland Hydrology Indicators:	Secondary Indicators (2 or more required)
<b>Primary Indicators (any one indicator is sufficient)</b>	
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Water Stained Leaves (B9)
<input checked="" type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Drainage Patterns (B10)
<input checked="" type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Salt Deposits (C5)
<input type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3)
<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Presence of Reduced Iron (C4)
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Stunted or Stressed Plants (D1)
<input type="checkbox"/> Mat of Crust of Algae or Marl (B4)	<input type="checkbox"/> Shallow Aquitard (D3)
<input type="checkbox"/> Iron Deposits (B5)	<input type="checkbox"/> Geomorphic Position (D2)
<input type="checkbox"/> Surface Soil Cracks (B6)	<input type="checkbox"/> Microtopographic Relief (D4)
<input type="checkbox"/> Inundations Visible on Aerial Imagery (B7)	<input checked="" type="checkbox"/> FAC-Neutral Test (D5)
<input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	
<input type="checkbox"/> Hydrogen Sulfide Odor (C1)	
<input type="checkbox"/> Dry Season Water Table (C2)	
<input type="checkbox"/> Other (Explain in Remarks)	

<b>Field Observations:</b>	
Surface Water Present? <input type="checkbox"/> No	Depth (inches): _____
Water Table Present? <input type="checkbox"/> Yes	Depth (inches): <u>5</u>
Saturation Present? <input type="checkbox"/> Yes (includes capillary fringe)	Depth (inches): <u>0</u>
<b>Wetland Hydrology Present? Yes</b>	

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Shallow pond nearby (~80-feet west). Water filled most of test pit.



**WETLAND DETERMINATION DATA FORM - Alaska Region**

Project Site: Mustang Development Project Borough/City: North Slope Sampling Date: Aug 6, 2011  
 Applicate/Owner: Brooks Range Petroleum Sampling Point: B-5  
 Investigator(s): JBrekken, JO'Brien Landform (hillside, terrace, Hummock, etc): Hummocks, micro  
 Local Relief (concave, convex, none): Flat Slope (%): <1  
 Subregion: \_\_\_\_\_ Lat: \_\_\_\_\_ Long: \_\_\_\_\_ Datum: \_\_\_\_\_

Are climate/hydrologic conditions on the site typical for this time of year? Yes

Are Vegetation?, No Soil? No or Hydrocarbon? No significantly disturbed? Are "Normal Circumstances" Present? Yes  
 Are Vegetation?, No Soil? No or Hydrocarbon? No 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 Is the Sampled Area within a Wetland? Yes  
 Hydric Soils Present? Yes  
 Wetland Hydrology Present? Yes

Remarks: \_\_\_\_\_

**VEGETATION (List all species in plot)**

Tree Stratum (Use scientific names)	Absolute %Cover	Dominant Species	Indicator Status	Dominance Test worksheet:
1.				Number of Dominant Species That Are OBL, FACW, or FAC: <u>3</u> (A) Total Number of Dominant Species Across All Strata: <u>4</u> (B) Percent of Dominant Species That Are OBL, FACW, FAC: <u>75</u> (A/B)
2.				
3.				
4.				
Total Cover:				<b>Prevalence Index:</b> Total % Cover of: Multiplied by: OBL Species <u>15</u> x 1 = <u>15</u> FACW Species <u>50</u> x 2 = <u>100</u> FAC Species <u>7</u> x 3 = <u>21</u> FACU Species <u>21</u> x 4 = <u>84</u> UPL Species <u>0</u> x 5 = <u>0</u> Column Totals: <u>93</u> (A) <u>220</u> (B) Prevalence Index = B/A = <u>2.37</u>
Sampling/Shrub Stratum		50% of total cover:	20% of total cover:	
1. <u>Salix reticulata</u>	<u>5</u>		<u>FAC</u>	
2. <u>Salix planifolia</u>	<u>8</u>	<u>Yes</u>	<u>FACW</u>	
3. <u>Salix fuscenscens</u>	<u>5</u>		<u>FACW</u>	
4. <u>Dryas integrifolia</u>	<u>20</u>	<u>Yes</u>	<u>FACU</u>	
5. <u>Cassiope tetragona</u>	<u>1</u>		<u>FACU</u>	
6.				
Total Cover: <u>39</u>				
Herb Stratum		50% of total cover: <u>19.5</u>	20% of total cover: <u>7.8</u>	
1. <u>Pedicularis sudetica</u>	<u>2</u>		<u>FACW</u>	
2. <u>Carex saxatilis</u>	<u>35</u>	<u>Yes</u>	<u>FACW</u>	
3. <u>Eriophorum angustifolium</u>	<u>15</u>	<u>Yes</u>	<u>OBL</u>	
4. <u>Poa arctica</u>	<u>2</u>		<u>FAC</u>	
5.				
6.				
7.				
8.				
Total Cover: <u>54</u>				
Plot size (radius, or length x width) <u>15'</u> radius		50% of total cover: <u>27</u>	20% of total cover: <u>10.8</u>	
% Cover of Wetland Bryophytes: <u>5</u>		% Bare Ground: <u>0</u>		
		Total Cover of Bryophytes: <u>5</u>		
Hydrophytic Vegetation Present? <span style="float: right; border: 1px solid black; padding: 2px;">Yes</span>				

Remarks: \_\_\_\_\_

SOIL

Sampling Point: B-5

**Profile Description: (Describe to the depth needed to document the Indicator.)**

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>	Texture	Remarks	Remarks
0-2									Organic layer
2-4	2.5 Y 2.5/1	100					clay loam		Organics/soil mix
4-18	2.5 Y 4/3	80	5 YR 4/6	20	RM	M	sandy clay loam		Organics/soil mix
18-20	2.5 Y 2.5/1	100					sandy loam		w/ decomposing organics

<sup>1</sup>Type: C=Concentrations, D=Depletions, RM=Reduced Matrix.      <sup>2</sup>Location: PL=Pore Linings, RC=Root Channel, 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:**

Alaska Color Change (TA4)<sup>4</sup>  
 Alaska Alpine Swales (TA5)  
 Alaska Redox With 2.5Y Hue

Alaska Gleyed Without Hue 5Y or Redder Underlying Layer  
 Other (Explain in Remarks)

<sup>3</sup>One Indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.  
<sup>4</sup>Give details of color change in Remarks.

Restrictive Layer (if present): **None encountered**

Depth: \_\_\_\_\_

Hydric Soils Present? **Yes**

Remarks:

HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (any one indicator is sufficient)

Surface Water (A1)       Surface Soil Cracks (B6)  
 High Water Table (A2)       Inundations Visible on Aerial Imagery (B7)  
 Saturation (A3)       Sparsely Vegetated Concave Surface (B8)  
 Water Marks (B1)       Hydrogen Sulfide Odor (C1)  
 Sediment Deposits (B2)       Dry Season Water Table (C2)  
 Drift Deposits (B3)       Other (Explain in Remarks)  
 Mat of Crust of Algae or Marl (B4)  
 Iron Deposits (B5)

Secondary Indicators (2 or more required)

Water Stained Leaves (B9)  
 Drainage Patterns (B10)  
 Salt Deposits (C5)  
 Oxidized Rhizospheres on Living Roots (C3)  
 Presence of Reduced Iron (C4)  
 Stunted or Stressed Plants (D1)  
 Shallow Aquitard (D3)  
 Geomorphic Position (D2)  
 Microtopographic Relief (D4)  
 FAC-Neutral Test (D5)

**Field Observations:**

Surface Water Present?  No      Depth (inches): \_\_\_\_\_

Water Table Present?  Yes      Depth (inches): 20

Saturation Present?  Yes      Depth (inches): 4  
(includes capillary fringe)

Wetland Hydrology Present? **Yes**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:      Some standing water present in trenches (not patterned)

### WETLAND DETERMINATION DATA FORM - Alaska Region

Project Site: Mustang Development Project Borough/City: North Slope Sampling Date: Aug 6, 2011  
 Applicate/Owner: Brooks Range Petroleum Sampling Point: B-6  
 Investigator(s): JBrekken, JO'Brien Landform (hillside, terrace, Hummock, etc): Hummocks/tussock  
 Local Relief (concave, convex, none): None Slope (%): 0-1  
 Subregion: \_\_\_\_\_ Lat: \_\_\_\_\_ Long: \_\_\_\_\_ Datum: \_\_\_\_\_

Are climate/hydrologic conditions on the site typical for this time of year? Yes

Are Vegetation?, No Soil? No or Hydrocarbon? No significantly disturbed? Are "Normal Circumstances" Present? Yes  
 Are Vegetation?, No Soil? No or Hydrocarbon? No 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 Is the Sampled Area within a Wetland? Yes  
 Hydric Soils Present? Yes  
 Wetland Hydrology Present? Yes

Remarks: \_\_\_\_\_

**VEGETATION (List all species in plot)**

Tree Stratum (Use scientific names)	Absolute %Cover	Dominant Species	Indicator Status	Dominance Test worksheet
1.				Number of Dominant Species That Are OBL, FACW, or FAC: <u>2</u> (A) Total Number of Dominant Species Across All Strata: <u>3</u> (B) Percent of Dominant Species That Are OBL, FACW, FAC: <u>66</u> (A/B)
2.				
3.				
4.				
Total Cover:				<b>Prevalence Index:</b> Total % Cover of: Multiplied by: OBL Species <u>15</u> x 1 = <u>15</u> FACW Species <u>52</u> x 2 = <u>104</u> FAC Species <u>11</u> x 3 = <u>33</u> FACU Species <u>32</u> x 4 = <u>128</u> UPL Species <u>0</u> x 5 = <u>0</u> Column Totals: <u>110</u> (A) <u>280</u> (B)  Prevalence Index = B/A = <u>2.55</u>
Sampling/Shrub Stratum		50% of total cover:	20% of total cover:	
1. <i>Salix reticulata</i>	5		FAC	
2. <i>Salix planifolia</i>	10		FACW	
3. <i>Salix arctica</i>	5		FAC	
4. <i>Dryas integrifolia</i>	30	Yes	FACU	
5. <i>Cassiope tetragona</i>	2		FACU	
6.				
		Total Cover: 52		
Herb Stratum		50% of total cover:	20% of total cover:	
1. <i>Polygonum viviparum</i>	1		FAC	
2. <i>Carex saxatilis</i>	40	Yes	FACW	
3. <i>Eriophorum angustifolium</i>	15	Yes	OBL	
4. <i>Eriophorum vaginitum</i>	2		FACW	
5.				
6.				
7.				
8.				
		Total Cover: 58		
Plot size (radius, or length x width) <u>15' radius</u>		50% of total cover:	20% of total cover:	
		29	11.6	
% Cover of Wetland Bryophytes: <u>10</u>		% Bare Ground: <u>0</u>		
		Total Cover of Bryophytes: <u>20</u>		
Hydrophytic Vegetation Present? <span style="float: right; border: 1px solid black; padding: 2px;">Yes</span>				

Remarks: Located in 'pond complex' or within group of ponds. Lichens present (fruticose and crustose). Micro-lows (trenches and depressions) have standing water.

**SOIL**

Sampling Point: **B-6**

**Profile Description: (Describe to the depth needed to document the indicator.)**

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>	Texture	Remarks	Remarks
0-2									Organic layer
2-4	2.5 YR 2.5/2	100					loamy sand		Organics/soil mix
4-18	5 Y 2.5/1	100					sandy loam		Organics/soil mix

<sup>1</sup>Type: C=Concentrations, D=Depletions, RM=Reduced Matrix.      <sup>2</sup>Location: PL=Pore Linings, RC=Root Channel, M=Matrix

Hydric Soil Indicators:	Indicators for Problematic Hydric Soils:
<input checked="" type="checkbox"/> Histosol or Histel (A1) <input type="checkbox"/> Histic Epipedon (A2) <input type="checkbox"/> Hydrogen Sulfide (A4) <input type="checkbox"/> Thick Dark Surface (A12) <input type="checkbox"/> Alaska Gleyed (A13) <input type="checkbox"/> Alaska Redox (A14) <input type="checkbox"/> Alaska Gleyed Pores (A15)	<input type="checkbox"/> Alaska Color Change (TA4) <sup>4</sup> <input type="checkbox"/> Alaska Alpine Swales (TA5) <input type="checkbox"/> Alaska Redox With 2.5Y Hue  <sup>3</sup> One Indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present. <sup>4</sup> Give details of color change in Remarks.

Restrictive Layer (if present): <b>Frozen</b>	Hydric Soils Present? <b>Yes</b>
Depth: <u>18" bgs</u>	

Remarks:

**HYDROLOGY**

Wetland Hydrology Indicators:	Secondary Indicators (2 or more required)
<b>Primary Indicators (any one indicator is sufficient)</b> <input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Inundations Visible on Aerial Imagery (B7) <input checked="" type="checkbox"/> Saturation (A3) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Dry Season Water Table (C2) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Mat of Crust of Algae or Marl (B4) <input type="checkbox"/> Iron Deposits (B5)	<input type="checkbox"/> Water Stained Leaves (B9) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Salt Deposits (C5) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Geomorphic Position (D2) <input checked="" type="checkbox"/> Microtopographic Relief (D4) <input checked="" type="checkbox"/> FAC-Neutral Test (D5)

<b>Field Observations:</b> Surface Water Present? <input type="checkbox"/> No      Depth (inches): _____ Water Table Present? <input type="checkbox"/> Yes      Depth (inches): <u>17</u> Saturation Present? <input type="checkbox"/> Yes      Depth (inches): <u>0</u> (includes capillary fringe)	Wetland Hydrology Present? <b>Yes</b>
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Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Some standing water present in trenches/micro-lows and ponds w/ open water nearby.

### WETLAND DETERMINATION DATA FORM - Alaska Region

Project Site: Mustang Development Project Borough/City: North Slope Sampling Date: Aug 6, 2011  
 Applicate/Owner: Brooks Range Petroleum Sampling Point: B-7  
 Investigator(s): JBrekken, JO'Brien Landform (hillside, terrace, Hummock, etc): Hummocks  
 Local Relief (concave, convex, none): Concave Slope (%): 0-1  
 Subregion: \_\_\_\_\_ Lat: \_\_\_\_\_ Long: \_\_\_\_\_ Datum: \_\_\_\_\_

Are climate/hydrologic conditions on the site typical for this time of year? Yes

Are Vegetation?, No Soil? No or Hydrocarbon? No significantly disturbed? Are "Normal Circumstances" Present? Yes  
 Are Vegetation?, No Soil? No or Hydrocarbon? No 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 Is the Sampled Area within a Wetland? Yes  
 Hydric Soils Present? Yes  
 Wetland Hydrology Present? Yes

Remarks: \_\_\_\_\_

**VEGETATION (List all species in plot)**

Tree Stratum (Use scientific names)	Absolute %Cover	Dominant Species	Indicator Status	Dominance Test worksheet:
1.				Number of Dominant Species That Are OBL, FACW, or FAC: <u>2</u> (A) Total Number of Dominant Species Across All Strata: <u>2</u> (B) Percent of Dominant Species That Are OBL, FACW, FAC: <u>100</u> (A/B)
2.				
3.				
4.				
Total Cover:				<b>Prevalence Index:</b> Total % Cover of: Multiplied by: OBL Species <u>71</u> x 1 = <u>71</u> FACW Species <u>0</u> x 2 = <u>0</u> FAC Species <u>25</u> x 3 = <u>75</u> FACU Species <u>0</u> x 4 = <u>0</u> UPL Species <u>0</u> x 5 = <u>0</u> Column Totals: <u>96</u> (A) <u>146</u> (B) Prevalence Index = B/A = <u>1.52</u>
50% of total cover: 20% of total cover:				
1. <u>Salix reticulata</u>	<u>2</u>		<u>FAC</u>	
2. <u>Salix ovalifolia</u>	<u>2</u>		<u>FAC</u>	
3.				
4.				
5.				
Total Cover: Treat w/ herb stratum				
50% of total cover: 20% of total cover:				
<b>Herb Stratum</b>				
1. <u>Polygonum viviparum</u>	<u>1</u>		<u>FAC</u>	
2. <u>Carex podocarpa</u>	<u>20</u>	<u>Yes</u>	<u>FAC</u>	
3. <u>Eriophorum angustifolium</u>	<u>70</u>	<u>Yes</u>	<u>OBL</u>	
4. <u>Saxifraga hirculus</u>	<u>1</u>		<u>OBL</u>	
5.				
6.				
7.				
8.				
Total Cover: 96				
50% of total cover: 48 20% of total cover: 19.2				
Plot size (radius, or length x width) <u>15' radius</u> % Bare Ground: <u>0</u>				
% Cover of Wetland Bryophytes: Total Cover of Bryophytes: <u>20</u>				
Hydrophytic Vegetation Present? <span style="float: right; border: 1px solid black; padding: 2px;">Yes</span>				

Remarks: \_\_\_\_\_

**SOIL**

Sampling Point: B-7

Profile Description: (Describe to the depth needed to document the indicator.)									
Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist) %		Type <sup>1</sup>	Loc <sup>2</sup>	Texture	Remarks	Remarks
0-2									Organic layer
2-10	5 YR 3/2	100					loam		High interspersions of organics
10-14	10 YR 3/2	100					loam		Organics/soil mix
<small><sup>1</sup>Type: C=Concentrations, D=Depletions, RM=Reduced Matrix.      <sup>2</sup>Location: PL=Pore Linings, RC=Root Channel, M=Matrix</small>									

<b>Hydric Soil Indicators:</b> <input checked="" type="checkbox"/> Histosol or Histel (A1) <input type="checkbox"/> Histic Epipedon (A2) <input type="checkbox"/> Hydrogen Sulfide (A4) <input type="checkbox"/> Thick Dark Surface (A12) <input type="checkbox"/> Alaska Gleyed (A13) <input type="checkbox"/> Alaska Redox (A14) <input type="checkbox"/> Alaska Gleyed Pores (A15)	<b>Indicators for Problematic Hydric Soils:</b> <input type="checkbox"/> Alaska Color Change (TA4) <sup>4</sup> <input type="checkbox"/> Alaska Alpine Swales (TA5) <input type="checkbox"/> Alaska Redox With 2.5Y Hue  <small><sup>3</sup>One Indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present. <sup>4</sup>Give details of color change in Remarks.</small>	<input type="checkbox"/> Alaska Gleyed Without Hue 5Y or Redder Underlying Layer <input type="checkbox"/> Other (Explain in Remarks)
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Restrictive Layer (if present): <b>Frozen</b>  Depth: <u>14" bgs</u>	Hydric Soils Present? <b>Yes</b>
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Remarks:

**HYDROLOGY**

<b>Wetland Hydrology Indicators:</b> <u>Primary Indicators (any one indicator is sufficient)</u> <input checked="" type="checkbox"/> Surface Water (A1) <input type="checkbox"/> Surface Soil Cracks (B6) <input checked="" type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Inundations Visible on Aerial Imagery (B7) <input checked="" type="checkbox"/> Saturation (A3) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Dry Season Water Table (C2) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Mat of Crust of Algae or Marl (B4) <input type="checkbox"/> Iron Deposits (B5)	<u>Secondary Indicators (2 or more required)</u> <input type="checkbox"/> Water Stained Leaves (B9) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Salt Deposits (C5) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Geomorphic Position (D2) <input checked="" type="checkbox"/> Microtopographic Relief (D4) <input checked="" type="checkbox"/> FAC-Neutral Test (D5)
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<b>Field Observations:</b> Surface Water Present? <span style="border: 1px solid black; padding: 2px;">Yes</span>	Depth (inches): <u>0</u>	<b>Wetland Hydrology Present?</b> <b>Yes</b>
Water Table Present? <span style="border: 1px solid black; padding: 2px;">Yes</span>	Depth (inches): <u>1</u>	
Saturation Present? (includes capillary fringe) <span style="border: 1px solid black; padding: 2px;">Yes</span>	Depth (inches): <u>0</u>	

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:      Adjacent to small shallow pond w/ open water.

### WETLAND DETERMINATION DATA FORM - Alaska Region

Project Site: Mustang Development Project Borough/City: North Slope Sampling Date: Aug 6, 2011  
 Applicate/Owner: Brooks Range Petroleum Sampling Point: B-8  
 Investigator(s): JBrekken, JO'Brien Landform (hillside, terrace, Hummock, etc): Terrace  
 Local Relief (concave, convex, none): Concave Slope (%): 1-2  
 Subregion: \_\_\_\_\_ Lat: \_\_\_\_\_ Long: \_\_\_\_\_ Datum: \_\_\_\_\_

Are climate/hydrologic conditions on the site typical for this time of year? Yes  
 Are Vegetation?, No Soil? No or Hydrocabon? No significantly disturbed? Are "Normal Circumstances" Present? Yes  
 Are Vegetation?, No Soil? No or Hydrocabon? No 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 Is the Sampled Area within a Wetland? Yes  
 Hydric Soils Present? Yes  
 Wetland Hydrology Present? Yes

Remarks: \_\_\_\_\_

**VEGETATION (List all species in plot)**

Tree Stratum (Use scientific names)	Absolute %Cover	Dominant Species	Indicator Status	Dominance Test worksheet:
1.				Number of Dominant Species That Are OBL, FACW, or FAC: <u>3</u> (A)  Total Number of Dominant Species Across All Strata: <u>3</u> (B)  Percent of Dominant Species That Are OBL, FACW, FAC: <u>100</u> (A/B)
2.				
3.				
4.				
Total Cover:				<b>Prevalence Index:</b> Total % Cover of: Multiplied by: OBL Species <u>41</u> x 1 = <u>41</u> FACW Species <u>40</u> x 2 = <u>80</u> FAC Species <u>35</u> x 3 = <u>105</u> FACU Species <u>0</u> x 4 = <u>0</u> UPL Species <u>0</u> x 5 = <u>0</u> Column Totals: <u>116</u> (A) <u>226</u> (B)  Prevalence Index = B/A = <u>1.95</u>
Sampling/Shrub Stratum		50% of total cover:	20% of total cover:	
1. <u>Salix reticulata</u>	<u>2</u>		<u>FAC</u>	
2. <u>Salix arctica</u>	<u>1</u>		<u>FAC</u>	
3.				
4.				
5.				
Herb Stratum		50% of total cover:	Treat w/ herb stratum 20% of total cover:	
1. <u>Polygonum viviparum</u>	<u>1</u>		<u>FAC</u>	
2. <u>Carex podocarpa</u>	<u>30</u>	<u>Yes</u>	<u>FAC</u>	
3. <u>Eriophorum angustifolium</u>	<u>30</u>	<u>Yes</u>	<u>OBL</u>	
4. <u>Saxifraga rivularis</u>	<u>1</u>		<u>OBL</u>	
5. <u>Carex saxatilis</u>	<u>40</u>	<u>Yes</u>	<u>FACW</u>	
6. <u>Pedicularis verticillata</u>	<u>1</u>		<u>FAC</u>	
7. <u>Melandrium affine</u>	<u>1</u>		<u>NI</u>	
8. <u>Carex rariflora</u>	<u>10</u>		<u>OBL</u>	
Total Cover: <u>117</u>				<b>Hydrophytic Vegetation Indicators:</b> <input checked="" type="checkbox"/> Dominance Test is >50% <input checked="" type="checkbox"/> Prevalence Test is ≤3.0 <input type="checkbox"/> Morphological Adaptions' (Provide supporting data in Remarks or on a spererate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation' Explain)  <u>'Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.'</u>
Plot size (radius, or length x width) <u>15' radius</u>		50% of total cover: <u>58.5</u>	20% of total cover: <u>23.4</u>	
% Cover of Wetland Bryophytes: _____		% Bare Ground: <u>10</u>		
		Total Cover of Bryophytes: <u>10</u>		
Hydrophytic Vegetation Present? <span style="border: 1px solid black; padding: 2px;">Yes</span>				

Remarks: DP located on slightly elevated terrace adjacent to swale that connects large lake and pond to the south.

SOIL

Sampling Point: B-8

**Profile Description: (Describe to the depth needed to document the indicator.)**

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>	Texture	Remarks	Remarks
0-6									Organics
6-17	5 Y 3/1	100					sandy loam		Organics/soil mix
17-19	5 Y 3/1	60	5 YR 2.5/1	40	RM	M	sandy loam		Organics/soil mix

<sup>1</sup>Type: C=Concentrations, D=Depletions, RM=Reduced Matrix.      <sup>2</sup>Location: PL=Pore Linings, RC=Root Channel, M=Matrix

Hydric Soil Indicators:	Indicators for Problematic Hydric Soils:
<input checked="" type="checkbox"/> Histosol or Histel (A1) <input type="checkbox"/> Histic Epipedon (A2) <input type="checkbox"/> Hydrogen Sulfide (A4) <input type="checkbox"/> Thick Dark Surface (A12) <input type="checkbox"/> Alaska Gleyed (A13) <input type="checkbox"/> Alaska Redox (A14) <input type="checkbox"/> Alaska Gleyed Pores (A15)	<input type="checkbox"/> Alaska Color Change (TA4) <sup>4</sup> <input type="checkbox"/> Alaska Alpine Swales (TA5) <input type="checkbox"/> Alaska Redox With 2.5Y Hue  <sup>3</sup> One Indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present. <sup>4</sup> Give details of color change in Remarks.

Restrictive Layer (if present): <b>Frozen</b>	Hydric Soils Present? <b>Yes</b>
Depth: 19" bgs	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:	Secondary Indicators (2 or more required)
<b>Primary Indicators (any one indicator is sufficient)</b> <input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> High Water Table (A2) <input checked="" type="checkbox"/> Saturation (A3) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Mat of Crust of Algae or Marl (B4) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Inundations Visible on Aerial Imagery (B7) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Dry Season Water Table (C2) <input type="checkbox"/> Other (Explain in Remarks)	<input type="checkbox"/> Water Stained Leaves (B9) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Salt Deposits (C5) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Microtopographic Relief (D4) <input checked="" type="checkbox"/> FAC-Neutral Test (D5)

<b>Field Observations:</b> Surface Water Present? <input type="checkbox"/> No      Depth (inches): _____ Water Table Present? <input type="checkbox"/> Yes      Depth (inches): 17 Saturation Present? <input type="checkbox"/> Yes      Depth (inches): 0 (includes capillary fringe)	Wetland Hydrology Present? <b>Yes</b>
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Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Large lake located to the north.



