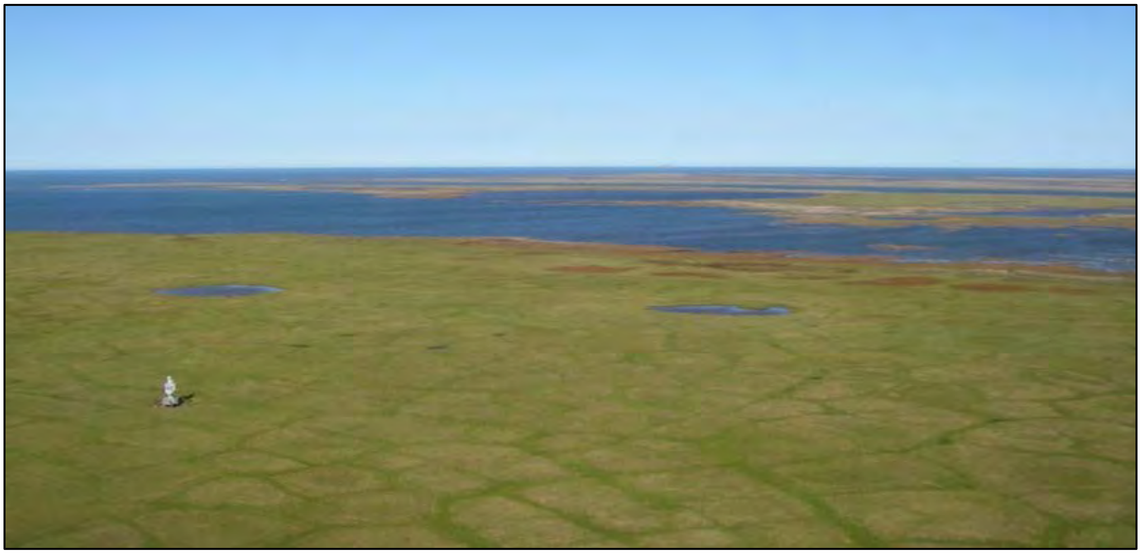
ENVIRONMENTAL REPORT

MUSTANG DEVELOPMENT PROJECT

July 25, 2012



Prepared for:

Brooks Range Petroleum Corporation
510 L St., Suite 601
Anchorage, AK 99516

Prepared by:

oasis ENVIRONMENTAL

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

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ACRONYMS AND ABBREVIATIONS

AAAQS.......... Alaska Ambient Air Quality Standards
ACP .... Arctic Coastal Plain
ACS .... Alaska Clean Seas
ADEC............ Alaska Department of Environmental Conservation
ADF&G.......... Alaska Department of Fish and Game
ADNR............ Alaska Department of Natural Resources
AHRS............ Alaska Heritage Resources Survey
ANCSA.......... Alaska Native Claims Settlement Act
AOGCC......... Alaska Oil and Gas Conservation Commission
ASOS............ Automatic Surface Observing System
AWQS........... Alaska Water Quality Standards
BAT............... best available technology
BMP .... best management practices
bopd.............. barrels oil per day
bpd................ barrels per day
BPXA .... BP Exploration (Alaska) Inc.
BRPC............ Brooks Range Petroleum Corporation
cfs .... cubic feet per second
CAH .... Central Arctic caribou herd
CO .... carbon monoxide
CPAI .... ConocoPhillips Alaska, Inc.
cy .... cubic yard
DCOM........... Division of Coastal and Ocean Management
EA .... Environmental Assessment
EPA............... United States Environmental Protection Agency
ER................. Environmental Report
ESA............... Endangered Species Act
ºF .... degrees Fahrenheit
FDD .... Fish Distribution Database
FLIR .... Forward Looking Infrared Radar
fps .... feet per second
ft.................... foot/feet
HSE .... Health, Safety, and Environmental
IC .... Incident Command
IRA................ Indian Reorganization Act
KPL .... Kuparuk Pipeline
KRU .... Kuparuk River Unit
LACT............. Lease Automatic Custody Transfer
LMR .... Land Management Regulation
LOA............... Letter of Authorization

MDP.............. Mustang Development Project
MMS .... Minerals Management Service
mph............... miles per hour
MSL .... mean sea level
NAAQS .... National Ambient Air Quality Standards
NAD .... North American Datum
NEPA .... National Environmental Policy Act
NEPDG .... National Energy Policy Development Group
NMFS............ National Marine Fisheries Service
NO2 .... nitrogen dioxide
NPDES.......... National Pollutant Discharge Elimination System
NSB .... North Slope Borough
NWI............... National Wetlands Inventory
OASIS........... OASIS Environmental, Inc., an ERM company
ODPCP .... Oil Discharge Prevention and Contingency Plan
PBU .... Prudhoe Bay Unit
PM .... particulate matter
PSD .... Prevention of Significant Deterioration
RAI................ Reanier and Associates, Inc.
SO2............... sulfur dioxide
SPAR .... Spill Prevention and Response
TAPS .... Trans Alaska Pipeline System
TDS............... total dissolved solids
TLUI .... Traditional Land Use Inventory
TWUP .... Temporary Water Use Permit
UM .... Umiat meridian
USACE.......... United States Army Corps of Engineers
USCG .... United States Coast Guard
USDOE .... U.S. Department of Energy
USFWS......... United States Fish and Wildlife Service
USGS............ United States Geological Survey
VSM .... vertical support member
Y-K................ Yukon-Kuskokwim delta

EXECUTIVE SUMMARY

Brooks Range Petroleum Corporation, as the operator, is proposing to develop small oil reservoir prospects near the Kuparuk oil field. The project, designated as the Mustang Development Project (MDP), is west of the Kuparuk River and just east of the Miluveach River, 14.5 miles south of the Beaufort Sea, Alaska. The project will produce sales quality oil from a productive formation, the Kuparuk C sand. Production would likely continue for 15 years.

This Environmental Report identifies the existing conditions and discusses the potential environmental effects of the proposed MDP. There are economic benefits from the proposed action with potential and actual effects to the local tundra environment. Environmental effects could occur that are associated with construction activities, gravel placement over tundra, traffic, and associated operational activities.

The proposed development project is located in the North Slope Borough within leased lands owned by the State of Alaska. The currently proposed MDP consists of the following construction and operation activities:

- Construction of a 19 acre gravel production pad to support wells and processing facilities;
- Construction of a gravel access road, 4.4 miles in length, to connect the production pad to existing roads;
- Development of and gravel extraction from a new 1.3 million cubic yard gravel extraction site, 41.6 acres in area and located 3,000 ft. northwest of the existing North Tarn 1A well where the Mustang Development is proposed;
- Construction of a 32 foot wide, 3,000 foot long gravel access road to connect the gravel mine to the production pad.
- Ice road construction to support gravel mining, pad and road construction;
- Drilling and completion of 38 production and injection wells and well tie-ins;
- Installation of a three-phase central processing facility;
- Construction of a 1,000 ft. dry oil pipeline for transport of sales quality oil to the common carrier Alpine Pipeline;
- Construction of a 1,000 ft. source water pipeline for transport of seawater from the Alpine seawater pipeline to the Mustang Field for waterflood;
- Installation of utility buildings to include offices, control room, warehouse, and maintenance facility; and
- Installation of communications infrastructure.

Minor air quality impacts would occur from fugitive dust emissions from earth disturbance, hydrocarbon emissions from equipment use, and increased transportation activity. The risk of small petroleum spills would be present during construction and operations. Wetland vegetation removal and fills resulting from project related activities will impact an estimated 10.26 acres of high functioning (Category I) wetlands, 64.42

acres of high to moderate functioning (Category II) wetlands, and 24.47 acres of moderate to low functioning (Category III) wetlands. Short-term minor impacts include increases in water use, wastewater generation, noise, and hazardous and domestic waste generation.

Birds and mammals using the project area as habitat may be disturbed during construction activities. Because of the localized nature of the proposed action within an already developed region of the Arctic coastal plain (ACP) any potential impacts to wildlife are projected to be minor.

Three federally-listed threatened species (Steller's eider, spectacled eider, and polar bear) are found on the ACP. Two species, spectacled eider and polar bear, could use the proposed project area. Precautions to avoid and minimize impacts to these species have been established, and they will be further monitored during the life of the project.

There is one anadromous fish bearing waterway in the immediate area of the proposed MDP. The Miluveach River, located 620 ft. west of the proposed project contains Dolly Varden, broad whitefish and other whitefish species according to the Alaska Department of Game and Fish (ADF&G) Anadromous Catalog and Atlas (ADF&G 1998). Two other neighboring streams, Kalubik Creek to the east, and Kachemak River to the west of the proposed project area, are also anadromous streams but are 10 and 6 miles distant respectively from the proposed Mustang pad.

The overall socioeconomic impacts of the MDP would be positive at the local level due to increased employment and spending during construction and operations through 2027. Through taxation and creation of jobs, the MDP would provide economic benefits to the state and local communities including the North Slope Borough. These benefits include temporary jobs during construction, drilling, production and decommissioning of project facilities. Over the life of the project, significant benefits will accrue to the State and the North Slope Borough through the payment of royalties and taxes.

There should be no long-term effects on subsistence or subsistence resources or disproportionate impacts on minority or low income groups primarily because of the location of the project within the existing oil field infrastructure and distance from the nearest community (Nuiqsut; 16.4 miles to the southwest).

The primary unavoidable disturbances resulting from the proposed action would be related to construction activities occurring within the boundaries of the MDP. The impacts of the project would be short-term, relatively minor, readily mitigated, and confined to the project area.

1. INTRODUCTION

Brooks Range Petroleum Corporation (BRPC) proposes to develop several small oil accumulations on Alaska's North Slope and designated as the Mustang Development Project (MDP). This environmental report (ER) discusses the current Project, describes the affected environment, and evaluates alternatives and potential consequences of the proposed project.

The proposed action requires National Environmental Policy Act (NEPA) evaluation. The evaluation will be conducted by the U.S. Army Corps of Engineers (USACE), triggered by the placement of gravel fill in U.S. jurisdictional waters and wetlands. NEPA requires a full analysis and disclosure of potential environmental impacts of a proposed action and reasonable alternatives. The project permitting processes require specific permits and regulatory approvals from federal, state, and North Slope Borough (NSB) agencies.

1.1. Project Location

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 2M 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.

1.2. History of Operations in the Area

The North Tarn/Mustang area is located on an existing oil and gas lease adjacent to the KRU in the SMU. Exploratory drilling has been done from an ice pad located to the north of the Tarn Field and to the southwest of the Kuparuk Field. Access to North Tarn/Mustang ice pad has been provided by a 4.5 mile ice road that started near 2M pad in KRU.

In 2011, BRPC drilled its North Tarn #1 well and sidetrack (1A) with Nabors drilling rig 9ES.

North Tarn #1 was spud March 13, 2011. The well was drilled to a vertical depth of approximately 6142 feet and total measured depth of 6223 feet. Following well control issues the wellbore was cemented and plugged in accordance with protocols approved by the Alaska Oil and Gas Conservation Commission (AOGCC). Rig 9ES remained in place to drill the sidetrack North Tarn 1A.

North Tarn 1A was spud April 11, 2011. The well was drilled to a vertical depth of approximately 6042 feet and total measured depth of 6070 feet. Casing was run in the well to total depth and the rig mobilized off-site on April 21, 2011. The well was left in an operational shutdown status in accordance with protocols approved by the AOGCC.

In 2012, BRPC re-entered, flow tested, and suspended its North Tarn 1A sidetrack and drilled and suspended Mustang #1 using Nabors drilling rig 7ES.

North Tarn 1A was re-entered on January 6, 2012. The well was drilled to a vertical depth of approximately 6226 feet and total measured depth of 6250 feet. The well was flow tested for approximately 3 days and produced 3,499 MSCF Gas / 177 bbls oil / 332 bbls water. Upon completion of the flow test, the well was suspended on January 30, 2012 in accordance with protocols approved by the AOGCC. Rig 7ES moved off to drill Mustang #1.

Mustang #1 was spud on February 2, 2012. The well was drilled to a vertical depth of approximately 6170 feet and total measured depth of 9315 feet. The well was suspended in accordance with protocols approved by the AOGCC. The rig mobilized off-site on February 25, 2012.

1.3. Purpose and Need

The purpose and need for the proposed action is to allow BRPC to develop hydrocarbon accumulations on state oil and gas leases near the Miluveach River and generate financial return on its investment. BRPC proposes to conduct this action in a safe, cost-effective manner that is efficient in concept and designed to minimize impacts to the surrounding environment.

1.3.1. Purpose

The purpose of the MDP is to produce petroleum from several small oil accumulations on Alaska's North Slope and to deliver the oil to the Alpine common carrier pipeline and subsequently to the Trans-Alaska Pipeline System (TAPS) for shipment to market. Developing this resource will help increase domestic oil production for the United States. Maximum production of oil is expected to be approximately 15,000 barrels per day (bpd). BRPC expects to recover 40 million barrels of oil from the prospects. The project could sustain economic production for 15 years.

The Project will also provide economic benefits to the state and local communities including the NSB through tax revenue and creation of jobs. These benefits include temporary jobs during drilling and construction, long-term jobs supporting permanent operations, and post-operation jobs for decommissioning the facilities. Over the life of the project, significant benefits will accrue to the State and the NSB through the payment of royalties and taxes.

1.3.2. Need

President George W. Bush issued Executive Order 13212 on May 16, 2001, which directed the National Energy Policy Development Group (NEPDG) to promote domestic oil and gas production to meet the country's energy needs in the 21st Century. The NEPDG report (2001) directs federal agencies to expedite permits and other federal actions necessary for energy-related project approvals on a national basis. More recently, on July 12, 2011, President Barrack Obama issued an Executive Order 13580 establishing an interagency working group tasked with coordinating domestic energy development and permitting in Alaska (Office of the Press Secretary 2011). This order reiterates the need for increased domestic energy resource development, both on and offshore, and advocates for efficient domestic energy development and permitting in Alaska that is in compliance with health, safety and environmental protection standards.

Consistent with these policy directives, BRPC is developing the MDP to recover oil from domestic reserves for production and transport of oil to U.S. markets.

The U.S. currently imports approximately 45 percent (Statistics from U.S. Energy Information Administration, 2011). Domestic oil production is expected to decline over at least the next decade. The U.S. Department of Energy (USDOE) reports that overall domestic oil and gas production is declining, stifling domestic economic growth since the trade deficit caused by oil imports represents a major transfer of wealth and jobs from the U.S. to foreign competitors (USDOI and BLM 2004).

Although domestic oil production contributes to the health of the nation's economy, it has an especially significant effect to the State of Alaska, by generating revenue to the state through jobs, investment, taxes, and royalties. Development of this project will also provide new revenues to the NSB government as tax revenues continue to decline from existing oil fields.

The Prudhoe Bay and Kuparuk oil fields have peaked in production. Historically, large oil companies have dominated development of these fields, but smaller reserves are not necessarily economically viable for larger companies to develop. As a smaller independent oil company, BRPC is actively seeking to develop some of these smaller reserves that have been investigated, but have not been moved towards development by other companies. The MDP meets the needs of domestic oil production and jobs by actively developing known reserves.

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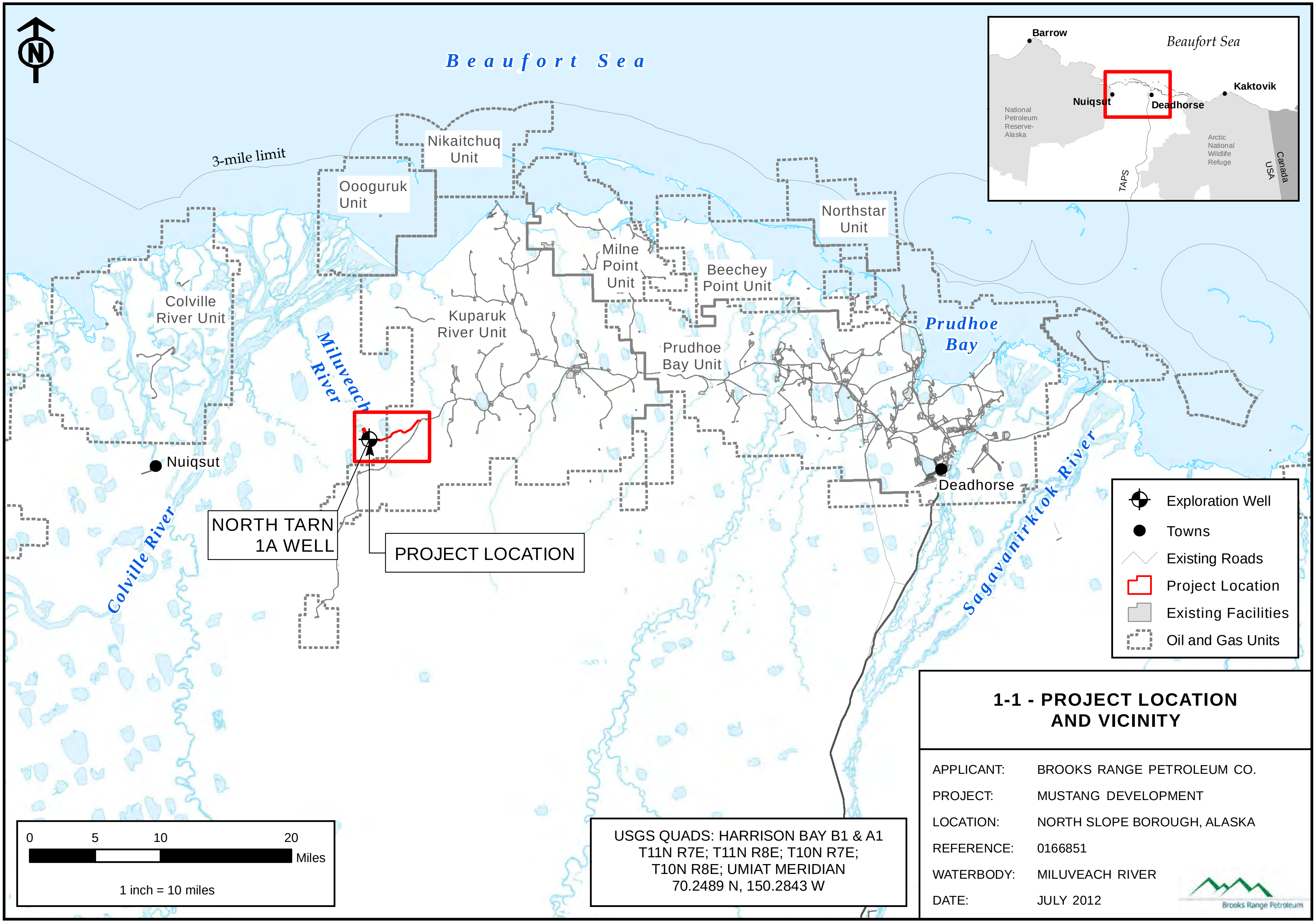

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2. PROJECT SUMMARY

Full details of the MDP are described in BRPC's Mustang Development Project Description (BRPC 2012).

Brooks Range Petroleum Corporation (BRPC) is proposing to develop the Mustang Oil Field within the Southern Miluveach Unit [SMU]. The development area is adjacent to the western boundary of the Kuparuk River Unit [KRU] on the North Slope of Alaska and is approximately 4.5 miles west of existing Kuparuk Drill Site 2M. The field will be developed as a standalone oil field with sales-quality crude transported via pipeline to the Alpine Transportation Company common-carrier pipeline.

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 bopd 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.

2.1. Primary Development Elements

The overall scope of the development includes the following major elements: 1) gravel mine development, gavel 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.

2.2. 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:

2.2.1. 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.

2.2.2. 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.

2.2.3. 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

2.2.4. Communications infrastructure

- Tower
- Communications Module

2.2.5. Wells

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

2.3. Water Volume Requirements

Water will be needed for all phases of the MDP. During the gravel mine and gravel road/pad building phase, water will be needed for construction of an ice-road and an ice pad. Water will also be required during developmental drilling to support rig operations and to support rig staff potable water needs. Upon startup of the MDP, water for dust control operations and to provide potable water for permanent staff will be required.

A 50-ft-wide ice road that parallels the gravel road route (approximately five miles long), and an ice road from the mine site (approximately one mile long) will require approximately six million gallons of fresh water, assuming that one million gallons of water per mile are needed for road construction and maintenance. One three-acre ice pad will be constructed approximately one mile from the Mustang gravel mine site, adjacent to the ice road, for staging and maintenance of equipment during the winter gravel haul season. Total water needed to construct and maintain the ice road and pad will be approximately six million gallons. During the construction phase of the Mustang development project, 30,000 gpd will be needed for potable water for 300 staff. Drilling operations will demand approximately 20,000 gallons per day (gpd) of water per rig, or approximately 600,000 gallons per month per rig. Potable water for the rig crew is estimated to be 8,000 gallons per day for 80 drill rig staff. Once drilling is completed, water needs will be less than 10,000 gpd for dust suppression and other operational uses. Approximately 3,500 gpd of potable water will be needed to support approximately 35 operations staff through end of field life.

2.4. Spill Prevention and Response

The MDP plan includes spill prevention measures, as well as spill response preparedness. A spill prevention, control and countermeasures (SPCC) plan will be developed for the Project in accordance with U.S. Environmental Protection Agency (EPA) regulations, and an Oil Discharge Prevention and Contingency Plan (ODPCP) will be prepared in accordance with Alaska Department of Environmental Conservation (ADEC) regulations to cover drilling, production/operations, and oil transportation. The ODPCP includes the following major sections:

- Response Action Plan describing deployment and response strategies for the facility and its operations including information on safety, emergency action, and incident reporting requirements;
- Prevention Plan describing pollution prevention measures and programs, personnel training, site inspection schedules, and maintenance protocols to prevent spills;
- Supplemental Information, including facility layout and description, the immediate environment, response logistical support and equipment, and spill response team training;
- Best Available Technology (BAT) presenting analyses of various technologies used and/or available for use at the site for well source control, pipeline source control and leak detection, tank source control and leak detection, tank liquid level determination and overfill protection, and corrosion control and surveys; and
- Response Planning Standard including oil discharge scenarios and response.

The project's ODPCP also includes site-specific measures and response scenarios. For the program to be authorized, the ODPCP will meet the requirements of ADEC's Spill Prevention and Response (SPAR) regulations (18 AAC 75).

2.4.1. Response Organization and Equipment

Alaska Clean Seas (ACS) will serve as BRPC's Oil Spill Removal Organization and primary Response Action Contractor for the MDP, as approved by the U.S. Coast Guard (USCG) and ADEC. ACS technicians will help assemble, store, maintain and operate the MDP's spill response equipment as they do for other North Slope oil operations.

Deployment strategies for spill response involving North Slope drilling operations are based on the capabilities generally provided by ACS (ACS 2003). Key elements for quick deployment include timely notifications and activation, appropriate transportation infrastructure, and trained personnel deploying readily available response resources.

On-site response equipment will be deployed immediately following safety and health assessment for securing spill sources. Deployment is directed by the initial Incident Command (IC) and by the trained responders at the spill site. On-site equipment is primarily for defensive actions and recovery of small spills. Larger spills will involve mobilization of additional resources from ACS.

North Slope operator spill response equipment is available through the ACS Charter. The ACS Master Equipment List provides a complete inventory of the available response equipment. A summary list of North Slope spill equipment is provided in the ACS Technical Manual, Volume 1, Tactic L-6.

Detailed equipment lists, locations, and maintenance schedules will be included in the Mustang Development Project's ODPCP. Available spill response equipment will include a variety of boom types, oil skimmers, portable tanks, pumps, hoses, generators, and wildlife protection equipment. To achieve the spill response capabilities described in the ODPCP, a range of specialized equipment dedicated to oil spill response will be staged on-site (Figure 2-1) on the west bank of the Miluveach River immediately adjacent to the proposed Mustang Production Pad. ACS will maintain all pre-staged equipment.

To respond to potential spills into the Miluveach River, spill response vessels will be maintained at the Spine Road crossing during the open water season, including shallow-draft boats capable of navigating shallow water common to the area. Other equipment involved in the day-to-day operations will be available to assist spill-dedicated equipment. For example, a front-end loader may be located at the Mustang Development Project Pad. This loader could be used to construct berms for diverting or containing spilled material. To minimize damage to sensitive environments and facilitate timely response, a pre-deployed exclusion/containment boom will be staged along the banks of the Miluveach River. If a spill were to occur during the open-water season the exclusion/containment boom will prevent a potential spill from spreading to the Lower Colville River, the Colville Delta or the Beaufort Sea.

2.4.2. Response Communication and Methods

ACS's mobile command center will support communications with oil spill emergency response teams. A communication plan will be designed for compatibility with communications equipment through BRPC's Anchorage office, ACS, and the MDP Pad and will be included in the ODPCP. The spill communication system is scalable in size and scope to serve both small- and large-scale response events.

Scenarios in the ODPCP describe numbers and types of equipment necessary to implement the planned response. These include the time frame for delivery and startup, recovery capacities, transit times, transfer rates, and storage of recovered oil and potentially contaminated snow.

The project facilities, which are designed to minimize the possibility of spills, will include secondary containment for fuels and hazardous materials, as required by state and federal regulations. Hydrocarbon storage tanks will have overfill protection systems in place meeting BAT. An employee spill prevention training program will increase preparedness and awareness and further reduce the likelihood of spills.

General procedures for prevention of spill incidents are contained in the ODPCP, which will be maintained onsite and will be available to all employees. BRPC will ensure that training focusing on oil spill avoidance and hazardous material spills is provided to its employees and contractors. Training will also be provided on spill response procedures.

Approved leak detection systems will be in place for pipelines and/or fuel storage tanks as required/applicable. Detection of discharges may also be accomplished by visual means as part of normal operations, scheduled site inspections, and ground observations from observers traveling the site. Specific onsite inspections will include visual observation of condition of tanks, lines and pumps. All above-ground piping will be visually inspected on a regular schedule.

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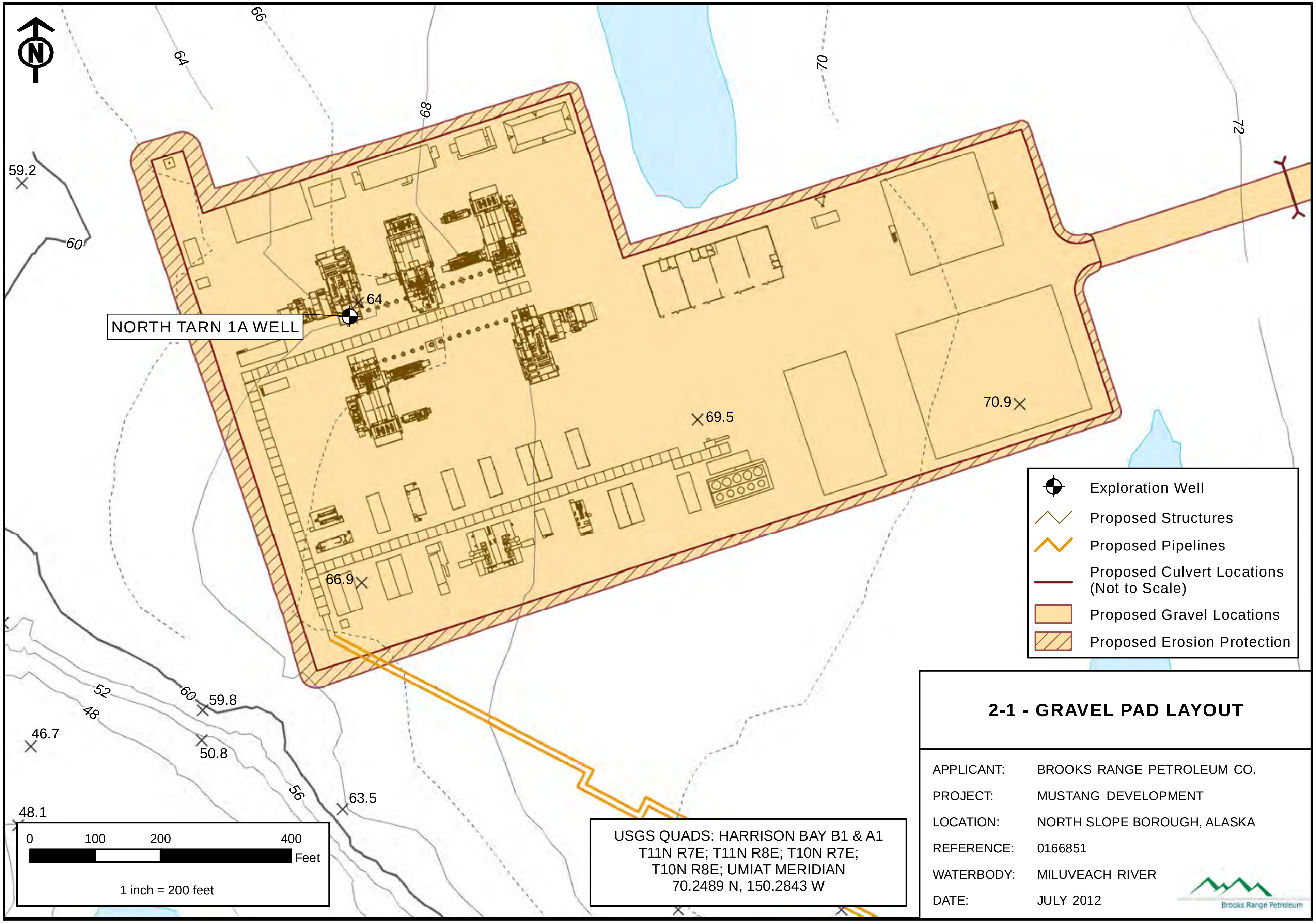

2-1 - GRAVEL PAD LAYOUT

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

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3. ALTERNATIVES TO PROPOSED ACTION

Three overall alternatives including the no action alternative were examined for development of the project based on technical feasibility, cost, and environmental impact:

- **Alternative 1**: No Action Alternative;
- **Alternative 2**: Alternative Road Route and Pad Location
- **Alternative 3**: Preferred Road Route and Pad Location

BRPC evaluated the biological, physical, and socio-economic impacts associated with each alternative. Because Alternative 2 and 3 vary only slightly in their road and pad alignment, BRPC's analysis concluded that impacts to biological, physical, and socio-economic for the two alternatives was essentially identical, with the exception of wetland impacts. Therefore, the following alternatives analysis focuses on the wetland impacts for each alternative. Refer to Chapter 5 – Environmental Consequences for a complete description of the anticipated biological, physical, and socio-economic impacts associated with this proposed project. The reader can assume that the biological, physical and socio-economic impacts associated described in Chapter 5 for Alternative 3 are the same for Alternative 2, with the exception of the difference in wetland impacts described below.

3.1. Alternative 1: No Action Alternative

A no-action alternative was considered and provides a baseline for comparison of the action alternatives. Under the no-action alternative, no construction of a drill pad, or gravel road would occur. This alternative does not meet the purpose and need of the project as described in Section 1.4. This alternative would not result in production of oil reserves and would not create an onsite processing site or road. Revenues, employment, contracting opportunities, and other indirect economic benefits to the NSB, its residents, and the state would not be realized.

3.2. Alternative 2: Alternative Road Route and Pad Location

The project design for Alternative 2 is nearly identical to Alternative 3 - the only difference being the alignment of the access road that connects the production pad to the existing roads; and the location and dimensions of the gravel production pad. Alternative 2 is illustrated in Figure 3-1 and consists of the following construction and operation activities:

- Construction of a gravel access road, 4.39 miles in length, and 28 acres of fill, to connect the production pad to existing roads;
- Construction of a 23 acre gravel production pad to support wells and processing facilities;

- Development of and gravel extraction from a new 1.3 million cubic yard gravel extraction site, 41.6 acres in area and located 3,000 ft. northwest of the existing North Tarn 1A well where the Mustang Development is proposed;
- Construction of a 32 foot wide, 3,000 foot long gravel access road to connect the gravel mine to the production pad.
- Ice road construction to support gravel mining, pad and road construction;
- Drilling and completion of 38 production and injection wells and well tie-ins;
- Installation of a three-phase central processing facility;
- Construction of a 1,000 ft dry oil pipeline for transport of sales quality oil to the common carrier Alpine Pipeline;
- Construction of a 1,000 ft source water pipeline for transport of seawater from the Alpine seawater pipeline to the Mustang Field for waterflood;
- Installation of utility buildings to include offices, control room, warehouse, and maintenance facility; and
- Installation of communications infrastructure.

Table 3-1 provides a summary of wetland impacts associated with each major project component by wetland type. (Refer to the MDP Jurisdictional Determination Report for a detailed description of the wetland delineation that supports the data summarized in Table 3-1). Table 3-2 provides a summary of wetland impacts associated with each major project component by wetland category. (Refer to the MDP Wetland Functional Assessment and Categorization Report that supports the data summarized in Table 3-2).

Wetland vegetation removal and fills resulting from Alternative 2 will impact an estimated 10.4 acres of high functioning (Category I) wetlands, 63.66 acres of high to moderate functioning (Category II) wetlands, and 27.87 acres of moderate to low functioning (Category III) wetlands, for a total of 101.93 acres of wetland impacts.

TABLE 3-1: ESTIMATED MUSTANG DEVELOPMENT ALTERNATIVE 2 FOOTPRINTS BY VEGETATION TYPE IN ACRES

Walker Classification Level C	Description	NWI* Class/ Subclass	NWI Hydro Modifier	Impacts Associated with Alternative 2 Project Components							
				Gravel Pad	Gravel Pad Access Road	Gravel Mine	Mine Access Road	Mine Berm	Pipeline VSMs	Total Acres	Percent of Total
Ia4	Ponds: waterbodies <20 acres, lacking vegetation	PUB	H	1.33	0	0	0	0	0	1.33	1.3
IIa	Shallow ponds w/ aquatic vegetation	PAB	H	0	0.12	0	0	0	0	0.12	0.12
IIIa	Wet Sedge Tundra	PEM1	E, F, H	0.04	0.14	0	0	0	0	0.18	0.18
IIIc	Wet Sedge Tundra/Water Complex (pond complex)	PEM1/AB	F, H	0	3.4	0	0	<0.01	0	3.40	3.34
IIId	Wet Sedge/Moist Sedge. Dwarf Shrub Tundra Complex (wet patterned-ground complex)	PEM1/SS1	B, E, F	8.18	11.99	39.41	1.57	4.32	<0.01	65.46	64.22
IVa	Moist Sedge, Dwarf Shrub/Wet Graminoid Tundra Complex (moist patterned-ground complex)	PEM1/SS1	B, E	0	9.07	0	2.80	0	0	11.87	11.65
Va	Moist Sedge, Dwarf Shrub Tundra	PEM1/SS1	B	1.09	0.63	0	<0.01	0	0	1.72	1.69
Vb	Moist Tussock Sedge, Dwarf Shrub Tundra	PEM1/SS1	B	12.31	2.64	2.17	0	0.72	<0.01	17.84	17.51
Total Acres**				22.96	27.99	41.58	4.37	5.04	<0.01	101.93	100%

*NWI: National Wetlands Inventory

**Slight differences in totals are due to rounding errors

TABLE 3-2: ESTIMATED MUSTANG DEVELOPMENT ALTERNATIVE 2 FOOTPRINTS BY WETLAND CATEGORY IN ACRES

Wetland Functional Category	Description	Gravel Pad	Gravel Access Road	Gravel Mine	Mine Road	Gravel Mine Berm	VSMs	Totals
I	High Functioning Wetlands. These are valuable, high functioning wetlands that may be regionally rare, difficult to replace, and are generally less common than wetlands in other categories.	0	10.4	0	0	<0.01	0	10.4
II	High to Moderate Functioning Wetlands. These wetlands may provide habitat for very sensitive or important wildlife or plants; be difficult to replace; or provide very high functions, particularly for wildlife.	9.55	8.82	39.41	1.57	4.32	<0.01	63.66
III	Moderate to Low Functioning Wetlands. These wetlands can provide important functions and be important for a variety of wildlife. These wetlands are generally less diverse than Category II wetlands.	13.41	8.76	2.17	2.80	0.72	<0.01	27.87
IV	Degraded and Low Functioning Wetlands. These wetlands are typically the smallest, often isolated with very little vegetation diversity, and generally already degraded by human activities. Regional differences allow for a more narrow definition of this category.	0	0	0	0	0	0	0
Totals		22.96	27.98	41.58	4.37	5.04	<0.01	101.93

3.3. Alternative 3: Preferred Road Route and Pad Location

The preferred project alternative includes the same construction and operation activities listed in Alternative 2 above, with two exceptions:

- Construction of a **19.34 acre** gravel production pad to support wells and processing facilities;
- Construction of a gravel access road, 4.4 miles in length, 28.82 acres of fill, to connect the production pad to existing roads using a slightly different alignment;

Table 3-3 provides a summary of wetland impacts associated with each major project component by wetland type. (Refer to the MDP Jurisdictional Determination Report for a detailed description of the wetland delineation that supports the data summarized in Table 3-3). Table 3-4 provides a summary of wetland impacts associated with each major project component by wetland category. (Refer to the MDP Wetland Functional Assessment and Categorization Report that supports the data summarized in Table 3-4).

Wetland vegetation removal and fills resulting from Alternative 3 activities will impact an estimated 10.26 acres of high functioning (Category I) wetlands, 64.42 acres of high to moderate functioning (Category II) wetlands, and 24.5 acres of moderate to low functioning (Category III) wetlands.

Alternative 3 results in 2.79 fewer acres of wetland impacts compared to Alternative 2 and the gravel pad alignment avoids a small lake.