**WETLAND DETERMINATION DATA FORM - Alaska Region**

Project Site: Mustang Development Project Borough/City: North Slope Sampling Date: Aug 6, 2011  
 Applicate/Owner: Brooks Range Petroleum Sampling Point: B-9  
 Investigator(s): JBrekken, JO'Brien Landform (hillside, terrace, Hummock, etc): Tussocks plentiful  
 Local Relief (concave, convex, none): Flat Slope (%): 2  
 Subregion: \_\_\_\_\_ Lat: \_\_\_\_\_ Long: \_\_\_\_\_ Datum: \_\_\_\_\_

Are climate/hydrologic conditions on the site typical for this time of year? Yes

Are Vegetation?, No Soil? No or Hydrocarbon? No significantly disturbed? Are "Normal Circumstances" Present? Yes  
 Are Vegetation?, No Soil? No or Hydrocarbon? No 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 Is the Sampled Area within a Wetland? Yes  
 Hydric Soils Present? Yes  
 Wetland Hydrology Present? Yes

Remarks: \_\_\_\_\_

**VEGETATION (List all species in plot)**

Tree Stratum (Use scientific names)	Absolute %Cover	Dominant Species	Indicator Status	Dominance Test worksheet
1.				Number of Dominant Species That Are OBL, FACW, or FAC: <u>1</u> (A)  Total Number of Dominant Species Across All Strata: <u>3</u> (B)  Percent of Dominant Species That Are OBL, FACW, FAC: <u>33</u> (A/B)
2.				
3.				
4.				
Total Cover:				<b>Prevalence Index:</b> Total % Cover of: Multiplied by: OBL Species <u>0</u> x 1 = <u>0</u> FACW Species <u>50</u> x 2 = <u>100</u> FAC Species <u>17</u> x 3 = <u>51</u> FACU Species <u>36</u> x 4 = <u>144</u> UPL Species <u>0</u> x 5 = <u>0</u> Column Totals: <u>103</u> (A) <u>295</u> (B)  Prevalence Index = B/A = <u>2.86</u>
<u>Sampling/Shrub Stratum</u>	50% of total cover:	20% of total cover:		
1. <u>Salix reticulata</u>	<u>3</u>		<u>FAC</u>	
2. <u>Salix arctica</u>	<u>2</u>		<u>FAC</u>	
3. <u>Cassiope tetragona</u>	<u>20</u>	<u>Yes</u>	<u>FACU</u>	
4. <u>Dryas integrifolia</u>	<u>15</u>	<u>Yes</u>	<u>FACU</u>	
5.				
6.				
Total Cover: <u>40</u>				
<u>Herb Stratum</u>	50% of total cover: <u>20</u>	20% of total cover: <u>8</u>		
1. <u>Polygonum bistorta</u>	<u>2</u>		<u>FAC</u>	
2. <u>Poa arctica</u>	<u>10</u>		<u>FAC</u>	
3. <u>Eriophorum vaginatum</u>	<u>50</u>	<u>Yes</u>	<u>FACW</u>	
4. <u>Papaver macounii</u>	<u>1</u>		<u>FACU</u>	
5.				
6.				
7.				
8.				
Total Cover: <u>63</u>				
Plot size (radius, or length x width) <u>15' radius</u>				
50% of total cover: <u>31.5</u> 20% of total cover: <u>12.6</u>				
% Bare Ground: _____				
% Cover of Wetland Bryophytes: _____ Total Cover of Bryophytes: <u>10</u>				
Hydrophytic Vegetation Present? <span style="float: right; border: 1px solid black; padding: 2px;">Yes</span>				

Remarks: A relatively higher area (topographically) than surrounding terrain. Site dominated by Eri. vag. tussocks with fruticose lichens and Cas. tet. in between.

SOIL

Sampling Point: B-9

**Profile Description: (Describe to the depth needed to document the indicator.)**

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>	Texture	Remarks	Remarks
0-2									Organics
2-6	10 R 2.5/1	100					sandy loam		Organics/soil mix
6-11	10 R 3/1	100					sandy loam		Organics/soil mix

<sup>1</sup>Type: C=Concentrations, D=Depletions, RM=Reduced Matrix.      <sup>2</sup>Location: PL=Pore Linings, RC=Root Channel, 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:**

Alaska Color Change (TA4)<sup>4</sup>  
 Alaska Alpine Swales (TA5)  
 Alaska Redox With 2.5Y Hue  
 Alaska Gleyed Without Hue 5Y or Redder Underlying Layer  
 Other (Explain in Remarks)

<sup>3</sup>One Indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.  
<sup>4</sup>Give details of color change in Remarks.

Restrictive Layer (if present): **Frozen**

Depth: 11" bgs

Hydric Soils Present? **Yes**

Remarks:

HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (any one indicator is sufficient)

<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Surface Soil Cracks (B6)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Inundations Visible on Aerial Imagery (B7)
<input checked="" type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)
<input type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)
<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Dry Season Water Table (C2)
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Mat of Crust of Algae or Marl (B4)	
<input type="checkbox"/> Iron Deposits (B5)	

Secondary Indicators (2 or more required)

<input type="checkbox"/> Water Stained Leaves (B9)
<input type="checkbox"/> Drainage Patterns (B10)
<input type="checkbox"/> Salt Deposits (C5)
<input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3)
<input type="checkbox"/> Presence of Reduced Iron (C4)
<input type="checkbox"/> Stunted or Stressed Plants (D1)
<input type="checkbox"/> Shallow Aquitard (D3)
<input type="checkbox"/> Geomorphic Position (D2)
<input checked="" type="checkbox"/> Microtopographic Relief (D4)
<input type="checkbox"/> FAC-Neutral Test (D5)

**Field Observations:**

Surface Water Present?  No      Depth (inches): \_\_\_\_\_

Water Table Present?  No      Depth (inches): \_\_\_\_\_

Saturation Present?  Yes      Depth (inches): 2

(includes capillary fringe)

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

**WETLAND DETERMINATION DATA FORM - Alaska Region**

Project Site: Mustang Development Project Borough/City: North Slope Sampling Date: Aug 6, 2011  
 Applicatee/Owner: Brooks Range Petroleum Sampling Point: B-10  
 Investigator(s): JBrekken, JO'Brien Landform (hillside, terrace, Hummock, etc): see remarks  
 Local Relief (concave, convex, none): Concave Slope (%): <1  
 Subregion: \_\_\_\_\_ Lat: \_\_\_\_\_ Long: \_\_\_\_\_ Datum: \_\_\_\_\_

Are climate/hydrologic conditions on the site typical for this time of year? Yes

Are Vegetation?, No Soil? No or Hydrocarbon? No significantly disturbed? Are "Normal Circumstances" Present? Yes  
 Are Vegetation?, No Soil? No or Hydrocarbon? No 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 Is the Sampled Area within a Wetland? Yes  
 Hydric Soils Present? Yes  
 Wetland Hydrology Present? Yes

Remarks: Flat basin - appears to be an old lake bed

**VEGETATION (List all species in plot)**

Tree Stratum (Use scientific names)	Absolute %Cover	Dominant Species	Indicator Status	Dominance Test worksheet	
1.				Number of Dominant Species That Are OBL, FACW, or FAC:	3 (A)
2.				Total Number of Dominant Species Across All Strata:	5 (B)
3.				Percent of Dominant Species That Are OBL, FACW, FAC:	60 (A/B)
4.				<b>Prevalence Index:</b>	
Total Cover: _____				Total % Cover of: Multiplied by:	
Sampling/Shrub Stratum		50% of total cover:	20% of total cover:	OBL Species	40 x 1 = 40
1. <u>Salix reticulata</u>	2		FAC	FACW Species	22 x 2 = 44
2. <u>Salix planifolia</u>	1		FACW	FAC Species	27 x 3 = 81
3. <u>Salix fuscescens</u>	1		FACW	FACU Species	7 x 4 = 28
4. <u>Dryas integrifolia</u>	4	Yes	FACU	UPL Species	0 x 5 = 0
5. <u>Cassiope tetragona</u>	3	Yes	FACU	Column Totals:	96 (A) 193 (B)
6.				Prevalence Index = B/A = 2.01	
Herb Stratum		50% of total cover:	20% of total cover:	<b>Hydrophytic Vegetation Indicators:</b>	
Total Cover: 11				<input checked="" type="checkbox"/> Dominance Test is >50%	
1. <u>Eriophorum angustifolium</u>	40	Yes	OBL	<input checked="" type="checkbox"/> Prevalence Test is ≤3.0	
2. <u>Carex saxatilis</u>	20	Yes	FACW	<input type="checkbox"/> Morphological Adaptions' (Provide supporting data in Remarks or on a spererate sheet)	
3. <u>Carex podocarpa</u>	25	Yes	FAC	<input type="checkbox"/> Problematic Hydrophytic Vegetation' Explain)	
4.				<u>' Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.</u>	
5.				Hydrophytic Vegetation Present? <input checked="" type="checkbox"/> Yes	
6.					
7.					
8.					
Total Cover: 85					
Plot size (radius, or length x width) <u>15' radius</u>		50% of total cover:	20% of total cover:		
		42.5	17		
% Bare Ground: 2					
% Cover of Wetland Bryophytes:		Total Cover of Bryophytes:			
		20			

Remarks: Dryas integrifolia and Cassiope tetragona found on micro-highs in plot

**SOIL**

Sampling Point: B-10

Profile Description: (Describe to the depth needed to document the indicator.)								
Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>	Texture	Remarks
0-10								Predominantly organics/peat
10-15	2.5 YR 2.5/1	100					sandy loam	Organic/soil mix

<sup>1</sup>Type: C=Concentrations, D=Depletions, RM=Reduced Matrix.      <sup>2</sup>Location: PL=Pore Linings, RC=Root Channel, M=Matrix

Hydric Soil Indicators:	Indicators for Problematic Hydric Soils:
<input checked="" type="checkbox"/> Histosol or Histel (A1) <input type="checkbox"/> Histic Epipedon (A2) <input type="checkbox"/> Hydrogen Sulfide (A4) <input type="checkbox"/> Thick Dark Surface (A12) <input type="checkbox"/> Alaska Gleyed (A13) <input type="checkbox"/> Alaska Redox (A14) <input type="checkbox"/> Alaska Gleyed Pores (A15)	<input type="checkbox"/> Alaska Color Change (TA4) <sup>4</sup> <input type="checkbox"/> Alaska Alpine Swales (TA5) <input type="checkbox"/> Alaska Redox With 2.5Y Hue <input type="checkbox"/> Alaska Gleyed Without Hue 5Y or Redder Underlying Layer <input type="checkbox"/> Other (Explain in Remarks)
<p><sup>3</sup>One Indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.</p> <p><sup>4</sup>Give details of color change in Remarks.</p>	

Restrictive Layer (if present): <b>Frozen</b> Depth: <u>15" bgs</u>	<b>Hydric Soils Present?</b> <b>Yes</b> _____
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Remarks:

**HYDROLOGY**

Wetland Hydrology Indicators:	Secondary Indicators (2 or more required)
<b>Primary Indicators (any one indicator is sufficient)</b> <input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> Surface Soil Cracks (B6) <input checked="" type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Inundations Visible on Aerial Imagery (B7) <input checked="" type="checkbox"/> Saturation (A3) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Dry Season Water Table (C2) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Mat of Crust of Algae or Marl (B4) <input type="checkbox"/> Iron Deposits (B5)	<input type="checkbox"/> Water Stained Leaves (B9) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Salt Deposits (C5) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Geomorphic Position (D2) <input checked="" type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)

<b>Field Observations:</b> Surface Water Present? <input type="checkbox"/> No Water Table Present? <input type="checkbox"/> Yes Saturation Present? (includes capillary fringe) <input type="checkbox"/> Yes	Depth (inches): _____ Depth (inches): <u>12</u> Depth (inches): <u>0</u>	<b>Wetland Hydrology Present?</b> <b>Yes</b> _____
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Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:      Soil is saturated/appears wet, but little if any standing water with apparent Iron precipitate on unvegetated mud/soil surface.

WETLAND DETERMINATION DATA FORM - Alaska Region

Project Site: Mustang Development Project Borough/City: North Slope Sampling Date: Aug 6, 2011  
 Applicate/Owner: Brooks Range Petroleum Sampling Point: B-11  
 Investigator(s): JBrekken, JO'Brien Landform (hillside, terrace, Hummock, etc): see remarks  
 Local Relief (concave, convex, none): Concave Slope (%): <1  
 Subregion: \_\_\_\_\_ Lat: \_\_\_\_\_ Long: \_\_\_\_\_ Datum: \_\_\_\_\_

Are climate/hydrologic conditions on the site typical for this time of year? Yes

Are Vegetation?, No Soil? No or Hydrocarbon? No significantly disturbed? Are "Normal Circumstances" Present? Yes  
 Are Vegetation?, No Soil? No or Hydrocarbon? No 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 Is the Sampled Area within a Wetland? Yes  
 Hydric Soils Present? Yes  
 Wetland Hydrology Present? Yes

Remarks: Landform: unpatterned troughs and scattered frost boils present

**VEGETATION (List all species in plot)**

Tree Stratum (Use scientific names)	Absolute %Cover	Dominant Species	Indicator Status	Dominance Test worksheet
1.				Number of Dominant Species That Are OBL, FACW, or FAC: <u>3</u> (A) Total Number of Dominant Species Across All Strata: <u>4</u> (B) Percent of Dominant Species That Are OBL, FACW, FAC: <u>75</u> (A/B)
2.				
3.				
4.				
Total Cover:				<b>Prevalence Index:</b> Total % Cover of: Multiplied by: OBL Species <u>40</u> x 1 = <u>40</u> FACW Species <u>25</u> x 2 = <u>50</u> FAC Species <u>8</u> x 3 = <u>24</u> FACU Species <u>20</u> x 4 = <u>80</u> UPL Species <u>0</u> x 5 = <u>0</u> Column Totals: <u>93</u> (A) <u>194</u> (B) Prevalence Index = B/A = <u>2.09</u>
<b>Sampling/Shrub Stratum</b>	50% of total cover:	20% of total cover:		
1. <i>Salix reticulata</i>	3		FAC	
2. <i>Salix arctica</i>	3		FAC	
3. <i>Dryas integrifolia</i>	20	Yes	FACU	
4.				
5.				
Total Cover: 26				
<b>Herb Stratum</b>	50% of total cover: 13	20% of total cover: 5.2		
1. <i>Eriophorum angustifolium</i>	15	Yes	OBL	
2. <i>Carex saxatilis</i>	25	Yes	FACW	
3. <i>Carex aquatilis</i>	25	Yes	OBL	
4. <i>Saxifraga oppositifolia</i>	2		FAC	
5.				
6.				
7.				
8.				
Total Cover: 67				
Plot size (radius, or length x width) <u>15' radius</u>				
50% of total cover: 33.5 20% of total cover: 13.4				
% Bare Ground: 5				
% Cover of Wetland Bryophytes: Total Cover of Bryophytes: 10				
Hydrophytic Vegetation Present? <u>Yes</u>				

Remarks: Dryas integrifolia and lichens (fruticose and crustose) located on micro-highs (frost boils) and Carex aquatilis located in troughs.

**SOIL**

Sampling Point: B-11

**Profile Description: (Describe to the depth needed to document the indicator.)**

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>	Texture Remarks	Remarks
0-12								Organics/peat-like
12-20	2.5 Y 3/1	100					loamy sand	Organic/soil mix w/ small gray

<sup>1</sup>Type: C=Concentrations, D=Depletions, RM=Reduced Matrix.      <sup>2</sup>Location: PL=Pore Linings, RC=Root Channel, M=Matrix

Hydric Soil Indicators:	Indicators for Problematic Hydric Soils:	
<input checked="" type="checkbox"/> Histosol or Histel (A1)	<input type="checkbox"/> Alaska Color Change (TA4) <sup>4</sup>	<input type="checkbox"/> Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Alaska Alpine Swales (TA5)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Alaska Redox With 2.5Y Hue	
<input type="checkbox"/> Thick Dark Surface (A12)		
<input type="checkbox"/> Alaska Gleyed (A13)	³One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.	
<input type="checkbox"/> Alaska Redox (A14)	⁴Give details of color change in Remarks.	
<input type="checkbox"/> Alaska Gleyed Pores (A15)		

Restrictive Layer (if present): <b>Frozen</b>	Hydric Soils Present? <b>Yes</b>
Depth: <u>20" bgs</u>	

Remarks:

**HYDROLOGY**

Wetland Hydrology Indicators:	Secondary Indicators (2 or more required)
<b>Primary Indicators (any one indicator is sufficient)</b>	
<input checked="" type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Water Stained Leaves (B9)
<input checked="" type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Drainage Patterns (B10)
<input checked="" type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Salt Deposits (C5)
<input type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3)
<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Presence of Reduced Iron (C4)
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Stunted or Stressed Plants (D1)
<input type="checkbox"/> Mat of Crust of Algae or Marl (B4)	<input type="checkbox"/> Shallow Aquitard (D3)
<input type="checkbox"/> Iron Deposits (B5)	<input type="checkbox"/> Geomorphic Position (D2)
<input type="checkbox"/> Surface Soil Cracks (B6)	<input checked="" type="checkbox"/> Microtopographic Relief (D4)
<input type="checkbox"/> Inundations Visible on Aerial Imagery (B7)	<input checked="" type="checkbox"/> FAC-Neutral Test (D5)
<input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	
<input type="checkbox"/> Hydrogen Sulfide Odor (C1)	
<input type="checkbox"/> Dry Season Water Table (C2)	
<input type="checkbox"/> Other (Explain in Remarks)	

Field Observations:		
Surface Water Present?	<input checked="" type="checkbox"/> Yes	Depth (inches): <u>0</u>
Water Table Present?	<input checked="" type="checkbox"/> Yes	Depth (inches): <u>0</u>
Saturation Present? (includes capillary fringe)	<input checked="" type="checkbox"/> Yes	Depth (inches): <u>0</u>
<b>Wetland Hydrology Present? Yes</b>		

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Small ponds nearby and troughs (unpatterned) with standing water. Area is a mix of frost boils, wet troughs, and small ponds.

**WETLAND DETERMINATION DATA FORM - Alaska Region**

Project Site: Mustang Development Project Borough/City: North Slope Sampling Date: Aug 6, 2011  
 Applicate/Owner: Brooks Range Petroleum Sampling Point: B-12  
 Investigator(s): JBrekken, JO'Brien Landform (hillside, terrace, Hummock, etc): hummocks  
 Local Relief (concave, convex, none): Flat Slope (%): <1  
 Subregion: \_\_\_\_\_ Lat: \_\_\_\_\_ Long: \_\_\_\_\_ Datum: \_\_\_\_\_

Are climate/hydrologic conditions on the site typical for this time of year? Yes  
 Are Vegetation?, No Soil? No or Hydrocarbon? No significantly disturbed? Are "Normal Circumstances" Present? Yes  
 Are Vegetation?, No Soil? No or Hydrocarbon? No 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 Is the Sampled Area within a Wetland? Yes  
 Hydric Soils Present? Yes  
 Wetland Hydrology Present? Yes

Remarks: \_\_\_\_\_

**VEGETATION (List all species in plot)**

Tree Stratum (Use scientific names)	Absolute %Cover	Dominant Species	Indicator Status	Dominance Test worksheet
1.				Number of Dominant Species That Are OBL, FACW, or FAC: <u>3</u> (A)  Total Number of Dominant Species Across All Strata: <u>4</u> (B)  Percent of Dominant Species That Are OBL, FACW, FAC: <u>75</u> (A/B)
2.				
3.				
4.				
Total Cover:				<b>Prevalence Index:</b> Total % Cover of: Multiplied by: OBL Species <u>42</u> x 1 = <u>42</u> FACW Species <u>41</u> x 2 = <u>82</u> FAC Species <u>16</u> x 3 = <u>48</u> FACU Species <u>15</u> x 4 = <u>60</u> UPL Species <u>0</u> x 5 = <u>0</u> Column Totals: <u>114</u> (A) <u>232</u> (B)  Prevalence Index = B/A = <u>2.04</u>
Sampling/Shrub Stratum		50% of total cover:	20% of total cover:	
1. <i>Salix reticulata</i>	5		FAC	
2. <i>Salix planifolia</i>	10	Yes	FACW	
3. <i>Salix rotundifolia</i>	2		NI	
4. <i>Dryas integrifolia</i>	15	Yes	FACU	
Total Cover: 32				
Herb Stratum		50% of total cover:	20% of total cover: 6.4	
1. <i>Eriophorum angustifolium</i>	35	Yes	OBL	
2. <i>Carex saxatilis</i>	25	Yes	FACW	
3. <i>Carex podocarpa</i>	10		FAC	
4. <i>Polygonum viviparum</i>	1		FAC	
5. <i>Pedicularis sudetica</i>	1		FACW	
6. <i>Eriophorum vaginatum</i>	5		FACW	
7. <i>Carex vaginata</i>	2		OBL	
8. <i>Carex aquatilis</i>	5		OBL	
Total Cover: 84				
Plot size (radius, or length x width) <u>15' radius</u>		50% of total cover: 42	20% of total cover: 16.8	
% Cover of Wetland Bryophytes: _____		% Bare Ground: 0		
Total Cover of Bryophytes: 15				
Hydrophytic Vegetation Present? <span style="border: 1px solid black; padding: 2px;">Yes</span>				

Remarks: Some fruticose lichens present on micro-highs.

**SOIL**

Sampling Point: B-12

Profile Description: (Describe to the depth needed to document the indicator.)									
Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist) %		Type <sup>1</sup>	Loc <sup>2</sup>	Texture	Remarks	Remarks
0-8									Organics
8-20	2.5 Y 4/1	100					loamy sand		Organic/soil mix

<sup>1</sup>Type: C=Concentrations, D=Depletions, RM=Reduced Matrix.      <sup>2</sup>Location: PL=Pore Linings, RC=Root Channel, M=Matrix

Hydric Soil Indicators:	Indicators for Problematic Hydric Soils:	
<input checked="" type="checkbox"/> Histosol or Histel (A1)	<input type="checkbox"/> Alaska Color Change (TA4) <sup>4</sup>	<input type="checkbox"/> Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Alaska Alpine Swales (TA5)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Alaska Redox With 2.5Y Hue	
<input type="checkbox"/> Thick Dark Surface (A12)		
<input type="checkbox"/> Alaska Gleyed (A13)	<sup>3</sup> One Indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.	
<input type="checkbox"/> Alaska Redox (A14)	<sup>4</sup> Give details of color change in Remarks.	
<input type="checkbox"/> Alaska Gleyed Pores (A15)		

Restrictive Layer (if present): <b>Frozen</b>	<b>Hydric Soils Present?</b> <b>Yes</b>
Depth: <u>20" bgs</u>	

Remarks:

**HYDROLOGY**

Wetland Hydrology Indicators:			Secondary Indicators (2 or more required)	
Primary Indicators (any one indicator is sufficient)				
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Surface Soil Cracks (B6)		<input type="checkbox"/> Water Stained Leaves (B9)	
<input checked="" type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Inundations Visible on Aerial Imagery (B7)		<input type="checkbox"/> Drainage Patterns (B10)	
<input checked="" type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)		<input type="checkbox"/> Salt Deposits (C5)	
<input type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)		<input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3)	
<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Dry Season Water Table (C2)		<input type="checkbox"/> Presence of Reduced Iron (C4)	
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Other (Explain in Remarks)		<input type="checkbox"/> Stunted or Stressed Plants (D1)	
<input type="checkbox"/> Mat of Crust of Algae or Marl (B4)			<input type="checkbox"/> Shallow Aquitard (D3)	
<input type="checkbox"/> Iron Deposits (B5)			<input type="checkbox"/> Geomorphic Position (D2)	
			<input checked="" type="checkbox"/> Microtopographic Relief (D4)	
			<input checked="" type="checkbox"/> FAC-Neutral Test (D5)	

<b>Field Observations:</b>			<b>Wetland Hydrology Present?</b> <b>Yes</b>
Surface Water Present?	<input type="text" value="No"/>	Depth (inches): <u>    </u>	
Water Table Present?	<input type="text" value="Yes"/>	Depth (inches): <u>12</u>	
Saturation Present? (includes capillary fringe)	<input type="text" value="Yes"/>	Depth (inches): <u>0</u>	

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:



**WETLAND DETERMINATION DATA FORM - Alaska Region**

Project Site: Mustang Development Project Borough/City: North Slope Sampling Date: Aug 6, 2011  
 Applicate/Owner: Brooks Range Petroleum Sampling Point: B-13  
 Investigator(s): JBrekken, JO'Brien Landform (hillside, terrace, Hummock, etc): troughs and tussocks  
 Local Relief (concave, convex, none): Flat Slope (%): <1  
 Subregion: \_\_\_\_\_ Lat: \_\_\_\_\_ Long: \_\_\_\_\_ Datum: \_\_\_\_\_

Are climate/hydrologic conditions on the site typical for this time of year? Yes  
 Are Vegetation?, No Soil? No or Hydrocabon? No significantly disturbed? Are "Normal Circumstances" Present? Yes  
 Are Vegetation?, No Soil? No or Hydrocabon? No 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 Is the Sampled Area within a Wetland? Yes  
 Hydric Soils Present? Yes  
 Wetland Hydrology Present? Yes

Remarks: Unpatterned troughs and tussocks present

**VEGETATION (List all species in plot)**

Tree Stratum (Use scientific names)	Absolute %Cover	Dominant Species	Indicator Status	Dominance Test worksheet
1.				Number of Dominant Species That Are OBL, FACW, or FAC: <u>3</u> (A)  Total Number of Dominant Species Across All Strata: <u>5</u> (B)  Percent of Dominant Species That Are OBL, FACW, FAC: <u>60</u> (A/B)
2.				
3.				
4.				
Total Cover:				<b>Prevalence Index:</b> Total % Cover of: Multiplied by: OBL Species <u>35</u> x 1 = <u>35</u> FACW Species <u>35</u> x 2 = <u>70</u> FAC Species <u>9</u> x 3 = <u>27</u> FACU Species <u>25</u> x 4 = <u>100</u> UPL Species <u>0</u> x 5 = <u>0</u> Column Totals: <u>104</u> (A) <u>232</u> (B)  Prevalence Index = B/A = <u>2.23</u>
Sampling/Shrub Stratum		50% of total cover:	20% of total cover:	
1. <i>Salix reticulata</i>	5		FAC	
2. <i>Salix planifolia</i>	10	Yes	FACW	
3. <i>Salix niphoclada (brachycarpa)</i>	2		FAC	
4. <i>Dryas integrifolia</i>	15	Yes	FACU	
5. <i>Cassiope tetragona</i>	10	Yes	FACU	
6.				
Herb Stratum		50% of total cover:	20% of total cover:	
Total Cover: 42				
1. <i>Eriophorum angustifolium</i>	10		OBL	
2. <i>Carex saxatilis</i>	25	Yes	FACW	
3. <i>Saussurea angustifolia</i>	2		FAC	
4. <i>Juncus arcticus</i>	25	Yes	OBL	
5.				
6.				
7.				
8.				
Total Cover: 62				
Plot size (radius, or length x width) <u>15' radius</u>		50% of total cover: 31	20% of total cover: 12.4	
% Cover of Wetland Bryophytes: _____		% Bare Ground: 0		
		Total Cover of Bryophytes: 5		
Hydrophytic Vegetation Present? <u>Yes</u>				

Remarks: Dryas integrifolia located on micro-highs. Little to no lichens present.