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TABLE 3-3: ESTIMATED MUSTANG DEVELOPMENT ALTERNATIVE 3 FOOTPRINTS BY VEGETATION TYPE IN ACRES

Walker Classification Level C	Description	NWI* Class/ Subclass	NWI Hydro Modifier	Impacts Associated with Alternative 3 Project Components							
				Gravel Pad	Gravel Pad Access Road	Gravel Mine	Mine Access Road	Mine Berm	Pipeline VSMs	Total Acres	Percent of Total
IIa	Shallow water: shallow ponds w/aquatic vegetation	PAB	H	0	0.06	0	0	0	0	0.06	0.06%
IIIa	Wet Sedge Tundra	PEM1	E, F, H	<0.01	0.32	0	0	0	0	0.32	0.32%
IIIc	Wet Sedge Tundra/Water Complex (pond complex)	PEM1/AB	F, H	0	2.60	0	0	<0.01	0	2.60	2.26%
IIId	Wet Sedge/Moist Sedge. Dwarf Shrub Tundra Complex (wet patterned-ground complex)	PEM1/SS1	B, E, F	11.32	13.28	39.41	1.57	4.32	<0.01	69.89	70.49%
IVa	Moist Sedge, Dwarf Shrub/Wet Graminoid Tundra Complex (moist patterned-ground complex)	PEM1/SS1	B, E	0	8.94	0	2.80	0	0	11.74	11.84%
Va	Moist Sedge, Dwarf Shrub Tundra	PEM1/SS1	B	<0.01	1.48	0	<0.01	0	0	1.48	1.50%
Vb	Moist Tussock Sedge, Dwarf Shrub Tundra	PEM1/SS1	B	8.02	2.14	2.17	0	0.72	<0.01	13.05	13.17%
Total Acres**				19.34	28.82	41.58	4.37	5.04	<0.01	99.2	100.00%

*NWI: National Wetlands Inventory

**Slight differences in totals are due to rounding errors

TABLE 3-4: ESTIMATED MUSTANG DEVELOPMENT ALTERNATIVE 3 FOOTPRINTS BY WETLAND CATEGORY IN ACRES

Wetland Functional Category	Description	Gravel Pad	Gravel Access Road	Gravel Mine	Mine Road	Gravel Mine Berm	VSMs	Totals
I	High Functioning Wetlands. These are valuable, high functioning wetlands that may be regionally rare, difficult to replace, and are generally less common than wetlands in other categories.	0	10.26	0	0	<0.01	0	10.26
II	High to Moderate Functioning Wetlands. These wetlands may provide habitat for very sensitive or important wildlife or plants; be difficult to replace; or provide very high functions, particularly for wildlife.	11.32	7.81	39.41	1.57	4.32	<0.01	64.42
III	Moderate to Low Functioning Wetlands. These wetlands can provide important functions and be important for a variety of wildlife. These wetlands are generally less diverse than Category II wetlands.	8.02	10.75	2.17	2.80	0.72	<0.01	24.47
IV	Degraded and Low Functioning Wetlands. These wetlands are typically the smallest, often isolated with very little vegetation diversity, and generally already degraded by human activities. Regional differences allow for a more narrow definition of this category.	0	0	0	0	0	0	0
Totals		19.34	28.82	41.58	4.37	5.04	<0.01	99.2

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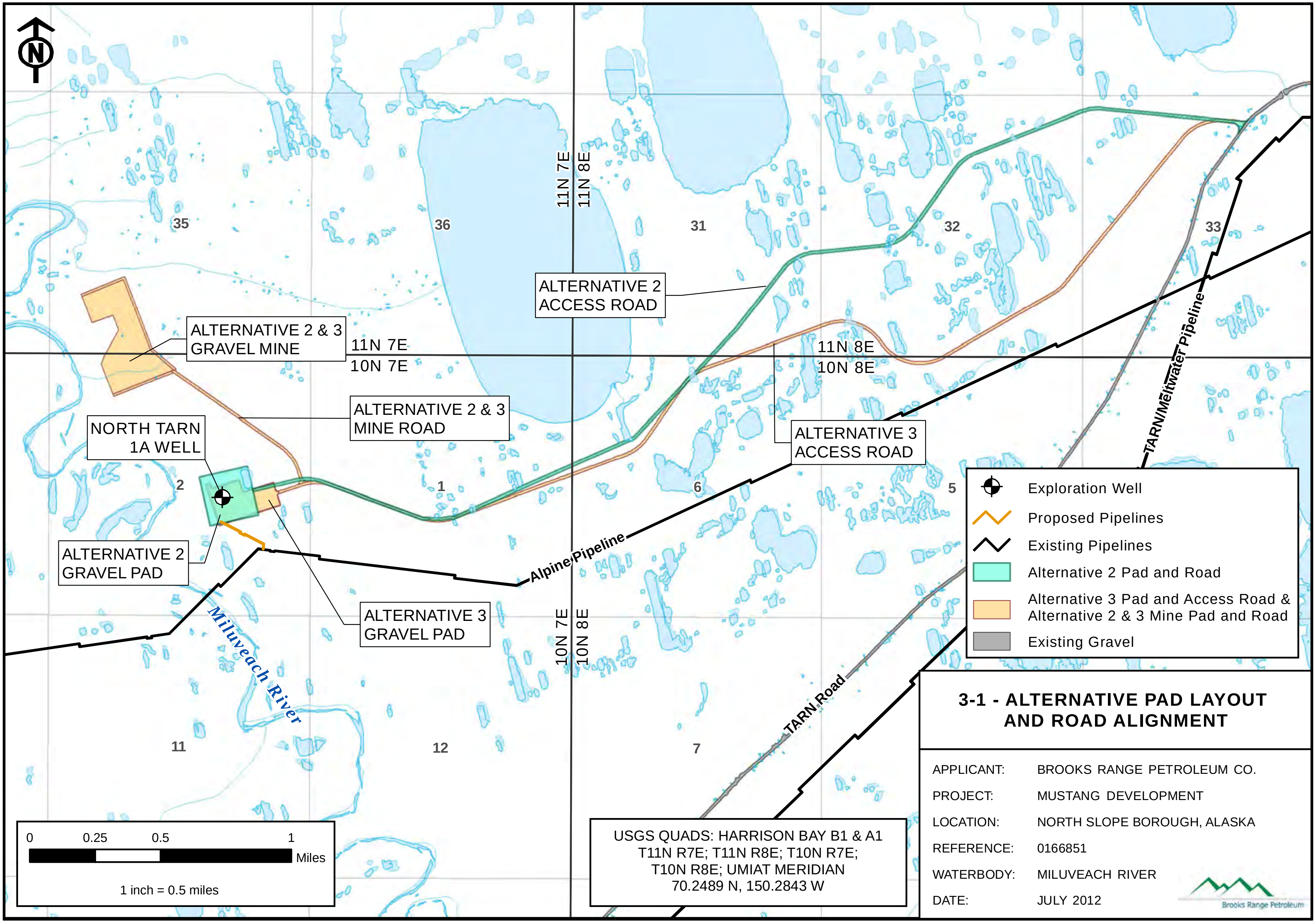

3-1 - ALTERNATIVE PAD LAYOUT AND ROAD ALIGNMENT

APPLICANT: BROOKS RANGE PETROLEUM CO.

PROJECT: MUSTANG DEVELOPMENT

LOCATION: NORTH SLOPE BOROUGH, ALASKA

REFERENCE: 0166851

WATERBODY: MILUVEACH RIVER

DATE: JULY 2012

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4. AFFECTED ENVIRONMENT

4.1. Geologic Environment

4.1.1. Geology

The project is within the Arctic Coastal Plain (ACP) physiographic province. This region is characterized by gently rolling topography, many shallow lakes and ponds, and poorly drained soils. When viewed from the air, the surface appears as contiguous, irregular polygons which have been created by ice formation in the surface and subsurface soils.

The project area is within the permafrost zone, where the subsurface soils below approximately two feet are continuously frozen. Surface deposits consist of recent unconsolidated marine silts, sands, clay, and outwash gravels, of the perennially frozen Gubik Formation which overlies Cretaceous or Tertiary rocks in the coastal plain (Black 1964).

Surface layer soils consist of peat underlain by silt and silty loam over layers of sand and gravel. Because of the flat topography, natural soil erosion is minor.

4.1.2. Seismicity

Seismicity of the project area and the surrounding Arctic slope region is considered to be relatively low (USACE 1999). Seventy-three earthquakes were recorded along the Arctic Coast from Point Barrow to the Canadian Border, ranging from 1.0 to 5.3 in local magnitude (local magnitude is analogous to the formerly used Richter scale) between 1937 and 1992 (USACE 1999). All significant (greater than 4.0 local magnitude) earthquakes on record for the North Slope between 1958 and 2003 were centered either to the south or to the east of Prudhoe Bay (AEIC 2006) and well away from the proposed project location. No seismic events resulted in damage to Prudhoe Bay facilities. Most earthquake activity in Alaska occurs along an arc extending east from the western edge of the Aleutian Islands, through Southcentral Alaska, and into the central Alaska interior.

4.1.3. Soils

Soils in the MDP area are underlain by permafrost, which exists at varying depths to approximately 2,000 ft. Snow and ice typically cover soils for most of the year. Decomposition rates are slow under Arctic environmental conditions, and organic matter accumulates over the mineral soil and parent materials as thick peat layers, particularly in low-lying areas (Nowacki et al. 2001). Cold temperatures and frozen conditions slow the process of soil formation, resulting in minor profile increases (Brady and Weil 1999).

In summer, the active layer thaws, typically within a few feet of the ground surface. Thaw bulbs are permanently unfrozen soils found in permafrost and are likely to be present within the project area below lakes and river channels and in areas disturbed by human activities (Rawlinson 1983). Regardless of thaw bulbs and the active layer, the presence of permafrost inhibits water drainage during the summer thaw, and combined with flat topography results in poorly drained soils that remain continuously wet (USDOI and BLM 2005) when they are not frozen.

4.2. Air Environment

4.2.1. Climate

The project area is located within the Arctic coastal climatic zone, which is characterized by short, cool, summers and long, cold, dry winters. The average annual temperature at Prudhoe Bay is 12 degrees Fahrenheit (°F) (Hoefler 2006). July is the warmest month, with temperatures averaging 41°F, while February is the coldest month, with average temperatures of -17°F. Temperatures are below freezing 80 percent of the year; snow covers the ground from approximately October through May. Daily and seasonal temperatures are moderated by the maritime effect of the Arctic Ocean during open water season. Almost two complete months of constant darkness occur in winter, while the sun is above the horizon for nearly two complete months during the summer.

4.2.2. Precipitation

The mean annual precipitation averages 3.1 inches in Kuparuk and occurs as rain and snow (MMS 2007). Relative humidity varies from 80 to 95 percent in the summer and drops to about 60 percent in the winter (ASRC 2004). Maximum precipitation occurs in August in the form of drizzling rain, while winter precipitation is light. Many times what is perceived as snowfall is actually blowing snow. Snow depth increases rapidly from mid-September through October and reaches a maximum of 12 to 16 inches in April, while snowmelt occurs from April to June. During the most extreme cold winters, snow depth can decrease because of blowing, drifting, and densification (MMS 2007). The snow tends to have a very light density and a granular structure.

4.2.3. Wind

The lack of trees and other natural wind barriers contributes to persistent strong winds that average approximately 12 miles per hour (mph) on the coast at Point Barrow (USDOI, BLM 2004). The average annual wind speed at Kuparuk Airport between 1973 and 1990 was 12.5 mph (Alaska Energy Authority 2005). Calms are very rare, occurring less than 6 percent of the time at the Kuparuk Airport (Alaska Energy Authority 2005). There is a bi-modal wind distribution, with winds from the east-northeast and east dominating the pattern and westerly and southwesterly winds occurring more infrequently. Farther inland the wind direction becomes more variable and wind velocity lessens (Olsson et al. 2002). A study of weather conditions in the mid-1990s established a 5-year record of wind speeds and characterized the Arctic slope as subject to nearly constant light to moderate winds (Olsson et al. 2002). At a weather station closest to the current project area the mean of average monthly wind speeds along the western edge of the Kuparuk River basin were approximately 8 mph (Olsson et al. 2002).

Strong storms with winds greater than 30 knots (34.5 mph) are least likely in the summer, and most likely in the fall (MMS 2007). Visibility is measured continuously at the Deadhorse airport as part of the Automatic Surface Observing System (ASOS). Conditions of blowing or drifting snow occur almost 25 percent of the year. The most restrictive visibility category (<1 mile) occurs approximately 10 percent of the year, with a minimum in summer and a maximum in winter because of blowing snow.

4.2.4. Climate Change

Temperatures in Alaska and throughout the Arctic have fluctuated over the last few centuries and are currently in a warming trend that is most evident at high latitudes. Possible impacts of global climate change on the North Slope include a shift in the composition of Arctic tundra plant communities, reduction in sea ice, and changes in the permafrost depth. Reduction in sea ice as a result of global climate change could affect marine mammals (particularly polar bears and seals), fish, and birds, with related implications for Native subsistence harvests (USDOI and BLM 2005). Reduction of sea ice is occurring faster than predicted by models forecasting climate change and modeling sea ice distribution. The accumulation of greenhouse gases (GHG), much of it caused by the burning of fossil fuels, has been implicated in the warming trend. Recently carbon dioxide in the Arctic atmosphere has passed the 400 parts per million (ppm) threshold which is concerning to scientists monitoring Arctic climate change (Anchorage Daily News, May 31, 2012).

4.2.5. Air Quality

Climatic conditions, topographic setting, and air pollution interact to influence air quality. Persistent winds and lack of significant topographic or vegetative barriers disperse most emissions in the region. The presence of aerosol haze in Arctic during winter and spring occasionally reduces local visibility. This well-documented haze may be caused by long-range transport of pollution from Europe and Asia (NOAA 2007).

Regional sources of emissions result from Prudhoe Bay, Milne Point, and Kuparuk facilities. Emission sources that exist include oil and gas production facilities and drilling rigs in the North Slope oil fields, small diesel-electric generators in the few communities in the area, and vehicle traffic.

The Nuiqsut monitoring site, located approximately 17 miles southwest of the project area, has been in operation since 1999. Data from the site are representative of regional air quality and indicate that it is virtually always in attainment with both the National Ambient Air Quality Standards (NAAQS) and the Alaska Ambient Air Quality Standards (AAAQS). An ambient air monitoring station was operated at the BPXA Endicott Production Facility from 2007 through 2008. Endicott is located about 55 miles northeast of the MDP. Ambient concentrations of nitrogen dioxide (NO2), carbon monoxide (CO), and sulfur dioxide (SO2) were measured (ASRC 2004). The data met data precision and accuracy quality assurance specifications and data capture requirements, demonstrating attainment with the NAAQS and AAAQS. ADEC has designated the area as "in attainment" of all air quality criteria.

Monitoring programs demonstrate that the NAAQS and AAAQS are met in the Prudhoe Bay industrial area. The EPA have classified the area as a Prevention of Significant Deterioration (PSD) Class II area, meaning that moderate deterioration of air quality would be allowed within the limits of PSD increments.

4.3. Hydrological Environment

4.3.1. Hydrology

Hydrology on the North Slope is heavily influenced by the arctic climate, which results in a thick layer of permafrost. Rivers in the vicinity of Prudhoe Bay cross the plain in complex channels and form large complex deltas at their outfall to the Arctic Ocean. The low relief of the plain results in low-gradient, meandering, and braided systems. Overland flows that are unconfined by defined channels are also prominent, especially during spring breakup, and can convey substantial discharge (Hinzmann et al., 1993).

Hydrologic conditions of the project area follow the pattern of the surrounding ACP. The annual hydrograph is dominated by spring flooding, following ice break-up. Fall rains also raise stream levels but during the remainder of the year conditions are at or near base flow. Stream systems are very “flashy” which means water level stages rise and fall quickly in response to precipitation events. This phenomenon happens because surface run-off is prevented from percolating downward by an impermeable permafrost layer and instead rapidly fills stream channels and is quickly transported downstream.

In spring, during breakup, ice jams can dam river channels and cause flooding. Ice can cause a variety of hydrologic/surface flow conditions that are difficult to predict and may change over time and year to year.

4.3.2. Miluveach River

The proposed project location is immediately to the East of the Miluveach River a tributary to the Lower Colville River which enters the East Channel of the Colville River Delta approximately 8.7 miles from the ocean. The Miluveach River drains the north slope of the Brooks Range and originates from several lakes located in the foothills. The River has a meandering pattern and deposits alluvial sediments (sand and gravel) as point bars along the inside bends of the river banks. The floodplain is approximately 0.5 miles wide adjacent to the proposed project area. The pad is planned to be located above a relic terrace outside of the active floodplain directly to the east of the river on tundra that is approximately 70 feet above mean sea level (MSL).

4.3.3. Lower Colville River and Colville Delta

The MDP does not cross any streams, but does lie within the Colville River drainage basin. The Colville River is one of the largest rivers on the North Slope and has the largest delta area of all rivers on the ACP. The river originates in the western Brooks Range and flows north and east across the ACP to the western Beaufort Sea approximately 120 miles west of Prudhoe Bay. The Colville River basin is 375 miles long, and drains a remote tundra area on the north side of the Brooks Range entirely north of the Arctic Circle. The river is frozen over for more than half of the year. Breakup and peak discharge occur over a three week period in late May. Because the region is underlain by continuous permafrost, the river is effectively isolated from deep groundwater (McNamara 1997).

4.3.4. Channel Patterns

Channel patterns are formed during high water flow during summer rainfall events. The highest flows are generally in late spring and are fed by ice and snow melt. Although the spring flows are higher (overbank flows occur annually), they are less likely to carve new channels because the riverbanks are still frozen during spring (MMS 2007). Wide fluctuations in seasonal flow are often intensified by shallow permafrost conditions.

In the spring, initial snowmelt from the upper basin flows over the frozen river surface and ponds behind snowdrifts and icings. As breakup progresses, these obstacles thaw or are overtopped, and the melt water is released downstream, until it ponds at snow or ice barriers further downstream. This storage-and-release process produces peak stream discharge (MMS 2007). River flows are minimal in winter. Spring breakup flooding begins in May, and flows continue through the summer and stop at freeze-up in early October.

4.3.5. Groundwater

Groundwater is limited in the ACP. Impermeable permafrost exists two to six feet below the ground surface and is continuous throughout the ACP. Permafrost can extend to depths of 2,000 ft. (Sloan 1987; Lachenbruch et al. 1988). Because of this limitation, groundwater within unfrozen soil can sometimes rise above the surface of the ground, causing sheet flow, which can occur from early May to late September. Groundwater, known as suprapermafrost groundwater, exists within the “active layer” (the seasonal thaw zone of soil) and is connected to and part of the surface water.