SOIL

Sampling Point: B-13

**Profile Description: (Describe to the depth needed to document the indicator.)**

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>	Texture	Remarks	Remarks
0-3									Organics
3-4	2.5 YR 4/6	100					loam		Organic/soil mix
4-17	2.5 Y 4/1	100					loamy sand		Organic/soil mix
17-20	2.5 Y 3/1	100					loamy sand		Organic/soil mix

<sup>1</sup>Type: C=Concentrations, D=Depletions, RM=Reduced Matrix.      <sup>2</sup>Location: PL=Pore Linings, RC=Root Channel, M=Matrix

Hydric Soil Indicators:	Indicators for Problematic Hydric Soils:
<input checked="" type="checkbox"/> Histosol or Histel (A1) <input type="checkbox"/> Histic Epipedon (A2) <input type="checkbox"/> Hydrogen Sulfide (A4) <input type="checkbox"/> Thick Dark Surface (A12) <input type="checkbox"/> Alaska Gleyed (A13) <input type="checkbox"/> Alaska Redox (A14) <input type="checkbox"/> Alaska Gleyed Pores (A15)	<input type="checkbox"/> Alaska Color Change (TA4) <sup>4</sup> <input type="checkbox"/> Alaska Alpine Swales (TA5) <input type="checkbox"/> Alaska Redox With 2.5Y Hue <input type="checkbox"/> Alaska Gleyed Without Hue 5Y or Redder Underlying Layer <input type="checkbox"/> Other (Explain in Remarks)
<p><sup>3</sup>One Indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.</p> <p><sup>4</sup>Give details of color change in Remarks.</p>	

Restrictive Layer (if present): <b>Frozen</b>	Hydric Soils Present? <b>Yes</b>
Depth: 20" bgs	

Remarks: 'orange' layer at base of organics layer (~3" bgs)

HYDROLOGY

Wetland Hydrology Indicators:	Secondary Indicators (2 or more required)
<p><u>Primary Indicators (any one indicator is sufficient)</u></p> <input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Inundations Visible on Aerial Imagery (B7) <input checked="" type="checkbox"/> Saturation (A3) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Dry Season Water Table (C2) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Mat of Crust of Algae or Marl (B4) <input type="checkbox"/> Iron Deposits (B5)	<input type="checkbox"/> Water Stained Leaves (B9) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Salt Deposits (C5) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Geomorphic Position (D2) <input checked="" type="checkbox"/> Microtopographic Relief (D4) <input checked="" type="checkbox"/> FAC-Neutral Test (D5)

<p><b>Field Observations:</b></p> Surface Water Present? <input type="checkbox"/> No      Depth (inches): _____ Water Table Present? <input type="checkbox"/> No      Depth (inches): _____ Saturation Present? <input checked="" type="checkbox"/> Yes      Depth (inches): 0 (includes capillary fringe)	Wetland Hydrology Present? <b>Yes</b>
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Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

### WETLAND DETERMINATION DATA FORM - Alaska Region

Project Site: Mustang Development Project Borough/City: North Slope Sampling Date: Aug 6, 2011  
 Applicate/Owner: Brooks Range Petroleum Sampling Point: B-14  
 Investigator(s): JBrekken, JO'Brien Landform (hillside, terrace, Hummock, etc): hummocks  
 Local Relief (concave, convex, none): Concave Slope (%): <1  
 Subregion: \_\_\_\_\_ Lat: \_\_\_\_\_ Long: \_\_\_\_\_ Datum: \_\_\_\_\_

Are climate/hydrologic conditions on the site typical for this time of year? Yes

Are Vegetation?, No Soil? No or Hydrocabon? No significantly disturbed? Are "Normal Circumstances" Present? Yes  
 Are Vegetation?, No Soil? No or Hydrocabon? No 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 Is the Sampled Area within a Wetland? Yes  
 Hydric Soils Present? Yes  
 Wetland Hydrology Present? Yes

Remarks: \_\_\_\_\_

**VEGETATION (List all species in plot)**

Tree Stratum (Use scientific names)	Absolute %Cover	Dominant Species	Indicator Status	Dominance Test worksheet:
1. _____				Number of Dominant Species That Are OBL, FACW, or FAC: <u>1</u> (A)
2. _____				Total Number of Dominant Species Across All Strata: <u>2</u> (B)
3. _____				Percent of Dominant Species That Are OBL, FACW, FAC: <u>50</u> (A/B)
4. _____				
Total Cover:				<b>Prevalence Index:</b>
<u>Sampling/Shrub Stratum</u>	50% of total cover: _____	20% of total cover: _____		Total % Cover of: Multiplied by:
1. <u>Salix reticulata</u>	<u>5</u>		<u>FAC</u>	OBL Species <u>5</u> x 1 = <u>5</u>
2. <u>Salix niphoclada (brachycarpa)</u>	<u>2</u>		<u>FAC</u>	FACW Species <u>35</u> x 2 = <u>70</u>
3. <u>Dryas integrifolia</u>	<u>25</u>	<u>Yes</u>	<u>FACU</u>	FAC Species <u>7</u> x 3 = <u>21</u>
4. _____				FACU Species <u>35</u> x 4 = <u>140</u>
5. _____				UPL Species <u>0</u> x 5 = <u>0</u>
6. _____				Column Totals: <u>82</u> (A) <u>236</u> (B)
Total Cover: <u>32</u>				Prevalence Index = B/A = <u>2.88</u>
<u>Herb Stratum</u>	50% of total cover: <u>16</u>	20% of total cover: <u>6.4</u>		<b>Hydrophytic Vegetation Indicators:</b>
1. <u>Eriophorum angustifolium</u>	<u>5</u>		<u>OBL</u>	<input type="checkbox"/> Dominance Test is >50%
2. <u>Carex saxatilis</u>	<u>10</u>		<u>FACW</u>	<input checked="" type="checkbox"/> Prevalence Test is ≤3.0
3. <u>Carex membranacea</u>	<u>10</u>		<u>FACW</u>	<input type="checkbox"/> Morphological Adaptions' (Provide supporting data in Remarks or on a spererate sheet)
4. <u>Equisetum arvense</u>	<u>10</u>		<u>FACU</u>	<input type="checkbox"/> Problematic Hydrophytic Vegetation' Explain)
5. <u>Calamagrostis purpurascens</u>	<u>20</u>	<u>Yes</u>	<u>NI</u>	<i>'Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.'</i>
6. <u>Arctagrostis latifolia</u>	<u>15</u>	<u>Yes</u>	<u>FACW</u>	
7. _____				
8. _____				
Total Cover: <u>70</u>				Hydrophytic Vegetation Present? <span style="border: 1px solid black; padding: 2px;">Yes</span>
Plot size (radius, or length x width) <u>15' radius</u>	50% of total cover: <u>35</u>	20% of total cover: <u>14</u>	% Bare Ground: <u>5</u>	
% Cover of Wetland Bryophytes: _____	Total Cover of Bryophytes: <u>30</u>			

Remarks: Crustose lichens present on micro-highs/frost boils.

**SOIL**

Sampling Point: **B-14**

**Profile Description: (Describe to the depth needed to document the indicator.)**

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>	Texture	Remarks	Remarks
0-2									Organics
2-20	2.5 Y 3/2	100					loamy sand		Organic/soil mix

<sup>1</sup>Type: C=Concentrations, D=Depletions, RM=Reduced Matrix.      <sup>2</sup>Location: PL=Pore Linings, RC=Root Channel, M=Matrix

Hydric Soil Indicators:	Indicators for Problematic Hydric Soils:
<input checked="" type="checkbox"/> Histosol or Histel (A1)	<input type="checkbox"/> Alaska Color Change (TA4) <sup>4</sup>
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Alaska Alpine Swales (TA5)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Alaska Redox With 2.5Y Hue
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
<input type="checkbox"/> Alaska Gleyed (A13)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Alaska Redox (A14)	<sup>3</sup> One Indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.
<input type="checkbox"/> Alaska Gleyed Pores (A15)	<sup>4</sup> Give details of color change in Remarks.

Restrictive Layer (if present): <b>None encountered</b>	Hydric Soils Present? <b>Yes</b>
Depth: _____	_____

Remarks: \_\_\_\_\_

**HYDROLOGY**

Wetland Hydrology Indicators:	Secondary Indicators (2 or more required)
<u>Primary Indicators (any one indicator is sufficient)</u>	
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Water Stained Leaves (B9)
<input checked="" type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Drainage Patterns (B10)
<input checked="" type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Salt Deposits (C5)
<input type="checkbox"/> Surface Soil Cracks (B6)	<input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3)
<input type="checkbox"/> Inundations Visible on Aerial Imagery (B7)	<input type="checkbox"/> Presence of Reduced Iron (C4)
<input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	<input type="checkbox"/> Stunted or Stressed Plants (D1)
<input type="checkbox"/> Hydrogen Sulfide Odor (C1)	<input type="checkbox"/> Shallow Aquitard (D3)
<input type="checkbox"/> Dry Season Water Table (C2)	<input type="checkbox"/> Geomorphic Position (D2)
<input type="checkbox"/> Other (Explain in Remarks)	<input checked="" type="checkbox"/> Microtopographic Relief (D4)
<input type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> FAC-Neutral Test (D5)
<input type="checkbox"/> Sediment Deposits (B2)	
<input type="checkbox"/> Drift Deposits (B3)	
<input type="checkbox"/> Mat of Crust of Algae or Marl (B4)	
<input type="checkbox"/> Iron Deposits (B5)	

<b>Field Observations:</b>		
Surface Water Present?	<input type="checkbox"/> No	Depth (inches): _____
Water Table Present?	<input type="checkbox"/> Yes	Depth (inches): 2
Saturation Present? (includes capillary fringe)	<input type="checkbox"/> Yes	Depth (inches): 0
<b>Wetland Hydrology Present? Yes</b>		

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: \_\_\_\_\_

### WETLAND DETERMINATION DATA FORM - Alaska Region

Project Site: Mustang Development Project Borough/City: North Slope Sampling Date: Aug 7, 2011  
 Applicate/Owner: Brooks Range Petroleum Sampling Point: B-15  
 Investigator(s): JBrekken, JO'Brien Landform (hillside, terrace, Hummock, etc): On top of pingo  
 Local Relief (concave, convex, none): Concave Slope (%): 5  
 Subregion: \_\_\_\_\_ Lat: \_\_\_\_\_ Long: \_\_\_\_\_ Datum: \_\_\_\_\_

Are climate/hydrologic conditions on the site typical for this time of year? Yes

Are Vegetation?, No Soil? No or Hydrocabon? No significantly disturbed? Are "Normal Circumstances" Present? Yes  
 Are Vegetation?, No Soil? No or Hydrocabon? No 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? No Is the Sampled Area within a Wetland? No  
 Hydric Soils Present? No  
 Wetland Hydrology Present? No

Remarks: Point located on top of pingo

**VEGETATION (List all species in plot)**

Tree Stratum (Use scientific names)	Absolute %Cover	Dominant Species	Indicator Status	Dominance Test worksheet
1.				Number of Dominant Species That Are OBL, FACW, or FAC: <u>1</u> (A) Total Number of Dominant Species Across All Strata: <u>2</u> (B) Percent of Dominant Species That Are OBL, FACW, FAC: <u>50</u> (A/B)
2.				
3.				
4.				
Total Cover:				<b>Prevalence Index:</b> Total % Cover of: Multiplied by: OBL Species <u>0</u> x 1 = <u>0</u> FACW Species <u>0</u> x 2 = <u>0</u> FAC Species <u>11</u> x 3 = <u>33</u> FACU Species <u>75</u> x 4 = <u>300</u> UPL Species <u>2</u> x 5 = <u>10</u> Column Totals: <u>88</u> (A) <u>343</u> (B) Prevalence Index = B/A = <u>3.90</u>
50% of total cover: 20% of total cover:				
1. <u>Salix reticulata</u>	<u>2</u>		<u>FAC</u>	
2. <u>Dryas integrifolia</u>	<u>70</u>	<u>Yes</u>	<u>FACU</u>	
3. <u>Cassiope tetragona</u>	<u>5</u>		<u>FACU</u>	
4.				
5.				
Total Cover: 77				
50% of total cover: 38.5 20% of total cover: 15.4				
<b>Herb Stratum</b>				<b>Hydrophytic Vegetation Indicators:</b> <input type="checkbox"/> Dominance Test is >50% <input type="checkbox"/> Prevalence Test is ≤3.0 <input type="checkbox"/> Morphological Adaptions' (Provide supporting data in Remarks or on a spererate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation' Explain) <i>'Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.'</i>
1. <u>Oxytropis nigrascens</u>	<u>2</u>		<u>NI</u>	
2. <u>Silene acaulis</u>	<u>2</u>		<u>UPL</u>	
3. <u>Carex obtusata</u>	<u>7</u>	<u>Yes</u>	<u>NI</u>	
4. <u>Poa arctica</u>	<u>5</u>	<u>Yes</u>	<u>FAC</u>	
5. <u>Agropyron boreale</u>	<u>2</u>		<u>NI</u>	
6. <u>Festuca rubra</u>	<u>3</u>		<u>FAC</u>	
7. <u>Polemonium acutiflorum</u>	<u>1</u>		<u>FAC</u>	
8.				
Total Cover: 22				
50% of total cover: 11 20% of total cover: 4.4				
Plot size (radius, or length x width) <u>15' radius</u> % Bare Ground: <u>5</u>				
% Cover of Wetland Bryophytes: _____ Total Cover of Bryophytes: <u>5</u>				
Hydrophytic Vegetation Present?			No	

Remarks: White crustose lichens prevalent/common.

**SOIL**

Sampling Point: B-15

Profile Description: (Describe to the depth needed to document the indicator.)								
Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>	Texture Remarks	Remarks
0-16	10 R 2.5/2	100						Live roots reaching to 12" bgs

<sup>1</sup>Type: C=Concentrations, D=Depletions, RM=Reduced Matrix.      <sup>2</sup>Location: PL=Pore Linings, RC=Root Channel, M=Matrix

Hydric Soil Indicators:	Indicators for Problematic Hydric Soils:
<input type="checkbox"/> Histosol or Histel (A1)	<input type="checkbox"/> Alaska Color Change (TA4) <sup>4</sup>
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Alaska Alpine Swales (TA5)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Alaska Redox With 2.5Y Hue
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
<input type="checkbox"/> Alaska Gleyed (A13)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Alaska Redox (A14)	<sup>3</sup> One Indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.
<input type="checkbox"/> Alaska Gleyed Pores (A15)	<sup>4</sup> Give details of color change in Remarks.

Restrictive Layer (if present): <b>Frozen</b>	Hydric Soils Present? <b>No</b>
Depth: 16" bgs	

Remarks:

**HYDROLOGY**

Wetland Hydrology Indicators:	Secondary Indicators (2 or more required)
<u>Primary Indicators (any one indicator is sufficient)</u>	
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Water Stained Leaves (B9)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Drainage Patterns (B10)
<input type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Salt Deposits (C5)
<input type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3)
<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Presence of Reduced Iron (C4)
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Stunted or Stressed Plants (D1)
<input type="checkbox"/> Mat of Crust of Algae or Marl (B4)	<input type="checkbox"/> Shallow Aquitard (D3)
<input type="checkbox"/> Iron Deposits (B5)	<input type="checkbox"/> Geomorphic Position (D2)
<input type="checkbox"/> Surface Soil Cracks (B6)	<input checked="" type="checkbox"/> Microtopographic Relief (D4)
<input type="checkbox"/> Inundations Visible on Aerial Imagery (B7)	<input type="checkbox"/> FAC-Neutral Test (D5)
<input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	
<input type="checkbox"/> Hydrogen Sulfide Odor (C1)	
<input type="checkbox"/> Dry Season Water Table (C2)	
<input type="checkbox"/> Other (Explain in Remarks)	

<b>Field Observations:</b> Surface Water Present? <span style="border: 1px solid black; padding: 2px;">No</span> Depth (inches): _____ Water Table Present? <span style="border: 1px solid black; padding: 2px;">No</span> Depth (inches): _____ Saturation Present? <span style="border: 1px solid black; padding: 2px;">No</span> Depth (inches): _____ (includes capillary fringe)	Wetland Hydrology Present? <b>No</b>
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Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

### WETLAND DETERMINATION DATA FORM - Alaska Region

Project Site: Mustang Development Project Borough/City: North Slope Sampling Date: Aug 7, 2011  
 Applicatee/Owner: Brooks Range Petroleum Sampling Point: B-16  
 Investigator(s): JBrekken, JO'Brien Landform (hillside, terrace, Hummock, etc): polygons  
 Local Relief (concave, convex, none): none Slope (%): <1  
 Subregion: \_\_\_\_\_ Lat: \_\_\_\_\_ Long: \_\_\_\_\_ Datum: \_\_\_\_\_

Are climate/hydrologic conditions on the site typical for this time of year? Yes

Are Vegetation?, No Soil? No or Hydrocarbon? No significantly disturbed? Are "Normal Circumstances" Present? Yes  
 Are Vegetation?, No Soil? No or Hydrocarbon? No 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 Is the Sampled Area within a Wetland? Yes  
 Hydric Soils Present? Yes  
 Wetland Hydrology Present? Yes

Remarks: \_\_\_\_\_

**VEGETATION (List all species in plot)**

Tree Stratum (Use scientific names)	Absolute %Cover	Dominant Species	Indicator Status	Dominance Test worksheet:
1.				Number of Dominant Species That Are OBL, FACW, or FAC: <u>2</u> (A) Total Number of Dominant Species Across All Strata: <u>4</u> (B) Percent of Dominant Species That Are OBL, FACW, FAC: <u>50</u> (A/B)
2.				
3.				
4.				
Total Cover:				<b>Prevalence Index:</b> Total % Cover of: Multiplied by: OBL Species <u>5</u> x 1 = <u>5</u> FACW Species <u>62</u> x 2 = <u>124</u> FAC Species <u>28</u> x 3 = <u>84</u> FACU Species <u>35</u> x 4 = <u>140</u> UPL Species <u>0</u> x 5 = <u>0</u> Column Totals: <u>130</u> (A) <u>353</u> (B)  Prevalence Index = B/A = <u>2.72</u>
Sampling/Shrub Stratum		50% of total cover:	20% of total cover:	
1. <u>Salix planifolia</u>	<u>2</u>		<u>FACW</u>	
2. <u>Salix reticulata</u>	<u>10</u>	<u>Yes</u>	<u>FAC</u>	
3. <u>Salix rotundifolia</u>	<u>5</u>		<u>NI</u>	
4. <u>Cassiope tetragona</u>	<u>10</u>	<u>Yes</u>	<u>FACU</u>	
5. <u>Dryas integrifolia</u>	<u>25</u>	<u>Yes</u>	<u>FACU</u>	
6.				
		Total Cover: <u>52</u>		
Herb Stratum		50% of total cover: <u>26</u>	20% of total cover: <u>10.4</u>	
1. <u>Eriophorum vaginatum</u>	<u>60</u>	<u>Yes</u>	<u>FACW</u>	
2. <u>Eriophorum angustifolium</u>	<u>5</u>		<u>OBL</u>	
3. <u>Polygonum viviparum</u>	<u>1</u>		<u>FAC</u>	
4. <u>Oxytropis nigrascens</u>	<u>1</u>		<u>NI</u>	
5. <u>Carex bigelowii</u>	<u>15</u>		<u>FAC</u>	
6. <u>Vaccinium vitis-idaea</u>	<u>2</u>		<u>FAC</u>	
7.				
8.				
		Total Cover: <u>84</u>		
Plot size (radius, or length x width) <u>15'</u> radius		50% of total cover: <u>42</u>	20% of total cover: <u>16.8</u>	
% Cover of Wetland Bryophytes:		% Bare Ground: <u>0</u>		
		Total Cover of Bryophytes: <u>5</u>		
				<b>Hydrophytic Vegetation Indicators:</b> <input type="checkbox"/> Dominance Test is >50% <input checked="" type="checkbox"/> Prevalence Test is ≤3.0 <input type="checkbox"/> Morphological Adaptions' (Provide supporting data in Remarks or on a spererate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation' Explain)  <u>' Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.</u>
				Hydrophytic Vegetation Present? <span style="border: 1px solid black; padding: 2px;">Yes</span>

Remarks: DP located in broad trough of polygons - tops of polygons are relatively flat with Eriophorum tussocks. White crustose lichens common.

SOIL

Sampling Point: B-16

**Profile Description: (Describe to the depth needed to document the indicator.)**

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type <sup>1</sup>	LoC <sup>2</sup>	Texture	Remarks	Remarks
0-2									Organics
2-4	5 YR 3/2	100					loamy sand		Organic/soil mix w/ high inter
4-10	7.5 YR 3/2	100					silty clay loam		Organics/soil mix - less roots
10-12	2.5 Y 2.5/1	100					loamy sand		Loose soil and organics

<sup>1</sup>Type: C=Concentrations, D=Depletions, RM=Reduced Matrix.      <sup>2</sup>Location: PL=Pore Linings, RC=Root Channel, M=Matrix

Hydric Soil Indicators:	Indicators for Problematic Hydric Soils:
<input checked="" type="checkbox"/> Histosol or Histel (A1) <input type="checkbox"/> Histic Epipedon (A2) <input type="checkbox"/> Hydrogen Sulfide (A4) <input type="checkbox"/> Thick Dark Surface (A12) <input type="checkbox"/> Alaska Gleyed (A13) <input type="checkbox"/> Alaska Redox (A14) <input type="checkbox"/> Alaska Gleyed Pores (A15)	<input type="checkbox"/> Alaska Color Change (TA4) <sup>4</sup> <input type="checkbox"/> Alaska Alpine Swales (TA5) <input type="checkbox"/> Alaska Redox With 2.5Y Hue  <sup>3</sup> One Indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present. <sup>4</sup> Give details of color change in Remarks.

Restrictive Layer (if present): <b>Frozen</b>	Hydric Soils Present? <b>Yes</b>
Depth: 12" bgs	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:	Secondary Indicators (2 or more required)
<b>Primary Indicators (any one indicator is sufficient)</b> <input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Inundations Visible on Aerial Imagery (B7) <input checked="" type="checkbox"/> Saturation (A3) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Dry Season Water Table (C2) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Mat of Crust of Algae or Marl (B4) <input type="checkbox"/> Iron Deposits (B5)	<input type="checkbox"/> Water Stained Leaves (B9) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Salt Deposits (C5) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Geomorphic Position (D2) <input checked="" type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)

<b>Field Observations:</b> Surface Water Present? <input type="checkbox"/> No      Depth (inches): _____ Water Table Present? <input type="checkbox"/> No      Depth (inches): _____ Saturation Present? <input checked="" type="checkbox"/> Yes      Depth (inches): 2 _____ (includes capillary fringe)	Wetland Hydrology Present? <b>Yes</b>
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Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Some trenches in the area are holding standing water.



WETLAND DETERMINATION DATA FORM - Alaska Region

Project Site: Mustang Development Project Borough/City: North Slope Sampling Date: Aug 7, 2011  
 Applicate/Owner: Brooks Range Petroleum Sampling Point: B-17  
 Investigator(s): JBrekken, JO'Brien Landform (hillside, terrace, Hummock, etc): tussocks and troughs  
 Local Relief (concave, convex, none): none Slope (%): <1  
 Subregion: \_\_\_\_\_ Lat: \_\_\_\_\_ Long: \_\_\_\_\_ Datum: \_\_\_\_\_

Are climate/hydrologic conditions on the site typical for this time of year? Yes

Are Vegetation?, No Soil? No or Hydrocarbon? No significantly disturbed? Are "Normal Circumstances" Present? Yes  
 Are Vegetation?, No Soil? No or Hydrocarbon? No 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 Is the Sampled Area within a Wetland? Yes  
 Hydric Soils Present? Yes  
 Wetland Hydrology Present? Yes

Remarks: Tussocks common and random troughs present

**VEGETATION (List all species in plot)**

Tree Stratum (Use scientific names)	Absolute %Cover	Dominant Species	Indicator Status	Dominance Test worksheet:	
1.				Number of Dominant Species That Are OBL, FACW, or FAC:	2 (A)
2.				Total Number of Dominant Species Across All Strata:	3 (B)
3.				Percent of Dominant Species That Are OBL, FACW, FAC:	66 (A/B)
4.				<b>Prevalence Index:</b>	
Total Cover:				Total % Cover of: Multiplied by:	
50% of total cover:		20% of total cover:		OBL Species	11 x 1 = 11
1. <u>Salix planifolia</u>	5		FACW	FACW Species	55 x 2 = 110
2. <u>Salix reticulata</u>	5		FAC	FAC Species	15 x 3 = 45
3. <u>Dryas integrifolia</u>	20	Yes	FACU	FACU Species	20 x 4 = 80
4.				UPL Species	0 x 5 = 0
5.				Column Totals:	101 (A) 246 (B)
6.				Prevalence Index = B/A = 2.44	
Total Cover: 30				<b>Hydrophytic Vegetation Indicators:</b>	
50% of total cover:		20% of total cover:		<input checked="" type="checkbox"/> Dominance Test is >50%	
15		6		<input checked="" type="checkbox"/> Prevalence Test is ≤3.0	
<b>Herb Stratum</b>				<input type="checkbox"/> Morphological Adaptions' (Provide supporting data in Remarks or on a spererate sheet)	
1. <u>Eriophorum angustifolium</u>	10		OBL	<input type="checkbox"/> Problematic Hydrophytic Vegetation' Explain)	
2. <u>Saxafraga hirculus</u>	1		OBL	<i>' Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.</i>	
3. <u>Carex membranacea</u>	30	Yes	FACW		
4. <u>Eriophorum vaginatum</u>	20	Yes	FACW		
5. <u>Carex bigelowii</u>	10		FAC		
6.					
7.					
8.					
Total Cover: 71				Hydrophytic Vegetation Present? <input checked="" type="checkbox"/> Yes	
50% of total cover:		20% of total cover:			
35.5		14.2			
Plot size (radius, or length x width) <u>15' radius</u>					
% Bare Ground: 0					
% Cover of Wetland Bryophytes: _____					
Total Cover of Bryophytes: 15					

Remarks: Few lichens present, but some fruticose lichens present.

SOIL

Sampling Point: B-17

**Profile Description: (Describe to the depth needed to document the indicator.)**

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>	Texture	Remarks	Remarks
0-4									Organics*
4-10	7.5 YR 3/1	100					clay loam		organics w/ some gravel mixed
10-14	2.5 Y 2.5/1	100					loamy sand		decomposing material mixed

<sup>1</sup>Type: C=Concentrations, D=Depletions, RM=Reduced Matrix.      <sup>2</sup>Location: PL=Pore Linings, RC=Root Channel, M=Matrix

<p><b>Hydric Soil Indicators:</b></p> <input checked="" type="checkbox"/> Histosol or Histel (A1) <input type="checkbox"/> Histic Epipedon (A2) <input checked="" type="checkbox"/> Hydrogen Sulfide (A4) <input type="checkbox"/> Thick Dark Surface (A12) <input type="checkbox"/> Alaska Gleyed (A13) <input type="checkbox"/> Alaska Redox (A14) <input type="checkbox"/> Alaska Gleyed Pores (A15)	<p><b>Indicators for Problematic Hydric Soils:</b></p> <input type="checkbox"/> Alaska Color Change (TA4) <sup>4</sup> <input type="checkbox"/> Alaska Alpine Swales (TA5) <input type="checkbox"/> Alaska Redox With 2.5Y Hue <input type="checkbox"/> Alaska Gleyed Without Hue 5Y or Redder Underlying Layer <input type="checkbox"/> Other (Explain in Remarks)
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<sup>3</sup>One Indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.  
<sup>4</sup>Give details of color change in Remarks.

Restrictive Layer (if present): <b>Frozen</b> Depth: 14" bgs	Hydric Soils Present? <b>Yes</b>
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Remarks: \* 0-4" bgs organic soil layer with predominantly organics (unable to get soil color)

HYDROLOGY

<p><b>Wetland Hydrology Indicators:</b></p> <p><u>Primary Indicators (any one indicator is sufficient)</u></p> <input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Inundations Visible on Aerial Imagery (B7) <input checked="" type="checkbox"/> Saturation (A3) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Dry Season Water Table (C2) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Mat of Crust of Algae or Marl (B4) <input type="checkbox"/> Iron Deposits (B5)	<p><u>Secondary Indicators (2 or more required)</u></p> <input type="checkbox"/> Water Stained Leaves (B9) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Salt Deposits (C5) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Geomorphic Position (D2) <input checked="" type="checkbox"/> Microtopographic Relief (D4) <input checked="" type="checkbox"/> FAC-Neutral Test (D5)
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<p><b>Field Observations:</b></p> Surface Water Present? <input type="checkbox"/> No      Depth (inches): _____ Water Table Present? <input type="checkbox"/> No      Depth (inches): _____ Saturation Present? <input checked="" type="checkbox"/> Yes      Depth (inches): 0 (includes capillary fringe)	Wetland Hydrology Present? <b>Yes</b>
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Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

**WETLAND DETERMINATION DATA FORM - Alaska Region**

Project Site: Mustang Development Project Borough/City: North Slope Sampling Date: Aug 7, 2011  
 Applicate/Owner: Brooks Range Petroleum Sampling Point: B-18  
 Investigator(s): JBrekken, JO'Brien Landform (hillside, terrace, Hummock, etc): see remarks  
 Local Relief (concave, convex, none): concave Slope (%): <1  
 Subregion: \_\_\_\_\_ Lat: \_\_\_\_\_ Long: \_\_\_\_\_ Datum: \_\_\_\_\_

Are climate/hydrologic conditions on the site typical for this time of year? Yes

Are Vegetation?, No Soil? No or Hydrocabon? No significantly disturbed? Are "Normal Circumstances" Present? Yes  
 Are Vegetation?, No Soil? No or Hydrocabon? No 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 Is the Sampled Area within a Wetland? Yes  
 Hydric Soils Present? Yes  
 Wetland Hydrology Present? Yes

Remarks: Landform: terrace/basin with frost boils towards edge of basin and wetter in the middle

**VEGETATION (List all species in plot)**

Tree Stratum (Use scientific names)	Absolute %Cover	Dominant Species	Indicator Status	Dominance Test worksheet:
1.				Number of Dominant Species That Are OBL, FACW, or FAC: <u>1</u> (A)
2.				Total Number of Dominant Species Across All Strata: <u>2</u> (B)
3.				Percent of Dominant Species That Are OBL, FACW, FAC: <u>50</u> (A/B)
4.				
Total Cover:				<b>Prevalence Index:</b>
Sampling/Shrub Stratum		50% of total cover:	20% of total cover:	Total % Cover of: Multiplied by:
1. <u>Salix ovalifolia</u>	<u>2</u>		<u>FAC</u>	OBL Species <u>74</u> x 1 = <u>74</u>
2. <u>Dryas integrifolia</u>	<u>10</u>	<u>Yes</u>	<u>FACU</u>	FACW Species <u>7</u> x 2 = <u>14</u>
3.				FAC Species <u>12</u> x 3 = <u>36</u>
4.				FACU Species <u>10</u> x 4 = <u>40</u>
5.				UPL Species <u>0</u> x 5 = <u>0</u>
6.				Column Totals: <u>103</u> (A) <u>164</u> (B)
Total Cover: <u>12</u>				Prevalence Index = B/A = <u>1.59</u>
Herb Stratum		50% of total cover: <u>6</u>	20% of total cover: <u>2.4</u>	<b>Hydrophytic Vegetation Indicators:</b>
1. <u>Pedicularis sudetica</u>	<u>2</u>		<u>FACW</u>	<input type="checkbox"/> Dominance Test is >50%
2. <u>Eriophorum angustifolium</u>	<u>10</u>		<u>OBL</u>	<input checked="" type="checkbox"/> Prevalence Test is ≤3.0
3. <u>Carex aquatilis</u>	<u>60</u>	<u>Yes</u>	<u>OBL</u>	<input type="checkbox"/> Morphological Adaptions' (Provide supporting data in Remarks or on a spererate sheet)
4. <u>Carex saxatilis</u>	<u>5</u>		<u>FACW</u>	<input type="checkbox"/> Problematic Hydrophytic Vegetation' Explain)
5. <u>Carex bigelowii</u>	<u>10</u>		<u>FAC</u>	<i>' Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.</i>
6. <u>Juncus arcticus</u>	<u>4</u>		<u>OBL</u>	
7.				
8.				
Total Cover: <u>91</u>				Hydrophytic Vegetation Present? <input checked="" type="checkbox"/> Yes
Plot size (radius, or length x width) <u>15' radius</u>		50% of total cover: <u>45.5</u>	20% of total cover: <u>18.2</u>	
% Bare Ground: <u>0</u>				
% Cover of Wetland Bryophytes:		Total Cover of Bryophytes: <u>35</u>		

Remarks: \_\_\_\_\_

SOIL

Sampling Point: B-18

**Profile Description: (Describe to the depth needed to document the indicator.)**

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>	Texture	Remarks	Remarks
0-2									Organics*
2-12	5 Y 3/2	100					loamy sand		coarse to fine sand matrix w/
12-20	5 Y 4/1	100					sandy clay loam		fine sand matrix w/ <50% dec

<sup>1</sup>Type: C=Concentrations, D=Depletions, RM=Reduced Matrix.      <sup>2</sup>Location: PL=Pore Linings, RC=Root Channel, M=Matrix

Hydric Soil Indicators:	Indicators for Problematic Hydric Soils:
<input checked="" type="checkbox"/> Histosol or Histel (A1)	<input type="checkbox"/> Alaska Color Change (TA4) <sup>4</sup>
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Alaska Alpine Swales (TA5)
<input checked="" type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Alaska Redox With 2.5Y Hue
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
<input type="checkbox"/> Alaska Gleyed (A13)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Alaska Redox (A14)	<sup>3</sup> One Indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.
<input type="checkbox"/> Alaska Gleyed Pores (A15)	<sup>4</sup> Give details of color change in Remarks.

Restrictive Layer (if present): <b>none encountered</b>	Hydric Soils Present? <b>Yes</b>
Depth: _____	_____

Remarks: \* 0-2" bgs organic surface layer with >50% roots with some sand (unable to get color)

HYDROLOGY

Wetland Hydrology Indicators:	Secondary Indicators (2 or more required)
<u>Primary Indicators (any one indicator is sufficient)</u>	
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Water Stained Leaves (B9)
<input checked="" type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Drainage Patterns (B10)
<input checked="" type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Salt Deposits (C5)
<input type="checkbox"/> Surface Soil Cracks (B6)	<input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3)
<input type="checkbox"/> Inundations Visible on Aerial Imagery (B7)	<input type="checkbox"/> Presence of Reduced Iron (C4)
<input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	<input type="checkbox"/> Stunted or Stressed Plants (D1)
<input type="checkbox"/> Hydrogen Sulfide Odor (C1)	<input type="checkbox"/> Shallow Aquitard (D3)
<input type="checkbox"/> Dry Season Water Table (C2)	<input type="checkbox"/> Geomorphic Position (D2)
<input type="checkbox"/> Other (Explain in Remarks)	<input checked="" type="checkbox"/> Microtopographic Relief (D4)
<input type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> FAC-Neutral Test (D5)
<input type="checkbox"/> Sediment Deposits (B2)	
<input type="checkbox"/> Drift Deposits (B3)	
<input type="checkbox"/> Mat of Crust of Algae or Marl (B4)	
<input type="checkbox"/> Iron Deposits (B5)	

<b>Field Observations:</b>	
Surface Water Present? <input type="checkbox"/> No	Depth (inches): _____
Water Table Present? <input type="checkbox"/> Yes	Depth (inches): 6
Saturation Present? <input type="checkbox"/> Yes (includes capillary fringe)	Depth (inches): 0
Wetland Hydrology Present? <b>Yes</b>	

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Lakes and ponds nearby

**WETLAND DETERMINATION DATA FORM - Alaska Region**

Project Site: Mustang Development Project Borough/City: North Slope Sampling Date: Aug 7, 2011  
 Applicate/Owner: Brooks Range Petroleum Sampling Point: B-19  
 Investigator(s): JBrekken, JO'Brien Landform (hillside, terrace, Huumock, etc): tussocks  
 Local Relief (concave, convex, none): flat Slope (%): 0  
 Subregion: \_\_\_\_\_ Lat: \_\_\_\_\_ Long: \_\_\_\_\_ Datum: \_\_\_\_\_

Are climate/hydrologic conditions on the site typical for this time of year? Yes  
 Are Vegetation?, No Soil? No or Hydrocabon? No significantly disturbed? Are "Normal Circumstances" Present? Yes  
 Are Vegetation?, No Soil? No or Hydrocabon? No 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 Is the Sampled Area within a Wetland? Yes  
 Hydric Soils Present? Yes  
 Wetland Hydrology Present? Yes

Remarks: \_\_\_\_\_

**VEGETATION (List all species in plot)**

Tree Stratum (Use scientific names)	Absolute %Cover	Dominant Species	Indicator Status	Dominance Test worksheet
1.				Number of Dominant Species That Are OBL, FACW, or FAC: <u>2</u> (A)  Total Number of Dominant Species Across All Strata: <u>3</u> (B)  Percent of Dominant Species That Are OBL, FACW, FAC: <u>66</u> (A/B)
2.				
3.				
4.				
Total Cover:				<b>Prevalence Index:</b> Total % Cover of: Multiplied by: OBL Species <u>11</u> x 1 = <u>11</u> FACW Species <u>37</u> x 2 = <u>74</u> FAC Species <u>27</u> x 3 = <u>81</u> FACU Species <u>23</u> x 4 = <u>92</u> UPL Species <u>0</u> x 5 = <u>0</u> Column Totals: <u>98</u> (A) <u>258</u> (B)  Prevalence Index = B/A = <u>2.63</u>
Sampling/Shrub Stratum		50% of total cover:	20% of total cover:	
1. <i>Salix reticulata</i>	3		FAC	
2. <i>Dryas integrifolia</i>	20	Yes	FACU	
3. <i>Salix rotundifolia</i>	1		NI	
4. <i>Salix planifolia</i>	2		FACW	
5. <i>Cassiope tetragona</i>	3		FACU	
6.				
		Total Cover: 29		
Herb Stratum		50% of total cover:	20% of total cover:	
1. <i>Pyrola grandiflora</i>	2		FAC	
2. <i>Vaccinium vitis-idaea</i>	1		FAC	
3. <i>Eriophorum angustifolium</i>	10		OBL	
4. <i>Saxifraga hirculus</i>	1		OBL	
5. <i>Polygonum viviparum</i>	1		FAC	
6. <i>Carex saxatilis</i>	25	Yes	FACW	
7. <i>Carex podocarpa</i>	20	Yes	FAC	
8. <i>Carex membranacea</i>	10		FACW	
		Total Cover: 70		
Plot size (radius, or length x width) <u>15' radius</u>		50% of total cover:	20% of total cover:	
		35	14	
% Cover of Wetland Bryophytes: _____		% Bare Ground: <u>0</u>		
		Total Cover of Bryophytes: <u>15</u>		
Hydrophytic Vegetation Present? <span style="float: right; border: 1px solid black; padding: 2px;">Yes</span>				

Remarks: Small drainage channel to the west and larger stream located to the east.

SOIL

Sampling Point: B-19

**Profile Description: (Describe to the depth needed to document the indicator.)**

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>	Texture	Remarks	Remarks
0-2									Organics, >50% roots in soil
2-8									100% root fiber mat
8-14	5 YR 2.5/1	100					loamy sand		<50% roots w/ sparse pea or

<sup>1</sup>Type: C=Concentrations, D=Depletions, RM=Reduced Matrix.      <sup>2</sup>Location: PL=Pore Linings, RC=Root Channel, M=Matrix

<p><b>Hydric Soil Indicators:</b></p> <input type="checkbox"/> Histosol or Histel (A1) <input checked="" type="checkbox"/> Histic Epipedon (A2) <input type="checkbox"/> Hydrogen Sulfide (A4) <input type="checkbox"/> Thick Dark Surface (A12) <input type="checkbox"/> Alaska Gleyed (A13) <input type="checkbox"/> Alaska Redox (A14) <input type="checkbox"/> Alaska Gleyed Pores (A15)	<p><b>Indicators for Problematic Hydric Soils:</b></p> <input type="checkbox"/> Alaska Color Change (TA4) <sup>4</sup> <input type="checkbox"/> Alaska Alpine Swales (TA5) <input type="checkbox"/> Alaska Redox With 2.5Y Hue  <sup>3</sup> One Indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present. <sup>4</sup> Give details of color change in Remarks.	<input type="checkbox"/> Alaska Gleyed Without Hue 5Y or Redder Underlying Layer <input type="checkbox"/> Other (Explain in Remarks)
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Restrictive Layer (if present): <b>frozen</b>  Depth: <u>14" bgs</u>	<b>Hydric Soils Present?</b> <b>Yes</b>
Remarks:	

HYDROLOGY

<p><b>Wetland Hydrology Indicators:</b></p> <p><u>Primary Indicators (any one indicator is sufficient)</u></p> <input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Inundations Visible on Aerial Imagery (B7) <input checked="" type="checkbox"/> Saturation (A3) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Dry Season Water Table (C2) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Mat of Crust of Algae or Marl (B4) <input type="checkbox"/> Iron Deposits (B5)	<p><u>Secondary Indicators (2 or more required)</u></p> <input type="checkbox"/> Water Stained Leaves (B9) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Salt Deposits (C5) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Geomorphic Position (D2) <input checked="" type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)
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<p><b>Field Observations:</b></p> Surface Water Present? <input type="checkbox"/> No      Depth (inches): _____ Water Table Present? <input type="checkbox"/> No      Depth (inches): _____ Saturation Present? <input type="checkbox"/> Yes      Depth (inches): <u>2</u> (includes capillary fringe)	<b>Wetland Hydrology Present?</b> <b>Yes</b>
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Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:      Small drainage channel to the west and larger stream located to the east.

### WETLAND DETERMINATION DATA FORM - Alaska Region

Project Site: Mustang Development Project Borough/City: North Slope Sampling Date: Aug 7, 2011  
 Applicate/Owner: Brooks Range Petroleum Sampling Point: B-20  
 Investigator(s): JBrekken, JO'Brien Landform (hillside, terrace, Hummock, etc): tussocks  
 Local Relief (concave, convex, none): flat Slope (%): <1  
 Subregion: \_\_\_\_\_ Lat: \_\_\_\_\_ Long: \_\_\_\_\_ Datum: \_\_\_\_\_

Are climate/hydrologic conditions on the site typical for this time of year? Yes

Are Vegetation?, No Soil? No or Hydrocabon? No significantly disturbed? Are "Normal Circumstances" Present? Yes  
 Are Vegetation?, No Soil? No or Hydrocabon? No 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 Is the Sampled Area within a Wetland? Yes  
 Hydric Soils Present? Yes  
 Wetland Hydrology Present? Yes

Remarks: \_\_\_\_\_

**VEGETATION (List all species in plot)**

Tree Stratum (Use scientific names)	Absolute %Cover	Dominant Species	Indicator Status	Dominance Test worksheet:
1.				Number of Dominant Species That Are OBL, FACW, or FAC: <u>3</u> (A) Total Number of Dominant Species Across All Strata: <u>4</u> (B) Percent of Dominant Species That Are OBL, FACW, FAC: <u>75</u> (A/B)
2.				
3.				
4.				
Total Cover:				<b>Prevalence Index:</b> Total % Cover of: Multiplied by: OBL Species <u>16</u> x 1 = <u>16</u> FACW Species <u>30</u> x 2 = <u>60</u> FAC Species <u>23</u> x 3 = <u>69</u> FACU Species <u>45</u> x 4 = <u>180</u> UPL Species <u>0</u> x 5 = <u>0</u> Column Totals: <u>114</u> (A) <u>325</u> (B) Prevalence Index = B/A = <u>2.85</u>
Sampling/Shrub Stratum		50% of total cover:	20% of total cover:	
1. <u>Salix reticulata</u>	<u>4</u>		<u>FAC</u>	
2. <u>Dryas integrifolia</u>	<u>40</u>	<u>Yes</u>	<u>FACU</u>	
3. <u>Salix rotundifolia</u>	<u>1</u>		<u>NI</u>	
4. <u>Salix arctica</u>	<u>3</u>		<u>FAC</u>	
5. <u>Cassiope tetragona</u>	<u>5</u>		<u>FACU</u>	
6.				
Total Cover: <u>53</u>				
Herb Stratum		50% of total cover: <u>26.5</u>	20% of total cover: <u>10.6</u>	
1. <u>Eriophorum angustifolium</u>	<u>15</u>	<u>Yes</u>	<u>OBL</u>	
2. <u>Saxifraga hirculus</u>	<u>1</u>		<u>OBL</u>	
3. <u>Saussurea angustifolia</u>	<u>1</u>		<u>FAC</u>	
4. <u>Carex bigelowii</u>	<u>15</u>	<u>Yes</u>	<u>FAC</u>	
5. <u>Carex membranacea</u>	<u>30</u>	<u>Yes</u>	<u>FACW</u>	
6.				
7.				
8.				
Total Cover: <u>62</u>				
Plot size (radius, or length x width) <u>15' radius</u>		50% of total cover: <u>31</u>	20% of total cover: <u>12.4</u>	
% Bare Ground: <u>0</u>				
% Cover of Wetland Bryophytes:		Total Cover of Bryophytes: <u>10</u>		
Hydrophytic Vegetation Present? <span style="float: right; border: 1px solid black; padding: 2px;">Yes</span>				

Remarks: \_\_\_\_\_

SOIL

Sampling Point: B-20

Profile Description: (Describe to the depth needed to document the indicator.)									
Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>	Texture	Remarks	Remarks
0-2									Organics/soil mix
2-7									100% root fiber mat
7-10	5 YR 2.5/1	100					sandy loam		<50% roots w/ some small roots
10-15	2.5 Y 2.5/1	100					sandy loam		<50% roots in soil matrix

<sup>1</sup>Type: C=Concentrations, D=Depletions, RM=Reduced Matrix.      <sup>2</sup>Location: PL=Pore Linings, RC=Root Channel, M=Matrix

Hydric Soil Indicators:	Indicators for Problematic Hydric Soils:
<input type="checkbox"/> Histosol or Histel (A1) <input checked="" type="checkbox"/> Histic Epipedon (A2) <input type="checkbox"/> Hydrogen Sulfide (A4) <input type="checkbox"/> Thick Dark Surface (A12) <input type="checkbox"/> Alaska Gleyed (A13) <input type="checkbox"/> Alaska Redox (A14) <input type="checkbox"/> Alaska Gleyed Pores (A15)	<input type="checkbox"/> Alaska Color Change (TA4) <sup>4</sup> <input type="checkbox"/> Alaska Alpine Swales (TA5) <input type="checkbox"/> Alaska Redox With 2.5Y Hue  <sup>3</sup> One Indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present. <sup>4</sup> Give details of color change in Remarks.

Restrictive Layer (if present): <u>frozen</u> Depth: <u>15" bgs</u>	Hydric Soils Present? <u>Yes</u>
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Remarks:

HYDROLOGY

Wetland Hydrology Indicators:	Secondary Indicators (2 or more required)
<u>Primary Indicators (any one indicator is sufficient)</u> <input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Inundations Visible on Aerial Imagery (B7) <input checked="" type="checkbox"/> Saturation (A3) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Dry Season Water Table (C2) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Mat of Crust of Algae or Marl (B4) <input type="checkbox"/> Iron Deposits (B5)	<input type="checkbox"/> Water Stained Leaves (B9) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Salt Deposits (C5) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Geomorphic Position (D2) <input checked="" type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)

<b>Field Observations:</b> Surface Water Present? <span style="border: 1px solid black; padding: 2px;">No</span> Water Table Present? <span style="border: 1px solid black; padding: 2px;">No</span> Saturation Present? (includes capillary fringe) <span style="border: 1px solid black; padding: 2px;">Yes</span>	Depth (inches): _____ Depth (inches): _____ Depth (inches): <u>0</u>	Wetland Hydrology Present? <u>Yes</u>
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Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:



**WETLAND DETERMINATION DATA FORM - Alaska Region**

Project Site: Mustang Development Project Borough/City: North Slope Sampling Date: Aug 7, 201  
 Applicate/Owner: Brooks Range Petroleum Sampling Point: B-21  
 Investigator(s): JBrekken, JO'Brien Landform (hillside, terrace, Huumock, etc): tussocks  
 Local Relief (concave, convex, none): concave Slope (%): <1  
 Subregion: \_\_\_\_\_ Lat: \_\_\_\_\_ Long: \_\_\_\_\_ Datum: \_\_\_\_\_

Are climate/hydrologic conditions on the site typical for this time of year? Yes  
 Are Vegetation?, No Soil? No or Hydrocabon? No significantly disturbed? Are "Normal Circumstances" Present? Yes  
 Are Vegetation?, No Soil? No or Hydrocabon? No 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 Is the Sampled Area within a Wetland? Yes  
 Hydric Soils Present? Yes  
 Wetland Hydrology Present? Yes

Remarks: \_\_\_\_\_

**VEGETATION (List all species in plot)**

Tree Stratum (Use scientific names)	Absolute %Cover	Dominant Species	Indicator Status	Dominance Test worksheet:
1. _____				Number of Dominant Species That Are OBL, FACW, or FAC: <u>2</u> (A) Total Number of Dominant Species Across All Strata: <u>2</u> (B) Percent of Dominant Species That Are OBL, FACW, FAC: <u>100</u> (A/B)
2. _____				
3. _____				
4. _____				
Total Cover: _____				<b>Prevalence Index:</b> Total % Cover of: Multiplied by: OBL Species <u>25</u> x 1 = <u>25</u> FACW Species <u>76</u> x 2 = <u>152</u> FAC Species <u>3</u> x 3 = <u>9</u> FACU Species <u>0</u> x 4 = <u>0</u> UPL Species <u>0</u> x 5 = <u>0</u> Column Totals: <u>104</u> (A) <u>186</u> (B) Prevalence Index = B/A = <u>1.79</u>
Total Cover: _____ (treat w/ herb stratum)				
50% of total cover: _____ 20% of total cover: _____				
1. <u>Salix planifolia</u>	<u>1</u>		<u>FACW</u>	
2. <u>Salix ovalifolia</u>	<u>2</u>		<u>FAC</u>	
3. <u>Salix rotundifolia</u>	<u>1</u>		<u>NI</u>	
4. _____				
Total Cover: _____ (treat w/ herb stratum)				
50% of total cover: _____ 20% of total cover: _____				
<b>Herb Stratum</b>				<b>Hydrophytic Vegetation Indicators:</b> <input checked="" type="checkbox"/> Dominance Test is >50% <input checked="" type="checkbox"/> Prevalence Test is ≤3.0 <input type="checkbox"/> Morphological Adaptions' (Provide supporting data in Remarks or on a spererate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation' Explain) ' Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.
1. <u>Eriophorum vaginatum</u>	<u>40</u>	<u>Yes</u>	<u>FACW</u>	
2. <u>Carex aquatilis</u>	<u>25</u>	<u>Yes</u>	<u>OBL</u>	
3. <u>Dupontia fischeri</u>	<u>15</u>		<u>FACW</u>	
4. <u>Carex saxatilis</u>	<u>20</u>		<u>FACW</u>	
5. <u>Polygonum viviparum</u>	<u>1</u>		<u>FAC</u>	
6. _____				
7. _____				
8. _____				
Total Cover: <u>105</u>				
50% of total cover: <u>52.5</u> 20% of total cover: <u>21</u>				
Plot size (radius, or length x width) <u>15' radius</u> % Bare Ground: <u>5</u>				
% Cover of Wetland Bryophytes: _____ Total Cover of Bryophytes: <u>5</u>				
Hydrophytic Vegetation Present?			Yes	

Remarks: Sapling/shrub stratum treated with herb stratum.