Suprapermafrost groundwater is present in localized unfrozen layers within the permafrost. It is also found beneath deep rivers and lakes which do not freeze to the bottom in winter. Large rivers and lakes deeper than six feet do not freeze to the bottom in winter but transfer heat downward, allowing a layer of unfrozen sediments to develop (Sloan 1987). These groundwater layers may be “open”, where they are connected to surface waterbodies, or “closed”, where they are isolated from surface water. Both the open and the closed types of shallow groundwater could potentially be found in the project area. Recoverable quantities of groundwater may be present where the thaw zone occurs in high-permeability gravel or sand sediments. Such shallow groundwater is likely to be present in the project vicinity beneath areas of the Miluveach River and deep, large lakes. Groundwater found in confined “closed” taliks within the permafrost can result from groundwater flow or when lakes fill in with sediment, reducing the heat input and allowing the surface to freeze over and encase the unfrozen zone. The volume of groundwater that can be recovered from closed taliks is usually limited due to barriers to recharge sources. Dissolved salts within the groundwater minimize freezing conditions, but also make the water potentially harmful to surface vegetation and unsuitable for drinking (BLM and MMS 2003; USDOI and MMS 2007).

4.3.6. Lakes

The ACP is dominated by many shallow lakes and ponds ("thaw lakes") that develop from small ponds in low-centered ice-wedge polygons (Sellman et al. 1975). Some small ponds have coalesced over time into larger lakes. There are several ponds and a few lakes in the project area.

Thaw lakes range in depth from just over three ft. to almost 20 ft (USACE 1999) and are classified as "shallow" or "deep" depending upon extent of freezing. Ice cover generally extends to about six ft. deep, which is the defining boundary between shallow and deep. Shallow lakes are underlain by permafrost, while deep lakes are underlain by a thaw depression in the permafrost (Sellman et al. 1975).

Regional lakes are recharged by rainfall and snowmelt in their basins and by flooding from nearby streams. Some lakes are recharged annually by flooding streams, while other lakes have been known to have residence life spans as long as 25 years (USDOI and BLM 2003).

4.3.7. Water Quality

Most fresh water on the ACP is pristine, soft, and dilute of calcium-bicarbonates. Near the Beaufort Sea coast, salt concentrations are greater than bicarbonate concentrations (USDOI and BLM 1998). The water chemistry of lakes and ponds is variable according to the distance from the Beaufort Sea, the frequency of flooding, and their connection to, or isolation from, river channels (termed "tapped" or "perched"). Lake water generally has lower total dissolved solids (TDS) than river water, but even river water is low in TDS and hardness (USACE 1999).

The Arctic freeze-thaw cycle affects water quality in ponds and lakes. Water shallower than 6 ft. usually freezes solid (Craig 1989), and solutes and particulates are excluded downward into the sediment. These materials are slowly released after the pond thaws. Deeper waters remain unfrozen, and concentrations of dissolved materials in the liquid water increase (Miller et al. 1980).

River turbidity peaks during breakup in May and June, and then decreases sharply later in the summer (USDOI and BLM 1978). North Slope streams are usually near oxygen saturation during the summer. During the winter, deeper waters in streams and lakes can become temporarily supersaturated with oxygen, as the dissolved oxygen is excluded from crystallizing ice (USDOI and BLM 1978), but this is followed by depletion of the oxygen later in winter.

Fresh water in the Arctic tundra is described as weakly buffered (USDOI and BLM 1978). This means that alkalinity increases in deep unfrozen water during winter. The pH values of rivers and streams are in the range of 6.5 to 8.5 (USDOI and BLM 1978), which is generally less acidic than in lakes and ponds. Generally, fresh water found on the ACP is low in trace metal content in comparison to most temperate waters (Prentki et al. 1980).

4.4. Biological Environment

4.4.1. Vegetation and Wetlands

BRPC conducted wetlands mapping for the proposed gravel roads and MDP Pad. The Wetland Functional Assessment and Categorization Report is provided as a separate document.

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).

A total of 2,014 acres were assessed in support of the proposed Mustang Development Project and of this area, 2,010.8 acres were classified and mapped as wetlands. There were 16 different vegetation/wetland communities identified during wetland assessment field work and aerial photo analysis (Table 4-1).

Further characterization of the vegetation communities was performed with information from site visits and by using guidelines presented by Walker and Weber (1975) and is presented in the Findings Section of the *Request for an Approved Jurisdictional Determination Report* (OASIS-ERM 2012). Please refer to the *Request for an Approved Jurisdictional Determination Report* and *Wetland Functional Assessment and Categorization Report* for additional wetlands information.

4.4.2. Birds

Bird species including seabirds (Laridae), loons (Gaviidae), waterfowl (Anatidae), shorebirds (Scolopacidae), raptors (Accipitridae), passerines (Order Passeriformes represented by dozens of families), and ptarmigans (*Lagopus* spp.) likely occur annually within the Mustang Development Project area (MMS 2007). Nearly all of these species are migratory and are present only during the summer breeding season from approximately late May and June through October. Some of the resident species that may overwinter include raptors, owls (Strigidae), ptarmigan (*Lagopus* spp.), and common raven (*Corvus corax*). For those species that are seasonal visitors migration to wintering grounds can take place as early as July or as late as November (USDOI BLM 2004). Spectacled and Steller’s eiders, both federally-protected species, are discussed in Section 4.5, Endangered and Threatened Species.

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)

Bird habitat found within the project area includes several types of tundra described as dry, moist, wet, flooded, and sparsely vegetated. Higher nest densities occur in drier areas (moist or wet tundra) and in areas of extensive micro-relief (e.g., polygon rims). A list of bird species potentially within or adjacent to the project area is presented in Appendix A.

4.4.3. Mammals

Terrestrial mammals that may occur in the project area include caribou (*Rangifer tarandus*), muskox (*Ovibos moschatus*), moose (*Alces alces*), grizzly bear (*Ursus arctos*), Arctic fox (*Alopex lagopus*), red fox (*Vulpes vulpes*), wolverine (*Gulo gulo*), gray wolf (*Canis lupis*), Arctic hare (*Lepus arcticus*), coyote (*Canis latrans*), and small mammals such as the Arctic ground squirrel (*Spermophilus parryii*), ermine (*Mustela ermine*), least weasel (*Mustela nivalis*), and microtines (USDOI and BLM 1998). These species occur across the North Slope and in many other parts of Alaska. Polar bears (*Ursus maritimus*) may occur in the project area in both terrestrial and marine habitats. Polar bears area addressed separately in ER Section 4.5, Threatened and Endangered Species. The terrestrial mammals that may be present in the project area are listed in Appendix B.

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)(Figure 4-1). 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). There is no record of permanent exchange of caribou between these herds, however (ADF&G 2001). The Mustang Development Project is located within the CAH calving and summer range. The CAH would likely be encountered during project operations, especially when caribou move to the Beaufort Sea coast for relief from high insect activity.

TABLE 4-1: VEGETATION AND WETLAND TYPES OF THE MUSTANG DEVELOPMENT PROJECT ASSESSMENT AREA, ALASKA

Walker Clasification 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. *Wetland Datapoints: None*
Ia3	Lakes: waterbodies >20 acres	L1UB	H	0.8	0.0%	0.0	0.0%	Freshwater lakes greater than 20 acres. *Wetland Datapoints: None*
Ia4	Ponds: waterbodies > 20 acres, lacking vegetation	PUB	H	65.1	3.2%	19.7	1.0%	Freshwater ponds less than 20 acres. Wetland Datapoints: None
IIa	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. *Wetland Datapoints: None*
IId	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. *Wetland Datapoints: None*
IIIa	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). *Wetland Datapoints: B4, B7, B18*
IIIc	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. *Wetland Datapoints: B1, B8, B11, B12, B22, B28*
IIId	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). *Wetland Datapoints: B6, B10, B13, B14, B21*
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). *Wetland Datapoints: B17, B19, B20, B29, B30, B24**
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). *Wetland Datapoints: B2, B5, B25*, B26**
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). *Wetland Datapoints: B3, B9, B16, B23*
Vc	Dry Dwarf Shrub, Crustose Lichen Tundra (Dryas tundra)	U		1.4	0.1%	0.5	0.0%	Dry Dwarf Shrub, Crustose Lichen Tundra (*Dryas* tundra, pingos). Uplands or wetlands. *Wetland Datapoints: B15*
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). *Wetland Datapoints: B27**
Xa	River Gravels	R2US	C	7.8	0.4%	4.5	0.2%	River Gravels. Riverine, Seasonally Flooded Areas (R2USC, R3USC). *Wetland Datapoints: None*
Xe	Gravel Roads and Pads	U		1.8	0.1%	1.8	0.1%	Gravel Roads and Pads. Upland/Unknown. *Wetland Datapoints: None*
XIa	Wet Mud	PUB	E	1.8	0.1%	0.0	0.0%	Wet, exposed mud. Largely unvegetated. *Wetland Datapoints: None*
Totals				**2014.0**	**100.0%**	**1320.8**	**65.6%**	

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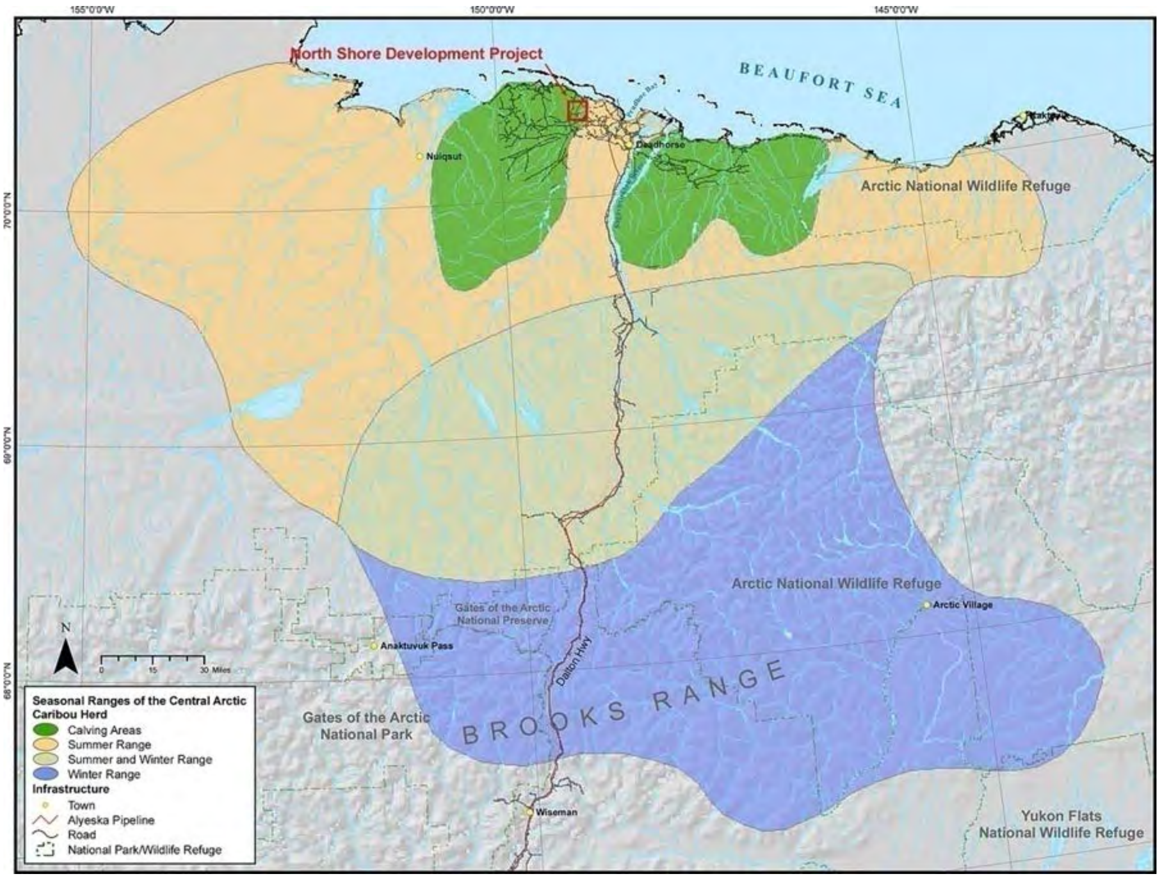

FIGURE 4-1: SEASONAL RANGES OF THE CENTRAL ARCTIC CARIBOU HERD

4.4.4. Fish

Surface waters closest to the proposed project area drain into the Miluveach River roughly 14.9 miles from the Beaufort Sea. The Miluveach River flows into the East Channel of the Colville River in the Colville Delta. This area is noteworthy for its important subsistence and small-scale commercial fisheries.

The fisheries fauna of the Arctic coastal plain is characterized by highly mobile species capable of exploiting marine, brackish and freshwater habitats. The species assemblage is dominated by whitefishes and char. These fishes have evolved to maximize their growth and reproductive potential by either migrating from freshwater to saltwater (anadromy) or being capable of moving back and forth between freshwater and saltwater as conditions and individual life stage dictate (*amphibdromy*). Fish species potentially present in the affected environment are Dolly Varden (*Salvelinus malma*), and whitefish including broad whitefish (*Coregonus nasus*), humpback whitefish (*Coregonus pidschian*) and least cisco (Coregonus sardinella). Resident species include ninespine stickleback (*Pungitius pungitius*), Arctic grayling (*Thymallus arcticus*), and slimy sculpin (*Cottus cognatus*). Other species likely to inhabit and/or visit the Colville Delta and its tributaries are included in Appendix C.

4.4.4.1. Fish, Habitats and Seasonality

Species distribution is highly dependent on time of year. The overall area of available fish habitat shrinks drastically during the long winter (essentially 9 months of the year) with water bodies less than 6 ft. in depth freezing solid to the bottom (Craig 1989). The majority of water bodies on the North Slope are simply too shallow to support fish year-round. During summer, shallow streams inaccessible to fish in winter, are used as migration corridors for feeding and spawning.

The proposed project area is close to several unnamed lakes and small ponds. The presence of fish in the larger, deeper thaw lakes near the project area has been inferred from the summer presence of loons (pers. comm. L. Moulton), which prey mostly on small fishes. Fish in these lakes may include Arctic grayling, ninespine stickleback, least cisco and whitefish. Both immigration and emigration of fish to and from these lakes is dependent on seasonal high water in spring and late summer which opens access to a network of stream channels; fish that are unable to exit these lakes before winter may be trapped there and are not likely to survive without adequate water depth.

Three nearby streams are listed in the State of Alaska's Anadromous Waters Catalog and Atlas (ADF&G 1998). They are (listed in from closest in proximity to the project to furthest from the project) the Miluveach River, Kachemak River and Kalubik Creek. The banks of the Miluveach River are approximately 620 ft. to the west of the proposed pad location. The river flows 12.4 miles in a meandering pattern toward the north and west before flowing into the eastern portion of the Colville River delta. Juvenile Dolly Varden utilize Miluveach River as rearing habitat and rearing habitat for broad whitefish has also been documented in the lower river reaches (ADF&G 1998). Broad whitefish inhabit the Colville Delta seasonally and it is a key feeding area for this economically important species. Arctic Cisco use the Colville Delta as an overwintering area while the most important feeding areas for Arctic cisco are in the coastal waters of the Beaufort Sea.

Kachemak River is located roughly 6 miles to the east of the proposed project area and also flows in to the Colville Delta. Kachemak River provides rearing habitat and summer feeding habitat for whitefish including broad whitefish and least cisco (ADF&G 1998).

Kalubik Creek is located 5.6 miles to the east of the proposed project and is habitat for Dolly Varden and whitefish including broad whitefish, round whitefish (Morris and Winters 2008) and least cisco (ADF&G 1998). Kalubik Creek is a beaded tundra stream that flows to the north and directly into Harrison Bay, a coastal area of the Beaufort Sea, east of the Colville River delta.

Least Cisco in the Colville Delta region spawn around river mouths. Arctic Cisco of the Colville Delta, however, spawn in the Mackenzie River Delta in the Canadian Arctic. Age-0 juveniles are transported west by wind-driven coastal currents that carry them to river deltas including the Colville Delta. There they grow to maturity before migrating back to the Mackenzie River as age-7 fish (Griffiths et al. 1998). Recruitment to the Alaska Beaufort Sea population is dependent on the strength of easterly winds because migration is largely passive. Although juveniles may overwinter in the Sagavanirktok River Delta, most juveniles and sub-adults overwinter in the brackish water of the

Colville Delta, which is the only river known to support significant numbers of Arctic Cisco (ABR 2007).

A zone of relatively warm (5-10 oC) and brackish (10-25 ppt) exists in the near shore areas of the Beaufort Sea, in summer (Craig 1984). These conditions are created by the influx of fresh water from many streams and rivers and by the shallow waters absorbing solar radiation. The result is an estuarine-like area and ideal foraging habitat for anadromous, amphibdromous, and some marine and freshwater species (Griffiths et al. 1998). The timing of this usage is critical for survival of species that must accomplish their annual growth needs and accumulate food reserves prior to the onset of winter (Craig 1989).

Arctic grayling is a freshwater species inhabiting most North Slope rivers. During summer they periodically enter brackish lagoons presumably to feed and to migrate from one river system to another. Because the species is stenohaline (not tolerant of wide salinity fluctuation), most of these forays occur early in the open-water season, when salinity levels near shore are low.

4.4.4.2. Human Use

Inupiat fishermen have harvested fish in the Colville delta dating back many generations (Moulton 2000). Arctic cisco (*Coregonus autumnalis*), in particular, is a valued food source by Inupiat subsistence users. The Inupiat community of Nuiqsut, located approximately 17 miles southwest of the project area, engages in subsistence fishing within the Colville Delta throughout most of year, but the greatest fishing effort takes place in summer and fall (ConocoPhillips 2005). Broad whitefish are targeted in summer while they use the delta for feeding and before they return to the upstream habitat of rivers for spawning (Moulton 1985). Fisheries targeting Arctic and least cisco commence in October after ice-up in the Colville River Delta. A small-scale commercial fishery has operated there since the early 1950's (Moulton 2001).

4.4.4.3. Marine Species of the Colville Delta

Arctic cod, a widely distributed species, is a key trophic species because of its importance in the diets of marine mammals, birds, and other fish species (Craig et al. 1982; Bradstreet et al. 1986).

Fourhorn sculpin are ubiquitous in Beaufort Sea near shore waters. They are a marine species and known to venture into deeper waters not frequented by anadromous or amphibdromous species (Griffiths et al. 1998).

4.4.4.4. Pacific Salmon in the Arctic

Although all five species of Pacific salmon present in Alaska waters are occasionally reported in the Beaufort Sea, these populations are considered marginal and near the outer boundaries of their range. Pink and chum salmon are probably most suited for survival after hatching in stream connected to the Arctic Ocean. The fry of these two species lacks a freshwater rearing stage and typically move downstream and directly into estuaries and the ocean. Recent reports suggest the incidence of salmon by-catch in subsistence fisheries has increased over the last 10 to 20 years co-occurring with measured climate change and retreating sea ice. However, to date no study has conclusively demonstrated an increase in the distribution range of Pacific salmon. Though salmon may indeed be increasing in the Beaufort Sea they are still exceedingly rare. While essential fish habitat (EFH) for salmon is found downstream of the proposed project area in Colville River Delta it is very unlikely that the current project will have any adverse effects on EFH for either Pacific salmon or other federally managed species such as Arctic cod (the only other species for which EFH has been designated).