SOIL

Sampling Point: B-21

**Profile Description: (Describe to the depth needed to document the indicator.)**

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>	Texture	Remarks
0-6	10 YR 3/2	100					loam	>50% roots/organics in soil m
6-10	5 Y 3/1	100					sandy loam	<50% roots/organics w/ small
10-20	5 Y 4/1	100					sandy loam	<50% roots/organics w/ small

<sup>1</sup>Type: C=Concentrations, D=Depletions, RM=Reduced Matrix.      <sup>2</sup>Location: PL=Pore Linings, RC=Root Channel, M=Matrix

Hydric Soil Indicators:	Indicators for Problematic Hydric Soils:
<input checked="" type="checkbox"/> Histosol or Histel (A1)	<input type="checkbox"/> Alaska Color Change (TA4) <sup>4</sup>
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Alaska Alpine Swales (TA5)
<input checked="" type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Alaska Redox With 2.5Y Hue
<input type="checkbox"/> Thick Dark Surface (A12)	
<input type="checkbox"/> Alaska Gleyed (A13)	<sup>3</sup> One Indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.
<input type="checkbox"/> Alaska Redox (A14)	<sup>4</sup> Give details of color change in Remarks.
<input type="checkbox"/> Alaska Gleyed Pores (A15)	
<input type="checkbox"/> Alaska Gleyed Without Hue 5Y or Redder Underlying Layer	
<input type="checkbox"/> Other (Explain in Remarks)	

Restrictive Layer (if present): <b>none encountered</b>	Hydric Soils Present? <b>Yes</b>
Depth: _____	_____

Remarks: \_\_\_\_\_

HYDROLOGY

Wetland Hydrology Indicators:	Secondary Indicators (2 or more required)
<u>Primary Indicators (any one indicator is sufficient)</u>	
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Water Stained Leaves (B9)
<input checked="" type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Drainage Patterns (B10)
<input checked="" type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Salt Deposits (C5)
<input type="checkbox"/> Surface Soil Cracks (B6)	<input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3)
<input type="checkbox"/> Inundations Visible on Aerial Imagery (B7)	<input type="checkbox"/> Presence of Reduced Iron (C4)
<input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	<input type="checkbox"/> Stunted or Stressed Plants (D1)
<input type="checkbox"/> Hydrogen Sulfide Odor (C1)	<input type="checkbox"/> Shallow Aquitard (D3)
<input type="checkbox"/> Dry Season Water Table (C2)	<input type="checkbox"/> Geomorphic Position (D2)
<input type="checkbox"/> Other (Explain in Remarks)	<input checked="" type="checkbox"/> Microtopographic Relief (D4)
<input type="checkbox"/> Water Marks (B1)	<input checked="" type="checkbox"/> FAC-Neutral Test (D5)
<input type="checkbox"/> Sediment Deposits (B2)	
<input type="checkbox"/> Drift Deposits (B3)	
<input type="checkbox"/> Mat of Crust of Algae or Marl (B4)	
<input type="checkbox"/> Iron Deposits (B5)	

<b>Field Observations:</b>	
Surface Water Present? <input type="checkbox"/> No	Depth (inches): _____
Water Table Present? <input type="checkbox"/> Yes	Depth (inches): 8
Saturation Present? <input type="checkbox"/> Yes	Depth (inches): 0
(includes capillary fringe)	

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Lake nearby/DP on margin of lake (~150' to the west)

### WETLAND DETERMINATION DATA FORM - Alaska Region

Project Site: Mustang Development Project Borough/City: North Slope Sampling Date: Aug 7, 2011  
 Applicate/Owner: Brooks Range Petroleum Sampling Point: B-22  
 Investigator(s): JBrekken, JO'Brien Landform (hillside, terrace, Hummock, etc): tussocks  
 Local Relief (concave, convex, none): concave Slope (%): <1  
 Subregion: \_\_\_\_\_ Lat: \_\_\_\_\_ Long: \_\_\_\_\_ Datum: \_\_\_\_\_

Are climate/hydrologic conditions on the site typical for this time of year? Yes

Are Vegetation?, No Soil? No or Hydrocarbon? No significantly disturbed? Are "Normal Circumstances" Present? Yes  
 Are Vegetation?, No Soil? No or Hydrocarbon? No 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 Is the Sampled Area within a Wetland? Yes  
 Hydric Soils Present? Yes  
 Wetland Hydrology Present? Yes

Remarks: \_\_\_\_\_

**VEGETATION (List all species in plot)**

Tree Stratum (Use scientific names)	Absolute %Cover	Dominant Species	Indicator Status	Dominance Test worksheet
1.				<b>Dominance Test worksheet</b> Number of Dominant Species That Are OBL, FACW, or FAC: <u>1</u> (A) Total Number of Dominant Species Across All Strata: <u>2</u> (B) Percent of Dominant Species That Are OBL, FACW, FAC: <u>50</u> (A/B)
2.				
3.				
4.				
Total Cover:				<b>Prevalence Index:</b> Total % Cover of: Multiplied by: OBL Species <u>67</u> x 1 = <u>67</u> FACW Species <u>10</u> x 2 = <u>20</u> FAC Species <u>4</u> x 3 = <u>12</u> FACU Species <u>10</u> x 4 = <u>40</u> UPL Species <u>0</u> x 5 = <u>0</u> Column Totals: <u>91</u> (A) <u>139</u> (B)  Prevalence Index = B/A = <u>1.53</u>
<b>Sampling/Shrub Stratum</b>	50% of total cover:	20% of total cover:		
1. <i>Salix reticulata</i>	2		FAC	
2. <i>Salix planifolia</i>	1		FACW	
3. <i>Dryas integrifolia</i>	10	Yes	FACU	
4.				
5.				
Total Cover: 13				
<b>Herb Stratum</b>	50% of total cover: 6.5	20% of total cover: 2.6		
1. <i>Eriophorum angustifolium</i>	50	Yes	OBL	
2. <i>Carex aquatilis</i>	15		OBL	
3. <i>Carex saxatilis</i>	5		FACW	
4. <i>Polygonum viviparum</i>	2		FAC	
5. <i>Pedicularis sudetica</i>	1		FACW	
6. <i>Carex capillaris</i>	3		FACW	
7. <i>Juncus biglumus</i>	2		OBL	
8.				
Total Cover: 78				
Plot size (radius, or length x width) <u>15'</u> radius				
50% of total cover: <u>39</u> 20% of total cover: <u>15.6</u>				
% Bare Ground: <u>5</u>				
% Cover of Wetland Bryophytes: _____ Total Cover of Bryophytes: <u>5</u>				
Hydrophytic Vegetation Present? <span style="border: 1px solid black; padding: 2px;">Yes</span>				

Remarks: Sampling/shrub stratum treated with herb stratum.

**SOIL**

Sampling Point: **B-22**

**Profile Description: (Describe to the depth needed to document the Indicator.)**

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>	Texture	Remarks	Remarks
0-2									Organics
2-9	7.5 YR 2.5/1	100					sandy loam*		80-90% fibrous root mat w/ s
9-14	2.5 YR 2.5/1	100					loam		<50% roots/organics

<sup>1</sup>Type: C=Concentrations, D=Depletions, RM=Reduced Matrix.      <sup>2</sup>Location: PL=Pore Linings, RC=Root Channel, 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:**

- Alaska Color Change (TA4)<sup>4</sup>
  - Alaska Alpine Swales (TA5)
  - Alaska Redox With 2.5Y Hue
  - Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
  - Other (Explain in Remarks)
- <sup>3</sup>One Indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.
- <sup>4</sup>Give details of color change in Remarks.

Restrictive Layer (if present): **frozen**

Depth: **14" bgs**

Hydric Soils Present? **Yes**

Remarks:

\* soil texture test not conclusive due to high % of root fibers - sandy loam or possibly sil

**HYDROLOGY**

**Wetland Hydrology Indicators:**

Primary Indicators (any one indicator is sufficient)

- Surface Water (A1)
- High Water Table (A2)
- Saturation (A3)
- Water Marks (B1)
- Sediment Deposits (B2)
- Drift Deposits (B3)
- Mat of Crust of Algae or Marl (B4)
- Iron Deposits (B5)
- Surface Soil Cracks (B6)
- Inundations Visible on Aerial Imagery (B7)
- Sparsely Vegetated Concave Surface (B8)
- 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)
- Salt Deposits (C5)
- Oxidized Rhizospheres on Living Roots (C3)
- Presence of Reduced Iron (C4)
- Stunted or Stressed Plants (D1)
- Shallow Aquitard (D3)
- Geomorphic Position (D2)
- Microtopographic Relief (D4)
- FAC-Neutral Test (D5)

**Field Observations:**

Surface Water Present?  No

Water Table Present?  Yes

Saturation Present?  Yes (includes capillary fringe)

Depth (inches): \_\_\_\_\_

Depth (inches): **10**

Depth (inches): **2**

Wetland Hydrology Present? **Yes**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

### WETLAND DETERMINATION DATA FORM - Alaska Region

Project Site: Mustang Development Project Borough/City: North Slope Sampling Date: Aug 8, 2011  
 Applicate/Owner: Brooks Range Petroleum Sampling Point: B-23  
 Investigator(s): JBrekken, JO'Brien Landform (hillside, terrace, Hummock, etc): tussocks  
 Local Relief (concave, convex, none): none Slope (%): <1  
 Subregion: \_\_\_\_\_ Lat: \_\_\_\_\_ Long: \_\_\_\_\_ Datum: \_\_\_\_\_

Are climate/hydrologic conditions on the site typical for this time of year? Yes  
 Are Vegetation?, No Soil? No or Hydrocarbon? No significantly disturbed? Are "Normal Circumstances" Present? Yes  
 Are Vegetation?, No Soil? No or Hydrocarbon? No 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 Is the Sampled Area within a Wetland? Yes  
 Hydric Soils Present? Yes  
 Wetland Hydrology Present? Yes

Remarks: \_\_\_\_\_

**VEGETATION (List all species in plot)**

Tree Stratum (Use scientific names)	Absolute %Cover	Dominant Species	Indicator Status	
1.				<b>Dominance Test worksheet</b> Number of Dominant Species That Are OBL, FACW, or FAC: <u>1</u> (A) Total Number of Dominant Species Across All Strata: <u>3</u> (B) Percent of Dominant Species That Are OBL, FACW, FAC: <u>33</u> (A/B)
2.				
3.				
4.				
Total Cover:				<b>Prevalence Index:</b> Total % Cover of: Multiplied by: OBL Species <u>0</u> x 1 = <u>0</u> FACW Species <u>72</u> x 2 = <u>144</u> FAC Species <u>9</u> x 3 = <u>27</u> FACU Species <u>20</u> x 4 = <u>80</u> UPL Species <u>0</u> x 5 = <u>0</u> Column Totals: <u>101</u> (A) <u>251</u> (B)  Prevalence Index = B/A = <u>2.49</u>
<b>Sampling/Shrub Stratum</b>	50% of total cover:	20% of total cover:		
1. <i>Salix arctica</i>	2		FAC	
2. <i>Salix planifolia</i>	2		FACW	
3. <i>Dryas integrifolia</i>	15	Yes	FACU	
4. <i>Salix glauca</i>	1		FAC	
5. <i>Cassiope tetragona</i>	5	Yes	FACU	
6.				
Total Cover: 25				
<b>Herb Stratum</b>	50% of total cover:	20% of total cover: 5		
1. <i>Eriophorum vaginatum</i>	60	Yes	FACW	
2. <i>Vaccinium vitis-idaea</i>	3		FAC	
3. <i>Carex saxatilis</i>	10		FACW	
4. <i>Polygonum bistorta</i>	2		FAC	
5. <i>Pyrola grandiflora</i>	1		FAC	
6.				
7.				
8.				
Total Cover: 76				
Plot size (radius, or length x width) <u>15' radius</u>				
50% of total cover: 38		20% of total cover: 15.2		
% Bare Ground: 5				
% Cover of Wetland Bryophytes:		Total Cover of Bryophytes: 5		
Hydrophytic Vegetation Present? <span style="border: 1px solid black; padding: 2px;">Yes</span>				

Remarks: White crustose lichens on boils.

**SOIL**

Sampling Point: B-23

**Profile Description: (Describe to the depth needed to document the indicator.)**

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>	Texture	Remarks	Remarks
0-3									Organics
3-7	2.5 YR 2.5/1	100					silty clay loam		Organics/soil mix w/ <50% <span style="border: 1px solid black; padding: 1px;">pp</span>
7-10	5 YR 2.5/1	100					silt loam		Organics/soil mix w/ <50% <span style="border: 1px solid black; padding: 1px;">pp</span>

<sup>1</sup>Type: C=Concentrations, D=Depletions, RM=Reduced Matrix.      <sup>2</sup>Location: PL=Pore Linings, RC=Root Channel, 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:**

- Alaska Color Change (TA4)<sup>4</sup>
- Alaska Alpine Swales (TA5)
- Alaska Redox With 2.5Y Hue
- Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
- Other (Explain in Remarks)

<sup>3</sup>One Indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.  
<sup>4</sup>Give details of color change in Remarks.

Restrictive Layer (if present): frozen

Depth: 10" bgs

Hydric Soils Present?    Yes

Remarks:

**HYDROLOGY**

**Wetland Hydrology Indicators:**

Primary Indicators (any one indicator is sufficient)

- Surface Water (A1)
- High Water Table (A2)
- Saturation (A3)
- Water Marks (B1)
- Sediment Deposits (B2)
- Drift Deposits (B3)
- Mat of Crust of Algae or Marl (B4)
- Iron Deposits (B5)
- Surface Soil Cracks (B6)
- Inundations Visible on Aerial Imagery (B7)
- Sparsely Vegetated Concave Surface (B8)
- 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)
- Salt Deposits (C5)
- Oxidized Rhizospheres on Living Roots (C3)
- Presence of Reduced Iron (C4)
- Stunted or Stressed Plants (D1)
- Shallow Aquitard (D3)
- Geomorphic Position (D2)
- Microtopographic Relief (D4)
- FAC-Neutral Test (D5)

**Field Observations:**

Surface Water Present?    No      Depth (inches):    \_\_\_\_\_

Water Table Present?      No      Depth (inches):    \_\_\_\_\_

Saturation Present?        Yes      Depth (inches):    3

(includes capillary fringe)

Wetland Hydrology Present?    Yes

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

### WETLAND DETERMINATION DATA FORM - Alaska Region

Project Site: Mustang Development Project Borough/City: North Slope Sampling Date: Aug 8, 2011  
 Applicatee/Owner: Brooks Range Petroleum Sampling Point: B-24  
 Investigator(s): JBrekken, JO'Brien Landform (hillside, terrace, Hummock, etc): low/small tussock  
 Local Relief (concave, convex, none): none Slope (%): <1  
 Subregion: \_\_\_\_\_ Lat: \_\_\_\_\_ Long: \_\_\_\_\_ Datum: \_\_\_\_\_

Are climate/hydrologic conditions on the site typical for this time of year? Yes

Are Vegetation?, No Soil? No or Hydrocarbon? No significantly disturbed? Are "Normal Circumstances" Present? Yes  
 Are Vegetation?, No Soil? No or Hydrocarbon? No 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 Is the Sampled Area within a Wetland? Yes  
 Hydric Soils Present? Yes  
 Wetland Hydrology Present? Yes

Remarks: \_\_\_\_\_

**VEGETATION (List all species in plot)**

Tree Stratum (Use scientific names)	Absolute %Cover	Dominant Species	Indicator Status	Dominance Test worksheet
1.				Number of Dominant Species That Are OBL, FACW, or FAC: <u>3</u> (A) Total Number of Dominant Species Across All Strata: <u>4</u> (B) Percent of Dominant Species That Are OBL, FACW, FAC: <u>75</u> (A/B)
2.				
3.				
4.				
Total Cover:				<b>Prevalence Index:</b> Total % Cover of: Multiplied by: OBL Species <u>25</u> x 1 = <u>25</u> FACW Species <u>11</u> x 2 = <u>22</u> FAC Species <u>45</u> x 3 = <u>135</u> FACU Species <u>40</u> x 4 = <u>160</u> UPL Species <u>0</u> x 5 = <u>0</u> Column Totals: <u>121</u> (A) <u>342</u> (B) Prevalence Index = B/A = <u>2.83</u>
Sampling/Shrub Stratum		50% of total cover:	20% of total cover:	
1. <i>Salix arctica</i>	2		FAC	
2. <i>Salix planifolia</i>	1		FACW	
3. <i>Dryas integrifolia</i>	40	Yes	FACU	
4. <i>Salix reticulata</i>	15	Yes	FAC	
5. <i>Salix niphoclada (brachycarpa)</i>	2		FAC	
Herb Stratum		50% of total cover:	20% of total cover:	
Total Cover: 60				
1. <i>Eriophorum angustifolium</i>	25	Yes	OBL	
2. <i>Eriophorum vaginatum</i>	5		FACW	
3. <i>Pedicularis lanata</i>	1		FAC	
4. <i>Carex bigelowii</i>	25	Yes	FAC	
5. <i>Arctagrostis latifolia</i>	5		FACW	
Total Cover: 61				
Plot size (radius, or length x width) <u>15' radius</u>		50% of total cover: <u>30.5</u>	20% of total cover: <u>12.2</u>	
% Cover of Wetland Bryophytes:		% Bare Ground: <u>10</u>		
		Total Cover of Bryophytes: <u>15</u>		
Hydrophytic Vegetation Present? <span style="float: right; border: 1px solid black; padding: 2px;">Yes</span>				

Remarks: Some fruticose lichens present, but not overly abundant.

**SOIL**

Sampling Point: B-24

Profile Description: (Describe to the depth needed to document the Indicator.)									
Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist) %		Type <sup>1</sup>	Loc <sup>2</sup>	Texture	Remarks	Remarks
0-3									Organics
3-8	10 R 2.5/2	100					sandy clay loam		Organics/soil mix w/ >50% <span style="border: 1px solid black; padding: 1px;">pp</span>
8-14	5 Y 2.5/1	100					sandy clay loam		Organics/soil mix w/ <50% <span style="border: 1px solid black; padding: 1px;">pp</span>
14-20	5 Y 3/1	100					sandy clay loam		Organics/soil mix w/ <25% <span style="border: 1px solid black; padding: 1px;">pp</span>

<sup>1</sup>Type: C=Concentrations, D=Depletions, RM=Reduced Matrix.      <sup>2</sup>Location: PL=Pore Linings, RC=Root Channel, M=Matrix

<p><b>Hydric Soil Indicators:</b></p> <p><input checked="" type="checkbox"/> Histosol or Histel (A1)</p> <p><input type="checkbox"/> Histic Epipedon (A2)</p> <p><input type="checkbox"/> Hydrogen Sulfide (A4)</p> <p><input type="checkbox"/> Thick Dark Surface (A12)</p> <p><input type="checkbox"/> Alaska Gleyed (A13)</p> <p><input type="checkbox"/> Alaska Redox (A14)</p> <p><input type="checkbox"/> Alaska Gleyed Pores (A15)</p>	<p><b>Indicators for Problematic Hydric Soils:</b></p> <p><input type="checkbox"/> Alaska Color Change (TA4)<sup>4</sup></p> <p><input type="checkbox"/> Alaska Alpine Swales (TA5)</p> <p><input type="checkbox"/> Alaska Redox With 2.5Y Hue</p> <p><input type="checkbox"/> Alaska Gleyed Without Hue 5Y or Redder Underlying Layer</p> <p><input type="checkbox"/> Other (Explain in Remarks)</p> <p><sup>3</sup>One Indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.</p> <p><sup>4</sup>Give details of color change in Remarks.</p>
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Restrictive Layer (if present): <u>frozen</u>	Hydric Soils Present? <b>Yes</b>
Depth: <u>21" bgs</u>	

Remarks:

**HYDROLOGY**

<p><b>Wetland Hydrology Indicators:</b></p> <p><u>Primary Indicators (any one indicator is sufficient)</u></p> <p><input type="checkbox"/> Surface Water (A1)</p> <p><input type="checkbox"/> High Water Table (A2)</p> <p><input checked="" type="checkbox"/> Saturation (A3)</p> <p><input type="checkbox"/> Water Marks (B1)</p> <p><input type="checkbox"/> Sediment Deposits (B2)</p> <p><input type="checkbox"/> Drift Deposits (B3)</p> <p><input type="checkbox"/> Mat of Crust of Algae or Marl (B4)</p> <p><input type="checkbox"/> Iron Deposits (B5)</p> <p><input type="checkbox"/> Surface Soil Cracks (B6)</p> <p><input type="checkbox"/> Inundations Visible on Aerial Imagery (B7)</p> <p><input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)</p> <p><input type="checkbox"/> Hydrogen Sulfide Odor (C1)</p> <p><input type="checkbox"/> Dry Season Water Table (C2)</p> <p><input type="checkbox"/> Other (Explain in Remarks)</p>	<p><u>Secondary Indicators (2 or more required)</u></p> <p><input type="checkbox"/> Water Stained Leaves (B9)</p> <p><input type="checkbox"/> Drainage Patterns (B10)</p> <p><input type="checkbox"/> Salt Deposits (C5)</p> <p><input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3)</p> <p><input type="checkbox"/> Presence of Reduced Iron (C4)</p> <p><input type="checkbox"/> Stunted or Stressed Plants (D1)</p> <p><input type="checkbox"/> Shallow Aquitard (D3)</p> <p><input type="checkbox"/> Geomorphic Position (D2)</p> <p><input checked="" type="checkbox"/> Microtopographic Relief (D4)</p> <p><input type="checkbox"/> FAC-Neutral Test (D5)</p>
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<p><b>Field Observations:</b></p> <p>Surface Water Present? <span style="border: 1px solid black; padding: 2px;">No</span>      Depth (inches): _____</p> <p>Water Table Present? <span style="border: 1px solid black; padding: 2px;">No</span>      Depth (inches): _____</p> <p>Saturation Present? <span style="border: 1px solid black; padding: 2px;">Yes</span>      Depth (inches): <u>10</u></p> <p>(includes capillary fringe)</p>	Wetland Hydrology Present? <b>Yes</b>
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Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:



### WETLAND DETERMINATION DATA FORM - Alaska Region

Project Site: Mustang Development Project Borough/City: North Slope Sampling Date: Aug 8, 2011  
 Applicate/Owner: Brooks Range Petroleum Sampling Point: B-25  
 Investigator(s): JBrekken, JO'Brien Landform (hillside, terrace, Hummock, etc): hummocks  
 Local Relief (concave, convex, none): none Slope (%): <1  
 Subregion: \_\_\_\_\_ Lat: \_\_\_\_\_ Long: \_\_\_\_\_ Datum: \_\_\_\_\_

Are climate/hydrologic conditions on the site typical for this time of year? Yes

Are Vegetation?, No Soil? No or Hydrocabon? No significantly disturbed? Are "Normal Circumstances" Present? Yes  
 Are Vegetation?, No Soil? No or Hydrocabon? No 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 Is the Sampled Area within a Wetland? Yes  
 Hydric Soils Present? Yes  
 Wetland Hydrology Present? Yes

Remarks: \_\_\_\_\_

**VEGETATION (List all species in plot)**

Tree Stratum (Use scientific names)	Absolute %Cover	Dominant Species	Indicator Status	Dominance Test worksheet
1. _____				Number of Dominant Species That Are OBL, FACW, or FAC: <u>2</u> (A) Total Number of Dominant Species Across All Strata: <u>3</u> (B) Percent of Dominant Species That Are OBL, FACW, FAC: <u>66</u> (A/B)
2. _____				
3. _____				
4. _____				
Total Cover: _____				<b>Prevalence Index:</b> Total % Cover of: Multiplied by: OBL Species <u>20</u> x 1 = <u>20</u> FACW Species <u>14</u> x 2 = <u>28</u> FAC Species <u>45</u> x 3 = <u>135</u> FACU Species <u>30</u> x 4 = <u>120</u> UPL Species <u>0</u> x 5 = <u>0</u> Column Totals: <u>109</u> (A) <u>303</u> (B)  Prevalence Index = B/A = <u>2.78</u>
Total Cover: _____				
<b>Sampling/Shrub Stratum</b>	50% of total cover: _____	20% of total cover: _____		
1. <u>Salix reticulata</u>	<u>5</u>		<u>FAC</u>	
2. <u>Salix planifolia</u>	<u>1</u>		<u>FACW</u>	
3. <u>Dryas integrifolia</u>	<u>30</u>	<u>Yes</u>	<u>FACU</u>	
4. _____				
Total Cover: <u>36</u>				
<b>Herb Stratum</b>	50% of total cover: <u>18</u>	20% of total cover: <u>7.2</u>		
1. <u>Eriophorum angustifolium</u>	<u>20</u>	<u>Yes</u>	<u>OBL</u>	
2. <u>Carex bigelowii</u>	<u>40</u>	<u>Yes</u>	<u>FAC</u>	
3. <u>Carex saxatilis</u>	<u>10</u>		<u>FACW</u>	
4. <u>Arctagrostis latifolia</u>	<u>2</u>		<u>FACW</u>	
5. <u>Draba alpina</u>	<u>1</u>		<u>NI</u>	
6. <u>Pedicularis sudetica</u>	<u>1</u>		<u>FACW</u>	
7. _____				
8. _____				
Total Cover: <u>74</u>				
50% of total cover: <u>37</u> 20% of total cover: <u>14.8</u>				
Plot size (radius, or length x width) <u>15' radius</u>	% Bare Ground: <u>5</u>			
% Cover of Wetland Bryophytes: _____	Total Cover of Bryophytes: <u>5</u>			
Hydrophytic Vegetation Present? <span style="float: right; border: 1px solid black; padding: 2px;">Yes</span>				

Remarks: Crustose and fruticose lichens (white) present.