4.5. Threatened and Endangered Species

The U.S. Fish and Wildlife Service (USFWS) administers the 1973 Endangered Species Act (ESA) for terrestrial and avian wildlife. The National Marine Fisheries Service (NMFS) administers the ESA for threatened and endangered marine mammals. An “endangered species” is a population of organisms at risk of becoming extinct either because individuals within the population are few in number, or are threatened by environmental change or predation patterns. A "threatened" status is defined as a species that is likely to become endangered in the foreseeable future. Currently 21 species of wildlife managed under USFWS and NMFS are listed as threatened or endangered in Alaska (USFWS/NMFS 2011). While there are no known endangered species in the MDP area, three species listed as threatened under the ESA could potentially occur in the Project area: spectacled eider (*Somateria fischeri*), Steller’s eider (*Polysticta stelleri*), and polar bear (*Ursus maritimus*). A fourth species, yellow-billed loon (*Gavia adamsii*) is a candidate for listing under the ESA and could occur in the project area.

4.5.1. Steller’s Eider

The Alaska breeding population of Steller’s eider was listed as a federal threatened species on June 11, 1997 (62 FR 31748 - 31757). The preponderance of the Steller's eiders breeding population in Alaska, nest on the Arctic Coastal Plain (ACP) primarily in the Barrow area (Quakenbush et al. 2002). No recent sightings have been reported east of the Sagavanirktok River and only a few sightings have occurred between the Colville and Sagavanirktok Rivers (Quakenbush et al. 2002). With the exception of a single inland sighting near the Colville River, nesting observations have not been reported east of Cape Halkett (Quakenbush et al. 2002). The extent to which Steller's eiders use offshore, Beaufort Sea habitat is unknown.

Annual indicated breeding-pair surveys conducted by the USFWS on the North Slope disclose an average density estimate of 0.0025 birds / km^2 for surveys between 1992 – 2006 and 2007 – 2010, approximately 6 times lower than that found in the Barrow area (Larned et al. 2011). Fluctuations and or shifts in annual distributions, coupled with aerial survey detectability difficulties, obfuscate density estimates for the Alaskan Steller’s eider population (Obritschkewitsch and Ritchie 2009). Larned et al. (2011) did not observe Steller’s eiders near the proposed MDP area during their eider surveys in 2010.

Causes of Steller's eider declines are unknown. Several potential threats have been theorized including contamination-induced habitat loss; lead poisoning through lead shot ingestion (USFWS 1997); predation; subsistence hunting; global climate change; and limitations due to specialized feeding behavior. Potential nest predators of Steller's eider include Arctic foxes (*Alopex lagopus*), short-tailed weasels (*Mustela erminea*), common ravens (*Corvus corax*), jaegers (*Stercorarius* spp.), and glaucous gulls (*Larus hyperboreus*).

The USFWS designated critical habitat for the Steller's eider in 2001 (66 FR. 8850 – 8884). Critical habitat includes the Y-K delta nesting areas and the Kuskokwim Shoals fall molting and spring staging area. Other critical habitat includes molting and staging lagoons along the north coast of the Alaska Peninsula including the Seal Islands, Nelson Lagoon and Port Moller, and Izembek Lagoon. Currently, there are no critical habitat designations for Steller's eiders on the North Slope of Alaska.

4.5.2. Spectacled Eider

The world's nesting populations of spectacled eider was listed as a threatened species on May 10, 1993 (58 FR 27474 - 27480). Reasons for spectacled eider population declines are unknown, however a combination of contributing factors likely include habitat loss, hunting, predation, lead poisoning, ecosystem change, contamination, parasites and disease (Stehn et al. 1993); and research activities (Bart 1977; Gotmark 1992).

Spectacled eider habitat includes tundra rich in lakes and wet polygonized coastal plains with numerous waterbodies and large river deltas (Dementev and Gladkov 1952, Kistchinski and Flint 1974, Warnock and Troy 1992). Nesting birds are mostly observed near flooded, vegetated shallow *Arctophilla* and *Carex* ponds with low ridges suitable for nest construction (Warnock and Troy 1992, Anderson and Cooper 1994, Anderson et al. 1995). Complex shorelines and small islands are characteristic as preferred nesting habitat (Larned and Balogh 1997). Spectacled eider nests have been found near polygon ponds, polygon series and polygon series complexes within 1m of the edge of the waterbody in the Colville River delta (Bart and Earnst, 2005). In the Kuparuk oil field, nests were observed in basin wetland complexes, and aquatic emergent vegetation (both aquatic grass and aquatic sedge) (Anderson et al. 2003). Nests have also been found along the tops of elevated perimeters on permanent water polygons containing emergent sedge or grass (Rothe et al. 1983, North 1990), and on the edges of deep open lakes (Bergman et al. 1977, Derksen et al. 1981).

Generally, spectacled eider densities decrease from west to east across the ACP, although localized areas of higher density occur near the Colville River and Prudhoe Bay (Larned et al. 2006, Figure 17). The MDP is located within the eastern portion of the ACP spectacled eider range. The Kuparuk River Unit, the closest developed project site to the MDP has been monitored for avian species from 1988- 1999 and again from 2000-2009. Spectacled eiders were monitored for distribution, abundance and productivity. Nine spectacled nests were located in the Kuparuk River unit in 2009, a mean of 11.2 nests annually between1993 and 2009 (Stickney et al. 2010) (Figure 4-2; potential spectacled eider nesting habitat) from late May to late September (ARRT 1999). Annual aerial surveys are conducted as part of the *Spectacled Eider Recovery Plan* administered by the USFWS (Larned et al. 2011). Surveys are timed to occur in early or mid-June to coincide with the peak presence of males on the breeding grounds (Larned et al. 2011). Current survey data indicate a statistically significant negative long-term trend in the ACP spectacled eider population (Larned et al. 2011).

The USFWS designated spectacled eider critical habitat for molting areas in Ledyard Bay and Norton Sound, breeding areas in the Y-K delta, and wintering areas in the Bering Sea south of St. Lawrence Island (66 FR 9146 - 9185). Critical habitat for spectacled eider has not been established on the ACP; however, the project is within the current breeding range for this species.

4.5.3. Polar Bear

The U.S. Fish and Wildlife Service (USFWS), the federal agency responsible for the management of polar bear populations, listed the species as threatened under the Endangered Species Act (ESA) on May 15, 2008 (73 FR. 28212 - 28303). Listing was determined after long-term evaluation of receding sea ice conditions concluded significant potential habitat loss. USFWS determined that population declines due to habitat loss warranted protection of the species.

The final Rule on critical habitat for the polar bear was issued on December 7, 2010 (75 FR 76086- 76137). Under the listing, critical habitat for polar bears has been defined to include an area 187,157 square miles of lands and waters along Alaska's northern coast from the Canadian Border to the northern half of the Seward Peninsula. Within that area there are three critical habitat types or units for the species: sea ice, terrestrial denning habitat, and barrier island habitat. The proposed project area is outside of designated critical habitat for polar bear. Maps of polar bear critical habitat are available at http://www.asgdc.state.ak.us/maps/cplans/subareas.html.

The seasonal distribution and local abundance of polar bears vary widely in the Beaufort Sea (Amstrup et al. 2000; Evans et al. 2003). Sea ice and food availability are the two most important natural influences on polar bear distribution.

Pregnant female Polar bears are known to den along river banks and at river deltas including the Colville and Kuparuk River Deltas. November through April is a critical life period for the species because it is the time when pregnant female polar bears are denning on land beneath the snow and are vulnerable to disturbance and den/cub abandonment. Work activities are not permitted during this time period within a one-mile radius of known polar bear den locations. The proposed project area (Figure 4-3; (potential polar bear denning habitat) is within maternal denning habitat for polar bear (Smith 2010).

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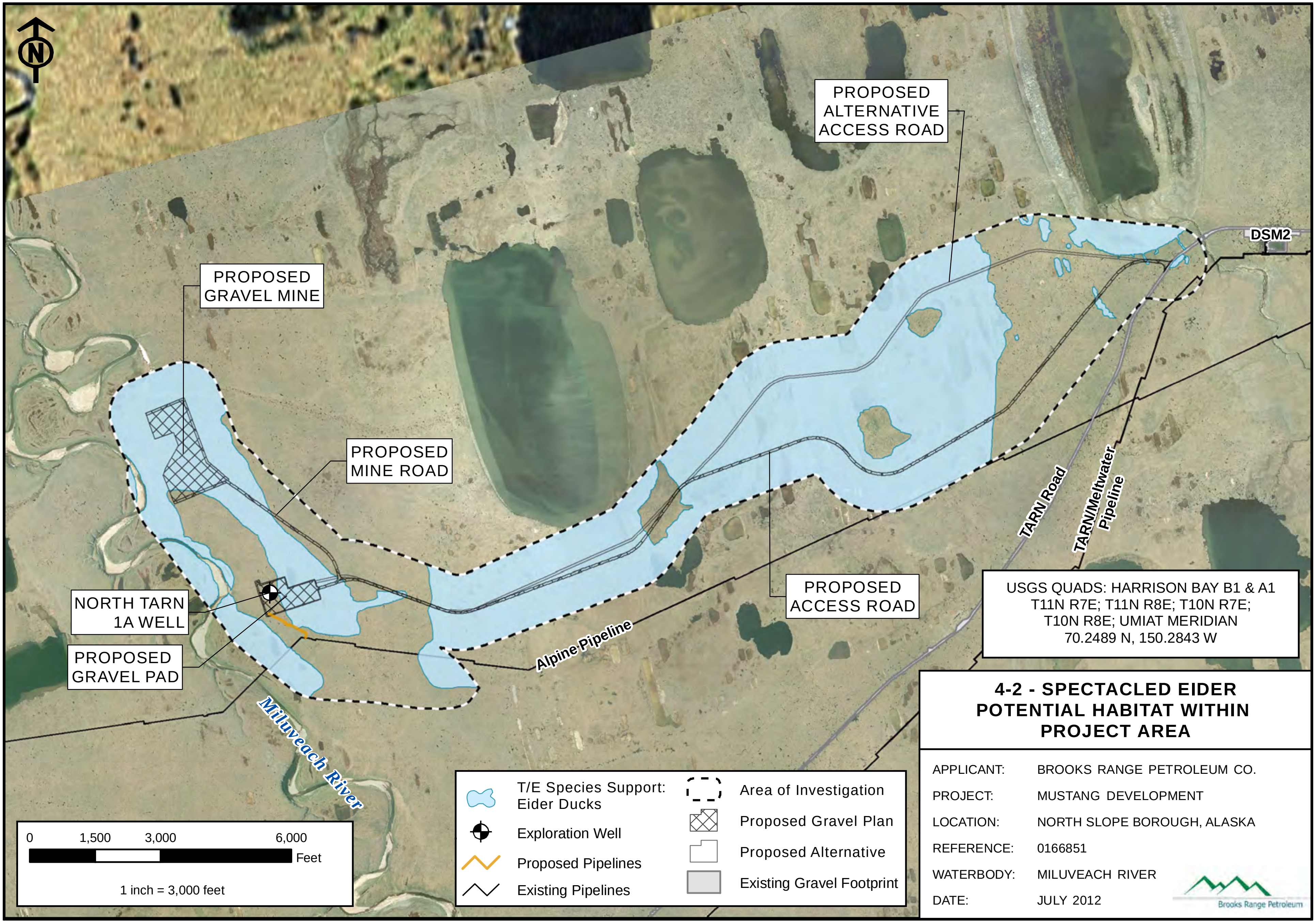

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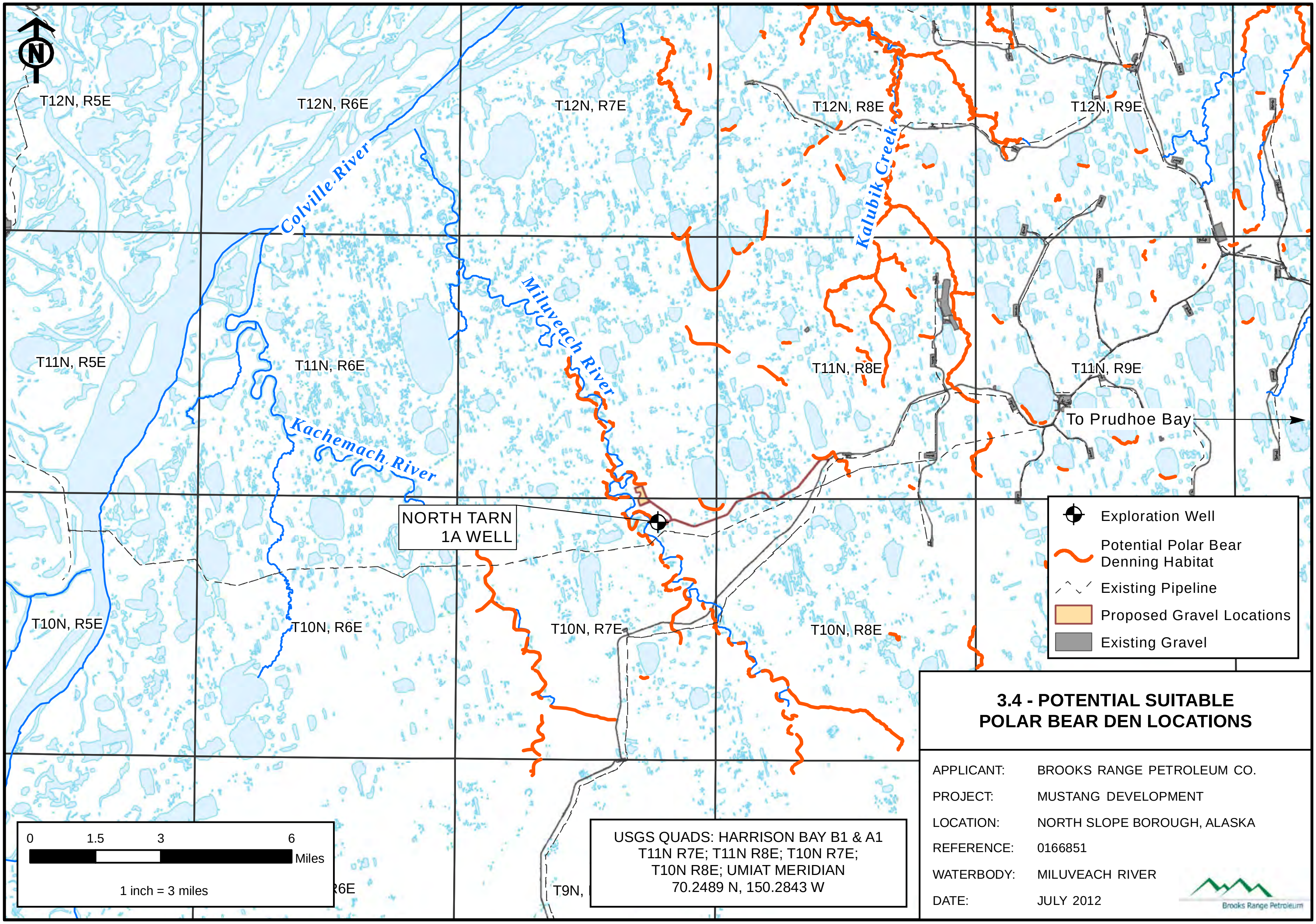

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4.5.4. Species of Special Concern

As of August 15, 2011, the Alaska Department of Fish and Game (ADF&G) no longer maintains a Species of Special Concern list. The list had not been reviewed and revised since 1998 and it is out of date and no longer considered valid (ADF&G 2012).

4.6. Human Environment

4.6.1. Cultural Resources

Cultural resources on the North Slope include sites and materials of prehistoric Native American, historic European and Euro-American, and historic Iñupiat origin. The archaeological record in the region extends from 7,000 years before present in the Prudhoe Bay area to more than 10,000 years before present in the Brooks Range south of the ACP. Sources of information about cultural resources include: Alaska Heritage Resources Survey (AHRS), maintained by Alaska Department of Natural Resources (ADNR), Office of History and Archaeology; Traditional Land Use Inventory (TLUI), maintained by the NSB (ADNR 2005; NSB 2003); and reports associated with oil and gas exploration and development.

The locations of the proposed ice road access roads and pads avoid known archaeological, cultural, and traditional land use sites. A site clearance investigation study was conducted within a one-mile wide corridor centered on the proposed ice road alignment. The ice road route and pad location were evaluated for the presence of cultural resources and none were identified that be impacted by the proposed exploration activities. The investigation was conducted by Dr. Richard Reanier of Reanier & Associates in August 2009 and was verified using updated Traditional Land Use Inventory (TLUI) data during August 2010. Dr. Reanier's findings have been submitted to the State Historic Preservation Officer (SHPO) and the Inupiat History, Language, and Culture (IHLC). On October 8, 2010, SHPO determined that no historical properties would be affected. If any object of prehistoric, historic or archaeological significance is discovered, notifications will be made immediately to the SHPO and every effort will be taken to protect the site from damage.

4.6.2. Communities

The two main human settlements nearest the project site are Nuiqsut and Deadhorse. The village of Nuiqsut is an Iñupiat community of over 400 people located at the head of the Colville River delta about 35 miles inland from the Beaufort Sea coast and approximately 17 miles southwest of the Mustang project area. Nuiqsut residents maintain a very strong attachment to their subsistence hunting and fishing lifestyle, and they harvest a significant portion of their food from local sources including fish, caribou, bowhead whale, seal, and waterfowl.

Deadhorse is an unincorporated community within the NSB. Essentially a large work camp for the oil industry, Deadhorse consists mainly of facilities for the workers and companies that operate in Prudhoe Bay and Kuparuk oil fields. The Deadhorse Airport, which is owned and operated by the State of Alaska, provides support to Prudhoe Bay operations and oil exploration and production activities. Alaska Airlines and oil company charters provide daily service to Deadhorse from Anchorage and Fairbanks. About 648 tons of cargo is transported by air to the North Slope annually (USACE 1999).

4.6.3. Land Ownership

Land and water surfaces in the project area are owned and managed by the State of Alaska. The project area is within the NSB.

4.6.4. Demographics

The NSB is the largest borough in Alaska, comprising 15 percent of the state. The borough includes eight villages: Anaktuvuk Pass, Atqasuk, Barrow, Kaktovik, Nuiqsut, Point Hope, Point Lay, and Wainwright. The 2010 Census listed 9,430 people residing in the borough. This represents a 27.7% increase in borough population from 2000-2010, a period in which the population of the State of Alaska as a whole increased by 13.3%. there are 2,049 households residing in the entire borough. There is roughly one person per 9.5 mi2. The ethnic makeup of the borough is 33.4 percent Caucasian, 1.0 percent African American, and 54.1 percent Native American, of which most are all or partly Iñupiat. The remainder of the NSB population is Asian (4.5%), Hawaiian or other Pacific Islander (1.1%), persons reporting two or more races (5.2%), and Hispanic (2.6%) (quickfacts.census.gov/qfd/states/02/02185.html).