SOIL

Sampling Point: B-25

**Profile Description: (Describe to the depth needed to document the indicator.)**

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>	Texture	Remarks	Remarks
0-3									Organics
3-9	10 YR 2/1	100					loam		Organics/soil mix w/ >50% org
9-12	10 YR 3/1	100					clay loam		Organics/soil mix w/ small org

<sup>1</sup>Type: C=Concentrations, D=Depletions, RM=Reduced Matrix.      <sup>2</sup>Location: PL=Pore Linings, RC=Root Channel, M=Matrix

Hydric Soil Indicators:	Indicators for Problematic Hydric Soils:
<input checked="" type="checkbox"/> Histosol or Histel (A1)	<input type="checkbox"/> Alaska Color Change (TA4) <sup>4</sup>
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Alaska Alpine Swales (TA5)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Alaska Redox With 2.5Y Hue
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
<input type="checkbox"/> Alaska Gleyed (A13)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Alaska Redox (A14)	<sup>3</sup> One Indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.
<input type="checkbox"/> Alaska Gleyed Pores (A15)	<sup>4</sup> Give details of color change in Remarks.

Restrictive Layer (if present): <u>frozen</u>	Hydric Soils Present? <u>Yes</u>
Depth: <u>12" bgs</u>	
Remarks:	

HYDROLOGY

Wetland Hydrology Indicators:	Secondary Indicators (2 or more required)
<b>Primary Indicators (any one indicator is sufficient)</b>	
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Water Stained Leaves (B9)
<input checked="" type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Drainage Patterns (B10)
<input checked="" type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Salt Deposits (C5)
<input type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3)
<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Presence of Reduced Iron (C4)
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Stunted or Stressed Plants (D1)
<input type="checkbox"/> Mat of Crust of Algae or Marl (B4)	<input type="checkbox"/> Shallow Aquitard (D3)
<input type="checkbox"/> Iron Deposits (B5)	<input type="checkbox"/> Geomorphic Position (D2)
<input type="checkbox"/> Surface Soil Cracks (B6)	<input checked="" type="checkbox"/> Microtopographic Relief (D4)
<input type="checkbox"/> Inundations Visible on Aerial Imagery (B7)	<input type="checkbox"/> FAC-Neutral Test (D5)
<input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	
<input type="checkbox"/> Hydrogen Sulfide Odor (C1)	
<input type="checkbox"/> Dry Season Water Table (C2)	
<input type="checkbox"/> Other (Explain in Remarks)	

<b>Field Observations:</b>	
Surface Water Present? <u>No</u>	Depth (inches): <u>    </u>
Water Table Present? <u>Yes</u>	Depth (inches): <u>12</u>
Saturation Present? (includes capillary fringe) <u>Yes</u>	Depth (inches): <u>0</u>
Wetland Hydrology Present? <u>Yes</u>	

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Alaska Region

Project Site: Mustang Development Project Borough/City: North Slope Sampling Date: Aug 8, 2011  
 Applicate/Owner: Brooks Range Petroleum Sampling Point: B-26  
 Investigator(s): JBrekken, JO'Brien Landform (hillside, terrace, Hummock, etc): hummocks  
 Local Relief (concave, convex, none): none Slope (%): <1  
 Subregion: \_\_\_\_\_ Lat: \_\_\_\_\_ Long: \_\_\_\_\_ Datum: \_\_\_\_\_

Are climate/hydrologic conditions on the site typical for this time of year? Yes

Are Vegetation?, No Soil? No or Hydrocabon? No significantly disturbed? Are "Normal Circumstances" Present? Yes  
 Are Vegetation?, No Soil? No or Hydrocabon? No 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 Is the Sampled Area within a Wetland? Yes  
 Hydric Soils Present? Yes  
 Wetland Hydrology Present? Yes

Remarks: \_\_\_\_\_

**VEGETATION (List all species in plot)**

Tree Stratum (Use scientific names)	Absolute %Cover	Dominant Species	Indicator Status	Dominance Test worksheet	
1.				Number of Dominant Species That Are OBL, FACW, or FAC:	3 (A)
2.				Total Number of Dominant Species Across All Strata:	4 (B)
3.				Percent of Dominant Species That Are OBL, FACW, FAC:	75 (A/B)
4.				<b>Prevalence Index:</b>	
Total Cover: _____				Total % Cover of: Multiplied by:	
50% of total cover: _____ 20% of total cover: _____				OBL Species	0 x 1 = 0
1. Salix reticulata	15	Yes	FAC	FACW Species	30 x 2 = 60
2. Salix niphoclada (brachycarpa)	5		FAC	FAC Species	63 x 3 = 189
3. Dryas integrifolia	20	Yes	FACU	FACU Species	25 x 4 = 100
4. Cassiope tetragona	5		FACU	UPL Species	0 x 5 = 0
5.				Column Totals:	118 (A) 349 (B)
6.				Prevalence Index = B/A = 2.96	
Total Cover: 45				<b>Hydrophytic Vegetation Indicators:</b>	
50% of total cover: 22.5 20% of total cover: 9				<input checked="" type="checkbox"/> Dominance Test is >50%	
<b>Herb Stratum</b>				<input checked="" type="checkbox"/> Prevalence Test is ≤3.0	
1. Eriophorum vaginatum	20	Yes	FACW	<input type="checkbox"/> Morphological Adaptions' (Provide supporting data in Remarks or on a spererate sheet)	
2. Carex bigelowii	40	Yes	FAC	<input type="checkbox"/> Problematic Hydrophytic Vegetation' Explain)	
3. Carex saxatilis	10		FACW	<i>' Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.</i>	
4. Saussurea angustifolia	2		FAC		
5. Polygonum viviparum	1		FAC		
6.					
7.					
8.					
Total Cover: 73				Hydrophytic Vegetation Present? <input checked="" type="checkbox"/> Yes	
50% of total cover: 36.5 20% of total cover: 14.6					
Plot size (radius, or length x width) 15' radius % Bare Ground: 10					
% Cover of Wetland Bryophytes: _____ Total Cover of Bryophytes: 5					

Remarks: White crustose and fruticose lichens present, but not overly abundant (~10 cover).

**SOIL**

Sampling Point: B-26

Profile Description: (Describe to the depth needed to document the indicator.)									
Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>	Texture	Remarks	Remarks
0-1									Organics
1-3	10 R 2.5/1	100					loam		Organics/soil mix w/ <50% <span style="border: 1px solid black; padding: 1px;">10</span>
3-13	5 Y 2.5/2	80	5 YR 5/8	20	RM	PL	clay loam		Organics/soil mix w/ w/ <50% <span style="border: 1px solid black; padding: 1px;">10</span>
13-20	10 R 2.5/1	100					loamy sand		Organics/soil mix

<sup>1</sup>Type: C=Concentrations, D=Depletions, RM=Reduced Matrix.      <sup>2</sup>Location: PL=Pore Linings, RC=Root Channel, M=Matrix

Hydric Soil Indicators:	Indicators for Problematic Hydric Soils:	
<input checked="" type="checkbox"/> Histosol or Histel (A1)	<input type="checkbox"/> Alaska Color Change (TA4) <sup>4</sup>	<input type="checkbox"/> Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Alaska Alpine Swales (TA5)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Alaska Redox With 2.5Y Hue	
<input type="checkbox"/> Thick Dark Surface (A12)		
<input type="checkbox"/> Alaska Gleyed (A13)	<sup>3</sup> One Indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.	
<input type="checkbox"/> Alaska Redox (A14)	<sup>4</sup> Give details of color change in Remarks.	
<input type="checkbox"/> Alaska Gleyed Pores (A15)		

Restrictive Layer (if present): <u>frozen</u> Depth: <u>16" bgs</u>	Hydric Soils Present? <u>Yes</u>
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Remarks:

**HYDROLOGY**

Wetland Hydrology Indicators:	Secondary Indicators (2 or more required)
<b>Primary Indicators (any one indicator is sufficient)</b> <input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Inundations Visible on Aerial Imagery (B7) <input checked="" type="checkbox"/> Saturation (A3) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Dry Season Water Table (C2) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Mat of Crust of Algae or Marl (B4) <input type="checkbox"/> Iron Deposits (B5)	<input type="checkbox"/> Water Stained Leaves (B9) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Salt Deposits (C5) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Geomorphic Position (D2) <input checked="" type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)

<b>Field Observations:</b> Surface Water Present? <input type="checkbox"/> No      Depth (inches): _____ Water Table Present? <input type="checkbox"/> No      Depth (inches): _____ Saturation Present? <input checked="" type="checkbox"/> Yes      Depth (inches): <u>10</u> (includes capillary fringe)	Wetland Hydrology Present? <u>Yes</u>
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Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

### WETLAND DETERMINATION DATA FORM - Alaska Region

Project Site: Mustang Development Project Borough/City: North Slope Sampling Date: Aug 8, 2011  
 Applicate/Owner: Brooks Range Petroleum Sampling Point: B-27  
 Investigator(s): JBrekken, JO'Brien Landform (hillside, terrace, Hummock, etc): micro highs & low  
 Local Relief (concave, convex, none): none Slope (%): <1  
 Subregion: \_\_\_\_\_ Lat: \_\_\_\_\_ Long: \_\_\_\_\_ Datum: \_\_\_\_\_

Are climate/hydrologic conditions on the site typical for this time of year? Yes

Are Vegetation?, No Soil? No or Hydrocabon? No significantly disturbed? Are "Normal Circumstances" Present? Yes  
 Are Vegetation?, No Soil? No or Hydrocabon? No 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 Is the Sampled Area within a Wetland? Yes  
 Hydric Soils Present? Yes  
 Wetland Hydrology Present? Yes

Remarks: \_\_\_\_\_

**VEGETATION (List all species in plot)**

Tree Stratum (Use scientific names)	Absolute %Cover	Dominant Species	Indicator Status	Dominance Test worksheet:
1.				Number of Dominant Species That Are OBL, FACW, or FAC: <u>3</u> (A)  Total Number of Dominant Species Across All Strata: <u>4</u> (B)  Percent of Dominant Species That Are OBL, FACW, FAC: <u>75</u> (A/B)
2.				
3.				
4.				
Total Cover:				<b>Prevalence Index:</b> Total % Cover of: Multiplied by: OBL Species <u>30</u> x 1 = <u>30</u> FACW Species <u>10</u> x 2 = <u>20</u> FAC Species <u>18</u> x 3 = <u>54</u> FACU Species <u>36</u> x 4 = <u>144</u> UPL Species <u>0</u> x 5 = <u>0</u> Column Totals: <u>94</u> (A) <u>248</u> (B)  Prevalence Index = B/A = <u>2.64</u>
Sampling/Shrub Stratum		50% of total cover:	20% of total cover:	
1. <i>Salix reticulata</i>	15	Yes	FAC	
2. <i>Salix planifolia</i>	2		FACW	
3. <i>Dryas integrifolia</i>	30	Yes	FACU	
4.				
5.				
Herb Stratum		50% of total cover:	20% of total cover:	
Total Cover: 47				
1. <i>Eriophorum angustifolium</i>	10	Yes	OBL	
2. <i>Carex rotundata</i>	20	Yes	OBL	
3. <i>Carex scirpoidea</i>	5		FACU	
4. <i>Papavar macounii</i>	1		FACU	
5. <i>Alopecurus alpinus</i>	5		FACW	
6. <i>Poa arctica</i>	2		FAC	
7. <i>Carex capillaris</i>	3		FACW	
8. <i>Pedicularis verticillata</i>	1		FAC	
Total Cover: 47				
Plot size (radius, or length x width) <u>15'</u> radius		50% of total cover:	20% of total cover:	
		23.5	9.4	
% Cover of Wetland Bryophytes:		% Bare Ground: <u>10</u>		
		Total Cover of Bryophytes: <u>0</u>		
<b>Hydrophytic Vegetation Indicators:</b> <input checked="" type="checkbox"/> Dominance Test is >50% <input checked="" type="checkbox"/> Prevalence Test is ≤3.0 <input type="checkbox"/> Morphological Adaptions' (Provide supporting data in Remarks or on a spererate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation' Explain <i>'Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.'</i>				
Hydrophytic Vegetation Present?			Yes	

Remarks: White crustose and fruticose lichens present.

SOIL

Sampling Point: B-27

**Profile Description: (Describe to the depth needed to document the indicator.)**

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>	Texture	Remarks	Remarks
0-2	10 R 2.5/2	100					loam		>50% roots in soil matrix
2-16	2.5 Y 5/2	50	5 YR 5/8	50	RM	PL/M	loamy sand		Organics/soil mix
16-20	2.5 Y 2.5/2	100					sandy clay loam		

<sup>1</sup>Type: C=Concentrations, D=Depletions, RM=Reduced Matrix.      <sup>2</sup>Location: PL=Pore Linings, RC=Root Channel, M=Matrix

**Hydic 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 Hydic Soils:**

Alaska Color Change (TA4)<sup>4</sup>  
 Alaska Alpine Swales (TA5)  
 Alaska Redox With 2.5Y Hue  
 Alaska Gleyed Without Hue 5Y or Redder Underlying Layer  
 Other (Explain in Remarks)

<sup>3</sup>One Indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.  
<sup>4</sup>Give details of color change in Remarks.

Restrictive Layer (if present): **none encountered**

Depth: \_\_\_\_\_

Hydic Soils Present? **Yes**

Remarks:

HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (any one indicator is sufficient)

<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Surface Soil Cracks (B6)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Inundations Visible on Aerial Imagery (B7)
<input checked="" type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)
<input type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)
<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Dry Season Water Table (C2)
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Mat of Crust of Algae or Marl (B4)	
<input type="checkbox"/> Iron Deposits (B5)	

Secondary Indicators (2 or more required)

<input type="checkbox"/> Water Stained Leaves (B9)
<input type="checkbox"/> Drainage Patterns (B10)
<input type="checkbox"/> Salt Deposits (C5)
<input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3)
<input type="checkbox"/> Presence of Reduced Iron (C4)
<input type="checkbox"/> Stunted or Stressed Plants (D1)
<input type="checkbox"/> Shallow Aquitard (D3)
<input type="checkbox"/> Geomorphic Position (D2)
<input checked="" type="checkbox"/> Microtopographic Relief (D4)
<input checked="" type="checkbox"/> FAC-Neutral Test (D5)

**Field Observations:**

Surface Water Present?	<input type="checkbox"/> No	Depth (inches):	_____
Water Table Present?	<input type="checkbox"/> No	Depth (inches):	_____
Saturation Present? (includes capillary fringe)	<input checked="" type="checkbox"/> Yes	Depth (inches):	10

Wetland Hydrology Present? **Yes**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Alaska Region

Project Site: Mustang Development Project Borough/City: North Slope Sampling Date: Aug 9, 2011  
 Applicate/Owner: Brooks Range Petroleum Sampling Point: B-28  
 Investigator(s): JBrekken, JO'Brien Landform (hillside, terrace, Hummock, etc): low hummocks  
 Local Relief (concave, convex, none): concave Slope (%): <1  
 Subregion: Lat: Long: Datum:

Are climate/hydrologic conditions on the site typical for this time of year? Yes

Are Vegetation?, No Soil? No or Hydrocabon? No significantly disturbed? Are "Normal Circumstances" Present? Yes  
 Are Vegetation?, No Soil? No or Hydrocabon? No 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 Is the Sampled Area within a Wetland? Yes  
 Hydric Soils Present? Yes  
 Wetland Hydrology Present? Yes

Remarks: Low-lying wet area adjacent to small lake

VEGETATION (List all species in plot)

Tree Stratum (Use scientific names)	Absolute %Cover	Dominant Species	Indicator Status	Dominance Test worksheet
1.				Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A) Total Number of Dominant Species Across All Strata: 3 (B) Percent of Dominant Species That Are OBL, FACW, FAC: 66 (A/B)
2.				
3.				
4.				
Total Cover:				<b>Prevalence Index:</b> Total % Cover of: Multiplied by: OBL Species 55 x 1 = 55 FACW Species 22 x 2 = 44 FAC Species 16 x 3 = 48 FACU Species 14 x 4 = 56 UPL Species 0 x 5 = 0 Column Totals: 107 (A) 203 (B) Prevalence Index = B/A = 1.90
Sampling/Shrub Stratum 50% of total cover: 20% of total cover:				
1. Salix reticulata	2		FAC	
2. Salix planifolia	2		FACW	
3. Dryas integrifolia	12	Yes	FACU	
4. Salix niphoclada (brachycarpa)	1		FAC	
5.				
Total Cover: 17				
Herb Stratum 50% of total cover: 8.5 20% of total cover: 3.4				
1. Eriophorum angustifolium	55	Yes	OBL	<b>Hydrophytic Vegetation Indicators:</b> <input checked="" type="checkbox"/> Dominance Test is >50% <input checked="" type="checkbox"/> Prevalence Test is ≤3.0 <input type="checkbox"/> Morphological Adaptions' (Provide supporting data in Remarks or on a spererate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation' Explain) 'Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.'
2. Polygonum viviparum	2		FAC	
3. Carex saxatilis	20	Yes	FACW	
4. Pedicularis verticillata	1		FAC	
5. Carex podocarpa	10		FAC	
6. Equisetum scirpoides	2		FACU	
7.				
Total Cover: 90				
50% of total cover: 45 20% of total cover: 18				
Plot size (radius, or length x width) 15' radius % Bare Ground: 0				
% Cover of Wetland Bryophytes: Total Cover of Bryophytes: 20				
Hydrophytic Vegetation Present? Yes				

Remarks:

**SOIL**

Sampling Point: **B-28**

**Profile Description: (Describe to the depth needed to document the Indicator.)**

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>	Texture	Remarks	Remarks
0-6									mostly roots and decomposition
6-14	2.5 YR 2.5/1	80	5 YR 3/1	20	RM	M	sandy loam		Organics/soil mix - high % of
14-22	10 YR 4/1	70	2.5 YR 3/2	30	RM	M	loamy sand		Organics/soil mix

<sup>1</sup>Type: C=Concentrations, D=Depletions, RM=Reduced Matrix.      <sup>2</sup>Location: PL=Pore Linings, RC=Root Channel, 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:**

Alaska Color Change (TA4)<sup>4</sup>  
 Alaska Alpine Swales (TA5)  
 Alaska Redox With 2.5Y Hue  
 Alaska Gleyed Without Hue 5Y or Redder Underlying Layer  
 Other (Explain in Remarks)

<sup>3</sup>One Indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.  
<sup>4</sup>Give details of color change in Remarks.

Restrictive Layer (if present): **none encountered**

Depth: \_\_\_\_\_

Hydric Soils Present? **Yes**

Remarks: **H2S odor prevalent**

**HYDROLOGY**

**Wetland Hydrology Indicators:**

Primary Indicators (any one indicator is sufficient)

<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Surface Soil Cracks (B6)
<input checked="" type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Inundations Visible on Aerial Imagery (B7)
<input checked="" type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)
<input type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)
<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Dry Season Water Table (C2)
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Mat of Crust of Algae or Marl (B4)	
<input type="checkbox"/> Iron Deposits (B5)	

Secondary Indicators (2 or more required)

<input type="checkbox"/> Water Stained Leaves (B9)
<input type="checkbox"/> Drainage Patterns (B10)
<input type="checkbox"/> Salt Deposits (C5)
<input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3)
<input type="checkbox"/> Presence of Reduced Iron (C4)
<input type="checkbox"/> Stunted or Stressed Plants (D1)
<input type="checkbox"/> Shallow Aquitard (D3)
<input type="checkbox"/> Geomorphic Position (D2)
<input checked="" type="checkbox"/> Microtopographic Relief (D4)
<input checked="" type="checkbox"/> FAC-Neutral Test (D5)

**Field Observations:**

Surface Water Present?	<input type="checkbox"/> No	Depth (inches):	_____
Water Table Present?	<input type="checkbox"/> Yes	Depth (inches):	2
Saturation Present? (includes capillary fringe)	<input type="checkbox"/> Yes	Depth (inches):	0

Wetland Hydrology Present? **Yes**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: **Low-lying area adjacent to lake, Pacific loon w/ single chick on lake**



**WETLAND DETERMINATION DATA FORM - Alaska Region**

Project Site: Mustang Development Project Borough/City: North Slope Sampling Date: Aug 9, 2011  
 Applicate/Owner: Brooks Range Petroleum Sampling Point: B-29  
 Investigator(s): JBrekken, JO'Brien Landform (hillside, terrace, Hummock, etc): hummocks and terraces  
 Local Relief (concave, convex, none): slightly convex Slope (%): <1  
 Subregion: \_\_\_\_\_ Lat: \_\_\_\_\_ Long: \_\_\_\_\_ Datum: \_\_\_\_\_

Are climate/hydrologic conditions on the site typical for this time of year? Yes

Are Vegetation?, No Soil? No or Hydrocarbon? No significantly disturbed? Are "Normal Circumstances" Present? Yes  
 Are Vegetation?, No Soil? No or Hydrocarbon? No 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 Is the Sampled Area within a Wetland? Yes  
 Hydric Soils Present? Yes  
 Wetland Hydrology Present? Yes

Remarks: Well-drained tundra

**VEGETATION (List all species in plot)**

Tree Stratum (Use scientific names)	Absolute %Cover	Dominant Species	Indicator Status	Dominance Test worksheet	
1.				Number of Dominant Species That Are OBL, FACW, or FAC:	1 (A)
2.				Total Number of Dominant Species Across All Strata:	2 (B)
3.				Percent of Dominant Species That Are OBL, FACW, FAC:	50 (A/B)
4.				<b>Prevalence Index:</b>	
Total Cover:				Total % Cover of: Multiplied by:	
<b>Sampling/Shrub Stratum</b>	50% of total cover:	20% of total cover:		OBL Species	45 x 1 = 45
1. <i>Salix reticulata</i>	3		FAC	FACW Species	9 x 2 = 18
2. <i>Salix planifolia</i>	5		FACW	FAC Species	10 x 3 = 30
3. <i>Dryas integrifolia</i>	30	Yes	FACU	FACU Species	34 x 4 = 136
4. <i>Cassiope tetragona</i>	2		FACU	UPL Species	0 x 5 = 0
5.				Column Totals:	98 (A) 229 (B)
6.				Prevalence Index = B/A = 2.34	
Total Cover: 40				<b>Hydrophytic Vegetation Indicators:</b>	
<b>Herb Stratum</b>	50% of total cover: 20	20% of total cover: 8		<input type="checkbox"/> Dominance Test is >50% <input checked="" type="checkbox"/> Prevalence Test is ≤3.0 <input type="checkbox"/> Morphological Adaptions' (Provide supporting data in Remarks or on a spererate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation' Explain)	
1. <i>Eriophorum angustifolium</i>	45	Yes	OBL	<i>' Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.</i>	
2. <i>Oxytropis nigrescens</i>	5		NI		
3. <i>Carex scirpoidea</i>	2		FACU		
4. <i>Carex saxatilis</i>	2		FACW		
5. <i>Saussurea angustifolia</i>	2		FAC		
6. <i>Pyrola grandifolia</i>	2		FAC		
7. <i>Carex capillaris</i>	2		FACW		
8. <i>Polygonum viviparum</i>	3		FAC		
Total Cover: 63				Hydrophytic Vegetation Present? <input checked="" type="checkbox"/> Yes	
50% of total cover: 31.5 20% of total cover: 12.6					
Plot size (radius, or length x width) <u>15' radius</u> % Bare Ground: 5					
% Cover of Wetland Bryophytes: _____ Total Cover of Bryophytes: 10					

Remarks: White crustose and fruticose lichens present.

**SOIL**

Sampling Point: **B-29**

Profile Description: (Describe to the depth needed to document the indicator.)									
Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>	Texture	Remarks	Remarks
0-2									Duff and organic material
2-6	10 YR 2/1	100					loamy sand		Organics/soil mix
6-14	7.5 YR 2.5/1	95	2.5 YR 3/6	5	RM	PL	loamy sand		Partially decomposed plant m
14-17	2.5 YR 3/1	65	7.5 YR 2.5/1	35	RM	PL/M	loamy sand		Dark streaks in soil
17-21	7.5 YR 2.5/1	60	2.5 Y 4/2	40	RM	PL/M	peat-like		Decomposing roots and organ

<sup>1</sup>Type: C=Concentrations, D=Depletions, RM=Reduced Matrix.      <sup>2</sup>Location: PL=Pore Linings, RC=Root Channel, M=Matrix

Hydric Soil Indicators:	Indicators for Problematic Hydric Soils:
<input checked="" type="checkbox"/> Histosol or Histel (A1)	<input type="checkbox"/> Alaska Color Change (TA4) <sup>4</sup>
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Alaska Alpine Swales (TA5)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Alaska Redox With 2.5Y Hue
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
<input type="checkbox"/> Alaska Gleyed (A13)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Alaska Redox (A14)	<sup>3</sup> One Indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.
<input type="checkbox"/> Alaska Gleyed Pores (A15)	<sup>4</sup> Give details of color change in Remarks.

Restrictive Layer (if present): **frozen**

Depth: 21" bgs

Hydric Soils Present? **Yes**

Remarks:

**HYDROLOGY**

Wetland Hydrology Indicators:	Secondary Indicators (2 or more required)
<u>Primary Indicators (any one indicator is sufficient)</u>	
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Water Stained Leaves (B9)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Drainage Patterns (B10)
<input checked="" type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Salt Deposits (C5)
<input type="checkbox"/> Surface Soil Cracks (B6)	<input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3)
<input type="checkbox"/> Inundations Visible on Aerial Imagery (B7)	<input type="checkbox"/> Presence of Reduced Iron (C4)
<input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	<input type="checkbox"/> Stunted or Stressed Plants (D1)
<input type="checkbox"/> Hydrogen Sulfide Odor (C1)	<input type="checkbox"/> Shallow Aquitard (D3)
<input type="checkbox"/> Dry Season Water Table (C2)	<input type="checkbox"/> Geomorphic Position (D2)
<input type="checkbox"/> Other (Explain in Remarks)	<input checked="" type="checkbox"/> Microtopographic Relief (D4)
<input type="checkbox"/> Mat of Crust of Algae or Marl (B4)	<input type="checkbox"/> FAC-Neutral Test (D5)
<input type="checkbox"/> Iron Deposits (B5)	

Field Observations:	Wetland Hydrology Present?
Surface Water Present? <input type="checkbox"/> No	<b>Yes</b>
Water Table Present? <input type="checkbox"/> No	
Saturation Present? (includes capillary fringe) <input checked="" type="checkbox"/> Yes	
Depth (inches): _____	
Depth (inches): _____	
Depth (inches): <u>3</u>	

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

### WETLAND DETERMINATION DATA FORM - Alaska Region

Project Site: Mustang Development Project Borough/City: North Slope Sampling Date: Aug 9, 2011  
 Applicate/Owner: Brooks Range Petroleum Sampling Point: B-30  
 Investigator(s): JBrekken, JO'Brien Landform (hillside, terrace, Hummock, etc): hummocks  
 Local Relief (concave, convex, none): flat Slope (%): <1  
 Subregion: \_\_\_\_\_ Lat: \_\_\_\_\_ Long: \_\_\_\_\_ Datum: \_\_\_\_\_

Are climate/hydrologic conditions on the site typical for this time of year? Yes  
 Are Vegetation?, No Soil? No or Hydrocabon? No significantly disturbed? Are "Normal Circumstances" Present? Yes  
 Are Vegetation?, No Soil? No or Hydrocabon? No 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 Is the Sampled Area within a Wetland? Yes  
 Hydric Soils Present? Yes  
 Wetland Hydrology Present? Yes

Remarks: DP between two lakes

**VEGETATION (List all species in plot)**

Tree Stratum (Use scientific names)	Absolute %Cover	Dominant Species	Indicator Status	Dominance Test worksheet:
1.				Number of Dominant Species That Are OBL, FACW, or FAC: <u>5</u> (A) Total Number of Dominant Species Across All Strata: <u>5</u> (B) Percent of Dominant Species That Are OBL, FACW, FAC: <u>100</u> (A/B)
2.				
3.				
4.				
Total Cover:				<b>Prevalence Index:</b> Total % Cover of: Multiplied by: OBL Species <u>41</u> x 1 = <u>41</u> FACW Species <u>19</u> x 2 = <u>38</u> FAC Species <u>37</u> x 3 = <u>111</u> FACU Species <u>0</u> x 4 = <u>0</u> UPL Species <u>0</u> x 5 = <u>0</u> Column Totals: <u>97</u> (A) <u>190</u> (B)  Prevalence Index = B/A = <u>1.96</u>
50% of total cover: _____ 20% of total cover: _____				
1. <u>Salix reticulata</u>	<u>3</u>	<u>Yes</u>	<u>FAC</u>	
2. <u>Salix planifolia</u>	<u>2</u>	<u>Yes</u>	<u>FACW</u>	
3. <u>Salix niphoclada (brachycarpa)</u>	<u>4</u>	<u>Yes</u>	<u>FAC</u>	
4.				
5.				
Total Cover: <u>9</u>				
50% of total cover: <u>4.5</u> 20% of total cover: <u>1.8</u>				
<b>Herb Stratum</b>				<b>Hydrophytic Vegetation Indicators:</b> <input checked="" type="checkbox"/> Dominance Test is >50% <input checked="" type="checkbox"/> Prevalence Test is ≤3.0 <input type="checkbox"/> Morphological Adaptions' (Provide supporting data in Remarks or on a spererate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation' Explain)  <i>' Indicators of hydric soil and wetland hydrology must be present unless disturbed or problemic.</i>
1. <u>Eriophorum angustifolium</u>	<u>40</u>	<u>Yes</u>	<u>OBL</u>	
2. <u>Eriophorum vaginatum</u>	<u>10</u>		<u>FACW</u>	
3. <u>Carex podocarpa</u>	<u>25</u>	<u>Yes</u>	<u>FAC</u>	
4. <u>Saxifraga hirculus</u>	<u>1</u>		<u>OBL</u>	
5. <u>Pedicularis sudetica</u>	<u>2</u>		<u>FACW</u>	
6. <u>Saxifraga oppositifolia</u>	<u>3</u>		<u>FAC</u>	
7. <u>Polygonum viviparum</u>	<u>2</u>		<u>FAC</u>	
8. <u>Carex capillaris</u>	<u>5</u>		<u>FACW</u>	
Total Cover: <u>88</u>				
50% of total cover: <u>44</u> 20% of total cover: <u>17.6</u>				
Plot size (radius, or length x width) <u>15' radius</u> % Bare Ground: <u>15</u>				
% Cover of Wetland Bryophytes: _____ Total Cover of Bryophytes: <u>10</u>				
Hydrophytic Vegetation Present?			Yes	

Remarks: \_\_\_\_\_

**SOIL**

Sampling Point: **B-30**

**Profile Description: (Describe to the depth needed to document the indicator.)**

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>	Texture	Remarks	Remarks
0-9									Peat-like layer
9-21	Gleyed (3+ val)	100					sandy loam		Organic deposits (partially de

<sup>1</sup>Type: C=Concentrations, D=Depletions, RM=Reduced Matrix.      <sup>2</sup>Location: PL=Pore Linings, RC=Root Channel, M=Matrix

Hydric Soil Indicators:	Indicators for Problematic Hydric Soils:
<input type="checkbox"/> Histosol or Histel (A1)	<input type="checkbox"/> Alaska Color Change (TA4) <sup>4</sup>
<input checked="" type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Alaska Alpine Swales (TA5)
<input checked="" type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Alaska Redox With 2.5Y Hue
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
<input type="checkbox"/> Alaska Gleyed (A13)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Alaska Redox (A14)	
<input type="checkbox"/> Alaska Gleyed Pores (A15)	

<sup>3</sup>One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present.  
<sup>4</sup>Give details of color change in Remarks.

Restrictive Layer (if present): <b>frozen</b>	Hydric Soils Present? <b>Yes</b>
Depth: <u>21" bgs</u>	

Remarks:

**HYDROLOGY**

Wetland Hydrology Indicators:	Secondary Indicators (2 or more required)
<b>Primary Indicators (any one indicator is sufficient)</b>	
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Water Stained Leaves (B9)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Drainage Patterns (B10)
<input checked="" type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Salt Deposits (C5)
<input type="checkbox"/> Surface Soil Cracks (B6)	<input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3)
<input type="checkbox"/> Inundations Visible on Aerial Imagery (B7)	<input type="checkbox"/> Presence of Reduced Iron (C4)
<input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	<input type="checkbox"/> Stunted or Stressed Plants (D1)
<input type="checkbox"/> Hydrogen Sulfide Odor (C1)	<input type="checkbox"/> Shallow Aquitard (D3)
<input type="checkbox"/> Dry Season Water Table (C2)	<input type="checkbox"/> Geomorphic Position (D2)
<input type="checkbox"/> Other (Explain in Remarks)	<input checked="" type="checkbox"/> Microtopographic Relief (D4)
<input type="checkbox"/> Mat of Crust of Algae or Marl (B4)	<input checked="" type="checkbox"/> FAC-Neutral Test (D5)
<input type="checkbox"/> Iron Deposits (B5)	

Field Observations:	Wetland Hydrology Present?
Surface Water Present? <input type="checkbox"/> No	<b>Wetland Hydrology Present?</b> <b>Yes</b>
Water Table Present? <input type="checkbox"/> Yes	
Saturation Present? <input type="checkbox"/> Yes (includes capillary fringe)	

Depth (inches): \_\_\_\_\_  
 Depth (inches): 14  
 Depth (inches): 0

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Standing water nearby, DP between two lakes.

## **APPENDIX D**

### **Select Photographs of Determination Points**

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**B1**



**SOIL PROFILE**



**VIEW EAST**

**B2**



**SOIL PROFILE**



**VIEW EAST**



**B3**



**SOIL PROFILE**



**VIEW NORTH**

**B4**



**SOIL PROFILE**



**VIEW SOUTH**

**B5**



**SOIL PROFILE**



**VIEW NORTH**

**B6**



**SOIL PROFILE**



**VIEW EAST**

**B7**



**SOIL PROFILE**



**GROUND VIEW**

**B8**



**SOIL PROFILE**



**VIEW WEST**

**B9**



**SOIL PROFILE**



**GROUND VIEW**

**B10**



**SOIL PIT**



**VIEW NORTH**



**B11**



**SOIL PROFILE**



**VIEW EAST**

**B12**



**SOIL PROFILE**



**VIEW EAST**

**B13**



**SOIL PROFILE**



**VIEW SOUTH**

**B14**



**SOIL PROFILE**

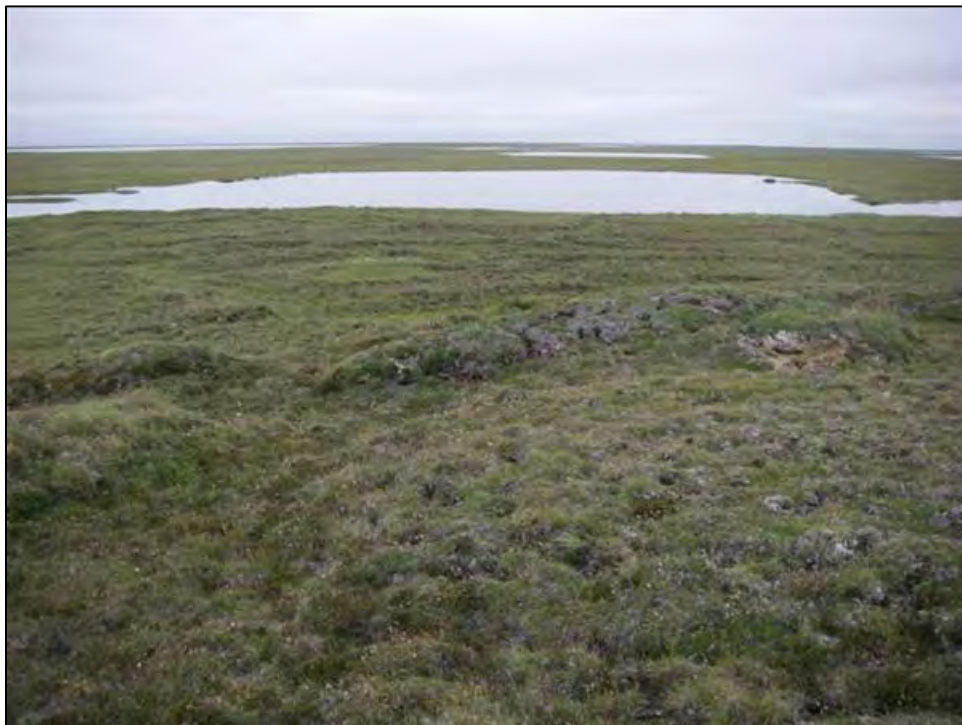


**VIEW NORTH**

**B15**



**SOIL PROFILE**



**VIEW NORTH**

**B16**



**SOIL PIT**



**VIEW EAST**

**B17**



**SOIL PROFILE**



**VIEW WEST**

**B18**



**SOIL PROFILE AND PIT**



**VIEW NORTH**



**B19**



**SOIL PROFILE**



**VIEW NORTH**

**B20**



**SOIL PROFILE**



**VIEW EAST**

**B21**



**SOIL PROFILE**



**VIEW EAST**

**B22**



**SOIL PROFILE**



**VIEW NORTH**

**B23**



**SOIL PROFILE**



**VIEW EAST**

**B24**



**SOIL PROFILE**



**VIEW NORTH**

**B25**



**SOIL PROFILE**



**GROUND VIEW**

**B26**



**SOIL PROFILE**



**VIEW NORTH**



**B27**



**SOIL PROFILE**



**VIEW NORTH**

**B28**



**SOIL PROFILE**



**VIEW SOUTH**

**B29**



**SOIL PROFILE**



**GROUND VIEW**

**B30**



**SOIL PROFILE**



**VIEW NORTH**

## **APPENDIX E**

### **Arctic Coastal Plain Species List**

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## PLANT SPECIES OBSERVED IN ASSESSED AREA DURING SITE VISIT

Scientific Name	Common Name	Indicator Status	Synonyms
<i>Agropyron boreale</i>	Alaska wheatgrass	-	
<i>Alopecurus alpinus</i>	boreal alopecurus	FACW	
<i>Arctagrostis latifolia</i>	wideleaf polargrass	FACW	
<i>Calamagrostis purpurascens</i>	purple reedgrass	-	
<i>Carex aquatilis</i>	water sedge	OBL	
<i>Carex bigelowii</i>	Bigelow's sedge	FAC	
<i>Carex capillaris</i>	hair-like sedge	FACW	
<i>Carex membranacea</i>	fragile sedge	FACW	
<i>Carex obtusata</i>	obtuse sedge	-	
<i>Carex podocarpa</i>	shortstalk sedge	FAC	
<i>Carex rariflora</i>	looseflower alpine sedge	OBL	
<i>Carex saxatilis</i>	rock sedge	FACW	
<i>Carex scirpoidea</i>	northern singlespike sedge	FACU	
<i>Carex vaginata</i>	sheathed sedge	OBL	
<i>Cassiope tetragona</i>	white arctic mountain heather	FACU	
<i>Draba alpina</i>	whitlow grass	-	<i>Alpine draba</i>
<i>Dryas integrifolia</i>	entireleaf mountain-avens	FACU	
<i>Dupontia fisheri</i>	Fisher's tundra grass	FACW	
<i>Equisetum arvense</i>	field horsetail	FACU	
<i>Equisetum scirpoides</i>	dwarf scouringrush	FACU	
<i>Eriophorum angustifolium</i>	tall cottongrass	OBL	
<i>Eriophorum vaginatum</i>	cotton grass, tussock	FACW	
<i>Festuca rubra</i>	red fescue	FAC	
<i>Juncus arcticus</i>	arctic rush	OBL	
<i>Juncus biglumis</i>	twoflowered rush	OBL	
<i>Melandrium affine</i>	arctic catchfly	-	
<i>Oxytropis nigrescens</i>	blackish oxytrope	-	
<i>Papaver macounii</i>	Macoun's poppy	FACU	
<i>Pedicularis sudetica</i>	sudetic lousewort	FACW	
<i>Pedicularis verticillata</i>	whorled lousewort	FAC	
<i>Poa arctica</i>	arctic bluegrass	FAC	
<i>Polemonium acutiflorum</i>	tall Jacob's ladder	FAC	
<i>Polygonum bistorta</i>	meadow bistort	FAC	
<i>Polygonum viviparum</i>	viviparous knotweed	FAC	
<i>Pyrola grandiflora</i>	largeflowered wintergreen	FAC	
<i>Salix arctica</i>	arctic willow	FAC	
<i>Salix fuscescens</i>	Alaska bog willow	FACW	
<i>Salix glauca</i>	grayleaf willow	FAC	
<i>Salix niphoclada</i>	barrenground willow	FAC	<i>Salix brachycarpa</i>
<i>Salix ovalifolia</i>	oval-leaf willow	FAC	
<i>Salix planifolia</i>	diamondleaf willow	FAC	
<i>Salix reticulata</i>	netleaf willow	FAC	

Scientific Name	Common Name	Indicator Status	Synonyms
<i>Salix rotundifolia</i>	least willow	-	
<i>Saussurea angustifolia</i>	narrowleaf saw-wort	FAC	
<i>Saxifraga hirculus</i>	yellow marsh saxifrage	OBL	
<i>Saxifraga oppositifolia</i>	East Greenland saxifrage	FAC	
<i>Saxifraga rivularis</i>	weak saxifrage	OBL	
<i>Silene acaulis</i>	moss campion	UPL	
<i>Vaccinium vitis-idaea</i>	lingonberry	FAC	

- Species not included on official published list of plant species for Alaska (USFWS 1988)



## POTENTIAL MAMMAL SPECIES OF THE ARCTIC COASTAL PLAIN

### **Order Ursid**

Polar bear (*Ursus maritimus*)

Grizzly bear (*Ursus arctos*)

### **Order Canid**

Wolf (*Canis lupus*)

Coyote (*Canis latrans incolatus*)

Red fox (*Vulpes vulpes*)

Arctic fox (*Alopex lagopus*)

### **Order Cervid**

Moose (*Alces alces*)

Caribou (*Rangifer tarandus*)

### **Order Bovid**

Muskoxen (*Ovibos moschatus*)

### **Order Mustelid**

Ermine (*Mustela erminea*)

Least weasel (*Mustela rixosa*)

Wolverine (*Gulo gulo*)

### **Order Lagomorpha**

Alaskan hare (*Lepus othus*)

### **Order Rodentia**

Arctic ground squirrel (*Spermophilus parryii*)

Singing Vole (*Microtus miurus*)

Northern Red-backed Vole (*Clethrionomys rutilus*)

Brown lemming (*Lemmus sibiricus*)

Collared lemming (*Dicrostonyx groenlandicus*)

### **Order Insectivora**

Masked Shrew (*Sorex cinereus*)

Dusky Shrew (*Sorex monticolus*)

Arctic Shrew (*Sorex arcticus*)

## POTENTIAL FRESHWATER FISH FOUND WITHIN THE ARCTIC COASTAL PLAIN\*

Sheefish (*Stenodus leucichthys*)  
Round whitefish (*Prosopium cylindraceum*)  
Lake Trout (*Salvelinus namaycush*)  
Arctic Char (*Salvelinus alpinus*)  
Northern Pike (*Esox lucius*)  
Lake Chub (*Couesius plumbeus*)  
Longnose Sucker (*Catostomus catostomus*)  
Trout-perch (*Percopsis omiscomaycus*)  
Burbot (*Lota lota*)  
Ninespine Stickleback (*Pungitius pungitius*)  
Slimy Sculpin (*Cottus cognatus*)  
Threespine Stickleback (*Gasterosteus aculeatus*)  
Alaska Blackfish (*Dallia pectoralis*)  
Arctic Grayling (*Thymallus arcticus*)  
Arctic Lamprey (*Lampetra japonica*)  
Pacific Herring (*Clupea pallasii*)  
Least Cisco (*Coregonus sardinella*)  
Arctic Cisco (*Coregonus autumnalis*)  
Round whitefish (*Prosopium cylindraceum*)  
Broad whitefish (*Coregonus nasus*)  
Humpback whitefish (*Coregonus pidschian*)  
Dolly Varden (*Salvelinus malma*)  
Pink salmon (*Oncorhynchus gorbuscha*)  
Chum salmon (*Oncorhynchus keta*)  
Pond smelt (*Hypomesus olidus*)  
Rainbow smelt (*Osmerus mordax*)  
Arctic cod (*Boreogadus saida*)

(\*Species from Morrow, 1980)

## POTENTIAL BIRD SPECIES FOUND WITHIN THE ARCTIC COASTAL PLAIN\*

### **Order Anseriformes**

Greater White-fronted Goose (*Anser albifrons*)  
Snow Goose (*Chen caerulescens*)  
Ross's Goose (*Chen rossii*)  
Tundra Swan (*Cygnus columbianus*)  
Gadwall (*Anas strepera*)  
Eurasian Wigeon (*Anas Penelope*)  
American Wigeon (*Anas americana*)  
Mallard (*Anas platyrhynchos*)  
Northern Shoveler (*Anas clypeata*)  
Northern Pintail (*Anas acuta*)  
Green-winged Teal (*Anas crecca*)  
Canvasback (*Aythya valisineria*)  
Greater Scaup (*Aythya marila*)  
Lesser Scaup (*Aythya affinis*)  
Steller's Eider (*Polysticta stelleri*)  
Spectacled Eider (*Somateria fischeri*)  
King Eider (*Somateria spectabilis*)  
Common Eider (*Somateria mollissima*)  
Harlequin Duck (*Histrionicus histrionicus*)  
Surf Scoter (*Melanitta perspicillata*)  
White-winged Scoter (*Melanitta fusca*)  
Black Scoter (*Melanitta nigra*)  
Long-tailed Duck (*Clangula hyemalis*)  
Common Goldeneye (*Bucephala clangula*)  
Smew (*Mergellus albellus*)  
Red-breasted Merganser (*Mergus serrator*)

### **Order Galliformes**

Willow Ptarmigan (*Lagopus lagopus*)  
Rock Ptarmigan (*Lagopus mutus*)

### **Order Gaviiformes**

Pacific Loon (*Gavia pacifica*)  
Common Loon (*Gavia immer*)  
Yellow-billed Loon (*Gavia adamsii*)  
Red-throated Loon (*Gavia stellata*)

### **Order Podicipediformes**

Horned Grebe (*Podiceps auritus*)  
Red-necked Grebe (*Podiceps grisegena*)

### **Order Procellariiformes**

Northern Fulmar (*Fulmarus glacialis*)  
Short-tailed Shearwater (*Puffinus tenuirostris*)

### **Order Falconiformes**

Osprey (*Pandion haliaetus*)  
Bald Eagle (*Haliaeetus leucocephalus*)  
Northern Harrier (*Circus cyaneus*)  
Sharp-shinned Hawk (*Accipiter striatus*)  
Northern Goshawk (*Accipiter gentiles*)  
Golden Eagle (*Aquila chrysaetos*)  
Rough-legged Hawk (*Buteo lagopus*)  
American Kestrel (*Falco sparverius*)  
Merlin (*Falco columbarius*)  
Gyr Falcon (*Falco rusticolus*)  
Peregrine Falcon (*Falco peregrinus*)

### **Order Charadriiformes**

Thick-billed Murre (*Uria lomvia*)  
Black Guillemot (*Cepphus grille*)  
Least Auklet (*Aethia pusilla*)  
Horned Puffin (*Fratercula corniculata*)  
Pomarine Jaeger (*Stercorarius pomarinus*)  
Parasitic Jaeger (*Stercorarius parasiticus*)  
Long-tailed Jaeger (*Stercorarius longicaudus*)  
Bonaparte's Gull (*Larus Philadelphia*)  
Mew Gull (*Larus canus*)  
Herring Gull (*Larus smithsonianus*)  
Thayer's Gull (*Larus thayeri*)  
Slaty-backed Gull (*Larus schistisagus*)  
Glaucous Gull (*Larus hyperboreus*)  
Sabine's Gull (*Xeman sabini*)  
Black-legged Kittiwake (*Rissa tridactyla*)  
Ross' Gull (*Pagophila eburea*)  
Ivory Gull (*Pagophila eburnean*)  
Arctic Tern (*Sterna paradisaea*)  
Black-bellied Plover (*Pluvialis squatarola*)  
American Golden-Plover (*Pluvialis dominica*)  
Semipalmated Plover (*Charadrius semipalmatus*)  
Killdeer (*Charadrius vociferous*)  
Red Phalarope (*Phalaropus fulicaria*)  
Red-necked Phalarope (*Phalaropus lobatus*)  
Wilson's Phalarope (*Phalaropus tricolor*)  
Wilson's Snipe (*Gallinago delicata*)  
Long-billed Dowitcher (*Limnodromus scolopaceus*)

Ruff (*Philomachus pugnax*)  
Buff-breasted Sandpiper (*Tryngites subruficollis*)  
Stilt Sandpiper (*Calidris himantopus*)  
Dunlin (*Calidris alpina*)  
Sharp-tailed Sandpiper (*Calidris acuminata*)  
Pectoral Sandpiper (*Calidris melanotos*)  
Baird's Sandpiper (*Calidris bairdii*)  
White-rumped Sandpiper (*Erolia fuscicollis*)  
Least Sandpiper (*Calidris minutilla*)  
Red-necked Stint (*Erolia ruficollis*)  
Western Sandpiper (*Calidris mauri*)  
Semipalmated Sandpiper (*Calidris pusilla*)  
Sanderling (*Calidris alba*)  
Eurasian Dotterel (*Charadrius morinellus*)  
Red Knot (*Calidris canutus*)  
Ruddy Turnstone (*Arenaria interpres*)  
Bar-tailed Godwit (*Limosa lapponica*)  
Hudsonian Godwit (*Limosa haemastica*)  
Black-tailed Godwit (*Limosa limosa*)  
Whimbrel (*Numenius phaeopus*)  
Upland Sandpiper (*Actitis macularia*)  
Spotted Sandpiper (*Actitis macularius*)  
Lesser Yellowlegs (*Tringa flavipes*)  
Wandering Tattler (*Heterosceles incanus*)

### **Order Passeriformes**

Hammond's Flycatcher (*Empidonax hammondi*)  
Eastern Phoebe (*Sayornis phoebe*)  
Say's Phoebe (*Sayornis saya*)  
Eastern Kingbird (*Tyrannus tyrannus*)  
Northern Shrike (*Lanius excubitor*)  
Gray Jay (*Perisoreus canadensis*)  
Common Raven (*Corvus corax*)  
Horned Lark (*Eremophila alpestris*)  
Tree Swallow (*Tachycineta bicolor*)  
Violet-green Swallow (*Tachycineta thalassina*)  
Bank Swallow (*Riparia riparia*)  
Cliff Swallow (*Petrochelidon pyrrhonota*)  
Barn Swallow (*Hirundo rustica*)  
Bluethroat (*Luscinia svecica*)  
Northern Wheatear (*Oenanthe oenanthe*)  
Gray-cheeked Thrush (*Catharus minimus*)  
Hermit Thrush (*Catharus guttatus*)  
American Robin (*Turdus migratorius*)  
Varied Thrush (*Ixoreus naevius*)  
Yellow Wagtail (*Motacilla flava*)

American Pipit (*Anthus rubescens*)  
Cedar Waxwing (*Bombycilla cedrorum*)  
Orange-crowned Warbler (*Vermivora celata*)  
Yellow Warbler (*Dendroica petechia*)  
Yellow-rumped Warbler (*Dendroica coronata*)  
Northern Waterthrush (*Seiurus noveboracensis*)  
Wilson's Warbler (*Wilsonia pusilla*)  
American Tree Sparrow (*Spizella arborea*)  
Chipping Sparrow (*Spizella passerine*)  
Savannah Sparrow (*Passerculus sandwichensis*)  
Fox Sparrow (*Passerella iliaca*)  
White-throated Sparrow (*Zonotrichia albicollis*)  
White-crowned Sparrow (*Zonotrichia leucophrys*)  
Dark-eyed Junco (*Junco hyemalis*)  
Lapland Longspur (*Calcarius lapponicus*)  
Smith's Longspur (*Calcarius pictus*)  
Snow Bunting (*Plectrophenax nivalis*)  
Red-winged Blackbird (*Agelaius phoeniceus*)  
Rusty Blackbird (*Euphagus carolinus*)  
Brown-headed Cowbird (*Molothrus ater*)  
Common Redpoll (*Carduelis flammea*)  
Hoary Redpoll (*Carduelis hornemanni*)  
Pine Siskin (*Carduelis pinus*)

**Order Coraciiformes**

Belted Kingfisher (*Ceryle alcyon*)

**Order Caprimulgiformes**

Common Nighthawk (*Chordeiles minor*)

**Order Apodiformes**

Rufous Hummingbird (*Selasphorus rufus*)

**Order Strigiformes**

Snowy Owl (*Bubo scandiacus*)  
Short-eared Owl (*Asio flammeus*)

**Order Gruiformes**

Sandhill Crane (*Grus canadensis*)

(\*Species from ANWR, 2008 – includes species cited as north of the Brooks Range)

## **APPENDIX F**

**Preliminary JD Form**

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**APPROVED JURISDICTIONAL DETERMINATION FORM**  
**U.S. Army Corps of Engineers**

This form should be completed by following the instructions provided in Section IV of the JD Form Instructional Guidebook.