The Village of Nuiqsut, located on the Colville Delta approximately 17 miles (27 km) from the project area is home to 402 people according to the U.S. Census Bureau 2010 data (quickfacts.census.gov/qfd/states/02/02185.html).

4.6.5. Government Institutions

The NSB, which is the main local government institution on the North Slope, provides most community services to its residents in each village. The NSB offers an array of services to its citizens through the following departments and programs:

- Mayor's Office
- Housing and Property Management
- Personnel Department
- Police Department
- Wildlife Management
- Administration and Finance
- Law Department
- Planning and Community Services
- Search and Rescue
- K-12 and Adult Basic Education
- Health and Social Services (open every day, available 24/7, staffed by health aides)

- Fire Department (with fire engines and ambulances)
- Municipal Services (electricity, water, sewer, trash disposal)

The NSB receives 97% of its revenue from property taxes on oil and gas activities. Most NSB communities have local governments that provide services to their community. These include Alaska Native Claims Settlement Act (ANCSA) village corporations, traditional village councils, Indian Reorganization Act (IRA) councils, and city governments. Nuiqsut's village corporation is the Kuukpik Corporation.

Non-governmental organizations include the Alaska Eskimo Whaling Commission, Iñupiat Community of the North Slope, and Kuukpikmiut Subsistence Oversight Panel, Inc.

4.6.6. Economy

Development of the oil fields around Prudhoe Bay has influenced the economy of the North Slope. The oil and gas industry is an important sector in the Alaskan and North Slope economies, providing substantial revenues to the state and the NSB. Economic activities in the region are driven primarily by oil field activities and by government employment (MMS 2002). Other economic contributors include the construction sector, tourism, manufacturing, commercial fishing, and Native arts.

Per capita household incomes have increased on the North Slope to an average of $75,057.00 per year which is greater than the State average of $66,712.00 per year (data from 2010 census; quickfacts.census.gov/qfd/states/02/02185.html). These increases, however, have been offset by the high cost of living in the region. Subsistence resources continue to be of economic and cultural importance to residents of the NSB (ASRC 2004). However, the adoption of modern technology through a mixed economy has raised the cost of participating in subsistence activities. The overall qualities of life within NSB communities have improved, and the percentage of families with income below the poverty line (7.8%) is less than the percentage of families with income below the poverty line in the State of Alaska (9.1%) (Data from 2010 census; quickfacts.census.gov/qfd/states/02/02185.html).

4.6.7. Subsistence

Subsistence uses are central to the customs and traditions of indigenous peoples in Alaska, including the Inupiat of the ACP. Subsistence customs and traditions encompass processing, sharing networks, and cooperative and individual hunting, fishing, gathering, and ceremonial activities. These activities are guided by traditional knowledge based on a long-standing relationship with the environment. Both federal and state regulations define subsistence uses to include the customary and traditional uses of wild renewable resources for food, shelter, fuel, clothing and other uses (Alaska National interest Lands Conservation Act [ANILCA], Title VIII, Section 803, and Alaska Statute 16.05.940[33]). The Alaska Federation of Natives not only views subsistence as the traditional hunting, fishing, and gathering of wild resources, but also recognizes the spiritual and cultural importance of subsistence in forming Native peoples' world view and maintaining ties to their ancient cultures (Alaska Federation of Natives 2005).

Subsistence hunting and fishing are traditional activities that include transmission of traditional knowledge between generations, maintain the connection of people to their land and environment, and support healthy diet and nutrition in rural communities in Alaska. ADF&G estimates that the annual wild food harvest in the Arctic is approximately 10.5 million pounds, or 516 pounds per person per year (Wolfe 2000). Subsistence harvest levels vary widely from one community to another as well as from year to year. Sharing of subsistence food is common in rural Alaska and can exceed 80 percent of households giving or receiving resources (ADF&G 2011). The term harvest and its variants, harvesters and harvested, are used as the inclusive term to characterize the broad spectrum of subsistence activities, including hunting, fishing, trapping and gathering.

Subsistence resource harvests differ among communities and may include bowhead whales, polar bear, caribou, and fish. Whaling is important to the Iñupiat, but caribou and fish are the most essential overall subsistence resource in terms of number of animals harvested and consumed.

Subsistence is part of a rural economic system called a "mixed, subsistence-market" economy, wherein families invest money into small-scale, efficient technologies to harvest wild foods (Wolfe 2000). According to Wolfe and Walker (1987), fishing and hunting for subsistence resources provide a reliable economic base for rural regions and these important activities are conducted by domestic family groups who have invested in fish wheels, gillnets, motorized skiffs, and snow machines. Subsistence is not oriented toward sales, profits or capital accumulation (commercial market production), but is focused on meeting the self-limiting needs of families and their extended kin and communities. Participants in this mixed economy in rural Alaska augment their subsistence production by cash employment. Cash (from commercial fishing, trapping, and/or wages from public sector employment, construction, firefighting, oil and gas industry, or other services) provides the means to purchase the equipment, supplies, and gas used in subsistence activities. The combination of subsistence and commercial-wage activities provides the economic basis for the way of life so highly valued in rural communities (Wolfe and Walker 1987). As one North Slope hunter observed: "The best mix is half and half. If it was all subsistence, then we would have no money for snow machines and ammunition. If it was all work, we would have no native foods. Both work well together" (Alaska Consultants Inc. et al. 1984).

Participation in subsistence activities promotes transmission of traditional knowledge from generation to generation and serves to maintain people's connection to the physical and biological environment. The subsistence way of life encompasses cultural values such as sharing, respect for elders, respect for environment, hard work, and humility. In addition to being culturally important, subsistence is a source of nutrition for residents in areas of Alaska where food prices are high. While some people earn income from employment, these and other residents rely on subsistence to sustain them throughout the year. Furthermore, subsistence activities support a healthy diet and contribute to residents' overall well-being.

Subsistence is regulated in multiple ways including federal and state regulations and local traditions, norms, and values that guide subsistence hunting and fishing practices. The federal and state governments regulate subsistence hunting and fishing in the state under a dual-management system. The federal government recognizes subsistence priorities for rural residents on federal public lands, while Alaska considers all residents to have an equal right to hunt and fish when resource abundance and harvestable surpluses are sufficient to meet the demand for all subsistence and other uses.

Historically, the North Slope has been inhabited by indigenous Inupiat populations which are comprised of two primary culture groups. The Tagiugmuit inhabited coastal areas of the Arctic Coastal Plain and the Nunamiut inhabited the Brooks Range and Arctic Foothills areas. Inupiaq is the language spoken by both North Slope cultural groups as well as in other areas of Alaska. Coastal Inupiat (Tagiugmiut) relied primarily on harvests of marine mammals, terrestrial mammals and fish, while their inland neighbors, the Nunamiut relied mostly on terrestrial mammals and fish, with caribou comprising the majority of their subsistence harvests.

Inupiat are still the primary occupants of the North Slope today and continue the hunting and harvesting traditions of their ancestors. Local residents often harvest subsistence resources from specific camps that are situated in locations that provide multiple resource harvest opportunities throughout the year. Harvest activities tend to occur near communities, along rivers and coastlines, or at particularly productive sites where resources are known to occur seasonally. Determining what, where and when a subsistence resource will be harvested is based on traditional knowledge about the distribution, migration, and seasonal variation of animal populations, as well as various other environmental factors (e.g., tides, currents, ice and snow conditions).

While some harvest locations may be used infrequently, they can still be important to a subsistence user or a community if they are particularly productive areas or if they have cultural, historical, or family significance to the user (USDOI, BLM 1978). Prior to the 1950s, when mandatory school attendance and economic factors such as a decline in fur prices compelled families to permanently settle in one of a few centralized communities, the Inupiat were highly mobile and ranged over large geographic areas for trapping, fishing, gathering, sealing and bird hunting activities. Contemporary subsistence use areas include many of these former areas. The advent of snow machines and all-terrain vehicles (ATVs) including four-wheelers, have reduced the time required to travel to traditional hunting and harvesting areas, but have also increased the need for cash employment to pay for purchase, maintenance and supplies for the new equipment (Ahtuangaruak 1997; Impact Assessment Inc. 1990a and 1990b; SRB&A and Institute of Social and Economic Research [ISER] 1993; Wori and Smythe 1986). The nomadic land use patterns once typical of North Slope Inupiat have evolved to the use of base camps consisting of tent platforms, cabins, and/or caches located near productive resource bases. Residents conduct subsistence hunting harvesting and processing activities from these locations (Impact Assessment Inc. 1990b; SRB&A 2010).

4.6.8. Environmental Justice

The NSB is comprised of minority and/or low income populations. Executive Order 12898 requires identifying and addressing potential environmental justice (EJ) impacts on minority and low-income populations resulting from federal actions, which in this case would be approval of the Plan of Development for the current Mustang Development Project. USEPA guidelines suggest that if a community exhibits ethnic or economic characteristics that are a minimum of 1.2 times the state average for these same characteristics, that the community or local population is considered an EJ population (EPA 1998). The community of Nuiqsut is considered an EJ population based on its percentage of the population made up of Alaska Natives (87.1%) being more than 1.2 times the state average of Alaska Natives in the state population (14.8%)(quickfacts.census.gov/qfd/states/02/02185.html).

Disproportionate impacts under the guidelines for environmental justice evaluations are circumstances where direct and indirect project impacts could affect minority or low-income population groups to a greater extent than the general population. If such disproportionate impacts are found to occur, then mitigation measures are needed to reduce, avoid, or eliminate these impacts.

5. ENVIRONMENTAL CONSEQUENCES

5.1. Geologic Environment

5.1.1. Geology

Alaska's North Slope is underlain by deep continuous permafrost that extends to depths of approximately 2,000 ft., the deepest occurring near Prudhoe Bay (NRC 2003). Permafrost is separated from the ground surface by an insulating active layer that thaws each summer to depths ranging from 8 inches to 6.5 ft. Changes in surface conditions from gravel pad and road development could disrupt the active layer, impound surface water, and cause subsidence, unstable ground conditions, and thermokarst. Thermokarsting, the warming and thawing of permafrost due to disruption of the tundra's surface, could pose problems during development of project infrastructure. The access road and production pad will consist of an insulating layer of gravel 6.5 ft. thick which will mitigate and minimize thermokarsting. Substantial impacts are not expected for surface or perched water tables in the project area.

Construction of the Mustang Development Project will cause minor changes to the local topography. The surface of the gravel structures will be constructed to an elevation of at least 25 ft. above MSL for 100-year flood events. In the Kuparuk and Prudhoe Bay oilfields, gravel roads are required to be built up to 6.5 ft. above the tundra surface (NRC 2003). Additionally, anticipated truck traffic will create road dust which could affect the thermal balance of the underlying permafrost from dust deposition.

5.1.2. Seismicity

Alaska is one of the most seismically active areas of the world, but the areas of highest earthquake hazard are along the Aleutian Islands and into Southcentral Alaska (Allen et al. 2009). Seismic activity in the North Slope region is relatively low and concentrated south and east of the project area. The Mustang Development Project is not expected to be adversely affected by earthquakes.

5.1.3. Soils

Soil erosion during construction is expected to be minor. All development drilling and production operations for the Mustang Development Project will be conducted from a gravel pad and accessed through the PBU gravel road infrastructure. Low-impact winter ice roads will connect the new gravel mine to the pad site to support gravel placement for construction of the gravel road and the Mustang Pad.

Petroleum spills can result in large areas of contaminated soils with reduced fertility both onsite and in adjacent areas. Cleanup is particularly difficult during summer when the ground is thawed and fluid is more difficult to remove. Spills on the Mustang Pad, from the pipeline, or on the gravel road would be cleaned up in a timely manner in accordance with the approved ODPCP, and in coordination with regulatory agencies, in order to reduce both onsite and offsite soil impacts to the extent possible.

5.2. Gravel Material Source

Brooks Range Petroleum Company (BRPC) proposes to develop a borrow site approximately 3,000 feet northwest of the existing North Tarn 1A well where the Mustang Development is proposed (Figure 5-1). The borrow site will support the construction and maintenance activities needed to develop the 32 foot wide all-season gravel resource recovery road, the Mustang gravel drill site and operations pad, and gravel extraction for maintenance operations.

After mining activities are completed, the post-development environment will include habitats that were not present at the site prior to mining. Specifically, the plan provides for the re-vegetation of exposed soils, creation of islands for waterfowl nesting, and creation of shallow littoral and deep water habitats. The deep water will also serve as a water source for future Mustang Development maintenance operations.

BRPC is proposing to permit a 41.6 acre, 1.3 million cubic yard gravel extraction site approximately 3,000 feet northwest of the Mustang Development pad. The borrow site will be developed in two separate times. The primary mine area consists of mining the southern three-quarters of the overall site. This cell will be 29.3 acres and be excavated to a depth approximately 30 to 40 feet below ground surface. The contingent mine area will develop the remaining 12.3 acres for a future project unknown at this time.

The mining plan will be implemented in four general stages.

- Stage 1: Segregate and stockpile organic overburden. Organic overburden consists of the top 1 to 2 feet of material. Typically, the top 0.5 ft. is organic mat and the material directly below is dark brown organic silt. This material will be used as topsoil for final restoration.
- Stage 2: Remove and stockpile mineral overburden. This material will be used for development of thermal dikes, restoration slope smoothing, littoral zone creation, and development of habitat islands.
- Stage 3: Mineral Extraction.
- Stage 4: Overburden replacement and restoration.

The placement of gravel for the production pad and the access roads will occur concurrently to accommodate the short seasonal construction window. Once the production pad and roads are constructed to the design elevation, additional gravel will be hauled and stockpiled to be used to finish the pad and roads to final grade after breakup. The proposed gravel mine depicted in Figure 5-1.

Additional mine development and rehabilitation details will be provided in the BRPC MDP 2012 Mine Plan.

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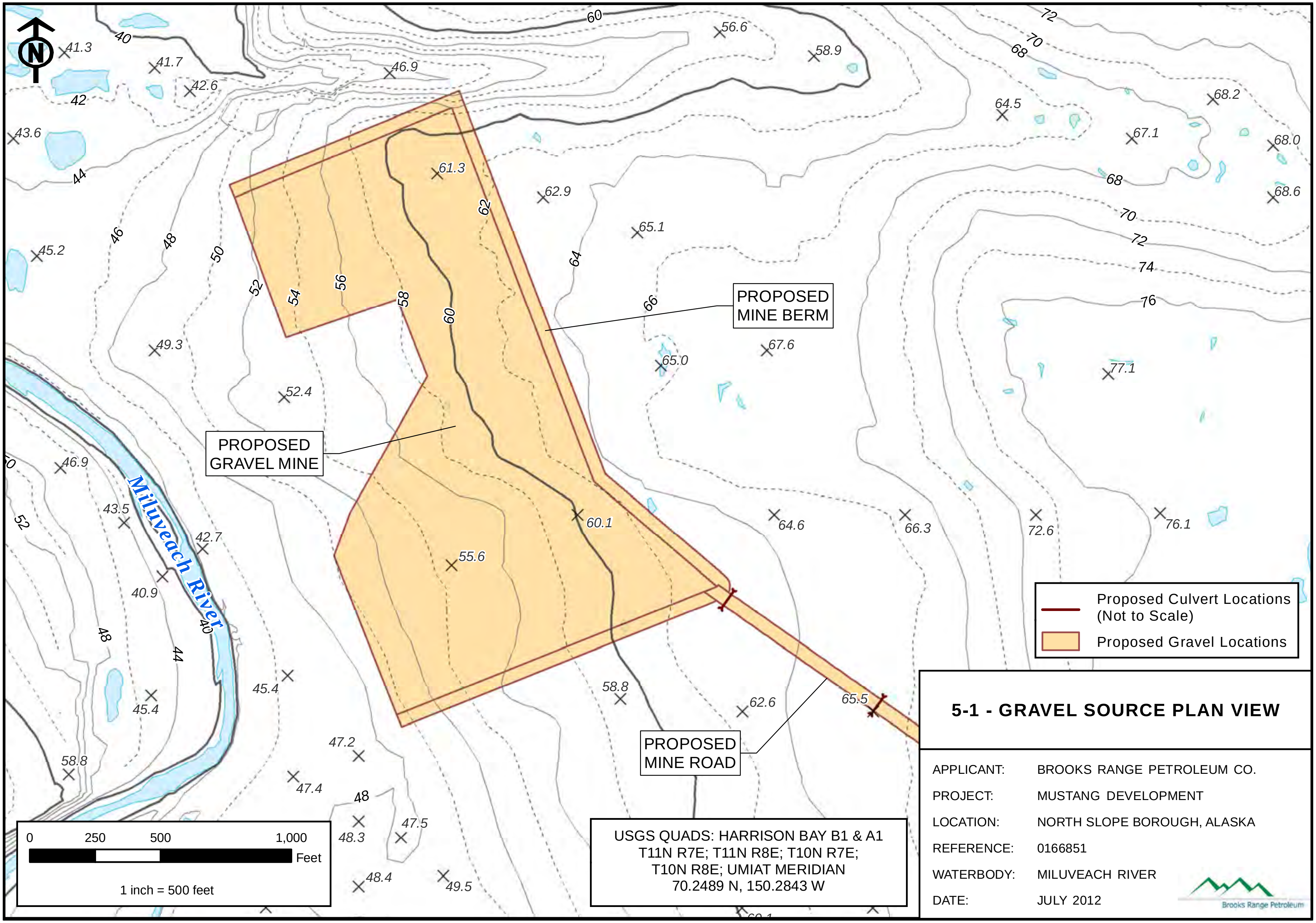

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5.3. Ice Roads

Temporary winter ice roads will be developed for gravel road and production pad construction. Ice roads will melt during spring thaw and will not cause major impacts to the tundra, riverine, and wetlands environments.

5.4. Air Environment

5.4.1. Climate

The North Slope of Alaska is bordered to the south by the mountains of the Brooks Range and to the north by the Arctic Ocean. These features act as natural barriers which separate the climate of the North Slope from the rest of the State (MMS 2007). The winters are cold and the summers are brief and cool with mean air temperatures above zero for three to four months. Storms with high winds can occur in the fall and fog is often prevalent in summer (MMS 2007).

The North Slope has been experiencing a warming trend for the past 56 years and is warming while the rest of Alaska has remained constant or cooled slightly (MMS 2007). The warming trend may bring about vegetation changes in the future if precipitation patterns continue to change as well. Precipitation has decreased by one third over the past 50 years and snowmelt/ice breakup occurs earlier in the spring than it has in the past (MMS 2007).

Construction and operation of the proposed production facility are anticipated to have no measureable influence on local climate.

5.4.2. Air Quality

Impacts to air quality would result primarily from fugitive dust and fossil fuel emissions. The majority of these emissions will be from dual-fueled turbines used to produce electricity and diesel-fired drill rig engines. The daily operation of trucks and heavy equipment would also provide an emission source, along with minor sources including heaters, boilers, emergency back-up generators, etc.

Effects on air quality from emissions would constitute a very small percentage of the maximum allowable PSD Class II increments. It is expected that the Mustang facilities will require a Minor Permit from ADEC. As part of the ADEC air permitting, an assessment of air quality impacts has to be conducted. The air quality assessment is expected to show that the emissions will not result in non-attainment with ambient air quality standards with the possible exception of the NO2 1-hour ambient standard that was promulgated in 2011. Potential impacts of development activities to air will be mitigated by designing process facilities which minimize carbon dioxide and other greenhouse gas emissions. This will be further accomplished by optimizing the maintenance and operation of fuel-burning equipment to ensure efficient combustion.

5.5. Hydrological Environment

5.5.1. Hydrologic Considerations

The presence of perennial frozen soils and ice during breakup can cause a variety of hydrologic/surface flow conditions that are difficult to predict and may change over time and year to year. To respond to the dynamic nature of hydrologic conditions BRPC proposes the following design features.

All proposed gravel structures including the MDP Pad, gravel road, and associated support pads are designed to:

- Protect the structural integrity of facilities;
- Maintain permafrost integrity;
- Minimize change to the existing hydrologic regime; and
- Maintain wetland structure and function.

Maintaining the structural integrity of the proposed gravel structures requires an evaluation of potential flood conditions to avoid deterioration in structural integrity of the gravel. Pad and road design and the site of the pad and road route have used the most current and accurate information, including ortho-rectified aerial photography, high-resolution contour mapping, and on-site inspections and surveys to ground-truth the aerial data.

5.5.1.1. Flood Potential Analysis

A 1-Dimensional hydraulic model was built of the Miluveach River in the immediate vicinity of the proposed Mustang Development. The model, built using HEC-RAS, was developed using high-resolution contour mapping that does not include topography of the Miluveach River channel. Therefore, estimated water surface elevations predicted by the model are conservative (i.e. biased high) as flood conveyance in the channel was not accounted for. The 100-year discharge used in the analysis was estimated using USGS Region 7 regression equations (Curran et al, 2003). A sensitivity analysis was conducted to address variations in channel and overbank roughness along with fluctuations in energy slope. Hydraulic modeling was performed under open channel conditions (i.e. free of snow and ice). As noted previously, ice jams can significantly affect peak stage.

Basic hydraulic analysis of the Miluveach River, at the proposed project site, concluded that the 100-year estimated water surface elevation is well below the proposed pad elevation of 68-feet. Based on the proximity of the proposed pad in relationship to the Arctic Coast, storm-surge influences are not anticipated at the project site. Consequently, the risk of flooding or erosion of the pad, with respect to the 100-year flood event, is minimal. A more detailed hydraulic analysis is recommended if placement of gravel roads or additional infrastructure is considered at an elevation below the proposed pad.

5.5.1.2. Maintenance of Channel Patterns

To maintain overland flow, surface water equilibrium, and hydrologic connections between and within wetlands, 50 culverts would be installed along the gravel access roads. Preliminary locations of these culverts are illustrated in Figure 5.2. The culverts at a minimum will be 24 inches in diameter and designed to maintain drainage during spring breakup and summer/fall precipitation events.

Culverts will be set in the winter after all the gravel hauling is complete. Based on previous experience it is anticipated that about 10 percent of new culverts will settle or need to be reset in summer.

The gravel road alignment was designed to be built on the highest topographical areas to avoid impacts to surface water by avoiding direct impacts to large lakes and ponds. The Mustang Pad will be situated 14.6 miles inland from Harrison Bay and will not affect marine waters.

5.5.2. Lakes and Lake Water Sources

Water will be needed for all phases of the MDP (construction, production, operations, and maintenance) and will be withdrawn from several lakes located nearby. Water removal from these lake sources will not affect the overall lake volumes due to seasonal recharge of the lakes. Lakes M9514, and K214 will be used for the construction of ice roads and pad construction. Water withdrawal limits are in place with respect to two other lakes under ADF&G Title 16 permits. The allowed combined annual withdrawal is approximately 89.88 million gallons.

A 50-ft.-wide ice road that parallels the gravel road route (approximately 5 miles long), and an ice road from the mine site (approximately 1 miles long) will require approximately 6 million gallons of fresh water, assuming that 1 million gallons of water per mile are needed for road construction and maintenance. One 3 acre ice pad will be constructed approximately 1 mile from the Mustang gravel mine site, adjacent to the ice road, for staging and maintenance of equipment during the winter gravel haul season. Total water needed to construct and maintain the ice road and pad will be approximately 1.6 million gallons. During the construction phase of the Mustang development project, 30,000 gpd will be needed for potable water for 300 staff. Drilling operations will demand approximately 20,000 gallons per day (gpd) of water per rig, or approximately 600,000 gallons per month per rig. Potable water for the rig crew is estimated to be 8,000 gallons per day for 80 drill rig staff. Once drilling is completed, water needs will be less than 10,000 gpd for dust suppression and other operational uses. Approximately 3,500 gpd of potable water will be needed to support approximately 35 operations staff through end of field life.

5.5.3. Groundwater

Project plans do not include utilizing any ground water; therefore effects on groundwater are not anticipated from construction and operation of the Mustang Development

Project. The Project pads and road will be constructed during winter and suprapermafrost groundwater will not be encountered.

5.5.4. Water Quality

National Pollutant Discharge Elimination System (NPDES) permits will be required for minimizing impacts of wastewater discharges to waters within or adjacent to the project area. The status of permits for NPDES discharges has recently changed. The previous EPA NPDES General Permit for Facilities Related to Oil and Gas Extraction (AKG-33-0000) expired on 1/2/09 but was administratively extended until a new permit could be issued. The new general permit (GP) authorizes the same discharges to wetlands except for domestic wastewater. The previous NDPES GP (AKG-33-0000) lists domestic wastewater as one of the discharges covered under the general permit, but when re-issued (AKG-33-1000), this discharge was not included. Instead, BPRC will conduct domestic wastewater discharges under and in compliance with the ADEC domestic wastewater permit (AKG-57-0000).The current permit allows discharge to wetlands of gray water, gravel pit dewatering, construction dewatering, hydrostatic test water, storm water, and mobile spill response activities. As mandated, BRPC will take steps as required under the new permit for discharges resulting from excavation dewatering, stormwater, hydrostatic test water, and mobile spill response activities.

In addition to permitted discharges, spills of oil and other substances could occur. The Project's facilities will lie within wetland areas and near water bodies potentially at risk from such accidental releases. Mandatory safety measures and protocols designed to limit the occurrence and frequency of spills are an integral part of industry operations on the North Slope. An ODCP will be in place during development and operations of the North Shore Development Project to avoid and minimize any potential impacts to water quality for local water bodies. As part of this plan, BPRC will develop and follow BMPs for all fuel handling, storing, and dispensing activities associated with production.

In some circumstances, spilled substances may spread to nearby waters and wetlands. In accordance with procedures that will be developed and followed in the contingency plan, such spills are typically cleaned up quickly. The extent of impacted areas will depend on the type and amount of material spilled and the timing, duration, and location of the spill. Although unlikely, spilled substances entering small streams may possibly spread to the Colville River, its delta, and coastal areas causing impacts to wildlife and fish. Risks from these spills are probably less than those from other activities ongoing on the North Slope, because the equipment and operations used in this project will adhere to the latest technology.

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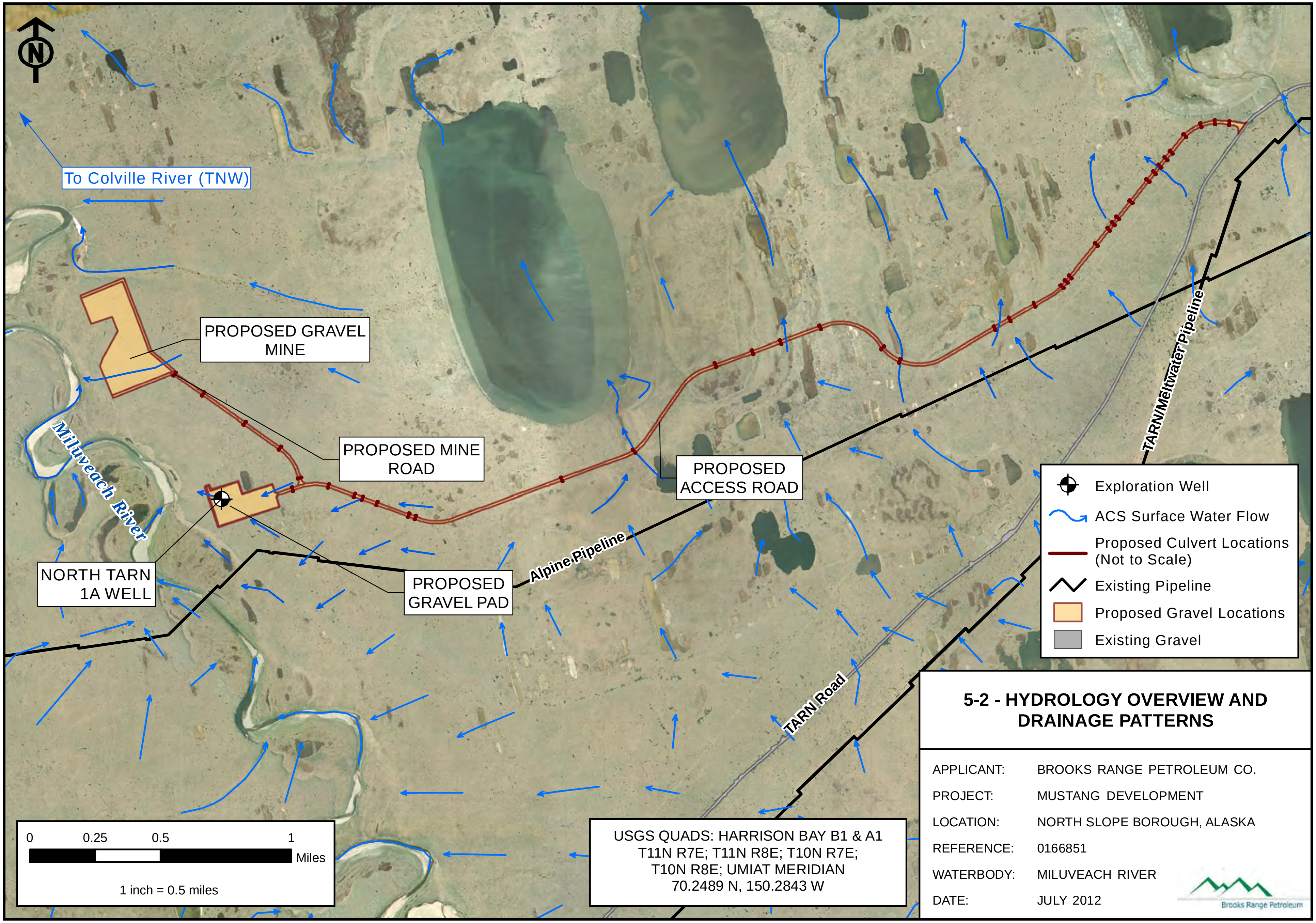

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5.6. Biological Resources

5.6.1. Vegetation and Wetlands

Wetlands and vegetation will be covered by gravel during the construction phase of the project. However, high value wetlands have been avoided to the greatest extent practicable during siting of the pads and access road. Additionally, facility construction will be confined to the winter months reducing impacts to adjacent vegetation. Development will take place on ice pads, roads and frozen lake surfaces to minimize impacts to vegetation and wetland communities. Table 5-1 quantifies project impacts to wetlands by Walker Vegetation type (Part A) and Functional Category (Part B).

Field wetland delineations were conducted for the proposed gravel road and Pad. BRPC will avoid riparian wetland habitats and minimize impacts to other wetlands types using BMPs such as silt fences and hay bales during ice- and snow-free periods as necessary.

TABLE 5-1: IMPACTS ASSOCIATED WITH PROPOSED PADS AND ROAD BY WETLAND TYPE (PART A) AND FUNCTIONAL CATEGORY (PART B)

Part A

Walker Vegetation Type	Access Road	Gravel Mine	Gravel Pad	Mine Berm	Mine Road	Pipeline VSMs	Total Acres
IIa	0.06	0	0	0	0	0	0.06
IIIa	0.32	0	<0.01	0	0	0	0.32
IIIc	2.60	0	0	<0.01	0	0	2.60
IIId	13.28	39.41	11.32	4.32	1.57	<0.01	69.89
IVa	8.94	0	0	0	2.80	0	11.74
Va	1.48	0	<0.01	0	<0.01	0	1.48
Vb	2.14	2.17	8.02	0.72	0	<0.01	13.05
Total Acres	28.82	41.58	19.34	5.04	4.37	<0.01	99.2

Part B

Functional Category	Access Road	Gravel Mine	Gravel Pad	Mine Berm	Mine Road	Pipeline VSMs	Total Acres
I	10.26	0	0	<0.01	0	0	10.26
II	7.81	39.41	11.32	4.32	1.57	<0.01	64.42
III	10.75	2.17	8.02	0.72	2.80	<0.01	24.47
IV	0	0	0	0	0	0	0
Total Acres	28.82	41.58	19.34	5.04	4.37	<0.01	99.2

NOTE: All units in acres.

5.6.2. Birds

Construction of the Mustang Development Project will result in the potential loss of nesting and feeding habitat for birds. Project infrastructure development could result in 1) temporary or permanent habitat loss; 2) various types of disturbance that could result in displacement from foraging, nesting or brood-rearing habitats; 3) increased predation pressure from predators attracted to areas of human activity; and 4) mortality resulting from collisions with vehicles or structures, or exposure to contaminants, including oil spills (USDOI and BLM 2005).

Petroleum spills present the greatest potential risks to birds during construction and operations. Oil is toxic to birds when ingested and coats their feathers upon contact, which can lead to hypothermia and death. BRPC will minimize the potential for oil spills and thus impacts on birds through training and preventative actions outlined in their C-Plan.

5.6.3. Mammals

All of the land and water directly impacted by gravel fill contains wildlife habitat and use areas. The project footprint contains a fraction of habitat available for terrestrial mammal use on the North Slope. Terrestrial mammals that may occur in the project area include caribou (*Rangifer tarandus*), muskoxen (*Ovibos moschatus*), grizzly bear (*Ursus arctos*), and arctic fox (*Alopex lagopus*). These species have the greatest potential of being affected by the Mustang Development Project. Potential consequences for polar bear, a marine mammal, are addressed in the Threatened and Endangered Species Section.

5.6.3.1. Caribou

Caribou are likely to be present in the project area and are subject to disturbance by drilling, vehicle traffic, aircraft, and human activity. In most cases, these activities are expected to cause short-term minor displacement and/or disturbance. Camps and drilling activity can cause localized disturbance and/or displacement for several weeks to months. Traffic on gravel roads would traverse caribou calving and summer areas. Impacts to wildlife include loss or damage of habitat and altered patterns of habitat use (e.g., noise and traffic disturbance).

Construction and operation noise may displace caribou from coastal insect-relief habitats. Displacement of caribou from these insect-relief habitats is not expected to be protracted. Based on the intensity and duration of the construction activities proposed, population-level impacts are also not anticipated.

Many caribou in the vicinity of the North Slope oil fields are habituated to typical construction traffic levels, and wandering caribou crossing the road may cause traffic delays. Collision mortality may increase with increasing traffic, but overall mortality would remain low without affecting population levels.

Construction traffic along the Spine Road would be heaviest during installation of pad facilities, and oil production. Oil field policies give caribou the right-of-way when crossing roads. Traffic levels of more than 15 vehicles/hour would hinder crossing of the Spine

Road by large groups of caribou, which may exclude them from some coastal insect-relief habitats during the summer (Murphy and Lawhead 2000). Even at the height of oil production traffic is not expected to exceed this threshold.

5.6.3.2. Muskoxen

Muskoxen are not present in the MDP area during winter; therefore, they will not be affected by development. In summer, however, construction has the potential to disturb muskox movements and cause an increase in collision mortality from increased traffic on the Spine Road. This will be mitigated through traffic speed adaption during the summer season. Muskoxen are seldom observed in the project area; therefore, very few individuals would be affected, and no population-level impacts are anticipated.

5.6.3.3. Other Mammals

Although disturbances of terrestrial mammals are expected to be minimal, grizzly bears, and foxes could be attracted to construction areas in search of food. Proper solid waste management and disposal of garbage in appropriate dumpsters, along with restrictions on feeding wildlife, will minimize human/wildlife interactions during construction of the project.

Other species such as arctic ground squirrels (*Spermophilus parryii*) and arctic fox could experience increased mortality with increased traffic.

BRPC will develop actions to reduce potential conflicts with terrestrial wildlife. These measures may include site layout and facility design to enhance visibility to reduce potential bear hiding places, providing wildlife awareness training to employees, and adherence to proper food waste disposal practices.

Since mammals are mobile and operations are seasonal and affect only a very small proportion of available summer habitat, no lasting adverse impacts to mammals, including furbearers and microtines are expected from winter construction or summer operations.

5.6.4. Fish

Fish habitat use of the Miluveach River, area lakes and ponds, and the Colville Delta were considered in evaluating the potential environmental consequences of the proposed project. Other surface waters in the project area including shallow lakes and ponds, freeze to the bottom by late winter. These water bodies are not considered fish overwintering habitats.

The ice road alignment was designed to avoid potential overwintering fish habitat. BRPC will route ice roads so that the number of watercourse crossings are minimal. At the time of construction the majority of waterways will be dry or frozen to the bed; ice roads constructed over these shallow bodies will not affect overwintering fish.

Oil entering the Miluveach River (tributary of the Colville River) has the greatest potential to affect fish species. Oil entering this river system could affect fish at various life stages through exposure to hydrocarbons or ingestion of contaminated prey. Such exposure could lead to mortality, reduced growth, or lower reproductive success. Indirect effects, including decreases in food supply and disruption in population dynamics, may result in declining prey and predator populations.

In winter, the only expected impacts to fish will be possible short-term, temporary stress from water withdrawal. Applicable mesh opening size screens will be used during water withdrawal from approved local water sources to prevent fish from being sucked into hose inlets. Ice roads will melt in the summer and would not interfere with fish migration. A Title 16 permit (Fish Habitat) for both water withdrawal from fish bearing lakes and for fish stream crossings will be obtained from ADF&G prior to ice road construction.

5.7. Threatened and Endangered Species

Three species listed as threatened under the ESA occur on the ACP. These species include the Steller's eider (*Polysticta stelleri*), spectacled eider (*Somateria fischeri*), and polar bear (*Ursus maritimus*). These species are discussed below.

BRPC is preparing Biological Assessments (BA) for Spectacled Eider and polar bear to assist the USFW in its ESA consultation process. Steller's eider are not likely to be encountered in the project area and so will be omitted from the BA analyses.