**SECTION I: BACKGROUND INFORMATION**

**A. REPORT COMPLETION DATE FOR APPROVED JURISDICTIONAL DETERMINATION (JD):**

**B. DISTRICT OFFICE, FILE NAME, AND NUMBER:**

**C. PROJECT LOCATION AND BACKGROUND INFORMATION:** The project spans approximately 9km and 2,014 acres and is located east of the Miluveach River and north of the Tarn Access Road in the North Slope Borough of Alaska. Please refer to the Mustang Development Project Wetlands and Waters Technical Report (OASIS 2012) and Map Atlas for details of the waters and wetlands that are included in this form.

State: Alaska County/parish/borough: North Slope Borough City:  
Center coordinates of site (lat/long in degree decimal format): Lat. 70.259dd° **N**, Long. -150.184dd° **W**.  
Universal Transverse Mercator: 7862372.535m N, 1053293.007m E

Name of nearest waterbody: Miluveach River, a tributary to the Colville River

Name of nearest Traditional Navigable Water (TNW) into which the aquatic resource flows: Colville River

Name of watershed or Hydrologic Unit Code (HUC): Colville HUC 19060304

Check if map/diagram of review area and/or potential jurisdictional areas is/are available upon request.

Check if other sites (e.g., offsite mitigation sites, disposal sites, etc...) are associated with this action and are recorded on a different JD form.

**D. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):**

Office (Desk) Determination. Date:

Field Determination. Date(s):

**SECTION II: SUMMARY OF FINDINGS**

**A. RHA SECTION 10 DETERMINATION OF JURISDICTION.**

There **Appear to be no** "navigable waters of the U.S." within Rivers and Harbors Act (RHA) jurisdiction (as defined by 33 CFR part 329) in the review area. [Required]

Waters subject to the ebb and flow of the tide.

Waters are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce.

Explain: The nearest 'navigable' water is the Colville River which is not in the assessment area. According to the ADNR Navigable Waters Mapping Tool website, the navigability of the Miluveach River is 'unknown'. For the purpose of this JD analysis, we are assuming the Miluveach is an RPW.

**B. CWA SECTION 404 DETERMINATION OF JURISDICTION.**

There **Are** "waters of the U.S." within Clean Water Act (CWA) jurisdiction (as defined by 33 CFR part 328) in the review area. [Required]

**1. Waters of the U.S.**

**a. Indicate presence of waters of U.S. in review area (check all that apply):<sup>1</sup>**

TNWs, including territorial seas

Wetlands adjacent to TNWs

Relatively permanent waters<sup>2</sup> (RPWs) that flow directly or indirectly into TNWs

Non-RPWs that flow directly or indirectly into TNWs

Wetlands directly abutting RPWs that flow directly or indirectly into TNWs

Wetlands adjacent to but not directly abutting RPWs that flow directly or indirectly into TNWs

Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs

Impoundments of jurisdictional waters

Isolated (interstate or intrastate) waters, including isolated wetlands

**b. Identify (estimate) size of waters of the U.S. in the review area:**

Non-wetland waters: linear feet: width (ft) and/or 3.2 acres.

Wetlands: 2010.8 acres.

**c. Limits (boundaries) of jurisdiction based on: 1987 Delineation Manual**

Elevation of established OHWM (if known): Unknown. .

**2. Non-regulated waters/wetlands (check if applicable):<sup>3</sup>**

<sup>1</sup> Boxes checked below shall be supported by completing the appropriate sections in Section III below.

<sup>2</sup> For purposes of this form, an RPW is defined as a tributary that is not a TNW and that typically flows year-round or has continuous flow at least "seasonally" (e.g., typically 3 months).

<sup>3</sup> Supporting documentation is presented in Section III.F.

Potentially jurisdictional waters and/or wetlands were assessed within the review area and determined to be not jurisdictional.  
Explain: .

**SECTION III: CWA ANALYSIS**

**A. TNWs AND WETLANDS ADJACENT TO TNWs**

The agencies will assert jurisdiction over TNWs and wetlands adjacent to TNWs. If the aquatic resource is a TNW, complete Section III.A.1 and Section III.D.1. only; if the aquatic resource is a wetland adjacent to a TNW, complete Sections III.A.1 and 2 and Section III.D.1.; otherwise, see Section III.B below.

**1. TNW**

Identify TNW: .

Summarize rationale supporting determination: .

**2. Wetland adjacent to TNW**

Summarize rationale supporting conclusion that wetland is “adjacent”:

**B. CHARACTERISTICS OF TRIBUTARY (THAT IS NOT A TNW) AND ITS ADJACENT WETLANDS (IF ANY):**

This section summarizes information regarding characteristics of the tributary and its adjacent wetlands, if any, and it helps determine whether or not the standards for jurisdiction established under *Rapanos* have been met.

The agencies will assert jurisdiction over non-navigable tributaries of TNWs where the tributaries are “relatively permanent waters” (RPWs), i.e. tributaries that typically flow year-round or have continuous flow at least seasonally (e.g., typically 3 months). A wetland that directly abuts an RPW is also jurisdictional. If the aquatic resource is not a TNW, but has year-round (perennial) flow, skip to Section III.D.2. If the aquatic resource is a wetland directly abutting a tributary with perennial flow, skip to Section III.D.4.

A wetland that is adjacent to but that does not directly abut an RPW requires a significant nexus evaluation. Corps districts and EPA regions will include in the record any available information that documents the existence of a significant nexus between a relatively permanent tributary that is not perennial (and its adjacent wetlands if any) and a traditional navigable water, even though a significant nexus finding is not required as a matter of law.

If the waterbody<sup>4</sup> is not an RPW, or a wetland directly abutting an RPW, a JD will require additional data to determine if the waterbody has a significant nexus with a TNW. If the tributary has adjacent wetlands, the significant nexus evaluation must consider the tributary in combination with all of its adjacent wetlands. This significant nexus evaluation that combines, for analytical purposes, the tributary and all of its adjacent wetlands is used whether the review area identified in the JD request is the tributary, or its adjacent wetlands, or both. If the JD covers a tributary with adjacent wetlands, complete Section III.B.1 for the tributary, Section III.B.2 for any onsite wetlands, and Section III.B.3 for all wetlands adjacent to that tributary, both onsite and offsite. The determination whether a significant nexus exists is determined in Section III.C below.

**1. Characteristics of non-TNWs that flow directly or indirectly into TNW**

**(i) General Area Conditions:**

Watershed size: **Pick List**

Drainage area: **Pick List**

Average annual rainfall: inches

Average annual snowfall: inches

**(ii) Physical Characteristics:**

**(a) Relationship with TNW:**

Tributary flows directly into TNW.

Tributary flows through **Pick List** tributaries before entering TNW.

Project waters are **Pick List** river miles from TNW.

Project waters are **Pick List** river miles from RPW.

Project waters are **Pick List** aerial (straight) miles from TNW.

Project waters are **Pick List** aerial (straight) miles from RPW.

Project waters cross or serve as state boundaries. Explain: .

Identify flow route to TNW<sup>5</sup>: .

Tributary stream order, if known: .

<sup>4</sup> Note that the Instructional Guidebook contains additional information regarding swales, ditches, washes, and erosional features generally and in the arid West.

<sup>5</sup> Flow route can be described by identifying, e.g., tributary a, which flows through the review area, to flow into tributary b, which then flows into TNW.

(b) General Tributary Characteristics (check all that apply):

**Tributary is:**  Natural  
 Artificial (man-made). Explain: \_\_\_\_\_  
 Manipulated (man-altered). Explain: \_\_\_\_\_

**Tributary properties with respect to top of bank (estimate):**

Average width: \_\_\_\_\_ feet  
Average depth: \_\_\_\_\_ feet  
Average side slopes: **Pick List.**

**Primary tributary substrate composition (check all that apply):**

Silts  Sands  Concrete  
 Cobbles  Gravel  Muck  
 Bedrock  Vegetation. Type/% cover: \_\_\_\_\_  
 Other. Explain: \_\_\_\_\_

**Tributary condition/stability [e.g., highly eroding, sloughing banks]. Explain:** \_\_\_\_\_

**Presence of run/riffle/pool complexes. Explain:** \_\_\_\_\_

**Tributary geometry: Pick List**

**Tributary gradient (approximate average slope):** \_\_\_\_\_ %

(c) Flow:

**Tributary provides for: Pick List**

**Estimate average number of flow events in review area/year: Pick List**

Describe flow regime: \_\_\_\_\_

**Other information on duration and volume:** \_\_\_\_\_

**Surface flow is: Pick List. Characteristics:** \_\_\_\_\_

**Subsurface flow: Pick List. Explain findings:** \_\_\_\_\_

Dye (or other) test performed: \_\_\_\_\_

**Tributary has (check all that apply):**

Bed and banks  
 OHWM<sup>6</sup> (check all indicators that apply):  
 clear, natural line impressed on the bank  the presence of litter and debris  
 changes in the character of soil  destruction of terrestrial vegetation  
 shelving  the presence of wrack line  
 vegetation matted down, bent, or absent  sediment sorting  
 leaf litter disturbed or washed away  scour  
 sediment deposition  multiple observed or predicted flow events  
 water staining  abrupt change in plant community  
 other (list): \_\_\_\_\_  
 Discontinuous OHWM.<sup>7</sup> Explain: \_\_\_\_\_

**If factors other than the OHWM were used to determine lateral extent of CWA jurisdiction (check all that apply):**

High Tide Line indicated by:  Mean High Water Mark indicated by:  
 oil or scum line along shore objects  survey to available datum;  
 fine shell or debris deposits (foreshore)  physical markings;  
 physical markings/characteristics  vegetation lines/changes in vegetation types.  
 tidal gauges  
 other (list): \_\_\_\_\_

(iii) **Chemical Characteristics:**

Characterize tributary (e.g., water color is clear, discolored, oily film; water quality; general watershed characteristics, etc.).

Explain: \_\_\_\_\_

Identify specific pollutants, if known: \_\_\_\_\_

<sup>6</sup>A natural or man-made discontinuity in the OHWM does not necessarily sever jurisdiction (e.g., where the stream temporarily flows underground, or where the OHWM has been removed by development or agricultural practices). Where there is a break in the OHWM that is unrelated to the waterbody's flow regime (e.g., flow over a rock outcrop or through a culvert), the agencies will look for indicators of flow above and below the break.

<sup>7</sup>Ibid.

(iv) **Biological Characteristics. Channel supports (check all that apply):**

- Riparian corridor. Characteristics (type, average width):
- Wetland fringe. Characteristics:
- Habitat for:
  - Federally Listed species. Explain findings:
  - Fish/spawn areas. Explain findings:
  - Other environmentally-sensitive species. Explain findings:
  - Aquatic/wildlife diversity. Explain findings:

2. **Characteristics of wetlands adjacent to non-TNW that flow directly or indirectly into TNW**

(i) **Physical Characteristics:**

(a) General Wetland Characteristics:

Properties:

Wetland size: 2,010.8 wetland acres

Wetland type. Explain: Vegetation and wetland communities include those associated with rivers, streams, lakes and ponds, and plustrine scrub-shrub / emergent wetlands.

Wetland quality. Explain: Please refer to the Mustang Development Project Jurisdictional Determination Report and Maps (OASIS 2012) for results of the wetland delineation and analysis performed on project area wetlands by OASIS.

Project wetlands cross or serve as state boundaries. Explain: N/A.

(b) General Flow Relationship with Non-TNW:

Flow is: **Perennial flow**. Explain: For the purpose of this JD analysis, we are assuming the Miluveach River (RPW) has continuous seasonal flow to the Colville River (TNW) based on aerial photography. Refer to the Mustang Development Project Jurisdictional Report and Maps (OASIS 2012).

Surface flow is: **Overland sheetflow**

Characteristics: Due to the different waterbody types within the assessment area, all flow types apply, but predominantly overland flow. Refer to the Mustang Development Project Jurisdictional Report and Maps (OASIS 2012).

Subsurface flow: **Yes**. Explain findings: In addition to potential surficial connections, wetlands within the ACP are also expected to have a hydrologic connection to TNWs and non-TNWs through adjacent soil saturation due in part to continuous shallow permafrost. This condition can extend into adjacent wetlands for extended distances before encountering an RPW or TNW, and can link seemingly 'isolated' wetlands to streams and rivers that flow into large TNWs, and eventually into the Beaufort Sea.

Dye (or other) test performed:

(c) Wetland Adjacency Determination with Non-TNW:

- Directly abutting
- Not directly abutting
  - Discrete wetland hydrologic connection. Explain:
  - Ecological connection. Explain:
  - Separated by berm/barrier. Explain:

(d) Proximity (Relationship) to TNW

Project wetlands are **15-20** river miles from TNW.

Project waters are **5-10** aerial (straight) miles from TNW.

Flow is from: **Wetland to navigable waters**.

Estimate approximate location of wetland as within the **500-year or greater** floodplain.

(ii) **Chemical Characteristics:**

Characterize wetland system (e.g., water color is clear, brown, oil film on surface; water quality; general watershed characteristics; etc.). Explain: Water quality varies, but is predominantly brown.

Identify specific pollutants, if known: Unknown.

(iii) **Biological Characteristics. Wetland supports (check all that apply):**

- Riparian buffer. Characteristics (type, average width):
- Vegetation type/percent cover. Explain: Please refer to the Mustang Development Project Jurisdictional Report and Maps (OASIS 2012).
- Habitat for:
  - Federally Listed species. Explain findings: Potential habitat exists for polar bears and spectacled eiders. Refer to Mustang Development Project Environmental Report (OASIS 2012).
  - Fish/spawn areas. Explain findings: Refer to Mustang Development Project Environmental Report (OASIS 2012).
  - Other environmentally-sensitive species. Explain findings: Refer to Mustang Development Project Environmental Report (OASIS 2012).
  - Aquatic/wildlife diversity. Explain findings: Refer to Mustang Development Project Environmental Report (OASIS 2012).

**3. Characteristics of all wetlands adjacent to the tributary (if any)**

All wetland(s) being considered in the cumulative analysis: **Pick List**

Approximately ( ) acres in total are being considered in the cumulative analysis.

For each wetland, specify the following:

<u>Directly abuts? (Y/N)</u>	<u>Size (in acres)</u>	<u>Directly abuts? (Y/N)</u>	<u>Size (in acres)</u>
see Table 2. SPN 2010-45 Multiple Waters Table in the Mustang Development Project Jurisdiction Report for a complete table listing the size, location and relationship with RPW.			

Summarize overall biological, chemical and physical functions being performed: A complete wetland functions and values analysis was performed for the assessment area wetlands. Refer to the Functional Assessment Report that is appended to the Environmental Report for this project. Assessment area wetlands were evaluated for the following 11 functions: 1) flood flow moderation and conveyance; 2) shoreline and bank stabilization; 3) maintenance of natural sediment transport processes; 4) production and export of organic matter; 5) maintenance of soil thermal regime; 6) waterbird support; 7) terrestrial mammal support; 8) fish support; 9) T&E species support (polar bears); 10) T&E species support (spectacled eider); and 11) scarce and valued habitats. Functions that were not evaluated, but are assumed to be performed by the assessment area wetlands include: nutrient and toxicant removal and sediment retention.

### C. SIGNIFICANT NEXUS DETERMINATION

A significant nexus analysis will assess the flow characteristics and functions of the tributary itself and the functions performed by any wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical, and biological integrity of a TNW. For each of the following situations, a significant nexus exists if the tributary, in combination with all of its adjacent wetlands, has more than a speculative or insubstantial effect on the chemical, physical and/or biological integrity of a TNW. Considerations when evaluating significant nexus include, but are not limited to the volume, duration, and frequency of the flow of water in the tributary and its proximity to a TNW, and the functions performed by the tributary and all its adjacent wetlands. It is not appropriate to determine significant nexus based solely on any specific threshold of distance (e.g. between a tributary and its adjacent wetland or between a tributary and the TNW). Similarly, the fact an adjacent wetland lies within or outside of a floodplain is not solely determinative of significant nexus.

Draw connections between the features documented and the effects on the TNW, as identified in the *Rapanos* Guidance and discussed in the Instructional Guidebook. Factors to consider include, for example:

- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to carry pollutants or flood waters to TNWs, or to reduce the amount of pollutants or flood waters reaching a TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), provide habitat and lifecycle support functions for fish and other species, such as feeding, nesting, spawning, or rearing young for species that are present in the TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to transfer nutrients and organic carbon that support downstream foodwebs?
- Does the tributary, in combination with its adjacent wetlands (if any), have other relationships to the physical, chemical, or biological integrity of the TNW?

**Note: the above list of considerations is not inclusive and other functions observed or known to occur should be documented below:**

1. **Significant nexus findings for non-RPW that has no adjacent wetlands and flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary itself, then go to Section III.D:N/A.
2. **Significant nexus findings for non-RPW and its adjacent wetlands, where the non-RPW flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D:
3. **Significant nexus findings for wetlands adjacent to an RPW but that do not directly abut the RPW.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: N/A.

### D. DETERMINATIONS OF JURISDICTIONAL FINDINGS. THE SUBJECT WATERS/WETLANDS ARE (CHECK ALL THAT APPLY):

1. **TNWs and Adjacent Wetlands.** Check all that apply and provide size estimates in review area:  
 TNWs: linear feet width (ft), Or, acres.  
 Wetlands adjacent to TNWs: acres.

2. **RPWs that flow directly or indirectly into TNWs.**

- Tributaries of TNWs where tributaries typically flow year-round are jurisdictional. Provide data and rationale indicating that tributary is perennial: .
- Tributaries of TNW where tributaries have continuous flow “seasonally” (e.g., typically three months each year) are jurisdictional. Data supporting this conclusion is provided at Section III.B. Provide rationale indicating that tributary flows seasonally: The navigability status of the Miluveach River is ‘unknown’ according to the ADNR Navigable Waters website mapping tool. For the purpose of this report, we are assuming the Miluveach is considered a RPW. Hydrologic data for the Miluveach was not available for this report; however flowing water is readily seen in the project aerials taken on July 10, 2010, which suggests continuous seasonal flow. Refer to Mustang Development Project Jurisdictional Report and Maps (OASIS 2012).

Provide estimates for jurisdictional waters in the review area (check all that apply):

- Tributary waters: **4,326** linear feet **30-50** width (ft).
  - Other non-wetland waters:        acres.
- Identify type(s) of waters: .

3. **Non-RPWs<sup>8</sup> that flow directly or indirectly into TNWs.**

- Waterbody that is not a TNW or an RPW, but flows directly or indirectly into a TNW, and it has a significant nexus with a TNW is jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional waters within the review area (check all that apply):

- Tributary waters:        linear feet        width (ft).
  - Other non-wetland waters:        acres.
- Identify type(s) of waters: .

4. **Wetlands directly abutting an RPW that flow directly or indirectly into TNWs.**

- Wetlands directly abut RPW and thus are jurisdictional as adjacent wetlands.
  - Wetlands directly abutting an RPW where tributaries typically flow year-round. Provide data and rationale indicating that tributary is perennial in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: .
  - Wetlands directly abutting an RPW where tributaries typically flow “seasonally.” Provide data indicating that tributary is seasonal in Section III.B and rationale in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: Assessment area wetlands are contiguous and directly abut the Miluveach River. They have a direct hydrologic connection to the Miluveach River (RPW) and ultimately to the Colville River (TNW) through seasonal flooding, continuous soil saturation, or shallow groundwater..

Provide acreage estimates for jurisdictional wetlands in the review area: **2010.8** acres.

5. **Wetlands adjacent to but not directly abutting an RPW that flow directly or indirectly into TNWs.**

- Wetlands that do not directly abut an RPW, but when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide acreage estimates for jurisdictional wetlands in the review area:        acres.

6. **Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs.**

- Wetlands adjacent to such waters, and have when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional wetlands in the review area:        acres.

7. **Impoundments of jurisdictional waters.<sup>9</sup>**

As a general rule, the impoundment of a jurisdictional tributary remains jurisdictional.

- Demonstrate that impoundment was created from “waters of the U.S.,” or
- Demonstrate that water meets the criteria for one of the categories presented above (1-6), or
- Demonstrate that water is isolated with a nexus to commerce (see E below).

<sup>8</sup>See Footnote # 3.

<sup>9</sup>To complete the analysis refer to the key in Section III.D.6 of the Instructional Guidebook.



**E. ISOLATED [INTERSTATE OR INTRA-STATE] WATERS, INCLUDING ISOLATED WETLANDS, THE USE, DEGRADATION OR DESTRUCTION OF WHICH COULD AFFECT INTERSTATE COMMERCE, INCLUDING ANY SUCH WATERS (CHECK ALL THAT APPLY):<sup>10</sup>**

- which are or could be used by interstate or foreign travelers for recreational or other purposes.
- from which fish or shellfish are or could be taken and sold in interstate or foreign commerce.
- which are or could be used for industrial purposes by industries in interstate commerce.
- Interstate isolated waters. Explain: .
- Other factors. Explain: .

**Identify water body and summarize rationale supporting determination:** .

Provide estimates for jurisdictional waters in the review area (check all that apply):

- Tributary waters: linear feet width (ft).
- Other non-wetland waters: acres.  
Identify type(s) of waters: .
- Wetlands: acres.

**F. NON-JURISDICTIONAL WATERS, INCLUDING WETLANDS (CHECK ALL THAT APPLY):**

- If potential wetlands were assessed within the review area, these areas did not meet the criteria in the 1987 Corps of Engineers Wetland Delineation Manual and/or appropriate Regional Supplements.
- Review area included isolated waters with no substantial nexus to interstate (or foreign) commerce.
  - Prior to the Jan 2001 Supreme Court decision in "SWANCC," the review area would have been regulated based solely on the "Migratory Bird Rule" (MBR).
- Waters do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction. Explain: .
- Other: (explain, if not covered above): .

Provide acreage estimates for non-jurisdictional waters in the review area, where the sole potential basis of jurisdiction is the MBR factors (i.e., presence of migratory birds, presence of endangered species, use of water for irrigated agriculture), using best professional judgment (check all that apply):

- Non-wetland waters (i.e., rivers, streams): linear feet width (ft).
- Lakes/ponds: acres.
- Other non-wetland waters: acres. List type of aquatic resource: .
- Wetlands: acres.

Provide acreage estimates for non-jurisdictional waters in the review area that do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction (check all that apply):

- Non-wetland waters (i.e., rivers, streams): linear feet, width (ft).
- Lakes/ponds: acres.
- Other non-wetland waters: acres. List type of aquatic resource: .
- Wetlands: acres.

**SECTION IV: DATA SOURCES.**

**A. SUPPORTING DATA. Data reviewed for JD (check all that apply - checked items shall be included in case file and, where checked and requested, appropriately reference sources below):**

- Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant: .
- Data sheets prepared/submitted by or on behalf of the applicant/consultant.
  - Office concurs with data sheets/delineation report.
  - Office does not concur with data sheets/delineation report.
- Data sheets prepared by the Corps: .
- Corps navigable waters' study: .
- U.S. Geological Survey Hydrologic Atlas: .
  - USGS NHD data.
  - USGS 8 and 12 digit HUC maps.
- U.S. Geological Survey map(s). Cite scale & quad name: Harrison Bay B1 & A1 quadrangles, 1:250,000 .
- USDA Natural Resources Conservation Service Soil Survey. Citation: .

<sup>10</sup> Prior to asserting or declining CWA jurisdiction based solely on this category, Corps Districts will elevate the action to Corps and EPA HQ for review consistent with the process described in the Corps/EPA Memorandum Regarding CWA Act Jurisdiction Following Rapanos.

- National wetlands inventory map(s). Cite name: Alaska Wetlands Mapper Dataset (National Wetlands Inventory).
- State/Local wetland inventory map(s): .
- FEMA/FIRM maps: .
- 100-year Floodplain Elevation is: (National Geodetic Vertical Datum of 1929)
- Photographs:  Aerial (Name & Date): Aerial date = July 10, 2010. Refer to the Mustang Development Project Jurisdictional Determination Report and Maps (OASIS 2012).  
or  Other (Name & Date): Wetland delineation field photos taken in August 2011. Refer to the Mustang Development Project Jurisdictional Determination Report and Maps (OASIS 2012).
- Previous determination(s). File no. and date of response letter: .
- Applicable/supporting case law: .
- Applicable/supporting scientific literature: Refer to the reference section of the Mustang Development Project Jurisdictional Determination Report and Maps (OASIS 2012).
- Other information (please specify): .

**B. ADDITIONAL COMMENTS TO SUPPORT JD:** .