5.7.1. Steller's Eider

The preponderance of the Steller's eiders breeding population in Alaska, nest on the Arctic Coastal Plain (ACP) primarily in the Barrow area (Quakenbush et al. 2002). Aerial surveys conducted within the last two decades confirm current breeding distributions (e.g., Larned et al. 2011, Safine 2011, and Obritschkewitsch and Ritchie 2011). The historic breeding range of the Alaska-nesting population of Steller's eiders encompassed the ACP from Wainwright to Demarcation Point and the coastline of the Yukon-Kuskokwim Delta (Gabrielson and Lincoln 1959, Kertell 1991, Quakenbush and Cochrane 1993, Flint and Herzog 1999, Quakenbush and Suydam 1999). Formerly common breeders on the Y-K delta, Steller's eiders have experienced dramatic and continued decline in numbers (Quakenbush et al. 2002).

No recent sightings have been reported east of the Sagavanirktok River and only a few sightings have occurred between the Colville and Sagavanirktok Rivers (Quakenbush et al. 2002). With the exception of a single inland sighting near the Colville River, nesting observations have not been reported east of Cape Halkett (Quakenbush et al. 2002). The extent to which Steller's eiders use offshore, Beaufort Sea habitat is unknown.

Annual indicated breeding-pair surveys conducted by the USFWS on the North Slope disclose an average density estimate of 0.0025 birds / km2 for surveys between 1992 – 2006 and 2007 – 2010, approximately 6 times lower than that found in the Barrow area (Larned et al. 2011). Fluctuations and or shifts in annual distributions, coupled with aerial survey detectability difficulties, obfuscate density estimates for the Alaskan Steller's eider population (Obritschkewitsch and Ritchie 2009). Larned et al. (2011) did not observe Steller's eiders near the proposed MDP area during their eider surveys in

2010There have been no recent reports of Steller's eider in the vicinity of the Mustang Development Project. The project is not expected to have any impact on Steller's eiders.

5.7.2. Spectacled Eider

Generally, spectacled eider densities decrease from west to east across the ACP, although localized areas of higher density occur near the Colville River and Prudhoe Bay (Larned et al. 2006, Figure 17). The MDP is located within the eastern portion of the ACP spectacled eider range. The Kuparuk River Unit, the closest developed project site to the MDP has been monitored for avian species from 1988- 1999 and again from 2000-2009. Spectacled eiders were monitored for distribution, abundance and productivity. Nine spectacled nests were located in the Kuparuk River unit in 2009, a mean of 11.2 nests annually between1993 and 2009 (Stickney et al. 2010).

Spectacled eider habitat includes tundra rich in lakes and wet polygonized coastal plains with numerous waterbodies and large river deltas (Dementev and Gladkov 1952, Kistchinski and Flint 1974, Warnock and Troy 1992). Nesting birds are mostly observed near flooded, vegetated shallow *Arctophilla* and *Carex* ponds with low ridges suitable for nest construction (Warnock and Troy 1992, Anderson and Cooper 1994, Anderson et al. 1995). Complex shorelines and small islands are characteristic as preferred nesting habitat (Larned and Balogh 1997). Spectacled eider nests have been found near polygon ponds, polygon series and polygon series complexes within 1m of the edge of the waterbody in the Colville River delta (Bart and Earnst, 2005). In the Kuparuk oil field, nests were observed in basin wetland complexes, and aquatic emergent vegetation (both aquatic grass and aquatic sedge) (Anderson et al. 2003). Nests have also been found along the tops of elevated perimeters on permanent water polygons containing emergent sedge or grass (Rothe et al. 1983, North 1990), and on the edges of deep open lakes (Bergman et al. 1977, Derksen et al. 1981).

The Mustang Development Project is scheduled to be developed during the winter when eiders are absent. Noise and activity disturbances continuing into the spring nesting season will have minimal effects on spectacled eiders. Construction activities may displace male and female eiders with broods during the post breeding period. These temporary impacts should be minimal due to the large amount of similar habitat in the surrounding area and the low density of this species. Furthermore, few spectacled eiders are expected to be present in the Mustang Development Project area. BRPC will coordinate with the USFWS if new eider nests or sightings occur.

5.7.3. Polar Bear

The polar bear was listed as a threatened species under the ESA May 15, 2008 (73 FR 28212 - 28303). Polar bear denning takes place during November and December, and continues through until the end of April. Project activities are not planned to commence before January, 2013, when female polar bears in reproductive condition will have already selected den sites. At the beginning of the project, polar bears could be disturbed by construction noise and other development activities if their dens are located in the immediate MDP vicinity. Newborn polar bears are among the most undeveloped of placental mammals; undisturbed maternal dens are critical in protecting them from the rigors of the Arctic winter for the first two months of life (Blix and Lentfer 1979, Amstrup 2003, Durner et al. 2006). Disturbance of maternity dens could result in den abandonment and death of cubs. Ice and gravel road construction, as well as pad construction, could disturb polar bears in nearby maternal dens. Food and associated odors could attract polar bears during winter construction, which could result in conflicts with bears. Current North Slope practices are designed to minimize or eliminate the potential for polar bear attraction and encounters in developed areas. These practices include proper waste management and reducing noise disturbance through BAT. Detailed species information will be discussed in the Polar Bear LOA to the USFWS. Impacts from ice roads on potential denning polar bears will be mitigated through requirements and stipulations contained in the USFWS Letter of Authorization (LOA).

5.8. Human Environment

5.8.1. Cultural Resources

Impacts to known cultural resources are not expected from the proposed project. NSB cultural resource management policies and codes require that any discovered cultural or paleontological resource not be disturbed and the NSB Iñupiat History, Language and Culture Commission be promptly notified. BRPC is committed to protecting cultural resources in the area and will adhere to any and all regulations concerning known and newly discovered resources. As noted in Section 4.6.1, cultural and archeological surveys will be conducted in the Mustang project area to assure that cultural or archaeological sites are not impacted by the proposed project construction or operation.

5.8.2. Impacts to Communities / Land Status

Communities and lifestyles in the Mustang area should not be affected by the development of the project. Workers would have a negligible effect on the cultural aspects of the communities and Native Alaskan population. Workers involved in construction and operations will be housed in existing facilities in Deadhorse. Drilling rig workers will be housed in a camp located on the Mustang pad. Overall impacts of the project to the surrounding communities would be insignificant.

5.8.3. Impacts to Government Institutions

Development of the Mustang Development Project should enhance revenues to federal, state and local (NSB) governmental economies. These revenues would consist of royalties and tax payments, and would be based on gross income from the project (royalties), capital investment (ad valorem tax), and net income (federal income tax). Any new revenues generated from implementation of the project would directly and indirectly contribute to provision of the wide variety of NSB services and facilities for nearby communities.

5.8.4. Impacts to the Economy

The MDP would increase market and cash economies of the region. Positive employment opportunities, royalties and taxes, and land lease payments would increase in value. Indirect inputs from ancillary/support goods and services will also create market or cash economy benefits within the NSB.

New employment and income opportunities would create a positive impact to the NSB economy. Availability of personnel, types of skills required, contractor hiring policies, season, and many other factors will affect those opportunities and actual work force numbers.

5.8.5. Subsistence

The community of Nuiqsut conducts subsistence harvest activities in the vicinity of the Mustang Development Project. Existing subsistence harvest data for Nuiqsut has been collected in multiple time periods: ADF&G (1986), Pedersen (1979 and 1986) and SRB&A (2003 and 2010). Pedersen's lifetime use areas (pre-1979) indicate that Nuiqsut residents utilize a large area centered on the community to harvest subsistence resources. Reported use areas extend offshore approximately 15 miles, as far east as Camden Bay, south along the Itkillik River, and west as far as Teshekpuk Lake. Subsequent use area data (SRB&A 2010) shows Nuiqsut residents traveling a progressively larger area for subsistence purposes, beyond Atqasuk to the west, offshore more than 60 miles northeast of Cross Island, overland to Cape Halkett and Barrow in the north, to Camden Bay in the east, and beyond the Colville River to the south. The majority of Nuiqsut use areas from 1995-2006 are concentrated around the Colville River, overland areas southwest of the community, offshore areas north of the Colville River delta, and northeast of Cross Island. Pederson (1986) and SRB&A (2003) show Nuiqsut use areas extending as far as Kaktovik to the east and along the Anaktuvuk River as far as Anaktuvuk Pass to the south.

Oil and gas development on the North Slope has caused subsistence users to feel constrained by facilities and construction areas when harvesting subsistence resources. They question the health of those resources and tend to harvest resources at least 5 miles from areas of development. This requires a greater effort from the subsistence users to locate, access, and harvest sufficient quantities of these resources. This could increase their costs in terms of fuel, time, equipment wear, and health (USDOI and BLM 2005).

With regard to polar bears, subsistence use area information is documented only for the 1973 to 1986 time period. Polar bear subsistence use was documented in the Colville River delta and offshore areas extending east to Cross and Tigvariak Islands (Pedersen 1986). Nuiqsut residents report typically low to medium levels of subsistence activity for polar bear in the period September through March, and no to very low subsistence activity for polar bear April through August (Impact Assessment Inc., 1990a; Research Foundation of the State University of New York, 1984).

BPRC employees and contractors would follow wildlife non-interference policies as listed in the North Slope Environmental Field Handbook. These policies are designed to protect subsistence resources such as caribou. BRPC activities will not reduce subsistence resources or interfere with local residents' ability to access subsistence resources.

5.8.6. Environmental Justice

Health, environmental, or socioeconomic effects on minority and/or low-income populations in the NSB will be not disproportionately high. Oil resource development is a well-established land use practice in the NSB, and any actual impacts would not be selectively imposed on any specific segment of the population. The Mustang Development Project has been designed to reduce the magnitude of actual health, environmental, or socioeconomic impacts through BMPs, BAT, and mitigation efforts. The project will also undergo various approvals and permitting processes of the regulatory framework, which serve to protect the low income and minority groups. This process allows residents to review, comment, and raise concerns about the proposed project, and gives BRPC the opportunity to address and mitigate those concerns.

5.9. Oil Spill Impact Assessment

The Mustang Development Project will add new oil wells and associated operations to the North Slope region and consequently increase the risk of oil spills. The MDP facilities will lie within wetland areas and near waterbodies risking accidental releases of hydrocarbons. These risks are not anticipated to be of any greater significance than those already analyzed for other projects on the North Slope.

BRPC will use engineering controls to reduce the potential for oil releases. BRPC is developing an ODPCP that consists of site-specific Mustang Development Project scenarios. The plan identifies the equipment, strategies, and personnel that would be necessary to respond to these scenarios. The ODPCP provides personnel safety strategies during drilling operations, prevention plans, and plans for the response to a hydrocarbon release or other type of fluid spill. It details ways to minimize potential environmental impacts, and describes spill planning guidelines necessary to implement an effective and efficient spill response. The ODPCP includes an inventory of the equipment that will be available onsite, as well as other equipment available through ACS.

BRPC will mitigate the potential for small spills of gasoline, diesel fuel, and hydraulic fluids from construction equipment by ensuring that all personnel are properly trained and that best management practices (BMPs) are followed. Specific locations will be designated for fueling operations using BMPs.

5.9.1. Hydrology, Geology, Geomorphology

The topography is distinguished by level to gently rolling tundra. Surface hydrology is characterized by numerous shallow lakes and ponds, the Miluveach River, and a few small intermittent creeks. The project area is within the zone of continuous permafrost. Oil released within the project area would primarily collect in small depressions, ponds and lakes within the tundra.

5.9.2. Water Quality

No matter the magnitude of the spill, oil released in moving water is expected to cause exceedance of Alaska Water Quality Standards (AWQS) temporarily. Oil sheen, total aqueous hydrocarbons, and total aromatic hydrocarbons in the water would decline below AWQS in a matter of days. Where un-recovered oil enters marshes, shorelines, and river eddies, the oil concentration would remain elevated for a longer time. Water quality will return to pre-spill conditions as the oil is recovered or becomes subject to bacterial degradation, evaporation and photo-oxidation.

5.9.3. Air Quality

Air quality impacts from any oil releases would vary according to the magnitude of the release. The primary sources of pollutants would be from oil vapors and exhaust emissions. Organic vapors from the oil would rapidly disperse into the air after the release. If wind conditions are calm, impacts from equipment emissions and volatile gases would remain temporarily localized near the spill site. In-situ burning of released oil would also add to a temporary degradation of air quality. If in-situ burning was used to remove oil, the work would adhere to the "In-Situ Burning Guidelines for Alaska," found in the *Federal/State Preparedness Plan for Response to Oil and Hazardous Substance Discharges/Releases (the Unified Plan)*. In-situ burning would also follow the conditions of approval necessary from both the state and the federal On-Scene Coordinators. The guidelines ensure that the public health is protected and that the public is not exposed to soot (e.g., PM10) and other smoke products exceeding the NAAQS.

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6. CONSULTATION AND COORDINATION

The consultation and coordination process among regulatory agencies, local government, and BRPC has been initiated. The purpose of these consultations is to obtain comments and input on potential development alternatives, provide project progress updates, and clarify regulatory requirements. Additionally, stakeholders will be able to submit comments on the proposed action through the public notice process as part of the permit application and review. This section summarizes the on-going consultation and coordination process for the proposed action.

6.1. Agency and Stakeholder Meetings and Consultations

The following provides meeting dates, locations, and agencies met by BRPC:

- NSB, Planning and Community Affairs Department, Anchorage
- NSB, Planning and Community Affairs Department, Barrow
- NSB, Planning Commission, Barrow
- USACE, Anchorage, May 14, 2012.
- USFWS, Fairbanks, May 21, 2012; May 29, 2012; June 1, 2012; June 28, 2012.
- ADNR, Division of Land, Mining and Water and ADF&G, Fairbanks
- Multi-agency (federal, state and NSB) sponsored by ADNR, Division of Coastal and Ocean Management (DCOM) Anchorage
- ADNR, Division of Coastal and Ocean Management
- ADNR, Division of Oil and Gas
- State Pipeline Coordinator's Office
- EPA, July 26, 2011
- USACE, November 2011

In addition to the above agencies, BRPC consulted with the following organizations regarding the proposed Mustang Project:

- Inupiat Community of the Arctic Slope
- Village of Nuiqsut

6.2. Status of Key Regulatory Review and Permit Applications

A permit package containing all required permit applications and authorizations is submitted along with this ER to the regulatory agencies. Table 6-1 details the permits and authorizations required for the Mustang project.

BRPC has also applied for a rezoning of the proposed Mustang Unit to Resource Development District to the NSB. That application includes a Master Plan and an analysis of conformance with the NSB Title 19 Land Management Regulation policies.

The State of Alaska Department of Natural Resources, division of Coastal and Ocean Management was dissolved on July 1, 2011 with the sunset of the Alaska Coastal

Management Program (ACMP). Funding was not renewed by the Alaska State Legislature and the ACMP ceased to operate on July 1, 2011. Without a program in place, federal agencies need not consult state or local officials on questions of coastal development. Submission of a Coastal Project Questionnaire (CPQ) is currently not required for the permitting of the MDP.

6.3. Site Visits

BRPC and OASIS Environmental, Inc. (OASIS) conducted a site visit to the project area in August 2011 for an assessment of wetland baseline conditions.

TABLE 6-1: PERMITS AND APPROVALS REQUIRED FOR MUSTANG DEVELOPMENT

AGENCY	PERMIT/APPROVAL	SCOPE AND JURISDICTION
FEDERAL		
U.S. Army Corps of Engineers	Section 404	Fill in wetlands (waters of the U.S.) including pads, road and mine site
U.S. Environmental Protection Agency	North Slope General NPDES Permit (Notice of Intent and supporting documents)	Wastewater discharges from camp facilities and dewatering mine site
	Spill Prevention, Control and Countermeasures (SPCC) Plan	Fuel storage and handling
U.S. Fish and Wildlife Service	Polar Bear Letter of Authorization (LOA)	Incidental disturbance of polar bears (construction and operations)
	Endangered Species Act Section 7 Consultation (related to federal permit processes)	Project activities that may affect threatened and endangered species (e.g., spectacled eiders, polar bears) – wetlands fill and disturbance
	Essential Fish Habitat (review process)	Project activities that may affect fish habitat (e.g., mine site development and construction in fish-bearing waters)
STATE		
Alaska Department of Environmental Conservation, Division of Spill Prevention and Response	Oil Discharge Prevention and Contingency Plan	Spill prevention, response and cleanup measures related to drilling, storage, production and transportation
Alaska Department of Environmental Conservation, Division of Air Quality	Air Quality Control Minor/Major Permit; Title V Air Quality Control Operating Permit Air Quality Control Minor General Permit (MG1)	Air emission sources – process facilities, drilling and related air impacts (e.g., dust) Drilling operations
Alaska Department of Environmental Conservation, Division of Environmental Health	Temporary Storage of Drilling Waste	Drilling waste storage facility at production and drilling pad (design review)
Alaska Department of Environmental Conservation, Division of Water	Section 401 Water Quality Certification	Section 404 discharges (fill materials) – pads, road

AGENCY	PERMIT/APPROVAL	SCOPE AND JURISDICTION
Alaska Department of Natural Resources, Division of Oil and Gas	Lease/Unit Plan of Operations	Surface use to support subsurface development on lease/unit (facilities and activities) – construction and production
Alaska Department of Natural Resources, Division of Oil and Gas	Right-of-Way Easements (Title 38.05)	Surface use for new MDP access road, and use of existing roads
Alaska Department of Natural Resources, Division of Mining, Land and Water	Land Use Permits	Project surface use and activities outside the lease/unit
	Temporary Water Use	Water extraction from lakes, ponds, rivers
	Material Sales Contract	Gravel extraction from state-owned lands and mine site rehabilitation
Alaska Department of Fish and Game	Title 16 Fish Habitat Permit	Activities and construction in fish bearing waters (rivers, lakes, etc.) including drainage structures, water extraction, and gravel mine dewatering and mine site rehabilitation
Alaska Department of Natural Resources, State Historic Preservation Office	Section 106 Clearance	Project construction activities that may affect archeological, historical, and cultural resources
Alaska Oil and Gas Conservation Commission	Permits to Drill Annular Disposal Area Injection Order	Production, enhanced oil recovery, and disposal wells (Class II)
LOCAL		
North Slope Borough	Rezone Development Permit(s)	Surface use activities within the North Slope Borough including construction, drilling, and production activities

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APPENDIX A

List of Bird Species That May Occur Within the Project Area

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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*)
Gyrfalcon (*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 alpine*)
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 hammondii*)
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 B

List of Terrestrial Mammal Species That May Occur Within the Project Area

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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*)

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APPENDIX C

List of Fish Species That May Occur Within the Project Area

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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 (*Gasterasteus aculeatus*)
Alaska Blackfish (*Dallia pectoralis*)
Arctic Grayling (*Thymallus arcticus*)
Arctic Lamprey (*Lampetra japonica*)
Pacific Herring (*Clupea pallasi*)
Least Cisco (*Coregonus sardinella*)
Arctic Cisco (*Coregonus autumnalis*)
Round whitefish (*Prosopium cylindraceum*)
Broad whitefish (*Coregonus nasus*)
Humpback whitefish (*Coregonus pid*schian)
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)

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